ENVIRONMENTAL MANAGEMENT PROGRAMME

~~FINAL~~ ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR) FOR THE PROPOSED GAS TO POWER VIA POWERSHIP PROJECT AT THE PORT OF RICHARDS BAY AND ASSOCIATED EVACUATION ROUTE WITHIN UMHLATHUZE LOCAL MUNICIPALITY, KING CETSHWAYO DISTRICT, KWAZULU-NATAL

DFFE REF NO: 14/12/16/3/3/2/2007

A Project for Karpowership SA (PTY) Ltd

16 May 2023

KARPOWERSHIP

triplo4 sustainable solutions

STATEMENT OF TRIPLO4 INDEPENDENCE

Neither Triplo4 nor any of the authors of this Report have any material present or contingent interest in the outcome of this Report, nor do they have any pecuniary or other interest that could be reasonably regarded as being capable of affecting their independence or that of Triplo4.

Triplo4 has no beneficial interest in the outcome of the assessment which is capable of affecting its independence.

DISCLAIMER

This report has been prepared by Triplo4 Sustainable Solutions (Pty) Ltd (Triplo4) based on information provided by the client and others that is presumed to be correct and professional assessments and opinions that are presumed to be honestly and professionally provided. Triplo4 does not accept any liability for any loss or damage whatsoever, whether direct, indirect or consequential that may result to any person from any advice, opinion, information, representation or omission, whether negligent or otherwise, contained in this report, including the use and interpretation of this report by the client, its representative agents, any government authority or any other third parties.

AMENDMENTS FROM 2022 EMPR

Clarification note: upon completion of the PPP in December 2022, any added text to the 2022 final EMPr was marked in **blue text**. The 2022 final EMP report was used as the basis of this revised draft EMPr, and any further additions are marked in **underlined blue text**. This will assist the readers in identifying the changes made to the report since the previous draft EMPr that was made available for public review and comments in November-December 2022.

DOCUMENT DESCRIPTION

Client / Applicant:	Karpowership SA (Pty) Ltd
Report name: via	~~Final~~ Environmental Management Programme (EMPr) for the Gas to Power Powership, Port of Richards Bay, KZN
Report type:	~~Final~~ Environmental Management Programme
Project name:	Gas to Power via Powership at Port of Richards Bay
Project number:	E-BL01.200446
Authority Reference:	DFFE REF NO: 14/12/16/3/3/2/2007
Version:	Draft V2

Compiled and Authorised by Triplo4:

Compiled By:	Date	Signature
Chen Read (*Reg. EAP (EAPASA)*) *Senior Sustainability Consultant*	16 May 2023 / Ballito	
Reviewed By:	**Date**	**Signature**
Shanice Singh (*Reg. EAP (EAPASA)*) *Sustainability Consultant*	16 May 2023 / Ballito	
Authorised By:	**Date**	**Signature**
Hantie Plomp (*Pri.Sci.Nat | Reg. EAP (EAPASA)*) *Managing Director*	16 May 2023 / Ballito	

The applicant affirms that he will abide and comply with the prescribed impact management outcomes and impact management actions as stipulated in the EMPr and have the understanding that the impact management outcomes and impact management actions are legally binding.

Client	Date	Signature
Mehmet Katmer *Karpowership*	16 May 2023 / Gauteng	

COMPILED FOR:
Karpowership SA (Pty) Ltd

COMPILED BY:
Triplo4 Sustainable Solutions (Pty) Ltd
Address: Suite 5, The Circle, Douglas Crowe Drive, Ballito, 4420
Telephone: +27 (0)32 946 3213
Facsimile: +27 (0)32 946 0826
Email: info@triplo4.com
www.triplo4.com

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES

GLOSSARY OF TERMS

Alien invasive species
A plant or animal that is a listed invasive species in terms of Section 70 of National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA); or a weed or invader plant listed under the Conservation of Agricultural Resources Act 43 of 1983.

Bunding
An impervious containment system for potential spillages from tanks / containers stored on site. The bunded area shall have a capacity greater than 110% of the total tankage contained. The bunding shall be constructed of a material impermeable and resistant to the stored material.

Clearing
The clearing and removal of vegetation, whether partially or in whole, including trees and shrubs, as specified.

Contract
The written agreement between the Contractor and the Project Developer for any construction activities required for the Project.

Contractors Camp Area
The area temporarily allocated for the establishment of equipment, repair area, ablution facilities, lie down and rest areas, etc. for the construction period. It also serves as the central point for the storage of fuel, construction materials and contractor offices.

Contractor
Persons or companies appointed by the Project Developer to undertake the construction of the Project.

Environmental Authorisation
Environmental Authorisation obtained in terms of the National Environmental Management Act 107 of 1998 (NEMA) and the associated EIA Regulations 2014 (as amended).

Environmental Control Officer (ECO)
Individual appointed by the Project Developer responsible for monitoring compliance with the implementation of the Environmental Authorisation and the EMPr, ensuring liaison between the Project Developer, the Contractor and relevant authorities and reporting on the verified compliance with the EMPr.

Environmental Site Officer (ESO)
An environmentally knowledgeable or qualified person nominated by the Contractor to assist with and monitor the day-to-day implementation of the EMPr on site.

Environment
The surroundings within which humans exist and that are made up of the land, water and atmosphere of the earth; micro-organisms, plant and animal life; any part or combination thereof and the interrelationships among and between them; and the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing;

Environmental Aspect
An environmental aspect is any component of the construction activity that is likely to interact with and on the environment.

Environmental Audit
An audit conducted at intervals specified in the Environmental Authorisation by an independent person with the relevant environmental auditing expertise as required by Regulation 34 of the EIA Regulations, 2014 to determine compliance with the conditions of the Environmental Authorisation and the EMPr.

Environmental Impact
An environmental impact is the change to the environment, whether desirable or undesirable, that will result from the effect of an activity. An impact may be the direct or indirect consequence of an activity.

Environmental Specifications
Instructions and guidelines for specific activities designed to help prevent, reduce and/or control the potential environmental implications of these activities during the operational, construction or decommissioning / closure phases of the facilities.

Environmental Audit Report
The report prepared by an independent person with the relevant environmental auditing expertise containing the findings of the Environmental Audit as set out in Appendix 7 of the EIA Regulations, 2014 and submitted to the Competent Authority within the timeframe specified in the Environmental Authorisation.

Fauna
Any and all animals identified within or outside of the operational or project areas. Animals may not be harmed in any way.

Flora
All species of indigenous plants that are found in a particular region, habitat, or time period within or outside of the operational or project areas.

Hazardous Substance
Any substance that poses a significant risk to health and safety, property or the environment. These substances have been classified under the SABS Code 0228: *'The Identification and Classification of Dangerous Goods and Substances'*. Hazardous substances / materials are those that are potentially: poisonous, flammable, carcinogenic or toxic. Some examples of hazardous substances / materials:

a. diesel, petroleum, oil, bituminous products;
b. cement;
c. chemicals such as solvent based acids, alkalines;
d. lubricants such as oil and greases;
e. pesticides, herbicides; and
f. LP gas.

Hazardous Waste Landfill Site
A waste disposal site that is designed managed and permitted by DWS or the Department of Forestry, Fisheries and the Environment (DFFE) to allow for the disposal of hazardous waste.

Incident
The occurrence of a pollution or degradation event that will have a direct or indirect effect on the environment e.g. surface water, groundwater, soils, ambient air as well as plants, animals and humans. Such an incident may qualify as an incident as defined by Section 30 of NEMA and/or Section 20 of the National Water Act 36 of 1998 (NWA). If it does, the requirements in the respective provisions under these sections apply.

Land owner
The individual, company, entity, Tribal Authority, Local Municipality or District Municipality that legally owns the land.

Method Statements
A written submission by the Contractor to the Project Manager in response to this EMPr or a request by the Project Manager and ECO. The method statement must set out the equipment, materials, labour and method(s) the Contractor proposes using to carry out an activity identified by the Project Manager when requesting the Method Statement. This must be done in such detail that the Project Manager and ECO is able to assess whether the Contractor's proposal is in accordance with this specification and/or will produce results in accordance with this specification.

The method statement must cover as a minimum applicable details with regard to:

a. Construction procedures;
b. Plant, materials and equipment to be used;
c. Transporting the equipment to and from site;
d. How the plant/ material/ equipment will be moved while on site;
e. How and where the plant/ material/ equipment will be stored;
f. The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
g. Timing and location of activities;
h. Compliance/ non-compliance; and
i. Any other information deemed necessary by the Project Manager.

Mitigation measures

Mitigation seeks to address poor or inadequate practices, procedures, systems and/ or management measures by the implementation of preventative and corrective measures to reduce, limit, and eliminate adverse or negative environmental impacts or improve the positive aspects.

No-Go

The No-Go references were removed in order to ensure alignment with DFFE definition.

Project

This refers to the construction activities associated with the Gas to Power Projects as approved in the Environmental Authorisation.

Project Developer

The Karpowership is the Project Developer and holder of the Environmental Approval.

Project Manager (PM)

Representative of the Project Developer, responsible for overall management of the construction phase of the Project. Duties also include the management of all Contractors.

Rehabilitation

Rehabilitation is defined as the return of a disturbed area, feature or structure to a state that approximates to the state (where possible) that it was before disruption, or to an improved state.

Remediation

The management of a contaminated site to prevent, minimise, or mitigate harm to human health or the environment

Servitude

A right which Local Municipality, District Municipality or Port Authority holds over another property for a rite of passage, pipeline or storm water servitude. The servitude is registered against the title deeds and binding on successive owners in perpetuity.

Slope

The inclination of a surface expressed as one unit of rise or fall for so many horizontal units.

Social Environment

Persons and built environment likely to be directly or indirectly affected by construction activities during the Project.

Solid Waste

Means all solid waste, including domestic and office waste (food, paper, plastic), waste from construction and operational activities e.g. empty chemical containers, excess cement/concrete, inert building rubble, packaging, timber, tins and cans.

Spoil material
Excavated material which is unsuitable for use as fill material in the construction works or is material which is surplus to the requirements of the construction works.

Sustainable development / sustainability
The integration of social, economic and environmental factors into planning, implementation and decision-making so as to ensure that development serves present and future generations.

Topsoil
The layer of soil covering the earth which provides a sustainable environment for the germination of seeds, allows water penetration, and is a source of micro-organisms and plant nutrients.

Watercourse
A river or spring; a natural channel or depression in which water flows regularly or intermittently; a wetland, lake or dam into which, or from which, water flows.

Waste
Any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered.

Workforce
The entire project team including people permanently or temporarily employed or contracted by the Project Developer, the Contractor and sub-contractors who are involved in the construction of the Project.

Works
The works to be executed in terms of the Contract.

LIST OF ABBREVIATIONS

BARESG	Birds and Renewable Energy Specialist Group
BOG	Boil Off Gas
CA	Competent Authority
CBA	Critical Biodiversity Areas
DFFE	Department of Forestry, Fisheries and the Environment
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMP	Environment Management Plan
EMPr	Environmental Management Programme
ESO	Environmental Site Officer
FSRU	Floating Storage Regasification Unit
HCS	Hazardous Chemical Substance
I&AP	Interested and Affected Parties
IDP	Integrated Development Plan
IDZ	Industrial Development Zone
IRP	Integrated Resource Plan
ISO	International Organization for Standardization
LNG	Liquefied Natural Gas
LNGC	Liquefied Natural Gas Carrier
MARPOL	The International Convention for the Prevention of Pollution from Ships
MSDS	Material Safety Data Sheets
NEMA	National Environmental Management Act
NEMBA	National Environmental Management: Biodiversity Act
NFEPA	National Freshwater Ecosystem Priority Areas
NGOs	Non-Governmental Organization
NPA	National Protected Area
OCIMF	Oil Companies International Marine Forum
PLEM	Pipeline End Manifold
PoS	Plan of Study
RMIPPPP	Risk Mitigation IPP Procurement Programme
SAAELIP	South African Atmospheric Emission Licencing and Inventory Portal.
SAHRA	South African Heritage Resources Agency
SEZ	Special Economic Zone
SDF	Spatial Development Framework
SIGTTO	Society of International Gas Tanker and Terminal Operators
TNPA	Transnet National Ports Authority
UNCLOS	United Nations Convention of the Law of the Sea

1. INTRODUCTION

1.1. PROJECT DESCRIPTION

1.1.1 Overview

The Karpowership Project entails the generation of electricity by two Powerships moored in the Port of Richards Bay, fueled with natural gas supplied from a third ship, a Floating Storage & Regasification Unit (FSRU). The three ships will be moored in the port for the Project's contracted 20-year lifespan (as per the RMI4P requirements-Appendix 7.2). A Liquefied Natural Gas Carrier (LNGC) will deliver Liquefied Natural Gas (LNG) and offload it to the FSRU approximately once every 20 to 30 days, dependent on power demand which is determined by the buyer, ESKOM. The FSRU stores the LNG onboard and turns the liquid form into gaseous form (Natural Gas) upon demand from the Powership (Regasification). Natural gas will be transferred from the FSRU to the Powerships via a subsea gas pipeline. The Project's design capacity is 540MW and the contracted capacity will be 450MW of electricity to be supplied to the national grid, which will be measured at the Point of Utility Connection and cannot be exceeded under the terms of the RMI4P. Electricity will be generated on the two Powerships by 27 reciprocating engines, each having a heat input in excess of 10MW (design capacity of 18.32MW each at full capacity). Heat generated by operation of the reciprocating engines is captured, and that energy is used to create steam to drive three steam turbines that each have a heat input of circa 15.45MW. The engines utilized on the Powerships are designed for maximum efficiency during stop / start scenarios, and can generate megawatts to the grid speedily from start-up and reach full load in less than 10 minutes. The engines are designed to start and stop – at the push of a button – time after time without efficiency loss.

The electricity that is generated is converted by the on-board High Voltage substation and the electricity evacuated via a 132kV transmission line over a distance of approximately 3.6km. The electricity will be evacuated from the Powership to the Impala substation, via a connection point (necessitating a new switching station) in proximity to the existing Bayside Substation, which feeds electricity into the national grid.

There are two alternative transmission line routes from the Powership to the proposed switching station – see Chapter 3 of the EIAr for the assessment of these alternatives.

Refer to the figures below, showing project layouts.

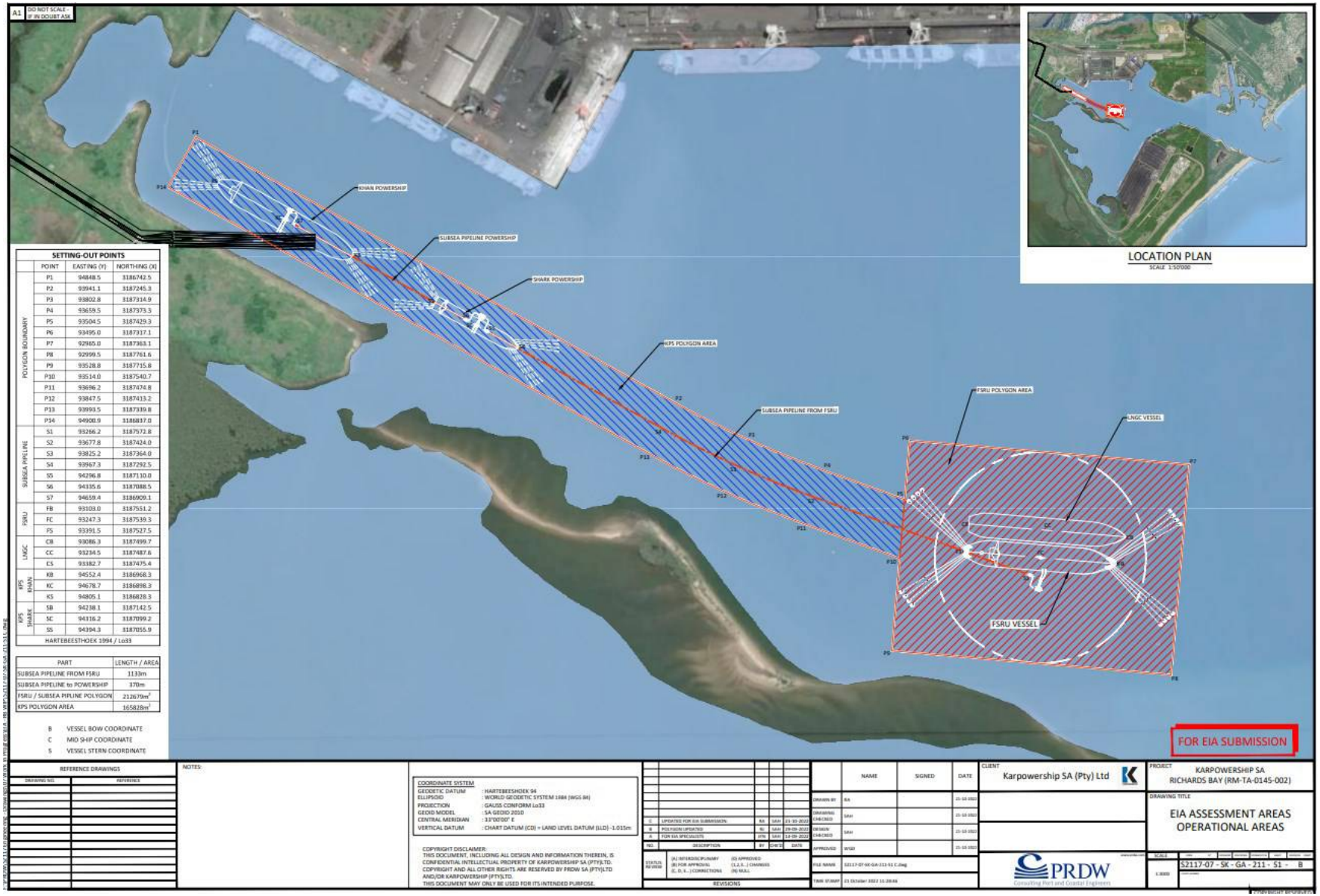


Figure 1-1: Overall Project Layout (Marine)

Figure 1-2: Construction Facilities

Figure 1-3: Construction Facilities inclusive of the Back of Quay Loading Area

Figure 1-4: Overall Project Layout showing alternative corridors routes (Transmission line)

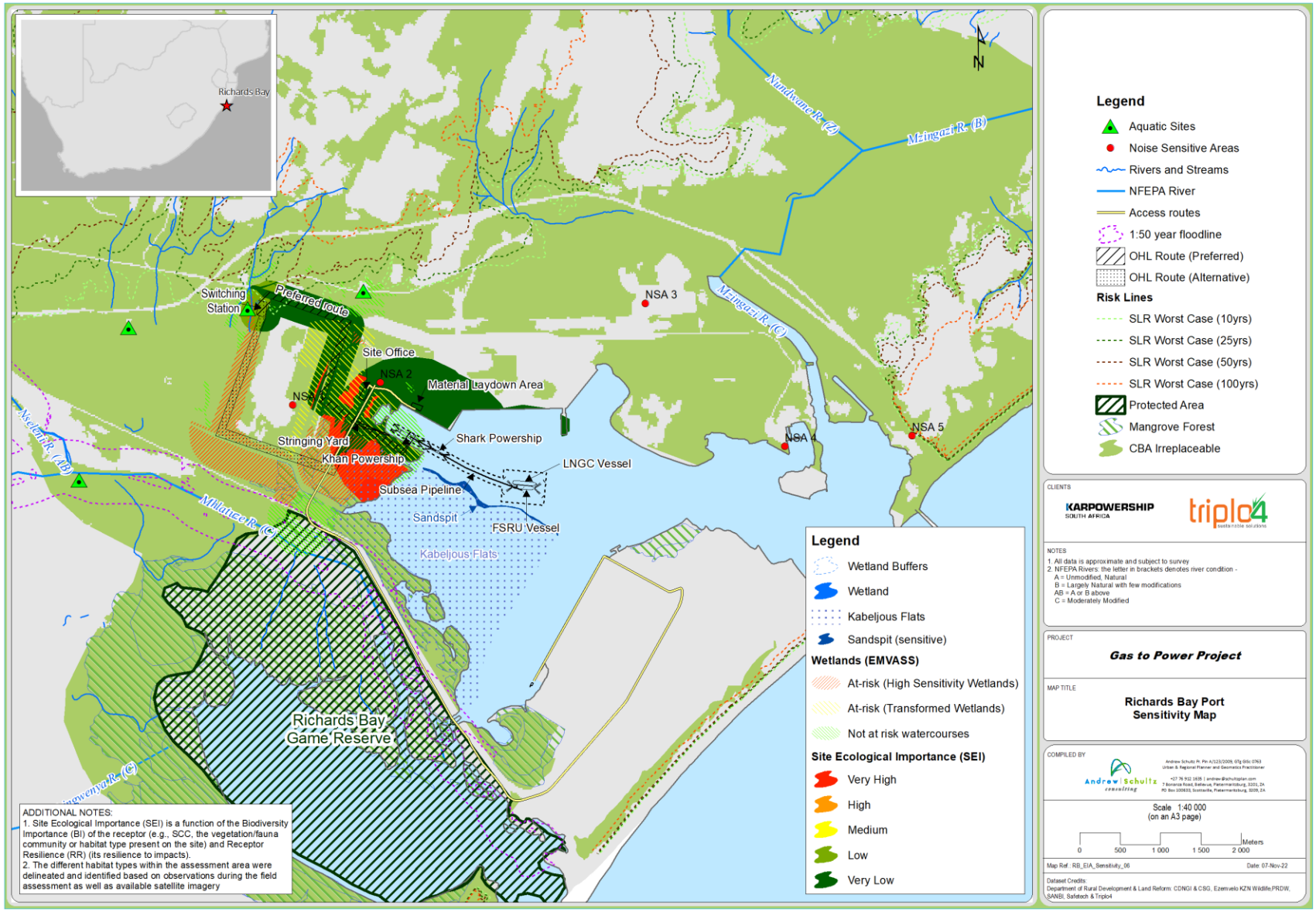
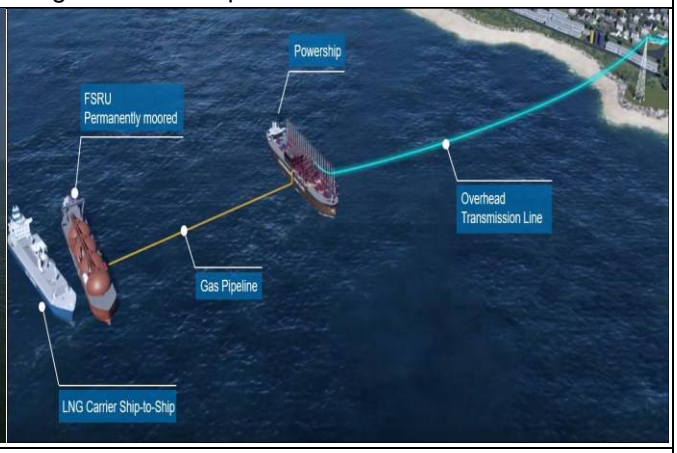


Figure 1-5: Sensitivity Map

Table 1-1: **Images of various Powerships**

<table>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Image 1: Powership – Shark Class</td><td>Image 2: Powership – Khan Class</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Image 3: Floating Storage & Regasification Unit (FSRU)</td><td>Image 4: Project Concept</td></tr>
</table>

The sub-chapters which follow provide details related to the proposed activity, and its various components. Chapter 3, which follows, provides an assessment of the proposed activities, with a focus on alternatives.

1.1.2 Location

The proposed project is situated within the Port of Richards Bay, and in proximity to the Richards Bay Industrial Development Zone (RBIDZ), which was designated Special Economic Zone (SEZ) status in July 2017 in terms of the Special Economic Zones Act 16 of 2014. The Port of Richards Bay, located within Ward 2 of the uMhlathuze Local Municipality, is state-owned and managed by Transnet National Ports Authority (TNPA) in a landlord capacity. The Powerships and FSRU are to be moored in the protected waters within the Port of Richards Bay (Figures 2-1). The transmission line route (2 alternatives) will be installed from the Richards Bay Port to the tie in point to the Eskom line, at a connection point (including a new switching station) in proximity to the existing Bayside Substation, within properties owned by TNPA, uMhlathuze Municipality and South32 Aluminium (Figure 2-2).

Please refer to Chapter 2.3 for further detail on the project location and Chapter 3 for details on the alternatives considered which include two alternative Powership positions, the gas line route associated with each Powership position, alternative transmission line routes, connections and switching station position.

1.1.3 Berthing, Mooring of the Powerships and FSRU

Berthing and mooring will be conducted as per the Ports' approved maintenance plans, procedures and requirements, and ships will be located where adequate depths exist and in acceptable positions to the port operator so as not to impact the safety of marine traffic and other port operations.

The operational requirements at the Port cannot accommodate the use of existing berthing infrastructure, and therefore the vessels will be positioned in unused areas of the Port and will utilise their own mooring system comprising catenary mooring chains and anchors, which are designed to secure the vessels taking into consideration all local conditions. The Khan Class and Shark Class Powerships will use piled anchors. Each Powership will have 16 mooring legs each consisting of a catenary mooring chain connected to an anchor pile with a padeye connector. The anchor piles will be installed using vibro-piling to drive the casing to refusal and then the Reverse Circulation Drilling method (RCD) to drill the pile to depth. The FSRU will be anchored using 16 mooring legs each consisting of a catenary mooring chain connected to a Vertical Load Anchor (VLA) which is dragged by anchor handling tug down to its embedment depth. No marine structures are planned, and the mooring system for the vessels will be heavy chain lying on the seabed attached to anchor piles or vertical load anchors. The vertical load anchors are by design buried during the installation. The intention is to install the anchor piles such they are flush or below the surrounding seabed.

No dredging is envisaged for the mooring locations.

The Sandspit area in the Port has been identified as sensitive and a minimum 170m distance from the water line to the moored vessels is maintained, as shown in figures 1-6 and 1-7 below.

Figure 1-6: Powerships' distance from the sandspit /shore (in meters)

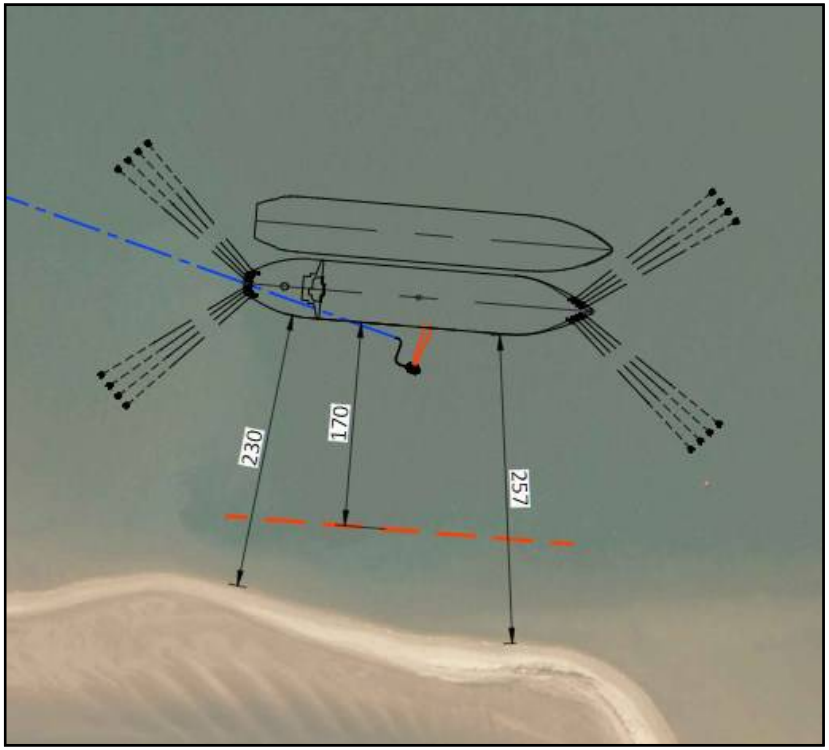


Figure 1-7: FSRU distance from the sandspit (in meters)

1.1.4 Gas Lines

A gas line is required between the FSRU and Powerships to ensure gas supply for power generation.

The FSRU discharges gas via 2no flexible risers to the FSRU pipeline end manifolds (PLEM) on the seabed next to the FSRU. The FSRU PLEM incorporates shutoff valves and pigging connections for maintenance. The gas is then transported from the FSRU PLEM to the Shark class Powership PLEM via a 24" steel pipeline with 50mm concrete weight coating, installed on the seabed. The Shark class Powership PLEM positioned adjacent to the Shark class Powership manifold, incorporates shutoff valves, expansion spools and 2no 12" flexible risers delivering gas to the Shark class Powership manifold flange. The gas supply then continues from the Shark class Powership PLEM to the Khan class Powership PLEM via a 24" steel pipeline with 50mm concrete weight coating, installed on the seabed. The Khan class Powership PLEM positioned adjacent to the Shark class Powership manifold, incorporates shutoff valves, pigging connection, an expansion spool and 2no 12" flexible risers delivering gas to the Khan class Powership manifold.

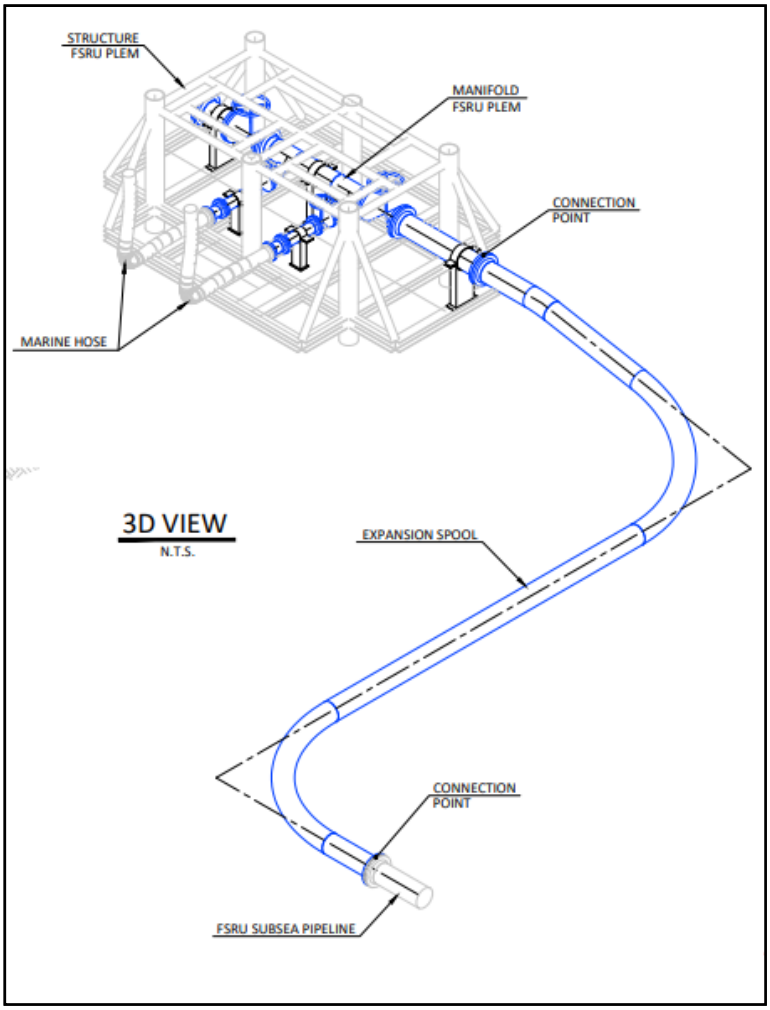


Figure 1-8 Typical PLEM and Tie-in Detail

For the gas pipeline, including the pipeline end manifolds (PLEM), there may need to be minor route rectification works along the subsea pipe route to limit the free span length of any section of the pipeline, over the undulating

seabed. This will comprise flattening high spots or building up support under the pipe at low points. Due to the minor nature of this work, it will likely be undertaken by divers as the pipeline is installed.

The subsea gas pipeline connecting the FSRU to the Powerships will be installed on the seabed

It is anticipated that the subsea pipeline will have a servitude of approximately 50m either side of the pipe centre line.

The recommended routes identified by the EIA process will be included in the commercial agreement to be entered into with Transnet National Port Authority (TNPA). Please refer to Appendix 10. for further details on this technical aspect.

1.1.5 Transmission line

The proposed transmission line will be constructed of either monopole or lattice steel construction based on the final engineering design requirements, the topography and geotechnical survey results. The available space will further influence the specific tower designs. The span lengths between towers will vary. Average spans lengths will be approximately 200m however based on the ground profile shorter spans of less than 100m or larger spans of greater than 300m can be constructed.

There are two potential routes being considered for connection from the Powership to the National Grid, both with the same start and end point:

Alternative 1 - from the start point, the route run towards the existing Harbour arterial road, crossing the road and towards the existing powerline servitude to the west through crossing of an open grassland/scrubland and unchannelled valley bottom wetland, then running along the exiting servitude along Manzamnyama Canal, before heading north and finally in a westerly direction before reaching its end point.

The route offers a shorter route to the end point (Approx. 3.6km, estimated 16 towers) and is in accordance with the proposed 2015 Transnet Evacuation Route

Access for construction and maintenance of the transmission line will be via the existing powerline servitude for the majority of the route, and an additional access / working servitude will be required for the portion of the route between the port and the Manzamnyama Canal, as well as from the start point to the Harbour arterial road.

Alternative 2 - begins at the same start point, the route joins into the harbour arterial road, and before the lower Bhizolo Canal, it cuts west across the lower Manzamnyama Canal, passing through the mangroves, traversing the smelter site, before heading north through mixed mangrove and wetland habitat on the western boundary of this site.

The route is approximately 4km long, requiring 19 towers.

For both alternatives, each tower will cover a maximum footprint of 2.75m by 2.75m for monopoles which will necessitate the clearing of vegetation to allow for these structures to be erected.

Routes options for the transmission lines are presented in the layout alternatives, section 3.2.3 of this report.

1.1.6 Switching Station

The electricity generated on the ship is required to be integrated into the Eskom National grid via a switching station. The location of the switching station is on shore. The switching station is part of the Eskom self-build process and will be built by Karpowership and handed to Eskom for their ownership and operation. The switching station will facilitate the control of the incoming lines from the Powership and the outgoing lines to the existing Impala – Bayside network line.

The switching station will measure approximately 17 898m^2 in size and will comprise of an incoming circuit for the lines from the ship, a busbar system to distribute the electricity and an outgoing circuit for the electricity to Eskom. The switching station further comprises of landing gantries, breakers, isolators, current transformers, voltage transformers and a control room for the monitoring, measurement and control of the power.

1.1.7 Operational Processes and Associated Measures

Powerships are equipped with cutting-edge modular medium speed reciprocating engine technology for generation, enabling reliable supply of electricity with minimal impacts from load profile and number of starts and stops. For all practical purposes, Powerships can maintain the same high efficiency even at partial loads by operation of a subset of the engines at full load and also offer the shortest response times for load variations. This modular technology and built-in redundancy allows that, even if one or more engines are taken off-line for any reason, it is most likely that the Powerships can continue operating and meeting the full contracted capacity requirements. The Powerships themselves have an effective operating lifespan of more than 25 years, more than covering the 20-year PPA provided for under the RMI4P.

Powerships store onboard all key spare parts that may be required to keep the generation running, essentially eliminating the risk of down-time caused by sourcing of necessary parts during the lifespan of a project, either related to routine maintenance or unplanned maintenance that may be required.

Another benefit of Karpowership over land-based solutions is that, in the highly unlikely event that a Powership falls completely out of commission, or if the buyer's requirements change, vessels can be quickly replaced with another suitable Powership from Karpowership's fleet to minimise any disruption to the power delivery.

1.1.7.1 Water Usage

The Powership uses seawater and potable water for cooling the reciprocating engines, condensers and other auxiliaries.

Part of the cooling seawater intake is processed into potable water through a vaporization process for steam generation (on-board water treatment unit) and non-process water consumption. In this way, seawater is primarily used for steam generation, make up water and for domestic use. Water supply for domestic use (cleaning, crew hygiene, etc.) is produced using the on-board water treatment unit whereby seawater is treated via freshwater generators and sea water reverse osmosis systems. Potable water for drinking purposes will be sourced as bottled water from local service providers. The Powerships have onboard sewage treatment units and oily bilge separators to be utilized while sailing, but the vessel will be moored for the duration of the Project and during this term wastewater disposal will be contracted to a licenced local service provider.

The Powership operates a once through cooling system, which abstracts seawater directly for cooling and then discharges it into the sea with no chemicals or other additives used. The total intake/outlet flow rates at 100% load are 8.49 m^3/s. The temperature of the discharged seawater (ΔT) ranges from 10.0 to 15.0°C within the Powerships process water. A smaller footprint of ΔT is achieved when discharging at a depth 8 m below the water surface. The

largest ΔT's are generally found at or near the surface, while the bottom is much less affected by the temperature change due to the buoyancy of the discharge. The thermal plume exceeds the 1°C ΔT guidance by 0.2°C. Nevertheless, the plume's absolute temperature did not exceed any of the biological thresholds assessed by the specialists. The conceptual process flow diagram (PFD) for the project's operational water balance is shown in Figure 2-6 below.

Water supply for domestic use is produced using the onboard water treatment unit. Drinking water for the crew will, where required, be provided by local suppliers. No bulk water supply will be necessary from the uMhlatuze Local Municipality or the King Cetshwayo District Municipality for operations. The Powership also has a sewage treatment unit and oily bilge separator to be utilized while sailing to the Port for installation. During the operational phase, the sewage will be taken off the vessels for treatment by a licensed service provider.

The following volume of water required daily is anticipated:

- 300 litres of drinking water will be required for onboard crew utilisation;
- 20 000 litres for potable water will be required for on-board utilisation;
- 15000 litres technical water for continuous Steam Turbine Generators (STG) operation (5000 litres per STG) (processed from sea water intake); and
- 25-30 litres of water per engine is required.

No chemicals whatsoever, including chlorine, are discharged with the cooling water. No biocides and no other additives are necessary to control bio-fouling in seawater pumping and temperature exchange systems.

Further details are captured in the Water Balance Report, attached as Appendix 9-A5.

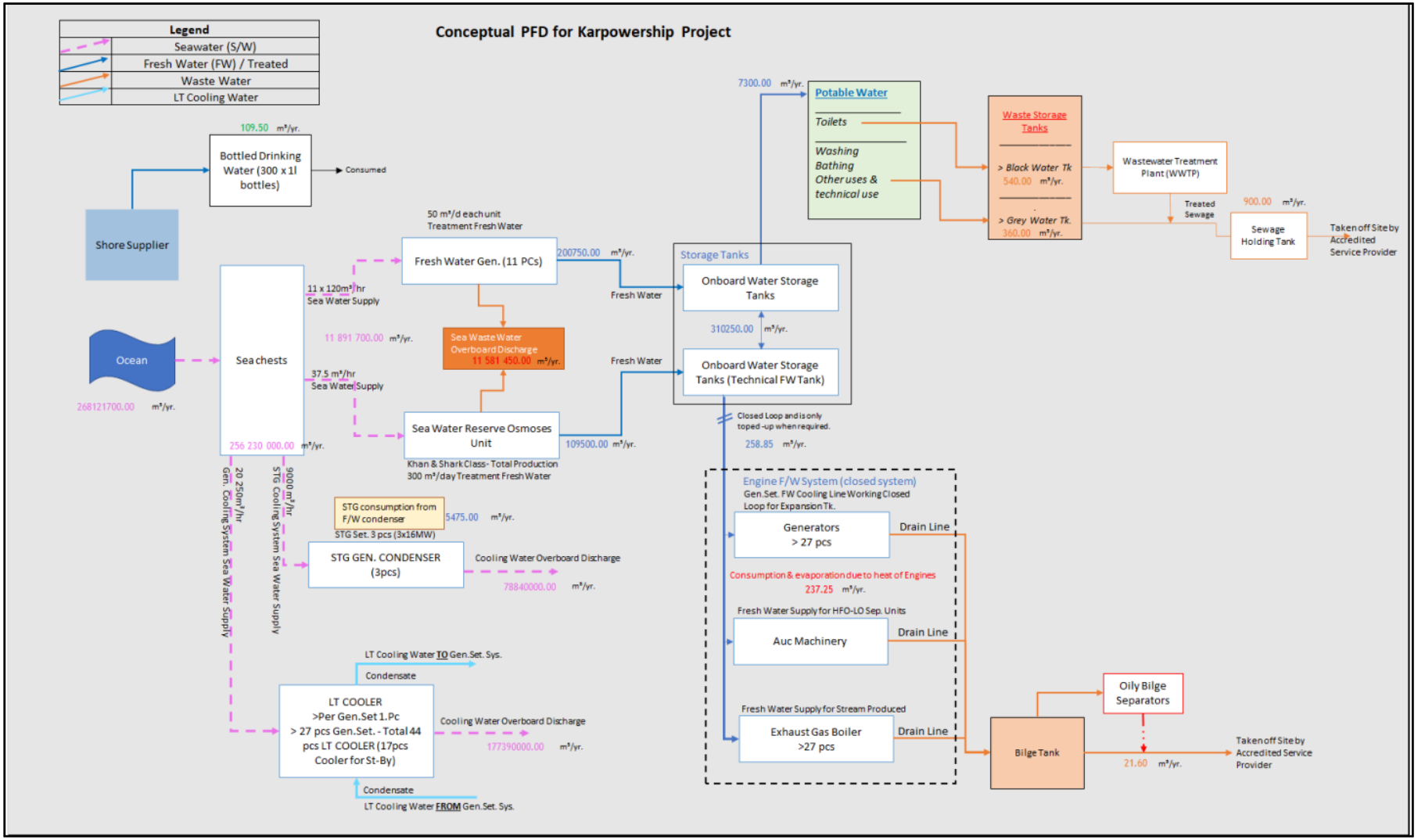


Figure 1-9: Conceptual Process Flow Diagram for the Project's Operational Water Balance

1.1.7.2 Water Temperature

As above, the Powerships will use seawater for cooling the gen-sets and optionally processed for the steam turbine generators and fresh water uses. The total intake/outlet flow rates at 100% load are 8.49 m^3/s. The temperature of the discharged seawater (ΔT) ranges from 10.0 to 15.0°C within the Powerships process water. A smaller footprint of ΔT is achieved when discharging at a depth 8m below the water surface. The largest ΔT's are generally found at or near the surface, while the bottom is much less affected by the temperature change due to the buoyancy of the discharge. The thermal plume exceeds the 1°C ΔT guideline by 0.2°C. Nevertheless, the plume's absolute temperature did not exceed any of the biological thresholds. No chemicals such as chlorine are discharged with the cooling water.

The dispersion of the resulting thermal plume depends on the flow rate, ΔT, discharge geometry, bathymetry, currents, winds and water column stratification.

A calibrated 3D hydrodynamic model was used to predict the extent of the thermal plume generated by the Powerships considered at Port of Richards Bay running at 100% load.

The results show that a smaller footprint of ΔT is achieved when discharging at a deeper depth below the water surface. Discharging at a deeper depth allows the thermal plume to entrain colder sub-surface ambient water as it rises to the surface, reducing the temperature of the plume.

To reduce the risk of recirculation of the discharge back to the intakes, based on recommendations the discharge pipeline running down the vessel hull will have a second elbow to discharge horizontally away from the vessel, and that the discharge pipes be positioned as far from the intakes as possible.

Further details are captured in the Integrated Dispersion Modelling of Thermal Plume Report, attached as Appendix 10.2, and the Marine Ecology Report, attached as Appendix 9-B4.

1.1.7.3 Risk and Possible Explosions

Safety performance is focused on risk and on the safe operation of the vessels as well as the containment of the LNG within the containment systems, including the pipeline. It is important to note that Powerships and FSRUs are operated by global leaders in a highly safety conscious industry, and that international best practices are adhered to at all times with respect to design, operations, procedures and training.

The gas lines between the FSRU and the Powerships are equipped with gas detectors in circuit which will identify any leak, so that the fuel gas can be immediately isolated and shut off, allowing the leak cause to be identified and the necessary repairs or replacements made. However, should there be a minor leakage of LNG, it will disperse quickly and rapidly rise into the atmosphere.

In the event of a lightning strike, the high conductivity of the large quantities of metal, with hundreds of square yards of hull in direct contact with the water, causes rapid dissipation of the electrical charge. The Powership, FSRU and LNG carriers are designed to meet stringent lightning protection standards required by the Ship Classification Society. FSRU operations are safeguarded through 100% containment with no LNG interface with the atmosphere. Lightning strikes are easily dissipated by the steel structures without affecting the normal operational aspects of the FSRU, however, in potential lightning situations, it is normal practice to cease STS (Ship-To-Ship) transfer operations if they are underway and make safe the transfer hoses through an inerting procedure and maintaining the cargo containment without oxygen.

Fire can be extinguished in the Powerships by means of various methods which include permanently installed systems in the Powerships that are able to fill the affected area with CO^2 or hot foam and portable extinguishing systems. Each chamber in the Powership is also equipped with fire detection and alarm equipment (fire detectors, manual call points, alarms, sounders, and bells) in order to detect & locate the origin of the fire.

In addition to using the fixed firefighting systems and portable firefighting equipment, personnel protection equipment is available and used throughout all areas of the Powership to ensure maximum protection from fire related accidents. Approved drawings on firefighting plans are located throughout the Powership in fireboxes and hung in different locations. In the event of fire drills or actual fire these plans are carried out rigorously.

1.1.7.4 Safety and Security Measures

Powership are equipped with advanced CCTV systems monitoring all areas, inside and out. To protect the Powership against unauthorized entry to the project site from land, the Powership site is surrounded by fencing and razor wire. A dedicated professional security team is responsible for monitoring and constantly patrolling the vessels to prevent any un-authorized entry or attacks. In addition, prior to deployment of the Powership to the operating location, an independent security risk assessor visits the location, meets local authorities (including port authorities and armed security forces) and provides detailed advice on any additional security measures that should be implemented before or during the operation over and above the proposed Security Plan specific to the project site.

The same independent security advisors visit the vessels shortly after their arrival, immediately after mooring arrangements are completed, to follow up and assess actual operation of the security systems and team. Regular follow up visits and assessments continue, and adaptation of systems and protocols would be made if the project site security risk status is deemed by security advisors to have changed in the area over time.

In addition, a vessel can be moved relatively quickly with TNPA approval in the event that South Africa becomes exposed to terrorist activities and the risk becomes severe. Access to these facilities is also more easily controlled than land-based facilities, by natural virtue of their position in the ocean.

In terms of Emergency Plans, the Major Hazard Installation (MHI) Risk Assessor had recommended that an Emergency Plan be developed and sent to the City's Disaster Management for them to comment and formulate action plans during the MHI application. The MHI application will be made to the District Municipality, and be assessed based on their disaster management capacity. This MHI application can only be made upon completion of the EIA process, once the EA has been granted (refer to the Major Hazard Installation Risk Assessment, Appendix 9 – D3). The attached procedures (Appendix 11) are examples of internally developed procedures utilised at Karpowership operations. Karpowership SA will develop and implement procedures aligned with relevant standards, legislative and key stakeholder (e.g. TNPA) requirements. These procedures will be updated as required throughout the full project lifespan to ensure the procedures remain current and applicable.

1.1.7.5 Occupation Health and Safety

Oxygen Twenty one undertook a comprehensive legal compliance review for KSA to comply with all legal requirements and applicable international norms and best practices that include the following but will not be limited to:

- Compensation for Occupational Injuries and Diseases Act 130 of 1993;
- Occupational Health and Safety Act 85, 1993 and all applicable regulations;
- Government Gazette notice No 1235 – Code of Practice Inshore Diving;
- Basic Conditions of Employment Act 75, 1997;
- Maritime Occupational Safety Regulations, 1994, R 1904;
- SAMSA Acts, Regulations and Codes

A comprehensive HSEQ management manual which underpins the HSEQ Policy of Karadeniz Holding and Group Companies Management, was developed. The HSEQ management system is aligned to international norms and standards such as ISO9001 and ISO 45001. The policy of Karadeniz Holding and Group Companies Management and existing procedures or amendments thereof will be implemented where required for Karpowership SA. These will include but not be limited to:

- Emergency Response Plan

- Fire Safety Plan
- Fire Alarm System
- Tanks Integrated Management Plan
- House Keeping and Leak Emergency on Board
- Technical Periodic Inspection Procedure
- Fugitive Emissions Management Plan

Please refer to Appendix 11 - Policy & Procedures.

1.1.7.6 Lighting

The project is proposed within the operational Port and there is therefore an existing level of light associated with the Port activities. Lighting is critical for the safe and secure operations of the Powerships as well as the Port operation at nights. The lighting aspects of the project was considered to ensure appropriate management in accordance with the Port's requirements where navigational vessels must display lights as directed by the Harbour Master. Minimum illumination levels, expressed in lux, that would ensure a safe working environment as per SANS 10389-1: Exterior lighting, Part 1: Artificial lighting of exterior areas for work and safety and the OHS Act of South Africa will be applicable to reduce risks and ensure that accidents are prevented. Excessively light levels and colour differences, where the distinction of colours are critical to ensure tasks are performed safely, must also be avoided in terms of environmental pollution and disruption of Port shipping and guidance activities.

Light pollution is the alteration of natural light levels in the night environment by artificial lighting where it may cause environmental harm or nuisance. Light pollution may arise from:

- Glare from excessive brightness of a light source;
- Over-illumination;
- Light clutter from excessive grouping of light sources;
- Light trespass from the unwanted direct lighting of an area;
- High energy, short wavelength UV/violet/blue light that is strongly detected by wildlife; and
- Areas requiring lighting must not be over lit and lighting trespass must be avoided.

Lighting will be provided during the construction phase at the respective working areas to provide a safe working environment. All effort will be made to limit the illumination to effective and safe levels and reduce the timeframe of exposures where possible.

The Powership and FSRU lighting will be carefully arranged to minimise lighting pollution and lighting effects on the natural environment. Light intensity and light trespass will be reduced by:

- Mounting lighting fixtures as low as possible;
- Dimming lights where possible and turning off lights when areas are not in use or lighting is not required;
- Where fixed lighting may not adequate for ship operations, portable or temporary lighting will be used to ensure safe operations and navigation on the ship.
- Directing light to the task by reducing the mounting height, repositioning lighting fixtures and adjusting the angle of lighting;
- Using shields on lighting fixtures to prevent light spill outside the footprint area.

High energy, short wavelength UV/violet/blue light which may be detected by nocturnal species will be minimised and avoided at the side of the Powership facing the sensitive natural receptors.

1.1.7.7 Air Emissions & Filtration Systems

Natural Gas (NG) will be the fuel used for the generation of electricity in the proposed Karpowership Project. The pollutants that are emitted using this type of fuel include oxides of nitrogen (NOx), low sulphur dioxide

(SO_2) and low particulate matter (PM_{10}) but in small quantities and within the thresholds allowed by South African law. This is fully disclosed in the AEL and is closely monitored during the lifetime of the Project.

The Powerships' Charge Air Systems are designed and equipped with both wet and dry filtration systems, so that Powerships can continue to operate in extreme environments, including the locations where high levels of organic or inorganic dusts exist, such as coal dust. Charge air filtering system day-to-day workmanship or its maintenance intervals may be affected by the pollutant intensity, but operations can continue. The Charge Air Filtering system has proved itself at other locations, for example at Guinea Conakry, where the Applicant is operating next to an iron ore exporting harbour.

1.1.7.8 Storage of Hazardous Goods

The LNG stored on the FSRU at any given time will not exceed 175 000m³. The FSRU is made up of a series of pressurised and cooled containers to store the LNG. Storage of Natural Gas (i.e. gaseous form) on the Powership is of very small quantities and can be assumed as zero. The reason for this is because LNG is regassified on the FSRU and is then sent to the Powership as gas on demand from the generation engines and it is used in its entirety. Health and Safety protocols and requirements are ensured for the storage of hazardous goods such as small quantities of lubricating oil stored for equipment maintenance purposes.

1.1.7.9 Fueling of the Powership

The fuel is supplied to the Powerships by a separate vessel, a FSRU, which stores the LNG and converts it to a gaseous state for delivery to the Powership through a gas pipeline on demand based on the generation requirement. The FSRU has an overall length of approximately 300m with an approximate breadth of 50m and incorporates a series of pressurised containers and regassification equipment.

The FSRU is refuelled through vessels specially fitted for the purpose of carrying LNG – a Liquid Natural Gas Carrier or LNGC. Refuelling would be required approximately every 20 to 30 days, depending on the power generation demand from Eskom and output of the Powerships. This LNGC will temporarily moor alongside the FSRU over a 1 to 2 day period, while offloading the LNG cargo via STS transfer to the FSRU. The LNG delivered by the LNGC will be sourced from the global market through the Project's contracted fuel supplier, Shell SA, and therefore does not form part of the Karpowership application.

The location of the LNGC, when re-fuelling, will be immediately adjacent to the FSRU. The LNGC will stay in this location within the Port only during the re-fuelling process which takes one to two days including all mooring, connection work, safety checks, offloading, disconnection, and preparation for safe transit out of the port. The FSRU can hold enough LNG to allow the Project to operate for approximately 40 days; expected arrival dates of the LNG Carriers transporting the LNG from the overseas market will be aligned (taking account of the prevailing weather conditions) with the expected usage profile, whilst ensuring that sufficient reserves are maintained on the FSRU in case of any short notice delays. This contingency is to avoid interrupting the supply of LNG to the Powership and thus, to ensure continuously reliable power generation.

The ship-to-ship transfer of LNG will be managed in accordance with STS operation, the applied standard is Ship-to-Ship Transfer Guide (Liquefied Gases) - 2nd edition (OCIMF/SIGTTO) via trained personnel to ensure compliance to this standard and with all quality, health and safety requirements.

The FSRU regasifies the required amount of LNG and sends this to the Powership in gaseous form Natural Gas (NG) continuously on demand through a connecting pipeline. The FSRU is specifically designed, constructed and equipped to supply the fuel gas required, at the designated pressure and flow rates for the power generator engines installed on the Powerships.

For daily operations, standard port limits will apply. For LNG STS (ship-to-ship) operation, an approximate 250-300m meters radius from the STS manifold will be defined as no-go zone and 500 meters radius as controlled traffic zone.

Natural gas boil-off of LNG (Boil Off Gas (BOG)) on board the FSRU is not flared or vented. The BOG is used as fuel for the operation of the FSRU and if in excess, is prioritised for export to the Powership for use in the generation of electrical power. In the event that BOG is in excess of the base load demand, then arrangements are provided on-board the FSRU for this excess BOG to be burnt in a specialised internal process as a last resort so as to avoid any discharge of natural gas to the atmosphere. All BOG management shall be performed in accordance with operating procedures in the approved FSRU Barge Operating Manual. The FSRU has a chromatograph and a metering system from which the data recorded will be provided in real time and formally reported to the Powership in accordance with established procedures.

Under normal operations it is anticipated that the demand for gas will be significantly in excess of the natural boil off resulting in LNG being re-gasified for export to the Powerships for supply to the engines. The engines in operation drive the corresponding generator shaft to generate electricity, and the heat generated by the engines may be captured and used by additional steam turbines for increased efficiency. The electricity generated is transmitted through the overhead transmission line to the switching station and to the national grid.

For further detail on fuelling please refer to Appendix 11.

The Powership is designed to use Natural Gas, a cleaner burning fuel for the cost-effective generation of power, as opposed to coal or diesel-fired power generation. Compared to coal, natural gas emits between 45 and 55% fewer greenhouse gas emissions and less than one-tenth of the air pollutants when used to generate electricity (Shell SA, Media Release, 2020).

Karpowership SA is partnering with Shell SA to supply LNG to the Projects. Shell is one of the global leaders in LNG supply. They are able to leverage economies of scale and their robust networks to secure LNG from the global market. There is a fuel supply management team in place and LNG procurement will be arranged based on COD date and demand during the Project terms. The gas will be sourced from Shell SA with relevant licenses and permissions for the supplier's full supply/value chain. The applicant has also indicated that they have received assurances from the LNG supplier that the gas will not be sourced from fracking.

According to Shell SA, "*Natural gas is the cleanest-burning hydrocarbon, producing around half the carbon dioxide (CO_2) and just one tenth of the air pollutants of coal when burnt to generate electricity. LNG is a clear, colourless and non-toxic liquid which forms when natural gas is cooled to -162ºC (-260ºF). The cooling process shrinks the volume of the gas 600 times, making it easier and safer to store and ship. In its liquid state, LNG is not explosive and cannot burn.*

If consumption remained at today's levels, there would be enough recoverable gas resources to last around 230 years. It is versatile. A gas-fired power station takes much less time to start and stop than a coal-fired plant. This flexibility makes natural gas a good partner to renewable energy sources like solar and wind power, which are only available when the sun shines and the wind blows." (https://www.shell.co.za/energy-and-innovation/natural-gas.html).

1.1.7.10 Global LNG Market

The market for Liquefied Natural Gas has existed since 1958 when the first tanker shipment of LNG took place from Lake Charles, USA bound for Canvey Island in the UK.

Today, more than 40 countries import LNG from 21 exporting nations around the world. Imports are dominated by the Asia Pacific region, with Japan, China and South Korea dominating demand.

On the supply side, Qatar has been the world's largest supplier of LNG for a number of years. However, both Australia and the USA are expected to surpass Qatar as the world's largest LNG suppliers since both nations have rapidly expanded their liquefaction capacity in recent years.

1.1.7.11 LNG Supply Sources

Given the complexity of different sources of LNG and different customers for LNG and the fact that demand for LNG in a country can change from year to year as well as within the market, this market is suited to very large and well prepared companies who can manage the complexity of changing import demand combined with the requirement to serve the customers' demands.

LNG Supply is a mature market with approximately 30 larger companies, capable of supplying LNG to the project. Shell SA was selected after a competitive selection process as they offered the best value for this Project. Any well–established company would have to supply LNG from within their total global portfolio. Therefore, the LNG will not be sourced from a dedicated source(s) continuously, but rather from the best fit supply location taking the market and logistics, in particular, into account at any given time also allowing the switch to indigenous or regional gas supply if it becomes available and feasible at any time in the project term. This global supply portfolio also adds to supply security, because if any shipping route or supply location becomes inaccessible, it can be substituted logistically.

The RMI4P also specifies termination clauses within the international LNG supply agreements, which can be executed if a suitable local or regional gas supply becomes available at any time through the Project term.

The market for the supply of LNG will continue to grow for the next 40 years, and therefore there is no risk associated with the physical supply of this fuel for the term of the project.

1.1.7.12 Waste Generation and Management

Due to daily activities, the Powership and FSRU will require regular maintenance and repairs which will produce waste. Approximately 75m^3 of sewage (black water) as well as grey water (washing and kitchen) will be generated monthly. All effluent and solid (general and hazardous) waste will be removed by authorised service providers in terms of legislation and TNPA and MARPOL requirements and will be treated and disposed of in authorised land-based treatment and disposal sites.

In terms of energy waste, Powerships operate with a lean waste philosophy. Every type of energy generated from the fuel is used in a specific way to reduce waste energy. While engines burn fuel, heat is ejected from the engines via exhaust gasses. In order to utilise this waste heat, Powerships use Exhaust Gas Boiler Equipment to convert waste heat to superheated steam which is redirected to the Steam Turbine Generators to generate electricity.

1.1.7.13 Hull Cleaning

Hull cleaning equipment to be used by Karpowership involves ‘Brushcart’ technology which is a diver-steered, hydraulically powered unit with twin / triple rotating discs that can be fitted with either brushes or blades, depending on the application. For niche areas, (fewer regular surfaces) shrouded hand tools and a containment box have been designed.

Each cleaning tool has a suction shroud that connects separately to the central, fully enclosed suction system through which debris is pumped to the surface support system for treatment. Extracted water and debris is then processed through a multi-staged, modular filtration and treatment system where the fouling debris and particles are removed, and then the filtrate passed through an automated UV disinfection unit. No chemical biofouling agents are used for the hull cleaning process, which will be done in accordance with TNPA approved operational procedures.

The anti-fouling strategy will include the Ultrasound System that works by emitting specific low powered pulsed ultrasonic frequencies from a digital control unit, via transducers that are in direct contact with the vessel’s sea chest boxes, and various points of the seawater system. In the same way, the ultrasound will resonate within the wall of the sea chest arrangement parts, providing pollution free protection against fouling.

1.1.8 Construction of the Powerships and FSRU

The Powerships are assembled off-site and will be delivered fully equipped and functional to the Port of Richards Bay. Powerships, through their modular generation capability, allow for greater technical flexibility for load cycling and shedding. The Khan Class Powerships are approximately 289m in length with an approximate breadth of 45m and Shark Class Powerships are approximately 180m in length with an approximate breadth of 26m. The gas reciprocating engines for power generation allow a reliable supply of electricity with minimal impacts from load profile and number of start and stops. They are essentially ships which have been fitted with the necessary gas fuelled generation equipment, including reciprocating engines and steam turbines, as well as a high voltage substation and all necessary equipment to transmit electricity to the grid.

1.1.9 Construction of the Gas Pipeline

1.1.9.1 Site Access

The subsea pipeline is to be brought onto site in 18m lengths by road truck, concrete weight coated and welded together in a pipe stringing yard near the launch site. The trucks used to deliver the pipeline sections will therefore require road access to the stringing yard and laydown area.

1.1.9.2 Pipeline Assembly

Sufficient space for a temporary onshore construction site / laydown area near the launch site will therefore be required to undertake the assembly of the pipeline. An area within the Port with sufficient space near the launch site has been selected in order to reduce new impacts. The estimated size for the stringing yard for the installation of the gas pipeline is 10 000m^2.

The proposed location of the stringing yard and launchway is proposed as shown on the drawings. The final selection of the site will only be finalised once a preferred marine contractor has been selected. A launchway will be constructed with rollers to transfer the pipeline from the stringing yard to the sea. The launchway typically will consist of concrete or steel pedestals supporting rollers at approximately 10 to 20m centres, over which the pipeline will move, allowing the completed pipeline to be pulled into the sea. This area will be fully rehabilitated after the completion of the installation of the pipeline.

Figure 1-10: Typical Stringing Yard

Figure 1-11 Typical Launchway across beach

1.1.9.3 Pipeline Installation

The pipeline is to be installed by pulling it from the shore fitted with floatation units, towing it into position using tugs or workboats and lowering it onto the seabed. The pipeline is lowered with minimal disturbance to the seabed and weighted with a 50 mm thick concrete weight coating to ensure the on-bottom stability of the

pipeline during operation. Although no dredging is required prior to installation of the pipeline, some seabed preparation in the form of levelling of high spots or placing of crushed stone founding material in low spots may be necessary prior to installing the pipeline.

Minor seabed preparation works are anticipated to receive the pipe and the PLEMs, with the intention to place both directly on the seabed. In cases where there may be a high point, some material might need to be moved to keep the PLEM level or the span lengths within limits.

Once the pipeline installation is complete, the laydown site will be rehabilitated to the topographical and environmental condition prior to the disturbance during the construction phase of this project.

The above methodology for the gas pipeline is captured in **Appendix 10.10 – Technical Information.** The methodology will also need to be approved by TNPA prior to construction start.

1.1.9.4 Pipeline Maintenance

The gas pipeline infrastructure is designed to require little to no maintenance during its design life. Furthermore, the maintenance of the gas pipeline will be managed by the Operation and Maintenance Contractor that will be appointed by the applicant. Relevant design features include the following:

- the subsea pipeline will be protected with a factory applied external coating as well as sacrificial anodes;
- the external coating will be protected by a concrete weight coating which is designed to provide abrasion resistance, which is especially important during pipeline installation; and
- the pipeline is designed to remain stable on the seabed, thereby mitigating against seabed abrasion and material fatigue.

2. SCOPE OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

This EMPr addresses the following phases of the development:

(a) Planning and Design Phase

The best practical environmental option is being implemented following the assessment of aspects and impacts, to prevent or reduce environmental impacts within acceptable limits. These include: administrative and legal requirements, roles and responsibilities for environmental management, environmental awareness, training and induction, protection of flora, worker conduct on site, preparation of construction servitude, equipment, vehicle maintenance yard and secured storage areas, water management and drainage areas and security and lighting.

(b) The Construction Phase

Proper implementation during this phase will ensure that the likelihood and/or severity of certain impacts taking place, is prevented or minimised and/or mitigated where prevention is not possible. The majority of the impacts which may occur during the construction phase will have immediate and a short term effect (e.g. noise, dust and pollution / waste generation). If the site is monitored on a continual basis during the construction phase, it is possible to identify and prevent, minimise or mitigate these impacts as they (may) occur. These impacts will then be mitigated through the implementation of the measures prescribed in the EMPr.

(c) The Rehabilitation and post construction activities

Following the construction of the Karpowership Project, this section of the EMPr provides management principles for the post-construction activities including rehabilitation of the site.

(d) The Operational Phase (including ongoing maintenance)

This section of the EMPr provides management principles for the maintenance and operational phases. This will include best practice, procedures and responsibilities as required for various associated activities.

2.1. RESPONSIBILITY FOR ENVIRONMENTAL MANAGEMENT

Karpowership is the owner of this project. The details of the project Owner are as per Table 3.1

Table 2-1: Details of the Project Owner

Name of Owner	Karpowership SA Proprietary Limited		
Contact Person	Mehmet Katmer		
Telephone Number	+90 212 295 47 37 - 121	Fax Number	-
Mobile number	-	Email	Mehmet.Katmer@karpowership.com

INDEPENDENT ENVIRONMENTAL ASSESSMENT PRACTITIONER

Triplo4 Sustainable Solutions was appointed by Karpowership as Independent Environmental Assessment Practitioner (EAP) to compile the EMPr. Table 3.2 indicates the details of the EAP:

Table 2-2: Environmental Assessment Practitioner

Name of Consultancy	Triplo4 Sustainable Solutions		
Contact Person	Hantie Plomp		
Telephone Number	032 946 3213	Fax Number	032 946 0826
Mobile number	083 308 8003	Email	hantie@triplo4.com

The Management Authority responsible for environmental authorisation and compliance is the Department of Forestry, Fisheries and the Environment (DFFE).

2.2. AUTHORS OF THE EMPr

This document was compiled by:

Mrs Chen Read – Postgraduate in Environmental Management

Chen Read, Senior Environmental Consultant of Triplo4 Sustainable Solutions has an post graduate Degree in Environmental Management, and she is a registered EAP with EAPASA since 2019. She is an accredited professional (AP) with the Green Building Council of South Africa (GBCSA) as well as certified Carbon Footprint Analyst (SETA accredited). Chen is responsible for conducting environmental impact assessments as well as Water Use License Applications for a wide variety of development projects, including road infrastructure and Industrial projects as well as waste, water and coastal management projects. Chen is also actively involved in conducting compliance auditing services, as well as developing and implementing audit protocol and programmes for compliance to environmental legal requirements, and assisting with the development of corrective and preventative action plans to address non-compliance.

This document was reviewed by:

Ms Shanice Singh- Honours in Environmental Management

Shanice is registered with Environmental Assessment Practitioners Association of South Africa (EAPASA). She has experience in conducting Water Use License Applications (WULA), Environmental Management Programmes (EMPr), Basic Assessment Reports (BA), Environmental Impact Assessments (EIA) as well as Section 24G applications for the rectification of unlawful projects. Furthermore, she is responsible for conducting Environmental Control Officer (ECO) duties which include site visits, surface water monitoring

and report compilation at Triplo4 Sustainable Solutions. She is an Institute of Environmental Management & Assessment (IEMA) certified Carbon Footprint Analyst and has undertaken several Carbon Footprint analysis since 2015. Her undergraduate degree was completed in the year 2014 at University of KwaZulu-Natal with a Bachelor of Science: Environmental and Life Sciences. She has completed her postgraduate degree in the year 2017 at the University of South Africa with a Bachelor of Science (Honours): Environmental Management. She is the Past-President of the Rotaract Club of Verulam (2014-2015) which is affiliated with Rotary International.

Mrs Hantie Plomp - Master's Degree in Environmental Management

The Managing Director, Hantie Plomp, has a Master's Degree in Environmental Management and has been professionally registered with the South African Council for Natural Scientific Professions (SACNASP) since 2001 and EAPASA since 2019. She is also an Assessor for EAPASA. She is an accredited professional (AP) with the Green Building Council of South Africa (GBCSA) and a registered member of the Institute of Directors South Africa (IODSA) and the International Association of Impact Assessment, South Africa (IAIAsa). She has more than 20 years environmental experience which includes legal compliance and internal systems audits, waste management, water management, air quality management, environmental training and awareness and the management and execution of environmental authorizations.

Hantie has been involved in EIA's since the first Regulation 1182 and 1183 of the Environmental Conservation Act. She was also involved in the CONNEP process (stakeholder process in the formulation of the NEMA Act). She compiled and managed the compilation of EIA's during the different applicable regulations under NEMA (2006, 2010, 2014 and amended 2017).

Hantie previously worked at Royal Haskoning DHV previously known as SSI Engineers & Environmental Consultants where she established the environmental sector within KZN and was the Regional Environmental Manager for 5 years. Prior to this she was at AngloGold Ashanti for 20 years where she headed up the Environmental Systems Section comprising EMS, Audits and Environmental Assessments within the Environmental Management Department and acted as Head of the Environmental Management Department on a number of occasions. She has successfully assisted approximately 7 different AngloGold Ashanti (South Africa and Ghana based) mining sectors (mines, metallurgy, engineering, rehabilitation, properties (high and low density), procurement and human resources), with the design, development and implementation of a certified EMS, in accordance with the ISO 14001:2004 standard. These EMS's included original policy development, gap analysis, EMS planning, implementation and review, including environmental training, assessment, non-conformance and environmental incident management, system and operational procedure development and auditing of the EMS systems. Hantie has extensive experience in the compilation and implementation of environmental management programmes.

The Curriculum Vitae of the authors are attached as Appendix H.

Table 2-3: DFFE Environmental Authority Contact Detail

Name of Authority	Department of Forestry, Fisheries and Environmental		
Contact Person	Minky Chauke - Director compliance		
Telephone Number	012 399 9422	Fax Number	012 359 3625
Mobile number	-	Email	MLChauke@environment.gov.za

3. ENVIRONMENTAL MANAGEMENT PROGRAMME METHODOLOGY

The methodology adopted is that of an Environmental Management Programme (EMPr) as described in Appendix 4 of the EIA Regulations, 2014 (as amended).

The EMPr has been structured to include:

- a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development;
- a description of proposed impact management actions, identifying the manner in which the impact management outcomes will be achieved;
- the method and frequency of monitoring the implementation of the impact management actions;
- the persons responsible for the implementation of the impact management actions;
- the time periods within which the impact management actions must be implemented;
- the mechanism for monitoring compliance with the impact management actions;
- a program for reporting on compliance; and
- an environmental awareness plan.

The EMPr specifies the minimum requirements to be implemented as per the scope of works and scope of the EMPr, in order to minimise and manage the potential environmental impacts and ensure sound environmental management practices.

The provisions of this EMPr are binding on Karpowership for the period during which the environmental authorisation and EMPr remain valid. It is essential that the EMPr requirements be carefully studied, understood, implemented, and adhered to at all time.

4. MANAGEMENT AND COMPLIANCE MONITORING

4.1. ORGANISATIONAL STRUCTURE AND RESPONSIBILTIES

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Project Developer, Project Manager, Contractor, Environmental Site Officer and Environmental Control Officer are as detailed below.

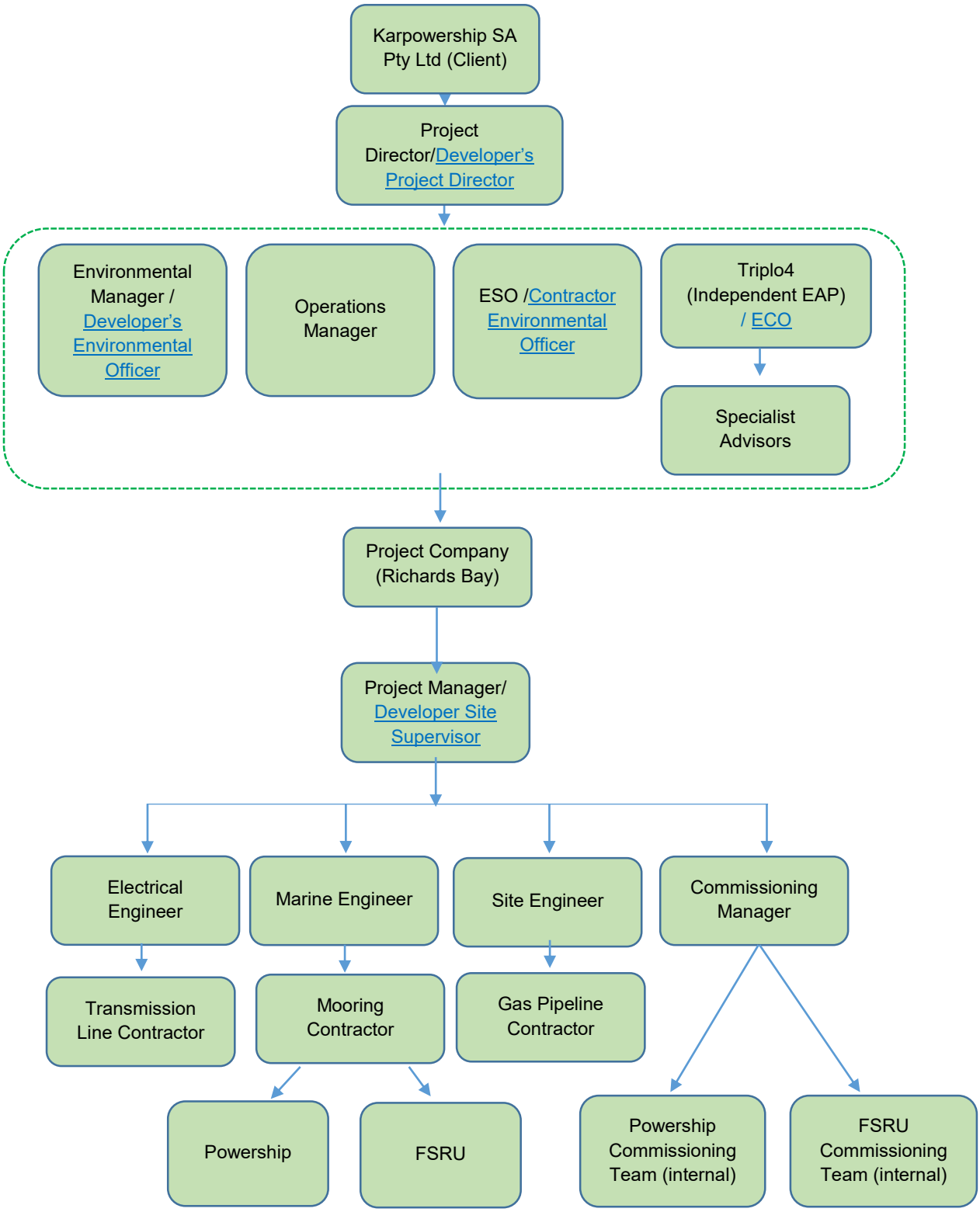


Figure 4-1: Organogram of formal responsibilities and reporting structure for the implementation of the gas to energy project

Table 4-1: Roles and Responsibilities

PROJECT DIRECTOR / DEVELOPER'S PROJECT DIRECTOR
Role: Responsible for overseeing all aspects of transmission lines, gas pipeline, mooring and all other aspects of site preparation prior to vessel arrival, quality control, health & safety and time and cost management for all project sites. ***Responsibilities:*** *The Project Director must:* • Be fully conversant with the EA and EMPr for the project and all other environmentally-related licences and permits; • Make provision for monitoring the implementation of the EMPr throughout the project by means of site inspections and meetings.
ENVIRONMENTAL MANAGER / DEVELOPER'S ENVIRONMENTAL OFFICER
Role: Responsible for all aspects of environmental compliance, management and monitoring. The Environmental Manager is ultimately responsible for ensuring compliance with the environmental specification and all relevant legislation and is accountable for any non-compliances with this EMPr and any other conditions of approval or non-compliances with legislation. ***Responsibilities:*** *The Environmental Manager must:* • Be fully conversant with the EA and EMPr for the project and all other environmentally-related licences and permits; • Ensure that all stipulations within the EMPr are communicated and adhered to by the Project Developer and its Contractor(s); • Make provision for monitoring the implementation of the EMPr throughout the project by means of site inspections and meetings. • Overall management of the project and EMPr implementation; and • Ensure that periodic site inspections are undertaken on the project implementation.
OPERATIONS MANAGER
Role: Responsible for commissioning teams and plant management. ***Responsibilities:*** *The Operations Manager must:* • Be fully conversant with the EA and EMPr for the project and all other environmentally-related licences and permits; • Ensure that all stipulations within the EMPr are communicated and adhered to by the project teams and its Contractor(s).
PROJECT MANAGER (PM) / DEVELOPER'S ENGINEERING REPRESENTATIVE ON SITE
Role*:* The Project Manager is responsible for site specific engineering management. The PM reports directly to the Developer, oversees site works and liaises with the Contractor(s) and the ECO. ***Responsibilities:*** *The PM must:*

- Enforce the environmental specification on site;
- Be fully conversant with the conditions of the EA, EMPr and all other environmentally-related licences and permits;
- Ensure the EA, approved EMPr and all other relevant licences and permits are in the tender documentation issued to prospective Contractors;
- Request for, review and approve the method statements prepared by the Contractor;
- Review and comment on environmental assessments and / or reports produced by the Contractor and ECO;
- Undertake regular site visits and ensure environmental specifications are implemented;
- Monitor compliance with the requirements of the specification;
- Assess the Contractor's environmental performance in consultation with the ECO from which a brief monthly report of environmental performance is drawn up for record purposes and to be reported on within project meetings; and
- Ensure the documentation, in conjunction with the Contractor, the state of the site prior to construction activities commencing. This documentation will be in the form of photographs or video records.

ENVIRONMENTAL CONTROL OFFICER (ECO)

Role:

The ECO must be appointed by the Project Developer for the duration of the Project. The ECO must report to the relevant authorities as required by the conditions of approval. The ECO must monitor compliance against the environmental specification and report on such.

Responsibilities:

The Environmental Control Officer must:

- Be aware of the findings and conclusions of the EA related to the development;
- Be familiar with the recommendations and mitigation measures of this EMPr;
- Be conversant with relevant environmental legislation, policies and procedures, and ensure compliance with them;
- Undertake regular and comprehensive site inspections and monitoring of the construction site according to the EMPr and applicable licenses in order to monitor compliance as required;
- Educate the construction team about the management measures contained in the EMPr and environmental permits/licenses;
- Compilation and administration of an environmental monitoring plan to ensure that the environmental management measures are implemented and are effective;
- Monitoring the performance of the Contractors and ensuring compliance with the EMPr and associated Method Statements;
- Recommend corrective action for any environmental non-compliance at the site;
- Compile a monthly report highlighting any non-compliance issues as well as progress and compliance with the EMPr prescriptions. These monthly reports are to be submitted to the Client, PM, DFFE, DWS and uMhlathuze Municipality;
- Conduct once-off training with the Contractor on the EMPr and general environmental awareness;
- In case of non-compliances, the ECO must first communicate this to the Senior Site Supervisor, who has the power to ensure this matter is addressed. Should no action or insufficient action be taken, the ECO may report this matter to the authorities as a non-compliance;
- Maintenance, update and review of the EMPr;
- Communication of all modifications to the EMPr to the relevant stakeholders.

It must be noted that the responsibility of the ECO is to monitor compliance and give advice on the implementation of the EMPr and not to enforce compliance. Ensuring compliance is the responsibility of the PM and the ESO.

CONTRACTOR (including Sub-Contractors, Service Providers and Suppliers)

The Contractor must:

- Be fully conversant with the conditions of the EA and the EMPr;
- Provide information on previous environmental management experience and company environmental policy in terms of the relevant forms contained in the Contract Document.
- Supply method statements for all activities requiring special attention as specified and / or requested by the Project Manager, ECO and/or Engineer prior to the commencement of such activities, for the full duration of project.
- Be conversant with the requirements of this environmental specification/ EMPr. Brief all staff and sub-contractors and their staff about the requirements of the environmental specification;
- Comply with requirements of the ECO in terms of this specification and the project specification, as applicable, within the time period specified.
- Ensure any Sub-Contractors/Suppliers who are utilised within the context of the contract comply with the environmental requirements of the project specifications. The Main Contractor will be accountable for all non-compliances.
- Bear the cost of any delays, with no extension of time granted, should the Main Contractor, Sub-Contractors / Suppliers contravene the said specifications such that the Project Manager orders a suspension of work. The suspension will be enforced until such time as the offending party(ies), procedure, or equipment is corrected.
- Bear the costs of any damages / compensation resulting from non-adherence to the said specifications or written site instructions.
- Comply with all applicable legislation.
- Inform the Engineer timeously of any foreseeable activities which will require input from the ECO.
- The Contractor will conduct all activities in a manner that minimises disturbance to the natural environment as well as directly affected residents and the public in general.

ENVIRONMENTAL SITE OFFICER (Contractor's Representative)

Role:

Each Contractor must have a dedicated Environmental Site Officer (ESO) to ensure the day to day implementation of the environmental specification on site and to report to the PM and ECO.

Responsibilities:

The ESO must:

- Be fully conversant and assist the Contractor in complying with the EA, approved EMPr and all other relevant licences and permits;
- Be fully conversant with all relevant environmental legislation applicable to the project, and ensure compliance with them;
- Compile environmental method statements on behalf of the Contractor that will specify how potential environmental impacts will be managed in line with the requirements of the EA, approved EMPr and other relevant licences and permits and where relevant environmental best practice, and how they will practically ensure that the objectives of the EMPr are achieved;
- Convey the contents of the EA, approved EMPr and other relevant licences and permits to the Contractor, sub-contractors and suppliers. Ensure all relevant information is relayed to construction site-staff in a manner that is easily understandable;
- Undertake daily and comprehensive inspection of the site and surrounding areas in order to monitor compliance with the EA, approved EMPr and other relevant licences and permits;
- Take appropriate action if the specifications contained in the EA, approved EMPr and other relevant licences and permits are not followed. This must include reporting transgressions to the Project Manager, Engineer and Contractor, and may include the recommendation for penalties to be imposed on the Contractor;
- Monitor and verify that environmental impacts are kept to a minimum, as far as possible;
- Ensure that the Written Warning Notification and Incidents Register is available on request; and
- Maintain an environmental register which keeps a record of all incidents which occur on the site during construction.

4.2. TRAINING AND ENVIRONMENTAL AWARENESS

It is important to ensure that the Contractor has the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and ongoing minimisation of environmental harm. Training needs should be identified based on the available and existing capacity of site personnel (including the Contractors and Sub-contractors) to undertake the required EMPr management actions and monitoring activities. It is vital that all personnel are adequately trained to perform their designated tasks to an acceptable standard.

The environmental training is aimed at:

- promoting environmental awareness;
- informing the Contractor of all environmental procedures, policies and programmes applicable;
- providing generic training on the implementation of environmental management specifications; and
- providing job-specific environmental training in order to understand the key environmental features of the construction site and the surrounding environment.

Training will be done in a verbal format and be conducted in person. In addition to training, general environmental awareness must be fostered among the project's workforce to encourage the implementation of environmentally sound practices throughout its duration. This ensures that environmental accidents are minimised and environmental compliance maximized.

During the construction phase, Safety, Health and Environmental (SHE) Tool Box Talks must be held on a regular basis (the norm is to do this weekly or every fortnight) to discuss to address potential environmental risks, near misses or incidents and how they can be avoided in future. Regular drills are to be held to ensure that all staff are aware of the spill contingency and other environmental emergency procedures as applicable and can perform these procedures in reasonable timeframes.

5. ENVIRONMENTAL MANAGEMENT COMPLIANCE, MONITORING AND REPORTING

5.1. EMPr COMPLIANCE MONITORING AND AUDITING

Environmental compliance monitoring is the continual evaluation of the status of the environment and condition of environmental elements. Its purpose is to detect activities that may have a negative impact on the environment as well as change that takes place in the environment over time. It therefore involves the checking and correcting of onsite activities as well as the measuring of physical, social and economic variables associated with development impacts. Monitoring will be ensured in terms of the Permits, Licenses and EMPr as per conditions and relevant authority requirements by the Holder of the Authorisation (Project Developer) as undertaken by the Project Developer and Contractor ESO and ECO appointments.

The timeframes for monitoring are specified as per the relevant conditions of the various phases i.e. planning and design, construction and post construction with rehabilitation and operational. The specific conditions related to the monitoring requirements per timeframe have been specified as per relevant condition and must be ensured e.g. water quality monitoring during the construction within wetlands are different to water quality monitoring during the operational phase. Where the phase (timeframe) had been indicated e.g. “during construction” and no specific frequency was stipulated, it means that the condition must be complied with through-out the phase e.g. every day and all day as long as activities are taking place or the phase is active.

The ESO shall monitor the site activities on a daily basis during the construction phase and submit proof of site inspections with findings and corrections to the ECO for consideration during the ECO visits to be conducted during the construction phase.

Compliance Monitoring of the activities and implementation of the EMPr will also be undertaken by the ECO. The findings and outcomes of these monitoring events will be recorded in a monthly monitoring report and kept in the site Environmental File. These reports must be provided to the Environmental Auditor at the time of the Environmental Audit and must also be made available to the Competent Authority on request, alternatively as indicated in the EA and/or Water Use Licence.

The ECO’s monthly monitoring report will be circulated to the Project Manager and filed in the EMPr file, and further submitted to the competent authority as required in the EA and/or Water Use Licence. At a minimum the monthly report is to cover the following:

a) Weekly Environmental Checklists;
b) Deviations and non-compliances with the checklists;
c) Non-compliances issued;
d) Completed and reported corrective actions;
e) Environmental Monitoring;
f) General environmental findings and actions; and
g) Minutes of the Bi-monthly Environmental Site Meetings.

On final completion of the Project, the ECO is required to prepare a final inspection report. The report is to be submitted to the CA for acceptance and approval. The environmental report must comply with Appendix 7 of the EIA Regulations, 2014.

The Contractor is deemed not to have complied with the Environmental Specification / EMPr if:

- There is evidence of contravention of clauses within the boundaries of the site and wetlands;
- Environmental damage ensues due to negligence;
- The Contractor ignores or fails to comply with corrective or other instructions issued by the Project Manager within a specified time; and
- The Contractor fails to respond adequately to complaints from the public.

5.2. COMPLAINTS AND ENVIRONMENTAL INCIDENTS

Identifying, recording and reporting complaints and environmental incidents further ensures the monitoring and auditing of environmental compliance and assessment of performance against the actual and perceived environmental aspects and impacts on site.

DOCUMENTATION

The following documentation must be kept on site in order to record compliance with the EMPr:

- Record of Complaints;
- Non-conformance Reports;
- Written Corrective Action Instructions; and
- Notification of Emergencies and Incidents.

The following inspection sheet and report templates are recommended and included in **Appendices B-E** respectively.

- Project Start Up Inspection Sheet;
- Routine Site Inspection Sheet;
- Construction Site Decommissioning Inspection Sheet; and
- Site Inspection Report Structure.

COMPLAINT RECORDS

The Contractor must record any complaints received. The lodged complaint must be brought to the attention of the ECO/PM who will respond accordingly. The following information will be recorded:

- Details of complainant;
- Time, date and nature of the complaint;
- Response and investigation undertaken; and
- Actions taken and by whom.

The complaints must be communicated to the Site Manager and ECO who will respond accordingly. An investigation must ensue and a response to the complainant must be provided within seven working days.

All environmental incidents occurring on the site will be recorded by the Contractor / ECO and submitted to the PM and copied to the Department of Fisheries, Forestry and Environment (DFFE). The following information will be documented:

- Time, date, location and nature of the incident;
- Actions taken and by whom;
- Response to complainant; and
- Close Out.

The ECO, in conjunction with the Project Manager and Contractor, will identify and authorise remediation action where necessary.

The following additional information may be added to the complaints and incident records:

- Party/parties responsible for causing complaint/incident;
- Additional corrective or remedial action taken and/or to be taken to address and to prevent reoccurrence of the complaint/incident;
- Timeframes and the parties responsible for the implementation of the corrective or remedial actions;

- Procedures to be undertaken and/or penalties to be applied if corrective or remedial actions are not implemented;
- Copies of all correspondence received regarding complaints/incidents; and
- Section 20 & 30 of NEMA.

As mentioned, EMPr compliance is the responsibility of all the parties that make up the project team. Similarly all these parties have a role to play in EMPr compliance monitoring and reporting in accordance with the authority structure. For example, sub-contractors must monitor their own compliance and report any discrepancies, non-compliances or incidents to the contractor, while the contractor must in turn monitor the sub-contractor compliance. In turn, the Engineer must monitor the Contractor's EMPr compliance on a day-to-day basis while the ECO has the role to undertake regular site inspections and audits and prepare internal audit reports.

The above records will form an integral part of the Contractors' Records. These records will be kept with the EMPr, and will be made available for scrutiny if so requested by the Client or Project Manager.

Outlined below are steps relating to increasing severity of environmental problems, which will be implemented. The principle is to keep as many issues within the first few steps as possible.

• Step 1
The ECO discusses the problem with the contractor or guilty party, and they work out a solution together. The ECO records the discussion and the solution implemented.

• Step 2
The ECO or Client observes a more serious infringement, and notifies the guilty party in writing, with a deadline by which the problem must be rectified. All costs will be borne by the contractor.

• Step 3
The ECO shall order the contractor to suspend part, or all, the works. The suspension will be enforced until such time as the offending party/parties, procedure or equipment is corrected and/or remedial measures put in place if required. No extension of time will be granted for such delays and all cost will be borne by the contractor.

• Step 4
Breach of contract - One of the possible consequences of this is the removal of a contractor and/or equipment from the site and/or the termination of the contract, whether a construction contract or an employment contract. Such measures will not replace any legal proceedings that the Project Developer may institute against the contractor.

EMERGENCY RESPONSE

According to Section 30 of NEMA, - "incident" means an unexpected, sudden and uncontrolled release of a hazardous substance, including from a major emission, fire or explosion that causes, has caused or may cause significant harm to the environment, human life or property.

According to Section 20 of the National Water Act 36 of 1998, "incident" includes any incident or accident in which a substance - (a) pollutes or has the potential to pollute a water resource; or (b) has, or is likely to have, a detrimental effect on a water resource.

The Contractor's environmental emergency procedures must enforce responses to unexpected / accidental actions / incidents that could cause environmental impacts. Such incidents include:

- Accidental discharges to water (i.e. into the watercourse) and land;

- Accidental spillage of hazardous substances (typically: oil, petrol, and diesel);
- Accidental damage to existing utilities e.g. sewer and water pipelines; and
- Specific environmental and ecosystem effects from accidental releases or incidents.

An Environmental Emergency Response Action Plan must be prepared aimed at responding specifically to environmental incidents and must enforce and include the following:

- Fulfilment with the reporting and incident management requirements prescribed by Section 30 of NEMA and Section 20 of NWA if an incident qualifies as a NEMA Section 30 or NWA Section 20 incident as defined.
- Construction employees shall be trained in terms of incidents and emergency situations;
- Details of the organisation (i.e. manpower) and responsibilities, accountability and liability of personnel;
- A list of key personnel and contact numbers;
- Details of emergency services (e.g. the fire department / on-site fire detail, spill clean-up services) shall be listed;
- Internal and external communication plans, including prescribed reporting procedures;
- Actions to be taken in the event of different types of emergencies;
- Incident recording, progress reporting and remediation measures to be implemented; and
- Information on hazardous materials, including the potential impact associated with each, and measures to be taken in the event of accidental release.

The Main Contractor, sub-contractor(s), service providers and suppliers must comply with the environmental emergency preparedness and incident and accident-reporting requirements as per the relevant legal requirements.

5.3. NON-COMPLIANCE, PENALTIES AND 'SUSPENDED WORK' ORDERS

The Project Manager, in consultation or on the advice of the ECO, shall issue penalties ('spot fines') if the Contractor infringes environmental specifications set out in this EMPr. The Contractor shall be advised in writing of the nature of the infringement and the amount of the spot fine. The Contractor shall take the necessary steps (e.g. training) to prevent a recurrence of the infringement.

The Contractor is also advised that the imposition of spot fines does not replace any legal proceedings the authorities, landowners and/or members of the public may institute against the Contractor. Further details on the value of spot fines will be agreed upon with the Main Contractor, once appointed, prior to commencement of construction. Fines range between R500.00 and R20 000.00, but not limited to, depending upon the severity of the infringement, amongst other considerations. For each subsequent similar offence, the penalty may, at the discretion of the Engineer or ECO be doubled in value to the maximum value to be determined by the Engineer and ECO.

This below list indicates the type of infringements that may attract a fine. The decision on when to impose a penalty will be at the discretion of the Engineer or ECO and will be final. In addition to the spot fine, the Contractor shall be required to make good any damage caused as a result of the infringement, at his own expense.

LIST OF INFRINGEMENTS THAT RESULT IN SPOT-FINES

A preliminary list of infringements for which spot fines can be imposed is as follows:

- Using or entering any areas outside the working areas without permission;
- Clearing and/or levelling areas outside of the working areas;
- Spillage onto the ground or water bodies of oil, diesel, etc;
- Picking/damaging plant material;

- Damaging/killing animals/birds;
- Untidiness and litter at contractors camp area;
- Inappropriate use of bins and poor waste management on site;
- Making fires on site;
- Discharging effluent and/or storm water onto the ground or into surface water;
- Repeated contravention of the specifications or failure to comply with instructions;
- Damage to any identified heritage sites.
- Additional fines as determined by the ECO and added to this list

The Engineer shall retain records for spot fines issued. The penalty imposed will be per incident. Unless otherwise stated in the project specification, the penalties imposed per incident or violation will be a set amount.

The Project Manager at his/her own discretion, or on recommendation from the ECO, may also order the Contractor to place on hold or suspend part or all the works if the Contractor repeatedly causes damage to the environment by not adhering to the EMPr (i.e. more than 3 cases of infringements). The suspension will be enforced until such time as the offending actions, procedure or equipment is corrected. No extension of time will be granted for such delays and all costs will be borne by the Contractor. Work may also be placed on hold if a heritage artefact or feature or grave is uncovered or to prevent a potential significant incident from occurring or spreading.

5.4. METHOD STATEMENTS

Method Statements indicate how the Contractor will achieve compliance with environmental legislation, good management practice and the Environmental Specifications during the construction phase. Method Statements may be required for any identified specific activity or group of activities for which it is considered necessary to implement a detailed method to mitigate potential environmental impacts. In addition to the Method Statements identified in this EMPr, the Contractor, Engineer and/or ECO may require additional Method Statements for effective environmental management and as the project unfolds.

PROCEDURES AND CONTENT

The Contractor shall submit a written Method Statement to the Engineer for approval. Method Statements may only be implemented once approved by the Project Manager in writing. On receipt of a Method Statement the Engineer shall forward a copy thereof to the ECO. Both the Engineer and ECO shall review the Method Statement and come to an agreement as to whether the Method Statement is acceptable or requires amendments.

The Method Statement shall state clearly:

- Timing of activities;
- Materials to be used;
- Equipment and staffing requirements;
- Proposed construction procedure designed to implement the relevant environmental specifications;
- The system to be implemented to ensure compliance with the above; and
- Other information deemed necessary by the Contractor, Engineer and/or ECO.

The Method Statement shall be submitted at least 14 working days prior to the projected commencement of work on an activity.

Once a Method Statement is approved it is binding and the Contractor must therefore ensure that all activities to which the approved Method Statement applies are carried out accordingly.

Due to changing circumstances, it may be necessary to modify Method Statements. In such cases, the proposed modifications must be reviewed by the Engineer and ECO. The Contractor may only implement a revised Method Statement once he receives formal written approval from the PE to do so. The Contractor must also obtain approval from the Engineer for any deviation from a Method Statement.

The ECO and Engineer must retain records of any amendments to any Method Statement and ensure that the most current version of all Method Statements are being used.

REQUIRED METHOD STATEMENTS

Method Statements that are identified and required from the Contractor in terms of this EMPr includes the following activities:

- Location, layout and preparation of the contractors camp area and materials storage areas
- Location, layout and preparation of cement/concrete batching facilities including the methods employed for the mixing of concrete and the management of runoff water from such areas;
- Storm water management plan;
- Contaminated water management plan, including the containment of runoff and polluted water;
- Incident Response Method Statements (including details of methods for fuel spills and clean-up operations);
- Waste management and removal of waste from site;
- Erosion Control Method Statement; and
- Traffic diversions (only to be done in consultation with Traffic Authority).
- Alien Invasive Vegetation control

As mentioned, additional Method Statements may be identified and required by the Contractor, Engineer and/or ECO as the project unfolds.

5.5. LIMITATIONS AND ASSUMPTIONS REGARDING ASSESSMENT AND MITIGATING OF IMPACTS

The assumption is that all significant issues have been identified during the development of the EMPr.

Environmental issues, concerns and development constraints were identified using professional judgement, project information, experience of similar projects, a review of available literature, site visits and consultation with the authorities.

The significance of environmental issues was evaluated and mitigation and management measures were identified as part of the EMPr development.

The effectiveness of the EMPr is limited by the level of adherence to the conditions set forth in this report by the Project Developer and the various contractors and agents acting on behalf of the Project Developer.

It is further assumed that compliance with the EMPr will be monitored and audited on a regular basis as set out in the EMPr. It should also be noted that this EMPr is a dynamic document that must be continually updated, as and when required. Also, all other documents from the Project Developer must be referred to in addition to this EMPr.

6. SUMMARY OF ACTIVITIES AND ASPECTS CAUSING IMPACTS

The construction and operation of the Karpowership Projects can potentially impact on the receiving environment as a result of the following aspects:

- Site layout and design;
- Site establishment, including set up of the contractors camp area and stockpiling;
- Clearing of indigenous vegetation;
- Clearing of alien invasive plants;
- Levelling out the ground;
- Installation of stormwater drains;
- Installation of temporary sewerage system / chemical toilets
- Installation of electrical conduits, overhead powerlines and equipment;
- Installation of communication systems;
- Improving the access road to site and establishment of working corridor;
- Erecting fencing;
- Planting and watering of revegetated areas; and
- Temporary storage of waste.
- Hydrocarbon spills from construction vehicles

The above-mentioned aspects of the Project can potentially cause the following negative environmental impacts, but not limited to:

- Pollution of the marine environment;
- Disturbance to the estuarine environment;
- Impact to CBA areas;
- Disturbance of the benthic environment;
- Change in temperature of the water;
- Loss of biodiversity through clearance of vegetation and disturbance of topsoil;
- Soil and water pollution from hazardous chemicals and waste;
- Degradation of air quality through increased dust, noise and odour levels and disturbance of neighbouring residents and animals;
- Increased runoff, erosion and downstream sedimentation of water courses;
- Increased colonisation of alien invasive vegetation; and
- Increased traffic on local roads as a result of construction vehicles

In order to prevent and/or minimise these impacts, care must be taken when embarking on activities throughout all phases of the project lifecycle.

This can be achieved by effective implementation of the necessary mitigation measures as stipulated in this EMPr. With adequate management, the associated risks and significant negative impacts of the proposed project can be minimised and/or entirely negated. These will all be dealt with in this EMPr.

7. DETAILED ENVIRONMENTAL MANAGEMENT PROGRAMME

This Section provides environmental specifications that must be adhered to all phases of the project. It is essential that all listed specifications are considered and incorporated into the project's contractual and other documentation, and adhered to during the respective phases of the project.

The environmental specifications must be regarded as the minimum environmental controls to be implemented for the project. They must not be regarded as exhaustive. The EMPr is a dynamic document and changes may be required, if instructed by the relevant environmental authority or upon request by interested and affected parties. Such amendments to the EMPr will follow a formal process prior to publishing a revised version of this EMPr.

Environmental specifications have been listed in tables below as per the following phases:

- Planning and Pre-Construction phase;
- Construction phase
- Post-Construction and Rehabilitation Phase
- Operational Phase

For each specification the responsibility and frequency of monitoring is indicated, where applicable.

7.1. PART A: ENVIRONMENTAL MANAGEMENT PROGRAMME FOR THE DEVELOPMENT OF OVERHEAD ELECTRICITY TRANSMISSION AND DISTRIBUTION INFRASTRUCTURE

The following section will provide environmental specifications for the proposed Overhead Electricity Transmission and Distribution Infrastructure which has been drawn up in accordance to the DEA (2019) EMPr relevant to an application for Overhead Electricity Transmission and Distribution Infrastructure which require environmental authorisation as identified in terms of Section 24(2) of the Act.

This section of the EMPr must be read together with the Generic EMPr, developed in terms of Appendix 2 of GN No. 435 dated 22 March 2019. Where there are any potentially perceived conflict, the generic EMPr will take precedence.

1. Objective

The objective of the generic EMPr is to prescribe and pre-approve generally accepted impact management outcomes and impact management actions, which can commonly and repeatedly be used for the avoidance, management and mitigation of impacts and risks associated with the development or expansion of substation infrastructure for the transmission and distribution of electricity. The use of a generic EMPr is intended to reduce the need to prepare and review individual EMPrs for applications of a similar nature.

2. Scope

The scope of the generic EMPr applies to the development or expansion of substation infrastructure for the transmission and distribution of electricity requiring EA in terms of NEMA. This generic EMPr applies to activities requiring EA, mainly activity 11 and 47 of the Environmental Impact Assessment Regulations Listing Notice 1 of 2014, as amended, and activity 9 of the Environmental Impact Assessment Regulations Listing Notice 2 of 2014, as amended, and all associated listed or specified activities necessary for the realization of such infrastructure.

7.2. Planning and Design Phase, Pre-Construction Activities

7.2.1 Environmental Training Awareness					
Impact Management Outcome: All onsite staff are aware and understands the individual responsibilities in terms of this EMPr.					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible person	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
1. All staff must receive environmental awareness training prior to commencement of work at the project. 2. All personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting, or hunting terrestrial species (e.g., guineafowl and francolin), and owls, which are often persecuted out of superstition. Signs must be put up to enforce this. 3. All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limit (40km/h), to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited 4. The Contractor must allow for sufficient sessions to train all personnel with no more than 20 personnel attending each course; 5. Refresher environmental awareness training must be done	ECO & Contractor	Weekly toolbox talks and awareness training	ECO	Monthly	Record of attendance to the toolbox talks and awareness training must be filed in the Site Environmental File

periodically. 6. All staff must be aware of the conditions and controls linked to the EA and the EMPr and be aware of individual roles and responsibilities in achieving compliance with the EA and EMPr; 7. The Contractor must procure and display environmental information posters as part of site establishment. 8. Environmental awareness training must include as a minimum the following: a) Description of significant environmental impacts related to the project / construction activities b) Mitigation measures to be implemented when carrying out specific activities; c) Emergency preparedness and response procedures; d) Procedures to be followed when working near or within sensitive areas; e) Wastewater management procedures; f) Water usage and conservation; g) Solid waste management procedures; h) Fire prevention; and i) Disease prevention. 9. Records must be retained for all environmental training that takes place for the full duration of the project, including attendance registers; 10. Educate workers that form part of the pre construction team on the dangers of fires; 11. Course material must be available and presented in appropriate languages that all staff can understand. 12. The cost-effective qualitative monitoring of the rehabilitation area may be time based through the use of periodic photographs taken from permanent photo points. These points are required to be established during site inception. The timeline created between the pre- and post-	ECO & Contractor	Weekly toolbox talks and awareness training	ECO	Monthly	Record of attendance to the toolbox talks and awareness training must be filed in the Site Environmental File

rehabilitation photos will provide an invaluable visual representation of the progress that is conveyed in a straightforward manner. The photographer should be an environmental scientist therefore allowing an expert assessment of the site adding to the qualitative information gathered from the photographs.					

PLANNING AND DESIGN PHASE, PRE-CONSTRUCTION ACTIVITIES

7.2.2. Access restricted areas					
Impact Management Outcome: Impact on restricted areas are avoided through effective demarcation and management of these areas					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible person	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
1. Restricted access areas will be informed by the environmental assessment and pre construction site walk. Additional areas may be indicated by the ECO during construction 2. A temporary barrier with clear signage must be in place around the perimeter of any access restricted area at all times. 3. Unauthorized access or construction related activity inside access restricted areas is prohibited. 4. A full site walk-through should be conducted in the summer prior to any construction activities to list all SCC and associated permits should be obtained for their removal or transplantation. 5. All SCC must be compensated for at a ratio of at least 3:1 either in gardens or as part of restoration and conservation efforts within the Richards Bay IDZ.	Ecologist ECO	Demarcation of sensitive areas with danger tape or barrier netting and identification of floral species of conservation concern	ESO ECO	Daily Fortnightly	Site Inspection

7.2.3. Access routes					
Impact Management Outcome: Dedicated and approved routes identified for future access roads					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible person	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
1. Access to the corridor and tower positions must be negotiated (by the client and construction manager) with the relevant landowner and must fall within the assessed and authorised area; 2. An access agreement must be formalised and signed by the DPM, Contractor and landowner before commencing with the activities; 3. Maximum use of both existing servitudes and existing roads must be made to minimize further disturbance through the development of new roads; 4. In circumstances where private roads needs to be used, the said roads must be recorded and agreed by the landowner, the DPM, and the contractor; 5. Installation of new gates to be discussed with affected landowners to ensure that safety of access is taken into consideration and maintained. 6. The use of existing servitudes/corridors must be discussed with the relevant landowners before construction commences. 7. Any new access roads must only be established after discussion with the relevant landowners before access to site. 8. Installation of new gates to be discussed with affected landowners to ensure that safety of access is discussed and maintained. 9. Any damage to an existing fence must be repaired to the satisfaction of the landowner.	ECO		ECO		Access agreement with landowners

10. No off-road driving should be allowed, and only designated roads used for site and monopole access. 11. As per the wetlands specialist recommendations: 12. Soft engineering (grassed swales (Teff Grass or Red Grass ideal for this climate)) instead of hard gutters should be used where possible. 13. Crossing structures utilised must be wide enough to allow diffuse, unhindered through-flow of the wetland systems and avoid impoundment upslope. 14. Cut and fill must be avoided where possible during the set-up of the construction camp. The utilisation of the already heavily disturbed areas should be encouraged.					

7.3. Construction Phase Activities

7.3.1. Site Establishment					
Impact Management Outcome: Impacts relating to site establishment are minimised.					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible person	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
1. All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limit (40km/h), to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited. 2. Use environmentally friendly cleaning and dust suppressant products. 3. Site Establishment method statement must be provided by the contractor prior to any onsite activity. This method statement must include the following as applicable: - Construction area layout / plan showing the location of key infrastructure and services, offices, overnight vehicle parking areas, hazardous and general materials stores, workshop, stockpile and lay down areas, batching plant, designated access routes, equipment cleaning areas, proposed placement of staff accommodation, cooking and ablution facilities, waste and wastewater management; 4. Location of construction areas must be within the approved area to ensure that the site does not impact on sensitive areas 5. Camp establishment must take place where possible on previously disturbed areas; 6. The construction area must be fenced in accordance with Section: Fencing and gate installation; and	Contractor and ESO	Method Statement and layout of construction camps / laydown areas to be compiled and approved by the ECO	ECO	Once-off	Approved Method Statement and Layout Plan

7. The use of existing accommodation for contractor staff is encouraged. 8. No contaminated runoff or grey water is allowed to be discharged from the construction camp, this must be planned for when establishing site. 9. Herbicides should only be utilised where manually removing is not possible. Herbicides utilised are restricted to products which have been certified safe for use in wetland areas by an independent testing authority. The ECO must be consulted before the purchase of any herbicide. 10. Water used on site must be from an approved source.					

7.3.2. Access roads					
Impact Management Outcome: Construction vehicle movement are restricted to approved routes to minimise disturbance					
Impact Management Actions	**Implementation**		**Monitoring**		
1. Access roads must fall within the authorized areas only, all contractors must be made aware of these approved	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**

access routes. 2. Where possible, existing access routes and walking paths must be made use of. 3. The access roads to tower positions must be signposted before the commencement of the activities; 4. All existing roads used for access to the corridor must be maintained by the contractor 5. Any access route deviations will be considered non-compliance with the EMPr; 6. In circumstances where private roads needs to be used, approval must be sought via the ECO and the said roads must be recorded, prior to doing so. 7. Access roads on level land must follow fence lines and tree belts to avoid fragmentation of vegetated areas or croplands 8. The use of access roads and private roads must comply with all road legislation pertaining to driving including adhering to road safety standards. 9. Installation of new gates to be discussed with affected landowners to ensure that safety of access is considered and maintained. 10. Any damage to an existing fence must be repaired by the contractor to the satisfaction of the landowner.	-Contractor	Access routes must be mapped prior to construction	ESO ECO	Fortnightly	Site Inspection

7.3.3. Fencing and gate installation					
Impact Management Outcome: Construction of fencing and gate should not occur within sensitive environments					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible person	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
1. Use existing gates provided to gain access to all parts of the area authorised for development, where possible; 2. The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments. Signs must be put up to enforce this. 3. Existing and new gates to be recorded and documented 4. All gates must be fitted with locks and be kept locked at all times, unless otherwise agreed with the landowner; 5. At points where the line crosses a fence in which there is no suitable gate within the extent of the line corridor, on the instruction of the DPM, a gate must be installed at the approval of the landowner; 6. Care must be taken that the gates must be so erected that there is a gap of no more than 100 mm between the bottom of the gate and the ground; 7. Where gates are installed in jackal proof fencing, a suitable reinforced concrete sill must be provided beneath the gate; 8. Original tension must be maintained in the fence wires; 9. All gates installed in electrified fencing must be re-electrified; 10. All demarcation fencing and barriers must be maintained in good working order for the duration of overhead transmission and distribution electricity infrastructure development activities; 11. Fencing must be erected around the camp, batching plants, hazardous storage areas, and all designated access restricted areas, where appropriate and would not cause	Contractor	Access routes must be mapped prior to construction	ESO ECO	Fortnightly	Site Inspection

harm to the sensitive flora; 12. Any temporary fencing to restrict the movement of life-stock must only be erected with the permission of the land owner. 13. All fencing must be developed of high quality material bearing the SABS mark; 14. The use of razor wire as fencing must be avoided; 15. Fenced areas with gate access must remain locked after hours, during weekends and on holidays if staff is away from site. Site security will be required at all times; 16. On completion of the construction phase all temporary fences are to be removed; 17. The contractor must ensure that all fence uprights are appropriately removed, ensuring that no uprights are cut at ground level but rather removed completely.					

7.3.4. Water Supply Management					
Impact Management Outcome: Water for construction is compliant with the requirements of the National Water Act (Act No. 36 of 1998).					
Impact Management Actions	**Implementation**		**Monitoring**		
1. Ensure water conservation is being practiced by: a. Minimising water use during cleaning of equipment; b. Undertaking regular audits of water systems; and c. Including a discussion on water usage and conservation during environmental awareness training (Toolbox Talks). The use of grey water is encouraged.	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
	Contractor	Water abstraction from municipal sources or licenced sources	ECO	Fortnightly	Site inspection Proof of water use authorisation for the abstraction of water (if applicable).

7.3.5. Storm and waste water management					
Impact Management Outcome: Avoid, prevent and manage impacts related to storm and waste water.					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible person	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
1. Runoff from concrete batching areas must be strictly controlled, and contaminated water must be collected, stored and either treated or disposed of off-site, at an appropriately registered disposal site. 2. All hydrocarbon spills must be controlled by the use of an approved absorbent material and the used absorbent material disposed of at an appropriate waste disposal facility; 3. Natural storm water runoff not contaminated during construction, and clean water, can be discharged directly to watercourses and water bodies, subject to the Project Manager's approval and support by the ECO; 4. Water that has been contaminated with suspended solids must be treated by means of settlement ponds. The release of settled water back into the environment must be subject to the Project Manager's approval and support by the ECO. 5. It is recommended that sandbags and temporary berms be used, to manage stormwater runoff (if storms do occur). Temporary stormwater systems must be sufficient to manage the stormwater at the site during construction. 6. Ensure that eroded areas are re-vegetated, to ensure reduced sedimentation risk and reduced runoff volumes to the streams. 7. The impoundment of water upslope due to the proposed development must be avoided. This is specifically relevant	Project Manager	Detailed SWMP, if any	ECO	Fortnightly	Approval of SWMP, if any

at the points where the proposed development will cross wetlands as per the current design (preferred alternative) and following wetlands: FP03 and UVB04. 8. Silt traps must be erected at the base of the slopes leading into the downstream wetlands and around all site camps, spill sites, access roads and temporary structures. Removal of sediment from the erected silt traps must take place on a weekly basis.					

TRANSMISSION LINE – CONSTRUCTION AND POST CONSTRUCTION PHASE ACTIVITIES

7.3.6. Solid and hazardous waste management					
Impact Management Outcome: The management of hazardous substances is undertaken in accordance with the Hazardous Substances Act (Act No. 15 of 1973).					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible person	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
1. All measures regarding waste management must be undertaken using an integrated waste management approach; 2. Sufficient, covered waste collection bins (scavenger and weatherproof) must be provided; 3. A suitably positioned and clearly demarcated waste collection site must be identified and provided; 4. The waste collection site must be maintained in a clean and orderly manner; 5. Waste must be segregated into separate bins and clearly marked for each waste type for recycling and safe disposal; 6. Staff must be trained in waste segregation; 7. Bins must be emptied regularly; 8. General waste produced onsite must be disposed of at registered waste disposal sites/ recycling company; 9. Hazardous waste must be disposed of at a registered waste disposal site; 10. Safe disposal records must be maintained for all waste types.	Contractor	Bunding of hazardous storage sites	ESO ECO	Ongoing	Site inspection of hazardous storage areas and inspection of drip trays and impervious surfaces

7.3.7. Protection of watercourses and estuaries					
Impact Management Outcome: Impact to watercourses and estuaries are managed in adherence to legislation and specialist recommendations					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible person	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
1. All watercourses must be protected from direct or indirect spills of pollutants such as solid waste, sewage, cement, oils, fuels, chemicals, aggregate tailings, wash and contaminated water or organic material resulting from the Contractor's activities; 2. In the event of a spill, prompt action must be taken to clear the polluted or affected areas; 3. No construction equipment must traverse any seasonal or permanent wetland. 1. No return flow into the estuaries must be allowed and no disturbance of the Estuarine Functional Zone should occur; 2. Development of permanent watercourse or estuary crossing must only be undertaken where no alternative access to tower position is available; 3. There must not be any impact on the long term morphological dynamics of watercourses or estuaries; 4. Existing crossing points must be favored over the creation of new crossings (including temporary access). 5. Temporary and permanent erosion control methods may include silt fences, flotation silt curtains, retention basins, detention ponds, interceptor ditches, seeding and sodding, riprap of exposed embankments, erosion mats, and mulching.	Contractor	Demarcation of watercourses and sensitive areas maintaining the specified buffers	ECO	Fortnightly	Watercourses and sensitive areas are marked as restricted areas

6. Placing a suitable geotextile in areas near or on-top of watercourses/wetlands, before placement of the soils, may help maintain some sub-surface soil processes. 7. Temporary stormwater channels and preferential flow paths should be filled with aggregate and/or logs (branches included) to dissipate and slow flows limiting erosion. 8. Mangrove and swamp forest habitat must be avoided. 9. When working in or near any watercourse or estuary, the following environmental controls and consideration must be taken: a) Water levels during the period of construction; No altering of the bed, banks, course or characteristics of a watercourse b) During the execution of the works, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented e.g. including ensuring that construction equipment is well maintained; c) Where earthworks is being undertaken in close proximity to any watercourse, slopes must be stabilised using suitable materials, i.e. sandbags or geotextile fabric, to prevent sand and rock from entering the channel; and d) Appropriate rehabilitation and re-vegetation measures for the watercourse banks must be implemented timeously. In this regard, the banks should be appropriately and incrementally stabilised as soon as development allows. 10. Temporary stormwater channels and preferential flow					

paths should be filled with aggregate and/or logs (branches included) to dissipate and slow flows limiting erosion. 11. If long periods of flow obstruction may be required, during periods of flow, intermitted releases of water, for a few hours every few days should be allowed for. 12. Water quality monitoring of the nearby river if there are visual signs of any sedimentation or surface pollution. 13. Install a temporary cut off trench to contain poor quality runoff. 14. Construction within and in the nearby vicinity of all watercourses or wetlands must proceed mainly during the dry, winter months where possible in order to minimize soil erosion linked to high runoff rates 15. Surface water monitoring if there are visual signs of soil pollution. 16. During the constructions of transmission lines within wetland areas, a Wetland Specialist must be present to ensure that construction are not entering sensitive environments (e.g: Mangrove Forest) and to ensure mitigation measures outlined in the Wetland Report are being followed. 17. In wetland areas including reed beds, the construction of berms should be avoided as far as possible. Construction measures must consist of the least impactful individual erection of monopole structures. No linear 3m corridors should be cleared of vegetation in these areas but individual drilled foundations used.					

7.3.8. Vegetation clearance					
Impact Management Outcome: Vegetation clearance and associated impacts are minimised					
Impact Management Actions	**Implementation**		**Monitoring**		
General: 1. Erosion control and alien invasive management plan must be compiled. 2. Indigenous vegetation which does not interfere with the development must be left undisturbed; 3. Protected or endangered species may occur on or near the construction site. Special care should be taken not to damage such species; 4. Areas of already fragmented indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible. Clearing beneath transmission lines should be avoided. 5. Search, rescue and replanting of all protected and endangered species likely to be damaged during project development must be identified by the relevant specialist and completed prior to any construction or clearing; 6. Search and Rescue plan must be developed for confirmation of those species of conservation concern that have a high probability of occurrence, and which will be impacted by the proposed infrastructure. 7. Relevant Permits must be obtained prior to the cutting or clearing of the affected species, and they must be filed on the site Environmental File; 8. The Environmental Audit Report must confirm that all identified species have been rescued and replanted and that	**Responsible person** Contractor Ecologist	**Method of implementation** Working within demarcated areas AIP eradication and control Once off	**Responsible Person** ESO ECO Ecologist	**Frequency of monitoring** Weekly Fortnightly Quarterly (per year)	**Mechanism for monitoring compliance** Site Inspection

the location of replanting is compliant with conditions of approvals; 9. Trees felled due to construction must be documented and form part of the Environmental Audit Report; 10. Rivers and watercourses must be kept clear of felled trees, vegetation cuttings and debris; 11. Only a registered pest control operator may apply herbicides on a commercial basis; 12. A daily register must be kept of all relevant details of herbicide usage; 13. No herbicides must be used in estuaries; 14. All protected species and sensitive vegetation not removed must be clearly marked and such areas fenced off in accordance to *Section: Access restricted areas*. 15. The land beneath the transmission line, and any other areas required for construction, but not for the operational phase, should be rehabilitated with indigenous species to retain connectivity within the system. 16. Construction measures must consist of the least impactful individual erection of monopole structures and all protected species avoided where possible. 17. A full site walk-through should be conducted prior to any construction activities to list all SSC and associated permits should be obtained for their removal or transplantation. 18. Should protected trees be disturbed by the proposed project, a compensation ratio of 1:5 will apply for each protected tree removed and it is the responsibility of the developer to determine the offsite area or to negotiated with the land owner for the area to plant those trees.					

19. Transplantable indigenous trees or seedlings should be transplanted to a suitable place prior the commencement of the activities 20. Restoration of areas utilised during construction, but not operation, should be considered in conjunction with the respective land owners. **Corridor:** 21. Vegetation that does not grow high enough to cause interference with overhead transmission and distribution infrastructures, or cause a fire hazard to any plantation, must not be cut or trimmed unless it is growing in the road access area, and then only at the discretion of the Project Manager; 22. Where clearing for access purposes is essential, the maximum width to be cleared within the corridor must be in accordance to distance as agreed between the land owner and the EA holder 23. Alien invasive vegetation must be removed according to a plan (in line with relevant municipal and provincial procedures, guidelines and recommendations) and disposed of at a recognised waste disposal facility; 24. Vegetation must be trimmed where it is likely to intrude on the minimum vegetation clearance distance (MVCD) or will intrude on this distance before the next scheduled clearance. MVCD is determined from SANS 10280; 25. Debris resulting from clearing and pruning must be disposed of at a recognised waste disposal facility, unless the landowners wish to retain the cut vegetation; 26. In the case of the development of new overhead transmission and distribution infrastructures, a one metre "trace-line" must be cut through the vegetation for stringing					

purposes only and no vehicle access must be cleared along the ”trace-line”. Alternative methods of stringing which limit impact to the environment must always be considered. 27. A walk through of the site prior to any construction to determine the presence of any Species of Conservation Concern (this is currently underway). 28. Application for permits for removal of any SCC where required (this is currently underway). 29. All working areas must be demarcated with safety tape and site construction disturbances be limited to within the demarcated area to prevent disturbing a wider area. 30. Felled trees must be stockpiled and not prevent movement off vehicles, people and drainage lines. 31. Landowners are to be notified about wood stockpiles and for the wood to be given away or taken to a dedicated vegetation waste collection site. 32. Notifying the landowner about wood stockpiles prevents contractors being sued in case of fire which the stockpile can be biomass fuel of the rampant fire. 33. A record of notification from the landowner with regards to wood stockpiling must be kept at the construction site. 34. The use of herbicides to treat stumps must be in line with the approved Eskom Vegetation Management standard. 35. In natural areas, the construction of a corridor should be avoided wherever possible. Construction measures must consist of the least impactful individual erection of monopole structures. No linear 3m corridors should be cleared of vegetation in these areas but individual drilled foundations used.					

7.3.9. Protection of fauna					
Impact Management Outcome: Impacts on fauna are minimized through adherence to EMPr requirements.					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible person	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
1. A total of 12-month monitoring have been conducted over the period 2020-2023 as part of pre-construction baseline monitoring. A second 12-month post construction monitoring programme will commence as soon as construction is complete. 2. Results from the monitoring will inform implementation of and any enhancement to the proposed mitigation measures to ensure the development does not have a long-term impacts on the SCCs and migratory waders in the area. 3. A follow-up assessment on avian biodiversity and species abundance within the assessment area and surrounding areas must be conducted within one year after the facility has been in operation and should be repeated every 3-5 years. A monitoring plan has been developed for the site and monitoring is currently ongoing. Information obtained from the monitoring must be provided to BirdLife Renewable Energy Programme on energy@birdlife.org.za. The data must be presented as described in Jenkins et al., 2017. 4. All project activities must be undertaken with appropriate noise mitigation measures to avoid disturbance to avifauna population in the region. 5. No interference with livestock must occur without the landowner's written consent and with the landowner or a person representing the landowner being present;	Contractor Ecologist	Awareness Training Injuring, capturing, killing of animals identified on site must be reported as an environmental incident and investigated Once off	ECO Ecologist Avian Specialist	Fortnightly Quarterly (per year) Monthly, for a minimum of 12 months	Training material relating to wildlife management

6. A walk-though must be done prior to construction to locate any nests, especially of any Species if Conservation Concern, which then should be dealt with on a case-by-case basis by an avifauna specialist. 7. The breeding sites of raptors and other wild birds species must be taken into consideration during the planning of the construction programme; 8. Breeding sites must be kept intact and disturbance to breeding birds must be avoided. Special care must be taken where nestlings or fledglings are present; 9. Nesting sites on existing parallel lines must documented; 10. Special recommendations of the avian specialist must be adhered to at all times to prevent unnecessary disturbance of birds; 11. Bird guards and diverters must be installed on the new line as per the recommendations of the Avifauna specialist; 12. No poaching must be tolerated under any circumstances. All animal dens in close proximity to the works areas must be marked as Access restricted areas; 13. No killing of fauna is allowed; 14. No Threatened or Protected species (ToPs) and/or protected fauna as listed according NEMBA (Act No. 10 of 2004) and relevant provincial ordinances may be removed and/or relocated without appropriate authorisations /permits. 15. Restoration of areas utilised during construction, but not operation, should be considered in conjunction with the respective landowners. 16. Add bird diverters to all sections of the line as it goes up. 17. Design the over-water line to stop birds perching on it and to stop them colliding with it (via diverters). 18. All new overhead pylons must be made bird-friendly to					

avoid electrocutions. 19. The use of static or dynamic marking devices can make the lines more conspicuous (particularly earth-wires). Various marking devices (spirals, bird flappers) have been used globally, and those tested reduce collisions between 50% and 92% relative to un-mitigated controls. 20. All pylons must follow the approved bird-friendly design to avoid electrocution of any species. 21. Avoid any active nests (some ground-nesters may be found on the beach). 22. Avoid polluting the area with plastics or human waste – all material to be disposed of in suitable receptacles. 23. Reduce the extent of human disturbance around the transmission line. 24. Speed limits should be posted and not exceed 40km/hr, especially at night when nocturnal and crepuscular species tend to rest on roads. 25. The monitoring must include the following (as per BARESG guidelines): a. Construction monitoring should be started as the lines are erected; b. All carcasses should be photographed with a GPS, in situ, and identified and recorded. c. The search area should be defined and consistently applied throughout the monitoring period; 26. Where avian fatalities are found to occur (i) to Red Data species, or (ii) at unacceptably high levels, to priority species, then the mitigation measures in the monitoring BARESG guidelines must occur. 27. Outside lighting should be designed and limited to					

minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided and sodium vapor (red/green) motion detection lights should be used wherever possible.					

7.3.10. Protection of heritage resources					
Impact Management Outcome: Impacts on heritage resources are minimised through adherence to EMPr requirements.					
Impact Management Actions	**Implementation**		**Monitoring**		
1. In terms of the heritage aspect, no sites were recorded for possible finds. 2. No heritage sites have been recorded in the study area. The project should be exempt from further HIA mitigation, especially for the maritime aspect since the harbour dredging removed all potential heritage deposits. A Chance Find protocol will be initiated during construction. 3. As a precaution, the following mitigation measures must be noted, in the case of a heritage find on site. 4. The rescue of fossils during earth works critically depends on spotting this material immediately as it is uncovered. The contractor must carry out general monitoring of excavation activity for potential fossils, artefacts and	**Responsible person** Contractor Paleontologist/ Archeologist	**Method of implementation** Awareness Training Injuring, capturing, killing of animals identified on site must be reported as an environmental incident and investigated	**Responsible Person** ECO	**Frequency of monitoring** Fortnightly	**Mechanism for monitoring compliance** Training material relating to wildlife management

material of heritage importance; 5. All work must cease immediately, if any human remains and/or other archaeological, paleontological and historical material are uncovered. Such a find must be reported to the ECO. 6. The subsequent process to be followed in the case of a find is: It must be reported to the nearest museum, archaeologist/ paleontologist (or the South African Police Services). Sufficient time must be allowed to remove/collect such material before construction recommences. 7. Identify and appoint stand-by paleontologist should paleontological finds be uncovered by earthworks. 8. Construction personnel to be alert for rare fossil bones and follow a Fossil Finds Procedure. 9. Exposed fossiliferous sections in earthworks must be recorded and sampled by appointed paleontologist. 10. The Environmental Control Officer (ECO) and contractor must inform staff of the need to watch for potential fossil occurrences as part of the Environmental Awareness training. 11. In the case of a significant find, a paleontologist must undertake the recording of the stratigraphic context and sedimentary geometry of the exposure and the compilation of the report to Heritage KZN. 12. Should maritime archaeology be discovered, SAHRA, as the relevant authority which deals underwater cultural heritage, must be contacted immediately, and approval must be obtained should there be need to demolish or		Once off			

remove such maritime archaeology site. Demolition / construction work may only commence or continue once SAHRA's approval has been obtained.					

7.3.11. Safety of the public					
Impact Management Outcome: All precautions are taken to minimise the risk of injury, harm or complaints.					
Impact Management Actions	**Implementation**		**Monitoring**		
1. Identify fire hazards, demarcate and restrict public access to these areas as well as notify the local authority of any potential threats e.g. large brush stockpiles, fuels etc.; 2. All unattended open excavations must be adequately fenced or demarcated; 3. Adequate protective measures must be implemented to prevent unauthorised access to and climbing of partly constructed towers and protective scaffolding; 4. Ensure structures vulnerable to high winds are secured; 5. Maintain an incidents and complaints register in which all incidents or complaints involving the public are logged.	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
	Contractor	Awareness Training Injuries and complaints on site must be reported as an environmental incident and investigated	ECO	Fortnightly	Training material relating to health and safety for the public

7.3.12. Sanitation			
Impact Management Outcome: No pollution or disease arises in terms of poorly maintained ablution / sanitation facilities or lack thereof.			
Impact Management Actions	**Implementation**	**Monitoring**	

1. Mobile chemical toilets are installed onsite if no municipal sewer services are available; 2. The indiscriminate use of the veld / construction site for the purposes of ablutions must be forbidden under all circumstances; 3. Where mobile chemical toilets are required, the following must be ensured: a) Toilets are located no closer than 100m from any watercourse or water body; b) Toilets are secured to the ground to prevent them from toppling over; c) No spillage occurs when the toilets are serviced and the contents are disposed by a registered service provider; d) Toilets have an external closing mechanism and are closed and secured from the outside when not in use; e) Toilets are emptied before long weekends and workers holidays, and must be locked after working hours; f) Toilets are serviced regularly and the ECO must inspect toilets to ensure compliance to health standards; g) A copy of the waste disposal certificates must be retained on the Environmental File	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
	Contractor	Provision of ablution facilities during construction Management of facilities	ESO ECO	Daily Fortnightly	Proof of servicing and safe disposal

7.3.13. Preventative health factors					
Impact Management outcome: All necessary precautions linked to the spread of disease are taken.					
Impact Management Actions	**Implementation**		**Monitoring**		
1. Undertake environmentally-friendly pest control in the camp area;	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**

2. Ensure that the workforce is sensitised to the effects of sexually transmitted diseases such as HIV / AIDS; 3. The Contractor must ensure that information posters on HIV / AIDS are displayed in the Contractor Camp area; 4. Information and education relating to sexually transmitted diseases to be made available to both construction workers and local community, where applicable; 5. Free condoms must be made available to all staff on site at central points; 6. Medical support must be made available; 7. Provide access to Voluntary HIV Testing and Counselling Services.	Contractor	Provision of services during pre- and construction phase	ESO	Daily Fortnightly	Proof of services on site

7.3.14. Emergency procedures					
Impact Management outcome: Emergency procedures are in place to enable a rapid and effective response to all types of environmental emergencies.					
Impact Management Actions	**Implementation**		**Monitoring**		
1. Compile an Emergency Response Action Plan (ERAP) prior to the commencement of the proposed project which must be submitted to Transnet Port Authority and DFFE for approval. 2. The Emergency Plan must refer to accidents, potential spillages and fires in line with relevant legislation; 3. All staff must be made aware of emergency procedures as part of environmental awareness training; 4. The relevant local authority must be made aware of any major fire incident as soon as it starts; 5. In the event of an environmental emergency necessary mitigation measures to contain the spill or leak must be implemented (see Hazardous Substances, Section 8.3.15).	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
	Contractor	Provision of emergency procedures during pre- and construction phase	ESO	Daily Fortnightly	Proof of emergency procedures on site

7.3.15. Hazardous substances					
Impact Management outcome: Safe storage, handling, use and disposal of hazardous substances.					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible person	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
1. Access to storage area for hazardous substances should be controlled. 2. The use and storage of hazardous substances to be minimised and non-hazardous and non-toxic alternatives substituted where possible; 3. All hazardous substances must be stored in suitable containers as defined in the relevant Method Statement; 4. Containers must be clearly marked to indicate contents, quantities and safety requirements; 5. All storage areas must be bunded. The bunded area must be of sufficient capacity to contain a spill / leak from the stored containers; 6. Bunded areas to be suitably lined with a SABS approved liner; 7. An Alphabetical Hazardous Chemical Substance (HCS) control sheet must be drawn up and kept up to date on a continuous basis on the site Environmental File 8. All hazardous chemicals that will be used on site must have Material Safety Data Sheets (MSDS); 9. All employees working with HCS must be trained in the safe use of the substance and according to the MSDS and appropriate personal protective equipment must be made	Contractor	Bunding of hazardous storage sites	ESO ECO	Daily Fortnightly	Site inspection of hazardous storage areas and inspection of drip trays and impervious surfaces

available to them 10. The Contractor must ensure that diesel and other liquid fuel, oil and hydraulic fluid is stored in appropriate storage tanks or in bowsers; 11. The tanks/ bowsers must be situated on a smooth impermeable surface (concrete) with a permanent bund. The impermeable lining must extend to the crest of the bund and the volume inside the bund must be 130% of the total capacity of all the storage tanks/ bowsers (110% statutory requirement plus an allowance for rainfall); 12. The floor of the bund must be sloped, draining to an oil separator. The bund must have a lockable outlet valve. 13. Provision must be made for refueling at the storage area by protecting the soil with an impermeable groundcover. Appropriate dispensing equipment and a drip tray must be used to ensure small spills are contained; 14. All empty externally dirty drums must be stored on a drip tray or within a bunded area or the dedicated hazardous waste skip on site 15. No unauthorised access into the hazardous substances storage areas must be permitted; 16. No smoking must be allowed within the vicinity of the hazardous storage areas; 17. Adequate fire-fighting equipment must be made available at all hazardous storage areas; 18. An appropriately sized spill kit kept onsite relevant to the scale of the activity/s involving the use of hazardous substance must be available at all times; 19. The responsible operator must have the required training to					

make use of the spill kit in emergency situations; 20. An appropriate number of spill kits must be available and must be located in all areas where activities are being undertaken; and 21. In the event of a spill, contaminated soil must be collected in containers and stored in a central location and disposed of according to the National Environmental Management: Waste Act 59 of 2008. Refer to Section 8.3.6 for solid and hazardous waste management.					

7.3.16. Workshop, equipment maintenance and storage					
Impact Management outcome: Soil, surface water and groundwater contamination is minimised.					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible person	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
1. All maintenance of vehicles and equipment must take place in the dedicated workshop area; alternatively at the respective contractor's own office workshop area 2. During servicing of vehicles or equipment, especially where emergency repairs are effected outside the workshop area, a suitable drip tray must be used to prevent spills onto the soil. 3. Leaking equipment must be repaired immediately or be removed from site to facilitate repair; 4. Workshop areas must be monitored for oil and fuel spills; The workshop area must have a bunded concrete slab that is sloped to facilitate runoff into a collection sump or suitable oil/ water separator where maintenance work on vehicles and	Contractor	Bunding of storage sites and inspection of equipment	ESO ECO	Daily Fortnightly	Site inspection of hazardous storage area, inspection of drip trays and impervious surfaces; and inspection and maintenance of onsite equipment

equipment can be performed; and 5. Water drainage from the workshop must be contained and managed in accordance Section: storm water management. 6. Strictly no washing of vehicles along local streams or rivers. Vehicles should preferably washed off site at a dedicated vehicle wash bay area. 7. As per the Hydrology specialist report, it is recommended that all vehicles are in good working order when entering the site (i.e., visual observations of any leakages that may emanate from the vehicle accessing the site) and parked in designated areas with drip trays. Weekly inspection of vehicles should be sufficient.					

7.3.17. Concrete Batching Plants					
Impact Management outcome: Minimise spillages and contamination of soil, surface water and groundwater**.**					
Impact Management Actions	**Implementation**		**Monitoring**		
1. Concrete mixing must be carried out on an impermeable surface; 2. Batching plants areas must be fitted with a containment facility for the collection of cement laden water. 3. Dirty water from the batching plant must be contained to prevent soil and groundwater contamination 4. Bagged cement must be stored in an appropriate facility and at least 10m away from any water courses, gullies and drains; 5. A washout facility must be provided for washing of concrete	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
	Contractor	Identification of area that is not sensitive and set-up batching plant	ESO ECO	Daily Fortnightly	Site inspection of batching plant area to ensure no contamination is occurring to environment

associated equipment. Water used for washing must be restricted; 6. Hardened concrete from the washout facility or concrete mixer can either be reused or disposed of at an appropriate licensed disposal facility; 7. Empty cement bags must be secured with adequate binding material if these will be temporarily stored on site; 8. Sand and aggregates containing cement must be kept damp to prevent the generation of dust (Refer to Section 8.3.18: Dust emissions) 9. Any excess sand, stone and cement must be removed or reused from site on completion of construction period and disposed at a registered disposal facility; 10. Temporary fencing must be erected around batching plants in accordance with Section: Fencing and gate installation.					

7.3.18. Dust emissions					
Impact Management outcome: Dust prevention measures are applied to minimise the generation of dust.					
Impact Management Actions	**Implementation**		**Monitoring**		
1. Take all reasonable measures to minimise the generation of dust as a result of project development activities to the	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**

satisfaction of the ECO; 2. Clearance of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces must be re- vegetated or stabilised as soon as is practically possible; 3. Environmentally friendly dust suppressants need to be utilised 4. Excavation, handling and transport of erodible materials must be avoided under high wind conditions or when a visible dust plume is present; 5. During high wind conditions, the ECO must evaluate the situation and make recommendations as to whether dust-damping measures are adequate, or whether work will cease altogether until the wind speed drops to an acceptable level; 6. Where possible, soil stockpiles must be located in sheltered areas where they are not exposed to the erosive effects of the wind; 7. Where erosion of stockpiles becomes a problem, erosion control measures must be implemented at the discretion of the ECO; 8. Vehicle speeds must not exceed 40 km/h along dust roads or 20 km/h when traversing unconsolidated and non-vegetated areas; 9. For significant areas of excavation or exposed ground, dust suppression measures must be used to minimise the spread of dust.	Contractor	Regular dust suppression techniques conducted.	ESO ECO	Daily Fortnightly	Site inspection of areas susceptible to dust and ensure suppression techniques are conducted.

7.3.19. Noise

Impact Management Outcome: Noise management is undertaken in accordance with SANS 10103 and the Occupational Health and Safety Act (Act No. 85 of 1993)

Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible person	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
1. The Contractor must keep noise levels within acceptable limits, and restrict the use of sound amplification equipment for communication and emergencies only; 2. All vehicles and machinery must be fitted with appropriate silencing technology and must be properly maintained; 3. Any complaints received by the Contractor regarding noise must be recorded and communicated. Records must be retained on the site Environmental File. 4. The Contractor must Develop a Code of Conduct for the construction phase in terms of acceptable conduct of construction staff on site. 5. Operating hours as determined by the environmental authorisation must be adhered to during the construction phase. 6. All project activities must be undertaken with appropriate noise mitigation measures to avoid disturbance to avifauna population in the region. 7. All construction operations should only occur during daylight hours if possible. Should the construction programme necessitate night shift work, permission must be sought via the ECO and Engineer. 8. No construction piling may occur at night. Piling must only occur during the day to take advantage of unstable atmospheric conditions. 9. Construction staff must receive “noise sensitivity” training such as switching off vehicles when not in use, as part of	Contractor	Compliance with SANS 10103 and OHS Act Use of appropriate PPE	ESO ECO	Daily Fortnightly	Inspection of Complaints Register Site inspection

the Environmental Awareness training / Toolbox Talks. 10. An ambient noise survey should be conducted at the noise sensitive receptors during the construction phase.					

7.3.20. Fire prevention					
Impact Management Outcome: Fire prevention measures are carried out in accordance with the relevant legislation.					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible person	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
1. A fire management plan needs to be compiled and implemented to restrict the impact fire might have on the surrounding areas. 2. Designate smoking areas where the fire hazard could be regarded as insignificant; 3. Designated smoking areas must prevent accidental spread of fire by either clearing 1m buffer of vegetation or locate smoking on concrete ground. 4. Cooking at the construction campsite must be done at designated cooking area. All fire safety equipment must be provided at cooking areas. 5. Firefighting equipment must be available on all vehicles located on site; 6. The local Fire Protection Agency (FPA) must be informed of construction activities; 7. Contact numbers for the FPA and emergency services must be communicated in environmental awareness training and	Contractor	Awareness Training	ECO	Fortnightly	Site Inspection

displayed at a central location on site; 8. In the case of larger capacity above ground fuel storage tanks, the local Fire Chief must inspect the bunded area and issue a certificate to verify it's safe.					

7.3.21. Stockpiling and stockpiling areas					
Impact Management outcome: Erosion and sedimentation as a result of stockpiling are reduced.					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible person	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
1. All material that is excavated during the project construction phase (during piling or earthworks) must be stored appropriately on site in order to minimise impacts to watercourses and water bodies; 2. All stockpiled material must be maintained and kept clear of weeds and alien vegetation growth by undertaking regular de-weeding and control methods; Topsoil stockpiles must not exceed 2m in height; 3. During periods of strong winds and heavy rain, the stockpiles must be covered with appropriate material (e.g. hessian cloth or tarpaulin); 4. Where possible, sandbags (or similar) must be placed at the bases of the stockpiled material in order to prevent erosion of the material.	Contractor	Bunding of stockpiling areas	ESO ECO	Daily Fortnightly	Site inspection of stockpiling areas.

7.3.22. Finalising tower position					
Impact Management outcome: No environmental degradation occurs as a result of the survey and pegging operations.					
Impact Management Actions	**Implementation**		**Monitoring**		
1. No new access roads must be developed to facilitate access for survey and pegging purposes; 2. Project manager, botanical specialist and contractor to agree on final tower positions based on survey within assessed and approved areas; 3. The surveyor is to demarcate (peg) access roads/tracks in consultation with ECO. No deviations will be allowed without the prior written consent from the ECO. 4. Add bird diverters or spirals (diurnal and nocturnal) to all new lines, to reduce fatality rates by 50% 5. Ensure all electrical infrastructure is bird-friendly to avoid electrocutions. 6. Marking, with bird diverters, all new overhead power lines that cannot run parallel with the existing lines. 7. Micro siting of the monopole structures and construction footprint should be done to ensure no protected species	**Responsible person** Contractor Ecologist	**Method of implementation** Preventative measures adhered to Once off	**Responsible Person** ECO	**Frequency of monitoring** Fortnightly	**Mechanism for monitoring compliance** Site inspections

are affected wherever practicable. 8. The existing pylon servitude adjacent to the Manzamnyama Canal and the existing berms must be used as the preferred route to minimise the disturbance footprint to the adjacent intertidal sand/mudflats of the canal. 9. The design of the proposed transmission line must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa (Jenkins et al., 2017). 10. Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used. 11. All the parts of the infrastructure must be nest proofed and anti-perch devices placed on areas that can lead to electrocution. 12. Any exposed parts must be covered (insulated) to reduce electrocution risk. 13. Follow existing routes where possible, staggering pylons and aligning transmission lines with existing lines, or setting the lines low.					

7.3.23. Excavation and installation of foundations		
Impact Management outcome: No environmental degradation occurs as a result of excavation or installation of foundations.		
Impact Management Actions	**Implementation**	**Monitoring**

1. All excess spoil generated during foundation excavation must be disposed of in an appropriate manner and at a recognized disposal site, if not used for backfilling purposes; 2. Spoil can however be used for landscaping purposes and must be covered with a layer of 150 mm topsoil for rehabilitation purposes; 3. Work area for establishing foundations for tower legs must be demarcated to limit disturbance within the demarcated areas thus minimizing rehabilitation cost. 4. Hazardous substances spills from equipment must be managed in accordance with Section 8.3.15: Hazardous substances. 5. Batching of cement to be undertaken in accordance with Section 8.3.17: Batching plants; 6. Residual cement must be disposed of in accordance with Section 8.3.6: Solid and hazardous waste management.	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
	Contractor	Preventative measures adhered to	ECO	Fortnightly	Site inspections

7.3.24. Assembly and erecting towers					
Impact Management outcome: No environmental degradation occurs as a result of assembly and erecting of towers.					
Impact Management Actions	**Implementation**		**Monitoring**		
1. Prior to erection, assembled towers and tower sections must	**Responsible person**	**Method of implementat**	**Responsible Person**	**Frequency of**	**Mechanism for monitoring**

be stored on an elevated surface (suggest wooden blocks) to minimise damage to the underlying vegetation; 2. In sensitive areas, tower assembly must take place off-site or away from sensitive positions; 3. The crane used for tower assembly must be operated in a manner which minimises impact to the environment; 4. The number of crane trips to each site must be minimised; 5. Wheeled cranes must be utilised in preference to tracked cranes; 6. Consideration must be given to erecting towers by helicopter or by hand where it is warranted to limit the extent of environmental impact; 7. Access to tower positions to be undertaken in accordance with access requirements in specified in Section : Access Roads; 8. Vegetation clearance to be undertaken in accordance with general vegetation clearance requirements specified in Section : Vegetation clearing; 9. No levelling at tower sites must be permitted unless approved by the Development Project Manager or Developer Site Supervisor; 10. Topsoil must be removed separately from subsoil material and stored for later use during rehabilitation of such tower sites; 11. Topsoil must be stored in heaps not higher than 1m to prevent destruction of the seed bank within the topsoil; 12. Excavated slopes must be no greater that 1:3, but where this is unavoidable, appropriate measures must be undertaken to stabilise the slopes; 13. Fly rock from blasting activity must be minimised and any pieces greater than 150 mm falling beyond the Working Area, must be collected and removed;		**ion**		**monitori ng**	**compliance**
	Contractor	Preventative measures adhered to	ECO	Fortnightly	Site inspections

14. Only existing disturbed areas are utilised as spoil areas; 15. Drainage is provided to control groundwater exit gradient with the spill areas such that migration of fines is kept to a minimum; 16. Surface water runoff is appropriately channeled through or around spoil areas; 17. During backfilling operations, care must be taken not to dump the topsoil at the bottom of the foundation and then put spoil on top of that; 18. The surface of the spoil is appropriately rehabilitated in accordance with the requirements specified in Section 8: Landscaping and rehabilitation; 19. The retained topsoil must be spread evenly over areas to be rehabilitated and suitably compacted to effect re-vegetation of such areas to prevent erosion as soon as construction activities on the site is complete. Spreading of topsoil must not be undertaken at the beginning of the dry season. 20. Use alternating black and white static pigtail flight diverters on the remaining transmission line spans as per Eskom guidelines. 21. Boundaries should be strictly maintained, and impacts retained within the boundary of the site.					

7.3.25. Stringing
Impact Management outcome: No environmental degradation occurs as a result of stringing.

TRANSMISSION LINE – CONSTRUCTION AND POST CONSTRUCTION PHASE ACTIVITIES

Impact Management Actions	Implementation		Monitoring		
	Responsible person	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
1. Where possible, previously disturbed areas must be used for the siting of winch and tensioner stations. In all other instances, the siting of the winch and tensioner must avoid Access restricted areas and other sensitive areas; 2. The winch and tensioner station must be equipped with drip trays in order to contain any fuel, hydraulic fuel or oil spills and leaks; 3. Refueling of the winch and tensioner stations must be undertaken in accordance with Section 8.3.15: Hazardous substances; 4. In the case of the development of overhead transmission and distribution infrastructure, a one metre "trace-line" may be cut through the vegetation for stringing purposes only and no vehicle access must be cleared along "trace-lines". Vegetation clearing must be undertaken by hand, using chainsaws and hand held implements, with vegetation being cut off at ground level. No tracked or wheeled mechanised equipment must be used; 5. Alternative methods of stringing which limit impact to the environment must always be considered e.g. by hand or by using a helicopter; 6. Where the stringing operation crosses a public or private road or railway line, the necessary scaffolding/ protection measures must be installed to facilitate access. If, for any reason, such access has to be closed for any period(s) during development, the persons affected must be given reasonable notice, in writing; 7. No services (electrical distribution lines, telephone lines, roads, railways lines, pipelines fences etc.) must be damaged because of stringing operations. Where disruption to services is unavoidable, persons affected must be given	Contractor	Preventative measures adhered to	ECO	Fortnightly	Site inspections

reasonable notice, in writing. 8. Where stringing operations cross cultivated land, damage to crops is restricted to the minimum required to conduct stringing operations, and reasonable notice (10 work days minimum), in writing, must be provided to the landowner;					

7.3.26. Temporary closure of site					
Impact Management outcome: Minimise the risk of environmental impact during periods of site closure greater than five days.					
Impact Management Actions	**Implementation**		**Monitoring**		
1. Bunds must be emptied (where applicable) and need to be undertaken in accordance with the impact management actions included in section: management of hazardous substances. 2. Hazardous storage areas must be well ventilated; 3. Fire extinguishers must be serviced and accessible. Service records to be filed and audited at last service; 4. Emergency and contact details displayed must be displayed; 5. Security personnel must be briefed and have the facilities to contact or be contacted by relevant management and emergency personnel; 6. Night hazards such as reflectors, lighting, traffic signage etc. must have been checked; 7. Fire hazards identified and the local authority must have been notified of any potential threats e.g. large brush stockpiles, fuels etc.; 8. Structures vulnerable to high winds must be secured;	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
	Contractor	Preventative measures adhered to	ECO	Fortnightly	Site inspections

9. Wind and dust mitigation must be implemented; 10. Cement and materials stores must have been secured; 11. Toilets must have been emptied and secured; 12. Refuse bins must have been emptied and secured; 13. Drip trays must have been emptied and secured.					

7.3.27. Landscaping, rehabilitation, and monitoring					
Impact Management Outcome: Post-construction and rehabilitation activities are undertaken in accordance with EMPR requirements					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible person	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
1. Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood and wind events. This will also reduce the likelihood of encroachment by alien invasive plant species. 2. Any woody material removed can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent further erosion. 3. Rehabilitation of the disturbed areas existing in the project area must be made a priority. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are endemic to this vegetation type. 4. All areas disturbed by construction activities must be subject to landscaping and rehabilitation; All spoil and waste must be disposed to a registered waste site and certificates of disposal provided; 5. All slopes must be assessed for contouring, and to contour only when the need is identified in accordance with the	Contractor Ecologist	Clean rehabilitated site free of litter and construction material Once off	ECO Ecologist Avian Specialist	Fortnightly Monthly (until closure of rehab) Monthly, minimum of 12months	Site Inspection, Record Keeping and ECO Reports

Conservation of Agricultural Resources Act, No 43 of 1983 6. All slopes must be assessed for terracing, and to terrace only when the need is identified in accordance with the Conservation of Agricultural Resources Act 43 of 1983; 7. Berms that have been created must have a slope of 1:4 and be replanted with indigenous species and grasses that approximates the original condition; 8. Rehabilitation of tower sites and access roads outside of farmland; 9. Indigenous species and/grasses must be used to compliment or match the original condition; 10. Stockpiled topsoil must be used for rehabilitation (refer to Section 8.3.21: Stockpiling and stockpiled areas); 11. Stockpiled topsoil must be evenly spread so as to facilitate seeding and minimise loss of soil due to erosion; 12. Before placing topsoil, all visible weeds from the placement area and from the topsoil must be removed; 13. Subsoil must be ripped before topsoil is placed; 14. The rehabilitation must be timed so that rehabilitation can take place at the optimal time for vegetation establishment; 15. Where impacted through construction related activities, all sloped areas must be stabilised to ensure proper rehabilitation is effected and erosion is controlled ; 16. Sloped areas stabilised using design structures or vegetation as specified in the design to prevent erosion of embankments. The contract design specifications must be adhered to and implemented strictly; 17. Spoil can be used for backfilling or landscaping as long as it is covered by a minimum of 150 mm of topsoil. 18. Where required, re-vegetation including hydro-seeding can be enhanced using a vegetation seed mixture as described below. A mixture of seed can be used provided the mixture is carefully selected to ensure the following:					

a) Annual and perennial plants are chosen; b) Pioneer species are included; c) Species chosen must be indigenous to the area with the seeds used coming from the area; d) Root systems must have a binding effect on the soil; e) The final product must not cause an ecological imbalance in the area 19. Development and implementation of an alien invasive plant species management plan, which would remove and control the alien vegetation within and bordering the site. 20. The land beneath the transmission line, and any other areas required for construction, but not for the operational phase, should be rehabilitated with indigenous species to retain connectivity within the system. 21. The development of a rehabilitation plan in line with port expansion plans and in conjunction with Transnet and the IDZ. 22. Monitoring plan of alien invasive plants must be implemented to prevent streamflow reduction on the Mhlatuze River. 23. Management interventions: Where avian fatalities are found to occur (i) to Red Data species, or (ii) at unacceptably high levels, to priority species, then the mitigation measures detailed above, should be brought into play. 24. We encourage the developers to release the results of the annual monitoring to the Endangered Wildlife Trust-Eskom partnership to be collated and assessed. In this way cumulative impacts assessments, currently crudely estimated, can be refined, region by region. 25. Disturbance around tower establishment and erection areas must be rehabilitated.					

26. Rehabilitation must include application of stored topsoil to not more than 30mm to support growth. 27. Indigenous grass seed mixture can be applied onto the topsoil and raked into soil. 28. The topsoil must be slightly compacted to encourage adherence of soil material thus preventing potential erosion. **29.** In terms of rehabilitation, this must be done with local supplier. 30. The establishment and infestation of AIPs must be prevented, managed and eradicated in the areas impacted upon by the proposed construction activities by a horticulturist for the period stipulated in the Wetland Rehabilitation Plan. 31. The type of species and location of that species will determine the type of methodology required for its management and eradication. This methodology should target all lifecycle phases and propagules of the specific species, e.g. seedlings/saplings, seeds, roots. 32. The cost-effective qualitative monitoring of the rehabilitation area may be time based through the use of periodic photographs taken from permanent photo points. These points are required to be established during site inception. The timeline created between the pre- and post-rehabilitation photos will provide an invaluable visual representation of the progress that is conveyed in a straightforward manner. The photographer should be an environmental scientist therefore allowing an expert assessment of the site adding to the qualitative information gathered from the photographs. 33. The Wetland Rehabilitation Plan, dated October 2022, must be implemented.					

7.3.28. Socio-economic					
Impact Management outcome: Socio-economic development is enhanced					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible person	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
1. Develop and implement communication strategies to facilitate public participation; 2. Develop and implement a collaborative and constructive approach to conflict resolution as part of the external stakeholder engagement process; 3. Sustain continuous communication and liaison with neighboring owners and residents 4. Create work and training opportunities for local stakeholders; and 5. Where feasible, no workers, with the exception of security personnel, must be permitted to stay over-night on the site. This would reduce the risk to local farmers. 6. A social development and economic development programme should be devised by the developer throughout the project's lifespan. 7. The plan should be developed in consultation with local authorities and local communities to identify community projects that would result in the greatest social benefits. 8. These plans should be reviewed on an annual basis and, where necessary, updated. 9. When identifying enterprise development initiatives, the focus should be on creating sustainable and self-sufficient enterprises. 10. In devising the programmes to be implemented, the developer should consider the priorities set out in the local IDP. 11. Use of local community for labour is encouraged, where	Operations Manager, Project Manager and Engineer	Interview process	Operations Manager	Fortnightly	Site inspections

possible. 12. Access into office, camp site and work area must be controlled to prevent accidents. 13. A register of visitors must be kept. 14. All health standards must be adhered to. 15. New temporary workers must be trained on environmental issues and management as well as on safety standards.					

7.3.29. Monitoring, Reporting, Record Keeping & Compliance					
Impact Management Outcome: Impact to the operational site and surrounding areas are minimal as result of adherence to the authorisations and EMPr.					
Impact Management Actions:	**Implementation**		**Monitoring**		
1. Compliance must be ensured with all monitoring, auditing, reporting and record keeping requirements as per approved environmental authorisations e.g. (EA, permits, licenses and amendments there to), programmes and plans (e.g. monitoring programmes). 2. Environmental monitoring must be undertaken by the ECO on a fortnightly basis. 3. An Environmental Audit Report to be completed by an external auditor, in accordance with the requirements of regulation 34 of the NEMA EIA Regulations, 2014 (as amended). 4. This monitoring must be undertaken in order to ensure compliance with all aspects or requirements of the EMPr and Environmental Authorisations. 5. The noise impact from the proposed project should be measured during the operational phase, to ensure that the impact is within the required legal limit.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Operations Manager and Project Manager	Establish registers, record of receipts, environmental file	ECO	Fortnightly	Site inspections

6. Management interventions: Where avian fatalities are found to occur (i) to Red Data species, or (ii) at unacceptably high levels, to priority species, then the following mitigation measures should be brought into effect: a. Construction monitoring should be started as the lines are erected; b. Post-construction monitoring should estimate bird mortalities along the entire 4.5-km of power line c. All carcasses should be photographed with a GPS, in situ, and identified and recorded. d. The search area should be defined and consistently applied throughout the monitoring period; e. Post-construction monitoring of bird abundance and movements and fatality surveys should span a minimum of 12 months. 7. Monitoring must be done to determine the rate of electrocution, as well as which species are affected. 8. Monopoles and lines must be regularly checked for any faults that may result in increased risk of electrocution. 9. New lines should be monitored monthly for a year to determine avifaunal mortality as a result of collisions and adaptive management techniques put in place to reduce impacts, or confirmation of low mortality levels. 10. The use of registered landfill sites must be utilised and waste disposal volumes must be recorded and documented proof kept on the site Environmental File. 11. Monitoring of noise levels at the sandspit is recommended at least monthly during operation so these can be compared to the changes in bird populations, if any.					

12. 16. An avifauna monitoring plan must be developed and implemented for both the ship and transmission lines. 13. 17. All lighting should be downlighting. 14. 18. No lights should be directed at the sandspit or Kabeljous flats. 15. 19. Light monitoring should be done monthly both pre- and post-construction along with avifaunal monitoring to determine change over time.					

TRANSMISSION LINE – POST CONSTRUCTION AND OPERATIONAL PHASE ACTIVITIES

7.4. Operational Phase Activities – Transmission Line

The following will provide environmental specifications for the proposed development of the Transmission Line for Richards Bay. The post construction and operational phase activities and impacts relating to the Operations of the transmission line, is grouped together in the section below. This section will largely apply to ESKOM who will take ownership of the Transmission Line and associated infrastructure post construction.

7.4.1. Maintenance of servitude and related infrastructure					
Impact Management Outcome: Environmental impacts during the Operation & Maintenance Phase for the Transmission Line will be effectively mitigated					
Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limit (40km/h), to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited. 2. All personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting, or hunting terrestrial species (e.g., guineafowl and francolin), and owls, which are often persecuted out of superstition. Signs must be put up to enforce this. 3. Use environmentally friendly cleaning and dust suppressant products. 4. All maintenance, refurbishment or related activities during operation must comply with ESKOM's Environmental Standards, Policies and Procedures. 5. All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limit (40km/h), to respect all forms of wildlife.	Operations Manager and Project Manager and Engineer	Standard Operating Procedures	ECO	Fortnightly	Site inspections

Speed limits must still be enforced to ensure that road killings and erosion is limited. 6. Erosion control and alien invasive management plan must be compiled. 7. Where possible, existing access routes and walking paths must be made use of. 8. Report erosion around towers around tower bases and along authorised corridors to landowners and Eskom 9. Regular (monthly or during maintenance runs) visual assessments of the transmission line and switching station must be conducted to identify signs of oil spills, sediment runoff, switching station leakages etc. to monitor potential pollution. 10. Report litter along authorised corridors to landowners. Eskom will however not be held liable for litter on landowner's property, unless it is as a result of Eskom activity. Waste management remains the responsibility of the landowner. 11. No dedicated buffer areas were identified as part of this hydropedology assessment, as the predicted impacts associated with the proposed activity on the hydropedological environment are deemed low to neutral. It is however proposed to maintain the operational phase buffer (working servitude) for any vehicles servicing the transmission line. 12. In accordance with the Hydrology report, no dedicated groundwater monitoring is required. Regular (monthly or during maintenance runs) visual assessments of the transmission lines and switching station should be however be conducted (i.e. signs of oil spills, sediment runoff, switching station leakages etc.) to monitor potential pollution.					

13. Sampling the non-perennial, wetlands and perennial streams downstream of the site will help to determine if the repair/maintenance activities are impacting the surface water quality (only if visual observations support potential pollution). 14. A fire management plan needs to be compiled and implemented to restrict the impact fire might have on the surrounding areas.					

7.4.2. Access control & Socio Economic					
Impact Management Outcome: Environmental impacts during the Post Construction and Operation & Maintenance Phase for the Transmission Line will be effectively mitigated.					
Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Access roads and servitudes will be maintained as per Eskom's Servitude Maintenance Policy. It must be inspected as per the internal roster predetermined by ESKOM. 2. The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments. Signs must be put up to enforce this. 3. Environmentally friendly dust suppressants need to be utilised. 4. Where possible, local labour must be considered for employment to increase the positive impact on the local economy.	Operations Manager and Project Manager and Engineer	Standard Operating Procedures	ECO	Fortnightly	Site inspections

5. As far as possible, local small and medium enterprises must be approached to investigate the opportunities for supply inputs required for operational phase of the Transmission Line. This could be in the form of a local landscaping firm to maintain vegetation or training local community as snake catchers.					

7.4.3.Fauna					
Impact Management Outcome: Environmental impacts during the Post Construction and Operation & Maintenance Phase for the Transmission Line will be effectively mitigated					
Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. A total of 12-month monitoring have been conducted over the period 2020-2023 as part of pre-construction baseline monitoring. A second 12-month post construction monitoring programme will commence as soon as construction is complete. 2. Results from the monitoring will inform implementation of and any enhancement to the proposed mitigation measures to ensure the development does not have a long-term impacts on the SCCs and migratory waders in the area.	Operations Manager and Project Manager and Engineer	Standard Operating Procedures	ECO	Fortnightly	Site inspections

3. A follow-up assessment on avian biodiversity and species abundance within the assessment area and surrounding areas must be conducted within one year after the facility has been in operation and should be repeated every 3-5 years. A monitoring plan has been developed for the site and monitoring is currently ongoing. Information obtained from the monitoring must be provided to BirdLife Renewable Energy Programme on energy@birdlife.org.za. The data must be presented as described in Jenkins *et al.,* 2017. 4. All project activities must be undertaken with appropriate noise mitigation measures to avoid disturbance to avifauna population in the region. 5. All project activities must be undertaken with appropriate noise mitigation measures to avoid disturbance to avifauna population in the region. 6. All pylons must be monitored for being bird-friendly (conductors slung below the towers) to avoid electrocution. 7. The 3.6km of overhead power line's diurnal-nocturnal diverters (night time solar bird diverters) must remain in place. 8. Post construction monitoring should be undertaken by competent ornithologists familiar with the area's threatened species. 9. 12-month baseline avifaunal monitoring ~~Monthly avifaunal monitoring~~ of the sandspit and Kabeljous flats. ~~for at least the next 3 years.~~ 10. Waterbird counts of the full site including both Richards Bay Port and the Richards Bay Game Reserve should resume and continue annually in both summer and winter. 11. The monitoring plan for the avifauna should speak to the existing monitoring plans of the port, if no such					

documents are available, Karpowership can contribute to them. 12. Monitoring must be done in conjunction with all port users and the TNPA as cumulative impacts are likely to be the most detrimental to such habitats. 13. The relevant specialist recommends Conservation of the sandspit and Kabeljous flats, and that no development should take place in these areas. An adaptively managed conservation plan should be developed for these areas in particular that aligns with the existing TNPA conservation management plan for the port. If no such document exists, KPS partnership with SANPARKS and EZEMVELO should have input into its development. 14. An agreement must be concluded with EKZNW on an appropriate biodiversity offset to compensate for residual impacts on waterbirds that cannot be effectively avoided, minimised, or mitigated through implementation of measures. It is noted that an agreement has been developed with input from EKZNW and is detailed in Chapter 7 of the EIA Report. 15. Regular monitoring of the transmission line will need to take place to ensure that any injured individuals are recovered timeously to ensure they receive medical attention as soon as possible which gives them the best chance of survival. 16. The Wetland Rehabilitation Plan, dated October 2022, must be implemented.					

7.4.4. Flora
Impact Management Outcome: Environmental impacts during the Post Construction and Operation & Maintenance Phase for the Transmission Line will be effectively mitigated.

TRANSMISSION LINE – POST CONSTRUCTION AND OPERATIONAL PHASE ACTIVITIES

Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Development and implementation of an alien invasive plant species management plan. Any existing and new alien species must be removed as soon as possible after emergence. 2. Areas of already fragmented indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible. Clearing beneath transmission lines should be avoided. 3. The land beneath the transmission line, which must be rehabilitated with indigenous species post construction, must be maintained to retain connectivity within the system. 4. No use of the surrounding vegetation will be allowed. This includes use as a toilet facility, for hunting, harvesting of indigenous plants, making fires etc. Although this impact largely applies to construction, it must also be reported should the above be observed during operational phase. 5. Some Species of Conservation Concern are present just outside the Transmission Line route(s). Although a higher risk during construction, care must be taken that they are not damaged / removed during maintenance to infrastructure. 6. Report growth of trees threatening safety on the electrified conductors to local CNC. 7. Ongoing maintenance of powerline servitudes and clearing of alien vegetation as per safety protocols to reduce combustible biomass and lower the risk of wildfires.	Operations Manager and Project Manager and Engineer	Standard Operating Procedures	ECO	Fortnightly	Site inspections

8. The cost-effective qualitative monitoring of the rehabilitation area may be time based through the use of periodic photographs taken from permanent photo points. These points are required to be established during site inception. The timeline created between the pre- and post-rehabilitation photos will provide an invaluable visual representation of the progress that is conveyed in a straightforward manner. The photographer should be an environmental scientist therefore allowing an expert assessment of the site adding to the qualitative information gathered from the photographs. 9. The Wetland Rehabilitation Plan, dated October 2022, must be implemented.					

7.5. PART B: ENVIRONMENTAL MANAGEMENT PROGRAMME FOR THE DEVELOPMENT FOR GAS LINES, POWERSHIP AND FSRU

The following will provide environmental specifications for the proposed development of the gas pipeline, the Powership and the FSRU.
Since the Powership and FSRU are assembled off-site and will be delivered to the port fully equipped and ready to operate, the construction and post-construction phases activities are deemed not relevant for these components, and are then related to the installation of the gas pipeline only. The planning and design phase, as well as the operational and decommissioning phases are related to all components of this section, namely the gas pipeline, the Powership and the FSRU.

7.6. Planning and Design Phase & Pre-Construction Activities – Gas Lines

7.6.1.Administrative and Legal Requirements					
Impact Management Outcome: All construction work must comply with the conditions of the relevant authorisations, licences and permits.					
Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. All environmental legal requirements must be considered such as Environmental Authorisation, licenses (water use licences, atmospheric emissions licenses, waste management licenses) and must be authorized prior to the commencement of the gas to power project. 2. Appoint an EAP and conduct the required environmental processes in terms of the NEMA, NEM:WA & NEM:AQA to ensure legal compliance, when relevant. 3. Confirm that changes to the original design / layout do not trigger additional activities that were not applied for nor authorised. 4. Consider and implement where feasible environmentally responsible layout and sustainable designs to reduce resource consumption (water) and prevent potential pollution and /or environmental degradation during the operational phase of the project.	Project Developer	Obtaining authorisations, permit and licences prior to construction	ECO	Once-off	All authorisations, licences and permits must be filed in the Site Environmental File

5. All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limit (40km/h), to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited. 6. Consider and implement where feasible favourable socio-economic options / solution, including but not limited to low maintenance infrastructure, incorporation with existing facilities and infrastructure and logistical arrangements and implementation of low energy or renewable energy options. 7. Adhere to Karpowership's Emergency Response Plan which deals with accidents, potential spillages and fires in line with relevant legislation 8. Include the EMPr in all tender documentation and ensure that environmental requirements for the construction are budgeted for by all contractors and sub-contractors. 9. It is recommended that all activities within the area coordinate the mitigation measures to ensure that an Open Space Management Plan, Rehabilitation Plan and Alien Invasive Plant Management Plan are developed and implemented for the area as a whole as these kinds of management measures should not be attempted in isolation. 10. Strict adherence to TNPA pollution, emergency, and health and safety protocols, MARPOL and other applicable maritime legislation and policies. 11. A Spill Prevention and Management Plan must be compiled and implemented. In the event of any significant spill the TNPA must be notified.					

12. A method statement in respect to the use, handling, storage and disposal of all chemicals as well as anticipated generated waste, must be compiled and submitted as part of any Environmental Management Programme. 13. Ensure correct handling, storage and disposal procedures are followed (e.g. bunded storage areas to contain 110% of volume). 14. Only specialist personnel who are well trained on the standard protocols for preparation, coupling and decoupling of the gas pipeline between vessels, may undertake these operations. All applicable certificates of conformance must be on site. 15. An emergency plan that is compliant with the Major Hazardous Installation Regulations must be compiled and implemented. 16. Areas required to be restricted outside of the confines of the Port, as a result of health, safety and security concerns must be properly cordoned off with signage installed indicating the reason for such restriction. 17. A plankton and nekton baseline assessment must be conducted prior to operation of the Powerships. 18. A plankton and nekton monitoring programme should be implemented to determine the impacts of entrainment in the cooling system on the plankton and fish larvae in the Port. Adaptive management should inform actions should there be substantial negative impacts of the cooling water intake on plankton and fish larvae. ~~19. An EA may be granted subject to the condition that, inter alia, ecological compensation is delivered. Should the application for environmental authorization be accepted conditional on an offset, then a detailed Offset Report and Offset Agreement would need to be prepared, together with an Offset Management Plan, providing details of how the offset site would be secured, financial requirements and provision, and implementation arrangements. These documents would need to be reviewed and accepted by~~					

~~Ezemvelo KZN Wildlife and the Competent Environmental Authority before the proposed activities could commence.~~					

7.6.2.Roles and Responsibilities for Environmental Management					
Impact Management Outcome: The implementation of the environmental management plan and environmental management on-site.					
Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. The overall responsibility for ensuring the implementation of this environmental management plan rests with the Project Manager and Project Developer (Karpowership). This environmental responsibility is also in line with Karpowership's Environmental and Social Management Plan. 2. Responsibility for on-site implementation of environmental management as well as the associated cost with the implementation of the EMPr rests with all appointed contractors, sub-contractors and suppliers. 3. Karpowership and appointed contractors must ensure that all permanent and temporary staff, sub-contractors and suppliers adhere to this EMPr. 4. Karpowership must appoint a senior staff member directly involved in the site construction activities as the Environmental Site Officer (ESO) before commencement of activities. This person will ensure the implementation of and adherence to the EMPr in the contractor's execution of the day-to-day construction activities. 5. The environmental responsibility of the ESO must be specified in this person's duties, which will also include: a. Liaison with the appointed ECO;	Karpowership	Environmental Authorisation, EMPr, licences and permits must be included in the tender documents and the Contractor	ECO	Fortnightly	Agreements and Appointment

b. Ensuring environmental awareness among members of the workforce; c. Ensuring that the Contractor/s and members of the construction workforce are aware of the requirements of the EMPr; d. The on-site implementation of the EMPr; e. Monitoring inappropriate behaviour, environmental impacts, including pollution and environmental incidents; and f. The implementation of corrective action. g. Maintain a contact list for all landowners for engagement and notification purposes. 6. The Project Developer must appoint a person with a qualification in environmental management as the ECO. The ECO will be the responsible person for monitoring and reporting on compliance in respect of the implementation of the EMPr. Requirements include: a. Monthly monitoring of activities to ensure compliance with the EMPr; b. Liaison and ongoing communication with the Environmental Site Officer; c. Ensuring the Implementation of preventative and corrective actions in accordance with the requirements of the EMPr and outcomes of environmental monitoring / auditing; d. Reporting of environmental incidents that may occur on site in accordance with the requirements of the EMPr and environmental legislation; 7. Monitoring and reporting on compliance with this EMPr to Karpowership and the competent authority. 8. The contractor and ESO must inform the ECO prior to the commencement of any significant construction activity.					

9. Karpowership has a responsibility to protect the environment within the development site and adjacent areas. No flora or fauna must be damaged or harmed in any way, apart from areas authorised for development. Failure to adhere to this requirement may result in the removal of staff from the site by Karpowership					

7.6.3.Environmental Awareness, Training and Induction					
Impact Management Outcome: Environmental impacts are minimised through effective awareness and training for all construction staff including sub-contractors, service providers and suppliers					
Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. In terms of section 2 (h) and (j) of the NEMA, the contractor has the responsibility to ensure **all** personnel involved in the project are aware of, and familiar with, the EMPr, the key environmental issues and consequences of non-compliance to the EMPr 2. The Contractor has the responsibility to ensure all personnel involved in the project are aware of, and familiar with, the EMPr, the key environmental issues and consequences of non-compliance to the EMPr. 3. All personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting, or hunting terrestrial species (e.g., guineafowl and francolin), and owls, which are often persecuted out of superstition. Signs must be put up to enforce this. 4. All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limit (40km/h), to respect all forms of wildlife. Speed limits must	Contractor	Weekly toolbox talks and awareness training	ECO	Fortnightly	Record of attendance to the toolbox talks and awareness training must be filed in

still be enforced to ensure that road killings and erosion is limited. 5. The use of pictures and real-life examples must be incorporated in the training and awareness material. 6. Contract employees must be educated about the value of wild animals and the importance of their conservation. 7. The Contractor's environmental awareness training must be site specific and address all findings raised by the ECO. 8. Training must be done via Toolbox Talks and records of the training (attendance registers and content notes) must be kept within the Site Environmental File. 9. Provide an inventory of waste produced and the nature of waste being produced and cooperate with the Transnet National Ports Authority in every way. 10. A requirement to report environmental accidents and emergencies immediately they occur, to the port captain. 11. A Formal Failure Analysis (FFA) must be conducted to conclude each incident investigation in order to inform preventative measures to be taken in future. 12. Training of emergency response teams to deal with environmental implications of an emergency in addition to the safety implications.					the Site Environmental File
1. The ECO must undertake the initial environmental induction with the project management team prior to the commencement of construction. 2. All contractors, sub-contractors and casual labourers must acknowledge their understanding of the EMPr and environmental responsibilities by signing an induction attendance record. 3. To ensure compliance to the EMPr by contractors, sub-contractors and employees, Karpowership must ensure that the EMPr forms part of the formal site induction for all contractors, sub-contractors and casual labourers. The	ECO	On-site environmental induction	ECO	Once-off	Record of attendance to the induction must be filed in the Site Environmental File

ESO must prepare and submit the training material to the ECO for approval. The induction training must, as a minimum, include the following: a) The environmental impacts, actual or potential, of their work activities; b) Why the environment needs to be protected; c) Their roles and responsibilities in achieving compliance with the EMPr, including emergency preparedness and response requirements; and d) The potential consequences of departure from specified operating procedures and any environmental risk which may result from their work; and e) The risks that must be dealt with in order to avoid pollution or the degradation of the environment.					
1. Environmental awareness training must include as a minimum the following: a) Description of significant environmental impacts, actual or potential, related to their work activities; b) Mitigation measures to be implemented when carrying out specific activities; c) Emergency preparedness and response procedures; d) Emergency procedures; e) Procedures to be followed when working near or within sensitive areas; f) Wastewater management procedures; g) Water usage and conservation; h) Solid waste management procedures; i) Sanitation procedures; j) Fire prevention; and k) Disease prevention.	Contractor	Weekly toolbox talks and awareness training	ECO	Once-off	Record of attendance to the toolbox talks and awareness training must be filed in the Site Environmental File

2. A record of all environmental awareness training courses undertaken as part of the EMPr must be available; Educate workers on the dangers of open and/or unattended fires; 3. A staff attendance register of all staff to have received environmental awareness training must be available. 4. Course material must be available and presented in appropriate languages that all staff can understand.					

7.6.4.Worker Conduct on Site					
Impact Management Outcome: Appropriate social and ecological well-being of the site and community					
Impact Management Actions:	**Implementation**		**Monitoring**		
1. A general regard for the social and ecological well-being of the site and community is expected of the site staff. Workers must be made aware of the following general rules:	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**

a) No alcohol / drugs to be present on site; b) No firearms allowed on site or in vehicles transporting staff to / from site, (unless used by security personnel); c) Prevent unsocial behaviour; d) No harvesting of firewood from the site or from the areas adjacent to it; e) Construction staff must make use of the facilities provided for them, as opposed to ad-hoc alternatives. (e.g.: fires for cooking); f) Driving under the influence of alcohol is prohibited. 2. In the event that construction staff be approached by members of the public or other stakeholders, they must assist them in locating the Project Developer or Contractor, or provide a number on which they may contact the Project Developer or Contractor.	Contractor	On-site monitoring	ESO	Weekly	Contractor Agreements and Appointment

7.6.5.Restricted Areas

Impact Management Outcome: Impact on restricted areas are avoided through effective demarcation and management of these areas

Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Construction of the Powerships including any piling on the land adjacent to the planned Powerships or within 200 m of the sandpit or Kabeljous flats, should be limited to the period from mid-April to mid-September to avoid disturbance to breeding and migratory species 2. Identification of access restricted areas is to be informed by the environmental assessment, site walk through and any additional areas identified during development. 3. A full site walk-through should be conducted prior to any construction activities to list all species of conservation	Ecologist and ECO	Demarcation of sensitive areas with danger tape or barrier netting and identification of floral species	ESO ECO	Daily Fortnightly	Site Inspection

concern, and associated permits should be obtained for their removal or transplantation, as applicable. 4. The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments. Signs must be put up to enforce this. 5. Erect, demarcate and maintain a temporary barrier with clear signage around the perimeter of any access restricted area, colour coding could be used if appropriate. 6. Unauthorised access and development related activity inside access restricted areas is prohibited,		of conservation concern			
1. Restricted areas must be demarcated. Should there be any other areas to be added, these must be agreed to in consultation between the ECO, Engineer and Karpowership prior to construction. These will include but not be limited to the sensitivity areas excluded from the development footprint, adjacent properties and other sensitive environments. 2. It must be ensured that all identified highly sensitive areas are adequately protected prior to construction by demarcating "restricted areas" through fencing or other means. All restricted areas must be clearly marked on a construction site layout plan. 3. Unauthorised access onto/into private properties is strictly prohibited. 4. The assembly basin area and the sandspit must not be disturbed or utilised during construction or during mooring activities. These are restricted areas. Mooring of the vessels must maintain a minimum distance of 170 m from the sandspit.	Ecologist and ECO	Demarcation of restricted areas with danger tape or barrier netting	ESO ECO	Daily Fortnightly	Site Inspection

7.6.6.Materials Management – Sourcing					
Impact Management Outcome: Ensure environmentally sustainable and responsible use of materials					
Impact Management Actions:	**Implementation**		**Monitoring**		
1. Use environmentally friendly cleaning and dust suppressant products. 2. Ensure that materials to be used during construction are legally sourced. Source materials locally where possible. 3. Water or sand must not be extracted from watercourses; should this be a requirement, then the required permits and approvals has to be obtained from authorities before construction commences. It is recommended that filling and levelling material be sourced from a local commercial quarry. 4. Only commercial sources will be used e.g. material from the local quarry. No borrow-pits will be created or used for source material. 5. Contractors must prepare a source statement indicating the sources of all materials (including topsoil, sands, natural gravels, crushed stone, asphalt, clay liners etc.) and submit these to the project manager, engineer and ECO for approval prior to commencement of any work. Where applicable, a signed document from the supplier of natural materials must be obtained confirming that they have been obtained in a sustainable manner and in compliance with the relevant legislation.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Project Manager and Engineer	Letter from supplier confirming legal source of materials	ECO	Fortnightly	Records of materials purchased

7.6.7.Socio-Economic Management					
Impact Management Outcome: Socio-economic development is enhanced					
Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. The developer should encourage the contractor to increase the local procurement practices and promote the employment of people from local communities, as far as feasible, to maximise the benefits to the local economies. 2. The developer should engage with local authorities and business organisations to investigate the possibility of procuring construction materials, goods and products from local suppliers where feasible. 3. Organise local community meetings to advise the local labour force about the project that is planned to be established and the jobs that can potentially be applied for. 4. Establish a local skills desk (in uMhlathuze Local Municipality) to determine the potential skills that could be sourced in the area. 5. Employment of labour-intensive methods in construction where feasible. 6. Sub-contract to local construction companies particularly SMME's and BBBEE compliant and women-owned enterprises where possible. 7. Use local suppliers where feasible and arrange with the local SMME's to provide transport, catering and other services to the construction crews.	Project Developer	Designated Human Resource / social facilitation team and associated procedures and policies	ESO ECO	weekly Monthly	Review of procurement documentations and records

8. Facilitate knowledge and skills transfer between foreign technical experts and South African professionals during the pre-establishment and construction phases. 9. Set up apprenticeship programmes to build onto existing skill levels or develop new skills amongst construction workers especially those from local communities. 10. Recruit local labour as far as feasible to increase the benefits to the local households. 11. Set up a recruitment office in Richards Bay and adhere to strict labour recruitment practices that would reduce the desire of potential job seekers to loiter around the properties in the hope of finding temporary employment. 12. Control the movement of workers between the site and areas of residence to minimise loitering around the site. This should be achieved through the provision of scheduled transportation services between the construction site and area of residence. 13. Employ locals as far as feasible through the creation of a local skills database. 14. Establish a management forum comprising key stakeholders to monitor and identify potential problems that may arise due to the influx of job seekers to the area. 15. Ensure that any damages or losses to nearby buildings that can be linked to the conduct of construction workers are adequately reimbursed. 16. Assign a dedicated person to deal with complaints and concerns of affected parties.					

17. Provide adequate signage along relevant road networks to warn the motorists of the construction activities taking place on the site. 18. Where feasible, assist the municipality in ensuring that the quality of the local social and economic infrastructure does not deteriorate through the use of social responsibility allocations. 19. The mitigation measures proposed by noise specialist should be adhered to. 20. During Construction the small fisherman should be engaged to reduce negative impacts on their operations. 21. As far as possible, local small and medium enterprises should be approached to investigate the opportunities for supply inputs required for the maintenance and operation of the Powership and related infrastructure. 22. A financial allocation over the lifespan of the project to be allocated towards skills development contributions. 23. The developer must consider establishing vocational training programmes for the local labour force to promote the development of skills required by the Powership and related infrastructure and thus provide for the opportunities for these people to be employed in other similar facilities elsewhere.					

PLANNING AND DESIGN PHASE & PRE-CONSTRUCTION ACTIVITIES & OFFSET

7.6.8 Biodiversity Offset – Like-for-Like: Marine/Estuaries and Out-of-Kind					
Impact Management Outcome: Ensure ecological sustainability of the project through mitigation of residual medium-high and medium impacts through offset and ecological compensation to achieve net-zero biodiversity impacts.					
Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible person	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
1. Ensure implementation and compliance with the Offset agreement entered into between EKZN Wildlife in terms of the roles and responsibilities applicable to Karpowership. 2. Develop relevant management plan for the in-kind estuary offset and review and amend annually, as required. 3. Review performance of out-of-kind, as per management plan. 4. Review and amend the agreement, if applicable to ensure the desired outcomes. 5. The Marine Offset Management Plan must be approved by the Competent Authority and will form part of the EMPr conditions for Offset Management at the location as specified within the Marine Offset Management Plan. 6. An Offset Areas Advisory Committee shall be established between EKZNW and Karpowership to ensure the annual review of performance and to ensure guidance on the future management needs of the offset areas.	Project Director / Env Manager	Agreement Management Plan Annual Report Agreement Offset Management Plan Offset Areas Advisory Committee	Env Manager Env Manager Project Director Project Director Project Director / Env Manager Project Director	Quarterly Annually, as required Annually As required based on outcomes As per Plan Annually	Transfer of property Records of meetings Auditing and reporting Updated and relevant management plan AGM Annual Report Meetings Monitoring programme Annual Reports

CONSTRUCTION PHASE ACTIVITIES

7.7. Construction Phase Activities

7.7.1. Administrative and Legal Requirements					
Impact Management Outcome: All construction work must comply with the conditions of the relevant authorisations, licences and permits.					
Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. All contractors, sub-contractors or agents and their employees will be responsible for the implementation of the EMPr and adherence to the conditions of the EMPr and Environmental Authorisation. 2. The ECO will be the responsible person for monitoring and reporting on compliance in respect of the implementation of the EMPr. 3. The ESO will be responsible for on-site implementation and daily monitoring of implementation of the EMPr. The ESO will provide evidence to the ECO that the EMPr is being implemented and adhered to (either through inspections sheets or audit reports).	Developer	Obtaining authorisations, permit and licences prior to construction	ECO	Once-off	All authorisations, licences and permits must be filed in the Site Environmental File
1. Fines / penalties will be issued by the Project Developer for wilful negligence or non-compliance to the EMPr resulting in environmental degradation or pollution. The fine will be determined by ECO based on the severity of the incident and potential action by Project Developer. These costs will not be recoverable from the project and will be utilised to rectify the environmental degradation caused.	Developer	Implementation of Incidents Incurring Penalties.	ECO	Fortnightly	Site Inspections and Record Keeping
1. Fortnightly monitoring must be conducted by the ECO. The ESO must assist the ECO during the audit.	Developer	Appointment of ECO	ECO	Fortnightly	Monthly ECO Reports

2. ECO must submit audit reports to the Compliance section of the competent authority section on a monthly basis as a minimum or as per the timeframes stipulated in the environmental authorisation.					
1. The ECO and ESO must consult and review compliance and performance against the EMPr and resolve inter alia environmental concerns, non-compliance (including environmental incidents) and any complaints.	Developer	Monthly monitoring reports	ESO ECO	Weekly Monthly	All authorisations, licences and permits must be filed in the Site Environmental File
1. During construction, as related to Coastal, Estuarine and Marine Ecology monitoring, general environmental compliance monitoring must be undertaken by a suitably qualified environmental control officer (ECO) on a weekly basis as a minimum to ensure that basic environmental best practices are followed and that conditions of the environmental authorisation are observed. The presence of an on-site environmental officer is essential to monitor daily activities. (Note: moved from Operational Phase).	Developer	Weekly monitoring reports	ESO ECO	Weekly	All authorisations, licences and permits must be filed in the Site Environmental File

7.7.2. Site Establishment					
Impact Management Outcome: Impacts relating to site establishment are minimised.					
Impact Management Actions:	**Implementation**		**Monitoring**		
1. Location of camp sites must be within approved area to ensure that the site does not impact on sensitive areas	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**

identified in the environmental assessment or site walk through. 2. The site selected for a construction camp must ensure potential negative impacts on the biophysical environment are kept to a minimum. The location must be within the perimeter of the proposed site. 3. Sites must be located where possible on previously disturbed areas. The use of existing accommodation for contractor staff, where possible, is encouraged 4. No construction camps / laydown areas must be established in sensitive areas or associated buffers. 5. A Site Establishment Method Statement must be provided by the Contractor prior to any on-site activity that includes the layout of the construction camps / lay-down-areas in the form of a plan showing the location of key infrastructure and services (where applicable), including but not limited to stockpile areas, hazardous materials storage areas (including fuels), equipment cleaning areas, cooking and ablution facilities, waste and wastewater management etc. 6. The location of the construction camps and laydown areas must be approved by the ECO and Avifauna specialist prior to implementation. 7. All site camps must be fenced off to limit any accidental vegetation disturbance outside the approved area. 8. Eating areas must be serviced and cleaned on a daily basis to ensure the highest possible standards of hygiene and cleanliness. 9. On-site accommodation will not be allowed. No persons, other than a night-watchman / security guard, may stay overnight at the construction camp	Contractor, Avifauna Specialist and ESO	Method Statement and layout of construction camps / laydown areas to be compiled and approved by the ECO	ECO	Once-off	Approved Method Statement and Layout Plan

10. Drainage at the camps must be designed to prevent the standing ponding of water or sheet erosion from taking place. 11. Signage must be placed in the area where construction will take place informing the public of the activities taking place. 12. The construction camp(s) must be kept in an orderly state at all times, to the satisfaction of the ECO. The Contractor must allow at least 15 minutes prior to close of business for site house-keeping. 13. Ensuring that a suitable drainage system is in place before construction on a site takes place is important to keep the area as dry as possible and thereby reducing the amount of erosion. 14. The area where water disperses out of a drain must be suitable for such and must not be susceptible to erosion. 15. A grass-lined channel conveys storm water runoff through a stable conduit. Vegetation lining the channel slows down concentrated runoff. 16. Direct discharges of runoff from developed/ disturbed areas to receiving waters should be avoided wherever possible. This involves the use of collection/conveyance through closed conduits. Runoff should be routed through one or a combination of runoff treatment practices. 17. The surrounding area must be surveyed prior to construction/laydown area establishment to determine the presence of nesting birds and sensitive fauna, and these must cordoned off where possibly or be safely relocated if necessary.					

CONSTRUCTION PHASE ACTIVITIES

7.7.3. Access to Construction Site					
Impact Management Outcome: Construction vehicle movement are restricted to approved routes					
Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. An access agreement must be formalised and signed by the PM / PE, contractor and landowner before commencing with the activities. 2. Any access route deviation from that in the written agreement must be closed and re-vegetated immediately, at the contractor's expense. 3. A stabilised site access must be established and limited to one point only. The access allows for the construction vehicles to enter the work area of while preventing the unnecessary tracking of sediment onto the nearby environment from multiple locations. A stabilised entry/exit point normally consists of a stabilised rock pad. 4. Sufficient parking must be provided for site staff and visitors at the construction camp. 5. The liberation of dust into the surrounding environment must be effectively controlled by the use of water sprays, fabric containment, where required. 6. If required, staff must be employed to clean spilt material onto the access roads. 7. Pedestrian and vehicle access must be restricted during construction so as to control access to otherwise potential dangerous excavations and materials.	Contractor	Access routes must be mapped prior to construction	ESO ECO	Fortnightly	Site Inspection

8. Secure and ensure safe passage for components and materials between destinations. Loads including, but not limited to sand, stone chip, fine vegetation, refuse, paper and cement, must have proper cover to prevent it from spilling over the side of the vehicle during transit. 9. If a spillage occurs resulting from the failure by staff or supplier to properly secure materials to be transported (as per previous condition) then the contractor is responsible for remediation and cleaning-up measures.					

7.7.4. Restricted Areas					
Impact Management Outcome: Impact on restricted areas are avoided through effective demarcation and management of these areas.					
Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Construction of the Powerships including any piling on the land adjacent to the planned Powerships or within 170 m of the sandpit or Kabeljous flats, should be limited the period from mid-April to mid-September to avoid disturbance to breeding and migratory species 2. The construction / work corridor must accommodate all construction-related activities, including materials storage and soil stockpiles. 3. Access must be confined to the existing road infrastructure and disturbed areas.					

4. Unauthorised entry, stockpiling, dumping or storage of equipment, material or waste outside the project boundaries is strictly prohibited. 5. Gathering of firewood, fruit, plants or any other natural material on site or in areas adjacent to construction sites is prohibited. 6. Unauthorised access onto/into private properties is strictly prohibited. 7. Activities in the surrounding open undeveloped areas must be strictly regulated and managed. 8. No entry or dumping into / onto the sensitive areas or buffer zones is allowed. 9. Personnel must not be allowed into indigenous vegetation, especially Mangrove Forest and Swamp Forest: 10. No picking any indigenous plant 11. Only provided portable toilets should be used 12. No lighting of fires 13. No catching or shooting of any wildlife 14. No trampling of vegetation	Contractor, Avifauna Specialist and ESO	Demarcation of sensitive areas and staying within approved areas for construction	ESO ECO	Daily Fortnightly	Site inspection of sensitive No-Go areas and photographic evidence

7.7.5. Protection of Flora and Fauna		
Impact Management Outcome: Impacts on flora and fauna are minimised through adherence of EMPr requirements.		
Impact Management Actions:	**Implementation**	**Monitoring**

CONSTRUCTION PHASE ACTIVITIES

Flora	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. A full site walk-through must be conducted prior to any construction activities to list all SCC and associated permits should be obtained for their removal or transplantation. 2. Erosion control and alien invasive management plan must be compiled. 3. The initial clearing phase must take place under the supervision of the ECO for the duration of the clearing. The Environmental Audit Report must confirm that all identified plant species have been rescued and replanted and that the location of replanting is compliant with conditions of approvals. 4. The majority of the indigenous vegetation must be maintained as a part of the open space and managed for conservation, if possible, in partnership with the respective landowners. 5. The area of construction and operation must be demarcated, and personnel not allowed to use the surrounding natural vegetation. 6. Contractors must ensure that no protected tree species are removed or trimmed without the required permit from the Department of Agriculture, Forestry and Fisheries. 7. Should protected trees be disturbed by the proposed project, a compensation ratio of 1:5 will apply for each protected tree removed and it is the responsibility of the developer to determine the offsite area or to negotiated with the land owner for the area to plant those trees. 8. Care must be taken to prevent the introduction of alien plant species to the site and surrounding areas by removing the invasive plants onsite.	Contractor	Awareness Training Injuring, capturing, killing of animals identified on site must be reported as an environmental incident and investigated	ECO	Fortnightly	Training material relating to wildlife management

9. Trees and shrubs to be conserved must be clearly marked. No natural vegetation is to be collected for use as firewood. 10. Damaging or removing of trees which have been marked for conservation must be a transgression of the environmental specifications for which a penalty may be imposed. 11. Corridors to be at 30m in width or as per agreement with Eskom. Clearance of vegetation and habitat to be restricted within the corridor. Vegetation that will not grow within the safety clearance of the powerline to be preserved in as far as possible. Protected and indigenous vegetation to be cleared with the required permits 12. Invader plant species and weeds must be removed and disposed of in accordance with existing legislation (as listed in the Conservation of Agricultural Resources Act, No. 43 of 1983 and National Environmental Management: Biodiversity Act). 13. Although removal of alien species will mostly require removal by hand and the use of saws, the use of herbicides and pesticides may be required. Only specified and approved herbicides and pesticides must be used for control of alien and invasive species. Manufacturer's instructions must be followed when using chemical methods, especially in terms of quantities, time of application etc. 14. Applications of herbicides and pesticides must be applied by certified, approved and trained employees or contractors. 15. Any construction and infrastructure occurring within the dune environment must be rehabilitated immediately after					

construction with the help of a qualified dune rehabilitation specialist. The rehabilitation must then be monitored and any impacts adaptively managed. 16. No additional infrastructure or use of the surrounding vegetation within the dunes should be allowed and includes placement of portable toilets, use of the beach for recreational purposes, fishing, hunting or removal of indigenous plant species. **Fauna** 17. A total of 12-month monitoring have been conducted over the period 2020-2023 as part of pre-construction baseline monitoring. A second 12-month post construction monitoring programme will commence as soon as construction is complete. 18. Results from the monitoring will inform implementation of and any enhancement to the proposed mitigation measures to ensure the development does not have a long-term impacts on the SCCs and migratory waders in the area. 19. A follow-up assessment on avian biodiversity and species abundance within the assessment area and surrounding areas must be conducted within one year after the facility has been in operation and should be repeated every 3-5 years. A monitoring plan has been developed for the site and monitoring is currently ongoing. Information obtained from the monitoring must be provided to BirdLife Renewable Energy Programme on energy@birdlife.org.za. The data must be presented as described in Jenkins et al., 2017..					

20. A qualified specialist should be called out to assist during construction to safely remove all slow-moving (chameleons and tortoises) and burrowing (moles, lizards and snakes) species from the path of the excavator and relocated to a conservation area, should it be necessary. For the sake of acting timeously, the ESO can also assist in this regard. 21. Some burrowing species may be affected by any excavation activities. Reptiles and amphibians may fall into holes, which they then cannot get out of. Any large holes must be monitored, and trapped fauna carefully removed. 22. A qualified snake catcher must be called out to safely relocate any snakes found. 23. Slow-moving animals such as tortoises can be relocated just outside the footprint by hand when encountered. Induction should include information on safe faunal relocation and rules on hunting. 24. Initial Environmental Training must include sending a dedicated employee from site on a snake handling course in order to fulfil the above task, should there not already be a qualified person on the team. 25. Disturbance to birds, animals and reptiles and their habitats must however be minimised by avoiding any interference or contact where possible. Animals may only be trapped or caught for conservation and relocation purposes. 26. Noise pollution must be minimized to ensure faunal inhabitants are not stressed. 27. The enclosed intertidal area where Zostera occurs, must be demarcated as a restricted area and a minimum					

distance of 100 m must be maintained for all construction related activities and movements. 28. In the unlikely event that Zostera is discovered within project area (i.e. Berth 600 Basin), an offset is proposed replacing like with like should it be affected by the powerships and associated infrastructure. 29. Disturbance must be kept to a minimum by confining the pipeline laying activity, working barge and/ or excavation/levelling equipment to within the project area and designated access routes/paths. 30. The assembly basin area and the sandspit must not be disturbed or utilised during construction or during mooring activities. These are restricted areas. 31. Mooring of the vessels must maintain a minimum distance of 170m from the sandspit. 32. Construction activities must be restricted to daylight hours. 33. No animals (birds, fish, reptiles, mammals) are to be disturbed unnecessarily and no animals are allowed to be shot, trapped or caught for any reason. The listed mammal species recorded from the site (as listed in the Terrestrial Biodiversity Assessment Report, dated October 2022 – Appendix B) should be observed and avoid any harm projected to them. The list should form part of the environmental induction and awareness programme to the construction personnel. 34. A comprehensive environmental awareness programme must be conducted amongst contracted construction personnel about sensitive estuarine and coastal habitats and fauna. 35. Management of all site activities and site camp/laydown area must be undertaken in accordance with a site specific EMPr and audited by an ECO. 36. In the unlikely event that Zostera is discovered within project area (i.e., 600 Berth Basin), an offset is proposed					

replacing like-with-like should it be affected by the powerships and associated infrastructure. 37. In order to ensure that the noise levels produced by construction are not higher than predicted in this report, the equipment used should be similar or less powerful than the equipment used as a model by Subacoustech Environmental (2022). No unnecessary production of noise should take place, to minimise the exposure of the estuarine/marine biota to noise and help to avoid disturbances and potential harm to estuarine/marine organisms. If a marine mammal is observed in the near vicinity of the construction activity, construction should be halted until the marine mammal is outside the range of hundreds of metres from the noise source, as a precaution. These measures will reduce the probability of the estuarine/marine biota being impacted by construction noise but does not reduce it enough to change the score. 38. A noise impacts monitoring programme should be implemented to validate the predictions made of the impacts of the noise produced by the construction operations on the marine ecology. Monitoring of the ecology in the immediate vicinity of the project should be undertaken following a before-after-control-impact (BACI) approach. This should include monitoring of the local macrofauna, and video surveys and fish sampling to understand the fish community in the area of the port where the powerships will be moored, as well as use of the project area by marine mammals. Monitoring of the distribution and behaviour of diving seabirds in the vicinity of the powerships should also be undertaken. 39. These surveys should be ongoing and following a sampling methodology that is robust when assessing the impacts of the noise produced by construction on the distributions of benthic macrofauna, fish, seabirds, and marine mammals. The results of such monitoring will be					

valuable in informing other developments and contributing to the international understanding of the effects of noise from construction activities on marine biota. 40. Mitigating the effect on terrestrial fauna (including avifauna) as a result of construction activities: a. Select alternative transmission route 1. b. Do not place transmission lines or access routes for their construction in functional natural habitat, Intact indigenous vegetation must be avoided. c. Do not clear natural vegetation in the process of construction of project infrastructure. No linear 3m footprints should be cleared of vegetation in these areas but individual drilled foundations used. d. Construction measures must consist of the least impactful individual erection of monopole structures. e. No use of the surrounding vegetation will be allowed. This includes use as a toilet facility, for hunting, harvesting of indigenous plants, making fires etc. f. No animals (birds, reptiles, and mammals) are to be disturbed unnecessarily and no animals are allowed to be shot, trapped or caught/hunted for any reason. g. A qualified specialist should be on site during construction to safely remove all slow-moving (chameleons and tortoises) and burrowing (moles, lizards and snakes) species from the path of the excavator and relocated to a conservation area.					

h. Construction activities, specifically excavation and moving/transporting of large components, must be restricted to daylight hours to prevent potential disturbance to roosting bird populations i. Restrict vehicles to clearly demarcated access routes, construction areas and contractor areas only. j. Keep vehicle access to the shoreline to a minimum. Only allocated access points to the beach be used. k. The surrounding area must be surveyed prior to construction/laydown area establishment to determine the presence of nesting birds and sensitive fauna, and these must be cordoned off. l. Regarding the African Fish Eagle nest on site, construction activities should be initiated during winter, when the nest is not in use, and after which the breeding pair will hopefully relocate their next nest to a safer area. m. Beyond the headland of the 600 Berth Basin, movement of supporting vessels must be restricted to the main channels only. n. The sandspit and Kabeljous Flat must be designated restricted areas, i.e. these areas may not be utilised in any way to support or facilitate construction/mooring activities, storing of materials, etc. o. Laying of the gas pipeline and mooring legs of the FSRU must be undertaken during the winter months to reduce disturbance of birds utilising the sandspit.					

p. Construction vehicles, plant and machinery must be well maintained and fitted with silencers. q. Regular maintenance on vehicle and equipment must be undertaken. 41.					

7.7.6. Preparation of Construction Camp / Laydown area for gas pipes					
Impact Management Outcome: Construction activities are restricted to the demarcated construction camp / laydown area					
Impact Management Actions:	**Implementation**		**Monitoring**		
1. Natural features must be considered and potential impacts must be minimised and/or prevented where possible.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**

CONSTRUCTION PHASE ACTIVITIES					
2. Boundaries should be strictly maintained, and impacts retained within the boundary of the site. 3. Ensure that materials to be used during construction are from a legal and licensed source. Water or sand is not extracted from watercourses. In the event this be a requirement, then the required permits and approvals have to be obtained from authorities before construction is to commence. It is recommended that filling and levelling material be sourced from the local quarry or supplier. 4. Existing services infrastructure must be identified and clearly demarcated. 5. The construction area must be clearly demarcated considering the sensitive environmental areas (in particular wetlands and open areas) and no extension of the permitted construction footprint (as authorised and specified in the engineering construction methodology) must be allowed. 6. All areas outside of the demarcated construction camp / laydown area must be considered restricted areas. Any Contractors found working inside the restricted areas must be fined as per fining schedule / system setup for the project. 7. The demarcation work must be signed off by the ECO before any work commences. 8. Adherence to port safety regulations and emergency procedures, particularly during construction/installation. 9. Quality and safety checks undertaken immediately after connection to ensure that connection point is secure. 10. Regular inspection on the quality and integrity of the pipeline and connections to prevent fugitive emissions.	Contractor	Demarcation of construction corridor prior to site clearing	ECO	Once-off	Photographic record. Clearly marked construction corridor Pre-construction photographic records

11. Pipe laying and anchorage operations should not take place during spring high tides and very strong south-westerly winds or storm weather conditions. 12. Laying of the pipeline and the anchor legs must be undertaken with as little disturbance of the seabed as possible. 13. Laying of the gas pipeline and mooring legs of the FSRU should be undertaken during the winter months reduce disturbance birds utilising the sandspit. 14. Pipe laying and anchorage operations should not take place during storm weather conditions where risk of disturbance to adjacent areas would be greater.					

7.7.7. Vegetation Clearance

Impact Management Outcome: Vegetation clearance and associated impacts are minimised though adherence of EMPr vegetation clearance requirements.

Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Areas of already fragmented indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible. Clearing beneath transmission lines should be avoided. 2. All cut vegetation must be disposed of onsite as mulch and use in rehabilitation efforts or to chip and compost. 3. There must be no burning on site under any circumstances. 4. Indigenous vegetation clearing must be kept to a minimum and undertaken under proper supervision.	Contractor	Working within demarcated areas IAP eradication and control	ESO ECO	Weekly Fortnightly	Site Inspection

5. Vegetation clearing activities must only be undertaken during agreed working times and permitted weather conditions. 6. Any vegetation clearing must be done immediately before construction activities to avoid prolonged exposure of the soil to weather elements. 7. It is recommended that alternatives be considered for the placement of the gas pipelines and laydown area infrastructure within, in order of preference, already transformed, degraded or disturbed areas. 8. If alternatives are not possible, then any and all excavations must be rehabilitated immediately after construction with the help of a qualified dune rehabilitation specialist. The rehabilitation must then be monitored and any impacts adaptively managed. 9. No additional infrastructure or use of the surrounding vegetation should be allowed and includes placement of portable toilets, use of the beach for recreational purposes, fishing, hunting or removal of indigenous plant species.					

7.7.8. Earthworks including Demolition or Construction					
Impact Management Outcome: Impacts resulting from earthworks are managed and guided by specifications and material sourced from authorised sites.					
Impact Management Actions:	**Implementation**		**Monitoring**		
1. All cut and fill earthworks must be carried out in accordance with the current SANS/SABS 1200 series.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**

CONSTRUCTION PHASE ACTIVITIES

2. Earthworks must be completed in accordance with the scope of works and designs. 3. Construction areas must be cordoned off and demarcated to prevent incidental public access. 4. Micro siting of the monopole structures and construction footprint must be done to ensure no protected species are affected wherever practicable. 5. Materials that will be used during construction must be legally sourced. A sourcing register must be maintained on the Site Environmental file for record keeping purposes. 6. Only commercial sources will be used e.g. material from the local quarry. No borrow-pits will be created or used for source material. 7. Contractors must prepare a source statement indicating the sources of all materials (including topsoil, sands, natural gravels, crushed stone, asphalt, clay liners etc.) and submit these to the project manager, engineer and ECO for approval prior to commencement of any work. Where applicable, a signed document from the supplier of natural materials must be obtained confirming that they have been obtained in a sustainable manner and in compliance with the relevant legislation. 8. The enclosed intertidal area where Zostera occurs, must be demarcated as a restricted area and a minimum distance of 100 m must be maintained for all construction related activities and movements.	Contractor	Earthworks undertaken according to specifications and material obtained from approved sources	Engineer ECO	Monthly Monthly	Earthworks undertaken according to specifications Proof of approved borrow pits / quarries where material is sourced from.

7.7.9. Fire Management					
Impact Management Outcome: Fire prevention measures are carried out in accordance with the relevant legislation.					
Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. A fire management plan needs to be compiled and implemented to restrict the impact fire might have on the surrounding areas. 2. Fires will only be allowed in facilities or equipment specially constructed for this purpose at the construction camp. 3. No open fires or uncontrolled fires are permitted on site. 4. Ensure that there is basic firefighting equipment available on-site. Firefighting equipment must be in working order and serviced to-date. 5. The workforce must be made aware of fire prevention and firefighting measures. 6. Any flammable material must be stored in areas where it does not present a fire hazard to surrounding vegetation and people. This includes bitumen, thinning agents, petrol, LPG containers, fuels and oils. 7. Burning of fire breaks is to be carefully planned and managed with the assistance of the local Fire Department. 8. Set smoking areas must be designated. Smoking outside these designated areas is prohibited. 9. The Contractor must ensure that the telephone number of the local Fire and Emergency Service are displayed at the site offices.	Contractor	Awareness Training	ECO	Fortnightly	Site Inspection

7.7.10. Soil Management

Impact Management Outcome: Impact on soils are minimised or avoided through implementation of mitigation measures

Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Stockpiles must not be located where natural drainage pathways will be obstructed / impeded. 2. Stockpiles must not exceed 2m in height unless otherwise permitted by the PM upon advice from the ECO. 3. Stockpiles exposed to windy conditions must be wetted to prevent windblown particles or in the case of heavy rain, must be covered/provided with containment to prevent contaminated run-off. Rocks can be stacked as walls to prevent the loss of top and subsoil on cut or fill banks. 4. Stockpiles must be kept clear of weeds and alien vegetation growth by regular weeding. 5. Do not allow stockpiling of any material within 20m of any restricted area.	Contractor and ESO	Method Statement to be compiled for soil stockpile management	ESO ECO	Daily Fortnightly	Site inspection and compliance with Method Statement
1. The topsoil obtained (i.e. the top 30-50 cm of soil) from site clearing must be stored in stockpiles no higher than 1m and used during rehabilitation. 2. Stockpiles must be within an earthen bund of approximately 0.5m and covered with a geofabric material or similar e.g. a tarp to prevent wind deflation and runoff when not in use. 3. Undertake the stripping of topsoil in a manner that minimises erosion by wind or runoff. 4. Subsoil and topsoil must not be mixed with other soils during stripping, excavation, reinstatement and rehabilitation.					

5. Minimise the amount of exposed ground and stockpiles of building material to prevent suspended solid transport loads and leaching of rocks/materials. Stockpiles can be seeded or covered and sediment fences constructed from a suitable geotextile. 6. Where possible, plants should be cut down to ground level instead of being removed completely to stabilise the soil during land-clearing operations. 7. Excavations must be undertaken carefully incorporating proper drainage and considering weather conditions. If heavy rains are expected excavations must be put on hold. 8. Excavated and imported material must be stockpiled/stored away from areas of concentrated flow to limit the risk of sediment wash to downstream areas. 9. Dumping of excavated material into the sensitive and restricted areas is prohibited. 10. Water from any dewatering process, if applicable, must be stored and re-used were possible, e.g. for dust suppression 11. Topsoil and subsoil which is excavated from the terrestrial and wetland areas must be stockpiled with the topsoil separate from the subsoil and preserved for future rehabilitation. Cleared vegetation and soils which will not be utilised for rehabilitation purposes must be disposed of at a registered waste disposal facility. 12. Stockpiles must be seeded with indigenous grasses or stabilised with geotextiles to reduce erosion potential.					
1. Suitable erosion control measures must be implemented in areas sensitive to erosion i.e. storm water discharge points, exposed areas and embankments. These measures could include:					

a) The suitable use of sand bags or soil saver; b) The prompt rehabilitation of exposed embankment areas (e.g. with indigenous vegetation); c) The removal of vegetation, only as it becomes required for work to proceed; d) Taking suitable precautions in terms of design, construction and earthworks. 2. Soil stockpiling areas must be situated at least 50m away from any sensitive areas. 3. No surface storm water generated as a result of the development may be directed directly into any natural drainage system. 4. The ECO must perform visual inspection during the fortnightly site visits of surface water in order to identify any rapid increase in erosion and erosional features in the area and remedy where essential. 5. Sandbags must be utilized as a temporary diverting barrier downslope of excavation areas. The sandbags must be placed in order to minimize surface runoff ensuring the sensitive areas situated downslope does not incur any impacts as a result of sedimentation and erosion. 6. Soil stockpiles must be protected from erosion, surrounded by suitable earthen buns and covered by erosion control blanket. 7. Site engineers must regularly inspect the erosion control measures to confirm their appropriateness and integrity	Contractor and ESO	Method Statement to be compiled for erosion control and sedimentation	ESO ECO	Daily Fortnightly	Site inspection and compliance with Method Statement

7.7.11. Waste Management					
Impact Management Outcome: Potential impacts to the environment caused by waste (general and hazardous) are avoided or managed.					
Impact Management Actions:	**Implementation**		**Monitoring**		
1. Waste must be dealt with in accordance with the National Waste Management Strategy namely reduce, re-use and recycling, with disposal to landfill being a last resort, in line with an integrated waste management approach. 2. Solid waste generated must be disposed of at the nearest registered landfill site on a weekly basis and disposed to suitable waste receptacles for disposal to the registered waste disposal site. Records of disposal to be kept in the environmental file on site. 3. Different waste bins, for different waste streams, must be provided to ensure correct waste separation. 4. All non-recyclable solid waste must be disposed of at a permitted landfill site, and proof must be available and presented to the ECO during site audits or for any other auditing purposes. 5. Littering is prohibited and dumping of any waste is not allowed in undeveloped, open areas or neighbouring properties. 6. No waste material is to be burned, buried or disposed of in any area that is not a licensed landfill site. 7. A number of waste receptacles must be available for waste disposal and prevention of littering.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Contractor	General camp house-keeping Provision of bins Awareness training on waste minimisation and re-use	ESO ECO	Daily Fortnightly	Provision of waste disposal facilities (bins & skips)

8. Waste bins must be cleaned out when full or at least one a weekly basis to prevent windblown waste and/or visual or odour disturbance. 9. The Contractor must ensure that all litter is collected from the work and camp areas daily. 10. Bins and/or skips must be emptied weekly and waste must be disposed of at a registered landfill site. Waybills for all such disposals are to be kept by the Contractor in the Environmental file on site for review by the ECO or any other auditors. 11. Any effluent containing oil, grease, or other industrial substances must be collected in a container with a leak-proof lid and removed from the site, either for resale or for disposal at a hazardous waste facility. Proof of sale disposal must be obtained from the service provider and kept in the environmental file on site. 12. No grey water runoff or uncontrolled discharges from the site/working areas (including wash down areas) to adjacent or nearby water bodies will be permitted. 13. Prevent runoff loaded with sediment and other suspended materials from the site/working areas from discharging to adjacent watercourses and/or stormwater infrastructure. 14. No waste material must be burned, buried or disposed of in any area that is not a licensed landfill site. 15. Littering is prohibited and dumping of any waste must not be allowed anywhere on site, including undeveloped or open areas. 16. Recycling and the provision of separate waste receptacles for different types of waste must be encouraged.					

CONSTRUCTION PHASE ACTIVITIES

17. The storage of waste must comply with the norms and standards as stipulated in the National Environmental Management: Waste Act. 18. Management of all site activities and site camp/laydown area must be undertaken in accordance with a site specific EMPr. 19. Strict adherence to TNPA pollution, emergency, and health and safety protocols, MARPOL and other applicable maritime legislation and policies 20. Construction workers and operational staff to adopt best practice waste minimisation procedures. 21. Implement the correct handling and disposal procedures for general and hazardous waste. 22. Reduce the amount of waste generated from the construction phase by means of efficient operations and recycling of general waste. 23. Good housekeeping to be done daily of the intertidal area and surrounding port waters. 24. No mixing of concrete in the intertidal zone. 25. No dumping of construction materials or excess concrete in the intertidal and subtidal zones. 26. Wind screening (e.g., fine mesh shade cloth fencing, or solid fencing) must be installed to prevent excessive wind-blown sand and light-weight solid waste (e.g., litter) entering the estuary; and 27. Conduct a comprehensive environmental awareness programme amongst contracted construction personnel about sensitive estuarine/marine habitats and good house-keeping.					

7.7.12. Pollution Control Measures

Impact Management Outcome: Impacts to the environment soils, surface and groundwater is avoided (where possible) or managed.

Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Material Safety Data Sheets (MSDS) for on-site chemicals, hydrocarbon materials and / or waste and hazardous substances must be readily available onsite. 2. The Contractor must prepare an emergency procedure and a procedure for the management e.g. storage, decanting and disposal of hazardous substances. 3. The contractor must store, handle and transport all materials that could adversely affect the environment, in accordance with material safety data sheet. 4. In the case of a spill of hydrocarbons, chemicals or bituminous material the spill must be contained and the material together with any contaminated soil collected and disposed of as hazardous waste. 5. In the event of a pollution incident on site the Site Environmental Officer and ECO must: a. Ensure the immediate implementation of reasonable measures to contain and minimise the impacts of the incident; b. Notify all persons as per legal requirements (NEMA, NEMWA & NEM:AQA) if applicable and approved communication / incident procedure; c. Undertake clean up procedures immediately;	tractor	Provision of sanitation facilities and bunding / impervious surfaces for activities that may lead to soil and groundwater pollution Construction staff to be trained in spill management	ESO ECO	Weekly Fortnightly	Site inspection Inspection of Environmental Incident Register Compliance with Spill Contingency Plan Provision of spill kits

d. Record the incident in the Environmental Incident Register; and e. Implement measures to prevent similar incidents from occurring in the future. 6. The Contractor will be responsible for any clean-up resulting from the failure by his employees or suppliers to properly secure transported materials. 7. The Contractor (and suppliers) must ensure that all materials are correctly secured to ensure safe passage between destinations. 8. Spillages within bunds containing hazardous liquids must be cleared by an approved specialist waste contractor. The ESO must inform the ECO of all spillages as well as the means used to clean them up. 9. Storage areas that contain liquids, that could be hazardous to the environment, must be bunded with an approved impermeable liner. Bunds must have the capacity to hold 130% of the quantity of liquid stored (110% statutory requirement plus an allowance for rainfall). 10. The quality of the surface water downstream must be monitored, in monthly frequencies at a minimum. 11. The quality of marine water near and surrounding the gas pipeline must be monitored, in monthly frequencies at a minimum. 12. Wind screening (e.g. fine mesh shade cloth fencing, or solid fencing) must be installed to prevent excessive windblown sand and light-weight solid waste (e.g. litter) entering the Estuary. 13. Pollution control measures will be adequately controlled in the Port of Richards bay in terms of the existing rules, port					

reception facilities, vessel management practices, oil spill contingency plans and other relevant domestic laws.					

7.7.13. Hazardous Substances Management					
Impact Management Outcome: The management of hazardous substances is undertaken in accordance with the Hazardous Substances Act (Act No. 15 of 1973).					
Impact Management Actions:	**Implementation**		**Monitoring**		
1. All hazardous substances must be stored within a secured storage area, with impervious lining and bunding. Drip trays must be used where suitable. 2. The choice of location for storage areas must be located more than 50m away from watercourses and sensitive areas. Storage areas must be on level ground. 3. Plant and equipment must be maintained to prevent spillage of oil, diesel, fuel or hydraulic fluid. The Contractor must repair or withdraw equipment or machinery from use if they consider these to be polluting and irreparable. 4. Suitably covered receptacles must be available at all times and frequently placed for the disposal of waste oils and greases. All used oils, grease or hydraulic fluids must be placed therein and these receptacles must be removed on a consistent basis for recycling. 5. No smoking is allowed in the vicinity of storage or dispensing areas.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Contractor	Bunding of hazardous storage sites	ESO ECO	Daily Fortnightly	Site inspection of hazardous storage areas and inspection of drip trays and impervious surfaces

6. Fuel decanting and refuelling must take place within the construction camp only. 50kg of hydrocarbon absorbent must be placed at the construction camp for the handling of accidental spillage. 7. Spill kits must be kept on site and all spills must be immediately cleaned up, treated accordingly and reported to the PM, ESO and ECO. 8. All waste must be stored in designated areas which are isolated from surface drains. Waste storage facilities must be covered to prevent potential contaminant migration. 9. Waste storage facilities must be regularly inspected and replaced when full 10. All concrete mixing must take place at designated areas with an impermeable surface e.g. concrete, tarpaulin. 11. Hazardous storage areas must be 110% bunded with an impermeable liner to protect groundwater quality. 12. Excess concrete, bituminous product, etc. may not be dumped on site in within vacant areas. These must be disposed to a licensed waste disposal site or re-used where feasible. 13. No vehicles transporting concrete to or compacting asphalt or any other bituminous product on the site may be washed on site without proper waste water management. 14. Lime and other powders must not be mixed during excessively windy conditions. 15. All hazardous substances required for vehicle maintenance and repair must be stored in sealed containers for disposal to a registered waste disposal site.					

16. Drums / tanks must be safely and securely stored in the construction camp in a location as far as possible from any watercourse. 17. Hazardous waste bins must be clearly marked, stored in a contained area (or have a drip tray) and covered (either stored under a roof or the container must be covered with a lid). 18. Transportation of hazardous materials must be in accordance with the National Road Traffic Act and relevant SANS Codes of Practice. Requirements including transporting the hazardous materials in sealed containers or bags, as well as using suitable cover to prevent the materials from spilling over the side of the vehicle during transit. 19. Hazardous waste is to be disposed of at a Permitted Hazardous Waste Landfill Site. The contractor must provide proof of disposal. 20. The establishment and operation of the site office complex, laydown area and stringing yard must follow a stringent Environmental Management Programme, monitored by an ECO. 21. Sufficient ablution facilities must be provided for construction personnel and sited away from high-risk areas. These must be frequently cleared (preferably every two weeks depending on the number of staff). 22. The laydown area must be adequately protected against adverse weather conditions, particularly the chemical storage areas, to prevent erosion and run-off of contaminants into the port.					

23. Strict adherence to TNPA pollution, emergency, and health and safety protocols, MARPOL and other applicable maritime legislation and policies. 24. A Spill Prevention and Management Plan must be compiled and implemented. In the event of any significant spill the TNPA must be notified. 25. A method statement in respect to the use, handling, storage and disposal of all chemicals as well as anticipated generated waste, must be compiled and submitted as part of any Environmental Management Programme. 26. Correct handling, storage and disposal procedures must be followed (e.g., bunded storage areas to contain 110% of volume). 27. Maintain vehicles and equipment - no leaking vehicles or equipment to be permitted on site. All vehicles and machinery must be parked or stored on an impervious surface. 28. A comprehensive environmental awareness programme must be conducted amongst contracted construction personnel about sensitive estuarine and marine habitats and the need for careful handling and management of chemical substances. 29. In the event of a spill, a penalty must be issued and the 'Polluter Pays' principle must be applied for clean-up operations and rehabilitation, if necessary.					

7.7.14. Sanitation / Ablution Management

Impact Management Outcome: No pollution or disease arises in terms of poorly maintained ablution / sanitation facilities or lack thereof.

Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Portable toilets must be maintained in a clean state. Provide portable toilets at the ratio of 1 toilet per 15 workers. All temporary/portable toilets must be secured to the ground to the satisfaction of the PM to prevent them from toppling over or being blown over by wind. 2. No spillage must occur when the toilets are cleaned or emptied and that the contents are removed from the site. The contractor/service provider is to provide proof that the toilets' contents are disposed of at a registered facility. 3. Under no circumstances may open areas or the surrounding bush be used as a toilet facility. 4. Temporary toilet facilities and sanitation facilities must be serviced weekly and locked from casual access by local communities and general public. 5. Ablution facilities must not cause any pollution to any water resource and it must not be a health hazard to the general public. 6. Temporary toilets must not be located closer than 100m from any watercourses. Should these need to be moved closer, the location must be discussed with and approved by the ESO and ECO.	Contractor	Provision of ablution facilities during construction Management of facilities	ESO ECO	Daily Fortnightly	Proof of servicing and safe disposal

7.7.15. Water Management

Impact Management Outcome: Water for construction is compliant with the requirements of the National Water Act (Act No. 36 of 1998).

Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Only municipal or other approved / licenced sources of water must be used for construction on the construction site and in the construction camps. 2. Water for human consumption must be available at the site offices and at other convenient locations on site where work occurs. 3. Washing of clothes, equipment or machinery within any watercourse is prohibited. 4. Site staff are not permitted to use any stream, river, open water body or natural water source adjacent to or within the designated site for any purpose including: bathing, washing of clothing or for any construction or related activities. 5. If any abstraction points or boreholes are to be used, these must be registered and suitable water meters installed to ensure that the abstracted volumes are measured on a daily basis. 6. All polluted run-off must be prevented or treated to acceptable water quality before being discharged into the storm water system. 7. Ensure water conservation is being practiced by: a. Minimising water use during cleaning of equipment; b. Undertaking regular audits of water systems; and	Contractor	Water abstraction from municipal sources or licenced sources	ECO	Fortnightly	Site inspection Proof of water use authorisation for the abstraction of water (if applicable).

c. Including a discussion on water usage and conservation during environmental awareness training. d. The use of grey water is encouraged.					

7.7.16. Stormwater Management					
Impact Management Outcome: Avoid, prevent and manage impacts related to stormwater					
Impact Management Actions:	**Implementation**		**Monitoring**		
1. Temporary cut off drains and berms must be implemented where required to capture storm water and promote infiltration. 2. Proper drainage must be in place to channel storm water to prevent soil erosion and the deposition of water into sensitive areas. 3. Earth, stone and rubble is to be disposed of so as not to obstruct natural water pathways over the site. i.e.: these materials must not be placed in stormwater channels, drainage lines or rivers. 4. An authorised storm water management plan (SWMP) is to be developed and adhered to, so that the stormwater generated on site does not adversely affect the natural watercourses nearby.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Project Manager	Detailed SWMP, if any	ECO	Fortnightly	Approval of SWMP, if any

5. Storm water runoff must be minimised so that the soil within the area is not subjected to erosion. 6. Ensure that eroded areas are re-vegetated, to ensure reduced sedimentation risk and reduced runoff volumes to streams. 7. Suitable material storage areas must be located up-slope of the main sediment barrier (e.g. sediment fence). 8. Stockpiles kept on site for more than two weeks will require an impervious cover (e.g. builder's plastic or geofabric) to protect against raindrop impact. Stockpiles of sandy material located behind a sediment fence will only need a protective cover if the stockpiles are likely to be exposed to strong winds. 9. Ensure no waste disposal to marine environment. 10. Runoff from the cement/ concrete batching areas must be strictly controlled, and contaminated water must be collected, stored and either treated or disposed of off-site, at a location approved by the project manager; Concrete mixing must be carried out on an impermeable surface; 11. Batching plants areas must be fitted with a containment facility for the collection of cement laden water. 12. Dirty water from the batching plant must be contained to prevent soil and groundwater contamination 13. A washout facility must be provided for washing of concrete associated equipment. Water used for washing must be restricted;					

14. Hardened concrete from the washout facility or concrete mixer can either be reused or disposed of at an appropriate licenced disposal facility; 15. Empty cement bags must be secured with adequate binding material if these will be temporarily stored on site. 16. All spillage of oil onto concrete surfaces must be controlled by the use of an approved absorbent material and the used absorbent material disposed of at an appropriate waste disposal facility.					

7.7.17. Air Quality					
Impact Management Outcome: Minimal dust, emissions and odour due to adherence of management actions					
Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. No burning of waste, such as plastic bags, cement bags and litter, is permitted. 2. Use of dust controls methods such as controlling vehicle speed, wetting or screening of stockpiles and the mixing of chemicals must be ensured to minimise excessive dust liberation. 3. Should excessive vehicle emissions be observed, the required maintenance must be done or the equipment removed from site. 4. A speed limit of 40km/hr must be set for all vehicles travelling over exposed areas or near stockpiles. 5. A complaints register must be provided to report any excessive dust incidents. 6. Contractors must make alternative arrangements (other than fires) for cooking and / or heating requirements. LPG	Contractor	Regular dust suppression Maintaining a dust suppression register Plant and equipment must be in good working order Ablutions /	ESO ECO	Daily Fortnightly	Site inspection Dust suppression register Inspection of Complaints Register relating to dust

gas cookers may be used provided that all safety regulations are followed. 7. Prevent the excavation, handling and transport of erodible materials under high wind conditions.		toilets cleaned weekly			complaints

7.7.18. Noise Management					
Impact Management Outcome: Noise management is undertaken in accordance with SANS 10103 and the Occupational Health and Safety Act (Act No. 85 of 1993)					
Impact Management Actions:	**Implementation**		**Monitoring**		
1. All project activities must be undertaken with appropriate noise mitigation measures to avoid disturbance to avifauna population in the region. 2. Construction activities must be undertaken according to working hours approved by local municipality. Night shift work is not recommended. As a precautionary measure, noisy activities such as vibro-piling (if required) must not occur at night. 3. Machinery and vehicles are to be kept in good working order for the duration of the project to minimize noise nuisance. 4. Construction vehicles and equipment generating excessive noise must be fitted with suitable noise abatement measures and maintenance undertaken or replaced. 5. Construction workers must be provided with proper PPE i.e. ear plugs at activity areas where excessive noise is generated.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**

6. Noise levels must be kept within prescribed limits. All noise and sounds generated must adhere to SANS 10103 specifications for maximum allowable noise levels for rural areas. 7. Noise pollution must be minimised to ensure faunal inhabitants are not stressed. Incorporation of suitable sound proofing material within the development may help to minimise noise and limit human interference in the system. 8. Proper signage must clearly indicate construction activities and advise landowners of blasting, drilling or other potential sources of disturbance. Any blasting activity must be conducted by a suitably licensed blasting contractor. Notification of surrounding landowners, emergency services site personnel of blasting activity 24 hours prior to such activity taking place on site. 9. A complaints register must be provided to record any complaints regarding excessive noise. 10. Periodic terrestrial noise measurements are taken during the construction and operational phases. 11. A long-term hydrophone system is installed in the vicinity of the FSRU, LNGC berth, harbour entrance and other sensitive areas in Richards Bay to determine the current underwater noise environment. 12. A noise impacts monitoring programme must be implemented to validate the predictions made of the impacts of the noise produced by the Powerships on the marine ecology. The results of such monitoring must form part of the Site Environmental File, will be valuable in	Contractor	Compliance with SANS 10103 and OHS Act Use of appropriate PPE	ESO ECO	Daily Fortnightly	Inspection of Complaints Register Site inspection

providing understanding of the effects of noise from large vessels on marine biota.					

7.7.19. Protection of watercourses & estuaries					
Impact Management Outcome: Impact to watercourses and estuaries are managed in adherence to legislation and specialist recommendations					
Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. All watercourses must be protected from direct or indirect spills of pollutants such as solid waste, sewage, cement, oils, fuels, chemicals, aggregate tailings, wash and contaminated water or organic material resulting from the Contractor's activities. 2. In the event of a spill, prompt action must be taken to clear the polluted or affected areas. 3. Where possible, no development equipment must traverse any seasonal or permanent wetland. 4. No return flow into the estuaries must be allowed and no disturbance of the estuarine functional zone should occur apart from the authorised activities. 5. Watercourse or estuary crossings can only be undertaken as per approved site layout plan. 6. There must not be any impact on the long term morphological dynamics of watercourses or estuaries. 7. Existing crossing points must be favoured over the creation of new crossings (including temporary access).	Contractor	Demarcation of watercourses and sensitive areas maintaining the specified buffers	ECO	Fortnightly	watercourses and sensitive areas are marked as restricted areas

8. The contractors laying the pipes and anchors should minimise the area of seabed disturbed. 9. When working in or near any watercourse or estuary, the following environmental controls and consideration must be taken: a. Water levels during the period of construction; No altering of the bed, banks, course or characteristics of a watercourse b. During the execution of the works, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented e.g. including ensuring that construction equipment is well maintained; c. Where earthwork is being undertaken in close proximity to any watercourse, slopes must be stabilised using suitable materials, i.e. sandbags or geotextile fabric, to prevent sand and rock from entering the channel; and d. Appropriate rehabilitation and re-vegetation measures for the watercourse banks must be implemented timeously. In this regard, the banks should be appropriately and incrementally stabilised as soon as development allows. 10. The contractors laying the pipes and anchors should minimise the area of seabed disturbed. 11. Construction periods to be scheduled avoiding heavy rain and storm seasons. Historical data must be used for best time period allocation. 12. Construction should be scheduled to avoid local species breeding seasons.					

CONSTRUCTION PHASE ACTIVITIES

13. The 170m distance from the water line to the moored vessels to be maintained from the Sand-spit area that has been identified as sensitive. 14. No vehicles and machinery shall be refuelled within sensitive coastal areas. 15. Disturbance must be kept to a minimum by confining the pipeline laying activity, working barge and/ or excavation/levelling equipment to within the project area. 16. Duration of pipe laying and anchorage operations must be minimised as much as possible to reduce suspended sediment loads. 17. The sandspit must not be disturbed or utilised during mooring activities. This is a restricted area. 18. Mooring must maintain a distance of 170m from the sandspit. 19. No mixing of concrete in the intertidal zone. 20. No dumping of construction materials or excess concrete in the intertidal and subtidal zones. 21. Water quality monitoring should occur monthly at strategic positions around the gas pipeline and mooring ships. 22. Beyond the headland of the 600 Berth Basin, movement of supporting vessels must be restricted to the main channel only. No vessels may access the Kabeljous Flats. 23. Disturbance must be kept to a minimum by confining the pipeline laying activity, working barge and/ or excavation/levelling equipment to within the project area. 24. Duration of pipe laying and anchorage operations must be minimised as much as possible to reduce suspended sediment loads. 25. Pipe laying and anchorage operations should not take place during inclement weather conditions where risk of disturbance to adjacent areas would be greater.					

CONSTRUCTION PHASE ACTIVITIES

26. The sandspit must not be disturbed or utilised during mooring activities. This is a restricted area. 27. Mooring of the vessels must maintain a minimum distance of 170 m from the sandspit. 28. Laying of the pipeline and the anchor legs must be undertaken with as little disturbance of the seabed as possible. 29. Monitoring of turbidity levels must be undertaken daily during the pipe laying and anchorage operations. TSS levels may not exceed 20 mg/l. 30. Management of all construction activities and site camp/laydown area must be undertaken in accordance with a site specific EMPr.					

7.7.20. Heritage - Areas of Specific Importance					
Impact Management Outcome: Impact to heritage and palaeontological resources are managed in terms of the National Heritage Act					
Impact Management Actions:	**Implementation**		**Monitoring**		
1. In terms of the heritage aspect, no sensitive heritage sites were recorded / identified by the relevant specialist. The following are however precautionary measures that should be taken into consideration. 2. No heritage sites have been recorded in the study area. The project should be exempt from further HIA mitigation, especially for the maritime aspect since the harbour removed all potential heritage deposits. A Chance Find protocol will be initiated during construction. 3. If an artefact on site is uncovered, work in the immediate vicinity must be stopped immediately.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**

4. Contractors must prevent any person from removing or damaging any such article and must immediately, upon discovery thereof, inform the PM or ECO of such discovery. 5. Approval must be obtained from the provincial heritage authority, should there be the need to demolish any sites of archaeological and cultural significance. Demolition / construction work must only commence once the provincial heritage authority's approval has being obtained. 6. Work may only resume once clearance is given in writing by an archaeologist. 7. If a grave is uncovered on site all work in the immediate vicinity of the graves must be stopped and the PM and ECO informed of the discovery. 8. The provincial heritage authority must be contacted and in the case of graves, arrangements made for an undertaker to carry out exhumation and reburial. 9. An archaeologist must be appointed for the duration of the construction phase of the project. 10. The appointed archaeologist must have the requisite experience and knowledge to recognise maritime cultural heritage that may be found in the beach/dune area. 11. The appointed archaeologist must do a short induction to familiarise the contractors and workers, including divers, to the potential heritage material artefacts that may be exposed during work. This includes Stone Age, Early Farming Communities, Colonial Period and Shipwreck artefacts and burials. 12. Should any heritage artefacts be exposed during marine excavations, work in the immediate area where the	Contractor Palaeontologist/ Archaeologist	Demarcation of heritage sites maintaining the specified buffers Once of	ECO Palaeontologist/ Archaeologist	Fortnightly Duration of construction	Heritage sites including graves are marked as restricted areas

artefacts were discovered, shall cease immediately and the on-site archaeologist shall be notified as soon as possible. 13. All discoveries shall be reported immediately to the on-site archaeologist so that an investigation and evaluation of the finds can be made. The archaeologist will advise the necessary actions to be taken, including notifying SAHRA and if the artefacts are below the high-water mark, SAHRA's MUCH Unit must be contacted. 14. Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and 15. Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the NHRA (Act No. 25 of 1999), Section 51. (1). 16. The preferred alternative from a coastal access perspective is to follow existing servitudes to minimise disruption to coastal access during the operation phase. 17. Should maritime archaeology be discovered, SAHRA, as the relevant authority which deals underwater cultural heritage, must be contacted immediately, and approval must be obtained should there be need to demolish or remove such maritime archaeology site. Demolition / construction work may only commence or continue once SAHRA's approval has been obtained.					

7.7.21. Monitoring, Reporting and Record Keeping					
Impact Management Outcome: Impact to the construction site and surrounding areas are minimal as result of adherence to the authorisations and EMPr.					
Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Environmental monitoring must be undertaken by the ESO on a daily basis and by the ECO on a fortnightly basis. 2. This monitoring must be undertaken in order to ensure compliance with all aspects or requirements of the EMPr and other environmental authorisations. 3. Contractors must provide proof of disposal of building rubble, domestic waste, industrial waste and hazardous waste to licensed waste disposal or recycling facilities. 4. Complaints received from the community or other I&AP's must be registered and recorded by the Environmental Site Officer and brought to the attention of the ECO and contractors. All relevant parties must respond accordingly. The following information must be recorded in the case of any complaint/incident: a. Time, date and nature of complaint; b. Response and investigation undertaken; and c. Corrective and preventative actions taken and by whom. 5. All complaints received must be investigated and a response given to the complainant within 7 days.	ESO Contractor	Establish registers, record of receipts,, environmental file	ESO ECO	Daily Monthly	Proof of registers, receipts and environmental file

POST CONSTRUCTION PHASE AND REHABILITATION ACTIVITIES

7.8. Post Construction Phase and Rehabilitation Activities

7.8.1.Construction Camp, Construction Areas and Rehabilitation					
Impact Management Outcome: Post-construction and rehabilitation activities are undertaken in accordance with EMPR requirements					
Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limit (40km/h), to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited. 2. All remaining construction infrastructure and material / consumables must be removed. 3. The working corridor must be rehabilitated / reinstated once all planting of vegetation has been completed to rectify any damage that may have been caused by heavy machinery. 4. All spillage areas must be cleaned and/or remediated. 5. All remaining waste and litter must be collected and recycled and /or disposed to reputable contractors / licensed facilities. 6. The Contractor must arrange for the cancellation of all temporary services, including but not limited to chemical toilets and waste removal and disposal services. 7. Temporary fences, barriers and demarcations associated with the construction phase are to be removed from the site, unless stipulated otherwise by the Project Developer. 8. All residual stockpiles must be removed to spoil or spread on site as directed by the Engineer. 9. The Contractor must repair any damage that the construction works has caused to neighbouring properties.	Contractor	Clean rehabilitated site free of litter and construction material	ECO	Fortnightly	Site Inspection, Record Keeping and ECO Reports

POST CONSTRUCTION PHASE AND REHABILITATION ACTIVITIES

10. The Contractor is to check that all watercourses are free from building rubble, spoil materials, debris and waste materials. 11. No temporary works, stockpiles or other circumstances that could impede natural water movements or act to concentrate run-off must be removed.					
1. Rehabilitation of vegetation and land areas must be undertaken concurrently with construction activities where possible. Where concurrent rehabilitation is not possible, rehabilitation of relevant areas must be commenced with immediately on completion of construction activities and deconstruction of the construction contractor's camp. 2. The undeveloped areas must be rehabilitated to its pre-establishment condition or agreed alternative i.e. hardened areas ripped and vegetated. 3. All areas that have been disturbed by construction activities (including the construction camp area) must be cleared of alien vegetation and the vegetation must be disposed to a registered waste disposal site or re-use facilities. 4. On completion of all operations, the construction site must be cleared of any contaminated soil accordance with the soil management procedure. 5. All excavations and test pits must be backfilled with in-situ material and the areas monitored for subsidence, which must be addressed if detected. 6. Topsoil that has been stockpiled during construction must be applied to the area to undergo rehabilitation. The depth of the topsoil layer to be applied depends on the natural depth of topsoil in the area, and the amount of topsoil that may have been lost during construction.	Contractor	Clean rehabilitated site free of litter and construction material	ECO	Fortnightly	Site Inspection, Record Keeping and ECO Reports

7. All alien vegetation is to be removed and disposed of. Removal will, to a large extent, be done by hand. Saws may be required in certain cases and specific herbicides may be required (if used, the use of these must be strictly controlled). 8. Regular monitoring of the rehabilitated areas must be conducted. Areas that show signs of erosion or where the vegetation has not established successfully must be repaired and / or re-vegetated.					

7.8.2.Rehabilitation of Watercourses, Estuary and Coastal Environment					
Impact Management Outcome: Post-construction and rehabilitation activities are undertaken in accordance with EMPR requirements					
Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. A total of 12-month monitoring have been conducted over the period 2020-2023 as part of pre-construction baseline monitoring. A second 12-month post construction monitoring programme will commence as soon as construction is complete. 2. Results from the monitoring will inform implementation of and any enhancement to the proposed mitigation measures to ensure the development does not have a long-term impacts on the SCCs and migratory waders in the area. 3. A follow-up assessment on avian biodiversity and species abundance within the assessment area and surrounding areas must be conducted within one year after the facility has been in operation and should be repeated every 3-5	Contractor	Clean rehabilitated site	ECO	Fortnightly	Site Inspection, Record Keeping and ECO Reports

years. A monitoring plan has been developed for the site and monitoring is currently ongoing. Information obtained from the monitoring must be provided to BirdLife Renewable Energy Programme on energy@birdlife.org.za. The data must be presented as described in Jenkins et al., 2017. 4. Rehabilitation of vegetation and land areas must be undertaken concurrently with construction activities where possible. Where concurrent rehabilitation is not possible, rehabilitation of relevant areas must be commenced with immediately on completion of construction activities and deconstruction of the construction contractor's camp. 5. Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood and wind events. This will also reduce the likelihood of encroachment by alien invasive plant species. 6. Any woody material removed can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent further erosion. 7. Rehabilitation of the disturbed areas existing in the project area must be made a priority. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are endemic to this vegetation type. 8. The undeveloped areas must be rehabilitated to its pre-establishment condition or agreed alternative i.e. hardened areas ripped and vegetated. 9. All areas that have been disturbed by construction activities (including the construction camp area) must be cleared of alien vegetation and the vegetation must be disposed to a registered waste disposal site or re-use facilities. 10. On completion of all operations, the construction site must be cleared of any contaminated soil accordance with the soil management procedure.					

POST CONSTRUCTION PHASE AND REHABILITATION ACTIVITIES

11. All excavations and test pits must be backfilled with in-situ material and the areas monitored for subsidence, which must be addressed if detected. 12. Topsoil that has been stockpiled during construction must be applied to the area to undergo rehabilitation. The depth of the topsoil layer to be applied depends on the natural depth of topsoil in the area, and the amount of topsoil that may have been lost during construction. 13. All alien vegetation is to be removed and disposed of. Removal will, to a large extent, be done by hand. Saws may be required in certain cases and specific herbicides may be required (if used, the use of these must be strictly controlled). 14. Regular monitoring of the rehabilitated areas must be conducted. Areas that show signs of erosion or where the vegetation has not established successfully must be repaired and / or re-vegetated. 15. The assembly basin area and the sandspit must not be disturbed or utilised during construction or during mooring activities. These are restricted areas. Mooring of the vessels must maintain a minimum distance of 170 m from the sandspit. 16. In the unlikely event that Zostera is discovered within project area (i.e., 600 Berth Basin), an offset is proposed replacing like-with-like should it be affected by the powerships and associated infrastructure. 17. The most typical rehabilitation interventions designed to assist in the recovery of degraded wetland ecosystems are 'plugs'. The 'plugs' are placed with the intention of reinstating a more natural hydrology.					

POST CONSTRUCTION PHASE AND REHABILITATION ACTIVITIES

18. Typical interventions for maintaining the health wetland ecosystems that are in the process of degrading are the placement of erosion control structures which assist in halting the advance through a wetland of an erosion headcut. 19. Rehabilitation is not confined to physical structures, and rehabilitation may include interventions such as reducing livestock grazing-pressure or reducing the frequency of burning. 20. All post-construction building material and waste must be cleared in accordance with the EMPr, before any re-vegetation may take place. 21. Erosion features that have developed as a result of construction related disturbance are required to be stabilised. This may also include the need to deactivate any erosion head cuts/rills/gullies that may have developed by either compacted soil infill, rock plugs, gabions or any other suitable measures. 22. Water utilised for irrigation must be free of any chlorine or contaminants that may negatively affect the plant species. 23. The establishment and infestation of AIPs must be prevented, managed and eradicated in the areas impacted upon by the proposed construction activities by a horticulturist for the period stipulated in the Wetland Rehabilitation Plan. 24. The type of species and location of that species will determine the type of methodology required for its management and eradication. This methodology should target all lifecycle phases and propagules of the specific species, e.g. seedlings/saplings, seeds, roots.					

POST CONSTRUCTION PHASE AND REHABILITATION ACTIVITIES

7.8.3.Monitoring, Reporting, Record Keeping & Compliance and Close-out Audit of Construction and Post Construction Activities					
Impact Management Outcome: Impact to the construction site and surrounding areas are minimal as result of adherence to the authorisations and EMPr.					
Impact Management Actions:	**Implementation**		**Monitoring**		
1. Environmental monitoring must be undertaken by the Environmental Site Officer on a daily basis and by the ECO on a fortnightly basis. 2. This monitoring must be undertaken in order to ensure compliance with all aspects or requirements of the EMPr and Environmental Authorisation. 3. A close-out inspection must be conducted by the ECO following the post-construction and rehabilitation activities. 4. Karpowership must not sign-off on the project and make payment of the final invoice to the Contractor until the close-out inspection is conducted by the ECO and 100% compliance to the EMPr has been achieved. 5. Construction and post-construction monitoring is recommended to ensure that any line-related fatalities are documented and addressed immediately.	**Responsible Person/s** ESO Contractor	**Method of Implementation** Establish registers, record of receipts, environmental file	**Responsible Person** ESO ECO Avian Specialist	**Frequency of Monitoring** Daily Fortnightly Monthly, lifespan of project	**Mechanism for Monitoring Compliance** Proof of registers, receipts and environmental file

OPERATION PHASE AND RELATED ACTIVITIES

7.9. Operational Phase and Related Activities

The aim of the Operational Environmental Management Plan (OEMP) is to provide an appropriate mechanism for the Karpowership's environmental management throughout the operational phase of the project. This OEMP therefore stipulates the components of the operational phase that will require ongoing management from an environmental perspective. To achieve this, the OEMP specifies the environmental management actions that Karpowership and all its agents must abide by during the operational phase of the development.

7.9.1.Legislative Requirements

Impact Management Outcome: Compliance with all environmental legislative requirements during the operational phase of the project.

Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Compliance with all environmental authorisations and legislative requirements. 2. Compliance with all MARPOL Convention requirements such as the prohibition of discharge of oil, noxious liquid substances, and sewage from vessels into the marine environment. 3. Should any scope changes or amendments to the development, facilities and / or operational activities be considered, an environmental opinion by a qualified EAP or environmental lawyer must be obtained and environmental compliance ensured prior to commencement with the changes. 4. Any changes to the EMPr must be consulted with an independent EAP prior to implementation. 5. All environmental requirements should be reviewed annually to ensure legal compliance. 6. An environmental audit must be undertaken annually by an independent environmental practitioner and the EMPr must be updated as required. 7. A dedicated person must be appointed who will be mandated with ensuring compliance with any Environmental Authorisations granted as well as the supplementary requirements, and any other	Operations Manager and Project Manager	Appointment of an EAP	EAP ECO	Annually Fortnightly	Site Inspections, Review of Documentation, Annual Report

documentation that will be required to ensure that the proposed works are carried out and maintained into perpetuity. 8. All personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting, or hunting terrestrial species (e.g., guineafowl and francolin), and owls, which are often persecuted out of superstition. Signs must be put up to enforce this. 9. Adherence to port safety regulations and emergency procedures during mooring/operation. 10. The Gas to Power operation must be aware of Transnet National Ports Authority Environmental Management Systems as well as emergency preparedness and response procedures and apply such on an ongoing basis and in the event of emergencies, for example, tidal surge, dust storms and other extreme events. 11. Areas required to be restricted outside of the confines of the Port, as a result of health, safety and security concerns, must be properly cordoned off with signage installed indicating the reason for such restriction. 12. Provide an inventory of waste produced and the nature of waste being produced and cooperate with the Transnet National Ports Authority in every way. 13. A requirement to report environmental accidents and emergencies immediately they occur, to the port captain. 14. A Formal Failure Analysis (FFA) must be conducted to conclude each incident investigation in order to inform preventative measures to be taken in future. 15. Training of emergency response teams to deal with environmental implications of an emergency in addition to the safety implications.					

16. Karpowership SA will develop and implement procedures aligned with relevant standards, legislative and key stakeholder (e,g: TNPA) requirements. These procedures will be updated as required during the project lifespan to ensure the procedures remain current and applicable. 17. The ship-to-ship transfer of LNG must be managed under an internationally-accredited process via trained personnel to ensure compliance and within clear quality, health and safety regulations. 18. Strict adherence to port safety regulations and emergency procedures during mooring and operation. 19. Areas required to be restricted outside of the confines of the Port, as a result of health, safety and security concerns, must be properly cordoned off with signage installed indicating the reason for such restriction. 20. Shipping: a. Provide an inventory of waste produced and the nature of waste being produced and cooperate with the Transnet National Ports Authority in every way. b. A requirement to report environmental accidents and emergencies immediately they occur, to the port captain. c. A Formal Failure Analysis (FFA) must be conducted to conclude each incident investigation in order to inform preventative measures to be taken in future. d. Training of emergency response teams to deal with environmental implications of an emergency in addition to the safety implications.					

7.9.2.Marine Environment					
Impact Management Outcome: Minimised impact to the benthic and marine environment from the establishment of the Karpowership.					
Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. All project activities must be undertaken with appropriate noise mitigation measures to avoid disturbance to avifauna population in the region. 2. Long term monitoring of the receiving water body and marine ecology should be implemented during construction and operation of the proposed Powerships facility. 3. Monitoring should follow a BACI (before/after control/impact) approach. At a minimum the temperature of the receiving water body in the vicinity of the discharge should be monitored to validate the modelling results and to ensure compliance with the stipulated water quality guidelines. 4. Intake velocities should be kept as close to 0.15 m/s to ensure that fish and other mobile organisms can escape the intake current. Intake velocities can be reduced through the use of footer valves. 5. Intake structures should not draw in water from the upper meter of the water column. 6. Intake structures should ensure the horizontal intake of water. 7. Cooling water is discharged into the sea at a depth of 8m, as recommended in the modelling report (PRDW 2022). 8. To reduce the risk of recirculation of the discharge back to the intakes, it is recommended that the discharge pipeline running down the vessel hull has a second	Operations Manager and Project Manager and Engineer	Operation of the Karpowership, FSRU and Gas Pipeline	ECO ESO Marine Specialist	Frequencies as per long terms monitoring, for the lifespan of project	Site inspections and document review

elbow to discharge horizontally away from the vessel, and that the discharge pipes be positioned as far from the intakes as possible	Operations Manager and Project Manager and Engineer	Operation of the Karpowership, FSRU and Gas Pipeline	ECO ESO Marine Specialist	Frequencies as per the monitoring programme, for lifespan of project	
9. A water quality monitoring programme should be implemented to validate the predictions of the hydrodynamic modelling study and monitor constituents of the effluent. Adaptive management, informed by monitoring results must be implemented to ensure compliance with water quality guidelines.					
10. The Powership shall not be operational for 24 hours a day, to reduce chronic exposure of noise to marine organisms. The Powership will operate for a maximum 16.5 hours a day.	Operations Manager and Project Manager and Engineer	Operation of the Karpowership, FSRU and Gas Pipeline	ECO ESO	Ongoing for lifespan of project	
11. Maximum power output from the Powership should be avoided. Noise levels produced by the Powership are proportional to the amount of power output, so lower noise levels will be achieved with lower power capacity.					
12. In the case that a marine mammal, especially a baleen whale, is in the near vicinity i.e., within hundreds of meters of the Powerships, the Powership should not operate at maximum power output, to reduce the noise level produced and thus the chances of disturbing the animal. A trained spotter is to periodically deployed to observe marine area surrounding the vessels during expected seasons for encounters with marine mammals, particularly sensitive baleen whales.	Operations Manager and Project Manager and Engineer	Operation of the Karpowership, FSRU and Gas Pipeline	ECO ESO	Ongoing for lifespan of project	
13. When moving in and out of the port, the LNGC should not move at maximum speed, so as to reduce the amount of noise produced by its engines.					
14. A noise impacts monitoring programme must be implemented to validate the predictions made of the impacts of the noise produced by the Powerships on the marine ecology. A baseline study of the ecology in the	Operations Manager and Project Manager and Engineer	Operation of the Karpowership, FSRU and Gas Pipeline	ECO ESO	Ongoing for lifespan of project	

immediate vicinity of the Powerships should be undertaken following a before-after-control-impact (BACI) approach. This should include an assessment of the local macrofauna and video surveys and fish sampling to understand the fish community in the nearshore region associated with the Powership. An assessment of the distribution and behaviour of diving seabird in the context of the Powership must also be undertaken. These surveys must be ongoing and following a sampling methodology that is robust when assessing the impacts of the noise produced by the Powership on the distributions of benthic macrofauna, fish, seabirds, and marine mammals. 15. The benthic communities surrounding the proposed Powership, FSRU and pipeline locations must be monitored using visual survey techniques. 16. Monitoring of infrastructure and general maintenance is required. 17. Access of infrastructure and maintenance of infrastructure and services corridor as per port's approvals and procedures. 18. Noise level monitoring must performed to measure the ambient noise from the ship. The 50 dBA at 100m levels are to be maintained. 19. Point source emissions are to be monitored and submitted annually to SAAELIP. 20. Plume modelling and managing of the mixing zone to remain within the 1 degree Celsius within 100m radius. 21. Discharging from the powership must be as per the environmental authorisation, preferably within the deep water and/or where water circulation by tidal flushing would be maximised.	Operations Manager and Project Manager and Engineer	Operation of the Karpowership, FSRU and Gas Pipeline	Marine Specialist ECO ESO	Ongoing for lifespan of project	

22. To reduce the risk of recirculation of the discharge back to the intakes, it is recommended that the discharge pipeline running down the vessel hull has a second elbow to discharge horizontally away from the vessel, and that the discharge pipes be positioned as far from the intakes as possible. 23. Discharges must be compliant with the South African Water Quality Guidelines for Coastal and Marine Waters (DWAF, 1995; DEA, 2018b) 24. All effluent and solid (general, hazardous and domestic) waste to be disposed though registered and certified service provides as per the NPA and MARPOL requirements. 25. Implementation of awareness, inspections, contingency plans, compliance with port protocols and reporting of environmental incidents. 26. An Operations Manual for each operation, including the gas transfer process must be developed and implemented. 27. Operational and Emergency procedures must be implemented and adhered to. 28. The Emergency Plan must be approved by the Port Authorities and must comply with the MHI Regulations. 29. The visiting Ship Captains must provide Port Management with their detailed Ship to Ship Cargo Transfer Operations Manual before offloading. 30. Only suitably qualified people must be used for all operations. All applicable certificates of conformance must be on site. 31. Security measures must be implemented to prevent any unauthorised access. 32. Environmental incident reporting to the Port & Authorities must be undertaken as per required timeframes.	Operations Manager and Project Manager and Engineer Operations Manager and Project Manager and Engineer	Operation of the Karpowership, FSRU and Gas Pipeline Operation of the Karpowership, FSRU and Gas Pipeline	ECO ESO ECO ESO	Ongoing for lifespan of project Ongoing for lifespan of project	

33. The Port Fire Department will handle all fire-fighting and emergencies. 34. Risk reduction programmes must be continually investigated to reduce the impact from accidental fires and explosions on surrounding communities. 35. The noise impact from the operating Powerships and FSRU should be measured during the operational phase, to ensure that the impact is within the required legal limit. 36. A baseline study of the underwater noise climates in the Port of Richards Bay is initiated. 37. Install acoustic enclosures around all major noise emitting components to supress the noise emissions from equipment such as engines. 38. Install Silencers on equipment such as exhaust stacks and turbo chargers. 39. The Powerships operator must ensure that water temperatures at 100 m from the discharge points are compliant with the Water Quality guideline ecological threshold. This will confirm the performance of the discharge system and the numerical model predictions. 40. Disturbance of the seabed should be limited to the minimum area required for construction of the pipeline fixtures. The pipeline or other materials should not be dragged across the seabed. 41. The powership attenuates the sound propagation to minimise any residual noise pollution issues. 42. Participation in and contribution of data to external, long-term monitoring programmes currently being undertaken in the Port is encouraged. 43. Consideration must be given to potential sea-level rise and increased storm intensity (refer to Section of Climate	Operations Manager and Project Manager and Engineer Operations Manager and Project Manager and Engineer	Operation of the Karpowership, FSRU and Gas Pipeline Operation of the Karpowership, FSRU and Gas Pipeline	ECO ESO ECO ESO	Ongoing for lifespan of project Ongoing for lifespan of project	

Change Impact Assessment) when designing and installing any permanent, non-floating infrastructure. 44. The sandspit and Kabeljous Flat must be designated restricted areas, i.e. these areas may not be utilised in any way to support or facilitate construction/mooring activities, storing of materials, etc. 45. Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided and sodium vapor (red/green) motion detection lights should be used wherever possible. 46. Intake velocities must be kept as close to 0.15 m/s to ensure that fish and other mobile organisms can escape the intake current. Intake velocities can be reduced through the use of footer valves. 47. Intake structures must not draw in water from the upper meter of the water column; and 48. Intake structures must ensure the horizontal intake of water. 49. Cooling water is discharged into the sea at a depth of 8m, as recommended in the modelling report (PRDW 2022). 50. To reduce the risk of recirculation of the discharge back to the intakes, it is recommended that the discharge pipeline running down the vessel hull has a second elbow to discharge horizontally away from the vessel, and that the discharge pipes be positioned as far from the intakes as possible.	Operations Manager and Project Manager and Engineer	Operation of the Karpowership, FSRU and Gas Pipeline	ECO ESO	Ongoing for lifespan of project	
51. A noise impacts monitoring programme should be implemented to validate the predictions made of the impacts of the noise produced by the Gas to Power project on the marine ecology. Monitoring of the ecology	Operations Manager and Project Manager and Engineer	Operation of the Karpowership, FSRU and Gas Pipeline	ECO ESO	Ongoing for lifespan of project	

in the immediate vicinity of the Gas to Power project should be undertaken following a before-after-control-impact (BACI) approach. This should include monitoring of the local macrofauna, and video surveys and fish sampling to understand the fish community in the region associated with the Powerships, as well as use of the project area by marine mammals.. Monitoring of the distribution and behaviour of diving seabirds in the vicinity of the Powerships should also be undertaken. 52. These surveys should be ongoing and following a sampling methodology that is robust when assessing the impacts of the noise produced by the Powerships on the distributions of benthic macrofauna, fish, seabirds, and marine mammals. If an effect if observed, adaptive management informed by monitoring results must be implemented. The results of such monitoring will be valuable in informing other developments and contributing to the international understanding of the effects of noise from large vessels on marine biota. 53. With regard to lighting: a. Only add light for specific purposes. Remove excess/unnecessary lights, and turn off lights in areas not in use. b. Restrict uplighting and water illumination. c. Use adaptive light controls to manage light timing, intensity and colour. d. Light only the object or area intended – keep lights close to the ground, directed and shielded to avoid light spill. e. Use the lowest intensity lighting appropriate for the task. f. Use non-reflective, dark-coloured surfaces.			Marine Specialist		

g. Use lights with reduced or filtered blue, violet and ultra-violet wavelengths. Avoid high intensity light of any colour. h. Implement actions when birds are likely to be present. This includes peak migration periods (flyway locations). i. No light source should be directly visible from foraging or nocturnal roost habitats, or from migratory pathways. j. Install screening/shielding with appropriate materials along the starboard side of the vessels. k. Do not install fixed light sources in nocturnal foraging or roost areas. l. Use curfews to manage lighting near nocturnal foraging and roosting areas in coastal habitats. For example, manage artificial lights using motion sensors and timers from 7pm until dawn. m. Use flashing/intermittent lights instead of fixed beam. n. Use motion sensors to turn lights on only when needed. o. Reduce deck lighting to minimum required for human safety on vessels moored near nocturnal foraging and roost areas. p. Prevent indoor lighting reaching migratory shorebird habitat, by using blinds, curtains, or shutters. q. In facilities requiring intermittent night inspections, turn lights on only during the time operators are moving around the facility. r. Use appropriate wavelength, explosion proof LEDs with smart lighting controls and/or motions					

sensors. LEDs have no warmup or cool down limitations so can remain off until needed and provide instant light when required for routine nightly inspections or in the event of an emergency. s. Industrial site/plant operators to use personal head torches. t. Undertake a night light audit on a moonless night and 24-hour noise audits in accordance with SANS 10103:2008 on the sandspit and Kabeljous Flats before operations commence to determine the baseline, once operations start and annually thereafter. 54. For the transmission lines and ancillary infrastructure: a. Approach and general access to the ships should be from the north side. b. No activities (post construction) must occur between the ships and the sandspit, other than activities in direct contact with the vessels, such as ship maintenance. c. Align transmission lines with existing transmission lines d. Mark the lines for visibility. e. Remove any nests built on powerline structures when not in use, to discourage their re-use. 55. The following must be adhered to for noise and lighting: a. In respect to noise impacts, layout option 1 must be selected to reduce noise and vibration impacts to surrounding avifauna b. Essential lighting is on at night c. Lumens are kept to a minimum d. Lights are installed as low as possible e. Lit up windows are shuttered at night.	Operations Manager and Project Manager and Engineer	Operation of the Karpowership, FSRU and Gas Pipeline Transmission lines and ancillary infrastructure	ECO ESO	Ongoing for lifespan of project	

56. Only specialist personnel who are well trained on the standard protocols for preparation, coupling and decoupling of the gas pipeline between vessels, may undertake these operations. 57. Strict adherence to TNPA pollution, emergency, and health and safety protocols, MARPOL and other applicable maritime legislation and policies for the storage and handling of LNG, and power generation processes. 58. A Spill Prevention and Emergency Response Plan must be compiled and implemented. In the event of any significant spill the TNPA must be notified. 59. A method statement in respect to the use, handling, storage and disposal of all chemicals as well as anticipated generated waste, must be compiled and submitted as part of any Environmental Management Programme; 60. Correct handling, storage and disposal procedures must be followed. 61. Conduct a comprehensive environmental awareness programme amongst contracted construction personnel about sensitive estuarine and marine habitats and the need for careful handling and management of chemical substances. 62. In response to possible pollution as a result of Shipping activities: a. Provide an inventory of waste produced and the nature of waste being produced and cooperate with the TNPA in every way. b. A requirement to report environmental accidents and emergencies immediately they occur, to the port captain; o A Formal Failure Analysis (FFA) must be conducted to conclude each incident	Operations Manager and Project Manager and Engineer	Operation of the Karpowership, FSRU and Gas Pipeline	ECO ESO	Ongoing for lifespan of project	

investigation in order to inform preventative measures to be taken in future; o Training of emergency response teams to deal with environmental implications of an emergency in addition to the safety implications. 63. In the event of a spill, a penalty must be issued. 64. To prevent catastrophic accidents impacting on estuarine/marine ecology, avifauna and ecosystem services: a. All mitigation measures provided in the Risk Assessment for Major Hazard Installations (MHR, 2022) must be adopted. b. Only specialist personnel who are well trained on the standard protocols for preparation, coupling and decoupling of the gas pipeline between vessels, may undertake these operations. All applicable certificates of conformance must be on site. c. An emergency plan that is compliant with the Major Hazardous Installation Regulations must be compiled and implemented. d. Strict adherence to TNPA pollution, emergency, and health and safety protocols, MARPOL and other applicable maritime legislation and policies for the storage and handling of LNG, and power generation processes. e. Comprehensive safety checks frequently undertaken of all project components and processes. f. Frequent risk assessments and adaptive management where required. g. Good housekeeping to be done daily.	Operations Manager and Project Manager and Engineer	Operation of the Karpowership, FSRU and Gas Pipeline	ECO ESO	Ongoing for lifespan of project	

OPERATION PHASE AND RELATED ACTIVITIES

65. Monitoring of noise levels at the sandspit and the Kabeljous Flats is recommended at least monthly during operation so these can be compared to the changes in bird populations, if any. In any instance of detectable change, additional means of reducing airborne noise from the powerships must be implemented to prevent lasting impacts on the birdlife. 66. Long term monitoring of the receiving water body and estuarine ecology must be implemented during construction and operation of the proposed Gas to Power project. Monitoring must follow a BACI (before/after control/impact) approach. The following monitoring programmes are recommended: a. Monitoring of turbidity levels must be undertaken daily during the pipe laying and anchorage operations. Total suspended solid levels may not exceed 20 mg/l. b. Undertake a night light audit on a moonless night and 24-hour noise audits in accordance with SANS 10103:2008 on the sandspit and Kabeljous Flats before operations commence to determine the baseline, once operations start and annually thereafter. c. A water quality monitoring programme must be implemented to validate the predictions of the hydrodynamic modelling study and monitor constituents of the effluent. d. At a minimum the temperature of the receiving water body in the vicinity of the discharge must be monitored to validate the modelling results and to ensure compliance with the stipulated water quality guidelines.	Operations Manager and Project Manager and Engineer	Operation of the Karpowership, FSRU and Gas Pipeline	ECO ESO Marine Specialist	Ongoing for lifespan of project	

e. A noise impacts monitoring programme must be implemented to validate the predictions made of the impacts of the noise produced by the proposed project on the estuarine ecology. Benthic macrofauna, fish, birds and megafauna communities surrounding the proposed powerships, FSRU and pipeline locations must be monitored (e.g. using grab survey techniques for benthic macrofauna, video monitoring and fish sampling, visual observation) to provide pre-, during, and post- operation scenarios. This must also include areas on the Kabeljous Flats, sandspit and adjacent mangroves. f. Monitoring of the distribution and behaviour of diving seabirds in the context of the powerships should also be undertaken. g. The long-term monitoring of underwater noise in Richards Bay must be conducted. ~~h. Avifauna monitoring is to take place monthly for one (1) year pre-construction and then monthly for one (1) year post construction so that mitigation measures can be adapted to ensure the development does not have a long-term impact on the avifauna Species of Conservation Concern and migratory waders in the area.~~ 67. A total of 12-month monitoring have been conducted over the period 2020-2023 as part of pre-construction baseline monitoring. A second 12-month post construction monitoring programme will commence as soon as construction is complete. 68. Results from the monitoring will inform implementation of and any enhancement to the proposed mitigation					

measures to ensure the development does not have a long-term impacts on the SCCs and migratory waders in the area. a. A follow-up assessment on avian biodiversity and species abundance within the assessment area and surrounding areas must be conducted within one year after the facility has been in operation and should be repeated every 3-5 years. b. A monitoring plan has been developed for the site and monitoring is currently ongoing. Information obtained from the monitoring must be provided to BirdLife Renewable Energy Programme on energy@birdlife.org.za. The data must be presented as described in Jenkins et al., 2017. c. A comprehensive monitoring programme must be implemented to ensure that operation, as well as maintenance, of the Gas to Power project and its various components comply with relevant standards and all environmental, health and safety regulations. All records of discharge volumes and quality are to be kept for auditing purposes. 69. Post construction monitoring should be undertaken by competent ornithologists familiar with the area's threatened species. 70. 12-month baseline avifaunal monitoring ~~Monthly avifaunal monitoring~~ of the sandspit and Kabeljous flats. ~~for at least the next 3 years.~~ 71. Waterbird counts of the full site including both Richards Bay Port and the Richards Bay Game Reserve should					

resume and continue annually in both summer and winter. 72. These surveys should be ongoing and following a sampling methodology that is robust when assessing the impacts produced by the powerships on the distributions of estuarine biotic communities. Importantly, adaptive management, informed by monitoring results must be implemented to reduce negative impacts and also to ensure compliance with applicable guidelines (e.g. water quality guidelines). Participation in and contribution of data to external, long-term monitoring programmes currently being undertaken in Richards Bay is encouraged. 73. ~~During construction, general environmental compliance monitoring must be undertaken by a suitably qualified environmental control officer (ECO) on a weekly basis as a minimum to ensure that basic environmental best practices are followed and that conditions of the environmental authorisation are observed. The presence of an on-site environmental officer is essential to monitor daily activities.~~ (Note: moved to Construction Phase). 74. Mooring of the vessels must maintain a minimum distance of 170 m from the sandspit. 75. In the event that seabirds start to roost or bring in nesting material, bird diverters, such as spikes, anti-bird gel and similar, should be installed in consultation with an Avifauna specialist. 76. The monitoring plan for the avifauna should speak to the existing monitoring plans of the port, if no such documents are available, Karpowership can contribute to them.					

77. Monitoring must be done in conjunction with all port users and the TNPA as cumulative impacts are likely to be the most detrimental to such habitats. 78. Conservation of the sandspit and Kabeljous flats is recommended, and no development should take place in these areas. An adaptively managed conservation plan should be developed for these areas in particular that aligns with the existing TNPA conservation management plan for the port. If no such document exists, KPS partnership with SANPARKS and EZEMVELO should have input into its development. 79. An agreement must be concluded with EKZNW on an appropriate biodiversity offset to compensate for residual impacts on waterbirds that cannot be effectively avoided, minimised, or mitigated through implementation of measures. It is noted that an agreement has been developed with input from EKZN and is detailed in Chapter 7 of the EIA Report.					

7.9.3.Waste Management					
Impact Management Outcome: Environmental impacts during the Operation and Maintenance Phase are managed in terms of Operational Maintenance Management Plan requirements.					
Impact Management Actions:	**Implementation**		**Monitoring**		
1. A procedure and system for the separation, recycling and management of general waste must be adhere to by all operational staff.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**

2. Waste that cannot reasonably be re-used or recycled must be disposed of via the Municipality's waste disposal system or disposed to the registered waste disposal site. 3. Oil and grease collected from the on-board kitchens must be disposed of at a reputable recycling company and maintenance records must be kept on file. 4. A hazardous waste collection point must be established to collect all hazardous waste. 5. Hazardous substances spills e.g. oils, grease etc., will have to be monitored and cleaned up on discovery, in accordance with the Oil Spill Emergency Response Plan (OSERP). 6. Contingency measures must be in place to ensure quick detection and repair of leakage or breakage to the sanitation systems, etc. 7. Keep sewage infrastructure plans available for management and maintenance purposes. 8. Leaking systems must be monitored for any pollution of the surrounding environment and repaired as soon as possible. 9. Waste disposal records must be maintained at all times. 10. Utilize existing early-warning systems and international standard operating procedures for vessels operating in inclement weather, including evasive action where appropriate. Adherence to port safety regulations and emergency procedures. 11. All waste must be removed to an appropriate licensed disposal facility.	Operations Manager and Project Manager	Procedures, Plans and records	ECO	Fortnightly	Site inspections

7.9.4.Socio-Economic Management					
Impact Management Outcome: Socio-economic development is enhanced					
Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. The operator of the Powerships and related infrastructure should be encouraged to, as far as possible, procure materials, goods and products required for the operation of the facility from local suppliers to increase the positive impact in the local economy. 2. Where possible, local labour should be considered for employment to increase the positive impact on the local economy. 3. As far as possible, local small and medium enterprises should be approached to investigate the opportunities for supply inputs required for the maintenance and operation of the Powerships and related infrastructure. 4. The developer should consider establishing vocational training programmes for the local labour force to promote the development and transfer of skills required by the Powerships and their related infrastructure and thus provide for the opportunities for these people to be employed in other similar facilities elsewhere. 5. Where possible, the local labour supply should be considered for employment opportunities to increase the positive impact on the area's economy. 6. As far as feasible, local small and medium enterprises should be approached to investigate the opportunities for supply inputs required for the maintenance and operation of the Powerships and their related infrastructure. 7. A social development and economic development programmes should be devised by the developer throughout the project's lifespan.	Project Developer	Designated Human Resource / social facilitation team and associated procedures and policies	ESO ECO	weekly Monthly	Review of procurement documentations and records

8. The plan should be developed in consultation with local authorities and local communities to identify community projects that would result in the greatest social benefits. 9. These plans should be reviewed on an annual basis and, where necessary, updated. 10. When identifying enterprise development initiatives, the focus should be on creating sustainable and self-sufficient enterprises. 11. In devising the programmes to be implemented, the developer should take into account the priorities set out in the local IDP. 12. Consult fishermen during operation to discuss concerns/ issues, such as through an environmental management committee					

7.9.5.Maintenance, Refurbishment & Management of the Infrastructure

Impact Management Outcome: Environmental impacts during the Operation and Maintenance Phase are managed in terms of an Operational Maintenance Management Plan requirements.

Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Karpowership must ensure adequate budget, labour and the maintenance and management of the facilities to ensure appropriate aesthetics, surrounding health and the prevention of environmental pollution and degradation. Requirements must include, but not limited to, regular collection of litter and removal of domestic waste and water management. 2. Karpowership must ensure that services infrastructures for water, electricity, sewage, waste and storm water are adequately implemented and maintained in adherence to environmental requirements.	Operations Manager and Project Manager and Engineer	Standard Operating Procedures	ECO	Fortnightly	Site inspections

OPERATION PHASE AND RELATED ACTIVITIES

3. All maintenance, refurbishment or related activities during operation must comply with the construction measures detailed in the construction phase of the EMPr. 4. Use environmentally friendly cleaning and dust suppressant products. 5. All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limit (40km/h), to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited. 6. All operation components must be regularly inspected and any structural failures must immediately be reported and the necessary steps must be taken to ensure continued safety. 7. Operating, monitoring / auditing, reporting, emergency and preventative and corrective action procedures must be available and all staff trained in accordance thereto. 8. Inspection of powerlines must occur on a bi-annual basis. 9. Maintenance and refurbishment of powerlines must occur when required. 10. Any dead bird carcasses must be identified and reported to TNPA and Eskom Environmental Unit 11. Access roads must be inspected on a bi-annual basis and reported if quality is deteriorating. 12. Limit driving to towers along vehicle tracks to limit disturbance to open areas. 13. Report erosion around towers around tower bases and along authorised corridors to landowners and Eskom 14. Report litter along authorised corridors to landowners and Eskom.					

15. All refurbishment waste to be removed, recycled or disposed at a registered landfill site. 16. Report growth of trees threatening safety on the electrified conductors to Eskom. 17. Quality and safety checks should be undertaken immediately after connection between the LNGCs, FSRUs, and the Powerships to ensure that connection points are secure. Regular inspection of the quality and integrity of the pipeline and connections is recommended to prevent fugitive emissions. 18. The fuel lines between the FSRU and the Powership should be double-walled with annular space. Fuel lines should be continuously purged with Nitrogen to render them inert. 19. Ongoing maintenance of powerline servitudes and clearing of alien vegetation as per safety protocols to reduce combustible biomass and lower the risk of wildfires. 20. The ship-to-ship transfer of LNG must be managed under an internationally-accredited process via trained personnel to ensure compliance and within clear quality, health and safety regulations. 21. Quality and safety checks should be undertaken immediately after connection between the LNGCs, FSRUs, and the Powerships to ensure that connection points are secure. Regular inspection of the quality and integrity of the pipeline and connections is recommended to prevent fugitive emissions. 22. The fuel lines between the FSRU and the Powership should be double-walled with annular space. Fuel lines should be continuously purged with Nitrogen to render them inert.					

23. The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments. Signs must be put up to enforce this. 24. Erosion control and alien invasive management plan must be compiled. 25. A fire management plan needs to be compiled and implemented to restrict the impact fire might have on the surrounding areas. 26. Areas of already fragmented indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible. Clearing beneath transmission lines should be avoided.					

7.9.6.Monitoring, Reporting, Record Keeping & Compliance

Impact Management Outcome: Impact to the operational site and surrounding areas are minimal as result of adherence to the authorisations and EMPr.

Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Compliance must be ensured with all monitoring, auditing, reporting and record keeping requirements as per approved environmental authorisations e.g. (EA, AEL, permits, licenses and amendments there to), programmes and plans (e.g. monitoring programmes). 2. Monitoring data must be assessed and actions must be determined and implemented where a decline in performance is detected e.g. increased consumption may indicate infrastructure leakage, water quality decline	Operations Manager and Project Manager	Establish registers, record of receipts, environmental file	ECO	Fortnightly	Site inspections

may indicate disposal of pollutants to the watercourse or alien invaders spread may indicate control and rehabilitation failures. 3. Environmental monitoring must be undertaken by the ECO on a fortnightly basis. 4. This monitoring must be undertaken in order to ensure compliance with all aspects or requirements of the EMPr and Environmental Authorisations. 5. Environmental Audit Report to be completed by an external auditor, in accordance with the requirements of regulation 34 of the NEMA EIA Regulations, 2014 (as amended). 6. The noise impact from the proposed project should be measured during the operational phase, to ensure that the impact is within the required legal limit. 7. Install acoustic enclosures around all major noise emitting components to supress the noise emissions from equipment such as engines, exhaust stacks. 8. Install silencers on equipment such as exhaust stacks outlets and all air outlets and inlets. 9. All records of discharge volumes and quality are to be kept for auditing purposes. 10. The operator must ensure that water temperatures at 100 m from the discharge points are compliant with the Water Quality guideline ecological threshold. This will confirm the performance of the discharge system and the numerical model predictions. 11. All records of discharge volumes and quality are to be kept for auditing purposes. 12. There must be an Operations Manual for the transfer process.			Noise Specialist Marine Specialist	Monthly, for 12 months minimum Monthly, lifespan of project	

13. The operations site must be considered an MHI. 14. The Emergency Plan must be approved by the Port Authorities. The risks will not impact on any other neighbouring flammable installations. 15. Only suitably qualified people must be used for all operations. The visiting Ship Captains must provide Port Management with their detailed STS Operations Manual before offloading. 16. All equipment, including radios used within the operations area, must be intrinsically safe. 17. Service Logbooks must be kept for all hoses and pipelines and checked regularly. 18. The Port Fire Department will handle all fire-fighting and emergencies. 19. At a minimum the temperature of the receiving water body in the vicinity of the discharge should be monitored to validate the modelling results and to ensure compliance with the stipulated water quality guidelines. 20. The benthic communities surrounding the proposed Powership, FSRU and pipeline locations should also be monitored using visual survey techniques. 21. Participation in and contribution of data to external, long-term monitoring programmes currently being undertaken in the Port is encouraged. 22. All records of discharge volumes and quality are to be kept for auditing purposes. 23. Quality and safety checks undertaken immediately after connection to ensure that connection point is secure. Regular inspection on the quality and integrity of the pipeline and connections to prevent fugitive emissions. 24. Where feasible and reasonable, consideration could be given to the purchasing of carbon credits or contribution					

to carbon capture and storage initiatives to offset some of the project's emissions and account for value-chain emissions/embedded carbon. 25. Consideration must be given to potential sea-level rise and increased storm intensity (refer to Section: Climate Change Impact Assessment) when designing and installing any permanent, non-floating infrastructure. 26. Project infrastructure located in low-lying areas (i.e., below the 10m elevation contour) and potentially exposed to future extreme events such as coastal storm surges should adopt a precautionary approach to detailed design and location. Similarly, the subsea pipeline, marine hoses, and associated infrastructure located outside of the sheltered port area should be appropriately designed to withstand extreme events under medium- to long-term scenarios, i.e., storms with 1:20 and 1:50 year return periods. 27. Existing early-warning systems and international standard operating procedures for vessels operating in inclement weather should be employed and strictly adhered to, including evasive action where appropriate. 28. Parameters relevant to climate change impacts should be actively tracked, monitored and reported throughout the life of the project. Such measures include but are not limited to: i) GHG emissions meters to ensure efficiency and safety; ii) gas leak detectors so that fuel can be immediately isolated and shut off, the leak identified, and the necessary repairs or replacements made; and iii) air and water temperature monitors to ensure that potentially rising sea-surface and ambient air temperatures do no negatively impact operations and pose a safety hazard.					

OPERATION PHASE AND RELATED ACTIVITIES

29. A climate change risk register should be developed and periodically updated. The downscaled climate trend analysis (Section 3.3 Climate Change Impact Assessment Report) of this report can be used as a baseline to determine the scope and scale of anticipated climate change impacts at the project site level and inform the climate change risk register. Site-specific safety protocols must cross-reference relevant aspects of the climate risk register. 30. Strict adherence to port safety regulations and emergency procedures during mooring and operation. 31. During operation, a comprehensive monitoring programme must be implemented to ensure that operation, as well as maintenance, of the Gas to Power project and its various components comply with relevant standards and all environmental, health and safety regulations. This must include water quality monitoring sites around sensitive areas, specifically the Kabeljous Flats and along the sandspit, to verify the outcomes of the thermal plume modelling, as well as monitor any water temperature changes not initially modelled within the 'assembly cove'. 32. The long-term ecological monitoring of port must be expanded to include sites within sensitive areas, i.e. the Kabeljous Flats and along the sandspit, to detect possible community changes in response to the proposed project, and to establish the possible presence of Z. capensis, as this will add to the habitat complexity and biodiversity of this area. 33. Scheduled / routine inspections of the avifauna utilising the sandspit, the adjacent shoreline and shrubland vegetation must be undertaken, including the transmission line route to assess the real impacts on bird					

populations and to apply adaptive management strategies. Should monitoring detect an emerging problem, recommendations made by the avifaunal expert must be implemented, which may include an offset agreement with the rehabilitation of alternate habitat for birds. 34. Usage of the project area by marine megafauna must be monitored during both construction/installation and operation phase to ensure that adaptive management can be applied to reduce negative impacts.					

PART C: MAINTENANCE MANAGEMENT PLAN FOR THE GAS PIPELINE, THE POWERSHIPS AND THE FSRU

Part C of the EMPr is to be used to ensure that maintenance is undertaken for the lifespan of the project.

The objectives of the MMP are:

- To be aligned with the conditions of the EA and approved EMPr;
- To recommend appropriate controls and mitigation measures to avoid or minimise the impacts from construction and maintenance activities;
- To ensure successful rehabilitation of the site to pre-construction conditions.

Due consideration has been given to the development in terms of the construction, rehabilitation and operational phases whilst considering the environment. Mitigation measures are provided to ensure:

- Minimising the extent of environmental impact during the life of the project, commencing from planning through to closure.
- Ensuring appropriate rehabilitation of areas affected by construction and operation.
- Preventing and remediating long term environmental degradation.

The MMP will be considered when the proposed maintenance activities constitute any one of the following listed activities identified and applied for in terms of the NEMA EIA Regulations, 2014 (as amended):

LISTED NOTICES	
LISTING NOTICE 1	
Activity No.	Activity Description
Activity 18	*The planting of vegetation or placing of any material on dunes or exposed sand surfaces of more than 10 square metres, within the littoral active zone, for the purpose of preventing the free movement of sand, erosion or accretion, excluding where* *(i) the planting of vegetation or placement of material relates to restoration and maintenance of indigenous coastal vegetation undertaken in accordance with a maintenance management plan*
Activity 19	*The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;* *but excluding where such infilling, depositing, dredging, excavation, removal or moving—* *(a) will occur behind a development setback;* *(b) is for maintenance purposes undertaken in accordance with a maintenance management plan;*
Activity 19A	*The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from—* *(i) the seashore;* *(ii) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater; or* *(iii) the sea; —*

OPERATION PHASE AND RELATED ACTIVITIES

LISTED NOTICES	
LISTING NOTICE 1	
Activity No.	Activity Description
	but excluding where such infilling, depositing, dredging, excavation, removal or moving— *(f) will occur behind a development setback;* *(g) is for maintenance purposes undertaken in accordance with a maintenance management plan;*
LISTING NOTICE 3	
Activity No.	Activity Description
Activity 12	*The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.* *i. KZN* *i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;* *ii. Within critical biodiversity areas identified in bioregional plans;* *iii.* ***Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuarine functional zone, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas****;*

This Maintenance Management Plan (MMP) is submitted with the agreement to a Maintenance Management Plan in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), and the Environmental Impact Assessment Regulations, 2014 (as amended).

7.9.7.Personal Details

Name of person/authority who will undertake responsibility for the activity:	Karpowership SA (Pty) Ltd		
Contact person (if other):	Mehmet Katmer		
Postal address:	P.O Box 619 Pretoria, Gauteng		
Telephone:	+90 212 295 47 37	Postal Code:	001
Fax:	+90 212 295 47 43	Cell:	083 787 8600
Email:	Mehmet.Katmer@karpowership.com		
Name of person who has prepared the MMP:	Triplo4 Sustainable Solutions (Pty) Ltd		
Contact person (if other):	Hantie Plomp		
Postal address:	P.O Box 6595, Zimbali		

Telephone:	(032) 946 3213	Postal Code:	4418
Fax:	(032) 946 0826	Cell:	083 308 8003
Email:	hantie@triplo4.com		
Name of landowner(s)	~~Refer to Appendix J~~ – Replaced by condition 7.6.2 (5)(g)		
Contact person (if other):			
Postal address:			
Telephone:			
Fax:			
Email:			
Municipality for proposed project:	uMhlathuze Local Municipality		
Farm name(s), erf(s) and portion number(s) etc*:	Remaining Extent of Erf 223 UMhlathuze No. 16230 Portion 45 of Erf 5333 Richards Bay Reminder of Erf 5333 (previously Erf 397) Richards Bay Portion 21 (of 8) Erf 5333 Richards Bay Remainder of Portion 8 of Erf 5333 Richards Bay Reminder of Erf 6363 (previously Erf 6362)		
Magisterial District or Town:	King Cetshwayo District		
Name(s) of watercourse(s) in question:	One artificial dam, one estuary/port waters, three channelled valley bottom (CVB) wetlands, one depression wetland, five floodplain (FP) wetlands, four unchannelled valley bottom (UVB) wetlands, six hillslope seepage wetlands and four river riparian systems. The riverine systems were classified as B channel streams i.e. streams that have presumable flow six to nine months of the year and those that sometimes have baseflow. Refer to Figure 1-5: Sensitivity Map		
***In instances where there is more than one landowner, please attach a list of landowners with their full names, contact details, farm name, farm number, portion number, Erf number, coordinates and signed declaration confirming approval for development and responsibility of the MMP.**			

7.9.8.Authority& Stakeholder Engagement

The following authorities and stakeholders have been consulted to provide input based on the proposed maintenance activities:

Authority	**Required involvement**
Department of Water and Sanitation	Comment on EIAR and EMPr, Issuing Water Use Authorisation
Department of Forestry, Fisheries and Environmental (DFFE)	Comment on EIAR and EMPr, Issuing Environmental Authorisation

Department of Forestry, Fisheries and Environmental (DFFE) – Climate Change; Oceans and Coast; Biodiversity and Protected Areas Directorates	Comment on EIAR and EMPr
Department of Mineral Resources (DMR)	Comment on EIAR and EMPr
Department of Energy (DoE)	Comment on EIAR and EMPr
KZN Department of Economic Development, Environmental Affairs, and Tourism (EDTEA)	Comment on EIAR and EMPr
KZN Provincial Department of Transport	Comment on EIAR and EMPr
KZN Provincial Department of Agriculture	Comment on EIAR and EMPr
uMhlathuze Local Municipality	Comment on EIAR and EMPr
King Cetshwayo District Municipality	Comment on EIAR and EMPr
South African Heritage Resource Agency (SAHRA)	Comment on EIAR and EMPr
Amafa Heritage KZN	Comment on EIAR and EMPr
South African National Roads Agency (SANRAL)	Comment on EIAR and EMPr
Department of Rural Development and Land Reform (DRDLR)	Comment on EIAR and EMPr
Transnet National Port Authority (TNPA)	Comment on EIAR and EMPr
Richards Bay Industrial Development Zone (RBIDZ)	Comment on EIAR and EMPr
Ezemvelo KZN Wildlife	Comment on EIAR and EMPr
South African Maritime Safety Authority (SAMSA)	Comment on EIAR and EMPr
National Energy Regulator of South Africa (NERSA)	Comment on EIAR and EMPr
South Africa Gas Development Corporation (SOC) Limited	Comment on EIAR and EMPr
Department of Human Settlements	Comment on EIAR and EMPr

7.9.9.Public Participation

This MMP is an outcome of the Environmental Impact Assessment Process undertaken for the proposed development. The Public Participation Process was carried out in compliance with the Regulations set out in Chapter 6 of Government Notice No. R. 326 of the National Environmental Management Act (NEMA) (Act No.107 of 1998). Steps were taken to allow opportunity for members of the public and key stakeholders to be involved and participate in the environmental process.

The authorities indicated in the table above were all provided with a copy of the Environmental Impact Assessment Report and given 33 days from 10 November 2022 to 13 December 2022 in which to provide comment. A summary of the public participation is included in the submission of the final EIR.

7.9.10. Management Specifications

7.9.10.1. Infrastructure Maintenance

The infrastructure corridors must be kept in a stable, sound and serviceable condition in order to maintain safety of users and minimise risk of loss of infrastructure during storm/high tides.

The Construction EMP management specifications contained within this EMPr shall be applicable to any construction work required as part of maintenance work. An ECO shall be appointed for maintenance

construction work only if the work scope is longer than 2 weeks. A fire management plan needs to be compiled and implemented to restrict the impact fire might have on the surrounding areas. All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limit (40km/h), to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited. All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limit (40km/h), to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited.

7.9.10.2. Alien Invasive Plant Management

The area within 2 metre width of the infrastructure corridors must be kept free of alien invasive plants as listed in the Alien Invasive Species Regulations (2016 and any subsequent amendments) of the National Environmental Management: Biodiversity Act (of 2004). These shall be pulled out by hand as seedlings and the plants removed from the area for disposal. Erosion control and alien invasive management plan must be compiled.

Erosion control and alien invasive management plan must be compiled.

Vegetation clearance must be done in accordance with the approved EMPr.

Clearance of Vegetation

7.9.10.3. Restricted areas

The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments. Signs must be put up to enforce this. Maintenance workers and staff shall not access private properties at any time and signage must be installed and maintained to discourage public access into private properties from the corridors and trampling of vegetation. All personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting, or hunting terrestrial species (e.g., guineafowl and francolin), and owls, which are often persecuted out of superstition. Signs must be put up to enforce this.

7.9.10.4. Rehabilitation

The objectives of rehabilitation are to ensure that the cleared/disturbed areas along the pipeline route are returned to their pre-construction conditions. This must be achieved through implementing the rehabilitation requirements outlined in this document. Areas of already fragmented indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible. Clearing beneath transmission lines should be avoided.

7.9.10.5. Safety

Safety/indemnity signage is recommended to make users aware of safety risks due to terrain and location within the HWM of the sea.

7.9.10.6. Local Labour

Wherever possible, local labour shall be used for maintenance work.

7.9.10.7. Interpretative Signage

Interpretative signage, encouraging environmental/conservation awareness is encouraged.

7.9.10.8. Aesthetics

Signage and infrastructure shall be aesthetically pleasing (and thus maintained in good condition).
Litter shall be controlled – through periodic litter clean ups and/or provision of litter bins.

7.9.11. Method Statements

Method Statements indicate how the Contractor will achieve compliance with environmental legislation, good management practice and the MMP. A site-specific Method Statement will be compiled by all appointed contractors to ensure that all work is undertaken in a practical, efficient and safe manner. Examples of typical construction methodologies has been developed for the purpose of the EIR submission (Refer to Appendix G).

The Method Statement must be developed and detailed for all activities triggering maintenance requirements in terms of NEMA, 2014 (as amended) in order to mitigate potential environmental impacts.
The Contractor must submit any required written Method Statement to the Engineer for approval and must only implement the Method Statement once he has received the Engineer's approval in writing. On receipt of the Method Statement the Engineer must forward a copy thereof to the ECO. Both the Engineer and ECO must review the Method Statement and come to an agreement as to whether the Method Statement is acceptable or requires amendments.

The Method Statement must state clearly:

- Purpose;
- Timing of activities;
- Materials to be used;
- Equipment and staffing requirements;
- Proposed construction procedure designed to implement the relevant environmental specifications;
- The system to be implemented to ensure compliance with the above; and
- Other information deemed necessary by the Contractor, Engineer and/or ECO.

Once a Method Statement is approved it is binding and the Contractor must therefore ensure that all activities, to which the approved Method Statement applies, are carried out accordingly.

7.9.12. Limitations and Assumptions Regarding the Assessment of Impacts

The assumption is that all significant issues have been identified during the development of the MMP as part of the EIR.

Environmental issues, concerns and development constraints were identified using professional judgement, project information, experience of similar projects, a review of available literature, specialist reports, site visits and consultation with the authorities.

The significance of environmental issues was evaluated and mitigation and management measures were identified as part of the MMP development for the EIR.

OPERATION PHASE AND RELATED ACTIVITIES

The effectiveness of the MMP is limited by the level of adherence to the conditions set forth in this report by the Client and the various contractors and agents acting on behalf of the Client.

It is further assumed that compliance with the MMP will be monitored and audited on a regular basis as set out in the MMP. Furthermore, the MMP will form part of the contract document(s) and will be legally binding.

7.10. Decommissioning / Closure Phase and Related Activities

The Karpowership project has a potential lifetime of approximately 20 years. At the end of the Power Purchase Agreement (PPA), the ship will depart the harbour and all pipelines and grid connections which are classified as own built will be decommissioned and the infrastructure subsequently removed. The decommissioning process will begin at the end of the PPA. Prior to commencing decommissioning, the Project will be shut down, de-energised and disconnected from the national grid. The Applicant will give landowners sufficient notice prior to the commencement of the decommissioned activities.

It is not anticipated that the proposed Karpowership project will be decommissioned in the foreseeable future. When decommissioning takes place, the legislation applicable at that time should be complied with, and relevant environmental processes and practices implemented. Therefore, an assessment of impacts for this phase is not applicable at this stage.

In the unlikely event that decommissioning occurs in the foreseeable future, the impacts and associated mitigation measures are expected to be similar to those that take place during the construction phase.

8. CONCLUSION

This EMPr has been compiled using various inputs including the EAPs, specialists, relevant Authorities and I&APs. These inputs facilitated the identification of relevant and implementable mitigation measures, which are to be used by Karpowership, project management, engineers and appointed construction teams upon obtaining of the environmental authorisation and the commencement of the project. Fines / Penalties to be imposed for the transgression of environmental specifications / requirements of this EMPr. In order to ensure compliance, all parties undertaking the planning, construction and operation of this gas to power project must be fully acquainted with the contents of the EMPr. This will ensure that potential negative impacts are identified, avoided or mitigated.

ENVIRONMENTAL CODE OF CONDUCT

One of the objectives of the EMPr is to ensure that all the workforce, contractors, sub-contractors and construction staff have an understanding of environmental issues and potential impacts on site activities. This environmental code of conduct provides the basic rules that should be strictly adhered to. It is the responsibility of the Environmental Site Officer and ECO to ensure that each contractor, sub-contractor and workforce understand and adhere to the Code of Conduct.

ALL PERSONS ARE OBLIGED TO KEEP TO THE RULES OF THIS CODE OF CONDUCT

ENVIRONMENTAL CODE OF CONDUCT

- Do not waste electricity, water or consumables;
- Only use authorised accesses;
- Do not litter;
- Dispose of solid waste to the correct waste containers provided;
- Prevent pollution;
- Use the toilet facilities provided;
- Do not dispose contaminated waste water to the storm water or the environment;
- Immediately report any spillage from containers, plant or vehicles;
- Do not burn or bury any waste;
- Do not trespass onto private properties;
- Strictly leave all animals alone. Never tease, catch or set devices to trap or kill any animal;
- Never damage or remove any trees, shrubs or branches unless it forms part of working instructions;
- Do not deface, draw or cut lettering or any other markings on trees, rocks or buildings in the area;
- Know the firefighting procedure and locations of firefighting equipment; and
- Know the environmental incident procedures.

PROJECT START UP INSPECTION SHEET

PROJECT START UP INSPECTION SHEET

PROJECT:_____ **DATE:**_____
CONTRACT NO.:_____ **COMPLETED BY:**_____
CONTRACTOR:_____

ES	ENVIRONMENTAL ASPECT	YES NO N/A	COMMENTS	ACTION
PLANNING				
ESTABLISHMENT				
CLEARANCE				

ROUTINE SITE INSPECTION SHEET

ROUTINE SITE INSPECTION SHEET

PROJECT:_____ **DATE:**_____
CONTRACT NO.:_____ **COMPLETED BY:**_____
CONTRACTOR:_____

ES	ENVIRONMENTAL ASPECT	YES NO N/A	COMMENTS	ACTION
HOUSEKEEPING				
CONSTRUCTION ACTIVITIES				
REINSTATEMENT AND REHABILITATION				

SITE DECOMMISSIONING INSPECTION SHEET

SITE DECOMMISSIONING INSPECTION SHEET

PROJECT:______________________________ DATE:____________________

CONTRACT NO.:______________________________ COMPLETED BY:____________________

CONTRACTOR:______________________________

ES	ENVIRONMENTAL ASPECT	YES NO N/A	COMMENTS	ACTION
DECOMMISSIONING OF THE SITE				

SITE INSPECTION REPORT STRUCTURE

Purpose of the Site Inspection Report
The purpose of the Site Inspection Report is to describe the results of the site inspections undertaken by the Environmental Control Officer (ECO) or delegated responsible person so that the level of compliance with the Environmental Management Programme (EMPr) can be monitored throughout the contract.

In particular, it will be expected to summarise the following:
- The key results
- Trends observed
- Key issues observed
- Problems encountered
- Actions required and response taken or to be taken
- Recommendations.

The Site Inspection Report should conclude with a commentary on the overall performance of the Contractor in terms of meeting the requirements of individual/groups of Environmental Specifications and/or EMPr as a whole.

Preparation of the Site Inspection Reports
Site Inspection Reports are expected to be prepared regularly throughout a given construction contract, including (but not limited to) the following:
- Prior to the handover of the site to the Contractor
- At regular stages throughout the construction works, and particularly with the commencement of particularly significant activities
- At the decommissioning of the site and prior to the handover of the site to the Employer/Operator.

Recommended Structure for the Site Inspection Reports
The following report structure is suggested for the Site Inspection Report:

Introduction	By way of setting the context for the Site Inspection Report, this section should outline the following: ▪ The need for the Site Inspections, and reporting. ▪ Purpose of the Site Inspection Report. ▪ The scope of coverage of the Site Inspection
Environmental Management Requirements	This section should summarise the environmental requirements for the contract and for the construction works, and against which environmental performance is assessed.
Methodology	This should describe the activities undertaken during the particular site inspection, such as: ▪ A site walkabout with the Project Manager (PM). ▪ A review of documents and records, such as complaints records and/or incidents reports maintained by the Contractor and/or ECO. ▪ Consultations with pertinent parties on site.

Findings of the Site Inspection	This should contain reference to the following: ▪ A commentary on the level of compliance with key aspects of the Environmental Specifications, as listed in the checklist(s). ▪ Details of issues, infringements, problems and non-compliances encountered. ▪ Recommendations on actions to be undertaken to address any issues, infringements and/or non-compliances.
Conclusions	This should include an overall statement on the level of compliance observed during the site inspection.
Annexures	Annexures should be used to store supporting information to the main document, such as: ▪ Photographs. ▪ A quick reference, summary table of issues of concern and the necessary corrective measures required to address these issues

GENERIC CONSTRUCTION METHOD STATEMENTS

THE INTEGRATION OF POWER PLANTS IN THE RICHARDS BAY, COEGA AND SALDANHA BAY AREAS TO THE NATIONAL GRID

Method Statement for the use of Overhead Lines

October 2022

Prepared for

KARPOWERSHIP

TABLE OF CONTENTS

SCHEDULE OF TABLES

SCHEDULE OF FIGURES

1. SCOPE

This specification details the requirements for the design, detailing, fabrication, testing, supply, delivery and erection of Transmission / Distribution line towers and foundations, together with the erection of all conductors and associated line hardware and fittings for the Karpowership Projects in Richards Bay, Coega and Saldanha.

The scope of works involves the provision of a new 132 kV double circuit greased conductor line from the Powership to the point of connection. The two lines shall be installed on a single self-supporting pole structure.

Specifications for the line are as per table below.

Table 1: Specifications for the Line

Conductor	Twin conductor per phase
Ground wire:	OPGW: ASLH-D(S)bb 48 SMF (AA / A20SA 102/26 - 12,0) Diameter: 15.2mm Rated: 12kA for 1 seconds
Insulators:	132kV insulator type to be used on this line shall be as per IEC 60816 specifications. The creepage shall be 31mm/kV as specified for high pollution environments.
Hardware:	132kV DT approved assemblies and hardware
Earthing:	Soil resistivity tests are required to be done on all new pole positions. The tower footing resistance shall be less than 20 ohms. The terminal structure shall be bonded to the main substation earth mat using a bonding strap.
Self-supporting steel monopoles	Self-supporting steel monopoles
Stays:	None
Foundations	Foundation type to be finalised upon completion of detailed design.
Foundations:	Self-supporting – Piled Foundations
Corrosion Protection	Standard galvanizing with 900g/m2 minimum, will be required
Route	From Karpowership to point of connection

2. DEFINITIONS

a) In accordance with applicable legislation, the Contractor shall take all reasonable precautions for the protection of life and property on, or about, or in connection with the works.
b) The Contractor shall comply strictly with the “Special Conditions” stipulated by the landowners in the negotiated Options.
c) The Contractor shall comply with all the conditions specified in the Environmental Management Plan (EMP) during construction. In general, soil disturbance should be kept to a minimum.
d) The “Employer” is the party for whom the works are to be executed and, in this specification, means Eskom and where applicable, includes Eskom’s successor in title but not, except with the written content of the Contractor, any assignee of Eskom.
e) The “Contractor” is the party appointed by the Employer to “Provide the Works”.
f) The “Project Manager” is the person appointed by the Employer from time to time to act in the capacity and notified, by name and in writing by the Employer to the Contractor, as required in “The NEC Engineering and Construction Contract”.
g) The “Supervisor” is the person appointed by the Employer from time to time to act in the capacity and notified, by name and in writing by the Employer to the Contractor, as required in “The NEC Engineering and Construction Contract”.

3. NORMATIVE REFERENCES

The following documents are to be read in conjunction with this specification. In cases of conflict, the provisions of this specification shall take precedence. Unless otherwise stated, the latest revision, edition and amendments shall apply.

- ASCE Manual No. 52 Guide for design of steel transmission towers
- BS 183:1972 Specification for general purpose galvanised steel wire strand.
- BS 443:1982 Specification for testing zinc coatings on steel wire and for quality requirements.
- BS 970 Specification for wrought steels for mechanical and allied engineering purposes.
- BS EN 287-1:1992 Approval testing of welders for fusion welding. Part 1: Essential variables,

- range of approval examination and testing, acceptance requirements, retests, period of validity.
- Annexes on steel groups, welders test certificate, procedure specification and job knowledge.
- BS EN 288-3:1992 Specification and approval of welding procedures for metallic materials.
- Part 3: Welding procedure tests for the arc welding of steels.
- ECCS Recommendations for angles in lattice transmission towers, No. 39.
- SABS 82:1975 Bending dimensions of bars for concrete reinforcement.
- SABS 135:1991 ISO metric bolts, screws and nuts (hexagon and square) (coarse thread free fit series).
- SABS 182-5:1979 Zinc-coated steel wires for conductors and stays.
- SABS 471:1971 Portland cement (ordinary, rapid-hardening and sulphate-resisting).
- SABS 626:1971 Portland blast furnace cement.
- SABS 675:1993 Zinc-coated fencing wire.
- SABS 471:1971 Hot-dip (galvanised) zinc coatings (other than on continuously zinc-coated
- sheet and wire). (Appendix C to apply).
- SABS 831:1971 Portland cement 15 (ordinary and rapid hardening).
- SABS 920:1985 Steel bars for concrete reinforcement.
- SABS 1083:1976 Aggregates from natural sources.
- SABS 1200-GE:1984 Precast concrete (structural).
- SABS 1431:1987 Weldable structural steels.
- SABS 1491-1:1989 Portland cement extenders, Part 1: Ground granulated blast furnace slag.
- SABS 1491-2:1989 Portland cement extenders, Part 2: Fly ash.
- SABS 1491-3:1989 Portland cement extenders, Part 3: Condensed silica fume.
- SABS 1466:1988 Portland fly ash cement.
- SABS 0100-1:1992 The structural use of concrete. Part 1: Design.
- SABS 0100-2:1992 The structural use of concrete, Part 2: Materials and execution of work.
- SABS 0144:1978 Detailing of steel reinforcement for concrete.

- SABS 0162-1:1993 The structural use of steel, Part 1: Limit-states design of hot-rolled steelwork.
- SABS 0162-2:1993 The structural use of steel, Part 2: Limit-states design of cold-formed steelwork.
- SABS 0162-3:1993 The structural use of steel, Part 3: Allowable stress design steelwork.
- SABS Method 862 Slump of freshly-mixed concrete.
- SABS Method 863 Compressive strength of concrete (including making and curing of the test cubes).
- ESKCAAB4 Zinc coated earth conductor, guy and stay wire for transmission lines
- ESKASABG3 Bush clearance and maintenance within overhead powerline servitudes.
- TRMSCABC9 Design, manufacturing and installation specification for transmission line labels.
- TRMASAAJ7 Earthing of transmission lines.
- TRMASACB2 Standard for the installation of overhead ground wire with optical fibre (OPGW)
- NWS 1074 Guy strand grips for transmission lines.
- NWP 3402 Powerlines in the vicinity of aerodromes and hazards to aircraft.
- Department of Agriculture Bulletin No. 399 ISBN0621082589,
- A primer on soil conservation.
- Environmental Conservation Act No. 73 of 1989.
- Fencing Act No 31 of 1963.
- SAISC, South African steel construction handbook.

4. STEEL STRUCTURES

4.1. STEEL STRUCTURES

All structures shall be designed in accordance with the OHS Act and relevant design codes. All structures shall be manufactured in accordance the relevant South African manufacturing codes. The Contractor is to procure poles and will be procured from Eskom approved manufacturers of steel poles as outlined in Technical Bulletin 240-97087024 “Approved Manufacturers Of Steel Poles”. Manufacturing drawings shall be submitted for approved before manufacturing starts. The Contractor shall place a holding point on the manufacturing

process before galvanizing as FAT inspection might be conducted prior to the poles being galvanized.

4.1.1. Strain Structures

Self-Supporting Steel monopole structures will be used for all strain structures. These will be single pole structures as well as 3-pole structures. The dimensions for phase clearance and phase to ground clearance will be based on drawing EC 03-05-21 001 sht 1 of 2 (Self Supporting Strain) with a 2.2 m phase clearance and EC 03-05-21 001 sht 2 of 2 (Three pole structures) respectively. The three pole structures will also be dimensioned differently in order to provide for phase clearances on transposition sections at the substations.

4.1.2. Intermediate Structures

Drawing EC 03-05-21 004 (Intermediate poles), with a 2.2 m phase clearances single pole structures will be used for all intermediate structures. These structures are bird-friendly structures.

4.1.3. Terminal Towers

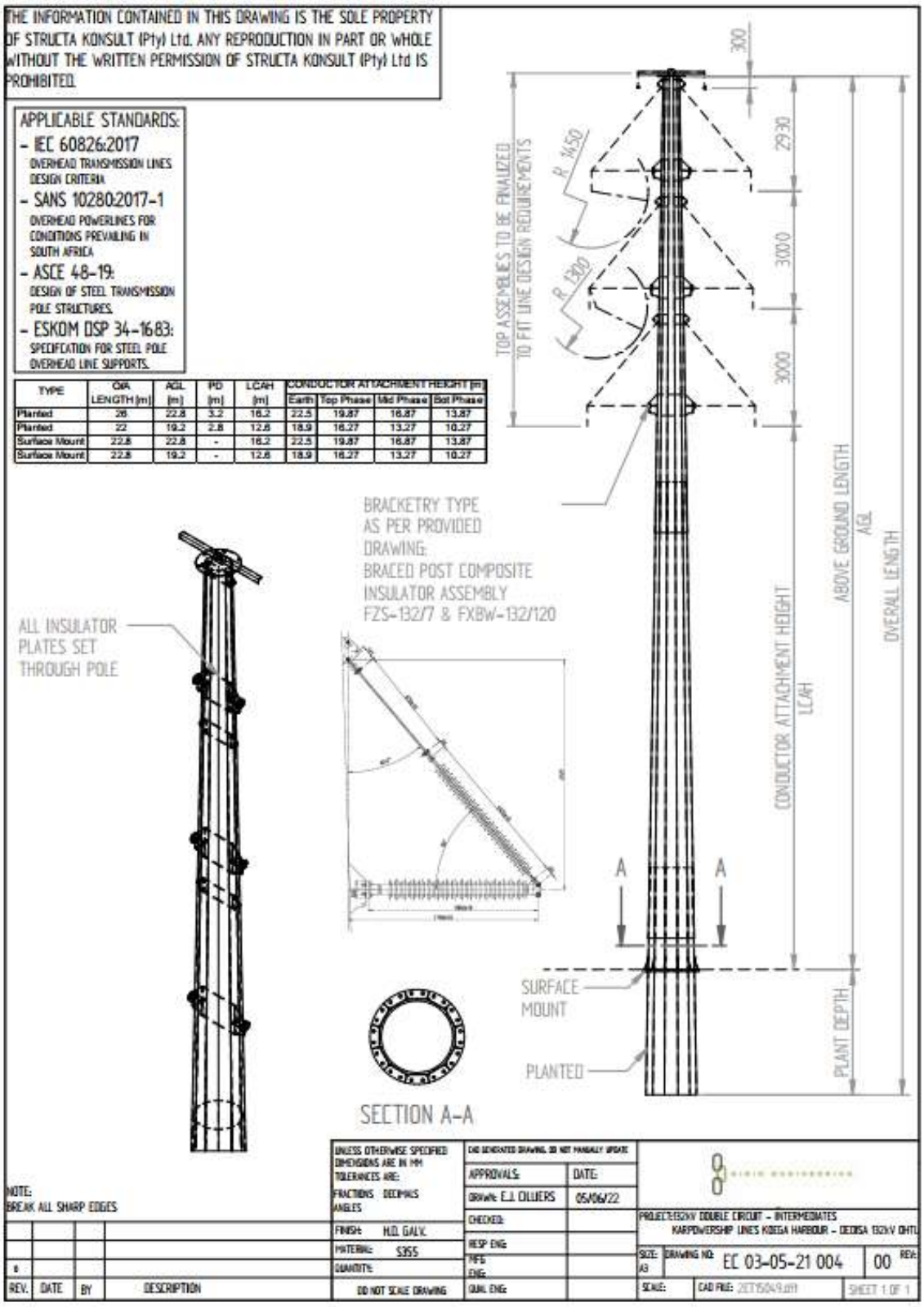
Self-Supporting Three pole terminal steel structures based on EC 03-05-21 001 sht 2 of 2 (Three pole structures) will be used to terminate the lines at the High-strung Columns and Beam. Separation distance between 3 poles should be 4m minimum. (This will allow for an entrance angle of 45º). The closing spans will be from the 3-pole terminal line structure to the column & beams in both Saltpan Switching Station and Dedisa substation. These structures are free standing self-supporting structures and do not require tie straps to stabilise the structures.

4.2. STEEL STRUCTURE TYPES

The steel structure types are shown in the table below.

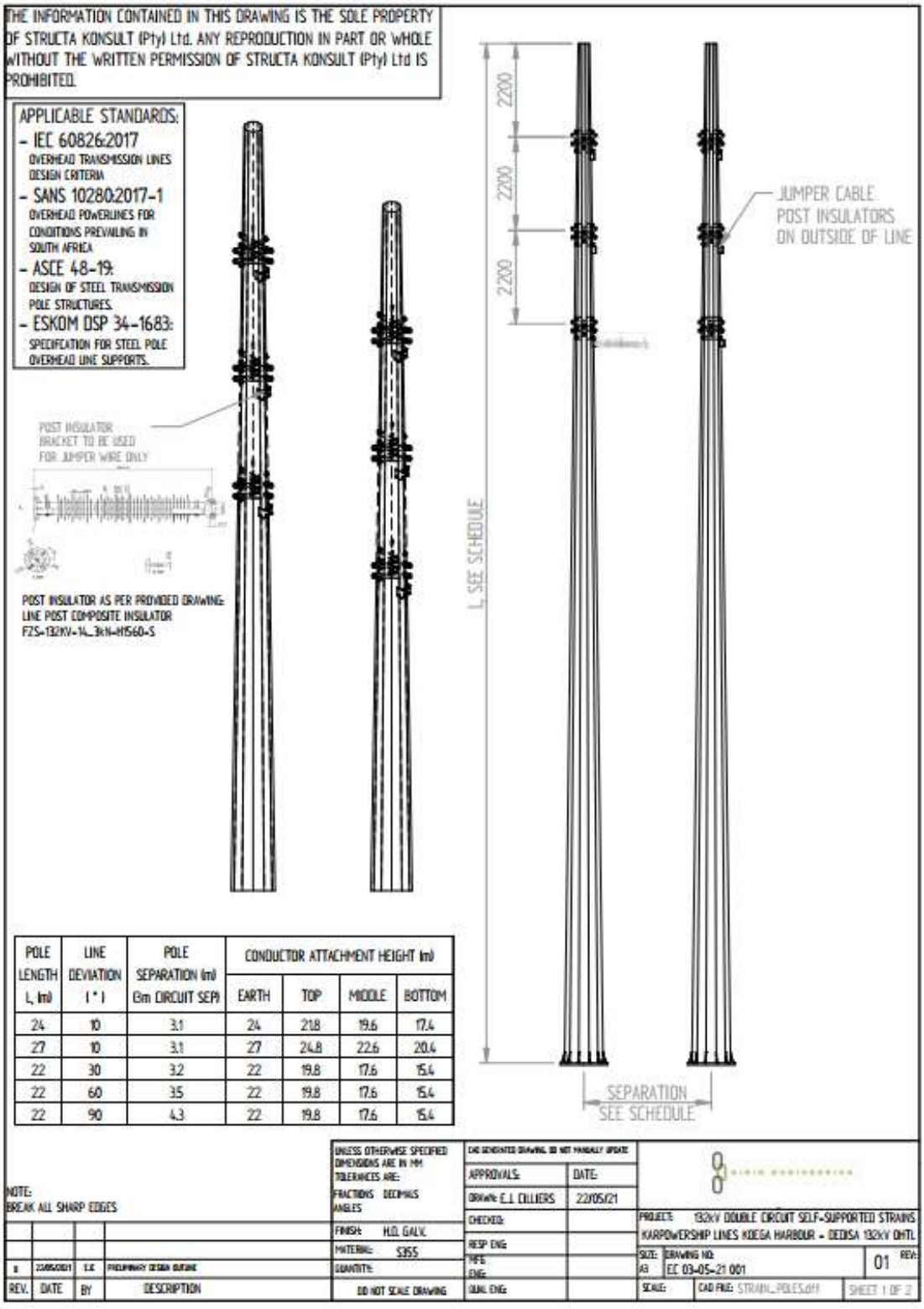
Table 2: Monopole Structure Types

Description	Structure type
132kV S/Pole Intermediate D/Circuit Compact	EC 03-05-21 004 (Fig 1)
S/Pole Self Supporting In-line Strain Double Circuit (0°-10°)	EC 03-05-21 001 sht 1 (Fig 2)
S/Pole Self Supporting Angle Strain Double Circuit (0°-30°)	EC 03-05-21 001 sht 1 (Fig 2)
S/Pole Self Supporting Angle Strain Double Circuit (30°-60°)	EC 03-05-21 001 sht 1 (Fig 2)
Triple Pole Self Supporting Inline Strain Double Circuit	EC 03-05-21 001 sht 2 (Fig 3)
Triple Pole Self Supporting Term Double Circuit	EC 03-05-21 001 sht 2 (Fig 3)
Triple Pole Self Supporting Angle Strain Double Circuit (60°-90°)	EC 03-05-21 001 sht 2 (Fig 3)



TYPE	OIA LENGTH (m)	AGL (m)	PD (m)	LCAH (m)	CONDUCTOR ATTACHMENT HEIGHT (m)			
					Earth	Top Phase	Mid Phase	Bot Phase
Planted	26	22.8	3.2	16.2	22.5	19.87	16.87	13.87
Planted	22	19.2	2.8	12.6	18.9	16.27	13.27	10.27
Surface Mount	22.8	22.8	-	16.2	22.5	19.87	16.87	13.87
Surface Mount	22.8	19.2	-	12.6	18.9	16.27	13.27	10.27

Figure 1: Intermediate Structure



POLE LENGTH L (m)	LINE DEVIATION (°)	POLE SEPARATION (m) (3m CIRCUIT SEP)	CONDUCTOR ATTACHMENT HEIGHT (m)			
			EARTH	TOP	MIDDLE	BOTTOM
24	10	3.1	24	21.8	19.6	17.4
27	10	3.1	27	24.8	22.6	20.4
22	30	3.2	22	19.8	17.6	15.4
22	60	3.5	22	19.8	17.6	15.4
22	90	4.3	22	19.8	17.6	15.4

Figure 2: Self-supporting strain structure

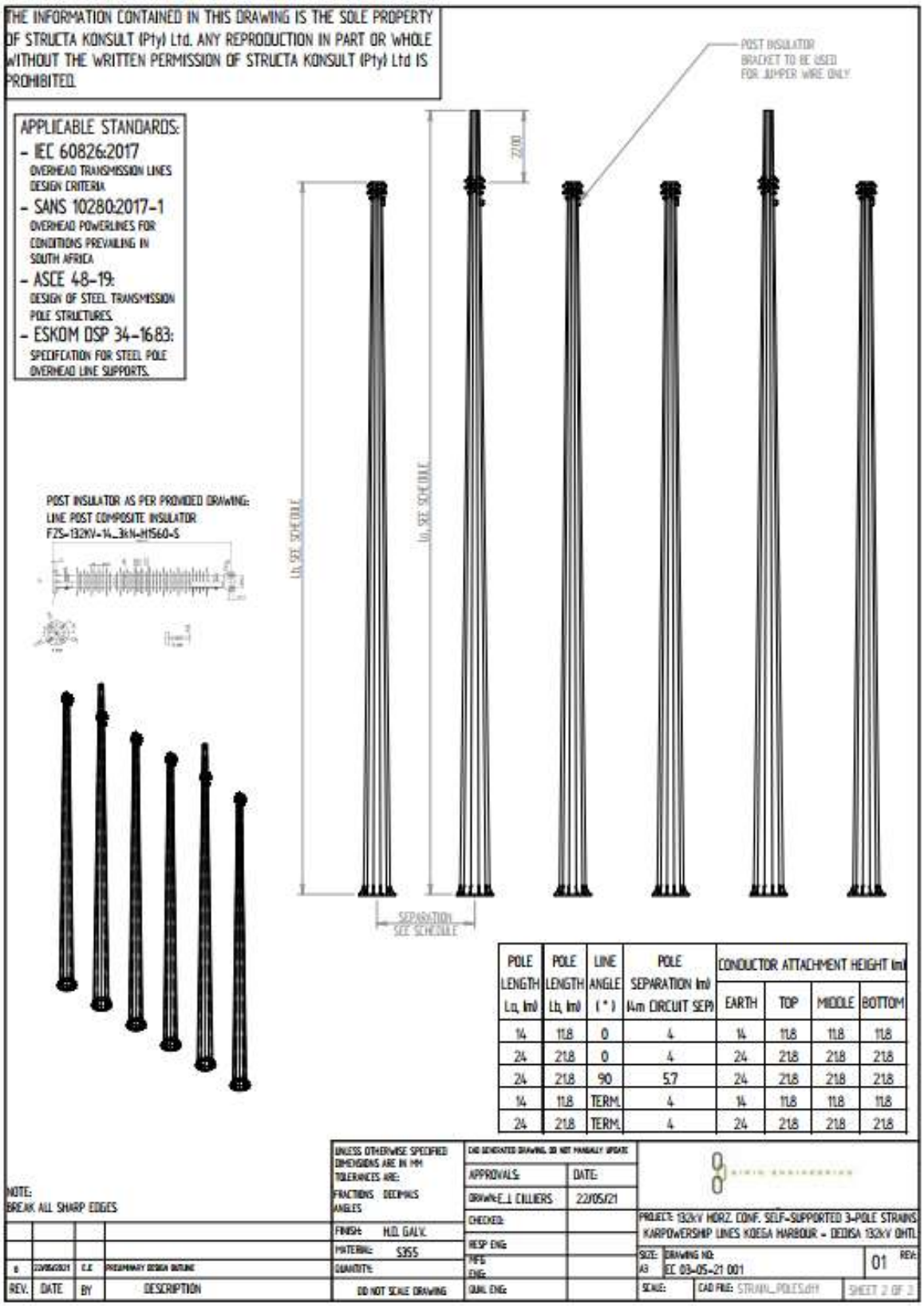


Figure 3: Self-supporting 3 pole strain structure

5. HARDWARE

5.1. BRACED POST INSULATOR ASSEMBLIES

Braced Post insulator assemblies will be in accordance with drawing FZS132/7 & FXBW-132/120 as shown in Figure 4 below.

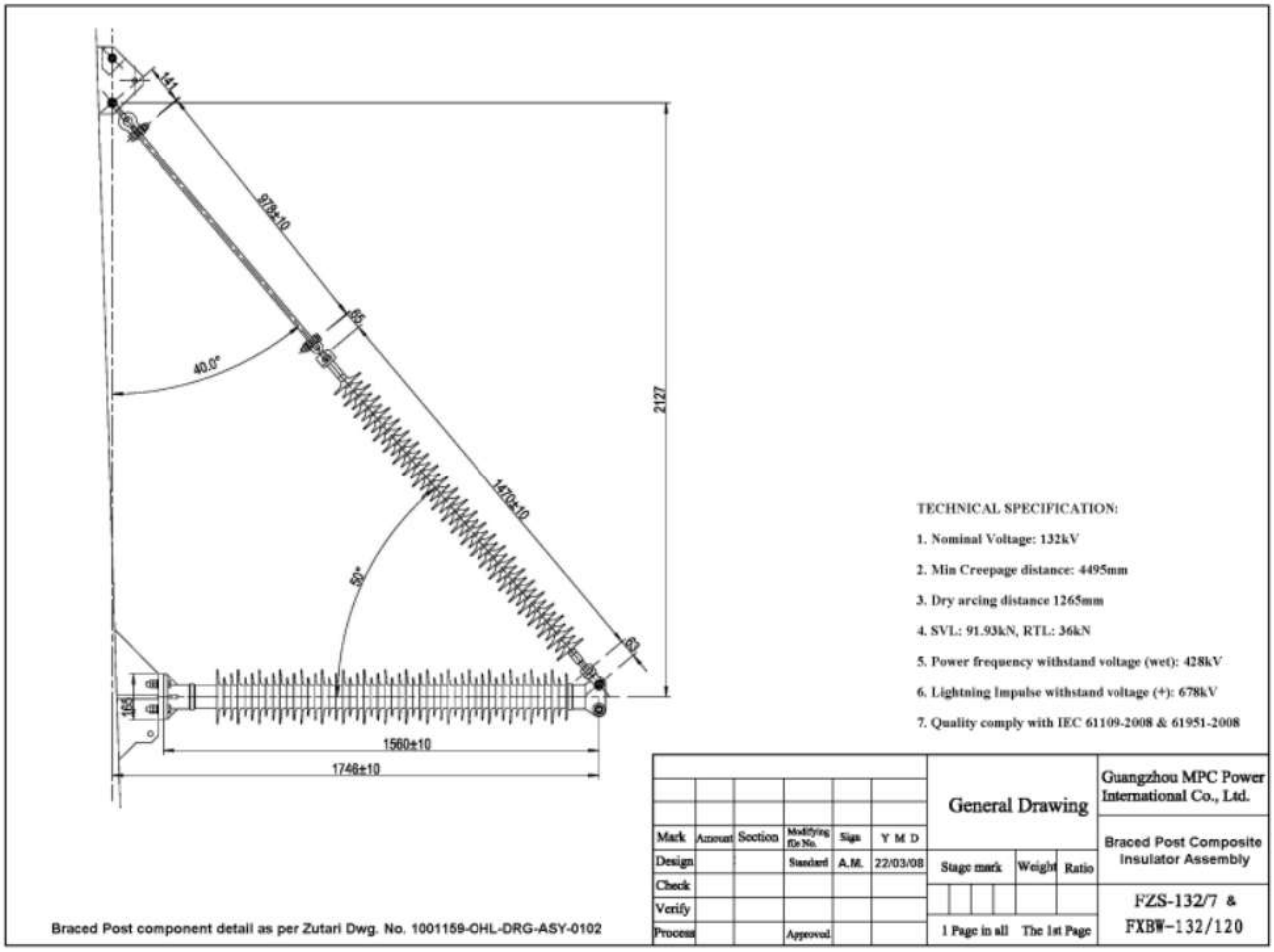


Figure 4: Braced Insulator Assembly

5.2. INSULATORS

Insulator options have been determined as per Eskom Standard DSP 34-510 Rev 0. This Standard allows for use of silicon post insulators and silicon long rod insulators. The type of insulator to be used on this line shall be as per IEC 60815 specifications. For this project, the creepage shall be 31mm/kV. The insulating material shall be silicon rubber and the dry arcing distance to be a minimum of 1200mm for 132kV.

Long rod Insulators:

- Will be made of composite silicone rubber.
- 120kN suspension long rod insulators on the intermediates
- 120kN long rod insulators on the strain towers
- Creepage distance = 31mm/kV
- Minimum failing load should have a strength value of at least the breaking point of the conductor bundle or the ground wire.

The long rod insulator will be in accordance with drawing FXBW-132/120 as shown in Figure 5 below:

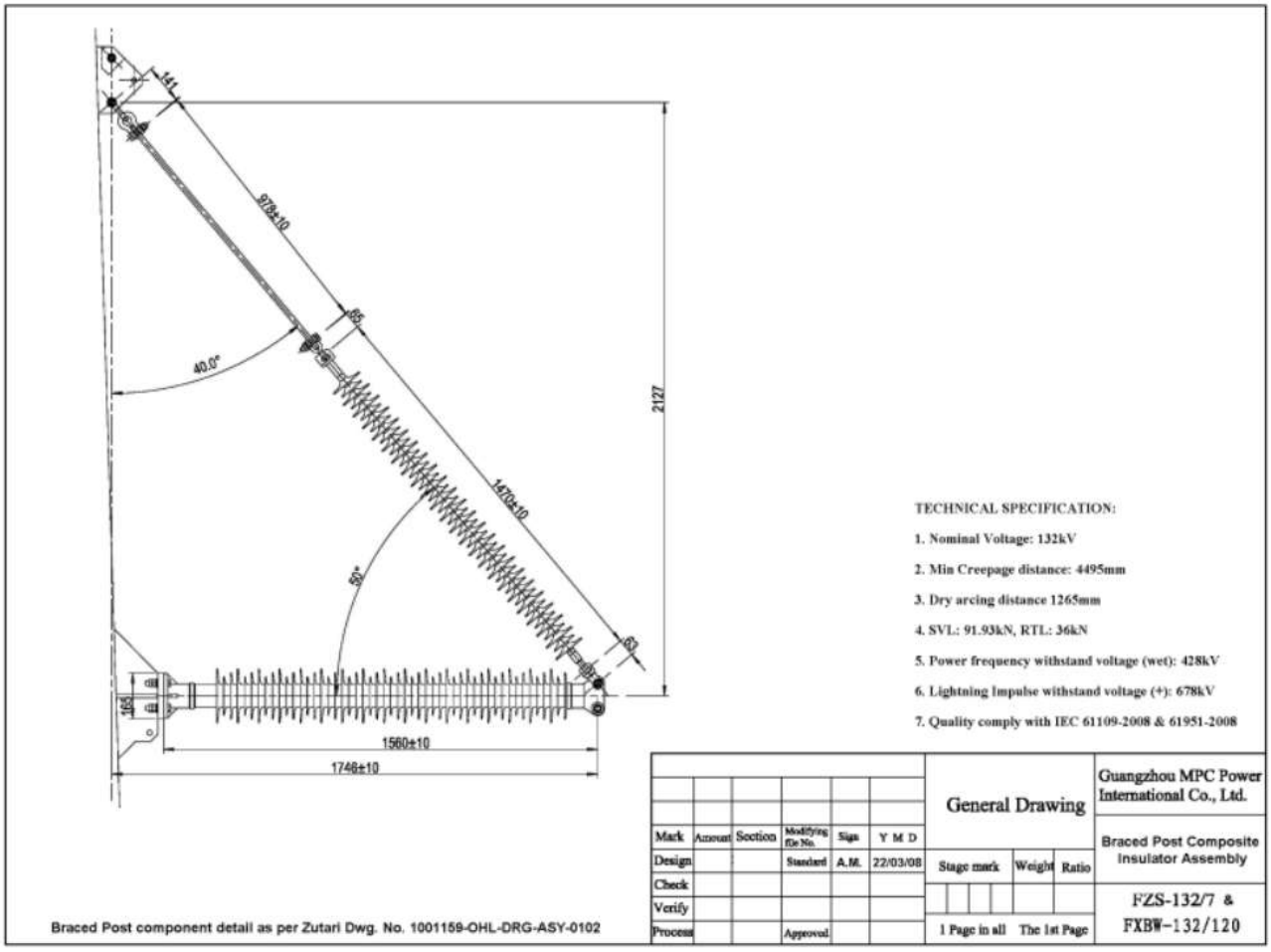


Figure 5: Long Rod Insulator

5.3. LINE POST INSULATORS

- Will be made of composite silicone rubber.
- 5.3kN post insulators on the strain towers
- Creepage distance = 31mm/kV
- Minimum design cantilever load should have a strength value of at least the maximum allowable weight span achievable by the structures.

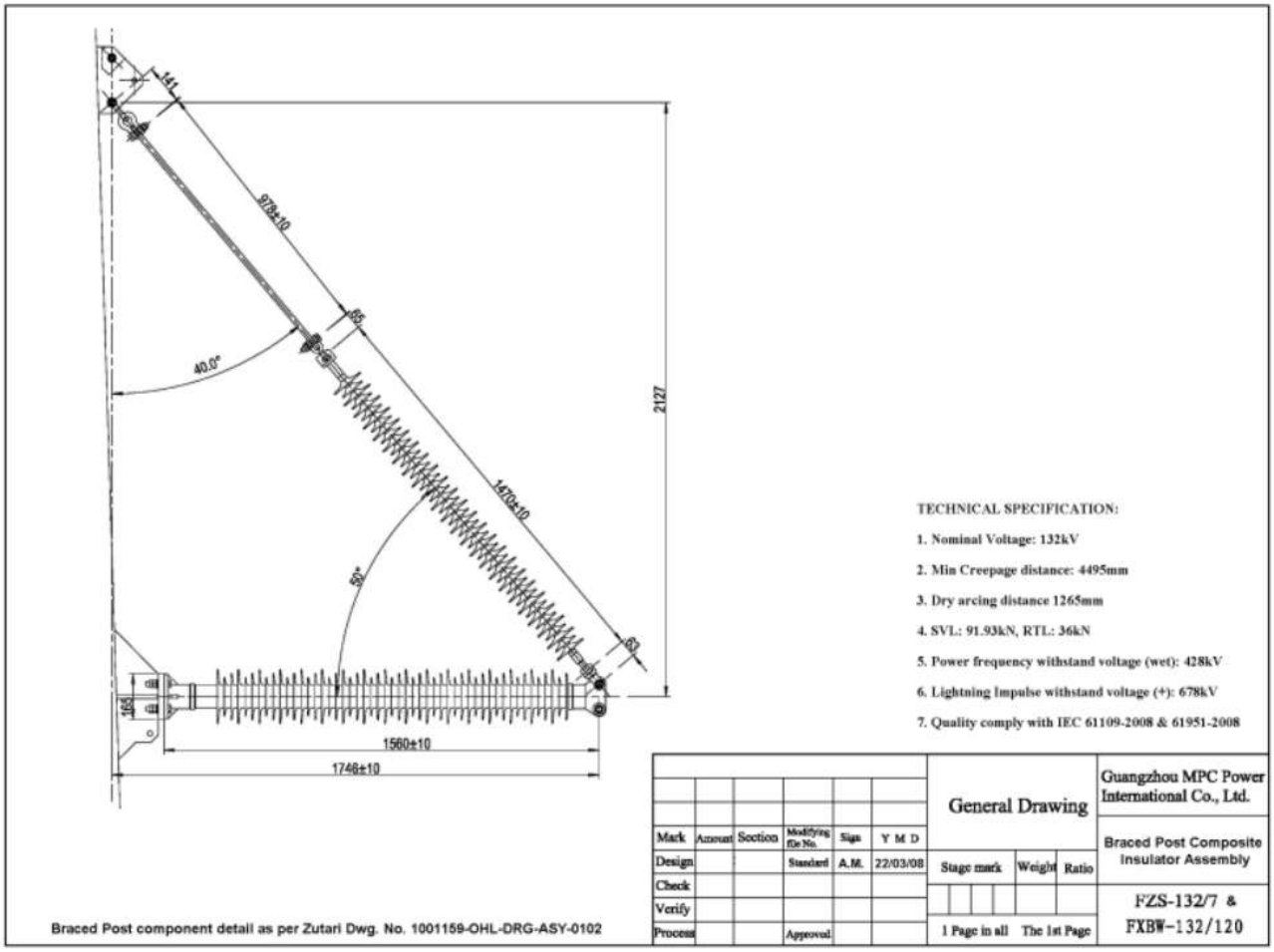


Figure 6: Line Post Insulator

5.4. HARDWARE AND ASSEMBLIES

All line hardware shall conform to Eskom standards 240-60777474 “Specification for Suspension and Strain Assemblies and For Hardware for Transmission Lines”.

5.5. CONDUCTOR SELECTION

The conductor to be used to be used for the new Overhead line will be twin greased ACSR.

6. FOUNDATION TYPES

6.1. FOUNDATION DESIGN LOAD FACTOR

Soil Types:

a) A soil investigation (soil type nomination) should be performed during construction, at which point the prevailing soil type will be confirmed based on the final geotechnical investigations and a suitable foundation system is selected for the various type of structures.
b) Foundations will be designed according to the following geotechnical classification:
    - Type 1 – Hard engineering strong granular soil
    - Type 2 – Less competent soil, stiff clay or dense sand
    - Type 3 – Very incompetent soil i.e. loose sand or soft clay
    - Type 4 – Saturated or submerged soft ground below the seasonal water table
    - Hard rock – Solid continuous moderately fractured
    - Soft rock – Very fractured, weathered or decomposed rock
c) Load safety factors have been incorporated for the designs allowing for variations in geotechnical conditions, construction inconsistencies and long-term performance.

6.2. INTERMEDIATE STRUCTURE FOUNDATIONS

Intermediate foundations for the freestanding steel monopoles shall be of pile & cap. The geotechnical investigation that was conducted indicate that the soil conditions are soil type 2 and 3 as shown it Table 16. During construction soil classification will again be done at each pole position to confirm the type of soil.

6.3. STRAIN STRUCTURE FOUNDATIONS

Strain structure foundations for the freestanding steel strain monopoles shall be pile and cap. During construction soil classification will again be done at each pole position to confirm the type of soil.

Figure 7 (Drawing PL01) below shows the pile layout, specifications and details of the Pile and cap foundations for the Intermediate & strain structures.

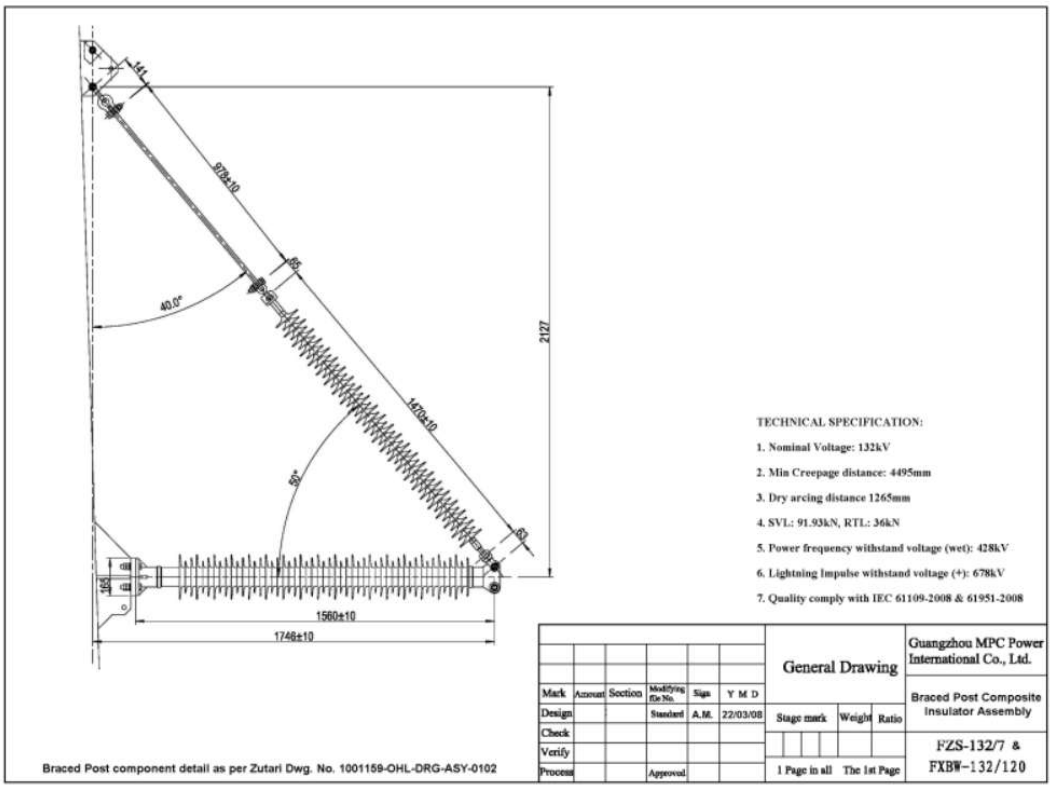


Figure 7: Pile Layout

7. ENVIRONMENTAL

7.1. GENERAL

7.1.1. Supervision

The Contractor shall give or provide all necessary superintendence during the execution of the works. The Contractor or a competent and authorised appointee approved of in writing by the Project Manager (which approval may at any time be withdrawn) shall be always on the works when work is being performed or when the Employer shall reasonably require it. The Contractor shall employ only such persons that are competent, efficient, and suitably qualified with related experience in the environmental field. The Employer shall be at liberty to object to and require the Contractor to remove from the works any person, who in the Project Manager's opinion, misconduct's himself or is incompetent in the proper performances of his duties.

7.1.2. Precautions against damage

a) In accordance with applicable legislation, the Contractor shall take all reasonable precautions for the protection of life and property on, or about, or in connection with the works.

b) The Contractor shall comply strictly with the “Special Conditions” stipulated by the landowners in the negotiated Options.

c) The Contractor shall comply with all the conditions specified in the Environmental Management Plan (EMP) during construction. In general, soil disturbance should be kept to a minimum. The disturbance of land contour banks or other erosion control structures shall be avoided.

d) No damage shall be caused to any crops unless both the landowner and the Supervisor, prior to the work commencing agree upon the extent of the intended damage.

e) There shall be no littering of the veld. The Contractor shall provide suitable containers for any waste.

f) No fires shall be allowed on site under any circumstances.

g) The Contractor shall be held liable for all damage arising from actions or negligence on the part of his workforce and any such damage shall be repaired immediately.

h) Any additional agreement concluded between the Contractor and a landowner not relating to Providing the Works, must be in writing and a copy made available to the Supervisor within 48 hours of such an agreement being concluded.

i) Any environmental incident as specified in the EMP, or accident during construction of the works shall be immediately reported to the Supervisor.

7.2. SANITATION

The Contractor is to provide portable toilet facilities for the use of his workforce at all work sites. Under no circumstances shall use of the veld be permitted. To prevent the occurrence of measles in cattle, employees may require to be examined for tapeworm and treated or treated irrespective of whether they are infested or not. Proof of such treatment is to be supplied to the Supervisor. The drug “Niclosamide” (Yomesan, Bayer) is freely available and highly effective against tapeworms in humans. It does not however, prevent re-infestation and regular examination and/or treatment is required.

7.3. WILDLIFE

a) It is illegal to interfere with any wildlife, fauna or flora as stipulated in the Environmental Conservation Act No 73 of 1989.
b) When stipulated in the EMP, two colour bird diverters are to be fitted on both earth wires along the indicated spans at 25m intervals.

7.4. ACCESS

a) The Supervisor shall, together with a representative of the Contractor, negotiate with each landowner the access to reach the servitude and each tower position. The access agreement will be formalised in the form “TPL 004/005 - Property Access Details” and signed by the three parties. The Contractor will mark the proposed route and/or a competent representative will accompany the equipment when opening the access. Any deviation from the written agreement shall be closed and re-vegetated immediately.
b) The Contractor shall signpost the access roads to the tower positions, immediately after the access has been negotiated.

7.5. USE OF EXISTING ROADS

a) Maximum use of both the existing servitudes and the existing roads shall be made. In circumstances where private roads must be used, the condition of the said roads must be recorded prior to use (e.g., photographed) and the condition thereof agreed by the landowner, the Supervisor, and the Contractor.
b) All private roads used for access to the servitude shall be maintained by the Contractor and upon completion of the works, be left in at least the original condition.
c) Access shall not necessarily be continuous along the line, and the Contractor must therefore acquaint himself with the physical access restrictions such as rivers, railways, motorways, mountains, etc. along the line. As far as possible, access roads shall follow the contour in hilly areas, as opposed to winding down steep slopes.
d) Access is to be established by vehicles passing over the same track on natural ground, multiple tracks are not permitted. Access roads shall only be constructed where necessary at watercourses, on steep slopes or where boulders prohibit vehicular traffic.
e) The Contractor is to inform the Supervisor before entering any of the following areas:

i. Naturally wet areas: vleis, swamps, etc.
ii. Any area after rain.
iii. Any environmentally sensitive area.

f) If access is across running water, the Contractor shall take precautions not to impede the natural flow of water. If instructed, the Contractor is to stone pitch the crossing point. There shall be no pollution of water. Access across running water and the method of crossing shall be at the approval of the Supervisor and the landowner.
g) Where in the opinion of the Supervisor and/or Project Manager, inordinate and irreparable damage would result from the development of access roads, the Contractor shall use alternative construction methods compatible with the access and terrain, as agreed with the Project Manager.
h) Existing water diversion berms are to be maintained during construction and upon Completion be repaired as instructed by the Supervisor.
i) Where access roads have crossed cultivated farmlands, the lands shall be rehabilitated by ripping to a minimum depth of 600mm.

7.6. CONSTRUCTION OF NEW ROADS

a) Where construction of a new road has been agreed, the road width shall be determined by need, such as equipment size, and shall be no wider than necessary.
b) In areas over 4% side slope, roads may be constructed to a 4% out slope. The road shall be constructed so that material will not be accumulated in one pile or piles but distributed as evenly as possible. The material shall be side-cast as construction proceeds and shall not be side-cast so as to make a barrier on the downhill side. The cut banks shall not overhang the road cut and shall if necessary be trimmed back at an angle which would ensure stability of the slope for the duration of the works. The sides or shoulders of roads shall not act as a canal or watercourse.
c) Water diversion berms shall be built immediately after the opening of the new access road. In addition, water outlets shall be made at intervals where berms are installed, and suitably stone pitched if instructed by the Supervisor.
d) No cutting and filling shall be allowed in areas of 4% side slope and less.
e) Existing land contours shall not be crossed by vehicles and equipment unless agreed upon, in writing, by the landowner and the Supervisor.
f) Existing drainage systems shall not be blocked or altered in any way.

7.7. CLOSURE OF ROADS

a) Upon completion, only roads as indicated by the Supervisor shall be closed.
b) In areas where no cut or fill has been made, barriers of earth, rocks or other suitable material shall affect closure.
c) In areas 30 % slope and less, the fill of the road shall be placed back into the roadway using equipment that does not work outside the roadcut (e.g., back-hoe). In areas of greater that 30 % slope, the equipment shall break the road shoulder down so that the slope nearly approximates to the original slope of the ground. The cut banks shall be pushed down into the road, and a near normal side slope shall be re-established and revegetated.
d) Replacement of earth shall be at slopes less than the normal angle of repose for the soil type involved.

7.8. CONSTRUCTION OF WATER DIVERSION BERMS

a) Water diversion berms shall be spaced according to the ground slope and actual soil conditions, but no greater than the following:
    - Where the track has a slope of less than 2%: 50m apart
    - Where the track has a slope of 2% - 10%: 25m apart
    - Where the track has a slope of 10% - 15%: 20m apart
    - Where the track has a slope of more than 15%: 10m apart
b) Berms shall be suitably compacted to a minimum height of 350mm.
c) The breadth of the water diversion berm shall be 4m at the base and extend beyond the width of the road for 2m on the outlet side to prevent water flowing back into the road. It shall be angled to a gradient of 1% to enable the water to drain off slowly.
d) Berms are to be constructed so that a canal is formed at the upslope side.
e) Where the in-situ material is unsuitable for the construction of water diversion berms, alternative methods of construction must be investigated and proposed by the Contractor and submitted to the Project Manager for acceptance.
f) Borrow pits - The Contractor’s decision as to the location of borrow pits, shall be at the Supervisor’s acceptance. The Contractor shall be responsible for the rehabilitation and revegetation of the borrow pits. It is the Contractor’s responsibility to negotiate the royalties for the borrow pits with the landowner.

7.9. LEVELLING AT TOWER SITES

a) No levelling at tower sites shall be permitted unless approved by the Supervisor.

b) The steep slopes formed by the cutbanks and respective fillings when building the tower platforms are to be trimmed back to an angle that ensures stability of the slope. When the ground is loose, berms are to be built on the top of the slope, 2m long logs spaced evenly must be pegged across the downslope, re-vegetated with appropriate local grass seeds together with fertiliser.

7.10. GATES

7.10.1. General

a) Attention is drawn to the Fencing Act No. 31 of 1963 as amended, in particular with regard to the leaving open of gates and the dropping of fences for crossing purposes, climbing, and willful damage or removal of fences.

b) At points where the line crosses any fence in which there is no suitable gate within the extent of the line servitude the Contractor is to, on the Supervisor's instruction, provide and install a servitude gate as detailed in the relevant drawing. The Contractor will mark these crossing points when the tower positions are being pegged.

c) Where applicable game gates are to be installed in accordance with the relevant drawing.

d) All vehicles shall pass through gates when crossing fences, and the Contractor shall not be allowed to drop fences temporarily for the purpose of driving over them. No construction work shall be allowed to commence on any section of line, unless all gates in that section have been installed. Installation of gates in fences on major road reserves shall comply with the ordinances of the relevant Provisional Authority. No gates may be installed in National Road and Railway fences.

7.10.2. Installation of gates

a) Care shall be taken that the gates shall be so erected that a gap of no more than 100mm to the ground is left below the gate.

b) Where gates are installed in jackal proof fencing, a suitable reinforced concrete sill as shown on the drawing shall be provided beneath the gate.

c) The original tension is to be maintained in the fence wires.

d) Where required, the Contractor shall replace rusted or damaged wire strands on either side of the gate with similar new wiring to prevent the movement of animals. The extent of the replacement shall be on the Supervisor's instruction.

7.10.3. Securing of gates

a) The Contractor shall ensure that all servitude gates used by him are kept closed and locked at all times.

b) The Contractor shall provide locks for all servitude gates, and when the line is taken over these locks shall be recovered by the Contractor and replaced by locks supplied by the Employer. The Contractor shall also ensure that all existing farm gates used by him are kept closed. The Contractor shall provide the Supervisor with keys for the above locks. No keys shall be provided to landowners to avoid conflict situations between neighbouring landowners.

7.10.4. Construction - within the servitude

a) All foundation excavations shall be kept covered or barricaded in a manner acceptable to the Supervisor to prevent injury to people and livestock. Failure to maintain proper protection of excavations may result in the suspension of excavation work until proper protection has been restored.

b) Material removed from the excavation, which is not suitable or not required for backfill may be spread evenly over or adjacent to the tower position. If in the opinion of the Supervisor, the excavated material is not suitable for spreading it shall be disposed of as directed by the Supervisor. Spreading of subsoil will not be permitted. All excavated soil suitable for backfill will be returned to the excavation by backfilling with the subsoil first and the topsoil last.

c) All other construction waste, nuts, bolts, surplus concrete, etc. shall be removed from the tower sites and servitude. Plastic, litter, and conductor offcuts etc. are to be removed immediately from site to avoid injury to farm animals and wildlife.

d) No surplus concrete or concrete washing is allowed to be dumped on the servitude and at tower locations. No concrete washing is allowed in watercourses.

7.10.5. Campsites

a) The Contractor will be responsible for negotiating the position of his campsite and the conditions under which the camps may be established, with the landowner. The

Contractor will be responsible for the proper management of the camps. Notwithstanding, it is required that the entire camp is fenced, and the gates shall be locked after hours and over weekends. Proper sanitation and cooking facilities are to be provided. The Contractor shall ensure that the water used at the campsite is of drinkable quality.

b) Litter shall be disposed to an appropriate site.
c) Sewerage and wastewater at the campsites must be removed to an approved sewerage farm.
d) The Contractor shall have the diesel tank protected underneath by plastic sheeting and a trench or bund wall around it to avoid ground pollution. In case of ground pollution, a certified contractor shall remove the soil to an approved toxic site, or the ground treated chemically. In both cases a certificate is to be supplied to the Project Manager.
e) The compacted ground shall be rehabilitated by ripping to a minimum depth of 600mm. The site shall be cleaned and left as it was found and to the satisfaction of the Supervisor and landowner.

7.10.6. Batching plants

a) The Contractor shall be responsible for negotiating the site of his batching plant (if required) and the conditions under it may be established, with the landowner. The Contractor shall be responsible for the proper management of the batching plant.
b) Upon completion of works, the ground of the batching plant area shall be rehabilitated, and the site cleaned and left as it was found and to the satisfaction of the Supervisor and landowner.
c) The use of local water for concrete must first be negotiated with the landowner and the appropriate authorities. Such water is to be analysed and accepted by the Project Manager before use.

8. LINE SURVEY

8.1. PLANS AND PROFILES

The route of the line will be surveyed by the Employer, who will provide all necessary route plans and templated profile drawings, on which, tower types and the position thereof will be indicated.

8.2. MARKING OF ROUTE

The line route will be marked by the Employer with iron pegs at each angle, and on-line reference pegs along the straights, at approximately 2 000m intervals, and will, in most cases, be inter-visible.

8.3. SURVEY BEACONS AT BEND POINTS

At bend positions, the original iron pegs indicating the centre line of the transmission line route are on no account to be disturbed or removed, as these are required for servitude registration purposes. The Contractor is to, during foundation installation, concrete the bend pegs in position.

8.4. SURVEY BY THE CONTRACTOR

The pegging of tower positions, and where necessary, the establishing of self-supporting tower leg extensions and guy anchor positions for guy towers, shall be carried out by professional land surveyors or registered surveyors.

The Contractor, on completion of suitable sections of the line, is to supply records of all distances measured for each individual tower position. These should agree with the profiles, and any discrepancy reported immediately.

It is the Contractor’s responsibility to inform the Supervisor immediately, should:

a) there is any discrepancy between the topography shown on the profiles and the actual ground.
b) errors be found, for example where a tower position is physically in “lands” and the profile states "no tower in land"
c) new features have appeared since the completion of the survey and the production of the profiles, such as roads, telephone, or power lines etc. which could create clearance problems.
d) the Contractor, in his opinion, finds that the site chosen is not suitable for a tower position, or the tower type indicated on the profiles is not suitable for the tower position e.g., excessive side slope.
e) It is the Contractor's responsibility to ensure that the surveyor is familiar with the limitations and restrictions of the tower types and construction methods used.

8.5. PEGGING BY THE CONTRACTOR

8.5.1. Procedure

a) The Contractor shall undertake the pegging of the transmission line tower positions along the intended line route. Pegging shall proceed far in advance of foundation nomination and construction.

b) Every tower centre position is to be marked with a steel peg ±1.2m high and painted white. The pegs are to carry a tag showing the tower number, tower type and height. The pegs are to be left in position until the tower is assembled.

8.5.2. Setting out of angle towers

All angle towers must be positioned in such a way that the centre phase conductor is on the centre line of the servitude.

8.5.3. Correct placing of towers

It is the Contractors responsibility to ensure that accepted survey methods are used, and that checks are done to ensure the correct placing of towers.

NOTE: As numerous numbers appear on the profile drawings, the Contractor is to ensure that the actual span distances add up to the length of the straight or section of line between two bends. Any distance which are shown from a line point to a tower are to be taken as unchecked.

9. FOUNDATIONS

9.1. DESIGN

9.1.1. Soil and rock classification

a) Hard Rock: hard to very hard solid or moderately fractured continuous rock and including hard to very hard rock of any other description which meets the strength requirements of the designs. Soft Rock: weathered or decomposed very soft to soft continuous rock and including rock of any other description which does not satisfy the requirements for classification above.

b) Type ‘1’ soils: competent soil with equal or better consistency (strength or toughness) than one would encounter in stiff cohesive soils or dense cohesionless soils above the water table. This soil must have a broad balanced texture (constituent particle sizes) with high average combinations of undrained shear strength and internal angle of

friction, with minimum values of 80kN/m² and 30° respectively. The minimum natural specific weight shall not be less than 18kN/m³.

c) Type ‘2’ soils: a less competent soil than type "1", with equal or weaker consistency than one would encounter in firm to stiff swelling cohesive soils, or dry poorly graded loose to medium dense cohesionless soils above the water table. The minimum undrained shear strength shall be 40kN/m², and the minimum natural specific weight shall not be less than 16kN/m³.
d) Type ‘3’ soils: dry loose cohesionless soil or very soft to soft cohesive soil.
e) Type ‘4’ soils: submerged cohesionless and cohesive soils. This includes all soils below the permanent water table, including soils below a re-occurring perched water table, or permeable soils in low-lying areas subjected to confirmed seasonal flooding.

9.2. FOUNDATION DESIGN LOADS

The ultimate simultaneous tower design loads shall be used for foundation design purposes. The foundation loads thus calculated shall be further factored upwards for foundation design purposes by a load factor equal to 1.2 for lattice steel self-supporting type towers. For guyed towers the guy anchor loads shall be factored by a load factor of 1.3 minimum and the mast plinths loads by a factor of 1.1.

Drilled foundations, including piles and rock anchors Soil /rock design parameters for final design and construction of drilled foundations shall be determined by pile tests, foundation tests or comprehensive soil /rock investigations.

The Contractor is fully responsible for the final foundation designs. As a guide only, "average" parameters are set out below:

a) In type ‘1’ or type ‘2’ soils, a skin friction with a maximum of 80kPa in a type ‘1’ soil, and a maximum of 40kPa in a type ‘2’ soil, may be used. The skin friction values that are used shall not exceed 80% of the ultimate friction determined from appropriate soil tests.
b) In soft rock, when non-shrink grout or concrete is utilised, a maximum skin friction of 135kPa may be used in all piles or anchors. A 37° frustum shall be used to check anchor group pull out resistance. The skin friction value shall not exceed 80% of the ultimate friction determined from appropriate rock tests.
c) In hard rock, when non-shrink grout or concrete is utilised, a maximum skin friction of 350kPa may be used in anchors with a maximum diameter of 150mm. A 45° frustum

shall be used to check anchor group pull out resistance. The skin friction value shall not exceed 80% of the ultimate friction determined from appropriate rock tests.

d) The depth of any pile(s) in a pile group in soils, shall be so calculated to resist the uplift force on the pile or pile group. For a type ‘1’ soil, a 30° frustum for suspension towers, and a 25° frustum for angle strain towers may be assumed. Similarly for a type ‘2’ soil, a 20° frustum for suspension towers, and a 15° frustum for angle strain towers may be assumed. Assumed material densities to be as per clause 6.1.2.

e) No horizontal shear resistance on the piles or pile cap shall be assumed for re-compacted excavated soil. The lateral resistance of undisturbed soil shall be ignored in the top 300mm from ground line, and taken as the lesser of 100kPa or 80% of the permissible bearing determined from appropriate tests from 300mm to the bottom of the pile cap. If the pile cap is not capable of restraining the entire horizontal base shear, the piles and pile cap shall be designed to resist the shears and moments introduced from the pile cap to the individual piles. A soil bearing pressure of 200kPa in type ‘1’ or 100kPa in type ‘2’ soil shall be allowed under the pile cap. End bearing components for compressive loads shall not be considered in soil replacement type piles with a diameter less than 750mm.

9.3. SOIL AND ROCK TESTS

a) In addition to the minimum soil/rock investigation requirements, tests shall be carried out by the Contractor, if so, required by the Project Manager, to confirm a soil or rock type classification and shall be conducted in accordance with accepted, good geotechnical engineering practices, and shall include but not be limited to the following:

i. Standard penetration tests or Dutch Cone penetrometer tests.
ii. Visual classification of soils
iii. Determination of present and probable water table level.
iv. Laboratory and/or site tests to determine soil friction angles and cohesion values.
v. Laboratory tests to determine stress-strain modules of soils and rock.
vi. Laboratory and/or site tests to determine soil unit weights.
vii. Laboratory and/or on site tests to determine the soil texture i.e. whether the soil is predominately clay, silt, sand or gravel.
viii. Continuous rock cores with recovery values and drilling times.

ix. The standard penetration tests and recovery of soil samples shall be obtained in each soil strata encountered or at 1.5m intervals whichever is the less. Rock cores shall extend a minimum of 3.5m into sound rock.

b) The soil/rock investigation shall be conducted to recognised standards to ensure that all encountered soil and/or rock strata are identified and delineated by area along the line route. It shall be the Contractor's responsibility to perform adequate soil/rock investigations to the satisfaction of the Supervisor to determine the soil/rock suitability at each site.

9.4. FOUNDATION SYSTEMS

9.4.1. General

a) Before foundation excavation commences the Contractor shall submit to the Project Manager, drawings, and relevant design calculations of all the proposed foundations intended for use. Acceptance by the Project Manager does not relieve the Contractor of his responsibility for the adequacy of the design, dimensions, and details. The Contractor shall be fully responsible for his designs and their satisfactory performance in service. A registered Civil Engineer or Civil Engineering Technologist, duly authorised to do so on behalf of the Contractor, shall accept responsibility for all foundation designs and drawings submitted to the Project Manager, and shall sign all drawings accordingly. If the Employer provides foundation designs and/or drawings, a registered Civil Engineer or Civil Engineering Technologist, acting on behalf of the Contractor, shall check and assume responsibility for such designs and/or drawings. All foundation design loads are to be shown on the relevant foundation drawing.

b) No foundation shall be constructed without the Project Manager acceptance. All drawing revisions must be submitted to the Project Manager before being issued for construction purposes.

c) Only with the specific permission of the Project Manager, may more than one design per soil or rock type of any foundation system for a tower type be utilised.

d) The Project Manager, for specific applications, may consider proprietary foundation systems not covered by this specification.

e) A ground slope of up to and including 12 degrees to the horizontal in any direction shall be assumed at all foundation positions for design purposes.

9.5. DRILLED FOUNDATIONS

The Contractor shall have equipment for, and personnel knowledgeable and experienced in, the evaluation and construction of this type of foundation.

9.5.1. General

a) The Contractor shall allow for the testing of two separate piles/anchors in each of the soil or rock conditions for which they have been designed. Pile/anchor tests as described in clause 6.1.5.2 d below, if so required by the Project Manager, are to be successfully tested to the Project Manager's satisfaction prior to construction of cast-in-situ pile/anchor foundations.

b) All design clauses in 6.1.3 relating to drilled concrete foundations shall apply.

c) Piles must be designed to limit ground line vertical deflection, at maximum loadings, to less than 12mm.

d) The minimum centre to centre spacing of any two piles in a group of piles, shall be three pile diameters of the pile with the larger diameter, unless otherwise accepted by the Project Manager.

e) The structural steelwork shall be firmly keyed into the concrete by means of bolted-on cleats. The adhesion between steel and concrete shall not be relied upon to transmit the load to the foundation. The cleats shall be so positioned on the structural steel member, so as to limit punching shear in the concrete due to both tension and compression load cases. When calculating the number and size of cleats required the maximum contact pressure between cleat and concrete shall not exceed 10mPa.

9.5.2. Single cast-in-situ piles

Foundations utilising one cast-in-situ concrete pile will be considered by the Project Manager if the following criteria are met:

a) If a pile cap is not utilised, the pile shall have a minimum diameter of 350mm in order that the structural steel attachment of the tower can be accommodated without conflict with the reinforcing steel. Should a pile cap be utilised, the minimum pile diameter shall be 250mm.

b) The pile shall be constructed vertically and shall be designed for the maximum combinations of uplift and compression loadings, and the total horizontal base shears associated with the vertical loadings. Total shear applied at the top of the foundation, including the 650 mm maximum projection above ground level, is to be included.

Lateral load design bending moments shall be calculated taking into account possible plastic soil formation. Raked piles will be accepted under special conditions only.

c) The pile shall be designed to ensure that it acts as a rigid pile. Horizontal deflection at the top of the projected pile under ultimate loading shall be limited to 5mm.

d) The pile shall be reinforced for its entire length, in order to resist the applied axial and bending forces, and sufficient reinforcing hoops shall be provided to support the vertical reinforcing and resist shear forces in the concrete. Reinforcing may be curtailed.

9.5.3. Multiple cast-in-situ piles

Foundations utilising multiple cast-in-situ piles of a minimum diameter of 250mm, will be considered by the Project Manager if the following criteria are met:

a) A minimum of two vertical piles per leg are used, connected to the structural steelwork by means of a reinforced concrete pile cap. Raked piles will be accepted under special conditions only.

b) The piles and pile cap shall be designed for the maximum combinations of uplift and compression loadings, and the total horizontal base shears associated with the vertical loadings, including leg shear. Lateral load design bending moments shall be calculated considering possible plastic soil deformation.

c) The piles shall be reinforced for their entire lengths to resist the applied axial and bending forces and sufficient reinforcing hoops shall be provided to support the vertical reinforcing. The reinforcement shall extend into the pile cap sufficiently and shall be suitably anchored to ensure full utilisation of reinforcement from pile cap to pile. The pile cap shall be reinforced to withstand the shear and bending forces applied by the structural steelwork. Reinforcing may be curtailed.

d) Allowance shall be made for all possible group effects when two or more piles, with a centre to centre spacing of less than three pile diameters, are used in a group.

9.5.4. Cast-in-situ pile/anchor test requirements

a) Prior to construction of any cast-in-situ pile/anchor foundations, the Contractor shall, if so, instructed by the Project Manager, install in each general soil or rock type encountered, and at any additional locations, a test cast-in-situ pile/anchor for the purpose of verifying the concrete/soil or grout/rock frictional resistance values. The test pile/anchor shall not be part of a final foundation.

b) The Contractor shall prepare the test procedure and supply all equipment and personnel to perform the tests. All pile/anchor tests shall be conducted to failure of the pile/anchor. The pile/anchor test procedure, based on the following requirements, shall be prepared by the Contractor, and shall be submitted to the Project Manager for acceptance prior to the tests.

- The test beam supports shall be placed outside the uplift influence zone of the pile/anchor to be tested and the distance from the outside of the pile/anchor (or pile/anchor group) to the test beam support shall not be less than "r".

  r = (l + c) tan Ø

  where:

  l = depth of pile/anchor (or pile/anchor group) with respect to the underside of the pile/anchor cap.

  c = depth of pile/anchor cap excavation.

  Ø = frustum angle.

- The Project Manager may request that the piled/anchor foundation as a whole be tested, but load tests shall generally be carried out on single piles/anchors with or without pile/anchor caps.
- The maximum design load shall be applied to the piled/anchor foundation during the test in appropriate increments to 50%, 75% and 90%, each for a minimum holding period of 5 minutes and finally, 100% for at least half an hour. Successive load increments shall not be applied, and the maximum test load shall be held until the rate of movement under the acting load has stabilised at a rate of movement not exceeding 0,5mm in 5 minutes for a pile and 0,2mm in 5 minutes for an anchor.
- The piled/anchor foundation will be considered to have passed provided the total movement does not exceed 5mm during the entire test up to and including the maximum design load. The anchor foundation will be considered to have passed provided the total movement does not exceed 2mm during the entire test up to and including the maximum design load. The

residual movement once all load has been removed must be recorded prior to the determination of the failure load.

- Two micrometers shall be placed on either side of the pulling rod, in order to eliminate errors due to rotation of the foundation. The datum frame supports shall also be positioned a similar distance from the test pile/anchor as the test beam supports above. The average reading of these gauges will represent the actual creep. Should this method, for any authentic reason prove impracticable, then a suitable approved alternative method may be used.

c) Pile/anchor tests shall be conducted in the presence of the Supervisor. Upon completion of the pile/anchor test, the pile shall be removed by the Contractor for examination, and properly disposed of, or cut-off at least 600mm below ground level and backfilled, or as directed by the Supervisor.

d) Pile/anchor foundations constructed by the Contractor, prior to acceptance by the Project Manager of the pile/anchor test results, will be subject to modification or replacement by the Contractor should the pile/anchor fail the test.

9.6. CONCRETE AND GROUTS

9.6.1. General

a) Concrete foundations shall be designed based upon a concrete strength of 25mPa at 28 days.

b) Concrete mix designs shall be proportioned to obtain a minimum required strength of 25mPa at 28 days, and a target strength of 35mpa, with a maximum water cement ratio of 0,59. No individual 28-day concrete test cube result shall fall below 85% of the specified strength. In the absence of any previous statistical data, the mix designs shall be proportioned to attain a characteristic strength of 33mpa at 28 days. Notwithstanding the above requirements, the minimum cement content shall be 340 kg/m3.

c) Grout mix designs for rock anchors shall be proportioned to attain a minimum strength of 35mPa at 28 days with any expansive additives included. The use of epoxy grouts is to be used only with the Project Manager’s approval.

d) Water shall be clean and free from all earthy, vegetable, or organic matter, acids or alkaline substances in solution or suspension.

9.6.2. Cement types

a) Concrete shall be batched utilising common cement types manufactured in accordance with SABS ENV 197-1

b) The minimum cement class used in concrete will be class 32.5

c) CEM I - Class 52.5 and accelerating admixtures shall not normally be utilised for concrete batching. Their use will only be considered by the Project Manager in unusual circumstances, in order to expedite tower erection to facilitate conductor stringing. The Contractor shall make test cubes and arrange for their testing, to confirm the concrete strength, and obtain acceptance from the Supervisor before proceeding with other activities.

d) Site blending will be acceptable provided the following criteria is met:

   i. Proportion of Portland Cement and Extenders are within industry norms (i.e., 50%replacement for slag and 30% replacement for Fly Ash).

   ii. The cementitious materials can be weighted into the mix with an accuracy of 2% or better. In special cases the Project Manager may require that the replacement value indicated in f) above be increased.

e) The cement utilised for grout mixes shall be of a “non-shrink” type. Any shrinkage-compensating admixture shall only be used with the Project Manager’s acceptance.

f) In aggressive environments where concrete is subject to chemical attack, extenders must be considered to improve resistance to chemical attack (refer to SABS 0100 –2).

9.6.3. Aggregates

a) Fine and coarse aggregate shall be obtained from sources accepted by the Project Manager and shall be assessed in accordance with SABS 1083.

b) Fine aggregate shall be natural sand or other accepted inert material with similar characteristics, composed of clean, hard, strong, durable, uncoated particles. Fine aggregates shall be free from deleterious amounts of soft, flaky or porous particles, loam, soft shale, clay lumps or organic material.

c) Fine aggregates shall be selected from local sources to provide a reasonably uniform grading of the various size fractions. Fine aggregates having a large deficiency or excess of any size fraction, shall be avoided to the extent practicable.

d) Coarse aggregate shall consist of crushed stone, gravel or other accepted inert material of similar characteristics having hard, strong, durable, uncoated pieces free from deleterious substances.

e) Coarse aggregates up to 26,5mm nominal size, may be single-sized stone. Coarse aggregates up to 40mm nominal size, shall be blended consisting of two parts by volume of single-sized 40mm stone to one part by volume of single-sized 20mm stone. The content of fine material (less than 4,75mm) in coarse aggregate shall be less than 10% by mass.

f) The void content of fine or coarse aggregate shall not exceed 48%. Aggregate shall not contain any materials that are reactive with any alkali in the aggregate itself or in the cement, the mixing water or in water in contact with the finished concrete or grout in amounts sufficient to cause excessive localised or general expansion of the concrete or grout.

g) Notwithstanding the limits on chlorides as per SABS 1083 (BS 882), the acid soluble chloride as NaCl level in aggregate as a percentage by mass shall not exceed the limits given in the following table:

Note: These limits shall be subject to the overall limit for the concrete as mixed.

h) The maximum nominal aggregate size for concrete batching shall be as follows:
   - unreinforced concrete: 37,5mm
   - reinforced concrete excluding piles:26,5mm
   - piles: 19mm
   - grout: 10mm

9.6.4. Workability

a) Concrete mix designs and batching shall be conducted in a manner to achieve adequate workability, to ensure that the concrete will be dense, without voids of honeycomb.

b) The design mix workability of the concrete, as determined by the “Slump Test”, shall meet the following requirements by application:
   - unreinforced concrete: 25mm – 75mm
   - reinforced concrete for conventional foundations and pile caps: 50mm – 100mm
   - reinforced concrete for cast in-situ piles: 100mm – 150mm
   - reinforced concrete for cast in-situ inclined piles/anchors: 150mm – 200mm

c) The consistency of grout mixtures shall be proportioned so that the mixture is pourable. The fine aggregate to cement ratio shall not exceed 3:1 irrespective of workability.
d) Any admixtures proposed by the Contractor shall be subject to the Project Manager's acceptance.

9.6.5. Reinforcing steel

a) All main reinforcing steel shall conform to SABS 920 Type C, Class 2, Grade II hot rolled deformed bars with a minimum yield stress of 450mPa. The minimum bar size utilised shall be 10mm.
b) All secondary reinforcing for stirrups, hoops and spirals, shall as a minimum conform to SABS 920 Type "A" hot rolled bars of plain cross-section of mild steel with a minimum yield stress of 250mPa.
c) At the Contractor's option or as required by design, Type B or Type C reinforcing steel may be utilised. The minimum bar sizes utilised shall be at least 0,25 times the largest main reinforcing bar, or 0,01 times the average of the cross-sectional dimensions of the concrete with a minimum diameter of 6mm allowed.

10. CONSTRUCTION

10.1. SOIL AND ROCK TYPE NOMINATION

The Contractor shall be responsible for ensuring that the subsoil at each foundation location is suitable to withstand the design loading which will be imposed upon it by the foundation and shall be responsible for any subsidence or failure of foundations due to insufficient care having been taken in the examination of the soil, the likely influence of other naturally occurring factors in the immediate and surrounding area of the tower, and the construction of the foundations. The acceptance by the Supervisor of foundation installations shall not relieve the Contractor of this responsibility.

The Contractor shall be responsible for the adoption of an acceptable method of soil/rock investigation in the presence of the Supervisor, and he shall delegate this work to a competent member or members of his staff who have suitable related qualifications and experience. Unless otherwise indicated in the Works Information, the minimum soil investigation requirement shall be the excavation of a test pit next to each foundation position, to allow for the in-situ inspection of the soil and the assessment thereof. The test pits shall be excavated outside the zone of influence of the appropriate foundation and shall be taken down to a depth

equal to the lesser of the depth of the foundation system to be constructed or 3m. In addition, appropriate soils tests shall be carried out where further clarification is required for the correct identification of a soil category. The soil type foundation nominations based on the procedures shall take place well in advance of actual foundation installation, so as not to disrupt construction activities, and to allow for the possibility of having to conduct laboratory tests on suspect soils and/or rocks.

Since combinations of two or more of the soil or rock classifications could occur at any one foundation position, including rock boulders in a soil matrix, the soil or rock nomination in terms of one of the six classifications shall then be conservatively based on the load transfer capability of the soil and/or rock encountered over the depth of influence of the approved foundation system. For example, a combination of a type '1' soil and soft rock over the depth of influence of an approved type '1' soil foundation design shall be nominated as a type '1' soil condition, and the approved type '1' soil foundation system installed. By following this procedure, the soil or rock nomination at each foundation position must be one of the six classifications and this shall in turn define which system design is to be installed d) The test pit shall be suitably backfilled immediately after the relevant inspections and tests have been completed.

Where site conditions, such as difficult access or environmentally sensitive areas, etc. preclude the excavation of a test pit, alternative soils identification procedures shall be proposed by the Contractor and acceptance obtained from the Supervisor. Should the foundation conditions at the actual foundation location be found to differ from those identified at the corresponding test pit, the Contractor shall immediately inform the Supervisor and a revised assessment made. The acceptance by the Supervisor of the soil type foundation nomination shall not relieve the Contractor of this responsibility.

10.2. EXCAVATION

a) At each tower or pole position, the Contractor shall excavate, construct the appropriate foundation, and backfill the excavation as required. Excavation in this instance shall be the removal of soil/rock by any accepted means for the purpose of constructing a particular foundation system, including conventional pad and pier type foundations, spread footings, piles, anchors, grillages, etc.

b) No excavation work, other than for soil investigation, shall be commenced on a section of line until the following conditions have been met:

i. The Contractor has submitted a schedule of tower leg ground levels and proposed leg extension lengths to the Project Manager.
ii. The Contractor has submitted the proposed foundation and soil type schedule to the Project Manager.
iii. If drilled cast-in-situ piles or rock anchors are proposed, soil samples and pile/anchor tests have been conducted, if instructed by the Project Manager.

c) Excavations shall be made to the full dimensions required and shall be finished to the prescribed lines and levels. The bottom or sides of excavations upon or against which concrete is to be poured shall be undisturbed. If, at any point in excavation, the natural material is disturbed or loosened, it shall be filled with 10mPa concrete, including the application of a blinding layer at the base of foundations where these eventualities are likely to occur during the construction process. Soil backfilling will not be accepted.
d) In soil which is incapable of withstanding the design loads which will be imposed upon it by a pad and pier type of foundation, the Contractor shall propose a method of increasing the effective bearing area of the foundation. This may entail the installation of a foundation with a larger pad, or other suitable solutions proposed by the Contractor. Any such proposal shall be submitted to the Project Manager for acceptance prior to excavation.
d) When the material at foundation depth is found to be partly rock or incompressible material, and partly a soil or material that is compressible, all compressible material shall be removed for an additional depth of 200mm and filled with 10mPa concrete.
e) The excavations shall be protected so as to maintain a clean subgrade until the foundation is placed. Any water, sand, mud, silt or other objectionable material which may accumulate in the excavation including the bottom of pile or anchor holes, shall be removed prior to concrete placement.
f) Excavations for cast-in-situ concrete, including pile caps cast against earth, shall be concreted within seventy-two hours after beginning the excavations. In addition to this general requirement, pile and/or anchor holes that are not adequately protected against the elements to the satisfaction of the Supervisor, shall be cast on the same day that drilling/excavation has taken place. Excavations that remain unconcreted longer than seventy-two hours may, at the option of the Supervisor, be required to be enlarged by 150mm in all dimensions.

g) The excavations shall be kept covered or barricaded in a manner accepted by the Supervisor to prevent injury to people or livestock. Failure to maintain proper protection of excavations may result in the suspension of excavation work until proper protection has been restored.

i) The Contractor is to notify the Supervisor upon completion of the excavation for the foundations. No concrete is to be placed until the excavation, shuttering and reinforcing steel has been inspected and accepted in writing by the Supervisor.

10.3. BACKFILLING

a) After completion of foundation construction, the Contractor shall backfill each excavation with suitable material. The Supervisor shall accept the materials used for backfill, the amounts used and the manner of depositing and compaction of the materials.

b) The material to be utilised for compacted backfill shall be deposited in horizontal layers, having a thickness of not more than 300mm before being compacted. In backfilling, the pad of the foundation shall be covered, first with a 200mm layer of well-graded material containing no pieces larger than 20mm, before any coarse material is deposited. The material to be compacted shall contain no stones more than 150mm in diameter, and be free from organic material such as trees, brush, scraps, etc.

c) The distribution of materials shall be such that the compacted material will be homogenous to secure the best practicable degree of compaction, permeability and stability.

d) Prior to and during compaction operations, the backfill materials shall have the optimum moisture content required for the purpose of compaction, permeability and stability.

e) The material shall be mechanically compacted to a minimum of 90% of the density of the undisturbed material.

f) The surface of the backfill around the foundation shall be carried to such an elevation that water will not accumulate.

g) Material removed from the excavation, which is either not suitable or not required for backfill, shall be spread evenly over or adjacent to the site, or be disposed of as directed by the Supervisor. Spreading of subsoil in agricultural areas will not be allowed. Excavated soil suitable for backfill will be returned to the excavation by backfilling with the subsoil first and the topsoil last.

h) Where the excavated material is unsuitable for backfill, such as a material with a high clay content or a sandy material with little variation in particle size, the Contractor shall propose a suitable method of soil improvement for consideration and acceptance by the Supervisor prior to being implemented. The properties of the soil may be improved by the addition of stabilising agents such as Portland cement in the case of sandy soils and slaked lime in the case of clayey soils. Backfill material stabilised in this way shall be mixed in the ratio of one part cement or lime per ten parts of soil. This material shall be properly mixed, moistened, placed and compacted in the same manner as excavated material

10.4. CONCRETE FOUNDATIONS

10.4.1. Supply of materials

The Contractor shall supply all concrete and concrete materials required for construction, including aggregates, cement, water, admixtures (if any), shuttering, reinforcing steel, all embedded steel components and materials for curing concrete. 6.2.4 Concrete foundations

10.4.2. Prior acceptance

a) Well in advance of construction, the Contractor shall select the location of aggregate sources for concrete and obtain representative samples of all aggregates. A representative sample shall consist of a blend of twelve separate samples from each aggregate stockpile. The representative samples shall be divided into two portions, one set of which shall be examined and accepted by the Supervisor and maintained on site during concreting operations. The second set which shall be delivered by the Contractor to the Portland Cement Institute, or other laboratory accepted by the Project Manager, for examination of suitability of the aggregate in accordance with SABS 1083. Prior to any concrete placement the Contractor shall submit the trial mix designs and results of seven- and twenty-eight-day test cube strengths to the Project Manager for acceptance.

b) If ready-mixed concrete is to be used, the Contractor shall obtain, from the ready-mix supplier, aggregate test reports and mix designs that satisfy the contractual requirements and test cube strength reports of all mix designs and submit to the Project Manager for acceptance prior to placement of any concrete. A ready-mix concrete supplier that does not have SABS 979 recognition shall only be used with the Project Manager’s acceptance, and thereafter only after satisfying the above requirements.

10.4.3. Tolerances for concrete construction

The intent of this paragraph is to establish tolerances that are consistent with construction practice, and the effect that permissible deviations will have upon the structural action or operational function of the structure. Where tolerances are not stated for any individual structure or feature, permissible deviations will be interpreted in conformity with the provisions of this paragraph. The Contractor shall be responsible for setting out and maintaining concrete excavations, shuttering and structural steelwork within the tolerance limits so as to ensure completed work within the specified tolerances. Concrete work, that exceeds the tolerance limits specified shall be remedied, or removed and replaced.

a) Variation in structure location
   - Transverse to centreline: less than 50mm
   - Longitudinal displacement: less than 300mm

b) Variation in relative vertical elevation of structural steelwork (one leg to another)
   - less than 5mm

c) Variation in horizontal distance between structural steelwork from that computed
   - Adjacent legs: less than 5mm
   - Diagonal legs: less than 7mm

d) Rotation - maximum deviation of transverse axis of structure from bisector of interior line angle
   - less than 0º 12’
   - minus 150mm
   - plus 1 000mm

e) Height of concrete foundations above ground level
   - min. 150mm
   - max. - per design

f) Variation in relative placement of foundation components from those indicated on drawings, including piles, shuttering, structural steelwork
   - less than 50mm

g) Tolerances for placing reinforcing steel
   - Variation of protective cover: 5mm
   - Variation from indicated spacing: 25mm

h) Tolerances for pole foundations
Pole foundations shall be constructed such that the pole, and the associated foundation works are within 50mm of the correct calculated position.

10.4.4. Workmanship

Concrete shall be proportioned, mixed, placed and finished in such a manner as to be free of honeycomb, segregation, and other defects of workmanship.

10.4.5. Formwork

a) Forms shall be of wood, metal or other suitable material.
b) The forms shall be mortar-tight and shall be designed, constructed, braced and maintained such that the finished concrete will be to true line and elevation, and will conform to the required dimensions and contours. They shall be designed to withstand the pressure of concrete, the effect of vibration as the concrete is being placed and all loads incidental to the construction operations without distortion or displacement.
c) Where the bottom of the form is inaccessible, provision shall be made for cleaning out extraneous material immediately before placing the concrete.
d) All exposed corners of the concrete shall be chamfered approximately 20mm. A suitable nosing tool may be used for horizontal chamfers only if approved by the Supervisor. All form work dimensions shall be checked, and if necessary, corrected before any concrete is placed.
e) All forms shall be treated with a form-release agent accepted by the Supervisor before concrete is placed. Any material, which will adhere to, discolour or be deleterious to the concrete, shall not be used.

10.4.6. Proportioning of concrete

a) The concrete mix shall consist of ordinary Portland cement, fine aggregate, coarse aggregate and water proportioned in accordance with the mix design accepted by Project Manager. Adjustments in these proportions may be directed at any time when found necessary as a result of field tests of the concrete. No change in proportioning shall be made unless instructed by the Supervisor. As an alternative to the use of ordinary Portland cement, the Project Manager may consider the use of other approved types of cement or blends thereof.

b) No change in the source, character or gradation of materials shall be made without notice to the Supervisor and without a revised proportioning mix design being prepared and accepted by the Project Manager prior to use of the materials.

c) During the concrete operations, the concrete mixture shall be tested for each batch by the Contractor to determine the slump of the fresh concrete in accordance with SABS Method 862. Records of slump tests shall be supplied to the Supervisor.

d) Test cubes shall be prepared, in accordance with SABS Method 863 at the initiation of concrete placement of each mix design and every day that concrete is batched thereafter. Test cubes shall only be made out of a concrete batch at the point of discharge. If the Contractor does not make use of independent facilities for the crushing of test cubes and the reporting there-on, then suitable on-site facilities for the crushing of test cubes must be provided by the Contractor, and the Supervisor shall witness such tests.

e) Additional test cube sets shall be prepared and crushed as directed by the Supervisor. Each set of test cubes shall consist of four cubes. One to be crushed at seven days, two to be crushed at twenty-eight days and one to be held as a spare in the event of a suspect result from one of the other three cubes. The written results of the test cube strength tests shall be immediately forwarded to the Supervisor upon receipt.

f) All cement shall be batched by mass. Cement shall be measured to within 2% accuracy. Aggregates may be batched by mass or by volume, provided that volumetric batching equipment is calibrated at the start of concrete operations by weighing a typical discharge. The quantities of aggregate batched shall be measured within 3% accuracy. Adjustments of fine aggregate volumes due to "bulking" shall be accounted for in batching.

g) The amount of moisture in the aggregates shall be determined daily by a method accepted by the Supervisor, and the water requirements as per the mix design altered accordingly.

h) Water quantities, including aggregate moisture allowances, shall be determined within 2% accuracy. The use of water meters for dispensing water shall be subject to the Supervisor’s acceptance.

10.4.7. Mixing of concrete

a) Concrete shall be mixed sufficiently to ensure that the various sizes of aggregate are uniformly distributed throughout the mass, and each particle of aggregate is adequately coated with cement paste of uniform consistency. Concrete delivered to site that lacks homogeneity should be mixed for a longer time or discarded, as directed by the Supervisor.

b) For mixers of one cubic metre or less, the mixing time shall be not less than ninety seconds after all ingredients have been charged in the mixer. For mixers of larger capacities, minimum-mixing times shall be increased by fifteen seconds for each additional half cubic metre of mixer capacity, or fraction thereof.

c) Concrete delivered to the job site shall be mixed en-route. Mixing shall be rigorously controlled for agitating time, mixing time and overall time upon arrival at the foundation site. Concrete discharge shall be completed within one and one-half hours after introduction of the water to the cement and aggregate.

d) In exceptional cases only, the Contractor may at his own risk add water to a concrete mix at the point of delivery. The maximum amount of water that may be added at site is three litres per cubic metre of concrete. At no time shall the water: cement ratio of 0.59 be increased.

e) Non-shrink grout shall be mixed in a suitable mechanical grout mixer/pump accepted by the Supervisor.

10.4.8. Placement of reinforcing steel

a) After acceptance of the excavation by the Supervisor, the Contractor shall install all the reinforcing steel required for foundations. Reinforcing steel shall be fabricated and bent in strict accordance with the drawings and SABS 82.

b) Reinforcing steel, before being positioned, shall be thoroughly cleaned of mill scale and any coatings that will destroy or reduce bond.

c) Reinforcing steel shall be accurately positioned and secured against displacement during placing and vibrating of concrete. Reinforcing bars shall be tied at all intersections with no less than No.18 gauge annealed wire. Reinforcing bars shall be lapped forty-five diameters at all splices, unless shown otherwise on the drawings. Reinforcing steel shall be provided and placed as detailed on the drawings. Unless otherwise shown on the drawings, the minimum cover to the main reinforcing bars in a slab, pile cap, chimney, pile or anchor, shall be 50mm. Use of suitable accepted

spacers or supports shall be made, to ensure that the minimum concrete cover to the reinforcement is maintained during the placement of concrete.

10.4.9. Placement of embedded items

a) The Contractor shall install all required embedded items shown on the drawings, prior to placing of concrete. Structural steelwork or holding down bolts shall be accurately positioned and securely held in place during the placement of concrete. The minimum cover to all embedded items, but excluding angle stubs, shall be 150mm. The minimum cover to angle stubs and cleats shall be 75mm unless otherwise shown on the drawings.

b) Angle stubs may be supported on the bottom of excavations by either precast concrete slabs set at the correct level by placing suitable grout or concrete underneath it, or on a previously placed binding layer installed up to the correct level. The precast slab shall be square in plan with a side dimension of 300mm, and a depth of 75mm, and shall be constructed using reinforced concrete with a minimum characteristic strength of 25mPa. The placing of loose rubble, stones, bricks, etc. under he precast slab will not be acceptable.

c) Structural steelwork or anchor bolts shall be embedded such that the top of the concrete of the foundation correctly coincides with the designed level.

d) Earthing requirements are to be as per the latest revision of specification “TRMASAAJ7 – Earthing of Transmission Lines”.

10.4.10. Placement of concrete

a) No concrete for foundations shall be placed until each foundation has been inspected and accepted by the Supervisor. The foundation at the time of this inspection shall be ready for concrete placement including reinforcing steel, embedded items and any necessary shuttering.

b) All surfaces of the foundation upon or against which concrete is to be placed shall be free from mud and/or loose or disturbed material. A blinding layer of 10mpa concrete not less than 50mm thick is to be installed on all bottom surfaces of a type ‘3’ or type ‘4’ foundations.

c) The surfaces of dry absorptive materials, against which concrete is to be placed, shall be moistened prior to the placing of concrete to prevent moisture being drawn from the fresh concrete.

d) At least two suitable concrete vibrators shall be ready for operation at the site prior to placement of concrete.

e) Freshly mixed concrete shall be handled, transported and deposited in such a manner as to prevent segregation or loss of material. When discharging by chute, the slope of the chute shall be uniform throughout its length and shall not be flatter than 1 in 3 or steeper than 1 in 2. Baffles shall be provided at the end of the chute to ensure a vertical discharge into the foundation. The maximum discharge height shall be three metres, and for heights in excess of this, a tremie pipe shall be used.

f) Placement of concrete shall not commence when the air temperature is below 2°C and rising, or below 5°C and dropping.

g) The temperature of the concrete mixture immediately before placement shall not exceed 32°C. Concrete exceeding this temperature shall be discarded. During hot weather concreting operations, the Contractor shall take the temperature of each batch of concrete.

h) No concrete shall be placed which has taken its initial set, regardless of whether the specified one and one-half hour period has elapsed or not. If a retarder, accepted by the Project Manager, has been used, the one and one-half hour period may be exceeded provided the concrete has not taken its initial set. The Contractor must dispose of waste concrete in a place acceptable to the Supervisor.

i) If concrete must be placed under water, a suitable watertight tremie, accepted by the Supervisor, of sufficient length to reach the bottom of the excavation shall be used. The tremie shall be free of water when filled with concrete to the bottom of the excavation. The tremie shall be kept full of concrete during the entire placing operation. The discharge end of the tremie must not be lifted out of the freshly placed mass of concrete until placement has been completed.

j) Concrete shall be thoroughly settled and compacted into a dense homogeneous mass throughout the whole depth of each layer being consolidated, using internal vibrators. Excessive vibration, causing segregation, is to be avoided. Concrete vibrators shall not be used to move concrete.

k) The concrete in cast-in-situ piles must be vibrated from the bottom upwards.

l) Unless authorised by the Supervisor, the Contractor shall not place concrete, unless the Supervisor is present during the entire placement operation.

m) When alternative foundations consisting of multiple cast-in-situ piles and pile caps are utilised, the Contractor shall at approximately one tower in twenty, open up on two

sides of the completed foundation of one leg, the pile cap and top 500mm of the piles, if so, instructed by the Supervisor. If the foundation is rejected for any reason, the Contractor shall open up as many additional foundations as determined by the Supervisor, as is necessary to fully assess the problem. Foundations accepted are to be backfilled using 10mPa concrete up to a level at least 150mm above the base of the pile cap.

10.4.11. Construction joints

a) In general, foundations shall be placed monolithically. Construction joints are to be avoided. If construction joints cannot be avoided and are accepted by the Supervisor, the Contractor may be permitted to make a construction joint if the following criteria are met:
    i. The concrete is reinforced, and the reinforcing steel will develop full bond strength both sides of the construction joint. No construction joints will be allowed in unreinforced concrete.
    ii. In single cast-in-situ piles, the construction joint is located one third the depth of the excavation, ±300mm and at least 150mm below the bottom of the structural steelwork or anchor bolts.
    iii. In multiple cast-in-situ piles, the construction joint is to be 75mm, and in rock anchors 100mm, above either the base of the pile cap excavation or the top of blinding level. If the piles are constructed after the excavation for the pile cap has taken place, suitable ring shutters of the same diameter of the piles shall be used to construct the above-mentioned pile/anchor projections.
b) No construction joints will be allowed in pile caps.
c) At all construction joints, the surfaces of the previously placed and hardened concrete shall be thoroughly cleaned of all foreign matter and primed with a 15mm thick layer of a wet mix of cement and sand in equal proportions, in the presence of the Supervisor before new concrete is placed. The grout coating shall be brushed over the concrete surface to ensure thorough coverage, particularly between the reinforcing bars. The new concrete shall be placed before the grout coating has taken its initial set.

10.4.12. Concrete finish

a) The top surface of the foundation shall be at least a wood float finish and shall be contoured to shed water.

b) All concrete placed against shuttering shall be free from irregularities, fins, rock pockets or other imperfections. Any rock pockets, porous or defective concrete shall be removed to the extent instructed by the Supervisor and repaired by filling with concrete, cement mortar or dry packed, as instructed by the Supervisor.

c) All exposed concrete shall be shuttered to a minimum of 150mm below ground level.

10.4.13. Concrete curing

a) The Contractor shall provide means of maintaining concrete in a moist condition for at least seven days after the placement of concrete. Exposed surfaces shall be kept thoroughly wet 24 hours a day for this period.

b) At the Contractor's option, concrete may be cured either by retaining shuttering in place and applying a liquid curing compound which forms a moisture retaining membrane on un-shuttered concrete surface, or by removing shuttering and applying a curing compound as described to all exposed concrete surfaces. Curing compounds utilised shall be of a type accepted by the Project Manager. Notwithstanding these requirements, formwork shall not be removed until at least 36 hours after the final placement of the concrete against such formwork. The Contractor shall remove formwork in such a way that shock and damage to the concrete is avoided.

10.4.14. Steelwork

a) All galvanised structural steel at the steel/concrete interface shall be cleaned with a suitable cleaner before painting with two protective coats of paint acceptable to Project Manager. This protection shall extend 500mm above and 400mm below the top surface level of the protruding foundation blocks.

b) In the case of concrete foundations, no part of the structural steelwork of the tower shall be buried or come into contact with the soil.

c) Anchors utilising steel extending below ground line shall be galvanised and then painted with two coats of an accepted bitumastic paint or be encased in concrete with at least 50mm cover. In addition to this requirement, the hot dip galvanised steel guy anchor link plate or bar utilised for the Deadman type of anchor foundation, shall be epoxy coated from 300mm below top of concrete level to the top end of the link above

ground level. Apply in accordance with the manufacturer's specifications one coat of galvanising epoxy primer followed by one coat of aluminium filled epoxy paint.

10.4.15. Construction proof load tests

10.4.15.1. Pole foundations

a) The Contractor shall provide equipment on site during the construction of the pole foundation capable of loading the pole foundation to two-thirds of the maximum design moment.
b) Where instructed by the Supervisor, the Contractor shall apply a construction proof load test of two-thirds the maximum design moment to the completed pole.
c) The pole foundation shall be loaded in increments of 50%, 75%, 90% and 100% and then unloaded to 50% in 3 cycles of 50% to 100% of the proof test. If creep exceeds 1mm/minute at ground level, additional load shall be applied until the creep is less than the stated limit. The three 50% loads and three 100% loads shall each be maintained on the pole for 5 minutes. If the creep is less than 1mm/minute, the final creep measurements shall be taken after each holding period. The pole foundation shall be considered acceptable if the total ground level creep from 50% to 100% load over 3 cycles is less than 30mm. If the creep exceeds 30mm, the foundation shall be modified or replaced by the Contractor and re-tested.
d) All pole foundation tests shall be conducted in the presence of the Supervisor.

11. TOWER ERECTION

11.1. ASSEMBLY OF POLES

a) Flanged and slip joints should be aligned such that there is minimum pole deflection around the joint.
b) The actual slip length shall not differ more than 100mm from the designed slip length.
c) Slip joints shall be cleaned and soaped before assembly to ensure ease of obtaining necessary slip lengths. Oil or grease shall not be permitted for use.
d) The jacking load shall be specified by the pole fabricator as below, refer to figure 1.
    - Jacking lugs shall be designed to accommodate the use of high-capacity hydraulic rams which are capable of applying up to 60 tons of load onto sections in either direction.

- The use of hydraulic rams will allow for sections to be pulled together and pushed apart, in the event that re-alignment is required
- The design of alternative jacking lugs is permissible, provided that compliance with the standard jacking system can be demonstrated, and the maximum capacity of jacking lugs exceeds the recommended jacking force.
- Designers may also consider the use of waste base plate material for fabrication of jacking lugs.
- The minimum jacking load shall be at least equal to the 1.8 times the sum of the design weight span of conductors and dead weight of the completed tower above that particular slip joint.
- The final recommended jacking load shall be specified by the fabricator, with due consideration to minimising joint slip after construction, and the maximum allowable compressive and circumferential stresses on the slip joint during the jacking operation.

e) Slip joint compressions shall be performed by hydraulic rams capable of a 60 ton compression and tension load. The system shall make use of rigid arms capable of pulling together or pushing apart sections in the event of misalignment. The system shall have load monitoring ability.

f) Small repairs to damaged galvanising shall be affected by the erector preferably after assembly and prior to lifting of poles.

12. INSTALLATION OF PHASE AND EARTH CONDUCTORS

12.1. MATERIAL SUPPLY

12.1.1. By the employer

a) The Contractor is to provide off-loading and secure storage facilities and shall be held responsible for the proper protection and safekeeping of all material until the completion date. The Contractor shall be held responsible for any loss or damage to material after delivery.

b) The Contractor is to verify and confirm the quantities of material supplied by the Employer. Conductor use is to be optimised to obviate excessive waste. A nominal amount (dependant on the terrain - max. 3%) of phase and earth conductor will be allowed for sags and jumpers. Off-cuts and waste shall be returned to the Employer upon Completion as scrap.

c) All other surplus material shall be returned to the Employer upon Completion.

12.1.2. By the contractor

a) The Contractor is to establish the correct quantities of all stringing materials required to Provide the works.

b) A nominal amount (dependent on the terrain - max. 3%) of phase and earth conductor will be allowed for sags and jumpers. Off-cuts and waste shall be returned to the Employer upon Completion as scrap.

12.2. INSTALLATION OF PHASE AND EARTH CONDUCTORS

12.2.1. Crossings, notices and permits

a) Substantial temporary conductor supports shall be used, or equally effective measures taken, to prevent encroachment of statutory clearances, or other clearance requirements stated in the permits, between the conductor being strung and other power or communication lines, roads or railways being crossed.

b) Suitable structures under each phase will be erected to protect all fences from conductor damage during stringing.

c) Temporary changes in poles, fixtures or conductors of lines being crossed will only be carried out if accepted by the Supervisor. The Contractor shall indicate any changes considered necessary and the Supervisor will co-ordinate any changes with the owner of the service.

d) The Contractor shall notify the Supervisor, at least 30 days in advance, of the time he intends to make crossings of power lines, communication lines, major roads or railways. This notification shall state the location of the crossing to be made, the approximate time of the permit, the length of time that will be required to effect the crossing, and the duration of permit requested.

e) The Employer will endeavour to arrange that all crossings be made with the crossed line deenergised. The time of line outages shall be kept to the absolute minimum. All preparatory work shall be done prior to the work permit coming into effect. Upon completion of the work, the Contractor shall immediately notify the Supervisor that lines are clear and release his working permit.

f) Special scaffolding may be required at certain crossings. If so, the Supervisor will instruct the Contractor to provide suitable scaffolding and nets

12.2.2. Handling and stringing of conductors

a) All phase and earth conductors shall be tension strung.

b) The equipment and methods used for stringing the conductors shall be such that the conductors will not be damaged. Particular care shall be taken at all times to ensure that the conductors do not become kinked, twisted or abraded in any manner.

c) Stringing shall be done in daylight hours only.

d) The Contractor shall make suitable arrangements for temporary staying of towers and anchoring of conductors when necessary. Conductors may not be anchored to any portion of any tower, except strain towers, and then only at the points designed for conductor attachment. Temporary anchoring to footings and guy anchors will not be permitted. Where temporary anchoring is required, suitable temporary anchors shall be provided. Installation and removal of temporary anchors will be the Contractor's responsibility.

e) Matched conductor drums, marked with the same number followed by the suffix A, B, C etc., shall be used for each pull of multiple conductors per phase to ensure even sag characteristics and a minimum number of joints. The Contractor shall select the most suitable sets of matched conductor drums for each stringing position to minimise wastage of conductor. The Contractor shall keep an accurate record of the phase and earth conductor drum numbers and their position in the line. On Completion a copy of these records shall be supplied to the Project Manager.

f) Where multiple conductors per phase are used, these shall be attached to a single running board and strung simultaneously to ensure matched sags. The individual conductors shall be attached to the running board by auxiliary clamps that will not allow relative movement of strands or layers of wire and shall not over tension or deform individual wires.

g) Running boards shall pass through blocks smoothly without hanging, catching or causing wide variations in pulling tensions, damage to the blocks or over stressing of towers. The pulling line shall be a non-rotating type, which will not impart twist or torque to the running board or conductors. Swivels shall be used to attach the pulling line and conductors to the running board. Swivels shall be small enough to pass through the blocks without damage to either and shall have ball bearings and be free turning under load.

h) All conductors shall be strung by the controlled-tension method by means of rubber faced, double bull wheel-type tension stringing equipment. This equipment must be so

designed that there shall be no conduction of the heat generated by the braking action, to the bull wheels. There shall be appropriate mechanical braking on the reels to prevent loose conductor between the reels and the bull wheels, but sufficient tension to pull the conductor in between layers remaining on the reel. Brake controls shall be positive and fail-safe in order to minimise the danger of brake failure.

i) The tension shall be controlled individually on each conductor, and when the desired tension is obtained, the same constant tension shall be held so long as the brakes are left at this setting. Tensions, while pulling, must be sufficient to clear all obstacles safely without damage to the conductor. At no time shall the pulling tension exceed the tension shown on the sag charts. Pulling of more than one drum length of conductor shall be subject to the Supervisor's acceptance

j) Adequate protection shall be provided where there is danger of conductors being damaged by vehicles or other equipment and objects. Conductors shall not be left in contact with the ground, vegetable matter or any conducting or semi-conducting material. Wood lagging or similar material shall be used to protect the conductor when working at ground level.

k) Radio communications shall be used to relay information and instructions between the conductor tensioning station, intermediate check points, mobile stations and the pulling station at all times during a stringing-tensioning operation. An outage of radio communications at any station will require immediate cessation of conductor pulling operations.

l) The placement of tensioning and pulling equipment shall be such that the vertical angle of pull on a crossarm during stringing operations shall not be more than 20°. Conductors shall not be pulled around angles that exceed 20°. With tandem-mounted blocks, the pulling angle shall not exceed 40°.

m) The sheaves shall conform to the conductor manufacturer's recommendation as to diameter, and to size and shape of groove for the size of conductor used. Sheaves shall have a minimum diameter of fifteen times the conductor diameter at the base of the groove. Block surfaces that will be in contact with the conductor shall be coated with neoprene or rubber. This covering shall be kept clean and free of materials that might damage the conductor surface. The conductor sheaves shall have a separate groove for the pulling line. The pulling line shall not run on the rubber covered conductor grooves. The sheaves shall be inspected for damage or contamination before each usage. The Contractor shall not use any sheaves rejected by the

Supervisor due to damage or excessive wear. The Contractor shall immediately remove such sheaves from the site.

n) During stringing operations and before regulating, if it becomes necessary to leave the conductor in the blocks for longer than eighteen hours, the conductor shall be left at reduced tension, and the Supervisor immediately notified. The percentage of sag, spans involved, time interval, and correction for creep shall be noted, and records forwarded to the Supervisor. In no case shall conductors be left with less than the following clearances:
   - cultivated or open country: 6 metres,
   - railroad tracks: 9 metres.

12.2.3. Joints

a) Before stringing commences, the Contractor will be required to compress sample phase and earth conductor mid span joints, as well as phase conductor dead/end assemblies on site in the presence of the Supervisor, using the matched and numbered dies and compressors intended to be used on the line during stringing. The length of conductor between any two fittings on the sample shall be not less than 100 times the overall diameter of the conductor. At an acceptable testing authority, a tensile load of about 50% of the breaking load of the conductor shall be applied and the conductor shall be marked in such a way that movement relative to the fitting can easily be detected. Without any subsequent adjustment of the fitting, the load shall be steadily increased to 95% of the breaking load and then reduced to 90% of the breaking load and maintained for 1 min. There shall be no movement of the conductor relative to the fitting due to slip during this period of 1 min and no failure of the fitting. The conductor shall then be loaded to failure and shall again withstand a minimum load of 95% of the minimum breaking strength of the conductor for it to be deemed acceptable. If the sample fails this test, a further three (3) samples shall be tested and will all be required to pass the above. If any one or more of these samples fail, no stringing shall commence until the Project Manager is satisfied that the equipment is acceptable. A copy of the test report shall be forwarded to the Project Manager prior to stringing.

b) As far as possible, complete drum lengths of conductor and earth conductor shall be used to reduce the number of joints. Joints shall not be closer than 15 metres to the nearest suspension tower or 30 metres from the nearest strain tower. Joints shall not be installed in spans crossings railways, proclaimed roads, power or important

communication lines. In no case shall more than one joint be installed in a given span, nor shall a joint be installed in a span dead-ended at both ends. The minimum distance between joints shall be 300 metres.

c) Whenever joints or dead-ends are made, auxiliary erection clamps and hauling devices shall not be placed closer than 8m to the point of joint or dead-end. The auxiliary erection clamps shall not allow relative movement of strands or layers of wire, and shall not birdcage, over tension or deform individual wires.

d) The conductor shall be cut with a ratchet or guillotine cutter to produce a clean cut, retaining the normal strand lay and producing minimum burrs. The aluminium strands shall then be stripped from the steel core by using an acceptable stripper. Under no circumstances shall high tensile hacksaw blades be used to cut conductor.

e) The conductor shall be laid out for a distance of 15 metres and straightened at the ends before preparation for installation of joints or dead-ends. Compression jointing shall be carried out on a clean tarpaulin or jointing trailer. The lay of wires shall be tightened before the first compression is made. The conductor strands shall be cleaned by wire brushing and an accepted non-oxidising paste applied. Compression shall be carefully made so that the completed joint or dead-end is as straight as possible. To minimise distortion, the joint should be rotated 180° between each compression operation, the joint and conductor being fully supported in the same plane as the compression jaws. If, in the opinion of the Supervisor, the completed joint or dead-end requires straightening, it shall be straightened on a wooden block by use of a sledgehammer and shaper or wooden mallet. If, in the opinion of the Supervisor, the joint or dead-end has not been satisfactorily straightened or has been damaged in the process, the Contractor shall replace it.

f) After compression has been completed, all corners, sharp projections and indentations resulting from compression shall be carefully rounded. All other edges and corners of the fitting that have been damaged shall be carefully rounded to their original radius. Nicked or abraded surfaces shall be carefully smoothed. Tape, tape residue and filler paste shall be removed from fittings and conductors.

g) Sufficient notification must be given to Supervisor prior to the installation of compression fittings. Unless previously agreed all joints and dead-ends shall be installed in the presence of the Supervisor.

h) Under no circumstances shall compression joint be allowed to pass the travellers.

i) During the progress of the stringing, the Contractor shall keep an accurate record of the spans in which conductor and earth conductor joints are made, the date of assembly onto the conductor. A copy of these records shall be supplied to the Project Manager.

12.2.4. Preparation of metal to metal contact surfaces

All current carrying connections, contact surfaces, clamps, conductor and terminals shall be prepared as follows:

- wipe the mating surfaces free from grease and dirt (except the bores of compression sleeves).
- apply 1mm thick coating of approved jointing compound to the surfaces using a non-metallic spatula or similar tool.
- scrub all the coated surfaces thoroughly with a wire brush which is new, or which has been used solely for this purpose.
- after a period of not more than one minute make the connection in the normal manner and remove excess extruded compound.

NOTE: No compound squeezed out by clamping pressure shall be used in making further joints.

The Contractor shall apply such compound as necessary for making the connections by the method outlined above. On bolted connections care shall be taken during the tightening to avoid overstressing the bolts or components of the clamps. A torque wrench shall be used for tightening each bolt to the required torque.

a) Tighten all bolts and U-bolts to their specified torque.
b) Leave clamps for 24 hours to allow aluminium conductor to expand and contract.
c) Check all bolts to ensure that they are still at the required torque.

12.2.5. Conductor repairs

a) Damage caused by the Contractor shall be repaired in a manner determined by the Supervisor. Damage is any deformity on the surface of the conductor that can be detected by eye or by feel. Damage includes, but is not limited to nicks, scratches, abrasions, kinks, bird caging, and popped out and broken strands.

b) Depending upon the severity of the damage and the length of damaged section, the repair shall be made by careful smoothing with extra fine sandpaper, covering with preformed repair rods, installing compression-type repair sleeve, or by cutting and splicing.

c) Kinked, bird caged, or severely damaged sections of conductor shall be cut out. When there is repeated damage in the same span, or in consecutive spans, the entire conductor in such spans hall be replaced.

d) All damage caused by auxiliary erection clamps or other gripping devices shall be repaired or cut out, as instructed by the Supervisor, before the conductor is sagged.

e) Preformed repair rods shall be installed if no more than one strand is broken or nicked deeper than one third of the strand diameter, or when a number of strands are reduced in area not exceeding the area of one strand. Not more than two sets of preformed repair rods shall be installed on any one conductor in any given span.

f) A compression-type repair sleeve shall be installed, if not more than one third of the outer strands of the conductor are damaged over a length of not more than 100mm, or not more than two strands are broken in the outer layer of conductor and the area of any other damaged strands is not reduced by more than 25%.

g) Compression-type repair sleeves shall not be installed on one conductor in a given span if it already contains a conductor splice, conductor dead-end or another compression-type repair sleeve.

h) Damage to the steel strands or aluminium strands, exceeding the stated limits for repair sleeves, shall be cut out and spliced by means of a compression type mid-span joint.

i) Any foreign matter such as pitch, paint and grease placed on the conductor and fittings by the Contractor shall be removed by methods approved by the Supervisor prior to regulating.

12.2.6. Regulating

a) The Contractor shall string all conductors and earth conductors to the appropriate sags and tensions as determined from the conditions specified in the Works Information. The calculation of sag corrections for creep and clamping offsets shall be the responsibility of the Contractor, based on charts supplied by the Project Manager. Such calculations shall be submitted to and accepted by the Project Manager prior to regulating.

b) Conductors and earth conductors shall be strung to the appropriate sag determined for the actual span length, and the equivalent span of the strain section involved. The appropriate conductor temperature to be used for sagging shall be determined by means of a Celsius thermometer inserted in the end of a suitable length of conductor or earth conductor from which a 150mm length has been removed from the centre strand, or other accepted method.

c) The wire with the thermometer inserted shall be hung at crossarm level for at least two hours before the temperature is read.

d) The length of a section of phase and earth conductors to be regulated at any one time shall be limited to that length that will assure attainment of correct sag based upon terrain and obstructions.

e) Where there are a large number of suspension towers between strain towers, regulating of phase and earth conductors shall be done at intervals of 3 to 5 spans. In hilly country the conductors may require to be temporarily anchored one span away from the spans being regulated. The sag spans chosen shall be near each end of the section pulled for single conductor lengths, and near each end and at the middle for double conductor lengths. In addition, the sags shall be checked in all spans over 500 metres. In unusual situations, the Supervisor may require additional checks.

f) The Contractor shall provide, and maintain in good condition, suitable dynamometers, sag boards or other accepted apparatus for the proper checking of the work. Dynamometers shall read in Newtons and shall be tested and recalibrated at regular intervals. The Contractor shall keep dynamometer calibration certificates at the site office.

g) The Contractor shall notify the Supervisor at least twenty-four hours prior to any planned regulating operation. No regulating shall be done except in his presence, unless otherwise authorised. The Contractor shall furnish labour and equipment, for signalling and climbing purposes as requested by the Supervisor, to facilitate his inspection of the sag.

h) In pulling up the conductor, caution shall be used to avoid pulling the conductor above sag.

i) The maximum elapsed time from the beginning of the pulling operation to the completion of the regulating operation, shall not exceed seventy-two hours, nor shall the maximum elapsed time between the completion of the regulating operation, and the completion of the clamping operation exceed seventy-two hours. Conductor

remaining in the blocks longer than the established limits shall be subject to inspection and, if damaged, replaced. The Contractor shall furnish labour and equipment as requested by the Supervisor for this purpose, as well as for inspection in the event of sudden windstorms.

j) No minus regulating tolerance will be allowed. A plus regulating tolerance of 0,01 times the theoretical sag, but not exceeding 150mm will be allowed, provided all conductors in the regulating span assume the same relative position to true sag. Sags of conductors in the same bundle shall not vary more than 35mm relative to one another. Sag variances between phases shall not be apparent to the naked eye.

k) When finally adjusting the sags of conductors and earth conductors, the sag shall be checked with sag boards, or other accepted methods in spans where the levels of the two towers are approximately the same, and the span length is approximately equal to the equivalent span length of the strain section. Upon completion of this regulating operation, as many successive spans as can be observed from the sag board position shall be checked for uniformity of sag.

l) All conductors, except for conductors in sag sections over flat terrain, shall be plumb-marked at each structure for the complete section regulated, before clamping-in or dead-ending of the conductor is begun. Conductors shall be marked with paint crayon or wax pencil - not with metal objects.

m) Insulator strings on three suspension towers adjacent to a new section to be regulated must be clamped to the conductor before temporary anchors are removed and regulating of the new section begins. These insulators shall remain in the plumb position upon completion of regulating of the new section and during plumb-marking.

n) Regulating operations shall be conducted during daylight hours only. Regulating operations shall be suspended at any time, when in the opinion of the Supervisor, wind or other adverse weather conditions would prevent satisfactory regulating.

o) On completion of regulating of a section of the line, the Contractor shall measure and record all clearances over roads, powerlines, communication lines, railways etc. along the route. A copy of these records is to be submitted to the Project Manager. The Supervisor is to be notified Records of temperature, sag and tension for each section regulated shall be kept by the Contractor, and a copy supplied to the Project Manager immediately of any discrepancy found between the actual clearance and that shown on the profiles.

12.2.7. Clamping of conductors

a) The conductors and earth conductors shall be clamped-in by the Contractor after the Supervisor has accepted the regulating operation as being in full compliance with the specifications and stringing data. Where offsets are required, the conductors shall be accurately adjusted in accordance with the offset clamping information developed by the Contractor.

b) All conductors in a sag section shall normally be clamped-in, beginning at the second structure from the forward end of the pull, and shall progress structure by structure, until the conductors at all structures are clamped in.

c) The Contractor shall exercise extreme care in moving the phase and earth conductor from the stringing blocks to the suspension clamps.

d) Where armour rods or conductor clamps incorporating armour rods are called for, they shall be installed in strict accordance with the manufacturer's recommendations. Armour rods shall be centred in each suspension clamp in such a manner that the clamp is not more than 50mm from the centre of the rods. Variations between the ends of the individual rods shall not exceed 12mm. Aluminium rods shall be handled with the same care as the conductor.

e) Properly calibrated torque wrenches shall be used to tighten suspension clamp and dead-end bolts to the manufacturer's specified torque values. U-bolts shall be drawn up evenly to torque values. Bolts shall not be tightened excessively. Proof of calibration must be submitted to the Supervisor.

f) All conductor support assemblies shall be installed such that the insulator string will hang in a vertical plane through points of insulator string attachment to structure, with the structure properly aligned.

12.2.8. Vibration dampers

a) Where vibration dampers are specified, these shall be installed at each suspension and strain point.

b) The number of dampers to be installed per span shall be as recommended by the manufacturer. The spacing from the mouth of the strain clamp or the centre of the suspension clamp shall be in accordance with the manufacturer's recommendations.

c) If the use of armour rods makes it impossible to meet this spacing, the first damper shall be positioned at the end of the armour rods, and any additional dampers shall

then be spaced from the first damper. Dampers shall be located within 25mm of their correct position.

d) Vibration dampers shall be installed when clamping the conductor, but only after the conductor has been securely fastened in the conductor support assembly.
e) Stockbridge type vibration dampers shall be installed so that they hang directly under the conductor.
f) The installation of vibration dampers shall be in accordance with the manufacturer's recommendations.

12.2.9. Multi-conductor spacers and spacer dampers

a) On lines employing more than one conductor per phase, spacers or spacer-dampers, shall be installed to separate the individual conductors of each phase.
b) Conductor spacers or spacer dampers shall be installed immediately after clamping the conductors, but in no instance shall conductors be allowed to remain without spacers installed for longer than seventy-two hours after clamping.
c) Notwithstanding the allowed times between stringing, regulating, clamping and fitting of vibration ampers, spacers or spacer dampers, the overall time for these operations shall not exceed six days (144 hours).
d) conductor spacers or spacer dampers shall be installed within 1 000mm of the positions as specified by the manufacturer.
e) Conductor spacer carts used by the Contractor to move his men along the conductor shall be furnished with neoprene or rubber lined wheels to support the carts on the conductors. The carts shall be equipped with an odometer, which shall run on one sub-conductor and indicate distances in metres. The odometer shall be set in such a manner, as to give the distance from the suspension clamp to all cart positions along the span on the centre phase from which all the hardware on the three phases will be aligned perpendicular to the centre line of each span. Spacer-dampers will also be installed perpendicular to the sub-conductors of a phase along the catenary.

12.2.10. Jumpers

a) The jumpers shall be formed to provide the maximum amount of clearance from earthed hardware, and tower steelwork. Their positioning shall comply with the clearances stated under the specified displacements.

b) The Contractor shall supply labour and equipment to assist the Supervisor in measuring clearances from jumpers to earthed hardware if requested.
c) Jumpers not meeting the required clearances shall be removed and replaced.

1. PROJECT LAYOUT – MARINE COMPONENTS

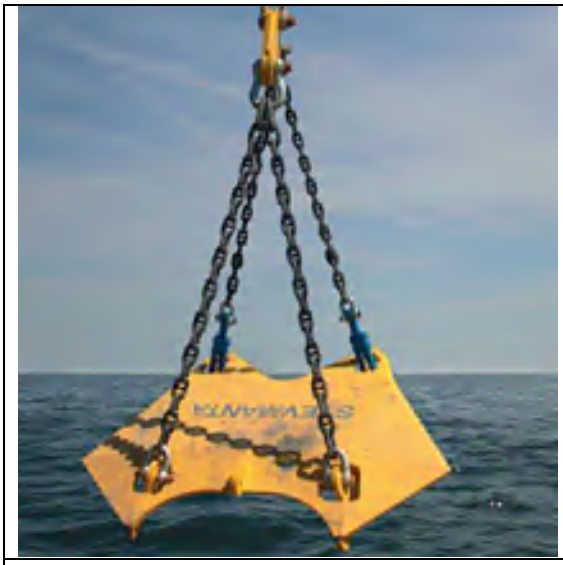
2. FSRU MOORING

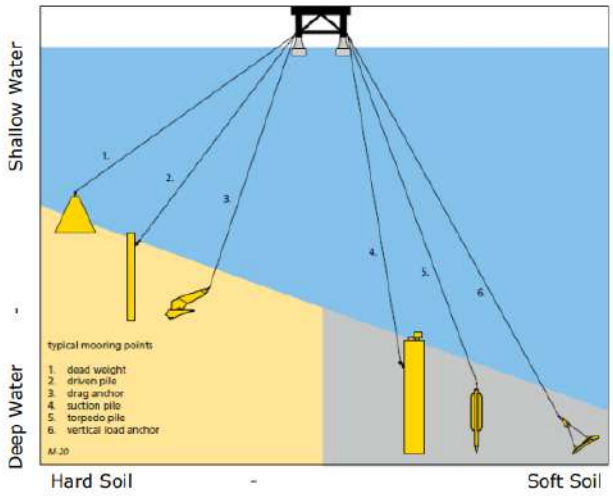
2.1	Typical Vessel characteristics	Length over all: 289m Beam: 49m Laden Draft: 11.5m
2.2	Typical Mooring type	Vessel spread mooring – chain connection from vessel to anchor point 16 no. legs – 8 no. bow and 8 no. stern each chain leg runs to a separate anchor point.
2.3	Governing Code	BV 493 NR
2.4	Mooring cases assessed	100-year return period - intact extreme various wave, wind and current cases 100-year return period - damage extreme various wave, wind and current cases 1 year return period with LNGC alongside – operational various wave, wind and current cases
2.5	Mooring equipment	Studless mooring chain, hawsers and chain stoppers

2.6	Anchoring method	Vertical load anchors with pad eye chain connection. Vertical load anchors to be set and tested to Class with anchor handling vessel. Anchors to be specified for deep soft material. Vertical load anchors suitable to resist high vertical load component resulting from short mooring chain lengths. Vertical load anchors selected due to the thick, soft material layer making piling impractical and the exorbitant number (12 to 16 no per mooring leg) of large 120t concrete block deadman anchors needed to achieve the same holding capacity would cover large areas of the sea bed.
2.7	Ship to ship transfer operations	Offload frequency is power demand dependant Offload duration is 24 to 48hrs for LNG transfer from LNG carrier to FSRU Ship to ship mooring equipment comprises pneumatic fenders and mooring lines

FSRU secured with vessel spread mooring system

FSRU to LNG Carrier Ship to Ship (STS) mooring for cargo transfer (Source: MOL)

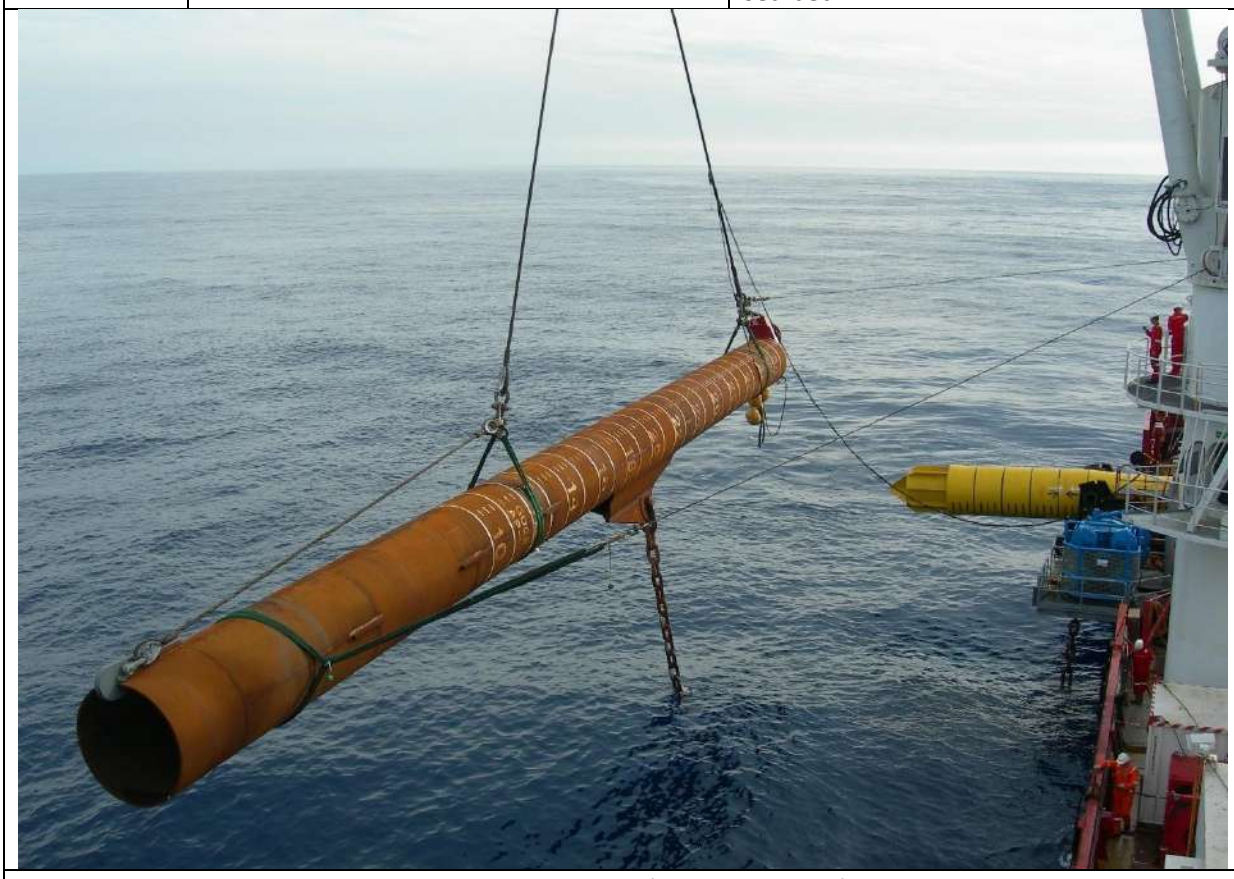




Vertical load anchor pre installaton and options for soft soil (Source: Vryhof)

3. POWERSHIP MOORING		
3.1	Typical Vessel characteristics	Khan Class Length over all: 289m Beam: 45m Laden Draft: 6m Shark Class Length over all: 179m Beam: 25.6m Laden Draft: 6.5m
3.2	Typical Mooring type	Vessel spread mooring – chain connection from vessel to anchor point 16 no. legs – 8 no. bow and 8 no. stern each chain leg runs to a separate anchor point
3.3	Governing Code	BV 493 NR
3.4	Mooring cases assessed	100-year return period - intact extreme various wave, wind and current cases 100-year return period - damage extreme various wave, wind and current cases 1 year return period with LNGC alongside – operational various wave, wind and current cases
3.5	Mooring equipment	Studless mooring chain, hawsers and chain stoppers

3.6	Anchoring method	Anchor piles with pad eye chain connection. Anchor piles to be vibro driven then advanced with reverse circulation drilling to achieve depth. Anchor piles suitable to resist high vertical load component resulting from short mooring chain lengths Anchor piles selected due to the hard ground conditions prohibiting the use of drag anchors and the exorbitant number (12 to 16 no per mooring leg) of large 120t concrete block deadman anchors needed to achieve the same holding capacity would cover large areas of the sea bed.

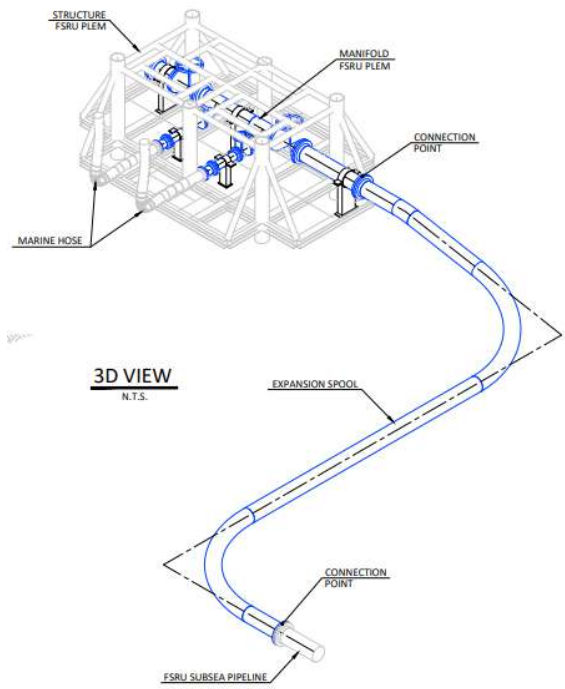


Typical anchor pile prior to being pitched and driven (source: Tekmar)

4. GAS PIPELINE

4.1	Configuration	Gas pipeline to transfer gas from FSRU to Powerships. 24” steel gas pipeline with 50mm concrete weight coating.
4.2	Pipeline to vessel connections	Connection to FSRU via pipeline end manifold and 2 no. 12” flexible hose strings. Connection to Powerships via pipeline end manifold and 2 no. 12” flexible hose strings
4.3	Governing Code	ASME B31.8
4.4	Design aspects	Pressure containment Stress analysis Pipe on-bottom stability Spanning Dropped object protection Pipe coating section Cathodic protection

Steel pipes with concrete weight coating in various stages of fabrication pre-installation on the sea bed



Subsea gas pipeline, spool, PLEM and riser hose configuration

ENVIRONMENTAL AUTHORISATION AND AMENDMENTS

CURRICULUM VITAE

HANTIE PLOMP

CURRICULUM VITAE

Name of Firm: **Triplo4 Sustainable Solutions (Pty) Ltd**

Name of Staff: Aletta Johanna Plomp (Hantie)

Position in Firm: Managing Director

Profession: Environmental Management

Date of Birth: 23-01-1966

Years of Professional Experience: >20 **Nationality:** South African

---

Professional Registrations and Memberships:
Registered as Professional Natural Scientist with the South African Council for Natural Scientific Professions; Professions in the field "Environmental Science" (2001) Registration number 400026/2001;
Registered as EAP with EAPASA. Registration Number 2019/189;
Registered Accredited Professional – Green Buildings Council South Africa (GBCSA); Registered member – International Association for Impact Assessment South Africa (IAIAsa); Registered member – Aquaculture Institute of Southern Africa;
Registered member – Project Management Institute (PMI);
Registered member – Institute of Directors of Southern Africa (IODSA); Registered company membership – Green Buildings Council South Africa;
Registered company membership – Institute of Waste Management of South Africa (IWMSA);
Registered company membership – Water Institute of South Africa (WISA).

Education:	
Key Qualifications:	
Mar 2001	Master in Environmental Management (Cum Laude), The University of the Free State (Student No 1999323726)
May 1997	National Diploma in Analytical Chemistry, Technikon Pretoria (Student No 93096851)
Jul 1990	Government Certificate of Competency: Assayers Certificate Part A, Department of Mineral and Energy Affairs
Aug 1989	Modular Training Programme for Analyst, AAC Gold and Uranium Division (Certificate No C.L.009)
Mar 1988	BSC (Microbiology, Physiology), University of Pretoria (Student No 8419329)
Nov 2002	Management Development Programme, Gordon Institute of Business Science – University of Pretoria
Nov 1993	Certificate in Business Management, (Cum Laude), Potchefstroom University for Christian Higher Education Small Business Advisory Bureau
Apr 2013	Registered Accredited Professional – Green Buildings Council South Africa
Sep 2017	Certificate of Competence: Train The Trainer (US 117871) – ETDP SETA
Sep 2017	Certificate of Competence: Conduct Assessments (US 115753) – ETDP SETA

Continued Professional Development: Additional Courses, Workshops, Seminars, Fora, Events:	
Apr 2019	Being a Director Part 5 (IODSA - 1 day Interactive Board Simulation)
Mar 2019	Woman on Boards Programme (Limit Breakers – 3 month programme)
Oct 2018	Sludge to Resource Symposium - 2 days (WISA)
Jun 2018	ISO 19011:2011 Guidelines for Auditing Management Systems, SHEQ National Cert, SA
Feb 2018	Aquaculture Farming 5 Day Course (Certificate of Attendance)
Feb 2018	SETA accredited to conduct environmental training (LG SETA)
Oct 2017	EAP Workshop Programme, DEA Environment House (Workshop)
Oct 2017	Environmental Affairs Business Forum, Durban Chamber of Commerce (Event)
May 2017	SETA Accreditation and Skills Development (Workshop)
Apr 2017	Ugu Maritime Strategy Implementation (Workshop)
Sep 2016	Environmental Affairs Business Forum, Durban Chamber of Commerce (Event)
Sep 2016	Energy Management System (EnMS) 2 Day End User, National Cleaner Production Centre (NCPC) South Africa;
Jun 2016	Hazardous Waste Training Course, Institute of Waste Management of Southern Africa (IWMSA) (Certificate of Attendance No 0106/16)
Apr 2016	Waste Legislation Training Course, IWMSA (Certificate of Attendance No 0304/16)
Mar 2016	SPLUMA, IAIAsa Event
Mar 2016	Sustainable Development Forum (SDF), Institute of Directors in Southern Africa (IODSA)
Sep 2015	Resource Efficient and Cleaner Production Basic Training, National Cleaner Production Centre (NCPC) South Africa (Certificate of Attendance)
Mar 2015	NEMA Environmental Legislation, Shepstone Wylie Attorneys (Certificate of Attendance)
Jun 2015	Being a Director Part 4, IODSA (Certificate of Attendance)
May 2015	Being a Director Part 3, IODSA (Certificate of Attendance)
May 2015	Environmental Law Update, Shepstone Wylie (Certificate of Attendance)
Apr 2015	Governance for SME's, IODSA (Certificate of Attendance)
Oct 2015	Windeed, Windeed Systems, a Division of Korbitec (Certificate of Completion)
Nov 2014	New proposed NEMA regulations 2014, IAIAsa and EDTEA (Workshop)
Nov 2014	Water Use Registrations, IAIAsa & DWS (Workshop)
Oct 2015	KwaDukuza Municipality Low Emissions Strategy for 2030, ICLEI (Stakeholder Contribution)
Aug 2015	KwaDukuza Green Buildings Guidelines Workshop, ICLEA & KDM (Stakeholder Contribution)
Various 2014	KwaDukuza Municipality Low Emissions Strategy for 2030, ICLEI (Workshops)
Various 2013	KwaDukuza Municipality Low Emissions Strategy for 2030, ICLEI (Workshops)
Nov 2012	Coastal Vulnerability Index Workshop, EDTEA (Workshop)
Sep 2010	National Environmental Management – EIA Regulations, DAEA (Workshop)
Sep 2010	National Environmental Management: Waste Act, DAEA (Workshop)
2009-2010	Project Management Course: Internal, RHDHV / SSI Engineers & Environmental Consultants
Sep 2009	Green Buildings & Accreditation, Green Buildings Council SA (Certificate of Attendance)
Nov 2008	DESD Course, Eskom Environmental KZN (Certificate of Completion)
Aug 2008	Quality Management System Training Internal, RHDHV / SSI Engineers & Environmental Consultants
Oct 2007	Project Management, Insite Training Services SETA Accreditation No 0270 (Certificate of Completion)
Apr 2005	Transition Workshop ISO 14001:1996 to ISO 14001:2004, North-West University (Certificate of Attendance)
Feb 2005	Crystal Reports, Business Objects (Certificate of Completion)
Jan 2005	Leadership Development Programme Phase 1 (Emotional Intelligence), AngloGold Ashanti Training and Development Services (Certificate of Completion, No 7152)

Mar 2004	Driver Evaluation K53, Code B, Exclusive Training & Services (Certificate of Competence No 17792)
Oct 2003	Isokinetic Sampling, University of Pretoria (Certificate L15257)
Sep 2003	Practical Landfill Management Principles, Enviro-Fill (Certificate of Attendance)
Aug 2003	Waste Management for Environmental Managers, Potchefstroom Universiteit vir Christelike Hoer Onderwys (Certificate of Attendance)
Mar 2003	Safety Management Audit Training, E.I du Pont Nemours and Company (Certificate of Completion)
Jul 2002	Hazardous Materials, Institute for International Research (Certificate of Participation, No P2333)
Aug 2001	Environmental Law, Potchefstroom Universiteit vir Christelike Hoer Onderwys Centre for Regional Development (Certificate of Completion)
May 2001	Environmental Management Systems, Universiteit vir Christelike Hoer Onderwys Centre for Regional Development (Certificate of Completion)
Apr 2001	Environmental Auditing, Universiteit vir Christelike Hoer Onderwys Centre for Regional Development (Certificate of Completion)
Feb 2000	Biodiversity and Biomonitoring Methodology, University of the Orange Free State Centre for Environmental Management (Certificate of Attendance)
Feb 2000	Integrated Environmental Management for Local Authorities, University of the Orange Free State Centre for Environmental Management (Certificate of Attendance)
Jan 2000	Environmental Impact Assessment, University of the Orange Free State Centre for Environmental Management (Certificate of Attendance)
Nov 1998	National Water Act, 1998 – Implications for the Mining Industry, South African Institute of Mining and Metallurgy and the Water Institute of Southern Africa Joint Colloquium
Mar 1998	Introduction to Computers, Windows 95, Procomp Computer Training (Certificate of Completion)
Feb 1998	Management Development Phase 1, Vaal Reefs Exploration and Mining Co Ltd Human Resource Development (Certificate of Attendance)
Jan 1998	Business Presentation Skills, Business Presentations Skills Pty Ltd (Certificate of Completion)
Sep 1997	Accident and Incident Investigations (Chamber of Mines South Africa Mine Safety Division (Certificate of Attendance)
Sep 1996	Risk Assessment for Mining Engineering Practice, AngloGold Technical Training and Development Services (Certificate of Completion No FG/96/02)
Jan 1995	Communication Skills Course (Oral & Written), Vaal Reefs Exploration and Mining Co Ltd Regional Training Centre (Certificate of Attendance)
Apr 1993	Communication Skills Course (Written), Vaal Reefs Exploration and Mining Co Ltd Regional Training Centre (Certificate of Attendance)
Aug 1990	Advanced Supervision Vaal Reefs Exploration and Mining Co Ltd Regional Training Centre (Certificate of Attendance)
Feb 1990	Safety Representative Vaal Reefs Exploration and Mining Co Ltd Metallurgical Plants (Certificate of Competence No SR 157)
Jan 1990	Supervision Vaal Reefs Exploration and Mining Co Ltd Regional Training Centre (Certificate of Attendance)
Feb 1989	Certificate in Mine Safety and Loss Control, Vaal Reefs Exploration and Mining Co Ltd Metallurgical& Engineering Plants (Certificate of Competence No M-324)

Employment History:

October 2011 to date Triplo4 Sustainable Solutions Pty Limited Managing Director
Responsible for the establishment and sustainable growth of the company and

ensuring the provision of consulting services and sustainability products as per the company profile. Ensure Corporate Governance and development and implementation of the company strategy.

August 2010 to September 2011	Enspire Environmental CC Founding Member Responsible for the execution of existing projects and the winding down of the close corporation and transition to Triplo 4 Sustainable Solutions Pty (Ltd).
November 2006 to July 2010	SSI Engineers and Environmental Consultants (Environmental Sector) Sector Area Manager – KZN Environmental / Principal Associate Responsible for the overall management and development of the regional environmental sector, including the identification, development and implementation of the regional strategy, innovation and corporate social responsibility management system. Business development, marketing and quality delivery were key aspects to address in ensuring a sustainable sector. Responsibilities also included the provision of environmental consulting services, technical assistance for environmental projects and ensuring compliance with occupational health and safety issues related to the Ballito satellite office.
Mar 2004 to Oct 2006	AngloGold Ashanti Environmental Manager Systems Environmental Manager responsible for managing the development and implementation of fifteen ISO 14001:2004 certificated Environmental Management Systems, conducting audits and ensuring the conducting of legal compliance and system audits, ensured the development and implementation of environmental training as well the conducting of impact and risk assessments and development of environmental management plans for AngloGold Ashanti (mining, chemical processing and engineering related). Responsibilities included the development and presentation of a range of environmental and EMS training courses and managing the investigation, reporting and review of major environmental incidents.
Jan 2003 to Mar 2004	Environmental Coordinator: Air and Waste Management Responsible for the development of a waste management and air quality management systems for the company. Initiated the strategies and driving of the implementation of the waste management strategy at corporate and business unit levels, ensuring the identification of the baseline assessment and identification of waste streams, development of guidelines and operational procedures as well as establishing appropriate waste contractors for recycling and disposal. Specific action plans were developed to ensure compliance with legislation, which were later incorporated into the certificated ISO 14001 system.
Apr 2001 to Dec 2002	Environmental Auditor Developed and implemented an audit protocol and programme and conducted compliance audits to ensure company compliance with environmental legal requirements. Assisted with the development of corrective and preventative action plans to address noncompliance and built environmental capacity through the implemented audit process. Developed an incident identification, classification and reporting programme, which required the detailing of environmental impacts, basic causes, immediate actions as well as long term corrective and preventative actions.
Mar 1996 to Apr 2001	Environmental Management, Training and Awareness & Water Co-coordinator The main function entailed the development of part 9 EMPR amendments for all South Africa Region mining Business Units (25). Coordinated the development and implementation of environmental training courses and awareness programmes.

	Regarding water management; developed a blueprint for water monitoring, analyzed and interpreted data relating to water monitoring and recommended remedial actions to be taken and assisted with the development of water balances and water related risk assessments.
Mar 1988 to Mar 1996	Chemical Analyst Grade 2 and Grade 1, Analytical Chemist and acting Assistant Chief Chemist As Chemical Analyst, responsibilities included the chemical analysis of solid and liquid mining samples. Responsibilities as Chemist included the supervising and co-coordinating uranium and gold laboratory staff and processes to meet planned schedules, co-coordinating the quality assurance programme, ensuring compliance with safety regulations and code of practices and procuring instrumentation and ensuring financial management.

Employment Experience:

- ***ISO 14001:2004 & 2015 Environmental Management Systems (EMS) & ISO 9001:2015***

Facilitated the stakeholder and public participation process and compiled a draft environmental policy for KwaDukuza Municipality. Compiled Environmental Management Policy and aligned company processes and systems with ISO 14001 required for supplier purposes for a refrigeration company, KZN.

Successfully assisted approximately 7 different AngloGold Ashanti (South Africa and Ghana based) mining sectors (mines, metallurgy, engineering, rehabilitation, properties (high and low density), procurement and human resources, with the design, development and implementation of a certified EMS, in accordance with the ISO 14001:2004 standard.

These EMS's included original policy development, gap analysis, EMS planning, implementation and review, including environmental training, assessment, non-conformance and environmental incident management, system and operational procedure development and auditing of the EMS systems.

In early 2018 ensured the successful development and implementation of the Triplo4 Sustainable Solutions ISO 9001:2015 and ISO 14001:2015 and external certification by SHEQ National Cert during May 2018.

- ***Environmental Assessments***

Completed or assisted consultants to complete various EIA's, environmental risk assessments and smaller environmental recommendations (list only as examples and therefore not comprehensive):

- BA's and EIA's for residential and housing developments;
- Environmental authorization for biodiesel processing facility and Moringa plantation;
- BA's for shopping Centres;
- Basic Assessments for roads and storm water management;
- Basic Assessment for pipelines and bridges with watercourse crossings;
- Basic Assessments for masts and antennas;
- Basic Assessments for construction activities within 100 metres of the high water mark;
- Basic Assessments and EIAs for Property Developments;
- Basic Assessment for the storage of dangerous goods;
- Basic Assessments for filling stations;
- EIA and Basic Assessments for Waste Licenses;
- EIA for a ventilation shaft (land rezoning);
- EIA for the development of a new water treatment facility;

- EIA for AngloGold Ashanti - Various smaller EIA's (2004 – 2006);
- New mining area extensions;
- Mining deepening project; ·
- Drainage trench pollution management project;
- New mill project;
- Removal of topsoil prior to waste rock dump extension;
- Calcine and pyrite storage areas;
- Underground garage tanks removal;
- Hydrocarbon discharge and containment requirements;
- SPCA relocation; and·
- Amendment and exemption applications for property development, storm water management, activities within 100 metres of the high water mark and public participation.

- ***Environmental Audits***

Conducted in excess of 50 legal compliance audits as environmental auditor for AngloGold Ashanti. These audits included all facilities associated with the mining authorizations, for example:

- mines / shafts;
- waste disposal sites;
- waste transfer stations / salvage yards;
- sewage treatment works;
- compliance to water use and discharge conditions;
- game parks;
- engineering workshops;
- third party audits e.g. rock drill and exploration drilling contractors; and high density, residential accommodation.

Conducted as lead auditor, gap analysis and internal environmental audits for ISO 14001:2004 certification.
Conducted external audits on environmental legal compliance, inclusive of relevant authorizations, licenses, permits and EMPs for:

- Dube Tradeport Corporation;
- Hazardous waste management facilities;
- Beema Bamboo plantation (approx. 500ha) for green energy generation;
- Construction and upgrades of roads and bridges;
- Shopping centers;
- Desalination plant;
- Pipeline constructions;
- Mines / shafts;
- Waste disposal sites;
- Mines / shafts;
- Waste transfer stations / salvage yards;
- Sewage treatment works;
- Compliance to water use and discharge conditions
- Cemeteries;
- Game parks; and
- Engineering workshops.

- ***Environmental Disasters, Non-conformance and Incidents***

Completed Section 30 and Section 28 emergency incident applications and business plans for KwaDukuza private sectors and Ugu District Municipality following the 2007 coastal storm event. Served on the KwaDukuza and Ugu Municipality Disaster Steering Committees and worked with the coastal management department of DAEA KZN, regarding coastal damage and remediation. Identifying remediation requirements in accordance with coastal principles and conducted environmental monitoring (Environmental Control Officer) for remediation work.

Conducted various workshops to assist business units to identify environmental incidents. Developed procedures for the identification, classification and reporting of environmental incidents. Developed inspection checklists and training material to build capacity for environmental incident management. Assisted business units with the identification and implementation of practical options to address and prevent future environmental incidents. Monitored the implementation and sustainability of the remediation plans and programmes and monthly reported statistics.

Compiled various major environmental review documentation, including:

- Hydrocarbon contamination;
- Pipeline failures and contamination;
- Contractor and contract management;
- Air pollution from tailing storage facilities; and
- Emergency preparedness and response.

Compiled Section 24G applications and environmental assessment and successfully obtained environmental authorizations for unauthorized activities in terms of the National Environmental Management – EIA Regulations.

Supervised S24G applications with GDACE and KZN DAEA/ EDTEA within various areas included:

- Activities within 100 meters of the high water mark (Ilembe, Ugu);
- Cemetery (Ugu);
- Crematorium (iLembe);
- Housing development (KwaDukuza)
- Foundry (Sedibeng).

- ***New Mining Authorizations, EMPr Amendments, EIA Amendments and EMPr Assessments***

Experience includes the management of and compilation of new mining authorizations and permits, EMPr Amendments and EMPr Assessments. The following is a short summary of work managed and compiled:

- Coal mining EMPr and pre-commencement requirements (Mpumalanga);
- Coal mining permits and EIA (KZN);
- Sand mining permits (KZN);
- EIA Assessments for activities within 100 meters of the high water mark (Ilembe, Ugu);
- EIA Assessment for Cemetery (Ugu);
- EIA Amendments for developments (various within KZN);
- EMP amendment for a Uranium Plant expansion project;
- EMPr's for property developments (low income, affordable housing, high density, upmarket residential);
- Environmental Performance Assessments for mining (33);
- New mining authorizations (2);
- Development and assessments of exploration EMP's;
- Tailings storage facility expansion;

- Waste Rock Dump mining and utilization;
- Pollution control dam (with safety risk) establishment;
- New ROM mill construction;
- Regional EMP updates in accordance with MPRDA;

As Environmental Manager – System, assistance was provided to the Legal Department with the environmental conditions for the conversion of the old order mining rights.

- ***Environmental Feasibility Studies and Environmental Enquiries***

Responsible for the compilation of feasibility studies and environmental enquiries for:

- Property developments;
- Linear developments;
- Commercial and industrial developments;
- Airport expansion; and
- Waste water treatment works.

Where possible, innovative solutions are investigated with Clients and the Authorities to reduce or eliminate environmental impacts within the legal frameworks, thereby reducing costs, timeframes and potential penalties associated with environmental processes and transgressions.

- ***Environmental Control Officer Functions***

Conducted numerous site inspections and produced environmental audit reports to Clients and the Authorities. Directed, guided and reviewed the work of subordinates:

- Linear developments e.g. roads and pipelines;
- Commercial developments e.g. Shopping Centers within urban and rural areas;
- Property developments, inclusive of sensitive areas; and
- Industrial developments e.g. desalination plant.

- ***Waste and Water Management, including Water Use Licenses***

Practical experience and competence in waste management was established through the development of waste management programmes and procedures for the responsible management (re-use, recycle and disposal) of waste, following the identification of general and hazardous waste types and waste streams for the various mining sectors. Procedures developed, included:

- General waste (paper, plastic, wood);
- Domestic waste;
- Hazardous waste (fluorescent tubes, hydrocarbons, batteries, medical); and
- Water management.

Conducted legal compliance audits for waste disposal sites - Gauteng and North West in accordance with the DWAF permits as well as the external (3rd party) audit of the Holfontein hazardous waste disposal site. Coordinated the review of the existing landfill and airspace requirements and investigations for extensions or new sites and provided recommendations to improve operational performance from an environmental perspective. As part of the corporate responsibility programme, assisted the Municipality and DAE&RD with waste recycling and waste awareness programmes.

Involvement with the establishment of a regional water balances, incident investigations and the review of Business Unit water resource and water quality management issues as well as developed competence on surface water management issues.

Applications for waste licenses in terms of the National Environmental Management Waste Act included:

- E-waste facility;

- Waste disposal facility (land building);
- Waste Water Treatment Works.

Conducted and managed applications for water use registrations for industry, private and public sectors that include:

- Water abstraction from a resource;
- Water storage;
- Wetland (c) and (i); and
- Discharge of water to a resource.

- ***Training Courses and Awareness Programmes***

Throughout my environmental career, I have been involved with the development of training and awareness programmes and material as well as the presenting of training to all levels within organizations and the public sector. The following is a list of courses prepared and delivered and awareness created:

- Environmental awareness programme to improve inadequate EMS performance;
- Train the trainer courses – waste management and general environmental awareness;
- Environmental Management Courses for Managers and Councilors – Local Municipality;
- 1-day General Environmental Management Course for Managers;
- Environmental incident recognition and reporting;
- Top management training course;
- General awareness course for C-level as well as Group 3 - 8 employees;
- Water management awareness course;
- General introduction to waste management and mining authorization requirements;
- EMS system procedures course;
- Water week awareness day with schools;
- Environment day projects with local pre-primary and primary schools;
- Greening project with local community (presentations and site visits);
- Arbour day programme with high schools; and
- Grassing and recycling project with local community.

In 2017, I completed the Train-The-Trainer and Assessor Courses and lead the company to obtain LG SETA accreditation.

- **International Experience**:

Ghana

Languages:

	Speak	**Read**	**Write**
English	Excellent	Excellent	Excellent
Afrikaans	Excellent	Excellent	Excellent

- **Environmental Experience: Selected Projects undertaken at Triplo4, Enspire Environmental & SSI:**

During my employment as Environmental Consultant as well as being a member of Enspire Environmental and Director and shareholder of Triplo4 Sustainable Solutions, Pty (Ltd), I have been and continue to be involved in environmental projects at various levels. Responsibilities included and continues to include:

- Conducting of site visits with the Clients and Authorities;
- Identifying environmental issues, legislative requirements and feasible alternatives;

- Compiling relevant documentation or advising on the requirements;
- Liaising with the Client, Authorities and conducting Public Participation Processes;
- Conducting ECO work and conducting external audits with the Authorities;
- Addressing Authority requirements;
- Problem-solving, innovation and advising on preventative and corrective measures;
- Reviewing documentation;
- Developing consultant's competence though coaching and mentoring;
- Ensuring quality management;
- Developing own competence though training;
- Taking full responsibility for own work;
- Being accountable for the unit (SSI) and companies' (Enspire and Triplo4) performance.

The following is a reference sample of specific projects:

Environmental Impact Assessments/ Basic Assessment Reports/ Environmental Management Programmes/ 24G Applications/ Amendments Applications / Closure Plans/ Enquiries

2021	Elaleni Lifestyle Estate Basic Assessment	Blue Gum Estate (Pty) Ltd
	Ballito Village & Ballito Views Part 2 Amendment	
	AMahlongwa Estuarine Management Plan	Department of Economic Development, Tourism and Environmental Affairs
	Gas to Power Powership Project at the Port of Saldanha Bay, EIA, Specialist Studies, EMPr	Karpowership SA (Pty) Ltd
	Gas to Power Powership Project at the Port of Richards Bay, EIA, Specialist Studies, EMPr, WULA	Karpowership SA (Pty) Ltd
	Gas to Power Powership Project at the Port of Nqgura, EIA, Specialist Studies, EMPr, General Authorization	Karpowership SA (Pty) Ltd
2020	Elaleni Lifestyle Estate Part 2 Amendment	Blue Gum Estate (Pty) Ltd
	The Strategic Corridor Development Plan for Vryheid to Ermelo	SMEC for COGTA
	Elaleni Coastal Forest Estate Leisure Centre Basic Assessment	Northglobal Properties
	Ballito Village Part 2 Amendment	ARCIS Pty Ltd
2019	South Coast Environmental Assessment	Black Balance Projects
	Seaward Estate Emergency Application	Seaward Estate
	Rocky Ridge Township Part 1 Amendment	Rocky Ridge Farming and Investments (Pty) Ltd
	Greater Inanda Local Area Plan (environmental input)	Zimanga Urban and Rural Design for eThekwini Human Settlement Department
	Development Framework and Master Plan Update for the La Mercy Joint Venture	Dube TradePort and ACSA JV
	Mandeni Filling Station, South Africa	Amazulu Foundation
	Oriole Precinct	Abland Propriety Limited
	Thompsons Bay Beach MMP	KwaDukuza Local Municipality
	Vlakspruit Crematorium Air Emissions License and Environmental Impact Assessment	KwaDukuza Local Municipality
	Thompsons Bay Beach Stormwater Infrastructure Maintenance Management Plan and S30 Application	KwaDukuza Local Municipality
	Nonoti Housing, WWTW and associated infrastructure EIA	SMA Consultants
	Elaleni External Audit and Legal Compliance	North Global Development
	Vuthela Waste Scoping & Assessment - Research	Vuthela

	eThafeni Cemetery – Water Management Assessment	KwaDukuza Municipality
	The Vines & Lush – Elaleni Amendments	Elaleni Estate
	The Executive Amendments	Golden Dividend 341
2018	Sappi Tugela Mill Effluent Pipeline - Maintenance Management Plan	Sappi Tugela Mill
	La Mercy South Beach Road Fatal Flaw Analysis Assessment	Met Developments (PTY) LTD
	Waste Tyre Pyrolosis Plant, Gauteng - Environmental Opinion and EMPr	Cosmic Energy Africa
	Oasis Sibaya Residential Development - Environmental Enquiry and EMPr	Edison Property Group
	Vulindlela Strategic Environmental Assessment	SMEC for Msunduzi Municipality
	Waste Tyre Pyrolysis Plant, Newcastle, Environmental Opinion	Encogenix
	Malachite Business Park - Environmental Enquiry, Part 1 amendment	Abland Propriety Limited
	Hydrocarbon Ground Contamination at a residence in Umlazi, Q Section	Ms. Nelisile Nzama
	Inoxa Cookware Factory: Environmental Management Programme	Shree Property Holdings
	Avondale Basic Assessment	Horsewood Trust
	Environmental Enquiries – Cellphone Masts	Huawei MTN
	Beachwood Coastal Estate – Basic Assessment	Beachwood Investments
	Elaleni – Lush Environmental Enquiry	Firewings Properties
	Shaya Quarry Mining Permit	Mataroway (Pty) Ltd
	Empangeni Coal Mining Permit	Mbavuza Mining
	KDM Sport Complex Basic Assessment	KwaDukuza Municipality
2017	KwaDukuza Coastal Maintenance Management Plan	KwaDukuza Municipality
	Southern Regional Bulk Water & Sanitation Scheme BA	Escongweni Engineers for iLembe District Municipality
	Yzermyn Underground Coal Mine, Mpumalanga	Atha Africa Ventures
	Remainder of Portion 1 of Erf 2838 is located within the	Golden Dividend 344 (Pty) Ltd
	“Executive Office Estate" Release from DMOSS and Part 1 Amendment	
	Groutville D Sanitation Programme Due Diligence, Planning and EMPr	DKG Project Managers and Engineers
	Lower Thukela Regional Bulk Water Supply Scheme, KZN, Basic Assessments and Amendments	Various Engineers e.g. Naidu Consulting for iLembe District Municipality
	Phase 1A and 1B of the Proposed Southern Regional Bulk Water and Sanitation Scheme - Basic Assessment and Environmental Enquiry	Escongweni Engineers (on behalf of iLembe)
	Cornubia North Phase 1 Mixed Use Development EIA	Tongaat Hulett Developments
	Yzermyn Underground Coal Mine, Mpumalanga EMPr	Atha Africa Ventures
	Springvale Country Estate Residential Development Section 24G and Part 2 Amendment	DG Investment / Springvale Country Estate
	KwaDukuza Crematorium S24G	KwaDukuza Municipality
	Zinkwazi Beach Sewer System Upgrade BA	Nyeleti Consulting for KwaDukuza Municipality

	Desalination Plants Pre-feasibility studies and business plan for 4 Districts (Ugu, iLembe, King Cetshwayo & uMkhanyakude)	FocusPM / Umhlatuze Water for CoGTA
	Homestead Residential Development Comprising of 288 Units, Umhlali	Spinosa Developments (Pty) Ltd
2016	Elaleni Coastal Forest Estate Residential Development EIA Pre-Commencement Environmental Services, EMPr and Part 2 Amendment	Cross Atlantic Properties 65
	Lower Thukela Regional Bulk Water Supply Scheme, KZN, Basic Assessments and Amendments	Black Balance Projects and Various Contractors for iLembe District Municipality
	BP Sunpark Motors Phase II Assessment	Sunpark Motors CC
	Dibiliza Junction – Petrol Filling Station (PFS) Relocation Enquiry and Closure Plan	Silverton 96 CC
	Felix Dlamini Road PFS BA	Dawngrove Investments CC
	Ngwelezane PFS Assessment, Enquiry and EMPr	Unlock Land Potential Pty Ltd
	Ethafeni Precinct Housing Development S24G and EIA	SMA Consultants for KwaDukuza Municipality
	Erf 196 Residential Development Tinley Manor BA	Elysium Trust
	Foxhill Smallholdings Development Assessment and Enquiry	Weaver
	Avondale Residential Development (Erf 1433, 1432, 1447) Enquiry and BA's	The Horsewood Trust
	Gasifier Project Environmental Assessment	Green Grid Energy
2015	Oceans Umhlanga Hotel & Residential Development	Edison Property Group
	Lower Thukela Regional Bulk Water Supply Scheme, KZN, Basic Assessments and Amendments	Black Balance Projects for iLembe DM
	Nonoti Housing Development EIR, EMPr and Specialist Studies	SMA Consultants for KwaDukuza Municipality
	Bhamshela PFS BA	Timocento (Pty) Ltd
	Zulti South Access Roads	RHDHV for Richards Bay Minerals
2014	Mhlabatshane Bulk Water Supply Scheme Phase 2 BA	Umgeni Water
	KwaDukuza Mall and Urban Precinct Development BA	Edison Property Group
	Lower Thukela Regional Bulk Water Supply Scheme BA's	Black Balance Projects for iLembe DM
	Mpophomeni Shopping Centre BA	Dymatron Pty Ltd
	Stanger Fuel Depot EDTEA Response, Enquiry and EMPr	Desai Family Trust
	Tugela Ferry PFS BA	Copperzone 163 Pty Ltd
	Eshowe Industrial Township BA	uMlalazi Local Municipality
	Bhamshela WWTW BA	Timcento Pty Ltd
2013	The Stables Retirement Village	Kabod Development Group
	Ugu Water and Sanitation – Generic EMPr for WWTW and Bulk Infrastructure	Ugu District Municipality
	Joymac Sands Mining Permit	Joymac Sands Sales
	Nyathikazi Road upgrade	SMA Consultants for KwaDukuza Municipality
	Cornubia North 760 hectare Mixed Use Phased Development - Full Scoping and Environmental Impact Assessment	Tongaat Hulett Developments

	Simbithi Eco Estate – Jacana Development	Silvermoon Properties
	P232 Road Upgrade and Stream Crossing BA	RHDHV for Department of Transport
	D887 Road Upgrade	RHDHV for Department of Transport
	Mbozamo Road Upgrade and Stream Crossing BA	SMA Consultants for KwaDukuza Municipality
	Greytown Bulk Water Supply Scheme Phase 2 – 35km	RHDHV for uMzinyathi DM
	Jozini Regional Community Water Supply Scheme – 62km BA & EMPr	RHDHV for Umkhanyakude DM
	77 Colwyn Drive BA	Marlboro Pty Ltd
2012	Steve Biko Phase 2 Housing Development	SMA Consultants for KwaDukuza Municipality
	Tugela Ferry Shopping Centre, WWTW	Copperzone 163 (Pty) Ltd
	Gqolweni Road BA	Umdoni Municipality
	Simba Mabhele Farm Enquiry and EMPr	Mrs Mbalo
2011	Steve Biko Phase 2 Housing Development	SMA Consultants for KwaDukuza Municipality
	Tugela Ferry Shopping Centre, WWTW	Copperzone 163 (Pty) Ltd
	Biodiesel BA (Moringa Oil)	Enterprise Ilembe
2010	Foundry Environmental Assessment & Authorisation	Yellow Star
	Umzinto Low Level Bridge BA	Liquid Platinum
	88 Compensation Amendment	Imali Corp / @ 88
	South Beach Road Amendment	Ivan Architects
	Umdoni Crematorium S24G and EMPr	Umdoni Municipality
2009	Environmental input into planning for the R102 & Local Area Plans for Northern Urban Development Corridor	eThekwini Municipality – Framework Planning
	Lower Sizananjalo Pedestrian Bridge in Underberg	Emzansi Engineers
	Emalangeni Rural Housing Development	eThekwini Municipality – Housing
	Umdoni Flood Damage Repair BA's and EMP	Umdoni Municipality
	eThekwini Promenade Upgrade	Aecom
	Compensation Industrial and Business Estate – 320 hectare EIA	Tongaat Hulett Developments
	Prospecton Anaerobic Digester Gas Conversion to Electricity BA	South African Breweries (Pty) Ltd
2008	Cornubia Mixed Use Phased Development – 1300 hectare EIA	Tongaat Hulett Developments
	Mkhuze Airport Feasibility Study	Umhlosinga Development Agency & DBSA
	Ekhrosini Livestock Market and Urban Node Development	Isibuko Se-Africa for Msunduzi Municipality
2007	National Radar Network Upgrading	South African Weather Service
	Signal Hill Housing Development – 200 hectare	Msunduzi Municipality – Housing
	Ximba Low Income Rural Housing Development	Msunduzi Municipality – Housing

Environmental Enquires / Environmental Opinion

2020	Elaleni Leisure Centre	Northglobal Properties
	Digrite, Sheffield Beach	Northglobal Properties
	Malachite Phase 2	Lapalaka Property Projects
	Elaleni Beach Club	Northglobal Properties

2019	Jex Estate	Collins Group
	Lazuli Phase 2	Lazuli Coastal Lifestyle Estate (Pty) Ltd
2018	Mandini Petrol Filling Station	Amazulu Foundation
	Romac Farm	Trace Property Investments (Pty) Ltd
2017	Extension to the Executive	Golden Dividend 344 (Pty) Ltd
	Foxhill Forest Estate, Salt Rock	LevEco Architects
	Sage Restaurant Expansion	Clinton Erlank
2016	Avondale Residential Development	Saxony Developments
	Foxhill Smallholdings Development	Mr. Weaver
	Erf 599 Stanger Warehouse Development	Chetty's Properties Trust
	27 Magai Drive	Martin Lind
	Dibiliza Petrol Filling Station	Silvertron 96 cc
	1 Barrier Lane	Mr. Murray
2015	50b Colwyn Drive	Graham Trading & Investments Pty Ltd
2014	Stanger Fuel Depot	Ismail Desai Family Trust
2013	Loxley Estate	Cenprop Pty Ltd

Water Use Authorisations and External Auditing

2019	Sheffield WWTW	Siza Water
	Eston Sugar Mill	Illovo Sugar (South Africa) (Pty) Limited
	Noodsberg Sugar Mill	Illovo Sugar (South Africa) (Pty) Limited
	Ixopo Clover	Dairy Farms of South Africa (Pty) Ltd.
2018	Integrated Water Use Licence Application for the UCL Company properties ; Uitmuntend Farm, Paardefontein Farm, Norton Heath Farm, Vogelvlei Farm	UCL Company (Pty) Ltd
	Izinga Residential Development Phase 2 (Izinga III): WULA	Tongaat Hulett Developments
	Mpumalanga Town Centre Housing - WULA	Pangea Consulting
2017	Elaleni Coastal Forest Estate	Cross Atlantic Properties
	Nonoti Housing Development	SMA Consultants
	Avondale Residential Development	Saxony Developments
	Clover Ixopo	Clover SA
	Groutville Bulk Sanitation Scheme (Ph 2)	Black Balance Projects for iLembe DM
	Eston Sugar Mill	Illovo Sugar (South Africa) Pty Ltd
2016	Avon Peaking Power Plant	Avon Peaking Power Plant (Pty) Ltd
	Bhamshela WWTW	Timocento (Pty) Ltd
	Avondale Residential Development	Saxony Developments
	Kwadukuza Crematorium	Kwadukuza Municipality
	Palm Lakes WWTW	Royal Palm Property Holdings
	Seaglen Dunes WWTW	Glenmore Seaside Resort Pty.
	Lower Thukela Bulk Water Supply Scheme	Black Balance Projects for iLembe DM
	Ixopo Clover Depot	Clover SA (Pty) Ltd

2015	Tugela Ferry Shopping Centre	Copperzone 163 (Pty) Ltd
	Groutville Bulk Sanitation Scheme (Ph 1)	Black Balance Projects for iLembe DM
	Birdhaven Residential Estate Development	Graham Trading & Investments
	Steve Biko Phase 2 Housing Development	SMA Consultants for KwaDukuza Municipality
	Mpophomeni Shopping Centre	Dymatron Pty Ltd
	Humberdale Landfill Site Phase 2 Expansion	Umdoni Municipality
	Jozini Regional Water Scheme	RHDHV
	Tugela Ferry Shopping Centre	Copperzone 163 (Pty) Ltd
	Gledhow Sewage Pipeline	Black Balance Projects for iLembe DM
	KwaDukuza Mall and Urban Precinct Development	Edison Property Group
	Greytown Bulk Water Supply Scheme Phase 2 – 35km	RHDHV for uMzinyathi DM
2014	Dunkirk Estate Club House	The Dunkirk Estate
	Lower Thukela Bulk Water Supply Scheme	Black Balance Projects for iLembe DM
	Zulti South Access Roads	RHDHV for Richards Bay minerals

Environmental Control Officer (ECO) and External Auditing

2020	Elaleni Lifestyle Estate	Blue Gum Estate (Pty) Ltd
	Clairwood Logistics Park	Capital Propfund (Pty) Ltd
	Phase 1b Southern Regional Bulk Water & Sanitation Scheme	Escongweni Engineers for iLembe District Municipality
	The Executive Estate Monitoring	Golden Dividend 341 (Pty) Ltd
2019	Mpophomeni Shopping Centre	Dymatron Pty Ltd
	External Audit Umbogintwini Industrial Complex (Site 17 and 19)	AECI Limited
	Elaleni: Lush	Fire Wings (Pty) Ltd
	Elaleni: Morris Village	Four Arrows Investments II (Pty) Ltd
	Elaleni: Vines	Cross Atlantic Properties 65 (Pty) Ltd
2018	Willard's Beach	Nyeleti Consulting (Pty) Ltd.
	Thompson's Bay Beach	Nyeleti Consulting (Pty) Ltd.
	Compliance Audit in terms of the Water Use Licence for the Impenjati Farm	Doveton Farms
	KwaDukuza Mall - compliance audit License conditions	Edison Property Group
	The Executive – Compliance Monitoring & Reporting	The Executive
2017	Yzermyn Underground Coal Mine, Mpumalanga	Atha Africa Ventures
	Lower Thukela Regional Bulk Water Supply Scheme, KZN, Basic Assessments and Amendments	Black Balance Projects and Various Contractors for iLembe District Municipality
	KwaDukuza Mall and Urban Precinct Development	Edison Property Group
	Elaleni Coastal Forest Estate	North Global Properties
	Warehouse facilities in Woodmead Estate	Shree Property Holdings
	Avon Power Peaking Plant Monthly Water Monitoring and Reporting	Avon Power Peaking Plant
	Humberdale Landfill Site - Annual External Audit in terms of the WML	Mashalaba & Associates Consultants
2016	Jozini Regional Community Water Supply Scheme	Royal HaskoningDHV

	Oceans Umhlanga Hotel & Residential Development	Edison Property Group
	Water Monitoring for Ground and Surface Water for the Avon Peaking Power Plant	Avon Peaking Power Plant
	Lower Thukela Regional Bulk Water Supply Scheme	Black Balance Projects and Various Contractors for iLembe District Municipality
	Beema Bamboo to Energy Project External Audit	Green Grid Energy
2015	Msikaba Water Supply Scheme Phase 1	RHDHV for Ugu DM
	Greytown Bulk Water Supply Scheme Phase 2	RHDHV for uMzinyathi DM
	Warehousing Facility at Dube Trade Port	Shree Property Holdings
	Lower Thukela Regional Bulk Water Supply Scheme	Black Balance Projects for iLembe DM
2014	Tugela Ferry Shopping Centre, WWTW and PFS	Copperzone 163 (Pty) Ltd
	DTP Agrizone & Site Wide External Operational Audit	Dube TradePort Corporation
	Kranskop Bulk Water Supply Scheme	RHDHV for uMzinyathi DM
	Upgrade of Stream Crossing Structure on Mbozamo	SMA Consultants for KwaDukuza Municipality
	DTP Agrizone & Site wide external operational Audits	Dube TradePort Corporation
2013	Beema Bamboo Plantation Site (Bamboo to Energy project) ECO	Green Grid Energy
	88 Compensation Residential Beach Development - Ballito	Imali Corp / @ 88
	Gqolweni Road ECO	Umdoni Municipality
	Foxhill Church and Residential Development	M&C Janigh Trust
2012	Zinkwazi Desalination Plant	Umgeni Water
	Komati Water Pipeline ECO	Stefanutti Stocks / Cycad Pipelines
	Joymac Sand Mining ECO	Joymac Sand Sales
	Clover ECO	Clover, Ixopo
2011	Beema Bamboo Plantation Site (Bamboo to Energy project)	Green Grid Energy
	88 Compensation Residential Beach Development - Ballito	Imali Corp / @ 88
	Foxhill Church and Residential Development ECO	M&C Janigh Trust
	Umzinto Low Level Bridge BECO	Liquid Platinum
2010	AngloGold Ashanti External Legal & ISO 14001 Audits (Various Mines and Services)	AngloGold Ashanti
	Zinkwazi Desalination Plant ECO	Umgeni Water
2009	Blackburn Bridge ECO	SANRAL
	Zinkwazi Desalination Plant ECO	Umgeni Water
	Umdoni Flood Damage Repair Projects ECO	Umdoni Municipality

Water Quality Monitoring

2018	Monthly Surface and Ground Water Monitoring for the Avon Power Peaking Plant	Avon Power Peaking Plant (Pty) Ltd
	KwaDukuza Mall - Groundwater and surface water monitoring	Edison Property Group

2017	Lower Thukela Regional Bulk Water Supply Scheme	Various Contractors for iLembe District Municipality
	KwaDukuza Mall and Urban Precinct Development	Edison Property Group
	Elaleni Coastal Forest Estate	North Global Properties
	Avon Power Peaking Plant Monthly Water Monitoring and Reporting	Avon Power Peaking Plant
	Birdhaven Residential development	Graham Trading and Investments Pty Ltd
2016	Oceans Umhlanga Hotel & Residential Development	Edison Property Group
	Lower Thukela Regional Bulk Water Supply Scheme	Black Balance Projects and Various Contractors for iLembe District Municipality
	Beema Bamboo to Energy Project	Green Grid Energy
	Avon Power Peaking Plant Monthly Water Monitoring and Reporting	Avon Power Peaking Plant
2015	Lower Thukela Regional Bulk Water Supply Scheme	Black Balance Projects and Various Contractors for iLembe District Municipality
2014	Tugela Ferry Shopping Centre, WWTW	Copperzone 163 (Pty) Ltd
2013	Beema Bamboo Plantation Site (Bamboo to Energy project)	Green Grid Energy
	88 Compensation Residential Beach Development - Ballito	Imali Corp / @ 88

Waste Management

2017	Waste Management Authorisation Gauteng & KZN Enquiries, BA's, Category C Registration and Compliance Assessment	Plant Care Waste Management
	Humberdale Landfill Site (Annual External Audit since 2013)	Umdoni Municipality
	Mkondeni Medical Waste Facility (Bi-Annual External Audit since 2013)	Ecocycle Waste Solutions
2014-2016	Glencoe Landfill Site (Annual External Audit since 2014)	Anderson Vogt Engineers for Endumeni Municipality
2012-2014	Waste Management Procedure for Piggery	Mrs Mbalo
	Glencoe Landfill Site (Annual External Audit since 2014)	Anderson Vogt Engineers for Endumeni Municipality
2011	Humberdale Landfill Site (Annual External Audit since 2013)	Umdoni Municipality
	Waste Management License E-Waste	Sims
	Biodiesel BA (Waste Oil)	Enterprise Ilembe
2010	Municipal Material Recovery Feasibility Study, Eastern Cape	Nelson Mandela Bay Municipality
2009	Monitoring and Rehabilitation of BP tanker spill at Chase Valley, KZN	BP South Africa (Pty) Ltd
2008	Medical Waste Incinerator	Quadrotone

2004-2006	AngloGold Ashanti Waste Management System and EMS	AngloGold Ashanti

Training

2016	PSR Landfill Training	PSR Logistics
	Environmental awareness programme to improve EMS performance- Site Supervisors	Stefanutti Stocks Civils KZN
2015	Environmental awareness programme to improve EMS performance – Site ESO's	Stefanutti Stocks Civils KZN
2010	Environmental Courses for Managers and Councillors – Local Municipality	Msunduzi Municipality
2006	Environmental Management Course for Managers	AngloGold Ashanti
	Waste Management Course	AngloGold Ashanti

Carbon Footprint Analysis and Air Emissions Licenses

As Director, ensuring the deliverables of the appointment (sourcing, calculating, evaluating and compiling of the carbon footprint analysis), is met.

2018	Carbon Footprint Analysis for Dube Trade Port	Dube TradePort Corporation
	KwaDukuza Crematorium	KwaDukuza Municipality
2017	Umgeni Water Carbon Footprint Mapping	Umgeni Water
	Karbochem Holdings in Newcastle and Sasolburg	Karbochem
	Calculate direct and indirect emissions from the company	Hychem (Pty) Ltd
2016	Measure Carbon Emissions and provide updated baseline that would enable DTPC to quantify, monitor and assess carbon footprint and its climate change impact for DTPC	Dube TradePort Corporation
	KwaDukuza Crematorium	KwaDukuza Municipality
2015	Determine Greenhouse Gas emissions from the Mkondeni Medical Waste Facility activities	EcoCycle Waste Solutions
2010	Foundry Environmental Assessment & Authorisation	Yellow Star
	Umdoni Crematorium	Umdoni Municipality
2004-2006	AngloGold Ashanti Air Quality Management System and EMS	AngloGold Ashanti

Cooperate Social Investments and Responsibility

2017	KwaDukuza Schools Recycling Programme with the Paper Recycling Association of South Africa (PRASA) and Glass Recycling Company	Triplo4 Sustainable Solutions, PRASA & GRC
	The Circle Waste Recycling	Triplo4 Sustainable Solutions
	Mandela 67minutes	Triplo4 Sustainable Solutions
	KwaDukuza Municipality Ward 28 Greening Project	Triplo4 Sustainable Solutions & KwaDukuza Municipality

	Participate in Grace Family Church Thanksgiving Bucket Programme	Grace Family Church
2016	Westbrook Ski Boat Club Waste Management	Triplo4 Sustainable Solutions & Westbrook Ski Boat Club
	The Circle Waste Recycling	Triplo4 Sustainable Solutions
	KwaDukuza Schools Recycling Programme with the Paper Recycling Association of South Africa (PRASA) and Glass Recycling Company	Triplo4 Sustainable Solutions, PRASA & GRC
	Mandela 67 minutes Orphan Fund Initiative	Triplo4 Sustainable Solutions
	Participate in Grace Family Church Thanksgiving Bucket Programme	Grace Family Church
2015	Bhamshela Community Glass Recycling Initiative	Triplo4 Sustainable Solutions
	Entrepreneurship Waste Recycling Programme with Local Women Waste Pickers	Triplo4 Sustainable Solutions
	KwaDukuza Schools Recycling Programme with the Paper Recycling Association of South Africa (PRASA) and Glass Recycling Company	Triplo4 Sustainable Solutions
	Arbour Day	Triplo4 Sustainable Solutions & KwaDukuza Municipality

CHEN READ

CURRICULUM VITAE

Name of Firm:	**Triplo4 Sustainable Solutions (Pty) Ltd**
Name of Staff:	Chen Read
Position in Firm:	Senior Environmental Consultant
Profession:	Environmental Management
Date of Birth:	27/07/1978
Years of Professional Experience:	> 10 **Nationality:** South African / Israeli (Dual)

Professional Registrations and Memberships:
Environmental Assessment Practitioner of South Africa (EAPASA)
International Association for Impact Assessment SA (IAIAsa)
Green Buildings Council of South Africa (GBCSA)
Water Institute of South Africa (WISA)
Institute of Waste Management of Southern Africa (IWMSA)
African Circular Economy Network (ACEN) – Chapter Member for South Africa

Key Qualifications:
Chen Read is a registered EAP and a Senior Environmental Consultant with Triplo4 Sustainable Solutions conducting environmental impact assessments (EIA) as well as Water Use License Applications (WULA) for a wide variety of development projects, including road infrastructure and Industrial projects as well as waste, water and coastal management projects. Chen is also actively involved in conducting compliance auditing services, as well as developing and implementing audit protocol and programmes for compliance to environmental legal requirements, and assisting with the development of corrective and preventative action plans to address non-compliance. Chen had a key role in developing and implementing the Quality and Environmental Management System, as well as obtaining the ISO 14001 and ISO 9001 certification in 2018 for Triplo4. Chen is an accredited professional of the Green Star SA (certified with the Green Building Council of South Africa), as well as certified Carbon Footprint Analyst (SETA accredited). Her international experience includes being part of the environmental compliance team for the development of ilmenite mine in Madagascar, as well as managing the Environmental Programme in a local environmental education and training centre in Madagascar, with duties included the design of academic courses and contribution to the researching, planning, and developing of the centre.

Education:

2010	Postgraduate Diploma in Environmental Management - Newcastle University, Australia;
2009	Diploma in Environmental Auditing and Reporting - Stonebridge Associated College, UK;
2008	BSC (Social Science), (cum laude) - The Open University of Israel.

Additional Courses:

2022	Inside the Circular Economy: Africa Programme - Ellen MacArthur Foundation, UK;
2019-2020	Woman On Board/ Reality Based Governance – Leadership Training Programme, Limit Breakers Global Foundation, SA;
2019	Conduct Out-come Based Assessment –EAPASA Assessor (SETA certified), Networx, SA;
2018	ISO 19011:2011 Guidelines for Auditing Management Systems, SHEQ National Cert, SA;
2016-2017	Further Education and Training: Generic Management, NQF4, Ubuhle Consultant (SETA Certified);
2016	Energy Management System, National Cleaner Production Centre (NCPC) South Africa;
2016	Hazardous Waste Management and Legislation, Institute of Waste Management of Southern Africa (IWMSA);
2015	Carbon Footprint Analyst course, NQF4, Terra Firma Academy (SETA Certified);
2014	Accredited Professional: New Building Course, The Green Building Council of South Africa;

2013	Advanced short course in Environmental Management Compliance Inspection (EMI) and Investigation, NQF 8, UNISA, South Africa;
2012	Understanding EIA – WESSA, South Africa.

Employment History:

2012 to date	**Triplo4 Sustainable Solutions (Pty) Ltd, South Africa** Senior Environmental Consultant
2011 to 2012	**The Jewish National Fund (JNF), Durban, KZN, South Africa** Environmental-Related project Co-ordinator
2006 to 2009	**Ecological Centre Of Libanona, Fort Dauphin, Madagascar** Environmental Programme Lecturer
2008	**Rio Tinto – QMM Project, Fort Dauphin, Madagascar** Assistant to the Environmental Superintendent – Construction (Intern)

Environmental Experience: Selected Projects undertaken at Triplo4:

Environmental Impact Assessments (EIA) / Basic Assessment Reports/ Environmental Management Programmes/ 24G Applications/ Amendments Applications / Strategic Environmental Assessment / Planning Projects

Year	Project Name	Client
2021	Whetstone Phase 1 – Fuel Filling Station	Cedar Point Trading 20 (Pty) Ltd
	Mnawe Road upgrade	Bi Infrastructure Consultants (Pty) Ltd – for Maphumulo Municipality
	aMahlongwa Estuarine Management Plan	Department of Economic Development, Tourism and Environmental Affairs
2020	The Strategic Corridor Development Plan for Vryheid to Ermelo	SMEC for COGTA
	Residential Dwelling Development – Prince's Grant Estate	Mr. Havnar
2019	Groutville D Sanitation Scheme	DKG for iLembe District Municipality
	Development Framework and Master Plan Update for the La Mercy Joint Venture	Dube TradePort and ACSA JV
	Estuarine Management Plan – 4 Estuaries	Umdoni Local Municipality
	Vulindlela Strategic Environmental Assessment	SMEC for Msunduzi Municipality
	Greater Inanda Local Area Plan (environmental input)	Zimanga Urban and Rural Design for eThekwini Human Settlement Department
2018	Effluent Pipeline - Maintenance Management Plan	Sappi Tugela Mill
	KwaDukuza Coastline - Maintenance Management Plan	KwaDukuza Local Municipality
	Malachite Business Park	Abland Propriety Limited
2017	Bellair Cluster 2 Housing Development	KZN Dept. of Human Settlements
	Yzermyn Underground Coal Mine, Mpumalanga	Atha Africa Ventures
	Springvale Country Estate Residential Development	DG Investment / Springvale Country Estate
	Gasifier Development in Sappi Mandeni	Green Grid Energy
	Zinkwazi Beach Sewer System upgrade	Nyeleti Consulting for KwaDukuza Municipality

Year	Project Name	Client
2016	Elaleni Coastal Forest Estate Residential Development	Cross Atlantic Properties 65
	Bellair Cluster 1 Housing Development	KZN Dept. of Human Settlements
	Ntshongweni Integrated Development Bulk Electrical Infrastructure	Tongaat Hulett Developments
	Ethafeni Precinct Housing Development	SMA Consultants for KwaDukuza Municipality
2015	Oceans Umhlanga Hotel & Residential Development	Edison Property Group
	Nonoti Housing Development	SMA Consultants for KwaDukuza Municipality
	Mpophomeni Shopping Centre	Dymatron (Pty) Ltd
2014	Mhlabatshane Bulk Water Supply Scheme Phase 2	Umgeni Water
	KwaDukuza Mall and Urban Precinct Development	Edison Property Group
	Lower Thukela Regional Bulk Water Supply Scheme	Black Balance Projects for iLembe DM
2013	The Stables Retirement Village	Kabod Development Group
	Nyathikazi Road upgrade	SMA Consultants for KwaDukuza Municipality
	Simbithi Eco Estate – Jacana Development	Silvermoon Properties
	P232 and D887 Roads upgrade	RHDHV for Department of Transport
2012	Steve Biko Phase 2 Housing Development	SMA Consultants for KwaDukuza Municipality
	Tugela Ferry Shopping Centre, WWTW and PFS	Copperzone 163 (Pty) Ltd

Water Use Licences and General Authorisations

Year	Project Name	Client
2019 - 2021	Various Sugar Mills – Eston, Noodsberg, Gledhow	Illovo Sugar
2019	Springvale Country Estate Residential Development	DG Investment / Springvale Country Estate
2018	Wetstone Mixed Use Development	Edstan Group of Companies
	Southern Regional Bulk Water and Sanitation Scheme, KwaDukuza	Escongweni Engineers for iLembe DM
2017	Elaleni Coastal Forest Estate	Cross Atlantic Properties
	uMvoti River Sand Mining	Umdlov Omanqindi Resources
	Bellair Cluster 1 & 2 Housing Developments	KZN Dept. of Human Settlements
	Avondale Residential Development	The Horsewood Trust
2016	Avon Peaking Power Plant	Avon Peaking Power Plant (Pty) Ltd
	Bhamshela WWTW	Timocento (Pty) Ltd
	Coastlands Tongaat Hotel Development	Zelphy 1325 (Pty) Ltd
2015	Humberdale Landfill Site Phase 2 Expansion	Umdoni Municipality
	Tugela Ferry Shopping Centre	Copperzone 163 (Pty) Ltd
	Groutville Bulk Sanitation Scheme	DKG Project Manager and Engineers
	Birdhaven Residential Estate Development	Graham Trading & Investments
	Steve Biko Phase 2 Housing Development	SMA Consultants for KwaDukuza Municipality

2014	Dunkirk Estate Club House	The Dunkirk Estate
	Lower Thukela Bulk Water Supply Scheme	Black Balance Projects for iLembe DM

Environmental Control Officer (ECO) and Water Quality Monitoring

Year	Project Name	Client
2022	Bridge City Waste Facility	Plant Care Durban
2020	uMvoti River Sand Mining	Umdlov Omanqindi Resources
2019	Groutville D Sanitation Scheme	DKG for iLembe District Municipality
2018	Thompson's Bay Beach, Ballito, KZN	Nyeleti Consulting for KwaDukuza Municipality
	Avon Power Peaking Plant	Avon Power Peaking Plant (Pty) Ltd
	KwaDukuza Mall, Stanger, KZN	Edison Property Group
2017	Full time on site ECO for the Yzermyn Underground Coal Mine, Mpumalanga (project manager)	Atha Africa Ventures
	KwaDukuza Mall and Urban Precinct Development	Edison Property Group
	Warehouse facilities in Woodmead Estate	Shree Property Holdings
2016	Ridgeside Commercial Development	Shree Property Holdings
	Oceans Umhlanga Hotel & Residential Development	Edison Property Group
	Water Monitoring for Ground and Surface Water for the Avon Peaking Power Plant	Avon Peaking Power Plant
2015	Msikaba Water Supply Scheme Phase 1	RHDHV for Ugu DM
	Warehousing Facility at Dube Trade Port	Shree Property Holdings
	Lower Thukela Bulk Water Supply Scheme	Black Balance Projects for iLembe DM
2014	Tugela Ferry Shopping Centre, WWTW and PFS	Copperzone 163 Pty Ltd
	DTP Agrizone & Site wide external operational Audits	Dube TradePort Corporation
	Kranskop Bulk Water Supply Scheme	RHDHV for uMzinyathi DM
2013	Beema Bamboo Plantation Site (Bamboo to Energy project)	Green Grid Energy
	88 Compensation Residential Beach Development - Ballito	Imali Corp / @ 88

Waste Management and Audits

Year	Project Name	Client
2022	Mkondeni Medical Waste Facility (Bi-Annual External Audit since 2013)	Ecocycle Waste Solutions
2020	External Compliance Audit – East London Waste Disposal Site	Buffalo City Municipality
	Enquiries and EMPr for new waste facility in Bridge City	Plant Care Durban

2019	Scoping Study for Implementation of Waste Efficiency within the KwaDukuza and Mandeni Municipalities	Vuthela IDM LED Support Programme
	External Compliance Audits – 4 Waste Disposal Facilities	Mossel Bay Municipality
2018	Waste Tyre Pyrolosis Plant, Gauteng - Environmental Opinion and EMPr	Cosmic Energy Africa
	Humberdale Landfill Site (Annual External Audit since 2013)	Umdoni Municipality
2017	Wadeville & Rosslyn Waste Management Facilities	Planet Care Gauteng
	Mkondeni Medical Waste Facility (Bi-Annual External Audit since 2013)	Ecocycle Waste Solutions
2016	Waste Management License (24G) for Springfield Facility	Plant Care Durban
	Glencoe Landfill Site (Annual External Audit since 2014)	Anderson Vogt Engineers (for Endumeni Municipality)

Carbon Footprint Analysis

Year	**Project Name**	**Client**
2018	Carbon Footprint Analysis – report and calculation tool	Dube TradePort Corporation
2017	Carbon Footprint Analysis – report and calculation tool	Umgeni Water
	Carbon Footprint Analysis – report and calculation tool	Karbochem Holdings
2016	Carbon Footprint Analysis – report and calculation tool	Dube TradePort Corporation
2015	Carbon Footprint Analysis– report and calculation tool	EcoCycle Waste Solutions

International Experience:

Madagascar

Languages:

	Speak	**Read**	**Write**
English	Excellent	Excellent	Excellent
Hebrew	Excellent	Excellent	Excellent

SHANICE SINGH

CURRICULUM VITAE

Name of Firm:	**Triplo4 Sustainable Solutions (Pty) Ltd**
Name of Staff:	Shanice Singh
Position in Firm:	Sustainability Consultant / Project Manager
Profession:	Senior Environmental Management
Date of Birth:	01/06/1992
Years of Professional Experience:	> 6 years **Nationality:** South African

Professional Registrations and Memberships:
Environmental Assessment Practitioners Association of South Africa (EAPASA) – 2019/735
International Association for Impact Assessment SA (IAIAsa)
IEMA Accredited Carbon Footprint Analyst

Key Qualifications:
Shanice Singh is an EAPASA registered environmental assessment practitioner (2019/735) with Triplo4 Sustainable Solutions who has experience in conducting Water Use License Applications (WULA), Environmental Management Programmes (EMPr), Basic Assessment Reports (BA), Environmental Impact Assessments (EIA) as well as Section 24G applications for the rectification of unlawful projects. Furthermore, she is responsible for conducting Environmental Control Officer (ECO) duties which include site visits, surface water monitoring and report compilation. She is an Institute of Environmental Management & Assessment (IEMA) certified Carbon Footprint Analyst and has undertaken several Carbon Footprint analysis since 2015. Her undergraduate degree was completed in the year 2014 at University of KwaZulu-Natal with a Bachelor of Science: Environmental and Life Sciences. She has completed her postgraduate degree in the year 2017 at the University of South Africa with a Bachelor of Science (Honours): Environmental Management. She is the Past-President of the Rotaract Club of Verulam (2014-2015) which is affiliated with Rotary International.

Education:

2017	BSc (Honours), Environmental Management, UNISA, South Africa
2014	BSc Environmental Science (Life Science), University of KwaZulu-Natal, South Africa

Continued Professional Development:

October 2021	IAIAsa KZN: Green Finance
August 2021	IAIAsa 2021 Virtual Conference: Re-Thinking IEM in pursuit of the Sustainable Development Goals
July 2021	IAIAsa GP: Towards Sustainable & Responsible Mine Closure
July 2021	IAIAsa SANBI National Event: Terrestrial and Aquatic Ecosystem Environmental Assessment Guideline
July 2021	IAIAsa KZN: The Application of the IFC performance Standards in SA
May 2021	IAIAsa KZN: Climate Change Impact Assessment Webinar
October 2020	IAIAsa EIA Report Writing Course
May 2019	National GHG Reporting Regulations and the Carbon Tax Bill
November 2018	IAIAsa KZN Carbon Management Event
August 2018	Legal and Technical Air Quality Seminar
April 2018	South Africa Risk and Vulnerability Atlas Launch and Training Workshop
September 2017	Carbon Footprint Analyst Training
October 2016	Effective Air Quality Management and GHG Reporting

June 2016	Climate Change Risk and Disclosure
May 2016	Cleaning the Air Seminar
March 2016	Carbon Footprint Analysis
March 2016	Industrial Waste and Effluent Treatment

Employment History:

January 2021 to date	**Triplo4 Sustainable Solutions (Pty) Ltd, South Africa** Senior Environmental Consultant
January 2019 to December 2021	**Triplo4 Sustainable Solutions (Pty) Ltd, South Africa** Environmental Consultant
August 2015 to December 2018	**Triplo4 Sustainable Solutions (Pty) Ltd, South Africa** Junior Environmental Consultant
April 2015 to July 2015	**Triplo4 Sustainable Solutions (Pty) Ltd, South Africa** Intern Environmental Consultant

---

Employment Experience: **Select Projects undertaken with Triplo4**

Built Environment Consulting Services

2018	Implementing Agent for the Storm Water Control Measures at the Ethafeni and Nkobongo Cemetery.	KwaDukuza Municipality

---

Environmental Impact Assessments/ Basic Assessment Reports/ Environmental Management Programmes/ S24G Application/ Section 30A Applications

2021	Gas to Power Powership - Port of Ngqura	Karpowership SA (Pty) Ltd
	Gas to Power Powership - Port of Saldanha Bay	Karpowership SA (Pty) Ltd
	Gas to Power Powership Project - Port of Richards Bay	Karpowership SA (Pty) Ltd
	Elaleni Lifestyle Estate Basic Assessment	Blue Gum Estate (Pty) Ltd
	Ballito Village & Ballito Views Part 2 Amendment	ARCIS Pty Ltd
2020	Elaleni Lifestyle Estate Part 2 Amendment	Blue Gum Estate (Pty) Ltd
	Elaleni Coastal Forest Estate Leisure Centre Basic Assessment	Northglobal Properties
	Ballito Village Part 2 Amendment	ARCIS Pty Ltd
2019	Vlakspruit Crematorium – Air Emissions License and Environmental Impact Assessment	KwaDukuza Municipality
	CTM Ballito – EMPr	Italtile Limited
	Tile Africa Ballito – EMPr	Mark Evan Investments cc
	Dinangwe Housing Development – Specialist Studies	Black Balance Projects
	Brettenwood Life – EMPr	Hulett Development Company
	Lot 109, Umhlali – Environmental Opinion	Nevada Sky 18 (Pty) Ltd.
	Thompsons Bay Beach Stormwater Infrastructure – Maintenance Management Plan and S30 Application	KwaDukuza Municipality
	Nonoti Housing Development – EIA	SMA Consultants
2018	Groutville Sanitation Scheme - Initial Assessments, Due Diligence Assessment, EMPr and Environmental Enquiries	DKG Project Manager and Engineers

	Sappi Tugela Mill Effluent Pipeline - Maintenance Management Plan	Sappi Tugela Mill
	Homestead Estate Residential Development, Umhlali	Spinosa Developments
	Basic Assessment for a Residential House on 105 Nkwazi Drive.	Ituwiz (Pty) Ltd.
	Basic Assessment for a Residential House on 57 Ocean Drive, Ballito.	Mark Evan Investments cc
2017	Storm Events and Coastal Erosion - Maintenance Management Plan for the KwaDukuza Coastline	KwaDukuza Municipality
	Thompsons Bay and Willard's Beach Emergency Application for Strom Events	KwaDukuza Municipality
	Zinkwazi Beach Sewer Upgrade	Nyeleti Consultants (Pty) Ltd
	Yzermyn Underground Coal Mine, Mpumalanga	Atha Africa Ventures
	Desalination Plants Pre-feasibility study and business plan for 4 Districts (Ugu, iLembe, King Cetshwayo & uMkhanyakude)	Focus PM / Umhlatuze Water
2016	Expansion of the KwaDukuza Crematorium	KwaDukuza Municipality
	S24 G application and Air Emissions License.	
2015	Lower Thukela Bulk Water Supply Scheme: Offtakes 9, 11D, 3a, 6d, 6a1, 6a2, 8d & 5b.	Black Balance Projects
	Nonoti Housing Development	SMA Consultants
	KwaDukuza Worship Sites Feasibility Assessment	KwaDukuza Municipality

---

Water Use Licences and General Authorisations

2019	Proposed Nevada Sky Dam – DWS Enquiry	Nevada Sky 18 (Pty) Ltd.
	Gledhow WWTW – WULA	DKG Project Manager and Engineers on behalf of iLembe District Municipality
2018	Homestead Residential Development, Umhlali	Spinosa Developments
	Ethafeni Cemetery Section 19 Application	KwaDukuza Municipality
2017	Zinkwazi Beach Sewer Upgrade	Nyeleti Consultants (Pty) Ltd
2016	Clover Milk Depot, Ixopo	Clover SA (Pty) Ltd
2015	Mpophomeni Shopping Centre	Dymatron (Pty) Ltd

Environmental Control Officer (ECO)

2021	Etete Phase 4 Housing Development	Motheo Construction
	Ballito Village Residential Development	ARCIS (Pty) Ltd
2020	Elaleni Lifestyle Estate	Blue Gum Estate (Pty) Ltd
2019	Beach Access at Salt Rock Beach	Nyeleti Consultants (Pty) Ltd
	Jozini Regional Community Water Supply Scheme – Phase 1A-2	RHDHV for Umkhanyakude DM
	Thompsons Bay Stormwater Infrastructure	KwaDukuza Municipality
	Elaleni: Lush	Fire Wings (Pty) Ltd
	Elaleni: Morris Village	Four Arrows Investments II (Pty) Ltd
	Elaleni: Vines	Cross Atlantic Properties 65 (Pty) Ltd
2018	Coastal Access at Willard's Beach	Nyeleti Consultants (Pty) Ltd
	Storm damage repair at Thompsons Bay Beach	Nyeleti Consultants (Pty) Ltd
	Sappi Tugela Mill Effluent Pipeline - Maintenance	Sappi Tugela Mill

2017	Monthly Water Monitoring for the Avon Power Peaking Plant Elaleni Coastal Forest Estate	Peakers Operations (Pty) Ltd Cross Atlantic Properties
2016	Lower Thukela Bulk Water Supply Scheme: Offtakes 9 & 8d Jozini Regional Community Water Supply Scheme – Phase 1A Warehousing Facility at Dube Trade Port	Black Balance Projects RHDHV for Umkhanyakude DM Shree Property Holdings
2015	Residential Development (Erf 102 Colwyn Drive)	Oliver Dalais

---

Carbon Footprint Analysis

2018	DTPC 2018 Carbon Footprint Analysis	Dube TradePort Corporation
2017	Umgeni Water 2017 Carbon Footprint Mapping	Umgeni Water
2016	DTPC 2016 Carbon Footprint Analysis	Dube TradePort Corporation
2015	Mkondeni Medical Waste Facility activities	EcoCycle Waste Solutions

---

Languages:

	Speak	**Read**	**Write**
English	Excellent	Excellent	Excellent
Afrikaans	Fair	Good	Fair

POLICY AND PROCEDURES

Health and Safety Policy

Karadeniz Holding and Group Companies are committed to conducting their business and operational activities by respecting and caring for people and assets. At Karadeniz Holding and Group Companies, maintaining the health, safety, security, and wellbeing of our employees, contractors, visitors, and communities that we engage with is one of our core values. Each level of management is responsible for protecting this value by setting an example through their Health and Safety leadership and providing a safe working environment for everybody. Every employee is responsible for acting safe by following established procedures, safe work practices, and regulatory requirements. Thus, our primary goal is to minimize accidents, harm to people, security breaches, and damage to the assets, which is why no business stage is of greater importance than achieving this goal.

Karadeniz Holding and Group Companies Management;

- is directly accountable for Health and Safety performance in its scope of authority and the continuous improvement of that performance through effective implementation of the Health and Safety Management System.
- provides all necessary resources to ensure maintaining safe working places.
- sets realistic targets for incidents, accidents, and Health and Safety performance to prevent recurrences and improve performance.
- inspects, improves, and develops Health and Safety Management System practices by regular reviews.
- maintains a healthy and safe working environment to prevent work related illnesses, injuries, and occupational diseases in all operations.
- carries out hazard identification and risk assessment studies on Health and Safety aspects in all fields and locations where the company operates.
- takes precautions against the risks of loss, accident, or property damage within the scope of Health and Safety principles by taking a proactive perceptive with the participation of all employees.
- complies with the national and international legal requirements, compliance obligations, and other conditions related to Health and Safety.
- ensures relevant training is provided for employees to improve their competency by increasing knowledge and awareness throughout the entire operations.

All employees

- are empowered to actively participate in Health and Safety processes and expected to stop and report any unsafe activity.
- are obliged to promptly report and communicate all Health and Safety incidents together with near misses and work-related illnesses.
- ensure that no task will start unless it is safe and compliant with the company policies, procedures, and regulatory requirements. If there is any uncertainty, true information shall be obtained from the proper authority, and measures are implemented prior to commencing work.
- are primarily responsible for their own Health and Safety, and those who could be affected by their actions.
- are expected to contribute to the hazard identification, risk assessment and risk mitigation studies.
- are encouraged to report Health and Safety related issues to management fearlessly and without any negative consequences by knowing that their employment in such cases is under the protection of the Health and Safety commitment of the company by this policy.
- are expected to support each other by supervision and discouraging unsafe behaviors without any prejudice and breeding blame culture within the organization.

Karadeniz Holding and Group Companies encourage and guarantee that highest attention is paid to the maintenance of Health and Safety standards, including the allocation of all necessary resources and the use of latest technology to ensure a healthy and safe working atmosphere is maintained.

KARPOWERSHIP SA

Operations and Maintenance
O&M MANUAL: HSE and Quality Manual

Quality information

Prepared by	Checked by	Approved by
		
Elaine Janse van Rensburg Business Systems Lead - SHEQ	Fred du Plessis Pr. CHSA (CHSA/026/2015) Senior Associate	Eugene Matthysen Project Manager, Technical

Revision History

Revision	Revision date	Details	Authorized	Name	Position
00	08/07/2021	First issue	LB	Lourens Bezuidenhout	Managing Director
01	19/07/2021	Second issue	LB	Lourens Bezuidenhout	Managing Director
02	01/09/2021	Third issue	LB	Lourens Bezuidenhout	Managing Director

Distribution List

PDF e-mailed	Name	Association / Company Name
✓	Eugene Matthysen	Karpowership South Africa
✓	Marius Meyer	Karpowership South Africa
✓	Vokan Patir	Karpowership
✓	Pinar Göl	Karpowership
✓	Baris Alimgil	Karpowership

Prepared for:

Karpowership South Africa
Eugene Matthysen
M: +27 82 457 0267
E: Eugene.Matthysen@karpowership.com

Prepared by:

Oxygen Twenty One (Pty)
Elaine Janse van Rensburg
T: +27(0) 12 665 1465
M: +27(0) 82 389 2247
E: elaine@oxygentwentyone.com

16 Pieter Street
Building 5, Lower Ground Level
Manhattan Office Park
Highveld Techno Park
Centurion
SOUTH AFRICA

www.oxygentwentyone.com

Table of Contents

1. Purpose

Karpowership South Africa was formed as part of the of the Risk Mitigation IPP procurement programme published by the Department of Mineral Resources and Energy, South Africa.

Subsequently a need has arose to establish a HSE and Quality maintenance and operational approach to ensure compliance to applicable legal and other requirements during the operation of the 3 power ships post the construction and commissioning phases.

2. Scope

This HSE and Quality Manual has been established to ensure that all operational and maintenance activities, which may have an impact on Occupational Health and Safety and Environmental aspects (or HSE), are carried out in a manner that meets or exceeds the intent of the:

- General Company Quality Management Approach
- Occupational Health and Safety Act, 85 of 1993
- Maritime Occupational Safety Regulations, 1994, R 1904
- Karpowership Occupational Health and Safety, Environment and Quality Policy and associated corporate requirements
- Relevant legislation and guidelines applicable to operational activities
- Environmental permits.

This standard applies to all O&M activities undertaken by Karpowership South Africa.

This standard identifies potential impacts and HSE and Quality risks related to operational and maintenance activities. The company recognizes that it is impossible to provide a rule to cover every possible task and therefore provides guidance in identifying, assessing and addressing potential safety hazards through the Job Safety Analysis (JSA) process.

3. General Company Quality Management Approach

Karpowership aims to create value to all stakeholders and contribute to the sustainable development by prioritizing legal obligations as well as being compliant with;

- ISO 9001 Quality Management
- ISO 14001 Environmental Management
- ISO 45001 Health and Safety Management System standards

In order to generate its products/services and perform operations on the basis of Group Company's vision, mission, strategy and values to undertake below commitments:

- To measure and continuously improve its financial, operational, occupational health and safety and environmental performances by planning our annual objectives within the scope of the Integrated Management System policy,
- To develop action plans for continuous process improvement by implementing health, security, environmental and social risk analysis at the facilities in line with the international standards
- To have respect for people and environment and to contribute to sustainable development by means of keeping our environmental impacts under control towards biodiversity and ecosystem protection
- To supply extensive, cutting-edge and professional trainings for all our employees and subcontractors who are involved in operational phases so as to assure the maximum interest in favor of our clients without disturbing local community and ecosystem during our operations,
- To enhance our cooperation with neighboring facilities, local and authorized administrations in the field of quality, occupational health & safety and environmental aspects, and to keep our mutual affinity at the highest level with all our shareholders,
- To keep pace with scientific and technological developments in global energy industry and with the changing conditions in our operating countries so as to adapt and promote the usage of relevant innovations for our working areas and partners,
- To provide our stakeholders the privilege to work in a transparent, reliable organization.

Karpowership has defined the required processes, interrelations between them and applications for these processes to comply with Integrated Management System established according to the beforementioned international standards.

4. Leadership

4.1 Leadership commitment

Karpowership South Africa is committed to establish, implement and maintain an effective management system, which meets the requirements of Stakeholders and Customer's and allows for continuous improvement.

We strive to implement and maintain, as far as is reasonably practicable, healthy working conditions for the prevention of work-related injury and ill health to persons through involvement of workers in the decision-making processes and protecting the environment.

Our aim is to ensure that through established standards and performance evaluations, the level of quality matches our customers and interested party's requirements and expectations.

For this reason, Karpowership South Africa has a Health, Safety, Environment and Quality (HSE and Quality) Management System that provides for policies, procedures, and work rules for eliminating accidents and injury / nonconformances at our facilities.

The HSE and Quality commitment to our employees, contractors, and our customers at Karpowership South Africa is our foremost business consideration. No person will be required to do a job that he or she considers unsafe. The company will comply with all applicable workplace environmental, HSE and Quality and health regulations and maintain occupational HSE and Quality and health standards that equal or exceed the best practices in the industry.

This puts upfront the priorities for the workplace HSE and Quality program and where it is in relation to production. A good operation has workplace HSE and Quality integrated fully into production.

We maintain a goal of ZERO workplace injuries/ non non-conformances which is consistent with our values and vision. To achieve this outcome, we pledge to do the following:

- Conduct business in a manner that actively integrates the elements of the Karpowership South Africa HSE and Quality Management System into all aspects of our operations;
- Comply with all applicable laws, regulations and statutory obligations;
- Stiving towards customer satisfaction;
- Pro-actively identify and control hazards/risks in the workplace;
- Allocate responsibilities and accountabilities through job descriptions and performance monitoring;
- Support employees and contractors in their decision to stop work and intervene when unsafe acts or unsafe conditions are identified;
- Communicate and consult openly with employees, contractors and visitors to our work areas regarding Karpowership South Africa's HSE and Quality expectations;
- Develop processes that facilitate continual improvement in the HSE and Quality Management System as well as HSE and Quality performance;
- Provide the necessary resources and training to ensure that the objectives and targets derived from this Policy are achieved; and
- Maintain a pro-active leadership role in HSE and Quality management.

4.2 Employees, contractors and customer leadership expectations

Employees, contractors, and our customers are to comply with the Karpowership South Africa policies, procedures, and work rules at all times.

4.3 HSE and Quality Policy

Karpowership South Africa will establish a HSE and Quality Policy applicable to all levels in the organisation.

The OH&S policy will

- be available as documented information;
- be communicated to workers within the organization;
- be available to interested parties, as appropriate;
- be reviewed periodically to ensure that it remains relevant and appropriate.

4.4 Individual Worker's Right and Responsibility to STOP work

Karpowership South Africa employees, contractors, and visitors need to understand that they have the right to stop work or refuse to work in situations that they do not understand or perceive to be unhealthful, unsafe or causing harm the environment, and to immediately bring these situations to the attention of those at imminent risk and to their direct supervision.

4.5 Organisational roles, responsibilities and authorities

The top management of Karpowership South Africa needs to ensure that defined responsibilities and authorities are assigned to individuals in the organisation to carry out OHSMS-related activities under their control.

Ultimately the Master of the vessel is responsible for the safety of the vessel, its crew, and all other personnel on the vessel and will always have overriding authority. However, the Master will need to liaise closely with the project leader on the vessel (e.g., client representative) to gain full understanding of the activity and any constraints on the vessel.

An organisational structure, allocation of OSH responsibilities to employees linked to operational controls, and ways of ensuring competence, training and consultation will be defined.

The Karpowership South Africa legal framework is represented in the figure below.

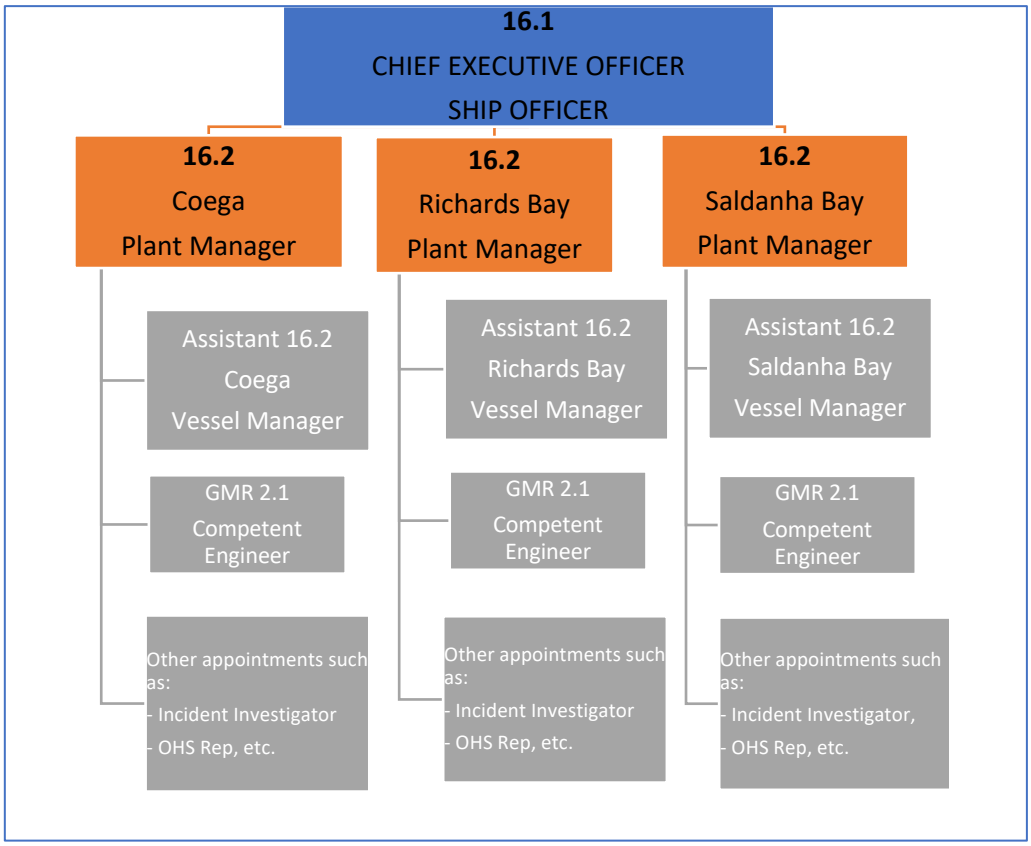


Figure 1 – Legal Framework

The various roles of our O&M management team will be defined within their respective appointment letters or job descriptions.

The following appointments will be in place.

Table 1 - Appointments required

Appointment description	Appointment required in terms of	Guidelines to consider
Assistant to the CEO	Occupational Health and Safety Act Section 16(2)	A CEO should assign duty to a responsible person for each of the sites.
Supervisor of Machinery	General Machinery Regulation 2(1)	A Competent person must be appointed as per the definition of competency set in the regulation.
Assistant Supervisor of Machinery	General Machinery Regulation 2(7)	A Competent person may be appointed, as per the definition of competency set in the regulation, to assist the supervisor.

Appointment description	Appointment required in terms of	Guidelines to consider
Pressure Vessel Inspector	Pressure Equipment Regulation 11(1)(d).	An Approved Inspection Authority must be appointed by the 16.2 or GMR 2(1) Appointee(representing the user), to perform the inspections at intervals not exceeding 36 months.
Pressure Pipping Inspector	Pressure Equipment Regulation 11(1)(e) read with note (h) of the regulation.	A Competent inspector must be appointed by the GMR 2(1) Appointee, as per the definition of competency set in General Machinery Regulation 1, to perform the inspection. Inspections as per risk-based intervals
Diving Contractor	Diving Regulation 4(1)	A single diving contractor must be appointed per diving project.
Incident investigator	General Administrative Regulation 9(2)	Refer to section 24 and 25 of the OHS Act which incidents and occupational diseases are reportable and Section 259 of the Merchant Shipping Act, 1951 (Act No. 57 of 1951)
Lifting Tackle inspector	Driven Machinery Regulation 18(10)(e)	A Competent person must be appointed, for the inspection of lifting tackle, as per the definition of competency set in the regulation.
Competent lift service provider	Lift, Escalator and Passenger Conveyor Regulations 7(1)	A Competent lift service provider must be designated, for the inspection of lift at least every 24 months, as per the definition of competency set in the regulation.

Appointment description	Appointment required in terms of	Guidelines to consider
Occupational H&S committee member	OHSA Section 19(3) & Maritime Occupational Safety Regulations, 1994, Section 11	Where two or more health and safety representatives have been designated, establish one or more health and safety committees
Occupational H&S representatives	OHSA Section 17(1) & Maritime Occupational Safety Regulations, 1994, Section 12	In a ship carrying fewer than 16 crew members, one safety representative; or in a ship carrying more than 15 crew members, one safety representative, to be elected by the officers, and one safety representative to be elected by the crew, or in a ship carrying more than 30 crewmembers, one safety representative, to be elected by the crew in each of the deck, engine and catering departments; and general purpose crews shall for this purpose be included in the deck apartment.
Safety Officer	Maritime Occupational Safety Regulations, 1994, Regulation 10	Offshore installations more than 500 meters from shore. Duties per section 10 of the Maritime Occupational Safety Regulations, 1994
Scaffolding Supervisor	Construction Regulation 16(1) (SANS 10085-1:2004)	The following persons must be competent a) Scaffold erectors b) Team leaders c) Inspectors

Appointment description	Appointment required in terms of	Guidelines to consider
Suspended platform Supervisor	Construction Regulation 17(1)	The following persons must be competent a) Suspended platform erectors b) Suspended platform operators c) Suspended platform inspectors
Suspended platform performance tester	Construction Regulation 17(8)(c)	Competent person to be appointed

4.6 HSE and Quality Management System

Karpowership South Africa will establish, implement, maintain and continually improve a HSE and Quality management system in line with the requirements of recognised HSE and Quality international standard requirements.

5. Planning

This section contains requirements, rules and guidelines for the planning of work to ensure the safety of the workers and the proper operation of equipment. Planning in HSE and Quality management systems is often viewed as something which relates mainly to setting up the system. However, HSE and Quality planning in this context is an ongoing activity which must continue throughout the life of the system in the never-ending PDCA cycle.

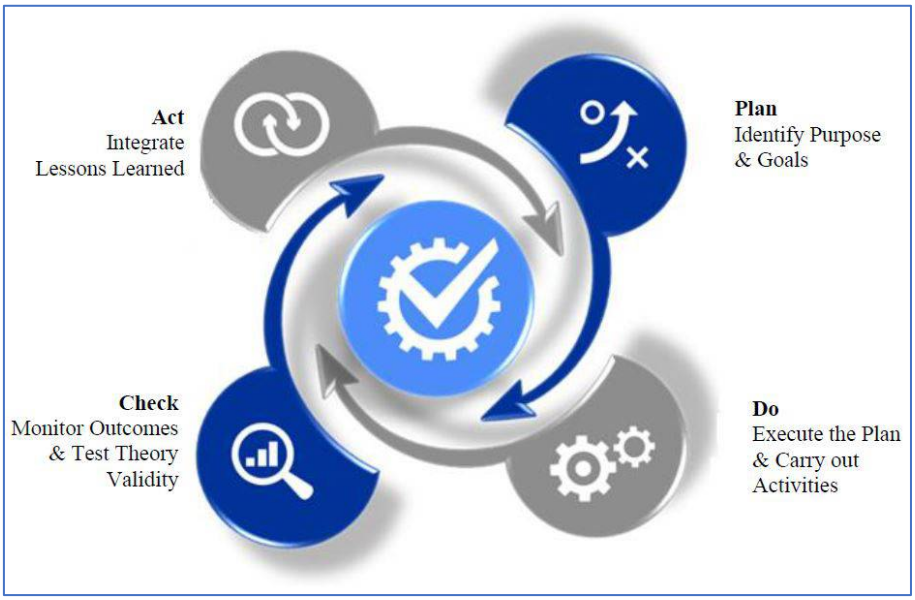


Figure 2 - PDCA Cycle

5.1 Risks and Opportunity

Karpowership South Africa is responsible and accountable for ensuring that effective procedures and assessment systems are in place to control hazards/aspects and to mitigate risks/impacts to as low a level as is reasonably practical.

The determination of risks and opportunities will be carried out at both at strategic and operational levels:

- those directly related to operational processes are defined as "HSE and Quality risks" and "HSE and Quality opportunities"
- those related to strategic levels are defined as "other risks to the "HSE and Quality Management System" and "other opportunities to the HSE and Quality Management System".

The process of analysing and managing risk will follow the following steps:

- Establishing the context of the risk assessment, including acceptability criteria for the risk analysis. The criteria will include potential Health and Safety hazards and Environmental aspects. The methodology used for risk assessments and the criteria will be documented.
- Identifying hazards/aspects (sources of potential to cause injury or ill health or an impact on the environment), determining risk scenarios and selecting a suitable level of risk evaluation;

  Once all hazards are identified, Karpowership South Africa will conduct a risk assessment at two levels:
  - assess HSE and Quality risks from the identified hazards/impacts, taking into account the effectiveness of existing controls
  - determine and assess the other risks to the system operations of the HSE and Quality Management System
- Evaluating risks/impacts by qualitative or quantitative assessment(s) and assigning ratings (classification);
- Recording the risk analysis in a risk register;
- Managing risks (prioritizing for action) according to their classification;
- Identifying and implementing controls to ensure that risk levels are as low as reasonably practicable (ALARP), the following hierarchy of controls must be applied:
  - Elimination of the risk scenario.
  - Substitution with a less hazardous material, process or equipment.
  - Isolation – isolating the hazard from the person or the person from the hazard.
  - Engineering – redesigning equipment / work processes or introducing engineering / process controls.
  - Administration – introducing administrative controls or management strategies e.g. permit systems, procedures, training, etc.
  - Personal Protective Equipment (PPE) – issuing and use of PPE as a last resort.
- Developing action plans for reducing risk levels / managing risks;
  - Verifying the completion of actions;

- Re-evaluating the risks and classifications as appropriate; and
- Reviewing and updating the risk register.

Karpowership South Africa will in a similar way, establish a process to determine and assess:

- opportunities to improve HSE and Quality performance during the implementation of planned changes, its policies, processes or activities. These opportunities may involve the adaptation of work, work organisation and work environment to workers, and the elimination of hazards/impacts and reduction of HSE and Quality risks;
- other opportunities for improving the system operations of the HSE and Quality Management System.

Karpowership South Africa will conduct a baseline risk assessment which identifies foreseeable hazards and risks for its operations. Detailed issued base risk assessments needs to be compiled for high risk tasks.

To align with legal requirements and to minimize risks a baseline risk assessment have been prepared. Refer Risk Assessment Document OX-BRA-KAR-001.

The Karpowership South Africa's Deck Officers, EHS Representatives, supervisory personnel, technical experts (as required) and workforce personnel directly involved with the task being examined must participate in the risk assessment processes.

A Job Safety Analysis (JSA) will at least:

- Be accompanied by a work method statement where possible (the work method statement will describe in detail the specific job or task to be performed);
- Provide a breakdown of every job or task into specific steps;
- Identify the hazards/aspects or potential hazards/aspects associated with each step;
- Assess the risk/impact that every hazard/aspect identified presents;
- Include consideration of possible exposure to noise, heat, dust, fumes, vapors, gas, chemical handling / use, ergonomics, vibration or any other identified health exposure risk on site; and
- Emissions to air, release to water, releases to land, use of raw materials and natural resources, use of energy, energy emitted (e.g. heat, radiation, vibration (noise), light), generation of waste and/or by-products and use of space;
- Describe how each identified hazard will be controlled to the extent that the residual risk is as low as reasonably practicable (ALARP) to allow work to commence and be completed safely.

Particularly for significant risks, Karpowership South Africa will develop action plans (in writing) to reduce the risks to levels as low as is reasonably practicable.

After every completed accident or incident investigation Karpowership South Africa will ensure a review is undertaken of all applicable Job Safety Analysis (JSA) incorporating all the lessons learned and action items.

The following high risks tasks have been identified. **(Note that this listing is not comprehensive ad does not cover all risks):**

Table 2 - High risk tasks

Hazard	Countermeasure
Working alone: There is a danger that, when working alone, you might become trapped or injured and be unable to call for assistance.	*Working alone:* Avoid working alone, but if you have to, maintain good communications with someone responsible for checking on your safety and always notify someone else of your intentions and location before you start. Remember to check your radio before leaving the office.
Lighting: It is the responsibility of the vessel's master to provide adequate lighting — but this is not always possible.	*Lighting:* If adequate light is not available, e.g. by opening hatches or doorways, a suitable IS torch or working light may be used.
Slips and falls: The deck of the vessel might be wet or coated with oil or fish residues which add to the risk of slipping.	*Slips and falls:* Wear appropriate anti-static non-slip shoes/boots. Pay particular attention in the vicinity of deck machinery, where lubricants may be spilt, or if leaking cargo is identified.
Machinery: A variety of machinery may be in use when the vessel is berthed, including: • ventilation equipment; • generators; • winches; • cargo-moving machinery, including fork-lift trucks, cranes, conveyors or elevators.	*Machinery:* Keep well away from moving machinery and wear high-visibility clothing and a safety helmet. Remember: the operator may have a limited view, particularly in the hold. You must observe any instructions from officers or crew. Remember: in tidal basins the ship's mooring lines may require frequent adjustment using winches. Keep well away from these operations.
Ship's equipment: You may be offered the chance to use safety equipment supplied by the vessel. However, you should not do so unless you have been trained how to	*Ship's equipment:* It should not be necessary to use equipment supplied by the master of the vessel. If needed, official equipment should always be used — with the appropriate training.

Hazard	Countermeasure
use it and are satisfied that it is in working order.	
Cold stores: Cold stores may have self-locking mechanisms and may contain a special atmosphere to preserve the goods. They are often maintained at -25 °C or lower.	*Cold stores:* • Always station someone outside the door to call for assistance if you get into difficulty. • Check that there is adequate oxygen and that there are no other hazardous gases in the store before you enter. • Wear insulation clothing to protect you from the cold. • Limit the amount of time you spend in the cold store to make sure your core body temperature does not drop too low.
Contact with oils and other spills: You might come across oil spills or leaking cargo. The oil or cargo could be hazardous, either by contact or by inhalation.	*Contact with oils and other spills:* If you see a spillage or leak from a container, check to see if it has been identified. Unless it has been absolutely ruled safe by a competent person, withdraw immediately and notify the master. Avoid all contact with spills even if they are deemed safe, as you may suffer a skin reaction. Seek proper medical attention if any symptoms occur. **Remember: even chemicals that are safe on their own may react together (or with atmospheric water vapour) releasing toxic fumes or giving off sufficient heat to cause injury or start a fire.**
Excessive noise: Many items of noisy machinery may be at work on a vessel even when it is berthed, including: • ventilation equipment; • generators; • winches; • cargo-moving machinery, including fork-lift trucks,	*Excessive noise:* You should assess the risk and limit exposure or use ear-defenders. Prolonged exposure to even moderate noise levels can damage hearing. **Remember: excessive noise can hinder communication and reduce your awareness of other hazards.**

Hazard	Countermeasure
cranes, conveyors or elevators.	
Confined spaces: Confined spaces on board ships, including: • ballast tanks, • storage lockers, • cargo holds and tanks, and • engine and machinery rooms can pose a wide range of hazards, including toxic fumes and substances.	*Confined spaces:* **Never enter any confined spaces without the appropriate training and equipment.** A risk assessment should always be carried out and permission sought from the master or the deck officer in charge before you enter any confined space.

Karpowership South Africa will implement requirements related to Hazard identification and risk assessment procedure KH-HSE-PR-036.

5.2 Legal and other requirements

Karpowership South Africa will comply with all applicable national laws, including local provincial, municipal bylaws and permit requirements.

As a minimum without limiting the applicability of any law not listed, Karpowership South Africa will ensure compliance to the following:

- Compensation for Occupational Injuries and Diseases Act, 1993;
- Occupational Health and Safety Act, 1993 and all applicable regulations;
- Government Gazette notice no 1235 – Code of Practice Inshore Diving;
- Basic Conditions of Employment Act, 1997;
- Maritime Occupational Safety Regulations, 1994, R 1904;
- Environmental Permits;
- Foodstuffs, Cosmetics and Disinfectant Act, 1972;
- Medicines and Related Substances Act 101 of 1965;
- SAMSA Acts, Regulations and Codes
- Bylaws
    - City of uMhlathuze
    - Nelson Mandela bay Metropolitan Municipality
    - Saldanha Bay Municipality

Compliance audits will be executed in accordance with HSE regulatory compliance monitoring and evaluation procedure KH-HSE-PR-040.

Karpowership South Africa will have a letter of good standing with the compensation fund or with a licensed compensation insurer.

5.3 HSE and Quality Objectives

Karpowership South Africa will set HSE and Quality objectives for relevant functions, levels and processes within its HSE and Quality Management System. Each operational site of Karpowership South Africa will decide which functions, levels and processes are relevant to them. It would be expected that the operational sites of Karpowership South Africa would prioritise objectives to deal with the hazards/impacts associated with the highest risk factors, associated with their site.

When defining its HSE and Quality objectives, the operational sites must take into account the results of the assessment of risks and opportunities, the results of consultation with workers and their representatives and the applicable legal & other requirements.

HSE and Quality objectives will be measurable or capable of performance evaluation, communicated and updated as appropriate. They must also be monitored in order to determine whether they are being met.

Defined HSE and Quality objectives should provide for the following:

- Legal compliance
- Best HSE and Quality management practices
- Minimize complaints, incidents and non-conformances
- Audits and inspections
- Compliance training

6. Support

Support is part of the "Do" step of the PDCA cycle, depicted in figure 2 above.

6.1 Competency

Karpowership South Africa shall provide competency records for the individuals as identified on the organisational chart (refer section 3.5). Karpowership South Africa is to ensure that workers possess the necessary competence, on the basis of the appropriate combination of education, training or experience.

Note: that the term "workers" means all persons performing work under its control under various arrangements: paid or unpaid, full-time or part-time, temporarily, intermittently or seasonally, managerial and non-managerial.

6.2 Training and Awareness

Karpowership South Africa's will follow HSE Training and employee participation instruction Document number KH-HSE-INS-009.

6.2.1 Orientation Training Requirements

Karpowership South Africa's employees and visitors assigned to perform O&M work shall be given a copy of this HSE and Quality manual and shall be required to attend Site Orientation Training. All personnel shall have the opportunity to ask questions on this information prior to starting work. Any unique hazards that exist on a vessel or in the performance of O&M work shall also be discussed during the training.

All Karpowership South Africa employees, contractors, and visitors must attend site specific orientation training prior to their first access to the site/vessel and annually every year after.

Personnel shall not be allowed onto the site/vessel until they have completed the HSE and Quality Orientation Training and successfully passed the HSE and Quality Orientation Training Quiz.

Proof of training will be kept and made available for auditing purposes upon request.

Each Karpowership South Africa operational site / vessel will conform to the training and competency requirements as stipulated in Merchant shipping (Safer Manning, Training and Certification) regulations, 2013.

6.2.2 Specific Training and Competency requirements

Karpowership South Africa will determine the competency requirements of workers in line with legislative requirements.

A worker will be trained, assessed and found competent before he or she will be given authorisation to perform certain tasks or fill certain roles. Where required workers need to be declared competent in Karpowership South Africa rules, processes, procedures and requirements, such as isolation and lock out process and work permitting requirements.

Workers have to be informed of the incidents/non-conformances, related investigations, hazards/aspects and HSE and Quality risks relevant to them, and must be able to stop working without fear of reprisal if they consider that it presents an imminent
danger to their life or health.

The Merchant Shipping (Safe Manning, Training and Certification) Regulations, 2013, as amended, (the Regulations) requires that SAMSA publishes the South African Maritime Qualifications Code (SAMSA Code). The purpose of the SAMSA Code is to give effect to the Provision of the STCW Convention and the STCW Code for the purpose of Training for Seafarers, as well as the medical fitness Standards for Seafarers.

Karpowership South Africa will align with the competency requirements as defined in the South African Maritime Qualification Code Matrix.

Below is an extract from the Part 6 – Occupational Health, Safety and Security SAMSA Code requirements

- Basic Training
    - STA-06-101 – Personal survival techniques
    - STA-06-102 – Fire prevention and fire fighting
    - STA-06-103 – Elementary first aid

- STA-06-104 – Personal safety and social responsibilities
- STA-06-C101 – Checklist for Personal Survival Techniques
- STA-06-C102 – Checklist for Fire Presentation and Fire fighting
- STA-06-C103 – Checklist for Elementary First Aid
- STA-06-C104 – Checklist for Personal Safety and Social Responsibility

- Fire Fighting Training
  - STA-06-301 – Advance Fire Fighting
  - STA-06-301a – Advance Fire Fighting – Refresher
  - STA-06-C301 – Checklist for Advance Fire Fighting
- Medical Training
  - STA-06-401 – Medical First aid
  - STA-06-402 – Medical care
  - STA-06-402a – Medical care – Refresher
  - STA-06-C401 – Checklist for Medical First Aid
  - STA-06-C402 – Checklist for Medical Care
- Security Training
  - STA-06-601 – Security awareness
  - STA-06-602 – Designated security duties
  - STA-06-C601 – Checklist for Security Awareness
  - STA-06-C602 – Checklist for Designated Security duties

In addition to the SAMSA training ad competency the following training will also be conducted. Only accredited training providers with the ability to provide quality training in line with National Qualifications Framework (NQF) standards will be used.

Table 3 - Training and Competancy requirements

Training	Applicable to
General Health and Safety Induction	All employees
Safety Observations and Coaching	All supervisors / deck officers
Health and Safety Representatives	All elected Health and Safety Representatives
First Aid	Refer SAMSA code requirements & R2666 Ship's Officers medial training regulation, 1992
Risk Assessment	All managers and supervisors / deck officers
Incident Investigation	Selected managers, supervisors / deck officers and safety officers
Legal Liability	All managers, supervisors/deck officers and safety officers that carries a legal appointment
Safety Leadership	All managers and supervisors / deck officers

Training	Applicable to
Working at Heights	All employees required to work at height, fall protection plan developer and safety officers
Rescue from heights	All rescue team members and fall protection plan developer
Fall protection plan development	Fall protection plan developer
Fire Extinguisher Use	All employees
Confined Spaces	All Confined Space Officers and Emergency Standby Persons
Isolation and Lockout	All Authorised Persons
Work permit training	All Authorised Persons
Scaffolding erectors	Training as per SAQA published unit standards and SANS10085 section 16
Scaffolding inspectors	Training as per SAQA published unit standards and SANS10085 section 16
Scaffolding supervisors	Training as per SAQA published unit standards and SANS10085 section 16
Mobile elevated work platform (MEWP) and Forklift operators	Licensed as per DMR 18.11 aligned to the lifting machine certification codes published under the OHS Act No familiarisation certificates from equipment suppliers will be accepted as proof of competence
Diver training	Diving Contractor, Systems Technicians, Divers and Emergency Standby Persons
Food handlers training	All food handlers

Only accredited maritime training providers may be used as approved by SAMSA.

6.2.3 Visitors

All visitors must undergo a visitor induction briefing entering the site.
However, this induction does not permit a visitor to enter the site unescorted.
Visitors must be accompanied at all times by an appropriately senior employee who has been fully inducted.

6.3 Communication and Consultation

Karpowership South Africa's will follow Communication protocols as outlined in the Health and Safety Communication Instruction Document number KH-HSE-INS-008.

6.3.1 Leadership, Safety Observations and Coaching

Karpowership South Africa's leadership team (Managers and Supervisors) must participate in the Karpowership South Africa Leadership program or process. Each member of the leadership team must, as part of his normal duties, perform HSE and Quality Observations and Coaching.

6.3.2 OHS Committee meeting

Each operational site/vessel shall in writing establish an OHS safety committee on board a vessel, designating the master to be chairman and appointing the safety officer and every safety representative as members.

Statutory functions of the safety committee:

- inquire into any occupational safety matters that affects a vessel and her crew and take the steps it may deem necessary to remove any hazard or potential hazard
- keep records of recommendations to employers and inspectors;
- where these recommendations do not lead to solving the matter, the committee may make recommendations to an inspector.
- shall discuss, report and keep records of incidents in which someone is killed, injured, or becomes ill,
- shall discuss incidents, injuries, illness, fatalities and may report on an incident in writing to inspector,
- Shall perform functions as prescribed
- Shall keep records of recommendations (3 years)

Minutes of the OHS Committee meetings will be kept.

6.3.3 HSE and Quality Meetings

Regular HSE and Quality meetings are required to create HSE and Quality awareness and to keep employees aware of recent incident / non-conformance analysis, to perform or review HSE and Quality self-inspections, and to discuss relevant HSE and Quality topics.

Karpowership South Africa needs to keep record (minutes) of the HSE and Quality meetings and keep an attendance register.

6.3.4 Toolbox Talks

Regular toolbox talks need to be conducted; toolbox talks will address HSE and Quality issues relevant to the work performed on the site and may include information / knowledge sharing, lessons learnt from incidents/non-conformances that have occurred, information concerning specific hazards /aspects / risks and control measures to prevent injury, ill health or environmental impacts etc.

6.3.5 Documented information

Karpowership South Africa will develop, implement and maintain a documented system of HSE and Quality related manuals, plans, procedures and work instructions. Safe Work Procedures must be developed and implemented for all activities involving significant health, safety or environmental risks.

Documentation required by Karpowership South Africa includes, but is not limited to, the following:

- Letter of Good Standing from the Compensation for Occupational Injuries and Diseases Commissioner (where applicable); Proof of Public Liability Insurance; and scope of work under the contract;
- List of Emergency contacts and their Telephone Numbers;
- HSE and Quality Policy and objectives; and HSE and Quality Management Plan;
- Legal Register (electronic or hard copy, inclusive of permit requirements and applicable bylaws); and Organizational Chart for the project;
- Appointment Letters;

- Register of Risks, Baseline and Job Safety Analysis (JSA), Safe Work Procedures, Work Instructions; Work Method Statements; and Planned Task Observations;
- Inspection Registers, Forms and Checklists
- Emergency Response Procedures;
- Incident / nonconformance records;
- A Employee Personal Profile for each employee;
- HSE and Quality Meeting Minutes;

- Copies of Inspection and Audit Reports and Toolbox Talks;
- QC / QA records
- Performance records
- Environmental Management Plan (EMP); and Waste Management Plan.

7. Operation – Health and Safety

7.1 General Safety Rules

Karpowership South Africa and its personnel, contractors and visitors, shall obey the following general safety rules, the rules are also depicted in figure 3 below:

- All personnel working or visiting the site/vessel for the first time will receive HSE and Quality Orientation Training prior to being allowed access to the site or vessel.
- All personnel must report to work fit for duty and free of the effect of drugs or alcohol.
- Notify your Deck Officer if you are taking prescription drugs that may affect your ability to perform your job safely.
- Personnel shall not consume alcohol or drugs while working or diving.
- All visitors must be escorted while on the site/vessel unless they have completed appropriate training and have been approved for unescorted access.
- Only enter an enclosed space if it has been ventilated and the atmosphere confirmed safe.
- Always protect yourself from falling when working at height or during personnel transfer.
- Verify Isolation before working with stored energy and invisible hazards (e.g., Electrical; pressure).
- When outside of ships rails always wear a Personal Flotation Device.
- Ensure yourself and others are positioned away from suspended loads, stored pressure, moving machinery and snap-back areas.
- Ensure own and others safety during maintenance and testing of lifeboats.
- Ensure spaces are free of flammable materials and gases before working where flame is used or sparks may be produced.

Figure 3 - General Safety Rules

7.1.1 *Operational procedures*

Karpowership South Africa have developed and document procedures and / or work instructions that detail the controls required for effectively managing the health and safety risks associated with its work activities, i.e., for high risk tasks. These procedures reference applicable operating requirements, will be communicated to all relevant personnel, will be made available to the appropriate users, and be implemented / followed.

The table below summarizes the current operational procedures.

Table 4 - Operational Procedures

Document Number	Document Description
KH-HSE-INS-013	Pressure Vessels Instruction
KH-HSE-INS-014	Lifting Equipment Instruction
KH-HSE-INS-015	Color Coding Instruction
KH-HSE-INS-016	Atmosphere measurement Instruction
KH-HSE-INS-017	Hot work Instruction
KH-HSE-INS-018	Working at heigh Instruction
KH-HSE-INS-019	Confined Space work Instruction
KH-HSE-INS-020	Work on scaffold Instruction
KH-HSE-INS-021	Electrical Works Instruction
KH-HSE-INS-022	Underwater Works Instruction
KH-HSE-INS-024	Load Lifting Instruction
KH-HSE-INS-041	Work Permit Procedure
KH-HSE-INS-042	Control of chemicals and hazardous substances Procedure
KH-HSE-INS-043	Personal Protective Equipment Procedure
KH-HSE-INS-045	Hazardous energy resources control LOTOTO Procedure
KH-KPS-PR-020	Waste Management Procedure

7.1.2 *Fit for duty*

Karpowership South Africa is committed to providing a safe and healthy work environment for its employees and contractors and others. In order to provide a safe work environment, personnel will be "fit for duty", be able to perform their work tasks in a safe, secure, productive, and effective manner, and remain able to do so for the duration of the shift.

"Fit for duty" means an individual is in a state (physical, mental and emotional) that enables them to perform work tasks competently and in a manner that does not threaten the health and safety of themselves or others, including negatively impacting the environment.

All personnel shall:

- Manage their health in a manner that allows them to safely perform their work tasks.
- Arrive at the site fit for work and able to perform work tasks in a safe, secure, productive, and effective manner for the duration of the shift.

- Notify their Supervisor or Deck Officer when they are not fit for work and to declare any medication and/or situations/concerns which may have an impact on their ability to perform work.
- Notify their Supervisor or Deck Officer when they observe a co-worker acting in a manner that indicates that they may be unfit for work.

All employees of Karpowership South Africa must undergo fitness assessments (medical examinations) which will be carried out prior to the commencement of employment on the site / vessel and periodically based on an employee's individual risk profile, and on termination of employment.

7.1.3 Heat illness prevention

Heat stress is the total heat burden to which the body is subjected by both external and internal factors. Heat stress may cause heat illness, a physical response designed to reduce body temperature.

Typically, people who are medically unfit and are on certain medications, overweight, have heart disease, are pregnant, abuse alcohol, or are not acclimatized, are at a greater risk of heat stress. Some people are less tolerant of heat than others.

Karpowership South Africa will ensure its employees implement the following controls to reduce heat stress related risks:-

- Replace lost fluids (drink more water, juice, sports drinks or other non-alcoholic drinks). Drinks of 100-200ml water at frequent intervals will be adequate to reduce fluid loss in sweating.
- When the ambient temperature is greater than 40°C a 10 minute rest break in a cool place should be taken each hour. When ambient temperatures exceeded 45°C no outdoor work should be undertaken until the temperature recovers to below 40°C.
- Minimize caffeine, carbonated drinks, alcohol and tobacco use.
- Do not take salt tablets unless your doctor has specifically advised you to do so.
- Inform your direct Supervisor or Deck Officer if you have an underlying health condition that may increase your risk of heat stress.
- Wear cool clothing, a wide brimmed hat and use sunscreen.
- Take a break and inform your direct Supervisor or Deck Officer if feeling dizzy or having trouble concentrating.

7.1.4 High risk work license

Karpowership South Africa should take note that the following activities is deemed to be high risk work activities and requires specialised licencing of operators, no employee is authorised to undertake any of these high risk work activities without the required competencies.

- Scaffolding;
- Rigging work;
- Crane and hoist operation - tower; self-erecting tower; derrick; portal boom; bridge and gantry; vehicle loading; non slewing mobile; slewing; materials

hoist; personnel and materials hoist; boom-type elevating work platform; vehicle mounted concrete placing boom;

- Forklift operation - forklift trucks; order-picking forklift trucks;
- Pressure equipment operation - basic, intermediate and advanced boiler operation; turbine operation; reciprocating steam engine operation.

Karpowership South Africa will keep record of the competency of operators that needs to perform any of the abovementioned high risk work activities.

7.1.5 Personal Protective Equipment (PPE)

Karpowership South Africa's will follow Personal Protective Equipment Procedure KH-HSE-PR-043.

7.1.5.1 General

Karpowership South Africa is responsible to ensure that:

- All PPE is inspected prior to use to ensure it is safe, properly assembled and not visibly defective.
- Personal Protective Equipment (PPE) is maintained in a sanitary and reliable condition. Supervisor will enforce this requirement for all employees and contractors. Damaged or otherwise unserviceable PPE shall be properly disposed of and replaced. Contact the Site Supervisor or the Deck Officer immediately for replacement of damaged items.
- Personnel will be trained and must demonstrate that they understand the following:
  - when PPE is necessary;
  - what PPE is necessary;
  - how to properly adjust, wear and use PPE;
  - the limitations of the PPE;
  - The care, maintenance, useful life and disposal of PPE.

7.1.5.2 Minimum PPE requirements

PPE requirements are based on Job Hazard Analysis (JHA) for the specific work that is to be performed. Minimum PPE requirements have been established for routine work such and visual inspections. These minimum requirements are:

- Hard Hat – SANS 1397:2003 and EN 397:1995
- Safety Glasses – SANS 1404:2009
- Goggles and Welding spectacles – SANS 1400:2010
- Safety Boots –SANS 20345:2014 / ISO 20345:2011
- Work Clothing – No shorts, sweatpants or sleeveless shirts allowed. High visibility protective clothing / overalls with reflective taping (long trousers and long-sleeved shirts). SANS 50471:2006. Site Technicians are required to wear Arc Rated (FR) clothing as part of their regular work uniform.
- Work Gloves – Leather or Dyneema shall be carried if there is a possibility of material handling. SANS 1297:2015.
- When on the vessel a personal floating devise – SANS 12402-4.

Additional PPE requirements must be determined through hazard identification and risk assessment. This hazard-specific PPE (such as hand protection, hearing protection and respiratory protection) must be worn as required (e.g., when in a certain area, when performing a certain task, or when working with a certain substance). The correct PPE must always be worn:

- In accordance with site requirements (as indicated at the entrances to the project site and at the entrances to buildings / areas on the premises);
- In zoned areas (e.g., noise zones and respirator zones); or
- As required by a Safe Work Procedure, a risk assessment, or a Material Safety Data Sheet (MSDS).

7.1.6 Access requirements

Karpowership South Africa will ensure that any visitors / contractors of employees confirm the following requirements:

Prior to entry onto the site/vessel all Contractors and Visitors must:

- Have a reason to enter the site/vessel
- Have proper attire (suitable work clothing appropriate for work at the site)
- Be Fit-for-Duty
- Complete Site Safety Orientation Training.

Note: A visitor is a person who attends the site/vessel solely to conduct a site inspection, attend a meeting, or make a delivery or pick-up (Note: they do no physical work at the site/on the vessel).

7.1.6.1 Access equipment

Access equipment on board a vessel will be in accordance with the Maritime Occupational Safety Regulations, 1994 and summarised in the table below.

Vessel size	Requirement
Vessel < 30 metres	Gangway **or** portable ladder which is appropriate to the deck layout, size, shape and maximum freeboard of the vessel
Vessel >30 metres	Gangway
On board a vessel of 120 metres or more in length	In addition to the gangway An accommodation ladder (including a rope or portable ladder) which is appropriate to the deck layout, size, shape and maximum free board of the vessel

Any rope or portable ladder used as access equipment will comply with the applicable requirements prescribed in the Maritime Code.

A life-buoy with a self-activating light and a separate safety line attached to a quoit or a similar device will be provided ready for use at the point of access to a vessel.

7.1.7 Material Handling and Storage

Prior to undertaking any manual handling activity Karpowership South Africa personnel must evaluate the object and the required task to determine if they can handle the object safely.

Some evidence shows that the risk of back injury increases significantly with objects of a certain weight considering the capability of the employee, so it is recommended to keep the load under that weight while standing. It is recommended not to lift loads exceeding a certain weight while sitting down. All these aspects are assessed in the risk assessment.

In the event personnel are in doubt about whether they can safely move the object by themselves, additional manual or mechanical help should be obtained, or the task should be avoided.

If a heavy object is to be moved to another location, the safest transport route should be determined prior to the activity. The area around the object and the route over which it will be transported should be checked for slip, trip, and fall hazards. Hazards should be removed prior to initiation of the task.

The object to be moved should be inspected for pinch points, grasping or handling hazards, including slivers, sharp edges, grease, water, etc. Eliminate or abate any identified hazards where possible. Safe grasping or handling points on the object should be determined.

OHS Act requirements for the identification, assessment and control of HSE hazards and risks associated with manual tasks should be followed.

Materials shall be stacked, stored, or positioned so it does not create a falling hazard and can be reached safely by personnel and material-handling equipment. All protruding nails, wires and ragged metal edges shall be removed or hammered flush before handling.

The following proper lifting techniques shall be observed at all times:

- Make sure you have a clear path to carry the load, and a place to set it down.
- Bend the knees, place your feet close to the object and centre yourself over the load.
- Get a good hand-hold.
- Lift straight up, smoothly, and let your legs do the work, not your back!
- Exhale as you make the lift.
- Do not twist or turn your body while carrying the load.
- Set the load down slow and controlled.
- Always push a load on a cart or dolly, do not pull it.
- If it's a long load or awkward, get additional help.

- Split the load into several smaller ones when you can.

7.1.8 Hazardous Chemical Substances

Employees shall be familiar with the hazards of all chemical materials in the workplace.

Hazardous chemical materials in the workplace may pose potential health hazards to Employees who are exposed. Employees have a right to know the properties and potential hazards of materials to which they may be exposed.

Chemical materials brought onto the plant shall include a copy of the items safety data sheet (SDS) that is provided to the Site Supervisor or Deck Officer for approval and filing. Copies of all SDSs shall be maintained and be available for review at all times.

Prior to procurement of hazardous substances, a risk assessment must be undertaken, which will enable determination appropriate storage, volumes, emergency response, handling procedures and PPE, and transportation.

Employees should reference the SDS for the safe handling, use, storage, production and disposal of chemical materials.

NO CHEMICAL MATERIALS SHALL BE USED OR STORED UNTIL SDSs ARE RECEIVED AND APPROVED BY SITE SUPERVISOR/DECK OFFICER.

Containers of chemical materials shall be properly labelled to indicate their contents. Labelling on any containers not intended for single-day, individual use shall contain additional information indicating potential health and safety hazards (flammability, reactivity, etc.).

Chemical materials transferred from the original container into another container shall have a label immediately affixed to the new container by the person making the transfer. At a minimum labels will:

- contain the identity of the chemical(s);
- include hazard rating, code or tag; and
- Provide appropriate information so an Associate can match the chemical with the SDS on file with the Site Supervisor/Deck Officer.

Chemical materials when not in use shall be kept in designated chemical storage cabinets or areas.

For more information refer to the Control of chemicals and hazardous substances Procedure KH-HSE-PR-042.

For any flammable liquid local bylaws in terms of registration will apply, should the specified quantities per municipal bylaws are exceeded.

Current applicable bylaws: City of uMhlathuze municipality – bylaws related to flammable liquids and Nelson Mandela Bay metropolitan municipality – Fire services bylaw and bylaw related to fire safety.

7.1.9 Housekeeping / Access / Guards / Barricades

Good housekeeping is fundamental and essential for the prevention of accidents due to slips, trips or falls, and in response to fires or other dangers. Work areas, passageways, storerooms, and service rooms must be kept clean, dry, orderly and in a sanitary condition.

DO NOT block or otherwise obstruct access to exit doors, fire extinguishers, fire lanes, fire hoses, fire hose connections, controls for automatic sprinkler risers or emergency lights.

Holes or openings through floors or decking at all elevations shall immediately be provided with covers or barricades. Material and equipment shall not be stored on a cover. Signs or labelling shall be attached indicating it is a temporary cover and not to remove it unless authorized. Covers shall be cleared, wired, or otherwise secured so it cannot slip off the exposed area, and shall extend adequately beyond the edge of the hole.

Prior to beginning any work that may present potential hazards to individuals, work areas will be inspected to determine the extent of barricading. Barricades must ensure a continuous separation of work activity from people not involved in the work. If adequate barricading cannot be established, then work may not begin.

An employee who creates a hazard is responsible for having it barricaded.

A barricade must be placed guarding all access routes to a hazard where a person could:

- Inadvertently enter a hazardous areas,
- Be unaware of required safety equipment or permission for entry,
- Be uncertain of the safe distance of observation, or
- Be working on an activity and accidentally enter into the actual hazard.

Table 5 - Guidelines for Barricades

Hazardous Condition	Barricade
General Construction	Use barricades to completely isolate the work area
Overhead Work	Use barricades for areas where debris may fall or drop
Excavation (e.g., trenches, open holes)	Use barricades to prevent personnel or vehicles from falling or accidentally driving into excavation. For all excavations open for longer than a standard workday temporary fencing may be required.

Hazardous Condition	Barricade
Tripping Hazards	Use barricades to block-off potential trip hazards (e.g., conduit stubs, piping stubs, holes in floor, uneven surfaces, etc.)
Potential Unsafe Condition	Use barricades when an unsafe condition exists (e.g., incident investigation scene, spill, etc.)
Ladders	Use barricades around the base of the ladders that are located where they can be displaced by workplace activities or traffic)
Energized Lines	Use non-conductive barricades around energized lines or equipment to prevent accidental contact

7.1.10 Notices and Signs

Karpowership South Africa will ensure that all required safety signs and notices are prominently displayed in accordance with the applicable legislation and good safety practice. Signs and notices must be in English as well as any other language(s) commonly spoken on the site/vessel.

All symbolic signs will comply with the applicable standards prescribed by the International Maritime Organisation, the South African Bureau of Standards or the International Standards Organisation. Marine Safety Signs will be in accordance with ISO 3864-1:2002.

No person may deface or damage any safety sign or notice. No person may remove or alter any safety sign or notice unless authorised to do so.

7.1.11 Working at Heights

Karpowership South Africa will ensure that all reasonable means will be investigated and implemented prior to any working at heights is undertaken.

In the event that work must be undertaken at heights, the following principles and or precautions will be undertaken:

- Working at Heights can only be undertaken by trained and competent personnel.
- A fall protection plan must be prepared by a competent fall protection developer.
- All working at heights equipment including scaffolding, work platforms, lanyards, etc. will be required to be inspected by a trained and competent person.

Karpowership South Africa will follow the Working at height instruction KH-HSE-INS-018 and the work permit procedure KH-HSE-PR-041.

7.1.12 Working over water or near a body of water or other liquid

Karpowership South Africa will ensure that when their employees, contractor or of visitors is outside of ship rails, they will always wear personal floating devices.

Suitable flotation devices will also be available and correctly used. All users will be trained in the effective use of floatation devices. The visitor induction will include the use of personal floating devices.

A task risk assessment for working over water or near a body of water or other liquid will be conducted and preventative measures will indicate the effective means of exiting from the body of water.

Persons performing tasks where there is a risk of drowning or entrapment as a result of a body of water or other liquid, the risk assessment shall specifically outline the method of rescue and the person/s shall be assisted by an attendant who is trained, able to raise an alarm and to initiate rescue procedures if so required.

7.1.13 Diving

Karpowership South Africa will ensure that it complies with the requirements as set out in the diving regulations. Each operational site of Karpowership South Africa will appoint a Diving Contractor to fulfil any inshore diving activities. Each operational site of Karpowership South Africa will ensure that:

- A documented health and safety specifications for the diving work is prepared and provided to any diving contractor who is making a bid to perform diving work,
- Each diving contractor is appointed as per the diving regulations.

If an operational site of Karpowership South Africa does not appoint a specific diving contractor and performs the duties of diving work the principal contractor themselves, they must perform the functions of a diving contractor as per the diving regulations.

The following requirements will be followed:

- The Underwater work instruction KH-HSE-INS-022,
- The work permit procedure KH-HSE-PR-041,
- Government Gazette notice no 1235 – Code of Practice Inshore Diving.

7.1.14 Isolation and lockout

Isolation and lockout procedures that make it impossible to inadvertently energise any system or equipment so isolated, will be in place for all work where hazardous energy sources exist.

These procedures will be strictly enforced. The Isolation and Lockout Procedure will incorporate the following basic requirements:

- The issuing of a formal Isolation permit by an authorised person for any work that requires the isolation of any system, plant or equipment;
- The use of defined Equipment, Personal Locks, and multiple lockout systems (i.e. Isolation Bars and lockout hasps);
- Clear identification of all isolation / lockout points ensuring there is no duplication;
- Isolation of the main energy source;
- The use of slip plates or the blanking off of pipelines or ducting, in addition to the chaining and locking of valves, as determined by a risk assessment;
- Suitable methods of preventing the movement of equipment; and
- Methods to test the effectiveness / completeness of the isolation.

Note: No work may commence on a system or equipment until an Isolation Permit has been issued by the Authorised Person; and an Isolation Permit may only be issued by an Authorised Person once all required Clearance Certificates have been issued by appointed Isolation Officers.

Requirements as stipulated in the Hazardous Energy Resources control (LOTOTO) procedure KH-HSE-PR-045 will be implemented.

7.1.15 Personal locks

A Personal Lock must be such that it can only be unlocked by its owner. A Personal Lock must be issued to each employee that requires one and included in the LOTOTO register.

The registration and removal of locks and tags will be in accordance with the Hazardous Energy Resources control (LOTOTO) procedure KH-HSE-PR-045.

7.1.16 Confined Spaces

Confined space means an enclosed, restricted or limited space in which, because of its construction, location or contents, or any work activity carried out therein, a hazardous substance may accumulate or an oxygen-deficient atmosphere may occur, and includes any chamber, tunnel, pipe, pit, sewer, container, valve, pump, sump, or similar construction, equipment, machinery or object in which a dangerous liquid or a dangerous concentration of gas, vapor, dust or fumes may be present. This is in addition to the Job Safety Analysis (JSA) and Pre-Job Briefing that must be completed for all jobs.

Karpowership South Africa will conform to the following requirements:

- Only personnel trained and qualified in Confined Space Entry are permitted to enter a “Confined Space”.
- Trained and qualified personnel may only enter a Confined Space after the completion and approval of a “Confined Space Permit”.

- Calibrated multipurpose gas monitors will be used to measure the air quality prior to entry into a confined space.
- All work performed within a confined space must comply with General Safety Regulations 5 and Section 27 of the Maritime Occupational Safety Regulations, 1994.

Karpowership South Africa will follow the Confined Space work instruction KH-HSE-INS-019 and the work permit procedure KH-HSE-PR-041.

7.1.17 Scaffolding

Karpowership South Africa will ensure that scaffolds comply with SANS 10085.

7.1.17.1 Training, Competency and Supervision

Scaffolding may only be erected, maintained, altered or dismantled under the strict personal supervision of a competent Scaffolding Supervisor (or Scaffolding Inspector) appointed in writing by the Karpowership South Africa operational site.

Scaffolding can only be erected, maintained, altered or dismantled by competent and appointed Scaffolding Erectors (or Scaffolding Builders). It is the Scaffolding Supervisor's responsibility to ensure that all employees carrying out such work are suitably trained and experienced. A certificate of competency issued by a reputable (i.e. accredited and approved) training provider will be produced for each Scaffolding Supervisor and each Scaffolding Erector.

7.1.17.2 Erection and Dismantling of Scaffolding

Only approved scaffolding components will be used to erect a scaffold. Scaffolding will be erected, modified and used in accordance with the manufacturer's guidelines / recommendations, and in strict compliance with all applicable legislation and standards.

Base width to scaffold height ratios prescribed by regulation or by the manufacturer of the components will be adhered to.

If the scaffolding is to be load bearing (i.e. other than normal access and workplace storage) then full calculations and a design will be prepared and authorised in writing by an engineer. The load limits specified by the scaffolding manufacturer will not be exceeded under any circumstances.

Karpowership South Africa will ensure that scaffolds comply with SANS 10085.

Should the scaffolding require earthing, this must be done as soon as possible while the scaffolding is being erected. Scaffolding may not be erected if it is raining or in winds stronger than 35km/h.

A green tag (displaying the words, "Scaffold Safe to Use") or a red tag (displaying the words, "Scaffold Unsafe to Use") will be prominently displayed on each scaffold at all times. The tag will be positioned close to the base of the

ladder / staircase provided for safe access. The wording on the tags must be in English and any other language commonly used on site/vessel. As a minimum, a green tag must display the Scaffolding Supervisor's name, the date that the scaffold was erected, and the date that the scaffold was last inspected. Only an appointed Scaffolding Supervisor may attach, change, update the information on, or remove these tags.

Mobile scaffolding will be fitted with brakes, which must be engaged at all times when the scaffolding is in use. A scaffold may not be moved if any person is on the structure.

7.1.17.3 Inspection of scaffolding

Every scaffold structure must be inspected by a competent Scaffolding Supervisor: Prior to use after erection, and at least weekly thereafter; After inclement weather (heavy rain, strong winds, etc.); After any incident resulting in jarring, tilting or overloading; After any alteration is made; and Before being dismantled.

On completion of an inspection, the Scaffolding Supervisor must update the information on the scaffold tag. A record of each inspection (date and time of inspection, location of scaffolding, findings, etc.) will be captured in a register. The register(s) must be maintained by the Scaffolding Supervisor(s) carrying out the inspections.

7.1.17.4 Identification, storage and inspection of scaffolding components

Prior to erecting a scaffold, all scaffolding components must be carefully inspected by a competent Scaffolding Supervisor.

Components found to be defective during an inspection will be conspicuously marked and removed to a suitably demarcated quarantine area for destruction, repair, refurbishment or removal from the site/vessel. Deformed and bent wedges must be straightened and inspected for cracks before being put back into service.

All scaffolding components will be stored in a demarcated storage area in such a manner that they are not exposed to environmental extremes and will not cause injury to persons. Suitable barricading or fencing must be erected, and warning signage must be posted (e.g. No Unauthorised Entry).

Within a storage area, scaffolding components must be stacked such that pathways (750 mm in width) are maintained between the stacks. Each stack must be stable, and components must be neatly placed to ensure that no ends protrude into any pathway. The various components must be stacked separately. The weight of scaffolding components must be considered when stacking them in elevated positions. Any storage area for scaffolding components must be positioned such that it will not interfere with any onsite activity (including the operation of any plant or equipment), block any access way, or obstruct access to any plant or equipment.

Any Scaffolding work will be performed in accordance with the Scaffold Instruction KH-HSE-INS-020 and the work permit procedure KH-HSE-PR-041.

7.1.18 Electrical Safety

Any Electrical work will be performed in accordance with the Electrical Works Instruction KH-HSE-INS-021 and the work permit procedure KH-HSE-PR-041.

7.1.18.1 Training and Qualifications

Only persons who are qualified and authorized are permitted to perform work on or near exposed, energized electrical equipment or to open enclosures or panels that contain exposed energized electrical parts or equipment.

Persons working on "live" lines or equipment shall have had appropriate training, be competent and familiar with the equipment and be aware of the all the potential risks involved with the work.

7.1.18.2 Basic Electrical Safety Principals

All electrical lines and equipment shall be considered "live" (energized) until proven "dead" (de-energized).

The "live, dead, live" testing method shall be used to prove that a line or piece of equipment is de-energized.

All electrical lines and equipment shall not be worked as "de-energized" until a lockout/tagout is in place

Workers must be insulated from the energized parts with insulated gloves and/or sleeves, or a barrier or guard shall be in place between energized parts and the worker.

Conductive items such as of jewellery or clothing shall not be worn during energized electrical work.

No work to be performed without a valid "Work Permit".

7.1.18.3 Working on or around Electrical Equipment

All persons who work near live electrical apparatus shall understand the hazards and the limits of their movements.

A Safety Observer shall be appointed when persons are working on or near energized electrical lines.

All energized work shall have an "Electrical Work Permit" completed prior to the start of work together with a JSA. Only the authorized personnel can approve and sign off an "Electrical Work Permit".

All insulated hand tools used in close proximity to live electrical equipment must be insulated to the highest voltage likely to be encountered.

Visually inspect all insulated tools prior to use.

Verify that test metering or sensing devices are operating properly and that appropriate settings are used.

Safe approach distances are areas around energized electrical lines and equipment into which no part of a person, equipment or object (other than insulated) may encroach.

Safe approach distances to energized electrical lines and equipment shall be adhered to at all times.

7.1.19 Welding and Cutting works and Machines

7.1.19.1 Arc welding

All welding machines and safety devices will be subjected to regular planned maintenance and a monthly electrical inspections. The inspections must include a test to ensure that the voltage reducer where necessary is functioning properly, by measuring and confirming that the open circuit output voltage is reduced.

Before using a welding machine, the welder must ensure that he is wearing all the required and approved protective clothing and equipment: Welding hood; Leather welding gloves; Safety boots with steel toe protection; Overalls; and any other clothing or equipment necessary to perform his or her work safely and efficiently. Persons assisting the welder must also wear all of the required personal protective equipment.

When changing electrodes or moving the earth clamp, the welder and his or her helpers must wear gloves to avoid possible skin contact with live electrical parts and to prevent burns. When attaching welding cables to the terminals of the welding machine, the welder and his or her helpers must wear gloves, or preferably, the machine should be switched off to avoid possible electric shock.

The welder must ensure that the earth cable follows the shortest practical route between the welding machine and the work piece. The earth connection must be directly between the welding machine and the work piece, and no building or other structure must form part of the earth return path. As far as is practicable, the welder should avoid welding under wet or damp conditions.

When working inside metal vessels or under other conditions where parts of his or her body may come into contact with conducting surfaces, the welder must take precautions to insulate him or herself from such surfaces. When working in confined spaces, the welder must take steps to ventilate the area to prevent inhalation of fumes, which may endanger his health and the health of any assistants. Engine powered welding machines must not be used in any place that is not very well ventilated since the welder and his or her helpers may be overcome by carbon monoxide fumes.

The welder should take the necessary precautions when welding objects that may catch alight, explode or release poisonous fumes or gases.

7.1.19.2 Arc Flash Safety

Depending on the scope and nature of the work, a documented arc flash protection programme must be in place that specifies:

- The methodology for calculating incident energies and determining flash protection boundaries; and
- The PPE required (specific to a task and the equipment on which the task is performed) and associated procedures to mitigate the hazard.

An Arc Flash Hazard Assessment must be carried out based on accurate and current data.

All electrical cabinets where the potential for an arc flash hazard exists must be labelled in accordance with the hazard assessment and the potential incident energies calculated.

A process must be in place for updating the Arc Flash Hazard Assessment and labelling as changes and electrical upgrades occur that might affect the available short circuit current on the system.

7.1.19.3 Gas welding and burning

Welding or cutting torches and hoses shall not be connected to cylinders when stored. When work is stopped and equipment is unattended, all valves at the gas and oxygen cylinders shall be closed. The hoses shall be bled, and a check shall be made for possible pressure build-up.

Torches shall be removed from the hoses prior to putting them into the toolbox. Smoking SHALL NOT be permitted during this stopping procedure.
Special care shall be taken during overhead cutting and welding operations to safeguard and prevent falling sparks from starting a fire. Warning signs shall be posted around and at each level below the area of each overhead welding or burning operation. Fire extinguishers shall be available and fire blankets shall be used for protection.

When welding or cutting, adequate ventilation must be ensured / provided. Hoses shall be kept clear from passageways, ladders and stairs. When hoses are subject to damage, they shall be properly protected. Hoses shall be inspected daily. Fire extinguishers shall be ready for instant use in locations where cutting is performed.

Flash-back arrestors must be fitted to all cutting torches at the torch and at the bottle (a total of four arrestors). Hoses may only be secured using approved hose clips, and not by wire, cable ties or any other means. Special care shall be taken when welding with respect to piping that has been painted, as toxic fumes may be emitted in some cases. The supervisor's advice should be sought prior welding operations being carried out.

Karpowership South Africa's operational sites/vessels will ensure implementation of hot work instruction KH-HSE-INS-017 and the work permit procedure KH-HSE-PR-041.

7.1.20 Safeguarding and operation of machinery

Karpowership South Africa's operational sites/vessels will ensure that every exposed and hazardous part of machinery on board a vessel which is within the normal reach of a person to be effectively safeguarded by means of insulation, fencing, screening or guarding so that it does not constitute a further hazard or potential hazard. And that the insulation, fencing, screening or guarding will be maintained and kept in operation. Relevant machinery will be provided with emergency stops.

Machinery which is in motion, under pressure, at high temperature or electrically alive (including the operation of such machinery for the purposes of the examination, adjustment, repair, lubrication or testing thereof) will be operated and examined by competent employees.

7.1.21 Pressure Vessels

Karpowership South Africa will ensure that inspection and testing will be in accordance with Pressure Equipment Regulations, 2009, for pressure equipment with a design pressure equal to or greater than 50 kPa.

Operational sites of Karpowership South Africa will ensure pressure equipment has a certificate, issued by the manufacturer, including a verification signature by an approved inspection authority when required, which certifies that the pressure equipment has been designed and manufactured in accordance with the relevant health and safety standard incorporated into these Regulations.

Only an organisation holding an approval certificate from the chief inspector shall perform the duties of an approved inspection authority.

Karpowership South Africa will ensure that no pressure equipment is permitted to be used unless it is provided with all the pressure and safety accessories required by the relevant health and safety standard as prescribe by the Pressure Equipment Regulations.

Karpowership South Africa will ensure that inspection frequencies are aligned to the Pressure Equipment Regulations.

Karpowership South Africa will follow the Pressure Vessels Instruction KH-HSE-INS-013.

7.1.22 Lifting plant and equipment

Karpowership South Africa will ensure that the requirements for lifting plant algins with applicable legal and other requirements.

7.1.22.1 Design, Manufacturing and Safety Features

Karpowership South Africa will ensure before any crane / hoist is operated on the site / vessel it must be formally accepted (authorised) by the nominated project management representative. The acceptance process must be based on an inspection and must take the crane's / hoist's safety features and cabin ergonomics (if applicable) into account. The same process must be followed before any crane / hoist is returned to service following any modification or repair. An equipment profile (dossier) will be compiled for each crane.

All lifting plant will be clearly and conspicuously marked with its safe working load.

Where practicable lifting plant will be fitted with:

- A limiting device which automatically arrests any driving effort when the load reaches its highest or lowest safe position
- A brake or other device suitable to holding a load and preventing the uncontrolled downward movement thereof when the raising effort of the lifting plant is interrupted; and
- A hook or load-attaching device so designed or proportioned that the accidental disconnection of a load under working conditions is prevented.
- Fitted with a device indicating the operating radius of the lifting plant at all times while it is in operation; and
- a diagram or indicator indicating to the operator the safe working load of the lifting plant corresponding to its operating radius, if it has a safe working load which varies according to its operating radius.

7.1.22.2 Planning and risk assessment

For each critical lift that must be carried out on site, a documented and detailed lift plan and risk assessment will be prepared to address all associated hazards. Only suitable qualified, competent and experienced persons (lift planners) may evaluate critical lifts and prepare lift plans.

The lifting supervisor, crane operators, riggers and spotters responsible for carrying out a critical lift must have input into the lift plan and risk assessment and must be consulted before these documents are finalised. All lift planners, lifting supervisors, crane operators, and riggers must be appointed in writing

The lift plan for a critical lift will include:

- General Information – crane manufacturer, crane model, items to be lifted, and reason for lift;

- Lift Data – load weight, lifting block and hook weight, hoist rope weight, rigging weight, total weight, height of lift, radius of lift, surface area of load, and centre of gravity of load;
- Rigging Data – sling material (chain, wire rope, or synthetic), sling diameter, sling length, sling configuration, sling capacity, hook type, shackle size and capacity;
- Lift Computation – boom length, jib length, radius of lift, crane capacity as configured, size of outrigger footplates, and wind speed;
- Proximity to Power Lines – mobile cranes working in proximity to energised power lines must operate under a Permit to Work, which must define exclusion zones and spotter duties; and
- Local Hazards and Controls – including the route for the crane, ground stability, proximity of people or equipment, and agreed communication method.

7.1.22.3 Operation

At the start of every day / shift, the operator of a crane / hoist must carry out a pre-operation safety check using a prescribed checklist. The specific requirements of the pre-operation safety check (and associated checklist) must be based on: Risk that addresses all aspects of safe operation of the crane / hoist; and the inspection recommendations of the manufacturer.

As a minimum, the pre-operation safety check will include: A thorough visual inspection of all wire ropes, chains, hooks and safety latches, hook blocks, sheaves, hydraulic hoses, electrical cables, and the general condition of the crane / hoist; Checks to confirm the serviceability of the operating controls; Tests to confirm the correct operation of all limit switches, emergency shutdowns, load indicators, alarms and other safety devices; and A thorough visual inspection of all lifting equipment (tackle) to be used.

Karpowership South Africa will ensure that inspection and controls parameters of lifting and transfer equipment and lifting tools and equipment as defined in Lifting Equipment Instructions KH-HSE-INS-014, Load Lifting Instructions KH-HSE-INS-024 and the work permit procedure KH-HSE-PR-041 will be implemented.

7.1.22.4 Inspection, testing and maintenance

Any crane / hoist brought onto the site will have a current test certificate and record of inspection as well as a suitable checklist (derived from the crane / hoist manufacturer's inspection recommendations) for use by the operator(s) when carrying out pre-operational safety checks.

A register of all cranes / hoists and lifting equipment (tackle) will be compiled and maintained. Each crane / hoist and item of lifting equipment must have a unique identification code or number, which must be referenced in the register.

For each crane / hoist and item of lifting equipment, the following documentation will be kept on site: Test records and certificates; Inspection records; and Maintenance records.

All cranes / hoists and lifting equipment will be inspected, tested and confirmed fit for purpose / accepted safe for use: Before being operated or put into service; Before being returned to service following any repair or modification; and Periodically as follows (unless local regulations require examination more frequently):

- Each crane / hoist (including all ropes, chains, hooks or other attaching devices, sheaves, brakes and safety devices that form an integral part of the crane / hoist) must be thoroughly examined by a competent, experienced and appointed person every 6 months;
- Each crane / hoist must be subjected to an annual performance test (i.e. a load test) by a competent, experienced registered authority; and
- All lifting equipment (tackle) must be thoroughly inspected by a competent, experienced and appointed person every 3 months.

Lifting plant will be examined by a competent person after installation and thereafter at least every 12 months. No lifting plant is permitted to be used unless examined and declared safe in writing.

Test certificates stating that the lifting plant was tested by a competent person will be maintained.

7.1.22.5 Training and Competency

Each operator will meet the competency requirements for the particular class / type of crane / hoist to be operated. Operators need to hold a certificate of competency issued by a recognised training institution.

7.1.23 Operation of vehicles and mobile plant

Karpowership South Africa will ensure that:

- Daily pre-start inspections by the equipment operator. Logbooks shall be maintained and audited and shall be located on the machine.
- A maintenance and inspection program for vehicles and plant.
- Truck loading/unloading procedures - to avoid material or objects falling from the vehicle.
- All equipment operators shall be appropriately licensed and deemed competent prior to operating any equipment at the plant. Licenses and certificates of competencies shall be located with the operator at all times.
- Mobile phones, whether hands free or not, shall only be used by an operator of equipment while it is stationary and in a safe location.

7.1.24 Lift

Karpowership South Africa will ensure compliance with the lift, escalator and passenger conveyor regulations, 2010.
The following documents will be available for each list:

- The name of the manufacturer;
- the year of installation;
- the year of modification;
- the official number contemplated in regulation 3(1) *(a);*
- the rated speed in metres per second; and
- the rated load in kilograms.

In addition to the aforementioned records, the following details will also be kept by each operational site of Karpowership South Africa that has a lift:

- Site name, address and telephone number
- The name, address and telephone number of the competent lift service provider
- A report on the result of every examinations of each list
- Rope certificates and results of examinations
- Technical dossiers and reports as per SANS specifications

All records will be kept for at least 10 years.

7.1.24.1 Inspections and tests

Karpowership South Africa will ensure that lifts are inspected at the following stages:

- After modifications
- After failure has occurred
- Whenever there has been a change in the competent lift service provider
- At intervals not exceeding 24 months thereafter, or at shorter intervals if indicted as such by the risk assessment.

Inspections will only be allowed to be carried out by an approved inspection authority.

7.1.24.2 Maintenance

Karpowership South Africa will appoint a competent lift service provider to examine and maintain their lifts at least once a month.

7.1.25 Emergency Preparedness and response

Each Karpowership South Africa operational site/vessels will compile an emergency response plan. The emergency response plan should be inclusive of any emergency response plans stipulated by permit conditions and should be compliant with all applicable legal requirements.

The plan will be risk-based and documented, and it will detail the procedures that will be followed when responding to various emergency scenarios.

Each Karpowership South Africa operational site /vessel must compile and maintain an up-to-date list of emergency telephone numbers. A copy of this list must be posted near each telephone, and on every notice board.

Each Karpowership South Africa operational site/vessel must conduct emergency response drills to test the effectiveness of the emergency procedures and equipment, and the knowledge and proficiency of the response personnel. The outcome must be documented. Corrective actions must be identified and implemented to address the shortcomings, and the Emergency Response Plan must be amended as required.

Karpowership South Africa will implement the requirements of Emergency Procedure KH-HSE-PR-037.

7.1.25.1 Medical Facility

Each operational site / vessels have a Health unit and a workplace medical services representative (Health Officer) available on 24/7 principle.

Relevant registration and compliance with the Medicines and Related Substances Act 101 of 1965, as amended, will be followed to ensure that medical facility pharmaceutics are stocked and controlled in line with legislative requirements.

7.1.25.2 First aid equipment

Karpowership South Africa will ensure that where more than five employees work on a vessel that a portable first aid kit is available. The minimum contents of the portable first-aid kit will be in accordance with the Maritime Occupational Safety Regulations, 1994. Furthermore, the contents of the first aid box will provide for additional first aid equipment based on the additional risks associated with the work activities as required in terms of Section 3(a) of the General Safety Regulations, 1986.

Karpowership South Africa will implement inspections and requirements of instructions for emergency response equipment as indicated in KH-HSE-INS-012.

7.1.25.3 First aid training

First aid training will be in accordance to SAMSA code requirements & R2666 Ship's Officers medial training regulation, 1992.

7.1.25.4 Lifebuoys and lifeboats

The Karpowership South Africa vessels will be equipped with the minimum number of lifebuoys and lifeboats as prescribed by the Life-savings equipment regulations, 1986.

7.1.26 Hand and Power equipment

The Karpowership South Africa will ensure that hand and power tools conform to the following rules:

- All hand-held power tools and appliances are protected by a Residual Current Device (RCD).
- Where available, only double insulated power tools are used at the site.
- Power tools, leads and plugs are regularly tested-and tagged for external damage or makeshift repairs.

- Do not use tools if the casing, cords or plugs are broken or damaged.
- Do not adjust tools without first switching off and removing the plug from the outlet.
- All personnel required to use hand tools and / or power equipment are appropriately trained to enable the safe operation of such equipment.
- Use the right tool for the job.
- Don't use broken or damaged tools, dull cutting tools, or screwdrivers with worn tips.
- Cut in a direction away from the body.
- Make sure grip and footing are secure when using large tools.
- Keep tools secure at all times when working at heights.
- Pass a tool to another person by the handle - never throw a tool.
- Use the right PPE for the job.
- Never carry sharp or pointed tools such as a screwdriver in a trouser pocket.
- Select ergonomic tools for the work task, particularly when movements are repetitive and forceful
- Ensure tools are always kept in good condition.
- Store tools properly at the end of shift.
- Personnel shall also inspect all hand tools and power equipment on a regular basis. Defective tools or equipment shall be immediately removed and tagged Out of Service or destroyed to prevent further use.

7.1.27 Colour Coding

Karpowership South Africa will ensure that all electrical hand tools (spiral machine, drill, driller, crusher, etc.), electrical equipment (cables, connecting cable, extension cord, projectors, heater, etc.) and ladders are fitted with a colour code label, as indicated in the figure below. The colour coding will be done by competent individuals.

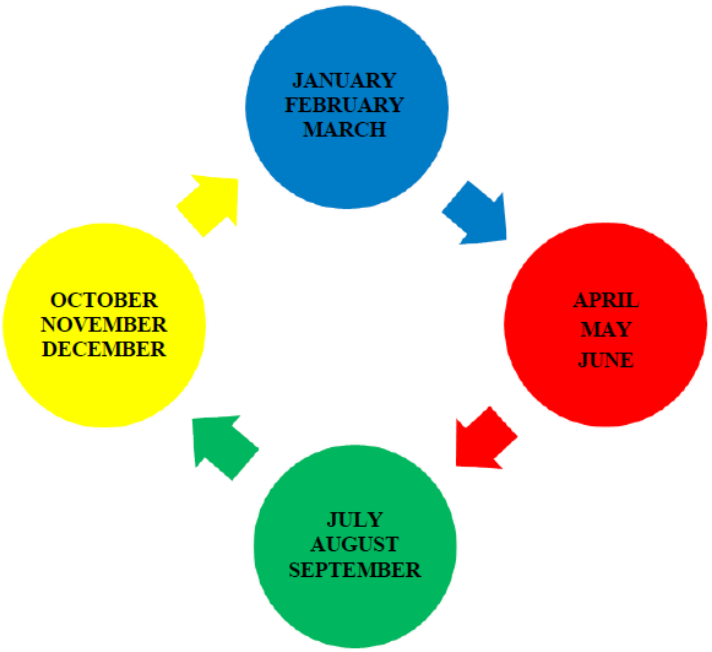


Figure 4 - Colour coding by Month

7.2 Food preparation

The operational site of Karpowership South Africa will ensure that a valid certificate of acceptability has been obtained and is displayed for information on the food premises.

The food preparation areas of the Karpowership South Africa vessels will comply with the requirements of the Foodstuffs, Cosmetics and Disinfectant Act, 1972.

The food preparation area will:

- Have a wash-up facility with hot and cold water for the cleaning of facilities
- Be bird and rodent proof in accordance with the best available method
- Be provided with effective means of controlling and preventing access of flies, cockroaches or other insects
- Have a waste water disposal system compliant with permit conditions.

The microbiological monitoring of the food preparation area, appliances and equipment will be done, in accordance with regulatory requirements to ensure that it is within acceptable microbiological counts.

Food prepares will not be allowed to handle food without wearing suitable protective clothing, consisting of:

- Protective clothing,
- Hear and beard nets

All food prepares will be training in accordance with the relevant SETA / SAQA requirements, including the principles and practices of food safety and hygiene.

Food waste management will be in accordance with the Waste Management Procedure KH-KPS-PR-020. The cleaning regime will include the regular disinfecting of refuse bins.

Sufficient provision will be made to allow for regular handwashing with clean water and soap for Food Handlers.

Food handlers will be required to undergo a food handler medical to confirm that they are not carriers of a disease or condition in its contagious stage.

Control measures will be implemented to ensure that relevant cooling facilities, maintains the legally prescribed core temperatures at all times.

7.3 Disaster Management

If the Karpowership operational site/vessels are classified as a major hazard installation, the requirements of Major Hazard Installation Regulations, 2001 will be implemented.

In addition to the aforementioned regulation, the City of Umhlathuze, Disaster Management Bylaw will apply to the Richards bay installation.

7.4 COVID-19 Requirements

Karpowership South Africa will ensure that the response to the COVID-19 outbreak is continually updated to ensure the legislative requirements as published and the information from the department of health regarding the management and prevention protocols are complied with.

Each Karpowership South Africa operational site will develop and implement a safe contingency plan that details the Karpowership South Africa's action plan with regards to the requirements to manage the possible exposure of its employees, contractor employees, visitors and suppliers. This plan will be in effect for the duration of the outbreak.

Prior to entering site, Karpowership South Africa will ensure that the screening process is implemented and that each employee, visitor and supplier that wants to enter the site / vessel is screened. Karpowership South Africa must ensure that social distancing is practiced during this time. Karpowership South Africa will ensure that an identification process is implemented to identify employees that has been screened.

Karpowership South Africa will ensure that all staff is trained on the hazards / risks and preventative measure regarding the sub-microscopic biological agent "Covid-19 Coronavirus", the training and assessment of risk shall be recorded and acknowledged by all in writing.

Karpowership South Africa will ensure that the complete process from employee transportation to site/vessel, up to the safe return to home is managed by the plan developed.

Karpowership South Africa will identify the process with which visitors and deliveries will be managed in line with the control measures stipulated in the baseline risk assessment. Karpowership South Africa will ensure that sufficient hand wash facilities and hand sanitizer is available to employees.

Karpowership South Africa will define a cleaning and sanitizing regime that will be implemented for all office areas, all eating and smoking areas, all stores and all communal areas employees would be required to use. This will include all requirements for cleaning to be done by individuals for their own desks, cutlery and crockery.

Karpowership South Africa will ensure that activities on-site is so scheduled and planned that the requirement of social distancing is not breached and that employees working in areas do not perform activities in such a way as to expose themselves or other employees to possible infection.

8. Operation – Environmental

Karpowership South Africa is to take note of any environmental permits and associated EMPr with the aim to:

- Comply with all conditions of the environmental authorisation;
- Encourage good management practices through planning and commitment to environmental issues;
- Define how the management of the environment is reported and performance evaluated;
- Provide rational and practical environmental guidelines to:
  - Minimise disturbance of the natural environment;
  - Prevent or minimise all forms of pollution;
- Comply with all applicable laws, regulations, standards and guidelines for the protection of the environment;
- Adopt the best practicable means available to prevent or minimise adverse environmental impacts;
- Develop waste management practices based on prevention, minimisation, recycling, and correct treatment or disposal of wastes;
- Describe all monitoring procedures required to identify impacts on the environment; and,
- Train employees and contractors with regard to environmental obligations.

Each Karpowership South Africa operational site / vessel will supply an Environmental Management Plan (OEMP), inclusive of waste management. Requirements asper Waste Management Procedure KH-KPS-PR-020 will be followed.

8.1 Occupational Health and Hygiene

Karpowership South Africa will measure the exposure or potential exposure of his employees to any of the following stressors assessed and measured (a baseline survey must be carried out by an Approved Inspection Authority): Noise; Thermal stress (heat and cold); Particulates (dust); Gases or vapours; Chemicals; Ionising radiation; Non-ionising radiation; Vibration (hand / arm vibration and whole body vibration); Ergonomics and Illumination.

If it is determined that exposure levels for a particular stressor are unacceptable, then a monitoring and control plan must be implemented to manage any risk of overexposure.

Each Karpowership South Africa operational site / vessel will confirm to requirements as stipulated in Atmosphere measurement instruction KH-HSE-INS-016.

Relevant risk assessments will be amended to reflect the risk profile based on the exposure results and preventative measures will be aligned with the recommendations from the Approved Inspection Authority.

Typical inspections that will be conducted is as follow:

- Weekly health and hygiene inspections will be carried out of the accommodation area, personnel meeting rooms, washrooms, infirmary, kitchen and freezers and dry provision rooms. (Refer checklist KH-KPS-FR-049 and KH-KPS-FR-240)
- All fans in the plant/vessel will be listed according to their sections and control points and will be checked monthly. (Refer checklist KH-KPS-FR-086)

8.2 Permit Conditions

The Karpowership South Africa needs to take note of any environmental permit requirements.

8.2.1 Waste management

All effluent and sold (general and hazardous) waste will be removed by authorised service providers in term of legislation and TPNA and MARPOL requirements.

Discharge of oil, noxious liquid substances, and sewage from vessels into marine environment is prohibited. All black (sewage water) and grey (washing and kitchen) wastewater generated during operation of Powership facilities will be removed by authorised service providers for appropriate off-site treatment and disposal.

Any medical waste will be managed in accordance with local bylaws and the South African National Standard, SANS 10248: 2004: Management of Health Care Waste. Current applicable bylaws include City of uMhlathuze – Environmental Health Bylaws and Nelson Mandela Bay Metropolitan municipality – Waste Management Bylaws.

8.2.2 Water management

Karpowership South Africa is responsible to ensure that the required testing of water to ensure compliance with the permit conditions and efficient operation of the site / vessel needs is done within the defined frequency and sampling methodology. It is inclusive of:

- Testing incoming water for compliance with water treatment and boiler requirements
- Testing effluent for compliance with discharge requirements.

8.2.3 Emergency Preparedness and response

In addition to requirements stipulated in section 6.1.24 Karpowership South Africa needs to ensure that the emergency preparedness plan include any permit conditions, as stipulated.

Each Karpowership South Africa operational site/vessels will compile an emergency response plan. The emergency response plan should be inclusive of any emergency response plans stipulated by permit conditions and should be compliant with all applicable legal requirements.

The plan will be risk-based and documented, and it will detail the procedures that will be followed when responding to various emergency scenarios.

Each Karpowership South Africa operational site /vessel must compile and maintain an up-to-date list of emergency telephone numbers. A copy of this list must be posted near each telephone, and on every notice board.

Each Karpowership South Africa operational site/vessel must conduct emergency response drills to test the effectiveness of the emergency procedures and equipment, and the knowledge and proficiency of the response personnel. The outcome must be documented. Corrective actions must be identified and implemented to address the shortcomings, and the Emergency Response Plan must be amended as required.

Karpowership South Africa will implement the requirements of Emergency Procedure KH-HSE-PR-037

9. Operation – Contractor and Supplier Management

Karpowership South Africa will ensure that processes are in place to ensure that the HSE and Quality risks associated with the procurement of materials, equipment, services and labour are effectively managed.

Where work is performed by a mandatory (registered service provider), there will be a 37.2 agreement between every service provider / contractor and Karpowership South Africa.

Karpowership South Africa is to ensure that Contractors and Suppliers comply with:

- All relevant statutory and other legal requirements
- All security, health, environmental and safety regulations, policies, codes of practice and rules
- All Facility/Vessel rules and regulations.

Karpowership South Africa will manage contractors and suppliers in accordance with Subcontractor and Contractor management Procedure KH-HSE-PR-034.

10. Operation – Quality

10.1 Quality Management Process

Karpowership South Africa will ensure a quality management process, consisting of the following is implemented:

- Quality planning - identification of the relevant quality standards and the determination of how to satisfy them. The output from quality planning is a quality management plan that documents how Karpowership South Africa team will implement its quality policy. It addresses quality control, quality assurance and quality improvement for the Facility/Vessel. In addition, it includes operational definitions or metrics (explicit descriptions of what something is and how it will be measured) and checklists (to verify that a set of required steps has been performed or that a set of required features have been included).
- Quality assurance - evaluating overall facility performance on a regular basis to provide confidence that the facility will satisfy the relevant quality standards.

Quality audits (structured reviews of other quality management activities) play a key role in quality assurance. Quality assurance results in quality improvements.

- Quality control – which is the monitoring of specific results to determine if they conform to the relevant quality standards and the identification of ways to eliminate the causes of unsatisfactory performance. Inspection using checklists as a guide and trend analysis are key elements of quality control. Quality control results in quality improvements, process adjustments (immediate corrective or preventive action) and rework. Since rework is a frequent cause of cost and schedule overruns, the goal of quality management is to minimize the amount of rework required and get it right the first time.

Quality Assurance will be implemented and maintain a quality assurance system that covers at least the working procedures of the examiners and Registrar, as required by Merchant Shipping Regulations, 2013.

10.2 Testing and sampling

Karpowership South Africa is to ensure that the minimum quality and testing requirements is documented in a testing and sampling plan. This plan should include testing of the Facility and Vessel as well as storage of samples.

In process verification checks and measurements to determine if acceptance criteria are met should be stipulated in the testing and sampling plan.

The sampling methodology should be documented by Karpowership South Africa.

10.3 Handover process

The commissioning handover process is typically done in 3 stages:

Stage 1 - Commissioning of Individual Equipment

This stage of commissioning consists of the complete inspection, testing and operation of each piece of equipment individually, checking that electrical control and power wiring has been connected to the equipment correctly and checking the configuration and calibration of each instrumentation loop. It is the normally the Installation Contractor's responsibility to direct and carry out this stage.

Stage 1 commissioning. The responsible Engineer will provide technical assistance where necessary and will approve the inspections and witness the tests.

Stage 2 - Commissioning of Systems

This stage of commissioning consists of successfully testing and operating the equipment grouped together into modules or system. Stage 2 will be directed by the responsible Engineer; any related work will be done by the Installation Contractor. At the end of Stage 2 commissioning, the Installation Contractor will have corrected any deficiencies which the Engineer deems necessary to proceed with Stage 3 commissioning (start-up). The Engineer will then prepare a list of the Installation Contractor's remaining work deficiencies, to which the Contractor will agree in writing to remedy.

The Contractor shall correct these, and any other deficiencies covered under his responsibilities and warranties as defined by the Installation Contract.

To signify the completion of Stage 2 commissioning, the Installation Contractor, Engineer and Owner's representative will sign a Handover Certificate (accompanied with a Deficiency List) mentioned above. The signing of this document hands over the module or system, from the Contractor to the Owner.

Stage 3 - Start-up

This stage of commissioning consists of placing the plant into operation by the Owner. Any assistance of the Contractor will be called for on an additional work basis.

10.4 Calibration

Karpowership South Africa is to ensure that all monitoring and measuring devices used to certificate the conformity to standards are controlled and calibrated on a regular basis and are in any respect in accordance with the technical requirements. Calibration and verification should be traceable to a recognised local South African standard.

Calibration check and re-certification will be once every 12 months. However, the frequency for a calibration check of a measuring instrument will depent on depend on the operating conditions of the instrument.

11. Performance Evaluation

Karpowership South Africa will develop a process for measuring HSE and Quality performance. Metrics must include leading and lagging indicators and be based on qualitative and quantitative data. H&S Performance measuring and monitoring procedure KH-HSE-PR-035 will be used as guideline.

Performance must be measured on a regular basis and this must include an evaluation of: The extent to which objectives are being met; Progress against targets; The effectiveness of controls; Proactive conformance measures; and Reactive or historical performance measures.

11.1 Audits

Karpowership South Africa needs to implement an audit programme to evaluate the Karpowership South Africa's performance on a regular basis and provide confidence that the O&M activities will satisfy the relevant HSE and Quality standards.

The intent is to ensure that:

- HSE and Quality management activities have been identified and scheduled in the Execution Plan/schedule and completed as planned
- Action items resulting from HSE and Quality management activities are being acted upon
- HSE and Quality management activities actually add value by improving quality.

HSE Site control and audit procedure KH-HSE-PR-038 will be followed.

11.2 Inspections

Karpowership South Africa will implement a process to conduct regular HSE and Quality inspections to ensure compliance with legal, compliance and Owner requirements.

Legally required and Karpowership South Africa required inspections have been documented in the applicable referenced procedures and sections of this Manual.

12. Improvement

12.1 Incident, nonconformity and corrective action

Karpowership South Africa will establish a procedure for the management of all incidents and nonconformances. The procedure will outline the methodologies and processes that will be followed for:

- Recording an incident and nonconformance;
- Investigating an incident and nonconformance;
- Analysing the impact(s) and the potential risk of future incidents and nonconformances;
- Communicating information concerning an incidents / non conformances to relevant persons / groups; and
- Managing corrective actions to prevent a reoccurrence.

Arrangement will be in place to ensure that proper medical care is provided to any employee that suffers an occupational injury or illness.

Requirements per Incident Notification, Investigation and Reporting Procedure KH-HSE-PR-044 will be implemented.

Reporting of incidents will be in accordance with Risk and Near miss notification instruction KH-HSE-INS-010 and Hazard alert and lessons learned instruction KH-HSE-INS-011.

12.2 Reportable incident and occupational diseases

12.2.1 Reportable incident

The Occupational Health and Safety Act (OHS Act) is minimum standard legislation providing among others for the health and safety of persons at work, and for the health and safety of persons in connection with the use of plant and machinery.

Reportable incidents include events where any person:

- dies;
- becomes unconscious;
- suffers the loss of a limb or part of a limb; or
- is otherwise injured or becomes ill to such a degree that he is likely either to die; or
- suffer a permanent physical defect; or
- is likely to be unable for a period of at least 14 days either to work or to continue with the activity for which he was employed or is usually employed.

According to subsection (c), the following incidents endangering the health and safety of any person must also be reported to an inspector:

- where a dangerous substance was spilled;
- where the uncontrolled release of any substance under pressure took place;
- where machinery or any part thereof fractured or failed resulting in flying, falling or uncontrolled moving objects; or
- where machinery ran out of control.

According to regulation 7 of the General Machinery Regulations, the following incidents involving machinery must be reported to an inspector:

- Where machinery ran out of control as a result of the failure of a control or safety equipment and could have caused an injury to a person who had been conveyed on or in such machinery or had been in the vicinity thereof; or
- the fracture or failure of any part of machinery in which gas is under pressure resulted in the sudden release of such gas.

Please note that the incident site may not be disturbed without the consent of an inspector in the case where a person:

- Dies
- Loss of limb or part of limb
- Is likely to die

You may however:

- Remove the injured or dead
- Rescue persons from danger

An incident must be reported on the same workday or shift on which it occurs. Reportable incidents must be reported on Annexure 1, within 7 days of the incident.

12.2.2 Occupational Diseases

Occupational diseases are illnesses caused by substances or conditions that the worker was exposed to at the workplace.

Karpowership South Africa will inform the Compensation Fund when their employees contract a disease or die after being exposed to a health hazard in the workplace.

An occupational disease will be reported within 12 months of the injury, diagnosis of a disease or the date of death.

+ 27 (0) 12 665 1465 | elaine@oxygentwentyone.com | www.oxygentwentyone.com

1. PURPOSE

The purpose of this plan is to define the competencies and responsibilities to ensure the planning of teams and actions that would provide the most immediate effective emergency response and reducing the loss of life and property before, during and after emergencies that may occur at Karadeniz Powership Osman Khan plant.

2. SCOPE

This plan includes/ covers facilities, goods and supplies belonging to Karadeniz Powership Osman Khan and temporary and / or permanent staff, subcontractors, visitors, interns, customers, establishments working in their fields.

3. RESPONSIBILITIES

Country Manager / Coordinator: Approves the emergency plan. Provides the resources. Executes the emergency coordinator task.

Plant Manager: Responsible for coordinating all the requirements for Emergency Response. In the absence of the plant manager, the plant manager assistant takes over the task. Emergency coordinator assistant executes the task out.

Deck Office Management: Delivery of the plan, including new staff - informing the staff about the emergency situations and the ways of response,

Responsible for the identification, updating, control, maintenance and procurement of emergency documents and equipment.

Plant OHS Department: OHS Department and Deck Office are responsible together for monitoring the fulfilment of the requirements of the Emergency Plan and informing the facility management of any inconsistencies / incidents, and for initiating corrective actions and monitoring their results.

Headquarter OHSE Department: The HQ OHSE Department is responsible for the control and coordination the implementations of this plan by Karadeniz Powership Osman Khan Plant. Audits the Emergency Response Plan prepared by the plant is functional and updated.

Plant Employees:

All plant employees are responsible;

- To follow the precautions taken within the particulars specified in the contingency plan,
- To notify immediately the nearest responsible supervisor or employee's representative when they encounter an emergency situation that would harm the health and safety of themselves and other persons in the machinery, equipment, vehicles, equipment, facilities and buildings,
- To comply with the instructions of the emergency team from the plant management and from out site team in order to rectify the emergency.
- To act in a way that does not put in a risk the lives of himself and his friends during emergencies,
- To act in such a way as not to block access to the emergency area and equipment during the period of the plant works,
- If there is a role of him/ her in the emergency response organization, he/she is responsible to perform the task in according with the theoretical and practical trainings taken.

4. RELATED PROCESSES

BB-040 KPS Business Management

İSG-010 Occupational Safety

İSG-020 Occupational Health

İSG-030 Environment Management

5. TERMS

Emergency: The event which is unplanned and may require emergency response or evacuation that causes injury or death of people include employees, client, visitors, such as fire, oil/fuel pollution, rescue from confined space, work accident, adverse weather conditions, civil war, terror attack, epidemic-pandemic diseases .

Emergency coordinator / assistant: Responsible for managing the emergency response teams and provides all coordination in case of emergency and/ or after.

Emergency Teams: Assigned by Emergency Coordinator and responsible for managing in case of emergency. Responsibilities. Roles and responsibilities and teams are defined in Emergency Response Instruction.

Emergency Management: It is a management model for preparing the plant for actions to be taken, identifying risks for emergencies, intervene and mitigating the damages that may occur.

Emergency Plan: The plant that includes information about the task and operations to be carried out in case of an emergency, which may lead to response, as well as actions for response.

Risk Assessment: Determination of the hazards that may exist in the workplace or that may arise from outside, the analysis of the factors that cause to be risky, the risks arising from the hazards, and the determination of the control measures.

Accident: An event that causes injury or death in the workplace or during working, or brings the body to a state of being spiritually disabled or physically disabled.

Plant/ Facility: Karadeniz Powership Osman Khan.

Plant Work Places: Warehouse, social life area, office, cafeteria, accommodation, etc., workplace extensions established outside the facility to support facility operations.

Evacuation: The process of leaving from the areas in a series and cool manner after mechanical, automatic or human voice warning or without warning.

Evacuation Escape Route: The route/ road used for the evacuation process, which is free from the sources of hazards and marked with the warning signs.

Muster Point: The place where the personnel to be evacuated in a safe area identified before and away from the hazards.

OHSE: Occupational Health& Safety, Environment

Employee: Personnel located in Karadeniz Holding or sub-contractor payroll who is responsible for ensuring/ maintaining the plant operations.

Visitor: Person visiting for procurement, inspection, training, interview subject and who are not directly involved to plant operations.

6. EXECUTION PRINCIPALS

This emergency response plan to be prepared/reviewed and submitted to country management for each facility.

The emergency plan will be partly or completely reviewed and renewed if there is a situation which may affect the existing emergencies or cause new emergencies.

6.1. Preparing the Emergency Plan

It is the basic principle to see the possible emergencies in advance and manage to handle the emergencies with minimum damages while preparing the emergency response plan.

Emergency plans are created out to minimize and control damages that may occur during and after defined emergency situations.

The following points are taken into account in the preparation of the Emergency Plans;

- The measures to be taken in relation to the hazards within the scope of emergency shall be determined in the emergency plan,
- Determination of the most common type or size of an emergency or event by risk assessment studies,
- Determination of the most suitable response methods to be done in case of accidents and/ or emergencies,
- Determining the methods of providing internal and external communication (such as neighbours, local people, governmental organizations, private organizations) in possible emergency situations,
- Identification of the activity or activities to be carried out in order to reduce the impact for identified emergency situations and to response,
- Performing incident investigations after emergencies / accidents, initiating corrective actions and monitoring the results,
- Emergency practices, awareness of employees within framework of their actions, the implementation of exercises to measure the preparation processes and competences,
- Planning and implementation of emergency trainings,
- Identification of necessary communication information for internal and external communication,
- Identification of areas such as Evacuation Routes, Muster Points, Warning Signs, Exit Doors,
- Determining possibilities for emergencies or accidents that may occurred in the neighbourhood or around of plant,
- Establishing mutual protocols for taking support from neighbour organizations,

Emergency plans are prepared by Deck Office Management and Plant OHS Department by taking the opinions of units and personnel related the above mentioned topics and announced to all employees by e-mail, announcement, communication panels and training after passing Head Quarter OHSE Department, Country and Plant Management approval.

6.2. Emergency Response Teams and Trainings

Authorized personnel for '' Searching, rescuing (Maritime Support Team), Fire Fighting, Extinguishing (Fire Team), First Aid (First Aid Team), Electrical and Mechanical System Security (Technical Team) 'teams established within national and international legal requirements, and the staff who have received training related with their duties from institutions and organizations. When the training is given, "KH-KPS-FR-007-00 Training Form given by the authorized company person" will be used.

6.3. Communication in case of Emergencies

The Emergency Contact List which is provided by the Deck Office Management, to be updated when necessary and posted to appropriate locations which shows all phone numbers and related personnel in case of an emergency.

Within the boundaries of the plant and in case of emergencies in neighbors, emergency calls shall be made by the radio, alarm ring, telephone or voice, depending on where the person location who saw emergency.

Detailed information such as the exact place of the incident, what has burned at the time of the fire, the size of the event, the number of person effected, and their status are reported.

In case of emergency, a long continuous siren is played in everywhere of the plant. It is informed about the type and content of the emergency by the general announcement circuit and the radios.

Teams and response/ intervention methods in according with the content of the emergency are explained in the Role Chart and Emergency Instructions.

The information required for external communication is defined in the Emergency Contact List. This information may include local support where emergency assistance is available; all local public and private organizations (epidemic prevention centers, World Health Organization local authorities, etc.) foreseen to receive support, police units, fire departments, hospitals, ambulance services, emergency contact information of the establishment to which the facility is connected, contact center, private establishment fire station, etc.) are added to the list. The relavent central units of the Karadeniz Holding (HQ OHSE Departmant, KH operation, fuel fleet, etc.) should be included in this list.

6.4. Drills

In order to ensure that the emergency plan can be followed and implemented on a regular basis, implementation exercises are carried out on possible emergency situations identified in the plan. These implementations are coordinated by the Plant management. Exercise topics and times are detailed in "KH-KPS-PL" Training Plans. The exercises to be carried out during the year include, but are not limited to, the following subjects;

- Emergency - abandon the Plant / evacuation
- Emergency - medical response
- Fire Fighting
- Man over board
- Combating with chemical spill

- Confined/ enclosed space rescue
- Work at height rescue
- Natural disasters
- Flooding in Plant
- Sabotage / terrorism
- Heavy Weather Conditions / Tsunami

The drills are evaluated and registered to the **"KH-KPS-FR-023"** Role Drill Registration Form and shared with the Headquarters HRD department by the way of QDMS.

Following the exercise; if there are deficiencies in the behaviour of the persons, the trainings are given again, if there are deficiencies in the environment, necessary corrections are made and if there is a deficiency in the procedure, plan and / or instructions, the methods of the Emergency Coordinator (Country Coordinator / Country Manager / Facility Manager) are revised in accordance with the recommendations, the related documents are updated when necessary, corrective and preventive actions are implemented in according with the "KH-KPS-PR-003'' Corrective Actions Procedures.

Drill intervals are determined to meet minimum requirements of international standards (SOLAS, ISPS Code, IMO, MARPOL etc.) Thus, fire and evacuation drills are performed at least once in every month. (SOLAS, Chapter III, Part B, Regulation 19)

Security drill is performed once in every 3 months and/or 25% of total crew replacement. (ISPS Code, Section 13)

Confined space entry and rescue drill is performed once in 2 months. (SOLAS, Chapter III, Part B, Regulation 19)

6.5. Post-Incident Investigation Reporting

Incident Investigation and Reporting to be prepared after the emergency event is conducted analysed and reported according to the KH-HSE-PR-025 Incident Investigation and Reporting Procedure.

6.6. Identification of Incidents within scope of Emergency Situation

6.6.1. Emergency Preparations

- Preparing the emergency plan, testing it and updating it as needed at specific time periods
- To be successful in case of emergencies, the organization is well structured and responsible are determined
- Supplying necessary tools and equipment for providing the fire safety for fires that may be caused by flammable and combustible materials used in the Plant,
- Establishing an alarm system that can be heard from all side of the plant so that personnel can receive immediate information in case of an emergency
- Training and certification of employees by authorized person/ personnel for the implementation of emergency plans,

- Providing first aid cabinets and kits in Plant and the use at appropriate located places.
- Determination of escape routes and Muster Points and making markings. Markings are selected and placed in accordance with the IMO regulation and "regulation of health and safety signs".
- Ensuring all the emergency equipments and fire extinguishers, escape routes, stairway entrances and exits are clear at all times and provide clear route to escape and response.

6.6.2. Emergency Response Resources and Equipments

- Announcement of the names, titles and telephone numbers of the personnel related in the emergency plan, placing to appropriate locations, the announcement of the contact details of the security forces, the fire department, hospital, Emergency Service and nearby health facilities etc.
- Determination of the number and location of emergency equipment (portable and stationary fire extinguishing systems, fire fighting equipment, escape air cylinders, life rafts, etc.) in accordance with the SOLAS and NFPA criteria,
- Risk assessments are made on dangerous subjects, all kinds of work tools, materials and ground, initiating preventive measures for them and taking precautions.
- Taking all kinds of precautions for fire fighting, making periodic inspections of fire fighting equipments and maintenance of them without interruption,
- Ensuring that periodic inspections of electrical and grounding installations are carried out on time
- Regular maintenance of fire pumps, generator, sailboat, machinery and equipment,
- Emergency lighting controls are done and they are in sufficient condition for operation,

6.6.3. Determined Emergency Situations

Emergency situations that may occur in the Plant or around Plant determined within the scope of the Plant activities, in the work places (warehouse, workshop, social area, etc.) in Plant are not limited with the following points but their results are listed;

- Fire and Explosion
- Oil / Fuel and Chemical Pollution (more than 500 lt)
- Man Overboard
- Confined/ enclosed Space Rescue
- Death or heavy injured incidents
- Terror Attack
- Internal and External War Situations

- Strong Wind-Storm (8 in the Bofor Scale and above)
- Earthquake
- Leakage of Gas and Poisining
- Collision
- Epidemic-pandemic diseases

6.7. Inspection and Review

Emergency drill results, emergency situations and measures taken are annually examined out with the Internal Audits, "**KH-CD-PR-002 Internal Audit Procedure**" in according with the ISO 14001 Environmental Management System and OHSAS 18001 Occupational Health and Safety Management System Standards, corrective actions are carried out within the scope of **"KH-KPS-PR-003 Corrective Action Procedure"** if deficiency / impropriety is detected.

Emergency drill results, emergencies and precautions are also periodically reviewed and evaluated under the **"KH-KPS-PR-001 Communication Procedure"** as follows below.

- In the Plants, the Plant is evaluated and corrective actions are taken at the OHSE and Security Committee meetings held with the participation of the OSH Department, Plant Manager, Assistant Plant Manager, Shift Supervisors, Maintenance Supervisors, Deck Officers, Health Officer / Doctor and Employee Representative. These meetings are recorded with **"KH-KPS-FR-013 OHSAS, Safety, Security and Environment Committee Meeting Report".**
- It is evaluated and corrective actions are determined and followed up annually at the Executive Committee meetings held with the participation of the Country Top Management, Plant Manager / Assistant Plant Manager, Integrated Management Representatives and relevant departmental representatives.

6.8. Risk Evaluation Review

Risk analysis of each plant is reviewed after any emergency incident identified within this procedure and the framework of the relevant standard, rule, local/international regulations has taken place. Risk analyzes are revised according to "**KH-KPS-PR-004 Risk Analysis Procedure**" according to need for revison.

7. PROCEDURAL STEPS

Temporary and / or permanent staff, subcontractors, visitors, trainees and customers working in the Karadeniz Powership Osman Khan and areas defined in the scope are obligated to comply with this plan. Necessary actions will be taken for employees who do not comply with this plan.

7.1. General Emergency Action

In case of an emergency, the general actions to be taken by the employee on the Plant or at the Plant units are shown in the flow chart below.

When an emergency situation is detected;

- The employee who detect the emergency activates the alarm by pressing the nearest alarm button,
- Inform his/her supervisor or the responsible he/she can reach about the emergency

When the emergency alarm is heard;

- Employees secure the work area and the equipment they use and leave the work place in such a way as not to create an additional hazard,
- The visitors will follow the employee who is responible for them or introduce themselfves to the nearest person and follow the person.
- Move to the nearest or primarily selected Muster Point with calm but fast steps,
- Employees and the visitors assemble to the dedicated muster point and informs the responsible supervisor
- Employee who is not an emergency response team member waits for the responsible supervisors instructions.
- The personnel who are members of an emergency team waits for the instructions of the team supervisors.

7.2. Duty of the team and task to be performed

Duty of the team and task to be performed is explained in the Role Chart and Role Cards, and information given to all employees about the Emergency Response plan with training/drills.

7.2.1. Emergency Coordinator / Assistant

- Determine the adequacy of existing controls and check their functionality.
- Ensure that staff are trained for emergency situations and make sure training is reinforced by drills.

- Coordination and cooperation with the official authorities.
- Ensuring that emergency material requirements are identified.
- To approve the prepared plans and measures, to ensure that they are updated annually.
- Coordinate all teams in case of emergencies.
- To provide contact with external agencies such as police / law enforcement, hospitals, fire brigades when necessary.
- Providing abandonment of the Plant when necessary, and ensuring that the CO_2 system is activated.

Note: In the times when the emergency coordinator is not available, the emergency coordinator assistant performs the task requirements.

7.2.2. Muster Point Supervisor

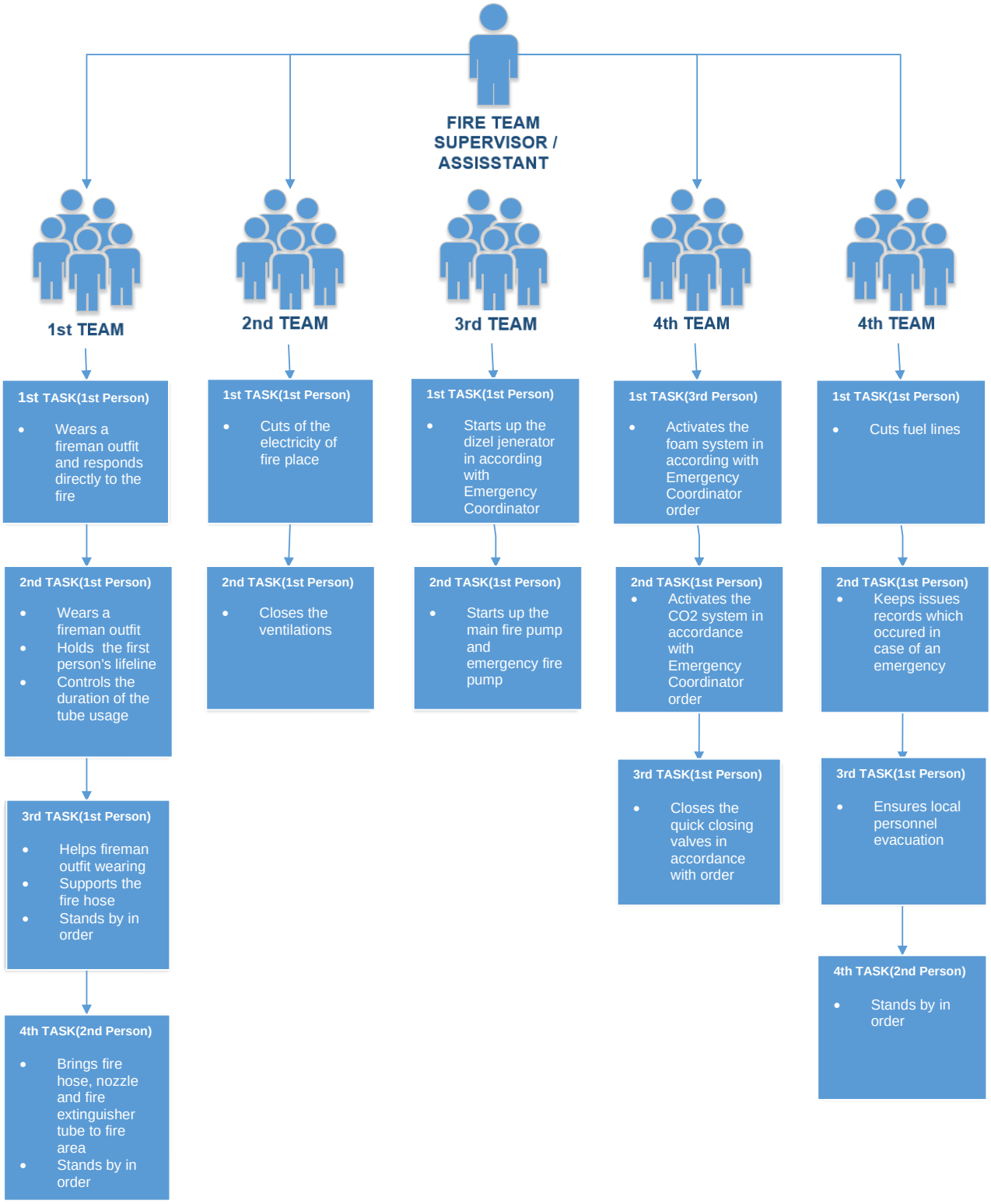
- Works under emergency coordinator and reports to him,
- Provide hierarchy and discipline the muster point.
- Ensure that all employee and visitors are in the muster point,
- Counts in according to current staff and visitor list,
- Ensuring the number and control of emergency response teams,
- Communicate the emergency coordinator which is requested from outside
- Gives the right information to the security gate for access of outside teams.

7.2.3. Fire Fighting Team

Team Supervisor: Assisstant Plant Manager or Shift Supervisor undertakes this role. Stays in contact, directs his team in according to the instructions given from the emergency coordinator, coordinates in the incident place, takes the counting of employees.

Team Assistant Supervisor: Keeps in contact with the supervisor, manage the team according to instructions, coordinates the incident scene/ place, controls the using of fire fighting clothes and performs team supervisor task when he is not available.

Task chart of fire teams;



Other Teams;

The team which is ready responds the fire, the second team responds such as cooling to prevent the growth of fire, the third team waits to be ready as a replacement for the other teams. At the same time, the First Aid, Sea Support and Technical Team personnel are ready at the muster point to fulfil the tasks specified in the plan in case of a possible needs.

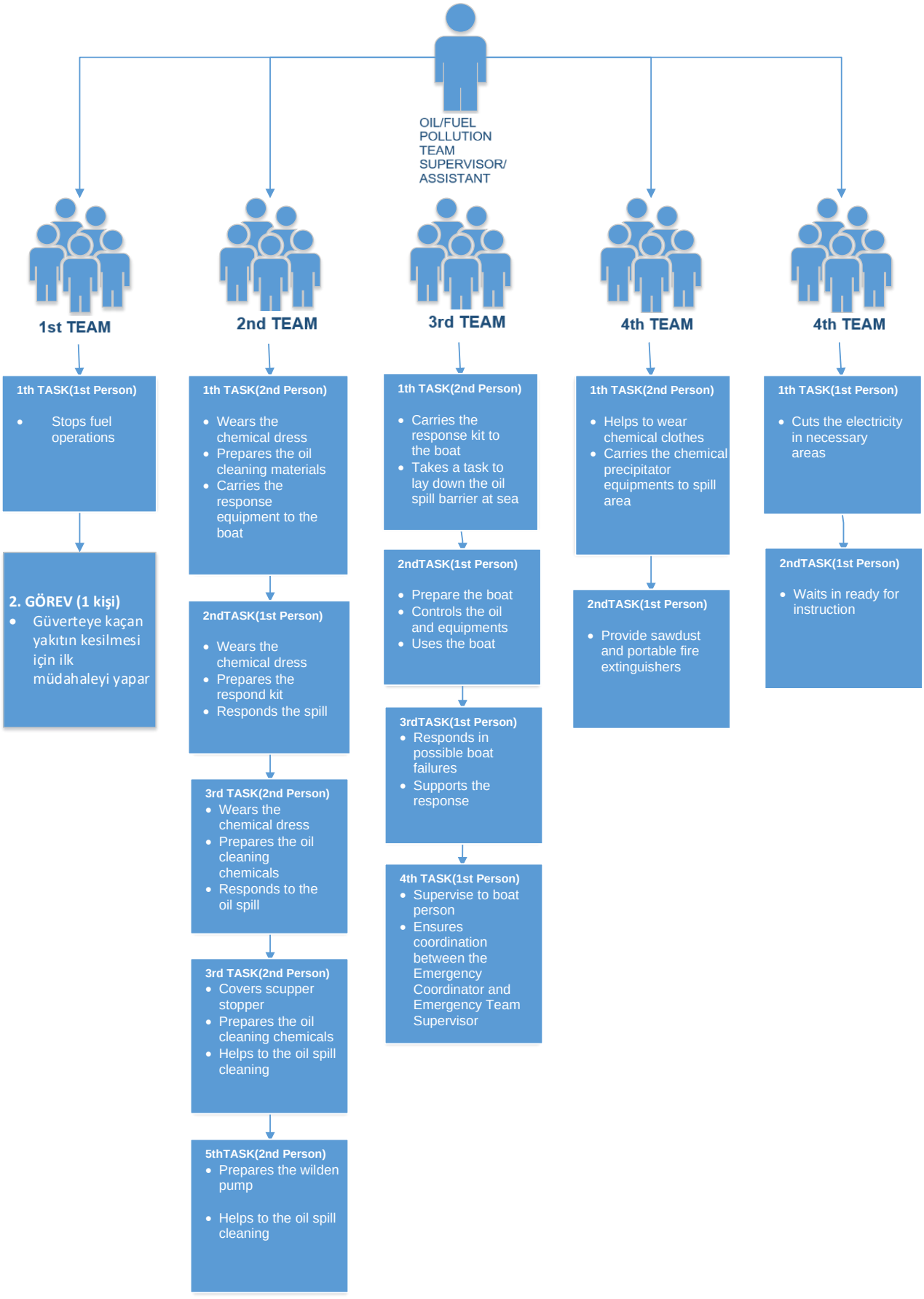
7.2.3.1. Fires that can Happen in the Environment or in Neighbors organizations

- The person who sees the fire in case of explosions or fire that may occur from neighbour establishment shall inform to the facility management and deck office by phone, radio, etc. methods.
- The Emergency Coordinator ensures that relevant teams and officials gathered in muster point.
- If necessary energy, fuel and gas flows to be cut in case of plants influence.
- In accordance with the Emergency Coordinator directives, the deck office communicates with the nearest health facility, fire department and other necessary institution and organizations.
- If there is a fire in the vicinity of the plant, the Fire Team responds to the fire by shielding with water.
- Contacting with the neighbour institutions and provide co-ordination to help each other.
- If/when emergency teams of neighboring organizations reached to fire area, firefighting continue until fire area and environment safety is provided.

7.2.4. Oil/Fuel Pollution/Spill Response Team

Team Supervisor: Deck office management undertakes this duty. He keeps in constant contact with the emergency coordinator, directs his team according to the instructions emergency coordinator, coordinates the incident place, takes the counting of employee.

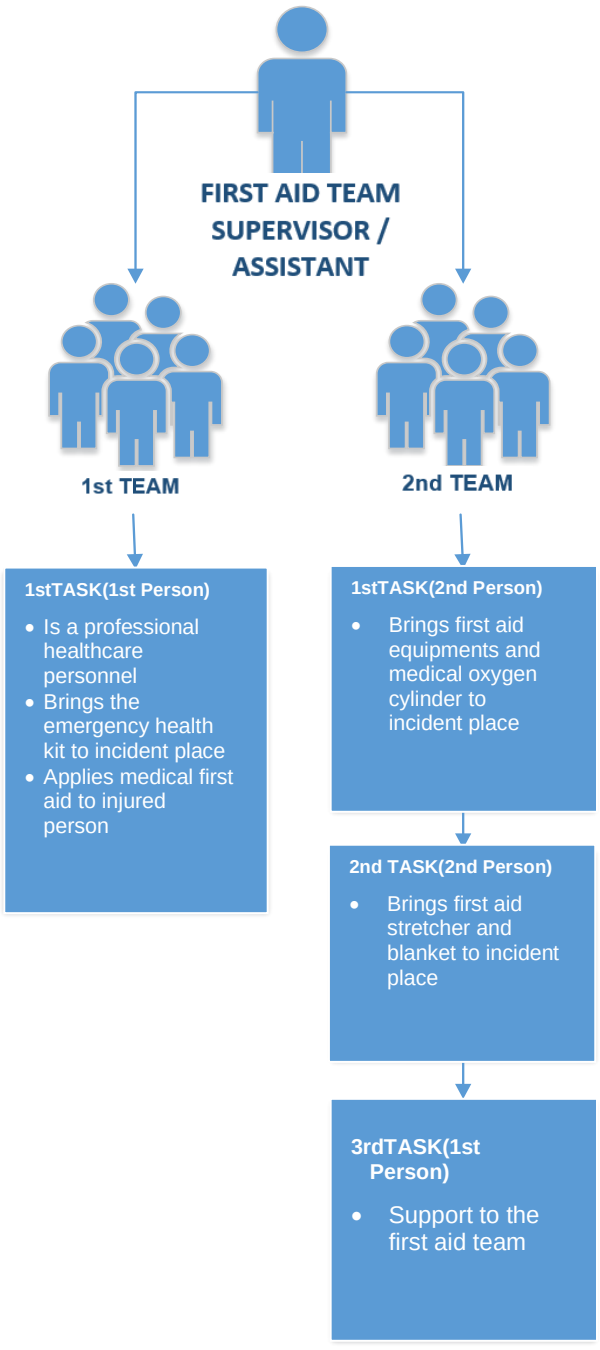
Team Assistant Supervisor: Keeps in constant contact with the supervisor, directs the team within the instructions given, supervises the housekeeping process at the area and perform his duties when the team manager is not available.


OIL/FUEL POLLUTION TEAM SUPERVISOR/ ASSISTANT
1st TEAM
2nd TEAM
3rd TEAM
4th TEAM
4th TEAM
1th TASK(1st Person)
Stops fuel operations
2. GÖREV (1 kişi)
Güverteye kaçan yakıtın kesilmesi için ilk müdahaleyi yapar
1th TASK(2nd Person)
Wears the chemical dress
Prepares the oil cleaning materials
Carries the response equipment to the boat
2ndTASK(1st Person)
Wears the chemical dress
Prepares the respond kit
Responds the spill
3rd TASK(2nd Person)
Wears the chemical dress
Prepares the oil cleaning chemicals
Responds to the oil spill
3rd TASK(2nd Person)
Covers scupper stopper
Prepares the oil cleaning chemicals
Helps to the oil spill cleaning
5thTASK(2nd Person)
Prepares the wilden pump
Helps to the oil spill cleaning
1th TASK(2nd Person)
Carries the response kit to the boat
Takes a task to lay down the oil spill barrier at sea
2ndTASK(1st Person)
Prepare the boat
Controls the oil and equipments
Uses the boat
3rdTASK(1st Person)
Responds in possible boat failures
Supports the response
4th TASK(1st Person)
Supervise to boat person
Ensures coordination between the Emergency Coordinator and Emergency Team Supervisor
1th TASK(2nd Person)
Helps to wear chemical clothes
Carries the chemical precipitator equipments to spill area
2ndTASK(1st Person)
Provide sawdust and portable fire extinguishers
1th TASK(1st Person)
Cuts the electricity in necessary areas
2ndTASK(1st Person)
Waits in ready for instruction

7.2.5. First Aid Team

Team Supervisor: Facility Health Officer carries out this duty. The Deck Officer performs this duty in the absence of a certified health officer. He keeps in constant contact with the Emergency Coordinator, directs his team in accordance with instructions, coordinates the incident place,

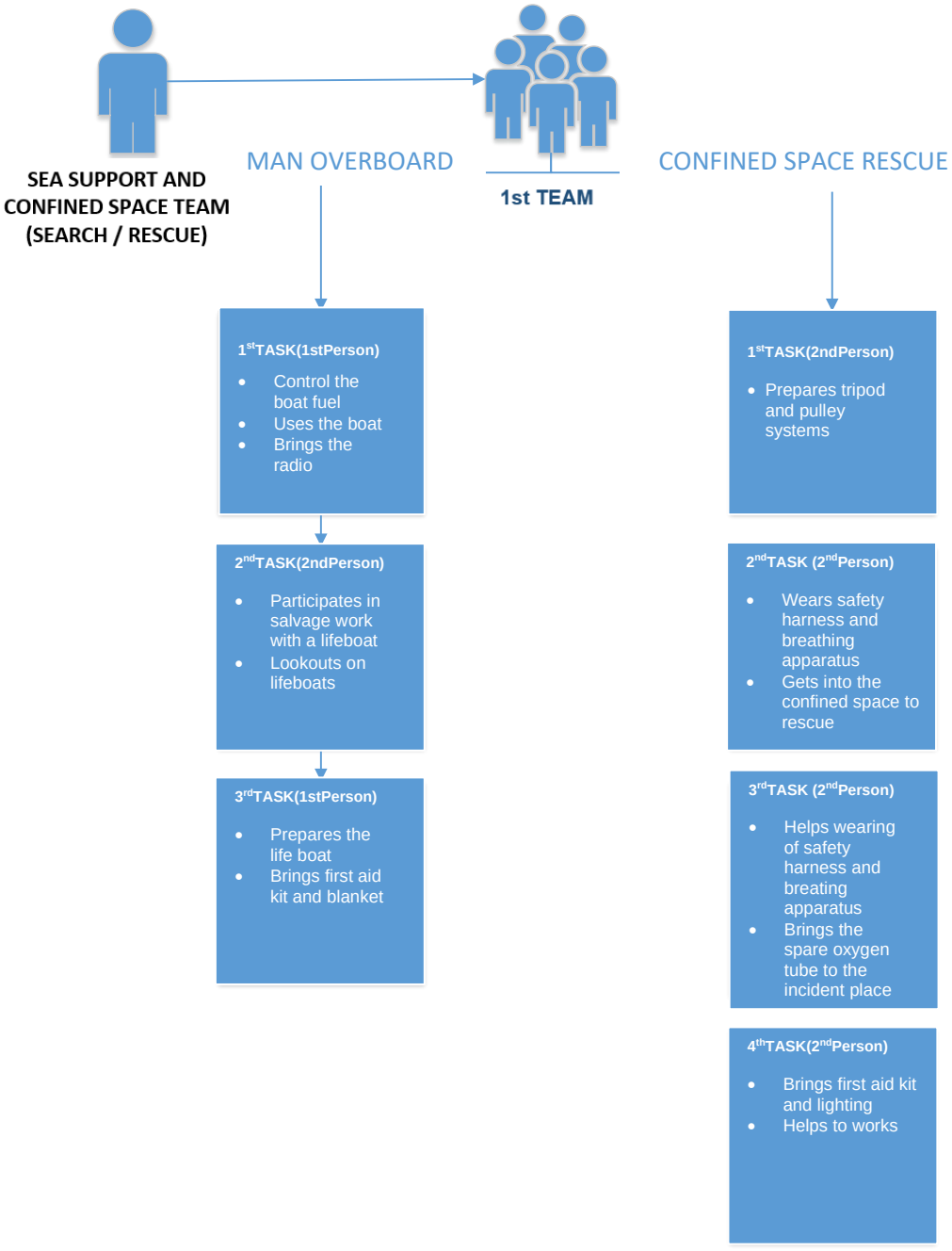
Team Assistant Supervisor: Team Supervisor Assistant: Keeps in constant contact with the team supervisor, directs the team in accordance with instructions, provides coordination at the incident place, provides first aid equipment such as first aid kit, stretcher, blanket, oxygen therapy device to the place of the incident,



7.2.6. Sea Support and Confined Space Team (Search / Rescue)

Team Supervisor: Deck office management carries out this task. It keeps constant communication with the Emergency Coordinator, directs the team within the instructions given, coordinates the incident site, makes gas testing with multi-gas measuring device in front of confined/enclosed space, count the employee, prepares and uses rescue boat when necessary.

Team Assistant Supervisor: Keeps in constant contact with the team supervisor, directs the team within the instructions given, coordinates the incident place, provides tripod, respirator, gas detector, life raft, portable lighting, lifeboat, life buoy, fulfills his duties at times when the team supervisor is not available.



7.3. Death and Severely Injured Conditions

7.3.1. Precautions to be Taken for prevention of occurring the incident

- Risk analysis should be carried out for all kinds of machines, materials and applications that may cause hazard within the physical structure and contents of the plant and preventive actions should be started up and precautions should be taken.
- Maintenance and inspection of all machines and equipments used in the Plant should be done regularly.
- Personal protectors to be used in for all activities must be provided to the employees
- In order to avoid work accidents, the personnel should not use the parts of the equipment and tools which are not belong to themselves and should not do any work except their responsibility
- Employment of qualified personnel should be provided for all jobs, especially electrical and mechanical works.
- All personnel who attendant in the plant should be informed about the plant physical structure and production processes.
- Trainings should be carried out on Occupational Health and Safety issues such as work accidents, situations that can cause work accidents and prevention of work accidents.

7.3.2. Actions to Minimize the Incident with Minimal Damage

- If the person who sees the incident is a first aider, he may apply first aid, if not he may call first aider to apply first aid to the injured person.
- Informs the plant management, deck office and plant OHS Department after first intervention,
- Take everyone out from the area except the authorized person.
- Take protective and warning precautions around the incident area.
- Factors which may cause fire, explosion or other additional hazards in the incident area to be observed and removed. If not injured person will be taken from the area in a controlled manner.
- Injured person is taken to the muster point by First Aid and Sea Support team members if it is necessary to be transported him/her out of the plant after first aid
- According to the health status of the injured person, external health institutions to be contacted within the information of the Emergency Coordinator.
- If the injured person is dispatched to the hospital, the health status of the injured person is followed by assigned staff within the information of the Emergency Coordinator / Assistant.

7.4. Terror and Sabotage / Internal and External War Situation

7.4.1. Measures to be Taken and Actions to be Done

Attacks and possible sabotages targeted by person outside of the plant or personnel targeted at the plant or threats to be created by persons inside or outside the plant are treated as an emergency. Dangers in these situations; attacking dangerous areas, direct attack on human beings, attacking the goods, and resulting in major injury, death or material damage.

Precautions taken against such situations in the plant are listed below.

- The plant inside the area is surrounded by wire fences and walls.
- Entrance and exit points to the plant boundaries are determined and controlled by security forces.
- Security cameras showing dangerous situations and other dangerous areas that may come from the sea are observed by security teams 24/7.
- The actions that can occur inside are seen / followed up with closed circuit camera system.
- Records of visitors from outside are kept by the Security Officers, the controls are carried out at the entry points and accompanied by the security personnel to the person or department to be interviewed.
- In case of any suspicious situation or suspicious person, the security officers inform the plant management and deck office and will act in accordance with instructions to be received.
- All employee's criminal records are questioned before becoming employment.
- In case of civil/foreign wars, the Country Coordinator / Country Manager will act in accordance with the instructions sent by the company.
- All details regarding the topic should be considered within the Powership Security Plan.

7.5. Strong Wind-Storm

7.5.1. Precautions to be Taken

- Local weather forecast reports followed by the deck office regularly during the day.
- The plant has been connected to the main chain zone with a chain and ropes at a safe level, taking into consideration the adverse weather conditions that may have been experienced.
- Connection ropes and chains are checked regularly. Tthe ropes and chains that are deformed due to timeout shall replaced with the new ones.
- Periodic checks and maintenance of ship anchors and moving maneuvering equipment are carried out regularly and recorded with **"KH-KPS-FR-061 Connection Equipment Check List" and "KH-KPS-FR-174 Connection Capstan Control List"**.
- Fender, ropes and yokohama fender to be back up in case of sudden problems.

7.5.2. Operations to be Done

- Inform the emergency coordinator and his/her assistant about the situation
- Materials that can be moved all over the decks, under the decks, in the boilers, especially in the engine room, in the galley and in the stores, shall be secured properly
- All the portholes and blind covers at accommodation places of plant / ship are closed,
- All openings which are going to the deck are closed,
- Production is set or stopped as required,
- The employee is warned about avoiding ropes and surrounding areas, decks and bollard areas that become dangerous due to the weather,
- Safety ropes / hand ropes are installed where required,

- Balance Water Tank covers and tank manholes are checked for leakage,
- Weather reports are followed at 4 hour intervals and reported to the Emergency Coordinator,
- Rails, chains, windlasses, bollards, emergency connection control is made, these areas shall be observed by the deck personnel,
- The port authorities shall be informed about the situation,
- Ropes are installed where necessary for emergency,
- All the sea fenders are checked that they are secured or no,
- Illumination of lighting areas and areas where bollards are located is provided / checked at lighting level.
- The connection points and steel wires of chimneys are checked out in every four (4) hours.
- Weather shall be observed until it is clear.
- Heavy Air and Severe Wind conditions are recorded in the **"KH-KPS-FR-177 Heavy Air or Severe Wind Emergency Check List"** by performing the necessary checks described above.

7.5.3. Tsunami

Please refer to **"Tsunami Evacuation Plan KH-KPS-PR-008-00"** steps to check the course of action in case of a tsunami.

7.5.4. Emergency Disconnection mooring, power cables and fuel supply connections

With the "Stop" order of Plant Manager (PM)/Plant Manager Assistant (PMA), the plant stops the generation and takes main switches open position. Electrical Shift Boss and operator gives information to onshore grid line responsible contractors and order to cut RST line energy. Electrical Shift Boss starts earthing process for the RST line after the contractor takes switches open position. Control RST Line after earthing process by an operator and feed back to PM/PMA. Team 1 starts cutting line cables (using the handsaw for metal cable) by the order of PM/PMA.

Team 2 starts cutting earthing plates cables and hanging wires (using saw or electrical cutting tools) around the Plant by the order of PM/PMA, after earthing process.

Team 3 starts cutting chains on the deck (with O2 and Acetylene (oxy-acetylene) cutting torch) and cuts chains on strong points (hanging oxy-acetylene torch from the deck side). At the same time team 3 pulls ship stb/port anchores by anchor mooring winches.

Team 3 prepares Bridge for departing.

Team 4 organizes black out procedure of ship side.

Team 4 prepares propulsion and aux systems.

If applicable, Fire fighting Team 4 disconnects the external fuel connetion of the ship.

7.6. Pandemic (Epidemic Disease)

Pandemic: Pandemics or pandemic diseases, are the common name given to epidemics that spread and take effect over a wide area, such as a continent or even the entire surface of the world. The diagnosis of Epidemic Disease can be made by the health authority of the country concerned if it is regional, and by the World Health Organization (WHO) if it is global. The cases of this potential are followed by the H&S unit.

5 risk steps are determined in the Pandemic Response Plan. In the event of a pandemic, these risk steps may occur in this order, or for various reasons, the presence of the pandemic may also occur with future risk steps. The risk steps in the Pandemic Response Plan are complementary to each other. That is, no matter what risk step, the measures described in the previous risk steps are also applied on the basis of all workplaces or locations and the continuity of the practices is ensured.

7.6.1. Risk Matrix

Risk Level	Description
1.Risk Step	The emergence of a pandemic potential case in any region of the Earth
2.Risk Step	Declaration of an outbreak by the WHO and the emergence of the outbreak in the country of operation
3.Risk Step	Outbreak of the disease at the location/city of operations being carried out
4.Risk Step	The emergence of epidemic pathogen in any workplace employee
5.Risk Step	The emergence of epidemic pathogen in large numbers of workplace employees

7.6.1.1. First Risk Step

The first risk step is the emergence of a pandemic potential case in any region of the earth.

- An emergency team is established including participants of HR, H&S, Administrative Affairs (AA), IT and other necessary department managers and also top management of the company, and they coordinate the actions to be taken for the possible outbreak and make general briefing announcements by taking decisions,
- When the presence of the pathogen is revealed, all company employees are informed about the pathogen by e-mail,
- The pathogen's spread routes, symptoms it causes, known general characteristics and prevention measures constitute the contents of this e-mail,
- In accordance with the decision of the management, regional or total restrictions are imposed on abroad travel related to the company, considering the spread of the pathogen,

- Employees travelling abroad or returning from travel are subjected to the control and monitoring of the headquarters health unit. Additional measures to be taken for these persons (quarantine, administrative leave, etc.) are coordinated by the established emergency team and the headquarters health unit,
- Information section about pathogen is established in Karportal and kept up-to-date according to the latest developments and is presented to the employees,
- In addition to the information about pathogen, protection ways and personal hygiene related toolboxes and visual posters are prepared and delivered to employees with the help of health officers/administrative personnel. The prepared information sheets are sent to all domestic establishments by AA. The information areas are determined by AA and H&S depending on the nature of the workplace, the status of the social areas and the cause of the pandemic. This way, it is ensured that employees to gain awareness,
- The pathogen's spread path is evaluated and the necessary material/equipment inventory control is carried out for the location or all workplaces and the necessary work is done to complete the deficiencies, if any.

7.6.1.2. Second Risk Step

The disease caused by the pathogen being declared as an epidemic (pandemic) by the WHO and the epidemic disease to arise in the country of operation is called the second risk step.

- With the emergence of the pathogen, the spread path is evaluated and all travels to or from that specific location (including intercity) is stopped as soon as possible, considering the continuity of the operation. If the spread is too fast, it may be considered to review the travel globally and to stop the travel by making changes (leave, return from leave) of the employees as soon as possible.
- All internal and external meetings, trainings, etc. where people meet face to face are reduced to the minimum by determining the measure of social distance or cancelled totally. Instead, digital communication ways are preferred using technological means. Also in social areas where people gather (dining hall, service vehicles, rest rooms, smoking areas, etc.) measures are taken to protect social distance. (Reducing the number of seats, increasing the gaps between seats, reducing the number of people, etc.)
- Planning for procurement and improvement actions is carried out by IT unit taking the variety of technological facilities and material/equipment stock situation ant other risk ratings into account,
- All employees are prohibited to be in crowded places (sports competitions, gyms, shopping centers, concerts, fairgrounds, etc.) except for the supply of basic needs. Employees are informed about this issue through announcements,
- All employees keep being informed about the pathogen by health officers in the workplace,
- In addition to the routine cleanings, additional disinfection deemed appropriate are performed in coordination with the H&S unit. Normal cleaning service is made more frequent, additional disinfection service can be applied according to the decisions taken,

- Flight and ticket organizations for critical trips are made subject to the approval of C level managers. Furthermore, travel principals inform the Pandemic Coordination Team about the travels. The Corporate Travel Team delivers travel kits provided by the health unit to travellers for this purpose,
- An evaluation for a new work order (home office, arrangement of shift hours, reduction of working hours, working in shifts, etc.) is made for all employees working in the workplace considering the social distance and personnel planning is made on the basis of carrying out activities with minimum employees as possible,
- Depending on the condition of pathogen, additional measures can be taken to prevent employees from gathering (periodizing dinner hours and break times, and shifting to working in shifts etc.),
- The entrances to the workplace are taken under control and all personnel, guests and 3. persons to enter are controlled for the symptoms of epidemic disease and persons with symptoms or suspicion are not allowed into the workplace. All suspicious cases in the process are reported to the health unit,
- For all material to come from outside to the workplace such as food, cargo, equipment etc., necessary precautions are taken according to the contamination properties of the pathogen. The goal here is to minimize contact of employees and 3rd parties and to reduce the risks of transmission from outside,
- If there are specific age groups or other risk groups affected by the epidemic, special measures are taken for these people,
- Disinfecting materials and protective equipment suitable for pathogen properties are placed by AA (in coordination with the health unit) to the common areas (toilets, meeting rooms, turnstiles, reception desks, etc.). The consumption of the materials is followed and renewed when necessary.

7.6.1.3. Third Risk Step

The occurrence of the epidemic in the location/city of the operations is considered as the third risk step.

- In case of any workplace personnel to develop the disease, the research of the appropriate health care provider for the necessary treatment is carried out by the headquarters health unit on the basis of workplace locations and listed,
- In order to increase the perception and awareness of the personnel, information on the measures to be taken towards the pathogen is continued,
- Disinfection procedures for all workplaces are carried out without any waste of time. Period of application, material to be used, etc. issues are evaluated by the Pandemic Coordination Team, taking into account the pathogen's spread and transmission ways. If necessary, disinfection application can be made by specially trained personnel,
- Environments in workplaces are ventilated frequently,
- Entrances and exits of the workplace are closed or planned to be reduced to the minimum possible level,

- Minimum number of employees and competent persons are determined to provide basic services. Procedure is developed to determine and evaluate the situation of employees in an emergency,
- Entry of service providers and suppliers to workplaces is restricted, controlled entry is provided in mandatory cases,
- The supply of food (store) in the workplaces of the ongoing operations is tried to be carried out in a packed manner to minimize contact. Measures are taken to prevent contact at the food distribution. Food can be served with closed containers as far as possible. Forks, spoons and knives are distributed in packs or disposable plastic products can be used. Furnitures on tables can be removed (can be replaced with packed cruets). Breads are served in bags, and disposable carton cups can be used instead of glass cups. Depending on the condition of pathogen, the seating capacity in the dining hall can be reduced and the seating order can be redesigned. The above-mentioned measures are put into practice by evaluating the connection of the workplace with the external environment, pathogen transmission ways, spread rate and available facilities,
- The transmission ways of the epidemic disease are evaluated and all personnel are provided with appropriate personal protective equipment and additional materials (hand sanitizer, mask, etc.) and their use is controlled,
- Service vehicles carrying personnel are disinfected after each use. Necessary measures are taken for disinfection of company vehicles. Daily disinfection plans are made for the company vehicles that are in mutual use by different people every day. Protective equipment and disinfectant are provided to service vehicles according to the evaluations to be made. The period of disinfection application is determined by AA and H&S unit depending on the material used.
- By taking into account the transmission routes and precautions of pathogens that cause epidemics, materials to reduce the risk of contamination and personal protective equipment are placed at social areas and public areas (toilets, meeting rooms, etc.) and necessary renewals are made by following the expenses of materials,
- The use of digital and online documentation is supported to minimize contact with paper in workplace document tracking, control and handling. By making arrangements for meals, working hours and the collective meetings of employees are reduced to minimum,
- Employment plans are made in case of the possibility of increasing the number of employees who suffer pathogen-related disease in the workplace. Quarantine-control application is made for employment during the required time according to the transmission characteristics of the pathogen. The entrance of these people to the workplace is possible after quarantine.

7.6.1.4. Precautions to be Taken During Dinner Preparation and Presentation and Rules to be Followed

- All personnel working during the preparation of meals and entering the dining hall, wear all necessary PPE such as overshoes, gloves, bonnets and masks before entering the work area and renew and use them when necessary during the work period,

- Any additional food that may be exposed to the risk of transmission (cold cuts, salad, etc.) are started to be supplied in ready plates,
- Food distribution zones are closed and isolated from staff,
- Common used food and materials on the dining table (jugs, sauces, bottles, forks, knives, bread, etc.) are removed, and personnel are given these individually according to the need and packaged products are used,
- Meals with open menus are temporarily removed,
- Disposable pet bottles or carton cups are used for personnel's need for water,
- All dishes are washed in the dishwasher above 60 degrees Celsius.

7.6.1.5. Fourth Risk Step

Emergence of pathogen in any workplace employee constitutes our 4. risk step.

- The employee who has the disease is referred to the hospital under the control of the health officer and is quarantined in a suitable place to be organized in hospital or outside the workplace in accordance with the response of the hospital. The employee who is understood to be infected with the disease is not allowed back into the workplace whatsoever,
- The authorities who are required to be notified about the infected employee are investigated by the workplace management and, if any, notifications are made,
- The contacts of the infected employee are identified and listed together with the workplace health unit, Administrative Affairs and workplace management (filiation) and additional measures for these persons (quarantine, monitoring, follow-up, etc.) are taken,
- Detailed disinfection work is renewed in the workplace,
- The necessary controls are carried out remotely by telephone to the sick person by the health officer at the workplace. After evaluating the vital signs, if the patient stays outside of the hospital, it may be considered to be referred to the hospital again or to a country having better health service conditions by considering the rules of the country,
- If it is a topic for the patient to be transferred to Turkey or another nearby country, necessary organization is made by the H&S, HR, country management/workplace management and Corporate Travel team coordination through 3rd party companies (ISOS, P&I Club etc.). If one of the employees loses his life, the same organization is made with the same units and the paths to be followed are determined,
- The personnel working in the same workplace are subjected to the necessary health checks and the measures taken against the disease can be expanded under the supervision of the health personnel or partial or total quarantine can be carried out,
- Necessary organizations are made by the Corporate Travel team for the transfer operations when a need arises for a personnel working abroad to return back to his/her country in cases such as having cases related to the pandemic in their family and the severity of their course, natural disasters and death of a first degree family member. These organizations can be made to the extent that conditions make it possible to obtain flight permits by communicating with

embassies/consulates in the related countries, taking into account country conditions and restrictions,

- Employees inform the headquarters health unit about the issue if the pathogen is positive for themselves or in family members. The headquarters health unit follows and monitors the health status of these people and provides support for their requirements when needed.

7.6.1.6. Fifth Risk Step

The emergence of the pathogen causing the epidemic in a large number of workplace personnel is evaluated as the 5. risk step.

- The workplace is completely quarantined by cutting off contact with the outside world,
- Healthcare providers are contacted about this situation,
- Following the evaluation made with the local health organization, all personnel in the workplace are kept under control and monitored,
- Additional actions are kept taken after the instruction of the authorized local health organization of the workplace,
- In case of closure of workplaces due to quarantine practices, if the need arises for accommodation of healthy staff in the respective countries, the Corporate Travel team will coordinate with HR, H&S and country management to put the appropriate hotel, etc. accommodation facilities into use,
- In case of transfers of all personnel in any workplace to their countries, the procedure is carried out in coordination with the consulates/embassies and in accordance with the travel restrictions in the country by organizing with the competent authorities to obtain permits if necessary and under the leadership of the Corporate Travel unit.

** Continuous communication with the headquarters H&S unit is provided for each of the above risk steps and the exchange of information is provided continuously.*

Pandemic Coordination Team	
Title	**Role In The Team**
Pandemic Coordinator	✓ Selected by the committee in workplaces where there is a committee of health and safety, ✓ Selected by the employer/employer representative in the workplaces where the committee is not present, ✓ The pandemic coordinator is preferred to be a senior manager,

Tasks	✓ Leads the works of implementing the pandemic response plan, identifying and implementing additional measures to be taken at workplaces, revising the plan, ✓ Makes the assignments of the pandemic coordination team and determines their task, authority and responsibilities, ✓ Makes/have somebody make a supply plan for the materials that employees will need such as materials, equipment, personal protective equipment, ✓ Takes decisions on cancellations and postponements in the production of goods and services in the workplace during the pandemic, ✓ Determines internal and external communication channels and follow up/have somebody follow up the updated news of the World Health Organization and the competent local health authority. Coordinates the delivery of information to the pandemic team about the updates. ✓ Determines the risk group that must be protected first during the pandemic and takes/have somebody take action for this group, ✓ Plans/have somebody plan training activities in order to raise awareness of employees on issues such as personal hygiene, social distance etc. ✓ Provides/have somebody provide daily monitoring of employees' health conditions, ✓ Provides/have somebody provide coordination of health condition of employees caught in pandemic and referral routes to health organizations, ✓ Organize to inform the staff about the implementation of the pandemic response plan in the workplace and to publish the instructions in social areas, ✓ Monitors the spread of the pandemic on a national and international scale, ensures/have somebody ensure the determination and implementation of additional measures to be taken in the light of the current information released by the World Health Organization and the competent local health authority, ✓ Follows up/have somebody follow up the use of the determined materials, equipment and personal protective equipment in the workplace, ✓ Coordinates the monitoring of the psychosocial status of employees and, if necessary, the provision of psychosocial support,
Team Members	✓ ***Workplace physician / Other medical personnel / First-Aid team / Health Officer*** ✓ ***Safety Specialist / Safety Asst. Manager / Deck Officer***
Tasks	✓ Conducts work in accordance with the directives of the pandemic coordinator and the recommendations of the WHO or the national health authority, ✓ Provides support to the pandemic coordination team headed by the pandemic coordinator and records the data in the works of detection, implementation and follow-up of measures to be taken in the workplace according to the pandemic action plan, ✓ Determines the risk rates according to the risk groups of workplaces and employees and makes recommendations to the pandemic coordinator and coordination team for additional measures to be taken, ✓ Prepares lists of employees within the risk group during the pandemic, checks their currentness and informs the pandemic coordinator, ✓ Provides support to the pandemic coordinator in preparing information materials about the pandemic, presenting them to workplaces and managing

	awareness-raising training, meetings and sharing, ✓ Follows the currentness of the pandemic response plan and makes recommendation and suggestions, ✓ Establishes communication channels in the workplace, monitors the international and national rates of pandemic spread and follows current information released by the World Health Organization and the competent local health authority and informs the pandemic coordinator, ✓ Evaluates and anticipate the risks of the pandemic in the workplace and provides feedback to the pandemic coordinator on additional measures for employees with symptoms of disease, ✓ Provides support to the pandemic coordinator during the decision making, implementation and development stages of personnel protection strategies against disease, ✓ Supports the pandemic coordinator in identifying personal protective equipment which employees should use, ✓ Provides control of isolation, cleaning and disinfection works and informs the pandemic coordinator, ✓ Follow-ups the psychosocial status of the employees and informs the pandemic coordinator by conducting research to provide psychosocial support if necessary, ✓ Participates in the activities of informing the employees, provides information to the pandemic coordination team at the point of problems on the implementation of the measures by the employees, ✓ Provides information to the pandemic coordination team on feedbacks from employees during the implementation phase of risk management strategy within the workplace, ✓ Participates and supports the works necessary to determine the effects of the pandemic on the workplace.

7.7. Communication in Case of Emergency

The communication information that will be required in case of Emergency is given in the table below and posted on the plant panels by using "**KH-KPS-FR-175 Emergency Contact List Form"**.

EMERGENCY CONTACT INFORMATIONS

Task-Name Surname	Location	Office Number	Mobile Number
Emergency Coordinator (Plant Manager – Semih ŞAHİN)	Plant 9900 Level Deck	122	+90 534 983 05 12
West & South Affrica Region Coordinator- Erkut ATEŞ	Turkey Head Quarters	-	+90 530 149 50 47
Project Manager Ali KUŞ	Plant 9900 Level Deck	-	+90 533 462 06 84
Plant Manager Semih ŞAHİN	Plant 9900 Level Deck	122	+90 534 983 05 12
Assistant Plant Manager Engin ÖZCAN	Plant 9900 Level Deck	122	+90 539 730 14 20
Assistant Plant Manager M.Cem GÖKPINAR	Plant 9900 Level Deck	122	+90 539 664 02 99
Shift Supervisor Mustafa BÜYÜKTEPE	Control Room	171	+90 506 558 87 88
Shift Supervisor Atahan İÇLİ		171	+90 544 510 76 22
Plant Security Officer Erdi SAKALLI	Plant 9900 Level Deck	180	+90 538 466 12 65
Deck Officer Enes KÖKTAŞ	Plant 9900 Level Deck	180	+90 537 843 12 84
HSE Office H.Süha ŞENOCAK	Plant 9900 Level Deck	180	+90 532 693 25 60
Clinic Fahrettin BULUT	Accommodation 21400 Level Deck	119	+90 516 165 56 23
Health Officer Hakan NAMLI	Accommodation 21400 Level Deck	119	+90 507 663 37 83
Security	Entrance Gate	-	+233 50 154 5923
Fire Team Leader Erdi SAKALLI	Plant 9900 Level Deck	180	+90 538 466 12 65
Rescue Team Leader Erdi SAKALLI	Plant 9900 Level Deck	180	+90 538 466 12 65
Pollution Response Team Leader Erdi SAKALLI	Plant 9900 Level Deck	180	+90 538 466 12 65
KH Head Quarters HSE Department	İstanbul	+90 212 295 47 37	-
MOC SEKONDI NAVAL BASE	Takoradi /Ghana	+233 54 886 63 83	+233 29 910 10 66
POLICE OPS	Takoradi /Ghana	+233 20 666 93 37	+233 29 920 44 58
GH. FIRE SERVICE	Takoradi /Ghana	+23350 200 86 88	
NAVAL CLINIC, SEKONDI (AMBULANCE)	Takoradi /Ghana	+233 24 883 78 78	-
SYCAMORE HOSPITAL,TAKORADI	Takoradi /Ghana	+233 20 890 72 75	+233 24 657 25 92

7.8. Emergency Situations in Powerships which use Natural Gas

Technical problem such as plant gas leak, sudden pressure frequency change etc. in emergency situations; **"Emergency Shutdown Procedure for Natural Gas Powerships with document number KH-KPS-PL-076"** should be followed.

7.9. Emergencies occurring in neighboring ships or businesses

In case of an emergency in the ships and businesses close to the facility, the Naval Army Command communicates with the KPS 12 Osman Khan facility management. In possible cases, the above mentioned contact numbers are also used actively.

7.10. Plant Role Chart/Table

Role Chart of Karadeniz Powership Osman Khan Plant is given below.

	GENEL TALİMATLAR (GENERAL INSTRUCTIONS)
1	Tesis müdürü olmadığında, genel amir Tesis müdür yardımcısıdır eger oda olmaz ise emniyet zabiti 1 veya emniyet zabiti 2 görevi devir alır. If p.m not on board second commander p.m.a and thirth safety off 1 and fourth safety off 2
2	Bir acil durum olduğunda, gemi ana elektrik devresinden veya acil durum elektrik güç kaynağından beslenen elektrikle çalışır zil veya klakson veya eşdeğer bir uyarı sistemi gemi düdüğü veya siren ile kesintisiz sürekli çalan sesten oluşan genel acil durum alarm işareti verilecektir. In case of emergency, alarm shall be sound consisting following continous alarm on an electrically operated bell or klaxon or other equivalent warning system which shall be powered from to ship's main power supply and the emergency.
3	Acil durum alarmı duyulduğunda tüm personel görevli oldukları toplanma noktalarına donanımlı olarak gidecektir. On hearing the emergency signal, all person will proceed to their assignated Muster Station with their rigging.
4	Vardiyacılar nöbet yerlerini teslim edene kadar veya amirinden terket emiri alıncaya kadar terketmeyeceklerdir. Watch keepers remain at their post until they are relieved or receive the order to leave it from head of operators.
5	Acil durumun tipi gemi anons sistemlerinden sözlü olarak anons edilecek ve herkes görevine göre olaya müdahale edecektir. Type of emergency situation shall be announced verbally from the ship's public adressor system and every personnel will interfere according their duties in muster list
6	Yangın durumunda , vardiyacılar yangın mahalinin kaportalarını içeride kimsenin olmadığından emin olduktan sonra kapatacaklar. In the event of fire, the personnel on watch will immediately close all automatic and manual fire doors. Must be sure nobody inside
7	Her türlü yangın,duman,su sızması veya başka türlü bir tehlikenin mutlaka Kontrol odası veya nöbetçi vardi mühendisine bildirilmesi zorunludur. Any fire, smoke, inrush of water or any danger has to be reported with out delay to Engine Control Room or the person on watch
8	Makine dairesi CO2 alarmı duyduğunda içerdeki personel derhal makine dairesini terk ederek toplanma istasyonuna gitmelidirler. In the CO2 alarm sounds in engine room the personnel shall be leave immediately and go to Master Station.
9	Tüm personel , solunum cihazlarını, yangınla mücadele ekipmanlarını kullanma eğitimi almış olmalıdır, All vrewmembers should be trained for the use of fire figting equipments, breathing apparatus.
10	Bir acil durum olduğunda, yabancı uyruklu tüm personel toplanma alanında toplanacak ve Güvenlik Zabiti talimatıyla hareket edeceklerdir. In case of emergency ,all foreign national personnel shall be go to Muster Station and theinstructions of Officers will act in
11	Haberleşme telsiz kanalı 14 dir. Emergency Comminication Radio Channel is 14.
12	Eğer yangın çalışma saatleri dışında olursa vardıya mühendisleri derhal ekip amirlerini ve tesis yönetimini durumdan haberdar edecek If the fire is out of working hours, the shift engineers will immediately inform the supervisors of team and the plant management

YANGIN (FIRE)

ROLE NO	GÖREVİ (RANK)	ACİL DURUM GÖREVİ (EMERGENCY DUTY)	EKİBİ (TEAM)
		KUMANDA EKİBİ **COMMAND TEAM**	
1	SEMİH ŞAHİN (PLANT MANAGER)	Genel Kumanda. General Command	KUMANDA EKİBİ COMMAND TEAM
2	ENGİN ÖZCAN (ASST.PLANT MANAGER)	Genel Kumanda. General Command	KUMANDA EKİBİ COMMAND TEAM
3	MEHMET CEM GÖKPINAR (ASST.PLANT MANAG	Genel Kumanda. General Command	KUMANDA EKİBİ COMMAND TEAM
		YANGIN EKİBİ (1. EKİP) **FIRE TEAM (1st. TEAM)**	
4	ERDI SAKALLI (ADM.AFF.ASST.MANAGER)	Yangın ekibine Amirlik Eder, olay mahalinde koordine sağlar .Tesis müdürüyle haberleşme sağlar. Tesis müdürünün onayıyla Navy Base den destek ister. 2. Yangın ekip amiri olmadığında her iki yangın ekibine de liderlik eder. (1 ST.team leader. Coordinates action taken and communicates with plant manager.request supports from Navy Base approval of the plant manager.) If there is not 2 TH. Team fire leader, he becomes fire team leader for first and second fire teams at the same time.	YANGIN EKİBİ FIRE TEAM
5	ARKIN YÜKSELEN(BOSUN)	Yangın elbisesi giyer.Takım amiri emri ile olay mahaline hareket eder. (Wear fireman outfit. Wait for instruction team leader.)	YANGIN EKİBİ FIRE TEAM
6		Yangın elbisesi giyer.Takım amiri emri ile olay mahaline hareket eder. (Wear fireman outfit. Wait for instruction team leader.)	YANGIN EKİBİ FIRE TEAM
7	YAŞAR ERDOĞAN (A/B)	Yangın elbisesi giyer.Takım amiri emri ile olay mahaline hareket eder. (YEDEK) (Wear fireman outfit. Wait for instruction team leader.) (SPARE)	YANGIN EKİBİ FIRE TEAM
8	OSMAN ÖZGÜR ÇİÇEK (SENIOR MECHANICAL TECH.)	Yangın elbisesi giyiminde yardım eder. Can halatını kumanda eder. Assist to wearing fireman outfit and control to life line.	YANGIN EKİBİ FIRE TEAM
9	SEMİR ARACI (MECH.MAINT.TECH.)	Yangın elbisesi giyiminde yardım eder. Can halatını kumanda eder. Assist to wearing fireman outfit and control to life line.	YANGIN EKİBİ FIRE TEAM
10	HALİL İBRAHİM BEDİR (MECH.MAINT.TECH.)	Yangın elbisesi giyiminde yardım eder. Can halatını kumanda eder. Assist to wearing fireman outfit and control to life line.	YANGIN EKİBİ FIRE TEAM
11	GÜROL ERGİN (MECH.MAINT.TECH.)	Yangın elbisesi giyiminde yardım eder. Can halatını kumanda eder. Assist to wearing fireman outfit and control to life line.	YANGIN EKİBİ FIRE TEAM
12	FATİH KARAGÖZ (MECH.MAINT.TECH.)	Olay mahaline yangın hortumu ve minimax getirir. Ekip amirinin talimatı ile yangın olan bölgenin yangın kapısını kapatır. Bring fire hose and portable fire extinguisher . In order of Team leader Closed to fire door in which fire area.	YANGIN EKİBİ FIRE TEAM
13	TURGUT KAYA (MAINT.TECH.)	Olay mahaline yangın hortumu ve minimax getirir. Ekip amirinin talimatı ile yangın olan bölgenin yangın kapısını kapatır. Bring fire hose and portable fire extinguisher . In order of Team leader Closed to fire door in which fire area.	YANGIN EKİBİ FIRE TEAM
14	GÖKSEL SİMSAR (OILER)	Yangın elbisesi giyer.Takım amiri emri ile olay mahaline hareket eder. (YEDEK) (Wear fireman outfit. Wait for instruction team leader.) (SPARE)	YANGIN EKİBİ FIRE TEAM
15	ÖMER ZEKİ KALYONCU (OILER)	Olay mahaline yangın hortumu ve minimax getirir. Ekip amirinin talimatı ile yangın olan bölgenin yangın kapısını kapatır. Bring fire hose and portable fire extinguisher . In order of Team leader Closed to fire door in which fire area.	YANGIN EKİBİ FIRE TEAM

	GÖREVİ (RANK)	ACİL DURUM GÖREVİ (EMERGENCY DUTY)	EKİBİ (TEAM)
		YANGIN EKİBİ (2. EKİP) **FIRE TEAM (2 nd. TEAM)**	
19	ALİ KUTAY ŞENER (DECK OFFICER)	Yangın ekibine Amirlik Eder, olay mahalinde koordine sağlar .Tesis müdürüyle haberleşme sağlar. Tesis müdürünün onayıyla Naval Base den destek ister. 1.Yangın ekip amiri olmadığında her iki yangın ekibine de liderlik eder. (1 ST.team leader. Coordinates action taken and communicates with plant manager,request supports from Naval Base approval of the plant manager. If there is not 2 TH. Team fire leader, he becomes fire team leader for first and second fire teams at the same time.	YANGIN EKİBİ FIRE TEAM
20	MUSTAFA TAŞÇI (USTA GEMİCİ)	Yangın elbisesi giyer.Takım amiri emri ile olay mahaline hareket eder. (Wear fireman outfit. Wait for instruction team leader.)	YANGIN EKİBİ FIRE TEAM
21	RAMAZAN ŞEN (MECH.MAINT.TECH	Yangın elbisesi giyer.Takım amiri emri ile olay mahaline hareket eder. (Wear fireman outfit. Wait for instruction team leader.)	YANGIN EKİBİ FIRE TEAM
22		Yangın elbisesi giyer.Takım amiri emri ile olay mahaline hareket eder. (YEDEK) (Wear fireman outfit. Wait for instruction team leader.) (SPARE)	
23	ADEM ÖZTÜRK (OILER)	Yangın elbisesi giyer.Takım amiri emri ile olay mahaline hareket eder. (YEDEK) (Wear fireman outfit. Wait for instruction team leader.) (SPARE)	YANGIN EKİBİ FIRE TEAM
24	İRFAN KARAGÜLLE (OILER)	Yangın elbisesi giyiminde yardım eder. Can halatını kumanda eder. Assist to wearing fireman outfit and control to life line.	YANGIN EKİBİ FIRE TEAM
25		Yangın elbisesi giyiminde yardım eder. Can halatını kumanda eder. Assist to wearing fireman outfit and control to life line.	YANGIN EKİBİ FIRE TEAM
26	MEMET KEMAL TOPAL (FITTER)	Yangın elbisesi giyiminde yardım eder. Can halatını kumanda eder. Assist to wearing fireman outfit and control to life line.	YANGIN EKİBİ FIRE TEAM
27		Yangın elbisesi giyiminde yardım eder. Can halatını kumanda eder. Assist to wearing fireman outfit and control to life line.	YANGIN EKİBİ FIRE TEAM
28	FATİH MEHMET AKYOL (MECH.MAINT.TECH.)	Olay mahaline yangın hortumu ve taşınabilir seyyar yangın söndürücü getirir. Ekip amirinin talimatı ile yangın olan bölgenin yangın kapısını kapatır. Bring fire hose and portable fire extinguisher . In order of Team leader Closed to fire door in which fire area.	YANGIN EKİBİ FIRE TEAM
29	YAŞAR TÜRKAN (SENIOR FITTER)	Olay mahaline yangın hortumu ve taşınabilir seyyar yangın söndürücü getirir. Ekip amirinin talimatı ile yangın olan bölgenin yangın kapısını kapatır. Bring fire hose and portable fire extinguisher . In order of Team leader Closed to fire door in which fire area.	YANGIN EKİBİ FIRE TEAM
30		Olay mahaline yangın hortumu ve taşınabilir seyyar yangın söndürücü getirir. Ekip amirinin talimatı ile yangın olan bölgenin yangın kapısını kapatır. Bring fire hose and portable fire extinguisher . In order of Team leader Closed to fire door in which fire area.	YANGIN EKİBİ FIRE TEAM
31	DURMUŞ YILDIRIM (FITTER)	Yangın bölgesinin kontrolünü yapar yaralı olup olmadığının teyidini ekip amirine verir. Gerektiğinde seyyar köpük aplikatörü hazırlar. It controls the fire zone and gives the team leader the confirmation of whether he's injured or not. If necessary prepare to Foam applicator.	YANGIN EKİBİ FIRE TEAM
32	İSMAİL BAL (SENIOR FITTER)	Yangın bölgesinin kontrolünü yapar yaralı olup olmadığının teyidini ekip amirine verir. Gerektiğinde seyyar köpük aplikatörü hazırlar. It controls the fire zone and gives the team leader the confirmation of whether he's injured or not. If necessary prepare to Foam applicator.	YANGIN EKİBİ FIRE TEAM
33	AYHAN ORAN (MECH.MAINT.TECH.)	Yangın bölgesinin kontrolünü yapar yaralı olup olmadığının teyidini ekip amirine verir. Gerektiğinde seyyar köpük aplikatörü hazırlar. It controls the fire zone and gives the team leader the confirmation of whether he's injured or not. If necessary prepare to Foam applicator.	YANGIN EKİBİ FIRE TEAM
		TEKNİK EKİP **1 .TECHNIC TEAM**	
34	MUSTAFA BÜYÜKTEPE (SHIFT SUPERVISOR)	1. Teknik ekip amiridir.Tes. Müd. Emriyle emg. dizel jeneratorü çalıştırır . 2. Teknik ekip amiri olmadığı durumda her iki teknik ekibin de amirliğini yapar. Acil durumlarda Kapatma prosedürünün gerekliliklerini yerine getirir. 1st. technic team leader . Acts asper Plant Mng. İnstruction according to the case. Start up emg. diesel generator . When there is no 2th. Technic team leader ,he will be leader of 1st and 2th Technic teams. When there is an emergency stuation, he takes actions according to shıutdown procedure.	TEKNİK EKİP TECHNIC TEAM
35	BİROL DÖNMEZ (ENGINEER)	Tes. Müd. Emriyle emg. dizel generatorü çalıştırır Technic team leader (2nd). Acts asper Plant Mng. İnstruction according to the case. Start up emg. diesel generator .	TEKNİK EKİP TECHNIC TEAM
36	TURGUT SELMAN TÜMER (ENGINEER)	Emg.Dizel jeneratör çalıştırılmasına yardımcı olur. Takım amiri talimatıyla, gaz yangınlarında yangın mahaline giden gaz hattı kapatma vanasını kapatarak gaz akışını keser. Assist for Start up emg. diesel generator. According to the instruction of team leader ,he closes the shut off valve that belong to gas line where feeds the fire area in gas fires.	TEKNİK EKİP TECHNIC TEAM
37	MUSTAFA KOCA (ENGINEER)	Emg. Dizel jeneratör çalıştırılmasına yardımcı olur. Takım amiri talimatıyla, gaz yangınlarında yangın mahaline giden gaz hattı kapatma vanasını kapatarak gaz akışını keser. Assist for Start up emg.diesel generator. According to the instruction of team leader ,he closes the shut off valve that belong to gas line where feeds the fire area in gas fires.	TEKNİK EKİP TECHNIC TEAM
38	SERDAR BALCIK (ENGINEER)	Takım amirinin talimatıyla en yakın ulaşabileceği yangın pompasını çalıştırır./ Makine yangınlarında temiz su püskürtme sistemini devreye sokar. Takım amiri talimatıyla, gaz yangınlarında yangın mahaline giden gaz hattı kapatma vanasını kapatarak gaz akışını keser. In order of Team leader ,start up one of the closest fire pumps/It activates the Local Application System in case of machine fires. According to the instruction of team leader ,he closes the shut off valve that belong to gas line where feeds the fire area in gas fires.	TEKNİK EKİP TECHNIC TEAM
39	HALİT TUĞBERK KURUTAŞ (ENGINEER)	Takım amirinin talimatıyla en yakın ulaşabileceği yangın pompasını çalıştırır./Makine yangınlarında temiz su püskürtme sistemini devreye sokar. In order of Team leader ,start up one of the closest fire pumps./It activates the Local Application System in case of machine fires.	TEKNİK EKİP TECHNIC TEAM
40	MESUT CUMHUR MORGÜL (ENGINEER)	Takım amirinin talimatıyla en yakın ulaşabileceği yangın pompasını çalıştırır./Makine yangınlarında temiz su püskürtme sistemini devreye sokar. In order of Team leader ,start up one of the closest fire pumps./It activates the Local Application System in case of machine fires.	TEKNİK EKİP TECHNIC TEAM
41		Takım amirinin talimatıyla kıç jettydeki Emg. Dizel yangın pompasını çalıştırır. In order of Team leader, start up emg. Diesel fire pump on the aft jetty.	TEKNİK EKİP TECHNIC TEAM
42		Takım amirinin talimatıyla kıç jettydeki Emg. Dizel yangın pompasını çalıştırır. In order of Team leader, start up emg. Diesel fire pump on the aft jetty.	TEKNİK EKİP TECHNIC TEAM
43	TACETTİN SERT (MECH.MAINT.TECH.)	Ambarların güverteden girişlerini ve manuel kapatılan havalandırmaları kapatır. Closed the entrances of the cargo holds from the deck and manually closed vents.	TEKNİK EKİP TECHNIC TEAM
44	İSMAİL ÖZ (MECH.MAINT.LEADER)	Ambarların güverteden girişlerini ve manuel kapatılan havalandırmaları kapatır. Closed the entrances of the cargo holds from the deck and manually closed vents.	TEKNİK EKİP TECHNIC TEAM
73	İBRAHİM ÇOLAK (ELC.TECH.)	Tesis Müdürü'nün talimatıyla olay yerinin elektriğini keser Cut off the electricity with P.M. order	DESTEK EKİBİ SUPPORT TEAM
74		Tesis Müdürü'nün talimatıyla olay yerinin elektriğini keser Cut off the electricity with P.M. order	DESTEK EKİBİ SUPPORT TEAM

		2. TEKNİK EKİP **2ND TECHNIC TEAM**	
45		2.Teknik ekip amiridir.Tesis Müdürüyle koordineli olarak olayın tipine göre hareket eder. Yangın tesis tarafında veya gemi makine dairesinde ise tesis müd. emriyle CO2 tüplerini patlatır. 1. Teknik ekip amiri olmadığı durumda her iki teknik ekibin de amirliğini yapar. Acil durumda Kapatma prosedürünün gerekliliklerini yerine getirir. Technic team leader acts asper Plant Mng. İnstruction according to the case (Fire in Plant side &Eng.room) Release co2 When there is no 1st. Technic team leader, He will be leader of 1st and 2th Technic Teams. When there is an emergency stuation, he takes actions according to shıutdown procedure.	TEKNİK EKİP TECHNIC TEAM
46	ACARALP ATAHAN İÇLİ (ENGINEER)	Teknik ekip lideri ile koordineli olarak olayın tipine göre hareket eder. Yangın tesis tarafında veya gemi makine dairesinde ise tesis müd. emriyle CO2 tüplerini patlatır. Acts asper Technic team leader. İnstruction according to the case(Plant &Fire in Eng. Room). Release co2	TEKNİK EKİP TECHNIC TEAM
47	NURİ SENAVER (ELEC. TECHNICIAN)	CO2 tüplerinin patlatılmasına yardım eder./Makine yangınlarında temiz su püskürtme sistemini devreye sokar Assist for release CO2./It activates the Local Application System in case of machine fires.	TEKNİK EKİP TECHNIC TEAM
48	MUSTAFA YILMAZ (ENGINEER)	CO2 tüplerinin patlatılmasına yardım eder/Makine yangınlarında temiz su püskürtme sistemini devreye sokar assist for release CO2./It activates the Local Application System in case of machine fires.	TEKNİK EKİP TECHNIC TEAM
49	FATİH TOPAL (ENGINEER)	Tes. Müd. Emriyle 8 nolu ambardaki köpük pompalarını devreye alır ve P.M ye rapor eder Order with P.M Release Foam pumps in the Cargo Hold 8 and report to P.M	TEKNİK EKİP TECHNIC TEAM
50	CANER BİROL ÖĞRETEN (ENGINEER)	Tes. Müd. Emriyle 8 nolu ambardaki köpük pompalarını devreye alır ve P.M ye rapor eder. Order with P.M Release Foam pumps in the Cargo Hold 8 and report to P.M.	TEKNİK EKİP TECHNIC TEAM
51	BARIŞ FETTAHOĞLU (OILER)	Tes. Müd. Emriyle 8 nolu ambardaki köpük pompalarını devreye alır ve P.M ye rapor eder Order with P.M Release Foam pumps in the Cargo Hold 8 and report to P.M	TEKNİK EKİP TECHNIC TEAM
52		Tes. Müd. Emriyle 9 nolu ambardaki Quick closing valfleri kapatır, P.M ye rapor eder Order with P.M shut down quick closing valves and report to P.M	TEKNİK EKİP TECHNIC TEAM
53	MEHMET ÇELİK (FITTER)	Tes. Müd. Emriyle 9 nolu ambardaki Quick closing valfleri kapatır, P.M ye rapor eder Order with P.M shut down quick closing valves and report to P.M	TEKNİK EKİP TECHNIC TEAM
54	MEHMET BOZAN (MECH.MAINT.TECH.)	Köpük tankının güverteden ana valfini, giriş çıkış valflerini ve yangın hangi ambarda ise o ambarın kıç tarafındaki foam sisteminin ayırıcı valfini açar. Pompayı çalıştırır. Takım amiri talimatıyla, gaz yangınlarında yangın mahaline giden gaz hattı kapatma vanasını kapatarak gaz akışını keser. Open foam Tank main valve, inner-outer valves and which Cargo Hold in the fire , open isolation valve from aft cargo hold on the deck. Start to foam tank pump. According to the instruction of team leader ,he closes the shut off valve that belong to gas line where feeds the fire area in gas fires.	TEKNİK EKİP TECHNIC TEAM
55	MEHMET CEM GÖKPINAR (MAINT.LEADER)	Köpük tankının güverteden ana valfini, giriş çıkış valflerini ve yangın hangi ambarda ise o ambarın kıç tarafındaki köpük sisteminin ayırıcı valfini açar. Pompayı çalıştırır. Open foam Tank main valve, inner-outer valves and which Cargo Hold in the fire , open isolation valve from aft cargo hold on the deck. Start to foam tank pu	TEKNİK EKİP TECHNIC TEAM
56		Köpük tankının güverteden ana valfini, giriş çıkış valflerini ve yangın hangi ambarda ise o ambarın kıç tarafındaki köpük sisteminin ayırıcı valfini açar. Pompayı çalıştırır. Open foam Tank main valve, inner-outer valves and which Cargo Hold in the fire , open isolation valve from aft cargo hold on the deck. Start to foam tank pu	TEKNİK EKİP TECHNIC TEAM
72	FERDİ ŞAHİN (ELC.TECH.)	Tesis Müdürü'nün talimatıyla olay yerinin elektriğini keser Cut off the electricity with P.M. order	DESTEK EKİBİ SUPPORT TEAM
75	NEBİ BAĞCI (ELC.TECH.)	Tesis Müdürü'nün talimatıyla olay yerinin elektriğini keser Cut off the electricity with P.M. order	DESTEK EKİBİ SUPPORT TEAM
76	HALİS TURGUT (ELC.TECH.)	Tesis Müdürü'nün talimatıyla olay yerinin elektriğini keser Cut off the electricity with P.M. order	DESTEK EKİBİ SUPPORT TEAM
		İLK YARDIM EKİBİ **FIRST AID TEAM**	
57	FAHRETTİN BULUT (HEALTH OFFICER)	İlk yardım ekiplerine Amirlik Eder, olay mahalinde koordine sağlar .Tesis müdürüyle haberleşme sağlar. leader of first aid squads,coordinates action taken and communicates with plant manager	İLK YARDIM EKİBİ FIRST AID TEAM
58	MERDAN SAPAROV (HEALTH OFFICER)	Revirden Ik yardım çantası ve oksijen tüpü getirir./Toplanma mahaline gider. Bring the first aid kit and O2 tube ./Going to muster station	İLK YARDIM EKİBİ FIRST AID TEAM
59	GÜNER GÜLLER (OILER)	Revirden Ik yardım çantası ve oksijen tüpü getirir./Toplanma mahaline gider. Bring the first aid kit and O2 tube ./Going to muster station	İLK YARDIM EKİBİ FIRST AID TEAM
60	İSMET ÖZTÜRK (COOK)	Revirden sedye ve battaniye getirir/ Toplanma mahaline gider Bring to strecher and blanket from hospital/Going to muster station	İLK YARDIM EKİBİ FIRST AID TEAM
61	ZEYNEL AYDIN (STEWARD)	Revirden sedye ve battaniye getirir/ Toplanma mahaline gider Bring to strecher and blanket from hospital/Going to muster station	İLK YARDIM EKİBİ FIRST AID TEAM
62	EMREN GÜLLER (COOK)	Toplanma mahaline gider. Ekip amirinin talimatına göre hareket eder. (ilk yardım ekibindedir) Goes to muster station and wait order from team leader.	DESTEK EKİBİ SUPPORT TEAM
63	RAMAZAN TOPRAK (MECH.MAINT.TECH.)	Toplanma mahaline gider. Ekip amirinin talimatına göre hareket eder. (ilk yardım ekibindedir) Goes to muster station and wait order from team leader.	DESTEK EKİBİ SUPPORT TEAM

DESTEK EKİBİ SUPPORT TEAM			
64	MEVLÜT YURTSEVEN (HSE SPECIALIST)	Destek ekip amiridir.Tesis müdürüyle haberleşme sağlar.Ganalı personelin tahliyesinden sorumludur.Toplanma alanında sayımını yapar Tesis Müdürüne rapor eder. Emre göre hakaret eder Support team leader.Responsible for the Ghananian personnel of evacuation and counting in muster station . Report to Plant Manager.	DESTEK EKİBİ SUPPORT TEAM
65	FARUK ÖZYİĞİT (MECH.MAINT.TECH.)	Destek ekip amir yardımcısıdır.Tesis müdürüyle haberleşme sağlar.Ganalı personelin tahliyesinden sorumludur.Toplanma alanında sayımını yapar Tesis Müdürüne rapor eder. Emre göre hakaret eder. Destek ekip amiri olmadığında destek ekip amirliği yapar. Support 2. team leader./Responsible for the Ghananian personnel of evacuation and counting in muster station . Report to Plant Manager. When there is no support team leader, he will be team leader.	DESTEK EKİBİ SUPPORT TEAM
66	UFUK GÜNGÖR (OILER)	Ganalı personelin tahliyesinden sorumludur.Toplanma alanında sayımını yapar Tesis Müdürüne rapor eder. Emre göre hakaret eder Responsible for the Ghananian personnel of evacuation and counting in muster station . Report to Plant Manager	DESTEK EKİBİ SUPPORT TEAM
67	AHMET AÇIKGÖZ (MECH. MAINT. TECHN.)	Ganalı personelin tahliyesinden sorumludur.Toplanma alanında sayımını yapar Tesis Müdürüne rapor eder. Emre göre hakaret eder Responsible for the Ghananian personnel of evacuation and counting in muster station . Report to Plant Manager	DESTEK EKİBİ SUPPORT TEAM
68	BAHATTİN ÖZÇELİK (ELC. ENGINEER)	Kontrol odasında Tesis Müdürü'nün talimatıyla hareket eder.Tesis Müdürü'nün talimatıyla fanları ve olay yerinin elektriğini keser stop eder. Standby in order of P.M at the control room and close the ventilations and Cut off the electricity with P.M. order	DESTEK EKİBİ SUPPORT TEAM
69	MEHMET UYGUN (SENIOR. ELC.TECH.)	Kontrol odasında Tesis Müdürü'nün talimatıyla hareket eder.Tesis Müdürü'nün talimatıyla fanları ve olay yerinin elektriğini keser stop eder. Standby in order of P.M at the control room and close the ventilations and Cut off the electricity with P.M. order	DESTEK EKİBİ SUPPORT TEAM
70	NEVZAT GÜNEŞ (SENIOR. ELC.TECH.)	Kontrol odasında Tesis Müdürü'nün talimatıyla hareket eder.Tesis Müdürü'nün talimatıyla fanları ve olay yerinin elektriğini keser stop eder. Standby in order of P.M at the control room and close the ventilations and Cut off the electricity with P.M. order	DESTEK EKİBİ SUPPORT TEAM
71		Tesis Müdürü'nün talimatıyla olay yerinin elektriğini keser Cut off the electricity with P.M. order	
77	AYDIN GÖKSU (FITTER)	Tesis Müdürü'nün talimatıyla su geçirmez kaportaları ve yangın damperlerini kapatır Close the watertight doors and fire dampers with P.M. order	DESTEK EKİBİ SUPPORT TEAM
78		Tesis Müdürü'nün talimatıyla su geçirmez kaportaları ve yangın damperlerini kapatır Close the watertight doors and fire dampers with P.M. order	
79		Toplanma mahaline gider.Tesis Müdürü talimatıyla hareket eder. Close the watertight doors and fire dampers with P.M. order	DESTEK EKİBİ SUPPORT TEAM
80	YAVUZ ATASOY (REPORTING SPECIALIST)	Gemi sertifikaları ve evrakların taşınmasına yardım eder. Acente ve yerel otoritelere haber verir. Assist to bring ship certificates and important documents. Inform the agent and local authories	DESTEK EKİBİ SUPPORT TEAM
81	ÜNAL MULLA (WAREHOUSE STAFF)	Toplanma mahaline gider.Tesis Müdürü talimatıyla hareket eder. Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
82	SERDAR ALTIOK (CHEMIST)	Toplanma mahaline gider.Tesis Müdürü talimatıyla hareket eder. Yangın sırasında güvenlik ofisindeki muster list tablosunu kontrol edip o anda tesiste bulunan toplam personel sayısını kumanda ekip başına bildirir. Goes to muster station and wait for order.During the fire, it checks the muster list table in the security office and reports the total number of personnel in the facility per control team.	DESTEK EKİBİ SUPPORT TEAM
83	İBRAHİM SEVEN (OILER)	Toplanma mahaline gider.Tesis Müdürü talimatıyla hareket eder./Yangın durumuna göre jettydeki yangın nozullarını kullanır. Goes to muster station and wait for order/Use the fire gun nozzles on the jetty according to the fire situation.	DESTEK EKİBİ SUPPORT TEAM
84	FATİH UZGÖREN (OILER)	Toplanma mahaline gider.Tesis Müdürü talimatıyla hareket eder./Yangın durumuna göre jettydeki yangın nozullarını kullanır. Goes to muster station and wait for order / Use the fire gun nozzles on the jetty according to the fire situation.	DESTEK EKİBİ SUPPORT TEAM
85	LEVENT EMRE (OILER)	Toplanma mahaline gider.Tesis Müdürü talimatıyla hareket eder./Yangın durumuna göre jettydeki yangın nozullarını kullanır. Goes to muster station and wait for order /Use the fire gun nozzles on the jetty according to the fire situation.	DESTEK EKİBİ SUPPORT TEAM

YANGIN (FIRE)

ROLE NO	GÖREVİ (RANK)	ACİL DURUM GÖREVİ (EMERGENCY DUTY)	EKİBİ (TEAM)
		KUMANDA EKİBİ **COMMAND TEAM**	
1	SEMİH ŞAHİN (PLANT MANAGER)	Genel Kumanda. General Command	KUMANDA EKİBİ COMMAND TEAM
2	ENGİN ÖZCAN (ASST.PLANT MANAGER)	Genel Kumanda. General Command	KUMANDA EKİBİ COMMAND TEAM
3	MEHMET CEM GÖKPINAR (ASST.PLANT MANAG	Genel Kumanda. General Command	KUMANDA EKİBİ COMMAND TEAM
		YANGIN EKİBİ (1. EKİP) **FIRE TEAM (1st. TEAM)**	
4	ERDI SAKALLI (ADM.AFF.ASST.MANAGER)	Yangın ekibine Amirlik Eder, olay mahalinde koordine sağlar .Tesis müdürüyle haberleşme sağlar. Tesis müdürünün onayıyla Navy Base den destek ister. 2. Yangın ekip amiri olmadığında her iki yangın ekibine de liderlik eder. (1 ST.team leader. Coordinates action taken and communicates with plant manager.request supports from Navy Base approval of the plant manager.) If there is not 2 TH. Team fire leader, he becomes fire team leader for first and second fire teams at the same time.	YANGIN EKİBİ FIRE TEAM
5	ARKIN YÜKSELEN(BOSUN)	Yangın elbisesi giyer.Takım amiri emri ile olay mahaline hareket eder. (Wear fireman outfit. Wait for instruction team leader.)	YANGIN EKİBİ FIRE TEAM
6		Yangın elbisesi giyer.Takım amiri emri ile olay mahaline hareket eder. (Wear fireman outfit. Wait for instruction team leader.)	YANGIN EKİBİ FIRE TEAM
7	YAŞAR ERDOĞAN (A/B)	Yangın elbisesi giyer.Takım amiri emri ile olay mahaline hareket eder. (YEDEK) (Wear fireman outfit. Wait for instruction team leader.) (SPARE)	YANGIN EKİBİ FIRE TEAM
8	OSMAN ÖZGÜR ÇİÇEK (SENIOR MECHANICAL TECH.)	Yangın elbisesi giyiminde yardım eder. Can halatını kumanda eder. Assist to wearing fireman outfit and control to life line.	YANGIN EKİBİ FIRE TEAM
9	SEMİR ARACI (MECH.MAINT.TECH.)	Yangın elbisesi giyiminde yardım eder. Can halatını kumanda eder. Assist to wearing fireman outfit and control to life line.	YANGIN EKİBİ FIRE TEAM
10	HALİL İBRAHİM BEDİR (MECH.MAINT.TECH.)	Yangın elbisesi giyiminde yardım eder. Can halatını kumanda eder. Assist to wearing fireman outfit and control to life line.	YANGIN EKİBİ FIRE TEAM
11	GÜROL ERGİN (MECH.MAINT.TECH.)	Yangın elbisesi giyiminde yardım eder. Can halatını kumanda eder. Assist to wearing fireman outfit and control to life line.	YANGIN EKİBİ FIRE TEAM
12	FATİH KARAGÖZ (MECH.MAINT.TECH.)	Olay mahaline yangın hortumu ve minimax getirir. Ekip amirinin talimatı ile yangın olan bölgenin yangın kapısını kapatır. Bring fire hose and portable fire extinguisher . In order of Team leader Closed to fire door in which fire area.	YANGIN EKİBİ FIRE TEAM
13	TURGUT KAYA (MAINT.TECH.)	Olay mahaline yangın hortumu ve minimax getirir. Ekip amirinin talimatı ile yangın olan bölgenin yangın kapısını kapatır. Bring fire hose and portable fire extinguisher . In order of Team leader Closed to fire door in which fire area.	YANGIN EKİBİ FIRE TEAM
14	GÖKSEL SİMSAR (OILER)	Yangın elbisesi giyer.Takım amiri emri ile olay mahaline hareket eder. (YEDEK) (Wear fireman outfit. Wait for instruction team leader.) (SPARE)	YANGIN EKİBİ FIRE TEAM
15	ÖMER ZEKİ KALYONCU (OILER)	Olay mahaline yangın hortumu ve minimax getirir. Ekip amirinin talimatı ile yangın olan bölgenin yangın kapısını kapatır. Bring fire hose and portable fire extinguisher . In order of Team leader Closed to fire door in which fire area.	YANGIN EKİBİ FIRE TEAM

TEKNİK EKİP **TECHNIC TEAM**			
34	MUSTAFA BÜYÜKTEPE (SHIFT SUPERVISOR)	Teknik ekip amiridir.Olay mahali yakıt akışını keser.Plant manager talimatına göre hareket eder. Technic team leader (1st). Scene areas shut down bunker.Stand-by Plant manager order.	TEKNİK EKİP TECHNIC TEAM
45		Teknik ekip amiridir.Olay mahali yakıt akışını keser.Plant manager talimatına göre hareket eder. Technic team leader(2ND) . Scene areas shut down bunker.Stand-by Plant manager order.	TEKNİK EKİP TECHNIC TEAM
68	BAHATTİN ÖZÇELİK (ELC. ENGINEER)	Olay mahali elektrik tesisatını kontrol eder . scene areas check electric equipment .	TEKNİK EKİP TECHNIC TEAM
69	MEHMET UYGUN (SENIOR. ELC.TECH.)	Olay mahali elektrik tesisatını kontrol eder . scene areas check electric equipment .	TEKNİK EKİP TECHNIC TEAM
70	NEVZAT GÜNEŞ (SENIOR. ELC.TECH.)	Olay mahali elektrik tesisatını kontrol eder . scene areas check electric equipment .	TEKNİK EKİP TECHNIC TEAM
36	TURGUT SELMAN TÜMER (ENGINEER)	Olay mahali yakıt akışını keser. Scene areas shut down bunker	TEKNİK EKİP TECHNIC TEAM
35	BİROL DÖNMEZ (ENGINEER)	Olay mahali yakıt akışını keser. Scene areas shut down bunker	TEKNİK EKİP TECHNIC TEAM
38	SERDAR BALCIK (ENGINEER))	Olay mahali yakıt akışını keser. Scene areas shut down bunker	TEKNİK EKİP TECHNIC TEAM
39	HALİT TUĞBERK KURUTAŞ (ENGINEER)	Olay mahali yakıt akışını keser. Scene areas shut down bunker	TEKNİK EKİP TECHNIC TEAM
50	CANER BİROL ÖĞRETEN (ENGINEER)	Olay mahali yakıt akışını keser. Scene areas shut down bunker	TEKNİK EKİP TECHNIC TEAM
49	FATİH TOPAL (ENGINEER)	Olay mahali yakıt akışını keser. Scene areas shut down bunker	TEKNİK EKİP TECHNIC TEAM
46	ACARALP ATAHAN İÇLİ (ENGINEER)	Olay mahali yakıt akışını keser. Scene areas shut down bunker	TEKNİK EKİP TECHNIC TEAM
37	MUSTAFA KOCA (ENGINEER)	Olay mahali yakıt akışını keser. Scene areas shut down bunker	TEKNİK EKİP TECHNIC TEAM
47	NURİ SENAVER (ELC. TECH)	Olay mahali yakıt akışını keser. Scene areas shut down bunker	TEKNİK EKİP TECHNIC TEAM
48	MUSTAFA YILMAZ (ENGINEER)	Olay mahali yakıt akışını keser. Scene areas shut down bunker	TEKNİK EKİP TECHNIC TEAM
İLK YARDIM EKİBİ **FIRST AID TEAM**			
57	FAHRETTİN BULUT (HEALTH OFFICER)	İlk yardım ekibi amiridir .Tesis müdürüyle haberleşme sağlar. Leader of first aid suquad ,coordinates action taken and communicates with plant manager	İLK YARDIM EKİBİ (FIRST AID TEAM)
58	MERDAN SAPAROV(HEALTH OFFICER)	Revirden lk yardım çantası ve oksijen tüpü getirir./Toplanma mahaline gider. Bring the first aid kit and O2 tube ./Going to muster station	İLK YARDIM EKİBİ (FIRST AID TEAM)
60	İSMET ÖZTÜRK (COOK)	Revirden lk yardım çantası ve oksijen tüpü getirir./Toplanma mahaline gider. Bring the first aid kit and O2 tube ./Going to muster station	İLK YARDIM EKİBİ (FIRST AID TEAM)
61	ZEYNEL AYDIN (STEWARD)	Revirden sedye ve battaniye getirir/ Toplanma mahaline gider Bring to strecher and blanket from hospital/Going to muster station	İLK YARDIM EKİBİ (FIRST AID TEAM)
62	EMREN GÜLLER (COOK)	Revirden lk yardım çantası ve oksijen tüpü getirir./Toplanma mahaline gider. Bring the first aid kit and O2 tube ./Going to muster station	İLK YARDIM EKİBİ (FIRST AID TEAM)
63	RAMAZAN TOPRAK (MECH.MAINT.TECH.)	Toplanma mahaline gider.İlk yardım ekibine yardım eder Assist for aid squad team	İLK YARDIM EKİBİ (FIRST AID TEAM)

DESTEK EKIBI SUPPORT TEAM			
64	MEVLÜT YURTSEVEN (HSE SPECIALIST)	Destek ekibi amiridir. Tesis müdürüyle haberleşme sağlar. Leader of support team ,coordinates action taken and communicates with plant manager	DESTEK EKİBİ SUPPORT TEAM
8	OSMAN ÖZGÜR ÇİÇEK (SENIOR MECHANICAL TECH.)	Toplanma yerinde emre hazır bekler. Destek ekibi amiri olmadığında, destek ekip amirliği yapar. Goes to muster station and wait for order. If leader of support team is absent, he will be leader of support	DESTEK EKİBİ SUPPORT TEAM
9	SEMİR ARACI (MECH.MAINT.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
10	HALİL İBRAHİM BEDİR (MECH.MAINT.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
11	GÜROL ERGİN (MECH.MAINT.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
12	FATİH KARAGÖZ (MECH.MAINT.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
13	TURGUT KAYA (MAINT.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
14	GÖKSEL SİMSAR (OILER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
22		Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
26	MEMET KEMAL TOPAL (FITTER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
28	FATİH MEHMET AKYOL (MECH.MAINT.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
29	YAŞAR TÜRKAN (SENIOR FITTER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
31	DURMUŞ YILDIRIM (FITTER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
32	İSMAİL BAL (SENIOR FITTER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
33	AYHAN ORAN (MECH.MAINT.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
40	MESUT CUMHUR MORGÜL (ENGINEER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM

42		Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
43	TACETTİN SERT (MECH.MAINT.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
44	İSMAİL ÖZ (MECH.MAINT.LEADER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
51	BARIŞ FETTAHOĞLU (OILER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
52		Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
53	MEHMET ÇELİK (FITTER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
54	MEHMET BOZAN (MECH.MAINT.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
55	MEHMET CEM GÖKPINAR (ENGINEER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
59	GÜNER GÜLLER (OILER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
65	FARUK ÖZYİĞİT (MECH.MAINT.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
66	UFUK GÜNGÖR (OILER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
67		Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
68	BAHATTİN ÖZÇELİK (ELC. ENGINEER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
69	MEHMET UYGUN (SENIOR. ELC.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
70	NEVZAT GÜNEŞ (SENIOR. ELC.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
72	FERDİ ŞAHİN (ELC.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
73	İBRAHİM ÇOLAK (ELC.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
~~75~~	~~NEBİ BAĞCI (ELC.TECH.)~~	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
76	HALİS TURGUT (ELC.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
77	AYDIN GÖKSU (FITTER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
78		Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
80	YAVUZ ATASOY (REPORTING SPECIALIST)	Toplanma mahaline gider.Tesis Müdürü talimatıyla hareket eder. Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
81	ÜNAL MULLA (WAREHOUSE STAFF)	Toplanma mahaline gider.Tesis Müdürü talimatıyla hareket eder. Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
82	SERDAR ALTIOK (CHEMIST)	Toplanma mahaline gider.Tesis Müdürü talimatıyla hareket eder. Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
83	İBRAHİM SEVEN (OILER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
84	FATİH UZGÖREN (OILER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
85	LEVENT EMRE (OILER)	Toplanma mahaline gider.Tesis Müdürü talimatıyla hareket eder. Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM

KAPALI MAHALDEN ADAM KURTARMA (ENCLOSED SPACE RESCUE)

ROLE NO	GÖREVİ (RANK)	ACİL DURUM GÖREVİ (EMERGENCY DUTY)	EKİBİ (SQUAD)
		KUMANDA EKİBİ **COMMAND TEAM**	
1	SEMİH ŞAHİN (PLANT MANAGER)	Genel Kumanda. General Command	KUMANDA EKİBİ COMMAND TEAM
2	ENGİN ÖZCAN (ASST.PLANT MANAGER)	Genel Kumanda. General Command	KUMANDA EKİBİ COMMAND TEAM
3	MEHMET CEM GÖKPINAR (ASST.PLANT MANAGER))	Genel Kumanda. General Command	KUMANDA EKİBİ COMMAND TEAM
		1.EKİP **FIRST TEAM**	
4	ERDI SAKALLI (ADM.AFF.ASST.MANAGER)	1.Ekip amiridir. İçeri girilmeden Gaz ölçüm cihazının kullanılmasını sağlar, verileri kontrol eder..Tesis müdürüyle haberleşme sağlar. leader of suquad 1, He provides the gas dedector and take datas from this device without going inside. He communicates with plant manager	1. EKİP FIRST TEAM
19	ENES KÖKTAŞ (DECK OFFICER)	Ekip amirleri olmadığında yangın ekiplerine liderlik eder. 2th leader of suquad 1, When the leader is absent , he will be team leader.	1. EKİP FIRST TEAM
5	ARKIN YÜKSELEN BOSUN)	Solunum cihazını takarak kapalı mahale girer. Wearing to breathing apparatus and entering to enclosed space	1. EKİP FIRST TEAM
6		Solunum cihazını takarak kapalı mahale girer. Wearing to breathing apparatus and entering to enclosed space	1. EKİP FIRST TEAM
7	YAŞAR ERDOĞAN (A/B)	Solunum cihazı ve can halatının getirilmesi ,kumandası ve giyilmesine yardımcı olur. Assist to bring 1st breathing apparatus, life line and wearing to breating apparatus and life line	1. EKİP FIRST TEAM
20	MUSTAFA TAŞÇI (A/B)	Solunum cihazı ve can halatının getirilmesi ,kumandası ve giyilmesine yardımcı olur. Assist to bring 1st breathing apparatus, life line and wearing to breating apparatus and life line	1. EKİP FIRST TEAM
23	ADEM ÖZTÜRK (OILER)	Solunum cihazı ve can halatının getirilmesi, kumandası ve giyilmesine yardımcı olur. Assist to bring 1st breathing apparatus, life line and wearing to breating apparatus and life line	1. EKİP FIRST TEAM
24	İRFAN KARAGÜLLE (OILER)	Solunum cihazı ve can halatının getirilmesi ,kumandası ve giyilmesine yardımcı olur. Assist to bring 1st breathing apparatus, life line and wearing to breating apparatus and life line	1. EKİP FIRST TEAM
14	GÖKSEL SİMSAR (OILER)	1. Ekip amiri olmadığında ekip amiridir. Gaz ölçüm cihazı kullanır.Tesis müdürüyle haberleşme sağlar. Stand by in order	1. EKİP FIRST TEAM
15	ÖMER ZEKİ KALYONCU (OILER)	Ekip amiri talimatıyla hareket eder Stand by in order team leader	1. EKİP FIRST TEAM
		TEKNİK EKİP **TECHNIC SQUAD**	
34	MUSTAFA BÜYÜKTEPE (SHIFT SUPERVISOR)	Teknik ekip amiri (1.)olay mahalinde denize sızıntı olup olmadığını kontrol eder .Plant manager Emrine göre hareket eder Technic team leader (1 ST).check for leaks at the scene areas.Stand-by Plant manager order.	TEKNİK EKİP TECHNIC TEAM
45		Teknik ekip amiri (2.).olay mahalinde denize sızıntı olup olmadığını kontrol eder .Plant manager Emrine göre hareket eder Technic team leader (2ND)check for leaks at the scene areas.Stand-by Plant manager order.	TEKNİK EKİP TECHNIC TEAM
68	BAHATTİN ÖZÇELİK(ELC. ENGINEER)	Ekip amiri talimatıyla hareket eder Stand by in order team leader	TEKNİK EKİP TECHNIC TEAM
69	MEHMET UYGUN (SENIOR. ELC.TECH.)	Ekip amiri talimatıyla hareket eder Stand by in order team leader	TEKNİK EKİP TECHNIC TEAM
70	NEVZAT GÜNEŞ (SENIOR. ELC.TECH.)	Ekip amiri talimatıyla hareket eder Stand by in order team leader	TEKNİK EKİP TECHNIC TEAM
36	TURGUT SELMAN TÜMER (ENGINEER)	olay mahalinde denize sızıntı olup olmadığını kontrol eder .Teknik ekip amiri ile hareket eder. check for leaks at the scene areas	TEKNİK EKİP TECHNIC TEAM
35	BİROL DÖNMEZ (ENGINEER)	olay mahallinde denize sızıntı olup olmadığını kontrol eder .Teknik ekip amiri talimatı ile hareket eder check for leaks at the scene areas	TEKNİK EKİP TECHNIC TEAM
38	SERDAR BALCIK (ENGINEER)	olay mahalinde denize sızıntı olup olmadığını kontrol eder . .Teknik ekip amiri ile hareket eder. In order of Technıc team leader.	TEKNİK EKİP TECHNIC TEAM
39	HALİT TUĞBERK KURUTAŞ (ENGINEER)	tesis müdürü talimatı ile olay mahali elektriğini keser . shut down electric according to P.M. Order .	TEKNİK EKİP TECHNIC TEAM
50	CANER BİROL ÖĞRETEN (ENGINEER)	olay mahalinde denize sızıntı olup olmadığını kontrol eder .Teknik ekip amiri ile hareket eder. check for leaks at the scene areas	TEKNİK EKİP TECHNIC TEAM
49	FATİH TOPAL (ENGINEER)	tesis müdürü talimatı ile olay mahali elektriğini keser . shut down electric according to P.M. Order .	TEKNİK EKİP TECHNIC TEAM
46	ACARALP ATAHAN İÇLİ (ENGINEER)	Ekip amiri talimatıyla hareket eder Stand by in order team leader	TEKNİK EKİP TECHNIC TEAM
37	MUSTAFA KOCA (ENGINEER)	Ekip amiri talimatıyla hareket eder Stand by in order team leader	TEKNİK EKİP TECHNIC TEAM
47	NURI SENAVER (ELC. ELECTRICAL)	Olay mahalinde denize sızıntı olup olmadığını kontrol eder . In order of Technıc team leader.	TEKNİK EKİP TECHNIC TEAM
48	MUSTAFA YILMAZ (ENGINEER)	Olay mahalinde denize sızıntı olup olmadığını kontrol eder . check for leaks at the scene areas	TEKNİK EKİP TECHNIC TEAM

		İLK YARDIM EKİBİ **FIRST AID SQUAD**	
57	FAHRETTİN BULUT (HEALTH OFFICER)	İlk yardım ekiplerine Amirlik Eder, olay mahalinde koordine sağlar .Tesis müdürüyle haberleşme sağlar. leader of first aid squads,coordinates action taken and communicates with plant manager	İLK YARDIM EKİBİ FIRST AID TEAM
58	ALİ ÇELİK /MERDAN SAPAROV(HEALTH OFFICER)	Revirden Ik yardım çantası ve oksijen tüpü getirir./Toplanma mahaline gider. Bring the first aid kit and O2 tube ./Going to muster station	İLK YARDIM EKİBİ FIRST AID TEAM
60	İSMET ÖZTÜRK (COOK)	Revirden Ik yardım çantası ve oksijen tüpü getirir./Toplanma mahaline gider. Bring the first aid kit and O2 tube ./Going to muster station	İLK YARDIM EKİBİ FIRST AID TEAM
61	ZEYNEL AYDIN (STEWARD)	Revirden sedye ve battaniye getirir/ Toplanma mahaline gider Bring to strecher and blanket from hospital/Going to muster station	İLK YARDIM EKİBİ FIRST AID TEAM
62	EMREN GÜLLER (COOK)	Revirden sedye ve battaniye getirir/ Toplanma mahaline gider Bring to strecher and blanket from hospital/Going to muster station	İLK YARDIM EKİBİ FIRST AID TEAM
63	RAMAZAN TOPRAK (MECH.MAINT.TECH.)	Toplanma mahaline gider. Ekip amirinin talimatına göre hareket eder. (ilk yardım ekibindedir) Goes to muster station and wait order from team leader.	DESTEK EKİBİ SUPPORT TEAM
		DESTEK EKIBI **SUPPORT TEAM**	
64	MEVLÜT YURTSEVEN (HSE SPECIALIST)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
8	OSMAN ÖZGÜR ÇİÇEK (SENIOR MECHANICAL TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
9	SEMİR ARACI (MECH.MAINT.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
10	HALİL İBRAHİM BEDİR (MECH.MAINT.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
11	GÜROL ERGİN (MECH.MAINT.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
12	FATİH KARAGÖZ (MECH.MAINT.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
13	TURGUT KAYA (MAINT.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
14	GÖKSEL SİMSAR (OILER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
25		Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
26	MEMET KEMAL TOPAL (FITTER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
27	(YAĞCI)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
28	FATİH MEHMET AKYOL (MECH.MAINT.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
29	YAŞAR TÜRKAN (SENIOR FITTER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
30		Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
31	DURMUŞ YILDIRIM (FITTER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
32	İSMAİL BAL (SENIOR FITTER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
33	AYHAN ORAN (MECH.MAINT.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
40	MESUT CUMHUR MORGÜL (ENGINEER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM

41		Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
42		Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
43	TACETTİN SERT (MECH.MAINT.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
44	İSMAİL ÖZ (MECH.MAINT.LEADER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
51	BARIŞ FETTAHOĞLU (OILER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
52		Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
53	MEHMET ÇELİK (FITTER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
54	MEHMET BOZAN (MECH.MAINT.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
55	MEHMET CEM GÖKPINAR (ENGINEER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
56		Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
59	GÜNER GÜLLER (OILER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
65	FARUK ÖZYİĞİT (MECH.MAINT.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
66	UFUK GÜNGÖR (OILER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
67	AHMET AÇIKGÖZ (MECH. MAINT. TECHN.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
71		Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
72	FERDİ ŞAHİN (ELC.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
73	İBRAHİM ÇOLAK (ELC.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
74		Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
75	NEBİ BAĞCI (ELC.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
76	HALİS TURGUT (ELC.TECH.)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
77	AYDIN GÖKSU (FITTER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
78		Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
79		Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
80	YAVUZ ATASOY (REPORTING SPECIALIST)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
81	ÜNAL MULLA (WAREHOUSE STAFF)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
82	SERDAR ALTIOK (CHEMIST)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
83	İBRAHİM SEVEN (OILER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
84	FATİH UZGÖREN (OILER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
85	LEVENT EMRE (OILER)	Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
86		Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM
87		Toplanma yerinde emre hazır bekler Goes to muster station and wait for order	DESTEK EKİBİ SUPPORT TEAM

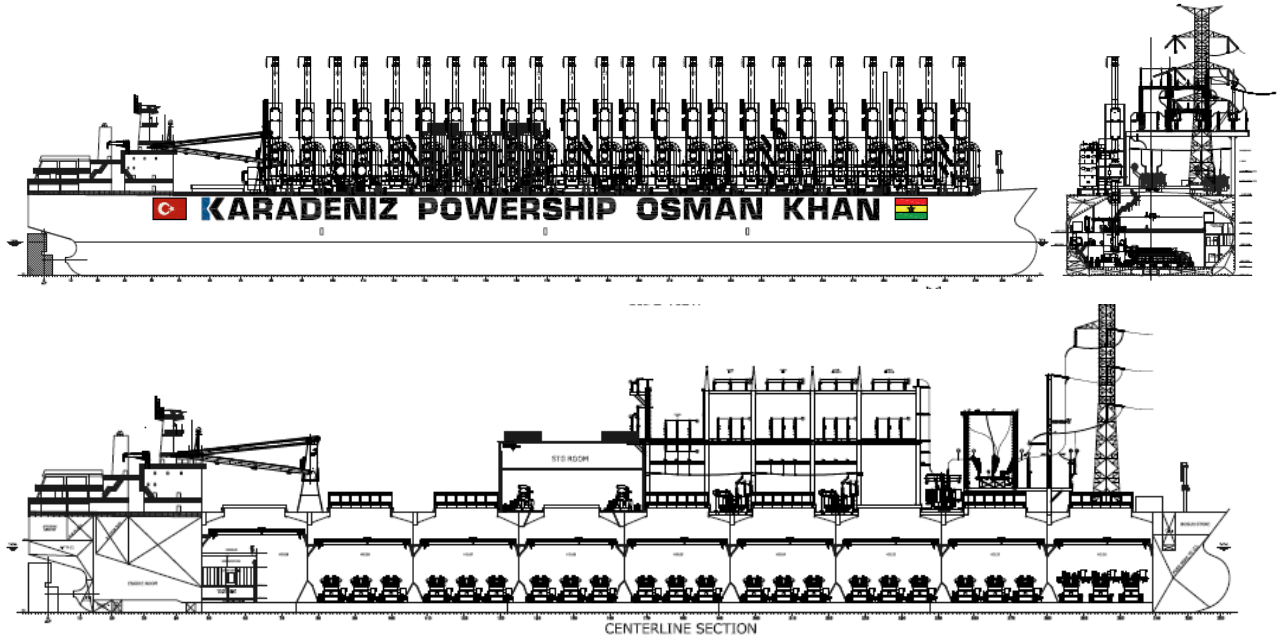
ALARMLAR (ALARMS)

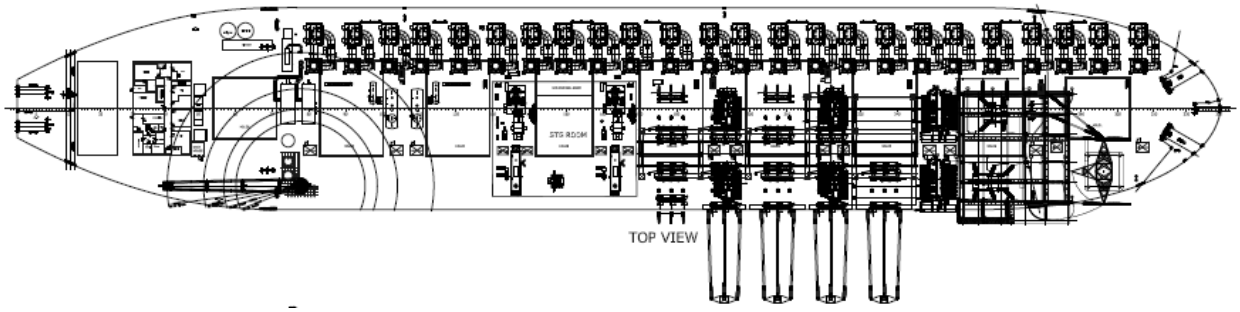
ACİL DURUMLAR(EMERGENCIES)	İŞARET (SIGNALS)	AÇIKLAMA (EXPLANATION)	
YANGIN ALARMI (FIRE ALARM)		Genel alarmın kısa fasılalı sürekli çalması Following continnois intervals short sound	Görevliler techizatlarıyla görev yerlerine gelir Duty crew to arrive Muster Station to receive their instruction
GENEL ALARM (GENERAL ALARM)		Genel alarmın kesintisiz sürekli çalması + Anons Following to the continous general alarm signal + Announce	

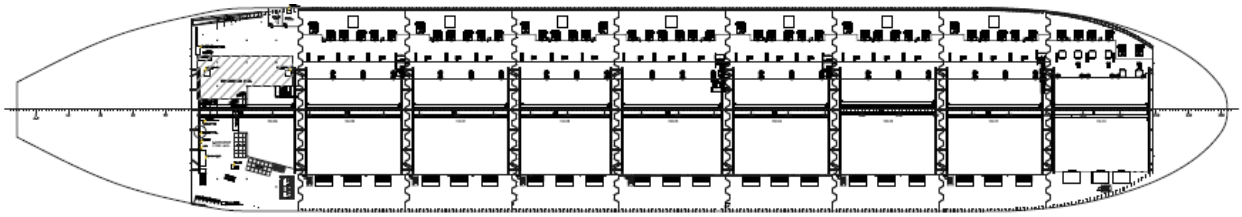
ACİL DURUM ALARMINA MÜTEAKİP ACİL DURUMUN TİPİ ANONS EDİLİR VE GÖREVLİLER DURUMA MÜDAHELE EDER.
(THE TYPE OF EMERGENCY TO BE DECLERATED AT MUSTER STATION FOLLOWING THE EMERGENCY ALARM SIGNAL AND THE DUTY CREW INTERVENTION STARTS)
PANİĞE KAPILMA- ROLE KARTINI AL- TOPLANMA İSTASYONUNA GİT- KENDİNİ RAPOR ET
DO NOT PANIC- TAKE YOUR MUSTER CARD- GO TO YOUR MUSTER STATION- REPORT YOURSELF

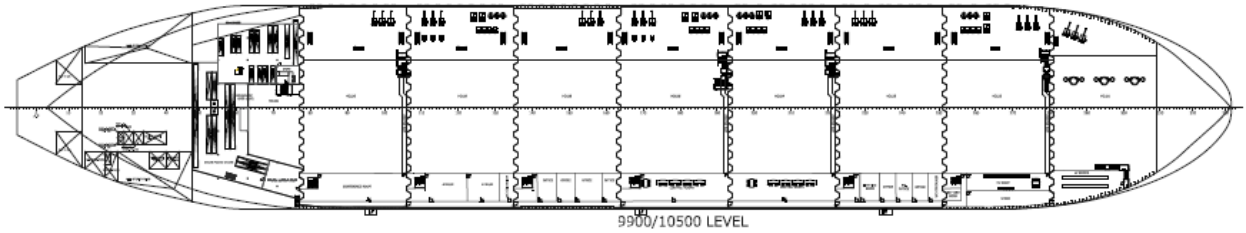
7.11. Plant General Layout Plan

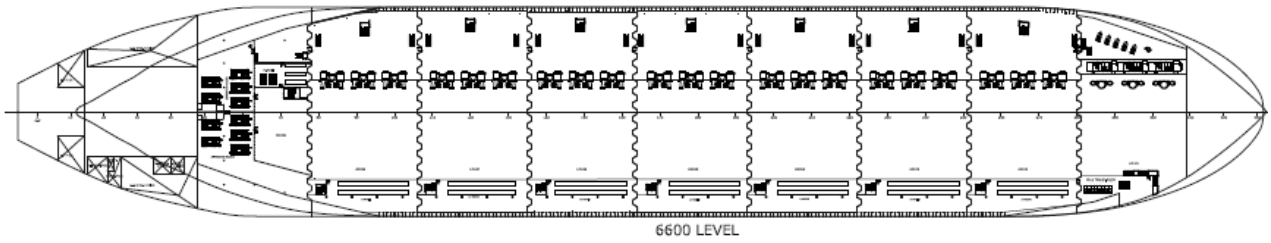
General Layout Plan of Karadeniz Powership Osman Khan is given below.

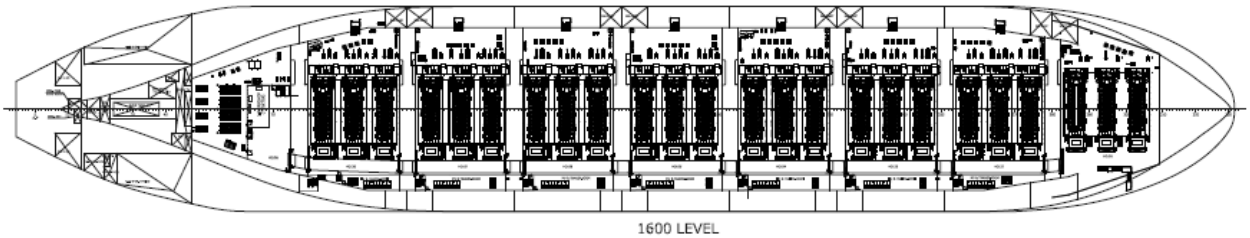


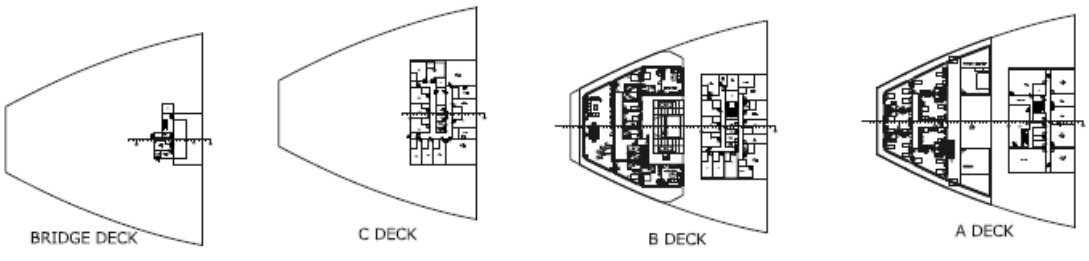

TOP VIEW

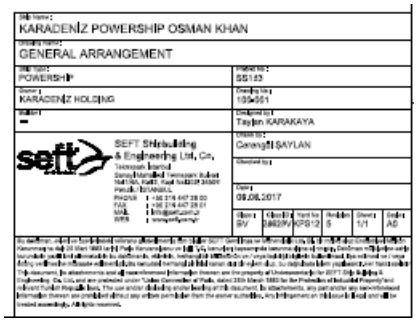

13200 LEVEL

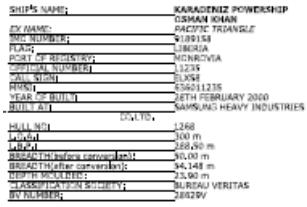

9900/10500 LEVEL


6600 LEVEL


1600 LEVEL

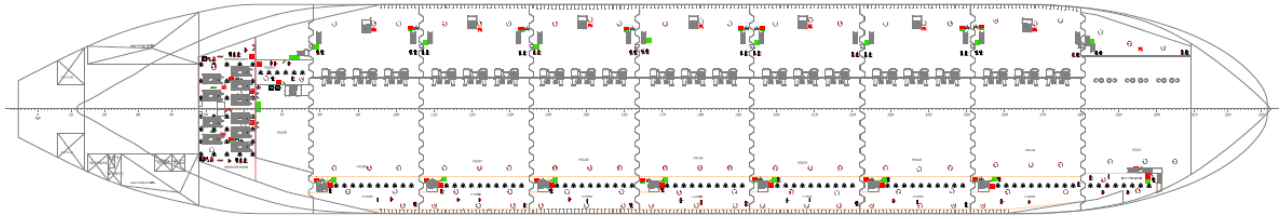

BRIDGE DECK
C DECK
B DECK
A DECK

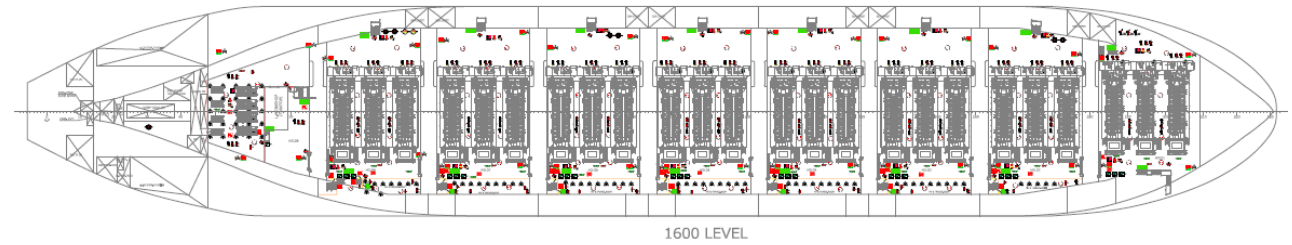

KARADENİZ POWERSHIP OSMAN KHAN
GENERAL ARRANGEMENT
POWERSHIP
KARADENİZ HOLDING
SEFT SHIPBUILDING & ENGINEERING LTD. CO.
Taylan KARAKAYA
Cenangil ŞAYLAN
09.06.2017

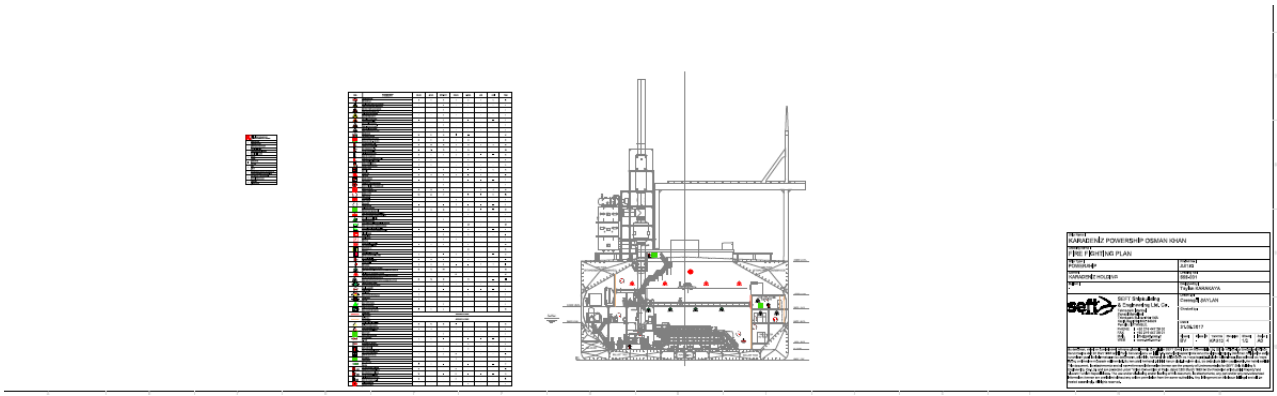

SHIP'S NAME: KARADENIZ POWERSHIP OSMAN KHAN
EX NAME: PACIFIC TRIANGLE
IMO NUMBER: 9189158
FLAG: LIBERIA
PORT OF REGISTRY: MONROVIA
OFFICIAL NUMBER: 1235
CALL SIGN: ELXS8
MMSI: 636011235
YEAR OF BUILT: 28TH FEBRUARY 2000
BUILT AT: SAMSUNG HEAVY INDUSTRIES
DIVIDED:
HULL NO: 1368
LoA(o): 300 m
LoB(o): 188,90 m
BREADTH(before conversion): 50,00 m
BREADTH(after conversion): 54,148 m
DEPTH MOULDED: 23,90 m
CLASSIFICATION SOCIETY: BUREAU VERITAS
IMO NUMBER: 2802BV

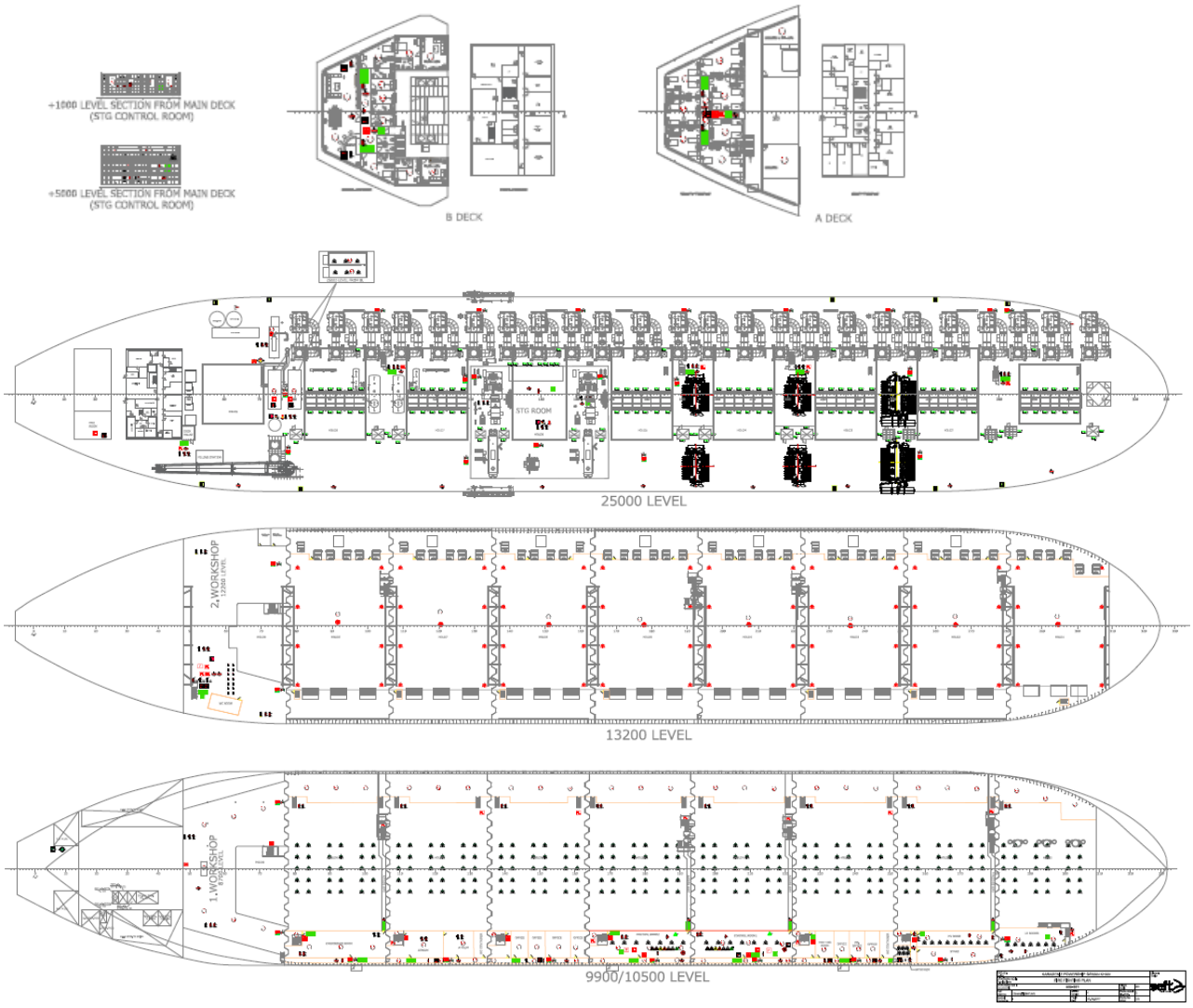
7.12. Plant Fire Plan

Fire Plan of Karadeniz Powership Osman Khan is given below.


6600 LEVEL

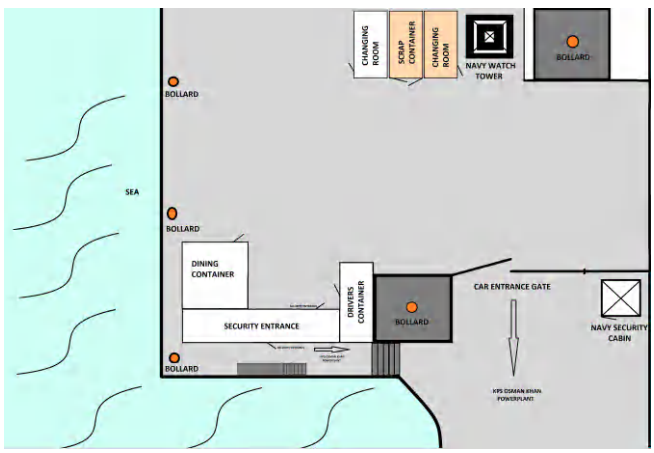

1600 LEVEL

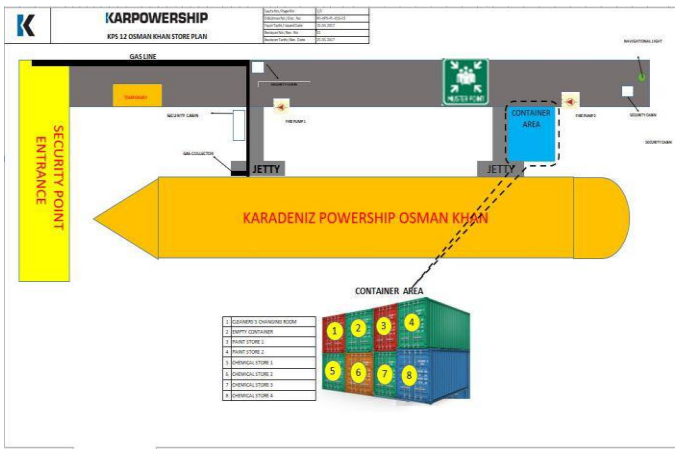

KARADENİZ POWERSHIP OSMAN KHAN
FIRE FIGHTING PLAN



7.13. Muster Point & Evacuation Plans

Muster point/s and Evacuation Plan of Karadeniz Powership KPS 12 are given below.





8. REPORTING

QDMS

KH-KPS-FR-023 Record of Safety Drills Form

KH-HSE-FR-004 Incident Investigation and Reporting Form

KH-KPS-FR-024 Emergency Response Checklist

KH-KPS-FR-006 Training Record Form KH-KPS-FR-177 Heavy Weather Emergency Checklist

RELATED DOCUMENTS

KH-KPS-FR-175 Emergency Contact List Form

Plant Role Chart

Plant General Layout Plan

Plant Fire Plan

9. REFERENCES

KH-HSE-PR-011 Emergency Response Procedure

KH-HSE-PL-001 Occupational Health and Safety and Environmental Plan

Standart Article 4.4.7 Emergency Preparation and Response

ISO 14001: 2015 Environmental Management System Standard Article 8.2 Emergency Preparation and Response

KH-HSE-PR-025 Incident Reporting and Investigation Procedure

MARPOL 73/78 - Annex I

IFC Environmental Health and Safety Guidelines 2.0 Occupational Health and Safety

10. REVISION FOLLOW-UP

REVISION FOLLOW-UP

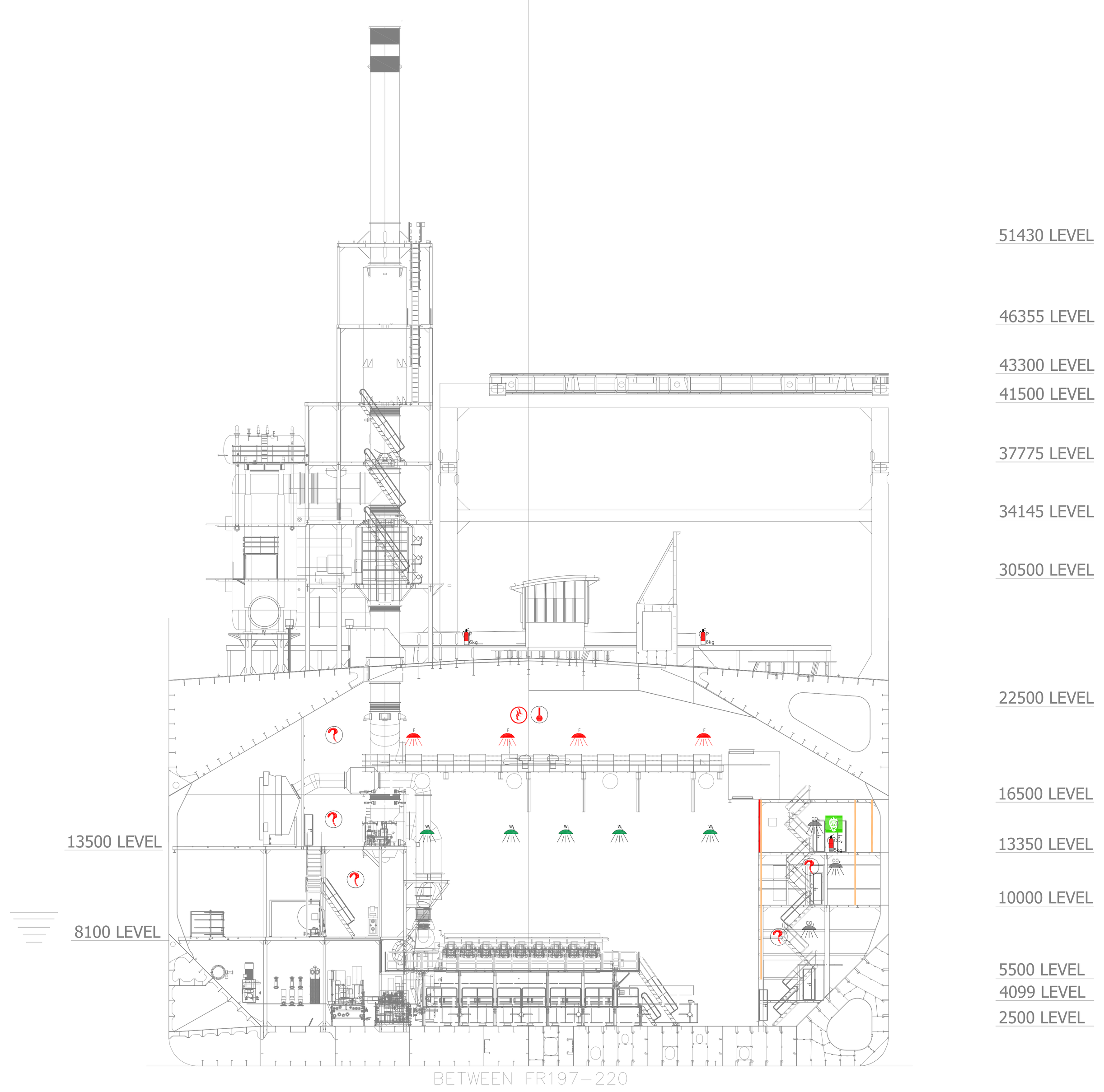
Rev. No	Rev. Date	Revision Definition	Prepared By
0	20.02.2019	First preparation of the document	Ferdi Aşılıoğlu
01	16.09.2019	Relocation another port (Takoradi -Sekondi)	Erdi SAKALLI
02	19.01.2020	Gas Conversion	Mevlüt YURTSEVEN
03	01.06.2020	Pandemic (Epidemic Disease)	Mevlüt YURTSEVEN
04	18.01.2022	Staff circulation	Mevlüt YURTSEVEN
05	01.08.2022	Emergency contact formations	H.Süha ŞENOCAK

8100 LEVEL

2500 LEVEL

SEMBOL	CAN KURTARMA TECHİZATI / LIFE SAVING EQUIPMENT	2500 LEVEL	8100 LEVEL	13500 LEVEL	16500 LEVEL	22500 LEVEL	A DECK	B DECK	TOPLAM
FIRE PLAN	YANGIN KONTROL PLANI / FIRE CONTROL PLAN	9	3	14	1	6	1	1	35
	KÖPÜK/SU YANGIN POMPASI UZAKTAN KUMANDASI / REMOTE CONTROLLED FOAM - WATER FIRE PUMP	-	-	1	-	-	-	-	1
	ANA YANGIN POMPASI UZAKTAN KUMANDASI / REMOTE CONTROLLED MAIN FIRE PUMP	-	-	1	-	-	-	-	1
	YAKIT POMPASI UZAKTAN KAPAMASI / FUEL PUMPS REMOTE SHUT-OFF	-	-	1	-	-	-	-	1
	YAĞ POMPASI UZAKTAN KAPAMASI / OIL PUMPS REMOTE SHUT-OFF	-	-	1	-	-	-	-	1
	YAĞ VALFLERİ UZAKTAN KONTROL / REMOTE CONTROL FOR OIL VALVES	-	-	1	-	-	-	-	1
	YAKIT VALFLERİ UZAKTAN KONTROL / REMOTE CONTROL FOR FUEL OIL VALVES	-	-	1	-	-	-	-	1
W	YANGIN VANALARI / FIRE MAIN WITH FIRE VALVES	35	18	16	2	20	1	-	92
	HORTUM VE SPREY/JET NOZUL KUTUSU / HOSE BOX WITH SPRAY - JET FIRE NOZZLE	35	18	16	2	20	1	-	92
P 6kg	TOZ YANGIN SONDURUCU (6 kg) / POWDER FIRE EXTINGUISHER (6 kg)	38	17	27	2	22	3	5	114
CO_2 5kg	CO2 YANGIN SONDURUCU (5 kg) / CO2 FIRE EXTINGUISHER (5 kg)	52	31	16	9	10	-	-	118
9 L	KÖPÜK YANGIN SONDURUCU (9 L) / FOAM FIRE EXTINGUISHER (9 L)	38	3	1	2	9	-	-	53
45L	TEKERLEKLI KOPUKLU YANGIN SONDURUCU (45 L) / WHEELED FOAM FIRE EXTINGUISHER (45 L)	17	10	-	1	2	-	-	30
20L	TASINABILIR KÖPÜK YAPICI (20 L) / PORTABLE FOAM APPLICATOR (20 L)	17	3	-	1	3	-	-	24
SPARE FOR 20 L FOAM	PORTATİF KÖPÜK YAPICI (20L) (YEDEK) / PORTABLE FOAM APPLICATOR (20 L) (SPARE)	17	3	-	1	3	-	-	24
	YANGIN BATTANİYESİ / FIRE BLANKET	-	-	9	-	-	1	1	11
FL	YANGIN DOLABI / FIRE LOCKER	9	13	-	10	6	-	-	38
	YANGIN ALARM PANELİ / FIRE ALARM PANEL	-	-	1	-	-	-	-	1
	YANGIN GENEL ALARM BUTONU/ANAHTARI / PUSH BUTTON - SWITCH FOR FIRE GENERAL ALARM	-	-	1	-	-	-	-	1
	MANUEL ÇAĞRI NOKTASI / MANUALLY OPERATED CALL POINT	16	8	28	1	5	3	4	65
	DUMAN DEDEKTÖRÜ / SMOKE DETECTOR	107	80	72	8	11	15	19	312
	ALEV DEDEKTÖRÜ / FLAME DETECTOR	-	-	-	-	8	-	-	8
	ISI DEDEKTÖRÜ / THERMAL DETECTOR	-	-	-	-	8	-	-	8
	ACIL KACIS SOLUNUM CIHAZI / EMERGENCY ESCAPE BREATHING DEVICE	39	20	29	3	14	3	5	113
F	SABİT YANGIN SÖNDÜRÜCÜ KÖPÜK MERKEZİ (7800 Lt) / FIXED FIRE EXTINGUISHING FOAM INSTALLATION (7800 Lt)	-	-	-	-	1	-	-	1
M	FANLAR İÇİN ACİL DURUM KAPATMA / EMERGENCY STOP FOR FANS	-	-	2	-	-	-	-	2
M	HAVALANDIRMA AGZI UZAKTAN KAPATMAK(MAKINE MAHALI ICIN) / REMOTE VENTILATION SHUT-OFF(FOR MACHINERY SPACES)	-	-	-	-	132	-	-	132
M	HAVALANDIRMA AGZI(ELLE)(MAKINE MAHALI ICIN) / VENTILATION SHUT-OFF(MANUEL)(FOR MACHINERY SPACES)	-	-	-	-	7	-	-	7
C	KONTROL İSTASYONU / CONTROL STATION	-	-	1	-	1	-	-	2
F	YANGIN İSTASYONU / FIRE STATION	-	-	1	2	-	-	-	3
S	YANGIN ALARM SİRENİ(SES ve IŞIKLI) / FIRE ALARM SOUNDER & BEACON	11	3	-	1	1	-	-	16
	YAĞ/YAKIT SIZINTI KITI(1 varil) / OIL SPILL KIT (1 barrel)	-	-	-	-	10	-	-	10
CO_2	CO2 ALARMI SESLİ ve IŞIKLI / CO2 ALARM SOUNDER & BEACON	10	10	6	-	-	-	-	26
	YANGIN ALARM ZİLİ / FIRE ALARM BELL	7	7	10	-	-	3	3	30
W_L	SU NOZULLARI TARAFINDAN DENETLENEN BOLGE / SPACE OR GROUP OF SPACES PROTECTED BY FIRE EXTINGUISHING SYSTEM (WATER-LAS)	50	234	-	-	-	-	-	284
F	KÖPÜK NOZULLARI TARAFINDAN DENETLENEN BOLGE / SPACE OR GROUP OF SPACES PROTECTED BY FIRE EXTINGUISHING SYSTEM (FOAM-LAS)	-	-	53	-	-	-	-	53
CO_2	CO2 NOZULLARI TARAFINDAN DENETLENEN BOLGE / SPACE OR GROUP OF SPACES PROTECTED BY FIRE EXTINGUISHING SYSTEM (CO2-LAS)	56	108	62	-	12	-	-	238
	BÖLGESEL UYGULAMA SU POMPASI / LOCAL APPLICATION SYSTEM WATER PUMP	-	1	-	-	-	-	-	1
	YANGIN ALARM DÜDÜĞÜ / HORN FIRE ALARM	-	-	7	-	-	-	-	7
	KÖPÜK POMPASI / LOCAL APPLICATION SYSTEM FOAM PUMP	-	-	-	-	1	-	-	1
	YANGIN POMPASI (100 m^3/h - 10 bar) / FIRE PUMP (100 m^3/h - 10 bar)	6	-	-	-	-	-	-	6
FOAM SW PUMP	KÖPÜK DENİZ SUYU POMPASI / FOAM SEA WATER PUMP	2	-	-	-	-	-	-	2
LAS	LAS AKTIVASYON ISTASYONU / LAS RELEASE STATION (LAS)	-	-	1	-	-	-	-	1
LAS	YEREL BÖLGE YANGIN ALARM PANELİ / LOCAL APPLICATION FIRE ALARM PANEL	22	4	-	-	-	-	-	26
LAS	LAS ALARM DÜDÜĞÜ / LAS HORN	22	3	-	-	-	-	-	25
	"A" SINIFI BÖLME / "A" CLASS DIVISION	AS INDICATED ON THE DRAWING							
	"B" SINIFI BÖLME / "B" CLASS DIVISION	AS INDICATED ON THE DRAWING							
	B SINIFI KENDİ KAPANIR YANGIN KAPISI / "B" CLASS FIRE DOOR SELF-CLOSING	14	9	27	10	-	-	-	60
	A SINIFI KENDİ KAPANIR YANGIN KAPISI / "A" CLASS FIRE DOOR SELF-CLOSING	2	5	4	-	-	-	-	11
	PORTATİF RADYO / SURVIVAL CRAFT PORTABLE RADIO	-	-	2	-	-	-	-	2
CO_2	CO2 ALARM DÜDÜĞÜ / CO2 HORN	1	2	1	-	-	-	-	4
	ULUSLARARASI SAHİL BAĞLANTISI / INTERNATIONAL SHORE CONNECTION	-	-	-	-	2	-	-	2
CO_2	SABİT CO2 BATARYASI / FIXED FIRE EXTINGUISHING CO2 BATTERY	-	2	-	-	3	-	-	5
	CO2 TUPLERI PATLATMA ISTASYONU / REMOTE RELEASE STATION (CO2)	-	-	-	-	1	-	-	1
	TOPLANMA YERİ / MUSTER STATION	-	-	-	-	3	-	-	3
P 6kg (yedek) (spare)	TOZ YANGIN SONDURUCU (6 kg)(yedek) / POWDER FIRE EXTINGUISHER (6 kg)(spare)	-	-	35	27	-	-	-	62
CO_2 5kg (yedek) (spare)	CO2 YANGIN SONDURUCU (5 kg)(yedek) / CO2 FIRE EXTINGUISHER (5 kg)(spare)	-	-	30	37	-	-	-	67
9 L (yedek) (spare)	KÖPÜK YANGIN SONDURUCU (9 L)(yedek) / FOAM FIRE EXTINGUISHER (9 L)(spare)	-	-	16	16	-	-	-	32
G	ACİL DURUM JENERATÖRÜ / EMERGENCY GENERATOR	-	-	-	-	1	-	-	1
	ACİL DURUM GÖZ YIKAMA / EYE WASH	5	-	-	-	5	-	-	10
F	KÖPÜK PÜSKÜRTME TOPU / FOAM MONITOR	-	-	-	-	2	-	-	2
30L	TASINABILIR KÖPÜK YAPICI (30 L) / PORTABLE FOAM APPLICATOR (30 L)	-	-	-	-	8	-	-	8
	FOAM ALARM DÜDÜĞÜ / AIR HORN - FOAM	-	-	8	-	-	-	-	8
LAS	LOCAL APPLICATION SYSTEM-DUMAN DEDEKTÖRÜ / LOCAL APPLICATION SYSTEM-SMOKE DETECTOR	1	3	-	-	-	-	-	4
LAS	LOCAL APPLICATION SYSTEM-ALEV DEDEKTÖRÜ / LOCAL APPLICATION SYSTEM-FLAME DETECTOR	1	3	-	-	-	-	-	4

FL	İTFAİYECİ DONATIM DOLABI TEÇHİZATI / LOCKER WITH FIREMAN'S OUTFIT EQUIPMENT
1	KORUYUCU ELBİSE / PROTECIVE CLOTHING
2	RUBBER,NON CONDUCTING BOOT / LASTİK,YALITKAN ÇİZME
3	RUBBER,NON CONDUCTING GLOVES / LASTİK,YALITKAN ELDİVEN
4	HELMET / MİGFER
5	HAND LATTERN / EL FENERİ
6	AXE / BALTA
7	AIR BREATHING APPARATUS AND TWO APARE BOTTLES / HAVA SOLUNUM CİHAZI VE 2 ADET YEDEK TÜPLER
8	FIRE RESISTANT LIFELINE WITH SNAP HOOK / YANMAZ,KANCALI CAN HALATI
9	SAFETY BELT / EMNİYET KEMERİ



NO:	REVISION NOTE	REVISED BY	REV. DATE
0	FIRST ISSUE	T.DUZGUN	28.09.2020

KARADENİZ HOLDİNG

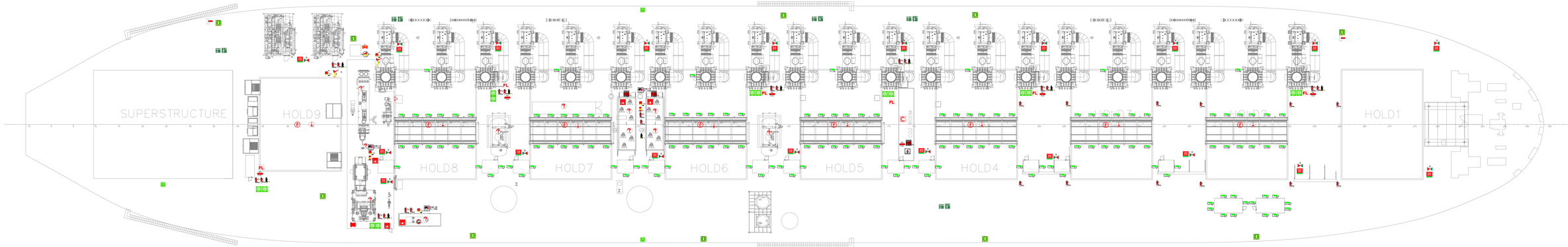
Karadeniz Holding A.Ş
Merkez Mahallesi Develi Caddesi No:14 – 34406
Kağıthane / İstanbul – TÜRKİYE
Tel: +90 212 295 47 37
Faks: +90 212 295 43 43
Mersis No: 0509002643500015
VD / VN: Kağıthane / 5090026435
www.karadenizholding.com

PRJ. NO / HULL NO: -
CLASS / ID NO: -
SHIPYARD: -
REV NO: 0

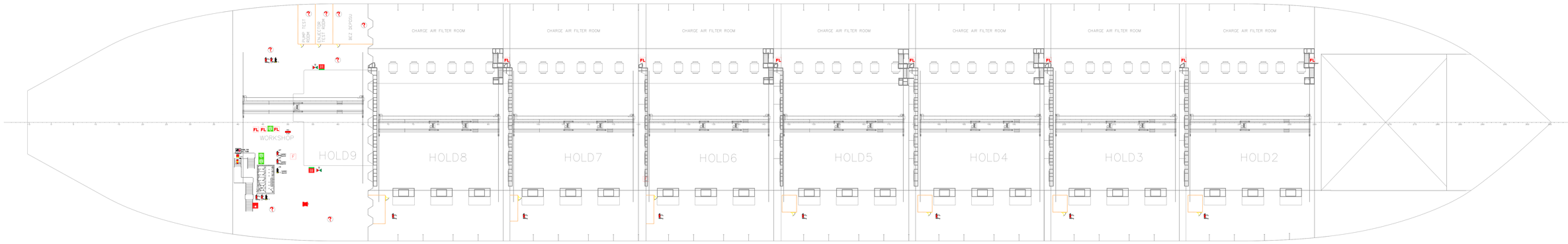
PROJECT NAME: KARADENİZ POWERSHIP KHAN CLASS

DRAWING NAME: FIRE FIGHTING PLAN

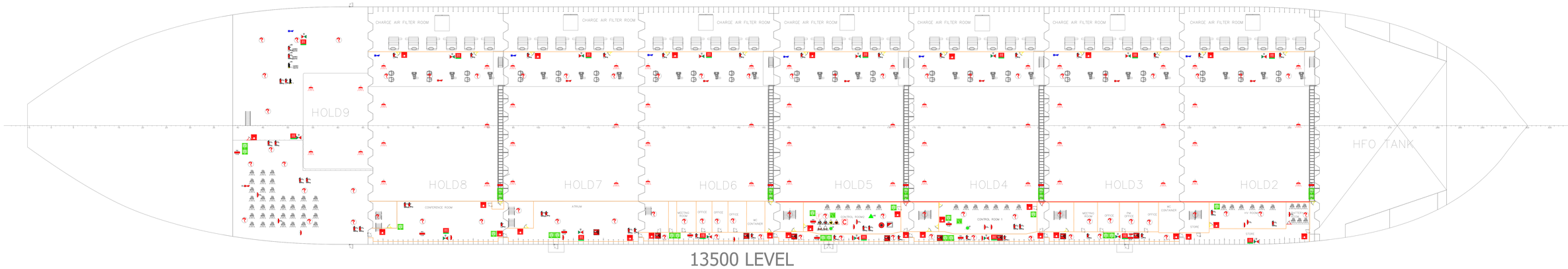
CHECKED BY	DRAWN BY	DATE	28.09.2020	SHEET	1/2
E. KAPLAN	T.DUZGUN	DWG NO	505-001	SCALE	A0



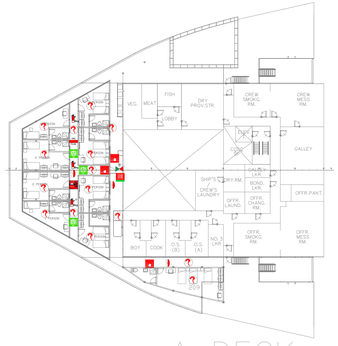
22500 LEVEL



16500 LEVEL



13500 LEVEL



NO	REVISION NOTE	REVISED BY	REV. DATE
0	FIRST ISSUE	T.DUZGUN	28.09.2020

KARADENİZ HOLDİNG

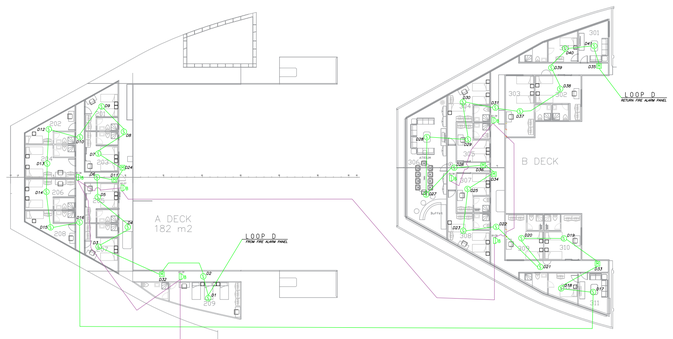
Karadeniz Holding A.Ş.
Merkez Mahallesi Develi Caddesi No:14 – 34406
Kağıthane / İstanbul – TÜRKİYE
Tel: +90 212 295 47 37
Faks: +90 212 295 43 43
Mersis No: 0509002645500015
VD / VN: Kağıthane / 5090026435
www.karadenizholding.com

PRJ. NO / HULL NO	-
CLASS / ID NO	-
SHIPYARD	-
REV NO	0

PROJECT NAME: KARADENİZ POWERSHIP KHAN CLASS

DRAWING NAME: FIRE FIGHTING PLAN

CHECKED BY	DRAWN BY	DATE	SHEET
E. KAPLAN	T.DUZGUN	28.09.2020	2/2
	DWG NO	505-001	SCALE A0



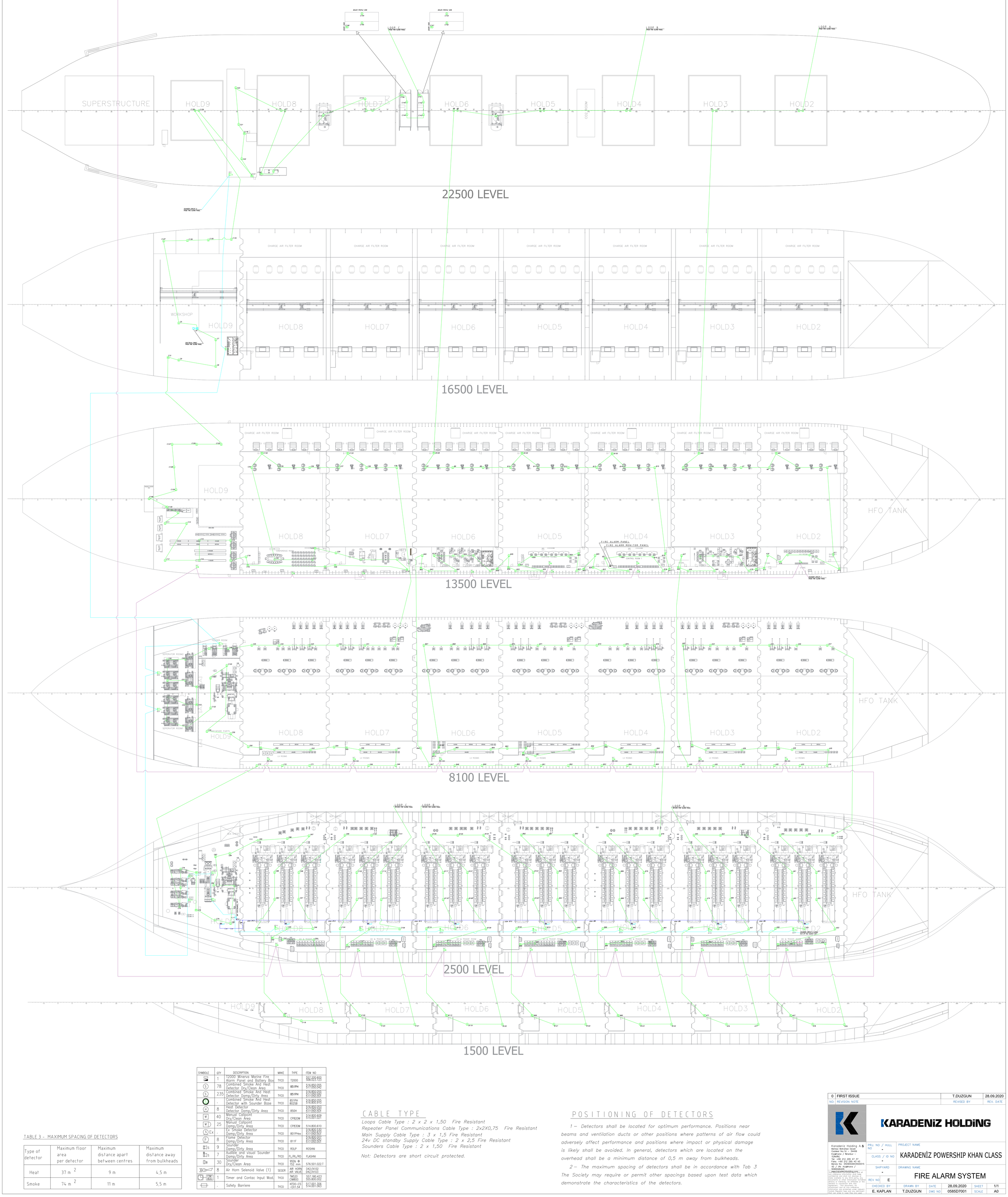


TABLE 3 - MAXIMUM SPACING OF DETECTORS

Type of detector	Maximum floor area per detector	Maximum distance apart between centres	Maximum distance away from bulkheads
Heat	37 m 2	9 m	4,5 m
Smoke	74 m 2	11 m	5,5 m

SYMBOLE	QTY	DESCRIPTION	MAKE	TYPE	ITEM NO
	1	T2000 Minerva Marine Fire Alarm Panel and Battery Box	TYCO	T2000	557.600.600 508.023.123
S	78	Combined Smoke And Heat Detector Dry/Clean Area	TYCO	851PH	516.850.046 517.050.042
S	235	Combined Smoke And Heat Detector Damp/Dirty Area	TYCO	851PH	516.850.055 517.050.051
	.	Combined Smoke And Heat Detector with Sounder Base	TYCO	851PH 802SB	516.850.055 516.800.910
H	8	Heat Detector Detector Damp/Dirty Area	TYCO	850H	516.850.052 517.050.024 517.050.051
M	40	Manual Callpoint Dry/Clean Area	TYCO	CP820M	514.800.609 515.001.021
M	25	Manual Callpoint Damp/Dirty Area	TYCO	CP830M	514.800.610
S Ex	.	Ex Smoke Detector Damp/Dirty Area	TYCO	801PHex	516.800.630 517.050.070 517.050.071
F	8	Flame Detector Damp/Dirty Area	TYCO	811F	516.800.007 517.050.051
s	9	Sounder Damp/Dirty Area	TYCO	ROLP	ROSHNI
s	7	Audible and visual Sounder Damp/Dirty Area	TYCO	FL/RL/RD	FLASHNI
	30	Sounder Dry/Clean Area	TYCO	950h Φ 152 mm	576.501.022.T
	8	Air Horn Selenoid Valve (1)	SEGER	AIR HORN AIR VALVE	042/A102 042/A103
CM 800	1	Timer and Contac Input Mod.	TYCO	TM520 CIM800	557.180.423 555.800.002
	.	Safety Barriere	TYCO	KFD0-CS -EX1.54	517.001.306 514.001.063

CABLE TYPE

Loops Cable Type : 2 x 2 x 1,50 Fire Resistant
Repeater Panel Communications Cable Type : 2x2X0,75 Fire Resistant
Main Supply Cable Type : 3 x 1,5 Fire Resistant
24v DC standby Supply Cable Type : 2 x 2,5 Fire Resistant
Sounders Cable Type : 2 x 1,50 Fire Resistant

Not: Detectors are short circuit protected.

POSITIONING OF DETECTORS

1 – Detectors shall be located for optimum performance. Positions near beams and ventilation ducts or other positions where patterns of air flow could adversely affect performance and positions where impact or physical damage is likely shall be avoided. In general, detectors which are located on the overhead shall be a minimum distance of 0,5 m away from bulkheads.

2 – The maximum spacing of detectors shall be in accordance with Tab 3 The Society may require or permit other spacings based upon test data which demonstrate the characteristics of the detectors.

NO	REVISION NOTE	REVISED BY	REV. DATE
0	FIRST ISSUE	T.DUZGUN	28.09.2020

KARADENİZ HOLDİNG

Karadeniz Holding A.Ş
Merkez Mahallesi Develi
Caddesi No:14 – 34406
Kağıthane / İstanbul –
Türkiye
Tel: +90 212 295 47 37
Faks: +90 212 295 43 43
Mersis No: 0509002643500015
VD / Vkn: Kağıthane /
5090026435
www.karadenizholding.com

PRJ. NO / HULL NO	-
CLASS / ID NO	-
SHIPYARD	-
REV NO	E

PROJECT NAME
KARADENİZ POWERSHIP KHAN CLASS

DRAWING NAME
FIRE ALARM SYSTEM

CHECKED BY	DRAWN BY	DATE	SHEET
E. KAPLAN	T.DUZGUN	28.09.2020	1/1
	DWG NO	0585D7001	SCALE A0

1 PURPOSE

The purpose of this document to define the inspection and control processes for pressure vessels (starting air eliminators, starting air compressors, exhaust gas boiler compressors, auxiliary boilers, exhaust gas steam-boilers, etc.) in the workplace and to minimize the risk of pressure vessel failure that can harm the environment, employees or cause important business interruption by forming minimum requirements for testing, control inspection, and audit of the pressure vessels defined in this directive.

The document includes the mandatory conditions for the inspection and control of the pressure vessels used by Karpowership and its contractors. The inspection, test, audit, control, and certification requirements are given in detail with a holistic approach.

2 SCOPE

This procedure applies to starting air eliminators, starting air compressors, exhaust gas boiler compressors, auxiliary boilers, exhaust gas steam-boilers, etc. of the workplace.

This directive provides requirements for inspection, test, audit, control, and certification of all pressure vessels owned and operated by the employees, subcontractors, when necessary (nature of the conducted work, conditions of contract, etc.), contractors, and other third persons (visitors, interns, etc.) working in all workplaces.

3 RESPONSIBLES

Workplace Senior Manager;

- He is responsible for monitoring that the requirements of this directive are met,
- Providing budget for the supply of the equipment to be used in the test, control, inspection, and audit of the pressure vessels directive,
- Providing the necessary sources (employee, finance, time, consultancy, etc.) for the practice of and conformance to the test, control, inspection, and audit of the pressure vessels directive.

Workplace Manager (Employer Representative);

- He is responsible for controlling and monitoring that the requirements of this directive are met,
- Setting a budget for the supply of tools and appliances deemed necessary in the test, control, inspection, and audit of the pressure vessels directive and assigning the relevant person to use this budget,
- The implementation of this directive.

Line Manager;

- He is responsible for continuously audit that the test, control, inspection, and audit of the pressure vessels are performed in accordance with the purpose of the directive and in line with the stated standards,
- Auditing that the requirements of the test, control, inspection, and audit of the pressure vessels are maintained and performed in accordance with the directive,

- Ensuring that the employees affiliated with him within the stated directive articles act in accordance with the stated articles,
- Ensuring the use of pressure vessels in a safe manner,
- Ensuring the proper protection of pressure vessels in the establishment/plant,
- Appointing Marine Engineer/Mechanical Engineer/Auditor/Technician for pressure vessels,
- Ensuring that records are kept for the pressure vessels,
- Taking joint action with the Marine Engineer/Mechanical Engineer/Maintenance Auditor/Technician,
- Ensuring the safe work of the pressure vessels,
- Ensuring the protection for the pressure vessels,
- Confirming that the contractors are complying with all relevant Karpowership pressure vessel requirements regarding the documentation.
- Knowing the articles subject to this directive, taking them into consideration in employee assignments and works, and implementing them.

Maintenance Responsible

- He is responsible for ensuring the implementation of the pressure vessels maintenance plans,
- Providing maintenance reports and circuit integrity reports to the pressure vessel auditors before audits,
- Preparing annual work plans about the periodic inspection and control of the pressure vessels,
- Preparing annual work plans about the periodic inspection and control of the lifting equipment,
- Monitoring the maintenance activities documented,
- Ensuring that color coding is applied for the audited items correctly,
- Keeping qualified staff records,
- Taking joint action with the Marine Engineer/Mechanical Engineer/Maintenance Auditor/Technician,
- Eliminating the non-conformances that come out during the control of the equipment subject to this directive,
- Ensuring the use of all pressure vessels in a safe manner,
- Developing and continuing the standards, directives, and forms of pressure vessels,
- Keeping the pressure vessels record book,
- Participating in incident investigations where pressure vessels are involved.
- Reporting the non-conformances upon elimination.

KH Investment, Design, and Powership Equipping Department

- They are responsible for choosing suitable pressure vessels and including them in the scope of the new establishments/plants.

SCM (Supply Chain Management);

- They are responsible for making sure that the production, test, and commissioning plans are included in the relevant contract for new equipment purchases. Providing coordination between the relevant technical team and the supplier regarding tests, audits, services, and all other necessary services,
- Including all specification details given by the technical staff during new equipment purchases in the contract completely and conformably with the supplier,
- Providing coordination between the technical staff and the supplier for the engineering/supervising services during the test and commissioning processes of equipment purchases.

HSE Representative;

- He is responsible for determining, knowing, auditing, and reporting the articles subject to this directive,
- Ensuring the use of pressure vessels in a safe manner,
- Consulting with the workplace maintenance responsible for the safety of the pressure vessels,
- Controlling the inspection, test, audit, control, and certification process of pressure vessels,
- Taking joint action with the Marine Engineer/Mechanical Engineer/Maintenance Auditor/Technician,
- Auditing whether the equipment complies with the test, control, inspection, and auditing directive and whether they were performed on time,
- Informing the employees regarding against which risks implementing the lifting equipment test, control, inspection, and auditing directive,
- Auditing and controlling that this directive is implemented,
- For notifying the Workplace Manager regarding the non-conformances that he finds as a result of his audits and controls and reporting in written form (via the H&S Software or Quality Document Management System (QDMS), Corrective and Preventative Action (CPA)), and monitoring these matters.

HQ HSE Management;

- They are responsible for the auditing and control of the implementation of this directive in all workplaces,
- Reporting the non-conformances that are discovered to the Workplace Manager in writing along with the solution suggestions and advising and guiding the Workplace Senior Manager.

Employees;

- They are responsible for knowing and implementing the articles subject to this directive.
- In the event that they are face to face with a serious and imminent hazard because of the situations where conformance is not achieved during the test, control, inspection, and audit of the used pressure vessels and because of non-conforming equipment, requesting the determination of the case by consulting the workplace Health and Safety (H&S) committee

and the Workplace Manager in workplaces that do not have such committee, requesting to take necessary measures, using the right to abstain from work in the case where the serious and imminent hazard cannot be prevented,

- Knowing that administrative penalty can be applied for using non-conforming pressure vessels knowingly and willfully,
- Knowing to continue the operation with the regularly controlled equipment during operation time.

4 RELATED PROCESSES

İSGÇ-010 Occupational Safety

İSGÇ-020 Occupational Health

İSGÇ-030 Environment Management

5 DEFINITIONS

KH: Karadeniz Holding and the Group Companies

KPS: Karpowership Plants

H&S: Health and Safety

HSE: Health, Safety, and Environment

HR: Human Resources

SCM: Supply Chain Management

JHSU: Joint Health and Safety Unit

QDMS: Quality Documents Management System

H&S Software: It refers to the digital platform where recording, tracking, and reporting can be done using the modules it contains regarding H&S.

Workplace: All offices, plants, shipyards, project sites, buildings and recreation, lactation, food, accommodation, hygiene, examination, treatment, and training rooms where the workplace and its extensions affiliated to Karadeniz Holding and Group Companies carry out their activities to produce goods or services, refers to the organization that involves other add-ons and tools such as training places.

Workplace Senior Manager: Refers to senior executives employed in the workplaces affiliated with Karadeniz Holding and Group Companies. It is the next manager for workplaces in Turkey, to which the Workplace Manager reports. For the workplaces abroad, the country responsible managers who worked as Country Coordinator for the Karpowership facilities on the date of publication of this procedure and will carry related responsibilities within the corresponding job description even if the title changes from now on, and for offices, a top manager or an office in the trade group managers. If there is more than one person with the same title, seniority (duration of employment in Karadeniz Holding and Group Companies) is considered.

Workplace Manager (Employer Representative): Employer representatives such as Plant Manager, Shipyard Manager, Project Manager in Karadeniz Holding and Group Companies, employer representative or office manager in offices, and when they are not available, it is the assistant or deputy. If there is more than one person with the same title, seniority (duration of employment in Karadeniz Holding and Group Companies) is considered.

Line Manager: The middle-level managers, such as engineers, supervisors, chief technicians, etc., who make assignments to employees. If there is more than one person with the same title, seniority (duration of employment in Karadeniz Holding and Group Companies) is considered

Workplace HSE Representative: Real or legal persons assigned to HSE management in Karadeniz Holding and Group Companies. (Workplace H&S Specialist/Director, Deck Officer, officials appointed by JHSU, etc.) In the Karpowership facilities, when there is no H&S Expert/Director or when the expert/director is under the supervision of the expert/director, the Deck Officer is responsible for the implementation, follow-up, and maintenance of the facility's HSE management system, employer's representative is accountable for the equivalent period.

H&S Specialist (HSS): Refers to the certified H&S specialist affiliated with Karadeniz Holding and Group Companies and assigned for workplaces in Turkey.

Workplace Medical Services Representative: Real or legal persons assigned to HSE management in Karadeniz Holding and Group Companies. (Workplace Doctor and/or Other Medical Personnel, Health Officer, Workplace Nurses, etc. appointed by doctor, company or JHSU) If there is more than one person mentioned in this definition at a workplace, the responsibility, in order of title, is first Workplace Doctors, then Other Medical Personnel, and finally Workplace Nurses and Health Officers.

Workplace Doctor (WD) Refers to the certified workplace doctor affiliated with Karadeniz Holding and Group Companies and assigned for workplaces in Turkey.

Other Medical Personnel (OMP): Refers to other certified healthcare professionals (Emergency medical technician, health officer, nurse) affiliated to Karadeniz Holding and Group Companies and assigned for workplaces in Turkey.

Workplace H&S Committee (H&S Committee): It refers to the committee/boards established to develop cooperation by including employees in the management of health and safety, to ensure effective control of health and safety, and to reduce occupational accidents and occupational diseases.

HQ HSE Management: Employees of the HSE department at Karadeniz Holding and Group Companies' HQ management office.

HQ HR Management: The HR unit's top manager in Karadeniz Holding and Group Companies' HQ management office. If there is more than one person with the same title, seniority (duration of employment in Karadeniz Holding and Group Companies) is considered.

Employees: It covers everyone who operates in the workplaces and their annexes affiliated with Karadeniz Holding and Group Companies, with or without payroll in these companies (including subcontractor, short-term service provider).

Subcontractor: Refers to the party (real or legal person) that agrees to provide materials or services following a legal contract/protocol/agreement established with Karadeniz Holding and Group Companies workplaces.

Contractor: Refers to the party (natural or legal person) who undertakes to do all of the work for Karadeniz Holding and Group Companies' for a fee.

Periodical Service Company: Refers to the party (real or legal person) who is not a subcontractor but agrees to provide materials/services under a short-term agreement with Karadeniz Holding and Group Companies.

Visitor: Refers to people who come to visit the KH workplace and its extensions.

Maintenance Responsible: The employee who provides the mechanical, electrical, and technical management and business order.

Fault: A type of defect whose type or size exceeds the applicable acceptance criteria.

Pressure Vessel: Vessels with internal pressure greater than 0.5 bar. These may be:

- Exhaust gas boilers,
- Auxiliary boilers,
- Startup air compressors,
- Device service air unit,
- Gas/liquid fuel steam boiler,
- Air to the water heat exchanger,
- Pressurized auxiliary engine,
- Air sprayer,
- Tanks belonging to the enterprise,
- Other warehouse and process containers, and
- Other pressure vessels.

Working Pressure and Temperature: The temperature and pressure at which the container normally works (as measured by the gauge on the container).

Inspection: It is the process to obtain a systematic, independent, and documented/reported audit result, to determine the extent to which the audit criteria are fulfilled, and to evaluate objectively.

Auditor: A competent person who can perform the audit.

Auditee: The workplace where the inspection is made.

Surveyor: A person who assists the auditor by performing specific non-destructive testing (NDT) on pressure vessel components but does not evaluate these tests' results unless specifically trained and authorized by the owner/user.

External Inspection: A visual inspection from the outside of a pressure vessel to detect conditions that might affect the ability to maintain the vessel's pressure integrity or compromise the integrity of supporting structures such as ladders and platforms. This inspection can be done while the container is in operation or when the container is out of service.

Internal Inspection: Inspection from inside a pressurized container using visual and/or NDT techniques.

Equipment Ticket Number (ETN): A unique identification number given to the pressure vessel item for registration purposes to facilitate traceability.

Defects: Defects or other discontinuities recorded during the inspection may or may not exceed applicable acceptance criteria.

Inspection and Visual Inspection: Visual inspection and inspection performed once a month by the Karpowership Marine Engineer/Mechanical Engineer/Maintenance Supervisor/Mechanical Technician.

Inspection and Testing: A detailed inspection carried out annually by a third party company ship engineer/mechanical engineer/maintenance inspector/mechanical technician, supported by other methods such as measurement and required non-destructive testing to arrive at the result of the condition and safety of the equipment.

Maximum Allowable Working Pressure (MAWP): The maximum allowable gauge pressure on the vessel in normal operating position at coinciding temperature (corrected for pressure head) specified pressure.

Third-Party Certification Company: Independent organization that provides inspection services on satisfactory results, its certificates are issued and comply with the requirements of TS EN ISO/IEC 17020.

Design Temperature: The temperature used in pressure vessel design per applicable construction code.

Technical Authority: It is an institution that has been informed about periodically testing the equipment.

Test and Inspection Certificate: A Test Certificate is issued by a third party certification mechanical engineer upon completion of a satisfactory investigation.

NDT: Non-Destructive Testing

Certificate of Conformity: A document in which the manufacturer confirms that the products provided comply with the order's requirements without any test results.

Authorized Pressure Vessel Inspector: A qualified and certified employee of an inspection company authorized to conduct inspections under this inspection instruction. Non-destructive (NDT) inspection is not required to be a qualified pressure vessel inspector. When the term inspector is used in this instruction, it means an authorized pressure vessel inspector.

6 APPLICATION PRINCIPLES

6.1 Periodic Inspections

Maintenance Responsible plans the periodic maintenance and controls of the pressure vessels (daily, weekly, monthly, etc.). In addition to this planning, all periods for maintenance, control, testing and inspections, including technical periodic inspections, are determined by considering two criteria. The first

of these is local legislation and the other is producer extensions. Whichever of them is shorter, the relevant period is taken into account. There may be different types of inspection, inspection and inspection depending on the conditions and the pressure vessel. For example, non-destructive testing methods (NDT) can be selected, as well as destructive methods such as hydrostatic pressure tests. In this election; relevant legal regulations and manufacturer's recommendations are taken into consideration. The inspections should be made in accordance with the inspection plan. Defects detected during inspection and inspection are identified, sized, evaluated and corrective actions determined by the Maintenance Responsible.

6.2 Performing Periodic Inspections

Considering the Regulation on Health and Safety Conditions in the Use of Work Equipment for the domestic and national / international requirements for the outside, if the person / persons authorized to perform the periodic inspections are employed in the facility, these inspections can be performed primarily by these persons. If the authorized personnel are not in the workplace, these inspections are carried out by inspection bodies (for example Type A Inspection Organization) that are accredited by the approved institutions for periodic inspections and have the authority of the machines and equipment to be checked periodically. For the services to be received from local inspection organizations abroad, the situation of meeting the local requirements (law, standard) of these organizations is evaluated by the Workplace Manager, Maintenance Responsible and Workplace HSE Representative and selection is made.

6.3 Evaluation of Periodic Inspection Reports

Maintenance Responsible notifies the Workplace HSE Representative and the Workplace Manager of the nonconformities detected in the periodic controls and inspections he / she has performed. Workplace HSE Representative processes and follows up the nonconformities in the "KH-KPS-FR-039 H&S Nonconformity Follow Up Log" or H&S Software. In the periodic inspection reports, if the unconformity/ies detected for the machine or equipment are serious to threaten the safety of this equipment and therefore the employee / workplace safety, the Unit Manager of the area where the relevant machine / equipment is located, this machine or equipment will be used until the nonconformity is corrected and a new periodic inspection is made and its safe use is approved. and takes all precautions to prevent it from being used.

7 OPERATION

Pressure vessel is a general term and includes boilers, steam boilers, air compressors, air service units, fuel boilers, heat exchangers, and boosters.

Design, supply, maintenance, operation, testing and inspection processes are carried out according to national / international standards. In addition to these references, the following societies and institutions' standards and regulations can be considered when necessary and applicable.

- American National Standards Institute (ANSI)
- American Petroleum Institute (API)
- American Association of Mechanical Engineers (ASME) Boiler and Pressure Vessels Code
- British Standards Institute (BSI)
- Federal Regulations Law
- Provision and Use of Work Equipment Regulations

- Local Pressure Vessels Regulation
- European National Standard (EN)
- International Standards Organization (ISO)
- Occupational Safety and Health Administration (OSHA)

7.1 Procurement Process

The procurement process of all pressure vessels is carried out by the Supply Chain Management Department with the coordination of the Workplace Manager.

After commencing the workplace operation, the workplace management is responsible for monitoring the test / inspection intervals. Before the inspection date of the relevant third party, the service provisions can be executed bilaterally, taking into account time constraints, cost and accessibility factors.

Workplace Management makes a purchase request to SAP. After the purchase request, the relevant Purchasing Group Responsible Business Management and Third-Party Supervision Authority has to set in communication or related services from Turkey with the producer.

Workplace Management submits the purchase request to the Local Procurement / Purchasing Officer. The Procurement / Purchasing Officer receives offers from the local market to arrange the relevant service locally.

All purchasing processes are carried out according to the "KH-SCM-PR-001 Purchase Request Management Procedure" and / or the "KH Local Purchase Instruction".

7.2 Identification and Traceability

Third party pressure vessels at the workplace or workplace must have a unique identification number (ETN Equipment Tag Number) to ensure recognition throughout their life. This number must be clearly visible on the equipment. The unique number distribution is controlled by the Maintenance and Repair Officer. It is identified by the number assigned by the pressure vessel manufacturer or the Maintenance and Repair Officer. These identification numbers are used in all documents and records regarding the specified equipment.

Standard Labels for these equipment should contain at least one of the information listed below.

Equipment Tag Number	
Manufacturer Serial Number	

7.3 Maintenance and Repairs

To ensure the reliability of the pressure vessel, a maintenance management system is established for all pressure vessels. The system is based on the manufacturer's recommendations, operating experience and integration of preventive and predictable maintenance techniques.

The system ensures the supply of sufficient spare parts, qualified maintenance technicians, maintenance procedures and manufacturer manuals.

A maintenance plan will be available for each pressure vessel. Maintenance plans proposed by the contractor are also uploaded to QDMS (Quality Documentation Management System) and maintenance work orders are recorded in the relevant SAP module. Suggestions for changing maintenance schedules should be reviewed and approved by the Maintenance Repair Officer before they are implemented.

The quality of maintenance with contractors is verified by the workplace by monitoring the pressure vessel performance and through inspections.

The maintenance database system of the workplace related SAP module should contain information about all pressure vessels of the workplace. The system generates work orders for the pressure vessel according to the defined schedule. The contractor will work with a similar system.

All major spare parts must be equal or equivalent to or exceed the original pressure vessel manufacturer's recommendations. Written reports should be maintained by the business or contractors and confirm the adequacy of major repairs or changes implemented.

7.4 Testing, Inspection, Inspection, Inspection and Certification

All pressure vessels used in the workplace must be subjected to new and existing testing, inspection and certification. It is very important to ensure the integrity of the pressure vessels and therefore the safe operation of the pressure vessels.

All pressure vessels should be inspected and maintained at certain intervals to eliminate the inconveniences seen in the vessels.

Routine, external and internal controls, testing and inspection activities are categorized according to the following items.

- Inspection and visual inspection is the visual inspection and inspection performed and recorded at regular intervals by the Maintenance Responsible.
- Inspection and visual inspection:
    - No cracks, loose connections, no deformation, abrasion or corrosion in parts,
    - Pressure gauge has a current calibration label,
    - Pressure relief valve, safety valve, drain valve, inlet valve, outlet valve, blowdown valve and barometer, if any, work safely,
    - Ensures that there is no air outlet from the connection points.

Periodic testing, inspection and certification intervals are defined by the Maintenance Responsible and should not exceed the specified intervals.

The following process principles should be applied during the activities:

- The maintenance and repair officer of the workplace verifies that inspection and certification requirements are met for all pressure vessels operated in the workplace through inspection.
- All new pressure vessels must be checked before first use and have the correct certification. The audit will comply with the requirements as specified and will be approved by the workplace and / or an approved inspection company.
- Prior to testing / inspection, risks are checked and documented with workplace risk assessments.

- When the existing pressure vessel is substantially changed or a major repair is performed, it will be thoroughly tested by the workplace and / or an approved inspection company and approved by the test workplace and / or an approved inspection company.
- Deviation from this requirement should be defined by the maintenance and repair officer of the workplace and documented in the pressure vessels list.
- All existing pressure vessels should be subject to periodic inspection.
- Prior to installation, all pressure vessels will be visually inspected by / under the supervision of the Maintenance Responsible to ensure they are in safe use.
- The intervals should not exceed the specified times.
- If the structural integrity of the pressurized container is affected by:
    - Failure,
    - Exposure to excessive pressure,
    - Modification or repair,
    - Change in conditions of use, eg: environmental.
- Original certificates should be kept in the workplace certificate file and kept by the Maintenance Responsible.
- Certification services are provided by an independent authority. This authority records the results of his activities and the certificate clearly states whether it is safe to use.

Details of existing and new pressure vessels are added to the "KH-HSE-FR-051 Equipment List Requiring Technical Inspection" by the Maintenance Responsible, shared with the Workplace HSE Representative and recorded in the H&S Software by the Workplace HSE Representative. Up-to-dateness of the list and follow-up of the periodic inspections of the equipment in the list are under the responsibility of the Maintenance Responsible.

7.5 Audit and Review

Auditing is an important activity to verify the implementation of the workplace requirements and to identify areas for improvement. The inspection is carried out at regular intervals for pressure vessels within the operations of the workplace throughout the year. The activities of contracted suppliers are also audited.

An annual inspection plan for pressure vessels is prepared by the workplace at the beginning of each year. The plan takes into account the status and importance of the activities to be audited. The results of previous inspections are taken into account during planning.

Corrective actions detected during the audit are recorded in the audit report. The report is sent to the person responsible for taking action. All corrective actions arising from the report are also recorded, stored and monitored on the QDMS Corrective Action Module in accordance with the "KH-KPS-PR-003 Corrective Action Procedure". In addition, "KH-KPS-FR-039 H&S Nonconformity Follow Up Log" or H&S Software can be used for these corrective actions.

The applicability and implementation of these procedures in the workplaces are audited at least once a year during the Management System Audits and audits to be carried out by the KQ HSE Management in accordance with the **"KH-CD-PR-002 Internal Audit Procedure".** In addition, corrective action and inspection results are reviewed at Monthly Operational Performance and H&S Board / Committee Meetings conducted in accordance with the "KH-KPS-PR-001 Communication Procedure".

8 REPORTING

3rd Party Test and Inspection Reports

Maintenance Records

H&S Software (Relevant forms / plans are tracked, reported and recorded through the software)

9 RELATED DOCUMENTS

KH-CD-PR-002 Internal Audit Procedure

KH-KPS-PR-001 Communication Procedure

KH-KPS-PR-003 Corrective Action Procedure

KH-SCM-PR-001 Purchase Request Management Procedure

KH-HSE-PR-039 HSE Technical Periodic Inspection Procedure

KH-KPS-FR-039 H&S Nonconformity Follow Up Log

10 REFERANCES

EBRD (European Bank for Reconstruction and Development)

EPA (Environmental Protection Agency)

IFC (International Finance Corporation)

ILO (International Labor Organization)

IMO (International Maritime Organization)

ISM (International Security Management)

ISPS Code (International Ship and Port Security Code)

MARPOL (International Convention for the Prevention of Pollution from Ships)

SOLAS (Safety of Life at Sea)

WHO (World Health Organization)

OSHA (Occupational Safety and Health Administration)

Social Insurance and General Health Insurance Law No.5510 and Regulations

Occupational Health and Safety Law No. 6331 and Regulations

Labor Law No. 4857 and Its Regulations

Environmental Law and Regulations No. 2872

ISO 45001 Occupational Health and Safety Management System

ISO 14001 Environmental Management System

Other relevant national and international legislation, standards and guidelines

Regulation on Health and Safety Conditions in Use of Work Equipment, Issue No: 28628

TS 1203 EN 286-1 Tanks - Simple - Non-flammable - Pressurized - Designed for air or nitrogen storage - Part 1: Pressure tanks for general purposes

TS 2025 Steam Boilers Operation, Inspection and Maintenance General Rules

API RP 571 Damage Mechanisms Affecting Fixed Equipment in the Refining Industry

API RP 572 Inspection of Pressure Vessels

API RP 576 Inspection of Pressure-Relieving Devices

API RP 577 Welding Inspection and Metallurgy

API RP 578 Material Verification Program for New and Existing Alloy Piping Systems

API RP 579 Fitness-For-Service

API RP 580 Risk-Based Inspection

API Publication 581 Risk-Based Inspection - Base Resource Document

API RP 582 Recommended Practice and Supplementary Welding Guidelines for the Chemical, Oil, and Gas Industries

API Publication 2201 Procedures for Welding or Hot Tapping on Equipment in Service

API 510 Inspector Certification Examination Body of Knowledge

ASME Boiler and Pressure Vessels Code

- Section V: Non-Destructive Testing
- Chapter VIII: Chapter I, Rules for the Manufacture of Pressure Vessels
- Chapter VIII: Chapter 2, Rules for the Production of Pressure Vessels-Alternative Rules
- Section IX: Welding and Soldering Competencies

1 PURPOSE

The purpose of this procedure is to outline the requirements for managing and controlling housekeeping operations in all areas of work, including plants, camps and fabrication yards.

2 SCOPE

Good housekeeping is one of the principles of accident prevention. Many injuries occur every year because people trip, stumble of fall over objects in their way. These instructions shall apply equally to office, workshop, plant or locations used by subcontractor personnel or their contractors during the course of the Project relating to the Karpowership direct operations and locations.

3 RESPONSIBILITIES

- The Plant Manager is responsible for ensuring good housekeeping practices are applied for the project in line with this procedure and that suitable arrangements are in place to maintain site tidiness to a high standard.
- The Safety Officer is responsible for the implementation and monitoring of this procedure with the Supervisors ensuring that waste material removed from site reaches the registered / licensed landfill/disposal area or incineration facility, and is not being 'fly tipped' or causing environmental damage.
- Assistant Plant Manager, Engineers and Discipline Managers are responsible for ensuring that good housekeeping is maintained in all areas and activities under their control and that conditions are monitored daily and remedial actions are implemented.
- It is the responsibility of all Assistant Plant Manager, Engineers and Discipline Managers to ensure their work areas are maintained in a good state of housekeeping and to ensure workers under their authority follow good housekeeping practice and conduct regular housekeeping in these areas.
- Workers and ALL personnel at site are ULTIMATELY responsible for complying with good housekeeping practices and for maintaining the site in a tidy and safe condition.

4 HOUSE KEEPING – GENERAL

- When not in use, all tools and equipment will be stored properly in a designated place. During use they will be kept orderly.
- Scrap will not be accumulated in working areas.
- Do not depend upon periodic cleaning to eliminate hazards. Do it continuously.
- Scraps of food, papers, oily rags, waste material, refuse, etc. will be placed in metal containers designated for that purpose and not thrown on the ground.
- Ends of wires and other such items protruding from any material will be bent over.
- The work area, especially walking areas, roadways, access ways, aisles, stairways and ladders, obstructions which may cause tripping or other accident hazards will be kept clear.

- Loose and surplus materials such as nuts, bolts, fuses or similar items will not be stored within operational areas.
- Both during performance and upon completion of work, the work areas will be kept in a neat, clean and safe condition.
- Keeping change rooms, toilets, first aid and canteen facilities in a clean and sanitary condition will be given due care.
- All exits passageways, fire doors, break-glass alarm points, firefighting equipment, first aid stations, and other emergency stations shall be kept clean, unobstructed and in good working order.
- Good working practice shall be employed when storing or placing materials, boxes, pallets or containers such that they do not pose a threat to workers from lifting, tripping or blocking egress routes.
- Any instances of poor housekeeping that results in the creation of a tripping, slipping or fire hazard shall be immediately dealt with;
- Materials shall be stacked or stored in a safe manner that prevents sliding, falling or collapse.
- Housekeeping in site location offices and containers is scheduled by the responsible occupants (Supervisor, Store men or Warehouseman etc).
- Smoking is only permitted in designated areas at all locations and not in public areas.

4.1. Office Housekeeping

The following basic housekeeping rules will be applied at main plant offices and all plant satellites.

- All doorways, exits, emergency exits, access passageways, alarm points, fire safety equipment shall be kept clear and unobstructed at all times.
- Litter bins will be provided and emptied as required.
- Offices shall be regularly tidied and cleaned.
- A clean desk policy will be applied and no build-up of paper and other flammable materials allowed to develop.
- Electrical cords and leads will be routed so as not to cause a trip hazard.
- Desk and filing cabinet drawers shall be kept closed when not in use so as not to create a trip hazard.
- The Administration Manager is responsible for coordinating housekeeping activities in the main offices and maintaining the schedules.

4.2. Plant Housekeeping

- Good Housekeeping is one of the basic premises of a safe working site, helping to prevent accidents fire hazards and many other environmental and health problems. It is therefore one of Managements primary concerns.
- Supervisors, Chiefs and Engineers have the ultimate responsibility for the maintenance of good housekeeping on site in the areas they are responsible for and for the safety and wellbeing of workers under their authority.
- Adequate time will be assigned by Supervision to ensure that good housekeeping is practiced. This may be carried out by the workers in a particular office, workshop or plant or, at the discretion of the Plant Management, by a team of nominated cleaners.
- Scrap and construction debris shall be segregated and removed from all work areas as a minimum at the end of each shift to designated skips or to a proper holding area.
- A specialist waste Disposal Contractor shall be employed to remove all waste, both Hazardous and Non-Hazardous from plant to an approved waste disposal facility. No ‘fly tipping” shall be tolerated and KH HSSE Officer shall monitor and coordinate waste disposal (both hazardous and non-hazardous) and report to HSSE Manager.
- An adequate number of skips and trash drums for the areas shall be assessed and maintained.
- Timber with protruding nails is removed immediately to a designated “de-nailing area” so as to protect from puncture wounds or nails are immediately bent over. When carrying out shuttering operations or any other activity that results in splinters, nails or other sharp edges the activity will be controlled by removal or other methods as appropriate.
- Dust control measures such as wetting down and limiting vehicle access and speed will be practiced.
- Hazardous spills shall be cleared as per MSDS and requirements and disposed of accordingly including those materials used for clean-up.
- Cables and hoses shall be routed above grade where possible so as not to create a trip hazard. They shall be suitably protected against traffic movements and covered or bound where routing above grade is not possible.
- When cleaning up at height nothing will be thrown or dropped from upper levels to lower levels. Area shall be barricaded and signposted and winches or hoists used so as to reduce or eliminate danger from falling materials.
- Tools, equipment, chemicals, fuels and raw materials at the workplace should be kept to a minimum commensurate with efficient working practice. Finished work, tools and equipment should be removed as soon as possible to a defined storage area such that the workplace is maintained clear.

4.3. Workshops, Warehouses, Laydown and Fabrication Yards

- Flammable liquids including fuels, solvents, paints, thinners, chemicals etc will be stored in designated purpose built containers / areas away from sources of ignition, clearly labelled and signposted with signage such as “Danger - Flammable Liquids”, “No Smoking or Naked Flame” and inclusive of appropriate fire protection / prevention measures.
- Incompatible chemicals shall not be stored together.
- Oil storage shall be adequately bunded or otherwise protected so as to contain any spills.
- Passageways, exits, emergency equipment shall be maintained clear at all times.
- Areas around workshop machinery shall be kept clear at all times.
- Trash, rags and any other combustible waste must be cleared immediately.
- Sumps and drip trays shall be drained of spills from maintenance works regularly to prevent build-up. They shall not be used as trash cans.
- Materials shall be stored in such a manner that they do not create a trip hazard and shall be stacked in such a manner that prevents falling or collapse.

5 Emergency Actions on Board

5.1. Hazardous Vapour-LNG Release Action on Board

1 - IMMEDIATE ACTION ON BOARD		Check
1.1	Sound alarm followed by PA announcement.	
1.2	MUSTER all crew and passengers in CITADEL	
1.3	Shout verbal warnings and sound ships whistle and alarm bells.	
2 - INITIAL RESPONSE		
2.1	Establish immediate risks.	
2.2	Assess wind direction and alter course so vapour stream passes well clear of accommodation.	
2.3	Stop non-essential air intake into accommodation and engine room.	
2.4	Assess proximity of land and other vessels.	
2.5	Broadcast GMDSS message PANPAN/SECURITE	
2.6	Call MOL LNG 24hrs Emergency telephone number.	
2.7	Prepare and transmit Telefax Form 14 – LNG / Hazardous Vapour Release Report to Managers	
2.8	Confirm any operations that could cause an ignition source are stopped.	
2.9	At sea enforce smoking rules.	
2.10	Inform Port Authorities or nearest Coast State.	
2.11	In port, advise Terminal	
2.12	Direct small craft in vicinity away from the vessel.	
2.13	Vessel at Anchor: - Use of main engine to manoeuvre vessel to carry vapour stream away from accommodation block.	

	- Consider proceeding to sea and reach safe point taking proximity of land and other vessels into account.	
2.14	Obtain weather forecast and assess effect on incident.	
2.15	Lead BA Team designated and preparing.	
2.16	Back-up BA Team designated and preparing.	
2.17	Prepare First Aid equipment.	
3 - CONTINUED RESPONSE		
3.1	Investigate cause of pressure rise.	
3.2	Check if single tank has pressure spike.	
3.3	Monitor pressure trend and if necessary stop Return Gas Blower (RGB) to prevent venting.	
3.4	In case of Machinery/Valve malfunction determine location of source of leak.	
3.5	In Discharging Port continue discharging to reduce tank pressure.	
3.6	In Loading Port reduce loading rate to minimum or stop loading.	
4 – FURTHER RESPONSE		
4.1	Collect evidence for Incident investigation including VDR, Statements, photos, and written records.	
4.2	Consider D&A Testing of key personnel ref: Drug & Alcohol procedure.	
4.3	Time of START and STOP Venting to be recorded and the volume of vapour vented to be calculated and recorded as a statement of facts.	
4.4	Consider leaving berth or anchorage.	

5.2. Jettison of Cargo- Action on Board

1 - IMMEDIATE ACTION ON BOARD		Check
1.1	Sound alarm followed by PA announcement.	
1.2	Stop any operation on board cargo, bunkering, gas freeing etc.	
1.3	MUSTER all crew and passengers/visitors	
1.4	Prepare Jettison cargo equipment on lee side manifold.	
2 - INITIAL RESPONSE		
2.1	Establish immediate risks, such as fire and injury.	
2.2	Assess wind direction and alter course so vapour stream passes well clear of accommodation.	
2.3	Stop non-essential air intake into accommodation and engine room.	
2.4	Assess proximity of land and other vessels.	
2.5	Broadcast GMDSS message PANPAN/SECURITE	
2.6	Call MOL LNG 24hrs Emergency telephone number.	
2.7	Prepare and transmit Telefax Form 15 – Primary Harmful Substance Report (MOLNG 145)	
2.8	Confirm any operations that could cause an ignition source are stopped.	

2.9	At sea enforce smoking rules.	
2.10	Inform Port Authorities or nearest Coast State.	
2.11	Prepare and transmit Telefax Form 1 – Emergency Report to Competent Authorities	
2.12	In port, advise Terminal	
2.13	Direct small craft in vicinity away from the vessel.	
2.14	Vessel at Anchor: - Use of main engine to manoeuvre vessel to carry vapour stream away from accommodation block. - Consider proceeding to sea and reach safe point taking proximity of land and other vessels into account.	
2.15	Obtain weather forecast and assess effect on incident.	
2.16	Lead BA Team designated and preparing.	
2.17	Back-up BA Team designated and preparing.	
2.18	Prepare First Aid equipment.	
3 - CONTINUED RESPONSE		
3.1	Investigate cause of pressure rise.	
3.2	Check if single tank has pressure spike.	
4 – FURTHER RESPONSE		
4.1	Collect evidence for Incident investigation including VDR, Statements, photos, charts and written records.	
4.2	Consider D&A Testing of key personnel ref: Drug & Alcohol procedure.	
4.3	Time of START and STOP of Jettison Cargo to be recorded and the volume of vapour vented to be calculated and recorded as a statement of facts.	

5.3. Emergency Breakaway from Jetty During Cargo Operation-Action on Board

1 - IMMEDIATE ACTION ON BOARD		Check
1.1	Stop any operation on board cargo, bunkering, gas freeing etc.	
1.2	Sound alarm followed by PA announcement.	
1.3	MUSTER all crew and passengers/visitors.	
2 - INITIAL RESPONSE		
2.1	Stop Cargo Transfer operations. Initiate Emergency Shutdown procedure.	
2.2	Instruct deck watch to proceed to manifold for disconnection.	
2.3	Crew not required for disconnection to proceed to mooring stations and prepare to un berth.	
2.4	Engine room officers and ratings should proceed to ready Main Engine and Auxiliaries for immediate un-berthing.	
2.5	If there are other vessels alongside order their immediate departure	
2.6	Confirm the Fire Main is fully pressurized and set for immediate use.	

2.7	Call MOL LNG 24hrs Emergency telephone number.	
2.8	Inform Terminal & Port Authorities.	
2.9	Determine current weather conditions.	
2.10	Determine proximity of hazards to vessel.	
2.11	Shut manual manifold valves.	
2.12	Drain shore loading arms / hoses (if not already done).	
2.13	Disconnect shore cargo and bunker hoses (if not already done).	
3 - CONTINUED RESPONSE		
3.1	Ascertain nearest hazards in the vicinity of the berth and distances to them.	
3.2	Check the effect of present weather and tidal stream on the vessel and likely direction of drift.	
3.3	BEFORE the vessel goes to open water, the current stability condition should be assessed/calculated in seagoing mode.	
3.4	If the vessel is outside of a safe seagoing condition and/or in the sloshing damage range then ballasting/cargo transfer operations are to be undertaken.	
3.5	If the cargo is within the sloshing damage range then where possible/safe the vessel should stay within safe sheltered waters until appropriate arrangements can be made.	
3.6	Ascertain availability of tugs and estimated time of arrival.	
3.7	Maintain communications with the jetty and or terminal for continuous updating on the emergency situation.	
3.8	Once hoses disconnected, shore personnel should disembark - if circumstances permit, clear ship / shore gangway.	
3.9	Notify shore vessel is ready to vacate berth.	
3.10	Prepare anchors and mooring equipment.	
3.11	Secure tugs.	
3.12	Determine availability of external assistance	
4 – FURTHER RESPONSE		
4.1	If shore crew available order them to release mooring lines. If shore personnel are not available it may be necessary to cut lines or fully run out. (cutting is preferred to minimise the chance of fouling propeller/thrusters)	
4.2	The vessel should be manoeuvred away from the berth. Be aware that other vessels may also be un-berthing in the emergency.	
4.3	Proceed to a safe location / emergency anchorage until the emergency is over.	
4.4	Assess any damage to the vessel.	
4.5	Collect evidence for Incident investigation including VDR, Statements, photos, and written records.	
4.6	Consider D&A Testing of key personnel ref: Drug & Alcohol procedure.	
4.7	When safe resume normal operations.	

1 PURPOSE

The purpose of this procedure is to define the mandatory conditions for the protection of the environment, health and safety of the staff working at the workplace, the subcontractors, and as necessary (the nature of the work that is conducted, contractual conditions...etc.), the contractors and other third parties (visitors, interns...etc.) and the inspection and control of the lifting-transfer, loading vehicles, pressurized vessels, electricity distribution panels and feeder pipes that are being used.

It aims to carry out and report the equipment controls, tests and inspections based on the inspection, test, auditing, control and certificate requirements, the national/international legal requirements (Regulation for Health and Safety Terms in Using Work Equipment), IMO, SOLAS and ISO 45001 Health and Safety Management System Standard principles, or to have them done and reported.

2 SCOPE

This procedure comprises the test, control and inspections of the equipment such as the lifting-transfer, loading vehicles, pressurized vessels, electricity distribution panels, feeder pipes...etc. that is used at the workplace and additions of Karadeniz Holding and the Group Companies.

3 RESPONSIBLES

Workplace Senior Manager;

- He is responsible for ensuring and monitoring the requirements of this procedure,
- Providing the sources (employee, finance, time, consultancy...etc.) necessary to ensure obtaining and compliance with the relevant legislation and standards regarding tests and inspections.

Workplace Manager (Employer Representative);

- He is responsible for controlling and monitoring the requirements of this procedure,
- Requesting necessary sources from the Workplace Senior Manager for fulfilling the requirements of the procedure,
- The implementation of this procedure.

Line Manager;

- He is responsible for continuously auditing that the tests and reportings are being performed in compliance with their purpose and within the stated standards,
- Auditing that the inspections, test, controls, and maintenance are performed adequately so that the equipment is continuously and safely operative,
- Informing the employees on the importance of technical inspections, test, controls, and maintenance (along with the Workplace HSE Representative),
- Being familiar with the legislation and standards subject to this procedure, considering and implementing those in employee and project assignments

Maintenance Responsible;

- He is responsible for recording the periodic control, inspection, test and maintenance repairs of the vehicles and equipment that are the subject of this procedure, controlling and approving its structural compatibility,
- Notifying the Workplace Manager about the spare part supply, stock management and needs for the maintenance and repair of the equipment,
- Keeping the records of equipment after maintenance,
- Carrying out the maintenance of the equipment based on its properties, and notifying the relevant persons (Workplace Manager, Line Manager, Workplace HSE Representative, users).

SCM (Supply Chain Management);

- They are responsible for the inspections to be performed by competent bodies as well as the equipment and managing the supply processes for the spare part supplies.

Workplace HSE Representative (HSS);

- He is responsible for determining, knowing, auditing, and reporting the legislation and standards subject to this procedure,
- Auditing whether the technical inspections of the equipment are performed relevantly and on time and informing the Workplace Manager regarding the non-conformances,
- Informing the employees on the importance of maintenance, repair, test, and inspection of the equipment (along with the Line Manager),
- Auditing and controlling the legislation and standards regarding HSE of the country that supplied by the Workplace Manager, advising and guiding Workplace Manager,
- Auditing and controlling the implementation of this procedure,
- For notifying the Workplace Manager regarding the non-conformances that he finds as a result of his audits and controls and reporting in written form (via the H&S Software or Quality Document Management System (QDMS), Corrective Action (CPA)), and following these matters.

Workplace Medical Service Representative (Workplace Doctor);

- He is responsible for determining, knowing, auditing, and reporting the legislation and standards subject to this procedure,
- Informing the employees on the importance of maintenance, repair, test, and inspection of the equipment,
- Performing the tests, controls, inspections, examinations, and maintenance of the health-related equipment and tools that are the subject of this procedure and following whether these are performed, and informing Workplace Manager and Workplace HSE Representative about the non-conformances,
- Ensuring that the equipment under his responsibility has been inspected, constantly operative and compliant with the standards.

HQ HSE Management;

- They are responsible for the audit and control of the implementation of this procedure in all workplaces affiliated with Karadeniz Holding and the Group Companies,
- Reporting the non-conformances that are discovered to the Workplace Manager in writing along with the solutions suggestions, and advising and guiding the Workplace Senior Manager.

Employees;

- They are responsible for being familiar with and implementing the legislation and standards subject to this procedure,
- In the event that they are face to face with a serious and imminent hazard because of the equipment and the situations where the requirements of this procedure are not met in the activities to be conducted, requesting the determination of the case by consulting the Workplace Health and Safety (H&S) committee and the Workplace Manager in workplaces where do not have such committee, requesting to take necessary measures, using the right to abstain from work in the case where the serious and imminent hazard cannot be prevented,
- Informing the Line Manager and Workplace HSE Representative for the equipment that is damaged or date of periodic control and test is outdated with risk notification,
- Knowing that in the event that they knowingly and willfully damage or deactivate the safety devices of the equipment that they use, the requirements of the disciplinary procedure will be applied.

4 RELATED PROCESSES

İSGÇ-010 Occupational Safety

İSGÇ-020 Occupational Health

İSGÇ-030 Environment Management

5 DEFINITIONS

KH: Karadeniz Holding and the Group Companies

KPS: Karpowership Plants

H&S: Health and Safety

HSE: Health, Safety, and Environment

JHSU: Joint Health and Safety Unit

QDMS: Quality Documents Management System

H&S Software: It refers to the digital platform where recording, tracking, and reporting can be done using the modules it contains regarding H&S.

Workplace: All offices, plants, shipyards, project sites, buildings and recreation, lactation, food, accommodation, hygiene, examination, treatment, and training rooms where the workplace and its extensions affiliated to Karadeniz Holding and Group Companies carry out their activities to produce goods or services, refers to the organization that involves other add-ons and tools such as training places.

Workplace Senior Manager: Refers to senior executives employed in the workplaces affiliated with Karadeniz Holding and Group Companies. It is the next manager for workplaces in Turkey, to which the Workplace Manager reports. For the workplaces abroad, the country responsible managers who worked as Country Coordinator for the Karpowership facilities on the date of publication of this procedure and will carry related responsibilities within the corresponding job description even if the title changes from now on, and for offices, a top manager or an office in the trade group managers. If there is more than one person with the same title, seniority (duration of employment in Karadeniz Holding and Group Companies) is considered.

Workplace Manager (Employer Representative): Employer representatives such as Plant Manager, Shipyard Manager, Project Manager in Karadeniz Holding and Group Companies, employer representative or office manager in offices, and when they are not available, it is the assistant or deputy. If there is more than one person with the same title, seniority (duration of employment in Karadeniz Holding and Group Companies) is considered.

Line Manager: The middle-level managers, such as engineers, supervisors, chief technicians, etc., who make assignments to employees. If there is more than one person with the same title, seniority (duration of employment in Karadeniz Holding and Group Companies) is considered

Workplace HSE Representative: Real or legal persons assigned to HSE management in Karadeniz Holding and Group Companies. (Workplace H&S Specialist/Director, Deck Officer, officials appointed by JHSU, etc.) In the Karpowership facilities, when there is no H&S Expert/Director or when the expert/director is under the supervision of the expert/director, the Deck Officer is responsible for the implementation, follow-up, and maintenance of the facility's HSE management system, employer's representative is accountable for the equivalent period.

H&S Specialist (HSS): Refers to the certified H&S specialist affiliated with Karadeniz Holding and Group Companies and assigned for workplaces in Turkey.

Workplace Medical Services Representative: Real or legal persons assigned to HSE management in Karadeniz Holding and Group Companies. (Workplace Doctor and/or Other Medical Personnel, Health Officer, Workplace Nurses, etc. appointed by doctor, company or JHSU) If there is more than one person mentioned in this definition at a workplace, the responsibility, in order of title, is first Workplace Doctors, then Other Medical Personnel, and finally Workplace Nurses and Health Officers.

Workplace Doctor (WD) Refers to the certified workplace doctor affiliated with Karadeniz Holding and Group Companies and assigned for workplaces in Turkey.

Other Medical Personnel (OMP): Refers to other certified healthcare professionals (Emergency medical technician, health officer, nurse) affiliated to Karadeniz Holding and Group Companies and assigned for workplaces in Turkey.

Workplace H&S Committee (H&S Committee): It refers to the committee/boards established to develop cooperation by including employees in the management of health and safety, to ensure effective control of health and safety, and to reduce occupational accidents and occupational diseases.

HQ HSE Management: Employees of the HSE department at Karadeniz Holding and Group Companies' HQ management office.

HQ HR Management: The HR unit's top manager in Karadeniz Holding and Group Companies' HQ management office. If there is more than one person with the same title, seniority (duration of employment in Karadeniz Holding and Group Companies) is considered.

Employees: It covers everyone who operates in the workplaces and their annexes affiliated with Karadeniz Holding and Group Companies, with or without payroll in these companies (including subcontractor, short-term service provider).

Subcontractor: Refers to the party (real or legal person) that agrees to provide materials or services following a legal contract/protocol/agreement established with Karadeniz Holding and Group Companies workplaces.

Contractor: Refers to the party (natural or legal person) who undertakes to do all of the work for Karadeniz Holding and Group Companies' for a fee.

Periodical Service Company: Refers to the party (real or legal person) who is not a subcontractor but agrees to provide materials/services under a short-term agreement with Karadeniz Holding and Group Companies.

Visitor: Refers to people who come to visit the KH workplace and its extensions.

Third-Party Certification Company: Independent organization that provides inspection services on satisfactory results, its certificates are issued and comply with the requirements of TS EN ISO/IEC 17020.

EN (European Norms): European Norms

ANSI (American National Standards Institute): It is a private institution that prepares and publishes industrial standards in the USA.

ASTM (American Society for Testing and Materials): An international standards organization that develops and publishes technical standards for various materials, products, and systems.

ISO (International Organization for Standardization): International Organization for Standardization

ILO (International Labour Organization): International Labor Organization

Operator: Employee or employees tasked with using work equipment.

6 APPLICATION PRINCIPLES

6.1 Equipment Planned to be Used at the Workplace

Before the equipment that is planned to be used enters the workplace, the equipment is visually checked along with the periodic control and test, inspection papers within the stated legislation and standards. The equipment that meet the necessary conditions is allowed to enter and operate at the workplace. A control card is prepared for each new piece of equipment that falls under the scope of this procedure and that arrives at the workplace, and the it includes the relevant information (under the tile 7.2).

6.2 Preparation of the List of Equipment Requiring Technical Periodic Inspection

While determining the equipment that is subject to periodic inspection at the workplace, it needs to be firstly divided based on the working groups. In general, the groups of equipment are as follows.

- Electrical equipment (distribution panels, lines, electrical hand tools...etc.)
- Pressurized vessels (vessels with an internal pressure of more than 0.5 bars)
- Lifting and transfer equipment (forklifts, scrapers, loaders, cranes, hoists, lever jacks, lever block, pallet trucks...etc.)

6.3 Planning

The inspection principles and standards of the equipment that is grouped needs to be planned at periods as specified by the manufacturing company. If the manufacturing company has not specified a period, planning is done based on the relevant legislation and the procedures/directives prepared at the workplace.

6.4 Monitoring and Recording

The monitoring and recording of the equipment within the workplace are performed and recorded via **"KH**-HSE-FR-051 List of Equipment Requiring Technical **Inspection"**. Additionally, the monitoring of the electrical equipment is performed separately through the articles stated in the **"KH**-HSE-INS-**015 Color Coding Instruction"** where the application that facilitates visual control with colors is explained and which is to be renewed at determined periods.

6.5 Writing the Corrective Action Report

The Workplace HSE Representative records the non-conformance records on the H&S Software, QDMS or **"KH**-HSE-FR-039 **H&S Nonconfirmity Follow Up Log"** based on the non-conformance notifications for the work equipment used at the workplace, and starts and monitors the corrective actions. The responsibles for these corrective actions are appointed by the Line Manager or the Workplace Manager, and their due dates are given based on their risk levels. The activities are monitored by the relevant Workplace HSE Representative based on the due dates that are given, and the closing records are created.

6.6 Updating the Risk Assessment (Specific to this Procedure)

The risk assessments are performed by the risk assessment teams as per the **"KH**-HSE-PR-036 **H&S Hazard Identification and Risk Assessment Procedure"** for the existing equipment that is the subject of this procedure and new equipment to arrive at the workplace, and they are recorded by the Workplace HSE Representative.

7 OPERATION

The periodic testing and inspections of the categorized equipment are performed within the relevant standards and recorded, regardless of whether the equipment is used. (The equipment that is faulty and waiting to be repaired is included in this application after the fault is repaired). Before the acceptance of the work equipment that are being operated at the workplace temporarily or permanently, it is made sure that the inspection papers are complete within the specified manufacturer's standards or that the said equipment meets the legislation requirements aside from visually inspecting it.

In this sense, the lists containing the brand, model, location, serial number, capacity...etc. of the equipment based on the working groups are prepared and monitored by the workplace maintenance responsible.

7.1 Definition and Traceability

A special identification number (an Equipment Ticket Number) is needed in order to ensure the identification of the equipment that is used at the workplace and that is subject to technical periodic inspection and ensure its traceability. This number should be attached to the equipment clearly and permanently along with the next inspection date.

The arrangement of this special number is controlled by the Maintenance Responsible. The contracted equipment is identified with a special number that is assigned by its manufacturer or its owner. If there is no such number assigned by the manufacturer, the Maintenance Responsible gives and records a serial number special to the equipment for each equipment. The identification numbers are specifically used in all documents and records regarding the equipment.

A standard equipment label must include the following information;

Equipment Ticket Number:	
Manufacturer Serial No.:	

The equipment that has been exposed to factors such as mechanical damage, corrosion, and chemicals is identified as a result of the tests, controls and inspections, subjected to abolishment of use or the necessary maintenance activities, and the maintenance responsible provides the renewal of the inspections and actions to be reused.

7.2 Maintenance and Repairs

A technical periodic inspection system is established to ensure the reliability of all technical periodic inspection equipment. The Maintenance Responsible determines the time intervals for the periodic control and inspection of the equipment by planning. For these and technical inspection criteria, first the local legislation requirements, then the manufacturer's recommendations, respectively, the workplace and equipment specific, environmental conditions, the frequency of use of the equipment, the age of the equipment, the frequency of failure.

It is obliged to apply it in the periods determined in the risk assessment results made by taking into consideration the criteria such as or according to the points specified in the relevant instructions, if any. There may be different types of inspection and inspection depending on the conditions and pressure vessel. Audits should be made in accordance with the audit plan. Defects detected during inspection and inspection must be identified, sized and evaluated.

7.3 Test, Auditing, Control, Inspection and Certification

All equipment requiring technical periodic inspection used at the workplace should be subjected to testing, auditing, inspection and certification. It is crucial to preserve the structural integrity of the equipment requiring technical periodic inspection and to guarantee the safe work of the equipment.

The inspections of the equipment subject to technical periodic inspection by the authorized persons (natural or legal) and institutions at the intervals specified in the relevant list of equipment requiring inspections are performed as explained in the **"KH**-HSE-INS-013 **Pressure Vessels Instruction"** and the **"KH**-HSE-INS-014 Lifting Equipment **Instruction"**.

As for regarding electricity, the control, records and approvals of the electrical hand tools at the workplace by competent persons are performed as per the **"KH**-HSE-INS-015 Color Coding **Instruction"**. In addition, the interior installation controls that are subject to inspection concerning electricity, controls and inspections including earthing, lightening rod...etc. are performed, monitored and recorded with the organization to be established under the electricity unit at the workplace.

Also, aside from the technical periodic inspections, the maintenance and repairs of the equipment that is the subject of this procedure controls and inspections are performed, monitored and recorded with the organization and plans of the relevant mechanical electricity maintenance units.

The electricity interior installments can wear off, have problems with its connections or lose their functions with time. The types of measurements to be performed by the electricity unit representatives so that the electricity installments and systems can be used safely and continuously, various errors and failures can be detected in time are as follows.

- Earthing Controls (Earthing measurements, machine/equipment/lines body earthings and equipotential earthings),
- Electrical Panel Controls (residual current device, open end cables, fuse controls, bar protection controls, other open end cable protection controls...etc.)
- Electricity Interior Installation Controls,
- Thermal Camera Control,
- Generator Controls,
- Control and Measurement of Lightening Protection Installment
- Control and Measurement of Cathodic Protection Installment

Atmosphere measurements; are performed and recorded according to the relevant standards within the "Labor Hygiene" measurements pursuant to the workplace atmosphere or the decision of possible factors such as the noise, lighting, thermal comfort, magnetic field, dust, chemicals...etc. that the employees suffer that are performed specific to the workplace.

The main scope of the said test, auditing, control, inspection and certification works has been defined and explained in the content of the directives stated below.

- KH-HSE-INS-012 Emergency Response Equipment Instruction
- KH-HSE-INS-013 Pressure Vessels Instruction
- KH-HSE-INS-014 Lifting Equipment Instruction
- KH-HSE-INS-015 Color Coding Instruction
- KH-HSE-INS-016 Atmosphere Measurements Instruction

7.4 Approval After the Inspection

As a result of the inspection and controls of the equipment, the availability is determined by the maintenance and repair officer. The Maintenance Responsible notifies the Workplace HSE Representative and the Workplace Manager of the nonconformities detected as a result of the controls and examinations made with the eye or device within the scope of periodic control and inspection planning.

Workplace HSE Representative processes and follows up nonconformities in the "KH-HSE-FR-039 H&S Nonconformity Follw Up Log". In the periodic inspection reports, if major inconveniences are detected in order to prevent the operation of the machine and equipment without correcting its inconveniences, the unit manager will ensure that measures are taken to discontinue this machine and equipment until the non-conformity is removed and the new periodic inspection is made and approved.

As for the electrical hand tools, in terms of monitoring of all the workplace employees after the inspection, they are labeled with the color code of the relevant period by the staff members who are responsible for maintenance in 3 month periods. The 3-month color coding and progress during a 12-month period are performed according to the **"KH-HSE-INS-015 Color Coding Instruction"**.

7.5 Use of Work Equipment Requiring Operator

The operator's certificate is the document given to the people who have been successful in the examinations made by taking the necessary training according to the type of machine to be used by the VQA (Vocational Qualifications Authority) in accordance with the work machine courses and local legislation. For example, an operator certificate is required for lifting and conveying vehicles (cranes, fork loaders, battery powered pallet trucks, etc.) used in workplaces. Accordingly, taking into account the legal conditions of the country of residence, the competency requirements of the personnel to be assigned to perform the works requiring competence and use the equipment are provided by the Workplace Manager.

8 REPORTING

The monitoring and documentation of the requirements of this procedure are performed by the maintenance responsible at the workplaces within the **"KH-HSE-FR-051 List of Equipment Requiring Technical Inspection"**. The management and monitoring of these processes within the proper standards are carried out by the Workplace Manager and the Workplace HSE Representative. Relevant forms / plans are tracked, reported and recorded through the H&S Software.

9 RELATED DOCUMENTS

KH-HSE-PR-034 Sub-Employer and Contractor Management Procedure

KH-HSE-PR-035 H&S Performance Measurement and Monitoring Procedure

KH-HSE-PR-036 H&S Hazard Identification and Risk Assessment Procedure

KH-HSE-INS-010 HSE Risk and Near-Miss Notification Instruction

KH-HSE-PR-038 HSE Site Control and Audit Procedure

KH-HSE-PR-040 HSE Legal Compliance Monitoring and Evaluation Procedure

KH-HSE-PR-043 Personal Protective Equipment Procedure

KH-HSE-PR-045 Hazardous Energy Resources Control (LOTOTO) Procedure

KH-HSE-INS-012 Emergency Response Equipment Instruction

KH-HSE-INS-013 Pressure Vessels Instruction

KH-HSE-INS-014 Lifting Equipment Instruction

KH-HSE-INS-015 Color Coding Instruction

KH-HSE-INS-016 Atmosphere Measurement Instruction

10 REFERANCES

EBRD (European Bank for Reconstruction and Development)

EPA (Environmental Protection Agency)

IFC (International Finance Corporation)

ILO (International Labor Organization)

IMO (International Maritime Organization)

ISM (International Security Management)

ISPS Code (International Ship and Port Security Code)

MARPOL (International Convention for the Prevention of Pollution from Ships)

SOLAS (Safety of Life at Sea)

WHO (World Health Organization)

OSHA (Occupational Safety and Health Administration)

Social Insurance and General Health Insurance Law No.5510 and Regulations

Occupational Health and Safety Law No. 6331 and Regulations

Labor Law No. 4857 and Its Regulations

Environmental Law and Regulations No. 2872

ISO 45001 Occupational Health and Safety Management System

ISO 14001 Environmental Management System

Other relevant national and international legislation, standards and guidelines

Regulation on Health and Safety Conditions in the Use of Work Equipment

ASME (American Society of Mechanical Engineers)

Regulation on Health and Safety Conditions in Use of Work Equipment, Issue No: 28628

TS 1203 EN 286-1 Tanks - Simple - Non-flammable - Pressurized - Designed to store air or nitrogen - Part 1: Pressure tanks for general purposes

TS 2025 Steam Boilers Operation, Inspection and Maintenance General Rules

API RP 571 Damage Mechanisms Affecting Fixed Equipment in the Refining Industry

API RP 572 Inspection of Pressure Vessels

API RP 576 Inspection of Pressure-Relieving Devices

API RP 577 Welding Inspection and Metallurgy

API RP 578 Material Verification Program for New and Existing Alloy Piping Systems

API RP 579 Fitness-For-Service

API RP 580 Risk-Based Inspection

API Publication 581 Risk-Based Inspection - Base Resource Document

API RP 582 Recommended Practice and Supplementary Welding Guidelines for the Chemical, Oil, and Gas Industries

API Publication 2201 Procedures for Welding or Hot Tapping on Equipment in Service

API 510 Inspector Certification Examination Body of Knowledge

ASME Boiler and Pressure Vessels Code

- Section V: Non-Destructive Testing
- Chapter VIII: Chapter I, Rules for the Manufacture of Pressure Vessels
- Chapter VIII: Chapter 2, Rules for the Production of Pressure Vessels-Alternative Rules
- Section IX: Welding and Soldering Competencies

1. PURPOSE

The purpose of this plan is to determine the fugitive emissions from NG utilization during Karpowership SA PTY Ltd operations, to evaluate the impacts of these determined aspects and ensuring environmental aspects are controlled and managed. This procedure further intends to comply with the Environmental Legislation Requirements and the Management System requirements.

This plan incorporates the planned activities in routine and non-routine activities, new plant installations and commissioning, all kinds of process changes related to the enterprises, emergency and near-miss incidents, the use of new equipment, materials and the management of fugitive emissions determined in relations with contractors / subcontractors associated directly with the Powership and FSRU operations and maintenance work within the approved Port locations.

2. DESCRIPTION OF EMISSION SOURCES

The Karpowership project will generate electricity from two floating mobile Powerships. The ships will be berthed at any one time, during the project's 20 year lifespan (as per the RMIPPPP requirements) - a Floating Storage Regasification Unit (FSRU) and Powerships. A Liquefied Natural Gas Carrier will supply the Liquefied Natural Gas (LNG) to the FSRU over a one-to-two-day period approximately every 20 to30 days. The natural gas once degasified is pumped from the FSRU to the Powerships via a gas pipeline.

2.1. Storage Tanks

The FSRU with an overall length of approximately 272m with a breadth of 47m is made up of a series of pressurized containers and stores the liquefied natural gas (LNG) and converts it to a gaseous state for delivery to the Powerships through a gas pipeline.

2.2. Loading Gantries

The ship to ship (STS) transfer of LNG will be managed under an international accredited process ((i.e. the Ship to Ship Transfer Guide (Liquefied Gases) - 2nd edition, OCIMF / SIGTTO) via trained personnel to ensure compliance and within clear quality, health and safety regulations. The fuel lines between the FSRU and the Powership will be via double walled with annular space being inserted and continuously purged with Nitrogen "N2" gas. A gas detector in circuit will identify a leak, so that the fuel gas can be immediately isolated and shut off, the leak identified, and the necessary repairs or replacements made.

The FSRU regasifies the required amount of LNG and sends this to the Powership in gaseous form (NG) continuously through a connecting pipeline. The FSRU is specifically designed, constructed and equipped to supply the fuel gas required for the power generator engines installed on the Powerships.

2.3. Operational Leaks

Natural gas boil off of LNG on board the FSRU is not flared or vented. The natural Boil Off Gas (BOG) is used as fuel for the operation of the FSRU and if in excess, is prioritized for export to the Powership for use in the generation of electrical power. In the event that BOG is in excess of the base load demand, then arrangements are provided on-board the FSRU for this excess BOG to be burnt in a specialised internal process. Under normal operations it is anticipated that the demand for gas will be significantly in excess of the natural boil off resulting in liquid LNG being re-gassified for export to the Powership.

3. EMISSION MINIMISATION MEASURES

All LNGC vessels are fitted with fixed gas detection systems which comply with the requirements of the IGC code applicable to the vessel. This includes engine spaces / compressor rooms / hold / tanks (depending on the design of the containment system and Class requirements).

The equipment has Monthly / 3 monthly / 5 yearly maintenance checks to ensure it is performing as designed and all vessels also have portable and personal gas detectors to back up of the fixed systems.

All FSRUs will have a dedicated Class approved maintenance plan for all equipment onboard. This is specifically designed for the;

- Vessel
- Equipment
- Location
- Planned deployment period.

This may differ from the following outlines. But where it does it will be risk assessed and agreed with the makers and Class.

The company has a Class approved Planned Maintenance System for each vessel with set intervals for a periodical maintenance, inspections and surveys. Company PMS is an integral part of the Class Continuous Machinery Survey (CMS) cycle.

The main benefits of operating an approved Machinery Planned Maintenance scheme is that the selected machinery systems and components can be credited for survey based on examinations by the ship's Chief Engineer on an approved schedule over a five years without the need for a Class Surveyor to be present. Approximately 20 per cent of machinery shall be examined each year.

The maintenance periods given in the PMS for the individual equipment are taken from the respective maker maintenance programs. Planned maintenance is primarily concerned with reducing breakdowns and the associated costs.

Critical systems have been identified and a study will take place after second special survey to allow timely preparation for vessels trading at 15 year anniversary. The Company's maintenance philosophy will follow its desired 'condition-based monitoring' program in conjunction with a planned maintenance program, since it may not always be possible to replace planned maintenance programs in their entirety with condition based programs (these exist in parallel).

- Preventive maintenance aimed at preventing failures or discovering a failure at an early stage.
- Corrective maintenance aimed at repairing failures that were expected.
- Condition-based monitoring maintenance

On-board Management Team duty is to recognize importance of maintaining a vessel in appropriate and safe operational condition and to follow the maintenance philosophy and Planned Maintenance System. All machinery failures are subject of a Technical Incident and subsequently a Non Scheduled Work Order is raised.

Proper maintenance history to be kept in the PMS by providing detailed report for each scheduled and unscheduled work order. Comments such 'work done' or 'all ok' are treated as inappropriate.

All gas detectors are to be maintained and tested as per PMS requirement. Full calibration of the gas detectors should be done at intervals not exceeding 6 months.

All usage, calibration and maintenance must be recorded in the log book. There is no requirement for the gas detectors to be landed ashore for testing or calibration, this can be done on board by ships staff.

Sufficient spares to effect routine repairs shall be maintained on board as most repairs consist of a simple replacement of parts. If, after changing the heads or other parts the detector can still not be calibrated it should then be landed ashore for service.

For multi-gas detectors each detecting element has a defined lifetime, which may be 2 or 3 years after which detector has to be changed.

4. TIMEFRAME

The following table lists the emission minimisation measures identified for LNG utilization during Karpowership SA PTY Ltd operations and the dates for implementation of those measures.

Source	Measure	Date for Implementation
Storage tanks	Leak detection and repair systems	Project lifespan-controlled via SoP's
Loading gantries	Leak detection and repair systems	Project lifespan, STS bunkering of LNG and deliver of natural gas to Powership
Equipment leaks	Routine maintenance and Leak detection and repair systems	Project lifespan

5. REFERENCES

- Pollution Prevention and Abatement Handbook, World Bank Group, July 1998
- European Commission, *Integrated Pollution Prevention and Control, Reference Document on Best Available Techniques on Emissions from Storage*, July 2006.

AFRISHORE

31 December 2022

Eugene Matthysen
Technical Project Manager, Karpowership SA
eugene.matthysen@karpowership.com

Dear Eugene,

RE: Selection Criteria of Service Providers to Ensure Increased Local Benefit

Our engagements regarding your requirements related to selection criteria for service providers for your projects, during construction and operations refer. Afrishore Shipping Pty Ltd ("Afrishore") hereby confirms that we are a TNPA approved vessel agency (refer to Appendix A).

The following scoring matrix will be applied when identifying and proposing preferred service providers for the respective ports:

Criteria	**Criteria Type**	**Requirement**	**Weighting**
Service Providers shall be TNPA approved	Disqualifier & Score	Potential service providers shall be disqualified if not approved by TNPA.	5%
Local Supplier	Score Only	Preference will be given to SMMEs from the community to improve local benefit.	15%
B-BBEE level	Disqualifier & Score	Service providers with a B-BBEE level of 4 and lower will be disqualified. Preference will be given to service providers with the best B-BBEE level.	10%
Price	Score Only	Preference will be given to the most competitive proposal from a commercial perspective	70%

AFRISHORE

Afrishore hereby notes that a detailed evaluation would be done, should we be appointed by Karpowership SA as Vessel Agent, however the following suggestions are made based on service providers currently approved by TNPA and our working experience with available service providers at the respective ports:

1. Vessel Agency

1.1 Primary Agent: Afrishore Shipping Pty Ltd

2.2 Regional Sub-Agency:

Richards Bay:	Blue Oceans Maritime (B-BBEE Level 1)
	D&A Shipping (B-BBEE Level 1)
	Thembani Shipping (B-BBEE Level 1)
Port Elizabeth:	Berlco Maritime (B-BBEE Level 1)
	Blue Oceans Maritime (B-BBEE Level 1)
	DJ Shipping (B-BBEE Level 4/EME)
Saldanha:	D&A Shipping (B-BBEE Level 1)
	Shipwright (B-BBEE Level 4)
	John Fish Agencies (B-BBEE Level 4/EME)

2. Waste Management

2.1 Waste Management, Control & Disposal Certification: Afrishore Shipping Pty Ltd

2.2 Waste Disposal Sub-Contractors

TNPA will oversee daily general waste, but this is limited to $1m^3$.
Larger waste volumes or hazardous waste will require “private” waste disposal, as well disposal procedures that require official “cradle to grave” certification from waste generator to waste disposal.
In this event the following TNPA approved service providers will be considered.

Richards Bay:	Africa Bunkering & Shipping CC
	Dolphin Coast Landfill Management
	Compass Medical Waste Services (Pty) Ltd
	Cwebile Waste and Allied Services
	Endlovini General Services & Maintenance CC
	FFS Refiners (Pty) Ltd, Interwaste (Pty) Ltd
	NW Recycling Services (Pty) Ltd
	Oil Separation Services Midlands (Pty) Ltd
	Spill Tech (Pty) Ltd
	Ubumba Industry Cleaning Services
Port Elizabeth:	Xtreme Projects
	Teloc Waste Management
	Oricol Environmental Services
	EP Waste Management

AFRISHORE

	FFS Refiners
	Spill Tech Pty Ltd t/a Spill Tech Clean Tech
Saldanha:	Enviroserve Waste Management
	Green Bin Waste Solutions CC
	FFS Refiners
	Spill Tech Pty Ltd t/a Spill Tech Clean Tech
	Interwaste Pty Ltd
	Wastebusters (Pty) Ltd
	AB Shipping Services (Pty) Ltd

Regards,

Chris Maree
Chief Operating Officer
Afrishore

AFRISHORE SHIPPING PTY LTD
Co Reg # : 2010/008030/07
Vat Reg #: 4460256243
62 Montagu Street / PO Box 751
Mossel Bay, 6500, Republic of South Africa
Tel: +27(0)44 691 3218
Email: info@afrishore.co.za

Appendix A: Confirmation of TNPA Approval

TRANSNET

national ports authority

VESSEL AGENT REGISTRATION CERTIFICATE

Registration Certificate Number: VA/CPT/13

Issued in terms of the Port Rules for the commercial ports of South Africa, adopted in terms of the National Ports Act No. 12 of 2005 ("the Act")

MAY NOT BE TRANSFERRED WITHOUT THE PRIOR WRITTEN CONSENT OF THE AUTHORITY

Name of Vessel Agent: Afrishore Shipping (Pty) Ltd

Registered physical address from where principal business is carried on: 62 Montagu Street Mossel Bay 6500

Registration Number: 2010/008030/07

V.A.T. Registration Number: 4460256243

("hereinafter referred to as the "Vessel Agent")
is hereby registered by the Authority to be a Vessel Agent in respect of the Port of Cape Town.

This registration is issued subject to:

1) compliance with the conditions printed on this Registration Certificate, which lists some of the obligations of the Vessel Agent;
2) compliance with the provisions of the Act and all other relevant legislation;
3) compliance with any Regulations adopted in terms of section 80(1) of the Act;
4) compliance with the Port Rules for the commercial Ports of South Africa, adopted in terms of section 80(2) of the Act, and with the Harbour Master's Written Instructions and the Authority's Written Instructions;
5) compliance with the Authority's Tariff Book, published in terms of section 72(1) of the Act;
6) compliance with the International Ship and Port Security Code ("the ISPS Code") as it applies to all Ports of South Africa; and
7) compliance with all other applicable legislation and generally the requirement to conduct its vessel agent activities in accordance with the Law.

Duration of registration certificate: 31 October 2022 to 30 October 2025

Registration certificate fee: R829.33 inclusive of VAT.

..... **Date:** 21 October 2022

THE AUTHORITY'S DELEGATEE

The Vessel Agent accepts that the registration is subject to compliance with the attached conditions and the statutory and other instruments listed above, as amended or changed from time to time.

.....

VESSEL AGENT OR ITS AUTHORISED REPRESENTATIVE **Date:** 02/11/22

CM

CONDITIONS OF VESSEL AGENT REGISTRATION

1. The Vessel Agent shall be a member of South African Association of Ship Operators and Agents (SAASOA). If membership of the Association is refused or cancelled for any reason, the Authority may, on good cause shown, grant an exemption from this condition.
2. The Vessel Agent shall provide the Authority with an agency appointment letter, indicating that the Vessel Agent represents the vessel. Such a letter shall be sent to the Authority at least three days in advance of the arrival of the vessel in the port, or such other shorter notice as the Authority may allow, on good cause shown.
3. The Vessel Agent may not act or purport to act on behalf of the Authority or to represent it in any way. The Vessel Agent is not the mandatory, agent or employee of the Authority arising out of the issue of this Licence. The Authority shall not be liable, vicariously or otherwise, for the acts or omissions of the Vessel Agent.
4. The Vessel Agent acknowledges and agrees that the Authority may disclose any or all of the information provided by the agent to law enforcement, government and regulatory agencies and the Vessel Agent releases and indemnifies the Authority from and against all losses, claims, damages, costs, liabilities, actions and causes of action arising out of or in any way connected with the disclosure or release of any information provided by the Vessel Agent to such bodies.
5. The Vessel Agent shall comply with all relevant management systems, policies and procedures and directives of the Authority.
6. The Vessel Agent shall be readily contactable:
   a) At the time of berthing of the vessel;
   b) At the time of sailing of the vessel;
   c) At the time of ship's supply; and
   d) At the time of loading or discharging of the vessel.
7. The Vessel Agent must perform the services diligently, safely and without deliberate or undue delay.
8. Only competent vessel contractors (ship chandlers, vessel searchers, ship surveyors, baggage handlers, cargo surveyors and cargo tallies) shall be utilised by the Vessel Agent.
9. The Vessel Agent shall ensure that if any service providers used by it, or contracted by it, require a licence issued by the Authority in terms of the Act or Port Rules, such persons are duly licensed.
10. The Vessel Agent is responsible for payment to the Authority of all port dues, fees, fines and any other monies due to the Authority by the vessel's owner.
11. The Authority may on good cause shown, including the breach of any one or more of these conditions, at any time suspend, withdraw or cancel this registration provided that it will follow a fair procedure before such a decision is taken.
12. The Vessel Agent shall have no claim against the Authority arising out of the suspension, withdrawal or cancellation of the permit or the amendment of the conditions, but shall be entitled to receive written reasons from the Authority in terms of the law.
13. The Authority may also amend the conditions contained in this registration provided that, prior to making a decision to amend, the Authority will indicate the reasons why it considers it necessary to amend the conditions and afford the Vessel Agent a reasonable opportunity to make representations as to why the conditions should not be amended.

MM

CM

TRANSNET

national ports authority

VESSEL AGENT REGISTRATION CERTIFICATE

Registration Certificate Number: TNPA SLD VA 088

Issued in terms of the Port Rules for the commercial ports of South Africa, adopted in terms of the National Ports Act No. 12 of 2005 ("the Act")

MAY NOT BE TRANSFERRED WITHOUT THE PRIOR WRITTEN CONSENT OF THE AUTHORITY

Name of Vessel Agent: AFRISHORE SHIPPING (PTY) LTD.
Registered physical address from where principal business is carried on: 62 Montagu Street, Mossel Bay, 6500
Registration Number: 2010 / 008030 / 07
V.A.T. Registration Number: 4460256243

("hereinafter referred to as the "Vessel Agent")

is hereby registered by the Authority to be a Vessel Agent in respect of the Port(s) of **Saldanha**

This registration is issued subject to:

1) compliance with the conditions printed on this Registration Certificate, which lists some of the obligations of the Vessel Agent;
2) compliance with the provisions of the Act and all other relevant legislation;
3) compliance with any Regulations adopted in terms of section 80(1) of the Act;
4) compliance with the Port Rules for the commercial Ports of South Africa, adopted in terms of section 80(2) of the Act, and with the Harbour Master's Written Instructions and the Authority's Written Instructions;
5) compliance with the Authority's Tariff Book, published in terms of section 72(1) of the Act;
6) compliance with the International Ship and Port Security Code ("the ISPS Code") as it applies to all Ports of South Africa; and
7) compliance with all other applicable legislation and generally the requirement to conduct its vessel agent activities in accordance with the Law.

Duration of registration certificate: 1 NOVEMBER 2022 to 31 OTOBER 2025.

Registration certificate fee: R 829, 33 inclusive of VAT.

.....
THE AUTHORITY'S DELEGATEE

Date: 28 October 2022

The Vessel Agent accepts that the registration is subject to compliance with the attached conditions and the statutory and other instruments listed above, as amended or changed from time to time.

.....
VESSEL AGENT OR ITS AUTHORISED REPRESENTATIVE

Date: 7 Nov 2022

CONDITIONS OF VESSEL AGENT REGISTRATION

1. The Vessel Agent shall be a member of South African Association of Ship Operators and Agents (SAASOA). If membership of the Association is refused or cancelled for any reason, the Authority may, on good cause shown, grant an exemption from this condition.
2. The Vessel Agent shall provide the Authority with an agency appointment letter, indicating that the Vessel Agent represents the vessel. Such a letter shall be sent to the Authority at least three days in advance of the arrival of the vessel in the port, or such other shorter notice as the Authority may allow, on good cause shown.
3. The Vessel Agent may not act or purport to act on behalf of the Authority or to represent it in any way. The Vessel Agent is not the mandatory, agent or employee of the Authority arising out of the issue of this Licence. The Authority shall not be liable, vicariously or otherwise, for the acts or omissions of the Vessel Agent.
4. The Vessel Agent acknowledges and agrees that the Authority may disclose any or all of the information provided by the agent to law enforcement, government and regulatory agencies and the Vessel Agent releases and indemnifies the Authority from and against all losses, claims, damages, costs, liabilities, actions and causes of action arising out of or in any way connected with the disclosure or release of any information provided by the Vessel Agent to such bodies.
5. The Vessel Agent shall comply with all relevant management systems, policies and procedures and directives of the Authority.
6. The Vessel Agent shall be readily contactable:
   a) At the time of berthing of the vessel;
   b) At the time of sailing of the vessel;
   c) At the time of ship's supply; and
   d) At the time of loading or discharging of the vessel.
7. The Vessel Agent must perform the services diligently, safely and without deliberate or undue delay.
8. Only competent vessel contractors (ship chandlers, vessel searchers, ship surveyors, baggage handlers, cargo surveyors and cargo tallies) shall be utilised by the Vessel Agent.
9. The Vessel Agent shall ensure that if any service providers used by it, or contracted by it, require a licence issued by the Authority in terms of the Act or Port Rules, such persons are duly licensed.
10. The Vessel Agent is responsible for payment to the Authority of all port dues, fees, fines and any other monies due to the Authority by the vessel's owner.
11. The Authority may on good cause shown, including the breach of any one or more of these conditions, at any time suspend, withdraw or cancel this registration provided that it will follow a fair procedure before such a decision is taken.
12. The Vessel Agent shall have no claim against the Authority arising out of the suspension, withdrawal or cancellation of the permit or the amendment of the conditions, but shall be entitled to receive written reasons from the Authority in terms of the law.
13. The Authority may also amend the conditions contained in this registration provided that, prior to making a decision to amend, the Authority will indicate the reasons why it considers it necessary to amend the conditions and afford the Vessel Agent a reasonable opportunity to make representations as to why the conditions should not be amended.

MM

SUITE 10, 6 LAKESIDE, DERBY DOWNS, UNIVERSITY RD, WESTVILLE, 3629
P.O. BOX 1635, DURBAN, 4000

TEL: +27 31 2661384 | FAX: +27 31 2661447
EMAIL: SECRETARY@ SAASOA.CO.ZA |WWW.SAASOA.CO.ZA

23rd March 2022

To whom it may concern

CONFIRMATION OF SAASOA MEMBERSHIP

This is to confirm that the following Business Entity is a member of the South African Association of Ship Operators and Agents (SAASOA):

AfriShore Shipping (Pty) Ltd
62 Montagu Street
Mossel Bay
6500

Yours faithfully,

Ian S Jones
Chief Financial Officer
South African Association of Ship Operators and Agents.

SAOGA
SOUTH AFRICAN
OIL & GAS ALLIANCE

MEMBERSHIP CERTIFICATE

Afrishore Shipping Pty Ltd

is registered as a Member of the South African Oil & Gas Alliance

The Alliance is a collective of industry players dedicated to the promotion and development of South Africa as a capable services and supply hub to the sub-Sahara Africa Oil and Gas Sector and a body promoting international standards for safety, health, environment, reliability and competitiveness amongst its members. This certificate is valid only whilst the above mentioned company and/or organisation remains a member of good standing with the Alliance.

1 April 2022 to 31 March 2023

MEMBERSHIP TERM

SOUTH AFRICAN OIL & GAS ALLIANCE
CORPORATE MEMBER

17 March 2022

DATE

CHIEF EXECUTIVE OFFICER