

Esso Highlands Limited



Papua New Guinea LNG Project

**Environmental and Social Management Plan
Appendix 3: Noise and Vibration
Management Plan**

PGGP-EH-SPENV-000018-005

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1.0 OBJECTIVES

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

The objective of the Noise and Vibration Management Plan is to reduce to an acceptable level noise and vibration impacts from project activities to local residents and specific fauna habitat, including marine fauna and bats.

The Noise and Vibration Management Plan should be read in conjunction with other Company plans:

- Ecological Management Plan
- Community Engagement Plan
- Stakeholder Engagement 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 identify work locations, including transport routes, which represent a noise and vibration risk to community dwellings and other sensitive receptors by virtue of proximity and, prior to the commencement of works, shall agree with Company site specific noise and vibration mitigation measures to be implemented at such locations.

Refer to the Ecological Management Plan for noise related information required as part of blasting procedures.

4.0 MANAGEMENT AND MONITORING

Table 1 presents a summary of the potential environmental impacts related to noise and vibration, together with mitigation and management measures to avoid or reduce these impacts.

Contractor shall develop a Noise and Vibration 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 Noise and Vibration 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.

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 a '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'.

Table 1: 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
Noise emissions from construction equipment (including drilling) and vehicles.	Intrusive and nuisance noise impacts to the local community. Wildlife may also be impacted.	Contractor shall establish a Noise Management Plan.	M175	N/A	N/A	Contractor
		Notify affected persons of the intended work and its duration where high intensity noise from construction activities may have adverse impacts.	M174	See Community Engagement Plan and Stakeholder Engagement Plan	As required	Contractor
		Limit construction works at night time where practicable and only undertake night time work with prior approval from Company.	M169	Verification	Ongoing	Contractor
		Implement noise mitigation measures (including consultation with local citizens) at drilling sites, where practical, to reduce the noise level to acceptable levels.	M170	Verification	Ongoing	Contractor
		Locate fixed and mobile equipment (e.g., generators) with consideration of local people (generally at a minimum distance of 500 meters from residences or other sensitive receptors, except where otherwise agreed by Company).	M177	Verification	Ongoing	Contractor
		Select construction equipment based on industry good practice.	M172	Verification	Once-off prior to construction	Contractor
		Limit work vehicles and machinery to designated access and work site areas.	M10	Verification	Ongoing	Company and Contractor
		Maintain construction vehicles and equipment in order to limit noise	M33	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
		emissions.				
		Maintain noise suppression devices on construction vehicles and equipment.	M173	Verification	Ongoing	Contractor
		Implement appropriate avoidance measures for caves with bat colonies by restricting access to caves with bats and prohibiting disturbance by Project workers and manage project activities to reduce noise disturbance of bat colonies.	M108	Verification	Ongoing	Contractor
		Schedule short-term high noise construction activities to reduce noise nuisance and intrusion.	A11	Verification	Ongoing	Contractor
		Fit pneumatic tools operated near settlements with an air exhaust port silencer.	A12	Verification	Ongoing	Contractor
Blasting activities.	Short-term, intermittent intrusive and nuisance noise and vibration impacts to the local community. Bats may also be temporarily impacted.	Establish blasting procedures (for both the terrestrial and marine environments) with consideration for local communities.	M35	Verification	As required prior to blasting	Contractor
		Implement blasting procedures.	M213	Refer to the Ecological Management Plan	Prior to blasting	Contractor
		Implement appropriate avoidance measures for caves with bat colonies by prohibiting or controlling blasting within 100 m of known colonies of cave bats.	M109	Verification	Ongoing	Contractor
		Select construction equipment based on industry good practice.	M172	Verification	Once-off prior to construction	Contractor
		Notify affected persons of the intended work and its duration where high	M174	See Community Engagement Plan and	As required	Company and 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
		intensity noise from construction activities may have adverse impacts.		Stakeholder Engagement Plan		
		Schedule short-term blasting activities to reduce vibration nuisance and intrusion.	A12	Verification (See Table 2)	During blasting	Contractor
Marine piling activities.	Underwater noise impacts on marine fauna.	Employ a soft start for piling activities during the construction of the jetty to allow any marine fauna in the vicinity the opportunity to move away.	M212	Verification	As required	Contractor

[†] See Section 1.

Contractor shall at all times during blasting activities, where the effects may be perceptible at sensitive receptors, undertake to meet the guideline levels presented in Table 2 below and shall undertake monitoring of blasting activities to determine compliance therewith.

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

Table 2: Blasting Overpressure and Vibration Guidelines

Airblast overpressure:	Recommended max: 115 dB(L in peak) for 95% of all blasts over 12 months; 120 dB(L in peak) not to be exceeded at any one time
Vibration:	Max level 5mm/s peak particle velocity (ppv); For 95% of all blasts over 12 months; 10mm/s not to be exceeded at any one time.
Timing:	0900 – 1700hrs, Mon-Sat
Measurement:	At noise sensitive sites (houses, schools, hospitals etc, or within 30 m of any building)

Source: Australia and New Zealand Environment Council Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Vibration, 1999

Contractor shall at all semi-permanent camp facilities (those to be utilised or in one place for a period equal to or exceeding one year) undertake to meet the guideline noise levels presented in Table 3 below. Contractor and Company shall undertake periodic noise monitoring in the vicinity of such facilities with the objective of evaluating conformance with the criteria presented in Table 3 at noise sensitive receptors. Contractor and Company shall develop site specific procedures for the noise monitoring program. Noise monitoring shall be carried out by competent personnel using Type 1 or 2 sound level meters meeting all appropriate IEC standards.

Contractors' noise monitoring procedure is subject to Company agreement.

Table 3: Noise Level Guidelines

Receptor	One hour LAeq (dBA) *	
	Daytime (7:00 – 22:00)	Nighttime: (22:00 – 7:00)
Residential Institutional Educational	55	45
Industrial Commercial	70	70

Source: IFC General Health, and Safety (EHS) Guidelines, April 2007

* Noise should not exceed the levels presented in Table 3 or result in a maximum increase in background levels of 3dBA at the nearest off-site receptor .

5.0 ROLES AND RESPONSIBILITIES

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

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

Company shall ensure sufficient resources are allocated on an ongoing basis to achieve effective implementation of Company's responsibilities in the Noise and Vibration 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 Noise and Vibration Management Plan are competent on the basis of education, training and experience.

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

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

Company's training activity associated with the Noise and Vibration 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 and measures for verifying performance in relation to the Noise and Vibration Management Plan.

Table 4: Performance Indicators

ID #	Performance Indicator	Measurement	Internal Assessment Frequency	Relevant Management Plan Objective [†]
1	Number of unresolved complaints relating to noise and vibration issues	Complaints register shows complaints from stakeholders have been adequately addressed	Quarterly	1
Performance Indicators are to be further developed and agreed between Company and Contractor				

[†] See Section 1.

8.0 REPORTING AND NOTIFICATION

Contractor shall report to Company the results of the surveys undertaken in accordance with the relevant components of the Ecological Management Plan (regarding blasting) and integrate the results, including additional mitigation and management measures as agreed with Company, with the Noise and Vibration Management Plan.

Contractor's monthly report to Company shall include:

- Number and results of verification inspections prescribed in Table 1
- Results of monitoring as prescribed in Table 2 and Table 3
- Performance Indicators as applicable in the reporting period.

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 noise emission or ambient noise quality standards. Nor does it have regulations relating to vibration. The Environment Act 2000 does, however, 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.

International Financial Institution Requirements

The following International Finance Corporation (IFC) Performance Standards apply to noise emissions and vibration during construction:

- 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 specifically the following provisions:

“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 noise levels] and seek to avoid or minimize these impacts within the context of the nature and significance of pollutants emitted. Large projects with potentially significant emissions and /or high impacts may require impacts on the surrounding environment (i.e., changes in ambient levels) to be monitored, in addition to the implementation of control measures.”

“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-effective¹. 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 practice², 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 limited to, varying levels of environmental degradation and environmental assimilative capacity as well as varying levels of financial and technical feasibility.

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

"Technical Guidance. The client should refer to the current versions of the EHS Guidelines when evaluating and selecting pollution prevention and control techniques for the project. These documents contain the performance levels and measures that are normally acceptable to IFC and are generally considered to be achievable at reasonable costs by existing technology."

"Ambient Considerations. To address adverse project impacts on existing ambient conditions³, the client will: (i) consider a number of factors, including the finite assimilative capacity⁴ 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."

The following IFC Guidelines apply to noise and vibration during construction. Contractor shall meet the intent of these guidelines:

- IFC *EHS General Guidelines* (April 2007), incorporating WHO Guidelines for Community Noise (1999); Section 1.7 and more specifically, Section 4.1 which advocates the following:
 - Planning activities in consultation with local communities so that activities with the greatest potential to generate noise are planned during periods of the day that will result in least disturbance
 - Using noise control devices, such as temporary noise barriers and deflectors for impact and blasting activities, and exhaust muffling devices for combustion engines.
 - Avoiding or minimizing project transportation through community areas
- IFC EHS Guidelines, *Industry Sector Guidelines, Onshore Oil and Gas* (p 11)

³ Such as air, surface and groundwater, and soils.

⁴ 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.