

Esso Highlands Limited



Papua New Guinea LNG Project

**Environmental and Social Management Plan
Appendix 4: Waste Management Plan**

PGGP-EH-SPENV-000018-006

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1.0 OBJECTIVES

Esso Highlands Limited (Company) has developed this Waste Management Plan as part of its Environmental and Social Management Plan (ESMP).

The objectives of the Waste Management Plan are to:

1. Contain, transport, handle and dispose of solid and liquid wastes arising from project construction activities in such a manner as to minimise impacts to human health and the environment
2. Dispose of wastes at facilities approved by Company, for which disposal (with or without prior treatment) is the only practicable option.

The Waste Management Plan should be read in conjunction with other Company plans:

This plan should be read in conjunction with the following plans:

- Air Emissions Management Plan
- Water Management Plan
- Spill Prevention and Response Plan
- Hazardous Material Management Plan
- Waste Management Template.

2.0 LEGAL AND OTHER REQUIREMENTS

Legal and other requirements applicable to this plan are identified in Attachment 1.

3.0 SURVEYS

No surveys are required for the Waste Management Plan.

4.0 MANAGEMENT AND MONITORING

Table 1 presents a summary of the potential impacts associated with wastes, together with mitigation and management measures to avoid or reduce these impacts.

Contractor shall develop a Waste Management Plan, which will as a minimum incorporate the measures described in Table 1 but shall not be limited to these measures.

Due to differing scopes of work and work locations, not all management and mitigation measures in the Waste Management Plan are applicable to all Contractors. Company's Environmental and Social Mitigation Register defines which management and mitigation measures are applicable to each Contract scope of work.

Contractor's Waste Management Plan shall be developed in accordance with Company's Waste Management Template, included as Attachment 2.

In Table 1, any mitigation and management commitments that were contained in the PNG LNG Project Environmental Impact Statement (EIS) are identified by a code commencing with an 'M' in the 'Mitigation Item Reference Number' column. Some mitigation measures have been reworded to provide further clarity or more detailed information regarding required measures. In these instances, the code is displayed in italics, and these reworded measures supersede what is in the EIS.

Other mitigation and management commitments required by Company are identified in Table 1 with a code commencing with an 'A'.

Monitoring required as part of the Waste Management Plan is also described in Table 1.

Contractor shall develop site-specific procedures for the monitoring program, to be agreed by Company.

Contractor shall undertake waste tracking and reporting to provide data on all waste amounts from generation through to disposal and enable early response to waste management infrastructure requirements. Waste parameters to be recorded are:

- Origin/location
- Type/quantity
- Date generated/identification number
- Storage/containment/treatment
- Transportation method
- Location of waste at any one time
- Disposal method.

Table 1: Management and Monitoring

Table 1: Management and Monitoring						
Source of Impact	Potential Impact and Relevant Management Plan Objective[†]	Mitigation and Management (Design Feature/Specific Measure)	Mitigation Item Reference Number	Monitoring	Monitoring Frequency	Responsibility
Inappropriate waste management and disposal	Soil, groundwater, surface water and marine water contamination, ambient air quality impact (Objectives 1, 2)	Establish appropriate processes for material, handling (receipt, unloading), storage, transportation and disposal (including recycling/reuse options), including establishment of a waste inventory and details in relation to waste minimization, separation and tracking through to final disposal, as described and required in Attachment 2: Company Waste Management Plan Template.	M95, M101, M103	Verification	Prior to construction	Contractor
		Adopt and enforce strict Duty of Care procedures, whereby a waste producer has a duty to ensure that a waste is properly managed even if, and after that waste has been transferred to a third party. Transfer of Project waste to third party facilities shall be avoided and shall be considered only as an interim measure on an exception basis. Where it is necessary to utilize a third party facility, an audit shall be undertaken of that facility and it may only be utilized following submission of a satisfactory audit report to Company and with Company's prior written approval.	A13	Verification	Prior to construction	Contractor
		Design marine outfall to ensure adequate dispersion of desalination brine to comply with environment (waste discharge) permit conditions.	M205	Verification	Once-off prior to Construction	Contractor
		Track all wastes to be disposed or recycled.	M98, M181	Waste tracking and reporting	Ongoing	Contractor
		Combustible wastes will be incinerated at	M128	Verification	Ongoing	Contractor

Table 1: Management and Monitoring						
Source of Impact	Potential Impact and Relevant Management Plan Objective†	Mitigation and Management (Design Feature/Specific Measure)	Mitigation Item Reference Number	Monitoring	Monitoring Frequency	Responsibility
		project-specified sites (see Air Emissions Management Plan PGGP-EH-SPENV-000018-004 for details). Control procedures shall be implemented so that only wastes that can be effectively combusted are incinerated. Control systems shall be in place to prevent feeding of restricted waste to the incinerator when operating conditions deviate from the acceptable range (e.g., during startup and shutdown or upset conditions).				
		Incinerate combustible waste and dispose of ash to Company approved landfills or as agreed with Company (see Air Emissions Management Plan PGGP-EH-SPENV-000018-004 for details).	<i>M97</i>	Waste tracking and reporting	Ongoing	Contractor
		Manage sewage in an appropriate manner to limit environmental contamination and protect human health.	<i>M96</i>	Waste tracking and reporting	Ongoing	Contractor
		Dispose of waste into Project designated and Company approved waste facilities. Prohibit disposal of any waste into forest, streams or sinkholes.	<i>M92</i>	Waste tracking and reporting	Ongoing	Contractor
		Dispose of wastes from RoWs and access ways construction activities (not spoil or timber) and camps (including the drilling camp) away from Hides Ridge.	<i>M94</i>	Waste tracking and reporting	Ongoing	Contractor
		Treat and dispose of biological, pharmaceutical and medical wastes using appropriate technologies. This includes use of special containers, segregation and handling	<i>M132</i>	Waste tracking and reporting	Ongoing	Contractor

Table 1: Management and Monitoring						
Source of Impact	Potential Impact and Relevant Management Plan Objective†	Mitigation and Management (Design Feature/Specific Measure)	Mitigation Item Reference Number	Monitoring	Monitoring Frequency	Responsibility
		procedures.				
Brine water and process/sanitary water from marine outfall	Saline water or contaminated water (Objectives 1, 2)	Consider discharging wastewater and brine in the same vicinity to assist with salinity dilution.	M206	N/A	N/A	Contractor
		Treated effluent will be treated as necessary to meet the effluent criteria established in Company's Environment Permit prior to discharge.	M219	N/A	N/A	Contractor
Camp waste disposal	Habitat degradation to sinkhole swamps. Soil, groundwater and surface water contamination, health and safety. (Objectives 1, 2)	Manage sewage in an appropriate manner to limit environmental contamination and protect human health.	M96	Verification	Ongoing	Contractor
		Operate sewage treatment plant(s) in accordance with the manufacturer's specifications and comply with the conditions of discharge quality (including disinfection) specified in Company's Environment Permit and any other relevant permits (see Water Management Plan).	M133	Verification	Ongoing	Contractor
Wellpad preparation and drilling at Hides Ridge	Soil, groundwater and surface water contamination, health and safety (Objectives 1, 2)	Dispose of drilling fluids, drilling cuttings and other drilling materials in an appropriate manner away from Hides Ridge.	M93	Waste tracking and reporting	Ongoing	Contractor
Drilling on Hides Ridge	Water contamination (Objectives 1, 2)	Well development waters will be captured within a closed system and be managed via alternative methods of disposal, including downhole injection where practicable.	M126	Verification	Ongoing	Contractor
		Wastewater streams associated with drilling, such as drilling fluids and completion fluids will be managed to limit environmental impact. Methods of disposal to include discharge in	M127	Verification	Ongoing	Contractor

Table 1: Management and Monitoring						
Source of Impact	Potential Impact and Relevant Management Plan Objective[†]	Mitigation and Management (Design Feature/Specific Measure)	Mitigation Item Reference Number	Monitoring	Monitoring Frequency	Responsibility
		accordance with permit requirements, and/or downhole injection as appropriate.				
Drilling at watercourse crossings	Soil, groundwater and surface water contamination, health and safety (Objectives 1, 2)	For watercourse crossings at which horizontal directional drilling techniques are used, implement a drilling fluids and cuttings management system, including drill cuttings settlement and slurry containment pits to limit environmental impacts to the surrounding area.	<i>M144</i>	Verification	Ongoing	Contractor

[†] See Section 1.

5.0 ROLES AND RESPONSIBILITIES

Wastes generated during construction are considered to be owned by Company, with the exception of materials to be returned to suppliers by Contractor and materials released by Contractor to third parties for reuse, recycling or disposal.

Project facilities shall be used for the management and disposal of Project wastes (including material for recycling and wastewater). Transfer of Project waste to third party facilities shall be avoided and shall be accepted by Company only as an interim measure on an exception basis. Where it is necessary to utilise a third party facility, an audit shall be undertaken of that facility and such facility may only be utilised following submission of a satisfactory audit report to Company and with Company's prior written approval.

Contractor shall be responsible for appropriate collection, segregation, treatment, and transfer of solid wastes to the Waste Management Areas, and for appropriate processing and disposal of the wastes upon acceptance to the Waste Management Areas.

Waste Management Areas shall be operated by personnel qualified by training and experience to perform the required waste management functions.

Contractor shall ensure sufficient resources are allocated on an ongoing basis to achieve effective implementation of the Waste Management Plan.

Contractor's Waste Management Plan shall describe the resources allocated to and responsible for the execution of each task and requirement contained therein, and shall describe how roles and responsibilities are communicated to relevant personnel.

Company shall ensure sufficient resources are allocated on an ongoing basis to achieve effective implementation of Company's responsibilities in the Waste Management Plan.

6.0 TRAINING, AWARENESS AND COMPETENCY

Contractor shall ensure that all personnel responsible for the execution of the tasks and requirements contained within the Waste Management Plan are competent on the basis of education, training and experience.

Contractor's Waste Management Plan shall describe the training and awareness requirements necessary for its effective implementation.

Contractor's training activity associated with the Waste Management Plan shall be appropriately documented by means of a training needs assessment, training matrix/plan and records of training undertaken.

Company shall ensure that all Company personnel responsible for the execution of Company's tasks and requirements in the Waste Management Plan are competent on the basis of education, training and experience.

Company's training activity associated with the Waste Management Plan shall be appropriately documented by means of a training needs assessment, training matrix/plan and records of training undertaken.

7.0 PERFORMANCE INDICATORS

Table 2 outlines indicators for measuring and verifying performance in relation to the Waste Management Plan.

Table 2: Performance Indicators

ID #	Performance Indicator	Measurement	Internal Assessment Frequency	Relevant Management Plan Objective [†]
1	All waste going to facilities approved by Company	Waste Tracking Forms	Quarterly	1, 2
Performance Indicators are to be further developed and agreed between Company and Contractor				

[†] See Section 1.

8.0 REPORTING AND NOTIFICATION

Contractor's monthly report to Company shall include:

- Number and results of verification inspections prescribed in Table 1
- Waste tracking reports (all wastes)
- Waste source
- Waste type
- Waste storage quantities/volumes and locations
- Waste treatment methods
- Waste disposition volumes and locations
- Performance Indicators as applicable in the reporting period.

Waste calculation methodology and reporting format will be developed and provided by Company.

Additional reporting and notification as may be prescribed in Attachment 2: Construction Waste Management Template.

Attachment 1: Legal and Other Requirements

LEGAL AND OTHER REQUIREMENTS

Contractor shall comply with applicable Papua New Guinea Laws and Regulations, applicable International Finance Institution (IFI) requirements and International Treaties and Conventions (where applicable).

Papua New Guinea Laws and Regulations

The Environment Act 2000 contains numerous provisions that promote environmental protection, regulate environmental impacts associated with development activities, and safeguard the life supporting capacity of air, water land and ecosystems. This Act also hosts the Environment (Water Quality Criteria) Regulation (2002) and specifically Schedule 1: Water Criteria for Aquatic Life Protection. It also provides for Environmental Codes of Practice (Section 38) and in this respect the Environmental Code of Practice for Sanitary Landfill Sites PNG 2001 is relevant to this Management Plan.

The Public Health Act 1973 hosts the Public Health (Drinking Water) Regulation (1984) and specifically the following schedules:

- Schedule 1 Standards for Raw Water
- Schedule 2 Standards for Drinking Water
- Schedule 3 Water Sampling for Community Water Supply Systems Monitoring Requirements for Bacteriological Analysis

Both the Environment (Water Quality Criteria) Regulation (2002) and Public Health (Drinking Water) Regulation (1984) are potentially relevant to this Plan since water can serve as a transport medium for waste, and therefore a conduit to communities and other sensitive receptors. The inherent properties of water can also be adversely affected as a result of poor or ineffective waste management practices.

The Oil and Gas Act (s. 87(c) and s. 124(f)) directly address waste issues.

International Financial Institution Requirements

The following International Finance Corporation (IFC) Performance Standards are applicable to construction waste management:

- IFC Performance Standard 1: *Social and Environmental Assessment and Management System*, which establishes requirements for assessment, management, organizational capability, training, community engagement, monitoring, and reporting.
- IFC Performance Standard 3 and Guidance Note 3 deal with Pollution Prevention and Abatement and include provisions in relation to waste management. IFC Performance Standard 3 contains the following provisions:
 - “The client will avoid or minimize the generation of hazardous and non-hazardous waste materials as far as practicable. Where waste generation cannot be avoided but has been minimized, the client will recover and reuse waste; where waste can not be recovered or reused, the client will treat, destroy, and dispose of it in an environmentally sound manner. If the generated waste is considered hazardous,¹ the client will explore commercially reasonable alternatives for its environmentally sound disposal

¹ As defined by local legislation or international conventions.

considering the limitations applicable to its transboundary movement.² When waste disposal is conducted by third parties, the client will use contractors that are reputable and legitimate enterprises licensed by the relevant regulatory agencies”.

- “Because of the risks to the environment and the ever-increasing costs and liabilities associated with the management and disposal of waste material, Performance Standard 3 requires clients to investigate options for waste avoidance, waste recovery and waste disposal during the operational stage of the project. The level of effort in addressing this requirement depends on the risks associated with the waste materials generated by a project. Clients should reasonably inquire about the location of the final disposal of their waste, even if the disposal is conducted by a third party, and especially if the waste is considered to be hazardous to human health and the environment. If no suitable disposal method is available through commercial or other means, the client should develop their own recovery or disposal facilities or work through their local business association or other similar entity to identify viable alternatives or approaches”.
- “In cases where the waste treatment, storage, or disposal alternative selected has the potential to generate polluting emissions, the client should apply adequate control techniques to avoid, minimize or reduce these emissions according to the requirements of paragraphs 4, 10 and 11 of Performance Standard 3.
- IFC Performance Standard 4: Community Health, Safety and Security, which requires Projects to avoid or minimize adverse impacts on soil, water, and other natural resources in use by affected communities. IFC Performance Standard 4 contains some general provisions relating to community risks and these are relevant to waste management:
 - “The client will evaluate the risks and impacts to the health and safety of the affected community during the design, construction, operation, and decommissioning of the project and will establish preventive measures to address them in a manner commensurate with the identified risks and impacts. These measures will favor the prevention or avoidance of risks and impacts over minimization and reduction”.
 - “Where the project poses risks to or adverse impacts on the health and safety of affected communities, the client will disclose the Action Plan and any other relevant project-related information to enable the affected communities and relevant government agencies to understand these risks and impacts, and will engage the affected communities and agencies on an ongoing basis consistent with the requirements of Performance Standard 1”.

² Consistent with the objectives of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes

The following IFC Guidelines are applicable to construction waste management. Contractor shall meet the intent of these guidelines:

- IFC EHS *General Guidelines* (April 2007), Section 1.6 and Section 6
- IFC EHS Guidelines, *Industry Sector Guidelines, Waste Management Facilities*
- IFC EHS Guidelines, *Industry Sector Guidelines, Offshore Oil and Gas*
- IFC EHS Guidelines, *Industry Sector Guidelines, Onshore Oil and Gas*
- IFC EHS Guidelines, *Industry Sector Guidelines, Shipping*
- IFC EHS Guidelines, *Industry Sector Guidelines, Ports and Harbours*

Other Requirements

Refer to the Air Emissions Management Plan PGGP-EH-SPENV-000018-004 for requirements relating to the monitoring of emissions from incinerators during construction.

Attachment 2: Construction Waste Management Template

See separate document

Esso Highlands Limited



Papua New Guinea LNG Project

**Environmental and Social Management Plan
Appendix 4: Waste Management Plan
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Attachment 2: Construction Waste
Management Template**

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Acronyms and Abbreviations:

cm	Centimeter
CWMT	Construction Waste Management Template
DEC	Department of Environment and Conservation
DPE	Department of Petroleum and Energy
EHL	Esso Highlands Limited
EHS	Environmental Health and Safety
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
ha	Hectare
IFC	International Finance Corporation
km	Kilometer
L/p-d	Liters per person per day
LNG	Liquefied natural gas
tonne	Metric ton
m ³	Cubic meter
PEMP	Preliminary Environmental Management Plan
PNG	Papua New Guinea
SEIA	Social and Environmental Impact Assessment
SHES	Safety, Health, Environment and Security
WMA	Waste Management Area
WMP	Waste Management Plan

1.0 OUTCOMES

Appropriate and prudent management of wastes associated with the construction phase of the Papua New Guinea Liquefied Natural Gas (PNG LNG) Project (the Project).

Reduce impacts on soil, vegetation, biota, water sources, air quality, and visual amenity.

1.1 Inclusions & Exclusions

This Construction Waste Management Template (CWMT) addresses handling of both solid and liquid waste anticipated from Project construction.

Not included within the scope of this CWMT are emissions to air, storm water management practices in general (except for aspects of segregation and discharge), hydrotest, discharge of brine from seawater desalination and dredge spoil disposal.

This CWMT does not address operations, but does identify areas of potential synergy for continued use of waste management facilities developed during construction.

2.0 LEGAL AND OTHER REQUIREMENTS

2.1 General Framework

This section describes the key applicable laws and regulations, International Financial Institution (IFI) requirements and international treaties and conventions which govern waste management activities for the Project.

Waste will be generally managed through new Project dedicated waste management facilities due to the lack of suitable waste management facilities currently available in the Project Area.

All waste management should be designed and executed such that impacts to the environment meet environmental design and discharge requirements of relevant laws and regulations, IFI requirements, international treaties and conventions as applicable, commitments made in the PNG LNG Project Environmental Impact Statement January 2009 (the EIS) and conditions of the associated Environment Permit.

In the absence of PNG laws and regulations related to a specific topic, appropriate and responsible standards, best practices, and/or procedures will be applied.

2.2 PNG LNG Waste Management Philosophy

It is a Company expectation that the first step in the waste management process is the development of a Waste Management Philosophy.

The PNG LNG Project Waste Management Philosophy (Esso Highlands Limited 2008) provides expectations and guidelines for waste management contractors involved with the Project and related plans. Significant elements of this document are as follows:

- Self sufficiency regarding waste management processes, procedures, and facilities.
- Waste management documentation to include a Waste Management Study, a Company Waste Management Plan (WMP) and separate WMP documents for each Contractor detailing execution of waste management.
- Implementation of the waste management hierarchy (in descending order): avoidance, reduction, reuse, recycling, treatment, and disposal.

2.3 Waste Management Facilities Review Process

Company has internal waste management facilities review requirements which must be followed to ensure that facilities operated by third party waste management companies handling certain Company wastes are evaluated, approved and managed with regard to the potential safety, health, and environmental impacts of their operations.

The process requirements take into account the level of risk associated with hazards of the waste, the technology used, and the operation of the facility itself.

Company intends that the Project be self-sufficient in waste management. However, limited off-site disposition of some wastes may become necessary and appropriate to meet Company objectives of re-use and recycling of non-restricted wastes, as well as management of certain restricted wastes. Company shall follow its internal waste management facilities review requirements (Tier II / Tier III Waste Management Facilities Review Process) in such situations involving disposition of any Company wastes to non Project facilities.

2.4 Papua New Guinea Laws and Regulations

Papua New Guinea laws and regulations that have relevance to the Project construction waste management program include:

- Environment Act 2000:
The principal legislation related to the environmental effects of projects in PNG is the Environmental Act 2000, administered by the Department of Environment and Conservation (DEC).
- Environmental Code of Practice for Sanitary Landfill Sites Papua New Guinea 2001:
The requirements of the Code apply to facilities on public and private land. Under the Code, Class 1 refers to facilities which have the capacity to treat special waste. Class 3 facilities refer to facilities, which are managed privately by institutions, companies and individuals and not serviced by municipal authorities. The Project will be managed privately and be capable of receiving and treating special waste. The requirements of the Environmental Code of Practice for Sanitary Landfill sites are administered by the PNG Department of Environment and Conservation. Aspects of the Code that will be considered by the Project in the design, construction, operations and closure of the Project landfill include direction of site selection, capacity, hydro-geological features, environmental, safety and health risks and compatibility with surrounding land uses.

2.5 International Financial Institution Requirements

The International Finance Corporation (IFC) has developed eight performance standards and complementary guidance notes that set out the requirements that a project must meet to receive IFC financial support (IFC, 2006a).

In addition to the performance standards and associated guidance notes, IFC has developed Environmental, Health and Safety (EHS) Guidelines that serve as a technical reference to support implementation.

The EHS Guidelines provide guidance to waste management practices during construction are described below:

- IFC's Policy and Performance Standards on Social and Environmental Sustainability (IFC, 2006)
- Environmental, Health, and Safety General Guidelines (IFC, 2007a)
- Environmental, Health, and Safety Guidelines for Construction Materials Extraction (IFC, 2007b)
- Environmental, Health, and Safety Guidelines for Crude Oil and Petroleum Product Terminals (IFC, 2007c)
- Environmental, Health, and Safety Guidelines for Liquefied Natural Gas (LNG) Facilities (IFC, 2007d)
- Environmental, Health, and Safety Guidelines for Waste Management Facilities (IFC, 2007e)
- IFC's Guidance Notes: Performance Standards on Social and Environment Sustainability (IFC, 2007f).

The Project will meet the intent of IFC guidelines to develop waste management guidance principles for the construction and operations phases.

The IFC states that the waste management processes and activities should:

- Establish waste management priorities at the outset of activities, based on an understanding of potential environmental, health, and safety risks and impacts and considering waste generation and its consequences
- Establish a waste management hierarchy that considers prevention, reduction, reuse, recovery, recycling, removal and finally disposal of wastes
- Avoid or minimize the generation of waste materials, as far as practicable
- Where waste generation cannot be avoided, but has been minimized, recover and reuse it
- Where waste cannot be recovered or reused, treat, destroy and dispose of it in an environmentally sound manner.

2.6 Permits for Waste Facilities

The principal authorization identified for Project construction waste management is the Environment Permit issued to Company in September 2009 in approval of the EIS and associated Application for an Environment Permit.

As such, the Environment Permit serves as an “umbrella permit” for waste management.

Licenses and permits to be acquired by Contractors for construction should not include waste or environmental aspects, unless facilities outside of what was described in the EIS are required.

Any waste facility development needed for construction in advance of the Environment Permit must be authorized by a separate permit.

Additional permits would be required in the case of export of waste from PNG, for example under the Waigani treaty.

3.0 WASTE STREAMS

Wastes to be produced during Project construction will include both solid and liquid waste. All wastes are to be managed in accordance with their “restricted” or “non-restricted” classifications.

Attachment A of this document provides definitions of “restricted” and “non-restricted” wastes, and

Attachment B of this document lists typical wastes occurring in these classifications.

Preliminary estimates of waste quantities that are expected to be generated during the construction phase are presented below.

3.1 Solid Wastes

3.1.1 Generating Processes

Solid wastes expected to be produced will result from construction activities and on-site workforce domestic camp and office operations. Combustible wastes are those amenable to treatment/volume reduction via incineration.

3.1.2 Estimated Quantities

The quantities of solid wastes will be dependent on the type of construction (plant, pipeline, etc.) and each Contractor’s scope of work and construction execution plan. Preliminary estimates of solid waste quantities have been prepared based on waste generation data available from similar construction projects. Preliminary estimates of solid waste quantities are presented in Table 1. These estimates are indicative only.

3.2 Liquid Wastes

Liquid wastes expected to be produced will typically fall within three categories:

- hydrocarbon-based liquid wastes
- chemical-based liquid wastes
- water-based liquid wastes

Water-based liquid wastes (wastewaters) can be further segregated as produced water, sanitary and non-sanitary, based on the activity that generated the wastewater (refer below).

Rainwater (or storm water) that comes into contact with construction areas is beyond the scope of this document. Refer to Company’s Water Management Plan (PGGP-EH-SPENV-000018-007).

3.2.1 Generating Processes

Hydrocarbon-based liquid wastes will be generated primarily from machinery refuelling and maintenance activities during the construction period, including change-out of engine, lube, gear and hydraulic oils for mobile light and heavy equipment and stationary engines (gensets). Additional liquid hydrocarbon wastes may come from incidental sources such as container residues, drum wash facilities, oil-water separators, bunding and containment facilities, and spill response activities involving liquid recovery.

Chemical-based liquid wastes will be generated from a variety of sources, anticipated to include, but not be limited to, container residues and drum washings, unused, spent and expired solvents and additives.

Wastewaters will be generated from construction activities and on-site workforce domestic camp and office operations. Sources of sanitary wastewater will primarily be from the water usage for domestic purposes (sinks, laundry, toilets, and showers) by on-site workforce in construction camps and office operations. Sources of non-sanitary wastewater will be from (process) sources: heating/cooling process for construction camps, hydro-test waters, fire-fighting water, washdown water/fluids, landfill leachates, equipment drains, vehicle and heavy equipment maintenance, etc.

Produced water wastes may be generated during the drilling and commissioning phases of the Project.

3.2.2 Estimated Quantities

The volume of hydrocarbon-based liquid wastes generated will be closely linked to mobile light and heavy equipment and stationary engine maintenance schedules.

The volume of hydrocarbon-based and chemical-based liquid wastes generated will vary depending on the fleet of equipment and the chemical products used by individual Contractors.

Sanitary wastewater treatment systems should be provided to accommodate a design flow of 360 L/day/person (95.1 gal/day/person). The volume of wastewater generated will vary with each stage of Contractor's activities.

The non-sanitary wastewater flow is anticipated to vary with each activity and stage of construction, and is not estimated here. However, wastewater treatment facilities should be designed and furnished commensurate with the anticipated construction activities such that no discharges of untreated or partially-treated wastewater becomes necessary. In addition, design should include provisions for peak-loading and upset conditions.

Table 1: PNG LNG Preliminary Estimates of Solid Waste Quantities

Waste Type	Classification	Combustibility	Drilling		Upstream		LNG Facilities		Disposal Method
			Volume (m ³)	Mass (tonnes)	Volume (m ³)	Mass (tonnes)	Volume (m ³)	Mass (tonnes)	
Non-restricted Wastes									
Soil (incl excess from clearing/grubbing)	Non-restricted	Non-combustible	NA	NA	NA	NA	919,800	442,000	Topsoil, overburden, and low-quality materials should be properly removed, segregated, stockpiled near the site, and preserved for rehabilitation. Contaminated Soil (Oily, TPH>1000ppm): Incineration followed by landfill in WMA. Land farming can be considered in larger volume cases. Contaminated Soil (Oily, TPH<1000ppm): Landfill in WMA.
Vegetation (incl excess from clearing/grubbing)	Non-restricted	Combustible	NA	NA	45,000	10,700	5,600	1,300	Topsoil, overburden, and low-quality materials should be properly removed, segregated, stockpiled near the site, and preserved for rehabilitation.
Glass	Non-restricted	Non-combustible	2	6	1,620	300	1	0.3	Landfill at WMA.
Scrap Metal (ferrous and nonferrous)	Non-restricted	Non-combustible	45	360	6,600	7,500	4,100	3,200	Landfill – Uncontaminated, unrecyclable scrap metal can be disposed of in the WMA landfill. Recycle – via local sources subject to Company approval.
Scrap Metal (drilling tubulars)	Non-restricted	Non-combustible	3,600	2,520	NA	NA	NA	NA	Landfill – Uncontaminated, unrecyclable scrap metal can be disposed of in the WMA landfill. Recycle – via local sources subject to Company approval.
Paper and Cardboard	Non-restricted	Combustible	1,300	150	12,000	1,100	2,300	200	Reuse/recycle to the maximum extent practical.
Plastic Materials	Non-restricted	Combustible	1,846	120	5,000	2,500	800	400	Uncontaminated (i.e., non-hazardous) non-reusable/ non-recyclable and non-halogenated plastic materials: incineration with combustible trash and/or compaction and direct landfill in WMA. Halogenated plastics (PVC, PTFE, etc.) should not be incinerated but may be directly land filled.
Plastic thread protectors (end caps)	Non-restricted	Combustible	150	60	NA	NA	NA	NA	Uncontaminated (i.e., non-hazardous) non-reusable/ non-recyclable and non-halogenated plastic materials: incineration with combustible trash and/or compaction and direct landfill in WMA. Halogenated plastics (PVC, PTFE, etc.) should not be incinerated but may be directly land filled.
Camp and Office Refuse	Non-restricted	Combustible	24,000	6,960	45,500	15,300	61,500	20,200	Incinerator and landfill at the WMA.
Sludge (wastewater, tank and vessel bottom waste, vehicle wash-down solids)	Non-restricted	Combustible	24,000	24,000	5,800	5,900	86,300	87,600	Incineration after dewatering and drying. Landfill – with approval from HSE Environment Group.
Timber (pallets, crates etc.)	Non-restricted	Combustible	1,080	540	tba	tba	tba	tba	Reuse/recycle to the maximum extent practical (includes gifting to community where practical).
Tires	Non-restricted	Combustible	60	24	3,200	320	350	35	Incineration. Tires are to be delivered to the WMA for storage for processing and incineration. Larger truck tires which are too big for the incinerator and which the Contractor does not want to reuse are to be cut with a tire cutter to a size amenable to incinerating.
Electrical parts, fittings, cable, electrodes	Non-restricted	Non-combustible	32	24	274	202	410	300	Landfill - Parts are to be stripped of any hazardous materials, then shredded before landfill disposal.
Empty metal containers (incl. drums etc)	Non-restricted	Non-combustible	240	72	600	24	1,100	103	<i>Containing non restricted materials:</i> Recycle - Drums in acceptable condition are to be returned to the supplier or drum recycling facilities in Port Moresby [subject to meeting Company acceptability criteria]. Bulk Containers - Use returnable bulk containers whenever possible. Reuse - Drums can be reused for storing the same product if in good condition. Metal drums may be used as trash containers once cleaned. Review annually for waste reduction efforts. <i>Containing restricted materials:</i> Recycle - Drums in acceptable condition are to be returned to the supplier or PNG drum recycling in Port Moresby. [Subject to meeting Company acceptability criteria]. Bulk Containers - Use returnable bulk containers whenever possible. Reuse - Drums can be reused for storing the same product if in good condition. Metal drums may be used as trash containers once cleaned. Review annually for waste reduction efforts.
Empty plastic containers	Non-restricted	Combustible	90	7	270	13	400	31	Uncontaminated (i.e., non-hazardous) non-reusable/ non-recyclable and non-halogenated plastic materials: incineration with combustible trash and/or compaction and direct landfill in WMA. Halogenated plastics (PVC, PTFE, etc.) should not be incinerated but may be directly land filled.
General Construction Debris	Non-restricted	Non-combustible	482	240	49,800	13,000	15,200	4,900	Incineration at the WMA. PVC or other chlorinated materials should not be incinerated in domestic garbage incinerators. Heavy plastics are to be incinerated in the high-temperature incinerator. Ash is to be disposed of in WMA landfill. Recycle should be the first priority for wood.
Restricted Wastes									
Empty Gas Cylinders	Restricted	Non-combustible	120	60	10,500	2,500	42	10	No disposal – Empty gas cylinders: return to supplier(s) for refilling.
Engine oil filters (spent)	Restricted	Combustible	5	2	400	120	10	3	Incineration of drained, crushed filters. Landfill of residue in WMA landfill.
Air filters (spent)	Restricted	Combustible	5	2	540	162	160	48	Incineration of drained, crushed filters. Landfill of residue in WMA landfill.
Batteries - spent motor vehicle	Restricted	Non-combustible	4	5	34	131	3	12	Acid solution should be removed from used/spent lead acid batteries and properly managed as an acidic solution via the WMA wastewater management system. Recycle: Large batteries may be returned to PNG Metals Recycling in Port Moresby subject to approval by Company. Landfill: Neutralize drained battery fluid. Small batteries from flash-flights will be containerized, stabilized and landfilled.

Waste Type	Classification	Combustibility	Drilling		Upstream		LNG Facilities		Disposal Method
			Volume (m ³)	Mass (tonnes)	Volume (m ³)	Mass (tonnes)	Volume (m ³)	Mass (tonnes)	
Medical Waste	Restricted	Combustible	0.1	0.3	200	24	40	5	Incineration: Waste shall be stored at the clinics or in a hazardous waste storage area/facility at the WMA until sufficient quantities are ready for disposal. One member of the medical staff and one Contractor SHES Group representative are required to observe incineration.
Oil, spent lube	Restricted	Combustible	216	216	3,150	2,700	90	78	Incineration at the WMA. Recycle – Used oils may be recycled via Port Moresby refinery subject to Company approval.
Paint Waste	Restricted	Combustible	6	6	880	800	8	7	Incinerate (including containers) at the WMA.
Unused, spent, expired, contaminated solvents, chemicals and additives	Restricted	Combustible	6	6	14	9	2	2	Recycle. Hydrocarbon-based products may be recycled via the local crude oil refinery in Port Moresby, subject to Company approval. Incineration: Some waste streams, including their containers may be incinerated via the WMA incinerator.
Miscellaneous Restricted	Restricted	Combustible	6	12	45,400	5,400	17	2	
Drilling fluids	Restricted	Non-combustible	30,000	30,000	NA	NA	NA	NA	TBD
Drilling brines	Restricted	Non-combustible	960	960	NA	NA	NA	NA	TBD
Drilling cuttings	Restricted	Non-combustible	1,392	672	NA	NA	NA	NA	TBD
Totals			89,647	67,024	236,782	68,703	1,098,232	560,436	

4.0 WASTE MANAGEMENT

4.1 General Approach

The general approach for waste management during Project construction is to:

- Follow a systematic program that applies the waste management hierarchy to reasonably minimize wastes requiring disposal (Section 5.2). This program shall include monitoring equipment performance and regular scheduled maintenance programs to provide optimum performance and minimize waste generation.
- Manage waste on-site: Transfer of Project waste (including material for recycling and wastewater) to third party facilities shall be avoided and shall be considered only as an interim measure on an exception basis. Where it is necessary to utilize a third party facility, an audit shall be undertaken of that facility and it may only be utilized following submission of a satisfactory audit report to Company and with Company's prior written approval.
- Establish facilities and procedures appropriate to prudently manage wastes requiring disposal on-site in accordance with applicable standards.

4.1.1 Solid Wastes

Solid wastes will be managed pursuant as follows:

- Segregation by classification (restricted/non-restricted)
- Labelling, storage, containerization, and conveyance to facilitate designated treatment and ultimate disposal
- Volume reduction (shredding, compaction, etc.)
- Incineration for combustible wastes
- Spoils area for clearing & grubbing material
- Engineered landfill for non-combustible waste and treatment residues.

4.1.2 Liquid Wastes

4.1.2.1 Hydrocarbon-based Liquid Wastes

Hydrocarbon-based liquid wastes will be managed as follows:

- Collection in designated containers and / or purpose built facilities (ie. sumps, bunds)
- Classification and labelling as restricted waste
- Containerization and temporary storage in a manner that minimises potential for uncontrolled release to the environment
- Conveyance to storage and/or disposal locations in a manner that minimises potential for uncontrolled release to the environment
- Volume reduction through routing and treatment in an oil-water separator
- Incineration
- Recycling/reuse where practicable.

4.1.2.2 Chemical-based Liquid Wastes

Chemical-based liquid wastes will be managed as follows:

- Identification of the material and establishment of clear understanding of the specific handling properties of the waste
- Where the waste is unknown, undertake sampling and testing of the waste to obtain data for use in classifying the waste
- Collection in designated containers, and attachment of a copy of the Material Safety Data Sheet
- Classification and labelling as restricted waste
- Containerization and temporary storage in a manner consistent with MSDS requirements, and that minimises potential for uncontrolled release to the environment
- Conveyance to storage and/or disposal locations in a manner that minimises potential for uncontrolled release to the environment
- Return to product supplier where possible and practicable
- Volume reduction and recycling by combining with waste hydrocarbon stream (generally only solvents and glycol-based products), check MSDS for compatibility
- Incineration where practicable.

4.1.2.3 Wastewater

Wastewater will be managed as follows:

- Liquid effluent collection via a system of drains segregated by flow source.
 - Sanitary flows
 - Non-sanitary flows
- Hydrostatic test water will be disposed in a manner that minimizes the impact on environment, as detailed in Company's Hydrotest Management Plan.
- Routing and treatment through wastewater treatment units and retention pond. All wastewater units associated with temporary construction activity will generally also be temporary. All wastewater treatment should be accomplished in above-grade packaged plant type units. Ponds (any land-based units) may only be used for treated effluent or uncontaminated storm water retention and their use is discouraged due to malaria risk.
- Effluent discharge monitoring for compliance with discharge limits established via the Project Environment Permit pursuant to applicable effluent guidelines (see Section 6.3.2).
- Waste sludge shall be incinerated after dewatering as much as practicable.

4.1.2.4 Produced Water

Produced water will be injected to appropriate deep subsurface strata.

4.1.3 Waste Management Areas

Following generation and storage, wastes should be conveyed to designated Waste Management Areas (WMA). Waste Management Areas should be secured, controlled, and operated by personnel trained to perform the functions of the Area.

For solid wastes, management should be accomplished within a network of WMAs. These WMAs should be designated by Contractor for storage (only), or storage + treatment, or storage/treatment/disposal.

For restricted wastes, WMAs should be provided for satellite storage and be lined, capable of containing any potential spills. For non-restricted wastes, satellite storage may be accomplished outside of WMAs with appropriate containers (drums, dumpsters, etc).

4.1.4 Interim Waste Management

During construction, interim short-term waste management procedures and facilities should be utilized as necessary pending development of construction-phase facilities and/or permanent facilities.

Interim waste management should be specifically addressed by Contractors in their project WMPs.

Interim measures include:

- Use of burn pit/landfill or incinerators for combustibles and food wastes, such as utilized by the Early Works survey camp.
- Containerized storage of restricted wastes in secured, drainage-controlled WMAs, pending final disposal;
- Construction of an interim WMA providing incineration for combustibles, landfill for non-restricted wastes, and storage of restricted wastes.
- Sanitary wastewater treatment capability (e.g., skid-mounted or trailer-mounted package plants) commensurate with maximum camp population capacity.

4.1.5 Waste Management for Linear Infrastructure Construction

Construction of linear infrastructure (pipelines, roads, power lines) limits the ability to practicably treat and dispose of wastes.

Wastewater production will generally be limited to raw sanitary waste. Solid wastes types will vary with the type of construction.

All waste should generally be collected and stored in satellite accumulation areas (as discussed in 4.1.3) and transported to a WMA for treatment and disposal.

Interim waste management measures (Section 4.1.4) may be employed as necessary, especially in remote areas with access constraints.

4.2 **Waste Management Process**

The waste management process should include procedures to accomplish the following:

- Manage waste in accordance with the principles of avoid, reduce, reuse, recycle and appropriate disposal.
- Limit the risk of incidents, such as fuel/chemical spills that may cause nuisance or harm to the environment.
- Manage the disposal of waste in accordance with applicable guidelines and standards.

Wastewater management should include the following procedures and practices:

- Water-use efficiency to reduce the amount of wastewater generation, including re-use of hydrostatic test water,
- Process optimization, including waste minimization, and reducing the use of hazardous materials to reduce the load of pollutants requiring treatment, and
- Application of wastewater treatment technologies to reduce the load of contaminants to acceptable levels prior to discharge, minimizing residuals generation (sludge) and minimizing potential impacts of cross-media transfer of contaminants during treatment (e.g., from water to air or land).

4.2.1 Source Reduction, Waste Minimization, and Recycling

Products Used/Purchased

Use of materials that will produce unwanted and/or restricted waste should be avoided. To this end, certain substances may be banned for use on Project sites. Refer also to Company's PGGP-EH-SPENV-000018-009).

Chemicals and substances to avoid, and suggested safer alternatives, are listed below in Table 2.

However, if reasonable alternatives do not exist for certain applications, a deviation from this requirement may be requested from Company.

Such requests should address subsequent waste handling and disposal.

Table 2: Prohibited Substances

Prohibited Substance	Alternatives
Polychlorinated Biphenyls (PCBs)	Silicones, esters, cast resin.
Asbestos	Non-asbestos containing materials.
Pentachlorophenol (PCP) and formaldehyde (biocides)	Glutaraldehyde, Isothiazolin (or other low-toxicity biocides).
Chlorofluorocarbons (CFCs)	Depends on use. Documents that list accepted alternatives for various uses are shown below. Links below provide CFC alternatives list. http://www.epa.gov/ozone/title6/snap/lists/index.html and CFR reference, 40 CFR 82 Subpart G Appendices. http://www.uneptie.org/Ozonaction/library/tech/tradename/main.html
Lead-based coatings, primers, and paints	Unleaded coatings, primers, and paints. Also, water-based or low-volatility solvent formulations.
Chlorinated solvents (e.g., carbon tetrachloride, 1,1,1-trichloroethane, trichloroethylene)	Non-chlorinated hydrocarbon-based solvents, steam cleaning. http://www.epa.gov/ozone/title6/snap/lists/index.html
Heavy metals (in reverse emulsion breakers, and grit blast)	Polymer (non-latex)-based formulation, low metals concentration barite and grit blast.
Mercury (in pressure-measuring devices/instrumentation)	Differential pressure cells/transmitters, pneumatic or electric instrumentation.
Fluorescent lights containing Mercury	Mercury-free fluorescent lights
Lead naphthenate (lubricant)	Lead-free lubricants.
Leaded thread compound	Lead-free thread compounds such as Bestolife 2000 (for tubing and casing).
Chromate corrosion inhibitors	Sulfite or organic phosphate corrosion inhibitors, especially those with reduced toxicity amine function.
High-phosphate laundry detergent	Low-phosphate or phosphate free laundry detergents

4.2.2 Source Reduction Techniques

Construction processes should be planned and executed to prevent, or minimize, the quantities of wastes generated and hazards associated with the wastes generated in accordance with the following strategy:

- Substituting raw materials or inputs with less hazardous or toxic materials or with those where processing generates lower waste volumes
- Instituting good housekeeping practices, including material acquisition and inventory control to avoid waste resulting from materials that are out-of-date, off specification, contaminated, damaged, or excess to project needs
- Instituting procurement measures that recognize opportunities to return usable materials such as containers and which prevents the over ordering of materials
- Minimizing restricted waste generation by implementing stringent waste segregation to prevent the commingling of non-restricted and restricted waste to be managed.

4.2.3 Methods (Reuse, Returning to Suppliers)

Material and equipment acquisition should seek to reduce waste generation through the implementation of supplier-return agreements. Where feasible, supplier agreement should be sought to specifically include the collection of used items. Such items are not considered to enter the waste stream. This option should include specific agreement for the supplier to handle returned items responsibly.

Recycling

Recycling procedures should encompass the following elements:

- Evaluation of waste production processes and identification of potentially recyclable materials
- Identification and recycling of products that can be reintroduced into the construction process or related activities at the site
- Investigation and audit of external markets for recycling by other industrial processing operations located in the neighbourhood or region of the facility (e.g., waste exchange)
- Establishment of recycling objectives and formal tracking of waste generation and recycling rates
- Provision of training and incentives to employees in order to meet objectives.

4.2.4 Tracking and Documentation

Procedures should be established and followed to track the types of wastes generated and the designated sequential handling steps followed to manage the wastes from the point (area) of generation through collection, storage, treatment, and final disposal.

A complete waste inventory should be developed and maintained as an element of each WMP. Also, waste-specific management procedures should be established for each waste stream.

Attachment C provides preliminary waste-specific management requirements for most solid and liquid wastes anticipated. Contractor WMPs should address each waste and include optimal management methods specific to their scope of work and phase of construction.

Procedures need to provide for on and off-site waste tracking to record, for each waste generated and managed, the:

- Quantity of each waste stream generated
- Handling and disposal method(s) used, and
- Ultimate disposition (e.g., specific landfill, off-site recycle and location).

For all offsite wastes movement, a waste tracking form should be used. An example is provided in Attachment D. The tracking form will record appropriate information about each waste stream and enable control of the waste disposition by confirming receipt by the designated recipient.

Thus, the tracking form is to be used for control and documentation of off-site waste disposal.

Data from waste handling activities and waste tracking forms should be used to produce reports to document conformance with the management plan, including:

- Volume of each waste type generated by source and/or over time
- Volume of each waste type generated by location
- Volume and disposal methods used for each waste stream over time.

Contractor WMP documents should address how data will be maintained and evaluated periodically to identify trends and opportunities to improve waste management practices and waste minimization. This information shall be included in Contractor's monthly Construction Environmental Report to Company.

4.2.5 Segregation and Sampling

For many waste streams, material or process knowledge may be adequate to classify the waste as restricted or non-restricted without the need for sampling. If information available is not sufficient or is inconclusive, sampling of the waste should be undertaken to obtain data for use in classifying the waste. Sampling and testing should be used to:

- Obtain data to properly classify the waste and support the appropriate management and disposal/recycle of the waste
- Ensure that wastes that are discharged to the environment meet applicable environmental standards
- Measure whether treatment/reclamation targets have been met.

4.2.6 Waste Storage and Containerization

Storage units should be designated according to waste type considering:

- Quantity
- Composition
- Classification
- Storage time.

The following management practices for containers should be followed, as appropriate:

- Storage areas for restricted wastes should be built with secondary containment to isolate wastes from the ground surface and prevent rainfall run-on or run-off. Restricted waste storage areas where more than 220 L of liquid wastes are stored should provide secondary containment capacity of 110% of the largest container volume, or 25% of the total storage capacity (whichever is greater).

- Wastes should be stored in containers that are in good condition (i.e., no apparent structural defects).
- Wastes should be stored in containers that are compatible with the waste (i.e., the waste will not react with the container and impair its ability to contain the waste).
- Waste containers should be kept closed (e.g., bungs in drums, covers or tarps over roll-off bins, etc.) unless waste is being added to or removed from the container.
- Areas should be designated to segregate full waste containers and empty containers.
- Liquid waste containers should be stored in single layers (not stacked).
- Containers holding wastes should be inspected periodically for damage or leaks and a written record kept of the inspection.
- Mixing different types of waste in the same container should be avoided if such mixing involves incompatible materials or makes it more difficult to dispose/recycle the waste.
- The void spaces in containers holding smaller liquid-containing items (e.g., Lab Packs) should be filled with an absorbent material that will absorb and not react with liquids, if released from their primary containers.
- Containers sent for landfill disposal should be filled with absorbent, as necessary; so that they are at least 90 percent full (no liquid disposal is allowed in landfills).
- Containers should be stored in a manner that limits the ability of spilled material to migrate downward and laterally. If earthen structures are used, they should have a suitable bottom (e.g., synthetic liner) and berms to provide secondary containment. Non-earthen devices can include concrete or metal catch pans or pre-manufactured secondary containment units. The base material should be designed to support, and not be damaged by, the weight of the containers, when full, and that of any equipment or vehicles that may be used to load/unload the containers.
- Containers holding waste should be protected from the weather (e.g., rain and wind) to help maintain the integrity of the container and reduce the potential for a spill. Such protection could include storage buildings, roofed areas, tarps, and plastic drum covers to keep water off the tops of the drums.
- Containers storing wastes should be labelled to provide information that facilitates the safe and proper management of the waste, including:
 - Name of the waste stream
 - Composition and physical state (e.g., solid, liquid, sludge) of the waste
 - Restricted properties of the waste (e.g. "Corrosive", "Ignitable", etc.)
 - Name of the activity, process, and/or location that generated the waste
 - Date the first waste entered the container.

4.2.7 Treatment

Waste treatment should be performed in accordance with waste-specific and unit-specific treatment plans. Contractor WMP documents should consider such issues as type and quantity of waste to be treated, the restricted constituents/characteristics to be treated, the target treatment levels, and the types of treatment that can be used to achieve the objectives.

Contractor WMP documents should then specify treatment procedures for each waste identified on the waste inventory (see Section 4.2.4).

Contractor WMP documents should incorporate unit-specific procedures, either expressly or by reference.

For example, a combustible waste stream may be designated for treatment via volume reduction and incineration, with residues to be disposed via landfill.

Unit specific procedures (i.e., shredder operations, incineration feed rates, etc.) may be delineated in operational procedures for those units.

4.2.8 Disposal

When a disposal option is suitable for a particular waste stream, the following factors will be considered when determining whether a technology is applicable:

- The types of wastes or waste components for which a technology offers a reduction of the waste stream's potential for undesired environmental or human health impact, or for which the disposal option is feasible
- General descriptions of each treatment or disposal option.

4.3 **Planned Discharges and Releases**

4.3.1 Solid Wastes

For solid wastes requiring disposal, potential adverse impacts on human health and the environment shall be minimized via application of technically and financially feasible/cost-effective alternatives identified in Section 4.1.1.

This approach will limit disposal-related releases to the following:

- Air emissions from incineration
- Land disposal via engineered landfill for non-combustible unrestricted wastes and residues and spoil area(s) for excess soil and vegetation from clearing and grubbing

These actions will be controlled by application of design and operating criteria, as described below.

Incineration

Incineration involves several integrated processes, including feed control and preparation, combustion, and management of combustion products (e.g., flue gases and ash). Incineration reduces the volume and weight of waste and destroys nearly all of the organic compounds in the waste, however incineration also generates air emissions and waste residues that need to be appropriately managed.

Control systems shall be in place to prevent feeding of restricted waste to the incinerator when operating conditions deviate from the acceptable range (e.g., during startup and shutdown or upset conditions).

Refer to Company's Air Emissions Management Plan (PGGP-EH-SPENV-000018-004) for details of requirements applicable to the monitoring of temporary incinerators utilized during construction.

Land Disposal

Constituents in wastes can potentially migrate from land disposal sites as leachate or as a gas. Therefore, appropriate design and operations criteria will be applied for the engineered landfill. These include:

- Design and operate in accordance with applicable PNG requirements and internationally accepted standards
- Divide the landfill into discrete cells to enable effective waste containment
- Maintain records of the wastes received, including sources, analytical results, and quantity
- Record on a map the location and dimensions of each cell
- Groundwater monitoring should include at a minimum: temperature, pH, electrical conductivity, turbidity, total organic carbon, ammonia (as N), chlorides, total dissolved solids, sodium, chemical oxygen demand, total petroleum hydrocarbons, nitrate (as N), sulphates, mercury, total metals, BOD.

Applicable landfill criteria based on PNG criteria and guided by IFC and US EPA standards are included in Attachment E.

4.3.2 Wastewater

Effluent from wastewater treatment systems (either sanitary or non-sanitary wastewater) should be polished prior to discharge.

PNG guidelines in Attachment F provide applicable criteria for discharge effluent quality. Wastewater sludge will be dewatered, dried, and incinerated.

4.4 Facilities

4.4.1 Solid Waste

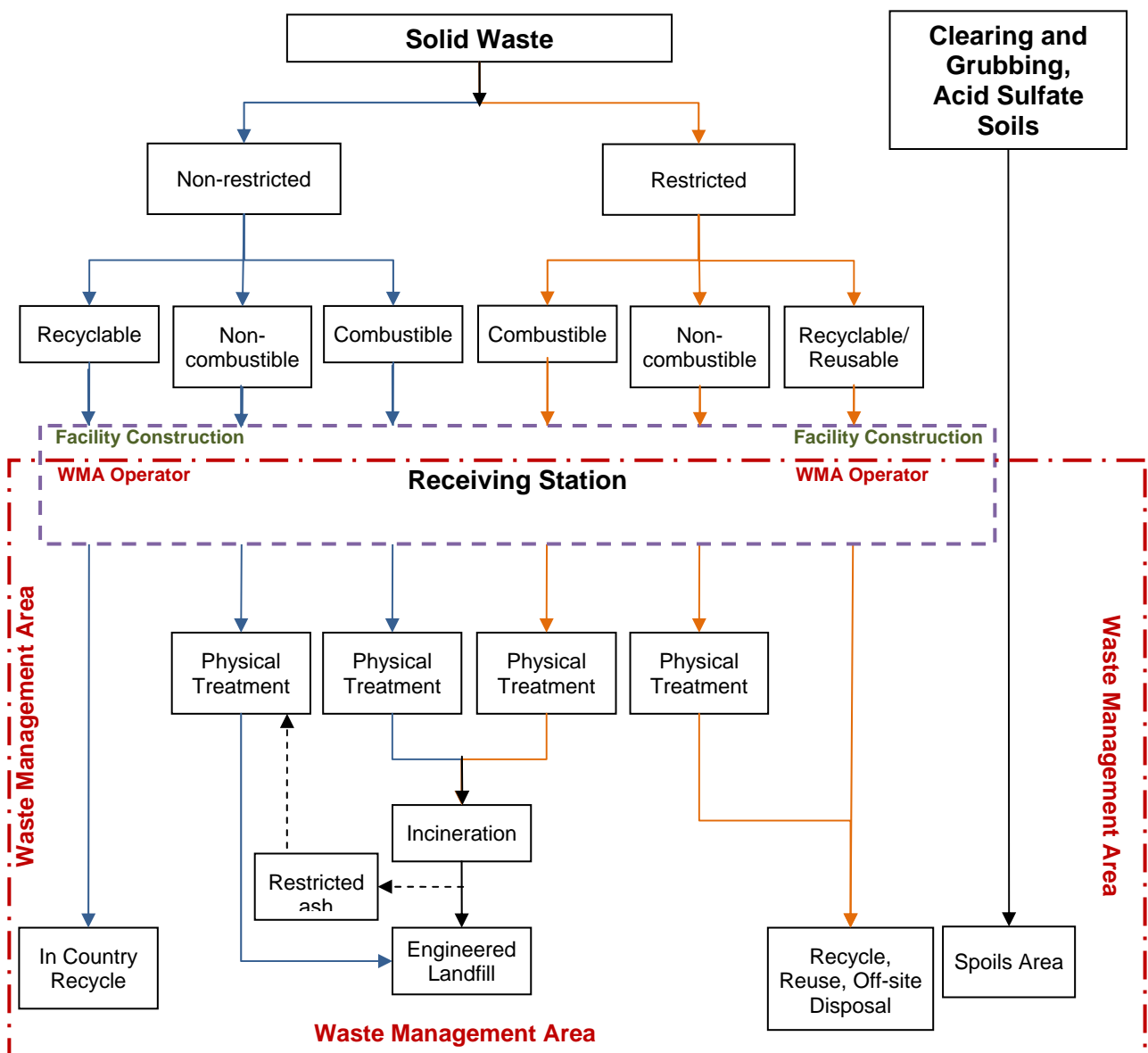
Wastes will be sorted and segregated and will be taken to the assigned waste management area for final segregation, incineration, and disposal to landfill.

Management Process

Although reasonable efforts will be made to reduce the quantity of waste generated, waste streams will be generated. During the period after the waste is generated and before the waste is sent for disposal or recycle, the waste should be properly managed in containers, tanks, bulk pads or other approved unit in a manner that reduces the potential for impact to human health and the environment. Wastes should not be stored for any longer than necessary, and wastes should be sent for disposal or recycling in a timely manner so as to limit the total quantity of waste in storage at any given time and the potential for accidental releases. Restricted waste should be conveyed to the Waste Management Area in a controlled manner with tracking forms. A completed Waste Tracking Form should also accompany the wastes transported off-site for recycle/reclaim.

The general solid waste management process expected is illustrated below.

Figure 1: Solid Waste Management Process



The following facilities are anticipated to be required to enable the solid waste management process. The number and capacity of these facilities, where addressed, is preliminary and subject to specific Contractor scope of work.

- Containers: Containers such as drums (fiber or steel), dumpsters, roll-off boxes, etc. should generally be used for waste storage and conveyance. Restricted waste should be containerized; no land-based or bulk storage is acceptable. Non-restricted wastes may be stored in bulk within hard-surfaced, secure, drainage-controlled areas.
- Incinerators: High-temperature industrial incinerator(s) featuring a dual combustion chamber design (i.e. primary and secondary combustion chambers) should be used to reduce the volume of combustible waste streams prior to burial of residual ash in the on-site engineered landfill. Incinerators should be erected in a secure WMA and may be fired on diesel or gas. Camps and other minor infrastructure will also be provided with waste incinerators as necessary to reduce waste quantities prior to depositing the residual ash in an engineered landfill. Combustible wastes will

generally be designated for incineration prior to final disposal, and the volume reduction is assumed to be of the order of 90%.

- Sludge Filter Press: The project will manage sludge by dewatering, drying, and incineration. Wastewater treatment facilities will include sludge dewatering capability for this purpose (See Section 4.4.2 below).
- Industrial Shredder: Industrial shredding may be used for volume reduction prior to incineration or disposal to landfill.
- Drum Cleaning and Crushing Facility: There may be a drum cleaning and crushing facility at landfills.
- Electronic waste stripper and shredder: Electrical equipment and parts may be stripped of any hazardous materials, then shredded before landfill disposal.
- Engineered Landfills: Landfills should be engineered facilities including groundwater monitoring. Landfills will be built at locations meeting the applicable siting criteria. Prior to construction of each landfill, design plans and specifications will be required for review and approval by the Company to verify conformance with landfill criteria (Attachment E). After the landfill site has been identified, baseline groundwater quality will need to be established before the commencement of landfill operations. Contractors will construct groundwater monitoring wells up-gradient (x1), cross gradient (x2) and down-gradient (x2) around the proposed landfill site. Groundwater samples will be collected in accordance with the Water Management Plan. Details for the design and construction of the groundwater monitoring wells should be in accordance with Specification for Groundwater Wells PGHU-EH-CSPDS-009921 Rev 0.
- Spoils Area: Excess topsoil, overburden, and vegetation will be stored in a stable, drainage-controlled, and monitored area for disposal or for use in site reclamation activities.
- Prior to managing solid wastes, each Contractor should prepare a WMP and include the following facility unit information:
 - Incinerator specifications, as per the design basis.
 - Landfill Development Plan, to include site selection report, design plans and specifications and groundwater monitoring plans
 - Procedures for operations and maintenance in accordance with the general management process expected, as illustrated above
 - Acid neutralization area with oil and contaminated fluid/residue collection systems required prior to disposal.

4.4.2 Liquid Waste

As previously discussed, liquid wastes will be generally of three types: hydrocarbon-based, chemical-based, or wastewater (sanitary and non-sanitary).

Management Process

Hydrocarbon-based liquids once collected will be transported securely to the WMAs for storage then treatment/disposal. Treatment may involve dewatering to effect volume reduction. Dewatering will be undertaken using appropriately designed and engineered oil/water separator equipment (or equivalent), with discharges meeting discharge criteria.

Recycling or reuse opportunities for hydrocarbon-based liquids are limited within the Project area. Where practicable, they may be transported off-site to third party receivers, as approved by Company (refer Section 4.5). As a useful alternative fuel for firing incinerators, onsite disposal will be via incineration.

Chemical-based liquid wastes shall be securely collected and stored in WMA's pending disposal. Where the properties of the waste are unknown, sampling and testing will be undertaken to assist in determining appropriate handling, treatment and/or disposal methods. Reference to the product MSDS will also be made in this regard. Disposal may be via return to the product supplier or shipping to a third party waste receiver for disposal, subject to Company approval (refer Section 4.5.1). Where this is not possible, on-site disposal will be necessary and will typically be via high temperature incineration.

Raw wastewater shall be collected and conveyed either through a combination of tanks and pipes or system of pipes and transferred to the wastewater treatment units. Wastewater conveyance by ditches is prohibited. Raw wastewater from linear infrastructure construction is expected to be limited to sanitary waste; this wastewater should be contained and transported to WMAs for treatment. Off-site transport of wastewater should be treated using the forms in Attachment D.

Wastewater should be segregated and managed via two types of wastewater treatment systems: sanitary and non-sanitary (or "process") as necessary depending on nature and extent of contamination. Wastewater treatment units may be package plants or skid-mounted or trailer-mounted individual process units. It is expected that the treatment units associated with temporary infrastructure will also be temporary and will be removed at the end of the construction. Disposal of temporary treatment units should be included in Contractor's WMP.

Wastewater treatment systems should have three distinct process units:

- Units to treat the liquid waste
- Units to dewater the sludge generated from treating liquid waste
- Unit(s) to dry the sludge from dewatering process.

Treated effluent discharged to a surface water body shall be in accordance with the effluent requirements established in Company's Environment Permit.

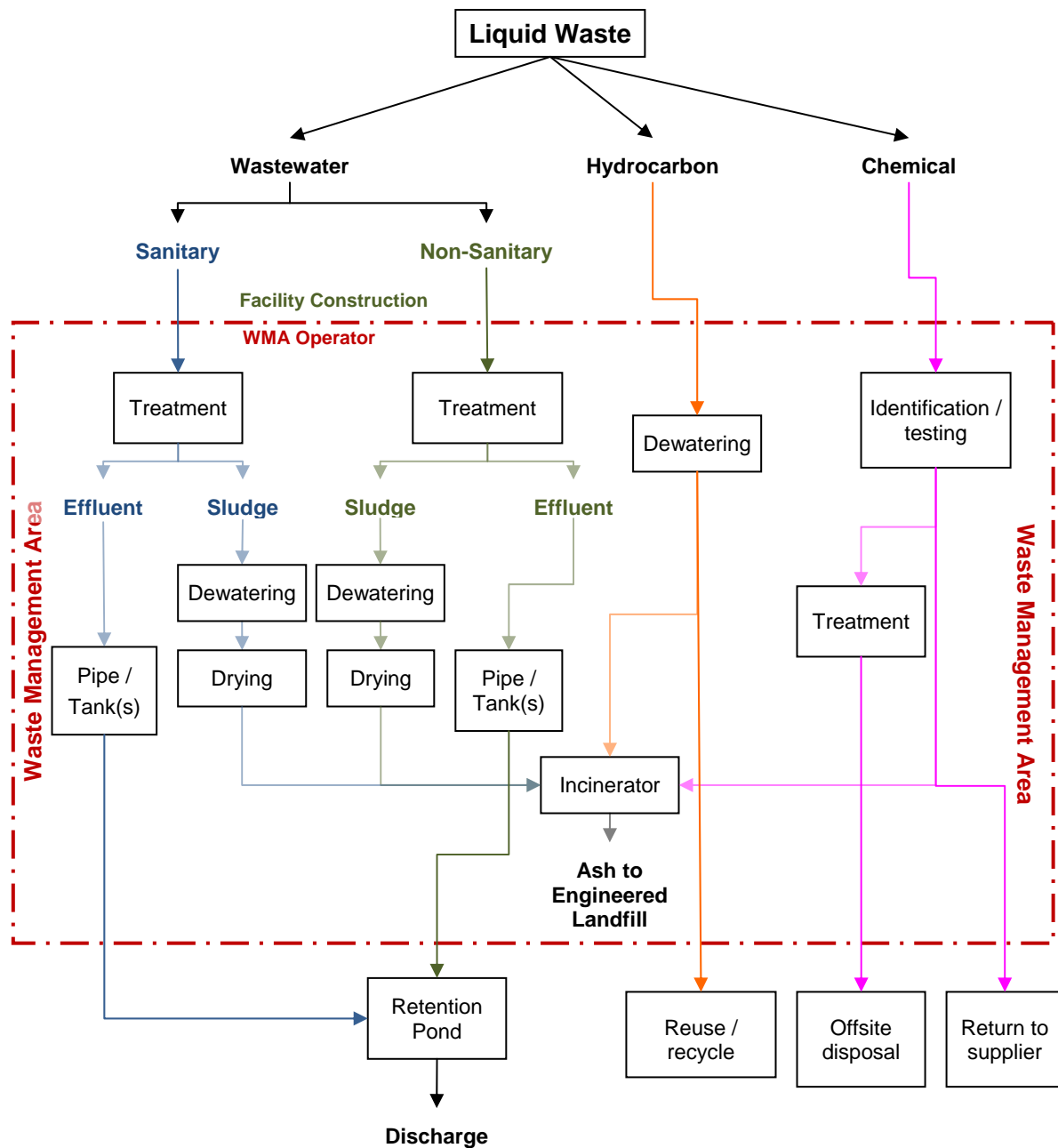
In addition, Contractor shall track, monitor, record, and report to Company the volume and quality of effluent discharged.

Sludge Management

Sludge generated from wastewater treatment system should be dewatered via physical treatment such as filter press (e.g. Belt Filter Press) or equivalent to achieve a sludge concentration of 30% or better.

Further, dewatered sludge should be dried using drying beds, mechanical dryers, or equivalent to achieve a sludge moisture content of 15% or less before transport to the Waste Management Area. The Waste Management Area will treat the dried sludge via incineration and dispose of residues in the on-site engineered landfill.

Figure 2: Wastewater Management Process



4.5 Off-site Disposal

Off-site disposal of solid and liquid wastes is planned to be limited to beneficial material reuse and recycling. In the event, off-site disposal is the best option for certain restricted waste(s), Contractor shall obtain approval from Company.

Off-site disposal should be undertaken in accordance with the following procedures, although the substantive requirements applicable to the off-site recipient will vary in relation to the service (i.e., recycle vs. disposal).

4.5.1 Facilities Review

In the event that a Company provided waste facility is not appropriate for certain wastes as recycled material, off site management may be considered. All such instances will be handled on an exception basis and are subject to Company approval in accordance with the following criteria:

- Have the technical capability to manage the waste in a manner that reduces immediate and future impact to the environment
- Have all required permits, certifications, and approvals, from applicable government authorities
- Have been secured through the use of formal procurement agreements
- Have been approved in advance by Company in accordance with the Tier III Waste Management Facilities Review Process (also see Section 2.3).

4.5.2 Records and Tracking

A tracking system will be utilized to track waste quantities and types disposed.

A tracking form (Attachment D) will be used to provide disposition control and facilitate recordkeeping for all offsite disposition activity.

A tracking form should be issued by the WMA operator and a copy signed by the recipient retained to confirm proper disposition and support records and reporting.

For on-site recycling, treatment, storage, and disposal, the following information should be maintained:

- Waste generator facility name and address
- Date of shipment for recycling, treatment, or disposal
- Type of waste
- Quantities of waste
- Method of recycle, treatment, or disposal
- Description of waste, including restricted characteristics (i.e. what makes it a restricted or non-restricted waste).

5.0 IMPLEMENTATION

Wastes generated shall be managed using the framework, and guidelines described in Section 4.0.

Contractor WMPs shall detail the treatment facilities and management procedures appropriate for their scope of work.

5.1 Responsibilities

WMAs should be operated by personnel qualified by training and experience to perform the waste management functions of the Area and fulfil the objectives of the WMP.

Contractor shall be responsible for collection, segregation, treatment, and transfer of solid wastes to the WMA.

The WMA operations personnel will be responsible for processing and disposal of the wastes transferred to the WMA.

Contractor is responsible for transferring the wastewaters to wastewater treatment systems and to the retention ponds (if used).

Contractor should segregate sanitary and non-sanitary wastewater treatment systems and sludge.

Contractor is also responsible for transferring the sludge to a solid waste management area for final disposal.

5.1.1 Waste Ownership

In general, wastes generated during construction will be considered to be owned by Company.

Exceptions to this condition are materials to be returned to suppliers by Contractors in accordance with Contractor agreements and materials released, to approved off-site recipients for reuse, recycle or disposal after acceptance by the recipient.

5.1.2 Contractors

Contractors are responsible for conducting waste management in accordance with their WMP.

Contractors' WMP documents should be approved by Company and maintained current, reflecting management of wastes and materials in Contractor's possession (Attachment G).

5.2 Procurement

During procurement of materials, supplies, and services, solicitations should include provisions requesting offers to provide information to support achieving the objectives of this CWMT. These provisions should include:

- Requirement of WMP for service Contractors
- Identification of any materials which would produce restricted waste and associated Material Safety Data Sheets (MSDS) where available
- Options for material substitutions where restricted wastes related material is being solicited
- Options for return of spent, unused, or scrap material for reuse or material recovery by the supplier.

5.3 Staffing and Training

All personnel and workers should be provided with training appropriate to their level of responsibilities on key environmental issues and required waste avoidance and management measures.

Contractor should provide their staff and subcontractors with appropriate training regarding key waste management expectations, requirements, required avoidance, and mitigation measures.

Contractor should maintain a copy of these training records and will be subject to audit by the Company.

Contractor should implement a program that emphasizes employee awareness, the development of waste management protocols, and effective WMA operations.

The specifics of training program elements will vary according to Contractor's scope, but generally should include:

- Importance and goals of the waste management program
- Waste avoidance and reduction
- Types of wastes that may be encountered at respective job activities
- Specific information regarding restricted wastes
- Waste sorting and segregation requirements
- Waste re-use/recycling
- Waste handling procedures
- Health, safety, and training requirements related to waste management
- Types and labelling of waste-specific containers
- Nature and limitations of on-site waste management facilities
- Project waste management facilities
- Required waste management-related documentation
- Facility- and/or equipment-specific training for waste facility operators
- Compliance Assurance and Reporting.

5.4 Inspections and Monitoring

Waste management activities should be monitored to confirm that WMP commitments, requirements, and objectives are satisfied.

Contractor will be responsible for monitoring its work activities. Monitoring parameters and the frequency of inspections and monitoring will be established in Contractor WMPs. Contractor WMP shall stipulate what will be monitored, when and how, but as a minimum this will include waste type verification and waste disposition verification prior to disposal. Copies or inspection and monitoring records shall be made available to Company upon request.

Company's Field Environmental Advisors will conduct on-the-ground monitoring activities to confirm that work is in compliance with the project's environmental requirements (e.g., permit conditions, regulatory requirements), obligations, commitments, and specifications, as well as Contractor WMPs.

The PNG Government may use representatives from its own agencies to assess the environmental performance of the Project and its Contractors.

If a performance shortcoming is identified at any of the monitoring levels listed above, Contractor's Construction Manager is responsible for corrective action.

Corrective actions will be documented and may be subject to potential assessment by Contractor and/or the Project.

Monitoring activities associated with the management of wastewater, restricted and non-restricted solid waste should include:

- Regular visual inspection of waste storage collection and storage areas for evidence of accidental releases and to verify that wastes are properly labelled and stored. When significant quantities of wastewater and restricted wastes are generated and stored on site, monitoring activities should include:
 - Inspection of vessels for leaks, drips or other indications of loss
 - Identification of cracks, corrosion, or damage to tanks, protective equipment, pipelines, or floors
 - Verification of locks, emergency valves, and other safety devices for easy operation (lubricating if required and employing the practice of keeping locks and safety equipment in standby position when the area is not occupied)
 - Checking the operability of emergency systems
 - Documenting results of testing for integrity, emissions, or monitoring stations (air, soil vapor, or wastewater)
 - Documenting any changes to the storage facility, and any significant changes in the quantity of materials in storage
- Regular audits of waste segregation and collection practices
- Tracking of waste generation trends by type, the amount of waste generated, preferably by facility departments, and the storage/ disposition of those wastes
- Characterizing waste at the beginning of generation of a new waste stream, and periodically documenting the characteristics and proper management of the waste, especially restricted wastes
- Keeping all tracking forms and other records that document the amount of waste generated and its destination for the duration of the contract period by the Contractor and turned over to Company upon the end of the contract
- Periodic auditing of third party treatment and disposal services including re-use and recycling facilities
- Regular monitoring and documentation of treated wastewater effluent quantity and quality prior to discharge to retention pond in the WMA
- Monitoring records for restricted waste collected, stored, or shipped should include:
 - Name and identification number of the material(s) composing the restricted waste
 - Physical state (i.e., solid, liquid, gaseous or a combination of one, or more, of these)

- Quantity (e.g., kilograms or litres, number of containers)
- Analytical records documenting waste characteristics
- Waste shipment tracking documentation to include, quantity and type, date dispatched, date transported and date received, record of the originator, the receiver and the transporter
- Method and date of storing, re-packing, treating, or disposing at the facility, cross-referenced to specific manifest document numbers applicable to the restricted waste
- Location of each restricted waste within the facility, and the quantity at each location
- Record incidents of spill and remedial action taken
- Records of complaints from workforce in camps or surrounding areas and/or the public.

5.5 Reporting

Contractor shall report to Company:

- Waste source
- Waste type
- Waste storage quantities/volumes and locations
- Waste treatment methods
- Waste disposition volumes and locations

Contractor should submit regulatory compliance records to the Company's SHES Representative on a monthly basis. The monthly report shall outline the Project's regulatory compliance status based on these categories:

- Pending Action
- Communicated (to Responsible Party)
- Accepted (by Responsible Party)
- Plan Developed (indicating that an appropriate compliance instruction has been prepared by a Responsible Party and has been passed on to the Regulatory Advisor)
- Complete (indicating that the obligation has been fully complied with).

5.6 Assessments

In order to assess (audit) the waste management processes, assessments will be performed for the routine, systematic assessment of Company and Contractor performance.

These assessments provide factually based information, highlight areas requiring additional resources or corrective actions for continuous improvement, and provide the basis of documentation for response to allegations or accusations of perceived non-compliance.

Assessment findings/documentation will be promptly reviewed between Company and Contractor.

Assessments will be conducted in a scope consistent with the complexity and sensitivity of the activity and its performance history.

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APPENDIX 1: Waste Descriptions

Restricted Waste:

The definition of a restricted waste follows the US EPA Characteristic Hazardous Waste guidelines as defined in 40 CFR Part 261, Subpart C.

1. **Ignitability** – A solid waste exhibits the characteristic of ignitability if a representative sample of the waste has any of the following properties:
 - a) It is a liquid, other than an aqueous solution containing less than 24 percent alcohol by volume and has flash point less than 60 °C (140 °F), as determined by a Pensky-Martens Closed Cup Tester, using the test method specified in ASTM Standard D 93–79 or D 93–80 (incorporated by reference, see §260.11), or a Setaflash Closed Cup Tester, using the test method specified in ASTM Standard D 3278–78 (incorporated by reference, see §260.11).
 - b) It is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard.
 - c) It is an ignitable compressed gas:
 - i. The term “compressed gas” shall designate any material or mixture having in the container an absolute pressure exceeding 40 p.s.i. at 70 °F or, regardless of the pressure at 70 °F, having an absolute pressure exceeding 104 p.s.i. at 130 °F; or any liquid flammable material having a vapor pressure exceeding 40 p.s.i. absolute at 100 °F as determined by ASTM Test D–323.
2. **Corrosivity** - A solid waste exhibits the characteristic of corrosivity if a representative sample of the waste has either of the following properties:
 - a) It is aqueous and has a pH less than or equal to 2 or greater than or equal to 12.5, as determined by a pH meter using Method 9040C in “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,” EPA Publication SW–846, as incorporated by reference in §260.11 of this chapter.
 - b) It is a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm (0.250 inch) per year at a test temperature of 55 °C (130 °F) as determined by Method 1110A in “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,” EPA Publication SW–846, and as incorporated by reference in §260.11 of this chapter.
 - c) A solid waste that exhibits the characteristic of corrosivity has the EPA Hazardous Waste Number of D002.
3. **Reactivity** - A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has any of the following properties:
 - a) It is normally unstable and readily undergoes violent change without detonating.
 - b) It reacts violently with water.

- c) It forms potentially explosive mixtures with water.
- d) When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.
- e) It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.
- f) It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.
- g) It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.
- h) It is a forbidden explosive as defined in 49 CFR 173.51, or a Class A explosive as defined in 49 CFR 173.53 or a Class B explosive as defined in 49 CFR 173.88.
- i) A solid waste that exhibits the characteristic of reactivity has the EPA Hazardous Waste Number of D003.

4. **Toxicity** - A solid waste (except manufactured gas plant waste) exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure, test Method 1311 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846, as incorporated by reference in §260.11 of this chapter, the extract from a representative sample of the waste contains any of the contaminants listed in Table 1 at the concentration equal to or greater than the respective value given in that table. Where the waste contains less than 0.5 percent filterable solids, the waste itself, after filtering using the methodology outlined in Method 1311, is considered to be the extract for the purpose of this section.

Maximum Concentration of Contaminants for the Toxicity Characteristic

EPA HW No. ¹	Contaminant	CAS No. ²	Regulatory Level (mg/L)
D004	Arsenic	7440-38-2	5.0
D005	Barium	7440-39-3	100.0
D018	Benzene	71-43-2	0.5
D006	Cadmium	7440-43-9	1.0
D019	Carbon tetrachloride	56-23-5	0.5
D020	Chlordane	57-74-9	0.03
D021	Chlorobenzene	108-90-7	100.0
D022	Chloroform	67-66-3	6.0
D007	Chromium	7440-47-3	5.0
D023	o-Cresol	95-48-7	⁴ 200.0
D024	m-Cresol	108-39-4	⁴ 200.0
D025	p-Cresol	106-44-5	⁴ 200.0
D026	Cresol		⁴ 200.0
D016	2,4-D	94-75-7	10.0
D027	1,4-Dichlorobenzene	106-46-7	7.5
D028	1,2-Dichloroethane	107-06-2	0.5
D029	1,1-Dichloroethylene	75-35-4	0.7
D030	2,4-Dinitrotoluene	121-14-2	³ 0.13
D012	Endrin	72-20-8	0.02
D031	Heptachlor (and its epoxide)	76-44-8	0.008
D032	Hexachlorobenzene	118-74-1	³ 0.13
D033	Hexachlorobutadiene	87-68-3	0.5

EPA HW No. ¹	Contaminant	CAS No. ²	Regulatory Level (mg/L)
D034	Hexachloroethane	67-72-1	3.0
D008	Lead	7439-92-1	5.0
D013	Lindane	58-89-9	0.4
D009	Mercury	7439-97-6	0.2
D014	Methoxychlor	72-43-5	10.0
D035	Methyl ethyl ketone	78-93-3	200.0
D036	Nitrobenzene	98-95-3	2.0
D037	Pentachlorophenol	87-86-5	100.0
D038	Pyridine	110-86-1	³ 5.0
D010	Selenium	7782-49-2	1.0
D011	Silver	7440-22-4	5.0
D039	Tetrachloroethylene	127-18-4	0.7
D015	Toxaphene	8001-35-2	0.5
D040	Trichloroethylene	79-01-6	0.5
D041	2,4,5-Trichlorophenol	95-95-4	400.0
D042	2,4,6-Trichlorophenol	88-06-2	2.0
D017	2,4,5-TP (Silvex)	93-72-1	1.0
D043	Vinyl chloride	75-01-4	0.2

¹Hazardous waste number.

²Chemical abstracts service number.

³Quantitation limit is greater than the calculated regulatory level. The quantification limit therefore becomes the regulatory level.

⁴If o-, m-, and p-Cresol concentrations cannot be differentiated; the total cresol (D026) concentration is used. The regulatory level of total cresol is 200 mg/l.

Non-restricted Waste:

Waste that does not exhibit characteristics defined as "Restricted" is deemed to be "Non-restricted".

APPENDIX 2: Typical Wastes

Typical Wastes

Typical Non-Restricted Wastes

Acid Sulfate Soils	Commonly associated with mangroves and low-lying coastal landforms. Saturated soils of tidal plains are recharged with each high tide and maintain an oxygen-free environment, with traces of acid neutralized by the overlying seawater. When the soils are excavated and allowed to drain the acid sulfate soil is exposed to oxygen in the air and the sulfate oxidizes to sulfuric acid. Subsequent exposure to water yields a toxic acid solution, which can affect aquatic life, and attack the concrete and steel of engineered structures and equipment.
Ash from incinerators	Residual matter remaining after combustion. Ash from incinerators should be periodically tested to confirm non-restricted characteristics. Ash that exhibits restricted waste characteristics should be treated to render the material non-restricted prior to landfill.
Clearing and Grubbing Waste	Excess soil, rock, and vegetative material produced from the clearing of plant site for construction.
Electrical parts, fittings, cable, electrodes	Electrical goods waste.
Empty containers	Generated from containerized products used, including: steel drums, steel and plastic buckets, plastic totes, and any other containers, that did not contain materials that would be restricted wastes if discarded, or that have been emptied and cleaned of such contents.
Fluorescent Tubes	Mercury-free gas-discharge lamps or tubes that use electricity to excite metal vapor causing a phosphor coating to glow.
General Construction Debris	Non-combustible waste generated during construction activities.
Glass	Produced from glass containers and construction waste
Paper and Cardboard	Paper and cardboard produced from packaging materials and paper products.
Plastic and Insulation	Plastic and insulation used for construction and shipment of materials
Plastic Materials	Consumables and domestic products from packaging materials, and repair/replacement of rubber or plastic parts.
Refuse	Camp operations and office operations – i.e. discarded items from kitchens, living quarters, bathrooms, laundries, warehouses, offices, etc. at camp/job sites.
Scrap Metal	Metal waste un-fit for construction uses, or leftover after construction. Separated into three categories: ferrous metal, non-ferrous metal and spent welding rods.
Sludge - sanitary	Solids waste from the sewage treatment plant.
Tires	Used tires from vehicles on site.
Wood Scrap (Dunnage)	Wood waste from packaging and/or construction activities.

Typical Restricted Wastes

Empty gas cylinders	Empty pressurized gas tanks..
Filters	Spent air and engine oil filters used for vehicles.
Medical waste	Wastes generated by medical procedures, first aid, medical laboratory tests and specimens and routine clinical procedures.
Miscellaneous Restricted	Restricted waste not represented in any other category.
Paint Waste	Unused or spent paint materials.
Spent Batteries	Lead-acid electrical storage batteries and disposable dry cells used in various fields and plant operations, including vehicles and construction equipment.
Spent lubricating oils	Oil waste from maintenance and operations of construction equipment and vehicles.
Unused, spent, expired and contaminated solvents, chemicals and additives	Chemical compounds and products used for maintenance and facility construction.

APPENDIX 3: Preliminary Waste-specific Management Requirements

Waste-specific Management Requirements

- Ash from Waste Incinerator
- Batteries (Spent)
- Construction Debris (Glass)
- Construction Debris (Lumber & Packaging Materials)
- Contaminated Soil (Oily, TPH > 1000 ppm)
- Contaminated Soil (Oily, TPH < 1000 ppm)
- Domestic Wastewater
- Domestic Wastewater Sludge
- Domestic Waste or Trash (Refuse)
- Empty Barrels, Drums & Containers [containing non-restricted materials]
- Empty Barrels, Drums & Containers [containing restricted materials]
- Empty Gas Cylinders
- Medical Waste
- Oily Debris
- Oily Debris (Filters)
- Plastics
- Process Wastewater (Oily)
- Scrap Metal
- Spent Lubricating Oils
- Tires
- Top Soil and Vegetation
- Unused, Spent, Expired, and Contaminated Solvents, and Additives

ASH FROM WASTE INCINERATOR

Waste generating process	Domestic refuse incinerators. High temperature incinerators.
Classification	Non-restricted
Handling	Reduce risk of airborne ash while handling. Avoid skin contact or ingestion. Wear standard PPE (i.e., hard hat, steel-toed shoes/boots, safety glasses/goggles), leather gloves, and dust mask when handling this waste. No ash handling activities will occur during high wind conditions.
Storage	Store in a tarp- or plastic sheet covered properly labelled roll-off bin placed in a contained area underlain by an impervious liner or in sealed, properly labelled metal or plastic drums placed in the designated restricted waste storage facility/ area at each camp site.
Labelling	Each container to be labelled " <i>ash from domestic or high temperature incinerator</i> "
Tracking	Waste Management Area operators to record waste cleaned from incinerators and turn in with their daily waste management activities. WMA Operators to provide monthly reports to HSE Group to track waste streams and quantities. Quarterly report shall be submitted by HSE group to Company Construction Management personnel and government agency.
Monitoring	Test for leachable heavy metals pending waste type incinerated.
Minimization	N/A
Disposal method	Landfill at WMA.

BATTERIES (SPENT)

Waste generating process	Vehicles, engines, emergency power systems. Instruments/ small equipment.
Classification	Restricted
Handling	Avoid skin contact or ingestion of acid. Avoid acid fumes. Wear standard PPE (i.e., hard hat, steel toed shoes/boots, safety glasses/ goggles), potentially supplemented with acid/caustic-resistant gloves, acid/ caustic resistant apron, and/or face shield when handling this waste. Do not damage or crack batteries. Includes spent lead acid, Ni, Cd, lithium, and mercury-cell batteries. Neutralizing materials should be readily on hand in the event of an accident or spillage at place of work
Storage	Store in sealed, properly labelled and segregated plastic drums or containers equipped with suitable absorbent and neutralizing material(s) and placed in a special closed shipping container located within the designated restricted waste storage facility/area at camp site.
Labelling	Each container to be labelled as battery or acid
Minimization	Recycle: Best and only available option. Field Operations Management Team to review annually for waste reduction efforts.
Tracking	Waste Management Area operator and Auto Shop Supervisor to keep records of batteries sent out for recycling and submit these monthly to HSE Group. HSE Group to track waste streams and quantities, and provide quarterly reports to Construction Management.
Disposal method	Acid solution should be removed from used/ spent lead acid batteries and properly managed as an acidic solution via the WMA wastewater management system. Recycle. Large batteries may be returned to PNG Metals Recycling in Port Moresby subject to approval by Company. Landfill. Neutralize drained battery fluid. Small batteries from flash- lights will be containerized, stabilized and landfilled.

CONSTRUCTION DEBRIS (GLASS)

Waste generating process	Glass from housing, vehicle windows, bottles, jars, human consumables, and "household products".
Classification	Non-restricted
Handling	Wear standard PPE (i.e. hard hat, steel-toed shoes/boots, safety glasses/ goggles) and leather gloves when handling this waste. Crush/break where asked to do so.
Storage	Collect in labelled metal or plastic drums or other suitable containers placed at designated/ strategic locations. Store in closed, properly labelled containers placed in an appropriate designated non-restricted waste storage area at camp/job site.
Labelling	Both the containers and storage area are to be properly labelled
Tracking	Waste Management Area operators to keep records of waste delivered to the WMA for landfill. WMA operators to provide monthly reports to HSE Group to track waste streams and quantities. Quarterly report shall be submitted by HSE Group to Construction Management personnel.
Disposal method	Landfill at WMA.

CONSTRUCTION DEBRIS (LUMBER & PACKAGING MATERIALS)

Waste generating process	Construction activities Includes: Wood, insulation, and other combustible waste and debris associated with the construction of buildings, wharves, warehouses, roads, etc
Classification	Non-restricted*
Handling	Wear standard PPE (i.e., hard hat, steel-toed shoes/boots, safety glasses/goggles) and leather gloves when handling this waste. PVC or other chlorinated materials should not be incinerated in domestic garbage incinerators. Recovery of scraps, surplus or waste material should be controlled via written approval from the HSE Group Supervisor.
Storage	Uncontaminated, reusable/recyclable, combustible, and non-combustible materials: bulk storage in a suitable location at camp/job site or store in sealed, properly labelled containers placed in an appropriate designated non-restricted waste storage area at camp/ job site. Restricted/contaminated materials: store in tarp- or plastic sheet covered properly labelled roll-off bin placed within a contained area underlain by an impervious liner or in suitable, labelled, sealed containers placed in a special closed shipping container located within the designated restricted waste storage facility/area at camp/ job site.
Labelling	Each container to be labelled as follows: "Construction Debris (Wood)" – additional labelling required if wood is contaminated.
Tracking	Waste Management Area operators to keep records of waste delivered to the WMA for incineration. WMA operators to provide monthly reports to HSE Group to track waste streams and quantities. Quarterly report shall be submitted by HSE Group to appropriate Construction Management personnel.
Minimization	Reuse/recycle wood to the maximum extent practical. Order materials in bulk to decrease packaging materials.
Disposal method	Incineration at the WMA. PVC or other chlorinated materials should not be incinerated in domestic garbage incinerators. Heavy plastics are to be incinerated in the high-temperature incinerator. Ash is to be disposed of in WMA landfill. Recycle should be the first priority for wood.

*Some packaging timbers are treated (ie. copper chromium arsenate, formaldehyde) and should be considered a restricted waste.

CONTAMINATED SOIL (OILY, TPH > 1000 ppm)

Waste generating process	Routine operations and maintenance or as a result of accidental releases, spills, or leaks located near tanks, facilities, and vehicle maintenance areas contaminated with hydrocarbon liquids.
Classification	Restricted
Handling	Avoid skin contact or ingestion. Wear standard PPE (i.e., hard hat, steel toed shoes/boots, safety glasses/goggles), potentially supplemented with disposable coveralls, rubber gloves, dust mask and/or activated carbon-equipped breathing protection device when handling this waste.
Storage	<u>Small quantities:</u> Store in sealed, properly labelled metal or plastic drums placed in a special closed shipping container located within the designated hazardous waste storage facility/area at a camp site or within a contained area underlain by an impervious liner. <u>Large quantities:</u> Store in roll-off bins placed on temporary contained areas underlain by an impervious liner. Temporarily cover large piles with plastic sheeting pending removal to storage.
Labelling	Each container to be labelled as follows: "Contaminated Soil". Additional label(s) giving more specific information re the nature of the contaminant required.
Tracking	Waste Management Area operator or Auto Shop Supervisor to submit records of quantities treated for disposal. Contractor SHES Group to track waste streams and quantities.
Minimization	Properly maintain equipment/machinery to prevent drips/leaks/spills.
Disposal method	Incineration followed by landfill in WMA. Landfarming can be considered in larger volume cases.

CONTAMINATED SOIL (OILY, TPH < 1000 ppm)

Waste generating process	Routine operations and maintenance or as a result of accidental releases, spills, or leaks located near tanks, facilities, and vehicle maintenance areas contaminated with hydrocarbon liquids.
Classification	Non-restricted
Handling	Avoid skin contact or ingestion. Wear standard PPE (i.e., hard hat, steel toed shoes/boots, safety glasses/goggles), potentially supplemented with disposable coveralls, rubber gloves, dust mask and/or activated carbon-equipped breathing protection device when handling this waste.
Storage	<u>Small quantities:</u> Store in sealed, properly labelled metal or plastic drums placed in a special closed shipping container located within the designated hazardous waste storage facility/area at a camp site or within a contained area underlain by an impervious liner. <u>Large quantities:</u> Store in roll-off bins placed on temporary contained areas underlain by an impervious liner. Temporarily cover large piles with plastic sheeting pending removal to storage.
Labelling	Each container to be labelled as follows: "Contaminated Soil". Additional label(s) giving more specific information re the nature of the contaminant required.
Tracking	Waste Management Area operator or Auto Shop Supervisor to submit records of quantities treated for disposal. Contractor SHES Group to track waste streams and quantities.
Minimization	Properly maintain equipment/machinery to prevent drips/leaks/spills.
Disposal method	Landfill in WMA.

DOMESTIC WASTEWATER

Waste generating process	Camps, laundries, toilets, showers, sinks, dishwashers.
Classification	Non-restricted
Handling	Avoid skin contact or ingestion. Wear standard PPE (i.e., hard hat, steel toed shoes/boots, safety glasses/ goggles), potentially supplemented with disposable coveralls, rubber gloves, and/or activated carbon equipped breathing protection device when handling this waste. Treated wastewater effluents discharged to surface water bodies must meet the effluent quality criteria stipulated in DEC-issued permits.
Storage	Domestic wastewater treatment plant (WWTP)
Labelling	Not applicable
Tracking	WWTP operator to record daily quantities and test results and submit weekly to HSE Environment Group. b) HSE Environment Group to track waste streams, do monthly effluent monitors and quantities and provide monthly and quarterly reports to Construction Management. Non-compliance with permit conditions shall be reported by the Project to DEC and/or DPE.
Disposal method	Treatment: via packaged biological activated sludge-type treatment unit. Sewage to be processed through treatment units. Effluent may be tested and discharged.

DOMESTIC WASTEWATER SLUDGE

Waste generating process	Wastewater treatment units at LNG Construction site.
Classification	Non-restricted
Handling	Avoid skin contact or ingestion. Wear standard PPE (i.e., hard hat, steel toed shoes/boots, safety glasses/goggles), potentially supplemented with disposable coveralls, rubber gloves, and/or breathing protection device when handling this waste.
Storage	In dedicated containers for transfer if incinerator is removed from site.
Labelling	N/A
Transportation	In dedicated containers and vehicle
Tracking	Contractors are to keep records of sludge quantities sent out for disposal and submit these records monthly to HSE Group. HSE Group to track and monitor quantities and provide quarterly reports to Construction Management..
Disposal method	Incineration after dewatering and drying. Landfill – with approval from HSE Environment Group

DOMESTIC WASTE OR TRASH (Refuse)

Waste generating process	Site and camp operations/administrative operations – i.e. discarded items from kitchens, living quarters, bathrooms, laundries, warehouses, offices, etc. at camp/job sites.
Classification	Non-restricted
Handling	Wear standard PPE (i.e., hard hat, steel-toed shoes/boots, safety glasses/ goggles) and leather gloves when handling this waste.
Storage	Collect in labelled bins/containers placed at designated/strategic locations. Segregate reusable/recyclable materials using separate, labelled containers. Store in closed, properly labelled containers placed in an appropriate designated non-restricted waste storage area at camp/job site.
Labelling	Both the containers and storage area are to be properly labelled
Tracking	WMA operators to record waste delivered to and incinerated at the WMA, and provide monthly reports to the HSE Group to track waste streams and quantities. Monthly report to be submitted by HSE Group to Company Construction Management.
Minimization	Items such as plastic containers should be recycled and reused whenever possible.
Disposal method	Incineration of combustible non-recyclable wastes; ash to landfill.
Disposal Site	Incinerator and landfill at the WMA.

EMPTY BARRELS, DRUMS & CONTAINERS [containing non-restricted materials]

Waste generating process	Drums/barrels/containers used to contain foodstuffs or other non-restricted materials
Classification	Non-restricted
Handling	Consult labelling of original material stored in the drum/barrel/container. Avoid physical contact with residues in empty containers. Wear standard PPE (i.e., hard hat, steel-toed shoes/boots, safety glasses/ goggles) and appropriate protective gloves (leather, chemically-resistant rubber) when handling this waste.
Storage	Store in appropriately designated non-restricted waste storage area.
Labelling	Drums are to be properly labelled as to contents or what it had contained and appropriate warning/precautions. Deliver same information to WMA Operators
Tracking	Waste Management Area operator to keep records of drums received for recycling or landfill. SHES group to track waste streams and quantities.
Disposal method	Recycle - Rinse and cleanse drums thoroughly prior to shipment - Drums are to be completely empty. Landfill - Drums thoroughly washed twice prior to crushing and landfill.
Disposal Site	WMA dedicated scrap metal landfill area
Minimization	Recycle - Drums in acceptable condition are to be returned to the supplier or drum recycling facilities in Port Moresby [subject to meeting Company acceptability criteria]. Bulk Containers - Use returnable bulk containers whenever possible. Reuse - Drums can be reused for storing the same product if in good condition. Metal drums may be used as trash containers once cleaned. Review annually for waste reduction efforts.

EMPTY BARRELS, DRUMS & CONTAINERS [containing restricted materials]

Waste generating process	Drums/barrels/containers used to contain restricted material
Classification	Restricted
Handling	<p>Consult labelling and MSDS of original material stored in the drum/barrel/container. Avoid physical contact with residues in empty containers.</p> <p>Wear standard PPE (i.e., hard hat, steel-toed shoes/boots, safety glasses/ goggles) and appropriate protective gloves (leather, chemically-resistant rubber) when handling this waste. Additional PPE (e.g. Canister-equipped breathing protection masks) may be required.</p> <p>Metal containers that have come into contact with restricted chemicals or oily materials should be triple rinsed to ensure removal of potentially restricted materials prior to re-use or crushing for final disposal.</p> <p>Specialized cleaning procedures may be required in some instances therefore MSDS along with other info should be delivered to WMA operators.</p>
Storage	Store in tarp or plastic-sheet-covered properly labelled roll-off bin placed within a contained area underlain by an impervious liner or in suitable, labelled, sealed container placed in a special closed shipping container located within the designated restricted waste storage facility or WMA at the site.
Labelling	Drums are to be properly labelled as to contents or what it had contained and appropriate warning/precautions.
Tracking	Waste Management Area operator to keep records of drums received for recycling or landfill. WMA Operator to provide monthly reports to HSE group to track waste streams and quantities. Quarterly reporting as part of waste management to plan.
Disposal method	Wash and cleanse thoroughly first, some instances will require specialized procedures such as incineration to burn residues. Re-use for waste storage purposes (restricted wastes only) or dispose via solid waste landfill after cleaning and crushing.
Disposal Site	Landfill at WMA
Minimization	<p>Recycle - Drums in acceptable condition are to be returned to the supplier or PNG drum recycling in Port Moresby. [Subject to meeting Company acceptability criteria].</p> <p>Bulk Containers - Use returnable bulk containers whenever possible. Reuse - Drums can be reused for storing the same product if in good condition. Metal drums may be used as trash containers once cleaned.</p> <p>Review annually for waste reduction efforts.</p>

EMPTY GAS CYLINDERS

Waste generating process	Welding activities
Classification	Restricted
Handling	Wear standard PPE (i.e., hard hat, steel-toed shoes/boots, safety glasses/ goggles) when handling this material.
Storage	Properly secure and store in the designated empty gas cylinder storage area at a WMA and/or job site.
Labelling	Each container to be labelled as follows: "Empty Gas Cylinders". Additional label(s) giving more specific information re the nature of the material the cylinder contained required.
Tracking	Waste Management Area operator or Auto Shop Supervisor to submit records of quantities treated for disposal. Contractor SHES Group to track waste streams and quantities.
Disposal method	No disposal - Empty gas cylinders: return to supplier(s) for refilling

MEDICAL WASTE

Waste generating process	Clinical Treatment Medical Lab Test Wastes generated by medical procedures, first aid, medical laboratory tests and specimens and routine clinical procedures.
Classification	Restricted
Handling	Specialized and/or trained personnel to handle waste, wear disposable latex gloves when handling this waste.
Storage	Sharps: Collect in special designated/labelled sharps disposal container. Non-sharps: Collect in special designated/ labelled biohazard bag. Store both in an onsite medical clinic until the time of disposal or in sealed, properly labelled containers placed in a special closed shipping container located within the WMA.
Labelling	Each container to be labelled as follows: "Medical Wastes". Additional label(s) giving more specific information re the nature of the containerized waste required, including a special "Hazardous Medical Waste" sticker.
Minimization	N/A
Tracking	A Waste Tracking Form shall be generated by the Contractor SHES Group as to the quantity disposed of. Contractor SHES Group to track waste streams and quantities.
Disposal method	Incineration: Waste shall be stored at the clinics or in a hazardous waste storage area/facility at the WMA until sufficient quantities are ready for disposal. One member of the medical staff and one Contractor SHES Group representative are required to observe incineration.

OILY DEBRIS

Waste generating process	Oily rags from maintenance of vehicles, equipment. Oily absorbents/materials from maintenance shop and spill clean-up activities.
Classification	Restricted
Handling	Avoid skin contact or ingestion. Wear standard PPE (i.e., hard hat, steel-toed shoes/boots, safety glasses/ goggles), potentially supplemented with disposable coveralls, chemically resistant gloves, and/or activated carbon-equipped breathing protection device when handling this waste.
Storage	Collect in labelled metal or plastic drums placed at designated/strategic locations. Store in closed, properly labelled metal or plastic drums placed in a special closed shipping container located within the designated restricted waste storage facility/area at a camp/job site.
Labelling	Containers are to be properly marked as to contents.
Tracking	Waste Management Area operators to keep records of waste delivered to the WMA for incineration. WMA operators to provide monthly reports to HSE Group to track waste streams and quantities. Quarterly report shall be submitted by HSE Group to Construction Management personnel.
Disposal method	Incineration at the WMA.

OILY DEBRIS (FILTERS)

Waste generating process	Autos - vehicle maintenance Motorized Equipment – maintenance & repair (e.g. of internal combustion engines, pumps, compressors, etc.).
Classification	Restricted
Handling	Avoid skin contact with or ingestion of oil. Wear standard PPE (i.e., hard hat, steel-toed shoes/boots, safety glasses/goggles), potentially supplemented with disposable coveralls, chemically resistant gloves, and/or activated carbon-equipped breathing protection device when handling this waste. Drain free liquids from filters prior to placement in a storage drum (recover removed liquids and manage as a restricted waste). Crush drained filters - high pressure compaction followed by appropriate storage and disposal as restricted waste.
Storage	Collect in labelled metal or plastic drums placed at designated/ strategic locations. Store in closed, properly labelled metal or plastic drums placed in a special closed shipping container located within the designated restricted waste storage facility/area at the job site.
Labelling	
Minimization	Reduction: Review processes to ensure waste is not being generated unnecessarily. Consider use of more effective filters that have a longer frequency between replacements. Waste stream shall be reviewed annually by appropriate supervisory personnel.
Tracking	Waste Management Area operators to submit records of filters delivered to the WMA and submit these monthly to HSE Group. HSE Group to track waste streams and quantities, and provide quarterly reports to Construction Management.
Disposal method	Incineration of drained, crushed filters. Landfill of residue in WMA landfill.

PLASTICS

Waste generating process	Packaging: Consumables and domestic products. Repair/replacement of rubber or plastic parts. Plastic drinking water bottles.
Classification	Non-restricted
Handling	Wear standard PPE (i.e., hard hat, steel-toed shoes/boots, safety glasses/ goggles) when handling this material. PVC plastic-containing materials should not be incinerated.
Storage	Collect in labelled metal or plastic drums or other suitable containers placed at designated/strategic locations – segregate to enable recycling. Store in sealed, properly labelled containers placed in an appropriate designated nonhazardous waste storage area at a camp/job site.
Labelling	Each container to be labelled "Plastic". Containers designated for recycle should be so labelled. Additional label(s) giving more specific information re the nature of the waste required.
Tracking	Waste Management Area operator to submit records of quantities treated for disposal. Contractor SHES Group to track waste streams and quantities.
Minimization	Reuse/recycle to the maximum extent practical. Order materials in bulk to decrease packaging materials.
Disposal method	Uncontaminated (i.e., non-hazardous) non-reusable/ non-recyclable and non-halogenated plastic materials: incineration with combustible trash and/or compaction and direct landfill in WMA. Halogenated plastics (PVC, PTFE, etc.) should not be incinerated but may be directly landfilled.

PROCESS WASTEWATER (OILY)

Waste generating process	Rainfall runoff from under/around equipment. Vehicle and equipment oily wash water. Water with oil and emulsions recovered during oil spill recovery or clean-up activities.
Classification	Restricted
Handling	Avoid skin contact or ingestion. Wear standard PPE (i.e., hard hat, steel toed shoes/boots, safety glasses/ goggles), potentially supplemented with disposable coveralls, rubber gloves, and/or activated carbon equipped breathing protection device when handling this waste.
Storage	Sumps/vacuum trucks/tanks.
Tracking	Contractors are to keep records of oily water releases and sent out for recycling, processing or disposal and submit these records monthly to HSE Group. HSE Group to monitor external releases monthly including quality (per Permit) and quantities, and provide quarterly reports to Construction Management.
Labelling	Each tank/vessel to be labelled as follows: "Process Wastewater". Additional label(s) giving more specific information re the nature of the tank/vessel contents required.
Disposal method	Recovered oil should be managed as Lube Oil/Motor Oil (used). De-oiled water should be managed as Domestic Wastewater.

SCRAP METAL

Waste generating process	Plant construction. Vehicle/equipment repair and maintenance.
Classification	Non-restricted
Handling	Wear standard PPE (i.e., hard hat, steel-toed shoes/boots, safety glasses/ goggles) and leather gloves when handling this waste. Scrap metals should be cut to size and sorted prior to conveyance to the WMAs. Any contaminated scrap metal should be thoroughly decontaminated and landfilled.
Storage	Bulk storage (potentially using a roll-off bin) in an appropriate location at camp/job site or store in the designated area for reusable/ recyclable materials at camp/job site.
Labelling	None required.
Minimization	Recycle: Sell uncontaminated scrap metal for salvage where possible. Reuse: Reduce quantities through salvage efforts and reuse scrap metal for other projects where feasible. Review annually for waste reduction efforts.
Tracking	Waste Management Area operators to keep records of quantities delivered to the WMA and submit these monthly to HSE Group. HSE Group to track waste streams and quantities, and provide quarterly reports to Construction Management.
Disposal method	Landfill - Uncontaminated, unrecyclable scrap metal can be disposed of in the WMA landfill. Recycle – via local sources subject to Company approval.

SPENT LUBRICATING OILS

Waste generating process	Autos - Lube oil, motor oil, transmission oil Motorized Equipment Gear Box Crankcase Fluid Equipment and vehicle maintenance and repair (e.g. of internal combustion engines, pumps, compressors, etc.).
Classification	Restricted
Handling	Avoid skin contact or ingestion. Wear standard PPE (i.e., hard hat, steel-toed shoes/boots, safety glasses/ goggles), potentially supplemented with disposable coveralls, chemically resistant gloves, and/or activated carbon-equipped breathing protection device when handling this waste. Drums containing used lube/motor oil will be conveyed in devices that provide secondary containment.
Storage	Collect in labelled metal or plastic drums placed at designated/ strategic locations. Store in a designated, properly labelled steel tank placed within a contained area underlain by an impervious liner or in sealed, properly labelled metal or plastic drums placed in a special closed shipping container located within the designated restricted waste storage facility/area at camp/job site. Drums / Containers: Used gear and lube oils may be stored on site until picked up for disposal.
Labelling	Containers are to be properly marked as to contents.
Minimization	Incineration: Used oil and used oil containers can be incinerated. Recycle: Recycling of used oils into the crude oil production system at the Port Moresby refinery is a potential method, subject to Company approval. Reduction: Review processes to evaluate the effectiveness of current materials used to ensure maximum efficiency is obtained prior to changing oils and lubes.
Tracking	Waste Management Area and Facility Operators will track and submit records of amounts recycled or incinerated to HSE Group monthly. HSE Group to track waste streams and quantities and provide quarterly reports to Construction Management.
Disposal method	a) Incineration. b) Recycle. Used oils may be recycled via Company approved third party receivers.

TIRES

Waste generating process	Vehicles - Auto Shop and Heavy Equipment
Classification	Non-restricted
Handling	Wear standard PPE (i.e., hard hat, steel-toed shoes/boots, safety glasses/goggles), potentially supplemented with leather gloves when handling this waste.
Storage	Bulk storage in an appropriate location at job site or store in the WMA ready for shredding. Steps should be taken to ensure that stored tires do not collect water and form a habitat for mosquitoes.
Labelling	N/A
Minimization	Reuse. Where possible, use tires for bumper guarding, etc. Project to review annually for waste reduction efforts. Monitor tire pressure regularly to maximize service life.
Tracking	Waste Management Area operator to keep records of tires delivered to the WMA. Provide monthly reports to HSE Environment Group. HSE Environment Group to track waste streams and quantities and provide quarterly reports to management and government agencies.
Disposal method	Incineration. Tires are to be delivered to the WMA for storage for processing and incineration. Larger truck tires which are too big for the incinerator and which the Contractor does not want to reuse are to be cut with a tire cutter to a size amenable to incinerating.

TOP SOIL AND VEGETATION

Waste generating process	Clearing and Grubbing
Classification	Non-restricted
Handling	Wear standard PPE (i.e., hard hat, steel-toed shoes/boots, safety glasses/ goggles) when handling this material. PVC plastic-containing materials should not be incinerated.
Storage	Stockpiled and protected from wind and water erosion, as well as from contamination.
Labelling	Not Applicable
Tracking	Not Applicable
Minimization	<ul style="list-style-type: none"> • Only clear the area required for safe operations. • Only grub when necessary. • Make material available to the local population for building materials and fuel. • Chip small trees and brush and use as soil amendment, as bulking agent for composting, or for erosion mitigation over areas to be reclaimed.
Disposal method	Topsoil, overburden, and low-quality materials should be properly removed, segregated, stockpiled near the site, and preserved for rehabilitation

UNUSED, SPENT, EXPIRED, AND CONTAMINATED SOLVENTS, CHEMICALS, AND ADDITIVES

Waste generating process	Parts Cleaning - Vehicles, liquid-cooled engines, dehydrators in vehicles Hydrocarbon Based Detergents Machine/ Maintenance Shops
Classification	Restricted
Handling	Avoid skin contact or ingestion. Wear standard PPE (i.e., hard hat, steel-toed shoes/boots, safety glasses/ goggles), potentially supplemented with disposable coveralls, chemically resistant gloves, chemically resistant apron, and/or activated carbon equipped breathing protection device when handling this waste. Drums containing waste glycol/antifreeze should be transported in over-packs or equivalent device that provides secondary containment.
Storage	Collect in labelled plastic or metal drums placed at designated/strategic locations. Store in sealed, properly labelled metal or plastic drums placed in a special closed shipping container located within the designated restricted waste storage facility/area at camp/job site. Drums / Containers: Spent fluids shall be stored in drums or containers awaiting disposal.
Labelling	Drums shall be properly labelled as to contents and warning labels.
Waste minimization	Recycle: Recycle and recovery through production systems Reduction: Personnel shall ensure that the materials are fully used before generating as a waste. Waste stream to be reviewed annually by appropriate supervisory personnel.
Tracking	Waste Management Area and Facility Operators to keep records of quantities recycled or incinerated and submit these monthly to Environmental & Regulatory Group. HSE Group to track waste streams and quantities, and provide quarterly reports to Construction Management.
Disposal method	Recycle. Some products may be recycled by returning to Company approved third party receivers. Incineration: Some waste streams, including their containers may be incinerated via the WMA incinerator.

APPENDIX 4: Sample Waste Tracking Form

WASTE TRACKING FORM

PNG LNG Project

PLEASE USE BLOCK LETTERS

This Section to be completed by the generator or designee of the waste generator.

SITE CONTRACTOR _____

SITE LOCATION _____

ADDRESS & PHONE OF SITE CO-ORDINATOR _____ (PROVIDE ADDRESS IF OFF-SITE TRANSFER)

WASTE INFORMATION

IDENTIFICATION #	DESCRIPTION	QUANTITY	UNITS <small>(KG, LITRES, M³)</small>	CONTAINERS	
				NUMBER	TYPE

I hereby declare that the above consignment is accurately described and is in proper condition for transport.

SIGNATURE _____

NAME _____ **DATE** _____

To be completed by the transporter of the waste.

TRANSPORTER NAME/CONTRACTOR _____

VEHICLE NUMBER _____

I hereby acknowledge receipt of the above mentioned waste for transport.

SIGNATURE _____

NAME _____ **DATE** _____

To be completed by the receiving station at the WMA receiving the waste.

WASTE MANAGEMENT AREA (WMA) RECEIVING STATION

I hereby declare I have received the above waste.

SIGNATURE _____

NAME _____ **DATE** _____

To be completed by the WMA.

FINAL DISPOSITION OF THE WASTE

IDENTIFICATION #	DISPOSITION
	<input type="checkbox"/> Landfill <input type="checkbox"/> Incineration <input type="checkbox"/> Recycle/Reuse through _____ <small>(Provide the name of the recycler/reuse company)</small>
	<input type="checkbox"/> Landfill <input type="checkbox"/> Incineration <input type="checkbox"/> Recycle/Reuse through _____ <small>(Provide the name of the recycler/reuse company)</small>
	<input type="checkbox"/> Landfill <input type="checkbox"/> Incineration <input type="checkbox"/> Recycle/Reuse through _____ <small>(Provide the name of the recycler/reuse company)</small>
	<input type="checkbox"/> Landfill <input type="checkbox"/> Incineration <input type="checkbox"/> Recycle/Reuse through _____ <small>(Provide the name of the recycler/reuse company)</small>
	<input type="checkbox"/> Landfill <input type="checkbox"/> Incineration <input type="checkbox"/> Recycle/Reuse through _____ <small>(Provide the name of the recycler/reuse company)</small>

I hereby declare that the above information is correct.

SIGNATURE _____

NAME _____ **DATE** _____

Complete the Section of this Notice that applies to you.
 The copies are distributed as follows:
 Green - Kept by the waste producer Blue - Kept by Receiving Station
 Yellow - Kept by Transporter White - Kept by CWMA
 The information contained on this form is confidential and may only be released with the permission of Esso Highlands Limited.

APPENDIX 5: Landfill Criteria

Landfill Criteria – LNG Facility in PNG

Type	Criteria
Siting Criteria	1. Must not be located within 1,524 meters of any airport runway end used by piston-type aircraft, or within 3,048 meters of any airport runway end used by turbojet aircraft. ^{1,3}
	2. Must demonstrate that the unit will not restrict the flow of the 100-year flood, reduce the temporary water storage capacity of the floodplain, or result in washout of solid waste so as to pose a hazard to human health and the environment. ¹
	3. Run-on and run-off prevention must handle a peak discharge of a 25-year storm. ²
	4. The construction and operation of the landfill will not cause the following: ¹ <ul style="list-style-type: none"> • Violation of any water quality standards, • Violation of any toxic effluent standards, • Jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of a critical habitat that is protected, and • Significant degradation of wetlands.
	5. Shall not be located within 60 meters of a fault that has had displacement in Holocene time unless proven otherwise. ¹

1. U.S. EPA 40 CFR 258 Subparts C and D - Criteria for Municipal Solid Waste Landfills.
2. International Finance Corporation. 2007. *Environmental, Health, and Safety Guidelines for Waste Management Facilities*. December, 2007.
3. World Bank, 1996. *Sanitary Landfill Siting and Design Guidance*.
4. Office of Environment and Conservation, 2001. *Environmental Code of Practice for Sanitary Landfill Sites Papua New Guinea*.

Landfill Criteria - LNG Facility in PNG (Continued)

Type	Criteria
<p>Siting Criteria (continued)</p>	<p>6. Shall not be located in seismic impact zones, unless designed to resist the maximum horizontal acceleration in lithified earth material for the site.¹ There shall be no fault lines or significantly fractured geologic structure within 500 meters of the perimeter of the landfill.³</p>
	<p>7. If located in an unstable area, engineered measures will be taken to ensure that the integrity of the structural components of the landfill will not be disrupted.¹ The landfill should be restricted to flat land.⁴</p>
	<p>8. Residential development must be further than 250 meters from the perimeter of landfill.¹ Avoid siting within 1 km of socio-politically sensitive sites.³ Landfill should be 500 to 1000 meters from any major urban settlement.⁴</p>
	<p>9. There shall be an adequate buffer such as a hill, trees or fences between the facility and potential receptors. The prevailing wind direction should be considered in the landfill location so that the downwind affect on facility personnel is minimized.²</p>
	<p>10. Seasonal high groundwater table must be at least 1.5 meters below the base of site preparation.^{2,3,4}</p>

1. U.S. EPA 40 CFR 258 Subparts C and D - Criteria for Municipal Solid Waste Landfills.
2. International Finance Corporation. 2007. *Environmental, Health, and Safety Guidelines for Waste Management Facilities*. December, 2007.
3. World Bank, 1996. *Sanitary Landfill Siting and Design Guidance*.
4. Office of Environment and Conservation, 2001. *Environmental Code of Practice for Sanitary Landfill Sites Papua New Guinea*.

Landfill Criteria - LNG Facility in PNG (Continued)

Type	Criteria
<p>Siting Criteria (continued)</p>	<p>11. Shall not be located over limestone, carbonate, or fissured rock and shall not be located over a ground water recharge zone for existing or pending water supply development. Shall not be sited within 500 meters up-gradient of a public drinking, irrigation or livestock water supply well.³</p>
	<p>12. All possible parties or agencies concerned with the landfill will be involved in the site selection process and include: Department of Lands, Department of Environment and Conservation, Department of Health, Department of Provincial and Local Government Affairs.⁴</p>
<p>Design Criteria</p>	<p>1. Leachate collection system designed and constructed to maintain less than 30-cm depth of leachate over the liner^{1,3} Leached water must not be discharged beyond the landfill premises. It should be contained within the landfill site and discharged into a safe environment or into a settling pond with liners and a clay basement.⁴ There should be at least four leachate observation stations where samples are to be collected every three months for analyses.⁴</p>
	<p>2. A gas management system should be considered in the design.³ Gas monitoring devices should be included.⁴</p>
	<p>3. Must have a composite liner^{1,3}:</p> <ul style="list-style-type: none"> • Upper component must consist of a minimum 30-mil flexible membrane liner (FML) or if using HDPE, at least 60-mil; • Lower component must consist of at least a 0.6-meter thick layer of compacted clay meeting the following criteria: Liquid Limit (LL) greater than 30%, a plasticity index (PI) greater than 15%, more than 30% by weight passing a number 200 sieve, gravel content less than 30%, and a hydraulic conductivity of 1×10^{-7} cm/sec or less; and • Components must be installed in direct and uniform contact with the compacted soil component.

1. U.S. EPA 40 CFR 258 Subparts C and D - Criteria for Municipal Solid Waste Landfills.
2. International Finance Corporation. 2007. *Environmental, Health, and Safety Guidelines for Waste Management Facilities*. December, 2007.
3. World Bank, 1996. *Sanitary Landfill Siting and Design Guidance*.
4. Office of Environment and Conservation, 2001. *Environmental Code of Practice for Sanitary Landfill Sites Papua New Guinea*.

Landfill Criteria - LNG Facility in PNG (Continued)

Type	Criteria
<p>Design Criteria (continued)</p>	<p>4. Slope angle of the perimeter berm should be constructed with an exterior slope no steeper than 3:1 horizontal to vertical. Maximum side-slopes of 3:1 in non-seismic areas and less steep slopes (e.g., 5:1) in seismic areas should be used. Adequate drainage of water should be maintained on the slopes so that saturated conditions do not develop and lead to slope subsidence.^{1,3}</p>
	<p>5. Run-on and run-off prevention must handle a peak discharge of a 25-year storm.¹</p>
	<p>6. Cut-off trenches can be dug close to the edge of the exterior perimeter of the landfill so that surface water can be directed around the site or to surface drains.⁴</p>
	<p>7. A water supply should be connected to the site to combat or extinguish fires. If a water supply line is not available, a stored water supply of not less than 50,000 liters should be provided via hydrants to extinguish fires and minimize dust.⁴</p>
<p>Operations Criteria</p>	<p>1. No disposal of putrescible wastes unless the facility is designed to be capable of handling such wastes.²</p>
	<p>2. No disposal of liquids, explosive wastes, radioactive or nuclear materials, or medical wastes.^{1,2} The Department of Environment and Conservation of PNG maintains a list of hazardous and toxic wastes which require special treatment and disposal.⁴ Bulky objects like tires and heavy machines are difficult to compact and should be disposed in a separate area of the landfill. There should be an allowance for the treatment of hazardous substances.⁴</p>

1. U.S. EPA 40 CFR 258 Subparts C and D - Criteria for Municipal Solid Waste Landfills.
2. International Finance Corporation. 2007. *Environmental, Health, and Safety Guidelines for Waste Management Facilities*. December, 2007.
3. World Bank, 1996. *Sanitary Landfill Siting and Design Guidance*.
4. Office of Environment and Conservation, 2001. *Environmental Code of Practice for Sanitary Landfill Sites Papua New Guinea*.

Landfill Criteria - LNG Facility in PNG (Continued)

Type	Criteria
Operations Criteria (continued)	3. Ground water monitoring wells will be installed around the site to assess whether the landfill is having an effect on the water quality. ^{1,3}
	4. The landfill will be fully enclosed with fencing so that no unauthorized personnel as well as livestock or wildlife can come into contact with the waste. ² Use of 1.8-meter high mesh wire is appropriate. ⁴
	5. Waste should be covered daily (minimum soil thickness of 30 cm) ⁴ to control disease vectors, fires, odors, blowing litter and scavenging. ^{1,2,3} Refuse should not be left uncovered for more than 24 hours from the time of the deposit. Edges and sides of the waste must be covered. Waste with organic matter must be covered immediately. ⁴
	6. Inspections should be conducted on a regular basis to confirm the integrity of the perimeter berm and to confirm the run-on/run-off controls leachate collection system are operating as designed. ²

1. U.S. EPA 40 CFR 258 Subparts C and D - Criteria for Municipal Solid Waste Landfills.
2. International Finance Corporation. 2007. *Environmental, Health, and Safety Guidelines for Waste Management Facilities*. December, 2007.
3. World Bank, 1996. *Sanitary Landfill Siting and Design Guidance*.
4. Office of Environment and Conservation, 2001. *Environmental Code of Practice for Sanitary Landfill Sites Papua New Guinea*.

APPENDIX 6: Onshore and Offshore Water Discharge Criteria

Parameter	Schedule 1 of Environment Act 2000 - Environment (Water Quality Criteria) Regulation 2002 and Environment Permit (9 September 2009)	
	Receiving Water Body	
	Freshwater	Seawater
pH (pH units)	6.5 – 9	No alteration to natural pH
Temperature	No alteration greater than 2°C	No alteration greater than 2°C
Turbidity NTU	No alteration greater than 25 NTU	No alteration greater than 25 NTU
Total Suspended Solids	35 mg/L or <10% change from background levels at any particular time	35 mg/L or <10% change from background levels at any particular time
Insoluble residues	No insoluble residues or sludge formation to occur	No insoluble residues or sludge formation to occur
Dissolved oxygen	Not less than 6.0 mg/L	Not less than 5.0 mg/L
Chemical Oxygen Demand (COD)	125 mg/L	125 mg/L
Biological Oxygen Demand (BOD)	25 mg/L	25 mg/L
Sulphate as SO ₄ ²⁻	400.0 mg/L	—
Sulphide as HS ⁻	0.002 mg/L	0.002 mg/L
Ammonia-nitrogen (NH ₃ -N)	Dependent on pH and temperature (see Table 1-2)	—
Nitrate (NO ₃ ⁻ + NO ₂ ⁻)	45.0 mg/L	45.0 mg/L
Potassium	5.0 mg/L	450.0 mg/L
Arsenic	0.05 mg/L	0.05 mg/L
Barium	1.0 mg/L	1.0 mg/L
Boron	1.0 mg/L	2.0 mg/L
Cadmium	0.01 mg/L	0.001 mg/L
Chromium (as hexavalent)	0.05 mg/L	0.01 mg/L
Cobalt	Limit of detection	
Copper	1.0 mg/L	0.03 mg/L
Cyanide, free as HCN	0.005 mg/L	0.01 mg/L
Fluoride	1.5 mg/L	1.5 mg/L
Iron	1.0 mg/L	1.0 mg/L
Lead	0.005 mg/L	0.004 mg/L
Manganese	0.5 mg/L	2.0 mg/L
Mercury	0.0002 mg/L	0.0002 mg/L
Nickel	1.0 mg/L	1.0 mg/L
Selenium	0.01 mg/L	0.01 mg/L
Silver	0.05 mg/L	0.05 mg/L
Tin	0.5 mg/L	0.5 mg/L
Zinc	5.0 mg/L	5.0 mg/L
Oil & Grease	No visible film (for construction discharges); and 10 mg/L (for operations discharges)	No visible film (for construction discharges); and 10 mg/L (for operations discharges)
Phenols	0.002 mg/L	0.002 mg/L
Fecal Coliform Bacteria	Not to exceed 200 colonies	Not to exceed 200 colonies

Units: mg/L unless stated otherwise

A dash ('—') denotes that no criteria or limit is given in the Regulation and as such does not exist.

Metal concentrations are for dissolved substances (passing through a nominal 0.45 µm medium)

NTU = nephelometric turbidity unit

Cobalt (as 'limit of detectability') uses Graphite furnace atomic absorption spectrometry (GFAAS)

The criterion for fecal coliform bacteria (colonies per 100 mL) is based on not fewer than five water samples collected over not more than a 30 day period

APPENDIX 7: Contractor Waste Management Plan (Long-form Template)

Contractor Waste Management Plan (Long-form Template)

Each Contractor will prepare a waste management plan (WMP) that presents and characterizes wastes, and summarizes the specific procedures for treatment and disposal of waste streams generated from their scope of work. This template presents the minimum information needed for a Contractor's WMP, and can be issued and revised as needed during the life of the project activities. The WMP sections are explained in greater detail below, and will include the following sections:

- Contractor Information
- Waste Avoidance and Minimization
- Waste Stream Analysis and Management
- Waste Management
- Waste Management Area Operations
- Inspections, Monitoring and Reporting

1. CONTRACTOR INFORMATION

Contractor information should include:

- Name of the Contractor,
- Scope of work,
- Waste generating activities,
- Contractor's designated waste management personnel, and
- Contact information.

2. WASTE AVOIDANCE AND MINIMIZATION

The Contractor is to address steps to be taken or methods adopted to:

- Avoid,
- Reduce, and
- Reuse or recycle wastes.

This section should include waste minimization goals and procedures for measuring performance toward the goals.

3. WASTE STREAM ANALYSIS AND MANAGEMENT

Waste Inventory

Provide a waste inventory that identifies each waste type, volume and mass expected to be generated, waste classification, and comments to capture special considerations such as safety concerns or reporting requirements. As project activities change, from the original plan, an updated inventory should be submitted. An example of the waste inventory table

format is shown in Table G-1. All pertinent assumptions in classifying wastes and calculating the volume and mass, of waste generated should be included.

**Table G-1:
Waste Generated**

Identification Number	Waste Type	Volume Generated (m ³)	Mass Generated (tonnes)	Classification [*]		Comments
				Restricted	Non-Restricted	

^{*}Classification based on Company definitions for Restricted and Non-restricted waste:

- Non-Restricted: A material that does not pose an immediate hazard to health, safety and/or the environment.
- Restricted: A waste which is ignitable (i.e., burns readily), corrosive, reactive (e.g., explosive), or toxic. In addition to these characteristic wastes, certain wastes may be listed as hazardous by government authorities or applicable international conventions and should be considered restricted. Restricted waste takes many physical forms and may be solid, semi-solid, liquid, and contained gases. This category also contains "pathogenic" materials (capable of causing disease, containing microorganisms that can cause disease in other organisms or in humans, animals and plants; they may be bacteria, viruses, or parasites.).

Waste-specific Characterization and Management Procedure

For each generated waste listed in the waste inventory, provide the following information (see typical format below):

- **Inventory number:**
Include an identification number that corresponds to the waste listing on the Waste Inventory.
- **Waste generating process:**
Describe the waste and generating process(es).
- **Waste classification:**
State whether the waste is restricted or non-restricted, provide characterization information and indicate the source of information (i.e., MSDS, process knowledge, waste analysis, etc.). Attached or appended documentation may be referenced.
- **Minimization:**
Describe measures to be taken to avoid generation, reduce the amount generated, and/or reuse materials, as applicable. Specific minimization goals should be included.
- **Safety considerations for handling:**
Include all safety considerations specific to the waste, including necessary PPE and all standard safety procedures.
- **Management methods:**
Explain methods that will be followed to store, label, track, collect, transport, treat, and dispose of waste. Include information on equipment and or facilities that would be used for effective management.
- **Disposal Site:** Specify the planned destination(s) for interim management and final disposal.

Waste-specific Characterization and Management Format

Waste Inventory Number:		Waste Type:
Waste Generating Process		
Classification		
Minimization		
Handling		
Storage		
Labelling		
Tracking		
Collection		
Transport		
Treatment		
Disposal Method		
Disposal Site		

Waste Collection and Transport

Include all collection and transport information, including waste tracking forms when applicable. A sample waste tracking form is included below.

WASTE TRACKING FORM					
PNG LNG Project					
This Section to be completed by the generator or designee of the waste generator.	PLEASE USE BLOCK LETTERS				
	SITE CONTRACTOR _____				
	SITE LOCATION _____				
	ADDRESS & PHONE OF SITE CO-ORDINATOR _____ (PROVIDE ADDRESS IF OFF-SITE TRANSFER)				
WASTE INFORMATION					
	IDENTIFICATION #	DESCRIPTION	QUANTITY	UNITS <small>(KG, LITRES, M³)</small>	CONTAINERS
					NUMBER TYPE
I hereby declare that the above consignment is accurately described and is in proper condition for transport.					
SIGNATURE _____					
NAME _____ DATE _____					
To be completed by the Transporter of the waste.	TRANSPORTER NAME/CONTRACTOR _____				
	VEHICLE NUMBER _____				
	I hereby acknowledge receipt of the above mentioned waste for transport.				
	SIGNATURE _____				
NAME _____ DATE _____					
To be completed by the receiving station at the WMA receiving the waste.	WASTE MANAGEMENT AREA (WMA) RECEIVING STATION				
	I hereby declare I have received the above waste.				
	SIGNATURE _____				
	NAME _____ DATE _____				
To be completed by the WMA.	FINAL DISPOSITION OF THE WASTE				
	IDENTIFICATION #	DISPOSITION			
		<input type="checkbox"/> Landfill <input type="checkbox"/> Incineration <input type="checkbox"/> Recycle/Reuse through _____ <small>(Provide the name of the recycler/reuse company)</small>			
		<input type="checkbox"/> Landfill <input type="checkbox"/> Incineration <input type="checkbox"/> Recycle/Reuse through _____ <small>(Provide the name of the recycler/reuse company)</small>			
		<input type="checkbox"/> Landfill <input type="checkbox"/> Incineration <input type="checkbox"/> Recycle/Reuse through _____ <small>(Provide the name of the recycler/reuse company)</small>			
		<input type="checkbox"/> Landfill <input type="checkbox"/> Incineration <input type="checkbox"/> Recycle/Reuse through _____ <small>(Provide the name of the recycler/reuse company)</small>			
		<input type="checkbox"/> Landfill <input type="checkbox"/> Incineration <input type="checkbox"/> Recycle/Reuse through _____ <small>(Provide the name of the recycler/reuse company)</small>			
I hereby declare that the above information is correct.					
SIGNATURE _____					
NAME _____ DATE _____					
Complete the Section of this Notice that applies to you. The copies are distributed as follows: Green - Kept by the waste producer Blue - Kept by Receiving Station Yellow - Kept by Transporter White - Kept by CIMA The information contained on this form is confidential and may only be released with the permission of Esso Highlands Limited.					

4. WASTE MANAGEMENT

Provide information on planned waste management area(s) and waste disposition.

Waste Management Areas

Information regarding waste management areas should include:

- Layout,
- Facilities, and
- Off-site disposition.

Waste Disposition

Provide methods for waste to be treated, disposed of, or recycled. Also include amounts of each generated waste to be treated, disposed, and recycled. An example of a waste disposition table format is shown in Table G-2.

**Table G-2:
Waste Disposition**

Identification Number	Amount Treated		Amount Disposed		Amount Recycled	
	Volume (m ³)	Mass (tonnes)	Volume (m ³)	Mass (tonnes)	Volume (m ³)	Mass (tonnes)

5. WASTE MANAGEMENT AREA OPERATIONS

Provide waste management area operations information including procedures, and staffing and training guidelines.

Procedures

Waste management area procedures should include:

- Site operating procedures,
- Ownership and personnel, and
- Emergency and corrective action procedures.

Staffing and Training

Provide information on staffing (staff size, position descriptions, roles and responsibilities), and provide specifics on the training programs.

6. INSPECTIONS, MONITORING AND REPORTING

Provide information including:

- Details of monitoring activities and inspection of waste management performance,
- Record keeping plans and recording frequencies, and
- Explain contents of reports (format) and delivery to Company.