ENVIRONMENTAL MANAGEMENT PROGRAMME

ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR) FOR THE GAS TO POWER VIA POWERSHIP PROJECT AT PORT OF NGQURA AT NELSON MANDELA BAY METROPOLITAN MUNICIPALITY, EASTERN CAPE

A Project for Karpowership

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KARPOWERSHIP

triplo4 sustainable solutions

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GLOSSARY OF TERMS

Alien invasive plants (AIPs)
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.

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

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

Construction camp
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 material and contractor offices.

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 Environmental Affairs, Forestry & Fisheries (DEFF) 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.

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.

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.

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.

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.

LIST OF ABBREVIATIONS

CBA	Critical Biodiversity Areas
DEFF	Department of Environmental Affairs, Forestry & Fisheries
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 Officier
FSRU	Floating Storage Regasification Unit
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
MARPOL	The International Convention for the Prevention of Pollution from Ships
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
PoS	Plan of Study
SAAELIP	South African Atmospheric Emission Licencing and Inventory Portal.
SAHRA	South African Heritage Resources Agency
SEZ	Special Economic Zone
SDF	Spatial Development Framework
TNPA	Transnet National Ports Authority
UNCLOS	United Nations Convention of the Law of the Sea

1. INTRODUCTION

1.1. Project Description

Karpowership proposes the generation of electricity from floating mobile Powerships moored in the Port of Ngqura. Three ships will be berthed at any one time - a Floating Storage Regasification Unit (FSRU) and two Powerships. A Liquefied Natural Gas Carrier will supply the Liquefied Natural Gas (LNG) to the FSRU over a 1 to 2 day period approximately every 20 days. The LNG is then converted to Natural Gas (NG) and pumped from the FSRU to the Powership via a gas pipeline. The design capacity for the Powerships are 540MW, which comprises of 27 gas engines having an approximate heat output of under 20MWeach. The 3 steam turbines have a heat out of 15.45 MW each. The power that is generated is then converted by the on-board High Voltage substation and the electricity evacuated via a 132kV transmission line over a distance of approximately 7.5 km to the Eskom Dedisa Substation which feeds into the national grid.

The Powerships and FSRU are to be moored in the protected waters within the Port of Ngqura. 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. No marine structures are planned and the mooring system for the vessels will generally be heavy chain lying on the seabed attached to anchors which will become buried in a very short time.

The key criteria for the mooring site are sufficient space for turning the LNG carrier as well as the approach channel shared with the container terminal to allow the safe passing of other traffic including container vessels, cargo vessels and tugs, and maintain the safety exclusion zone required for the ship-to-ship transfer of the LNG to the FSRU.

Two alternative mooring sites are being considered. The first option is to position the two Powerships in a closer position to the transmission line on land. The second is to position the two Powerships further away from the land and the connection to the transmission line. The depth of the water in which the ships will be positioned is approximately 14m. The gas pipeline that connects from the FSRU to the Powerships will be routed along small portions of the seabed but predominantly on the eastern side of the breakwater. From one of the Powerships, an electricity tower and lines will connect to a sub-station and into the national grid.

In terms of construction, the Powerships, FSRU and LNG carrier are built internationally and arrive fully equipped in the Port ready for operation. Construction is therefore limited to transmission and gas supply lines.

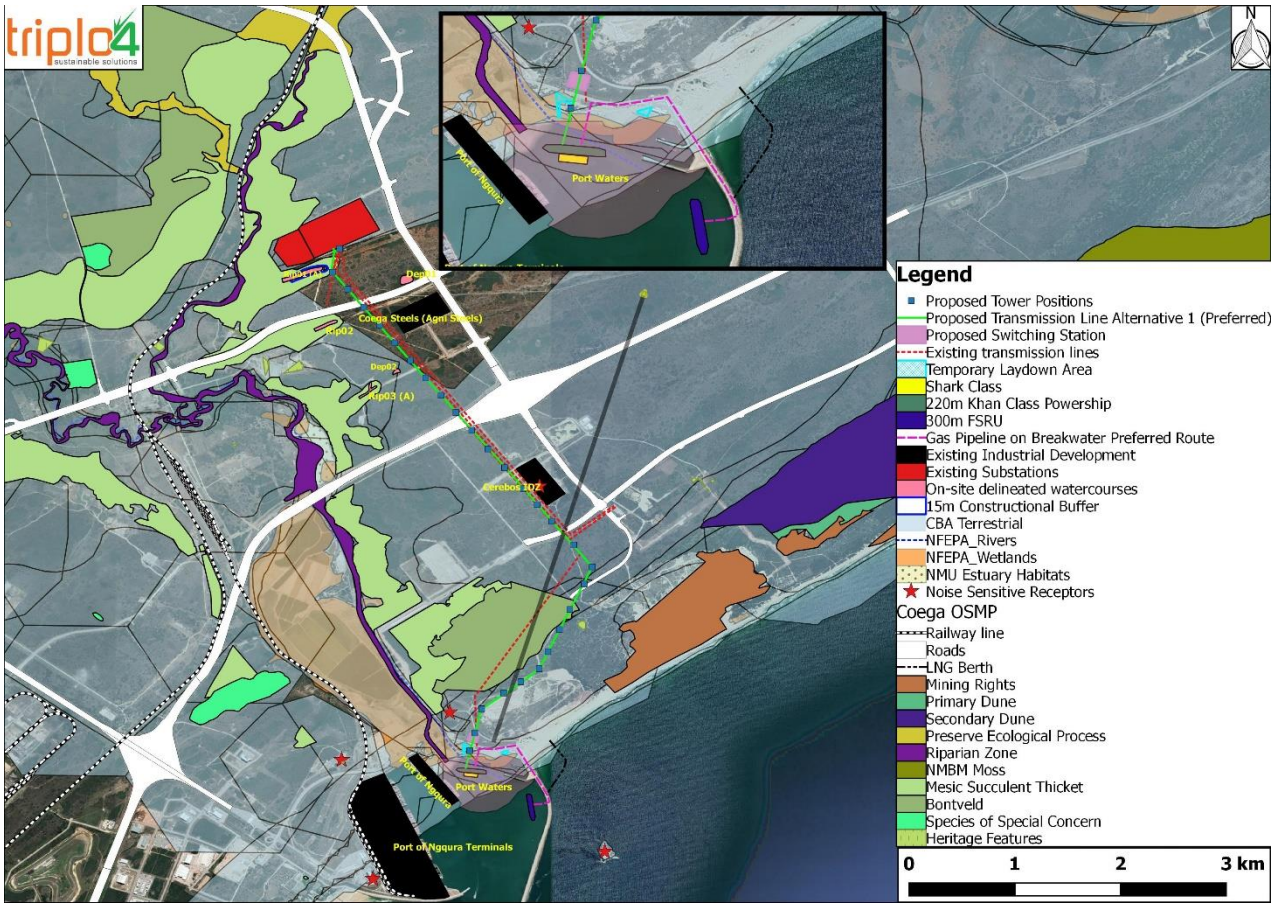

Figure 1-1: Map representing the project details in relation to environmental sensitivities.

Powerships

The Powerships are assembled off-site and will be delivered fully equipped and functional to the Port of Ngqura. They are essentially ships which have been fitted with the necessary equipment, including reciprocating engines, steam turbines, and a high voltage substation to generate and transmit electricity using natural gas as a fuel.

The fuel is supplied by a separate, vessel, a Floating Storage Regasification Unit (FSRU) which stores the liquefied natural gas (LNG) and converts it to a gaseous state for delivery to the Powerships through a gas pipeline. A LNG carrier shall periodically supply LNG to the FSRU and will temporarily stay in the location within the Port while offloading the LNG cargo.

The design capacity for the Port of Ngqura Powerships (classes Khan and Shark) are 540MW, which comprises of 27 gas engines having an approximate heat output of under 20MWeach. The 3 steam turbines have a heat out of 15.45 MW each. The Powerships are equipped with reciprocating engines for power generation, allowing reliable supply of electricity with minimal impacts from load profile and number of starts and stops. Powerships, with their modular generation capability, allow for greater technical flexibility for load cycling and shedding.

Refer to the images below, showing the types of Powerships, FSRU and Project Concept.

Table 1-1: Images of Various Powerships

Image 1: Powership – Khan Class

Image 2: Powership – Khan Class

Image 3: Floating Storage & Regasification Unit (FSRU)

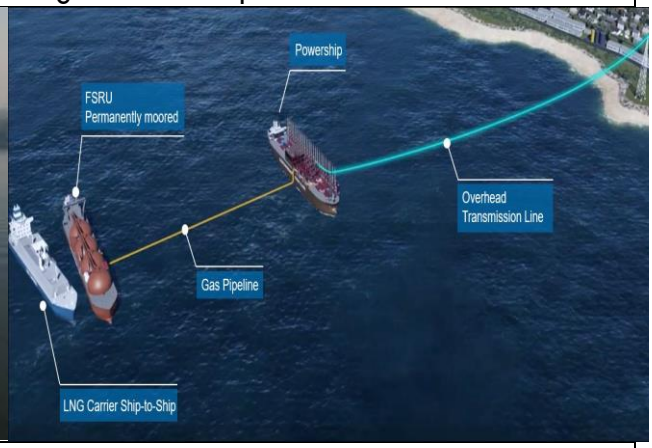

Image 4: Project Concept

The FSRU regasifies the required amount of LNG and sends this to the Powership in gaseous form (NG) continuously through a connecting pipeline. The NG is supplied to the engines. The engines in operation drive the 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 and the substation to the national grid.

Berthing & Mooring of the Powership 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.

No dredging is required as the mooring locations are positioned in sufficient water depth to safely accommodate the moored vessels. In the process of identification of the potential sites, the existing cargo facilities and the Port's future short term developments were avoided.

Key considerations for a feasible position are the size of the turning circle for the LNG carrier as well as that the approach channel and turning circle which will be shared with the coal terminal and bulk berths. The traffic in the basin (coal vessels, cargo vessels and tugs) cannot be impeded by the Powership project.

Transmission Lines

The power generated on the ship will be converted by the on-board High Voltage substation and transmitted along 132kV twin tern conductor overhead transmission line. A transmission line (approximately 7.5 km) will be erected as part of the project from the Port through the Coega SEZ to the existing Dedisa Substation, which is also situated within the Coega SEZ). The Powership will be connected to new Saltpan switching station onshore that will be located near the Powership. Saltpan switching station will be connected to Dedisa substation by means of 2 x 7.5 km Double circuit twin tern 132 kV lines. The transmission line includes:

- Extending the Dedisa132 kV busbar to accommodate an additional 132 kV feeder bay;
- Installing 2 x 132 kV feeder bays at Dedisa;
- Establishing Saltpan 132 kV switching station onshore to connect to the HV yard in the Khan Powership via overhead lines;
- Installing 4 x 132 kV feeder bays at Saltpan switching station;
- Connecting 2 x 132 kV overhead lines (about 1 km) from the Powership 132 kV yard to the Saltpan switching station; and
- Constructing 2 x 7.4 km of 132 kV double circuit Twin Tern conductor lines from Saltpan switching station to Dedisa substation.

There will be approximately 28 monopoles located along the transmission line. Each tower will cover a maximum footprint of 15m by 15m and the footprint of the monopole will be 0.6m x 0.6m to a maximum of 2.5m x 2.5m, both of which will necessitate the clearing of vegetation to allow for the monopole to be erected. The servitude, stretching the transmission line from the port to the substation, will have a width of 30m as per Eskom safety specifications. The monopole structures require small excavations for their foundations. These excavations vary in size from a 1m x 1m to 2.5m x 2.5m. The overhead line route is in currently undeveloped land and services in the area are in a central database controlled by the Coega SEZ. The survey of the exact excavation will be conducted during the construction phase. The route for the powerline was chosen to follow the path of the road (in process of being constructed) which will interlink the port to the Coega Special Economic Zone (SEZ). Within the Coega SEZ the overhead line route is parallel to existing overhead lines and within an existing powerline servitude.

Gas Lines

A gas line is required between the FSRU and Powership to ensure gas supply for power generation. The pipelines used for natural gas transmission will be made of steel engineered to meet the standards for natural gas pipelines with a diameter of approximately 60cm (600mm). The gas pipeline will likely need to be mounted on small footings requiring minor civil works to construct and install.

There are two alternative routes for the gas pipeline:

- Alternative 1 (Preferred) route of the gas pipeline route (approx. 1.6km in length) is preferred from an engineering perspective, as it is in line with the preferred position (from an engineering design perspective). This route is routed along the edge of the existing eastern breakwater towards the craft basin connecting to the vessels via a flexible marine hose.
- Alternative 2 route of the gas pipeline route (approx. 0.7km in length) is along the edge of the existing eastern breakwater and existing roads and connecting to the vessels via a flexible marine hose.

The preferred route subsequent to the EIA process will also need to be approved by Transnet National Port Authority (TNPA).

The Applicant is currently investigating the procurement of natural gas from global suppliers. As already mentioned, the gas will be shipped into the Port on a specialised carrier and offloaded to the FSRU.

<u>Pipeline installation</u>

The landside and subsea pipeline is to be brought onto site in sections. The pipeline is likely to be delivered to the site by truck and welded together in a pipe stringing yard near the beach crossing location. The trucks used to deliver the pipeline sections will therefore require access to the stringing yard.

The proposed methodology to install the landside and subsea gas pipeline will be to international best practices and in conjunction with the specific expertise of the Marine Contractor that will be appointed to undertake the construction works. Temporary site facility onshore will be required for the assembly and launching of the gas pipeline. The location of the facility will be selected at a location in the port which was previously used as temporary construct sites for previous projects, in order to reduce new impacts, and will be completely removed after installation of the pipeline, to reinstate the site to its original topographical and environmental condition, as has been done previously.

For the installation of the gas pipeline - sufficient space near the launch site will therefore be required to undertake the assembly of the pipeline. This area will be fully rehabilitated after the completion of the installation of the pipeline. Estimated size for the assembly area for the installation of the gas pipeline is 5463m^2.

Water Requirements

The Powerships use seawater and potable water for cooling the reciprocating engines, condensers and other auxiliaries. They operate a once through cooling system, which abstracts seawater directly for cooling and then discharges it into the sea. Part of the cooling water is processed into potable water through the vaporization process for steam generation (onboard water treatment unit) and non-process water consumption. Seawater is primarily used for steam generation, make up water and for domestic use. Water supply for domestic use is produced using the onboard water treatment unit. Potable water will, where required be provided by local suppliers. Besides the Powership has also sewage treatment unit and oily bilge separator to be utilized while sailing.

The following volume of water required daily is anticipated:

- 400 litres of drinking water will be required for onboard utilisation;
- 1010 litres technical water for continuous Steam Turbine Generators (STG) operation; and
- 25-30 litres of water per engine is required and 200 litres for STG consumption.

No biocides and no other additives are necessary to control bio-fouling in seawater pumping and temperature exchange systems. Part of the cooling seawater is processed into steam through an evaporation process for non-process water consumption.

Water Temperature and Marine Ecology

The Powerships will use seawater for cooling the gen-sets and optionally the steam turbine generators and fresh water generators. The total intake/outlet flow rates range from 2.4 m^3/s to 11.4 m^3/s and the increase in temperature (ΔT) range from 4°C to 15°C. 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. In confined water bodies with low water exchange there can be a build-up of temperature including recirculation from the intake to the outlet.

Typical ecological thresholds include ΔT = 3°C at 100 m from the discharge point (World Bank), ΔT = 1°C at sensitive receptors or the edge of the mixing zone, which for discharges beyond the surf-zone can be assumed as 300 m from the discharge point, according to the South African Marine Water Quality Guidelines (DWAF, 1995).

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. In can be concluded that the thermal plume meets the World Bank guideline and the generic South African Marine Water Quality Guideline when the cooling water is discharged 4 m below the water surface.

Storage of Hazardous Goods

The liquefied natural gas stored on the FSRU is in a series of pressurised containers, and at any given time will not exceed 175 000m³.

The storage of NG on the Powerships is of small quantities and can be assumed as zero, as it is used for the electricity generation operations, not stored on the Powerships. 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.

Refuelling

The FSRU is refuelled through vessels specially fitted for the purpose of carrying LNG and fuelling the FSRU. Refuelling would be required approximately every 20 days, depending on the power generation capacity and output of the Powership.

Waste Generation and Management

Due to daily operational activities and the regular repair and maintenance of the Powerships and FSRU, waste will be generated. All effluent and solid (general, and hazardous) waste will be removed by authorised service providers in terms of the legislation and TNPA and MARPOL requirements.

Sewage from on-board ablution facilities and bilge water will be produced by the Powerships. Approximate of 75m³ of sewage (black water) will be generated per month, as well as grey water (washing and kitchen). Pursuant to the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78 or “MARPOL Convention” in short) (Annexes I, II and IV), discharge of oil, noxious liquid substances, and sewage from vessels into marine environment is prohibited. All black and grey wastewater generated during operation of Powership facilities will be removed by authorised service providers for appropriate off-site treatment and disposal.

2. PROPOSED SITE

Being a ship-based power generating operation (as opposed to land-based) with transmission of energy to land-based transmission connection points, locations that provide infrastructure associated with the proposed technology were identified.

The ports of South Africa are hubs of the economy, with the port of Ngqura situated adjacent to the Coega Industrial Development Zone (CIDZ) - Special Economic Zones (SEZ) in terms of the SEZ Act 16 of 2014, so called as they are specifically designed to allow for related industries to be based in an Industrial Zone.

The Ngqura Port was identified as a preferred location in the region, as it meets the specifications for the Powership project and occurs within a close proximity to the Coega Industrial Development Zone (CIDZ).

Other ports in the region considered was the port of Durban, however based on congested traffic, economic consideration of the evacuation line and commercial constraint, this site was not further investigated.

2.1. LAYOUT ALTERNATIVES

Powership position alternatives within the port

Feasible locations for the mooring of the Powerships and the FSRU were identified and assessed.

The locations selected for the mooring of the FSRU and the Powerships are existing areas of the Port that are maintained at the advertised depth by the Port Authority. At the FSRU location the water depth is -18mCD and at the Powerships mooring the water depth is -12.5mCD.The depth of the water in which the ships will be positioned is approximately 14m. The pipeline will need to rise from the -18mCD contour up to below the exiting breakwater cap and then follow a route with level topography along the Eastern Breakwater access road and the Admin Craft Basin before crossing the beach to meet the Powerships. There are no concerns around the project site topography as the elevation changes and distances are minor and there are no notable high points or depressions on the route. The main risk for the project relates to the water depth but the Port maintained water depths are deemed sufficient for the project vessels and therefore no project specific dredging is required.

No dredging is required as the mooring locations are positioned in sufficient water depth to safely accommodate the moored vessels. In the process of identifying feasible sites, the existing cargo facilities and the Port's future short term developments were avoided.

Key factors also requiring consideration are the size of the turning circle for the LNG carrier as well as the approach channel being shared with the container terminal, therefore traffic in basin from container vessels, cargo vessels and tugs. The Powerships need to be located away from the approach channel entrance and outside the turning circle so as to not to impede vessel traffic movement in the port. This will keep the safety exclusion zones required for the ship-to-ship transfer from the LNG to the FSRU.

No alternative mooring sites are being considered as the preferred location is within the TNPA port limits and is aligned with the proposed plans for the Port (NPP, 2019).

The following alternatives, with the preferred position to be also agreed with the Port Authorities, were identified and are being assessed:

- **Alternative 1** is deemed the preferred option from an engineering perspective, as the Powerships and FSRU are not located close to each other and are positioned adjacent to the break bulk quay /multi-purpose terminal. This option is to position the two Powerships adjacent to the admin craft basin and the FSRU along the eastern breakwater. Alternative 1- is the preferred as it is in line with the FSRU in the port's long term FSRU berth position plans. Figures 3-4 and 3-5 below show the alternatives for the positioning of the Powerships.

- **Alternative 2** is considered less suitable from an engineering perspective, as the Powerships and the FSRU are located too close together and would be an issue in terms of navigational aspects. This option is to position the two Powerships closer to the liquid bulk terminal and the FSRU along the curved portion of the eastern breakwater.

Figure 2-1 below shows the Preferred Alternative Route.

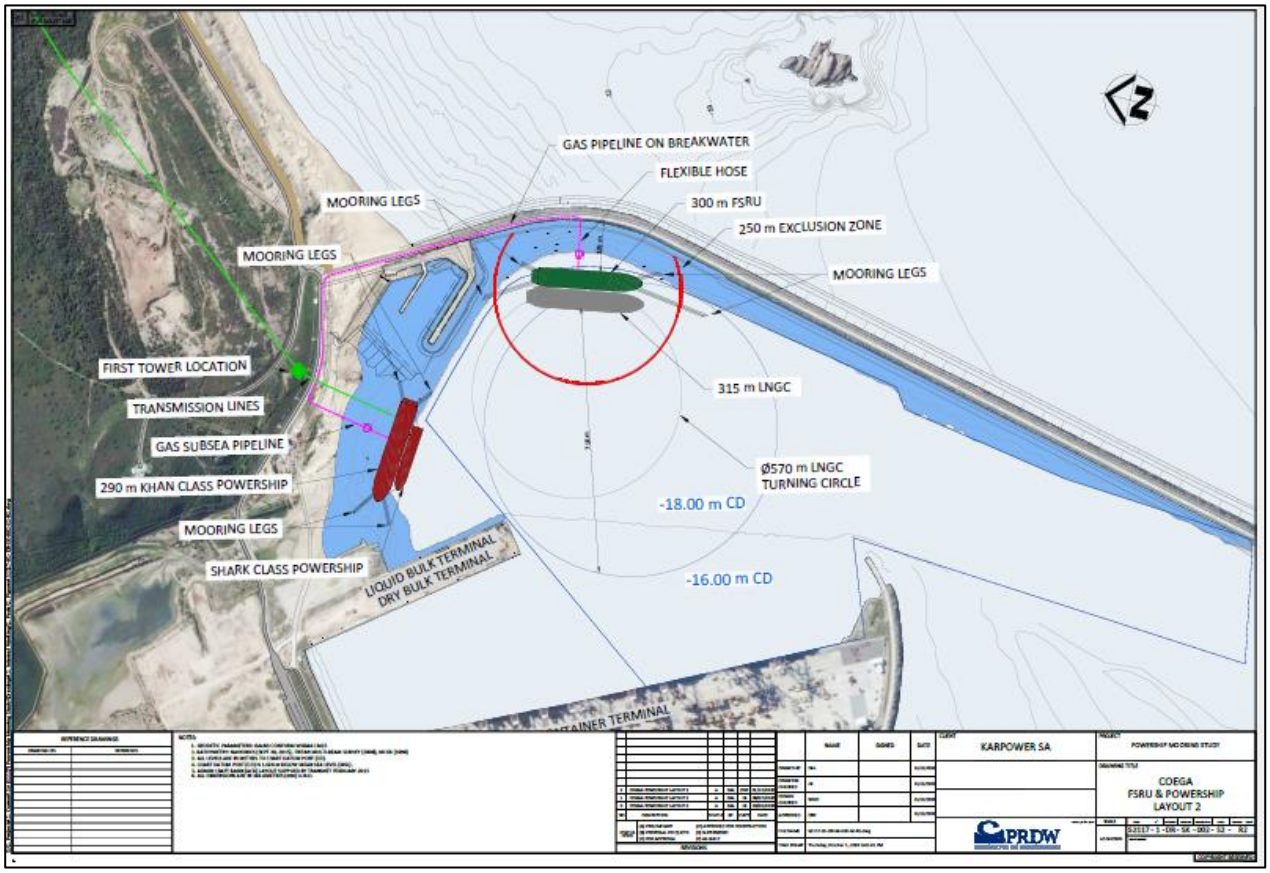

Figure 2-1: Alternative 1- Preferred: position within the port

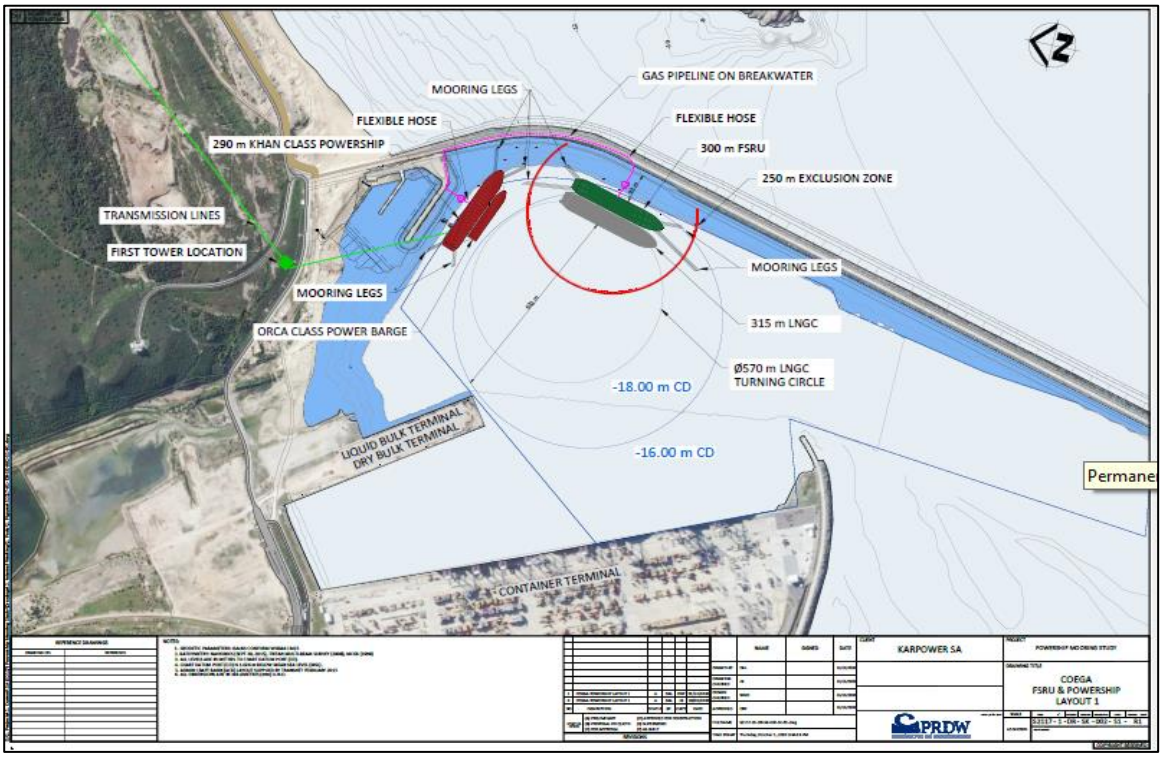

Figure 2-2: Alternative 2: position within the Port

Transmission Lines Alternatives

Alternative 1

This preferred route as presented in the Accepted Scoping Report has been adjusted slightly in order to avoid a section of Bontveld set aside as conservation open space in which development is prohibited. One monopole structure is present in a small area of disturbance within this habitat type.

This option utilises overhead lines to connect the Powerships' plant to Dedisa substation at 132 kV voltage level using Twin Tern conductors at higher templating temperature rated @ 350 MVA each.

This alternative comprises:

- Extending the Dedisa132 kV busbar to accommodate an additional 132 kV feeder bay;
- Installing 2 x 132 kV feeder bays at Dedisa;
- Constructing the Saltpan 132 kV switching station onshore to connect to the HV yard in the Khan Powership via overhead lines;
- Installing 4 x 132 kV feeder bays at Saltpan switching station (approx. 105m x 105m);
- Connecting 2 x 132 kV overhead lines (about 1 km) from the Powership 132 kV yard to the Saltpan switching station; and
- Constructing 2 x 7.5 km of 132 kV double circuit Twin Tern conductor lines from Saltpan switching station to Dedisa substation.

This alternative route begins in an FEPA wetland (as per the NFEPA dataset; Nel et al, 2011), thereafter this route heads in a north-easterly direction and finally a north-westerly direction before reaching its end point at the Dedisa substation. With respect to the FEPA wetland, while the dataset indicates that this is a FEPA wetland, a site verification by the wetland specialists has determined that this wetland no longer exists.

The route is the preferred overhead transmission line from the Powership to the switching station, as it offers a shorter route to the end point (approximately 7.5km in length with 28 monopoles). The majority of the

preferred route is located in areas of low to moderate sensitivity with the location of a single monopole structure within a degraded area inside of the bontveld set-aside within the SEZ.

Overall, this route is located in low to moderate sensitivity areas, mainly due to its location in transformed areas or in highly degraded areas adjacent to transformed areas, and a large portion of this alternative follows the route of the existing powerline servitude (yellow line in Figure 2-3). Furthermore, the Wetland specialist supports the construction and operational activities that will occur along this route.

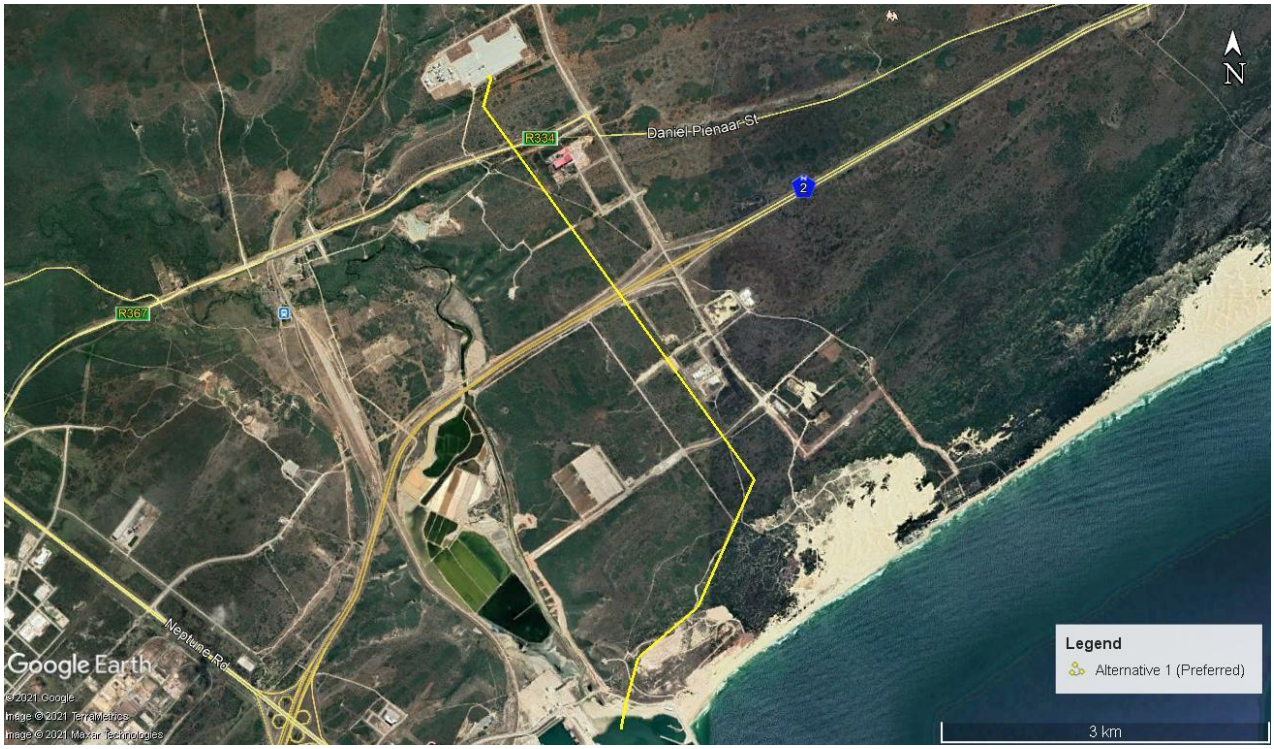

Figure 2-3: Alternative 1: Power Evacuation Route (Preferred)

Figure 2-3 as per the yellow line is the preferred amended option (Alternative 1) from an engineering perspective, therefore making this alternative less feasible or preferred from a technical perspective.

Alternative 2

Alternative 2 as per Accepted Final Scoping Report is not supported as results from the stakeholder and specialist engagements indicated that this option was not an environmentally feasible option.

The route begins approximately 180m away from the Port of Ngqura and heads in a north-westerly direction for most of the length of the route which crosses several watercourses and adjacent to the transformed Ngqura River, thereafter a small stretch heads in a easterly direction and finally continues in a north-westerly direction before reach its end point at the Dedisa substation. The length of this powerline is approximately 6.67km in length. According to the wetland specialist it was determined at a desktop level that the aforementioned route will be detrimental to several watercourses that it will traverse and in close proximity to the FEPA River (Coega River). Thus, the potential impacts on these watercourses were considered to be too detrimental to these systems, it was therefore the wetland specialist opinion that this route to be deemed unacceptable. From an ecological perspective this route is also not favoured as it traverses some undisturbed thicket areas that form important habitats for fauna, many of which are themselves protected species.

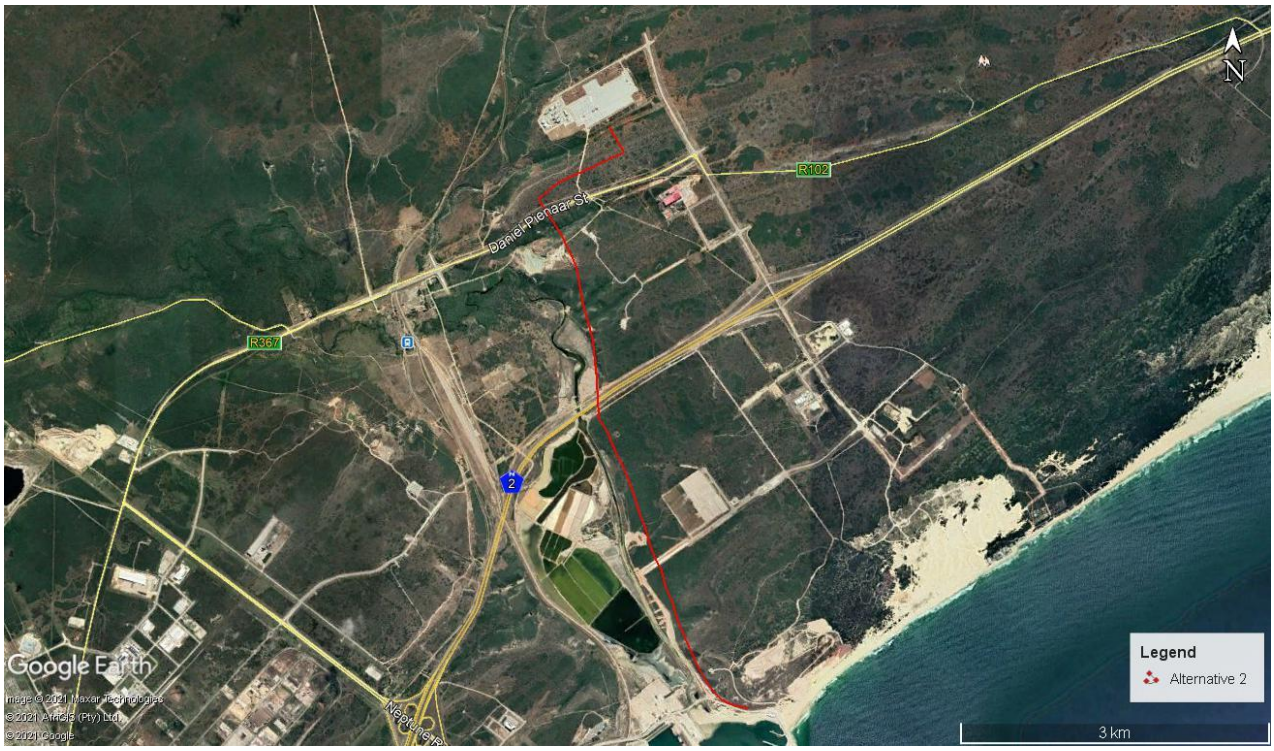

Figure 2-4: Alternative 2 Power Evacuation Route

Alternative 3

This route was originally the preferred alternative in the Accepted Final Scoping Report and went through the Bontveld set aside as conservation open space. As discussed in Alternative 1, this route was re-aligned to impose less impact on the Bontveld and natural habitats. Refer to Figure 2-5.

Figure 2-5: Alternative 3: Power Evacuation Route (Preferred)

The connection point of the 132kV powerline from the Powership into the existing Eskom electricity grid is a new 132kV switching station situated within the Port of Ngqqura, as illustrated in Figure 2-6 below, and currently engagement with Eskom on the connection to the line is underway. This switching station was only considered for the Preferred Alternative route.

Figure 2-6: \Saltpan Switching Station

Gas Pipelines Alternatives

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

The subsea pipeline from the FSRU will be installed on the seabed and through the existing revetment. The first leg of the overland pipeline will be installed on plinths above ground between the paved area of the admin craft basin and the crest of the breakwater.

The remainder of the overland pipeline will be trenched alongside the existing access road and crossing the existing entrance to the Admin Craft Basin. The subsea pipeline will be buried through the shore crossing and laid on the seabed connecting the overland pipeline to the Powerships. The horizontal and vertical alignment of the overland pipeline will take existing structures and services as well as safety aspects into consideration.

The gas pipeline connecting the FSRU to the Powerships will be routed along the edge of the existing eastern breakwater and will connect to the vessels via a flexible marine hose. The gas pipeline will likely be mounted on small footings requiring minor civil works to be constructed and installed. There are two \alternative routes for the gas pipeline, and these are directly influenced by the selected positions of the Powerships in relation to the position of the FSRU.

Alternative 1 of the gas pipeline route (Figure 2-7) is preferred from an engineering perspective, as it is in line with the preferred position (from an engineering design perspective) of the Powerships and the FSRU within the Port, positioning the Powerships in closer proximity to the land and the transmission line (Powerships position – Alternative 1). Alternative 2 of the gas pipeline route (Figure 2-8) is aligned to the second alternative of the Powerships positions (further from the shore) and the FSRU. Although this alternative presents a shorter gas pipeline, the position of the Powerships in relation to the shore is not

supported from an engineering perspective, therefore making this alternative less feasible or preferred from a technical perspective.

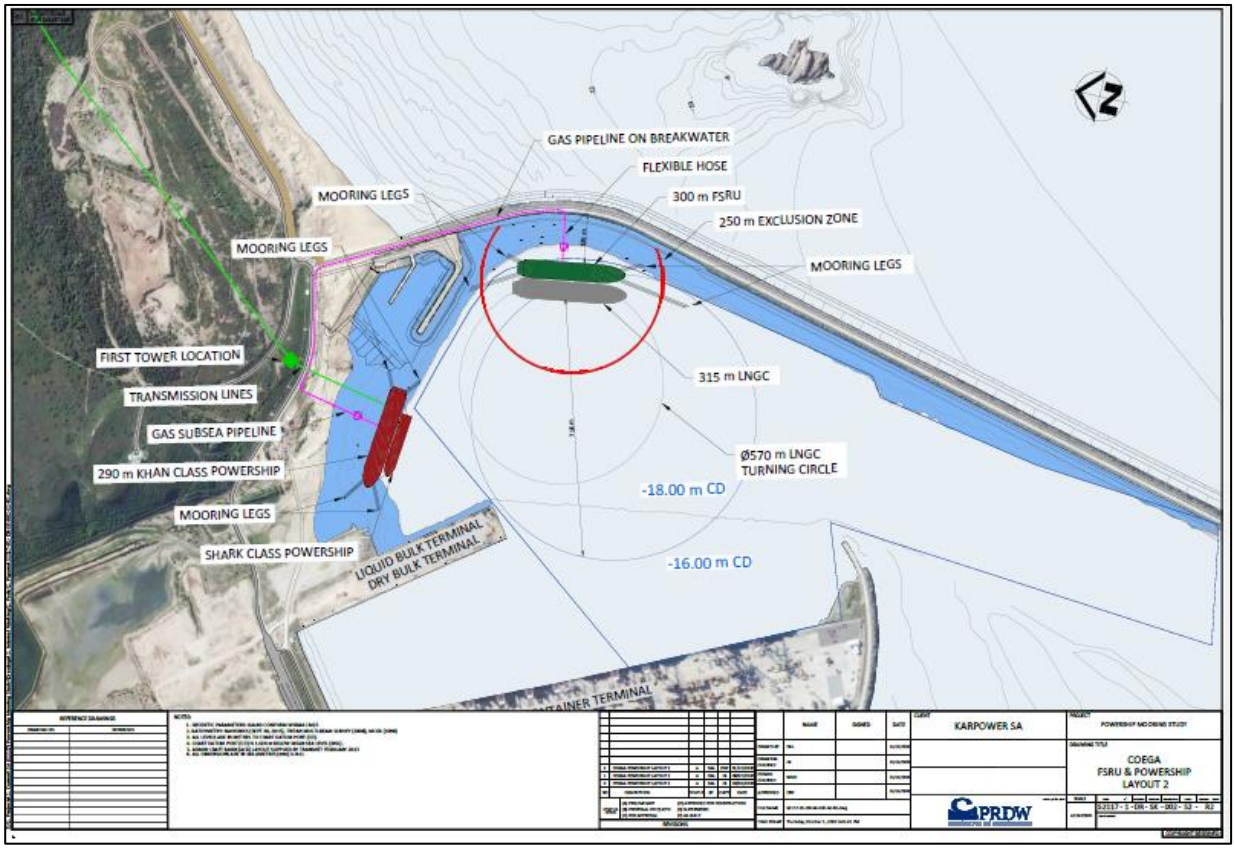

Figure 2-7: Preferred Alternative: Gas Pipeline route (Pink Line)

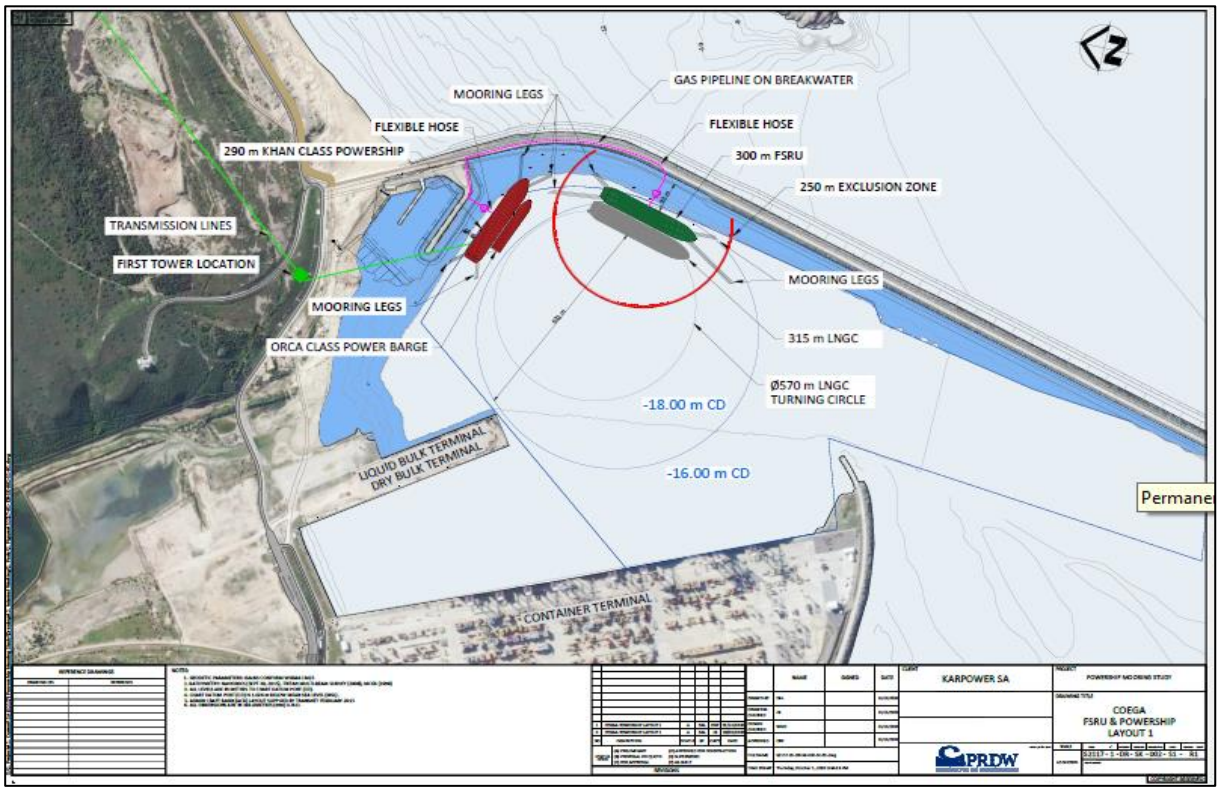

Figure 2-8: Alternative: Gas Pipeline route (Pink Line)

3. 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 described 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.

3.1. RESPONSIBILITY FOR ENVIRONMENTAL MANAGEMENT

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

Table 3-1: 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 3-2: 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 Environment, Forestry and Fisheries.

3.2. AUTHORS OF THE EMPr

This document was compiled by:

Mrs. Naadira Nadasen – Master in Environmental Management

Naadira Nadasen is a Sustainability Consultant with Triplo4 Sustainable Solutions, holds a Master's Degree in Geography and Environmental Management with over 8 years of environmental experience. Miss Nadasen is a registered EAP (2020/988) and has been responsible for conducting environmental impact assessments and water use license applications on road infrastructure, bulk water and waste projects as well as mixed use developments. Miss Nadasen has previously worked as a Project Manager and a Senior Environmental Consultant at an Environmental Consulting Company, overseeing close to 200 environmental projects. In addition, Miss Nadasen has also lectured numerous environmental courses (adhoc) at the University of KwaZulu-Natal. Furthermore, Miss Nadasen has extensively worked with industry for over two years and has extensive knowledge with enhancing the competitiveness between firms and facilitating programmes within the automotive, clothing and chemical industries as an industrial development consultant. Lastly, Mrs. Nadasen is currently a PhD student in the School of Agriculture, Earth and Environmental Sciences, University of KwaZulu-Natal, Durban.

This document was reviewed by:

Mrs. Melissa Gopaul (nee Padayachee) - Honours in Environmental Management

Melissa Gopaul is a Senior Environmental Consultant and Project Manager with Triplo4 Sustainable Solutions with more than 7 years of environmental consulting experience. She is registered as professional natural scientist with the South African Council for Natural Scientific Professions (SACNASP) and as an EAP with EAPASA. Melissa has formed part of the Risk Committee with monthly reporting since 2019 and is in charge of evaluating any potential future risks to the company's operations. She has been conducting environmental impact assessments, 24G rectification processes as well as water use licenses for various projects such as mixed-use developments, commercial, coastal developments, industrial townships and associated infrastructure, and filling stations. Melissa's experience includes compilation of environmental management programmes (Elaleni Coastal Forest Estate, Hyde Park Estate, Malachite Park, Jozini Filling Station, Tugela Filling Station, Mpophomeni Shopping Centre, etc.). Melissa is also responsible as a Project Manager for coordinating the project and resource planning, progress reporting and troubleshooting for projects. She also conducts public participation processes, develop and distribute reports, liaise with clients, NGO's and departmental authorities. She is able to identify practical and achievable mitigation and management strategies and the development of appropriate management plans. She has gained the ability to conduct compliance evaluation inspections (environmental control officer duties) for the purpose of achieving environmental goals. She holds her Honours in Environmental Management which was attained in 2016 through University of South Africa.

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 HaskoningDHV previously known as SSI Engineers & Environmental Consultants were 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 were 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 compilers can be provided on request.

Table 3-3: DEFF Environmental Authority Contact Detail

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

4. 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 the 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.

5. MANAGEMENT AND COMPLIANCE MONITORING

5.1. 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.

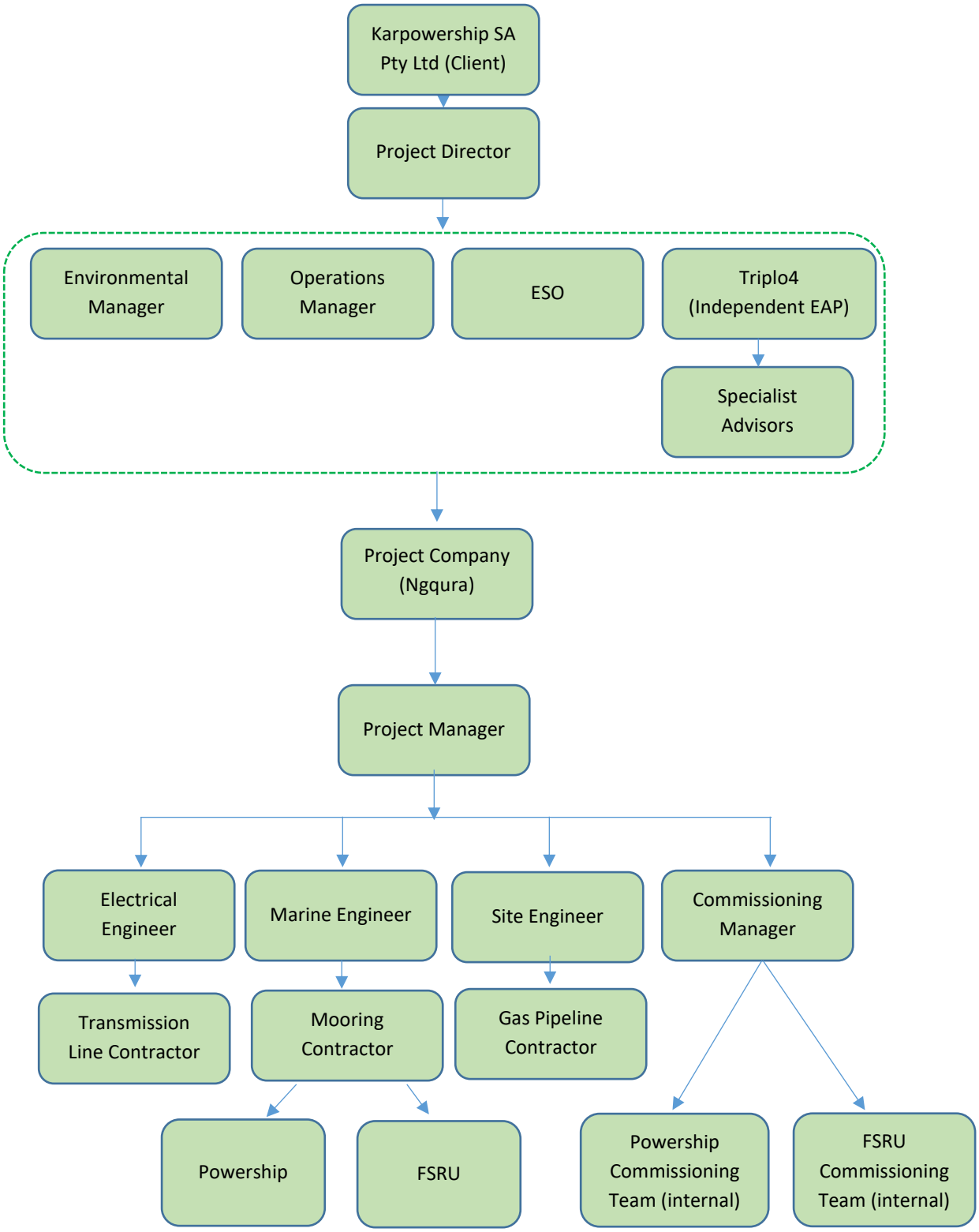

Figure 5-1. Organogram of formal responsibilities and reporting structure for the implementation of the gas to energy project.

Table 5-1: Roles and Responsibilities

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, 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
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) or (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 record.

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 all 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 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 and the PM;
- 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 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 timeously for all activities requiring special attention as specified and / or requested by the Project Manager, ECO and/or Engineer during the duration of the Contract.

- Be conversant with the requirements of this environmental specification/ EMPr. Brief all his/ her 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 utilized within the context of the contract comply with the environmental requirements of the project, in terms of the specifications. The Contractor will be held responsible for non-compliance on their behalf.
- Bear the cost of any delays, with no extension of time granted, should he or his 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.
- Ensure that he informs the Engineer timeously of any foreseeable activities which will require input from the ECO.
- The Contractor will conduct all activities in a manner that minimizes 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;
- Ensuring 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.

5.2. 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. The training will be a once-off event. 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 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.

6. ENVIRONMENTAL MANAGEMENT COMPLIANCE, MONITORING AND REPORTING

6.1. EMPr COMPLIANCE MONITORING AND AUDITING

Environmental 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 is 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 inspections with findings and corrections to the ECO for consideration during the ECO visits to be conducted during the construction phase.

Monitoring of the activity 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 EMPr 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 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.

6.2. 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 Environmental Affairs (DEFF). 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 should 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 Contractor and their sub-contractor(s), service providers and supplies must comply with the environmental emergency preparedness and incident and accident-reporting requirements as per the relevant legal requirements.

6.3. 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 be liable for the fine and it is his responsibility to recover the fine from the relevant employee. The Contractor shall also 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. Spot fines shall be between R100.00 and R20 000.00, but not limited to, depending upon the severity of the infringement.

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 list may be amended provided it is formally issued to the Contractor prior to an incident for which a penalty is imposed. 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 camp;
- 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;
- Additional fines as determined by the ECO and added to this list; and
- Damage to any identified heritage sites.

The Engineer shall retain records for spot fines issued. Monies for the spot fines will be deducted from the Contractor's monthly certificate. 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 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.

6.4. 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, and shall only implement a Method Statement once s/he has received the Project Manager's approval 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;
- 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, to allow the Engineer and ECO time to study and approve the Method Statement. The Engineer shall strive to review and approve the Method Statement within 7 working days of receipt thereof.

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 may cover, for example, the following activities:

- Location, layout and preparation of the construction camp(s) 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;
- Incidence Response Method Statements (including details of methods for fuel spills and clean-up operations);
- Solid waste management and removal of waste from site;
- Erosion Control Method Statement; and
- Traffic diversions (only to be done in consultation with Traffic Authority).

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

6.5. 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.

7. 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 construction camp and stockpiling;
- Clearing of indigenous vegetation;
- Clearing of alien invasive plants;
- Levelling out the ground;
- Installation of stormwater drains;
- Installation of sewerage system
- Installation of electrical conduits, overhead powerlines and equipment;
- Installation of communication systems;
- Improving the access road to site and establishment of working servitude;
- Erecting fencing;
- Planting and watering of revegetated areas; and
- Generation and temporary storage of waste.

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

- Disturbance to the sandbar;
- Pollution of the marine environment;
- Disturbance to the estuarine environment;
- Impact to CBA Irreplaceable area;
- Destruction 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 with, *inter alia*, the disposal of waste, spillage, storage, noise and dust control, selection of sites, preservation and re-establishment of indigenous vegetation, sediment management, the demarcation of sensitive areas and management of the different phases of construction and operation.

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 project can be minimized and/or entirely negated. These will all be dealt with in this EMPr.

8. DETAILED ENVIRONMENTAL MANAGEMENT PROGRAMME

This Section provides environmental specifications that must be adhered to during the planning, pre-construction, construction, post-construction (with rehabilitation activities) and operational phases of the Project. It is essential that all listed specifications are considered and appropriately incorporated into the planning, design and/or contract documentation, and adhered to during the respective phases of the project.

The listed environmental specifications must be regarded as the minimum range of environmental constraints, controls, procedures and/or standards. They must not be regarded as exhaustive and therefore improvements and/or amendments must be made where reasonable and required.

Such requirements may be identified by stakeholders and/or other interested and affected parties, upon which the EMPr and the relevant environmental specifications may require revision. Environmental specifications have been listed in tables in the sub-sections as per the following phases:

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

For each phase and specification the responsible monitoring party/parties and frequency, where relevant, is indicated.

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

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

8.2. Planning and Design Phase & Pre-Construction Activities

8.2.1. 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 the activities; 2. The Contractor must allow for sufficient sessions to train all personnel with no more than 20 personnel attending each course; 3. Refresher environmental awareness training is available as and when required; 4. All staff are aware of the conditions and controls linked to the EA and within the EMPr and made aware of their individual roles and responsibilities in achieving compliance with the EA and EMPr; 5. The Contractor must erect and maintain information posters at key locations on site, and the posters must include the following information as a minimum: a) Safety notifications; and b) No littering. 6. Environmental awareness training must include as a minimum the following: a) Description of significant environmental impacts, actual or potential, related to their work activities; and b) Mitigation measures to be implemented when carrying out specific activities; c) Emergency preparedness and response procedures; d) Emergency procedures;	ECO & Contractor	Weekly toolbox talks and awareness training	ECO	Fortnightly	Record of attendance to the toolbox talks and awareness training must be filed in the Site Environmental File

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. 7. A record of all environmental awareness training courses undertaken as part of the EMPr must be available; 8. Educate workers on the dangers of open and/or unattended fires; 9. A staff attendance register of all staff to have received environmental awareness training must be available. 10. Course material must be available and presented in appropriate languages that all staff can understand.					

8.2.2. Access restricted areas					
Impact Management Outcome: Impact on No-Go areas are avoided through effective demarcation and management of these areas					
Impact Management Actions	**Implementation**		**Monitoring**		
1. Identification of access restricted areas is to be informed by the environmental assessment, site walk through and any	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**

additional areas identified during development; 2. 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; and 3. Unauthorized access and development 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 SSC and associated permits should be obtained for their removal or transplantation. 5. Development and implementation of an alien invasive plant species management plan, which would remove and control the alien vegetation within and bordering the site. 6. A rehabilitation plan must be developed and implemented for areas that will be used during construction but not operation, especially within servitudes to reduce the numbers of alien invasive plants and allow recovery of some indigenous vegetation within these areas. 7. Development and implementation of an alien invasive plant species management plan, which would remove and control the alien vegetation within and bordering the site.	Ecologist and 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

CONSTRUCTION PHASE ACTIVITIES

8.3. Construction Phase Activities

8.3.1. 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. A method statement must be provided by the contractor prior to any onsite activity that includes the layout of the construction camp in the form of a plan showing the location of key infrastructure and services (where applicable), including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous materials storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management; 2. Location of camps must be within approved area to ensure that the site does not impact on sensitive areas identified in the environmental assessment or site walk through; 3. Sites must be located where possible on previously disturbed areas; 4. The camp must be fenced in accordance with ***Section 5.5: Fencing and gate installation***; and 5. The use of existing accommodation for contractor staff, where possible, is encouraged.	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

CONSTRUCTION PHASE ACTIVITIES

8.3.2. Access roads					
Impact Management Outcome: Construction vehicle movement are restricted to approved routes					
Impact Management Actions	**Implementation**		**Monitoring**		
1. Access to the servitude and tower positions must be negotiated with the relevant landowner and must fall within the assessed and authorized area; 2. An access agreement must be formalized and signed by the DPM, Contractor and landowner before commencing with the activities; 3. The access roads to tower positions must be signposted after access has been negotiated and before the commencement of the activities; 4. All private roads used for access to the servitude must be maintained and upon completion of the works, be left in at least the original condition	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**

5. All contractors must be made aware of all these access routes. 6. Any access route deviation from that in the written agreement must be closed and re-vegetated immediately, at the contractor's expense; 7. Maximum use of both existing servitudes and existing roads must be made to minimize further disturbance through the development of new roads; 8. In circumstances where private roads must be used, the condition of the said roads must be recorded in accordance with ***section 4.9: photographic record***; prior to use and the condition thereof agreed by the landowner, the DPM, and the contractor; 9. Access roads in flattish areas must follow fence lines and tree belts to avoid fragmentation of vegetated areas or croplands 10. Access roads must only be developed on pre-planned and approved roads.	Contractor	Access routes must be mapped prior to construction	ESO ECO	Fortnightly	Site Inspection

8.3.3. Fencing and gate installation					
Impact Management Outcome: Construction of fencing and gate should not occur within sensitive environments					
Impact Management Actions	**Implementation**		**Monitoring**		
1. Use existing gates provided to gain access to all parts of the area authorised for development, where possible; 2. Existing and new gates to be recorded and documented in accordance with **section *4.9: photographic record***;	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**

3. All gates must be fitted with locks and be kept locked at all times during the development phase, unless otherwise agreed with the landowner; 4. At points where the line crosses a fence in which there is no suitable gate within the extent of the line servitude, on the instruction of the DPM, a gate must be installed at the approval of the landowner; 5. 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; 6. Where gates are installed in jackal proof fencing, a suitable reinforced concrete sill must be provided beneath the gate; 7. Original tension must be maintained in the fence wires; 8. All gates installed in electrified fencing must be re-electrified; 9. All demarcation fencing and barriers must be maintained in good working order for the duration of overhead transmission and distribution electricity infrastructure development activities; 10. Fencing must be erected around the camp, batching plants, hazardous storage areas, and all designated access restricted areas, where appropriate and would not cause harm to the sensitive flora; 11. Any temporary fencing to restrict the movement of life-stock must only be erected with the permission of the land owner. 12. All fencing must be developed of high quality material bearing the SABS mark; 13. The use of razor wire as fencing must be avoided; 14. 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; 15. On completion of the development phase all temporary fences are to be removed; 16. The contractor must ensure that all fence uprights are appropriately removed, ensuring that no uprights are cut at ground level but rather removed completely.	Contractor	Access routes must be mapped prior to construction	ESO ECO	Fortnightly	Site Inspection

8.3.4. 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**		
	Responsible person	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
1. All abstraction points or bore holes must be registered with the DWS and suitable water meters installed to ensure that the abstracted volumes are measured on a daily basis; 2. The Contractor must ensure the following: a. The vehicle abstracting water from a river does not enter or cross it and does not operate from within the river; b. No damage occurs to the river bed or banks and that the abstraction of water does not entail stream diversion activities; and c. All reasonable measures to limit pollution or sedimentation of the downstream watercourse are implemented. 3. 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. The use of grey water is encouraged.	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).

8.3.5. Storm and waste water management		
Impact Management Outcome: Avoid, prevent and manage impacts related to storm and waste water.		
Impact Management Actions	**Implementation**	**Monitoring**

CONSTRUCTION PHASE ACTIVITIES

1. 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; 2. 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; 3. Natural storm water runoff not contaminated during the developmentand 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, such as soils and silt, may be released into watercourses or water bodies only once all suspended solids have been removed from the water by settling out these solids in 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.	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
	Project Manager	Detailed SWMP	ECO	Fortnightly	Approval of SWMP

8.3.6. 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**		
1. All measures regarding waste management must be undertaken using an integrated waste management approach; 2. Sufficient, covered waste collection bins (scavenger and	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**

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. Certificates of safe disposal for general, hazardous and recycled waste must be maintained.	Contractor	Bunding of hazardous storage sites	ESO ECO	Daily Fortnightly	Site inspection of hazardous storage areas and inspection of drip trays and impervious surfaces

8.3.7. 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**		
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	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**

disturbance of the Estuarine Functional Zone should occur; 5. Development of permanent watercourse or estuary crossing must only be undertaken where no alternative access to tower position is available; 6. There must not be any impact on the long term morphological dynamics of watercourses or estuaries; 7. Existing crossing points must be favored over the creation of new crossings (including temporary access) 8. 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. 11. Installation of piezometric seepage boreholes if pollution is evident. The boreholes can be positioned downstream of the transmission lines. 12. Pylons along the alternate route must be located outside of EFZ 13. In the event of a large-scale marine pollution event, every effort must be made to prevent it reaching and negatively impacting the Coega Estuary, even though the system is ephemeral and often closed.	Contractor	Demarcation of watercourses and sensitive areas maintaining the specified buffers	ECO	Fortnightly	Watercourses and sensitive areas are marked as No-Go areas

8.3.8. Vegetation clearance

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

Impact Management Actions	**Implementation**		**Monitoring**		
General: 1. Indigenous vegetation which does not interfere with the development must be left undisturbed; 2. Protected or endangered species may occur on or near the development site. Special care should be taken not to damage such species; 3. 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 development or clearing; 4. Permits for removal must be obtained from the Department of Agriculture, Forestry and Fisheries prior to the cutting or clearing of the affected species, and they must be filed; 5. The Environmental Audit Report must confirm that all identified species have been rescued and replanted and that the location of replanting is compliant with conditions of approvals; 6. Trees felled due to construction must be documented and form part of the Environmental Audit Report; 7. Rivers and watercourses must be kept clear of felled trees, vegetation cuttings and debris; 8. Only a registered pest control operator may apply herbicides on a commercial basis and commercial application must be carried out under the supervision of a registered pest control operator, supervision of a registered pest control operator or is appropriately trained; 9. A daily register must be kept of all relevant details of herbicide	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
	Contractor	Working within demarcated areas AIP eradication and control	ESO ECO	Weekly Fortnightly	Site Inspection

usage; 10. No herbicides must be used in estuaries; 11. All protected species and sensitive vegetation not removed must be clearly marked and such areas fenced off in accordance to ***Section 5.3: Access restricted areas***. 12. Vegetation clearing operations in Zone 7 must be monitored by a professional archaeologist.. 13. Excavations for new roads, services, and powerline footings must be inspected/monitored by a professional archaeologist. 14. Any unmarked human remains are exposed or intercepted during construction operations, these must be immediately reported to the contracted archaeologist. 15. Routes options for the transmission lines should be planned to avoid area that has been identified as sensitive and offer important functions, such as habitat, breeding areas, areas where natural resources that are considered of important status occur and migration route. The use of existing servitudes is encouraged wherever possible to minimize impacts on natural vegetation. **Servitude:** 1. 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; 2. Where clearing for access purposes is essential, the maximum width to be cleared within the servitude must be in accordance to distance as agreed between the land owner and the EA holder 3. 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; 4. 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; 5. 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; 6. 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.					

8.3.9. Protection of fauna					
Impact Management Outcome: Impacts on fauna are minimised through adherence of EMPr requirements.					
Impact Management Actions	**Implementation**		**Monitoring**		
1. No interference with livestock must occur without the landowner's written consent and with the landowner or a person representing the landowner being present; 2. The breeding sites of raptors and other wild birds species	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**

must be taken into consideration during the planning of the development programme; 3. 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; 4. Nesting sites on existing parallel lines must documented; 5. Special recommendations of the avian specialist must be adhered to at all times to prevent unnecessary disturbance of birds; 6. Bird guards and diverters must be installed on the new line as per the recommendations of the specialist; 7. 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; 8. No deliberate or intentional killing of fauna is allowed; 9. In areas where snakes are abundant, snake deterrents to be deployed on the pylons to prevent snakes climbing up, being electrocuted and causing power outages; and 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. 10. Routes options for the transmission lines should be planned to avoid area that has been identified as sensitive and offer important functions, such as habitat, breeding areas, areas where natural resources that are considered of important status occur and migration route. The use of existing servitudes is encouraged wherever possible to minimize impacts on natural vegetation;	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

CONSTRUCTION PHASE ACTIVITIES

8.3.10. Protection of heritage resources					
Impact Management Outcome: Impacts on heritage resources are minimised through adherence of EMPr requirements.					
Impact Management Actions	**Implementation**		**Monitoring**		
1. Identify, demarcate and prevent impact to all known sensitive heritage features on site in accordance with the No-Go procedure in ***Section 5.3: Access restricted areas***; 2. Carry out general monitoring of excavations for potential fossils, artefacts and material of heritage importance; 3. All work must cease immediately, if any human remains and/or other archaeological, palaeontological and historical material are uncovered. Such material, if exposed, must be reported to the nearest museum, archaeologist/ palaeontologist (or the South African Police Services), so that a systematic and professional investigation can be undertaken. Sufficient time must be allowed to remove/collect such material before development recommences.	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
	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

8.3.11. 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	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**

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; Maintain an incidents and complaints register in which all incidents or complaints involving the public are logged.	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

8.3.12. 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**		
	Responsible person	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
1. Mobile chemical toilets are installed onsite if no other ablution facilities are available; 2. The use of ablution facilities and or mobile toilets must be used at all times and no indiscriminate use of the veld for the purposes of ablutions must be permitted under any circumstances; 3. Where mobile chemical toilets are required, the following must be ensured: a) Toilets are located no closer than 100 m to any watercourse or water body; b) Toilets are secured to the ground to prevent them from toppling due to wind or any other cause; c) No spillage occurs when the toilets are cleaned or emptied and the contents are managed in accordance with the EMPr; d) Toilets have an external closing mechanism and are	Contractor	Provision of ablution facilities during construction Management of facilities	ESO ECO	Daily Fortnightly	Proof of servicing and safe disposal

closed and secured from the outside when not in use to prevent toilet paper from being blown out; 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 maintained.					

8.3.13. Prevention of disease

Impact Management outcome: All necessary precautions linked to the spread of disease are taken.

Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible person	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
1. Undertake environmentally-friendly pest control in the camp area; 2. Ensure that the workforce is sensitised to the effects of sexually transmitted diseases, especially HIV AIDS; 3. The Contractor must ensure that information posters on 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

8.3.14. 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 project; 2. The Emergency Plan must deal with 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 a fire as soon as it starts; 5. In the event of 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

8.3.15. Hazardous substances					
Impact Management outcome: Safe storage, handling, use and disposal of hazardous substances.					
Impact Management Actions	**Implementation**		**Monitoring**		
1. The use and storage of hazardous substances to be minimised and non-hazardous and non-toxic alternatives substituted where possible; 2. All hazardous substances must be stored in suitable	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**

containers as defined in the Method Statement; 3. Containers must be clearly marked to indicate contents, quantities and safety requirements; 4. All storage areas must be bunded. The bunded area must be of sufficient capacity to contain a spill / leak from the stored containers; 5. Bunded areas to be suitably lined with a SABS approved liner; 6. An Alphabetical Hazardous Chemical Substance (HCS) control sheet must be drawn up and kept up to date on a continuous basis; 7. All hazardous chemicals that will be used on site must have Material Safety Data Sheets (MSDS); 8. All employees working with HCS must be trained in the safe use of the substance and according to the safety data sheet; 9. Employees handling hazardous substances / materials must be aware of the potential impacts and follow appropriate safety measures. Appropriate personal protective equipment must be made available; 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; 13. Provision must be made for refueling at the storage area by protecting the soil with an impermeable groundcover. Where	Contractor	Bunding of hazardous storage sites	ESO ECO	Daily Fortnightly	Site inspection of hazardous storage areas and inspection of drip trays and impervious surfaces

dispensing equipment is used, 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; 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. Where refueling away from the dedicated refueling station is required, a mobile refueling unit must be used. Appropriate ground protection such as drip trays must be used; 19. 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; 20. The responsible operator must have the required training to make use of the spill kit in emergency situations; 21. An appropriate number of spill kits must be available and must be located in all areas where activities are being undertaken; and 22. 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 8.6.16*** for procedures concerning ***storm and waste water management*** and **5*.8*** for ***solid and hazardous waste management.***					

8.3.16. 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. Where possible and practical all maintenance of vehicles and equipment must take place in the 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. The relevant local authority must be made aware of a fire as soon as it starts; 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; 5. Appropriately sized spill kit kept onsite relevant to the scale of the activity taking place must be available; 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 equipment can be performed; and 6. Water drainage from the workshop must be contained and managed in accordance ***Section 5.7: storm and waste water management***.	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

8.3.17. Batching Plants		
Impact Management outcome: Minimise spillages and contamination of soil, surface water and groundwater**.**		
Impact Management Actions	**Implementation**	**Monitoring**

	Responsible person	Method of implementation	Responsible Person	Frequency of monitoring	Mechanism for monitoring compliance
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 10 m away from any water courses, gullies and drains; 5. A washout facility must be provided for washing of concrete 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 licenced 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 5.20: 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 5.5: Fencing and gate installation***.	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

8.3.18. Dust emissions		
Impact Management outcome: Dust prevention measures are applied to minimise the generation of dust.		
Impact Management Actions	**Implementation**	**Monitoring**

CONSTRUCTION PHASE ACTIVITIES

	Responsible person	Method of implementation	Responsible Person	Frequency of monitoring	Mechanism for monitoring compliance
1. Take all reasonable measures to minimise the generation of dust as a result of project development activities to the satisfaction of the ECO; 2. Removal 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. Excavation, handling and transport of erodible materials must be avoided under high wind conditions or when a visible dust plume is present; 4. During high wind conditions, the ECO must evaluate the situation and make recommendations as to whether dust-damping measures are adequate, or whether working will cease altogether until the wind speed drops to an acceptable level; 5. Where possible, soil stockpiles must be located in sheltered areas where they are not exposed to the erosive effects of the wind; 6. Where erosion of stockpiles becomes a problem, erosion control measures must be implemented at the discretion of the ECO; 7. Vehicle speeds must not exceed 40 km/h along dust roads or 20 km/h when traversing unconsolidated and non-vegetated areas; 8. Straw stabilisation must be applied at a rate of one bale/10 m² and harrowed into the top 100 mm of top material, for all completed earthworks; 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.

8.3.19. 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**		
1. The Contractor must keep noise level within acceptable limits, Restrict the use of sound amplification equipment for communication and emergency 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. Where possible or applicable, provide transport to and from the site on a daily basis for construction workers; 4. Develop a Code of Conduct for the construction phase in terms of behaviour of construction staff. Operating hours as determined by the environmental authorisation are adhered to during the development phase. Where not defined, it must be ensured that development activities must still meet the impact management outcome related to noise management.	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
	Contractor	Compliance with SANS 10103 and OHS Act Use of appropriate PPE	ESO ECO	Daily Fortnightly	Inspection of Complaints Register Site inspection

8.3.20. Fire prevention		
Impact Management Outcome: Fire prevention measures are carried out in accordance with the relevant legislation.		
Impact Management Actions	**Implementation**	**Monitoring**

1. Designate smoking areas where the fire hazard could be regarded as insignificant; 2. Firefighting equipment must be available on all vehicles located on site; 3. The local Fire Protection Agency (FPA) must be informed of construction activities; 4. Contact numbers for the FPA and emergency services must be communicated in environmental awareness training and displayed at a central location on site; Two way swop of contact details between ECO and FPA.	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
	Contractor	Awareness Training	ECO	Fortnightly	Site Inspection

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

8.3.22. Finalizing 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 vegetation clearing must occur during survey and pegging operations; 2. No new access roads must be developed to facilitate access for survey and pegging purposes; 3. Project manager, botanical specialist and contractor to agree on final tower positions based on survey within assessed and approved areas; 4. 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.	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
	Contractor	Preventative measures adhered to	ECO	Fortnightly	Site inspections

8.3.23. 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 recognised disposal site, if not used for backfilling purposes; 2. Spoil can however be used for landscaping purposes and	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**

must be covered with a layer of 150 mm topsoil for rehabilitation purposes; 3. Management of equipment for excavation purposes must be undertaken in accordance with ***Section 8.3.16: Workshop equipment maintenance and storage***; and 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 *8.3.15: Solid and hazardous waste management***.	Contractor	Preventative measures adhered to	ECO	Fortnightly	Site inspections

8.3.24. 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**		
	Responsible person	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
1. Prior to erection, assembled towers and tower sections must be stored on 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;	Contractor	Preventative measures adhered to	ECO	Fortnightly	Site inspections

7. Access to tower positions to be undertaken in accordance with access requirements in specified in Section 8.4: Access Roads; 8. Vegetation clearance to be undertaken in accordance with general vegetation clearance requirements specified in Section 8.10: 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; 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 5.29: 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. Provide bird perches on top of the monopoles to encourage them away from perching on the conductors. 21. Use alternating black and white static pigtail flight diverters on the remaining spans of the power line as per Eskom Guidelines. 22. Report any bird casualties to the CDC or TNPA Environmental Officer and the Coega / Ngqura Environmental Control Officer. 23. Construction of the three monopole structures within intact indigenous vegetation (21, 22 and 23) should utilise the method with the least impact. Each pole should be placed individually, with no servitude construction. 24. Development and implementation of an alien invasive plant species management plan, which would remove and control the alien vegetation within and bordering the site.					

8.3.25. Stringing					
Impact Management outcome: No environmental degradation occurs as a result of stringing.					
Impact Management Actions	**Implementation**		**Monitoring**		
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	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**

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 5.17: 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 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;	Contractor	Preventative measures adhered to	ECO	Fortnightly	Site inspections

CONSTRUCTION PHASE ACTIVITIES

9. Necessary scaffolding protection measures must be installed to prevent damage to the structures supporting certain high value agricultural areas such as vineyards, orchards, nurseries.					

OPERATION PHASE ACTIVITIES

8.3.26. 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 ***sections 8.3.15: management of hazardous substances*** and ***8.3.16 workshop, equipment maintenance and storage***; 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; 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.	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
	Contractor	Preventative measures adhered to	ECO	Fortnightly	Site inspections

OPERATION PHASE ACTIVITIES

8.3.27. Landscaping and rehabilitation

Impact Management Outcome: Post-construction and rehabilitation activities are undertaken in accordance with EMPR requirements as well as Rehabilitation Plans.

Impact Management Actions	**Implementation**		**Monitoring**		
	Responsible person	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
1. 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; 2. All slopes must be assessed for contouring, and to contour only when the need is identified in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983 3. 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, No 43 of 1983; 4. 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; 5. Where new access roads have crossed cultivated farmlands, that lands must be rehabilitated by ripping which must be agreed to by the holder of the EA and the landowners; 6. Rehabilitation of tower sites and access roads outside of farmland; 7. Indigenous species must be used for with species and/grasses to where it compliments or approximates the original condition; 8. Stockpiled topsoil must be used for rehabilitation (refer to Section ***5.24: Stockpiling and stockpiled areas***); 9. Stockpiled topsoil must be evenly spread so as to facilitate seeding and minimise loss of soil due to erosion; 10. Before placing topsoil, all visible weeds from the placement area and from the topsoil must be removed;	Contractor	Clean rehabilitated site free of litter and construction material	ECO	Fortnightly	Site Inspection, Record Keeping and ECO Reports

OPERATION PHASE ACTIVITIES

11. Subsoil must be ripped before topsoil is placed; 12. The rehabilitation must be timed so that rehabilitation can take place at the optimal time for vegetation establishment; 13. Where impacted through construction related activity, all sloped areas must be stabilised to ensure proper rehabilitation is effected and erosion is controlled ; 14. 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; 15. Spoil can be used for backfilling or landscaping as long as it is covered by a minimum of 150 mm of topsoil. 16. 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 17. Development and implementation of an alien invasive plant species management plan, which would remove and control the alien vegetation within the site throughout the life of the development. 18. Water quality monitoring of the nearby river. 19. Ideally use dynamic reflective bird flappers, preferably with lights that flash at night, on the most sensitive spans of the transmission line between the Powerships and the top of the Eastern Reclamation. Use alternating black and white static pigtail flight diverters on the remaining spans of the transmission line.					

OPERATION PHASE ACTIVITIES

20. Development and implementation of an alien invasive plant species management plan, which would remove and control the alien vegetation within and bordering the site. 21. Development and implementation of an alien invasive plant species management plan, which would remove and control the alien vegetation within and bordering the site.					

OPERATION PHASE ACTIVITIES

8.3.28. Socio-economic					
Impact Management outcome: Socio-economic development is enhanced.					
Impact Management Actions	**Implementation**		**Monitoring**		
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.	**Responsible person**	**Method of implementation**	**Responsible Person**	**Frequency of monitoring**	**Mechanism for monitoring compliance**
	Operations Manager, Project Manager and Engineer	Interview process	Operations Manager	Fortnightly	Site inspections

PLANNING AND DESIGN PHASE & PRE-CONSTRUCTION ACTIVITIES

8.4. PART B: ENVIRONMENTAL MANAGEMENT PROGRAMME FOR THE DEVELOPMENT FOR GAS LINES, POWERSHIPS AND FSRU'S

The following will provide environmental specifications for the project of the gas pipeline, the Powerships 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 powerships and the FSRU.

8.5. Planning and Design Phase & Pre-Construction Activities

8.5.1. 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 identified and 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 in a case of any changes to the original design / layout, that these 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. 5. Consider and implement where feasible favourable socio-economic options / solution, including but not limited to low maintenance infrastructure, incorporation with existing	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

facilities and infrastructure and logistical arrangements and implementation of low energy or renewable energy options. 6. Compile an Emergency Response Action Plan (ERAP) prior to the commencement of the project. 7. The ERAP must deal 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. The noise impacts are re-modelled when the final design of the infrastructure and methods of construction is determined. This will enable extra noise mitigation measures to be determined before the equipment is finally installed. 10. A separate study should be considered to determine the impact on the marine environment. This should include the impact of anthropogenic noise on the African penguins breeding on Jahleel Island, as well as the underwater noise impacts. 11. The applicant must take into account, adhere to and implement the relevant section of the ICM Act applicable to this gas to powership project at the Port of Ncqura;					

8.5.2.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**		
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	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Karpowership	Environmental Authorisation,	ECO	Fortnightly	Agreements and

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; 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. 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:		EMPr, licences and permits must be included in the tender documents and the Contractor			Appointment

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					

8.5.3.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**		
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	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Contractor	Weekly toolbox talks and	ECO	Fortnightly	Record of attendance to

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. The use of pictures and real-life examples must be incorporated in the training and awareness material. 4. Contract employees must be educated about the value of wild animals and the importance of their conservation. 5. The Contractor's environmental awareness training must be site specific and address all findings raised by the ECO. 6. 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.		awareness training			the toolbox talks and awareness training must be filed in 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 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	ECO	On-site environmental induction	ECO	Once-off	Record of attendance to the induction must be filed in the Site Environmental File

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. 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.	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

8.5.4. Worker Conduct on Site					
Impact Management Outcome: Appropriate social and ecological well-being of the site and community					
Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
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: 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

8.5.5. No-Go Areas / Restricted Areas		
Impact Management Outcome: Impact on No-Go areas are avoided through effective demarcation and management of these areas		
Impact Management Actions:	**Implementation**	**Monitoring**

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	Responsible Person/s	Method of Implementation	Responsible Person	Frequency of Monitoring	Mechanism for Monitoring Compliance
1. Identification of access restricted areas is to be informed by the environmental assessment, site walk through and any additional areas identified during development. 2. A full Ecological study, inclusive of a site visit, must be conducted prior to any construction activities to list all species of conservation concern, and associated permits should be obtained for their removal or transplantation, as applicable. 3. 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. 4. Unauthorised access and development related activity inside access restricted areas is prohibited,	Ecologist and 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
1. The authorised development layout plan must be adhere to, inclusive of the laydown area for the gas pipeline, and no-go 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 “no-go areas” through fencing or other means. All “no go” areas must be clearly marked on a construction site layout plan. 1. Unauthorised access onto/into private properties is strictly prohibited.	Ecologist and ECO	Demarcation of no-go areas with danger tape or barrier netting	ESO ECO	Daily Fortnightly	Site Inspection

PLANNING AND DESIGN PHASE & PRE-CONSTRUCTION ACTIVITIES

8.5.6.Materials Management – Sourcing					
Impact Management Outcome: Ensure environmentally sustainable and responsible use of materials					
Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Ensure that materials to be used during construction are legally sourced. Source materials locally where possible. 2. Water or sand must not be extracted from watercourses; should this be a requirement, then the required permits and approvals have to be obtained from authorities before construction commences. It is recommended that filling and levelling material be sourced from a local commercial quarry. 3. Only commercial sources will be used e.g. material from the local quarry. No borrow-pits will be created or used for source material. 2. 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.	Project Manager and Engineer	Letter from supplier confirming legal source of materials	ECO	Fortnightly	Records of materials purchased

8.5.7.Socio-Economic Management		
Impact Management Outcome: Socio-economic development is enhanced		
Impact Management Actions:	**Implementation**	**Monitoring**

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	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 LM) 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. 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 Port of Ngqura 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.	Project Developer	Designated Human Resource / social facilitation team and associated procedures and policies	ESO ECO	weekly Monthly	Review of procurement documentations and records

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. Engage with local authorities and inform them of the development as well as discuss with them their ability to meet the additional demands on social and basic services created by the in migration of workers. 19. 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. 20. 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. 21. A three-year social development and economic development programmes should be devised by the developer throughout the project's lifespan.					

22. 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. 23. These plans should be reviewed on an annual basis and, where necessary, updated. 24. When identifying enterprise development initiatives, the focus should be on creating sustainable and self-sufficient enterprises. 25. In devising the programmes to be implemented, the developer should take into account the priorities set out in the local IDP. 26. The mitigation measures proposed by noise specialist should be adhered to.					

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8.6. Construction Phase Activities – Gas pipeline and Temporary Laydown area / Construction Camp

8.6.1. 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 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. A fine will be issued by the Project Developer for wilful negligence or non-compliance 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. 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.	Developer	Appointment of ECO	ECO	Fortnightly	Monthly ECO Reports

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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

8.6.2. Site Establishment

Impact Management Outcome: Impacts relating to site establishment are minimised.

Impact Management Actions:	**Implementation**		**Monitoring**		
1. Location of camp site / laydown area must be within approved area (as specified in the authorised site development plan) to ensure that the site does not impact on sensitive areas 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. 3. 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. 4. The location of the construction camps and laydown areas must be approved by the ECO prior to implementation.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	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

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5. All site camps must be fenced off to limit any accidental vegetation disturbance outside the approved area. 6. Eating areas must be serviced and cleaned on a daily basis to ensure the highest possible standards of hygiene and cleanliness. 7. On-site accommodation will not be allowed. No persons, other than a night-watchman / security guard, may stay overnight at the construction camp 8. Drainage at the camps must be designed to prevent the standing ponding of water or sheet erosion from taking place. 9. Signage must be placed in the area where construction will take place informing the public of the activities taking place. 10. 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. 11. 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. 12. The area where water disperses out of a drain must be suitable for such and must not be susceptible to erosion. 13. A grass-lined channel conveys storm water runoff through a stable conduit. Vegetation lining the channel slows down concentrated runoff. 14. 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.					

15. The surrounding area must be surveyed prior to construction/camp establishment to determine the presence of nesting birds and these must cordoned off where possibly or be safely relocated if necessary. 16. The conservation authority must be contacted for the relocation of birds/ wildlife.					

8.6.3. Access to Construction Site					
Impact Management Outcome: Construction vehicle movement are restricted to approved routes					
Impact Management Actions:	**Implementation**		**Monitoring**		
1. An access agreement must be formalised and signed by the PM / PE, contractor and Transnet 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. Further, the deviation will be deemed as a non-compliance to the Environmental Authorisation and its approved development layout plan. 3. Sufficient parking must be provided for site staff and visitors at the construction camp. 4. The liberation of dust into the surrounding environment must be effectively controlled by the use of water sprays, fabric containment, where required. 5. If required, staff must be employed to clean spilt material onto the access roads. 6. Pedestrian and vehicle access must be restricted during construction so as to control access to otherwise potential dangerous excavations and materials. 7. Secure and ensure safe passage for components and materials between destinations. Loads including, but not	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Contractor	Access routes must be mapped prior to construction	ESO ECO	Fortnightly	Site Inspection

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. 8. 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.					

8.6.4. No-go Areas					
Impact Management Outcome: Impact on No-Go areas are avoided through effective demarcation and management of these areas.					
Impact Management Actions:	**Implementation**		**Monitoring**		
1. The construction / work servitude must accommodate all construction-related activities, including materials storage and soil stockpiles. 2. Access must be confined to the existing road infrastructure. 3. Unauthorised entry, stockpiling, dumping or storage of equipment, material or waste outside the project boundaries is strictly prohibited. 4. Gathering of firewood, fruit, plants or any other natural material on site or in areas adjacent to construction sites is prohibited. 5. Unauthorised access onto/into private properties is strictly prohibited. 6. Activities in the surrounding open undeveloped areas must be strictly regulated and managed. 7. No entry or dumping into / onto the sensitive areas or buffer zones is allowed. 8. Personnel must not be allowed into indigenous vegetation especially Mangrove Forest and Swamp Forest (unless	**Responsible Person/s** Contractor and ESO	**Method of Implementation** Demarcation of sensitive areas and staying within approved areas for construction	**Responsible Person** ESO ECO	**Frequency of Monitoring** Daily Fortnightly	**Mechanism for Monitoring Compliance** Site inspection of sensitive No-Go areas and photographic evidence

within the authorised layout plan), and the following activities are prohibited: • No picking any indigenous plant • Only provided portable toilets should be used • No lighting of fires • No catching or shooting of any wildlife • No trampling of vegetation					

8.6.5. 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**		
1. 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 if any identified species have been rescued and replanted and that the location of replanting is compliant with conditions of approvals. 2. Contractors must ensure that no protected tree species are removed or trimmed without the required permit from the Department of Agriculture, Forestry and Fisheries. 3. Care must be taken to prevent the introduction of alien plant species to the site and surrounding areas by removing the invasive plants onsite. 4. All large indigenous plant and sedge species must be conserved wherever possible. 5. Any indigenous tree that is removed, cut or pruned will require permit if form part of “natural forest”, to be consulted with the ECO. 6. Trees and shrubs to be conserved must be clearly marked.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	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

7. 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. 8. Disturbance to birds, animals and reptiles and their habitats must be minimised by avoiding any interference or contact where possible. 9. No natural vegetation is to be collected for use as firewood. 10. No animals are to be disturbed unnecessarily and no animals are allowed to be shot. No faunal species must be trapped, hunted or harmed in any way. Any fauna directly threatened by the development must be removed to a safe location with the guidance of the ECO. Animals may only be trapped or caught for conservation and relocation purposes. 11. Special recommendations of the avian specialist must be adhered to at all times to prevent unnecessary disturbance of birds. 12. In areas where snakes are abundant, snake deterrents to be deployed on the pylons to prevent snakes climbing up, being electrocuted and causing power outages. 13. Noise pollution must be minimised to ensure faunal inhabitants are not stressed. 14. Clearance of vegetation and habitat to be restricted within the authorised layout for the laydown area. Protected and indigenous vegetation to be cleared with the required permits 15. 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).					

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16. 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. 17. Applications of herbicides and pesticides must be applied by certified, approved and trained employees or contractors. 18. Alternative 1: To avoid disturbance to breeding Kelp Gulls and African Oystercatchers, the gas pipeline should not be constructed over the dune area during the period 1 October to 31 January. 19. A long-term hydrophone system is installed in the vicinity of the FSRU, LNGC berth, harbour entrance and other sensitive areas in Algoa Bay to determine the current underwater noise environment. 20. Construction activities, specifically excavation and moving/transporting of large components, to be restricted to daylight hours to prevent potential disturbance to roosting bird populations, and the core estuarine area					

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8.6.6. 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 feasible. 2. 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. 3. Existing services infrastructure must be identified and clearly demarcated. 4. 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.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**

5. All areas outside of the demarcated construction camp / laydown area must be considered No-Go areas. Any Contractors found working inside the No-Go areas must be fined as per fining schedule / system setup for the project. 6. The demarcation work must be signed off by the ECO before any work commences. 7. The laydown area must not be established within a high-risk area (i.e. the Coega Estuary or below the high water mark). 8. 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.	Contractor	Demarcation of construction servitude prior to site clearing	ECO	Once-off	Photographic record. Clearly marked construction servitude Pre-construction photographic records

8.6.7. 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. All cut vegetation must be disposed of onsite as mulch and use in rehabilitation efforts or to chip and compost. 2. There must be no burning on site under any circumstances. 3. Indigenous vegetation clearing must be kept to a minimum and undertaken under proper supervision. 4. Vegetation clearing activities must only be undertaken during agreed working times and permitted weather conditions. 5. Any vegetation clearing must be done immediately before construction activities to avoid prolonged exposure of the soil to weather elements.	Contractor	Working within demarcated areas IAP eradication and control	ESO ECO	Weekly Fortnightly	Site Inspection

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8.6.8. 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, if required, must be carried out in a manner to promote the stable development of the site, in accordance with the current SANS/SABS 1200 series. 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. Earthworks must commence shortly after vegetation clearing to prevent erosion runoff. 5. Only commercial sources will be used e.g. material from the local quarry. No borrow-pits will be created or used for source material. 6. 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**
	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.

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8.6.9. Fire Management					
Impact Management Outcome: Fire prevention measures are carried out in accordance with the relevant legislation.					
Impact Management Actions:	**Implementation**		**Monitoring**		
1. Fires will only be allowed in facilities or equipment specially constructed for this purpose at the construction camp. 2. No open fires or uncontrolled fires are permitted on site. 3. Ensure that there is basic firefighting equipment available on-site. Firefighting equipment must be in working order and serviced to-date. 4. The workforce must be made aware of fire prevention and firefighting measures. 5. 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. 6. Burning of fire breaks is to be carefully planned and managed with the assistance of the local Fire Department. 7. Set smoking areas must be designated. Smoking outside these designated areas is prohibited. 8. The Contractor must ensure that the telephone number of the local Fire and Emergency Service are displayed at the site offices.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Contractor	Awareness Training	ECO	Fortnightly	Site Inspection

8.6.10. 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 the “no go” area. 6. 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. 7. 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. 8. Undertake the stripping of topsoil in a manner that minimises erosion by wind or runoff. 9. Subsoil and topsoil must not be mixed with other soils during stripping, excavation, reinstatement and rehabilitation. 10. 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	Contractor and ESO	Method Statement to be compiled for soil stockpile management	ESO ECO	Daily Fortnightly	Site inspection and compliance with Method Statement
	Contractor and ESO	Method Statement to be compiled for erosion control and sedimentation	ESO ECO	Daily Fortnightly	Site inspection and compliance with Method Statement

seeded or covered and sediment fences constructed from a suitable geotextile. 11. Where possible, plants should be cut down to ground level instead of being removed completely to stabilise the soil during land-clearing operations. 12. Excavations must be undertaken carefully incorporating proper drainage and considering weather conditions. If heavy rains are expected excavations must be put on hold. 13. Excavated and imported material must be stockpiled/stored away from areas of concentrated flow to limit the risk of sediment wash to downstream areas. 14. Dumping of excavated material into the sensitive and no-go areas is prohibited. 15. Water from any dewatering process, if applicable, must be stored and re-used were possible, e.g. for dust suppression 16. Construction should be planned to the dryer winter months when high rainfall and the risk of sediment runoff is limited. 17. 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. 18. Soil stockpiling areas must be situated at least 50m away from any sensitive areas.					

19. No surface storm water generated as a result of the development may be directed directly into any natural drainage system. 20. 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. 21. 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. 22. Soil stockpiles must be protected from erosion, surrounded by suitable earthen buns and covered by erosion control blanket. 23. Site engineers must regularly inspect the erosion control measures to confirm their appropriateness and integrity.					

8.6.11. 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.	**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	ESO ECO	Daily Fortnightly	Provision of waste disposal facilities (bins & skips)

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. 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.		minimisation and re-use			

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. 17. The storage of waste must comply with the norms and standards as stipulated in the National Environmental Management: Waste Act.					

8.6.12. 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**		
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.	**Responsible Person/s** Contractor	**Method of Implementation** Provision of sanitation facilities and bunding / impervious surfaces for activities that may lead to soil and groundwater	**Responsible Person** ESO ECO	**Frequency of Monitoring** Weekly Fortnightly	**Mechanism for Monitoring Compliance** Site inspection Inspection of Environmental Incident Register Compliance with Spill Contingency Plan

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; 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. Installation of piezometric seepage boreholes if pollution is evident.		pollution Construction staff to be trained in spill management			Provision of spill kits

11. The quality of the surface water downstream must be monitored, in frequencies as stipulated in the Water Use Licence.					

8.6.13. 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. 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.	**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

7. Spill kit 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.					

8.6.14. 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**		
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.	**Responsible Person/s**	**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

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.					

8.6.15. Water Management					
Impact Management Objective: Undertake responsible water usage during construction.					
Impact Management Actions:	**Implementation**		**Monitoring**		
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 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 with the DWS 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.	**Responsible Person/s**	**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. 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. d. The use of grey water is encouraged. 8. No dumping of construction materials or excess concrete in the intertidal and subtidal zones.					

8.6.16. 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. A storm water management plan (SWMP) for the construction camp/laydown area must be developed and adhered to, so that the stormwater generated on site does not adversely affect the natural watercourses nearby. 5. Storm water runoff must be minimised so that the soil within the area is not subjected to erosion. 6. Ensure no waste disposal to marine environment.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Project Manager	Detailed SWMP	ECO	Fortnightly	Approval of SWMP

7. 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; 8. Batching plants areas must be fitted with a containment facility for the collection of cement laden water. 9. Dirty water from the batching plant must be contained to prevent soil and groundwater contamination 10. A washout facility must be provided for washing of concrete associated equipment. Water used for washing must be restricted; 11. Hardened concrete from the washout facility or concrete mixer can either be reused or disposed of at an appropriate licenced disposal facility; 12. Empty cement bags must be secured with adequate binding material if these will be temporarily stored on site. 13. 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.					

8.6.17. Air Quality					
Impact Management Outcome: Minimal dust, emissions and odour due to adherence of management actions					
Impact Management Actions:	**Implementation**		**Monitoring**		
1. No burning of waste, such as plastic bags, cement bags and litter, is permitted.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**

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 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.	Contractor	Regular dust suppression Maintaining a dust suppression register Plant and equipment must be in good working order Ablutions / toilets cleaned weekly	ESO ECO	Daily Fortnightly	Site inspection Dust suppression register Inspection of Complaints Register relating to dust complaints

8.6.18. 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**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. Construction activities must be undertaken according to working hours approved by local municipality 2. Machinery and vehicles are to be kept in good working order for the duration of the project to minimize noise nuisance. 3. Construction vehicles and equipment generating excessive noise must be fitted with suitable noise	Contractor	Compliance with SANS 10103 and OHS Act Use of appropriate PPE	ESO ECO	Daily Fortnightly	Inspection of Complaints Register Site inspection

abatement measures maintenance undertaken or replaced. 4. Construction workers must be provided with proper PPE i.e. ear plugs at activity areas where excessive noise is generated. 5. 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. 6. 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. 7. 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. 8. A complaints register must be provided to record any complaints regarding excessive noise. 9. Construction staff should receive “noise sensitivity” training including the switching off vehicles when not in use and the location of noise sensitive areas. 10. An ambient noise survey should be conducted at the noise sensitive receptors during the construction phase.					

8.6.19. Protection of watercourses, estuaries and the Coastal Environment					
Impact Management Outcome: Impacts to watercourses and estuaries are managed in adherence to legislation and specialist recommendations					
Impact Management Actions:	**Implementation**		**Monitoring**		
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). 8. 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.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Contractor	Demarcation of watercourses and sensitive areas maintaining the specified buffers	ESO ECO	Daily Fortnightly	watercourses and sensitive areas are marked as No-Go areas

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. 9. No Construction activities with the potential to affect the general public's enjoyment of the coast should be scheduled during peak season. 10. Construction periods to be scheduled avoiding heavy rain and storm seasons. Historical data must be used for best time period allocation. 11. Construction should be scheduled to avoid local species breeding seasons. 12. The proposed 200m offset from the water line to the moored vessels to be maintained from the Sand-spit area that has been identified as sensitive. 13. No vehicles and machinery shall be refuelled within sensitive coastal areas. 14. In the event of a large-scale marine pollution event, every effort must be made to prevent it reaching and negatively impacting the beach and estuarine environment. 15. Powerships must be adequately distanced from the estuary mouth to reduce adverse thermal effects of marine/estuarine biota in the mouth region during open mouth conditions					

CONSTRUCTION PHASE ACTIVITIES

8.6.20. Areas of Heritage 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. If an artefact on site is uncovered, work in the immediate vicinity must be stopped immediately. 2. 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. 3. 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. 4. Work may only resume once clearance is given in writing by an archaeologist. 5. 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. 6. The provincial heritage authority must be contacted and in the case of graves, arrangements made for an undertaker to carry out exhumation and reburial.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Contractor	Demarcation of heritage sites maintaining the specified buffers	ECO	Fortnightly	Heritage sites including graves are marked as No-Go areas

8.6.21. 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**

CONSTRUCTION PHASE ACTIVITIES

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.	**Responsible Person/s** ESO Contractor	**Method of Implementation** Establish registers, record of receipts,, environmental file	**Responsible Person** ESO ECO	**Frequency of Monitoring** Daily Monthly	**Mechanism for Monitoring Compliance** Proof of registers, receipts and environmental file

POST CONSTRUCTION PHASE AND REHABILITATION ACTIVITIES

8.7. Post Construction Phase and Rehabilitation Activities – Construction Camp / Gas pipes Laydown Area

8.7.1.Construction Camp, Construction Areas and Rehabilitation					
Impact Management Outcome: Post-construction and rehabilitation activities are undertaken in accordance with EMPR requirements as well as Rehabilitation Plans.					
Impact Management Actions:	**Implementation**		**Monitoring**		
1. All remaining construction infrastructure and material / consumables must be removed. 2. The working servitude must be rehabilitated / reinstated once all planting of vegetation has been completed to rectify any damage that may have been caused by heavy machinery. 3. All spillage areas must be cleaned and/or remediated. 4. All remaining waste and litter must be collected and recycled and /or disposed to reputable contractors / licensed facilities. 5. The Contractor must arrange for the cancellation of all temporary services, including but not limited to chemical toilets and waste removal and disposal services. 6. Temporary fences, barriers and demarcations associated with the construction phase are to be removed from the site, unless stipulated otherwise by the Project Developer. 7. All residual stockpiles must be removed to spoil or spread on site as directed by the Engineer. 8. The Contractor must repair any damage that the construction works has caused to neighbouring properties. 9. The Contractor is to check that all watercourses are free from building rubble, spoil materials, debris and waste materials.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Contractor	Clean rehabilitated site free of litter and construction material	ECO	Fortnightly	Site Inspection, Record Keeping and ECO Reports

10. No temporary works, stockpiles or other circumstances that could impede natural water movements or act to concentrate run-off must be removed					

8.7.2. Rehabilitation of Watercourses, Estuary and Coastal Environment

Impact Management Outcome: Post-construction and rehabilitation activities are undertaken in accordance with EMPR requirements as well as Rehabilitation Plans.

Impact Management Actions:	**Implementation**		**Monitoring**		
	Responsible Person/s	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
1. The Wetland Rehabilitation Plan (Appendix F) must be adhere to and implemented. 2. 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. 3. The undeveloped areas must be rehabilitated to its pre-establishment condition or agreed alternative i.e. hardened areas ripped and vegetated. 4. 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. 5. On completion of all operations, the construction site must be cleared of any contaminated soil accordance with the soil management procedure. 6. All excavations and test pits must be backfilled with in-situ material and the areas monitored for subsidence, which must be addressed if detected.	Contractor	Clean rehabilitated site	ECO	Fortnightly	Site Inspection, Record Keeping and ECO Reports

7. 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. 8. 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). 9. 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.					

8.7.3. 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.	**Responsible Person/s** ESO Contractor	**Method of Implementation** Establish registers, record of receipts, environmental file	**Responsible Person** ESO ECO	**Frequency of Monitoring** Daily Fortnightly	**Mechanism for Monitoring Compliance** Proof of registers, receipts and environmental file

OPERATION PHASE AND RELATED ACTIVITIES

8.8. Operational Phase and Related Activities – Powerships, FSRU and Gas Pipeline

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.

8.8.1. Legislative Requirements

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

Impact Management Actions:	**Implementation**		**Monitoring**		
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. An ECO must be appointed, and will be mandated with ensuring compliance with any and all Environmental	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Operations Manager and Project Manager	Appointment of an EAP	EAP ECO	Annually Fortnightly	Site Inspections, Review of Documentation, Annual Report

Authorisations granted as well as the supplementary requirements,a Management and Maintenance Plan (Refer to Part C of this Report) and any other documentation that will be required to ensure that the proposed works are carried out and maintained into perpetuity.					

8.8.2.Marine Environment					
Impact Management Outcome: Minimised impact to the benthic and marine environment from the establishment of the Karpowership.					
Impact Management Actions:	**Implementation**		**Monitoring**		
1. Monitoring of infrastructure and general maintenance as required. 2. Access of infrastructure and maintenance of infrastructure and services servitude as per port's approvals and procedures and drafted MMP as per Part C of this Report. 3. Contractual agreements must include the EMPr conditions for e.g. alien invasive management, firebreak and security. 4. Noise level monitoring must performed to measure the ambient noise from the ship. The 50 dBA at 100m levels are to be maintained. 5. Point source emissions are to be monitored and submitted annually to SAAELIP. 6. Plume modelling and managing of the mixing zone to remain within the 1 degree Celsius within 300m radius. 7. 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.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Operations Manager and Project Manager and Engineer	Operation of the Karpowership, FSRU and Gas Pipeline	ECO	Fortnightly	Site inspections

8. Discharges would need to be compliant with the South African Water Quality Guidelines for Coastal and Marine Waters (DWAF, 1995; DEA, 2018b) 9. 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. 10. Implementation of awareness, inspections, contingency plans, compliance with port protocols and reporting of environmental incidents. 11. Ensure continued supply of natural gas to the Powership. 12. Specific EMPr conditions for gas pressure monitoring must be developed. 13. An Operations Manual for each operation, including the gas transfer process must be developed and implemented. 14. Operational and Emergency procedures must be implemented and adhered to. 15. The Emergency Plan must comply with the MHI Regulations. 16. The Emergency Plan must be approved by the Port Authorities. 17. The visiting Ship Captains must provide Port Management with their detailed Ship to Ship Cargo Transfer Operations Manual before offloading. 18. Only suitably qualified people must be used for all operations. All applicable certificates of conformance must be on site. 19. Security measures must be implemented to prevent any unauthorised access. 20. Environmental incident reporting to the Port & Authorities must be undertaken as per required timeframes. 21. The Port Fire Department will handle all fire-fighting and emergencies.					

OPERATION PHASE AND RELATED ACTIVITIES

22. Risk reduction programmes must be continually investigated to reduce the impact from accidental fires and explosions on surrounding communities. 23. The employees and sub-contractors of Karpowership must receive basic training in environmental awareness, including the minimisation of disturbance to sensitive areas, management of waste, identification of protected biodiversity, water conservation and prevention of erosion and water pollution. 24. 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. 25. Install acoustic enclosures around all major noise emitting components to supress the noise emissions from equipment such as engines. 26. Install Silencers on equipment such as exhaust stacks and turbo chargers. 27. 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. 28. Implement technical measures to reduce fugitive emissions at source and during transfer to FSRU and consider contributions to appropriate carbon offset/drawdown initiatives. 29. Adherence to port safety regulations and emergency procedures during mooring/operation. 30. 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.					

OPERATION PHASE AND RELATED ACTIVITIES

31. Adherence to port safety regulations and emergency procedures, particularly during construction/installation. 32. The ship-to-ship transfer of LNG will be managed under an internationally-accredited process 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 inerted 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. 33. Hydraulic monitoring of the pipeline to ensure that the system operates as per design specifications. If pressure losses are noted, a pipeline survey should be undertaken to look for leaks. Pipe sections which rupture should be amended accordingly to prevent possible erosion and land subsidence. 34. No operational activities associated with the project to take place on the Eastern Breakwater. 35. All lighting to be down lighting, to be limited to that required for safe operations and not to illuminate or be directed towards Jahleel Island or the Coega estuary and shoreline. 36. Undertake light and noise audits (daytime and night time) on the Eastern Breakwater at its closest point to Jahleel Island and at the Klub Road causeway crossing the Coega Estuary before operations start to determine the baseline, once operations start and annually thereafter. 37. Undertake underwater noise audits at the end of the Eastern Breakwater before operations start to determine the baseline, once operations start and annually thereafter.					

38. Discharge cooling water from the powerships at 8m depth and away from the water intakes to prevent re-circulation. 39. Emergency plans / equipment are to include plans to evacuate and rehabilitate penguins and other injured or at risk birds in conjunction with SANParks. 40. Ensure that avifauna monitoring continues (African Penguin and Damara Tern colonies, Kelp Gull colonies in the Port, bi-annual Co-ordinated Waterbird Counts on the saltpans). 41. Potential development of a wildlife contingency plan in which key wildlife response organizations are identified to respond to affected wildlife in case of an incident.					

8.8.3. 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. 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	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Operations Manager and Project Manager	Procedures, Plans and records	ECO	Fortnightly	Site inspections

accordance with Karpowership's 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. Records and certificates of waste collection must be documented and maintained at all times.					

8.8.4.Socio-Economic Management					
Impact Management Outcome: Socio-economic development is enhanced					
Impact Management Actions:	**Implementation**		**Monitoring**		
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	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Project Developer	Designated Human Resource / social facilitation team and associated procedures and policies	ESO ECO	weekly Monthly	Review of procurement documentations and records

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. 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.					

8.8.5.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**

OPERATION PHASE AND RELATED ACTIVITIES

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. 3. All maintenance, refurbishment or related activities during operation must comply with the construction measures detailed in the construction phase of the EMPr. 4. All operation components, including radios used within the operations, must be regularly inspected and any structural failures must immediately be reported and the necessary steps must be taken to ensure continued safety. 5. Service Logbooks must be kept for all hoses and pipelines and checked regularly. 6. Operating, monitoring / auditing, reporting, emergency and preventative and corrective action procedures must be available and all staff trained in accordance thereto.	**Responsible Person/s**	**Method of Implementation**	**Responsible Person**	**Frequency of Monitoring**	**Mechanism for Monitoring Compliance**
	Operations Manager and Project Manager and Engineer	Standard Operating Procedures	ECO	Fortnightly	Site inspections

8.8.6.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**

OPERATION PHASE AND RELATED ACTIVITIES

	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. rehabilitation plan, monitoring programmes). 2. Monitoring plan of alien invasive plants must be implemented to prevent streamflow reduction on the tributary of the Mzimvubu River and the Mzimvubu River itself. 3. 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 may indicate disposal of pollutants to the watercourse or alien invaders spread may indicate control and rehabilitation failures. 4. Environmental monitoring must be undertaken by the ECO on a fortnightly basis. 5. This monitoring must be undertaken in order to ensure compliance with all aspects or requirements of the EMPr and Environmental Authorisations. 6. The noise impact from the project should be measured during the operational phase, to ensure that the impact is within the required legal limit. 7. An avifauna specialist should be consulted to determine the effects that an increase in noise levels will have on the Damara Tern Colony. 8. Install acoustic enclosures around all major noise emitting components to supress the noise emissions from equipment such as engines. 9. Install Silencers on equipment such as exhaust stacks and turbo chargers.	Operations Manager and Project Manager	Establish registers, record of receipts, environmental file	ECO	Fortnightly	Site inspections

8.9. PART C: MAINTENANCE MANAGEMENT PROGRAMME 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.* *Eastern Cape* *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 the high water mark of the sea, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas;* *iv.Outside urban areas, within 100 metres inland from an estuarine functional zone; or* *v.On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.*

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).

8.9.1.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)			
Contact person (if other):			
Postal address:			
Telephone:			
Fax:			
Email:			
Municipality for proposed project:	Nelson Mandela Bay Metropolitan Municipality		
Farm name(s), erf(s) and portion number(s) etc*:			
Magisterial District or Town:			
Name(s) of watercourse(s) in question:	A Channel stream, Depression wetland		
***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.**			

NB: The landowner(s) details will be completed upon the delivery of the final Environmental Impact Assessment Report.

8.9.2. Authority Engagement

The following authorities 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 Environmental Affairs (DEA)	Comment on EIAR and EMPr, Issuing Environmental Authorisation
Department of Environment, Forestry and Fisheries (DEFF) – Climate Change; Oceans and Coast; Biodiversity and Protected Areas Directorates	Comment on EIAR and EMPr, Issuing Environmental Authorisation
Department of Mineral Resources (DMR)	Comment on EIAR and EMPr, Issuing Environmental Authorisation
Department of Energy (DoE)	Comment on EIAR and EMPr, Issuing Environmental Authorisation
Eastern Cape Department of Economic Development, Environmental Affairs, and Tourism (DEDEAT)	Comment on EIAR and EMPr, Issuing Environmental Authorisation

Eastern Cape - Provincial Department of Transport	Comment on EIAR and EMPr, Issuing Environmental Authorisation
Eastern Cape - Provincial Department of Agriculture	Comment on EIAR and EMPr, Issuing Environmental Authorisation
Nelson Mandela Metropolitan Municipality	Comment on EIAR and EMPr, Issuing Environmental Authorisation
South African Heritage Resource Agency (SAHRA)	Comment on EIAR and EMPr, Issuing Environmental Authorisation
South African National Roads Agency (SANRAL)	Comment on EIAR and EMPr, Issuing Environmental Authorisation
Department of Rural Development and Land Reform (DRDLR)	Comment on EIAR and EMPr, Issuing Environmental Authorisation
Transnet National Port Authority (TNPA)	Comment on EIAR and EMPr, Issuing Environmental Authorisation
Coega Development Corporation (CDC)	Comment on EIAR and EMPr, Issuing Environmental Authorisation
South African National Parks (SANParks)	Comment on EIAR and EMPr, Issuing Environmental Authorisation
South African Maritime Safety Authority (SAMSA)	Comment on EIAR and EMPr, Issuing Environmental Authorisation
Eastern Cape Development Corporation (ECDC)	Comment on EIAR and EMPr, Issuing Environmental Authorisation
National Energy Regulator of South Africa (NERSA)	Comment on EIAR and EMPr, Issuing Environmental Authorisation
South Africa Gas Development Corporation (SOC) Limited	Comment on EIAR and EMPr, Issuing Environmental Authorisation
Eastern Cape Parks and Tourism Agency	Comment on EIAR and EMPr, Issuing Environmental Authorisation

8.9.3.Public Participation

This MMP is an outcome of the Environmental Impact Assessment Process undertaken for the project. 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 will all provided with a copy of the Environmental Impact Assessment Report and given 30 days from 26th February 2021 to 31st March 2021 in which to provide comment. A summary of the public participation will be included in the submission of the final EIR.

8.9.4.Management Specifications

8.9.4.1. Infrastructure Maintenance

The infrastructure servitudes 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.

8.9.4.2. Alien Invasive Plant Management

The area within 2 meter width of the infrastructure servitudes 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.

8.9.4.3. Clearance of Vegetation

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

8.9.4.4. Working within proximity to the watercourse or watercourse crossing

Construction method statements must be developed and detailed for all excavation and trenching activities in order to mitigate potential environmental impacts. Of significance are the activities relating to the crossing of the watercourse and working in proximity to the watercourse.

8.9.4.5. No-go areas

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 servitudes and trampling of vegetation.

8.9.4.6. 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

8.9.4.7. Safety

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

8.9.4.8. Local Labour

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

8.9.4.9. Interpretative Signage

Interpretative signage, encouraging environmental/conservation awareness is encouraged.

8.9.4.10. 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.

8.9.5.Method Statement

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 Draft 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;
- 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.

8.9.6. 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 Draft EIR.
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.

8.10. 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 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.

It is recommended that a closure plan be developed prior to closure and be approved by the relevant Authorities approximately one year before the anticipated closure, following consultation with the relevant Authorities to determine the specific requirements to be addressed regarding closure.

9. 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. Penalties to be imposed for the transgression of environmental specifications are also noted along with the roles and responsibilities of all stakeholders. 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

<u>**SITE DECOMMISSIONING INSPECTION SHEET**</u>

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 METHODS

The Contract

xxx

Marine Works – Maintenance Plan

TABLE OF CONTENTS

1. Introduction

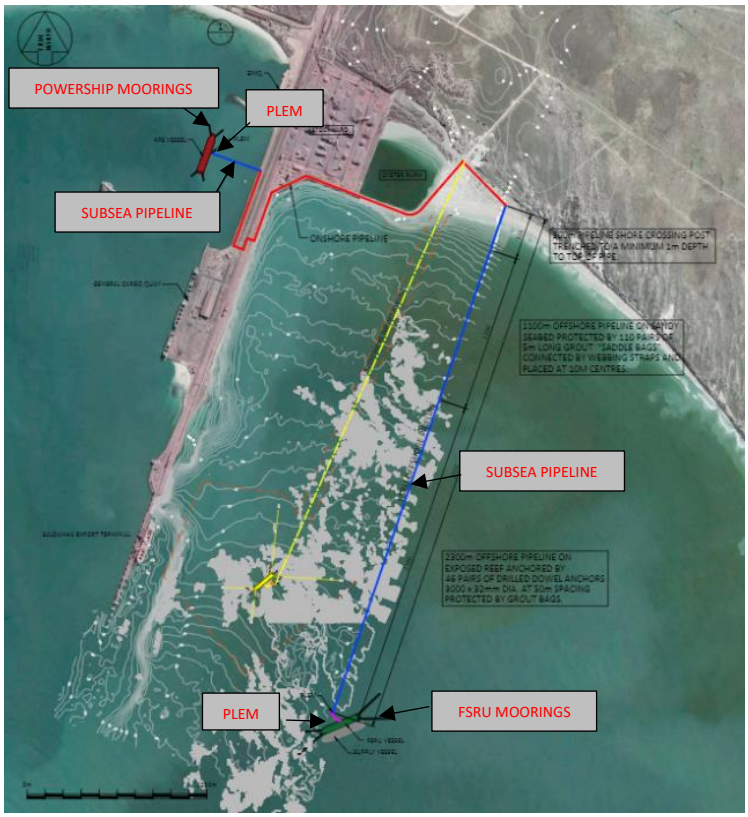
Karpowership (KPS) has responded to the South African Department of Energy's (DOE) Emergency Power RFI offering Powerships with supporting Floating Storage and Regasification Units (FSRUs). KPS is uniquely positioned to offer South Africa floating power generation capacity at scale and speed. KPS has appointed PRDW to undertake technical studies for the proposed gas pipelines (subsea and overland) and vessel moorings in three of South Africa's ports, namely Saldanha Bay, Ngqura and Richards Bay. This document describes the envisaged maintenance plan for the marine works, consisting of the subsea gas pipelines, PLEMs (pipeline end manifolds) and vessel moorings. Maintenance for vessels and flexible hoses are not addressed in this document.

The marine works facilities proposed for the three ports are intended to be largely maintenance free. However, this maintenance plan has been prepared to monitor and mitigate against unforeseen events that could arise, such as during and after extreme storm conditions. A general overview of the proposed infrastructure in each port is presented in Section 2. Refer to the marine works design documentation, as prepared for the tender, for further details.

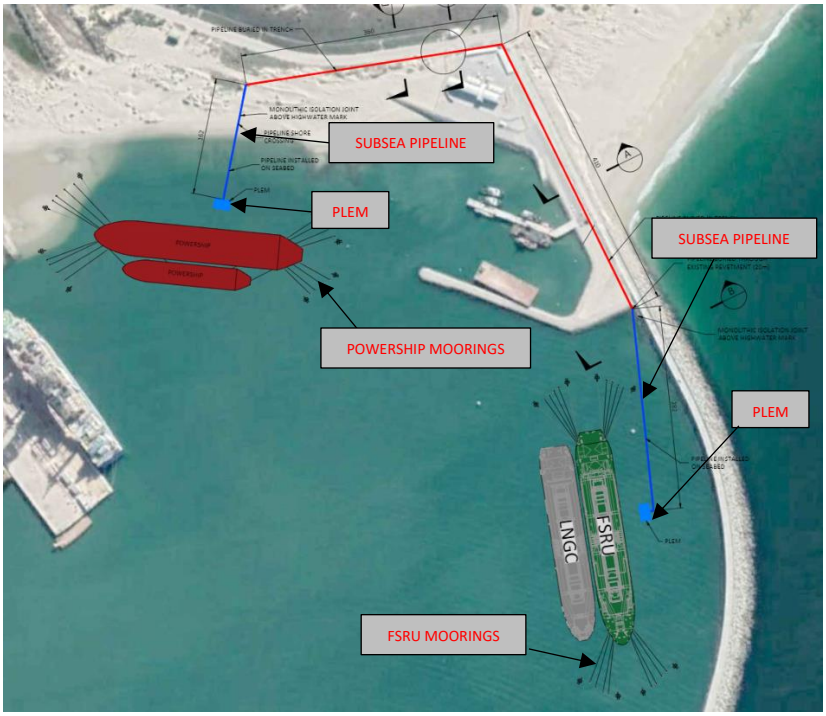
All maintenance activities will be undertaken in a safe and efficient manner with due consideration to personnel safety and protection of the environment.

2. General Overview of Proposed Marine Infrastructure

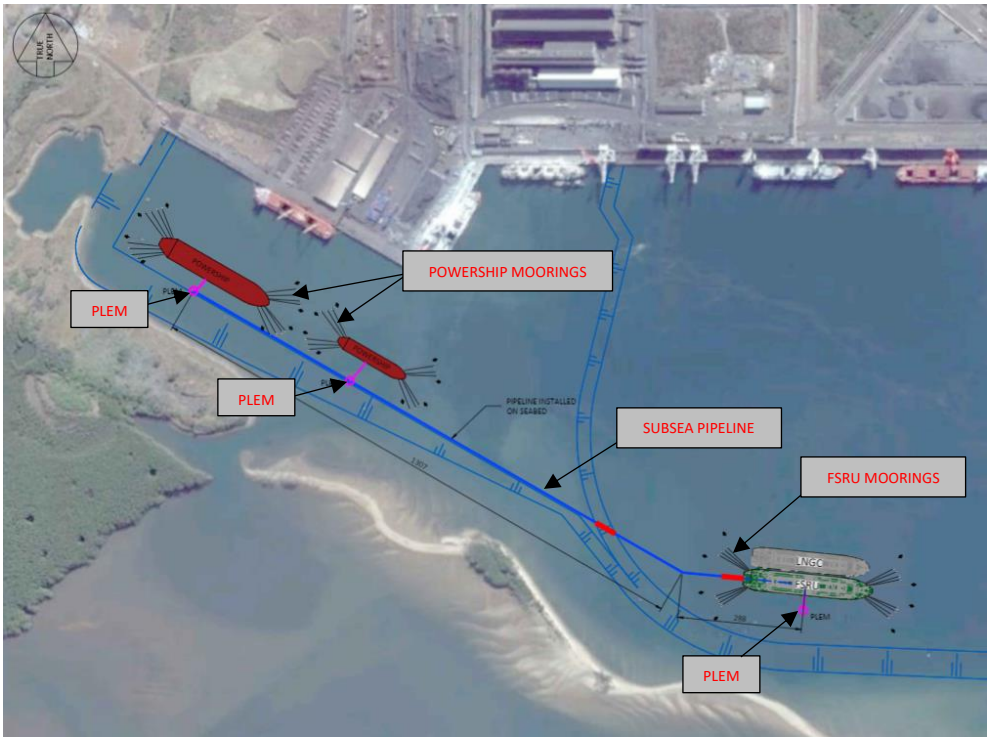
2.1 Port of Saldanha



2.2 Port of Ngqura



2.3 Port of Richards Bay



3. Inspections and Maintenance

Inspections and routine maintenance tasks are required to be performed on a regular basis to ensure efficient, reliable and safe operation of the marine facilities and their components.

These tasks include:

- Routine inspections, maintenance and servicing of the marine terminal; and
- Availability (at short notice) of divers and support vessel for maintenance repairs and emergencies.

The gas pipeline and PLEM infrastructure is designed to require little to no maintenance during its 25 year design life. 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.

While operational pigging of the pipeline is not envisaged due to the clean nature of the gas, facilities for periodic inspection pigging are included at each end of the subsea pipelines (refer to P&ID schematic below) to allow for inspection and integrity management.

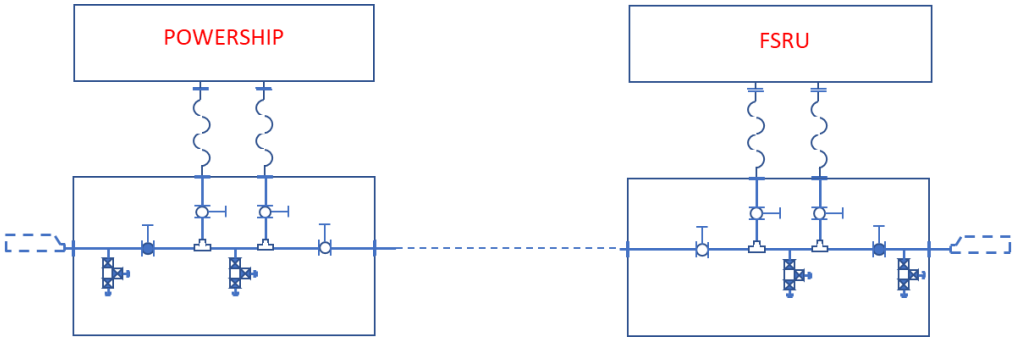


Figure 3-1: PLEM P&ID schematic

The following inspection intervals are recommended to identify any additional maintenance requirements during the life of the facility:

- Subsea pipeline(s):
  - Annual visual inspection of pipeline by divers:
    - Verify external integrity of the pipeline weight coating;
    - Inspect sacrificial anodes and replace if anodes are excessively depleted;
    - Inspect sandbags for pipeline stability and protection;
    - Identify any localized changes in seabed levels causing pipeline spanning; and
  - Pipeline integrity pigging inspection and bathymetric survey of the pipeline every 2 – 4 years.
- PLEM:
  - Annual diver inspection, removing sand and silt and manually operating valves.

4. Annual inspections (by divers)

- Subsea pipeline and PLEMs:
  - Visual inspection of pipeline;
  - Remove sand and silt from PLEM;
  - PLEM piping structure and foundation;
  - Manual valve operation;
- Vessel mooring chains:
  - Chain sections including ground rings and buoy connection;
  - Swivels;
- Embedded anchors:
  - Position and signs of seabed disturbance or scour.

5. Two year inspections

- Subsea pipeline and PLEMs:
  - Surveys for external inspections of the pipeline and PLEM:
    - Multi-beam survey;
    - Side scan survey;
  - Pipeline pigging (years: 2, 4, 8, 12, 16, 20);
- Vessel mooring chains:
  - Chain connections and mooring hooks - non-destructive testing (NDT).

1. SCOPE

This instruction applies to the foundations and soils and the use of DCP. The scope follows Eskom's DISASADB8 part 6 sub transmission lines, section 5: Foundations and soils

2. REQUIREMENTS

2.1. Theory of foundations and bearing

Typically, planted freestanding poles are subject to bending resulting in stresses imposed onto the sides of the foundations. Stayed structures, intermediate or strain, are subject to a vertical force, resulting in stresses to the bottom of the foundation.

2.1.1. Planted intermediate in-line structures

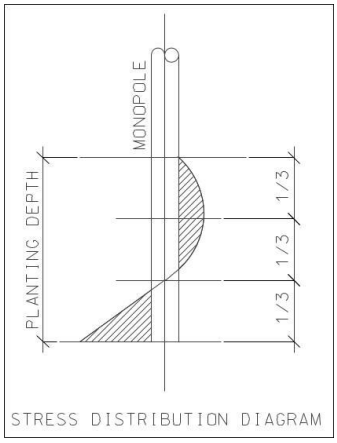


Figure 1

The foundation for a planted in-line structure consists of a hole excavated or drilled into the in -situ ground and, once the pole is planted, is backfilled with suitable soil in maximum layers of 150mm to ensure firm founding conditions.

Under still air conditions the bottom of the foundation shall resist the vertical load due to the mass of the pole and the weight of the conductors.

Under wind load conditions the foundation shall resist the horizontal forces imposed on the walls of the foundations. The typical stress distribution diagram is shown on figure 1. There is little change to the loading on the bottom of the foundation.

The most important area of bearing of the monopole on the wall of the foundation is at 1/3 of the depth of the planted portion of the pole.

DCP readings shall be taken up to a depth of 50% of the planting depth of the pole, below ground level. If these DCP readings indicate stronger soils with increasing depth they are acceptable. If these DCP readings indicate weakening soils with increasing depth below ground level the project engineer is to be consulted. Foundations for these conditions may have to be strengthened.

2.1.2. Guyed intermediate in-line structures

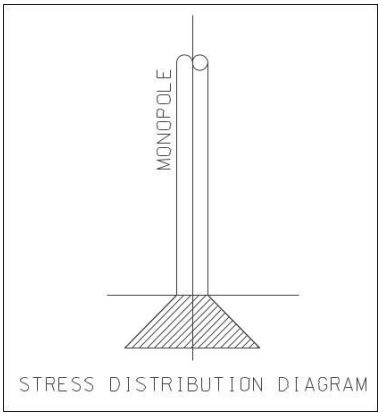


Figure 2

The foundation for the guyed in-line structure consists of a pivot point in a bearing pad placed into the in-situ ground. This pad may be precast or cast in-situ.

Under still air conditions the foundation pad shall resist the vertical load due to the mass of the pole, the mass of the conductors and the tension in the guys (stays).

Under wind load conditions the vertical load induced in the pole increases. This increase in load is due to the action of the guys/stays resisting the imposed wind loads on the structure. A small amount of horizontal load will be present at the base level.
The most important area of bearing of the guyed monopole is the area 300mm – 500mm below the surface. The typical stress distribution diagram is shown on figure 2. DCP readings shall be taken up to 1m below ground level or to refusal.

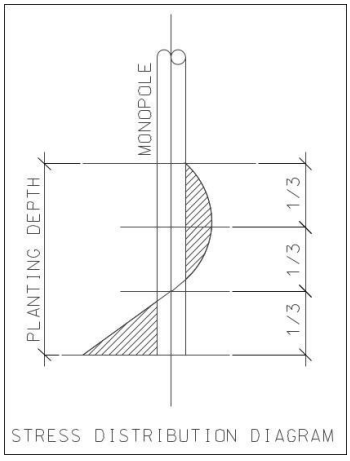


Figure 3

2.1.3. Planted intermediate angle, strain and Terminal structures (STAYED)

The foundations for planted intermediate angle, strain and terminal structures consist of a hole excavated or drilled into the in-situ ground and, once the pole is planted, is backfilled with suitable soil in maximum layers of 150mm to ensure firm founding conditions.

Under still air conditions the bottom of the foundation shall resist the vertical load due to the mass of the pole, the mass of the conductors, the angle of deviation and the tension in the conductors.

Under wind load conditions the vertical load induced in the pole will increase. This increase in load is due to the action of the guys/stays resisting the imposed wind loads on the structure. The typical stress distribution diagram is shown on figure 3.

The most important area of bearing of the monopole is on the bottom of the foundation excavation. DCP readings to be taken at the base of the excavation to a depth of 500mm below the excavated base

2.1.4. Planted self supporting angle structures

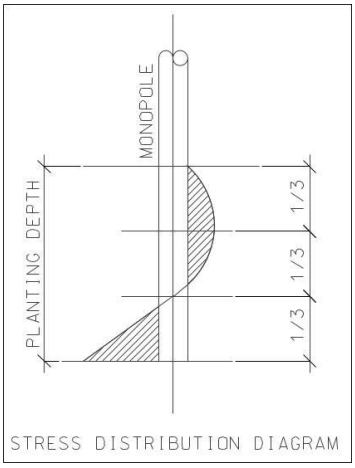


Figure 4

The foundation for a planted self supporting angle structure consists of a hole excavated or drilled into the in-situ ground and, once the pole is planted, is backfilled with suitable soil in maximum layers of 150mm to ensure firm founding conditions.
Under still air conditions the bottom of the foundation shall resist the vertical load due to the mass of the pole and weight of the conductors. The walls of the foundation shall resist the horizontal forces imposed due to the angle of deviation and the tension in the conductors. The typical stress distribution diagram is shown on figure 4.

Under wind load conditions the horizontal forces on the walls may increase. There is little change to the loading on the bottom of the foundation. The most important area of bearing of the monopole is on the wall of the foundation is 1/3 of the depth of the hole.

DCP readings shall be taken up to a depth of 50% of the planting depth of the pole, below ground level. If these DCP readings indicate stronger soils with increasing depth they are acceptable. If these DCP readings indicate weakening soils with increasing depth below ground level the project engineer is to be consulted. Foundations for these conditions may have to be strengthened.

2.2. Soil classification

The correct classification of soil type and bearing capacity is essential for the selection of the correct foundation. The Dynamic Cone Penetrometer (DCP) is an instrument that enables the user to determine the density of soil by measuring the number of blows it takes for the DCP meter to penetrate the soil by a certain distance. These values are known as the DCP values and are used to determine the bearing capacity (shear strength) of the in-situ material under prevailing conditions. These values will normally not correlate with laboratory or soaked CBR values for the same material. At a depth of 1m below ground level, there will not be a large variation in the values obtained in moist/wet soil conditions.

2.3. Soil types and properties

2.3.1. Hard rock

This is the category for hard, to very hard, solid or moderately fractured continuous rock. The DCP will have no penetration with a distinct sound that rock has been encountered. The sliding hammer will “bounce” on the anvil.

The maximum bearing or toe pressure at foundation depth shall be 2 000 kPa.

2.3.2. Soft rock

This is the category for weathered or decomposed very soft to soft continuous rock. The DCP will have a very low penetration rate with a DCP value of 10 or more (or penetration of 2 to 10mm per blow). Do not penetrate for more than 200 mm as it may be very difficult to remove the DCP.

The maximum bearing or toe pressure at foundation depth shall be 800 kPa.

2.3.3. Type "1" soils

Consistency (degree of density):

This is the category for competent soil with equal or better consistency (strength or toughness) than would be encountered in stiff cohesive soils or medium dense cohesionless soils above the water table.

Firm of stiff cohesive soils:

Moulding of soil with the fingers is difficult to impossible. Excavation with a spade is difficult and picking is required.

Medium dense non-cohesive soils:

Considerable resistance to shovelling or penetration by hand bar.

Texture:

Cohesive soils:

- Very stiff clay, sandy clay, silty clay, sandy silts and silty sands.

Cohesiveless soils:

- Compact, well graded gravels, sands and gravel sand mixtures, permanently above all water tables.

The DCP will have a low penetration rate with a DCP value of 6 to 10 (or 10mm to 17mm per blow).
The maximum bearing at foundation depth shall be 300 kPa.

2.3.4. Type "2" soils

Consistency (degree of density):

A less competent soil than type 1 soil with equal or better consistency than would be encountered in firm to stiff swelling cohesive soils or dry, poor graded loose to medium dense soils above the water table.

Firm of stiff swelling cohesive soils:

- Soil can be moulding with fingers with strong to very strong pressure. Freshly exposed surface shows faint heel mark when stood upon. Excavation with shovel is difficult.

Medium dense to loose soils:

- Having little to considerable resistance to shovelling or penetration with hand bar.

Texture:

Cohesive soils:

- Firm to stiff clay, sandy clay, sandy silt and silty sands. Clayey soil will have a smooth texture and will tend to stick to the DCP rod when removed.

Cohesiveless soils:

- Poor to well graded sands, gravels and gravel-sand mix, permanently above all water tables. Dry sand will have a course texture.

The DCP will have visible penetration rate with a DCP value of 4 to 6 (or 17mm to 25mm per blow).
The maximum bearing at foundation depth shall be 150 kPa.

2.3.5. Type "3" soils

Consistency (degree of density):

This is the category for dry loose cohesionless soil or very soft to soft cohesive soil.

Soft to very soft cohesive soils:

Mouldable with ease to manageable with fingers. Forms faint to distinct heel marks on freshly exposed surface when stood upon.

Very loose to loose cohesiveless soils:

Easily excavated with spade and penetrable with hand bar.

Texture:

Cohesive soils:

Soft to very soft clay, sandy clay, sandy silt and silty sands. Clay will stick to the DCP rod whilst sand will provide a clean rod when removed after the test.

Cohesiveless soils:

Poorly graded sands, gravels and gravel-sand mixtures, permanently above all water tables. The DCP will have a high penetration rate with a DCP value of 2 to 4 (or 25mm to 50mm per blow). The maximum bearing at foundation depth shall be 100 kPa.

2.3.6. Type "4" soils

Consistency (degree of density):

This is the category for 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.

The DCP will have a very high penetration rate with a DCP value of 1 to 2 (or 50mm to 100mm per blow).

The maximum bearing at foundation depth shall be 50 kPa.

2.4. Excavations and protection thereof

Any excavations left overnight shall be suitably covered to avoid injury or loss of life for humans and animals. The excavations shall be clearly marked and suitably barricaded.

SABS 1200 DA shall be adhered to in all instances.

2.5. Planting and backfilling

Soil compaction shall be done in accordance with SCSSCAAO1, *Soil compaction for stay and pole foundations.* Granular soils (ie. sands) and clayey soils form part of unsuitable backfill material and may not be used for this purpose.

2.6. Concrete

2.6.1. Mixtures

Ordinary Portland cement is generally used for foundations. Admixtures are rarely used unless site conditions necessitate this.

2.6.2. Transporting

Pre-cast concrete foundations may be used for inaccessible locations. These are to be carefully transported to ensure that no chipping of the surface takes place.

Cement bags are to be stored off ground level and not exposed to water in either liquid or vapour form.

2.6.3. Curing

At normal temperatures concrete stiffens gradually and becomes unworkable after 3 hours. Ordinary Portland cement will develop 50% and 65% of its 28-day cube strength at three to five days respectively.

2.6.4. Shuttering

Shuttering will be clean and in good condition. It should be capable of supporting the concrete which it is retaining.

2.6.5. Pre-cast concrete

Pre-cast concrete foundations will have quality control sheets showing the concrete mix, reinforcing used and batch numbers.

2.6.6. Test cubes

Test cubes will be extracted for each concrete batch. Where ready mix concrete is used, a certificate for each batch will be obtained.

2.7. Reinforcing

Reinforcing will be placed as per engineer's drawings. It shall be clean and free from loose rust, paint, oil and grease.

Reinforcement delivered to site will be inspected upon delivery for signs of damage, loose rust and excessive mill scale. The storage of reinforcement shall prevent contamination by mud, water, sea spray, oils, paint etc. It is preferable to store reinforcing bars off the ground and under cover.

Reinforcing will be firmly fixed using the correct tie wire and method. The cover required on the civil drawings is to be adhered to at all times.

1. Purpose

The purpose of this Work Method Guideline is to overview the installation of drilled/piled foundations for the project duration in order to ensure legal compliance and compliance with the Client's requirements and specifications. This Work Method Guideline should be read in conjunction with the Project Health and Safety Plan and the Project Environmental Management Plan. This document also outlines to whom the appropriate responsibilities are allocated.

2. Scope

This document is applicable to all Ampcor employees and subcontractors and is valid for the duration of the project. From this Work Method Guideline, a Project Manager may design a project-specific Method Statement a Specific Task Instructions will be delegated to the appropriate responsible person.

3. Roles and Responsibilities

- This project will be headed by a Project Manager solely responsible for the successful completion of this project within the quality, time and cost constraints as set down by the contract specification, and the Ampcor Quality Manual.
- The Site Supervisor is responsible for ensuring that this methodology is followed.
- The Site Manager will be responsible for the day to day control and movement of materials, plant and tools.

4. Instruction for Drilled/Piled Foundations for self-supporting towers

4.1. Site Drainage Control

Ampcor shall:

- Control and properly dispose of drill flush and construction related waste, including excess grout, in accordance with the standard specifications and all applicable local codes and regulations.
- Provide positive control and discharge of all surface water that will affect construction of the micropile installation. Maintain all pipes or conduits used to control surface water during construction. Repair damage caused by surface water. Upon substantial completion of the work, remove surface water control pipes or conduits from the site. Alternatively, with the approval of the Engineer, pipes or conduits that are left in place, may be fully grouted and abandoned or left in a way that protects the structure and all adjacent facilities from migration of fines through the pipe or conduit and potential ground loss.
- Immediately contact the Engineer if unanticipated existing subsurface drainage structures are discovered during excavation or drilling. Suspend work in these areas until remedial measures meeting the Engineer's approval are implemented.

4.2. Excavation

- Ampcor will coordinate the work and the excavation so that the micropile structures are safely constructed. Perform the micropile construction and related excavation in accordance with the plans, and approved submittals. No excavations steeper than those specified on the plans, except as stated herein, shall be made above or below the micropile structure locations without written approval of the Engineer.

4.3. Protection of Existing Utilities

- Ampcor shall control its operations to prevent damage to existing overhead and underground utilities. Preventive measures shall include, but not limited to, selecting construction methods and procedures that will prevent caving of the micropile boreholes.

4.4. Ground Heave or Subsidence

- During construction, Ampcor shall observe the conditions in the vicinity of the micropile construction site on a daily basis for signs of ground heave or subsidence. Immediately notify the Engineer if signs of movements are observed. Ampcor shall immediately suspend or modify drilling or grouting operations if ground heave or subsidence is observed, if the micropile is adversely affected, or if adjacent structures are damaged from the drilling or grouting. If the Engineer determines that the movements require corrective action, Ampcor shall take corrective actions necessary to stop movement or perform repairs

4.5. Grouting

Micropiles shall be primary grouted the same day the load transfer bond length is drilled. Ampcor shall use a stable neat cement grout or a sand cement grout. Admixtures, if used, shall be mixed in accordance with manufacturer's recommendations. The grouting equipment used shall produce a grout free of lumps and undispersed cement. Ampcor shall have verifiable means and methods of measuring the grout quality, quantity and pumping pressure during the grouting operations. Expansion additives in grout will not be allowed. Grout shall not be re-tempered or used after it has begun to set.

The grout pump shall be equipped with a pressure gauge to monitor grout pressures. A second pressure gauge shall be placed at the point of injection into the pile top. The pressure gauges shall be capable of measuring pressures of at least 150 psi or twice the actual grout pressures used, whichever is greater. The grout shall be kept in agitation prior to mixing. Grout shall be placed within one hour of mixing. The grouting equipment shall be sized to enable each pile to be grouted in one continuous operation. The grout shall be injected from the lowest point of the drillhole and injection shall continue until uncontaminated grout flows from the top of the pile. The grout may be pumped through grout tubes, casing, hollow-stem augers, or drill rods. Temporary casing, if used, shall be extracted in stages ensuring that, after each length of casing is removed the grout level is brought back up to the ground level before next length is removed. The tremie pipe or casing shall always extend below the level of the existing grout in the drillhole. The grout pressures and grout takes shall be controlled to prevent excessive heave or fracturing of rock or soil formations. Upon completion of grouting, the grout tube may remain in the hole, but shall be filled with a 5,000-psi minimum compressive strength grout without voids from bottom to top of the micropile. The entire bond zone shall be completely filled with grout.

If Ampcor elects to use a postgrouting system, Working Drawings and details shall be submitted in the working drawings.

4.6. Drilled foundations

The drilling equipment and methods shall be suitable for drilling through the conditions to be encountered, without causing damage to any overlying or adjacent structures or services. The drilling equipment and methods shall provide an open borehole to the defined nominal diameter and full length, as shown on plans, prior to placing grout and reinforcement. Temporary casing or other approved method of pile drillhole support will be required in caving or unstable ground to permit the pile shaft to be formed to the minimum design drillhole diameter. Ampcor's proposed method(s) to provide drillhole support and to prevent detrimental ground movements shall be reviewed by the Engineer. Detrimental ground movement is defined as movement which requires remedial repair measures. Use of drilling fluid containing bentonite is not allowed.

4.6.1. General

- Piles shall be designed to limit ground line vertical deflection, at maximum loadings, to less than 12 mm.
- 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 Design Engineer.
- 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. The number of cleat bolts required shall be calculated in accordance with SANS 10162-1: 2005.
- Pile caps shall have a minimum thickness and width of 750mm for loads above 400kN.

4.6.2. Single cast-in-situ piles

Foundations utilising one cast-in-situ concrete pile will be considered following the criteria below:

- If a pile cap is not utilised, the pile shall have a minimum diameter of 350 mm in order that the structural steel attachment of the tower can be accommodated without conflict with the reinforcing steel. The option of raking with the correct set to reduce shear may be considered should a pile cap be utilised, the minimum pile diameter shall be 300 mm.
- The pile shall be constructed vertically and shall be designed for the maximum combinations of uplift and compression loadings, and the total horizontal base shear forces associated with the vertical loadings. Total horizontal 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 deformation. Raked piles will be accepted upon submission of all method statements and review of calculations and drawings by the Design Engineer for acceptance.
- 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 5 mm.
- Single in line guy anchor piles shall only be designed for type 1 soil and with an additional load factor of 1.2, a minimum diameter of 300mm and meet all the requirements.
- The lateral pressure on the leading face of the cap in the rock, as well as the friction on the two side faces in the rock shall be 135kPa for soft rock and 300kPa for hard rock or 80% of the permissible value determined from appropriate tests.

4.6.3. Multiple cast-in-situ piles

- Foundations utilising multiple cast-in-situ piles of a minimum diameter of 300 mm, will considered following the criteria below:
- A minimum of two vertical piles per leg are used, connected to the structural steelwork by means of a reinforced concrete pile cap.

- The piles and pile cap shall be designed for the maximum combinations of uplift and compression loadings, and the total horizontal base shear forces associated with the vertical loadings, including leg shear. Lateral load design bending moments shall be calculated considering possible plastic soil deformation.
- The piles shall be reinforced for their entire lengths in order 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 transfer of forces from pile cap to pile. The pile cap shall be reinforced to withstand the shear and bending forces applied by the structural steelwork.
- The minimum pile centre to centre spacing shall be three times the pile diameters. Allowance shall be made for the smaller group effect when two or more piles, with a centre to centre spacing of less than three pile diameters, are used in a group.

4.7. Methodology

Setting Out

- The termination and bend structure positions will be established by the Client and be pegged by Ampcor.
- Ampcor shall position the intermediate towers based on the profile and our design criteria.

Soil Identification

- Test pits are to be dug at every pole position and a professionally registered Engineer will establish the exact soil type at every position. After completion of every test pit, the pit shall be refilled.

Access

- Where required basic access tracks will be established for each structure position by moving obstacles, leveling high spots and filling in holes. This work would shall be done so as to minimize the impact on the environment and on the natural surroundings and in accordance with the Ampcor Environmental Management Plan.
- Existing tracks will be used where possible and a new track will be made to pole positions where existing access is not available. This will be discussed with the Project Engineer.

Excavation

- All holes will be dug by means of an excavator and according to approved drawing dimensions. Should hard material or rock be encountered, suitable compressors or blasting as dictated by actual conditions at each hole and as directed and approved by the Engineer shall be used.
- Excess soil shall be stockpiled and managed according to the Ampcor Environmental Management Plan.
- Tower excavation will be done by approved drawings dimension issued.

Bush Clearing

- Should bush clearing become necessary it shall be done in accordance with the Bush Clearing Work Method Guideline and in line with the Ampcor Environmental Management Plan .Trees shall be cut with a chainsaw by trained personnel. All environmental issues will be addressed by the Environmental Site Representative or Environmental Officer.

Steel Pole / Tower Erection

- Steel poles will be delivered by road from the factory direct to pole position where possible.
- The poles are to be assembled ready for erection on day of foundation excavation.
- Assembly and erection of the poles will be done with a special truck 22ton mounted crane for assembly and a relevant certified crane for the erection.
- Tower steel will be delivered to site dedicated area where this will be control on a store system issue to site.
- Tower steel assembly will take place at relevant tower position and will be assembly by hand with general labourers.
- Tower erection will be done by means of a suitable crane for the lifting onto base.

Under no circumstances are any unauthorised personnel or public allowed near the structure erection site as death or serious injury can occur if slings break and/or crane fails. A minimum clearance of 50m around the structure must be observed by unauthorised persons at all time during erection as the poles are up to 24m in height and could hit anyone standing close.

Steel Mono Pole / Tower Backfill

- Backfilling will be done to the foundation on the steel mono pole by using 10MPA concrete. Where required, concrete will be delivered by the concrete supplier on site and the relevant test cubes will be taken controlled and monitored manner.
- Tower backfill will be done by means approved concrete on the base and chimney with approved MPA concrete delivered to site by the concrete supplier.
- The base backfill will be done will approved soil in layers of 200mm with a whacker.

Conductor Stringing

- The conductor will be pulled out and put in running blocks. It will be tensioned using a dynamometer and terminated. When crossing the roads, all traffic shall be temporarily stopped and the pilot rope will be taken across the road by hand. Flag men are to be placed on either side of any roads. No pedestrians will be allowed under the conductors during the stringing period.
- The conductor will be tensioned to initial sag figures allowing for conductor creep and settlement.

Under no circumstances are any unauthorised personnel or public allowed near the conductor installation site as death or serious injury can occur if slings break and/or stringing equipment fails. A minimum clearance under the line of at least 100m must be observed at all times as whiplash can occur with broken conductors or slings which have been known to cause death.

5. Risk Assessments and Safety

- Prior to any work being performed a risk assessment will take place together with a tool box talk where the safety issues as well as the scope of the works for the relevant task will be addressed and explained in detail to all the workers. Safety will be Number one priority at all times! The site supervisor will perform the risk assessments which will be recorded.
- Ensure that all personnel remain clear of the swing radius of equipment. Be aware of and avoid the operator's blind spots.
- Equipment shall not be operated within 6 meters from live lines over 250,000 volts.

- An effective means of communication between the workers shall be established and maintained. The operator and front end man shall agree on the type of communication to be used prior to starting work. Hand signals must be used when verbal communication is not effective. All workers shall be familiar with machine operation hand signals, however, the Operator shall accept signals only from the designated signalman except for an emergency stop signal, which may be given by any worker.
- When open-hole drilling is being performed, soil conditions shall be carefully observed during drilling of each hole. If loose or caving material is observed which may endanger the surrounding work area, measures such as liners and/or drilling slurry shall be introduced. These measures will remain in place until the holes have been backfilled above the loose or caving material.
- Avoid approaching the hole unnecessarily. Added precautions should be observed during work that may disturb the ground surface such as liner placement and removal.
- Before pouring concrete check to see that no one is in the caisson or an adjacent caisson. Discuss the soil conditions with the project engineer to determine a safe working distance between holes under construction.
- When replacing worn teeth on an auger use safety glasses and the proper installation tools. Never clean an auger pinhole with your fingers. Use a wood dowel or piece of reinforcing steel that will keep your fingers clear of being pinched.
- After any suspension of drilling always check that the shaft is clear prior to resuming operations.

6. Procedure during drilling operations

- The area surrounding a hole being drilled or an open drilled hole is designated as a restricted area. Access shall be limited to authorized, trained personnel and such personnel are to avoid approaching the hole unnecessarily.
- Where there is a liner in the hole extending 1.0 m or more above grade, the liner serves as an acceptable guardrail.
- No one shall approach within 1.8 metres from the edge of a hole during or after drilling unless they are directly involved in the operation. Workers involved in the operation shall not come within come within 1.8 metres of the edge of a hole being drilled or a drilled caisson without a liner extending at least 1.0 m above grade unless the worker is protected against falling into the hole. Protection shall entail wearing a fall arrest/fall restricting system or, when drilling in Type 1 or Type 2 soils, the use of a guardrail placed around the hole.
- Fall arrest systems shall be anchored to temporary fixed supports. For fall arrest systems, fixed supports must be capable of withstanding a static force of 8 kN. Fall restricting systems must be capable of withstanding a static force of 6 kN
- Workers should approach the equipment within the operator’s view and be mindful of his blind spots. Workers should stay away from working equipment and the swing area, until they have the operator’s attention. The drill operator and the front end man are to cease operations if someone enters the restricted area without proper protection. Operations are not to continue until the person has been escorted out of the restricted area.
- When setting soldier piles or rebar cage the workers shall be protected from falling by a fall arrest/fall restraint system unless the pile or cage once placed in the hole makes a fall impossible.
- An effective means of communication between the workers shall be established and maintained. All workers shall be familiar with machine operation hand signals.

- Adequate protection shall be placed surrounding any open holes or an adequate cover shall be placed over the open hole when left unfilled during such periods when the hole is not being worked on.
- All workers are to be trained in fall protection. All geotechnical inspection personnel must be trained by their employers.

7. Quality Assurance

- Responsibility for all aspects of quality assurance rests with the Project Manager. He/she will submit an overall Quality Plan for the project to the Engineer for approval.
- It is his/her duty to see that all the required inspection, witness and hold points are documented and implemented and that the subcontractors and suppliers are timeously made aware of these points as well as of all aspects of quality control.

8. Materials Management

- The Project Manager will be responsible for all aspects of materials management including procurement, quantity, quality, timing and compliance to specification.
- The Site Manager will be responsible for the day to day control and movement of materials, plant and tools.
- This will be carried out in accordance with the contract document and the Ampcor quality manual, using the prescribed test and inspection reports, goods received notes and delivery notes.

9. Site Plant and Equipment

- The project will have core plant and equipment that will be used to equip the crews with the required plant and equipment.
- Extra plant and equipment that may be required from time to time will be hired as and when required. The Project Manager will ensure the co-ordination of the required plant.

10. Non-Conformance

Non-conformance to this Procedure should be reported immediately to the Site Supervisor and/or Project Manager.

11. References

THE STANDARD FOR THE CONSTRUCTION OF OVERHEAD POWERLINES 240-47172620 (TRMSCAAC 5.2)
Project Health & Safety Plan
Project Environmental Management Plan
Quality Control Plan: Installation of Stubs and Base
Ampcor Quality Manual
Project Quality Plan

METHOD STATEMENT FOR

EXCAVATION AND BACKFILLING

Revision Record

1. This cover page is a record of all revisions of the document identified above by number and title. All previous cover pages are hereby superseded and are to be destroyed.

2. The contractor has the full right to modify, amend or change Method Statement and supporting documents as required or as deemed necessary. All such documents will be submitted to the "CONSULTANT" for approval.

Rev	Date	Prepared By	Reviewed by	Approval for Issuance by	Description & page Number of Revision

Contents

1.0 PURPOSE

The purpose of this method statement is to clarify excavation and backfilling works to be carried out for the project.

2.0 SCOPE

This method statement covers general excavation works for foundations and other structures requiring straightforward excavations. It generally encompasses the following:

- Machineries for earthwork, delivery, transportation, handling and storing at site.
- Survey
- Stockpiling and disposal of excavated material
- All necessary safety measures
- Testing, preparing ground surface to final grade and levels

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3.0 REFERENCES

- Project specifications
- Contract Drawings
- Approved Shop Drawings
- NOC from the Concerned Authority
- Project Quality Plan

4.0 DEFINITIONS & ABBREVIATIONS

PM:	Project Manager
CM:	Construction Manager
PE:	Project Engineer
SE:	Site Engineer
QCE:	Quality Control Engineer
QA QC:	Quality Assurance and Quality Control
HSE:	Health Safety Environment

5.0 RESPONSIBILITIES

- Project Manager is responsible for overall project execution, quality and safety. Adopt a leading role with respect to Contractor's quality and safety procedures. The PM is responsible for the overall implementation of this method statement. The Project Manager shall ensure that the key personnel are well aware of the specifications and method statement.

- CM / Project Engineer shall arrange all materials, equipment, safety related items & manpower & direct the Site Engineers & Foremen to resort appropriate action for the smooth execution of the works.
- Safety Engineer shall be responsible for safe working environment & conditions. Coordinate with Site Engineer to identify potential hazards before works and advise methods of safe working from new developments.
- Surveyor shall be responsible for setting out for levels, layout, and lines & establish top levels. Ensuring setting out books are properly maintained and filed when completed. To coordinate with the CONSULTANT surveyor in determining coordinates, levels, and limits.
- QA/QC Engineer shall be responsible for ensuring that execution of works are complying with approved method statement; specifications, approved shop drawings and ensure ITR are submitted based on ITP requirements.
- Site Engineer shall ensure that all works are carried out according to approved shop drawings. He shall direct the surveyor for the setting out lines & levels in concurrence from the Construction Manager/Senior Civil Engineer.
- MEP Coordinator / Engineer shall be responsible for proper execution of MEP works involved before, during and after the works.

6.0 MATERIALS

- Approved Materials for backfilling

7.0 EQUIPMENTS& TOOLS

Below is the equipment involved in the subject works included the following:

- Excavator
- Power shovel
- Motor Grader
- Dump Truck
- Plate and Roller Compactor
- Front End Loader
- JCB`
- Water Tanker
- Hand tools (Shovels, Spade, rake etc.)
- Dewatering Equipment (if required)
- Total station, level
- Shoring materials (if required)

The capacity / size and quantity of the above equipment shall be judged in accordance with site conditions, requirements, and availability at the time of execution.

8.0 SAFETY & HEALTH

- Site HSE Management shall be applied.
- All personnel involved will use necessary PPE as required such as safety helmet, glasses, coverall, shoes, gloves, ear plugs etc.
- HSE officer to ensure that excavated area is barricaded. Adequate warning tapes and warning signs are provided. All access from adjacent play ground to extension area shall be closed and monitored.
- Though the excavation is minor in nature a hazard analysis table is attached for excavation activities. All major possible risks/ hazards are highlighted.
- The workers will be made aware of safety requirements related to this activity through daily tool box and safety talk.
- All required work permits will be acquired and kept available at respective work site hanged clearly in plastic folders.
- Safety notice board will be installed.

9.0 PROCEDURE

EXCAVATION:

- Ensure the availability and validity of documents such as Excavation Permits, NOC and approved drawings.
- Ensure the availability of MEP clearance, risk assessment, shoring and dewatering permits etc.
- Before commencement of work ascertain the nature and location of all existing (above and underground) services on site by visual survey or by reviewing the service layout drawing.
- If any protection, rerouting, termination or removals of services are required for the smooth processing of work, it shall be discussed and written approval shall be obtained from the Engineer as appropriate.
- The surveyor will set out line / coordinates as per relevant construction drawings.
- The surveyor will inform area / excavation foreman of these lines & levels.
- Banks man will be deployed with all mechanical excavation equipment & dump trucks to guide the operators.

- The excavation / area foreman will direct the excavation equipment in an agreed sequence.
- Dumping of unsuitable material will be done to disposal point, as notified by CLIENT & material fit for backfilling will be stock piled separately at a suitable agreed location.
- Barricading of the excavated area will be done as work proceeds.
- Where ever there are chances of sliding, the sides of excavation will be sloped
- The bottom of all excavated areas shall be trimmed, leveled and rammed.
- While excavation is in progress, excavation area foreman will continuously monitor the level to avoid over excavation.
- The surveyor will check the lines & levels upon completion of excavation.
- Upon acceptance of survey, the area will be released for subsequent activities.
- If excavation goes below the adjacent structures, shoring will be carried out.

BACKFILL & FILL:

- CM/PE will ensure that particular area/structure has been cleared for backfilling by QC department.
- Upon approval for backfilling the PE will instruct concerned foreman to conduct this activity.
- The backfill material will be sourced from suitable stock pile or from excavated material.
- The backfill material will be placed in layers according to the specification.
- The layer will be moisturized and compacted.
- Generally compaction will be done by rollers / compactors.
- Compaction must be monitored and judged by regular tests for density which should not be less than 95% Maximum Dry Density.
- Once test results are satisfactory to the specification subsequent layer shall be precede.
- In narrow places and corners where roller can't reach, a plate compactor shall be used to complete the job.
- Precede the subsequent layer with the same procedure until the required level obtained.
- Upon completion of backfill activity, the area will be cleaned of waste materials.
- Safety barriers will be removed to safety store.

Operation Concept of FSRU

1. Basic Concept

The Storage & Regas Services to be provided by the FSRU Owner is to include the following items.

1.1. To receive LNG unloaded from incoming LNG Ships on to the FSRU

The incoming LNG Carriers will discharge their LNG cargo on to the FSRU through STS transfer hoses and LNG sampling system. The FSRU will manage the Boil-Off Gas generated in this operation via consuming gas in the main engines and boilers, sending-out through the BOG booster compressors to Powership, all in accordance with operating procedures in the approved FSRU Operating Manual. At the same time, the FSRU will supply vapour return to the incoming LNG Ship in order to keep their cargo tanks above minimum pressure.

The FSRU shall plan for the efficient loading of LNG from each LNG Carrier upon receipt of the delivery schedule, cargo volume and cargo composition of delivery LNG Carrier. The loading plans will be shared with the Project upon request.

1.2. To store and take custody of LNG onboard the FSRU

The FSRU will store the LNG received and make reasonable efforts to avoid any rollover phenomena, maintain the stability of the FSRU at all times which will require occasional internal cargo transfers, keeping the LNG inventory in the cargo tanks of the FSRU at levels sufficient to perform regasification at required rates, and keeping all tanks sufficiently cold for the next scheduled delivery of LNG.

Daily records will be maintained to monitor the amount of LNG onboard.

1.3. To regasify LNG onboard the FSRU

The FSRU will first fill the LNG daily tank using the cargo pump. LNG booster pump will then transfer LNG from LNG daily tank to the Regas Module to regasify the LNG on board and sending it out to Powership through the gas metering and Regasified LNG Manifolds into the riser and subsea pipelines, as per Project's requirements.

Continuous records of regasified LNG send-out quantity and gas quality shall be recorded.

1.4. Boil-Off Gas management and handling

The FSRU will manage the Boil-Off Gas generated via consuming gas in the main engines and boilers, sending-out with the BOG booster compressors to Powership. In case of emergency, the FSRU may vent the gas onboard.

All Boil-Off Gas (BOG) management shall be performed in accordance with operating procedures in the approved FSRU Operating Manual.

1.5. To meter the send-out quantity and measure the quality of Regasified LNG

The FSRU has a chromatograph and a metering system which the data recorded will be provided in real time and formally reported to the Client in accordance with established procedures.

1.6. To deliver Regasified LNG at the Regasified LNG Delivery Point

The FSRU will deliver the nominated quantity of Regasified LNG as nominated by Client. The nomination process shall be in accordance with Gas Send-Out Nomination Procedures herein.

1.7. To safely moor the FSRU

The FSRU shall be moored in accordance with mooring plan developed by FSRU Owner which shall be suitable for the range of environmental conditions contained in the Operational Manual, which will be developed jointly between the FSRU Owner, Client, and the associated Contractor(s).

1.8. To provide the Client reports and access to the relevant measurable operating variables of the FSRU

The FSRU Owner will provide the relevant measurable operating values of the FSRU to the Client taking the parameter from the Custody Transfer Metering System (CTMS). The transmittal of the FSRU operating data shall be through a combination of daily electronic reports and real time data transmission in accordance with agreed procedures. In principle, the FSRU shall submit daily reports, monthly reports, LNG loading reports, incident reports and other reports pursuant to this Agreement and agreed procedures.

1.9. To exercise emergency procedures under heavy weather conditions

The FSRU shall closely monitor the weather and weather forecasts, and the Master will follow the actions determined according to the Terminal Adverse Weather Operational Limits and Procedures. Procedure to be developed before FSRU arrive on site.

All emergencies will be notified to the FSRU's Terminal Manager and the relevant authorities, and the Master will follow the actions determined according to the Terminal Emergency Plan Manual.

However, the Master has the safety and welfare of all personnel onboard under his jurisdiction and can carry out any operation that he deems to be required to ensure the safety of the personnel and the FSRU.

1.10. Training and certification of the FSRU crew

The FSRU Owner emphasises the importance of training LNG officers and ratings over and above the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) standard to satisfy regulatory agency inspections and maintain certifications.

The FSRU Owner is responsible for fulfilling the company's obligations with respect to the Regulatory Inspections and Certifications.

The FSRU Owner continuously monitors the validity of the Regulatory Inspection and Certificates in order to guarantee the FSRU keeps the required documents up to date.

1.11. SIRE vetting of the FSRU

Ship Inspection Report Programme (SIRE) inspections will be undertaken periodically or at any other time according to the Project business requirements.

1.12. Performance efficiency monitoring and optimisation

The FSRU Owner has a dedicated person (Project Engineer in Performance Monitoring) who is responsible in monitoring the FSRU's Performance Efficiency.

The relevant key performance indicators (KPIs) are set up and monitored using a ship performance monitoring system installed on board which detail and parameters can be accessed remotely.

In summary, the key functions of the Storage and Regas Services operations are:

- Safe and efficient transfer of LNG to and from the FSRU without affecting the simultaneous operation of the LNG regasification system to satisfy Client's regasification send-out nominations.
- Safe and reliable cargo management and control to ensure conditions with the cargo tanks are within acceptable operational limits. This is achieved through instrumented monitoring of cargo tanks via the CTMS systems, including the management of liquid levels, pressures and temperatures.
- To achieve the above, the FSRU Owner will undertake the following key activities in ensuring the performance of the FSRU's Storage and Regas Services for the duration of the Term.
- Safety Management System for the FSRU's operations and Security – ISPS (International Ship and Port Facility Security) and HSSE (Health, Safety, Security and Environment).
- Regas operations in accordance with gas nomination requirements of the Project and maintain a fully functional Cargo Control Room (CCR) in the FSRU for all control and communication between the Terminal and the Client's designated facilities.
- Resource, recruitment, development and training plans for technical operations and officers / crew to implement all cargo procedures effectively.
- Development of planned maintenance and operations manuals to cover all critical equipment and services and to assure availability of the FSRU and cover all areas of risks.

Provision of periodical reports on the FSRU's performance, incidents, failures and the operation of the FSRU, including loss prevention activities to mitigate and minimise the amount of hydrocarbon released to the environment. Internal audit systems to monitor effectiveness of operation procedures.

2. FSRU Outline Specification

2.1. General concept

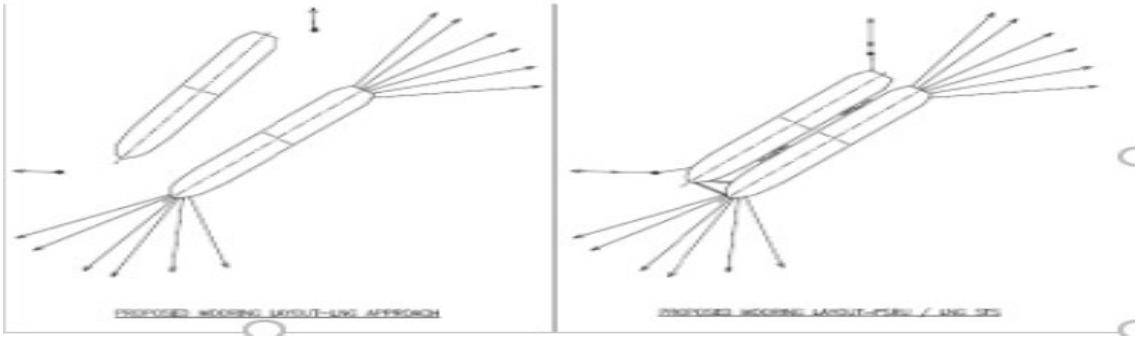
The FSRU is the result of refurbishment and conversion of an existing LNG MOSS Carrier of approximately 125,000m3 with following specification. Please also see Appendix 1 for details.

(a) Length: [272.00 m];
(b) Breadth: [47.20 m];
(c) Draft: [11.4555m] ;
(d) Cargo Capacity: [127,386 m3];
(e) Effective or net LNG storage capacity of [98.5]% of the Cargo Capacity;
(f) LNG Loading Rate/discharge rate: [9,000] m3/hour (hoses);
(g) Boil-off gas rate: [0.15]%;
(h) Regasification rate:

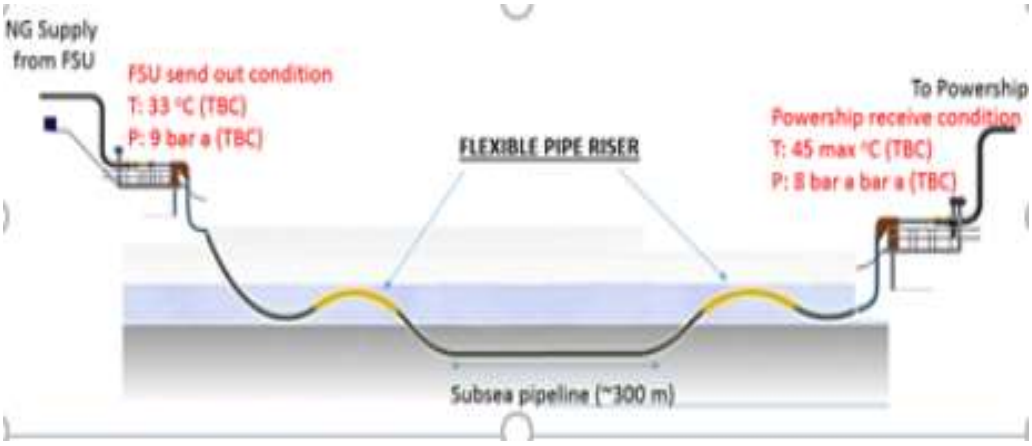
- minimum 3.5 MMSCF / day
- / maximum 168 MMSCF / day
- / nominal: 84 MMSCF / day
- zero send out

2.2. Mooring concept

The FSRU is to be spread-moored in the immediate vicinity of the power source and able to receive conventional LNG carriers via Ship to Ship Hoses. The structural integrity of both vessels is maintained by the use of Floating fenders positioned between the vessels during STS operations.

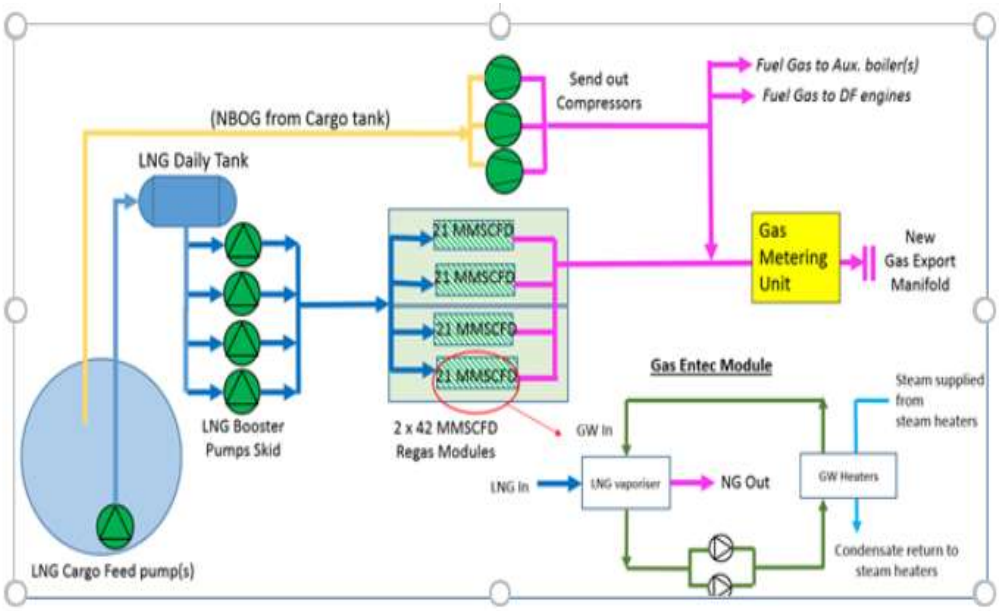


The re-gasified LNG would be exported from the FSRU to the power source by means of subsea pipeline. (Please see an image below just for reference.)



2.3. Regas design concept

There are Two Regas process concepts for FSRU specially developed as a redundancy to always supply an uninterrupted gas supply to the power source.
Each consists of an expansion tank, glycol water (GW) circulation pump. Electric back-up heater, GW/Steam heater and GW/LNG vaporisers and buffer tank. The principle of the Regas system uses glycol/water as the heating medium to vaporise LNG.
Two sets of vaporiser are installed in each Regas Module. Each vaporiser has a capacity of [42] MMSCD. (Million standard cubic feet per day). Two modules are installed on-board to meet peak send out of [168] mmscfd. Duplication of the Regasification plant design also allows for maintenance and repair. (Please see an image below just for reference.)


Send out
Compressors
Fuel Gas to Aux. boiler(s)
Fuel Gas to DF engines
(NBOG from Cargo tank)
LNG Daily Tank
21 MMSCFD
21 MMSCFD
21 MMSCFD
21 MMSCFD
Gas
Metering
Unit
New
Gas Export
Manifold
Gas Entec Module
Steam supplied
from
steam heaters
LNG Booster
Pumps Skid
2 x 42 MMSCFD
Regas Modules
GW In
LNG In
LNG vaporiser
NG Out
GW Heaters
Condensate return to
steam heaters
LNG Cargo Feed pump(s)

Appendix 1

PARTICULARS OF VESSEL

1. Principal Particulars

(a)	Length overall	272.00 m
(b)	Length Between Perpendiculars	259.00 m
(c)	Breadth moulded	47.20 m
(d)	Depth moulded	26.50m
(e)	Draught at summer freeboard (Extreme)	11.4555m
(f)	Height overall — keel to highest fixed point	68.295 m
(g)	Maximum air draught (with full ballast and half bunkers)(corresponding draughts)	59.295M at Ballast condition (9.00m)
(h)	Gross Tonnage (International)	105,708 MT
(i)	Net Tonnage (International)	31,712 MT
(j)	Gross Tonnage (Suez)	110,898.27MT
(k)	Net Tonnage (Suez)	98,859.75MT
(l)	Light Ship Displacement	29,456MT
(m)	Displacement (maximum)	97,978MT (at Summer Draft 11.4555m)
(n)	Windage: Lateral	2,990 m^2 (at normal ballast cond.)
	Longitudinal	964 m^2 (at normal ballast cond.)
(o)	Classification designation	NK NS* (Tanker, Liquefied gas, Maximum pressure 25kPaG and Minimum temperature 163degree C. Type 2G), MNS* (M0, CHG, MPP, CAA, MO, B)
(p)	Conditions of Carriage (as defined on Certificate of Fitness):	Tank Number : No.1～No.4 Minimum temperature: -163°C Maximum pressure : 0.025 MPa Maximum Density : 0.5 t/m3

2. Operating Draught and Deadweight

(a)	Draught filling to 98.5% (@ cargo density 0.47 kg/m^3)	10.84m (Design)

(b)	Deadweight filling to 98.5%(@ cargo density 0.47 kg/m^3)	62,212MT

3. Ballast System

(a)	Total capacity of ballast water tanks	19 tanks, 54,839.6m^3 (100%)
(b)	Number, capacity and head of pumps for handling ballast	2 sets x 2,500m^3/h x 35mTH
(c)	Is Vessel able to ballast / de-ballast within the cargo loading/discharging period?	Yes / ~~No~~
(d)	Can the Vessel undertake ballast exchange at sea within 24 hours	Yes / ~~No~~

4. Details of Principal Certification

(List conventions complied with / Certificates obtained, including protocols, amendments and date of issue)

(a)	Loadline	Load line 1966 with the protocol of 1988, Cert.No.: 16SP0947-LLC Date of issue: 16 June 2016
(b)	SOLAS	SC: SOLAS 1974 with the protocol of 1988, Cert.No.: 16SP0947-SCC Date of issue: 16 June 2016 SE: SOLAS 1974 with the protocol of 1988, Cert.No 16SP0947-SEC Date of issue: 16 June 2016 SR: SOLAS 1974 with the protocol of 1988, Cert.No 16SP0947-SRC Date of issue: 16 June 2016
(c)	IGC Code	Gas fitness: Cert.No 16SP0947-GAS Date of issue: 16 June 2016
(d)	Tonnage	E131311002, Issued at Tokyo 4th Mar. 2013
(e)	Marine Pollution (MARPOL)	IOPP: Cert.No 3, 30 July 2017 ISPP: Cert.No 2001, 16 June 2016 IAPP: Cert.No 2001, 16 June 2016

(f)	Certificate of Fitness	Gas fitness: Cert. 16SP0947-GAS Date of issue: 16 June 2016
(g)	Document of Compliance	Cert.No 14TK-M0259JPNDOC Date of issue: 23 OCT 2014
(h)	Independent Sworn Measurer Certificate(CTMS)	Nippon Kaiji Kentei Kyokai(NKKK) Date of Inspection: 16th and 17th June, 2016
(i)	SIRE Inspection	8 March 2018 by IDEMITSU
(j)	Port state control	5 January 2017 AMSA(Darwin)

Is certification held indicating compliance with the following?

(k)	ISPS Code	Yes / ~~No~~
(l)	Rules and Regulations of Suez Canal Authorities	~~Yes~~ / No
(m)	ISM	Yes / ~~No~~

5. Propulsion

(a)	Type and make of propulsion plant	Mitsubishi MS36-2 Type (Geared, 2 Cylinder Cross Compound Impulse Steam Turbine)
(b)	Maximum rated power and RPM	23,536kW x 85rpm
(c)	Proposed service power and RPM	-
(d)	Grade of Fuel	Heavy fuel oil 380 cSt
(e)	Dual Fuel Burning	Boil Off Gas and Fuel Oil If the Vessel uses only Gas for Fuel, the Owners do not warrant the Laden and Ballast Service speed.

6. Speed / Consumption

(a)		Maximum fuel consumption (Tonnes of Fuel Oil Equivalent / day)	
	Speed (Knots)	Laden	Ballast
	19.0		

	18.5		
	18.0		
	17.5		
	17.0		
	16.0		
	15.0		

(b)	Trial Speed at Maximum Power	-
(c)	Service Speed	About 18.5 Kts If the Vessel uses only Gas for Fuel, the Owners do not warrant the Laden and Ballast Service speed.
(d)	In Port (cargo operations)	About 5.0 MT per day (for reference only)
(e)	In Port (idle)	About 4.0 MT per day (for reference only)
(f)	For inert gas generation	1.0 MT per hour of Gas Oil (for reference only)

7. Boilers and Steam Capacity

(a)	Number and type of boilers	Number : 2 sets
(b)	Maximum steam output available	55,000 kg/h
(c)	Normal service output corresponding to 5(b)	50,000 kg/h

8. Cargo Tanks

(a)	Number of tanks	4

(b)	Capacity of LNG tanks at normal filling level at 98.5%	(excluding dome, at -163°C)
	No.1Tank No.2Tank No.3Tank No 4 Tank Total	31,359.694 m^3 31,388.503 m^3 31,354.600 m^3 31,372.203 m^3 125,475.000m^3
(c)	Gross Capacity of LNG tanks at 100%	(excluding dome, at -163°C)
	No.1Tank No.2Tank No.3Tank No 4 Tank Total	31,837.253 m^3 31,866.501 m^3 31,832.081 m^3 31,849.952 m^3 127,385.787m^3
(d)	Partial loading / filling restrictions	No restrictions, in general The equator temperature should be kept at liquid temp. + 50°C or below in case that the liquid level can reach the equator due to the ship's motion etc..
(e)	The Vessel's cargo tanks can be cooled down from ambient in:	Cargo tanks (equator part) can be cooled down from ambient to –112 °C within about 15 hours.
(f)	Maximum filling rate	About 10,000m^3/h
(g)	Relief valve settings (MARVS)	25 kPaG
(h)	Loaded Boil-Off rate	0.15% of the cargo capacity per day
(i)	Ballast Boil Off rate	None

9. Cargo Discharge

(a)	Number of cargo pumps per tank	2

(b)	Maker and type of cargo pumps	Maker: EBARA Model: 12EC-24 Electric motor driven, Centrifugal, submerged type
(c)	Design rated capacity of each cargo pump and corresponding discharge head	8 sets x 1,400m^3/h x 135mTH
(d)	Number of spray (stripping) pumps per tank	1
(e)	Maker and type of spray (stripping) pumps	Maker: EBARA Model: 2EC-092 Electric motor driven, Centrifugal, submerged type
(f)	Design rated capacity of each spray pump and corresponding discharge head	40m^3/h x 135mTH
(g)	Number, Make and Capacity of Auxiliary Pumps	N/A
(h)	Bulk discharge time (not including start up and stripping periods) — assume head at ship's rail = 75.4 mlc and no restrictions on vapour return from shore.	About 12 hours

10. Cryogenic Systems

(a)	Type of LNG containment system	Moss-Rosenburg Spherical Tank
(b)	Design temperature	-163℃
(c)	Make and type of vapour return compressors	Maker : Cryostar SAS Model : CM400/55 Type : Electric motor driven, Centrifugal, Horizontal
(d)	Number and rated capacity of vapour return compressors and corresponding discharge head	Number : 2 sets Rated capacity : 20,000 m^3/h / 1set (Parallel operation is available.) Suction press. : 104 kPaA Discharge press. : 203 kPaA

(e)	Is a steam dump system provided? If so, is the capacity sufficient to deal with all excess steam generated by the boilers at max designed Boil-Off rate with engines stopped according to Class & USCG Rules?	Yes Yes
(f)	Total capacity of liquid nitrogen storage tanks (if nitrogen generator not fitted)	N/A(Nitrogen generators fitted)

11. LNG Measurement and Tank Calibration

(a)	Are all tanks calibrated and certified by a qualified agency? (Specify agency)	Yes NKKK
(b)	Make and type of primary system for measuring cargo level, temperature and pressure Level measuring system accuracy and range Temperature measuring system accuracy and range Pressure measuring system accuracy and range	<Level Gauge> Maker: Kongsberg Maritime AS Type: Radar type ± 2.4mm <Temperature Gauge> Maker: Kongsberg Maritime AS Type: PT100Ω Resistance Temperature Sensor ±0.11℃(-165℃ to -145℃) ±0.51℃(-145℃ to +50℃) <Pressure gauge> Maker: Yamatake Corporation Type: Absolute Indication type ±0.5% F.S. (0.30 kPa)
(c)	Is secondary system for measuring LNG liquid level fitted and, if so, state type and measuring accuracy	Yes The detail is same the above.

12. Cargo Manifolds

(a)	Do manifolds follow requirements of Vol Category "B" of OCIMF *"Recommendations for Manifolds for Refrigerated Liquefied Natural Gas Carriers (LNG)" 2nd Edition — 1994*? (If "No", state variations)	No The distance of between each Liquid Line is 2.5m
(b)	State layout of liquid and vapour connections	LLVLL, 2.5m interval
(c)	Distance of the centre of manifolds from amidships	(P)22.46m fwd from Midship (S)10.46m fwd from Midship
(d)	Distance of presentation flange from ship's side	2.1m + 0.35m + 3.5m
(e)	Distance of presentation flange from ship's rail	3.5m
(f)	Height of manifold centre above keel	31.0m
(g)	Size and location of liquid nitrogen loading connection	N/A

13. Emergency Shutdown System and Ship/Shore Compatibility

(a)	At what cargo level (%) is overflow protection activated?	Two kinds of overflow protection are provided. Set level is as follows; Cargo level high-high : 99.2 % Cargo level very-high : 99.7 %
(b)	Does overflow protection activate the following: Trip ESD system? Close manifold valves? Trip cargo pumps? Trip ship/shore link system?	Overflow protection of 99.2 % level closes filling valve of corresponding tank. Overflow protection of 99.7 % level is treated as one of ESD cause. Therefore, ESD system including manifold valves, cargo pumps and ship/shore link system are tripped.
(c)	What ship/shore link systems are installed: Optical Fibre Link Electric Links — Pyle-National / Miyake connector Pneumatic ESD Link	FURUKAWA ELECTRIC MIYAKI ELECTRIC, MIYAKI ADAPTOR BOX for Pyle National NITTA MOOR

14. Bunkers

(a)	Capacity of fuel oil bunker tanks	2993.2 m^3
(b)	Capacity of diesel oil bunker tanks	118.4 m^3
(c)	Maximum bunker loading rate	about 500m^3/h for fuel oil bunker about 40m^3/h for diesel oil bunker
(d)	Segregated low sulphur fuel oil storage capacity	-

15. Fresh Water Capacity

(a)	Capacity of fresh water generators	45m^3/day x 2 set
(b)	Distilled capacity	349 m3
(c)	Domestic capacity	349 m3
(d)	Distilled consumption	about 16t/day (for reference only)
(e)	Domestic consumption	about 18t/day (for reference only)

16. Inert Gas Generation

(a)	Type and make of equipment	Type : Oil burning type Model: IN 12000-0.25BUFD Maker: Kvaemer Eureka A.S.. (Moss-Norway)
(b)	Capacity	11,400 Nm^3/h
(c)	Quality of gas O2 Max	max. 0.5% by Vol.
(d)	Quality of gas CO Max	max. 100 ppm
(e)	Quality of gas SOx Max	max. 10 ppm
(f)	Quality of gas NOx Max	max. 100 ppm
(g)	Dew point	max. -45°C

17. Nitrogen

(a)	Type and capacity of nitrogen generation system	Type: Membrane air separation system Model: Teisan 83MOP Capacity: 6 x 20 Nm^3/h

(b)	Consumption	Normal sea going : about 11 Nm^3/h Initial cool down : about 106 Nm^3/h
(c)	Liquid nitrogen storage	N/A
(d)	Nitrogen generator capacity	6 x 20 Nm^3/h
(e)	Pressure tank	Nitrogen Buffer Tank : 10m^3 x 0.5MPa

18. Gas Compressors

(a)	Low duty (fuel gas compressor): No. and capacity	Number : 2 sets Rated capacity : 6,200 m^3/h / 1set (1set as stand-by) Suction press. : 104 kPaA Discharge press. : 203 kPaA
(b)	Low duty (fuel gas compressor): make	Maker : Cryostar SAS Model : CM300/45 Type : Electric motor driven, Centifugal, Horizontal

19. Electrical Generating

(a)	Number of electric generators	Turbo Generator: 2sets Diesel Generator: 1set Emergency: 1set
(b)	Type of electric generators	Turbo Generator, Diesel Generator Emergency Diesel Generator
(c)	Output of electric generators	Turbo Generator: 2,500kW Diesel Generator: 1,200kW Emergency: 250kW
(d)	Fuel type and quantity at full load of electric generators	Marine Diesel Oil 252kg/h(at MDO)
(e)	Power required for discharge / de-ballasting at full rate	About 2,845kW /average(Cargo Loading) About 4,360kW /average(Cargo Unloading)

20. Deck Machinery

(a)	Winches	No: 9 (18drums) Pull Type: Electro-Hydralic Brake Holding Force: 80 ton
(b)	Wires	Size: 42mmφ. x 200m Steel Wire Rope MBL:124 ton
(c)	No. Wires Forward	10
(d)	No. Wires Aft	8
(e)	Wires Fitted with Synthetic Tails	Length and Size: 85mmφx 11m MBL: 173 ton
(f)	Derricks, Cranes – Type and SWL	Electro-hydraulic hose handling crane SWL: 5 ton

21. Navigation and Communications

(a)	Type and number of radar sets fitted	JRC S-band Radar (JMA-9133-SA) ×1set X-band Radar (JMA-9123-9XA) ×1set
(b)	Is an approved GMDSS installed? (Type?)	YES MF/HF radio installation (JRC, JSS-710), Inmarsat-C (JRC, JUE-85), VHF radiotelephones (JRC, JHS-31)
(c)	Is an additional SatCom system installed? (Type?)	YES Inmarsat-FBB (JRC, JUE-501)
(d)	Is Suez Canal Projector fitted?	No