



Rovuma
LNG

**ENVIRONMENTAL AND SOCIAL
REQUIREMENTS FOR CONTRACTORS:
ANNEX 3 – WASTE MANAGEMENT**

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 Waste Management.

1.2. Scope

For the purposes of this document, Waste Management encompasses the generation, collection, storage, transport, disposal, recycling of solid waste produced onshore and offshore, including at camp. It does not include waste water management which is covered under Effluent Discharges or disposal of dredge material which is covered under Dredging.

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 be read specifically in conjunction with the Company Waste Management Philosophy (MZLN-ED-RGWST-00-0001). Specific requirements pertaining to waste from ships and marine activity can be found in the Marine Operations Annex, and requirements pertaining to dredging waste in the Dredging Annex.

1.4. Background Context

A Waste Management Feasibility Study (WMFS) was carried out in 2015 by ERM on behalf on Eni East Africa and Anadarko Moçambique Área 1, Lda (“AMA1”) to identify the need of a joint waste management feasibility study for the Afungi peninsula. In this study, four Scenarios for waste management were considered:

- Scenario 1: Use of existing Third Party waste management facilities in Mozambique
- Scenario 2: Use of existing Third Party waste management facilities in neighbouring countries
- Scenario 3: Use of dedicated waste management facilities within Afungi
- Scenario 4: A combination of the above scenarios.

The report considered Scenario 4 the best option in terms of low costs, reduced environmental impacts, and compliance with international best practice. This was for both construction and operations phases of the project. This Scenario entailed the construction of a project landfill and use of designated project incinerators. All recycling and hazardous waste treatment was considered to be managed by Third Parties.

It should be noted though that the WMFS was conducted in 2015 when operations onshore were not split into separate components, and synergies with local communities for waste management were not considered.

The WMFS report considers alternatives to the Project base case, and therefore the Contractor is not expected to propose alternative solutions, but rather verify a preferred solution based on those that have already been evaluated. EMMML agrees with the WMFS report that Scenario 4 is the best option and the Scope of Work includes construction of a waste management facility for both construction and operational waste. Potential for the facility to be a shared facility or at least a common location with Area 1 had been proposed by EMMML and is under discussion.

1.5. E&S Risks and Potential Impacts

Table 1-1 outlines the E&S risks and potential impacts identified to date associated with Waste Management. 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
Generation of waste	Waste management	Waste disposal legacy (P9)
		Increased pressure on community infrastructure (C5)
		Impact on worker health (LAB4)
Collection, segregation, and storage of waste	Accidental leaks and spills	Contamination of surface or groundwater (P5)
		Littering of the landscape from blown material (P8)
		Pollution of marine environment (P4)
		Impact on worker health (LAB4)
Transport of waste	Accidental leaks and spills	Contamination of surface or groundwater (P5)
		Littering of the landscape from blown material (P8)



Activity	Potential Consequence	Risks And Potential Impacts
		Pollution of marine environment (P4)
		Impact on worker health (LAB4)
		Waste disposal legacy (P9)
Landfill sites	CH4 emissions leachate odour	Degradation of ambient air quality (P1)
		Degradation or destruction of natural seed bank and soil quality (P10)
		Contamination of surface or groundwater (P5)
		Contribution to total country GHG emissions (P2)
		Littering of the landscape from blown material (P8)
		Scavengers / child labour from local community (LAB2)
		Pollution of marine environment (P4)
		Waste disposal legacy (P9)
		Community disturbance / nuisance (C1)
Incinerators	Combustion air emissions (SOx, NOx, particulates, CH4, dioxins)	Degradation of ambient air quality (P1)
		Contribution to total country GHG emissions (P2)
Export of waste	Regulatory compliance	Contravention of international agreements (O1)
		Waste disposal legacy (P9)

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 waste management, 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.

There has been significant work already carried out in the form of a waste management feasibility study (Section 1.4). Because this work was undertaken in 2015, the project shall now verify the final details of the waste management strategy for the construction and operations phases using this study as the starting point.

Table 2-1: Process for Analysis of Alternatives

Step	Specific Requirements	Responsibility
1	Review potential for synergies with AMA1.	Company
2	Confirm findings of the Waste Management Feasibility Study to confirm appropriate siting and overall Waste Management Strategy for construction and operations phases.	Company

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

Once the project 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	Once the waste management strategy is defined, determine if additional baseline data is needed.	Company
2	If required, for each proposed waste management facility, collect additional (more detailed) environmental and social baseline information to inform assessments and decisions	Company
3	Refine the waste management inventory if required and describe the waste management facilities to be used.	Contractor
4	Refine E&S impact / risk assessment on each proposed Waste Management facility considering risks and impacts identified in Table 1-1. Where incinerators are being proposed, carry out air dispersion modelling.	Contractor
5	Carry out or refine cumulative impact assessment, as required.	Company
6	Assess whether the execution strategy needs to be modified or optimised in the light of knowledge gained from steps (3) and (4).	Contractor
7	Assess whether there are sufficient / appropriate design and execution control measures in Table 2.3 to mitigate the identified impacts and risks and update if necessary	Contractor
8	Document results including a summary of project description (final design basis or execution strategy), summary of the environmental and social baseline, risk / impact assessment method, results of the risk / impact assessments including the proposed list of control measures to be applied	Contractor

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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	The waste management facility will be operated in compliance with the requirements of the Project Waste Management Plan (LNG Project EIA, Annex E).			Shared WM 1		
	Adopt a hierarchy approach to waste management by prioritising avoidance and reduction of waste in the first instance, followed by reuse, recycling and recovery, with treatment and disposal being the least favoured options.				A	
	Provide support to Company led initiatives / opportunities for waste management synergies (including disposal options) with other operators, projects and government.				A	
	Consider opportunities to assist local entrepreneurs in the establishment of responsible waste management service providers which meet Company minimum requirements.				A	
	Storage shall only be allowed as a temporary solution during the construction phase.				A	
	The Project should implement strict controls for food transport, storage and waste (food waste should be addressed as per the Waste Management Plan).				A	
Design Requirements						
Design of new waste storage and	Contractor to design the waste storage facilities, landfills and incinerators in line with Good International Industry Practice.	P9			A	

disposal facilities						
Execution Requirements						
Pre-treatment of food waste	Install food waste dewatering systems in canteens / kitchens to reduce the volume of food wastes, where food waste is to be incinerated.	P5, P9			A	
General waste management activities	Provide appropriate PPE to all workers associated with waste management duties and ensure it is worn correctly at all times.	LAB4			A	
	All waste management infrastructure areas shall be securely fenced and only open during normal working hours	P8, P9, LAB2			A	
	Conduct periodic inspections of waste management areas and document findings. Inspections shall include review of waste accumulation and segregation practices, as well as work site housekeeping.	P8, P9			A	
Waste segregation	Segregate waste according to the waste types defined in the Waste Management Contractor Implementation Plan, to be compatible with the subsequent management of the wastes at the DUAT Waste Management Facility, or by third party waste management contractors as required.	P8, P9			A	
	Use different colored and labelled waste containers for all segregated waste streams.	P8, P9			A	
Waste collection and storage	Waste collection and storage containers shall be: <ul style="list-style-type: none"> compatible with the waste being generated in good physical condition colour coded for segregation kept closed during storage provided in adequate numbers and across locations 	P8, P9			A	

	<ul style="list-style-type: none"> · checked regulatory to avoid overfilling · labelled 					
	Incompatible wastes shall be suitably segregated, to avoid coming into contact with each other.	P8, P9			A	
	Waste management sumps shall be routinely emptied as required and all recovered material appropriately managed as waste.	P5, P8, P9			A	
	Containers shall be kept closed (e.g. bungs on drums; covers, tarps, or netting over roll-off bins and other bulk containers) during storage and transportation.	P5, P8, P9			A	
Waste Transportation	Containers used for the transportation of waste from point of generation to the Contractor's waste management area shall be compatible with the waste, covered, in good physical condition and properly labeled.	P5, P8, P9			A	
	Ensure trucks used for transportation of waste are in good condition and that drivers are qualified (i.e. have appropriate drivers licence and training for the vehicles driven) and wastes handled / transported, and that appropriate spill kits are carried where required.	P5, P8, P9			A	
	Ensure that wastes leaving the site for third-party waste facilities are accompanied with a COMPANY-approved waste manifest that includes waste description documents (e.g. MSDSs).	P5, P8, P9			A	
	Inspect waste consignments prior to their leaving site to ensure shipments are: Manifest accurately reflects the wastes being transferred <ul style="list-style-type: none"> · Containers are: <ul style="list-style-type: none"> o labelled appropriately o In good condition and not leaking o Compatible with the waste it contains 	P5, P8, P9			A	

	<ul style="list-style-type: none"> o Appropriately sealed (e.g. with a lid or bung) o Not emitting any harmful gases or generating heat <p>Where applicable, properly secured aboard ship-to-shore transport vessels to prevent spillage or loss at sea.</p>					
	<p>Keep a record of all waste, in accordance with Company-approved manifest and record keeping procedures. Waste manifest shall include, at a minimum, the following information:</p> <ul style="list-style-type: none"> · Date and location of waste collection · Description and classification of waste and its volume / weight (including type and number of containers) · Treatment, storage and/or disposal location. 	P5, P8, P9			A	
Waste disposal – landfill	Develop and implement procedures for the management of the landfill site which are in line with Good International Industry Practice.	P1, P2, P5, P8, P9, P10, LAB2, C1			A	
	Prohibition of disposal of any wastes which are incompatible with the design of the landfill.	P1, P2, P5, P8, P9, P10, LAB2, C1			A	
	Operated by sufficient number of competent, trained operators	P1, P2, P5, P8, P9, P10, LAB2, C1			A	
Waste disposal – incinerator	<p>Develop and implement procedure for the management of any incinerator in line with Good International Industry Practice including:</p> <ul style="list-style-type: none"> · Installation, start up and commissioning by qualified factory personnel · Prohibition of incinerating wastes incompatible with the design of the incinerator. · Appropriate waste disposal of incinerator ash · Operation of the incinerator in line with manufacturer's operating instructions 	P1, P2, P5, P8, P9			A	

	· Operated by sufficient number of competent, trained operators					
Waste disposal - general	Burning waste in pits, piles or drums is prohibited unless there are special circumstances subject to risk assessment and prior approval by Company.	P2, P9			A	
Hazardous / special waste	Labels for hazardous waste shall include at a minimum waste name, waste hazards and emergency contact information.	LAB4, P9			A	
	Maintain waste description documents for (e.g. MSDSs) onsite for each hazardous waste stream.	LAB4, P9			A	
	Any unidentified waste will be suitably quarantined and treated as hazardous until a risk assessment/investigation is carried out to characterise the waste and determine the correct handling and management procedures for the materials.	LAB4, P9			A	
	Identify whether any radioactive wastes may be generated as part of their activity and document waste management procedures for these in their Waste Management CIP.	LAB4, P9			A	
	Pack medical waste in COMPANY approved leak-proof and disposable containers properly identified by label and color coded and dispose of accordingly. Containers for sharps shall be puncture proof.	LAB4, P9			A	
Hazardous Waste Disposal	The CIP shall contain procedures relating to the collection, labelling, transferring/handling, storage, treatment and disposal of hazardous materials (including chemicals, fuels, and topsoil or subsoil contaminated by accidental hydrocarbon or chemical releases).	P5, P9, P10			A	
Training	Provide training and awareness to workers handling waste streams.	LAB4, P9			A	

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2.3. Requirements for Additional Land

Where new land is required for the construction of waste management facilities, the Contractor shall follow the agreed Protocol for Additional Land in order to gain access to that land.

2.4. Pre-Construction Surveys

Preconstruction surveys for waste management infrastructure should follow requirements outlined in Site Development, Construction and Reinstatement.

3. DELIVERABLES

The following deliverables are associated with Waste Management. 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	Updated Project Waste Management Strategy, if required.	Company	To be agreed on contract award
STAGE 2			
Table 2-2	Topic-specific E&S Report, which as a minimum includes: <ol style="list-style-type: none"> 1) Definition of the approved Project base case 2) Design specifications for landfills and incinerators and storage facilities 3) Waste management inventory and description of management of each stream. 4) Updated E&S risks and impacts evaluations 5) Refined list of E&S control measures. 	Contractor	To be agreed on contract award
STAGE 3			
Section 2.3	Description of land needs	Contractor	As required
Section 2.2	Topic-Specific CIP, which as a minimum includes: <ol style="list-style-type: none"> 1) Approved list of E&S control measures 2) 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) 3) Details of the monitoring, reporting and assessment. 	Contractor	To be agreed on contract award