



UFUDU MARINE NAMIBIA CC

MEFT REFERENCE NO.: APP-0068

**ENVIRONMENTAL MANAGEMENT PLAN (EMP) FOR THE PROPOSED
PROVISION OF IN-WATER HULL CLEANING SERVICES USING THE
SCHOMBERG VACU-CART AND RECLAMATION FILTRATION
SYSTEM IN WALVIS BAY, ERONGO REGION, NAMIBIA**

Prepared on behalf of



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1. INTRODUCTION

The Proponent for the proposed in-water cleaning operation is **UFUDU Marine Namibia cc**. It is expected that the proposed in-Water Hull cleaning operations would make maritime operations efficient by reducing high maintenance costs and fuel consumption incurred due to biofilm accumulation on the hull surface of vessels. This will protect port waters against the biofilm wastes as well as the bio-risk of marine species that may be introduced into the port from foreign ports.

- The proposed Schomberg Vacu-Cart and Reclamation Filtration System meets the requirements of the IMO (International Maritime Organisation).
- This method of hull cleaning is in line with international regulations and those required for entry into US and European Waters.

Detailed description of the cleaning operations using the proposed Schomberg Vacu-Cart and Reclamation Filtration System has been provided in the Scoping/EIA Report which forms part of this submission to support application for the ECC (environmental clearance certificate).

This EMP (Environmental Management Plan) Report sets out the operational aspects of the Schomberg Vacu-Cart and Reclamation Filtration System.

2. OBJECTIVES

Purpose of the EMP is to describe how the Proponent intends to mitigate negative environmental impacts and provide details on how the EMP will be implemented.

Specific objectives are to:

- List documents, permits, licenses and other environmental permits required;
- Prescribe technology and equipment requirements for baseline environmental monitoring, and
- Prescribe human capacity required to implement EMP.

3. ENVIRONMENTAL CERTIFICATIONS AND DOCUMENTATIONS

Environmental certifications will include permits and certificates needed to authorize performance of proposed in-water hull cleaning as required by entities representing GRN (Government Republic of Namibia). Documentations will be communicable materials required to describe, explain or instruct and communicate information regarding the proposed in-water hull cleaning operational procedures.

Before commencement of the proposed underwater hull cleaning operation, the following environmental certifications and documentations shall be required:

Table 1: permits and authorization.

Certification and documentation	Institution/competent authority	Contact person/details
Environmental clearance certificate	Ministry of Environmental, Forestry and Tourism	Environmental Commissioner
Written permission to operate	Namibia Ports Authority	Harbor master
Domestic and industrial wastewater and effluent discharge permits	Ministry of Agriculture, Water and Land Reform	Department of Water Affairs
Pre-cleaning inspection report	Namibia Ports Authority	Harbor master
Method statements	Namibia Ports Authority	Harbor master
Cleaning exit operation plan	Namibia Ports Authority	Harbor master
Baseline environmental monitoring plan	Namibia Ports Authority	Harbor master
SOPs (Standard operation procedures)	Namibia Ports Authority	Harbor master

Contents and conditions of ECC, written permission to operate as well as domestic and industrial wastewater and effluent discharge permits will be determined by the competent authority. Details for other documentations required are proposed to be as described in **table 2**.

Table 2: documentations.

Documentations	Proposed contents
Pre-cleaning inspection report	<ul style="list-style-type: none"> • Give composition of hull paint and determine whether TBTs and TPhTs are present. • Date of last painting and cleaning. • The last 3 ports visited/entered. • SOPs for MV inspection.
Method statement for underwater cleaning	<ul style="list-style-type: none"> • Information about the port of Walvis Bay. • Map of ecological sensitive areas in the port. • Land use planning of the Walvis Bay port including storm waters, river drainage, sewage discharge, etc. • SOPs for operation of the Schomberg Vacu-Cart and Reclamation Filtration System equipment.
Cleaning operation exit plan	<ul style="list-style-type: none"> • Housekeeping and removal of equipment from wharfs, quays, jetties and other work places in the port. • Provide details on type of drums to store/transport debris. • Waste management and water discharge procedures.
Baseline environmental monitoring plan	<ul style="list-style-type: none"> • Physical/chemical and biological indicators (environmental indicators). • SOPs for environmental indicators.
SOPs (Standard operation procedures)	<ul style="list-style-type: none"> • Detailed procedures will be provided in the SOPs for each documentation.

4. BASELINE ENVIRONMENTAL MONITORING INDICATORS

4.1. *Physical/chemical environmental indicators*

The following parameters shall be used as indicators of water quality:

- Free Carbon Dioxide;
- Seas surface temperatures (SSTs);
- Dissolved oxygen (DO);
- Turbidity;
- Total suspended and dissolved solids;
- Nutrients (nitrates, nitrites, total phosphate, free chlorine, etc);
- pH, conductivity/salinity metre;
- Pathogens (bacteria, virus, etc), and
- Trace metals.

Water samples for the above parameters shall be collected before, during and after the underwater hull cleaning operation at each site where cleaning operations will be performed. Samples could either be measured on site or transported to a laboratory for analysis. Data shall be recorded using various form (see example **Form-1**). Detailed procedures shall be provided in the SOPs (standard operations procedures) for each parameter.

Concentration levels of trace metals shall be measured from water and sediment samples. Trace metals concentration levels shall be used to indicate TBT (tributyltin) and TPhT (triphenyltin) compounds which may result from accidental removal of marine paints.

4.2. Baseline biological sampling

The following parameters shall be used as biological indicators:

- Phytoplankton;
- Zooplankton, and
- Epi-fauna, and ☐ Benthic fauna.

Phytoplankton, benthic and zooplankton samples shall be collected before, during and after the underwater hull cleaning operation.

Since introduced species could either occur as part of phytoplankton, zooplankton, epi-fauna and benthic fauna, it shall be necessary to keep record of alien and native or endemic species.

5. TECHNOLOGY AND EQUIPMENT REQUIREMENTS

Equipment and technologies required for EMP implementation and baseline environmental monitoring are provided below.

With regard to technologies and equipment requirements, the local capacity for baseline environmental monitoring exist in Namibia. Therefore, it will not be necessary for the Proponent to purchase these technologies and equipment. Rather it will be advisable for the Proponent to collaborate with local institutions in order to invest in the local capacity for environmental baseline monitoring activities.

Table 3: technology and equipment requirements.

Parametre	Equipment/method
Free Carbon Dioxide (CO ₂)	<p>-Measure CO₂ directly using beverage carbonation metre. The recommended OxyGuard portable CO₂ meter is a reliable and easy-to-use instrument that measures dissolved CO₂ in water. The meter consists of a probe and a battery-powered transmitter. The meter displays CO₂ concentration and an analog signal as output.</p> <p>-The titration method can also be used, though not recommended.</p>
Water temperature	<p>-Measure using a thermometer.</p> <p>-The Hach HQ30D also measures temperature.</p> <p>-Currently there are online weather databases that provide daily water temperature data.</p>
Dissolved oxygen	<p>-The recommended Hach HQ30D portable multi-parametre gives maximum measurement flexibility and ease of operation with interchangeable probes and automatic parameter recognition.</p> <p>-The Winkler's titration method will be used for comparison.</p>
Turbidity	<p>-The recommended HACH 2100Q turbidometre is accurate and reliable in measuring turbidity. It is portable and battery powered; so measurements could be taken and recorded while in the field.</p> <p>-The HACH HQ30D also measures TDS (total dissolved solids) and could be ideal in case the HACH 2100Q turbidometre is not available. TDS could be used to indicate turbidity.</p>
Total suspended and volatile solids	<p>TSS and TVS could be measured either using the HACH DR 2700, DR 2800 or DR 900. The recommend HACH DR 900 is portable, LED-sourced colorimeter and it measures at wavelengths of 420, 520, 560 and 610 nm. Measurements could be taken and recorded while in the field; eliminating the need for sample transportation.</p>
Nutrients (nitrates, nitrites, total phosphate, free chlorine, etc)	<p>The Hach HQ30D mlti-parametre is recommended.</p>
pH, conductivity/salinity metre	<p>The Hach HQ30D mlti-parametre is recommended.</p>
Pathogens	<p>Pathological samples shall be taken for analysis of total coliforms and <i>Streptococcus sp.</i> Other indicators may be selected according to the IEC's discretion and factors inherent at site.</p>
Trace metals	<p>It is recommended that analysis for trace metals are performed by a commercial laboratory. The proponent or the IEC should collect samples, preserve and send them to a commercial laboratory (e.g. Analytical laboratory or NAMWATER).</p>
Phytoplankton	<p>Use a phytoplankton net to collect the samples. The samples should be analysed under a compound microscope (recommended is the Olympus type).</p>
Zooplankton	<p>Use a zooplankton net to collect the samples. The samples should be analysed under a light microscope (recommended is the Zeiss type).</p>
Epi-fauna	<p>Sample should be collected from vessel hulls or sub-merged structures as well as from rocks and soft sediments (sandy shores). Microscopes maybe required for tiny organisms.</p>

Benthic fauna	A Van veen grab will be used to collect sediment samples. The samples should be analysed either under a light or compound microscopes (recommended is the Olympus and Zeiss type).
Sediment size analysis	Part of the sediment will be used to study grain size using the Sieving AssemblageWilson instrument.

8. MITIGATION ACTIONS

Mitigation actions required to reduce or minimize negative impacts are provided in **table 4**.

8.1. Risk preparedness and response plan

Risk is an event that may or may not happen; whereas an impact is what will happen if a risk occurs. Risks poses a significant impact on people, the environment or property. Although they may or not happen, the Proponent shall be prepared to response to risks at all times.

All response actions shall be geared toward the following priorities in the order below:

- **Safety** of people (always First);
- **Protection** of the Environment, and **Protection** of Assets.

Emergence preparedness and response management shall involve 5 basic steps as follows:

- **Preventive actions** shall be taken to avoid an incident.
- **Mitigation measures** shall be actions taken to prevent an emergency, reduce the chance of an emergency happening, or reduce the damaging effects of unavoidable emergencies.
- **Preparedness** shall increase the Proponent's ability to respond when a risk occurs. Typical preparedness measures shall include developing method statements and emergence exit procedures, awareness and training for both response personnel and affected parties and conducting drills to reinforce training and test capabilities.
- **Response** is shall be actions carried out immediately before, during, and immediately after a hazard impact, which shall be aimed at saving lives, reducing economic losses, and alleviating suffering. Response shall include activating the emergency operations center, evacuating threatened employees or equipment, emergency rescue and medical care, firefighting, and sea search and rescue.

- **Recovery** shall be actions taken to return to normal or near-normal conditions, including the restoration of basic services and the repair of environmental, social and economic damages. Typical recovery actions shall include debris cleanup, financial assistance to individuals, rebuilding of infrastructures and key facilities, and sustained mass care for displaced marine animal populations.

9. GRIEVANCE MECHANISM

The procedure the management shall apply to deal with the employees' grievances shall be enforced as follows:

9.1. Timely Action

The first and foremost requisite in grievance handling shall be immediate settlement. The sooner a grievance is settled, the lesser it will affect employees' performance. This requires the first line supervisors to be trained in recognizing and handling a grievance properly and promptly.

9.2. Accepting the Grievance

The supervisor shall recognize and accept the employee grievance as and when it shall be expressed. Acceptance shall not necessarily mean agreeing with the grievance; it rather shows the supervisor's willingness to look into the complaint objectively and dispassionately.

9.3. Identifying the Problem

The grievance expressed by the employee shall be at times simply emotional, over-toned, imaginary or vague. The supervisor, therefore, shall be required to identify or diagnose the problem stated by the employee.

9.4. Collecting the Facts

Once the problem is identified as a real problem; the supervisor shall, then, collect all the relevant facts and proofs relating to the grievance. The facts so collected shall be separated from the opinions and feelings to avoid distortions of the facts.

9.5. Analyzing the cause of the Grievance

Having collected all the facts and figures relating to the grievance, the next step involved in the grievance procedure shall be to establish and investigate the cause of grievance. Investigation shall involve studying various aspects of the grievance such as the employees past history, frequency of the occurrence, management practices, union practices, etc.

9.6. Taking Decision

In order to take the best decision to handle the grievance, alternative courses of actions shall be worked out. These are, then, evaluated in view of their consequences on the aggrieved employee, the union and the management. Finally, a decision taken should best suite a given situation. Such decision should serve as a precedent both within the department and the company.

9.7. Implementing the Decision

The decision shall be immediately communicated to the employee and also implemented by the competent authority.

In case, it is not resolved, the supervisor once again needs to go back to the whole procedure step by step to find out an appropriate decision or solution to resolve the grievance.

10. EXTERNAL COMMUNICATIONS

External communications shall be handled in line with company procedures.

11. RECOMMENDATIONS

It is recommended that the Proponent should be granted with ECC provided that:

- The Proponent strictly adheres to EMP and undertake baseline environmental monitoring;
- Data from baseline environmental monitoring shall be kept and availed to NAMPORT and other GRN authorities when requested.

Table 4: EMP.

Receiving environment	Valued environmental component	Issue	Mitigation actions	Responsible institution/ personnel
Air climate and	Technosphere	Poor ambient air quality and health implications to residents due to emissions of GHGs (greenhouse gases).	<p>Avoid higher consumption of heavy diesel by MVs in order to reduce emissions of GHGs. It is anticipated that environmental regulations will at some point see fuel oils displaced in favor of supposedly cleaner fuels.</p> <p>Encourage MVs to use fuels with low carbon such as ULSD.</p> <p>Regular hull cleaning of MVs.</p> <p>Reduce vessel drag and increase fuel efficiency by regular hull cleaning.</p>	<p>MWTC/DMA (Ministry of works, transport and communication/Directorate of maritime Affairs).</p> <p>Vessel owners.</p>
		Release of dust and metals particles into the air	Grit blasting with glass beads or metal particles such as aluminum oxide, steel grit, cast iron shot, garnet and slag should be done only upon approved method statement by NAMPORT.	NAMPORT
	Air composition	Ocean acidification due to increased atmospheric Carbon Dioxide.	Reduce emission of Carbon Dioxide.	MWTC

	Biosphere	Effects of acidification on flora and fauna	The Proponent should regularly measure pH, carbon dioxide and other indicators of acidification as may be determined by NAMPORT or authorizing entity.	Baseline Environment Monitoring Plan and SOPs.	IEC (Independent Environmental Consultant)
	Cryosphere	Melting of ice and sea level rise due to global warming.	Avoid higher consumption of heavy diesels by MVs and reduce emission of GHGs.	Regulations to use cleaner marine fuels. Regular hull cleaning of MVs.	MWTC. Vessel owners.
Ocean and seas	Sediment modification	Hydrodynamic vortices generated by the Schomberg Vacu-Cart and Reclamation Filtration System equipment.	Hull cleaning operations maybe be temporarily terminated if it is observed that the equipment used generate a hydrodynamic vortex with a significant impact on sediment transport.	Notice to terminate in-water cleaning operations.	NAMPORT
	Seawater quality	Increased turbidity.	The Proponent should measure turbidity before, during and after the hull cleaning operations and such data should be availed to NAMPORT or other authorized GRN entities upon request.	Baseline Environment Monitoring Plan and SOPs.	IEC (Independent Environmental Consultant)
		Release of IAS and harmful pathogens.	The Proponent should demonstrate that the hull cleaning equipment could reclaim debris removed from MVs' hull and that such equipment efficiently minimizes the release of IAS and harmful pathogens into port waters. Samples of bio-fouling organisms removed from MVs should be taken in order to identify potential IAS and harmful pathogens.	Baseline Environment Monitoring Plan and SOPs.	Proponent

		Release of pollutants from biocide antifouling paint.	The Proponent should measure trace elements before, during and after the hull cleaning operation and such data should be availed to NAMPORT or other authorized entity upon request.	Baseline Environment Monitoring Plan and SOPs.	Proponent and IEC
		Water pollution	Where needed permit to extract or discharge water will be needed.	Domestic and industrial waste and effluent discharge permits.	Proponent
			Appoint IEC to co-ordinate water pollution and baseline monitoring activities.	IEC	Proponent
			No sanding, stripping and chipping of antifouling paints may be carried out during hull cleaning operations in the port's waters.	Method statement	Proponent and NAMPORT
			The proponent shall not perform any hull cleaning activity on vessels or movable structures that have reached or exceeded their planned inservice period.		
			When the anti-fouling coating has reached the end of its service life the vessel or movable structure should be removed from the water and a new antifouling coating applied. Should the vessel require new anti-fouling coating, the activity should be carried out in a dry or floating dock facility.		
			No chemicals or detergents shall be released into the water, port, air and sea during the hull cleaning operations. This includes the release of Tributyltin (TBT), which is a common constituent of vessel paints. Only vessels which are certificated of TBT-free paint shall be allowed to undergo under-water hull cleaning in ports.		

Land, seabed and sea	Sediment transport and morphology	Sediment modification will negatively affect the environment.	Monitor sediment characteristics and benthic fauna before and after underwater hull cleaning operations.	Baseline Environment Monitoring Plan and SOPs.	Proponent and IEC
	Waste pollution	Disposal of waste	Waste generated may only be disposed in a manner as prescribed in relevant policies and legislations. The proponent should submit to NAMPORT a method statement detailing on how waste will be managed.	Method statement.	Proponent
	Land use	Port Authority	Hull cleaning operations should not be performed without written authorization from NAMPORT. This authorization should be granted on a vessel to be cleaned and per quay berth where the vessel is docked. NAMPORT will do this in strict compliance and adherence to conditions in the ECC and any conditions imposed by other relevant authorities. The Proponent may not enter the port without this authorization.	Written permission to undertake hull cleaning operations. Port entry register.	NAMPORT
		Potential conflict use	The proposed areas where cleaning operations may take place include fishing factories, main harbour, tanker jetties and anchorage 1-4. Hull cleaning operations may not be undertaken at the expense of other users.	Port map.	Proponent NAMPORT
Ecology and biodiversity	Effect on local biodiversity	Bio-fouling organisms	The Proponent shall submit the monitoring plan and SOPs (as per IMO Resolution MEPC. 207(62)) to NAMPORT detailing how bio-fouling organisms will be treated.	Baseline Environment Monitoring Plan and SOPs.	Proponent
		IAS and pathogens	The proponent should submit a monitoring plan and SOPs detailing how IAS and pathogens will be monitored and mitigated.	Biosecurity Risk Assessment Plan and EMP	Proponent
	Ecosystem diversity	Ecologically sensitive areas	Hull cleaning operations should only be permitted in certain port areas for which permission is	Map of ecologically sensitive areas	Proponent Vessel

			granted; these areas specifically exclude ecologically sensitive areas.		
Human environment	Safety of life at sea	Occupational safety and public health.	<p>Prior to cleaning operations, the Proponent shall submit occupational safety plan detailing how safety and occupational issues will be dealt with while working at sea.</p> <p>Among others, occupational safety plan should provide details on how CVDs (cardio-vascular diseases) and communicable diseases (including COVID-19) shall be dealt with among different employees.</p>	Occupational health safety plan and EMP	Proponent
		Diving	Terms and conditions of the underwater hull cleaning permit should be read in conjunction with the Diving License conditions.	Diving license	Proponent
		Vessel preparation	Ensure the main engine and any relevant auxiliary engines must be isolated and not be operated for the duration of the hull cleaning activity. All costs related to the activity and any movement of vessel shall be for the account of the vessel.	Method statement	Vessel owner and Proponent.
		Injury on duty (IOD)	Any IOD or fatality to employees or third party, shall be reported to NAMPORT without delay and to any applicable statutory body within the required time-frame.	Accident report	Proponent
		Reporting of incidents	<p>The proponent shall:</p> <p>a) Report to competent authorities any incidents that result or could result, any environmental impact and any activity that may remotely affect the operations of the port.</p> <p>b) Not undertake any modification of the authorized equipment, of whatsoever nature, unless approved in writing by all relevant Authorities and such approvals provided to NAMPORT.</p>	Notice to terminate hull cleaning.	NAMPORT, MWTC/DMA, EC/DEA, DWA, MFMR

		Termination of hull cleaning	NAMPORT, DMA, EC/DEA, DWA or any other duly authorised entity may terminate hull cleaning operations immediately upon receipt of notification to do so.		
Hull cleaning technology		Removal of macrofouling organisms of domestic or international origin.	Underwater cleaning technologies should aim to, at least, capture debris greater than 50 micrometres (µm) in diameter in order to minimise release of viable adult, juvenile and larval stages of bio-fouling organisms.	SOPs for underwater cleaning using ROV-cart	Proponent
		Release into water of macro-fouling organisms of domestic or international origin	<p>The Proponent should avoid accidental removal of anti-fouling paint that may contain TBT (tributyltin) and TPhT (triphenyltin).</p> <p>The following vessels may not be cleaned while underwater:</p> <ul style="list-style-type: none"> ○ MVs that were painted 10 years ago as there is a higher risk of removing painting materials; ○ MVs that frequently visit/enter ports known to be 'hotspots' of IAS and pathogens, and ○ Vessels that had been denied entry into other ports for environmental violations. <p>The proponent may only be allowed to clean aged MVs while on dry dock where old paint could be removed and properly disposed.</p>	Pre-cleaning inspection report and SOPs.	Proponent

		Hull clear equipment	<p>The proponent is limited to the use of equipment that are:</p> <ul style="list-style-type: none"> a) The same technology as demonstrated when applying for the hull cleaning authorisation and permit, b) Where the equipment efficacy is proven and approved by relevant/competent authority and are marked with a safe working load and or is capable of being recovered in case of remote failure; c) In good operating and maintenance conditions in accordance with statutory standards and duly licensed by the appropriate regulatory body, operated by competent and adequately trained and certified staff. 	SOPs for underwater cleaning using ROV-cart	Proponent
		Calibration and servicing of the equipment	Calibration and servicing of the equipment should be done as prescribed by equipment manufacturers.	Equipment calibration certificate and service plan	Proponent
		House keeping	All equipment used during the performance of hull cleaning operations should be removed from wharfs, quays, jetties and other work places in the port without delay immediately after hull cleaning operations are completed on a particular vessel, or within such extended time as the Authority may allow, on good cause shown.	Cleaning operation exit plan.	Proponent
		Inspection and compliance	The proponent shall have written safety, health and occupational plan as well as environmental certifications, SOPs and method statements in place at all times and shall make these available to NAMPORT or relevant Authority for inspection upon request.	Baseline environmental monitoring plan	Proponent

Table 5: baseline environmental monitoring plan.

Activity	Description	Frequency	Responsible
PRE-CLEANING INSPECTION REPORT	<p>Upon booking of ship for in water hull cleaning, the following information should be obtained:</p> <ul style="list-style-type: none"> • Make and composition of paint on hull and date when painted. • Age of ship. • Route to port and names of last three ports visited. • Date of last hull cleaning. • Copy of vessel bio-fouling management plan. 	<p>All ship cleaning operations.</p>	<p>Proponent/IEC.</p>
	<p>Upon arrival at cleaning berth, manual inspection of hull is to be undertaken and the following is to be evaluated:</p> <ul style="list-style-type: none"> • Nature of biofouling: heavy, moderate or limited. • Dominant bio-fouling species (e.g. mussel; barnacle; algal). • Nature of paint hull - degraded; some peeling and sound state. • Presence of cathodic protection devices. • State of propeller/ prop shaft. <p>DECISION: where biofouling is considered excessive, alternative cleaning methods or rejection will be considered. ALTERNATIVE: alternative is to clean MV at dry dock. ACCEPTANCE: upon acceptance, the Proponent should:</p> <ul style="list-style-type: none"> • Submit pre-inspection report to NAMPORT for approval so that underwater cleaning could commence. • Conduct a general inspection of the berth. 	<p>All ship cleaning operations.</p>	<p>Proponent/IEC.</p>

OPERATIONAL MANAGEMENT			
Check operations of generator and containment of spillage	Ascertain that all aspects of the Schomberg Vacu-Cart and Reclamation Filtration System are operating appropriately and that the generator and fuel spillage is addressed/contained.	All cleaning operations.	Proponent - land based crew
Emergency response equipment	Ensure all emergency response equipment are mobilized and in working conditions including the following: <ol style="list-style-type: none"> 1. Turbidity curtains. 2. Spill booms. 3. Sample probe. 	All cleaning operations.	Proponent - land based crew
Pre-operation check of cart	Oversee brushes/skirt and rectify any anomalies. Check hoses and hose connection. Ensure outlet pipe is down drift of MV.	All cleaning operations.	Proponent - land based crew.
Review surface water turbidity / variation	Identify state of water around MV: turbid/clear? Any solid waste?	All cleaning operations.	Proponent - land based crew.
Check intake of brush cart during operations	Any evidence of plumes?	All cleaning operations.	Diver.
Check intake of filter system	During operations camera review of intake, ensuring that no plumes arise from cart.	All cleaning operations.	Diver.
Establish probe and collection process	Where applicable – ascribe position and placement of probe.	All cleaning operations.	Proponent/IEC.
CLOSURE OF CLEANING OPERATIONS			
Solid waste debris	Proponent shall ensure that all solid waste is contained within containment drum: <ul style="list-style-type: none"> • Add probiotic if required. • Ensure labelling is completed and in order. • Seal drum. 	All cleaning operations.	Proponent - land based crew.

	<ul style="list-style-type: none"> • Ensure collection by registered waste operator and transfer to approved landfill site. 		
Removal and cleaning of equipment	<p>All equipment shall be removed from the water once all cleaning has been completed. The following actions shall be required:</p> <ul style="list-style-type: none"> • Equipment is to be inspected for debris and any damage. • Equipment is to be removed from the berth and cleaned at point with freshwater. • No washing down of equipment is to take place on the quayside or on the barge. 	All cleaning operations.	Proponent - land based crew.
BASELINE ENVIRONMENTAL MONITORING	<p>Specific analysis of water quality and operations shall be undertaken on individual vessel using the multi parameter probe as well as taking samples for further analysis as per SOPs. This data shall be recorded per vessel and shall act as a record of findings on that vessel.</p> <p>More specific monitoring of underwater hull cleaning operations by the Pure Ballast 3.1 barge mounted system is to take place on a selected vessel once every 3 month or as advised by the IEC.</p>	Every 3 months	IEC
Pre-cleaning	Measure and record weather parameters such as tide level, air temperature, humidity, etc.	Every 3 months	IEC
	Collect surface water samples from bow and stern of MV for analysis.	Every 3 months	IEC
	Collect sediment samples.	Every 6 months	IEC

	Phytoplankton and zooplankton samples should be collected before, during and after the underwater hull cleaning operation. Samples for benthic fauna should be collected twice a year only.	Every 3 months	IEC
Operations	Collect 2 x samples from intake pipeline of cart and at intake of Pure Ballast system using sterilized sampling bottles.	Every 3 months	IEC
	Collect 2 x samples from intake pipeline of cart and at outfall of Pure Ballast system using sterilized sampling bottles.	Every 3 months	IEC
Closure of cleaning procedure	Collect sediment samples from centerline of MV.	Every 3 months	IEC
	Collect surface water sample from fore and aft of MV for analysis.	Every 3 months	IEC
	Collect sample of solid careened materials for preservation in dry form and formaldehyde.	Every 3 months	IEC
	All sampling requiring laboratory analysis should be transferred to commercial/accredited laboratory under instruction of IEC.	Every 3 months	IEC
MONITORING REPORTS	Present/submit report on analysis on 7th day of every quarter after analysis to Harbour Master or authorized GRN entity.	Every 3 months	Proponent

FORM-1

Site/station name	GPS position	Temperature °C	pH	Salinity ‰	Dissolved Oxygen mg/L	Conductivity Ms/cm	TSS mg/L	Total dissolved solids mg/L

FORM-2

Hour	Air pressure	Air temperature	Cloud cover	Precipitation	Humidity	Wind direction	Wave direction	Wind speed	Tide

