ENVIRONMENTAL AND SOCIAL REQUIREMENTS FOR CONTRACTORS: ANNEX 2 – EFFLUENT DISCHARGES

ROVUMA LNG PROJECT

MZLN-EL-RBENV-00-0001

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1. PURPOSE AND SCOPE

This document is one of a series of topic-specific supporting annexes contained in the overarching document: Environmental and Social Requirements for Contractors: Environmental and Social Management System (ESMS).

These annexes define the processes that need to be followed and the control measures that must be applied to ensure the delivery and approval of a topic-specific Contractor Implementation Plan (CIP) and other implementation deliverables ahead of commencing activity.

Where the final design basis or execution strategy has not been determined and alternatives exist, an analysis of alternatives (taking environmental and social (E&S) factors into account) shall be undertaken. This analysis shall be based on an accurate characterisation of the local setting using up-to-date baseline data and an assessment of the risks and impacts related to each alternative.

Where the project base case has already been determined, additional baseline information may be required to inform an up-to-date / site-specific E&S risks and impacts evaluation. This evaluation may result in a refinement of control measures relative to the local conditions and licensing requirements.

1.1. Objectives

The overall objective of this document is to set out all the E&S requirements that need to be fulfilled in order to prevent and manage potential E&S risks and impacts associated with Effluent Discharges.

1.2. Scope

For the purposes of this document, Effluent Discharges encompasses the assessment and management of E&S impacts and risks associated with the following activities: design, operation and maintenance of effluent treatment equipment and related infrastructure such as retention basins and ocean outfalls; and onshore and nearshore construction practices meant to minimize contamination.

Effluent discharges are limited to ocean discharge with one exception – treated sanitary/domestic wastewater discharged to temporary onshore leach fields during early construction phases. Discharges of contaminated effluent to wetlands are prohibited.

In-scope effluents include produced water, process wastewater, desalination unit reject brine and filter backwash, sanitary and domestic wastewater, wash-down water, bilge water (and other oil-contaminated waters from marine vessels), collected surface drainage, hydrotest water, and runoff from dredged material stored onshore in settling basins.

Ballast water is addressed in the E&S requirements for Ballast and Biofouling and surface water runoff that does not go to a collection system is covered in Site Development, Construction and Reinstatement.

This document follows the overall Scope definition outlined in the E&S Management System Requirements for Contractors described in Section 2.2 of that document

1.3. Linkage to Other Contractor Requirements

This document is an overarching document which is supported by a number of topic-specific annexes. It also needs to be read in conjunction with Section D (Scope of Work) and Section F (Coordination Procedure) to provide a holistic view of E&S requirements.

This document should also be read in conjunction with the following Requirements annexes: Ballast Water and Biofouling and Marine Operations.

1.4. Background Context

The Anadarko / Eni EIA (2014) henceforth called the EIA relies on a Pre-FEED project description and effluent inventories - i.e. combined Area 1/Area 4 development and a single Area 4 Operator. The effluent inventory for the construction phase is incomplete, plus the EIA's alternatives analysis does not include an examination of technically and financially feasible effluent management alternatives (e.g. deep well injection versus ocean discharge).

The Early Environmental Design Basis (EEDB) specifies general requirements for effluent management, plus sets numerical discharge limitations and ambient water quality standards; however, there are few details specified regarding effluent treatment systems and ocean outfall design.

The Project currently intends to treat, commingle and discharge effluents to Palma Bay via one or more of the following ocean outfalls:

- Export Jetty - Outfall piping will be routed along the jetty and will terminate at a point beyond the jetty. Outfall will not be used during construction.
- MOF - Outfall piping will be routed along the MOF and will terminate at a point beyond the MOF. Outfall will be used during construction and may be used by operations.
- Storage Tank Area - Two adjacent outfalls located near the storage tank area. Outfalls will be used to discharge treated/uncontaminated stormwater. Outfalls will not be used during construction.

The Project also intends to discharge treated sanitary/domestic wastewater to temporary onshore leach fields during early construction phases.

Overall, pollution prevention aspirations are clearly stated in project documentation but further project-specific actions are needed to systematically avoid/mitigate E&S risks and impacts, to comply with national applicable requirements, including the prohibition of discharges to freshwater water bodies, including freshwater or estuarine wetlands (EIA 12.9.3; EIA 12.9.4) and to address IFC's Performance Standard's stated objective of controlling pollution.

1.5. E&S Risks and Potential Impacts

Table 1-1 outlines the E&S risks and potential impacts identified to date associated with Effluent Discharges. This table is meant to provide insight to the risks and potential impacts which are possible and a guide for additional assessment activities required by Section 2.1 of this document. It also provides a reference to the control measures tables (Table 2-3).

Table 1-1: A Guide to Activities, Consequences, Risks and Potential Impacts

Activity	Potential Consequence	Risks And Potential Impacts
Seabed routing of piping	Physical presence on the seabed	Reduced ecological function and diminished quality of ecosystem services (NR13)
Temporary operation of leach fields	Discharge of effluent to land	Contamination of surface water or ground water (P5)
Operation of process plant / sewage treatment	Discharge of effluent to sea	Altered hydrological regimes to wetlands (increased or diminished flows and accumulations) (NR6)
		Pollution of marine environment (P4)
		Changes to physical/chemical characteristics of substrate (P14)

2. REQUIREMENTS

2.1. E&S Assessment and Evaluation and CIP Development

As discussed in the overarching Environmental and Social Requirements for Contractors: Environmental and Social Management System (Section 2), due to the further refinement of the design since the EIA was prepared, and due to the Project seeking finance (which requires compliance with the International Finance Corporation (IFC) E&S requirements), it is anticipated that additional E&S assessment will be required for some topics which may result in the addition or refinement of E&S controls specified to date. This assessment, as outlined in the overarching ESMS document, includes three stages:

- Stage 1: Analysis of Alternatives
- Stage 2: E&S risk and impact evaluation of the project base case and refinement of control measures
- Stage 3: CIP development (based on the refined control measures).

For Effluent Discharges, all 3 stages are required.

Stage 1 – Assessing Alternatives to Develop a Project Base Case

The requirements outlined in Table 2-1 must be completed in order to assess alternatives and determine the Project base case.

Table 2-1: Process for Analysis of Alternatives

Step	Specific Requirements	Responsibility
1	Provide technical memo with seafloor pipeline routes intake and discharge locations, and intake and outfall diffuser designs.	Contractor
2	As necessary, collect relevant nearshore and offshore environmental and social baseline data for defined areas of interest with particular focus on identifying sensitive receptors such as community fishing areas and sensitive marine receptors. Environmental data set shall include metocean data pertinent to understanding effluent discharge transport and fate). Baseline data shall be sufficient to inform constraints mapping for alternatives analysis, as appropriate. Document the results of the baseline assessment including the method of baseline collection.	Company
3	Carry out E&S cumulative risk/impact assessment on all seafloor pipeline routing options contemplated considering risks and impacts identified in Table 1-1.	Company
4	Document results of alternatives analysis, including description of ocean outfall alternatives; summaries of E&S baseline data (including collection methodology), E&S risk/impact assessment methodology, and E&S assessment results; overall assessment of alternatives; and final decision on preferred seafloor pipeline routing and discharge location for each ocean outfall.	Company

Stage 2 – Assessing the Project Base Case and Refining Control Measures

Once the base case has been determined, the actions outlined in Table 2-2 are required in order to refine the preliminary E&S control measures outlined in Section 2.2.

Table 2-2: Process for Risk and Impact Assessment of Project Base Case

No	Specific Requirements	Responsibility
1	Determine if additional baseline data is needed around the chosen discharge locations. Ensure final baseline data characterizes seasonal variability and includes a comprehensive metocean data set for discharge modelling.	Company
2	Collect (as necessary) relevant nearshore and offshore E&S baseline data for defined areas of interest. Document and summarize baseline data.	Company
3	Update Construction and Operations effluent inventories (using assumed figures from construction) with level of detail sufficient to inform E&S risk/impact assessment of ocean discharge.	Contractor
4	Carry out E&S risk/impact assessment of nearshore ocean discharge considering risks and impacts identified in Table 1-1. For nearshore discharges, assess each ocean outfall using preferred seafloor pipeline routing and discharge location for each. Assess effluent transport and fate using both near-field and far-field discharge models.	Contractor
5	Refine cumulative impact assessment of ocean discharge as required.	Company
6	Affirm or revise effluent treatment system design and outfall diffuser design specifications based on E&S risk/impact assessment results. Affirm or revise related project execution details based on risk/impact assessment results.	Contractor
7	Affirm or revise design and execution control measures in Tables 2-3 and 2-4 based on E&S risk/impact assessment results.	Contractor
8	Document results including a summary of the project description, summary of the environmental and social baseline, risk / impact assessment method, results of the risk / impact assessments, and the proposed list of refined control measures to be applied.	Contractor

Stage 3 – Contractor Implementation Plan

The Contractor shall develop a CIP which outlines how they propose to implement the control measures in the Table 2-3 (including any proposed additions or refinements as applicable to the update and finalisation of the design and execution strategy), and how they propose to implement the management system requirements (as outlined in the E&S Management System Requirements for Contractors) which relate specifically to the topic of this document, in a way that conforms to E&S requirements. The CIP shall include the refined control measures developed in Stage 2.

2.2. E&S Control Measures

The control measures in Table 2-3 have been defined ahead of the site-specific risk / impact evaluations defined in Section 2.1. The Contractor shall apply these or seek agreement to

apply a refined list, with justification for all changes based on the outcomes of assessments described in Section 2.1.

Where these requirements originate from the Anadarko / Eni EIA (2014), henceforth called the EIA, the EIA section reference is included. Similarly, the Government-approved Environmental Management Plans (EMPs) references are included for those relevant controls. As noted in the overarching ESMS requirements document, a number of additional controls have been identified as being required to meet lender expectations. As such, the EIA / EMP controls have been supplemented by good practice design and control requirements where practicable and appropriate, however, where any overlap is present, the EMP (and EIA) commitments should be considered paramount over good practice guidance in the hierarchy of adoption of such controls.

Table 2-3: E&S Control Measures

ACTIVITY / SOURCE OF POTENTIAL IMPACT	CONTROL MEASURE	IMPACT / RISK BEING ADDRESSED	SOURCE			Notes
			EIA	EMP	Other	
Overarching Requirements						
General	No contaminated effluent will be discharged into the wetlands. Any effluent discharge will be in accordance with applicable laws and regulations.			Area 4 SW 19,29 Shared SW 16,27 LNGMT SW 17 MOF SW 17		
	Evaluate alternatives for the re-use of treated wastewater			Area 4 ME 56		
	Implement a Water Resources and Wastewater Management Plan that is based on GIIP for stormwater management.			Area 4 ME 57		
	Establish and implement a Water Resources and Wastewater Management Plan with stormwater retention dam(s) sufficient to capture the first-flush of stormwater. Treat any stormwater that may be impacted by hydrocarbons prior to disposal or discharge.			Area 4 ME 58		
Design Requirements						
Discharge Limitations	Adopt design specifications for treatment systems for effluents intended for discharge into Palma Bay that allow compliance with specified discharge limits.	P4, P5, NR13			A	
	Ensure that the Project's process water (e.g. brine and treated sewage effluent) for construction and operational discharges into Palma Bay operate at optimum efficiency in line with the Projects			Area 4 ME 52, MOF ME 35		The Projects Water Resources and

	Water Resources and Wastewater Management Plan, through auditable maintenance schedules, and meet all water quality-related effluent parameters.					Wastewater Management Plan can be considered within the Water Use and Abstraction CIP and the Effluent Discharge CIP.
	Treated sewage will comply with all the applicable standards, regulations (national and international) and/or approval or authorization.			Area 4 ME 53, MOF ME 36		
	Ensure that nearshore marine construction and support vessel effluents intended for discharge comply with applicable MARPOL 73/78 discharge limitations prior to being discharged into Palma Bay.	P4, P5, NR13	EIA 11.24.2 EIA Approval Letter S10 18		A	
	Perform regular analysis of waters from the oil/water separators to assess the quality before discharge to the recipient, ensuring the concentration does not exceed 15 ppm as stated in MARPOL 73/78			Area 4 ME 55, MOF ME 40		
	In line with the Water Resources and Wastewater Management Plan, combine the flow of the treated produced water with the discharges from the desalinisation plant and sewage treatment plant.	P4, P5, NR13	EIA 11.20.2	Area 4 ME 54		
	Comply with the following minimum design requirements for ocean outfalls: · Discharge location and diffuser design shall yield a dilution sufficient to ensure compliance with ambient water quality standards for all expected metocean conditions. · Discharge shall avoid sensitive receptors such as community fishing areas and sensitive marine receptors.	P3, P4, P5, NR13			A	

	· Discharge piping shall follow routing of other infrastructure to limit impacts where reasonably practicable. · Discharge monitoring point shall be easily accessible and yield representative effluent samples. · Discharge point shall be accessible for routine inspection and maintenance.					
Effluent Management	Ensure that treated sanitary/domestic wastewater (black water and grey water) complies with applicable standards, regulations (national and international), approvals and authorizations prior to discharge. This includes discharges of treated sanitary/domestic wastewater to temporary onshore leach fields during early construction phases.	P4, P5, NR13, O1			A	
	Sanitary/domestic wastewater collected in septic tanks shall be comingled with other sanitary wastewater streams and treated prior to discharge.	P4, P5, NR13			A	
	Sanitary/domestic wastewater systems shall be equipped with source controls such as grease traps and filters where necessary to protect sewer infrastructure and wastewater treatment processes, prevent noncompliant discharges, and eliminate discharges of toxic, flammable or explosive materials.	P4, P5, NR13			A	
	Minimize the volume of hydrotest water discharged by reusing the water for multiple hydrotests where reasonably practicable.	P4, P5, NR13			A	
	Wastewater pits shall only be used to store potentially contaminated stormwater runoff and landfill leachate. Contractor shall ensure pits used in these services comply with the following minimum design requirements: · Pit shall be designed as permanent infrastructure · Pit bottom and sides shall be continuously lined. Liner materials shall limit hydraulic conductivity to no greater than 1x10-7cm/s	P4, P5, NR13			A	

	· Pit shall be equipped with leak detection or groundwater monitoring wells if potable groundwater exists within 6m of pit bottom · Pit shall be within a fenced area · Pit shall include wildlife deterrents, where required.					
	Open ditches, channels, and pits which may convey or contain contaminated effluent will be lined to prevent those contaminants from seeping into the surrounding soil.				A	
Execution Requirements						
Discharge Limits	Ensure that the Project's process water (e.g. brine and treated sewage effluent) for construction and operational discharges into Palma Bay operate at optimum efficiency in line with the Projects Water Resources and Wastewater Management Plan, through auditable maintenance schedules, and meet all water quality-related effluent parameters.	P4, P5, NR13	EIA 11.19.2	Area 4 ME 52 MOF ME 35		The Projects Water Resources and Wastewater Management Plan can be considered within the Water Use and Abstraction CIP and the Effluent Discharge CIP.
	Treated sewage will comply with all the applicable standards, regulations (national and international) and/or approval or authorization.			Area 4 ME 53 MOF ME 36		
	Perform regular analysis of waters from the oil/water separators to assess the quality before discharge to the recipient, ensuring the concentration does not exceed 15 ppm as stated in MARPOL 73/78			Area 4 ME 55 MOF ME 40		

	Ensure that nearshore marine construction and support vessel effluents intended for discharge comply with applicable MARPOL 73/78 discharge limitations prior to being discharged into Palma Bay.	P4, P5, NR13, O1	EIA 11.24.2 EIA Approval Letter S10 18		A	
Effluent Monitoring	Implement the requirements of the Company Minimum Environmental Monitoring and Reporting Plan	P4, P5, NR13			A	
	Ensure that wastewater treatment systems are operated and maintained by trained and competent personnel, and according to manufacturer's specifications.	P4, P5, NR13			A	
	Manage sludge and debris removed from wastewater treatment equipment in accordance with requirements set out in the Waste Contractor Implementation Plan.	P4, P5, NR13			A	
	Ensure that treated sanitary/domestic wastewater (black water and grey water) complies with applicable standards, regulations (national and international), approvals and authorizations prior to discharge. This includes discharges of treated sanitary/domestic wastewater to temporary onshore leach fields during early construction phases.	P4, P5, NR13	EIA 11.19.2		A	
	Develop a Sanitary Wastewater Source Control Procedure in accordance with Good International Industry Practice, and with the overall objectives of protecting sewer infrastructure and wastewater treatment processes, as well as preventing noncompliant effluent discharges. The procedure shall address, at a minimum: · Site inspection · Site sampling · Site corrective actions, including site input limitations (concentration and/or volume) · Awareness training	P4, P5, NR13			A	

	· Recordkeeping.					
	Prior to commencing discharge/disposal of hydrotest water, prepare a hydrotest disposal procedure that considers point of discharge, rate of discharge, chemical use and dispersion- to align with GIIP (namely IFC EHS Guidelines for Offshore Oil and Gas Developments for the management of hydrotest waters).	P4, P5, NR13	EIA 11.6.2	Area 4 ME 9		
	Prior to commencing discharge submit to MITADER the procedures to be used for the treatment of hydrotest effluent.	P4, P5, NR13	EIA Approval Letter	Area 4 ME 10		

3. DELIVERABLES

The following deliverables are associated with Effluent Discharges. Contractor deliverables shall be submitted to the Company for Company approval.

Table 3-1: Summary of Deliverables

Section Reference	Deliverable	Responsibility	Deliverable Date
STAGE 1			
Table 2-1	Baseline report	Company	To be agreed on contract award
Table 2-1	Technical memo on the intake and discharge locations and design	Contractor	To be agreed on contract award
Table 2-1	Topic-specific Alternatives Analysis Report, which as a minimum includes: • Overview of E&S baseline relevant to the options assessment screening • Alternatives analysis review, including details of E&S risks and impacts evaluation, as well as other relevant drivers for the decision-making process • Final recommendation on the Project base case.	Company	To be advised on contract award
STAGE 2			
Table 2-2	Topic-specific E&S Report, which as a minimum includes: • Definition of the approved Project base case • Updated/refined baseline description, as applicable to the base case • Updated E&S risks and impacts evaluations • Refined list of E&S control measures.	Contractor	To be agreed on contract award
STAGE 3			
Section 2.2	Topic-Specific CIP, which as a minimum includes: • Approved list of E&S control measures • Details of how the approved control measures will be implemented (including linkage to other Project plans and procedures, where necessary, to demonstrate the implementation of the E&S controls committed to) • Details of the monitoring, reporting and assessment.	Contractor	To be agreed on contract award