Esso Highlands Limited

Papua New Guinea LNG Project

Environmental and Social Management Plan
Appendix 14: Hydrotest Management Plan

PGGP-EH-SPENV-000018-016

CONTENTS

TABLES

ATTACHMENTS

1.0 OBJECTIVES

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

The objective of the Hydrotest Management Plan is to reduce environmental impacts related to water abstraction and discharge.

The Hydrotest Management Plan should be read in conjunction with the following Company plans:

- Ecological Management Plan
- Water Management Plan
- Erosion and Sediment Control Plan.

2.0 LEGAL AND OTHER REQUIREMENTS

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

3.0 SURVEYS

Contractor shall collect data as necessary to establish capacity of relevant water bodies to supply water for hydrostatic tests, establish whether natural flow can be maintained during abstraction and evaluate potential impacts to beneficial uses.

4.0 MANAGEMENT AND MONITORING

Table 3 presents a summary of the potential environmental impacts related to the abstraction and discharge of hydrostatic test water, together with mitigation and management measures to avoid or reduce these impacts.

Contractor shall develop a Hydrotest Management Plan, which will as a minimum incorporate the measures described in Table 3 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 Hydrotest 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.

Mitigation and management commitments contained in the PNG LNG Project Environmental Impact Statement 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 with a code commencing with A.

Contractor shall conduct sampling of the hydrotest discharge water prior to discharge in order to verify compliance with prescribed water quality criteria and any specific conditions of relevant environmental permits.

Relevant criteria for the discharge of hydrotest water are prescribed in the Water Management Plan, in addition to those presented in Table 1 below.

Table 1: Hydrotest Water Parameters

Parameter	Water Discharge Criteria (for discharge to surface waters or land)
pH	6-9
BOD	25 mg/L
COD	125 mg/L
TSS*	35 mg/L
Phenols	0.5 mg/L
Sulfides	1 mg/L
Heavy metals (total)**	5 mg/l
Chlorides	600 mg/L (average); 1200 mg/L (maximum)

* As established in Schedule 1 of Environment Act 2000 - Environment (Water Quality Criteria) Regulation 2002 and Environment Permit (9 September 2009) as detailed in **Error! Reference source not found.**, the applicable criteria for TSS is 35 mg/L or <10% change from background levels at any particular time.

** Includes: Arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, vanadium, zinc

Monitoring requirements applicable to hydrotest are presented in Table 2 below.

Table 2: Hydrotest Discharge Monitoring

Location	Quality Parameter	Frequency
End of pipe discharge locations	See Table 1	To be agreed by Company

Table 3: Management and Monitoring

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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**
Water abstraction for hydrotest use	Impacts to environmental flows and downstream beneficial uses (Objective 1)	Conduct an environmental assessment of abstraction and discharge locations.	A94	Verification	As required	Contractor
		Sources for the hydrotest water abstraction shall be chosen to allow filling to occur while maintaining adequate flow rates to protect aquatic life and not impair the quality or quantity of water available to downstream users (typically the abstraction rate should be no more than 10% of the flow rate in the water body), .	A95	Verification	As part of selection of water body to be used for abstraction	Contractor
		In order to reduce the amount of fresh water required for the hydrostatic tests, the water from one test section should be transferred to the next test section, where practicable, in order to reduce the overall fresh water quantity requirements.	A96	Verification	As part of selection of water body to be used for abstraction	Contractor
		Screens on hydrostatic test water abstractions shall be used to prevent the entry of fish or the potential losses of fish due to entrainment or impingement.	A97	Verification	During abstraction	Contractor
Hydrotest water discharge	Impacts to water quality with consequent adverse impacts on downstream beneficial uses (Objective 1)	Discharge of hydrotest waters will be at a sufficient distance from water bodies so as to prevent pollution by turbid water and comply with relevant discharge criteria. Discharge will be performed to discharge structures so as to prevent erosion of the surrounding land and to maintain the discharge quality required.	A98	Verification	Prior to discharge	Contractor
		Perform controlled discharge of hydrotest water in order to control erosion and use erosion protection measures.	A99	Verification	Prior to/during discharge to land	Contractor
		Utilise runoff controls to maintain stable landforms.	A100	Verification	Prior to/during discharge to land	Contractor

		Use of chemicals in hydrotest water will take into consideration discharge criteria as specified in the Water Management Plan and is subject to Company review and approval.	A101	Verification	As part of hydrotest	Contractor
		Inject hydrotest discharge water into a disposal well if one is available and where practicable.	A102	Verification	N/A	Contractor
		Reduce the need for chemicals by minimizing the time that test water remains in the equipment or pipeline	A103	Verification	As part of hydrotest	Contractor
		Use break tanks or energy dissipators (e.g. protective riprap, sheeting, tarpaulins) for the discharge flow.	A104	Verification	As part of hydrotest	Contractor
		Use sediment control methods (e.g. silt fences, sandbags or hay bales) to protect aquatic biota water quality, and water users from the potential effect of discharge.	A105	Verification	As part of hydrotest	Contractor
		Reinstatement of disturbed lands at both abstraction and discharge points.	A106	Verification	Upon completion of hyrdotest	Contractor
		Obtain necessary environmental permits for the discharge of hydrotest water.	*M187*	As required by hydrotest discharge permit	As required by hydrotest discharge permit	Contractor
		Hydrotest water will, if necessary, be filtered prior to filling and emptying the pipeline to remove most solid material.	*M196*	N/A	N/A	Contractor
		If necessary, model dispersion characteristics of hydrotest water that will be discharged in Caution Bay prior to discharge.	*M214*	Modelling	Prior to discharge	Contractor

		Develop a site-specific Hydrostatic Test Water Management Plan which provides for: • Discharge of hydrotest waters in accordance with industry good practice for system gauging, hydrotesting and discharge. • Obtain necessary environmental permits for discharge. • Discharge of hydrotest water to meet prescribed water quality criteria (see Water Management Plan) and any specific conditions of relevant environmental permits. • Measures to hold and treat hydrotest water where necessary to meet the above criteria. • Sampling and analysis of hydrotest water prior to discharge in order to verify compliance with above criteria. In the case of discharge to land, the outflow energies will be dissipated in order to reduce erosion (see relevant mitigation measures above).	*M145*	Sampling and analysis prior to discharge	Prior to discharge	Contractor
Hydrotest water discharge	Introduction of foreign aquatic species (Objective 1)	At Hides Ridge, hydrotest water sourced off the ridge will be discharged into the same watershed as its source to prevent cross-contamination with live organisms from another catchment.	M51	Verification	As part of hydrotest	Contractor

† See Section 1.

5.0 ROLES AND RESPONSIBILITIES

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

Contractor's Hydrotest 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 Hydrotest 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 Hydrotest Management Plan are competent on the basis of education, training and experience.

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

Contractor's training activity associated with the Hydrotest 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 Hydrotest Management Plan are competent on the basis of education, training and experience.

Company's training activity associated with the Hydrotest 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 4 outlines indicators for measuring and verifying performance in relation to the management of the abstraction and discharge of hydrotest water.

Table 4: Performance Indicators

ID #	Performance Indicator	Measurement	Internal Assessment Frequency	Relevant Management Plan Objective†
1	Percent reuse of abstracted water used for further hydrotest	Record of abstraction and discharge volumes	At hydrotest	1
2	Number of exceedances of water quality criteria due to discharge of hydrotest water	Verification of water quality analysis prior to discharge	Prior to discharge	1
Performance Indicators to be further developed and agreed between Contractor and Company				

† See Section 1.

8.0 REPORTING AND NOTIFICATION

Contractor shall report to Company the results of the surveys undertaken in accordance with Section 3.0 and integrate the results, including additional mitigation and management measures as agreed with Company, with the Hydrotest Management Plan.

Contractor's monthly report to Company shall include:

- Results of the surveys prescribed in Section 3
- Results of all water sampling undertaken in accordance with Section 4.0
- Number and results of verification inspections prescribed in Table 3
- Performance Indicators as applicable in the reporting period.

Contractor shall notify Company immediately should the water quality criteria specified in the Water Management Plan be exceeded.

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

PNG has no specific regulations with respect to hydrotest effluent discharge criteria, however, the Environment Act 2000 does contain 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. More specifically, the Environment (Water Quality) Regulation 2002 specifies a suite of water criteria that shall not be exceeded within defined mixing zones. These are specified in the Project Environmental and Social Guidelines and Standards (Table 5).

International Financial Institution Requirements

The following International Finance Corporation (IFC) Performance Standards apply to the management of hydrotest water:

- 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: *Pollution Prevention and Abatement,* and in particular the following broad requirements:

  "The objectives of pollution prevention are a) to avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities; and b) to promote the reduction of emissions that contribute to climate change."

  "To achieve these objectives, clients should take into account the potential impact of their emissions on the ambient conditions (such as ambient water quality) and seek to avoid or minimize these impacts within the context of the nature and significance of pollutants emitted."

  "General requirements. During the design, construction, operation and decommissioning of the project (the project life-cycle) the client will consider ambient conditions and apply pollution prevention and control technologies and practices (techniques) that are best suited to avoid or, where avoidance is not feasible, minimize or reduce adverse impacts on human health and the environment while remaining technically and financially feasible and cost-effective[1]. The project-specific pollution prevention and control techniques applied during the project life-cycle will be tailored to the hazards and risks associated with project emissions and consistent with good international industry practice[2], as reflected in various internationally

[1] "Technical feasibility" and "financial feasibility" are defined in Performance Standard 1. "Cost-effectiveness" is based on the effectiveness of reducing emissions relative to the additional cost required to do so.

[2] Defined as the exercise of professional skill, diligence, prudence and foresight that would reasonably be expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally. The circumstances that skilled and experienced professionals may find when evaluating the range of pollution prevention and control techniques available to a project may include, but are not

recognized sources, including IFC's Environmental, Health and Safety Guidelines (the EHS Guidelines)."

"Pollution Prevention, Resource Conservation and Energy Efficiency. The client will avoid the release of pollutants or, when avoidance is not feasible, minimize or control the intensity or load of their release. This applies to the release of pollutants due to routine, non-routine or accidental circumstances with the potential for local, regional, and transboundary impacts[3].

"Ambient Considerations. To address adverse project impacts on existing ambient conditions[4], the client will: (i) consider a number of factors, including the finite assimilative capacity[5] of the environment, existing and future land use, existing ambient conditions, the project's proximity to ecologically sensitive or protected areas, and the potential for cumulative impacts with uncertain and irreversible consequences; and (ii) promote strategies that avoid or, where avoidance is not feasible, minimize or reduce the release of pollutants, including strategies that contribute to the improvement of ambient conditions when the project has the potential to constitute a significant source of emissions in an already degraded area. These strategies include, but are not limited to, evaluation of project location alternatives and emissions offsets."

"If ambient levels are in compliance with relevant ambient quality guidelines and/or standards, projects with potentially significant emissions of pollutants should be designed so as to reduce the potential for significant deterioration and to ensure continuing compliance."

I"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".

- 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.

The following IFC Guidelines apply to the management of hyrdotest water. Contractor shall meet the intent of these guidelines:

[3] In reference to trans-boundary pollutants, including those covered under the Convention on Long-range Trans-boundary Air Pollution.

[4] Such as air, surface and groundwater, and soils.

[5] The capacity of the environment for absorbing an incremental load of pollutants while remaining below a threshold of unacceptable risk to human health and the environment.

- IFC EHS *General Guidelines* (April 2007), Sections 1.3, 1.4, 3.1 and 4.1

- IFC Onshore Oil and Gas Development Industry Sector Guideline (Section 1.1):

  Water sourcing for hydrotesting purposes should not adversely affect the water level or flow rate of a natural water body, and the test water withdrawal rate (or volume) should not exceed 10 percent of the stream flow (or volume) of the water source.

  Erosion control measures and fish-screening controls should be implemented as necessary during water withdrawals at the intake locations. The disposal alternatives for test waters following hydrotesting include injection into a disposal well if one is available or discharge to surface waters or land surface. If a disposal well is unavailable and discharge to surface waters or land surface is necessary the following pollution prevention and control measures should be considered:
  - Reduce the need for chemicals by minimizing the time that test water remains in the equipment or pipeline;
  - If chemical use is necessary, carefully select chemical additives in terms of dose concentration, toxicity, biodegradability, bioavailability, and bioaccumulation potential;
  - Conduct toxicity testing as necessary using recognized test methodologies. A holding pond may be necessary to provide time for the toxicity of the water to decrease. Holding ponds should meet the guidance for surface storage or disposal pits as discussed in this Guideline;
  - Use the same hydrotest water for multiple tests;
  - Hydrostatic test water quality should be monitored before use and discharge and should be treated to meet the discharge limits in Table 1 in Section 2.1 of this Guideline (refer Table 5, Project Environmental and Social Guidelines and Standards).
  - If significant quantities of chemically treated hydrostatic test waters are required to be discharged to a surface water body, water receptors both upstream and downstream of the discharge should be monitored. Post-discharge chemical analysis of receiving water bodies may be necessary to demonstrate that no degradation of environmental quality has occurred;
  - If discharged to water, the volume and composition of the test water, as well as the stream flow or volume of the receiving water body, should be considered in selecting an appropriate discharge site to ensure that water quality will not be adversely affected outside of the defined mixing zone;
  - Use break tanks or energy dissipators (e.g. protective riprap, sheeting, tarpaulins) for the discharge flow;
  - Use sediment control methods (e.g. silt fences, sandbags or hay bales) to protect aquatic biota, water quality, and water users from the potential effect of discharge, such as increased sedimentation and reduced water quality;
  - If discharged to land, the discharge site should be selected to prevent flooding, erosion, or lowered agriculture capability of the receiving land. Direct discharge on cultivated land and land immediately upstream of community / public water intakes should be avoided;
  - Water discharge during cleaning pig runs and pretest water should be collected in holding tanks and should be discharged only after water-quality testing to ensure that it meets discharge criteria established in Table 1 of Section 2.1 of this Guideline (refer Table 5, Project Environmental and Social Guidelines and Standards).