ENVIRONMENTAL MANAGEMENT PLAN (RKL)

AND

ENVIRONMENTAL MONITORING PLAN (RPL)

INTEGRATED ACTIVITIES OF

THE TANGGUH LNG EXPANSION PROJECT

Teluk Bintuni and Fakfak Regencies,

Papua Barat Province

August, 2014

SKKMIGAS
Wisma Mulia Lantai 35
Jl. Jend. Gatot Subroto No. 42
Jakarta 12710

BP Indonesia
Perkantoran Hijau Arkadia
Tower D & E
Jl. T.B. Simatupang Kav. 88
Jakarta Selatan 12520

DISCLAIMER

The official text of AMDAL document on Integrated Activity of the Tangguh Expansion Project ("**Amdal Document**") is Bahasa Indonesia. This is an unofficial English translation of AMDAL Document. Reasonable efforts have been made to provide an accurate translation, however, this translation is provided **"as is."** and for convenience only. **No warranty of any kind, either expressed or implied, is made as to the accuracy, correctness, or reliability of the English translation.** Any discrepancies or differences created in the translation are not binding and have no legal effect for compliance or enforcement purposes. If any questions arise related to the accuracy of the information contained in the English version of the AMDAL document, please refer to the Bahasa Indonesia version of the AMDAL Document which is the official version.

TABLE OF CONTENTS

DISCLAIMER ..... **i**

TABLE OF CONTENTS ..... **ii**

LIST OF APPENDICES ..... **iv**

LIST OF TABLES ..... **iv**

LIST OF FIGURES ..... **iv**

Chapter I Introduction **1**

1.1 Purpose and Objective **2**

1.2 Environmental and social policy **2**

1.3 Environmental Management and Monitoring **5**

1.3.1 Water Quality Management 5

1.3.1.1 Produced Water 1

1.3.1.2 Oily Contaminated Water 2

1.3.1.3 Chemically Contaminated Water 3

1.3.1.4 Reject Brine 3

1.3.1.5 Sewage 3

1.3.1.6 Other Wastewater Sources 4

1.3.1.7 Rain Water Run-Off 6

1.3.2 Air Quality Management 6

1.3.2.1 Flare 6

1.3.2.3 Green House Gas Emission 7

1.3.3 Solid Waste and Hazardous Waste Management from Onshore Activity 8

1.3.4 Wastewater, Solid Waste and Hazardous Waste Treatment from Offshore Activity Location (Marine Facility, Offshore Platform, Gas Exploitation, etc.) 10

1.3.5 Drilling Mud and Cutting Management 14

1.3.6 Hazardous Material Management 17

1.3.7 Revegetation 18

1.3.8 Environmental Monitoring Approach 19

1.4 Tangguh Social Management **21**

1.4.1 Introduction 21

1.4.1.1 Definition of Indigenous People and Areas Surrounding Tangguh LNG Operation Site 22

1.4.1.2 Tangguh LNG Operating Philosophy 23

1.4.1.3 Management Approach 25

1.4.1.4 Regulations and Standards 25

1.4.2 Tangguh LNG Social Management 26
1.4.2.1 Public Health 26
1.4.2.2 Education 33
1.4.2.3 Papuan Development and Industrial Relations 37
1.4.2.4 Livelihood 46
1.4.2.5 Papuan Entrepreneurship 51
1.4.2.6 Governance 53
1.4.2.7 External Relation 64
1.5 Institutional Approach 67
1.5.1 Environmental Management System Approach 67
1.5.2 External Relation and Social Management System Approaches 68
Chapter II ENVIRONMENTAL MANAGEMENT PLAN 1
2.1 Gas Exploitation Activity Summary Matrix 1
2.2 Gas Transmission Activity Summary Matrix 12
2.3 LNG Plant Activity Summary Matrix 21
2.4 Marine Facility Activity Summary Matrix 47
2.5 Survey, Seismic, and Exploration and Appraisal Well Drilling Activity Summary Matrix 59
Chapter III ENVIRONMENTAL MONITORING PLAN 1
3.1 Summary of EMP for Gas Exploitation Activity (Gas Well Drilling and Offshore Platform) 1
3.2 Summary of EMP for Gas Transmission Activity 11
3.3 Summary of EMP for LNG Plant Activity 19
3.4 Summary of EMP for Marine Facility Activity Ringkasan 41
3.5 Summary of EMP for Survey, Seismic, and Exploration Well and Exploration and Appraisal Well Activity 52
Chapter IV AMOUNT AND TYPE OF REQUIRED ENVIRONMENTAL PROTECTION AND MANAGEMENT PERMIT (PPLH) 1
Chapter V COMMITMENT STATEMENT ON rkl-rpl implementation 1

LIST OF APPENDICES

Appendix I Environmental Quality Standard

Appendix II Environmental and Social Monitoring Map

LIST OF TABLES

Table I-1 References for Wastewater, Solid Waste and Hazardous Waste Management According to MARPOL and IMO 10

Table I-2 Summary of Drilling Mud and Cutting Management 14

Table I-3 Evaluation Result of Monitoring Activity Based on AMDAL 2002 to be Added in this AMDAL RPL 19

Table I-4 Penderita HIV+ dan AIDS di Kabupaten Teluk Bintuni 2009 - 2013 31

Table I-5 Environmental Sanitation in Teluk Bintuni Regency 32

Table I-6 Workforce Percentage Target on Construction Phase 44

Table I-7 Workforce Percentage Target on Operation Phase 45

Table II-1 Summary Matrix of EMP for Gas Exploitation Activity (Gas Well Drilling and Offshore Platform) 1

Table II-2 Summary Matrix of EMP for Gas Transmission Acitvity 12

Table II-3 Summary Matrix of EMP for LNG Plant Activity 21

Table II-4 Summary Matrix of EMP for Marine Facility Activity 47

Table III-1 Summary Matrix of EMP for Gas Exploitation Activity (Gas Well Drilling and Offshore Platform) Matriks Ringkasan RPL Kegiatan Eksploitasi Gas 1

Table III-2 Summary Matrix of EMP for Gas Transmission Activity 11

Table III-3 Summary of EMP for LNG Plant Activity 19

Table III-4 Summary Matrix of EMP for Marine Facility Activity 41

LIST OF FIGURES

Figure I-1 Water Quality Management Flowchart 6

Figure I-2 Produced Water Management Flowchart 1

Figure I-3 Existing Produced Water Treatment Unit at Tangguh LNG 2

Figure I-4 Oily Contaminated Water Management at Operations Phase Flowchart 2

Figure I-5 Chemically Contaminated Water Management Flowchart 3

Figure I-6 Reject Brine Management Flowchart 3

Figure I-7 Domestic Sewage Management Flowchart 3

Figure I-8 Wastewater from Hydrotest Activity Management 4
Figure I-9 Other Wastewater that Potentially Contaminated with Hydrocarbon and Chemical Management Flowchart 5
Figure I-10 Other Wastewater which are not Potentially Contaminated with Hydrocarbon and Chemical Management Flowchart 5
Figure I-11 Oily Contaminated Water in Construction Phase Management Flowchart 5
Figure I-12 Rain Water Run-Off Management Flowchart 6
Figure I-13 Solid Waste and Hazardous Waste Management from Onshore Activity 9
Figure I-14 Wastewater Management from Offshore Activity 11
Figure I-15 Solid Non Hazardous and Hazardous Waste Management from Offshore Activity 13
Figure I-16 Gross Enrolment Ratio in Teluk Bintuni Regency 33

CHAPTER I
INTRODUCTION

The Environmental Management Plan (RKL) and Environmental Monitoring Plan (RPL) are prepared based on Minister of Environment Regulation No. 16 Year 2012 regarding Guideline for Developing Environmental Document. This RKL-RPL document covers efforts to manage impacts and monitor environmental and social components which affect either significant impact as a result from holistic evaluation process or insignificant impact which still requires management and monitoring. The RKL-RPL document is submitted parallel with Tangguh Expansion Project Environmental Impact Assessment (ANDAL).

Tangguh LNG holds a commitment to run a business that will be beneficial to the country and community that involved in Tangguh Expansion Project including establishing efforts to minimise potential environmental and social impact from the project.

AMDAL study of Tangguh Expansion Project covers management and monitoring plan of environmental and social components impact which composed in RKL-RPL and designed to fulfil applicable regulations in Indonesia along with Environmental and Social Guidelines principles from International Finance Corporation (IFC PS version 1 January 2012) and Equator Principle (EP 3).

Besides that, industrial common practice will be considered in determining the feasibility and implementation either during engineering design activity or during project construction and operational activity.

This RKL-RPL document is developed based on 4 project activities which covered in Tangguh Expansion Project AMDAL study scope which are:

- Gas Exploitation activity;
- Gas Transmission activity;
- LNG Plant activity; and
- Marine Facility activity.

Management and monitoring plan of each activity above will be defined in more details following the activity phases as follows:

- Pre-Construction;
- Construction;
- Operations; and
- Post-Operations.

1.1 PURPOSE AND OBJECTIVE

Purpose and Objective of the RKL – RPL development are as follows:

- Provide protection to the environment and surrounding communities through environmental and social impact management plan to prevent, control and manage significant impacts and other negative impacts as well as to increase positive impact with correct approach;
- Monitor implementation effectiveness level of impact management plan which will be implement in construction activity towards all facilities which will be constructed as part of Tangguh Expansion Project scope and during Tangguh LNG operations activity;
- Monitor emission and treated waste water discharge from Tangguh LNG construction and operations activity and compare monitoring results with environmental standard as per applicable regulations and standards by considering environmental baseline condition stipulated in the Tangguh Expansion Project Integrated ANDAL document;
- As a reference in environmental and social management for the development and operations of Tangguh LNG facility with quality and efficient;
- As a reference which can used for Government Institutions related to performance value and project compliance to management and monitoring stipulated in the AMDAl and/or applicable environmental standards; and
- Increase benefit to the government, society and local communities by the presence of Tangguh Expansion Project.

1.2 ENVIRONMENTAL AND SOCIAL POLICY

ENVIRONMENTAL AND SOCIAL PHILOSOPHY – TANGGUH EXPANSION PROJECT
Tangguh LNG has a commitment to run business that will be beneficial to the country and community that involved in Tangguh LNG operations.This commitment includes conducting efforts to minimise possible environmental and social impact through compliance to regulations, impact management, protection to employee, contractor and surrounding communities. Tangguh LNG implements continuous improvement programme for their operation activities and provide assistance to develop local community to achieve stable, safe, reliable and sustainable operations and also aspires to be a role model for other operators.
ENVIRONMENTAL AND SOCIAL POLICY – TANGGUH EXPANSION PROJECT
Tangguh LNG has a strategical purpose to be a good and responsible Oil and Gas

Operator in Indonesia. Our target is simply stated no accident, no harm to people and no damage to the environment.

Tangguh LNG will comply with all applicable Indonesian regulations and international standard principles in reference to this AMDAL study in implementing environmental and social monitoring and management programs.

Tangguh LNG will continue striving at best to reduce and control negative impacts and improve positive impacts from our activities by applying environmental and social management and monitoring system, reducing wastes and emissions also using energy efficiently.

Tangguh LNG will coordinate with stakeholders to be involved in supporing government in sustainability social economic development efforts in Bintuni Bay area as part of Tangguh LNG long-term business strategy to perform safe, steady and efficient operation in Papua. Tangguh LNG will strive to support in creating economy development distribution artery by the presence of Tangguh LNG in Bintuni Bay area and surroundings.

Continuous improvement will be achieved by setting environmental performance target, perform the management plan which has been defined, and conduct performance assessment. These are in line with Social and Environmental Management System which has been and will be continuously implemented.

Tangguh LNG will also use natural resources wisely, protect biodiversity and conduct continuous development.

Waste Management

Tangguh LNG will manage the waste by reducing, reusing, recycling, treating and disposing the waste using best management options in accordance with applicable regulations.

Sustainable Development

Tangguh LNG supports the efforts of sustainable development in Bintuni Bay region, so that socio-economic benefits derived by community at this time, will still be gained in the future. Tangguh LNG will implement social programs that have the following priorities:

- Working with stakeholders to support the government involved in efforts to sustainable socio-economic development as part of a long-term business of Tangguh LNG;
- Develop a broader partnership and synergy with civil society, corporation and government;
- Indigenous People Centred Development;
- Gender and human rights equality;
- Applying the principles of Governance.

Indigenous People Centred Development

Indigenous People are the main beneficiaries of the Tangguh LNG presence in Bintuni Bay region; therefore, Indigenous People are the main actors in the sustainable socio-economic and culture development. Affirmative approach will be made to strengthen the capacity of Indigenous People in the current era of industrialization in Bintuni Bay region.

Gender and Human Rights Equality

Tangguh LNG recognizes that everyone has equality under the law. Tangguh LNG comply with all the provisions concerning human rights in the regulations in prevailing regulations in Indonesia as well as the principles of the international standards referred to this EIA study, including elements of human rights in the UN Universal Declaration of Human Rights (UDHR) and Convention on the International Labor Organization (ILO Convention).

Tangguh LNG believes that all humans have the same role in moving the wheel of development. Therefore, the policy establishes equality of Tangguh LNG human rights including gender in the management of on-site workers and the Tangguh LNG in any implementation of Tangguh LNG social programs to the community. Specifically, Tangguh LNG provides a good working environment to the workers, especially women in the Tangguh LNG site, and Tangguh LNG will also support the efforts of the community, including women in the village to play a greater role in the development of the village.

Tangguh LNG will take a constructive and progressive role in the human rights issues associated with the initiatives of stakeholders, including running the Voluntary Principles on Security and Human Rights (VPHR). Tangguh LNG will ensure that communication with the government, regulatory bodies, and public authorities will always be consistent with these human rights commitments.

Communication and Disclosure

At the time of developing and implementing programs and social environment, Tangguh LNG will always be open (transparent) and provide information about these aspects as well as environmental and social performance of the project. Tangguh LNG will openly receive feedback and suggestions from stakeholders and strive to build an effective trusted relationship.

Tangguh LNG will transparently convey information about the impact and social performance based on the principles of Free, Prior and Informed Consent (FPIC).

Competency

Any individual who works at Tangguh LNG need to have competency which shall be in line with applicable regulations and standards. Therefore, training for workers in environmental management will be delivered as per their functionality.

Risk

Tangguh will review, assess and manage any potentially arising risks to prevent any potential accident. Therefore, Tangguh LNG will develop emergency response procedure.

1.3 ENVIRONMENTAL MANAGEMENT AND MONITORING

Environmental management approach in construction and operations activity at Tangguh LNG and its supporting facilities will be conducted through:

- Obligation to the applicable Indonesian regulations and international standards that are relevant and referred to in this AMDAL;
- Technological approach;
- ISO 14001 Environmental Management System approach;
- Lessons learned from the previous construction and the current operation experiences.

1.3.1 WATER QUALITY MANAGEMENT

Types of wastewater which are managed during construction and operations activity of Tangguh LNG including:

- Produced water;
- Oily contaminated water;
- Chemically contaminated water;
- Reject brine;
- Sewage; and
- Other wastewater sources.

Further discussion on the management of water quality for Tangguh LNG's construction and operation activities is shown in Figure I-1.

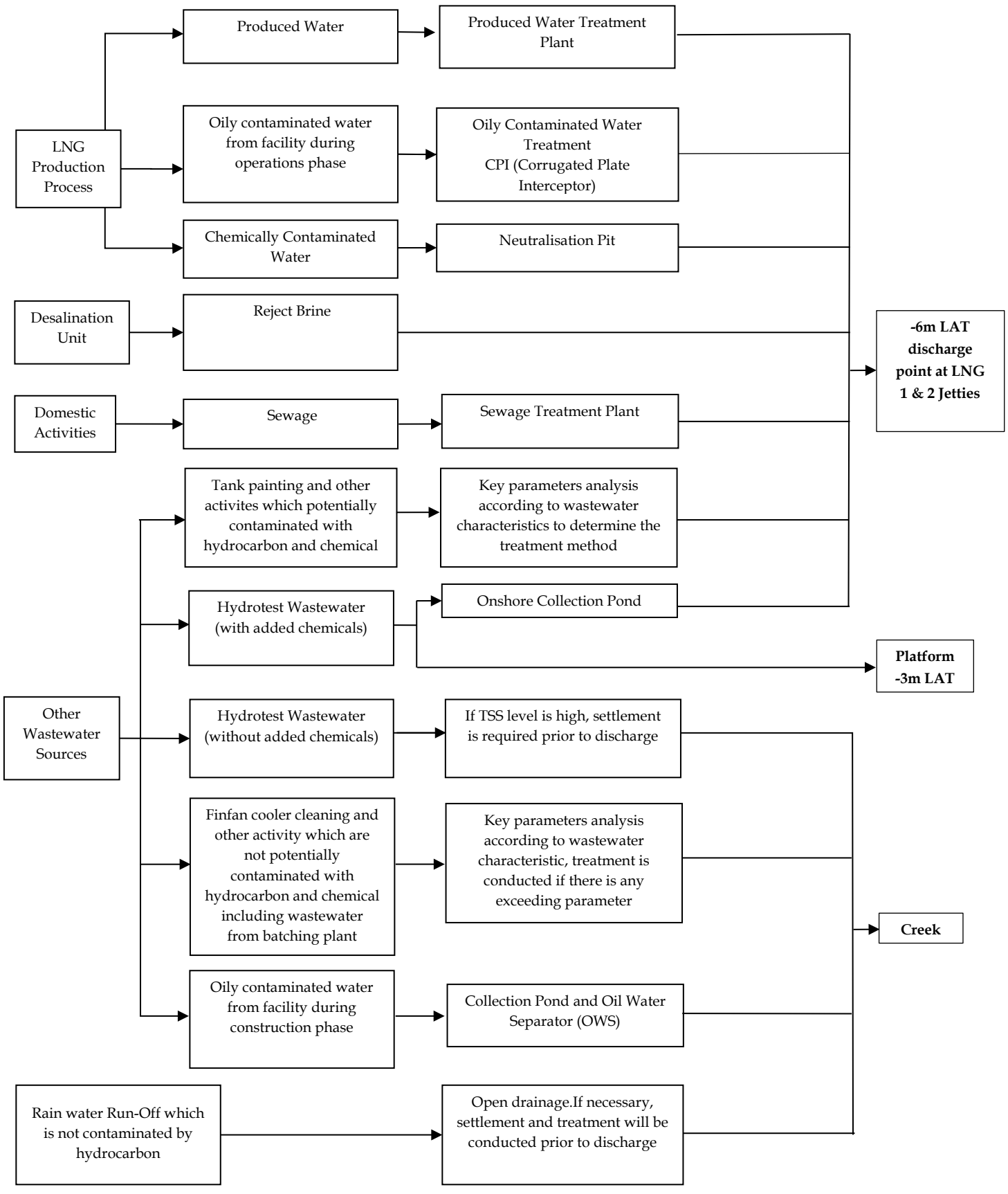


Figure I-1 Water Quality Management Flowchart

1.3.1.1 Produced Water

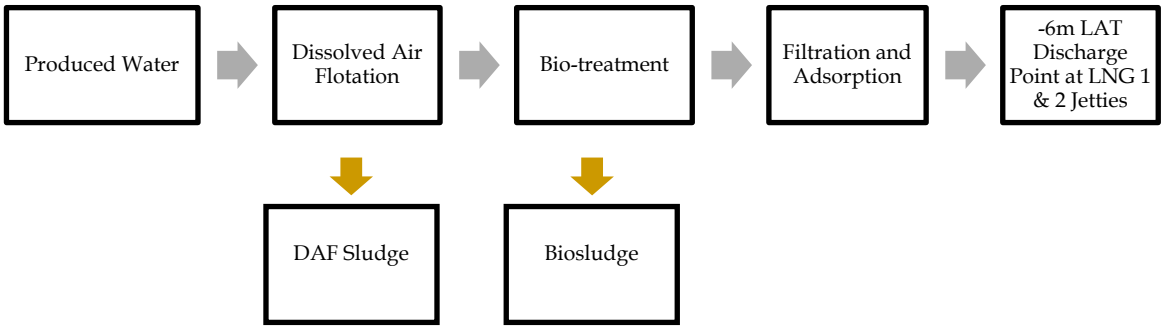


Figure I-2 Produced Water Management Flowchart

Separation process between gaseous hydrocarbon, liquid hydrocarbon and water results in wastewater in the form of produced water which then transferred to permanent produced water treatment unit consists of:

- Primary treatment (Dissolved Air Flotation), to separate hydrocarbon from produced water;
- Secondary treatment (biological treatment), to treat biologically;
- Tertiary treatment (filtration and adsorption), to filtrate sediment from secondary treatment.

Wastewater that already complies with the standard then transferred to -6m LAT discharge location at LNG 1 and/or 2 Jetties.

Sludge management from produced water treatment process is as follow:

- DAF Sludge: management will be in accordance with the study result which being conducted and/or soil enricher and/or incinerated in the hazardous waste incinerator and/or sent to licensed hazardous waste treatment facility.
- Biological sludge: will be managed as the raw material for compost and/or soil enricher and/or similar utilization in accordance with the study result which being conducted. If the study result shows this option is not feasible then other considered option is to incinerate the biosludge in incinerator and/or sent to licensed hazardous waste treatment facility.

Figure I-3 Existing Produced Water Treatment Unit at Tangguh LNG

1.3.1.2 Oily Contaminated Water

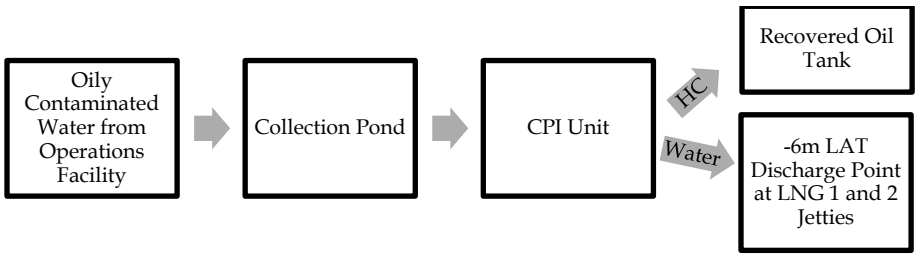


Figure I-4 Oily Contaminated Water Management at Operations Phase Flowchart

Hydrocarbon contaminated water from operations phase is transferred and treated in the separation unit using Corrugated Plate Interceptor (CPI) hence the hydrocarbon, oil and grease will attach to the plate and separated from the water. The separated water from hydrocarbon will be discharged directly to -6m LAT at LNG 1 and/or 2 Jetties. Recovered hydrocarbon from CPI unit will be transferred to Recovered Oil Tank. If there is any technical difficulties in CPI, the wastewater will be transferred to Produced Water Treatment Unit for further treatment.

Sludge management from CPI unitu will be done in accordance with the study result which being conducted and/or soil enrichment and/or incinerated in the hazardous waste incinerator and/or sent to licensed hazardous waste treatment facility.

1.3.1.3 Chemically Contaminated Water

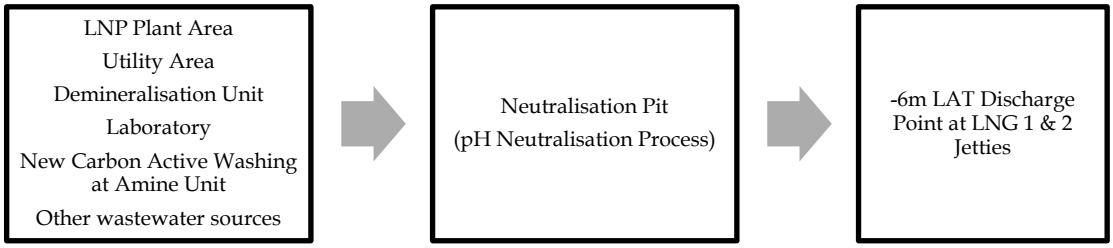


Figure I-5 Chemically Contaminated Water Management Flowchart

Neutralisation process for chemically contaminated water is conducted in the neutralisation pit at utility area by adding acid or alkaline material so that the wastewater complies with pH standard between 6-9. Treated wastewater will be discharged at -6m LAT discharge point at LNG 1 and/or 2 Jetties. An automatic pH level monitoring device is installed at neutralisation pit which will allow the treated wastewater in compliance with standard prior to discharge at -6m LAT discharge point at LNG 1 and/or 2 Jetties at sea.

1.3.1.4 Reject Brine

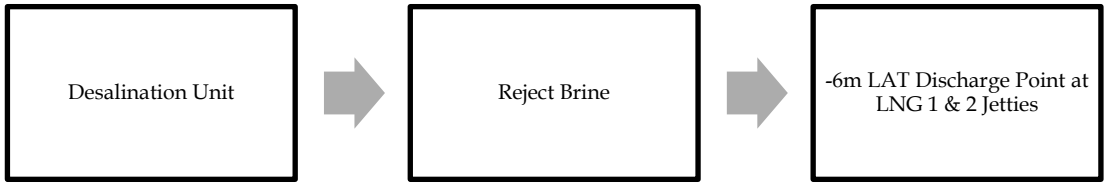


Figure I-6 Reject Brine Management Flowchart

Reject brine produces from mechanical vapor compression or reverse osmosis sea water desalination unit. Wastewater from this facility is sea water with high salinity level which then discharged to -6m LAT discharge point at LNG 1 and/or 2 Jetties.

1.3.1.5 Sewage

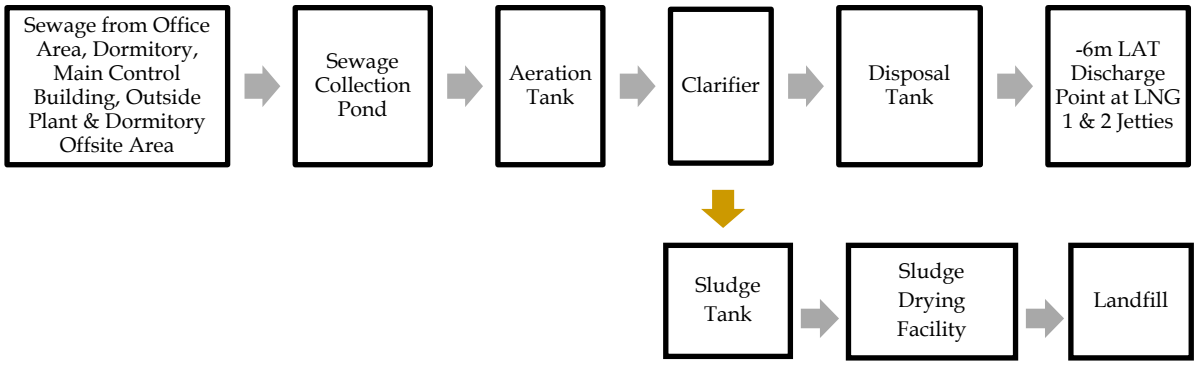


Figure I-7 Domestic Sewage Management Flowchart

Sewage from office building, dormitory, Main Control Building, and outside LNG plant is treated in STP facility. The STP uses biological process with activated sludge. Treated wastewater from this STP which already complies with standard will then be discharged to -6m LAT discharge point at LNG 1 and/or 2 Jetties. Sludge from treatment process will be disposed to landfill and/or as raw material for compost and/or soil enricher and/or similar utilization in accordance with the study result which being conducted and/or incinerated the biological sludge in incinerator.

1.3.1.6 Other Wastewater Sources

Other wastewater sources which are not from main activity of LNG plant operations and its supporting facility will be categorised and managed as follows:

A. Wastewater from Hydrotest Activity

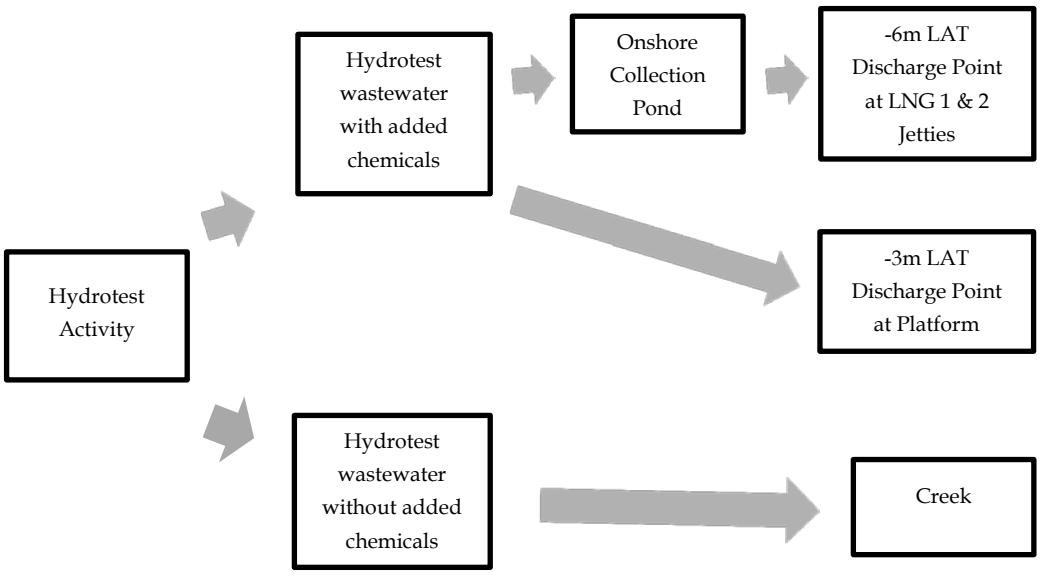


Figure I-8 Wastewater from Hydrotest Activity Management

Hydrotest activity from subsea pipeline, tanks and other facility will generate wastewater. Wastewater will be managed in accordance with wastewater characteristics.

a. Wastewater from hydrotest activity with added chemical for subsea pipeline:

   Wastewater can be directly discharged to platform at -3m LAT depth at platform location or transferred to onshore collection pond and then discharged at -6m LAT at LNG 1 and/or 2 Jetties.

b. Wastewater from hydrotest activity with added chemical for onshore facility:

   Wastewater will be collected at temporary collection pond to be treated first before being discharged at -6m LAT discharge point at LNG 1 and/or 2 Jetties.

c. Wastewater from hydrotest activity without added chemical

Wastewater will be discharged to creek through discharge pipe. If the TSS level in the wastewater is high, the wastewater will be collected in temporary collection pond prior to discharge to creek.

B. Other Wastewater that Potentially Contaminated with Hydrocarbon and Chemical

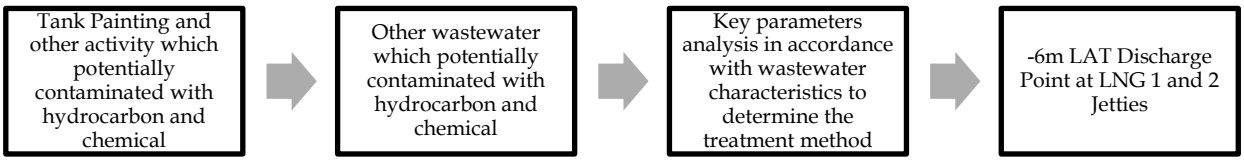


Figure I-9 Other Wastewater that Potentially Contaminated with Hydrocarbon and Chemical Management Flowchart

Wastewater from tank painting and other wastewater will be analysed for the key parameters (e.g.: pH, TSS, COD and Oil & Grease) and other parameters in accordance with its characteristics to determine the treatment method prior to discharge to sea.

C. Other Wastewater which are not Potentially Contaminated with Hydrocarbon and Chemical

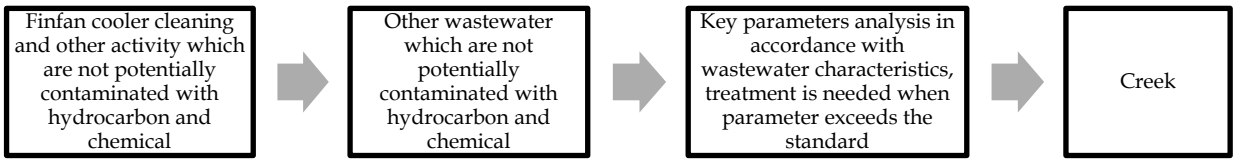


Figure I-10 Other Wastewater which are not Potentially Contaminated with Hydrocarbon and Chemical Management Flowchart

Wastewater from finfan cooler cleaning activity and similar activities which are not potentially contaminated with hydrocarbon or other chemical will be analysed for the key parameters to ensure compliance with wastewater characteristics prior to discharge to creek. If it does not comply, then further treatment is needed prior to discharge.

D. Oily Contaminated Water from Activity during Construction Phase

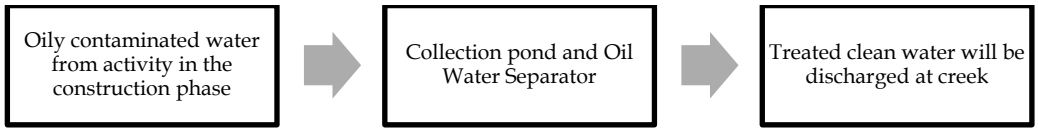


Figure I-11 Oily Contaminated Water in Construction Phase Management Flowchart

Oily contaminated water from activity during construction phase will be transferred to Collection Pond and Oil Water Separator (OWS) unit. Oily contaminated water which trapped in the OWS will be collected regularly and sent to Temporay Hazardous Waste Storage for further treatment. Treated wastewater will be discharged to creek.

1.3.1.7 Rain Water Run-Off

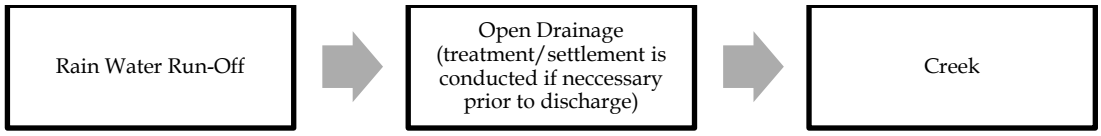


Figure I-12 Rain Water Run-Off Management Flowchart

Rain water run-off flow from construction activity area which are not potentially contaminated with hydrocarbon will be managed to prevent erosion and sedimentation that can cause turbidity in the receiving water body (surface water and sea water).

Rain water around LNG plant during operations phase will be flowed through permanent open channel from concrete and transferred to Control Pit prior to discharge to surface water.

1.3.2 Air Quality Management

Main source for air emission from LNG plant and its supporting facilities activities will be summarised as follows:

1.3.2.1 Flare

Based on current Tangguh LNG normal operation (Train 1 and 2), the amount of flared gas is less than 3% of feed gas amount. According to Ministry of Energy Resources and Mineral (ESDM) Regulation No. 31 Year 2012, Flare Gas optimisation study and approval from related department are required if the amount of flared gas is more than 3% of feed gas amount.

Management efforts that could be done to maintain air quality from flaring emission are as follows:

- Conducting effort to minimise flaring emission amount by:
  - Implement BOG (Boil of Gas) recovery from LNG storage facility and loading system;
  - Plant facility will be designed to transfer process gas to flaring system for safe burning and emergency conditions including relief valves, blowdown valves and operation/maintenance vent;

- Optimising TAR (Turnaround – LNG Plant major maintenance acitvitiy) frequency and numbers of Plant Shut Down, whether planned (Gas Turbine inspection) or unplanned;
- Maintain the balance of the fuel management system as a whole (supply and demand) to reduce flaring emission amount by calculating fuel balance from whole system (existing plant and new plant).

- Conduct calculation and recording of flaring amount.

1.3.2.2 Air Emission from Process Activity

Activities which will be conducted to manage air emission from process activities are:

- Utilising energy efficient design, such as using HRSG (Heat Recovery Steam Generator) to recover waste heat from gas turbine to produce high pressure steam;
- Utilising efficient gas turbine;
- Utilising Dry Low NOx burner for gas turbine;
- Installing and operating Continuous Emission Monitoring System (CEMS) at stacks with reference to applicable regulations;
- Conducting CEMS monitoring recording;
- Providing adequate facilities for safe monitoring and/or sampling;
- Conducting calibration process and CEMS maintenance to ensure CEMS is working properly.

1.3.2.3 Green House Gas Emission

LNG production has the potential to reduce GHG emission on the consumer side, compared to other, more commonly used energy sources such as coal and oil. On the other hand, the low fuel emission on the consumer side means a concentrated GHG emission on the LNG processing side. The CO_2 produced by Tangguh operational activities is from the feed gas from the reservoir, which contains between 10 - 15% CO_2. The higher the production rate of LNG, the higher the CO_2 leve that is produced.

Tangguh LNG has conducted a study to evaluate a number of alternatives in significantly reducing the GHG emission produced by LNG plant through increasing energy efficiency, waste heat utilization and re-utilization of hydrocarbon that is usually emitted to the air, to be processed in the plant. A few examples are listed in the Air Emission Management section above.

Actions that will be taken to monitor Green House Gas emission are as follows:

- Conducting calculation dan recording the amount of Green House Gas emission (CO_2 dan CH_4) from all activities in LNG plant and its supporting facility;

- Conducting recording of fuel consumption, including diesel and aviation fuel.

1.3.3 SOLID WASTE AND HAZARDOUS WASTE MANAGEMENT FROM ONSHORE ACTIVITY

Waste management from onshore activity refers to **Figure I-13**.

Waste management facility for construction and operation activities of Tangguh LNG and its supporting facilities include:

1. Integrated Waste Management Facility (IWMF); and
2. Non-hazardous waste landfill.

Integrated Waste Management Facility consists of:

- Segregation and collection area for solid and hazardous waste;
- Temporary Hazardous Waste Storage;
- Non-hazardous waste incinerator: to treat burnable non-hazardous waste such as paper, cardboard and etc.;
- Hazardous waste incinerator: to treat burnable hazardous waste;
- Food dryer and composter: to treat organic waste such as food waste and others;
- Wood chipper for timber waste;
- Can compactor; and
- Plastic shredder.

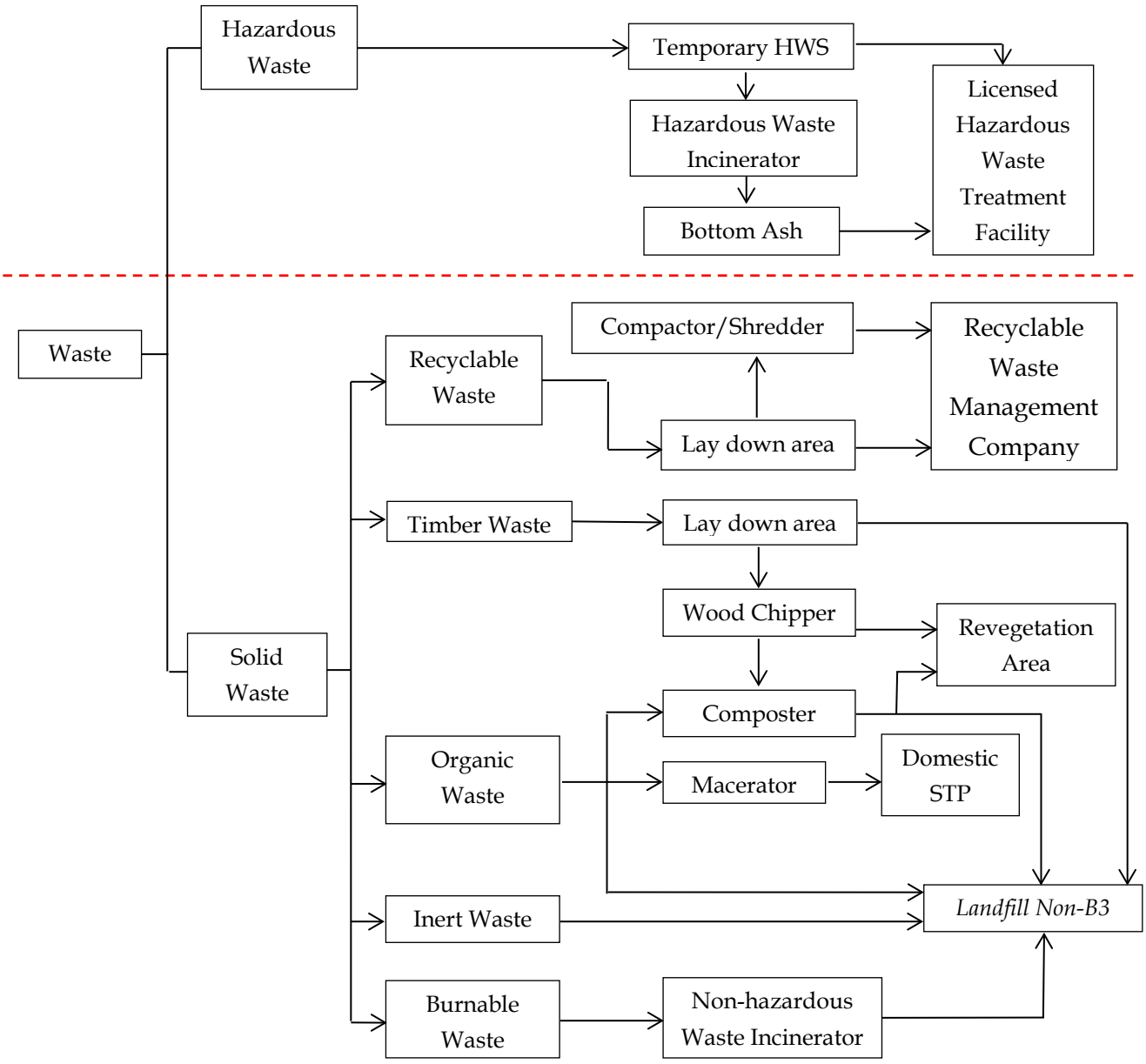


Figure I-13 Solid Waste and Hazardous Waste Management from Onshore Activity

Non-hazardous waste landfill will be utilized as final disposal for solid waste that cannot be recycled or treated. Types of solid waste that will be landfilled are:

- Inert waste;
- Organic waste which can not be treated in macerator and composter;
- Ash from burning process in non-hazardous waste incinerator; and
- Composter product that will not be used in the revegetation area.

Recyclable waste such as food/beverage can that has been compacted, shredded plastic bottles and glasses sent offsite to recyclable waste management facility.

Currently, a study is conducted to assess option for food waste maceration and disposal to STP for further treatment. It aims to reduce the waste volume that being disposed to non-hazardous waste landfill. If the study result concludes that by using food macerator is considered effective then food macerator will be utilised as one of non-hazardous solid waste treatment facility.

Hazardous waste management will be divided into:

- Hazardous waste incinerator; and
- Temporary hazardous waste storage (for unburnable hazardous waste, including ash from hazardous waste incinerator) prior to sending off to licensed hazardous waste management facility.

1.3.4 WASTEWATER, SOLID WASTE AND HAZARDOUS WASTE TREATMENT FROM OFFSHORE ACTIVITY LOCATION (MARINE FACILITY, OFFSHORE PLATFORM, GAS EXPLOITATION, ETC.)

Wastewater, solid waste and hazardous waste treatment from offshore activity location refers to related regulations and MARPOL.

Table I-1 References for Wastewater, Solid Waste and Hazardous Waste Management According to MARPOL and IMO

Waste Type	Reference
Wastewater - Oily Contaminated Water	MARPOL *A*nnex I - Prevention of pollution by oil
Wastewater - Sewage	MARPOL Annex IV - Prevention of pollution by sewage from ships
Solid Waste - Food Waste	MARPOL Annex V - Prevention of pollution by garbage from ships
Wastewater - Ballast Water	IMO - International Convention for the Control and Management of Ships' Ballast Water and Sediments

A. Wastewater Management

Wastewater management from activities which located offshore can be divided into two types based on the management and disposal location, which are:

1. Management is conducted in the offshore wastewater management facility, without sending off to onshore facility for further treatment. Disposal location is conducted offshore.
2. Wastewater transfer from offshore activity to onshore facility for further treatment.

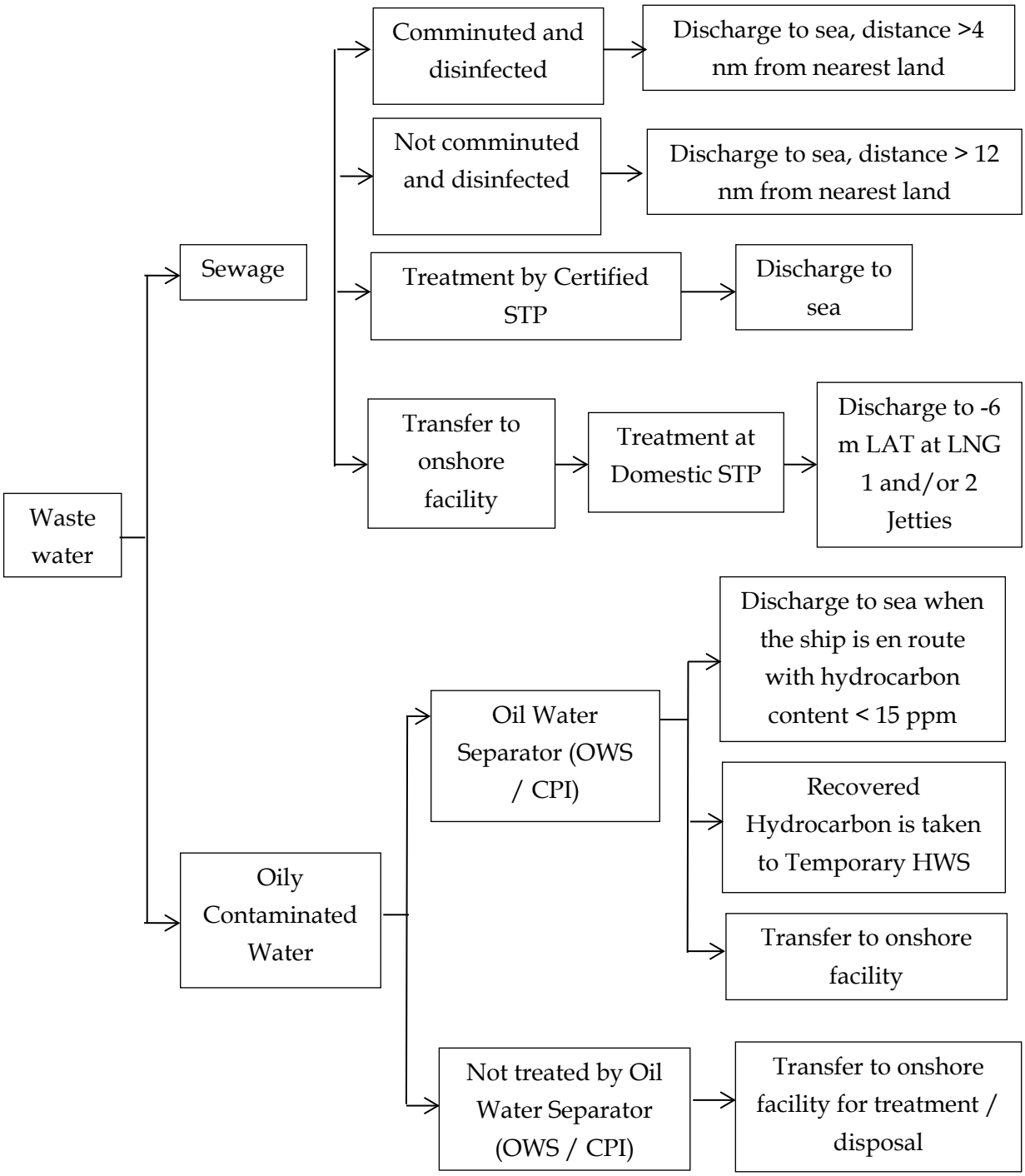


Figure I-14 Wastewater Management from Offshore Activity

B. Solid Non Hazardous and Hazardous Waste Management

Solid non hazardous and hazardous waste management from activity which located offshore can be divided into three types based on the management location, which are:

1. Management will be conducted in offshore waste management facility, without sending off to onshore facility for further treatment;
2. Waste transfer from offshore activity to onshore facility for further treatment;
3. Management for some waste will be conducted at offshore facility, and the rest is transferred to onshore facility for further treatment.

The management of food waste can be conducted through 2 different methods:

1. Food waste will be discharged to sea in accordance with MARPOL requirements;

   Food waste will be comminuted to less than 25 mm and discharged at distance < 3 nautical miles from the nearest land. Uncomminuted food waste shall only be disposed at distance > 12 nautical miles from the nearest land.

2. Food waste is transferred to onshore facility for further treatment.

Organic, recyclable, and inert waste from small vessels and Tug Boat which operate around jetty area will be transferred to Tangguh LNG onshore waste management facility. Waste from other type of vessel (big vessels) will not be managed in onshore facility. Vessel owner will manage the generated waste by following MARPOL requirements.

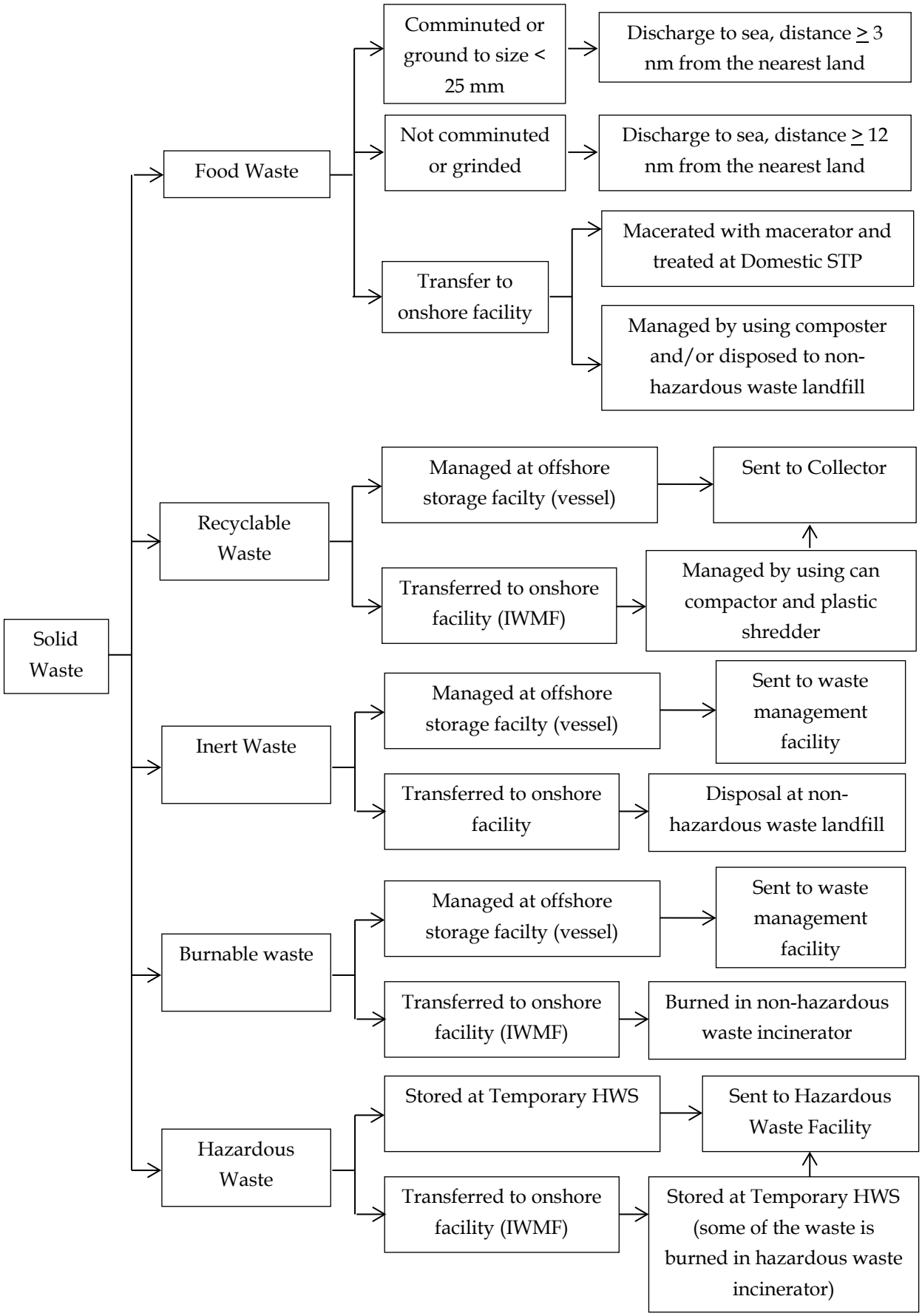


Figure I-15 Solid Non Hazardous and Hazardous Waste Management from Offshore Activity

1.3.5 Drilling Mud and Cutting Management

Prior to utilization, a toxicity test will be conducted to the drilling mud (WBM and SBM). The toxicity test will be conducted according to the Government Regulation no. 18 of 1999 (JO PP 85 of 1999) on the Management of Hazardous Waste and the Ministry of Energy and Mineral Resources Regulation no. 45 of 2006 on the Management of Drilling Mud in Oil and Gas and Geothermal Activities.

The test results of the drilling mud on the previous wells will also be used as a reference.

The current plan is all depth sections (except for reservoir zone) drilling from production wells will use Water Based Mud (WBM), meanwhile for the last section (reservoir section) the plan is to use Synthentic Based Mud (SBM) or Oil Based Mud (OBM). Nevertheless, the possibility of using SBM or OBM at 17.5" interval of production wells is now being reviewed and will depend on the condition of wellbore.

Basically the drilling mud will be reused as much as possible during drilling campaign.

Table I-2 Summary of Drilling Mud and Cutting Management

Mud Type	Re-Injection *) - Dedicated Well - Production Well Annulus		Overboard Discharge	
	Mud	Cutting	Mud	Cutting
Water Based Mud (WBM)	√	√	LC50 ≥ 30000 ppm	√
Synthetic Based Mud (SBM)	√	√	No discharge	Oil Content ≤ 6,9%
Oil Based Mud (OBM)	√	√	No discharge	No discharge

*) : requires permit

There are two alternatives for drilling mud and cuttings management that are being reviewed in this AMDAL study, which are:

1. Reinjection of the drilling mud and cuttings to the subsurface formation

   Drill Cuttings Re-Injection (DCRI) and the drilling mud reinjection to the subsurface formation is the preferred alternative. Currently, Tangguh LNG is researching the possibility of conducting the reinjection of drill cuttings and drilling mud including mud from final depth or if it cannot be reused to an allocated reinjection well that will be drilled at every platform or inside the annulus, between the 13-3/8" and 9-5/8" casing of the drilled production well. This DCRI option was successfully conducted in the drilling of previous 15 wells in VRA and VRB.

   If deemed feasible, the drilling wastes that will be reinjected are as follows:

   - Drilling mud (WBM, SBM and OBM) including drilling mud from the final depth and all mud that is no longer usable;

- Drill cuttings (WBM, SBM and OBM);
- Sludge from the sludge tank;
- Viscous material for pre-flush and over-flush;
- Invert Emulsion Mud contaminant waste from the drill base;
- Cement mix spacer;
- Cement mix returned to the surface;
- Cleaning fluid from the annulus;
- Extra KCL brine;
- Produced water during testing;
- Produced solid during testing;
- Sludge from the mud plant tank;
- Sludge from the drilling mud tank on the vessel; and
- Potential hydrocarbon contaminated water.

Although the reinjection alternative was chosen, technical difficulties may occur at any time of the drilling activity which may make it impossible for reinjection to be conducted.

Several examples of the technical difficulty that may occur are listed below:

1) If the targeted formation is not adequate to receive the reinjection material, the drilling mud and cuttings will be discharged overboard;
2) For the first well drilled at every platform, both disposal well and production well, there will be no reinjection location. Hence, the only possibility is to discharge the drill mud and cuttings overboard;
3) The volume of the cuttings produced is greater than the capacity of the injection equipment. As it may be impossible to shut down the drilling operation (shutting down drilling operation in the middle will have a major impact on the cost), the excess will be discharged overboard;
4) Injection equipment failure at critical stages of the drilling operation, also due to cost related reasons, makes it unfeasible to stop the drilling operation;
5) Unavoidable damage to the well or the formation, for example well pipe collapsed and blocked half or whole formation;
6) In case of uncontrollable outburst and to overcome shallow gas; and
7) If the reinjection of drilling mud and cutting affect the integrity of production wells.

If there are any technical difficulties with reinjection process and drilling mud or cutting is not in compliance with Overboard Discharge option requirements,

hence drilling mud and cutting will be sent off to licensed waste management facility.

Technical studies on geology and rock mechanics are currently underway to decide on the drilling mud and cutting reinjection plan. Although this study is still ongoing, one or more formation is expected to be adequate for the reinjection. So far, the Fumai formation is the formation selected for the drilling mud and cuttings reinjection.

These technical studies were conducted to overcome the technical challenges below:

- Does the chosen formation have a high enough injectivity, and safe and cost-efficient enough technically?
- Will the potential formation for reinjection be able to contain all of the injected mud and cuttings?
- Does the potential formation for reinjection have strong partitioning that are able to hold the injected drilling mud and cuttings from flowing upwards and downwards where potential hydrocarbon can be found?
- What is the level of contamination risk to the water body above it?
- What is the level of contamination risk to the potential layer of hydrocarbon source?
- Will there be any impact to nearby reservoirs owned by other PSCs?

The final decision on whether reinjection will be conducted to a special reinjection well or through the annulus between the 13-3/8" and 9-5/8" casings of the production well is still being studied and has not been decided.

2. Overboard Discharge

If reinjection is deemed technically unfeasible due to geological or other technical reasons, or if there is a technical issue with the DCRI operation during drilling activity, the drilling mud (WBM only) and cuttings (if drilled with WBM and SBM) are planned to be discharged overboard at the drilling location. Consequently, the distribution and impact of the overboard discharge of the drilling mud and cuttings will be evaluated.

The overboard discharge of the WBM from the final depth will be conducted if the mud passes the toxicity test ((≥30.000 ppm, 96 hours LC-50) and complies with the relevant Indonesian regulations and the IFC Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development.

Synthetic-Based Mud can also be dumped if reinjection is not possible. It will only be conducted if the mud's oil content is less than or equal to 6.9% (≤ 69.000 ppm). Other drilling wastes that may be disposed of include brine water, seawater and a small amount of chips from the sand blasting operation throughout the drilling operation.

Tangguh LNG will request permit to conduct the DCRI option and the overboard discharge permit to the Ministry of Environment in accordance with the relevant regulations.

The management of drilling mud and cuttings will be conducted according to the requirements stated in the permit, the relevant Indonesian regulations and the IFC Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development.

DCRI option will only be conducted in the production wells drilling. For exploration well drilling, the chosen management option is by overboard discharge.

1.3.6 Hazardous Material Management

Hazardous materials that will be used in Tangguh LNG's construction and operational comprise of fuel and chemicals. The management will include:

- Develop and socialize hazardous material management procedure;
- Develop and implemement an emergency response procedure;
- Increase the emergency response personnel and equipment for fuel and chemical spill;
- Ensure the containers are built according to the compatibility and are in good condition;
- Ensure that fuel containers are equipped with a secondary containment system around the tank to collect any spill from tank overflow, cracks or leakage. The secondary containment will include a waterproof membrane, concrete or other suitable material to prevent fuel from contaminating the soil and groundwater underneath it;
- Ensure that the location is safe from flood or the proposed area is on higher elevation;
- The minimum requirements for the storage facility are:

- Equipped with a bunded area that will be able to contain 110% of the volume of the largest container, or 25% of the total volume;
- The building, including the floor and the bund wall, must be constructed with a waterproof material;
- The floor construction must have a slope of at least 1%;
- Equipped with a sump pit for facilities with a roofed shelter;
- Equipped with an Oil Water Separator (OWS) unit for facilities without a roofed shelter;

- Available spill kit.

  - Ensure that the container and the storage area are completed with label and symbol;
  - Chemicals must always be accompanied by the MSDS;
  - Chemical storage shall complies with these requirements:
  - Materials with different characteristics must be stored separately in accordance with the MSDS;
  - The chemical storage must be in accordance with the characteristic of the chemical kept in it;
  - The distance between blocks must be at least 60 cm to allow inspections.

1.3.7 REVEGETATION

Revegetation will be conducted in bare areas during the construction phase, but will not be used for the project's physical facilities. The revegetation activities will use local Papua plants.

The objectives of revegetation are:

- To control sedimentation and erosion during construction and operations phase; and
- To minimize impact to flora and fauna by using local Papua plants for revegetation of disturbed areas.

According to its nature, revegetation can be categorized into two types, which are:

1. Temporary Revegetation

   Temporary revegetation will be conducted in disturbed areas that will not be used temporarily, at least for 3 months. The main objective from this revegetation is to control sedimentation and erosion. Cover crop will be used for this type of revegetation.

2. Permanent Revegetation

   Permanent revegetation will be conducted in disturbed areas that will not be used permanently, whether for construction or operation purposes. It will also be conducted in the post-operations phase in accordance with the Decommissioning Plan that will be developed. The main objective of permanent revegetation is to control sedimentation and erosion by using local Papua plants to revegetate disturbed areas.

Revegetation activities will include:

- Developing and managing a nursery;

The nursery will be developed in parallel with land clearing.

- Land preparation;

Land preparation will cover land clearing and leveling; stripping, preserving and managing topsoil; and developing a drainage system to control erosion.

- Planting;

Planting cover crop and trees will be conducted according to the type and objective of revegetation.

- Revegetation maintenance; and

Revegetation maintenance will be conducted after the planting stage and it will include the application of fertilizer.

- Monitoring

Routine monitoring will be done to monitor the success rate of the revegetation program.

1.3.8 Environmental Monitoring Approach

As part of implementation of RKL-RPL Tangguh Integrated AMDAL which was approved in 2002 for Tangguh LNG Train 1 and 2 operation activity, the environmental monitoring has been routinely conducted. The current environmental monitoring has been evaluated with regards to monitoring result and its trend to understand the effectiveness. The evaluation also considers requirement in environmental permit and related regulations from government of Indonesia.

Based on the evaluation result, the current monitoring activity is deemed effective and will be continued, meanwhile the ineffective ones is proposed to change or not continued anymore, according to **Table I-3** below. The monitoring activity which will be continued and the amended ones will be added to RPL table for Tangguh Expansion Project (TEP) Integrated AMDAL, hence the monitoring scope that will be conducted are monitoring activity for current Tangguh LNG operations (Train 1 and 2 with its supporting facility) and monitoring activity for Tangguh Expansion Project.

Table I-3 Evaluation Result of Monitoring Activity Based on AMDAL 2002 to be Added in this AMDAL RPL

Parameter	Monitoring according to AMDAL 2002	Monitoring to Continue or Change	Remarks
A. Air Quality			
Ambient Air	3 locations onshore and 2 locations nearshore	Proposed to change into 2 locations onshore near perimeter fence	Based on monitoring result to date, the ambient air quality always comply to standard hence the current monitoring location is adjusted

Parameter	Monitoring according to AMDAL 2002	Monitoring to Continue or Change	Remarks
Air Emission	- Boiler - Gas turbine - AGI - Flaring - Non-hazardous waste incinerator - Diesel generator	No change	The same air emission monitoring is still conducted
B. Water Quality			
Seawater Ambient	4 locations at 30 m distance from wastewater discharge point	Proposed to change into 1 location upstream and 1 location downstream of wastewater discharge point to sea at 100 m distance	With reference to current wastewater discharge permit
Wastewater	- Produced water - Sewage - Oily contaminated water - Chemically contaminated water	Additional parameters of Nitrate and Phosphate	Monitoring of these parameters is additional only, not required in regulation and does not have standard. Nitrate and phosphate are not included in Tangguh LNG wastewater parameters. The purpose of monitoring for these parameters is to provide data (if necessary) to prove that there is no correlation between wastewater from Tangguh LNG to natural condition in Bintuni Bay area which shows high level of Nitrate and Phosphate concentration in some monitoring points including at area far from project activity location
Reject Brine	Seawater salinity monitoring is conducted at upstream and downstream of wastewater discharge point to sea at 30 m distance	Seawater salinity monitoring is conducted at upstream and downstream of wastewater discharge point to sea at 100 m distance	Change is based on wastewater modeling study result
Surface water	Surface water sample will be taken at 3 – 5 meter distance from discharge point.	Proposed to change into 100 m upstream and downstream from wastewater discharge point or settling pond	

Parameter	Monitoring according to AMDAL 2002	Monitoring to Continue or Change	Remarks
Groundwater (Non-hazardous waste landfill)	6 monitoring wells of groundwater around landfill	Proposed to change into 1 monitoring well at upstream and 3 monitoring wells at downstream of Non-hazardous waste landfill	Based on monitoring during operations phase, groundwater analysis result shows insignificant difference between each well location, hence future monitoring location is adjusted
C. Sediment and benthos quality			
Sediment and benthos	10 locations around wastewater discharge point	Proposed to change into 1 location upstream and 1 location downstream wastewater discharge point to sea at 100 m distance	Based on monitoring during operations phase to date, the analysis result of sediment and benthos from 10 locations shows minimum difference, hence amount and location of future monitoring is adjusted with seawater ambient monitoring.

1.4 TANGGUH SOCIAL MANAGEMENT

1.4.1 Introduction

Industrialization growth in Bintuni Bay region is predicted to be rapid and continuous. At present, Tangguh LNG is not the only oil and gas investor operating in Bintuni Bay and Berau Bay. There have been oil and gas companies exploring, even some of those companies have found proven oil and gas reserves which may be ready to be exploited. In the future, some oil and gas companies and their contractors will start their operation in Bintuni Bay and Beray Bay. Those exploitation activities may later cause some other big industries and kinds of business development. It also will be accelerated then by electricity installation in villages in Bintuni Bay and Berau Bay. To anticipate social, economic and cultural impacts from this situation, Tangguh LNG has conducted initial analysis as part of the Tangguh Expansion Environment and Social Impact Assessment (AMDAL). However, to manage broader risks of the future industrialization impacts, Tangguh LNG has developed a study on "Tangguh Future Cumulative Impacts", as well as a study on "Risks of Indigenous People Marginalization".

1.4.1.1 Definition of Indigenous People and Areas Surrounding Tangguh LNG Operation Site

In the Tangguh Expansion ESIA (AMDAL) document, Indigenous People who are the beneficiaries of Tangguh LNG called as "Indigenous People" is defined as indigenous communities living across Bintuni Bay and Berau Bay coastal area, which is part of Kamundan, Weriagar, Tomu, Aranday, Babo, Sumuri, Bomberay and Kokas1 Districts derived from the tribes of Sebyar, Irarutu, Simuri, Petuanan Arguni, Wertuwar and SekarPikpik, who occupy certain customary law areas, as well as other people living in those customary law areas who are recognized by the Indigenous People as part of them, and have been occupying the indigenous territories before the presence of Tangguh LNG in 2002.

Indigenous People as defined above consist of several levels which showing their priorities:

I. Indigenous People of Papua having customary rights in certain customary law areas of Bintuni Bay coastal area and Berau Bay;
II. Indigenous People of Papua living in certain customary law areas of Bintuni Bay and Bintuni Bay coastal area but do not have customary rights;
III. Other Papuan who are recognized by the Indigenous People as part of certain community of Indigenous People;
IV. Non-Papuan who are recognized by the Indigenous People as part of certain community of Indigenous People[2].

The **"Areas Surrounding Tangguh LNG Operation Site[3]"** refers to the environment of Bintuni Bay and Berau Bay coastal area, which is physically, socially and culturally[4] affected by Tangguh LNG activities, including terms of changes in demography, livelihood, income and spatial use, as the impacts of Tangguh LNG activities.

Cumulative Impact of Bintuni Bay and Berau Bay Development

The future industrial growth in Bintuni Bay and Berau Bay region is predicted to attract more migrants seeking economic benefits in the form of job or business opportunities. A study of Tangguh LNG's social and economic cumulative impacts was conducted by a group of academia from the University of Cendrawasih, University of Papua, University of Indonesia and some NGOs in 2013. It showed cumulative impacts such as demographic changes, economic structure and quality changes, environmental quality changes, possibility of Indigenous People marginalization, changes in disease pattern, and tendency of increased social tension, potential human rights violations and the increasingly dynamic governance

[1] Region of the district refers to the districts area during the Tangguh Expansion ESIA document is approved.
[2] Mechanism and specified Indigenous People recognition delivered to Indigenous People itself.
[3] What is meant by Operation are activities associated with exploration, development and production of Tangguh LNG.
[4] Determination of the area and the people that categorized into the area of social management will refer to TSDP document and the results of monitoring social impact management in the future.

issues. As previously explained on ANDAL Document Chapter 1.2 Description of Project Planning Activities, in order to maintain safety at the LNG plant and increase the economic benefits for areas surrounding the LNG plant, Tangguh LNG will encourage non-core LNG activities to be conducted outside the LNG plant area. This strategy is expected to create opportunity for the growth of service businesses outside the LNG plant area, in support of the Tangguh LNG operation. Furthermore, through this strategy, in the future only the workers who directly handle the plant operations will work and live in the LNG plant, thus the security and safety of the LNG plant operation can be increased.

1.4.1.2 Tangguh LNG Operating Philosophy

In some studies and data projections made by Tangguh LNG, the increasing rapid industrialization of Bintuni Bay and Berau Bay coastal area is predicted to cause some impacts in the form of demographic change as the result of migration, changes in economic structure and occupation as a result of the emergence of new businesses supporting the industrialization, and changes in patterns of social tension, from vertical to horizontal. In the longer term, if such changes are not well managed, they are predicted to cause marginalization of the Indigenous People of Bintuni Bay and Berau Bay.

In a public consultation held in early 2012, the Local Government and local people expressed hopes for more direct economic benefits from the presence of Tangguh LNG. Economic benefits that have been enjoyed by businesses outside Bintuni Bay, Berau Bay and outside Papua are expected to be enjoyed particularly by businesses from the Indigenous People or local businesses in Bintuni Bay and Berau Bay region.

To address this, Tangguh LNG will modify its strategy related to the flow of economic benefits. The Diversified Growth Strategy/DGS, which is the operating philosophy of Tangguh LNG, will be still upholding the following:

- Making efforts to reduce pressure on the region, limit in-migration, and avoid the formation of urban areas around the project as the result of the honey pot syndrome;
- Measurably reducing work safety risks at the LNG plant;
- Synergizing the presence of Production Sharing contractor and other strategic industries in the Bintuni Bay and Berau Bay;
- Paying attention to the Central Government Blue Print for the development of West Papua and Papua;
- Considering the expectations of the local community and Local Government to directly benefit from the presence of Tangguh LNG.

Based on experience and on development in the Tangguh LNG surrounding areas to date, the DGS as operating philosophy will be reformulated by emphasizing the

strategic development of Bintuni Bay, Berau Bay and its Indigenous People, as follows:

- The Areas Surrounding Tangguh LNG Operation site will not be developed as growth areas. It will remain remote from residential settlements and centers of economic growth;
- Creating economic arteries in Bintuni Bay and Berau Bay by setting the city of Bintuni, Babo and Kokas as new growth centers;
- Promoting Indigenous People-centered development, through affirmative action by prioritizing Indigenous People as the main beneficiaries of development;
- Ensuring safe, effective and comply to Tangguh LNG operations that comply with the prevailing regulations and standards.

In the last decade, there has been a shift in approaches to development goals at the global level, from geographic approaches to human-centred approach. In the context of Tangguh, the development approach[3] centred on *Directly Affected Villages-DAVs* has become less effective because the flow of migrants has taken portions of benefits intended to be accepted by Indigenous People.

By considering the cumulative impact studies, the risk of Indigenous People marginalization, the shift in global social development approaches, and the projected populations in the surrounding villages, Tangguh LNG will change the target direction of its social programs to "sustainable development that focuses on Indigenous People", thus no longer using the DAVs approach. This new approach was chosen with the aim of protecting the Indigenous People from marginalization impacts. This can be done by strengthening capacities and increasing the social and economic opportunities for Indigenous People. The policy to prioritize, empower and strengthen the Indigenous People will underlie all of Tangguh LNG's social programs.

In some studies and data projections made by Tangguh LNG, the increasing rapid industrialization of Bintuni Bay and Berau Bay coastal area is predicted to cause some impacts in the form of demographic change as the result of migration, changes in economic structure and occupation as a result of the emergence of new businesses supporting the industrialization, and changes in patterns of social tension, from vertical to horizontal. In the longer term, if such changes are not well managed, they are predicted to cause marginalization of the Indigenous People of Bintuni Bay and Berau Bay.

[3] Based on census data and survey by UGM in 2003 - 2011, it is estimated that the percentage of Indigenous People in Area Surrounding Tangguh LNG Operation site can be reduced from 79% in 2003 to 18% in 2027.

1.4.1.3 Management Approach

Social management related to the social impact of Tangguh LNG has been stipulated on RKL Table, but there are some social impacts from the cumulative activities in Bintuni Bay and Berau Bay region that will be managed in the form of Tangguh LNG's commitments. To operationalize RKL and those social commitments, Tangguh will prepare the Tangguh Sustainability Development Program (TSDP) document to replace the existing Integrated Social Program (ISP) document.

TSDP document will stipulate the management principles emphasizing the need for cooperation and social responsibility division among Tangguh LNG, Local Government and other stakeholders. Tangguh LNG does not intend to take over the government's responsibility or creating people's dependence on social development, but rather act as catalyst in such development.

TSDP document shall apply and be reviewed every 5 years, and shall include seven major social programs, namely:

- Public Health;
- Education;
- Papuan Development and Industrial Relation;
- Livelihood;
- Papuan Entrepreneurship;
- Governance; and
- External Relations;

The last two programs are additional programs from existing Integrated Social Program (ISP) document. During TSDP implementation, Mid-term Evaluation and Final Evaluation will be done on a regular basis, together with an independent institution, to evaluate program direction and performance. Annual evaluation will be done to ascertain output achievement of each program.

1.4.1.4 Regulations and Standards

Preparation of Tangguh LNG's social commitments and program direction was done by considering the Indonesian government regulations and the applicable international standards, mainly the International Finance Corporation (IFC) standards and Equator Principles (EP 3). This aims at anticipating the financing of Tangguh LNG Expansion Project sourced from financial institution. The regulations and standards include:

1. Constitution of the Republic of Indonesia Number 32 Year 2009 on the Protection and Environmental Management; Regulation of the Minister of

Environment Number 8 Year 2006 on Guidelines for Preparation of Environmental Impact Assessment;
2. Equator Principles (EP) 3 and IFC Performance Standards (PS) of 2012;
3. UNGP-HR, United Nations Guiding Principles on Business and Human Rights which refers to the UDHR/Universal Declaration of Human Right, and the VPSR/Voluntary Principle on Human Right;
4. The 1998 ILO/International Employment Organization Declaration on Fundamental Principles and Rights at Work.
5. Safeguard Policy Statement ADB 2009

The regulations and standards are likely to changes along with the future development. Tangguh LNG will adjust and comply with any amendments of the prevailing regulations and standards.

Tangguh LNG will prepare some additional documents to satisfy the terms and condition mentioned above, namely:

- PCDP/Public Consultation and Disclosure Plan;
- IPDP/Indigenous People Development Plan
- Papuan Development Framework

1.4.2 Tangguh LNG Social Management

1.4.2.1 Public Health

Health problem is one of the major issues in Teluk Bintuni and Fakfak Regencies. Some problems in health sector include:
(1) Health Facilities and Infrastructure Development;
(2) Public Services on Health;
(3) Behaviour Changes;
(4) Prevention of Main Diseases; and
(5) Clean Water and Environment.

A. Health Facilities and Infrastructure Development

Hospital is a health care institution providing comprehensive individual health care, in-patient, out-patient and emergency services. A hospital plays important roles in fulfilling the community needs for equal and good quality health care services.

Bintuni General Hospital/RSUD Bintuni is a local government hospital established in 2008, but it was only able to operate properly as hospital in 2011 due to some obstacles in terms of medical personnel capability, management capability and availability of supporting infrastructure. Bintuni General Hospital has started operating as health care institution for out-patient, in-patient, laboratories check and emergency services. As a newly operating hospital, it requires facilities and

infrastructure development in order to provide the community with optimum health care services. Therefore, support is very crucial for Bintuni General Hospital to obtain accreditation and be able to serve as referral hospital for the people in Teluk Bintuni Regency and other regencies in West Papua.

> *Tangguh LNG will support the Local Government efforts in developing Bintuni General Hospital into a referral hospital. The form, scope, type, amount, budget, time period and other matters associated with Tangguh LNG support in this instance will be further specified in Public Health Program listed in TSDP.*

Indicators:

- Blue Print on the development of Bintuni General Hospital into a referral hospital;
- Bintuni General Hospital is recognized as Local Public Service Agency (BLUD) and referral hospital;
- Local Government supports to provide operational budget, facilities, main and supporting infrastructure for the development of Bintuni General Hospital into a referral hospital; and
- Bintuni General Hospital functions and operates properly in providing good quality health care services.

<u>Health Facilities and Infrastructure Development in the North Shore and South Shore of Bintuni Bay and Kokas District</u>

Indigenous People living in the villages in Area Surrounding Tangguh LNG Operation site across the North Shore and South Shore frequently complain about the health care service quality and patient handling in the Community Health Centres (CHCs) and supporting Community Health Centres. The low quality health care service is caused by the lack of facilities, infrastructure and capability in handling emergency case in the CHCs and supporting CHCs. It can be seen from the numbers of patients referred to Bintuni General Hospital that supposed to be treated in the nearby CHCs and supporting CHCs, those patients suffer from Tuberculosis, Sexually Transmitted Infections (STIs) and HIV/AIDS. The poor health care services in the Community Health Centres (CHCs) and supporting Community Health Centres indicated by a high rate of maternal and infant mortality, which based on the annual report 2012 issued by the Health Department of Teluk Bintuni Regency, reaching 600 people per 100,000 live births.

Therefore, in order to improve health care quality in the North Shore and South Shore of Bintuni Bay and Kokas District, the Community Health Centres (CHCs) and Supporting Community Health Centres must be completed with standard facilities and infrastructure according to ISO (International Organization for Standardization) and medical personnel with required competency in adequate number.

Tangguh LNG supports the Local Government efforts in development of one unit of primary health care facilities in North Shore and South Shore of Bintuni Bay as well as in Kokas District. The form, scope, type, amount, budget, time period and other matters associated with Tangguh LNG support in this instance will be further specified in Public Health Program listed in TSDP.

Indicators:

- Blue Print on the development of Community Health Center (*Puskesmas*) in North Shore and South Shore of Bintuni Bay and Kokas District, which can accommodate in-patients;
- Availability of access to adequate health care standards for people living in North Shore and South Shore of Bintuni Bay and Kokas District.

B. Public Service in Health Sector

Hospital as health care institution plays important roles in providing all people with good quality health care services. In order to deliver good quality and equitable health care services, it requires not only adequate facilities and infrastructure, but also the availability of adequate medical personnel either in terms of number, quality and distribution.

Up to this time, the public health care in Teluk Bintuni and Fakfak Regencies still faces the problem in health management system and medical personnel availability either in terms of number, quality and distribution. Generally, the doctors, nurses, or midwives do not stand performing their duties in Teluk Bintuni and Fakfak Regencies, given that most of the medical personnel are not from the surrounding areas, having temporary employment contract or honorary contracts with low salary and minimum facilities; and the difficult condition of their working area. Consequently, medical personnel are concentrated in Bintuni Township, causing non-optimal health care services and health program implementation for people in the villages.

Therefore, the efforts to systematically and strategically improve the medical personnel capacity through various programs and facilities are very critical.

Tangguh LNG supports the Local Government efforts in improving the capacity (quality, quantity and distribution) of medical personnel, especially those from the Indigenous People. The form, scope, type, amount, budget, time period and other matters associated with Tangguh LNG support in this instance will be further specified in Public Health Program listed in TSDP.

Indicators:

- Capacity building programs and activities for medical personnel, especially those from the Indigenous People and Papua region;

- Educational assistance program in the field of health for medical personnel and candidate of medical personnel, especially those from the Indigenous People and Papua region;
- Increasing number of certified medical personnel in the villages in Area Surrounding Tangguh LNG Operation site;
- Improved public satisfaction level in public health service.

Tangguh LNG supports the Local Government efforts in improving the health facilities management in the Community Health Centre (Puskesmas), hospital and Local Health Department. The form, scope, type, amount, budget, time period and other matters associated with Tangguh LNG support in this instance will be further specified in Public Health Program listed in TSDP.

Indicators:

- Availability of public health insurance system in Bintuni Bay and Fakfak Regency provided by the Local Government; Efforts to support the Local Government in creating an integrated health care information management system in the Local Health Department;
- Availability of access to adequate health care services for the people living in Area Surrounding Tangguh LNG Operation site.

C. Behavior Change

Most of the Indigenous People living in the villages in Area Surrounding Tangguh LNG Operation site believe in the spirits of ancestors, which according to them can control and affect human health. Most of the Indigenous People are still taboo or do not believe in medical treatment. This belief really affects the Indigenous People's attitude in handling the diseases. There is an opinion saying that someone's disease is more likely caused by human faults in nurturing their relationship with the Mother Nature. Based on this belief, when the Indigenous People suffer from certain disease, they prefer non-medical treatment rather than medical treatment.

With the above consideration, since 2005 Tangguh LNG has made various efforts to change the Indigenous People's attitude through public health program. Quantitatively, the outcomes have significantly improved the public health conditions. From behaviour change standpoint, however, those efforts did not indicate considerable changes in people's daily life, for example in birth delivery assistance, feeding of children under 5 years old, habit of washing hands with soap and running water, immunization for pregnant women and babies, as well as treatment for sick children, in which medical treatment has yet to become the first option.

To encourage healthy behaviour among the local community, all parties need to systematically and continuously build awareness and conduct training, particularly on behaviour change in the environmental health, birth delivery, nutrition improvement and reproduction (HIV/AIDS and STIs).

Tangguh LNG supports the Local Government efforts to encourage behaviour change in the field of environmental health, normal delivery management, nutrition improvement status and reproduction (HIV/AIDS and STIs) in Area Surrounding Tangguh LNG Operation site. The form, scope, type, amount, budget, time period and other matters associated with Tangguh LNG support in this instance will be further specified in Public Health Program listed in TSDP.

Indicators:

- Behavior change in the field of environmental health, birth delivery management, nutrition improvement status and reproduction (HIV/AIDS and STIs) in Area Surrounding Tangguh LNG Operation site;
- Increase in awareness and behavior change towards clean and healthy daily life and prevention of infectious diseases in Area Surrounding Tangguh LNG Operation site;
- Decline in maternal, infant and toddler mortality rates in Area Surrounding Tangguh LNG Operation site.

D. Main Diseases Prevention

Some main diseases contributing to health problem in Teluk Bintuni and Fakfak Regencies include malaria, diarrhea, tuberculosis, Sexually Transmitted Infections (STIs) and HIV/AIDS.

Various efforts to prevent and control the spread of those major diseases have been done and showed positive trend. Malaria disease, for example, through a number of approaches done by Tangguh LNG and its partners have been able to reduce malaria prevalence rates in the villages in Area Surrounding Tangguh LNG Operation site namely from 23% in 2000 to 0.30% in 2012, so does malaria case incidence rates from 68.2 per mil in 2005 to 4,7 per mile in 2012. Diarrhea case in children under 5 years old has showed significant reduction in terms of diarrhea mortality rates from 22% in 2003 to 0% in 2012.

However, tuberculosis still remains one of the major diseases faced by people in Bintuni Bay region and the surrounding areas. In 2012, there were 29 new cases of tuberculosis in the villages in Area Surrounding Tangguh LNG Operation site, while its treatment success rate is very low. One of the reasons is the lack of tuberculosis awareness among patients, and the habit of tuberculosis patients who

are generally moved around the place, making it difficult for medical personnel to control the use of drugs on regular basis.

Other main disease is Sexually Transmitted Infections (STIs). One of the Community Health Centres monitoring STIs in Teluk Bintuni Regency is Bintuni Community Health Centre, which focuses on commercial sex workers in Teluk Bintuni Regency. In the period of January – June 2013, data showed that 66 people have been doing the STIs examination and 80% of them were infected by syphilis/GO (gonorrhoea) while the remaining other were infected by STIs related diseases. Among the 66 people doing the STIs examination, 59 people belong to high risk category while the rest did not fall to high risk category. One of the challenges in screening STIs is not all health facilities in Teluk Bintuni Regency provide STIs services, and the low participation of sexual partners and customers in attending STIs regular testing at the STIs clinics.

HIV/AIDS is one of the diseases contributing to health problem in Teluk Bintuni Regency. Based on data monitoring carried out by HIV working group of Bintuni General Hospital, 34 out of 95 HIV/AIDS cases have caused death and most of the sufferers were the people of Teluk Bintuni Regency.

Table I-4 Penderita HIV+ dan AIDS di Kabupaten Teluk Bintuni 2009 - 2013

Year	HIV +	AIDS	Number	Dead	Living
2009	6	19	25	11	14
2010	1	17	18	11	7
2011	7	11	18	3	15
2012	6	20	26	7	19
2013	4	4	8	2	6
	24	71	95	34	61

Sumber : Dinas Kesehatan Teluk Bintuni 2013

Various efforts to prevent HIV/AIDS have been done for example by strengthening the Regional AIDS Commissions (KPAD) in West Papua, local NGOs, STIs / HIV clinics, education and outreach to high-risk groups, as well as conducting STIs and HIV/AIDS screening. Therefore, Tangguh LNG supports the efforts to prevent and control the spread of major diseases through the following commitments:

> *Tangguh LNG supports the Local Government and stakeholders' efforts in preventing the spread of main diseases in Area Surrounding Tangguh LNG Operation site. The form, scope, type, amount, budget, time period and other matters associated with Tangguh LNG support in this instance will be further specified in Public Health Program listed in TSDP.*

Indicators:

- Availability of appropriate information on preventing the spread of main diseases;
- Availability of access to major diseases health care services;
- Limited spread of major diseases in Area Surrounding Tangguh LNG Operation site;
- The increase of public awareness in preventing the spread of main disease.

E. Clean Water and Environment

One of the major obstacles in environmental health issues in Teluk Bintuni Regency is the problem of clean water and sanitation. Residential housing is mostly surrounded by the sea and swamp, making it difficult for people to access clean water and sanitation. Specific data indicated by Communicable Disease Control's (P2PL) data from environmental health department, that most of the Indigenous People live in Area Surrounding Tangguh LNG Operation site, especially the North Shore, is difficult to get clean water and live under unsanitary environment. Therefore, the efforts to supply clean water and create healthy environment must be supported, so the Indigenous People living in Area Surrounding Tangguh LNG Operation site can easily access to clean water and qualified environmental sanitation.

Table I-5 Environmental Sanitation in Teluk Bintuni Regency

	Clean Water Coverage	Latrine Coverage	Coverage of Standard Latrine	Healthy House Coverage
Teluk Bintuni Regency	66%	48%	44%	58%
Babo Community Health Center	76%	51%	45%	41%
Tofoi Community Health Center	29%	45%	35%	75%
Tanah Merah Community Health Center	99%	98%	25%	93%
Weriagar Community Health Center	27%	27%	25%	26%
Aranday Community Health Center	27%	45%	30%	71%

Sumber: Dinas Kesehatan Teluk Bintuni, 2012

Tangguh LNG supports the Local Government' efforts to provide clean water and environmental sanitation for the people living around the Tangguh LNG operation site. The form, scope, type, amount, budget, time period and other matters associated with Tangguh LNG support in this instance will be further specified in Public Health Program listed in TSDP.

Indicators:

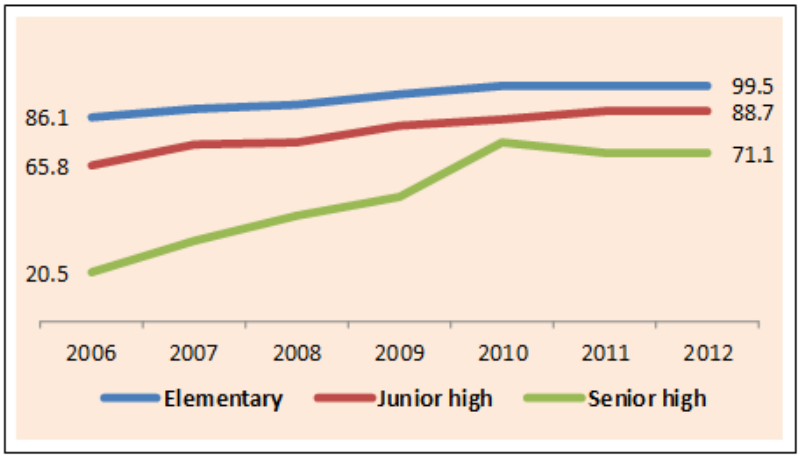
- Better access to clean water as well as healthy and environmental sanitation condition for the people living in Area Surrounding Tangguh LNG Operation site.

1.4.2.2 Education

Tangguh LNG realizes that the quality of human resources is the main capital for development; thus Tangguh LNG pays special attention to education in the villages surrounding its operation site. It is expected that in the long term the students of the regency affected by Tangguh LNG may fill the job opportunities in Tangguh LNG. Census conducted by PSKK-UGM in 2011 showed that 46% of school-age people in the directly affected villages (DAVs) were elementary school graduates. In the same census revealed that although the students graduation rate at various levels of education (elementary, junior high and senior high schools) has reached more than 90%, but in reality many of the graduated students still can not read and write correctly or do not able to well understand the meaning of the sentence.

A. School Quality Improvement

Gross Enrolment Ratio (GER) at elementary and junior high level has reached more than 85%, whilst senior high reached 71% in 2012.



Source: British Council, 2012

Figure I-16 Gross Enrolment Ratio in Teluk Bintuni Regency

Nevertheless, despite the quite good gross enrolment ratio, the research conducted by ABN Foundation and Summer Institute of Language (SIL) in DAVs in 2012 showed that although almost all respondents have been able to read and write, but 95% of them still have difficulties in understanding the meaning of the sentence they read.

Improving the quality of school graduates in Bintuni especially in the Indigenous People's villages in Area Surrounding Tangguh LNG Operation site has become Tangguh LNG's great concern. Commitment to increase the education quality is the endeavour to improve teaching and learning process, teachers' capacity, curriculum and infrastructure. To accelerate these efforts, therefore:

> *Tangguh LNG will support the Local Government efforts in the development of flagship schools at elementary, junior high and senior high level in 5 districts across the North Shore and South Shore of Bintuni Bay as well as Kokas District. The form, scope, type, amount, budget, time period and other matters associated with Tangguh LNG support in this instance will be further specified in Education Program listed in TSDP.*

Indicators:

- Availability of flagship schools at elementary, junior high and senior high level in North Shore and South Shore of Bintuni Bay as wells as Kokas District, completed with teachers, excellence curriculum, and basic supporting facilities such as library and laboratory;
- The flagship schools run efficiently with teachers and graduates' competencies above the school average in West Papua Province;
- Improvement in number of achievement attained by flagship school graduates from the Indigenous People, leading it to national standards;
- Active participation of flagship schools students in the teaching and learning process.

Flagship school is expected to foster "sister school" relationship with one of the top Indonesian and overseas schools having measurable targets and qualified graduates. The flagship schools have to meet all aspects of the best education in Bintuni Bay and Berau Bay, producing students with a higher competitiveness compared to other public schools. Moreover, the flagship schools are also expected to accommodate the best students from each district across Teluk Bintuni and Fakfak Regencies, especially for the Indigenous People.

The data from socio-economic survey conducted by UGM showed that the elementary school building has been found in almost all main DAVs, but the junior high school and senior high school building can only be found in the capital district. The existing junior high and senior high schools are insufficient to accommodate elementary school graduates from the Indigenous People's villages in Area Surrounding Tangguh LNG Operation site spreading across the North Shore and South Shore of Bintuni Bay as well as Berau Bay. Therefore, the junior and senior high school addition and development program has become top priority, through which some senior high schools will be completed with boarding house for students who come from rural areas.

For children becoming the targets of Indigenous People development, Tangguh LNG will encourage the local government to issue policies or regulations concerning 12 years compulsory education. This means that all children must obtain at least senior high education or equivalent. Compulsory education should be followed by the elementary to high school development in Area Surrounding Tangguh LNG Operation site, where Tangguh LNG plays its role encouraging the Local Government of Teluk Bintuni and Fakfak to implement it throughout the selected villages in Teluk Bintuni and Fakfak regencies.

Tangguh LNG will support the Local Government efforts to improve the existing education infrastructure at elementary, junior high and senior high level in the Areas Surrounding Tangguh LNG Operation site. The form, scope, type, amount, budget, time period and other matters associated with Tangguh LNG support in this instance will be further specified in Education Program listed in TSDP.

Indicators:

- Availability of adequate facilities and infrastructures in schools having a high proportion of students from Indigenous People;
- Availability of decent house for teachers in order to support the teaching and learning process in schools having a high proportion of students from Indigenous People;
- Availability of adequate boarding house to accommodate its administrator and indigenous students from Bintuni Bay and Berau Bay who study at some particular high schools;
- Government programs to provide adequate internet access for schools located in the Area Surrounding Tangguh LNG Operation site.

Tangguh LNG's commitment is expected to allow the elementary and junior high school graduates living in the villages in Area Surrounding Tangguh LNG Operation site to continue their education to the higher level. Tangguh will endeavor to enable students of the affected villages continuing their education in the university.

B. Capacity Strengthening of Local Education Deaprtment and Education Foundations

The education quality in the villages, districts and regencies can not be separated from the role of the Department of Education and Teaching as a policymaker. Since 2005, Tangguh LNG has assisted the Department of Education and Teaching in Teluk Bintuni Regency in terms of planning, budgeting, curriculum, and teacher capacity building. Active participation has also been carried out in DAVs' schools in terms of providing teachers and school management. Assistance to the Department of Education and Teaching is expected to drive policies and programs to improve the teaching and learning quality as well as produce excellent students from Bintuni Bay and Berau Bay. However, Tangguh LNG believes that education quality

improvement is not only specified by the capacity of the Department of Education and Teaching, but also the capacity of education institution itself.

Tangguh LNG supports the Local Government efforts in capacity building of the Department of Education and Teaching to achieve education quality standards. The form, scope, type, amount, budget, time period and other matters associated with Tangguh LNG support in this instance will be further specified in Education Program listed in TSDP.

Indicators:

- Capacity building programs for the Department of Education and Teaching apparatus in delivering its functions and responsibilities (*tupoksi*);
- Feedback from stakeholders / surveys (to measure the competence of the Department of Education and Teaching); Improvement in the management of schools having a high proportion of Indigenous People in Areas Surrounding Tangguh LNG Operation Site.

C. Scholarhip for Indigenous People[4]

Parents living in the Indigenous People's villages in Areas Surrounding Tangguh LNG Operation site are generally less prepared in terms of financial plan for their children's education. Therefore, many students could not continue their education to a higher level. Scholarships for Indigenous People to enrol higher education either in Indonesia or abroad can be implemented through cooperation with the Local Government.

Tangguh LNG will provide scholarship for outstanding students selected from the Indigenous People in senior high schools across the Areas Surrounding Tangguh LNG Operation Site.

Tangguh LNG will provide education financial aid through a scholarship program for outstanding students from selected Indigenous People in Area Surrounding Tangguh LNG Operation Site; Bintuni Bay, Fakfak and other regions in Papua to continue their education at the university level.

At university level, Tangguh LNG will provide support to several universities in Papua such as UNIPA, UNCEN, and USTJ, in order to ensure the continuity of education for students from Indigenous People.

[4] The definition of Indigenous People, specifically in relation to the Scholarship for Indigenous People set out in the Education Sub-Chapter 2.2., is derived from Indigenous People from Sebyar, Simuri, Irarutu, Petuanan Arguni, SekarPikpik and Wertuwar tribes.

Cooperating with Local Government and other stakeholders, Tangguh LNG will provide informal education facilities namely vocational trainings, certification and English courses for the Indigenous People to improve their skills.

The form, scope, type, amount, budget, time period and other matters associated with Tangguh LNG support in this instance will be further specified in Education Program listed in TSDP.

Indicators:

- A mechanism to determine the number and value of financial aid or scholarships;
- There are indigenous students who granted financial aid or scholarships;
- Increase in school graduation rates;
- Increasing number of high school graduates from Indigenous People that are accepted in leading universities;
- MoU with universities in Papua and West Papua to provide special programs for students from Indigenous People.

1.4.2.3 Papuan Development and Industrial Relations

Job opportunity problem still become the most frequently conveyed issue by community to date. In the public consultation conducted in 2012, there were 96 public aspirations recorded on issues related to job opportunities.

At this time, there are still many unemployed labour force in the Indigenous People's villages in Areas Surrounding Tangguh LNG Operation site. Data of the socio-economic survey and census conducted by UGM in 2011 showed that the percentage of unemployed labour force in the Indigenous People's villages in Areas Surrounding Tangguh LNG Operation site reaches 8%.

In 2009, Tangguh LNG has stated long term commitment that 85% of every level of job position in Tangguh may be filled by Papua workforce including Indigenous People in the year of 2029. Tangguh LNG recognizes the needs of community development and strengthening for Indigenous People in order to be more competitive on accessing job opportunities.

Considering the high risk works both in the construction and operation phases of the LNG Plant, Tangguh LNG requires a strict recruitment control by determining the required level of competence.

Recognizing the considerable gap between the quality of human resources and education especially in the Bay, and Papua in general compared to the required workforce qualifications, Tangguh LNG will implement capacity building strategy for Indigenous People. The development strategy will involve facilities, curriculum,

teaching staffs, in order to produce qualified human resources either for Tangguh LNG or other major industries in Bintuni Bay, Berau Bay and Papua region.

In addition to the physical facilities, the strategy will also include workforce distribution system accommodating the needs of career advancement and sustainable job opportunities from the construction phase to operation phase of Tangguh LNG. Therefore, Tangguh LNG will require its major contractors to follow the aforementioned workforce development system for Indigenous People and Papuan.

A. Indigenous People Empowerment to be more Competitive in Job Opportunities and Skill Development

To obtain the Papua workforce's commitment for Tangguh LNG, then structured measures are necessary to continuously developing qualified and competitive Papua workforces who are able to win the job opportunities in heavy industries such as LNG. To achieve this, Tangguh committed as follows:

Tangguh LNG will make the Long Term Strategic Plan for Papuan Workforce Development, serving as a guideline for Tangguh itself as well as contractors, government and other stakeholders in order to achieve the target of 85% Papua Workforce in 2029.

Indicators:

- A strategic plan and resources (budget, personnel) supervised and managed directly by the senior management from Tangguh LNG's operator;
- Career development and training programs for Tangguh LNG's workforce from the Indigenous People and others Papua region to meet Tangguh LNG's short, medium and long term needs.

Tangguh LNG will priorities the Indigenous People possessing required qualifications, fulfilling the health requirements specified by Tangguh LNG as well as good behavior. The form, scope, type, amount, budget, time period and other matters associated with Tangguh LNG support in this instance will be further specified in Papuan Development and Education Program listed in TSDP.

Indicators:

- Availability of initial data, to be further updated every year in terms of skill level of the Indigenous People living in the Areas Surrounding Tangguh LNG Operation site;
- Percentage of workforce Tangguh LNG derived from Indigenous People and other Papuan in accordance with existing commitments on table of workforce target.

Tangguh LNG and its major contractor will require contractors to fulfill the commitment on capacity building for workforce from Indigenous People and other Papua regions. Each contractor will develop and implement educational programs and workforce development in accordance with the nature and term of the contract (construction, operation, onshore vs. offshore) so that they can supply workforce from Indigenous People and other Papua regions with competencies required by Tangguh LNG. The form, scope, type, amount, budget, time period and other matters associated with Tangguh LNG support in this instance will be further specified in Papuan Development and Education Program listed in TSDP.

Indicators:

- Each contractor at Tangguh LNG will employ Indigenous People and other Papuan, as well as has clear provisions regarding the development of employee competence;
- Each contractor in Tangguh LNG which employ Indigenous People and other Papuan has a competency-based training plan to develop workforce derived from Indigenous People and other Papuan;
- An annual report on the number of competency-based training implementation;
- A quarterly report on the number of Indigenous People and other Papuan on each contractor (type of work and level of skill).

Tangguh LNG and its major contractors will work with the agencies/institutions to provide skills training, particularly to selected indigenous people living in Areas Surrounding Tangguh LNG Operation site in order to improve their competitiveness in getting a job in West Papua region. The form, scope, type, amount, budget, time period and other matters associated with Tangguh LNG support in this instance will be further specified in Papuan Development and Education Program listed in TSDP.

Indicators:

- An increase in Indigenous People and other Papuan competency who have involved on trainings through program supported by Tangguh LNG which later absorbed by labour market of Papua;
- Availability of good quality training service to deliver trainings for Indigenous People and other Papuan in order to meet the needs of local labour market in Papua.

B. *Social Investment for Developing Vocational Education Infrastructure and Facilities to Support other Oil and Gas Business and Industry Opportunities*

Based on the field experience in construction phase of Train 1 and 2, many prospective workforces from the Indigenous People and other Papuan do not have sufficient skills to be involved in the project works. Tangguh LNG and its major contractors will provide skills training to the prospective workforce. The training is expected to improve the capacity and skills of those prospective workforces, thus they have the competencies required by labour market and contractors. Policy to

provide training for the indigenous workforce is not only self-development for them, but also the efforts to avoid or reduce the recruitment of workforce from outside the region.

Tangguh LNG and its major contractors also need to create a data source on the human resources of Indigenous People's capacity in their respective villages located at Areas Surrounding Tangguh LNG Operation site. The data source is used to facilitate Tangguh LNG and its contractors to identify skilled workforce. The data source on the workforce's skills should be completely up to date and tailored to the skills development based on proportional assessment towards the Indigenous People and other Papuan in the nearby villages so as not to cause jealousy among the community itself. The data sources can also be used as a tool to promote transparency and accountability in the workforce recruitment process in the Indigenous People's villages in Areas Surrounding Tangguh LNG Operation site.

Tangguh LNG will provide training to improve the skills of the Indigenous People and other Papuan living in Areas Surrounding Tangguh LNG Operation site. This training is intended as approach to increase the availability of skilled workforce from Indigenous People especially in Areas Surrounding Tangguh LNG Operation site. The needs for skills enhancement training will be tailored to the existing data sources and the workforce needed by Tangguh LNG and contractors as well as the market demand for skilled workforce in West Papua Province.

Therefore, Tangguh LNG can help the government of the Bay, in order to reduce unemployment of skilled workforce and minimize workforce conflicts.

Technical School Establishment and Development.

In order to meet the needs of skilled workforce around the Tangguh LNG Expansion Project and to prepare skilled workforce for the labour market in West Papua Province, and in the future need efforts to help the development of Training Centre for Working Skills (BLK) and Fakfak Polytechnic Public School. The Polytechnic School is expected to be developed in order to meet the standard criteria for the Oil and Gas Accreditation Standards and the Directorate of Higher Education (DIKTI). This school can accommodate high school/vocational school graduates or its equivalent. BLK encourage developing non-formal skilled workforce. The Polytechnic School graduates will receive a certificate in accordance with the Oil and Gas Accreditation Standards and the Directorate of Higher Education (DIKTI). Fakfak Polytechnic Public School in West Papua is expected to be able to help Indigenous People and other Papuan becoming skilled in the field of engineering, in accordance with the needs of labour market in West Papua Province.

Tangguh LNG will work together with related stakeholders in the development of Assessment and Training Centre for Working Skills (BLK) to developm basic technical skills and the development of Polytechnic School. The form, scope, type, amount, budget,

time period and other matters associated with Tangguh LNG support in this instance will be further specified in Papuan Development and or Education Program listed in TSDP.

Indicators:

- Tangguh LNG contribution on development of Fakfak Polytechnic School development and Assessment and Training Centre for Working Skills (BLK) in West Papua;
- Fakfak Polytechnic School and Assessment and Training Centre for Working Skills (BLK) in West Papua produce quality graduates to enter the labor market, including the Tangguh LNG and/or to continue their education to a higher level;
- Data of graduate's number of Fakfak Polytechnic Public School was accepted as an apprentice and worked in the Tangguh LNG and its contractors as well as other industries.

C. Relation with Local Government Manpower (SKPD)

Considering the recruitment process as required in the construction phase of the Tangguh LNG Expansion Project will begin, Tangguh LNG along with the contractors has to cooperate and coordinate with local government periodically and sustainable, especially workforce of local government.

Tangguh LNG and its contractors will communicate and coordinate with the workforce of Local Government, including those in Teluk Bintuni Regency, Fakfak Regency, Sorong, Manokwari, and West Papua Province.

Indicator:

- Periodical coordination meetings among Tangguh LNG, contractors and workforce of Local Government of Teluk Bintuni Regency, Fakfak, Sorong, Manokwari, and West Papua Province.

D. Worker Relations

Tangguh LNG and its contractors shall comply with all prevailing labour regulations in Indonesia, and refer to the 1998 ILO Declarations on Fundamental Principles and Rights at Work.

Leading up to Tangguh LNG Expansion Project, Tangguh LNG workforce management must be promptly formulated. A team will monitor the activities of contractors involved in Tangguh LNG construction, managing all workforce and industrial relations processes. During the workforce and industrial relations management process, Tangguh LNG will be responsible for developing workforce source data monitoring systems, monitoring the performance of contractors in supporting the capacity building of Indigenous People and other Papuan as well as assisting the settlement of all industrial relations issues with individual workers. This workforce source data will be very useful as authentic information to support

efforts to settle workforce issues at the Bintuni Regency level or in Indigenous People's villages in Areas Surrounding Tangguh LNG Operation site.

To manage operational activities carried out by workers in the project, Tangguh LNG will ensure that each contractor makes Standard Operating Procedures (SOP) with reference to the company regulations and prevailing laws in Indonesia. The SOP will be used as operational guidelines governing all workers in Tangguh LNG, in order to achieve workers' conformity and compliance to Tangguh LNG management and / or their contractors.

For gender equality issue, Tangguh LNG and its contractor will give equal opportunity to each worker either female or male workers, taking into account the existing regulations. Tangguh LNG and its contractors will create a monitoring and evaluation system related to gender equality in Tangguh LNG.

Tangguh LNG will monitor and prohibit contractors from employing children under 18 years old in Tangguh LNG Expansion Project. In respect of payment, Tangguh LNG will ensure and monitor every contractor does not pay below the prevailing local minimum wage rate. Each worker in Tangguh LNG will be covered by insurance arranged by every contractor that employs the workers.

Related to the Tangguh LNG Expansion Project, additional of thousands of workers is predicted to be working in Tangguh LNG area during the construction phase. These thousands of workers' working site are integrated with the existing Tangguh Train 1 and Train 2 production site. Obviously, this will increase the potential for workplace accidents and industrial-related social problems among thousands of workers. Therefore, to minimize workforce problems, standard operating procedures (SOP) are required to manage all activities related to Tangguh LNG Expansion Project activities and Tangguh LNG operations.

Regarding the Tangguh LNG remote area work activities and conditions during construction and operation phases, plus the presence of thousands workers who will work on the Tangguh LNG Expansion Project, Tangguh LNG needs to provide a convenient working environment complete with health facilities, accommodation and adequate sport facilities, according to the applicable regulations or standards of the company. By the presence of those facilities is expected to produce convenient atmosphere in working and avoid tension among employees. Moreover, it also expected to provide opportunity for workers to build relationships and social bonding, as well as solidarity among workers in Tangguh LNG.

Tangguh LNG and its contractors will comply with all prevailing labour laws in Indonesia and operator labour standards and workforce competency standards of Tangguh LNG.

Indicators:

- Contractor has owned and implemented standard operating procedure of workforce in accordance with the prevailing labour laws in Indonesia and labour standards in Tangguh LNG;
- Availability of places of worship, health, accommodation and sports facilities as required by laws and occupational safety and health standards of Tangguh LNG.

Point of Hire

Associated with the recruitment plan during the construction phase, Tangguh LNG and its contractors will have recruitment in several point of hire. Priority will be given to Indigenous People living in Areas Surrounding Tangguh LNG Operation site.

During the construction phase, and with due regard to the priority admission as mentioned above, Tangguh LNG will assign the point of hire.

Indicators:

Description of point of hire as follows:

- For Indigenous People: Area Surrounding Tangguh LNG Operation site, Bintuni Bay and Fakfak;
- For Papuan: Bintuni Bay, Fakfak, Sorong, and Manokwari. Cooperating with outsourcing contractor, and the center of curriculum vitae submission will be later considerly opened in Jayapura and Biak;
- For Non-Papua in Papua (Bintuni Bay, Fakfak, Manokwari, Sorong) and Jakarta.

Furthermore, other indicators as follows:

- A Memorandum of Understanding with the workforce of local government in Teluk Bintuni Regency, Fakfak, Sorong, Manokwari, and West Papua Province regarding the recruitment process;
- Cooperation with contractors that supply workers from those aforementioned areas;
- The socialization and job announcement for Indigenous People and other Papua region in each point of hire.

Workforce Criteria

In construction phase, number of workers is required with various criteria based on stages of construction and type of work. During construction phase, Tangguh LNG will develop criteria for each level based on competencies required in each field of work. Workforce criteria during the construction phase are as follow:

- Unskilled Workers:
  - Graduated/Not graduated from Elementary School;
  - Able to read and write in Indonesia language.

- Low-Skilled Workers:
  - Graduated from Elementary School/Junior High School, with ≥ 4 years of working experience;
  - Graduated from High School with ≥ 2 years of working experience.
- Semi-Skilled Workers:
  - High school graduates with ≥ 4 years of working experience;
  - High school graduates with ≥ 2 years of working experience
  - and holding skills certificate;
  - Diploma 3/ Polytechnic/ University Degree (S1) graduates with < 4 years of working experience.
- Skilled Workers:
  - Polytechnic/ University Degree (S1) graduates with ≥ 4 years of working experience;
  - Polytechnic/ University Degree (S1) graduates with ≥ 2 years of working experience and holding skills certificate.
- Managerial Level / Supervisory:
  - Polytechnic/ University Degree (S1) graduates with structural position, (supervisor, superintendent, team leader and manager)

The workforce percentage target on construction phase will depend on each contractor working on it. The workforce percentage target in the construction phase will refer to the following table:

Table I-6 Workforce Percentage Target on Construction Phase

	IP (%)	**B/F (%)**	**P (%)**	**N &E (%)**
Unskilled Workers	20	25	55	0
Semi-Skilled Workers	10	20	63	7
Skilled Workers	0	2	10	88
Manager/ Supervisor	0	1	5	94

Remarks: **IP** = Indigenous People, **B/F** = Bintuni/Fakfak, **P** = Papua, **N & E** = National and Expatriat

The workforce percentage target in the operation phase of Tangguh LNG Expansion Project will refer to the following table:

Table I-7 Workforce Percentage Target on Operation Phase

	2015		2019		2024		2029	
	IP (%)	P (%)	IP (%)	P (%)	IP (%)	P (%)	IP (%)	P (%)
Unskilled Workers	50	50	75	25	85	15	100	0
Low-Skilled Workers	30	70	60	40	75	25	90	10
Semi-Skilled Workers	10	60	13	67	25	65	40	60
Skilled Workers	1	24	2	43	5	55	15	63
Manager/ Supervisor	0	15	0	20	0	25	3	32

Keterangan: **IP** = Indigneous Peopla, **P** = Papua

Mobilization and Demobilization of Workers

During the construction phase, each worker at Tangguh LNG shall comply with the prevailing regulation. Therefore, Tangguh LNG and its contractors need to ensure that all workers follow and conform to the prevailing regulations. When the construction workers' employment contract expires, the contractor will demobilize its workers from Tangguh LNG no later than 2 calendar days after the worker's employment contract expired.

During the construction and operation phases, Tangguh LNG and its contractors will build communication strategies for mobilization and demobilization of workers to ensure the workers demobilized to their previous point of hire as soon as possible.

Indicators:

- A document communication strategy prior to mobilization and demobilization in construction and operation phases;
- Communication from Tangguh LNG and its contractors to workers concerning working condition and rights before they signed working contract;
- Mobilization and demobilization process running in accordance with the procedure;
- Tangguh LNG and its contractors comply with the normative rights of workers when his contract expired.

Complaints/Grievance Procedure

In order to overcome complaints related to workforce issues in Tangguh LNG Expansion Project, Tangguh LNG and its contractors create procedure to receive, communicate and resolve the incoming complaints. Complaints/Grievance procedures will be used as a guideline for each worker who wants to express their aspirations or complaints to Tangguh LNG and/or its contractors.

As an effort to further facilitate the settlement of industrial relations issues in the Tangguh LNG Expansion Project, a Complaints/Grievance Resolution Committee will be formed in Tangguh LNG project. This committee will consist of representatives from Tangguh LNG and its contractors to address and resolve existing complaints. In the process of industrial dispute settlement, Tangguh LNG and its contractors will refer to the prevailing labour laws and company's regulations.

During the construction and operation phases, Tangguh LNG and its contractors will create, implement and manage complaints/grievance procedure for its workforce.

Indicators:

- The availability and implementation of complaints/grievance procedures for Tangguh LNG and its contractors' workers;
- The formation of complaints/grievance resolution committee by Tangguh LNG and its contractors;
- The functioning of complaints/grievance resolution procedures as part of the industrial relations mechanism during the construction and operation phases.

1.4.2.4 Livelihood

Livelihood program aims at improving the capability of indigenous families to create various, competitive and sustainable source of income. This program is expected to encourage the increase in value added of existing home industry through improvement of production process and product development, and also livelihood diversification for the Indigenous People living in the villages in Areas Surrounding Tangguh LNG Operation site.

The target of this program is the Indigenous People living in Areas Surrounding Tangguh LNG Operation site and their economic institutions. This program includes primary sectors such as activities related to agriculture, fishery and stockbreeding; secondary sectors such as small-scale industry and production; tertiary sectors such as trading and other professional services, which can be the embryo for the growth of larger scale businesses.

A. Market Development

At this time, the marketing of local communities' products in Areas Surrounding Tangguh LNG Operation site remain an obstacle in implementing livelihood program. During this time, the marketing of local communities' product rely on Tangguh LNG as the primary market. Local, regional and national market that should be an alternative market besides Tangguh LNG cannot be accessed yet by

the local community, given the limited means of transportation, information and marketing network. Therefore:

> *Tangguh LNG supports the Local Government effort in developing a broader marketing network for the local products produced by the Indigenous People. The form, scope, type, amount, budget, time period, and other matters associated with Tangguh LNG support in this instance will be further specified in Livelihood Program listed in TSDP.*

Indicators:

- A strategic document to develop local products managed by Indigenous People and broader marketing network for those products;
- A business cooperation between the buyers from outside Bintuni Bay and Berau Bay region with the Indigenous People managing the outlet trained by Tangguh LNG and/or Government.

During the construction and operation phases, Tangguh LNG needs a wide range of products to meet the daily needs of its workers. In order to meet those needs, then:

> *Tangguh LNG will optimise the absorption of local products in the sector of agriculture, fisheries, foods, and other qualified supplies. The form, scope, type, amount, budget, time period, and other matters associated with Tangguh LNG support in this instance will be further specified in Livelihood Program listed in TSDP.*

Indicators:

- Clear information for the public about the needs and demands of agriculture products, fisheries, foods, other daily supplies by Tangguh LNG and its contractors;
- The availability of data on local superior products that can be marketed and data on the number of transaction occur for those products;
- The transaction between Tangguh LNG and its contractors with the local business unit managed by the majority of Indigenous People in providing agriculture products, fisheries, foods and other supplies;
- 10% minimum of the food needs from the sector of agriculture and fisheries during the construction of the Tangguh LNG Expansion Project or offshore activities are locally supplied;
- 65% minimum of the food needs from the sector of agriculture and fisheries in Tangguh LNG's long term operation are locally supplied.

The partnership will involve the Indigenous People living in Areas Surrounding Tangguh LNG Operation site. Thus, the economic benefits from the presence of Tangguh LNG will be much closer to the Indigenous People.

B. Development of Financial Institution and Markets

Up to present, the financial institution or banks are only available in Babo and Tofoi, whilst in other villages in Areas Surrounding Tangguh LNG Operation site, bank and formal financial institution are not yet available. This situation has caused limited access to financial institution facilities and services for the Indigenous People. This may lead to difficulties in developing businesses managed by Indigenous People. This condition is the background of commitment below:

> *Tangguh LNG supports the Indigenous People efforts to gain access to financial services. The form, scope, type, amount, budget, time period, and other matters associated with Tangguh LNG support in this instance will be further specified in Livelihood Program listed in TSDP.*

Indicators:

- Increasing capacity and numbers of available financial institutions that can be accessed by the Indigenous People;
- The Indigenous People use financial services (capital and savings) provided by financial institutions;
- Increasing of people's awareness and habit to save in financial institutions.

C. *Development of Economic Institution*

The presence of Community-Based Economic Institution (LEBM) growing with the principle "of, by and for the people" in the villages in Areas Surrounding Tangguh LNG Operation site such as Cooperative, Saving Loan Joint Units and Joint Business Group have been developed from 4 units of Cooperative in 2008 to 9 units in 2012. The formation of Community-Based Economic Institution is based on the absence of formal economic institution that can be accessed to support the growth of real sector and micro enterprises for the community.
Community-Based Economic Institution located in several villages in Areas Surrounding Tangguh LNG Operation site is still facing some barriers related to human resources, management, capitals, and markets. On the basis of the fact:

> *Tangguh LNG will support the effort to develop some community-based economic institutions that are already available for the Indigenous People. The form, scope, type, amount, budget, time period, and other matters associated with Tangguh LNG support in this instance will be further specified in Livelihood Program listed in TSDP.*

Indicators:

- Increasing management skill for community-based economic institutions;
- Availability of development strategy and planning for community-based economic institutions;

- Inclusion of the development of community-based economic institutions in the Local Government Strategic Plans in economic field;
- The functioning of community-based economic institutions, which are beneficial for the Indigenous People.

D. Strengthening and Developing the Economy for Indigenous People and Household Enterprises

Migrants from outside the region following the presence of the Tangguh LNG Expansion Project, will put pressure and create competition between the migrants and the Indigenous People living in the villages in Areas Surrounding Tangguh LNG Operation site, both in economic sectors and job opportunities. In order to prevent the migration negative impacts, then:

> *Tangguh LNG supports the Local Government effort in increasing the participation and development of micro enterprises run by the Indigenous People. The form, scope, type, amount, budget, time period, and other matters associated with Tangguh LNG support in this instance will be further specified in Livelihood Program listed in TSDP.*

Indicators:

- Local Government's *alignment* towards Indigenous People in developing micro enterprises;
- Capacity strengthening program for Indigenous People in managing micro enterprises;
- Increasing amount of income from small-scale business managed and developed by Indigenous People.

In the Areas Surrounding Tangguh LNG Operation site, women that categorised as vulnerable group turned out to be the key actors in household enterprises activities. In the field of agriculture and fisheries, women become the key actors and more active in running the business activities. Similarly in managing trading business and financial services through cooperative and Saving Loan Joint Units (UBSP), women are proved to be the key in supporting the success and effectiveness of business activities.

Although the businesses managed by women have shown positive trends, they still face a number of obstacles in running the household scale business. Some of those obstacles include the lack of knowledge and technical skills, business and financial management, as well as poor access to capitals and markets. This reality has caused the development of those household scale businesses run by women are still far from the expectation. Therefore:

Tangguh LNG supports the Local Government or local community's efforts in capacity building of women from Indigenous People in developing their household scale enterprises or other enterprises. The form, scope, type, amount, budget, time period, and other matters associated with Tangguh LNG support in this instance will be further specified in Livelihood Program listed in TSDP.

Indicators:

- Special program from Local Government to increase the potential and household scale enterprise or other enterprises managed by the women from Indigenous People;
- Capacity strengthening of women from Indigenous People in managing the household scale enterprise or other enterprises;
- The sustainability and success of various household scale enterprises or other enterprises managed by women from Indigenous People.

E. Development of Potential Local Resource for Economic Interests

The development of people-based economic activities in the villages in Areas Surrounding Tangguh LNG Operation site includes businesses in the field of agriculture, fisheries, livestock, as well as other home industries which are derivative products close to the daily life and local knowledge. These activities are potential to be developed, as supported by abundant natural resources and in accordance with the community's social and cultural context.

To develop livelihood based on local resources and local knowledge is required support in the form of business infrastructure, training and intensive mentoring. This reason is the background of the following commitments:

Tangguh LNG will help a number of selected Indigenous People in acquiring capacity to earn income or activities generating revenues, especially skills related to natural resource-based activities, in which the Indigenous People have the traditional knowledge. The form, scope, type, amount, budget, time period, and other matters associated with Tangguh LNG support in this instance will be further specified in Livelihood Program listed in TSDP.

Indicators:

- Supporting facilities/infrastructure for agricultural, fisheries and other production activities of selected Indigenous People derived from Areas Surrounding Tangguh LNG Operation site;
- Assistance to businesses that based on the local resources and local knowledge for selected Indigenous People derived from Areas Surrounding Tangguh LNG Operation site;

- The number and type of business that based on local resources and local knowledge sustainably grow, which participated by Indigenous People.

1.4.2.5 Papuan Entrepreneurship

As part of the social commitment, Tangguh LNG will endeavour so that the Indigenous People living in Areas Surrounding Tangguh LNG Operation site can enjoy the economic benefit from the presence of Tangguh LNG and develop large scale service industry. One of those efforts to implement the commitment is Tangguh LNG's plan to develop Papuan Entrepreneurship.

The program is also intended as local content initiatives of the overall Tangguh LNG's activities from construction to operational phase.

The goals of Papuan Entrepreneurship are:

- In the long term, creating economic artery in Bintuni Bay and Berau Bay region led by Indigenous People;
- Creating local businesses integrated to Tangguh LNG operation in the long term;
- Determining business types that are able to build synergy with Tangguh LNG;
- Maximizing potential and opportunity for Indigenous People;
- Encouraging capacity building for Indigenous People in the field of business;
- Developing local business with superior quality.

To implement these goals, one of efforts will be made by Tangguh LNG, through cooperation with an intermediary institution to conduct training, mentoring, and development for local entrepreneurial, in order to become entrepreneurs.

Furthermore, should the entrepreneurs are deemed ready and able based on various considerations, Tangguh LNG will open up opportunities for cooperation with the incubated local entrepreneurs or business institutions to manage supporting business units (non-core) run by Tangguh LNG's contractors during this time.

A. Development of Manufacturing, Services and Supporting Business Sector

In maximizing productivity and people's economic activities to increase revenue, business diversification is needed. In addition to the development of business in agricultural, fisheries, livestock sectors and other local resource-based businesses, people need to recognise and develop business in the sector of manufacturing, services, and other supporting businesses. This is done to enable local entrepreneurs entering a broader and diverse business competition.

This business diversification is important as a way to increase the Indigenous People's capacity and facilitate them to economically compete with the migrants who tend to dominate businesses in those sectors. Therefore:

Tangguh LNG supports the integrated efforts to develop the sector of manufacturing, services and supporting business that are integrated and synergizing with Tangguh LNG operation in the long term. The form, scope, type, amount, budget, time period and other matters related to Tangguh LNG's support in this instance will be further specified in Papuan Entrepreneurship Program listed in TSDP.

Indicators:

- Business feasibility study in accordance with the needs of Tangguh LNG;
- Clear mapping of the non-hydrocarbon activities in Tangguh LNG as well as business identification that will be able to be done by local contractors;
- Strategic documents on the entrepreneurship development supporting Tangguh LNG operation;
- The implementation of entrepreneurial management and technical training in accordance with identified business types;
- Business relationship between the local company managed by Papua's entrepreneurs around Bintuni Bay, Berau Bay and Tangguh LNG sub-contractor;
- The growth of economic activities as the benefit from the presence of Tangguh LNG for the Indigenous People in Bintuni Bay and Fakfak;
- Increasing Gross Domestic Product/the proportion of total expenditure spent by Tangguh LNG in Bintuni Bay and Fakfak.

B. Capacity Development of Entrepreneurs

The target of Papuan Entrepreneurship is novice entrepreneurs (start-up) from the Indigenous People, who are required to have high competitiveness and the ability to grow new businesses with high economic value.

To encourage the emergence of leading local business sector that capable to grow new businesses with high economic value and high competitiveness, then efforts to improve the knowledge, skills, capitals, and markets are fundamental for the local entrepreneurs in running the business. Therefore:

Tangguh LNG provides support to entrepreneurs from the Indigenous People and Papua to participate in local economic activities, including in the effort to create and train businesses as well as develop entrepreneurship. The form, scope, type, amount, budget, time period and other matters related to Tangguh LNG support in this instance will be further specified in Papuan Entrepreneurship Program listed in TSDP.

Indikator:

Indicators:

- The capacity strengthening (including skill and business management) for entrepreneurs from the Indigenous People as a long term strategy, and Papuan entrepreneurs as a short and mid-term strategy;

- Capacity Building for Government Agencies and the institutions of business association;
- Technical and financial support for Indigenous People's businesses;
- The growing of leading business that become the model of business managed by Indigenous People and Papuan;
- The emergence of a number of competitive entrepreneurs from the Indigenous People participating in the procurement of goods and services in Bintuni Bay and Fakfak;
- The availability of marine transportation and other infrastructure supporting the entrepreneurs' needs in Bintuni Bay and Fakfak;
- The availability of support on local initiatives to recycle organic and non-organic waste except government waste. The implementation of waste management shall comply *with* the prevailing regulations, equipped with decent facilities and the availability of market to promote recycling product sustainable proceed.

C. Support on Business Strategy Development

Tangguh LNG realizes that business development in the region needs to be supported by appropriate Local Government policies as local economic driver. Therefore:

> *Tangguh LNG supports the Local Government efforts to make and implement policies as local economic driver that has synergy with long terms business development needs, which has partiality toward the Indigenous People's interest. The form, scope, type, amount, budget, time period and other matters related to Tangguh LNG support in this instance will be further specified in Papua Entrepreneurship Program listed in TSDP.*

Indicators:

- Local Government policies and regulations to boost the sustainable growth of service sector, manufacturing and other industries having *alignment* toward the Indigenous People;
- The implementation of long terms local economic development, supported by the Local Government policies having *alignment* toward the Indigenous People.

1.4.2.6 Governance

Governance approach should refer to the balanced roles among the community, government and company. If good governance condition can be achieved then the realisation of clean and responsible state, vibrant civil society and good corporate governance is no longer a dream.

A. Government Officials Capacity Strengthening

Government officials capacity strengthening is one of Tangguh LNG's strategies to support the fulfilment of basic services to the community and organizational development at the local level, including government organizations and civil society. Component of the program includes the government capacity building in development planning and budgeting as well as Revenue Sharing management. Governance program that has been implemented previously has laid a solid foundation and produced development plan, skilled government officials, responsible security management, as well as trust and good relation between the Local Government and community.

However, the non-optimal performance of public services, rotation of Local Government officials, incoming migration, regional expansion and new investment plans for the region, as well as issues related to society's welfare, are still challenges in governance practice in Teluk Bintuni and Fakfak Regencies.

Public Services Capacity

One of the requirements to implement governance itself is government officials with integrity and satisfactory competence in their field. To support the endeavour, in certain period of time the government officials' capacity building through training and mentoring activities at the village, district and regency level is really needed. The training and mentoring approach will lead to strategic issues involving competent major parties.

Tangguh LNG realise that the capacity building effort for officials at the village and district level is the authority and responsibility of the Regencial Government. Therefore, Tangguh LNG will cooperate with the Local Government to support every capacity building effort dedicated for the officials in the village and district level in Areas Surrounding Tangguh LNG Operation site located at Teluk Bintuni and Fakfak Regencies.

> *Tangguh LNG will support the Local Government efforts in increasing the professional capacity of the officials at the village and district level in Areas Surrounding Tangguh LNG Operation site located at Teluk Bintuni and Fakfak Regencies. The form, type, amount, budget, time period and other matters related to Tangguh LNG support in this instance will be further specified in Governance Program listed in TSDP.*

Indicators:

- The implementation of mentoring and training activities on the main duties and function of Local Government officials at the village and district level around Tangguh LNG operation sites;
- Good selection and regeneration based on the ability of the Local Government officials serving in Bintuni Bay and Fakfak region;

- Basic skills improvement of Local Government officials at the village and district level in performing basic tasks and functions.

As the first step, it takes an in-depth and comprehensive study regarding the ongoing governance implementation. This study aims at giving an overview about the public services condition that needs to be improved in addition to a benchmark to measure the progress of the future governance improvement program. The result of this study will be used as a basis to prepare the governance program development strategy in Teluk Bintuni and Fakfak Regencies from the village level, district level up to regional level.

> *Tangguh LNG akan mendukung Pemerintah Daerah dalam memberikan pelayanan publik yang berkualitas bagi masyarakat terutama dalam bidang kesehatan, pendidikan, dan ekonomi masyarakat di tingkat kabupaten, distrik, dan kampung. Bentuk, lingkup, jenis, jumlah, anggaran, jangka waktu dan hal-hal lain yang berhubungan dengan dukungan Tangguh LNG dalam hal ini akan lebih lanjut ditentukan di dalam Program Tata Kelola Kepemerintahan yang tercantum dalam TSDP.*

Indicators:

- Program to improve public services in the field of health, education and public economy at the village, district and regencial level;
- The village regulation regarding the village governance;
- Mentoring activities related to public services held by Local Government at the village and district level;
- Improvement of people's perception to the quality of public services delivered by the Local Government;
- Support to Local Government in formulating public service policies dedicated to Indigenous People;
- Granting business license in accordance with the local General Spatial Planning.

<u>Budgeting and Planning Transparency</u>

In the practice of community development and expansion, government officials are still facing the problem of low transparency and accountability in planning and budgeting, weak supervision of both government and public, along with poor implementation of transparency and accountability principles in the use of public funds. This situation is allegedly to be the major cause of budgeting misuse. Thus, education efforts is needed to provide comprehensive understanding to government officials and community, making the planning, budgeting and financial management more transparent and accountable to ensure that the development leads to the improvement of social welfare.

For Tangguh LNG, building a good relationship with stakeholders is the key to success in running its programs and business. One of the challenges in building a

good relationship and cooperation with Government officials, community, and other stakeholders are the possibility of business ethic violation, such as corruption, collusion and bribery.

Therefore, in implementing the collaboration program with the stakeholders, Tangguh LNG will uphold high business ethics by applying the principles of transparency and accountability expected to develop and inculcate the values of anti-corruption, anti-collusion and anti-bribery to the stakeholders.

Tangguh LNG will comply with the prevailing laws regarding anti-bribery and anti-corruption, as well as uphold and promote ethical business practices. The form, scope, type, amount, budget, time period and other matters associated with Tangguh LNG support in this instance will be further specified in Governance Program listed in TSDP.

Indicators:

- Every interaction with Government officials will be done transparently and refer to the government rules and business ethic rules applied in Tangguh LNG;
- Tangguh LNG efforts to share their experience in the implementation of governance to other companies and Local Government in Bintuni Bay and Fakfak region.

B. Multi-Stakeholders Cooperation

Along with the Tangguh LNG Expansion Project, many activities in oil and gas exploration and other business activities start to enter and thrive in Teluk Bintuni and Fakfak Regencies. With various companies entering the region and bring diverse approaches in conducting their business activities will bring influence and consequences in many aspects namely demography, economy, social, and security. On the other hand, if the investment growth and progress have synergy and are well coordinated, it can be driving force to accelerate the development progress in Teluk Bintuni and Fakfak Regencies.

Therefore, Tangguh LNG recognizes the necessity to form a cooperation forum among stakeholders consisting of Government officials, public, university and companies operating in Teluk Bintuni and Fakfak Regencies.

The cooperation forum among the stakeholders is expected to be the platform to build synergy in planning the community development program, roles and responsibility division and to encourage community development policy and improvement in the Teluk Bintuni and Fakfak Regencies.

Tangguh LNG will encourage the formation of cooperation forum among the stakeholders in the development and expansion of Bintuni Bay and Fakfak region.

The form, scope, type, amount, budget, time period and other matters associated with Tangguh LNG support in this instance will be further specified in Governance Program listed in TSDP.

Indicators:

- Formation and passage of cooperation forum that discuss about the strategic development in Bintuni Bay and Fakfak, whose members are company, traditional leader, community leader, religious leader, Local Government and other stakeholders;
- The existence of joint activities to address strategic issues in Bintuni Bay and Fakfak region such as disaster management, environmental management and human rights.

C. Management of Incoming Migration

The presence of Tangguh LNG and other companies in Bintuni Bay and Fakfak region has attracted people from outside the region to come seeking job or business opportunities. The uncontrolled migration rates will give pressure that could shift the existence and opportunity of the Indigenous People in the field of economy, social, politics and culture.

Considering the facts, Tangguh LNG is committed to support every effort made by the Local Government to provide greater attention and portion in the development of Indigenous People living in the villages in Areas Surrounding Tangguh LNG Operation site, so that the Indigenous People may receive greater benefits from the presence of the companies operating in Bintuni Bay region and the surroundings.

Tangguh LNG will support local government effort in managing incoming migration and its impacts. The form, scope, type, amount, budget, time period and other matters associated with Tangguh LNG support in this instance will be further specified in Governance Program listed in TSDP.

Indicators:

- An open forum to periodically discuss the impact of migration to the Indigenous People;
- Support to the Civil Administration and Information System program (SIAK);
- Providing support to village authorities through programs having *alignment* toward Indigenous People;
- Mutual agreement with other stakeholders in Bintuni Bay and Fakfak region to mitigate the migration impacts.

D. Revenue Sharing

Revenue Sharing (DBH) has always been a prominent issue in the acceptance of investment benefits in a region. Although the Revenue Sharing management is not

the authority of Tangguh LNG operator, in fact, the public and Local Government frequently convey their complaints about the Revenue Sharing to Tangguh LNG operator. If the situation is not properly managed, it potentially causes disruption to Tangguh LNG operation activities.

To build better understanding on Revenue Sharing management, Tangguh LNG will encourage transparent discussion among stakeholders and government at various levels about the process of Revenue Sharing management.

Tangguh LNG support the Government's efforts in providing better understanding regarding the process of Revenue Sharing management to the stakeholders at the Region and Province where Tangguh LNG is operating. The form, scope, type, amount, budget, time period and other matters associated with Tangguh LNG support in this instance will be further specified in Governance Program listed in TSDP.

Indicators:

- Workshop or similar forum regarding Revenue Sharing management process at Regencial and Provincial level;
- Effort to facilitate a good, intensive and transparent communication among the authorities concerning Revenue Sharing management.
- Support to the Local Government in planning and using the Revenue Sharing for sustainable development in Bintuni Bay and Fakfak region.

E. Civil Socity Strengthening

Civil society can be described as an independent society satisfying the principles of participation, transparency and accountability. In Bintuni Bay and Fakfak region, the most prominent civil society movement is the Indigenous People union that fights together for their welfare. At the higher level, the movement reflected by the existence of Non-Profit Organisation (NGO) and mass media functioning to control the development in Bintuni Bay and Fakfak region.

Tangguh LNG appreciates the civil society's roles in the development of Bintuni Bay and Fakfak region. Together with other stakeholders, Tangguh LNG will contribute in the development process based on the principles of participation, transparency and accountability. Therefore, Tangguh LNG will always prioritise consultancy and partnership in building relationship with other stakeholders in Bintuni Bay and Fakfak region.

Tangguh LNG will provide the stakeholders in Papua with accurate information on the progress of Tangguh LNG operation activities on a regular basis for stakeholders in Papua.

Indicators:

- Availability of space for the community to freely express their opinion and aspiration through an open consultation regularly held by Tangguh LNG team especially for traditional figures/leaders;
- Consultation forum for Government and NGOs to provide information about the development of Tangguh LNG operation activities each semester;
- Bulletin and other communication medias providing information about the development of Tangguh LNG operation activities each quarter;
- Media control giving feedback to Tangguh LNG;
- Good understanding and feedback from the stakeholders related to Tangguh LNG operation activities.

Tangguh LNG realizes that due to the remote geographical conditions, community villages have limited access to public services or development. On the other hand, there are gaps in the capacity of the community to actively participate in planning and implementing the development activities as initiated in the governance.

Tangguh LNG supports the civil society strengthening in the villages, districts and regencies in Areas Surrounding Tangguh LNG Operation site. The form, scope, type, amount, budget, time period and other matters associated with Tangguh LNG support in this instance will be further specified in Governance Program listed in TSDP.

Indicators:

- Community Strengthening to independently participate in the development planning, implementation and evaluation monitoring;
- Gender perspective and Indigenous People development are applied in all impact management activities and other programs in TSDP;
- Self-reliance in the development of the village.

Indigenous People as civil society's power in Bintuni Bay and Fakfak region are currently facing a challenge in considerable social change. Industrial growth and migrants have resulted in social, political and economic competition. If this is not managed properly, this component of civil society will experience marginalisation and the erosion of identity.

Considering the result of study in cumulative impact, the risk of Indigenous People marginalisation and population projections, then Tangguh LNG has determined the Indigenous People-centred development strategy, where Indigenous People as one of the important components of civil society in Bintuni Bay and Fakfak region should play the main role in driving the development. One of the important efforts from the above strategy will be done through the social and cultural identity strengthening and the Indigenous People capacity building.

Tangguh LNG supports the effort to preserve and strengthen the cultural identity and values of the Indigenous People in Areas Surrounding Tangguh LNG Operation site. The form, scope, type, amount, budget, time period and other matters associated with

Tangguh LNG support in this instance will be further specified in Governance Program listed in TSDP.

Indicators:

- The existence of "Traditional House" respectively for Sumuri, Sebyar, Irarutu and Petuanan Arguni, SekarpPikpik and Wertuwar tribes as gathering place for traditional leaders and center of cultural activities for Indigenous People;
- The existence of indigenous culture art gallery that serves as a center of art and culture of Indigenous People;
- The revitalization of the Indigenous People's art and culture (such as dances, art and songs);
- The strengthening of the Indigenous People's socio-cultural identity through preservation of local language or dialects;
- The cultural preservation program involving young people of the local tribes;
- Religious program intended for community in the villages;
- Youth program intended for community in the villages.

Indigenous People in Bintuni Bay and Fakfak region have wisely recognised customary rights as communal rights of the traditional community in certain customary law areas. Customary rights contain not only the elements of economic resource control, but also the social function as the clan identity of the customary right holders. As a social system applied to other Papua, the first settlers entitled to retain the land and natural resource in the region. Appreciation to the traditional values is done through the preservation of art, culture, sacred objects and places as well as traditional ceremonies.

Tangguh LNG values the heritage sites and sacred places of the Indigenous People living and working in particular customary law in Areas Surrounding Tangguh LNG Operation site. The form, scope, type, amount, budget, time period and other matters associated with Tangguh LNG support in this instance will be further specified in Governance Program listed in TSDP.

Indicators:

- Introduction to local culture for Tangguh LNG's workforce, as well as cultural orientation to contractor's workers and Tangguh LNG visitors;
- Protection and access for Indigenous People to visit sites, objects and sacred places inside the Tangguh LNG location;
- Conducting traditional ceremonies, if necessary, as part of the Tangguh LNG operation activities.

As a Tangguh LNG appreciation to the existence of Indigenous People affected by the Tangguh LNG activities, as well as participation of the Tangguh LNG in development in Teluk Bintuni regency, Tangguh LNG will support the local government of Teluk Bintuni in continuing and accelerating the implementation of

improvement/settlement of housing program for Indigenous People in Weriagar District and Tomu District.

Improvement/settlement of housing program planned for Indigenous People in the Weriagar District given several considerations as follows: 1) that the settlement of housing in Weriagar District has become a priority plan of Local Government of Teluk Bintuni caused by severe abrasion resulting in erosion of housing land; 2) Weriagar District that are in the work area where the Tangguh LNG has conducted exploration activities, and 3) in the future the possibility of Tangguh LNG will conduct further exploration and exploitation activities.

Improvement/settlement of housing program is also planned for Indigenous People in Tomu District with considerations as follows that: 1) Tomu District is in the region where Tangguh LNG has conducted exploration activities, and 2) location of Indigenous People housing in Tomu District is located in the region in contact with the working area of Tangguh LNG so that it is possible to Tangguh LNG conducting exploration and exploitation activities. Therefore, Tangguh LNG is committed as follows:

> *Tangguh LNG appreciates Indigenous People existence affected by Tangguh LNG activities and will provide direct benefit to Indigenous People in accordance with public consultation process. The form, scope, type, amount, budget, time period and other matters associated with this cooperation in this instance will be further specified in TSDP.*

Indicators:

- Local government program in infrastructure development related to housing *settlement* for Indigenous People in Weriagar District and specific location in Tomu District;
- Financial aid of housing *settlement* and other activities from Tangguh LNG in Weriagar District and specific location in Tomu District.

F. Integrated Community Based Security

Vital national assets have an important role to the state both in the aspect of economic, political, social, cultural, defence and security. With the increasing of threat and disruption to vital national assets including acts of terrorism, it is considered necessary to set up security measures toward the facility.
Some security concepts to secure the strategic industrial facilities of mining, oil and gas have been implemented but have not completely given positive effect, instead potentially lead to human rights violation.

Indonesian Government has issued several regulations concerning the Security of National Vital Objects including:

a. Energy and Mineral Resource Ministerial Decree No 2288 K/07/MEN/2008 on the Security of National Vital Objects in the Energy and Mineral Resource Sector.
b. Presidential Decree 63/2004 regarding the Security of National Vital Objects.

Tangguh LNG realizes that the security concept to secure Tangguh LNG's strategic facilities should be done cautiously by upholding respect to Human Rights and local culture. Based on the precautionary principles, if necessary, the involvement of security officers (Police/Military Force) in safeguarding Tangguh LNG operation will be done proportionally and appropriately by upholding the respect to Human Rights.

On the other hand, the social dynamics in Bintuni Bay and its surroundings takes place very quickly, in line with the development of industrialization that occurred in this region and the influx of migrants. Such situations require special security approach which emphasizes the principle of civil society and respect for human rights, while the other side is also required law enforcement in securing the sustainable operation of Tangguh LNG.

In order to implement the above-mentioned security approach Tangguh LNG see the need for the involvement of communities and other stakeholders in creating a stable security in the Bintuni Bay and Fakfak region.

In regards to the above matter, since 2004 the security concept for Tangguh LNG provided by Tangguh LNG and government officials was done by sustainably applying a security concept called Integrated Community Based Security (ICBS) in Bintuni Bay and Fakfak region.

Tangguh LNG will cooperate with the related security officers, community and other stakeholders in maintaining the stability of public order and security across the region to support Tangguh LNG sustainable operation activities. The form, scope, type, amount, budget, time period and other matters associated with Tangguh LNG support in this instance will be further specified in Integrated Community Based Security Program listed in TSDP.

Indicators:

- The implementation of Community-based Integrated Security system (Integrated Community Based Security/ICBS) is operating effectively in the Areas Surrounding Tangguh LNG Operations site;
- The implementation of stability and order in Areas Surrounding Tangguh LNG Operations site supported by a strong civil society participation;
- There are 85% of the Tangguh LNG security members are Indigenous People from villages surrounding Tangguh LNG Operation site and Indigenous People in other Bintuni Bay and Fakfak regions.

- Integrated Community Based Security (ICBS) runs effectively in providing safety and order around Tangguh LNG operation site by promoting the principles of civil society and law enforcement;
- A memorandum of understanding (Hint Field Joint Security - JUKLAPPAMBERS) between Tangguh LNG and Papua Police regarding security with the Tangguh LNG;
- Establishment and functioning of Public Safety Cooperation Forum (FKPM) by involving community leaders, Police and other relevant stakeholders in the villages in Areas Surrounding Tangguh LNG Operation site;
- Enhancing the capacity of FKPM members;
- Maintaining the security and order stability by the community in its territory.

Tangguh LNG realizes that the current effective security concept is to build social fence around Tangguh LNG's assets. This approach relies on the community welfare improvement in the surrounding areas of Tangguh LNG operations.

In addition Tangguh LNG realizes that to conduct security approach has to be synergizing with Tangguh Social Management Program. One strategy is the establishment of the social fence by involving local police and the local community as much as possible in a Community-Based Integrated Security approach. This concept aims at triggering the people's sense of belonging to Tangguh LNG, encouraging sense of responsibility of local policies and other stakeholders to contribute sustainable law enforcement and security operation of Tangguh LNG.

Tangguh LNG understands that the stability of public order and security in Bintuni Bay and Fakfak region is very important for the security of Tangguh LNG operation activities. Based on:

a. Energy and Mineral Resource Ministerial Decree (KEPMEN ESDM) No. 2288 K/07/MEN/2008 on the Security of National Vital Objects in the Energy and Mineral Resource sector.

b. Presidential Decree (KEPRES) 63/2004 regarding the Security of National Vital Objects.

Tangguh LNG will play its roles in safeguarding the Tangguh LNG's assets, if necessary; the security officers will be used proportionally and appropriately to avoid any potential violations of Human Rights. Therefore, Tangguh LNG will encourage strategic partnership between the Local Police and the people living in Areas Surrounding Tangguh LNG Operation site.

Human Rights issue and security concept are still sensitive issues in Papua to date. Experience has shown that the lack of proper security approach can lead to negative impact in the form of Human Rights violation causing long term trauma to the people. Tangguh LNG realise that the challenging geographic condition has caused

the presence of security officers in the village become less effective. Violations of law committed by people in remote villages were caused by low public awareness on prevailing laws.

Tangguh LNG supports the effort to raise public understanding and awareness on prevailing laws and Human Rights principles in Bintuni Bay and Fakfak region. The form, scope, type, amount, budget, time period and other matters associated with Tangguh LNG support in this instance will be further specified in Integrated Community Based Security listed in TSDP.

Indicators:

- The understanding of Human Rights among stakeholders in Bintuni Bay and Fakfak region;
- Activity to raise the understanding and awareness of the prevailing laws among Indigenous People living in Areas Surrounding Tangguh LNG Operation site;
- Decline in violation of law and the absence of Human Rights violation related to Tangguh LNG operation activities;
- Availability of legal support in Bintuni Bay and Fakfak *region* to give advice on civil rights law of local community.

1.4.2.7 External Relation

Socio-economic changes in Bintuni Bay and Fakfak region in the last ten years went so fast. Socio-economic changes along with the development of local and national politic has raised the expectation of better welfare among the community and Local Government. The socio-economic and political dynamics directly affected the external relations pattern between Tangguh LNG with those stakeholders.

The fundamental problems and expectations of the people in the villages are frequently related to community welfare. Based on the study, the most fundamental issue affecting the community's opportunity to improve their welfare was actually the community lacked capacity to play an active role in driving the development of their villages. Tangguh LNG believes that by helping the community to manage the development in their villages and encourage improvement of public welfare will create harmonious external relations pattern between Tangguh LNG and the community in the villages.

A. Community Development

Planning at the village level is very important as a development planning strategy for the community. Availability of development funds in DAVs both from the government, Tangguh LNG or other sources would need to be well managed and integrated. The funds flowing to DAVs during this time were taken from the Local

Budget Revenue and Expenditures, National Program for Community Empowerment, Strategic Village Development Plan, as well as Community Action Plan derived from Tangguh LNG.

Tangguh LNG will support the development efforts for Indigenous People living in Areas Surrounding Tangguh LNG Operation site, involving the planning from the community and Local Government with focus on sustainable activities. The form, scope, type, amount, budget, time period and other matters associated with Tangguh LNG support in this instance will be further specified in External Relations Program listed in TSDP.

Indicators:

- Integrated village development plan, involving active participation from the community living in Areas Surrounding Tangguh LNG Operation site;
- Mutual agreement between the regency government especially BAPPEDA (Regional Planning Board) and Tangguh LNG in implementing the outcome of Development Planning Meeting (*Musrenbang*) in villages in Areas Surrounding Tangguh LNG Operation site with partiality toward the Indigenous People's interest.

B. Communication and External Relation

Tangguh LNG understands that to create a stable operation in Tangguh LNG operations area, a good relationship between Tangguh LNG and all parties must be nurtured and maintained. Tangguh LNG will build and maintain a good relationship with the key stakeholders, including community, authority at the village, district, regencial, provincial and Central Government level, people's representative, non-governmental organisation, academia and media. Tangguh LNG is committed as follows:

Tangguh LNG actively builds harmonious mutual relationship with all stakeholders with the principles of equality, partnership, trust, respect and appreciation. The form, scope, type, amount, budget, time period and other matters associated with Tangguh LNG support in this instance will be further specified in External Relations Program listed in TSDP.

Indicators:

- A well maintained relationship with the local communities through regular visits to people living in the villages, districts, regencies and province in Areas Surrounding Tangguh LNG Operation site;
- Annual visit of the Indigenous People leaders, Local Government, District and Regency officials to Tangguh LNG location;
- Good perception about Tangguh LNG from the stakeholders at the village, District, regencial, provincial and national level;

- Declining numbers and type of complaints filed and recorded in the complaints log at Tangguh LNG;
- Effective and efficient settlement of every grievance addressed to Tangguh LNG.

C. Electricity for Community and Gas to Power

Tangguh LNG presence in exploration and exploitation of gas resources in Bintuni Bay and Berau Bay has attracted the attention of various stakeholders in the area surrounding LNG plant. In the future, the existence of LNG plant in that area either expected to deliver added value such as electricity for community or industries especially in the area surrounding Bintuni Bay, Berau Bay and all region in West Papua. Moreover, community expects to the availability of electricity in villages due to support small and middle scale business development and encourage the economic growth.

Up to this time, the availability of adequate power supplies particularly in the area surrounding Bintuni Bay, Bintuni Bay and all regions in West Papua become issues need to be considered. At this time, people generally use a small generator to generate electricity and lighting which require expensive maintenance and fuel costs.

These conditions have led to a poor perception of the public and local government and other stakeholders. Therefore, Tangguh LNG is committed as follows:

On the early phases, Tangguh LNG will provide power to the State Electricity Company (PLN) were taken from the electricity oversupply of LNG plant in an effort to increase performance of Tangguh LNG power plant at 4 Megawatts and will be increased to a maximum of 8 Megawatts in accordance with the ability of the power plant performance of Tangguh LNG. Furthermore, PLN will coordinate with Local Government of Teluk Bintuni Regency to regulate the distribution of electricity to the villages in Teluk Bintuni Regency.

Furthermore, Tangguh LNG supports the Local Government (West Papua province, and Teluk Bintuni and Fakfak Regencies) in an effort to meet the electricity needs in these areas by allocating a certain amount of gas produced in connection with the Tangguh LNG Expansion Project. The gas will be used as fuel for gas power plant (PLTG) to be built in West Papua.

For this purpose, the Tangguh LNG will support to conduct a study regarding feasibility of gas power plants (PLTG), including the study of the economics reserve and field, infrastructure readiness. Tangguh LNG understands to require SKK Migas recommendation and agreement from Ministry of Energy and Mineral Resource concerning the specific amount of gas allocation in accordance with the Tangguh LNG Expansion Project before supply and sale of gas.

Indicators:

- The availability of electricity oversupply in Tangguh LNG plant as a result of efforts to improve the performance of the power plant in Tangguh LNG plant at 4 Megawatts and will be increased to a maximum of 8 Megawatts in accordance with the increased performance capability of power plants in Tangguh LNG plant;
- The existence of an agreement set forth in the agreement between PLN and the Tangguh LNG and approved by the SKK Migas from Tangguh LNG electricity supply to PLN at between 4-8 Megawatt;
- An allocation decisions through POD II Tangguh by 40% of the production of the Tangguh LNG Train 3 which is intended for domestic needs.

1.5 INSTITUTIONAL APPROACH

1.5.1 Environmental Management System Approach

Tangguh Expansion Project has a commitment to achieve proper environmental performance by minimising environmental and social impact from the project activity. Therefore, a structured and integrated environmental management system with overall management activities is required.

Currently Tangguh LNG operation has implemented Environmental Management System (EMS) for its operation activity and has been ISO 14001:2004 certified since 2010. Continuous improvement effort is continued to be made to maintain ISO 14001 certification.

Tangguh LNG Environmental Organisation has been made to ensure AMDAL and EMS implementation, either for current operation activity as well as Tangguh Expansion Project activity. In the implementation, environmental organisation will be supported by all departments in Tangguh LNG with regards to each activity aspect.

In the construction phase of Tangguh Expansion Project, the construction contractor will be required to implement Environmental Management System in accordance with ISO 14001 principles in conducting all of the activities, however ISO 14001 Environmental Management System implementation certification is not mandatory.

Once Tangguh Expansion Project has entered operations phase, ISO 14001 certificate for Tangguh LNG operations will be renewed by incorporating built facility in Tangguh Expansion Project into ISO 14001 certification scope for overall Tangguh LNG Operations facility. This will be done within one year after operations phase of Train 3 is started. The same approach will be done for future development which covered in this AMDAL.

Key elements in the EMS consist of:

- Environmental Policy

Environmental Policy is defined by considering both current Tangguh LNG operational and Tangguh Expansion Project activity, posed environmental aspect and impact, commitment to pollution prevention, commitment for compliance to applicable regulations and commitment to continuous improvement.

- Planning

  Planning process has been established for current operations activity. Similar process will be implemented for Tangguh Expansion Project activity, starting from environmental aspect and impact identification from current Tangguh LNG operations activity and Tangguh Expansion Project, relevant requirements and regulations also environmental objective, target and programmes.

- Implementation and Operation

  In implementing the Environmental Management System for Tangguh Expansion Project, execution instruction and Environmental Management System operations including Roles and Responsibilities, Training and Competencies, Communication, Documentation, Document Control, Operational Control, also Emergency Response and Readiness will be prepared by referring to existing EMS.

- Checking and Corrective Action also Management Review

  Periodic EMS Audit has been and will continue to be implemented to determine the EMS conformance or inconformance to specified requirements. In addition to that, senior management will review the EMS periodically to ensure conformance, adequacy, and effectiveness to achieve continuous improvement in EMS implementation.

1.5.2 External Relation and Social Management System Approaches

Tangguh LNG values mutual respect as a major component in the continuing good relations between all parties. Therefore, the management approach of social, economic and cultural continued through communication and consultation continuously with the local community, community leaders, local and national governments, and other stakeholders such as Non-Governmental Organization (NGO), media, religious institutions and colleges.

Tangguh LNG has built an internal organization called as Communications and External Relations (C & EA), which has a major role to establish and maintain good relations with all interested parties. Communication Team, Governance Team and Community Relations Team which are part of C & EA organization has been at the forefront of the management of external relations.

Cooperation among Stakeholders Forum will be supported by Tangguh LNG with the aim to establish communication between all stakeholders in Bintuni Bay region.

The forum is expected to lead by local government and consists of the main companies in Bintuni Bay region, community leaders, and development agencies. This forum will hold regular consultation meetings to discuss the development in Bintuni Bay region and social issues that accompany it.

A Social Management system will be built to ensure the performance of Tangguh LNG social management programs. The system will be integrated with existing systems in the Tangguh LNG project and operations. The evaluation of social performance will be carried out routinely by the Performance Management Team of C&EA and the Independent External Evaluation Team. The results of the evaluation will be the input for further improvement of social programs.

CHAPTER II
ENVIRONMENTAL MANAGEMENT PLAN

2.1 GAS EXPLOITATION ACTIVITY SUMMARY MATRIX

Table II-1 Summary Matrix of EMP for Gas Exploitation Activity (Gas Well Drilling and Offshore Platform)

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
I.	**Significant Environmental Impact to Manage (Management Advice Result from ANDAL)**								
I.1	**Pre-Construction Phase** (No Significant Impact during Pre-Construction Phase)								
Environmental Impact									
No Significant Impact during Pre-Construction Phase									
Social Impact									
No Significant Impact during Pre-Construction Phase									
I.2	**Construction Phase**								
Environmental Impact									
1	Seawater quality and marine biota diversity and abundance	Drilling Mud and Cutting Discharge to Sea (Overboard Discharge) alternative	a. TSS and Oil & Grease concentration for seawater at 500 m distance from mud and cutting discharge activity location comply with MoE Regulation no. 51 Year 2004 by considering environmental baseline during AMDAL b. Minimise the potential of conditional change for plankton and benthos diversity and equitability compared to environmental baseline during AMDAL c. Minimise the potential reduction of nekton abundance and marine mammal diversity compared to environmental baseline during AMDAL	a. Update drilling activity procedure and conduct training to related employees about environmental management in drilling activity b. Update drilling mud and cutting management with overboard discharge method procedure and conduct socialisation to related employees c. Update emergency response procedure for drilling mud and cutting management and conduct socialisation to related employees d. Conduct LC_{50} 96 hours test to Water Based Mud at least once prior to be used at the same sludge waste system in the same basin of offshore drilling activities e. If using Water Based Mud, the waste that will be discharged are: 1) Used sludge and excess mud with LC_{50} 96 hours $\geq$ 30.000 mg/L 2) Drill cutting f. If using Synthetic Based Mud, the waste that will be discharged are: 1) Drill cutting with oil on cutting content $\leq$ 6,9% g. If using Oil Based Mud, the drilling mud and cutting will not be discharged to the sea	a. Drilling Mud and Cutting Dumping Permit submission and toxicity test will be conducted through proponent's head office in Jakarta b. Recycle will be conducted at Rig c. Drilling mud and cutting discharge to sea around drilling location	a. Permit submission and toxicity test will be conducted prior to drilling activity b. Recycle will be conducted during drilling activity c. Drilling mud and cutting discharge will be conducted during drilling activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General
				h. Conduct sludge recycle as much as possible ,e.g.: using Solid Control Unit i. Conduct activities in accordance with applicable Drilling Mud and Cutting Dumping Permit and related procedures j. Record volume of drilling mud and cutting discharge to sea					

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
		DCRI to Subsurface Formation Alternative	Conduct DCRI in accordance with DCRI permit	a. Update drilling activity procedure and conduct training to related employees about environmental management in drilling activity b. Update drilling mud and cutting management with re-injection method procedure and conduct socialisation to related employees c. Update emergency response procedure for drilling mud and cutting management with DCRI method and conduct socialisation to related employees d. Ensure the re-injection zone is not located in the freshwater aquifer zone e. Only conduct re-injection of waste type according to DCRI Permit f. Only conduct re-injection in the wells and formation according to DCRI Permit g. Conduct subsurface modeling to understand drilling mud and cutting distribution pattern which re-injected in the injection zone and percentage of injection zone injected with drilling mud and cutting h. Record injected drilling mud and cutting volume i. If technical problem occurs with re-injection process and drilling mud or cutting does not comply with the Overboard Discharge option, then drilling mud and cutting will be sent to licensed waste management facility	a. DCRI Permit submission will be conducted through proponent's head office in Jakarta b. DCRI in the drilling location	a. Permit submission is conducted before drilling activity b. DCRI activity will be conducted during drilling activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
2	Marine biota abundance and diversity	• Sea Transportation Activity • Offshore Gas Platform Installation Activity • Gas Well Drilling and Drilling Mud and Cutting Discharge to Sea	Minimise the potential reduction of nekton abundance and marine mammal diversity compared to environmental baseline during AMDAL	<u>Sea transportation Activity</u> a. Update marine mammal protection procedure and conduct socialisation to related employees and vessel crew b. Update solid waste and wastewater management procedure for sea transportation activity and conduct socialisation to related employees c. Update emergency response procedure at vessel and conduct training to vessel crew d. Provide emergency response facility in the vessel in accordance with developed procedure e. Implement No Fishing policy f. Conduct routine maintenance to engine/equipments according to specified schedule to ensure that the engine/equipments are working efficiently g. Prioritizing sailing in deeper area (>12 m) when the sea condition is calm h. Reduce vessel speed if approaching marine mammal until the marine mammal swims away i. Conduct solid waste and wastewater management in accordance with Government Regulation No. 21 Year 2010 and MARPOL also applicable regulations. Solid waste and wastewater management will be discussed more details in EMP regarding seawater quality j. Manage ballast water in accordance with Government Regulation No. 21 Year 2010 and MARPOL. Ballast exchange is anticipated will not happen often since most of the vessels will arrive at Tangguh LNG in loaded condition k. Record ballast exchange (date, location, volume, and vessel's name)	Sea transportation lane during construction phase from Tangguh LNG Marine Facility area to offshore gas platform construction location, gas well drilling location up to Bintuni Bay estuary	During sea transportation activity to support offshore gas platform construction and gas well drilling activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
				<u>Offshore Gas Platform Installation</u> a. Update marine mammal protection procedure and conduct socialisation to related employees and vessel crew b. Update solid waste and wastewater management procedure for sea transportation activity and conduct socialisation to related employees c. Conduct routine maintenance to engine/equipments according to specified schedule to ensure that the engine/equipments are working efficiently d. Conduct solid waste and wastewater management in accordance with Government Regulation No. 21 Year 2010 and MARPOL also applicable regulations. Solid waste and wastewater management will be discussed more details in EMP regarding seawater quality	Construction area of Offshore Gas Platform installation	During Offshore Gas Platform installation activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
				<u>Gas Well Drilling including Drilling Mud and Cuting Discharge</u> a. Update marine mammal protection procedure and conduct socialisation to related employees b. Update solid waste and wastewater management procedure for drilling activity and conduct socialisation to related employees c. Conduct solid waste and wastewater management in accordance with Government Regulation No. 21 Year 2010, MARPOL and applicable regulations. d. Conduct management plan in drilling mud and cutting discharge activity in accordance with AMDAL and Drilling Mud and Cutting Dumping Permit e. Implement JNCC Guideline when conducting Vertical Seismic Profile (VSP) during drilling, with procedures as follows: 1) Conduct observation of marine mammal spotting within 500 m distance for 30 minutes prior to VSP activity 2) If marine mammal is spotted within 500 m distance, then the activity is suspended to allow for marine mammal to swim away 3) Implement "Soft Start" procedure	Gas well drilling area	During gas well drilling activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
Social Impact									
1	Workforce	Job opportunities during construction phase of Gas Exploitation due to workforce recruitment and demobilization activities	a. Strategies for workforce recruitment and demobilization in construction phase b. Achieved the target of workforce percentage complies with workforce table c. At the end of contract, workers accept their rights and are demobilized to their previous point of hire	a. Tangguh LNG will require its contractors to employ limited number of workers at unskilled/low skilled level working as Community Relation team with prioritizing Indigenous People in Bintuni Bay and Fakfak. b. Tangguh LNG will require its contractor to enforce workforce recruitment with prioritizing local Indigenous People, Bintuni and Fakfak,West Papua, Papua and National. c. At the end of employment contract, Tangguh LNG will require its contractor to demobilize its workers in Community Relation team to their previous point of hire.	The nearest villages to platforms location	During the transportation and installation of offshore gas platforms	BP Berau Ltd.	Ministry of Environment, Regional Department of Manpower of West Papua, Environmental Office (KLH) of Teluk Bintuni Regency control activities located in Teluk Bintuni Regency, while Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua, Regional Department of Manpower of Teluk Bintuni and Regional Department of Manpower of Fakfak Regency	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni Regency and Environmental Agency (BLH) of Fakfak Regency
2	Changes in Local Business Growth	Business opportunities caused by the workforce recruitment and demobilization activities during transportation and installation of platforms	Absorption of local products from agriculture and fisheries sector; data of local products of agriculture and fisheries sectors absorbed from the villages closest to project activities	Optimizing local products absorption from agriculture and fishery sectors.	The nearest villages to platforms location	During the transportation and installation of offshore gas platforms	BP Berau Ltd.	Ministry of Environment, Regional Department of Manpower of West Papua, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, while Environmental Agency (BLH) of Fakfak Regency, control activities located in Fakfak Regency,	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni Regency and Environmental Agency (BLH) of Fakfak Regency

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
3	Fishery activityand sea transportation disturbances	Application of safety exclusion zone surrounding transportation and installation of platforms	a. Notes from public consultation with local community and local fishermen b. Implementation of income recovery program for local fishermen with fishing activities surrounding WDA platform area c. Instalation of sea signs and sea transportation line in national shipping channel d. Announcement letter of activity from Syahbandar Bintuni, Babo, as well as Kokas	a. Conducting public consultation for local community and local fishermen regarding project activities of platforms and sea transportation construction b. Particularly to WDA platform instalation, livelihood diversification and income recovery program will be delivered to local fishermen with fishing activities surrounding WDA platform area c. Installing sea signs surrounding the activity area d. Coordinating with Syahbandar of Bintuni, Babo and Kokas .	a. Weriagar Village; b. Weriagar Baru Village; c. Mogotira Village; d. South Weriagar Village; e. North Weriagar Village ; dan Tuanaikin Village f. Magarina Village Kesyahbandaran Office in City of Bintuni, Babo dan Kokas	During the construction phase of transportation and installation of offshore gas platforms	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, while Environmental Agency (BLH) of Fakfak Regency, control activities located in Fakfak Regency, Kesyahbandaran Office of Teluk Bintuni, Kesyahbandaran Office of Babo and Kesyahbandaran Office of Kokas	Ministry of Environment, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Environmental Office (KLH) of Teluk Bintuni Regency and Environmental Agency (BLH) of Fakfak Regency, Directorate of Sea Transportation
4	Community Perception and Social Tension as impacts of job opportunities, fishery activityand sea transportation disturbances and flaring	Application of safety exclusion zone surrounding transportation and installation of platforms, as well as supporting ships traffic during installation of platforms	a. Notes from public consultation with local community b. Functioning of grievance procedure for local community and data of grievance by local community	a. Conducting public consultation for local community regarding project activities of platforms construction, including sea transportation as well as safety exclusion zone surrounding platforms location, flaring activities and gas well drilling b. Running a grievance procedure for local community	The nearest villages to activities of transportation and installation, flaring and gas well drilling	During the construction phase of transportation and installation of offshore gas platforms	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency Environmental Agency (BLH) of Fakfak Regency, control activities located in Fakfak Regency, Regional Department of Manpower of Fakfak, Regional Department of Manpower of Teluk Bintuni, Kesyahbandaran Office of Bintuni, Kesyahbandaran Office of Kokas	Ministry of Environment, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Environmental Office (KLH) of Teluk Bintuni Regency and Environmental Agency (BLH) of Fakfak Regency, Directorate of Sea Transportation

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
I.3 Operations Phase									
Environmental Impact									
1	Marine biota abundance and diversity	Offshore Gas Platform	a. Increase of nekton abundance and marine mammal diversity compared to environmental baseline condition during AMDAL	Maintain positive impact by: a. Solid waste from the operations of offshore facility such as offshore gas platform will be sent to onshore for further treatment c. Implement No Fishing policy	Offshore Gas Platform Location	During Offshore Gas Platform Operations activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General
Social Impact									
1	Fishery Activity and Sea Transportation Accessibility Disturbances	Platform and safety exclusion zone operation	a. Notes from public consultation with local community and local fishermen b. Implementation of livelihood program for affected local fishermen c. Availability of alternative transportation access for affected local community d. An activity announcement letter from Syahbandar Bintuni, and Babo, as well as Kokas	a. Conducting a public consultation for local community and local fishermen b. Implementation of a livelihood program through livelihood diversification and income recovery to affected local fishermen c. Support the efforts to develop alternative transportation access for local community d. Coordination with Syahbandar of Bintuni, Babo and Kokas	a. Weriagar Village; b. Weriagar Baru Village; c. Mogotira Village; d. South Weriagar Village; e. North Weriagar Village ; dan Tuanaikin Village f. Magarina Village g. Kesyahbandaran Office in City of Bintuni, Babo dan Kokas	During the operation phase of offshore gas platforms	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency, control activities located in Fakfak Regency, Kesyahbandaran Office of Bintuni, Kesyahbandaran Office of Babo, Kesyahbandaran Office of Kokas	Ministry of Environment, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Environmental Regional Office (KLH) of Teluk Bintuni Regency and Environmental Agency (BLH) of Fakfak Regency, Directorate of Sea Transportation

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
2	Community Perception and Social Tension influenced by platform operation	Platform and safety exclusion zone operation	a. Notes from public consultation with local community b. Functioning of grievance procedure for local community and data of grievance by local community	a. Routinely conducting public consultation for local community b. Running a grievance procedure for local community	The nearest villages to platfroms location	During the operation phase of offshore gas platforms	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency, control activities located in Fakfak Regency	Ministry of Environment, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Environmental Office (KLH) of Teluk Bintuni Regency and Environmental Agency (BLH) of Fakfak Regency
I.4 Post-Operations Phase (No Significant Impact during Post-Operations Phase)									
Post-operations activity (facility decommissioning) will be conducted in accordance with applicable regulations in Indonesia. Detail Decommissioning Plan will be prepared at the latest five years before decommissioning is executed, in coordination with related government institutions and other stakeholders.									
II. Other Environmental Impact to Manage									
Environmental management which has been planned from the beginning as part of of the activity plan, or refers to SOP, technical guidance from government, international standard, etc.									
II.1 Pre-Construction Phase									
Environmental Impact									
No Other Environmental Impact during Pre-Construction Phase									
Social Impact									
No Other Social Impact during Pre-Construction Phase									
II.2 Construction Phase									
Environmental Impact									
1	Air Quality	Flaring emission during Well Test	a. Minimise well test duration in accordance with initial plan b. Limit the flaring rate	a. Update well test procedure with regards to well test duration and conduct socialisation to related employees b. Maintain maximum flaring emission rate of 100 MMSCFD during well clean up activity	Gas Well Rig	During well test activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Power Generation from Diesel Generator	Diesel Generator emission complies with standards from MoE Regulations No. 13 Year 2009 and General EHS Guideline 2007	a. Update diesel generator operational procedure and conduct socialisation to diesel generator operator b. Operate generator in accordance with its specification, both operational load and time c. Conduct routine maintenance to engine/equipments according to specified schedule to ensure that the machine/equipments are working efficiently	Diesel Generator	During power generation activity to support offshore gas platform construction activity and gas well drilling	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency,

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
								Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
2	Water quality and marine biota abundance and diversity	Wastewater management from Rig	a. Wastewater management according to Government Regulation No. 21 Year 2010 and MARPOL b. Minimise the potential conditional change of plankton and benthos diversity and equitability also marine mammal disruption compared to environmental baseline during AMDAL	<u>Wastewater Management</u> a. Update wastewater management procedure and conduct socialisation to related employees b. Conduct sewage treatment in accordance with Government Regulation No. 21 Year 2010 and MARPOL Annex IV prior to discharge to sea c. Conduct oily contaminated water treatment by using Oil Water Separator in accordance Government Regulation No. 21 Year 2010 and MARPOL Annex I prior to discharge to sea d. Conduct ballast water treatment in accordance with Government Regulation No. 2010 and MARPOL	Drilling platform (Rig)	During Gas Well Drilling activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Solid waste (non-hazardous) and Hazardous Waste management activity in offshore actvitiy	a. Solid waste (non-hazardous) management is conducted in accordance with Government Regulation No. 21 Year 2010, MARPOL and related regulations b. Hazardous waste management is conducted in accordance with Government Regulation No. 85 Year 1999, MARPOL and related regulations c. Minimise the potential conditional change of plankton and benthos diversity and equitability also marine mammal disruption compared to environmental baseline during AMDAL	<u>Solid Waste (non-hazardous) and Hazardous Waste Management</u> General Management : a. Update hazardous and non-hazardous solid waste management procedure and conduct socialisation to related employees b. Conduct solid waste segregation (Non-hazardous and hazardous waste) c. Implement 3R system (Reduce, Reuse, Recycle) d. Categorize non-hazardous solid waste into organic, recyclable, burnable and inert waste Non-Hazardous Solid Waste Management : a. Conduct solid waste management in accordance with Government Regulation No. 21 Year 2010, MARPOL Annex V and applicable regulations b. Do not dispose garbage to sea, except food waste which shall be in compliance with MARPOL Annex V requirements c. Comminute food waste to size less than 25 mm for further disposal to sea with distance more than 3 nm from nearest land d. Dispose uncomminuted waste at distance more than 12 nm from the nearest land e. Transport non-hazardous solid waste except food waste to onshore facility at Tangguh LNG or other locations for further treatment f. Record generated and disposed waste (daily)	Vessel and Drilling platform (Rig)	During Gas Well Drilling activity and Offshore Platform Installation	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
				Hazardous Waste Management: a. Conduct hazardous waste management in accordance with Government Regulation No. 85 Year 1999 and applicable regulations b. Transfer hazardous waste to licensed waste facility for further treatment c. Conduct labelling for hazardous waste container d. Use permitted hazardous waste transporter facility e. Generated and transported hazardous waste shall be recorded (amount, type, date, source)					
3	Sea Water quality	Fuel and Chemical Storage and Refueling at Offshore and/or Marine Facility	a. Minimise the possibility of offshore fuel and chemical spill b. Offshore spill response can be done effectively as per procedure hence will not disturb water quality and marine biota	a. Update hazardous material management procedure and conduct socialisation/training to related employees b. Update fuel and chemical management procedure and conduct training/socialisation to related employees c. Update emergency response procedure and conduct training to emergency response team (ERT) d. Appoint Emergency Response Team for fuel and chemical spill e. Ensure fuel and chemical storage container are built compatible with the material and are in good condition f. Ensure every stored material is recorded and accompanied with MSDS g. Minimum requirements for storage facility are as follows: 1) Completed with bunded area that will be able to contain 110% of the volume of the largest container or 25% of the total volume in the storage facility 2) Building construction, including the floor and bunded area must be constructed with a impermeable material 3) Treat oily contaminated water trapped in the bunded area 4) Completed with spill kit h. Put label and symbol on the container (package) and storage area i. Conduct regular inspection to fuel and chemical storage and refueling facility j. Perform efforts to response oil spill in accordance with Oil Spill Contingency Plan and conduct spill response training according to planned schedule	Fuel and Chemical Storage and Refueling locations at gas well drilling platform (Rig), vessel and/or Marine Facility which are used to support offshore platform construction and drilling activity	During Fuel and Chemical Storage and Refueling activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
4	Soil contamination	Onshore Fuel and Chemical Storage Facility and Refueling Facility	a. Minimise the possibility of onshore fuel and chemical spill b. Onshore spill response can be done effectively as per procedure hence will not contaminated the land	a. Update hazardous material management procedure and conduct socialisation/training to related employees b. Update emergency response procedure and conduct training to emergency response team (ERT) c. Appoint Emergency Response Team for fuel and chemical spill d. Ensure fuel and chemical storage container are	Onshore Fuel and Chemical Storage Facility and Refueling location	a. Storage facility design is conducted prior to activity b. Routine maintenance is conducted during construction and	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
				built compatible with the material and are in good condition e. Ensure fuel and chemical storage and refueling location is safe from flood or is on a higher elevation f. Minimum requirements of storage facility are as follows : 1) Completed with a bunded area that will be able to contain 110% of the volume of the largest container, or 25% of the total volume 2) The building, including the floor and the bund wall, must be constructed with a impermeable material 3) The floor construction must have a slope of at least 1% towards sump pit or Oil Water Separator (OWS) 4) Completed with a sump pit for facilities with a roofed shelter 5) Completed with an Oil Water Separator (OWS) unit for facilities without a roofed shelter; 6) Completed with spill kit 7) Completed with MSDS information g. Conduct routine clean up of oily contaminated water trapped in sump pit or OWS for further treatment h. Put label and symbol on the container (package) and storage area i. Conduct regular inspection/audit j. Treat contaminated soil by excavated, separated and collected to Temporary Hazardous Waste Storage for further treatment k. Ensure clean up process is performed well and conduct TPH soil test (if necessary) according to MoE Decree No. 128 Year 2003		drilling activity			Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General
II.3 Operations Phase									
Environmental Impact									
No Other Environmental Impact during Operations Phase									
Social Impact									
No Other Social Impact during Operations Phase									
II.4 Post-Operations Phase (No Other Potential Impact to be Managed)									
Post-operations activity (facility decommissioning) will be conducted in accordance with applicable regulations in Indonesia. Detail decommissioning plan will be prepared at the latest 5 years before decommissioning is conducted, in coordination with related government institutions and other stakeholders.									

2.2 GAS TRANSMISSION ACTIVITY SUMMARY MATRIX

Table II-2 Summary Matrix of EMP for Gas Transmission Acitvity

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
I.	**Significant Environmental Impact to Manage (Management Advice Result from ANDAL)**								
I.1	**Pre-Construction Phase** (No Significant Impact during Pre-Construction Phase)								
Environmental Impact									
No Significant Impact during Pre-Construction Phase									
Social Impact									
No Significant Impact during Pre-Construction Phase									
I.2	**Construction Phase**								
Environmental Impact									
No Significant Impact during Construction Phase									
Social Impact									
1	Workforce	Job opportunities during construction phase of Gas Transmission	a. Workforce recruitment and demobilization strategies in construction phase b. Achieved the percentage of workforce target according to workforce table c. At the end of employment contract, workers obtain their rights and will be demobilized to their previous point of hire	a. Tangguh LNG will require its contractors to employ limited number of workers at unskilled/low skilled level working as Community Relation team with prioritizing Indigenous People in Teluk Bintuni and Fakfak Regencies. b. Tangguh LNG will require its contractor to enforce workforce recruitment with prioritizing local Indigenous People, Bintuni and Fakfak,West Papua, Papua and National. c. At the end of employment contract, Tangguh LNG will require its contractor to demobilize its workers in Community Relation team to their previous point of hire.	The nearest villages to location of seabed pipeline installation	Construction Phase of Gas Transmission	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, while Environmental Agency (BLH) of Fakfak Regency, control activities located in Fakfak Regency, Regional Department of Manpower of Teluk Bintuni and Regional Department of Manpower of Fakfak Regency	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni. Environmental Agency (BLH) of Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua
2	Changes in livelihood and income level as the impact of secondary impact of fishing activities	Seabed pipeline installation and sea transportation	a. Absorption of local products from agriculture and fisheries sector; data of local products of agriculture and fisheries sectors absorbed from the villages closest to project activities b. Implementation of income recovery program for affected local fishermen	a. Optimizing local products absorption from agriculture sector, fishery sector and household activities. b. Implementation of a livelihood program through livelihood diversification and income recovery to affected local fishermen	The nearest villages to location of seabed pipeline installation	Construction Phase of Gas Transmission	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni and Bappeda (Regional Planning and Development Agency) of Teluk Bintuni control activities located in Teluk Bintuni Regency, and Environmental Agency (BLH) of Fakfak Regency and Bappeda (Agency for Regional Development) control	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni, Environmental Agency (BLH) of Fakfak Regency, and Bapedalda (The Regional Environmental Management Agency) of West Papua

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
								activities located in Fakfak Regency	
3	Fishery activityand sea transportation disturbances	Sea transportation and seabed pipeline installation including trenching and rock dumping	a. Conducting public consultation for local community and local fishermen b. Running program of livelihood diversification and income recovery for affected local fishermen c. Sea signs installation surrounding the activity area d. Sea transportation line listed on national shipping channel e. Announcement letter of activity from Syahbandar Bintuni, Babo, as well as Kokas	a. Conducting public consultation for local community and local fishermen related to sea transportation and seabed pipeline installation including trenching and rock dumping b. Implementation of a livelihood program through livelihood diversification and income recovery to affected local fishermen c. Installing sea signs surrounding the activity area d. Coordinating with Syahbandar of Bintuni, Babo and Kokas	a. The nearest villages to location of seabed pipeline installation b. Kesyahbandaran Office in Bintuni, Babo and Kokas c. Watershed in surounding safety exclusion zone of Tangguh LNG and sea transportation line	The construction phase of Gas Transmission	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agecny (BLH) of Fakfak Regency, control activities located in Fakfak Regency, Kesyahbandaran Office of Bintuni, Kesyahbandaran Office of Babo, Kesyahbandaran Office of Kokas	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni, Environmental Agency (BLH) of Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua, Directorate of Sea Transportation
4	Community Perception and Social Tension as impacts of job opportunities, disturbance of fishing activities and sea transportation =	Sea transportation and seabed pipeline installation including trenching and rock dumping	a. Notes taken from public consultation with local community b. Functioning of grievance procedure for local community and data of grievance by local community	a. Conducting public consultation for local community related to sea transportation and seabed pipeline installation including trenching and rock dumping b. Running a grievance procedure for local community	The nearest villages to seabed pipeline installation	The construction phase of Gas Transmission Gas	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regenc, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Kesyahbandaran Office of Bintuni, Kesyahbandaran Office of Babo, Kesyahbandaran Office of Kokas	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni, Environmental Agency (BLH) of Fakfak Regency, , Bapedalda (The Regional Environmental Management Agency) of West Papua, and Directorate of Sea Transportation
I.3 Operations Phase									
Environmental Impact									
No Significant Impact during Operations Phase									
Social Impact									
No Significant Impact during Operations Phase									
I.4 Post-Operations Phase (No Other Significant Impact to be Managed)									

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
Post-operations activity (facility decommissioning) will be conducted in accordance with applicable regulations in Indonesia. Detail decommissioning plan will be prepared at the latest 5 years before decommissioning is conducted, in coordination with related government institutions and other stakeholders.									
II. Other Environmental Impact to Manage (Environmental management which has been planned from the beginning as part of of the activity plan, or refers to SOP, technical guidance from government, international standard, etc.)									
II.1 Pre-Construction Phase									
Environmental Impact									
No Other Environmental Impact during Pre-Construction Phase									
Social Impact									
No Other Social Impact during Pre-Construction Phase									
II.2 Construction Phase									
1	Noise Level	Nearshore Pipeline Installation with HDD alternative	Noise level complies to standards in MoE Decree No. 48 Year 1996 and General EHS Guidelines 2007 in Tangguh Perimeter Fence location	a. Conduct routine maintenance of engine/equipment according to specified schedule to ensure that the engine/equipments are working efficiently b. Conduct land clearing only in designated area c. Maintain forest area which is not included as cleared area to be noise barrier (buffer zone)	Nearshore Pipeline Installation with HDD system location	During Nearshore Pipeline Installation with HDD system activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General
2	Sea water quality and marine biota abundance and diversity	Seabed Trenching, Pipeline Installation and Rock Dumping	a. TSS concentration in seawater outside 500 m distance from activity location complies with MoE Decree No. 51 Year 2004 by considering environmental baseline during AMDAL b. Minimise the conditional change of benthos diversity and equitability outside 500 m distance from activity location compared to environmental baseline during AMDAL c. Minimise the potential reduction of nekton abundance and marine mammal diversity disturbance compared to environmental baseline during AMDAL	a. Update trenching, pipeline installation and rock dumping procedure and conduct training and socialisation to related employees b. Perform trenching in designated area	Trenching, pipeline installation and rock dumping locations in subsea gas transmission pipeline	During trenching, pipeline installation and rock dumping activities in subsea gas transmission pipeline	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
		Hydrotest water discharge for the alternatives of : a. Gas transmission end of pipe direct discharge to sea at Offshore Platform b. Onshore storage and discharge to sea	a. Hydrotest wastewater management in accordance with Wastewater Discharge to Sea Permit b. Minimise the potential reduction of nekton abundance and marine mammal disruption compared to environmental baseline during AMDAL	Gas transmission end of pipe direct discharge to sea at Offshore Platform alternative: a. Update Hydrotest activity procedure to ensure that the dosage of chemicals used are in accordance with the requirements (planned) and conduct procedure socialisation and training to related employees b. Use chemicals as approved by DITJEN MIGAS c. Select environmentally friendly chemicals for dewatering process d. Construct discharge end pipe which is likely to be located at Offshore Platform in 3 m depth below sea level e. Ensure discharged wastewater complies with maximum flowrate limit as stated in Wastewater Discharge to Sea Permit	Offshore discharge location, probably at offshore platform	During Hydrotest activity and Hydrostest wastewater discharge to sea	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
				Onshore Storage and Discharge to Sea alternative: a. Update Hydrotest activity procedure to ensure that the dosage of chemicals used are in accordance with the requirements (plan) and conduct procedure socialisation and training to related employees b. Use chemicals as approved by DITJEN MIGAS c. Select environmentally friendly chemicals for dewatering process d. Construct impermeable temporary onshore storage facility to collect hydrotest water e. Conduct hydrotest water discharge at -6 m LAT in LNG Jetty location f. Ensure discharged wastewater complies with maximum flowrate limit as stated in Wastewater Discharge to Sea Permit	a. Onshore Storage location b. Offshore discharge location	During Hydrotest activity and Hydrostest wastewater discharge to sea	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General
3	Sea Water Quality	Nearshore Pipeline Installation with HDD alternative	TSS concentration in sea water complies with standard in MoE Decree No. 51 Year 2004 by considering environmental baseline condition during AMDAL	a. Update wastewater management procedure and conduct socialisation to related employees b. Conduct land clearing only at designated area c. Manage drainage pattern and sediment control sytem including sediment trap and sedimentation pond along cleared area during HDD activity d. Use Water Based Mud and conduct mud test prior usage to confirm it is non hazardous material e. Reuse mud by using Shaker Unit to separate mud and cutting	Nearshore Pipeline Installation with HDD system location	During Nearshore Pipeline Installation with HDD system activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
				f. Used mud and cutting from HDD will be collected in a pond that will be constructed near the HDD location. Once finished, the pond will be closed and revegetated. Another alternative is to dispose the used mud into non-hazardous landfill at Tangguh site. g. Conduct revegetation in affected area after the activity is completed. h. If required, pre-trench material will be disposed in disposal location and the disposal will be recorded e.g. volume, actual coordinate of disposal location and disposal time			BP Berau Ltd.		
		Nearshore Pipeline Installation with Trenching and Shore-Pull alternative	TSS concentration in sea water complies with standard in MoE Decree No. 51 Year 2004 by considering environmental baseline condition during AMDAL	a. Minimise land clearing area by only conduct land clearing in the designated area (including mangrove) b. Design Trenching and Shore-Pull activity by considering erosion mitigation factor c. Manage drainage pattern and sediment control (including sediment trap and pond) d. Conduct revegation in affected area after the activity is completed e. If required, pre-trench material will be disposed in disposal location and the disposal will be recorded e.g. volume, actual coordinate of disposal location and disposal time	Nearshore Pipeline Installation with Trenching and Shore-Pull alternative location	During nearshore Pipeline Installation with Onshore Trenching and Shore-Pull alternative activity			
4	Soil erosion and surface water quality	Onshore Trenching	Minimise soil erosion and TSS concentration in the surface water complies with standard in Government Regulation No. 82 Year 2001 Class 2 by considering environmental baseline during AMDAL	a. Minimise land clearing area by only conduct land clearing in the designated area (including mangrove) b. Design Onshore Trenching activity by considering erosion mitigation factor c. Manage drainage pattern and sediment control including sediment trap and sedimentation pond along cleared area in trenching activity d. Conduct revegation in affected area after the activity is completed	Onshore Trenching location	During onshore trenching activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
5	Sea Water Quality	Wastewater management in offshore construction	Wastewater management complies with requirements in Government Regulation No. 21 Year 2010, MARPOL and applicable regulation	a. Update wastewater management procedure and conduct socialisation to related employees b. Conduct sewage treatment in accordance with Government Regulation No. 21 Year 2010 and MARPOL Annex IV prior to discharge to sea c. Conduct oily contaminated water treatment by using Oil Water Separator in accordance Government Regulation No. 21 Year 2010 and MARPOL Annex I prior to discharge to sea d. Complies with requirements in Government Regulation No. 21 Year 2010 and MARPOL for ballast water. Ballast water exchange is anticipated tobe rarely conducted since most of the vessel will arrive in Tangguh LNG in loaded condition e. Record ballast water exchange (date, location, volume and vessel's name)	Vessel or other facility which are conducting offshore gas transmission construction activity	During offshore gas transmission construction activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General
		Solid waste (non-hazardous) and hazardous waste management activity during offshore construction	a. Solid waste (non-hazardous) management is conducted in accordance with Government Regulation No. 21 Year 2010, MARPOL and applicable regulations b. Hazardous waste management is conducted in accordance with Government Regulation No. 85 Year 1999, MARPOL and applicable regulations	General management a. Update hazardous and non-hazardous solid waste management procedure and conduct socialisation to related employees b. Conduct solid waste segregation (non-hazardous waste and hazardous waste) c. Implement 3R system (Reduce, Reuse, Recycle) d. Categorise non-hazardous solid waste into organic waste, recyclable waste, burnable waste and inert waste Non-hazardous solid waste management : a. Conduct solid waste management in accordance with Government Regulation No. 21 Year 2010, MARPOL Annex V and applicable regulations b. Do not dispose garbage to sea, except treated food waste in accordance with MARPOL Annex V requirements c. Comminute food waste to size less than 25 mm for further disposal to sea with distance more than 3 nm from nearest land d. Dispose uncomminuted waste at distance more than 12 nm from the nearest land e. Record generated and disposed waste (daily) Hazardous Waste Management: a. Conduct hazardous waste management in accordance with Government Regulation No. 85 Year 1999 and applicable regulations b. Transfer hazardous waste to licensed waste facility for further treatment c. Conduct labelling for hazardous waste container d. Use permitted hazardous waste transporter facility	Vessel or other facility which are conducting offshore gas transmission construction activity	During offshore gas transmission construction activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
		Offshore Fuel and Chemical Storage Facility and Refueling Facility	a. Minimise the possibility of offshore fuel and chemical spill b. Offshore spill response can be done effectively as per procedure hence will not affect water quality and marine biota	a. Update hazardous material management procedure and conduct socialisation/training to related employees b. Update Fuel and Chemical Management Procedure and conduct training/socialisation to related employees c. Update emergency response procedure and conduct training to emergency response team (ERT) d. Appoint Emergency Response Team for fuel and chemical spill e. Ensure storage containers are built compatible with the materialand are in good condition f. Ensure every stored material is recorded and completed with MSDS g. Minimum requirements for storage facility are as follows: 1) Completed with bunded area that will be able to contain 110% of the volume of the largest container or 25% of the total volume in the storage facility 2) Building construction, including the floor and bunded area must be constructed with a impermeable material 3) Treat oily contaminated water trapped in the bunded area 4) Completed with spill kit h. Put label and symbol on the container (package) and storage area i. Conduct regular inspection to fuel and chemical storage and refueling facility j. Perform efforts to response oil spill in accordance with Oil Spill Contingency Plan and conduct spill response training according to planned schedule	Offshore Fuel and Chemical Storage Facility and Refueling Facility Location	During Offshore Fuel and Chemical Storage Facility and Refueling Facility Activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General
6	Soil Contamination	Onshore Fuel and Chemical Storage Facility and Refueling Facility	a. Minimise the possibility of onshore fuel and chemical spill b. Onshore spill response can be done effectively as per procedure hence will not contaminated the land	a. Update hazardous material management procedure and conduct socialisation/training to related employees b. Update emergency response procedure and conduct training to emergency response team (ERT) c. Appoint Emergency Response Team for fuel and chemical spill d. Ensure fuel and chemical storage container are built compatible with the materialand are in good condition e. Ensure fuel and chemical storage and refueling location is safe from flood or is on a higher elevation f. Minimum requirements of storage facility are as follow: 1) Completed with a bunded area that will be able to contain 110% of the volume of the largest container, or 25% of the total volume	Onshore Fuel and Chemical Storage Facility and Refueling location	During Fuel and Chemical Storage and Refueling activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
				2) The building, including the floor and the bund wall, must be constructed with a impermeable material 3) The floor construction must have a slope of at least 1% towards sump pit or Oil Water Separator (OWS) 4) Completed with a sump pit for facilities with a roofed shelter 5) Completed with an Oil Water Separator (OWS) unit for facilities without a roofed shelter 6) Completed with spill kit 7) Completed with MSDS information g. Conduct routine clean up of oily contaminated water trapped in sump pit or OWS for further treatment h. Put label and symbol on the container (package) and storage area i. Conduct regular inspection/audit j. Treat contaminated soil by excavated, separated and collected to Temporary Hazardous Waste Storage for further treatment k. Ensure clean up process is performed well and conduct TPH soil test (if necessary) according to MoE Decree No. 128 Year 2003					
7	Terrestrial Flora and Fauna	Land clearing	a. Conduct land clearing as planned to minimize disruption to terrestrial flora and fauna b. Minimum disruption to terrestrial flora and fauna	a. Update land clearing and tree cutting procedure and conduct socialisation to related employees b. Minimise land clearing by only conducting land clearing in designated area c. Implement no fire policy for land clearing activity d. Implement reduced impact logging technique to reduce impact from tree cutting: 1) Develop Skid Trail and Log Landing plan, avoid buffer zone and area with slope more than 50% 2) Construct Skid Trail and Log Landing as planned 3) Cut the vines 4) Timber cutting in accordance with Skid Trail 5) Timber waste cutting e. Maintain buffer zone f. Conduct revegetation in the cleared area which will not be used for permanent facility or construction access. Using local Papua plants. g. Implement no flora fauna disturbance and not entering or carrying out flora fauna from or to Tangguh LNG h. Implement no hunting and fishing policy at Tangguh LNG area i. Install signage of wild animal presence and crossing, especially protected and endangered animals j. Install fence and signage to avoid wild life	Land Clearing area	During Land Clearing activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
				disturbance to employees and project installation					
II.3 Operations Phase									
Environmental Impact									
No Other Environmental Impact during Operations Phase									
Social Impact									
No Other Social Impact during Operations Phase									
II.4 Post-Operations Phase									
Post-operations activity (facility decommissioning) will be conducted in accordance with applicable regulations in Indonesia. Detail decommissioning plan will be prepared at the latest 5 years before decommissioning is conducted, in coordination with related government institutions and other stakeholders									

2.3 LNG PLANT ACTIVITY SUMMARY MATRIX

Table II-3 Summary Matrix of EMP for LNG Plant Activity

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
I.	**Significant Environmental Impact to Manage (Management Advice Result from ANDAL)**								
I.1	Pre-Construction Phase (No Significant Impact during Pre-Construction Phase)								
Environmental Impact									
No Significant Impact during Pre-Construction Phase									
Social Impact									
No Significant Impact during Pre-Construction Phase									
I.2	**Construction Phase**								
Environmental Impact									
1	Noise level	a. Earthwork activity including Land Clearing and Site Preparation such as cut and fill b. Construction of LNG Plant and its supporting facilities	Noise level complies to standards in MoE Decree No. 48 Year 1996 and General EHS Guidelines 2007 in Tangguh Perimeter Fence location	a. Use inspected and certified equipments according to applicable regulation b. Conduct routine maintenance to engine/equipments according to specified schedule to ensure that the engine/equipments are working efficiently c. Only conduct land clearing in designated area d. Maintain buffer zone as noise barrier	a. Earthwork activity location b. Construction area of LNG Plant and its supporting facilities	a. During earthwork activity b. During construction of LNG Plant and its supporting facilities	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General
2	Natural hydrological change including surface run off increase, drainage pattern changes, creek morphology changes, and creek flowrate increase	Earthwork activity including Land Clearing and Site Preparation such as cut and fill	Minimum natural hydrological change	a. Develop Earthwork plan map which provides information about: 1) Land clearing plan 2) Cut and fill plan including amount of excavated and stockpiled soil 3) Initial and final topography from site preparation 4) Natural drainage pattern and drainage management plan during Earthwork including erosion control b. Conduct land clearing and site preparation only at designated area c. Maintain riparian area with the minimum of 100 meters for large river and minimum 50 meters for small river in accordance with Government Regulation No. 38 Year 2011 d. Minimise natural flow pattern change of Ephemeral e. If Earthwork at creek is inevitable then culverts, bridges and artificial drainage or other method will be installed f. Ensure culverts, bridges, drainage or other facility can accommodate peak flow of creek/river	Earthwork location	During Earthwork activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
				g. Design drainage pattern at affected area to transfer surface run off to natural flow h. Construct sedimentation pond in the downstream affected area before receiving water body to minimise impact i. Build facilities to reduce run off flow rate hence minimizing river morphological change j. Conduct revegetation (grass/cover crop) at cleared area which will not be used yet for construction activity in the period of minimum 3 months. Using local Papua plants					
3	Soil erosion and sea water quality impact due to TSS concentraction increase	Earthwork activity including Land Clearing and Site Preparation such as cut and fill	Minimise soil erosion and TSS concentration in surface water complies with standards in Government Regulation No. 82 Year 2001 Class 2 by considering environmental baseline during AMDAL	a. Develop land clearing and site preparation activity plan by considering erosion mitigation factor b. Earthwork activity will start after main facility of erosion and sedimentation control is available c. Manage drainage pattern and sediment control by: 1) Create temporary or permanent drainage and construct dike and water channel 2) Ensure water channel and/or creek is not blocked 3) Provide Retaining Wall with wall slope more than 2:1 4) Install jute net or plant cover crop to maintain wall stability especially in the area with wall slope ratio more than 3:1 or wall/slope height more than 3 meters 5) Install Sediment Trap in various drainage locations 6) Provision of Sedimentation Pond at downstream of drainage before entering receiving water body 7) Conduct routine clean up for trapped sediment in Sediment Trap and Sediment pond 8) Sediment pond volume shall be able to control TSS during peak rain condition (hour) 9) If sediment pond volume is ineffective then other control efforts need to be done 10) Conduct revegetation (grass/cover crop) at cleared area which will not be used yet for construction activity in the period of minimum 3 months. Using local Papua plants d. Conduct routine inspection to erosion and sedimentation control facility to ensure those facilities in maximum function, especially after rain	a. Earthwork location b. Location with potential of erosion	During Earthwork activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General
4	Natural geohydrological change with potential disruption to community well and land subsidence	Water resource provision from groundwater extraction alternative	a. Ensure the volume of extracted groundwater is the optimum yield according to	a. Groundwater production well will be designed to extract groundwater from aquifer at a depth of 300 – 400 m hence it will not disturb shallow groundwater which is typically used for groundwater source for community in Tanah	a. Tangguh LNG groundwater production well b. Groundwater monitoring well	During groundwater utilisation for the construction purposes	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency,	Ministry of Environment, Environmental Office at Teluk Bintuni Regency,

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
			pumping test and groundwater extraction permit b. Minimise impact to community groundwater availability in Tanah Merah and Saengga by minimising the potential of sea water intrusion (TDS < 1.000 mg/L); and c. Minimise the potential of land subsidence (< 5 cm) related to long term groundwater extraction	Merah Baru and Saengga villages. b. Groundwater extraction for Tangguh LNG will be limited to deeper groundwater aquifer (>150 m). Groundwater aquifer at a depth over 150 meters will be protected with steel casing installation c. Groundwater pumping/extraction volume is determined by groundwater pumping test result witnessed by related government institutions (Ministry of Environment) and based on groundwater utilisation permit according to related regulations d. Measure groundwater level from community well in Tanah Merah and Saengga villages as environmental baseline information e. Install groundwater monitoring well at a depth of 150 m which is located between Tangguh LNG groundwater production well and community groundwater well to monitor the potential reduction of groundwater level from groundwater utilisation activity f. Install groundwater monitoring well at a depth of 150 – 400 m to monitor the potential of sea water migration g. Install land subsidence monitoring station around groundwater production wells locations h. Update numerical model based on new data from production test well with depth of 400 m and nearby monitoring well with depth of 150 m (Pumping test for 10 days) to verify pumping flow rate, other aquifer parameters, potential effect of fault and aquifer salinity to a depth of 400 m			Environmental Impact Management Agency Papua Barat, Energy and Mineral Resources Agency of Teluk Bintuni Regency	Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
				i. Proposed production wells location, monitoring wells, and well design will be determined based on modelling result j. By the end of construction phase, numerical modelling in AMDAL will be re-calibrated using monitoring and groundwater extraction/pumping data during construction phase k. Use Water Based Mud (WBM) which is non toxic for groundwater well and monitoring well drilling activities. Drilling mud will be tested for TCLP and LD_{50} prior to use l. Used mud and cutting from groundwater well drilling activity will be disposed to non-hazardous waste landfill at Tangguh LNG or will be collected in a pond that will be constructed near the drilling location. Once groundwater well drilling is finished, the pond will be closed and revegetated. m. Mitigation efforts will be conducted to avoid sea water intrusion such as extraction/pumping reduction of groundwater production well around shore area, or construct additional groundwater production well further south near to Tangguh LNG perimeter fence					
5	Terrestrial Flora and Fauna	a. Land Clearing b. Construction of LNG Plant and its supporting facilities	a. Conduct land clearing as planned to minimize disruption to terrestrial flora and fauna b. Minimum disruption to terrestrial flora and fauna	a. Update land clearing and tree cutting procedure and conduct socialisation to related employee b. Minimise land clearing by conducting land clearing only in designated area c. Implement no fire policy for land clearing activity d. Implement reduced impact logging technique to reduce impact from tree cutting: 1) Develop Skid Trail and Log Landing plan, avoid buffer zone and area with slope more than 50% 2) Construct Skid Trail and Log Landing as planned 3) Cut the vines 4) Timber cutting in accordance with Skid Trail 5) Chip timber waste e. Maintain buffer zone	a. Land Clearing area b. Construction area of LNG Plant and its supporting facilities	a. During land clearing activity b. During construction of LNG Plant and its supporting facilities	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General
				f. Conduct revegetation in the cleared area which will not be used for permanent facility or construction access. Using local Papua plants g. Implement no flora fauna disturbance and not entering or carrying out flora fauna from or to Tangguh LNG h. Implement no hunting and fishing policy at Tangguh LNG site i. Install signage of wild animal presence and					

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
				crossing, especially protected and endangered animals j. Install fence and signage to avoid wild life disturbance to employee and project installation					
6	Marine mammal disruption	Sea Transportation for Workforce, Equipment and Material	Minimise the potential of marine mammal disruption compared to environmental baseline during AMDAL	a. Update marine mammal protection procedure and conduct socialisation to related employees and vessel crew b. Update solid waste and wastewater management procedure for sea transportation activity and conduct socialisation to related employees c. Update emergency response procedure at vessel and conduct training to vessel crew d. Provide emergency response facility in the vessel in accordance with developed procedure e. Implement No Fishing policy f. Conduct routine maintenance to engine/equipments according to specified schedule to ensure that the engine/equipments are working efficiently g. Prioritizing sailing in deeper area (>12 m) when the sea condition is calm h. Reduce vessel speed if approaching marine mammal until the marine mammal swims away i. Conduct solid waste and wastewater management in accordance with Government Regulation No. 21 Year 2010 and MARPOL also applicable regulations. Solid waste and wastewater management will be discussed more details in EMP regarding seawater quality j. Manage ballast water in accordance with Government Regulation No. 21 Year 2010 and MARPOL. Ballast exchange is anticipated will not happen often since most of the vessels will arrive at Tangguh LNG in loaded condition.	Sea Transportation lane during construction of LNG plant and its supporting facilities at Marine Facility until Bintuni Bay estuary	During transportation activity in the construction phase of LNG Plant and its supporting facilities	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General
				k. Record ballast exchange (date, location, volume, and vessel's name)					
Social Impact									
1	Demographic (Migration, Population Structure and Population Growth)	Job opportunities and business opportunities during the operation phase due to workforce recruitment and demobilization activities	a. The availability of Socio-Economic and population data b. Conducting a study of incoming migration and its negative impact c. Functioning of population control system d. Indigenous People lead the village	a. Conducting a study of incoming migration and its negative impact b. Cooperating with Development Institutions to support the implementation of Civil Administration and Information System (SIAK) for Regency Government officials c. Cooperating with Development Institutions to implement governance program and civil society strengthening with partially to Indigenous People	a. The villages of Indigenous People in surrounding area of Tangguh LNG b. Local Government of Teluk Bintuni and Fakfak Regency Offices	The Contstruction Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni Regency control activities located in Teluk Bintuni Regency, and	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni Regency, and Environmental

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
			development process e. Availability of Civil Administration and Information System					Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency	Agency (BLH) of Fakfak Regency
2	Workforce	Job opportunities for Indigenous People and local community	a. Strategies for workforce recruitment and demobilization in construction phase b. Achieved the target of workforce percentage complies with workforce table c. Implementation of Indigenous People development activities working in construction phase to join the operation phase d. At the end of contract, workers accept their rights and are demobilized to their previous point of hire	a. Tangguh LNG will require its contractors to develop recruitment strategy for Indigenous People, Bintuni-Fakfak, West Papua, Papua and National b. Tangguh LNG will require its contractor to enforce workforce recruitment with prioritizing local Indigenous People, Bintuni and Fakfak,West Papua, Papua and National c. Tangguh LNG will require its contractor to develop Papuan workforce in order to increase their skills through by giving them opportunity to participate in trainings d. At the end of employment contract, Tangguh LNG will require its contractor to demobilize its workers to their previous point of hire.	a. The villages of Indigenous People in surrounding area of Tangguh LNG b. Bintuni-Fakfak Cities c. Sorong Regency d. Sorong City e. Manokwari City f. Jakarta	The Contstruction Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni Regency control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Regional Department of Manpower of Teluk Bintuni, Regional Department of Manpower of Fakfak Regency	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni Regency, and Environmental Agency (BLH) of Fakfak Regency
3	Changes in Local Business Growth	Business opportunities caused by the workforce recruitment and demobilization activities during the construction phase of LNG Plant	Absorption of local products from agriculture and fisheries sector; data of local products of agriculture and fisheries sectors absorbed from the villages closest to project activities	Optimizing local products absorption in agriculture and fishery sectors	The villages in surrounding area of the construction of LNG Plant activities	The Contstruction Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni Regency control activities located in Teluk Bintuni Regency, and Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency	Kementerian Lingkungan Hidup, Bapedalda Provinsi Papua Barat, KLH Kabupaten Teluk Bintuni, dan BLH Kabupaten Fakfak

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
4	Changes in livelihood pattern and level of income due to secondary impact of job and business opportunities	The construction of LNG Plant activities including sea transportation, food supplies and other supplies for workers	a. Absorption of local products from agriculture and fisheries sector; data of local products of agriculture and fisheries sectors absorbed from the villages closest to project activities b. Availability of intermediate industries/services to provide services in Tangguh LNG	a. Optimizing local products absorption in agriculture and fishery sectors b. Providing training and mentoring on agriculture, livestock and fishing commodities processing for Indigenous People living in Area Surrounding Tangguh LNG Operation site c. Optimizing intermediate business development of Indigenous People, giving good support through training and funding access to obtain good and prosper business competencies	The villages in surounding area of Tangguh LNG	The Contstruction Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment,, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, and Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni, and Environmental Agecny (BLH) of Fakfak Regency
5	Community Perception and Social Tension due to job opportunities, fishery activityand sea transportation disturbances	The construction of LNG Plant activities including job opportunities, sea transportation, food supplies and other supplies for workers	a. Notes from public consultation with local community b. Functioning of grievance procedure for local community and data of grievance by local community	a. Conducting public consultation for local community related to the construction of LNG Plant activities b. Running a grievance procedure for local community	The villages in surounding area of the construction of LNG Plant activities	The Contstruction Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, and Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni, and Environmental Agency (BLH) of Fakfak Regency

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
6	Assimilation, Acculturation, Changes in Social Values and Norms	Job opportunities and business opportunities due to workforce recruitment and mobilization	a. Note taken from regular art and cultural activities in art and cultural center of Indigenous People b. Development of traditional houses in the selected villages c. Activities of Art and cultural promotions with economic value	a. Supporting community and government to develop art and culture center of Sebyar, Simuri, Irarutu and Petuanan Arguni tribes b. Supporting community to build traditional houses in selected villages c. Encouraging cultural promotion activities of Indigenous People	The villages in surounding area of Tangguh LNG	The Contstruction Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, and Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni, and Environmental Agency (BLH) of Fakfak Regency
7	Marginalization of Indigenous People and vulnerable groups	Social competition between Indigenous People and new settlers	a. The main beneficiaries of social program is Indigenous People b. Activities of Art and cultural promotion with economic value c. Indigenous People and vulnerable group have access to livelihood program	a. Giving priority to Indigenous People living in area surrounding LNG Plant and other Indigenous of Papuan related social programs b. Implementing livelihood program accessible to Indigenous People and vulnerable group	The villages of Indigenous People in surounding area of Tangguh LNG	The Contstruction Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, and Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni, and Environmental Agency (BLH) of Fakfak Regency
8	Decline in access to Public Service including Education	Job opportunities and business opportunities emerge honey pot syndrome; influence new settler and their families to settle in villages in area surrounding Tangguh LNG operation site	a. Tangguh LNG contribution in infrastructure development in villages in area surrounding Tangguh LNG b. Students derived from Indigenous People have access and service to obtain good education as well as quality of	a. Improving infrastructures in villages surrounding Tangguh LNG through Musrenbang mechanism in regencial level b. Strengthening the provision of teaching staff in schools c. Providing educational support for students from selected Indigenous People d. Providing scholarship for student from selected Indigenous People e. Improving school infrastructure in villages surrounding Tangguh LNG f. Mentoring school management for schools in villages surrounding Tangguh LNG	The villages of Indigenous People in surounding area of Tangguh LNG	The Contstruction Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni, and Environmental Agency (BLH) of Fakfak Regency

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
			education significantly					Fakfak Regency control activities located in Fakfak Regency	
9	Changes in Disease Pattern, Changes in Disease Prevalence, Changes in Access to Healthcare and Changes in Environmental Health	Job opportunities and business opportunities due to workforce recruitment and mobilisation which emerge honey pot syndrome; influence new settler and their families to settle in villages in area surrounding Tangguh LNG operation site	a. Indigenous People have access and service to healthcare appropriate with good standard b. Controlled the spread and prevalence of communicable diseases in villages surrounding Tangguh LNG operation site c. Maintaining environmental health in the destination villages of the new settlers	a. Conducting study of impact on public health before the early construction b. Cooperating with local community health center (Puskesmas) to implement the effort of prevention of disease dissemination and transmission c. Promoting clean healthy living behaviors d. Supporting provision of infrastructure, access, paramedic and medicines in villages e. Occupying working permit based on employee health (medical check-up and site entrance approval request) f. Cooperating with village officials to manage incoming migration and its negative impact to community and environmental health g. Coordinating with village officials to prevent prostitution activities surrounding Tangguh LNG	The villages of Indigenous People in surounding area of Tangguh LNG	The Contstruction Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Health Department of Teluk Bintuni Regency and Health Department of Fakfak Regency	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni, and Environmental Agency (BLH) of Fakfak Regency
I.3 Operations Phase									
Environmental Impact									
1	Air Quality	Air emission from whole operations activity of LNG Plant and its supporting facilities	a. CO_2 emission complies with planned annual emission forecast b. Emission quality complies with standards according to MoE Regulation No. 13 Year 2009 and Guideline for LNG ActivityYear 2007 c. Complies with CEMS requirements in accordance with MoE Regulation No. 13 Year 2009	a. CO_2 from Tangguh operations comes from the feed gas from reservoir which contains between 12-15% CO_2. The higher the production level of LNG, the higher the CO2 level that is produced. b. Conduct CO_2 calculation from whole activities of LNG Plant and its supporting facilities c. Use energy efficient design such as boiler (HRSG Heat Recovery System Generator) to recover waste heat from gas turbine to produce high pressure steam d. Use Dry Low NOx Burner for gas turbine e. Install, operate, record and routine calibration of CEMS facility at stacks according to related regulations	a. LNG plant and its supporting facilities b. Emission stacks	During operations activity of LNG Plant and its supporting facilities	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
2	Natural geohydrological change with potential disruption to community well and land subsidence	Water resource provision from groundwater extraction alternative	a. Ensure the volume of extracted groundwater is the optimum yield according to pumping test and groundwater extraction permit b. Minimise impact to community groundwater availability in Tanah Merah and Saengga by minimising the potential of sea water intrusion (TDS < 1.000 mg/L); and c. Minimise the potential of land subsidence (< 5 cm) related to long term groundwater extraction	a. . Groundwater production well will be designed to extract groundwater from aquifer at a depth of 300 – 400 m hence it will not disturb shallow groundwater which is typically used for groundwater source for community in Tanah Merah Baru and Saengga villages. b. Groundwater extraction for Tangguh LNG will be limited to deeper groundwater aquifer (>150 m). Groundwater aquifer at a depth over 150 meters will be protected with steel casing installation c. Groundwater pumping/extraction volume is determined by groundwater pumping test result witnessed by related government institutions (Ministry of Environment) and based on groundwater utilisation permit according to related regulations d. Measure groundwater level from community well in Tanah Merah and Saengga villages as environmental baseline information e. Install groundwater monitoring well at a depth of 150 m which is located between Tangguh LNG groundwater production well and community groundwater well to monitor the potential reduction of groundwater level from groundwater utilisation activity f. Install groundwater monitoring well at a depth of 150 – 400 m to monitor the potential of sea water migration g. Install land subsidence monitoring station around groundwater production wells locations Use Water Based Mud (WBM) which is non toxic for groundwater well and monitoring well drilling activities. Drilling mud will be tested for TCLP and LD_{50} prior to use h. Used mud and cutting from groundwater well drilling activity will be disposed to non-hazardous waste landfill at Tangguh LNG or will be collected in a pond that will be constructed near the drilling location. Once groundwater well drilling is finished, the pond will be closed and revegetated	a. Tangguh LNG groundwater production wells b. Groundwater monitoring wells	During groundwater utilisations for the operations purposes	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Impact Management Agency Papua Barat, Energy and Mineral Resources Agency of Teluk Bintuni Regency	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General
				i. Mitigation efforts will be conducted to avoid sea water intrusion such as extraction/pumping reduction of groundwater production well around shore area, or construct additional groundwater production well further south near to Tangguh LNG perimeter fence					
Social Impact									
1	Demographic (Migration, Population Structure and Population Growth)	Job opportunities and business opportunities	a. The availability of Socio-Economic and population data b. Conducting a study	a. Conducting population survey and census for biennial period as well as study of incoming migration and its negative impact.	a. The villages of Indigenous People in surrounding	The Operation Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Bapedalda (The	Ministry of Environment, Bapedalda (The

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
		during the operation phase due to workforce recruitment and demobilization activities	of incoming migration and its negative impact c. Functioning of population control system d. Indigenous People lead the village development process e. Availability of Civil Administration and Information System	b. Cooperating with Development Institutions to support the implementation of Civil Administration and Information System (SIAK) for Regency Government officials c. Cooperating with Development Institutions to implement governance program and civil society strengthening with partially to Indigenous People	area of Tangguh LNG b. Local Government of Teluk Bintuni and Fakfak Regencies offices			Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni and Environmental Agency (BLH) of Fakfak Regency	Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni and Environmental Agency (BLH) of Fakfak Regency
2	Workforce	Job opportunities for Indigenous People and local community due to workforce recruitment and demobilization	a. Strategies for workforce recruitment and demobilization in operation phase b. Graduates from selected Indigenous People to continue higher education in leading university in Papua and National based on accreditation issued by Directorate of Higher Education c. Achieved the target of workforce percentage complies with workforce table d. Achieved the target percentage e. Implementation of Indigenous People development activities working in construction phase to join the operation phase f. At the end of contract, workers accept their rights and are demobilized to their previous point of hire	a. Developing workforce recruitment strategy to Indigenous People, Bintuni and Fakfak,West Papua, Papua and National b. Providing scholarship for student from selected Indigenous People to continue higher education in leading university in Papua and National based on accreditation issued by Directorate of Higher Education c. Tangguh LNG will require its contractor to enforce workforce recruitment with prioritizing local Indigenous People, Bintuni and Fakfak,West Papua, Papua and National d. At the end of employment contract, Tangguh LNG will require its contractor to demobilize its workers to their previous point of hire. e. Building adequate training facilities for workforce in West Papua with quality and standard qualified by Tangguh LNG and other major industries in West Papua	a. The villages of Indigenous People in surrounding area of Tangguh LNG b. Bintuni-Fakfak Cities c. Sorong Regency d. Sorong City e. Manokwari City f. Jakarta	The Operation Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Regional Department of Manpower of West Papua, Environmental Office (KLH) of Teluk Bintuni Regency control activities located in Teluk Bintuni Regency, while Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua, Regional Department of Manpower of Teluk Bintuni and Regional Department of Manpower of Fakfak Regency	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni and Environmental Agency (BLH) of Fakfak Regency
3	Changes in Local Business Growth, Changes in livelihood patterns and level of income	Job opportunities and business opportunities during operation phase due to workforce recruitment and	a. Absorption of local products from agriculture and fisheries sector; data of local products of	a. Optimizing local products absorption in agriculture and fishery sectors b. Assisting financial access for Indigenous People c. Assisting local production marketing for wider market d. Encouraging capacity improvement of business	a. The villages of Indigenous People in surrounding area of Tangguh LNG b. Bintuni, Babo and	The Operation Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency)	Ministry of Environment, Bapedalda (The Regional Environmental Management

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
		demobilization	agriculture and fisheries sectors absorbed from the villages in surrounding area od Tangguh LNG b. Indigenous People get the capital access and business loan c. The formation of business administration of local products marketing in the market located in and outside Bintuni Bay Region d. The availability of intermediate good/service which offer services for Tangguh LNG e. Percentage of contribution of local government revenue derived from economic activities centered on Tangguh LNG	actors in Teluk Bintuni Regency and Fakfak Regency, especially for Indigenous People derived from villages surrounding Tangguh LNG e. Determining Bintuni, Babo and Kokas as the area of economic growth to support Tangguh LNG activity	Kokas Cities			of West Papua, Environmental Office (KLH) of Teluk Bintuni and Bappeda (Regional Planning Board) of Teluk Bintuni Regency, and Environmental Agency (BLH) of Fakfak Regency and Bappeda (Regional Planning Board) of Fakfak Regency	Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni, and Environmental Agency (BLH) of Fakfak Regency
4	Assimilation, Acculturation, Changes in Social Values and Norms, Changes in Cultural Heritage	Job opportunities and business opportunities during operation phase due to workforce recruitment and demobilization	a. Note taken from regular art and cultural activities in art and cultural center of Indigenous People b. Development of traditional houses in the selected villages c. Activities of Art and cultural promotions with economic value	a. Supporting community and government to develop art and culture center of Sebyar, Simuri, Irarutu and Petuanan Arguni tribes b. Supporting community to build traditional houses in selected villages c. Encouraging cultural promotion activities of Indigenous People	The villages of Indigenous People in surrounding area of Tangguh LNG	The Operation Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua , Environmental Office (KLH) of Teluk Bintuni, and Environmental Agency (BLH) of Fakfak Regency	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni, and Environmental Agency (BLH) of Fakfak Regency
5	Community Perception and Social Tension related to the impact of Tangguh LNG activities, namely workforce, business opportunities, on fishery activity and sea transportation	The operation phase of LNG Plant activities including workforce, business opportunities due to workforce	a. Notes from public consultation with local community b. Notes from public consultation with local government c. Functioning of grievance procedure	a. Conducting a routine public consultation for local community and local fishermen related to operation activities as well as social programs implementation b. Conducting a routine public consultation for Local Government related to social issues in community and social programs implementation	a. The villages in surrounding area of Tangguh LNG b. Local Government of Teluk Bintuni and Fakfak Regencies offices	The Operation Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua , Environmental Office	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua ,

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
	accessibility disturbances, and seawater intrusion. In addition, the growing expectations of community also needs to be managed considering the impact that community expect greater benefits from Tangguh LNG, such as education program, health program, livelihood program, Papuan entrepreneurship program, and Papuan development program, revenue-sharing (DBH), adat recognition, gas to power, electricity for community, housing development, expansion area, expansion of the coverage area of social programs and infrastructure improvement on a large scale.	recruitment and demobilization	for local community d. The establishment and functioning of the Stakeholder Forum in Bintuni Bayand Berau Bay	c. Running a grievance procedure for local community d. Maintaining good relationship with as many as stakeholdersin Bintuni Bay and Berau Bay regions				(KLH) of Teluk Bintuni, and Environmental Agency (BLH) of Fakfak Regency	Environmental Office (KLH) of Teluk Bintuni, and Environmental Agency (BLH) of Fakfak Regency
6	Marginalization of Indigenous People and vulnerable group	Social competition between Indigenous People and new settlers	a. The main beneficiaries of social program is Indigenous People b. Activities of Art and cultural promotion with economic value c. Indigenous People and vulnerable group have access to livelihood program	a. Giving priority to Indigenous People living in area surrounding LNG Plant and other Indigenous of Papuan related social programs b. Implementing livelihood program accessible to Indigenous People and vulnerable group	The villages of Indigenous People in surrounding area of Tangguh LNG	The Operation Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua , Environmental Office (KLH) of Teluk Bintuni, and Environmental Agency (BLH) of Fakfak Regency	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua , Environmental Office (KLH) of Teluk Bintuni, and Environmental Agency (BLH) of Fakfak Regency

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
7	Decline in Access to Public Service including Education	Job opportunities and business opportunities during operation phase due to workforce recruitment and mobilisation which emerge honey pot syndrome; influence new settler and their families to settle in villages in area surrounding Tangguh LNG operation site	a. Tangguh LNG contribution in infrastructure development in villages in area surrounding Tangguh LNG b. Students derived from Indigenous People have access and service to obtain good education as well as quality of education significantly c. Development of flagship schools	a. Improving infrastructures in villages surrounding Tangguh LNG through Musrenbang mechanism in regencial level b. Strengthening the provision of teaching staff in schools c. Providing educational support for students from selected Indigenous People d. Providing scholarship for student from selected Indigenous People e. Improving school infrastructure in villages of Indigenous People in surrounding area of Tangguh LNG f. Mentoring school management for schools villages of Indigenous People in surrounding area of Tangguh LNG g. Developing flagship school for student in surrounding area of Tangguh LNG	The villages in surrounding area of Tangguh LNG	The Operation Phase of LNG Plant Activities	BP Berau Ltd.	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua , Environmental Office (KLH) of Teluk Bintuni, and Environmental Agency (BLH) of Fakfak Regency	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua , Environmental Office (KLH) of Teluk Bintuni, and Environmental Agency (BLH) of Fakfak Regency
8	• Changes in Disease Pattern, Changes in Disease Prevalence • Changes in Access to Healthcare, and • Changes in Environmental Health	Job opportunities and business opportunities during operation phase due to workforce recruitment and mobilisation which emerge honey pot syndrome; influence new settler and their families to settle in villages in area surrounding Tangguh LNG operation site	a. Indigenous People have access and service to healthcare appropriate with good standard b. Hospital in Bintuni become referral hospital and changes into Local Public Service Agency c. Controlled the spread and prevalence of communicable diseases in villages surrounding Tangguh LNG operation site d. Maintaining environmental health in the destination villages of the new settlers	a. Conducting study of impact on public health before the early construction b. Supporting Local Government program in developing hospital in Bintuni as referral hosiptal c. Improving Primary Healthcare in North and South Shores as well as Kokas d. Cooperating with localPuskesmas in preventing the spread and infection of disease e. Promoting clean healthy living behaviour f. Supporting provision of infrastructure, access, paramedic and medicines in villages g. Occupying working permit based on employee health (medical check-up and site entrance approval request) h. Cooperating with village officials to manage incoming migration and its negative impact to community and environmental health i. Coordinating with village officials to prevent prostitution activities surrounding Tangguh LNG	a. The villages in surrounding area of Tangguh LNG b. Bintuni City	The Operation Phase of LNG Plant Activities	BP Berau Ltd.	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua , Environmental Office (KLH) of Teluk Bintuni, and Environmental Agency (BLH) of Fakfak Regency	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua , Environmental Office (KLH) of Teluk Bintuni, and Environmental Agency (BLH) of Fakfak Regency
I.4 Post-Operations Phase									
Post-operations activity (facility decommissioning) will be conducted in accordance with applicable regulations in Indonesia. Detail decommissioning plan will be prepared at the latest 5 years before decommissioning is conducted, in coordination with related government institutions and other stakeholders									

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
II.	**Other Environmental Impact to Manage** (Environmental management which has been planned from the beginning as part of of the activity plan, or refers to SOP, technical guidance from government, international standard, etc.)								
II.1	**Pre-Construction Phase**								
Environmental Impact									
No Other Environmental Impact during Pre-Construction Phase									
Social Impact									
No Other Social Impact during Pre-Construction Phase									
II.2	**Construction Phase**								
1	Air Quality	a. Land Preparation b. Construction of LNG Plant and its supporting facilities	Ambient air quality complies with standards according to Government Regulation No. 41 Year 1999 and *General EHS Guidelines 2007* (Attachment 1)	a. Land clearing, site preparation and construction material excavation only conducted at planned area b. Conduct routine watering. Watering shall be adjusted with seasonal condition and rainfall. If possible, watering can be done by using treated domestic sewage which already complies with standard c. Set maximum speed for land transportation in site preparation and construction area at of 30 km/hour d. Conduct routine maintenance to engine/equipments according to specified schedule to ensure that the engine/equipments are working efficiently e. Conduct operational management for incinerator and generator in order to comply with emission standards f. Conduct revegetation (grass/cover crop) at cleared area which will not be used yet for construction activity in the period of minimum 3 months. Using local Papua plants	a. Earthwork activity location b. Construction area of LNG Plant and its supporting facilities	During constructio of LNG Plant and its supporting facilities	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General
		Incinerator Operational from Solid Waste (Non-hazardous) and Hazardous Waste Management activity	a. Emission from Non-hazardous waste incinerator complies with standards in MoE Decree No. 13 Year 1995 (Attachment 1) b. Emission from Hazardous waste incinerator complies with standards in Head of Environmental Impact Agency Decree No. 03 Year 1995 (Attachment 1)	a. Ensure the installed incinerator comply with emission standards b. Update operational procedure for each incinerator and conduct training and socialisation to operators c. Only burn waste according to specification for non-hazardous waste incinerator and according to permit for hazardous waste incinerator d. Operate incinerator according to its specification (Burner, blower and feed rate) e. Hazardous waste incinerator complies with design according to Head of Environmental Impact Agency Decree No. 03 Year 1995 and completed with permit from related agency f. Conduct daily record for amount and type of burnable waste and incinerator operational condition for each incinerator g. Conduct routine maintenance to engine/equipments according to specified schedule to ensure that the engine/equipments are working efficiently	a. Waste segregation location b. Non-hazardous waste incinerator c. Hazardous waste incinerator	During construction of LNG Plant and its supporting facilities	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
				h. Define sampling locations and provide sampling facility according to applicable regulations					
		Power Generation from Diesel Generator	Emission from Diesel Generator complies with standards according to MoE Regulation No. 13 Year 2009 and General EHS Guideline 2007	a. Update diesel generator operational procedure and socialise it to operators b. Operate generator according to its specifications both operational load and time c. Conduct routine maintenance to engine/equipments according to specified schedule to ensure that the engine/equipments are working efficiently d. Define sampling locations and provide sampling facility according to applicable regulations	Diesel Generator	During utilisation of power generator which using diesel generator to support construction activity in Tangguh and its supporting facilities	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General
2	Sea water quality due to salinity increase and reduction of plankton abundance and diversity	Water provision from desalination alternative	a. Treated reject brine complies with standards according to applicable Wastewater Discharge Permit to Sea b. Minimise the potential reduction of plankton abundance and diversity compared to environmental baseline during AMDAL	a. Update reject brine management procedure and conduct training and socialisation to related employee b. Install wastewater discharge pipeline at sea according to study result (-6 m LAT) c. Install flow meter and sampling facility at reject brine outlet d. Discharge reject brine according to allowable maximum flowrate e. Conduct daily recording of discharged reject brine volume f. Conduct routine maintenance to engine/equipments according to specified schedule to ensure that the engine/equipments are working efficiently	a. Desalination Unit b. Treated wastewater discharge point at sea	During desalination water utilisation as water resource for the construction purposes	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General
3	Surface water quality, groundwater, and soil quality	Solid waste (non-hazardous) and hazardous waste management activity during construction	Solid waste (non-hazardous) and hazardous waste management complies with requirements in Law No. 18 Year 2008 and Government Regulation No. 85 Year 1999	<u>Solid Waste (non-hazardous) and Hazardous Waste Management</u> General Management: a. Update hazardous and non-hazardous solid waste management and conduct socialisation to related employees b. Conduct solid waste segregation (Non-hazardous and hazardous solid waste) c. Implement 3R system (Reduce, Reuse, Recycle) d. Categorize non-hazardous solid waste into organic, recyclable, burnable and inert waste	a. All locations which potentially generated solid waste b. Solid waste management facility	During construction activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
				Non-Hazardous Solid Waste Management: a. Waste storage facility will be completed with impermeable floor to prevent soil contamination b. Food waste will be managed by extracted using macerator and/or composting process and/or disposal to Non-hazardous waste landfill c. Recyclable waste will be collected and sent to waste recycling company d. Burnable waste will be incinerated using non-hazardous waste incinerator e. Timber waste will be collected, chipped into wood chips for raw material for composting process, utilisation in revegetation activity or used as landfill cover f. Inert waste will be disposed to non-hazardous waste landfill g. Conduct recording of generated and treated waste Hazardous Waste Management : a. Hazardous waste will be packed using packaging which will not react with the contained material b. Hazardous waste will be stored in permitted Temporary Hazardous Waste Storage Facility c. Burnable hazardous waste will be incinerated using permitted hazardous waste incinerator d. Hazardous waste will be sent to licensed hazardous waste treatment facility e. Using permitted hazardous waste transporter facility f. Keep hazardous waste manifest and report regularly to related agency				
4	Groundwater quality	Non-hazardous waste landfill operational	Groundwater quality around Non-hazardous waste landfill complies with standard according to Government Regulation No, 82 Year 2001 Class 1 by considering environmental baseline condition during AMDAL (Attachment 1)	a. Update solid waste management and non-hazardous waste landfill operational procedure and conduct socialisation/training to related employees b. Solid waste that being disposed to non-hazardous waste landfill are food waste and other non-hazardous waste according to applicable procedure (e.g.: inert waste) c. Hazardous waste shall not be disposed to non-hazardous waste landfill d. Design non-hazardous waste landill so it does not contaminate surrounding groundwater: 1) Proposed non-hazardous waste landfill location will be compacted before lined with HDPE Liner 2) Non-hazardous waste landfill will be lined with HDPE Liner, both at Non-hazardous waste landfill Main Pond and Leachate Pond 3) Non-hazardous waste landfill capacity shall calculate leachate management to	a. Operations of LNG Plant and its supporting facilities b. Non-hazardous waste landfill location	During operations phase of non-hazardous waste landfill	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
				prevent leachate overflow 4) Leachate will be transferred to Sewage Treatment Plant prior to discharge 5) Install Monitoring Well in the upstream and downstream of non-hazardous waste landfill based on study result 6) Number of Monitoring Well shall represent groundwater upstream and downstream area around non-hazardous waste landfill, minimum 1 monitoring well in the upstream and 3 monitoring well in the downstream e. Conduct routine inspection of Non-hazardous waste landfill integrity					
5	Water Quality	Wastewater Management	a. Effluent from WWT and STP comply with standards in MoE Decree No. 112 Year 2003 and General EHS Guidelines 2007 b. Effluent from WWT and other wastewater comply with standards according to related regulations c. Surface water quality complies with standards according to Government Regulation No. 82 Year 2001 Class 2 and/or environmental baseline during AMDAL (parameter pH, TDS, TSS and main parameters which are related with wastewater characteristics) d. Sea water quality complies with standards according to MoE Decree No. 51 Yaer 2004 and/or environmental baseline during AMDAL (parameter pH, Salinity, BOD, TSS, Oil and Grease)	a. Update wastewater management during construction procedure and conduct socialisation/training to related employees b. Conduct effort to minimise wastewater c. Install wastewater discharge pipe at sea at location according to study result (-6 m LAT) d. Several potential wastewater and its management system from LNG Plant construction activities are: 1) Sewage will be treated using physical, biological and chemical treatment (either using activated sludge or other method) prior to discharge to sea. Sludge from treatment process will be disposed to Landfill and/or as raw material for composting and/or soil enricher material and/or similar utilisation according to study result which is now being conducted and/or treat the biological sludge in the incinerator. 2) If possible, treated sewage which already complies to standards will be used to water the road or other utilisation 3) Wastewater from Batching Plant will be neutralized first prior to discharge to surface water 4) Other wastewater (including wastewater from commissioning activity) which is not potentially contaminated with oil or other chemicals will be analysed for key parameters prior to discharge to surface water. If there is any incompliance from the key parameters then treatment will be conducted prior to discharge 5) Other wastewater (including wastewater from commissioning activity) which is potentially contaminated with oil or other chemicals will be analysed for key parameters (e.g.: pH, TSS, COD, and Oil and Grease) and other relevant parameters to determine the treatment method prior to discharge to sea 6) Oily contaminated water from workshop	a. Wastewater sources b. Sewage and other wastewater Treatment Unit c. Treated water discharge point at sea d. Other wastewater discharge point	During construction of LNG Plant and its supporting facilities	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
				and warehouse activities will be transferred to Collection Pond and Oil Water Separator (OWS) Unit. Oily contaminated water trapped in Oil Water Separator Unit will be taken out regularly and sent to Temporary Hazardous Waste Storage Facility for further treatement. Treated wastewater will be discharge to surface water (creek). e. Conduct wastewater treatment and ensure treated wastewater complies with standards prior to discharge to receiving water body f. No wastewater dilution and mixing from different sources					
6	Contour changes	Site Preparation	Contour changes is as planned	a. Develop Site Preparation activity plan which covers: 1) Initial contour before activity 2) Activity plan including final contour 3) Present information about drainage pattern, topography, etc. b. Conduct Site Preparation activity as planned	Site Preparation location	During Site Preparation activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General
7	Soil contamination	Fuel and Chemical Storage Facility and Refueling Facility	a. Minimise the possibility of onshore fuel and chemical spill b. Onshore spill response can be done effectively as per procedure hence will not contaminated the land	a. Update hazardous material management procedure and conduct socialisation/training to related employees b. Update emergency response procedure and conduct training to emergency response team (ERT) c. Appoint Emergency Response Team for fuel and chemical spill d. Ensure fuel and chemical storage containers are built compatible with the materialand are in good condition e. Ensure fuel and chemical storage and refueling location is safe from flood or is on a higher elevation	Onshore Fuel and Chemical Storage Facility and Refueling location	a. Storage facility design is conducted prior to activity b. Routine maintenance is conducted during construction and drilling activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
				f. Minimum requirements of storage facility are as follows: 1) Completed with a bunded area that will be able to contain 110% of the volume of the largest container, or 25% of the total volume 2) The building, including the floor and the bund wall, must be constructed with a impermeable material					

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
				3) The floor construction must have a slope of at least 1% towards sump pit or Oil Water Separator (OWS) 4) Completed with a sump pit for facilities with a roofed shelter 5) Completed with an Oil Water Separator (OWS) unit for facilities without a roofed shelter; 6) Completed with spill kit 7) Completed with MSDS information g. Conduct routine clean up of oily contaminated water trapped in sump pit or OWS for further treatment h. Put label and symbol on the container (package) and storage area i. Conduct regular inspection/audit j. Treat contaminated soil by excavated, separated and collected to Temporary Hazardous Waste Storage for further treatment k. Ensure clean up process is performed well and conduct TPH soil test (if necessary) according to MoE Decree No. 128 Year 2003					
		Top Soil stripping during Earthwork	Managed the affected top soil to maintain its amount and quality	a. Update Top Soil Management procedure and conduct socialisation/training to related employees b. Top soil shall consist of organic soil which is free from subsoil mixture, stump, root, rock, weeds and etc. c. The depth of top soil excavation is 20 mm, unless specifically defined d. Segregate and store Top Soil at specific locations provided for revegetation e. Provide drainage system around stock pile area f. Use light excavator/stripper when conducting Top Soil stripping g. Provide erosion control facility and conduct seed dispersal (cover crop) to protect Top Soil	a. Earthwork locations, especially Top Soil stripping location b. Stock Pile location	Top soil stripping and stock piling activity until reusing for reclamation purposes	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
II.3	**Operations Phase**								
1	Air Quality	Flaring Emission	a. Total amount of flaring emission < 3% of feed gas b. Flaring opacity complies with standard as per MoE Regulation No. 13 Year 2009	a. Conduct calculation and recording of flaring emission amount *b.* Conduct reduce flaring program, by: *1)* Implement BOG (Boil Off Gas) recovery from LNG storage facility and LNG loading system to Tanker *2)* Plant facility will be designed to transfer processed gas to flaring system for safe burning and in emergency condition including relief valves, blowdown valves and operation/maintenance vent *3)* Optimise TAR frequency and the amount of Plant Shut Down, both planned (Gas Turbine inspection) and unplanned c. Maintain the balance of the fuel management system as a whole (supply and demand) to reduce flaring emission amount by calculating fuel balance from whole system (existing plant and new plant)	LNG Plant including Flare Stack	During flaring activity in LNG Plant operations	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General
2	Air Quality	Incinerator Operational from Solid Waste (Non-hazardous) and Hazardous Waste Management activity	a. Emission from Non-hazardous waste incinerator complies with standards in MoE Decree No. 13 Year 1995 (Attachment 1) b. Emission from Hazardous waste incinerator complies with standards in Head of Environmental Impact Agency Decree No. 03 Year 1995	a. Ensure the installed incinerator complies to emission standards b. Update operational procedure for each incinerator and conduct training and socialisation to operators c. Only burn waste according to specification for non-hazardous waste incinerator and according to permit for hazardous waste incinerator d. Operate incinerator according to its specification (Burner, blower and feed rate) e. Hazardous waste incinerator complies with design according to Head of Environmental Impact Agency Decree No. 03 Year 1995 and completed with permit from related agency f. Conduct daily recording for amount and type of burnable waste and incinerator operational condition for each incinerator g. Conduct routine maintenance to engine/equipments according to specified schedule to ensure that the engine/equipments are working efficiently h. Define sampling locations and provide sampling facility according to applicable regulations	a. Waste segregation location b. Non-hazardous waste incinerator c. Hazardous waste incinerator	During operations of LNG Plant and its supporting facilities	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General
3	Sea Water Quality and marine biota abundance and diversity	Wastewater treatment from LNG Plant and its supporting facilities	a. WWT effluent of: 1) Produced Water 2) Oily Contaminated Water 3) Chemically Contaminated Water complies with standards as per	a. Conduct wastewater minimisation effort by: 1) Considering groundwater utilisation (as substitute or supplement of desalination unit). This will reduce reject brine from desalination unit 2) Conduct study of reusing treated wastewater from Produced Water Treatment (PWT) unit for utility purpose b. Conduct wastewater treatment and maintain WWT operational stability to ensure treated	a. Wastewater sources b. Wastewater Treatment Unit: 1) PWT Unit 2) CPI Unit 3) Neutralisation Pit Unit 4) STP Unit at accommodatio	During operations phase of LNG Plant and its supporting facilities	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
			MoE Regulation No. 19 Year 2010, applicable permit and EHS Guidelines for LNG Activity 2007 b. STP effluent complies with standards as per MoE Decree No. 112 Year 2003 and General EHS Guidelines 2007 c. Effluent from other wastewater treatement comply with standards as per related regulations d. Minimise the potential reduction of plankton abundance and diversity and nekton abundance compared to environmental baseline during AMDAL	wastewater has complied with standards prior to discharge to sea. Wastewater treatment facility for Tangguh Expansion Project will mimic existing technology at Tangguh LNG c. Update wastewater management procedure and conduct socialisation to related employees d. Treated wastewater that will be discharged to sea are as follows: 1) Produced water from PWT unit 2) Oily contaminated water from CPI unit 3) Chemically contaminated water from Neutralisation Pit 4) Sewage from STP 5) Reject Brine from Desalination Unit e. Install wastewater discharge pipe at sea at location -6 m LAT during Tangguh Expansion Project f. Wastewater discharge to sea locations are as follows: 1) At -13 m LAT at LNG Jetty for LNG Plant 1 and 2 operational activity until LNG Plant 3 construction is completed and; 2) At -6 m LAT at LNG Jetty 1 and 2 since the start up of LNG Plant 3 operation	n area 5) Wastewater recycling facility c. Other non-routine wastewater treatment unit d. Treated wastewater discharge to sea			Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General
				g. Wastewater from non-routine activities such as: 1) Finfan cooler cleaning and similar activities which are not potentially contaminated with oil or other chemicals will be analysed for key parameters first prior to discharge to surface water. If there is any incompliance, then treatment will be conducted prior to discharge 2) Tank repainting and similar activities which are potentially contaminated with oil or other chemicals will be analysed for key parameters (e.g.: pH, TSS, COD and Oil and Grease) and other relevant parameters to determine the treatment method prior to discharge to sea 3) Wastewater from Batching Plant Unit will be neutralized first prior to discharge to surface water h. Install flow meter and sampling facility at each treatment plant effluent pipe i. Conduct daily volume recording for each discharged wastewater j. Discharge treated wastewater according to allowable maximum flowrate k. Produced water will be treated using physical, biological and chemical treatment l. DAF sludge and sludge from CPI unit will be				

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
				treated according to study result and/or as soil enricher material and/or treated using hazardous waste incinerator and/or sent licensed hazardous waste treatment facility m. Conduct study and utilisation efforts of bilogical sludge from PWT unit as mixture material for composting process and/or soil enricher material and/or other utilisation according to study result and/or sent to licensed hazardous waste treatment facility n. Chemically contaminated water will be treated by wastewater neutralisation system using neutralizer chemical addition o. Oily contaminated water will be treated at oil water separator unit (Corrugated Plate Interceptor/CPI) p. Sewage will be treated using physical, biological and chemical treatment (either treatment by activated sludge or other method). Sludge from treatment process will be disposed to landfill and/or as composting material and/or as soil enricher and/or similar utilisation according to study result which is now being conducted and/or treat biological sludge in the incinerator q. If possible, treated sewage which already complies to standards will be used to water the road or other utilisation r. Oily contaminated water from workshop and warehouse activities will be transferred to Collection Pond and pumped to CPI unit. Treated wastewater will be discharged to sea s. Conduct routine maintenance to engine/equipments according to specified schedule to ensure that the engine/equipments are working efficiently t. Provide access for surface water monitoring activity if there is any wastewater discharge to surface water				
4	Sea water quality due to salinity increase and reduction of plankton abundance and diversity	Water provision from desalination alternative	a. Treated reject brine complies with standards according to applicable Wastewater Discharge Permit to Sea b. Minimise the potential reduction of plankton equitability and diversity compared to environmental baseline during AMDAL	a. Update reject brine management procedure and conduct training and socialisation to related employees b. Reject brine will be discharged at sea in the these locations: 1) -13 m LAT at LNG Jetty for LNG Plant 1 and 2 operational activity until LNG Plant 3 construction is completed and; 2) -6 m LAT at LNG Jetty 1 and 2 since the start up of LNG Plant 3 operation c. Install flow meter and sampling facility at reject brine outlet d. Discharge reject brine according to allowable maximum flowrate e. Conduct daily recording of discharged reject	a. Desalination Unit b. Treated wastewater discharge point at sea	During desalination water utilisation as water resource for construction purposes	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
				brine volume f. Conduct routine maintenance to engine/equipments according to specified schedule to ensure that the engine/equipments are working efficiently					
5	Surface water quality, groundwater, and soil quality	Solid waste (non-hazardous) and hazardous waste management activity during construction	Solid waste (non-hazardous) and hazardous waste management complies with requirements in Law No. 18 Year 2008 and Government Regulation No. 85 Year 1999	<u>Solid Waste (non-hazardous) and Hazardous Waste Management</u> General Management : a. Update hazardous and non-hazardous solid waste management and conduct socialisation to related employees b. Conduct solid waste segregation (Non-hazardous and hazardous solid waste) c. Implement 3R system (Reduce, Reuse, Recycle) d. Categorize non-hazardous solid waste into organic, recyclable, burnable and inert waste Non-Hazardous Solid Waste Management: a. Waste storage facility will be completed with impermeable floor to prevent soil contamination b. Food waste will be managed by extracted using macerator and/or composting process and/or disposal to Non-hazardous waste landfill c. Recyclable waste will be collected and sent to waste recycling company d. Burnable waste will be incinerated using non-hazardous waste incinerator e. Timber waste will be collected, cipped into wood chip for raw material for composting process, utilisation in revegetation activity or used as landfill liner f. Inert waste will be disposed to Non-hazardous waste landfill g. Conduct recording of generated waste and its management activity Hazardous Waste Management: a. Hazardous waste will be packed using packaging which will not react with the contained material b. Hazardous waste will be stored in permitted Temporary Hazardous Waste Storage Facility c. Burnable hazardous waste will be incinerated using permitted hazardous waste incinerator d. Hazardous waste will be sent to licensed hazardous waste treatment facility e. Using permitted hazardous waste transporter facility f. Keep hazardous waste manifest and report regularly to related agency	a. All locations which potentially generated solid waste b. Waste management facility	During Operations activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
6	Groundwater quality	Non-hazardous waste landfill operational	Groundwater quality around Non-hazardous waste landfill complies with standard according to Government Regulation No. 82 Year 2001 Class 1 by considering environmental baseline condition during AMDAL (Attachment 1)	a. Update solid waste management and non-hazardous waste landfill operational procedure and conduct socialisation/training to related employees b. Solid waste that being disposed to non-hazardous waste landfill are food waste and other non-hazardous waste according to applicable procedure (e.g.: inert waste) c. Hazardous waste shall not be disposed to non-hazardous waste landfill d. Design non-hazardous waste landill so it does not contaminate surrounding groundwater: 1) Proposed non-hazardous waste landfill location will be compacted before lined with HDPE Liner 2) Non-hazardous waste landfill will be lined with HDPE Liner, both at Non-hazardous waste landfill Main Pond and Leachate Pond 3) Non-hazardous waste landfill capacity shall calculate leachate management to prevent leachate overflow 4) Leachate will be transferred to Sewage Treatment Plant prior to discharge 5) Install Monitoring Well in the upstream and downstream of non-hazardous waste landfill based on study result 6) Number of Monitoring Well shall represent groundwater upstream and downstream area around non-hazardous waste landfill, minimum 1 monitoring well in the upstream and 3 monitoring well in the downstream e. Conduct routine inspection of Non-hazardous waste landfill integrity	a. Operations of LNG Plant and its supporting facilities b. Non-hazardous waste landfill location	During operations phase of non-hazardous waste landfill	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General
7	Soil contamination	Fuel and Chemical Storage Facility and Refueling Facility	a. Minimise the possibility of onshore fuel and chemical spill b. Onshore spill response can be done effectively as per procedure hence will not contaminated the land	a. Update hazardous material management procedure and conduct socialisation/training to related employees b. Update emergency response procedure and conduct training to emergency response team (ERT) c. Appoint Emergency Response Team for fuel and chemical spill d. Ensure fuel and chemical storage container are built compatible with the materialand are in good condition e. Ensure fuel and chemical storage and refueling location is safe from flood or is on a higher elevation	Onshore Fuel and Chemical Storage Facility and Refueling location	During operations phase of LNG Plant and its supporting facilities	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
				f. Minimum requirements of storage facility are as follows: 1) Completed with a bunded area that will be able to contain 110% of the volume of the largest container, or 25% of the total volume 2) The building, including the floor and the bund wall, must be constructed with a impermeable material 3) The floor construction must have a slope of at least 1% towards sump pit or Oil Water Separator (OWS) 4) Completed with a sump pit for facilities with a roofed shelter 5) Completed with an Oil Water Separator (OWS) unit for facilities without a roofed shelter 6) Completed with spill kit 7) Completed with MSDS information g. Conduct routine clean up of oily contaminated water trapped in sump pit or OWS for further treatment h. Put label and symbol on the container (package) and storage area i. Conduct regular inspection/audit j. Treat contaminated soil by excavated, separated and collected to Temporary Hazardous Waste Storage for further treatment k. Ensure clean up process is performed well and conduct TPH soil test (if necessary) according to MoE Decree No. 128 Year 2003					
II.4 Post-Operations Phase									
Post-operations activity (facility decommissioning) will be conducted in accordance with applicable regulations in Indonesia. Detail decommissioning plan will be prepared at the latest 5 years before decommissioning is conducted, in coordination with related government institutions and other stakeholders									

2.4 MARINE FACILITY ACTIVITY SUMMARY MATRIX

Table II-4 Summary Matrix of EMP for Marine Facility Activity

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
I. Significant Environmental Impact to Manage (Management Advice Result from ANDAL)									
I.1 Pre-Construction Phase (No Significant Impact during Pre-Construction Phase)									
Environmental Impact									
No Significant Impact during Pre-Construction Phase									
Social Impact									
No Significant Impact during Pre-Construction Phase									
I.2 Construction Phase									
Environmental Impact									
1	Benthos abundance	Dredging for Marine Facility Construction	Minimise the potential reduction of benthos abundance and diversity compared to environmental baseline during AMDAL	a. Update dredging procedure according to scenario in ANDAL and conduct training/socialisation to related employees b. Conduct dredging only in designated area c. Use appropriate dredger to minimiseduration of impact d. Conduct corrective action if monitoring result shows that TSS distribution is not in accordance with simulation in ANDAL study	Dredging area around Marine Facility, including its shipping line	During Dredging activity for Marine Facility construction	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
2	Marine mammal disruption	Sea Transportation for Workforce, Equipments and Material	Minimise the potential of marine mammal disruption compared to environmental baseline during AMDAL	a. Update marine mammal protection procedure and conduct socialisation to related employees and vessel crew b. Update solid waste and wastewater management procedure for sea transportation activity and conduct socialisation to related employee c. Update emergency response procedure at vessel and conduct training to vessel crew d. Provide emergency response facility in the vessel in accordance with developed procedure e. Implement No Fishing policy f. Conduct routine maintenance to engine/equipments according to specified schedule to ensure that the engine/equipments are working efficiently g. Prioritizing sailing in deeper area (>12 m) when the sea condition is calm h. Reduce vessel speed if approaching marine mammal until the marine mammal swims away i. Conduct solid waste and wastewater management in accordance with Government Regulation No. 21 Year 2010 and MARPOL also applicable regulations. Solid waste and wastewater management will be discussed more details in EMP about seawater quality	Sea Transportation lane during construction of Marine Facility at Marine Facility until Bintuni Bay estuary	During transportation activity in the construction phase of Marine Facility	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
				j. Government Regulation No. 21 Year 2010 and MARPOL. Ballast exchange is anticipated will not happen often since most of the vessels will arrive at Tangguh LNG in loaded condition k. Record ballast exchange (date, location, volume, and vessel's name)					
Social Impact									
1	Fishery activity disturbance	Dredging activity for new jetty and BOF construction activity (*Bulk Offloading Facility*)	a. Note taken from public consultation with local fishermen b. Implementation of livelihood program for affected local fsihermen	a. Conducting public consultation for local fishermen related to BOF construction (*Bulk Offloading Facility*) b. Running a livelihood program through livelihood diversification and income recovery to directly affected local fishermen	Tanah Merah and Saengga Villages	The Construction of Marine Facilities	BP Berau Ltd.	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni and Bappeda (Regional Planning Board) of Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency and Bappeda (Regional Planning Board) of Fakfak Regency, Kesyahbandaran Office of Bintuni, Kesyahbandaran Office of Babo, and Kesyahbandaran Office of Kokas	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni, Environmental Agency (BLH) of Fakfak Regency and Directorate of Sea Transportation
2	Sea Transportation Accessibility Disturbance for Community	Application of safety exclusion zone along vessel transportation support for construction activitiy	a. Notes from public consultation with local community b. Installation of sea signage and sea transportation access in national maritime system c. Announcement letter of activity from Syahbandar Bintuni, Babo, as well as Kokas	a. Conducting public consultation for local community related to sea transportation acitivities during construction activitiy b. Installing sea signs surrounding the activity area c. Supporting the efforts to develop alternative of transportation access for local community d. Coordinating with Syahbandar of Bintuni, Babo and Kokas	a. Tanah Merah, Saengga, Onar, and Babo Villages b. Watershed surrounding Saengga River Estuary c. Waters in Bintuni Bay is a public route for local transportation d. Kesyahbandaran Office in Bintuni, Babo and Kokas Cities	The Construction of Marine Facilities	BP Berau Ltd.	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH), Environmental Agency (BLH) of Fakfak Regency, Kesyahbandaran Office of Bintuni, Kesyahbandaran Office of Babo, and Kesyahbandaran Office of Kokas	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni, Environmental Agency (BLH) of Fakfak Regency and Directorate of Sea Transportation

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
3	Community Perception and Social Tension due to fishery activityand sea transportation disturbances, noise and cultural heritage	a. Dregdring activity for new jetty and BOF construction activity b. Traffic of support Vessel for construction and safety exclusion zone application along the transportation channel of support vessel for construction activity c. BOF Piling activity	a. Notes from public consultation with local community b. Functioning of grievance procedure for local community and data of grievance by local community	a. Conducting public consultation for local community regarding BOF construction activitiy, including BOF Piling activity, and sea transportation activities for construction activity b. Running a grievance procedure for local community	Tanah Merah, Saengga, Babo, and Onar Villages	The Construction of Marine Facilities	BP Berau Ltd.	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni, Environmental Agency (BLH) of Fakfak Regency	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni, Environmental Agency (BLH) of Fakfak Regency
4	Changes in Cultural Heritage	BOF construction activitiy	a. Note taken from regular art and cultural activities in art and cultural center of Indigenous People b. Development of traditional houses in the selected villages c. Activities of Art and cultural promotions with economic value	a. Supporting community and government to develop art and culture center of Simuri b. Supporting community to build traditional houses of Tanah Merah and Saengga c. Encouraging cultural promotion activities of Simuri tribe d. Dedicated access from the BOF to avoid disturbance to the sacred house within the Tangguh LNG e. Sacred objects preservation, such as sacred stone, sacred river, and sacred house located inside and outside Tangguh LNG	a. Tanah Merah and Saengga Villages b. Sacred stone, sacred river, and sacred house located inside and outside Tangguh LNG	The Construction of Marine Facilities	BP Berau Ltd.	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni and Environmental Agency (BLH) of Fakfak Regency	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni and Environmental Agency (BLH) of Fakfak Regency
I.3 Operations Phase									
Environmental Impact									
1	Benthos abundance and diversity	Maintenance dredging for Marine Facility	Minimise the potential reduction of benthos abundance and diversity compared to environmental baseline during AMDAL	a. Update dredging procedure according to preferred method and conduct training/socialisation to related employees b. Conduct dredging only in designated area c. Use appropriate dredger to minimise duration of impact d. Conduct corrective action if monitoring result shows that TSS distribution is not in accordance with simulation in ANDAL study e. Dispose dredged material at West Disposal Site and East Disposal Site	Dredging area around Marine Facility, including its shipping line	During Dredging activity for Marine Facility maintenance	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
2	Marine mammal disruption	Sea Transportation activity, including LNG and condensate product transportation and logistic transportation for Tangguh LNG Operations	Minimise the potential of marine mammal disruption compared to environmental baseline during AMDAL	a. Update marine mammal protection procedure and conduct socialisation to related employees and vessel crew b. Update solid waste and wastewater management procedure for sea transportation activity and conduct socialisation to related employees c. Update emergency response procedure at vessel and conduct training to vessel crew d. Provide emergency response facility in the vessel in accordance with developed procedure e. Implement No Fishing policy f. Conduct routine maintenance to engine/equipments according to specified schedule to ensure that the engine/equipments are working efficiently g. Prioritizing sailing in deeper area (>12 m) when the sea condition is calm h. Reduce vessel speed if approaching marine mammal until the marine mammal swims away i. Conduct solid waste and wastewater management in accordance with Government Regulation No. 21 Year 2010 and MARPOL also applicable regulations. Solid waste and wastewater management will be discussed more details in EMP about seawater quality j. Manage ballast water in accordance with Government Regulation No. 21 Year 2010 and MARPOL. k. Record ballast exchange (date, location, volume, and vessel's name)	Sea transportation lane from marine facility up to Bintuni Bay estuary	During Marine Facility operational activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
Social Impact									
1	Fishery activityand sea transportation disturbances	Sea transportation activities for operation	a. Note taken from public consultation with local fishermen and local community b. Implementation of livelihood program for affected local fsihermen c. Instalation of sea signs and sea transportation line in national shipping channel d. Announcement letter of activity from Syahbandar Bintuni, Babo, as well as Kokas e. Availability of alternative transportation access for affected local community	a. Conducting a public consultation for local community and local fishermen related to marine facilities activities b. Implementation of a livelihood program through livelihood diversification and income recovery to affected local fishermen c. Support the efforts to develop alternative transportation access for local community d. Sea signs installation surrounding the activity area e. Coordinating with Syahbandar of Bintuni, Babo and Kokas f. Support the efforts to develop alternative transportation access for local community	a. Tanah Merah, Saengga, Onar, and Babo Village b. Kesyahbandaran Office in City of Bintuni, Babo dan Kokas c. Watershed surrounding platform and sea transportation lane	The operation phase of Marine Facilities	BP Berau Ltd.	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni, Environmental Agency (BLH) of Fakfak Regency, Kesyahbandaran Office of Bintuni, Kesyahbandaran Office of Babo, Kesyahbandaran Office of Kokas	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni, Environmental Agency (BLH) of Fakfak Regency, and Directorate of Sea Transportation
2	Community Perception and Social Tension due to Fishery activityand sea transportation disturbances	Sea transportation activities for operation	a. Note taken from public consultation with local community b. Functioning of grievance procedure for local community and data of grievance by local community	a. Conducting public consultation for local community b. Running a grievance procedure for local community	Tanah Merah, Saengga, Onar and Babo Villages	The operation phase of Marine Facilities	BP Berau Ltd.	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni, Environmental Agency (BLH) of Fakfak Regency,	Ministry of Environment, Bapedalda (The Regional Environmental Management Agency) of West Papua, Environmental Office (KLH) of Teluk Bintuni, Environmental Agency (BLH) of Fakfak Regency,
I.4 Post-Operations Phase									
Post-operations activity (facility decommissioning) will be conducted in accordance with applicable regulations in Indonesia. Detail decommissioning plan will be prepared at the latest 5 years before decommissioning is conducted, in coordination with related government institutions and other stakeholders									

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
II.	**Other Environmental Impact to Manage** (Environmental management which has been planned from the beginning as part of of the activity plan, or refers to SOP, technical guidance from government, international standard, etc.)								
II.1	**Pre-Construction Phase**								
Environmental Impact									
No Other Environmental Impact during Pre-Construction Phase									
Social Impact									
No Other Social Impact during Pre-Construction Phase									
II.2	**Construction Phase**								
1	Noise Level	Construction of BOF facility, LNG Jetty 2 and Combo Dock extension	Noise level complies with standards in MoE Decree No. 48 Year 1996 and General EHS Guidelines 2007 in Tangguh Perimeter Fence location	a. Conduct routine maintenance of engine/equipment according to specified schedule to ensure that the engine/equipments are working efficiently b. If possible, the use of muffler or noise reduction method will be considered c. If necessary, noise barrier at impact source and receptor area (sensitive public facility) will be built d. Activity which is potentially can cause high noise level will only be conducted up to 14 hours per day	a. Construction area of BOF facility, LNG Jetty 2 and Combo Dock extension b. Noise receptor location at the nearest village	During construction of BOF facility, LNG Jetty 2 and Combo Dock extension	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
2	Marine biota abundance and diversity	Construction of BOF facility, LNG Jetty 2 and Combo Dock extension	a. Minimise the potential reduction of benthos diversity and equitability compared to environmental baseline during AMDAL b. Minimise the potential reduction of nekton abundance and marine mammal disruption compared to environmental baseline during AMDAL	a. Update marine mammal protection procedure and conduct socialisation to related employees and vessel crew b. Update solid waste and wastewater management procedure for sea transportation activity and conduct socialisation to related employees c. Conduct routine maintenance to engine/equipments according to specified schedule to ensure that the engine/equipments are working efficiently d. If possible, maintain noise level from activity gradually e. Do not dispose solid waste to sea during Marine Facility construction f. Conduct solid waste and wastewater management according to Government Regulation No. 21 Year 2010 and MARPOL also applicable regulations	Construction area of BOF facility, LNG Jetty 2 and Combo Dock extension	During construction of BOF facility, LNG Jetty 2 and Combo Dock extension	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
3	Sea water quality and marine biota abundance and diversity	Dredging and Disposal of Dredged Material for Marine Facility construction	a. TSS concentration in sea water does not exceed standard outside safety exclusion zone at Marine Facility area in dredging area or 500 meters from dredging location according to MoE Decree No. 51 Year 2004 by considering environmental baseline during AMDAL b. TSS concentration in sea water outside 500 m distance from dredging disposal area complies with MoE Decree No. 51 Year 2004 by considering environmental baseline during AMDAL c. Minimise the potential reduction of plankton abundance and diversity compared to environmental baseline during AMDAL d. Minimise the potential reduction of nekton abundance and marine mammal disruption compared to environmental baseline during AMDAL	a. Update dredging procedure according to preferred method and conduct training/socialisation to related employees b. Conduct dredging only in designated area c. Conduct corrective action if monitoring result shows that TSS distribution is not in accordance with simulation in ANDAL study d. Dispose dredged material only at designated location in AMDAL and dredging permit e. Record dredged material disposal (volume, actual disposal coordinate and disposal time)	a. Dredging area around Marine Facility, including its shipping line b. Dredged Material Disposal area	During Dredging and Disposal of Dredged Material activity for Marine Facility construction	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
4	Sea water quality and marine biota abundance and diversity	Solid waste (non-hazardous) and Hazardous Waste management activity in Marine Facility construction	a. Solid waste (non-hazardous) management is conducted in accordance with Government Regulation No. 21 Year 2010, MARPOL and related regulations b. Hazardous waste management is conducted in accordance with Government Regulation No. 85 Year 1999, MARPOL and related regulations	General Management : a. Update hazardous and non-hazardous solid waste management and conduct socialisation to related employee b. Conduct solid waste segregation (Non-hazardous and hazardous solid waste) c. Implement 3R system (Reduce, Reuse, Recycle) d. Categorize non-hazardous solid waste into organic, recyclable, burnable and inert waste Non-Hazardous Solid Waste Management: a. Conduct solid waste management in accordance with Government Regulation No. 21 Year 2010, MARPOL Annex V and applicable regulations b. Do not dispose garbage to sea, except food waste which complies with MARPOL Annex V requirements c. Organic, recyclable, and inert waste management from small vessel and tug boat which operate around jetty location will be sent to Tangguh LNG onshore waste management facility d. Organic, recyclable, and inert waste management from small vessel and tug boat which operate around jetty location will be sent to Tangguh LNG onshore waste management facility e. Waste from other type of vessel (large vessel) will not be managed onshore. Vessel owner will manage generated waste by following requirements in MARPOL Annex 5, such as 1) Comminute food waste to size less than 25 mm for further disposal to sea with distance more than 3 nm from nearest land. Uncomminuted waste can only be disposed to sea at distance more than12 nm from the nearest land 2) Transport non-hazardous solid waste except food waste to waste management facility for further treatment f. Record generated, disposed and treated waste	Construction area of BOF facility, LNG Jetty 2 and Combo Dock extension, including vessels which support construction activity	During construction activity of BOF facility, LNG Jetty 2 and Combo Dock extension	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
				Hazardous Waste Management: a. Conduct hazardous waste management in accordance with Government Regulation No. 85 Year 1999 and applicable regulations b. Conduct labelling for hazardous waste container c. Record generated and treated waste according to applicable regulations d. Hazardous waste management from small vessel and tug boat which operate around jetty area will be sent and stored/treated at Tangguh LNG onshore hazardous waste management facility and subsequently will be sent to licensed hazardous waste treatment facility for					

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
				further treatment e. Hazardous waste from other vessels (large vessel) will not be treated at onshore facility. Vessel owner will manage generated waste by following to requirements in MARPOL and related regulations. Transport hazardous waste to licensed waste management facility for further treatment f. Use permitted hazardous waste transporter facility					
		Offshore Fuel and Chemical Storage Facility and Refueling Facility	a. Minimise the possibility of offshore fuel and chemical spill b. Offshore spill response can be done effectively as per procedure hence will not affect water quality and marine biota	a. Update hazardous material management procedure and conduct socialisation/training to related employees b. Update Fuel and Chemical Management Procedure and conduct training/socialisation to related employees c. Update emergency response procedure and conduct training to emergency response team (ERT) d. Appoint Emergency Response Team for fuel and chemical spill e. Ensure storage containers are built compatible with the materialand are in good condition f. Ensure every stored material is recorded and completed with MSDS g. Minimum requirements for storage facility are as follow: 1) Completed with bunded area that will be able to contain 110% of the volume of the largest container or 25% of the total volume in the storage facility 2) Building construction, including the floor and bunded area must be constructed with a impermeable material 3) Treat oily contaminated water trapped in the bunded area 4) Completed with spill kit	Fuel and Chemical Storage Facility and Refueling location at Marine Facility area	During Marine Facility construction activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
				h. Put label and symbol on the container (package) and storage area i. Conduct regular inspection to fuel and chemical storage and refueling facility j. Perform efforts to response oil spill in accoradance with Oil Spill Contingency Plan and conduct spill response training according to planned schedule					
		Wastewater management from vessel operational activity	Wastewater management complies with standards in Government Regulation No. 21 Year 2010, MARPOL and applicable regulations	a. Update wastewater management procedure and conduct socialisation to related employees b. Conduct sewage treatment in accordance with Government Regulation No. 21 Year 2010 and MARPOL Annex IV prior to discharge to sea c. Conduct oily contaminated water treatment by using Oil Water Separator in accordance Government Regulation No. 21 Year 2010 and MARPOL Annex I prior to discharge to sea d. Complies with requirements in Government	a. Sea transportation lane from Marine Facility up to Bintuni Bay estuary b. Construction area of BOF facility, LNG Jetty 2 and Combo Dock extension, including vessels which support	During construction activity of Marine Facility	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
				Regulation No. 21 Year 2010 and MARPOL for ballast water. Ballast water exchange is anticipated to rarely conducted since most of the vessel will arrive in Tangguh LNG in loaded condition e. Record ballast water exchange (date, location, volume and vessel's name)	construction activity			located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
II.3	**Operations Phase**								
1	Natural Oceanographical changes including current pattern changes, coast line abrasion and accretion	Marine Facility at operations phase	Minimise impact or change of natural erosion and sedimentation according to erosion and sedimentation rate in the area	a. Design BOF Terminal near shore to reduce sedimentation b. Use trestle structure at LNG terminal c. Corrective action will be conducted if there is any abrasion which is not as expected in ANDAL document which caused by Tangguh LNG activity and needs to be mitigated	Location around Marine Facility	During operational and presence of Marine Facility	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
2	Sea water quality and marine biota abundance and diversity	Refueling at Marine Facility area	a. Minimise the possibility of offshore fuel spill b. Offshore spill response can be done effectively as per procedure hence will not affect water quality and marine biota	a. Update hazardous material management procedure and conduct socialisation/training to related employees b. Update Fuel and Chemical Management Procedure and conduct training/socialisation to related employees c. Update emergency response procedure and conduct training to emergency response team (ERT) d. Appoint Emergency Response Team for fuel and chemical spill e. Ensure storage containers are built compatible with the materialand are in good condition f. Ensure every stored material is recorded and completed with MSDS g. Perform efforts to response oil spill in accordance with Oil Spill Contingency Plan and conduct spill response training according to planned schedule	Fuel and chemical refuelling facility location at Marine Facility area	During operations phase of Marine Facility	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Wastewater management from vessel operational activity	Wastewater management complies with standards in Government Regulation No. 21 Year 2010, MARPOL and applicable regulations	a. Update wastewater management procedure and conduct socialisation to related employee b. Conduct sewage treatment in accordance with Government Regulation No. 21 Year 2010 and MARPOL Annex IV prior to discharge to sea c. Conduct oily contaminated water treatment by using Oil Water Separator in accordance Government Regulation No. 21 Year 2010 and MARPOL Annex I prior to discharge to sea d. Manage ballast water according to Government Regulation No. 21 Year 2010 and MARPOL e. Record ballast water exchange (date, location,	Sea transportation lane from Marine Facility up to Bintuni Bay estuary	During operational activity	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
				volume and vessel's name)				Impact Management Agency Papua Barat	General, and Sea Transportation Directorate General
		Solid waste (non-hazardous) and Hazardous Waste management activity in offshore actvitiy	a. Solid waste (non-hazardous) management is conducted in accordance with Government Regulation No. 21 Year 2010, MARPOL and related regulations b. Hazardous waste management is conducted in accordance with Government Regulation No. 85 Year 1999, MARPOL and related regulations	General Management: a. Update hazardous and non-hazardous solid waste management and conduct socialisation to related employees b. Conduct solid waste segregation (Non-hazardous and hazardous solid waste) c. Implement 3R system (Reduce, Reuse, Recycle) d. Categorize non-hazardous solid waste into organic, recyclable, burnable and inert waste Non-Hazardous Solid Waste Management: a. Conduct solid waste management in accordance with Government Regulation No. 21 Year 2010 and MARPOL Annex V b. Do not dispose garbage to sea, except food waste which complies with MARPOL Annex V requirements c. Organic, recyclable, and inert waste management from small vessel and tug boat which operate around jetty location will be sent to Tangguh LNG onshore waste management facility d. Waste from other type of vessel (large vessel) will not be managed onshore. Vessel manager will manage generated waste by following requirements in Government Regulation No. 21 Year 2010 and MARPOL Annex 5 e. Comminute food waste to size less than 25 mm for further disposal to sea with distance more than 3 nm from nearest land. f. Uncomminuted waste can only be disposed to sea at distance more than 12 nm from the nearest land g. Record generated and treated waste Hazardous Waste Management: a. Conduct hazardous waste management in accordance with Government Regulation No. 85 Year 1999 b. Conduct labelling for hazardous waste container c. Hazardous waste management from small vessel and tug boat which operate around jetty area will be sent and stored/treated at Tangguh LNG onshore hazardous waste management facility and subsequently will be sent to licensed hazardous waste treatment facility for further treatment d. Hazardous waste from other vessels (large vessel) will not be treated at onshore facility. Vessel manager will manage generated waste by following to requirements in MARPOL and	Vessels which operate at Tangguh LNG	During marine facility operations activity	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
				related regulations. Transport hazardous waste to licensed waste management facility for further treatment e. Transfer hazardous waste to licensed waste facility for further treatment f. Use permitted hazardous waste transporter facility					
3	Sea water quality and marine biota abundance and diversity	Maintenance Dredging for Marine Facility and Disposal of Dredged Material	a. TSS concentration in sea water does not exceed standard outside safety exclusion zone at Marine Facility area in dredging area or 500 meters from dredging location according to MoE Decree No. 51 Year 2004 by considering environmental baseline during AMDAL b. TSS concentration in sea water outside 500 m distance from dredging disposal area complies wi MoE Decree No. 51 Year 2004 by considering environmental baseline during AMDAL c. Minimise the potential reduction of plankton abundance and diversity compared to environmental baseline during AMDAL d. Minimise the potential reduction of nekton abundance and marine mammal disturbance compared to environmental baseline during AMDAL	a. Update dredging procedure according to preferred method and conduct training/socialisation to related employees b. Conduct dredging only in designated area c. Conduct corrective action if monitoring result shows that TSS distribution is not in accordance with simulation in ANDAL study d. Dispose dredged material only at designated location in AMDAL and dredging permit e. Record dredged material disposal (volume, actual disposal coordinate and disposal time)	a. Dredging area around Marine Facility, including its shipping lane b. Dredged Material Disposal area	During disposal activity of dredged material for Marine Facility maintenance	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
II.4 Post-Operations Phase									
Post-operations activity (facility decommissioning) will be conducted in accordance with applicable regulations in Indonesia. Detail decommissioning plan will be prepared at the latest 5 years before decommissioning is conducted, in coordination with related government institutions and other stakeholders.									

2.5 SURVEY, SEISMIC, AND EXPLORATION AND APPRAISAL WELL DRILLING ACTIVITY SUMMARY MATRIX

Table II-5 Summary Matrix of EMP for Survey, Seismic, and Exploration and Appraisal Well Drilling Activity

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
Other Environmental Impact to Manage (Environmental management which has been planned from the beginning as part of of the activity plan, or refers to SOP, technical guidance from government, international standard, etc.)									
Environmental Impact									
1	Sea water quality, Air quality, Soil contamination and marine biota abundance and diversity	Exploration Program both Seismic and/or Exploration Well Drilling	a. Solid waste (non-hazardous) management is conducted according to Government Regulation No. 21 Year 2010, MARPOL and related regulations b. Hazardous waste management is conducted according to Government Regulation No. 85 Year 1999, MARPOL and related regulations c. Wastewater management is conducted according to Government Regulation No. 21 Year 2010, MARPOL and related regulations d. TSS and Oil & Grease concentration in sea water at 500 meters distance from drilling mud and cutting dumping location comply with MoE Decree No.51 Year 2004 by considering environmental baseline during AMDAL e. Minimise the potential of conditional change for plankton and benthos diversity and equitability compared to environmental baseline during AMDAL f. Minimise the potential reduction of nekton abundance and marine mammal diversity compared to environmental baseline during AMDAL g. Minimise well test period as initial plan and limit the flaring rate	<u>Solid Waste (non-hazardous) and Hazardous Waste Management</u> General Management: a. Update hazardous and non-hazardous solid waste management and conduct socialisation to related employees b. Conduct solid waste segregation (Non-hazardous and hazardous solid waste) c. Implement 3R system (Reduce, Reuse, and Recycle) d. Categorize non-hazardous solid waste into organic, recyclable, burnable and inert waste Non-Hazardous Solid Waste Management : a. Conduct solid waste management in accordance with Government Regulation No. 21 Year 2010 and MARPOL Annex V b. Do not dispose garbage to sea, except food waste which complies with MARPOL Annex V requirements c. Comminute food waste to size less than 25 mm for further disposal to sea with distance more than 3 nm from nearest land d. Dispose uncomminuted waste at distance more than 12 nm from the nearest land e. Record generated and disposed waste (daily) Hazardous Waste Management: a. Conduct hazardous waste management in accordance with Government Regulation No. 85 Year 1999 and applicable regulations b. Transfer hazardous waste to licensed waste facility for further treatment c. Conduct labelling for hazardous waste container d. Use permitted hazardous waste transporter facility e. Generated and transported hazardous waste shall be recorded (amount, type, date, source) <u>Wastewater Management from vessel and Drilling Platform (Rig)</u> a. Update wastewater management procedure and conduct socialisation to related employees	a. Seismic activity location b. Exploration Well Drilling activity location c. Vessel and supporting facility for Seismic and Exploitation Well Drilling activity	a. During Seismic activity b. During Exploration Well Drilling activity	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat, Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
			h. Emission quality from diesel generator complies with MoE Regulation No. 13 Year 2009 and General EHS Guideline 2007 i. Minimise the possibility of fuel and chemical spill j. Spill response can be done effectively as per procedure	b. Conduct sewage treatment in accordance with Government Regulation No. 21 Year 2010 and MARPOL Annex IV prior to discharge to sea c. Conduct oily contaminated water treatment by using Oil Water Separator in accordance Government Regulation No. 21 Year 2010 and MARPOL Annex I prior to discharge to sea d. Conduct ballast water treatment in accordance with Government Regulation No. 2010 and MARPOL <u>Sea Transportation Activity</u> a. Update marine mammal protection procedure and conduct socialisation to related employees and vessel crew b. Update solid waste and wastewater management procedure for drilling activity and conduct socialisation to related employees c. Update emergency response procedure at vessel and conduct training to vessel crew d. Provide emergency response facility in the vessel in accordance with developed procedure e. Implement No Fishing policy f. Conduct routine maintenance to engine/equipments according to specified schedule to ensure that the engine/equipments are working efficiently g. Prioritizing sailing in deeper area (>12 m) when the sea condition is calm h. Reduce vessel speed if approaching marine mammal until the marine mammal swims away i. Conduct solid waste and wastewater management in accordance with Government Regulation No. 21 Year 2010 and MARPOL also applicable regulations j. Manage ballast water in accordance with Government Regulation No. 21 Year 2010 and MARPOL <u>Drilling Mud and Cutting Management (Overboard Discharge)</u> a. Update drilling activity procedure and conduct training to related employees about environmental management in drilling activity b. Update drilling mud and cutting management with overboard discharge method procedure and conduct socialisation to related employees c. Update emergency response procedure for drilling mud and cutting management and conduct socialisation to related employees d. Conduct LC_{50} 96 hours test to Water Based Mud at least once prior to be used at the same sludge waste system in the same basin of offshore drilling activities e. If using Water Based Mud, the waste that will be					

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
				discharged are: 1) Used sludge and excess mud with LC_{50} 96 hours ≥ 30.000 mg/L 2) Drill cutting f. If using Synthetic Based Mud, the waste that will be discharged are: 1) Drill cutting with oil on cutting content ≤ 6,9 % g. If using Oil Based Mud, the drilling mud and cutting will not be discharged to the sea h. Conduct sludge recycle as much as possible, for example using Solid Control Unit i. Conduct activities in accordance with applicable Drilling Mud and Cutting Dumping Permit and related procedures j. Record volume of drilling mud and cutting discharge to sea <u>Marine Mammal Management/Protection</u> a. Update marine mammal protection procedure and conduct socialisation to related employee b. Update solid waste and wastewater management procedure for drilling activity and conduct socialisation to related employees c. Conduct solid waste and wastewater management in accordance with Government Regulation No. 21 Year 2010, MARPOL and applicable regulations d. Conduct management plan in drilling mud and cutting discharge activity in accordance with AMDAL and Drilling Mud and Cutting Dumping Permit e. Implement JNCC Guideline when conducting Vertical Seismic Profile (VSP) during drilling, with procedures as follow: 1) Conduct observation of marine mammal spotting within 500 m distance for 30 minutes prior to VSP activity 2) If marine mammal spotted within 500 m distance, then the activity is suspended to allow for marine mammal to swim away 3) Implement "Soft Start" procedure					
				<u>Air Quality Management</u> a. Update well test procedure with regards to well test period and conduct socialisation to related employees b. Maintain maximum flaring emission rate of 100 MMSCFD during well clean up activity c. Update diesel generator operational procedure and conduct socialisation to diesel generator operators d. Operate generator in accordance with its specification, both operational load and time e. Conduct routine maintenance to engine/equipments according to specified schedule to ensure that the machine/equipments					

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
				are working efficiently Fuel and Chemical Storage and Refueling at Offshore and/or Marine Facility a. Update hazardous material management procedure and conduct socialisation/training to related employees b. Update fuel and chemical management procedure and conduct training/socialisation to related employees c. Update emergency response procedure and conduct training to emergency response team (ERT) d. Appoint Emergency Response Team for fuel and chemical spill e. Ensure fuel and chemical storage container are built compatible with the materialand are in good condition f. Ensure every stored material is recorded and completed with MSDS g. Minimum requirements for storage facility are as follow: 1) Completed with bunded area that will be able to contain 110% of the volume of the largest container or 25% of the total volume in the storage facility 2) Building construction, including the floor and bunded area must be constructed with a impermeable material 3) Treat oily contaminated water which trapped in the bunded area 4) Completed with spill kit h. Put label and symbol on the container (package) and storage area i. Conduct regular inspection to fuel and chemical storage and refueling facility					
				j. Perform efforts to response oil spill in accordance with Oil Spill Contingency Plan and conduct spill response training according to planned schedule Onshore Fuel and Chemical Storage Facility and Refueling Facility a. Update hazardous material management procedure and conduct socialisation/training to related employees b. Update emergency response procedure and conduct training to emergency response team (ERT) c. Appoint Emergency Response Team for fuel and chemical spill d. Ensure fuel and chemical storage container are built compatible with the materialand are in good condition e. Ensure fuel and chemical storage and refueling					

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
				location is safe from flood or is on a higher elevation f. Minimum requirements of storage facility are as follow: 1) Completed with a bunded area that will be able to contain 110% of the volume of the largest container, or 25% of the total volume 2) The building, including the floor and the bund wall, must be constructed with a impermeable material 3) The floor construction must have a slope of at least 1% towards sump pit or Oil Water Separator (OWS) 4) Completed with a sump pit for facilities with a roofed shelter 5) Completed with an Oil Water Separator (OWS) unit for facilities without a roofed shelter 6) Completed with spill kit 7) Completed with MSDS information g. Conduct routine clean up of oily contaminated water trapped in sump pit or OWS for further treatment h. Put label and symbol on the container (package) and storage area i. Conduct regular inspection/audit j. Treat contaminated soil by excavated, separated and collected to Temporary Hazardous Waste Storage for further treatment k. Ensure clean up process is performed well and conduct TPH soil test (if necessary) according to MoE Decree No. 128 Year 2003					
Social Impact									
1	Workforce and business opportunities	Exploration activity, either Seismic activities and/or Well Drilling Exploration	a. Data of local and Papua workforce absorbed in seismic activitiy b. Data of local products from Indigenous People	a. Tangguh LNG will require its contractors to employ limited number of workers at unskilled/low skilled level working as Community Relation team with prioritizing Indigenous People in Bintuni Bay and Fakfak. b. Optimizing local products absorption from agriculture and fishery sectors.	The villages of Indigenous People in surrounding Tangguh LNG exploration activities	During the exploration activities	BP Berau Ltd	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni, Regional Department of Manpower of Teluk Bintuni, control activities located in Teluk Bintuni Regency , Environmental Agency (BLH) of Fakfak Regency and Bappeda (Regional Planning Board) of Fakfak Regency Kabupaten Fakfak control activities located in Fakfak Regency, Bapedalda (The Regional Environmental	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni, Environmental Agency (BLH) of Fakfak Regency, Directorate General of Oil and Gas, Directorate of Sea Transportation

No	Environmental Impact to Manage	Source of Impact	Success Indicator in Environmental Management	Environmental Management Plan	Environmental Management Location	Period of Time	Environmental Management Institution		
							Implementer	Supervisor	Reports Recipient
								Management Agency) of West Papua	
2	Fishery activityand sea transportation disturbances	Exploration activity, either Seismic activities and/or Well Drilling Exploration	a. Notes taken from public consultation with local community b. Sea signs installation surrounding the activity area c. Sea transportation line listed on national shipping channel d. Announcement letter of activity from Syahbandar Bintuni, Babo, as well as Kokas	a. Conducting public consultation for local community regarding platform construction and sea transporatation b. Implementation of a livelihood program through livelihood diversification and income recovery to affected local fishermen c. Installing sea signs surrounding the activity area d. Coordinating with Syahbandar of Bintuni, Babo and Kokas	a. The nearest villages to Tangguh LNG exploration activities b. Kesyahbandaran Office in City of Bintuni, Babo dan Kokas c. Watershed in suroundin exploration and drilling activities	During the exploration activities	BP Berau Ltd	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni, and Bappeda (Regional Planning Board) of Teluk Bintuni Regency control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency and Bappeda (Regional Planning Board) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua, Kesyahbandaran Office of Babo, Kesyahbandaran Office of Kokas	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni, Environmental Agency (BLH) of Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation
3	Community Perception and Social Tension	Exploration activity, either Seismic activities and/or Well Drilling Exploration	a. Notes taken from public consultation with local community b. Functioning of grievance procedure for local community and data of grievance by local community	a. Conducting public consultation for local community regarding exploration either seismic and/or well gas drilling b. Running a grievance procedure for local community	The nearest villages to seismic and/or drilling	Before and during the activity running	BP Berau Ltd	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni, control activities located in Teluk Bintuni Regency , Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni, Environmental Agency (BLH) of Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation

CHAPTER III
ENVIRONMENTAL MONITORING PLAN

3.1 SUMMARY OF EMP FOR GAS EXPLOITATION ACTIVITY (GAS WELL DRILLING AND OFFSHORE PLATFORM)

Table III-1 Summary Matrix of EMP for Gas Exploitation Activity (Gas Well Drilling and Offshore Platform) Matriks Ringkasan RPL Kegiatan Eksploitasi Gas

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
I. Pre-Construction Phase									
No environmental and social impacts during Pre-Construction phase									
II. Construction Phase									
II.1 Environmental Impact									
1	Air Quality	a. Well test duration b. Flare emission volume	Well test	a. Check well test duration records b. Check the flare emission volume record	Rig	During well test at each well	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Emission quality of the generator a. Capacity< 570 KWth (NOx, CO, H_2S) b. Capacity 570 KWth < x < 3MWth (Total Particulate, SO_2, NOx, CO and H_2S)	Power generation from the diesel generator	a. Collect air emission samples at sampling points of the stack and conduct analysis for the concentration of the required parameters done by an accredited laboratory b. Conduct compliance evaluation by comparing analysis results with the Minister of Environment Regulation No. 13 Year 2009 and the General EHS Guidelines 2007 (refer to Table in Appendix I) c. Conduct trend analysis	Sampling point of the diesel generator stack	a. Capacity< 570 KWth : Once every 3 years b. Capacity 570 KWth < x < 3MWth : Once every year	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Generator maintenance records		Check the generator maintenance records to ensure that its maintenance is conducted in accordance with the determined schedule	Check the generator maintenance records at the workshop	Generator maintenance records check is conducted once every 6 months			

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
2	Seawater quality	a. TSS and Oil and Grease of the seawater b. Amount of mud and drill cuttings discharged overboard	Overboard discharge alternative for mud and drill cuttings	a. Collect seawater samples and conduct analysis for the concentration of the required parameters done by an accredited laboratory b. Conduct compliance evaluation by comparing analysis results with the Minister of Environment Regulation No. 51 Year 2004 (refer to Table in Appendix I), also taking into consideration baseline condition during AMDAL c. Check the records of the mud and drill cuttings amount which are discharged overboard	a. 1 station upstream, 1 station downstream and 1 control station at a 500 m radius from the overboard discharge location, taking into consideration the current direction b. Rig	a. Once every 3 months during the activity b. Once after discharge is completed c. Records check is conducted for every discharge activity. The report is checked every 3 months	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Effluent quality from the Sewage Treatment Plant (Chlorine residue and floating material/foam) or as per the Wastewater Discharge to Sea Permit	Sewage	a. Collect samples of the treated effluent(at the discharge pipe) and conduct analysis for the concentration of the required parameters done by an accredited laboratory b. Conduct visual observation for floating material and foam at the discharge pipe c. Conduct compliance evaluation by comparing analysis results and visual observation with the standards set in the Wastewater Discharge to Sea Permit d. Record the sewage flowrate. If possible, measurement is done with a flowmeter e. Conduct trend analysis	Effluent discharge pipe from the Sewage Treatment Plant on the Rig	Monthly	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
		Effluent quality from the Oil Water Separator (OWS) unit (Oil film and Oil and Grease) or as per the Wastewater Discharge to Sea Permit	Oil contaminated wastewater from the Oil Water Separator (OWS) unit	Visual observation: a. Conduct visual observation for oil film on the seawater at the discharge pipe from the Oil Water Separator unit Laboratory analysis a. Collect samples of the treated effluent (at the discharge pipe) and conduct analysis for the concentration of the required parameters done by an accredited laboratory b. Conduct compliance evaluation by comparing analysis results with the standards set in the Wastewater Discharge to Sea permit and MARPOL c. Record the wastewater flowrate. If possible, measurement is done with a flowmeter d. Conduct trend evaluation	Visual observation: a. Seawater at the discharge pipe of the Oil Water Separator (OWS) unit on the rig Laboratory analysis a. Discharge pipe from the OWS unit on the rig	Visual observation a. Internal observation is conducted daily b. External observation is conducted monthly Laboratory analysis a. Monthly	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Seawater Quality (pH, Temperature, BOD, Oil Film, Oil and Grease)	Wastewater treatment from the Sewage Treatment Plant and the Oil Water Separator (OWS) Unit	a. Collect seawater samples and conduct analysis for the concentration of the required parameters done by an accredited laboratory b. Conduct compliance evaluation by comparing analysis results with the Minister of Environment Regulation No. 51 Year 2004 (refer to Table in Appendix I), also taking into consideration baseline condition during AMDAL	1 upstream location, 1 downstream location and 1 control location 100 m away from the wastewater discharge location on the rig, taking into consideration the current direction	Once every 3 months			

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
				c. Conduct trend evaluation					
		Ballast water exchange records	Ballast water exchange	a. Check the ballast water exchange records to compare with the MARPOL requirements (at least the date, location, volume and vessel's name)	Vessels required by MARPOL	Records check conducted every 6 months	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
3	Sediment	TPH and Total Metal (Cu, Cr, Cd, Hg, Pb, As, Zn, Sb, Ni, Ag)	Overboard discharge alternative for mud and drill cuttings	a. Collect sediment samples and conduct analysis for the concentration of the required parameters done by an accredited laboratory b. Conduct compliance evaluation by comparing analysis results with the ANZECC Guidelines (refer to Table in Appendix I), also taking into consideration baseline condition during AMDAL	1 sampling point at the discharge location and 1 control site	a. Once every 6 months during the overboard discharge activity b. Once after discharge is completed	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
4	Decline in abundance and biodiverisity of the aquatic biota	Abundance, diversity index, uniformity index of aquatic plankton and benthos (only for overboard discharge activity)	Overboard discharge alternative for mud and drill cuttings	a. Collect samples of plankton and benthos b. Calculate abundance, diversity index and uniformity index for plankton and benthos c. Collection, identification and calculation will be conducted by an accredited laboratory d. Conduct trend evaluation by comparing analysis results with baseline condition during AMDAL	a. Plankton monitoring is conducted at 1 upstream station, 1 downstream station and 1 control station at a 500 m radius from the overboard discharge location, taking into consideration the current direction b. Benthos monitoring is conducted at 1 point at the discharge location and 1 control site	a. Once every 6 months b. Once after discharge is completed	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
			Marine activity including wastewater management	a. Collect plankton samples b. Calculate abundance, diversity index and uniformity index of the plankton c. Collection, identification and calculation will be conducted by an accredited laboratory d. Conduct trend evaluation by comparing analysis results with baseline condition during AMDAL	1 upstream station, 1 downstream station and 1 control station at a 100 m radius from the wastewater discharge location, taking into consideration the current direction	Once every 3 months			
		a. Type and abundance of nekton b. Type and number of marine mammals	a. Offshore platform construction b. Overboard discharge alternative for mud and drill cuttings c. Sea transportation for personnel, equipment and material	a. Conduct visual observation and routinely record marine mammal sighting b. Conduct fishery surveys (Nekton sample collection and fishermen's catch data collection and marine mammal (visual, if possible using a hydrophone)	a. On location b. Berau Bay and Bintuni Bay	a. Visual observation is conducted daily b. Fishery and marine mammal survey is conducted once during construction and once after construction is completed	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Vessel engine maintenance records		Check vessel engine maintenance records to ensure that maintenance is conducted according to the determined schedule	Vessel	Once every 6 months			
5	Hazardous material and waste spill leading to seawater contamination	Facility condition and hazardous material and waste management	a. Fuel and chemical storage and management at marine facilities b. Hazardous waste storage and management at marine facilities	a. Inspect hazardous material and waste storage facility prior to operation in accordance with the applicable procedure b. Conduct weekly inspection of containers, storage system, storage warehouse condition, emergency response system, and other facilities in accordance with the applicable procedure	a. Fuel and chemical storage warehouse b. Temporary hazardous waste storage c. Refuelling station	a. Storage facility inspection is conducted once before it is used b. Routine inspection is done on a weekly basis	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Spill clean-up, Oil and Grease concentration at the spill location, and management of		a. Visual observation of oil film on the water to ensure that the oil spill response is	Spill location	a. When a spill occurs b. During spill clean-up at sea			

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
		hydrocarbon contaminated materials		conducted in accordance with the procedure b. If required, conduct seawater quality analysis for the Oil and Grease parameter in accordance with the applicable procedure (emergency response procedure) to ensure that the spill clean-up activity is conducted as per the procedure					
		Hazardous material and waste spill records		Record any spill that at least notes the amount and type of the spilled hazardous material and waste, spill location and the spill handling efforts	Spill location	When a spill occurs			
6	Hazardous material and waste spill leading to soil contamination	Facility condition and hazardous material and waste management	a. Fuel and chemical storage and management b. Hazardous waste storage and management	a. Inspect hazardous material and waste storage facility prior to operation in accordance with the applicable procedure b. Conduct weekly inspection of containers, storage system, storage warehouse condition, emergency response system, and other facilities in accordance with the applicable procedure	a. Fuel and chemical storage warehouse b. Temporary hazardous waste storage c. Refuelling station	a. Storage facility inspection is conducted once before it is used b. Routine inspection is done on a weekly basis	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Spill clean-up, the soil TPH concentration and management of hydrocarbon contaminated materials		a. Visual observation to ensure that the oil spill response is conducted in accordance with the procedure b. If required, conduct soil TPH analysis (as per the Minister of Environment Decree No. 128 Year 2003) on location after the soil has been cleaned up to ensure that the contaminated soil excavation has been done as per the procedure	a. Location of the spill and the contaminated soil b. Temporary hazardous waste storage	a. When a spill occurs b. During clean-up of contaminated soil			

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
		Hazardous material and waste spill records		Record any spill that at least notes the amount and type of the spilled hazardous material and waste, spill location and the spill handling efforts	Location of the spill and the contaminated soil	When a spill occurs			
7	Solid non-hazardous waste and hazardous waste	a. Amount of solid non-hazardous waste and hazardous waste that has been produced and managed b. Solid waste and hazardous waste facility condition and management	Solid non-hazardous waste and hazardous waste management	a. Check records of the amount and type of waste that has been produced and delivered to the storage and treatment facilities in Tangguh b. Check records of the amount and disposal location of food waste that has been comminuted and disposed to the sea c. Check the records and delivery of the hazardous waste manifest d. Conduct weekly inspection of the solid waste and hazardous waste treatment facilities in accordance with the applicable procedure	Solid waste and hazardous waste treatment facilities	a. Records check is conducted every month during the solid waste and hazardous waste treatment activity b. Inspection is conducted on a weekly basis	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
II.2 Social Impact									
1	Workforce	a. Strategies for workforce recruitment and demobilization in construction phase b. Achieved the target of workforce percentage complies with workforce table c. At the end of contract, workers accept their rights and are demobilized to their previous point of hire	Recruitment and demobilization of workforce in Construction Phase	a. Method : Direct observation b. Analysis: correlational and descriptive statistics	a. The villages of Indigenous People in surrounding area of Tangguh LNG b. The Bintuni-Fakfak City c. The City of Manokwari d. The City of Jakarta	During construction phase	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua control activities located in Fakfak Regency.	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency , Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
2	Changes in Local Business Growth	Absorption of local products from agriculture and fisheries sector; data of local products of agriculture and fisheries sectors absorbed from the villages closest to project activities	Platform construction and sea transportation	a. Method : Direct observation b. Analysis: correlational and descriptive statistics	The nearest villages to platforms location	During the transportation and installation of offshore gas platform	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency , Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation
3	Fishery activityand sea transportation disturbances	a. Notes from public consultation with local community and local fishermen b. Implementation of income recovery program for local fishermen with fishing activities surrounding WDA platform area c. Instalation of sea signs and sea transportation line in national shipping channel d. Announcement letter of activity from Syahbandar Bintuni, Babo, as well as Kokas	Platform construction and sea transportation	a. Method : Direct observation b. Analysis: correlational and descriptive statistics	a. Weriagar Village; b. Weriagar Baru Village; c. Mogotira Village; d. South Weriagar Village; e. North Weriagar Village ; dan Tuanaikin Village f. Magarina Village g. Kesyahbandaran Office in City of Bintuni, Babo dan Kokas	During the construction phase of transportation and installation of offshore gas platforms	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency , Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation
4	Community Perception and Social Tension due to business opportunities, fishery activity and sea transportation disturbances and flaring	a. Notes from public consultation with local community b. Functioning of grievance procedure for local community and data of grievance by local comunity	Economic opportunitie for local community	a. Method : Direct observation and perception survey b. Analysis: correlational and descriptive statistics	The nearest villaged to transportation and installation activitiesof platform, falaring activity and well gas drilling	During the construction phase of transportation and installation of offshore gas platforms	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency , Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
III. Operations Phase									
III.1 Environmental Impact									
1	Change in the abundance and diversity of the marine biota	Type and abundance of nekton, and the marine mammal diversity compared with the baseline condition during AMDAL	a. Offshore platform b. Sea transportation for personnel, equipment and materials	Conduct fishery surveys (Nekton sample collection and fishermen's catch data collection and marine mammal (visual, if possible using a hydrophone)	Berau Bay and Bintuni Bay	Once every 3 years	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
III.2 Social Impact									
1	Fishery activityand sea transportation disturbances	a. Notes from public consultation with local community and local fishermen b. Implementation of livelihood program for affected local fishermen c. Availability of alternative transportation access for affected local community d. An activity announcement letter from Syahbandar Bintuni, and Babo, as well as Kokas	Platform and safety exclusion zone operation	a. Method : Direct observation and survey b. Analysis: correlational and descriptive statistics	a. Weriagar Village; b. Weriagar Baru Village; c. Mogotira Village; d. South Weriagar Village; e. North Weriagar Village ; dan Tuanaikin Village f. Magarina Village g. Kesyahbandaran Office in City of Bintuni, Babo dan Kokas	During the operation phase of offshore gas platforms	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency , Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
2	Community Perception and Social Tension	a. Notes from public consultation with local community b. Functioning of grievance procedure for local community and data of grievance by local community	Platform and safety exclusion zone operation	a. Method : Direct observation and perception survey b. Analysis: correlational and descriptive statistics	The nearest villages to platfroms location	During the operation phase of offshore gas platforms	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency , Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation
IV. Post-Operations Phase									
Post-operations activity (facility decommissioning) will be conducted in accordance with applicable regulations in Indonesia. Decommissioning procedure will be prepared at the latest 5 years before decommissioning will be conducted, in coordination with related government institutions and other stakeholders.									

3.2 SUMMARY OF EMP FOR GAS TRANSMISSION ACTIVITY

Table III-2 Summary Matrix of EMP for Gas Transmission Activity

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
I. Pre-Construction Phase									
No environmental and social impacts during Pre-Construction phase									
II. Construction Phase									
II.1 Environmental Impact									
1	Noise level increase	Noise level increase	a. Land clearing b. Horizontal Directional Drilling (HDD)	a. Measure noise level using the Sound Level Meter, conducted internally or an accredited laboratory b. Conduct compliance evaluation by comparing analysis results with the Minister of Environment Decree No. 48 Year 1996 (refer to Table in Appendix I) c. Conduct trend evaluation	Noise level measurement is conducted at 2 locations on the perimeter fence of Tangguh	a. Internal measurement is conducted once every month b. Measurement by an external laboratory is conducted once every 6 months especially at the peak of activities	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Engine/equipment maintenance records		Check engine/equipment maintenance records to ensure that maintenance is conducted in accordance with the determined schedule	Check engine/equipment maintenance records at the workshop	Records check for vehicle maintenance is done once every 6 months			
2	Potential of water quality decline	Quality of discharge from the settling pond (turbidity)	Onshore trenching	Conduct visual observation for turbidity	Discharge point of the settling pond	a. Weekly b. After heavy rainfall	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Surface water quality (pH, TDS and TSS)	Runoff from onshore trenching	a. Collect surface water samples and analyse the required parameters internally or by an accredited laboratory	a. At the creek, upstream from the discharge point of the settling pond b. At the creek, 50 – 100 meter downstream from the discharge point of the settling pond	a. Internal monitoring is conducted on a monthly basis b. Monitoring by an external laboratory is conducted once every 3 months	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
				b. Conduct compliance evaluation by comparing analysis results with the regulatory standards of Class 2 in the Government Regulation No. 82 Year 2001, also taking into consideration baseline condition during AMDAL c. Conduct trend evaluation					
		Seawater Quality (TSS)	a. Seabed trenching, pipeline installation and rock dumping b. Nearshore pipeline installation by HDD alternative c. Nearshore pipeline installation by trenching alternative d. Pre-trench material dumping	a. Collect seawater samples with the following requirements: 1) If depth is less than 10 m, collect sample 2 m below sea level 2) If depth is between 10 – 20 m, collect samples 2 m below sea level and 2 m above the seabed 3) If depth is deeper than 20 m, collect samples 2 m below sea level, mid-depth depending on the actual depth and 2 m above the seabed b. Analyse for TSS using an accredited laboratory c. Conduct compliance evaluation by comparing analysis results with the seawater quality regulatory standards as per the Minister of Environment Regulation No. 51 Year 2004 (refer to Table in Appendix I), also taking into consideration baseline condition during AMDAL d. Monitor record of pre-	a. 1 upstream station, 1 downstream station, 1 control station at a 500 m radius depending on the current direction: 1) Seabed trenching, pipeline installation and rock dumping 2) Nearshore pipeline installation by HDD alternative 3) Nearshore pipeline installation by trenching alternative 4) Pre-trench material dumping b. Records check is conducted on the vessel or in the office	a. Once every pipeline network installation and pre-trench material dumping b. Once after the activity is completed c. Records check is conducted once every 3 months	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
				trench material dumping to track the dumping location and volume and ensure that the pre-trench material disposal is done at the agreed location in accordance with the AMDAL					
		Seawater DO level	Hydrotest water discharge to sea	a. Collect seawater samples with the following requirements: 1) If depth is less than 10 m, collect sample 2 m below sea level 2) If depth is between 10 – 20 m, collect samples 2 m below sea level and 2 m above the seabed 3) If depth is deeper than 20 m, collect samples 2 m below sea level, mid-depth depending on the actual depth and 2 m above the seabed b. Analyse for DO using an accredited laboratory c. Conduct compliance evaluation by comparing analysis results with the seawater quality regulatory standards as per the Minister of Environment Regulation No. 51 Year 2004 (refer to Table in Appendix I), also taking into consideration baseline condition during AMDAL d. Record concentration of the chemicals used	1 upstream station, 1 downstream station, 1 control station at a 500 m radius depending on the current direction from the hydrotest water discharge point	a. Once for every hydrotest activity b. Once after discharge is completed	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
3	Decline in the abundance and diversity of the marine biota	a. Decline in type and abundance of nekton and	Sea transportation for personnel, equipment and materials	a. Conduct fishery surveys (Nekton sample collection and	Berau Bay and Bintuni Bay	a. Once at the peak of the construction phase	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for	Ministry of Environment, Environmental Office at Teluk Bintuni Regency,

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
		marine mammal diversity		fishermen's catch data collection and marine mammal (visual, if possible using a hydrophone)		b. Once after the construction phase		activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		a. Vessel maintenance records	Sea transportation for personnel, equipment and materials	a. Check of vessel maintenance records to ensure that maintenance is conducted in accordance with the determined schedule	Vessel	Once every 6 months	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
4	Soil erosion	a. Erosion control efforts b. Soil erosion	Onshore trenching	a. Visual observation on the availability and effectiveness of the erosion control facilities for example drainage pattern, slope modification, jute net, or planting vines, soft material handling b. Visual observation at locations prone to erosion, for example slopes, stockpiles, etc c. Visual observation during revegetation	a. Drainage b. Slopes c. Stockpiles d. Other locations prone to erosion	a. During the construction of the drainage pattern and slopes b. During onshore trenching	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
5	Hazardous material and waste spill leading to seawater contamination	Facility condition and hazardous material and waste management	a. Fuel and chemical storage and management at marine facilities b. Hazardous waste storage and management at marine facilities	a. Inspect hazardous material and waste storage facility prior to operation in accordance with the applicable procedure b. Conduct routine inspection of containers, storage system, storage warehouse condition, emergency response system, and other facilities in accordance with the applicable procedure	a. Fuel and chemical storage warehouse b. Temporary hazardous waste storage c. Refuelling station	a. Storage facility inspection is conducted once before it is used b. Routine inspection is done on a weekly basis	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
		Spill clean-up, Oil and Grease concentration at the spill location, and management of hydrocarbon contaminated materials		a. Visual observation of oil film on the water to ensure that the oil spill response is conducted in accordance with the procedure b. If required, conduct seawater quality analysis for the Oil and Grease parameter in accordance with the applicable procedure (emergency response procedure) to ensure that the spill clean-up activity is conducted as per the procedure	Spill location	a. When a spill occurs b. During spill clean up at sea			
		Hazardous material and waste spill records		Record any spill that at least notes the amount and type of the spilled hazardous material and waste, spill location and the spill handling efforts	Spill location	When a spill occurs			
6	Hazardous material and waste spill leading to soil contamination	Facility condition and hazardous material and waste management	Fuel and chemical storage and management	a. Inspect hazardous material and waste storage facility prior to operation in accordance with the applicable procedure b. Conduct weekly inspection of containers, storage system, storage warehouse condition, emergency response system, and other facilities in accordance with the applicable procedure	a. Fuel and chemical storage warehouse b. Temporary hazardous waste storage c. Refuelling station	a. Storage facility inspection is conducted once before it is used b. Routine inspection is done on a weekly basis	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Spill clean-up, the soil TPH concentration and management of hydrocarbon contaminated materials		a. Visual observation to ensure that the oil spill response is conducted in accordance with the procedure b. If required, conduct soil TPH analysis (as per the Minister of Environment Decree No. 128 Year 2003) on location after the soil has been cleaned up to ensure that the contaminated soil	a. Location of the spill and the contaminated soil b. Temporary hazardous waste storage	During clean-up of contaminated soil			

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
				excavation has been done as per the procedure					
		Hazardous material and waste spill records		Record any spill, noting the amount and type of the spilled hazardous material and waste, spill location and the spill handling efforts	Location of the spill and the contaminated soil	When a spill occurs			
7	Solid non-hazardous waste and hazardous waste	Amount of solid non-hazardous waste and hazardous waste that has been produced and managed	Solid non-hazardous waste and hazardous waste management	a. Check records of the amount and type of waste that has been produced and delivered to the storage and treatment facilities in Tangguh b. Check records of the amount and disposal location of food waste that has been comminuted and disposed to the sea c. Check records and delivery of the hazardous waste manifest	Solid waste and hazardous waste treatment facilities	Records check is conducted every month during the solid waste and hazardous waste treatment activity	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Solid waste and hazardous waste facility condition and management		Conduct weekly inspection of the solid waste and hazardous waste treatment facilities in accordance with the applicable procedure	Solid waste and hazardous waste treatment facilities	Inspection is conducted on a weekly basis			
8	Terrestrial fauna and flora condition	Land clearing area	Land clearing	Compare the actual to planned land clearing area	Land clearing area	Once every 3 months during land clearing	BP Berau Ltd	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Tree cutting inventory		Check the tree cutting inventory data	Tree cutting area	During tree cutting			
		Flora and fauna diversity including revegetation		a. Maintain records of visual observation of fauna sightings during activity b. Compare the actual to planned revegetation area c. Maintain records of cover crop data (type and amount) and trees used for	a. Land clearing area for fauna sightings data b. Revegetation area	a. During land clearing b. Revegetation survey is conducted once every 6 months during revegetation operation and care			

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
				revegetation					
				d. Routinely monitor the success rate of the Revegetation Program through the following parameters: density, diversity, survival rate and canopy cover					
II.2 Social Impact									
1	Workforce	a. Workforce recruitment and demobilization strategies in construction phase b. Achieved the percentage of workforce target according to workforce table c. At the end of employment contract, workers obtain their rights and will be demobilized to their previous point of hire	Recruitment and demobilization in the Construction Phase	a. Method : Direct observation b. Analysis: correlational and descriptive statistics	a. The villages of Indigenous People in surrounding Tangguh LNG b. Bintuni-Fakfak Cities c. Manokwari City d. Jakarta	The construction phase of Gas Transmission	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation
2	Changes in livelihood pattern and level of income due to secondary impact of job and business opportunities	a. Absorption of local products from agriculture and fisheries sector; data of local products of agriculture and fisheries sectors absorbed from the villages closest to project activities b. Implementation of income recovery program for affected local fishermen	Installation of seabed pipeline and sea transportation	a. Method : Direct observation, survey and questionnaire b. Analysis: correlational and descriptive statistics	The nearest villages to location of seabed pipeline installation	The construction phase of Gas Transmission	BP Berau Ltd	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
3	Fishery activityand sea transportation disturbances	a. Notes taken from public consultation with local community b. Diimplementasi kannya program pemulihan pendapatan bagi nelayan lokal yang terkena dampak c. Terpasangnya rambu laut d. Tercantumnya jalur transportasi laut dalam alur pelayaran nasional e. Adanya surat pemberitahuan kegiatan kepada Syahbandar Bintuni, dan Babo, dan Kokas	Installation of seabed pipeline and sea transportation	a. Method : Direct observation b. Analysis: correlational and descriptive statistics	a. The nearest villages to location of seabed pipeline installation b. Kesyahbandaran Office in Bintuni, Babo and Kokas c. Watershed in surounding safety exclusion zone of Tangguh LNG and sea transportation channel	The construction phase of Gas Transmission	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation
4	Community Perception and Social Tension due to job opportunities, fishery activityand sea transportation disturbances	a. Notes taken from public consultation with local community b. Functioning of grievance procedure for local community and data of grievance by local community	Installation of seabed pipeline and sea transportation	a. Method : Direct observation and perception survey b. Analysis: correlational and descriptive statistics	The nearest villages to location of seabed pipeline installation	The construction phase of Gas Transmission	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation
III. Operations Phase									
III.1 Environmental Impact									
No Environmental Impact during Operations Phase									
III.2 Social Impact									
No Social Impact during Operations Phase									
IV. Post-Operations Phase									
Post-operations activity (facility decommissioning) will be conducted in accordance with applicable regulations in Indonesia. Decommissioning procedure will be prepared at the latest 5 years before decommissioning will be conducted, in coordination with related government institutions and other stakeholders.									

3.3 SUMMARY OF EMP FOR LNG PLANT ACTIVITY

Table III-3 Summary of EMP for LNG Plant Activity

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
I. Pre-Construction Phase									
No environmental and social impacts during Pre-Construction phase									
II. Construction Phase									
II.1 Environmental Impact									
1	Noise level increase	Noise level	a. Land clearing b. Construction of LNG Plant and its supporting facilities	a. Measure noise level using the Sound Level Meter, conducted internally or an accredited laboratory b. Conduct compliance evaluation by comparing analysis results with the regulatory standards in the Minister of Environment Decree No. 48 Year 1996 (refer to Table in Appendix I) c. Conduct trend evaluation	Noise level measurement is conducted at 2 locations on the perimeter fence of Tangguh	a. Internal measurement is conducted once every month b. Measurement by an external laboratory is conducted once every 6 months especially at the peak of activities	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Engine/equipment maintenance records		Check engine/equipment maintenance records to ensure that maintenance is conducted in accordance with the determined schedule	Check engine/equipment maintenance records at the workshop	Records check for vehicle maintenance is done once every 6 months			
2	Air Quality	Ambient air quality (SO_2, CO, NO_2, HC, PM 10, PM 2.5, TSP and Lead)	a. Land preparation b. Construction of LNG Plant and its supporting facilities	a. Collect ambient air samples and analyse the required parameters internally or by an accredited laboratory b. Conduct compliance evaluation by comparing analysis results with the regulatory standards in Government Regulation No. 41 Year 1999 and the General EHS Guidelines 2007 (refer to Table in Appendix I) c. Conduct trend evaluation	2 locations on the perimeter fence of Tangguh	Once every 6 months	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Incinerator emission quality a. Non-hazardous waste incinerator (NOx, SO_2, H_2S) b. Hazardous waste incinerator(particulate, SO_2, NO_2, HF, HCl, CO, Total Hydrocarbon, As, Cd, Cr, Pb, Hg, Ti, and opacity)	Incinerator operation for non-hazardous waste and hazardous waste management	a. Collect air emission samples at the sampling points on the stacks and analyse the required parameters internally or by an accredited laboratory b. Conduct compliance evaluation by comparing analysis results with the applicable regulations: 1) Non-hazardous waste incinerator emission as per the Minister of Environment Decree No. 13 Year 1995 (refer to Table in Appendix I) 2) Non-hazardous waste incinerator emission as per	a. Sampling point on the non-hazardous waste incinerator stack b. Sampling point on the hazardous waste incinerator stack	a. Non-hazardous waste incinerator: once every year b. Hazardous waste incinerator: once every 3 months			

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
				the Head of Environmental Impact Agency Decree No. 03 Year 1995 (refer to Table in Appendix I) c. Conduct trend evaluation					
		Incinerator maintenance records check		Check incinerator maintenance records to ensure that maintenance is conducted in accordance with the determined schedule	Check incinerator maintenance records at the workshop/incinerator location	Records check for incinerator maintenance is done once every 6 months			
		Emission quality of the generator a. Capacity< 570 KWth (NOx, CO, H_2S) b. Capacity 570 KWth < x < 3MWth (Total Particulate, SO_2, NOx, CO and H_2S) c. Generator maintenance records	Power generation from the diesel generator	a. Collect air emission samples at sampling points of the stack and conduct analysis for the concentration of the required parameters done by an accredited laboratory b. Conduct compliance evaluation by comparing analysis results with the Minister of Environment Regulation No. 13 Year 2009 and the General EHS Guidelines 2007 (refer to Table in Appendix I) c. Conduct trend analysis d. Check the generator maintenance records	a. Sampling point of the diesel generator stack b. Check the generator maintenance records at the workshop	a. Capacity< 570 KWth : Once every 3 years b. Capacity 570 KWth < x < 3MWth : Once every year c. Generator maintenance records check is conducted once every 6 months			
3	Water Quality	Seawater salinity and pH level at the desalination unit discharge pipe	Wastewater from the desalination alternative	a. Collect seawater samples and conduct analysis for salinity done by an accredited laboratory b. Collect wastewater samples and measure the pH level done by an accredited laboratory c. Check the records of the daily wastewater discharge flowrate d. Conduct compliance evaluation by comparing analysis results with the standards set in the Wastewater Discharge to Sea Permit, also taking into consideration baseline conditions during AMDAL e. Conduct compliance evaluation by comparing the actual flowrate with the maximum allowable flowrate f. Conduct trend evaluation for the wastewater concentration and flowrate discharged to sea	a. Upstream and downstream from the common outfall at a 100 m radius (salinity) b. Desalination unit discharge point (pH and flowrate) c. Flowrate reading is taken from the desalination unit's flowmeter	a. Water quality analysis is done on a monthly basis b. Flowrate record is taken on a daily basis	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Wastewater discharge quality from Sewage Treatment Plant (STP) (pH, BOD, TSS, Oil And Grease)	Treated sewage from the STP	a. Collect treated sewage samples at the compliance points and analyse the required parameters as per the applicable regulations, by an	a. Discharge point of the STP unit b. Flowrate reading is taken from the desalination unit's	a. Water quality analysis is conducted on a monthly basis b. Flowrate record is taken on a daily basis	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Impact Management Agency	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
				accredited laboratory b. Check records of the daily wastewater discharge flowrate c. Calculate the load for each treated wastewater discharged to sea through multiplying the flowrate reading by the concentration (analysis results) d. Conduct compliance evaluation by comparing analysis results with the regulatory standards in the Wastewater Discharge to Sea Permit, Minister of Environment Decree No. 112 Year 2003 and the General EHS Guidelines 2007 (refer to Table in Appendix I)	flowmeter			Papua Barat	Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
				e. Conduct compliance evaluation by comparing the actual flowrate with the maximum allowable flowrate f. Conduct compliance evaluation by comparing the calculated load with the maximum allowable load g. Conduct trend evaluation for concentration, flowrate and load of the discharged wastewater					
		Seawater quality (pH, BOD, TSS, Oil and Grease)	Treated sewage from the STP	a. Collect seawater samples upstream and downstream from the common outfall at a 100 m radius and conduct analysis for the required parameters b. Conduct compliance analysis by comparing analysis results with the regulatory standards in the Minister of Environment Decree No. 51 Year 2004 (refer to Table in Appendix I), also taking into consideration baseline conditions during AMDAL c. Conduct trend evaluation	Upstream and downstream from the common outfall at a 100 m radius	Once every 3 months	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
		Discharge quality from the settling pond (turbidity and pH)	Runoff from Earthwork which includes land clearing and site preparation	a. Internally conduct visual monitoring for turbidity b. Internally analyse for pH	Settling pond discharge point	a. Weekly; and b. After heavy rainfall	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Surface water quality (pH, TDS, TSS and other main parameters related to the characteristic of the wastewater)		a. Collect surface water samples and internally analyse for pH, TDS and TSS b. Collect surface water samples and conduct analysis for the required parameters by an accredited laboratory c. Conduct compliance evaluation by comparing analysis results with the Class 2 surface water regulatory standards in Government Regulation No. 82 Year 2001, also taking into consideration baseline conditions during AMDAL d. Conduct trend evaluation	a. Upstream of the settling pond discharge point b. 50 - 100 meter downstream from the settling pond discharge point	a. Internal monitoring is done on a monthly basis b. Monitoring by an external laboratory is done once every 3 months	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Groundwater level and groundwater quality (pH, TDS, TSS, Fecal Coliform, Nitrite, Nitrate, Ammonia, Sulphate, Sulphide, Total Phosphate, Chloride, BOD, COD, Mercury, Arsenic, Cadmium, Zinc, Iron, Manganese, Copper and Lead)	Sanitary Landfill (Non-hazardous waste)	a. Collect groundwater samples from monitoring wells and analyse for the required parameters by using an accredited laboratory b. Conduct compliance evaluation by comparing analysis results with the Class I groundwater quality regulatory standards in Government Regulation No. 82 Year 2001, also taking into consideration baseline conditions during AMDAL c. Conduct trend evaluation d. Measure groundwater level using the Water Level Monitoring Equipment	1 Monitoring Well upstream and 3 Monitoring Wells downstream of the Sanitary Landfill	Once every 6 months	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
4	Hydrology change	Change in drainage patterns from the natural pattern to the new pattern as per the activity plan	Earthwork covering land clearing and site preparation including excavation and backfilling	a. Conduct visual monitoring and compare the actual drainage pattern with the planned drainage pattern b. Compare the actual drainage pattern with the hydrology map in the plan	Drainage pattern in the Earthwork location	a. Visual monitoring is conducted every time there is a change in the drainage pattern b. Map checks is conducted once every 3 months throughout Earthwork	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
									Directorate General
5	Soil erosion increase	a. Implementation of erosion control efforts (including facilities and infrastructure) b. Soil erosion	Earthwork including land clearing and site preparation	a. Conduct visual monitoring and inspection of the erosion control efforts (for example: drainage pattern, slope modification, jute net or planting vines, soft material handling and sedimentation pond) b. Conduct visual monitoring and inspection at locations which are prone to erosion (for example: slopes, stockpiles, etc)	a. Drainage b. Slopes c. Stockpiles d. Earthwork location in general	a. Weekly b. After heavy rainfall	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
6	Change from natural hydrogeology with the potential to disturb the community groundwater wells and land subsidence	Groundwater use flowrate	Freshwater source from the groundwater extraction alternative	Maintain daily records of groundwater use from the production wells	Production wells	Daily	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat, Energy and Mineral Resources Agency at Teluk Bintuni Regency	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Groundwater quality		Collect groundwater samples and conduct groundwater quality analysis for salinity and TDS	Production wells and monitoring wells	a. Weekly for the production wells b. Once every 3 months for the monitoring wells			
		Groundwater level		Maintain records of the groundwater levels of the production wells, monitoring wells and community wells	Production wells, monitoring wells and the community wells	a. Weekly for the production wells b. Monthly for the monitoring wells c. Once every 3 months for the community wells			
		Ground level		Maintain records of the landscape change at the land subsidence monitoring station	Land subsidence monitoring station around the production wells	Once every 3 months			
7	Terrestrial flora and fauna change	Land clearing extent	a. Land clearing b. Construction of the LNG Plant and its supporting facilities	Compare the actual land clearing area with the planned area	Land clearing area	Once every 3 months during land clearing	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Flora and fauna diversity including revegetation		a. Maintain records of the fauna sightings during land clearing and teh construction of the LNG Plant and its supporting facilities b. Conduct flora and fauna survey in the Buffer Zone c. Compare actual revegetation area with the planned area d. Maintain records of cover crop (type and amount) and the planted trees e. Conduct routine monitoring of the success rate of the Revegetation Program through a number of parameters: density, diversity, survival rate and canopy cover	a. Land clearing area and around the construction of the LNG Plant and its supporting facilities only for fauna sightings data b. Buffer zone c. Revegetation location	a. Visual monitoring for fauna sightings is done during land clearing and construction of the LNG Plant and its supporting facilities b. Flora fauna survey is conducted once during the construction phase c. Revegetation survey is conducted once every 6 months during the operation and maintenance of the revegetation program			

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
8	Potential of decline in abundance and diversity of marine biota	a. Nekton type and abundance b. Marine mammal diversity	Sea transportation for personnel, equipment and materials	Conduct fishery (nekton sample collection and fishermen catch data collection) and marine mammal (visual, if possible using a hydrophone) survey	Bintuni Bay and Berau Bay	Once during the Construction phase	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Marine mammal awareness training		Check the marine mammal awareness training records given to the vessel crew and compare the records with the training matrix	Onshore or in the vessel	During sea transportation activities in the construction phase			
		Vessel engine maintenance records		Conduct records check of vessel engine maintenance to ensure that maintenance is conducted in accordance with the determined schedule	Vessel	Once every 6 months			
9	Hazardous material and waste spill leading to soil contamination	Facility condition and hazardous material and waste management	a. Fuel and chemical storage and management b. Hazardous waste storage and management	a. Inspect hazardous material and waste storage facility prior to operation in accordance with the applicable procedure b. Conduct weekly inspection of containers, storage system, storage warehouse condition, emergency response system, and other facilities in accordance with the applicable procedure	a. Fuel and chemical storage warehouse b. Temporary hazardous waste storage c. Refuelling station	a. Storage facility inspection is conducted once before it is used b. Routine inspection is done on a weekly basis	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Spill clean-up, the soil TPH concentration and management of hydrocarbon contaminated materials		a. Visual monitoring to ensure that the oil spill response is conducted in accordance with the procedure b. If required, conduct soil TPH analysis (as per the Minister of Environment Decree No. 128 Year 2003) on location after the soil has been cleaned up to ensure that the contaminated soil excavation has been done as per the procedure	a. Location of the spill and the contaminated soil b. Temporary hazardous waste storage	During clean-up of contaminated soil			
		Hazardous material and waste spill records		Record any spill, noting the amount and type of the spilled hazardous material and waste, spill location and the spill handling efforts	Location of the spill and the contaminated soil	When a spill occurs			

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
10	Solid non-hazardous waste and hazardous waste	Amount of solid non-hazardous waste and hazardous waste that has been produced and managed	Solid non-hazardous waste and hazardous waste management	a. Check records of the amount and type of waste that has been produced and delivered to the storage and treatment facilities in Tangguh b. Check records of waste that has been treated in Tangguh (for example incineration, composting, etc) c. Check records of the solid waste amount disposed to the Non-hazardous waste landfill d. Check records of the recyclable waste sent to the external recycling company e. Check records and delivery of the hazardous waste manifest	Solid waste and hazardous waste treatment facilities in Tangguh	a. Throughout the management of solid waste and hazardous waste b. Inspection is done on a weekly basis	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Solid waste and hazardous waste facility condition and management		Conduct weekly inspection of the solid waste and hazardous waste treatment facilities in accordance with the applicable procedure	Solid waste and hazardous waste treatment facilities	Inspection is done on a weekly basis			
11	Decline in soil quality due to top soil stripping	Disturbed topsoil that is managed in accordance with the procedure to retain the amount and the quality	Topsoil stripping during Earthwork	a. Conduct Logbook checks from the excavation and storage of topsoil b. Conduct inspection of topsoil management	Topsoil excavation and storage location	a. Records check is conducted on a monthly basis b. Routine inspection is conducted on a weekly basis	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
II.2 Social Impact									
1	Demographic (Migration, Population Structure and Population Growth)	a. The availability of Socio-Economic and population data b. Conducting a study of incoming migration and its negative impact c. Functioning of population control system d. Indigenous People lead the village development process e. Availability of Civil Administration and Information System	Job opportunities and business opportunities during the operation phase due to workforce recruitment and mobilization which emerge honey pot syndrome; influence new settler and their families to settle in villages in area surrounding Tangguh LNG operation site	a. Method : survey, census and observation b. Analysis: correlational and descriptive statistics	a. The villages of Indigenous People in surounding area of Tangguh LNG b. Local Government of Teluk Bintuni and Fakfak Regencies offices	The Construction Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation
2	Workforce	a. Strategies for workforce recruitment and demobilization in construction phase b. Achieved the target of workforce percentage complies with workforce table c. At the end of contract, workers accept their rights and are demobilized to their previous point of hire	Job opportunities for Indigenous People and local community	a. Method : Direct observation b. Analysis: correlational and descriptive statistics	a. The villages of Indigenous People in surounding area of Tangguh LNG b. Bintuni-Fakfak Cities c. Manokwari City d. Jakarta	The Construction Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation
3	Changes in Local Business Growth	Absorption of local products from agriculture and fisheries sector; data of local products of agriculture and fisheries sectors absorbed from the villages closest to project activities	Job opportunities in construction phase	a. Method : Direct observation and survey b. Analysis: correlational and descriptive statistics	The villages in surounding area of construction phase of LNG Plant	The Construction Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
								Management Agency) of West Papua	and Gas, Directorate of Sea Transportation
4	Changes in livelihood pattern and level of income due to secondary impact of job and business opportunities	a. Absorption of local products from agriculture and fisheries sector; data of local products of agriculture and fisheries sectors absorbed from the villages closest to project activities b. The availability of intermediate good/service which offer services for Tangguh LNG	The construction activity of LNG Plant including sea transportation, food supplies and other supplies for workers	a. Method : Direct observation, survey and questionnaire b. Analysis: correlational and descriptive statistics	The villages in surounding area of Tangguh LNG	The Construction Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation
5	Community Perception and Social Tension related to job opportunities, livelihood, fishery activity and sea transportation disturbances	a. Attendance list and notes taken from public consultation b. Consultation notes c. Functioning of grievance procedure for community d. The amount of grievances is not significant	a. Notes from public consultation with local community b. Functioning of grievance procedure for local community and data of grievance by local community	a. Method : Direct observation and perception survey b. Analysis: correlational and descriptive statistics	The villages in surounding area of construction phase of LNG Plant	The Construction Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation
6	Assimilation, Acculturation, Changes in Social Values and Norms	a. Notes taken from regular art and cultural activities in art and cultural center of Indigenous People b. Development of traditional houses in the selected villages c. Activities of Art and cultural promotions with economic value	Job opportunities and business opportunities emerge honey pot syndrome; influence new settler and their families to settle in villages in area surrounding Tangguh LNG operation site	a. Method : Direct observation b. Analysis: qualitative descriptive	The villages of Indigenous People in surounding area of Tangguh LNG	The Construction Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas
7	Marginalization of Indigenous People	a. The main beneficiaries of	Social competition between Indigenous	a. Method : Direct observation b. Analysis: correlational and	The villages of Indigenous People in	The Construction Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Environmental Office	Ministry of Environment, Environmental Regional

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
	and vulnerable groups	social program is Indigenous People b. Activities of Art and cultural promotion with economic value c. Indigenous People and vulnerable group have access to livelihood program	People and new settlers	descriptive statistics	surrounding area of Tangguh LNG			(KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation
8	Decline in access to Public Service including Education	a. Tangguh LNG contribution in infrastructure development in villages in area surrounding Tangguh LNG b. Students derived from Indigenous People have access and service to obtain good education as well as quality of education significantly	Job opportunities and business opportunities emerge honey pot syndrome; influence new settler and their families to settle in villages in area surrounding Tangguh LNG operation site	a. Method : Direct observation b. Analysis: correlational and descriptive statistics	The villages in surrounding area of Tangguh LNG	The Construction Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation
9	Changes in Disease Pattern, Changes in Disease Prevalence, Changes in Access to Healthcare and Changes in Environmental Health	a. Indigenous People have access and service to healthcare appropriate with good standard b. Controlled the spread and prevalence of communicable diseases in villages surrounding Tangguh LNG operation site c. Maintaining environmental health in the destination villages of the new settlers	Job opportunities and business opportunities emerge honey pot syndrome; influence new settler and their families to settle in villages in area surrounding Tangguh LNG operation site	a. Method : survey and observation b. Analysis: correlational and descriptive statistics	The villages in surrounding area of Tangguh LNG	The Construction Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
III. Operations Phase									
III.1 Environmental Impact									
1	Noise level increase	Noise level	Operation of the LNG Plant and its supporting facilities	a. Measure noise level using the Sound Level Meter, conducted internally or an accredited laboratory b. Conduct compliance evaluation by comparing analysis results with the Minister of Environment Decree No. 48 Year 1996 (refer to Table in Appendix I) c. Conduct trend analysis	Noise level measurement is conducted at 2 locations on the perimeter fence of Tangguh	Once every 6 months	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Engine/equipment maintenance records		Check engine/equipment maintenance records to ensure that maintenance is conducted in accordance with the determined schedule	Check engine/equipment maintenance records at the workshop	Records check for vehicle maintenance is done once every 6 months			
2	Air Quality	Ambient air quality (SO_2, CO, NO_2, HC, PM 10, PM 2.5, TSP, O_3 and Lead)	Operation of the LNG Plant and its supporting facilities	a. Collect ambient air samples and analyse the required parameters by an accredited laboratory b. Conduct compliance evaluation by comparing analysis results with the regulatory standards in Government Regulation No. 41 Year 1999 and the General EHS Guidelines 2007 (refer to Table in Appendix I) c. Conduct trend evaluation	2 locations on the perimeter fence of Tangguh	Once every 6 months	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Flare emission volume and quality (Opacity)	Flare emission	a. Conduct opacity monitoring using an accredited laboratory b. Conduct compliance evaluation by comparing the analysis results with the Minister of Environment Regulationi No. 13 Year 2009 (refer to Table in Appendix I) c. Calculate the actual flare emission volume and compare it with the planned volume	Flare stack	Once every 6 months			
		CO_2 emission	CO_2 emission from the LNG Plant and its supporting facilities in general	a. Check records of the diesel fuel and jet fuel usage b. Check records of the flared gas volume, fuel gas volume and the amount of CO_2 from the feed gas incinerated in AGI and flared c. Calculate the total CO_2 emission and compare it with the planned CO_2 emission	LNG Plant and its supporting facilities	Once every 6 months			
		Emission quality which includes:	Emission from the Boiler, Steam	a. Collect samples and analyse for the required parameters in	Boiler, Gas Turbine and AGI stacks	Once every 6 months			

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
		a. Boiler (NOx, Opacity, SO_2, Total Particulate andH_2S) b. Gas Turbine (NOx, Total Particulate, SO_2, H_2S) c. Acid Gas Incinerator (AGI) (SO_2 and H_2S)	Generator, Gas Turbine and AGI	accordance with the applicable regulations using an accredited laboratory b. Conduct compliance evaluation by comparing the analysis results with the Minister of Environment Regulationi No. 13 Year 2009 (refer to Table in Appendix I) c. Conduct trend evaluation					
		CEMS reading and operation, covering: a. Monitoring result b. Calibration c. Abnormal condition		a. Check the records and calculate the CEMS monitoring result average in accordance with the Minister of Environment Regulation No. 13 Year 2009 b. Check records of calibration, repair and maintenance and the consequent adjustments c. Conduct records of abnormal conditions as per the Minister of Environment Regulation No. 13 Year 2009	Emission sources in accordance with the applicable regulation	a. During Operational activities that may produce emission, in accordance with the applicable regulations b. During calibration, repair and maintenance and the consequent adjustments c. Abnormal conditions			
		Incinerator emission quality a. Non-hazardous waste incinerator (NOx, SO_2, H_2S) b. Hazardous waste incinerator (Particulate, SO_2, NO_2, HF, HCl, CO, Total Hydrocarbon, As, Cd, Cr, Pb, Hg, Ti, and Opacity)	Operation of incinerator for the management of solid non-hazardous waste and hazardous waste	a. Collect air emission samples at the stack sampling point and analyse for the required parameters using an accredited laboratory b. Conduct compliance evaluation by comparing analysis results with the applicable regulations: 1) Non-hazardous waste incinerator emission as per the Minister of Environment Decree No. 13 Year 1995 (refer to Table in Appendix I) 2) Non-hazardous waste incinerator emission as per the Head of Environmental Impact Agency Decree No. 03 Year 1995 (refer to Table in Appendix I) c. Conduct trend evaluation	a. Sampling point on the non-hazardous waste incinerator stack b. Sampling point on the hazardous waste incinerator stack	a. Non-hazardous waste incinerator: Once every year b. Hazardous waste incinerator: Once every 3 months			
		Incinerator maintenance		Check records of incinerator maintenance to ensure that maintenance is conducted as per the determined schedule	Incinerator maintenance records check is done at the workshop/incinerator location	Incinerator maintenance records check is done once every 6 months			

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
3	Water Quality	Seawater salinity and pH level at the desalination unit discharge pipe	Wastewater from the desalination alternative	a. Collect seawater samples and analyse for salinity using an accredited laboratory b. Collect wastewater samples and measure pH using an accredited laboratory c. Check records of daily wastewater discharge flowrate d. Conduct compliance evaluation by comparing analysis results with the regulatory standards in the Wastewater Discharge to Sea Permit e. Conduct compliance evaluation by comparing actual flowrate with the maximum allowable flowrate f. Conduct trend analysis for concentration and flowrate of the effluent	a. Upstream and downstream of the common outfall at a 100 m radius (salinity) b. Discharge point of the desalination unit (pH and flowrate) c. Flowrate reading is conducted on the desalination unit's flowmeter	a. Quality analysis is done on a monthly basis b. Flowrate record is taken on a daily basis	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Effluent water quality from the Wastewater Treatment Plant a. Produced water (temperature, pH, Oil and Grease, Total Phenol, H_2S, Ammonia, COD, Methanol) b. Oily contaminated water(pH, Oil and Grease, Total Organic Carbon) c. Chemically contaminated water(pH, COD, TSS and Total Metal) d. Sewage(pH, BOD, TSS, Oil and Grease)	Wastewater from: a. Produced water b. Oily contaminated water c. Chemically contaminated water d. Sewage	a. Collect treated wastewater samples from the compliance point and analyse for the required parameters in accordance with the applicable regulations using an accredited laboratory b. Check the daily wastewater discharge flowrate records c. Calculate the load of each of the treated wastewater streams discharged to sea through multiplying the flowrate by the concentration (analysis results) d. Conduct compliance evaluation by comparing analysis results with the wastewater regulatory standards: 1) Produced water, Oily contaminated water, Chemically contaminated water: Minister of Environment Regulation No. 19 Year 2010, applicable Permit and the EHS Guidelines for LNG Activity 2007 (refer to Table in Appendix I) 2) Sewage: Minister of Environment Decree No. 112 Year 2003 and the General EHS Guidelines 2007 (refer to Table in Appendix I)	a. Compliance points of each treatment plant b. Specifically for methanol, collect samples at a 100 m radius from common outfall	a. Quality analysis is conducted on a monthly basis b. Flowrate record is taken on a daily basis	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
				e. Conduct compliance evaluation by comparing the actual flowrate with the maximum allowable flowrate f. Conduct compliance evaluation by comparing the calculated load with the maximum allowable load g. Conduct trend evaluation for concentration, flowrate and load of the effluent					
		Effluent water quality from all treatment plants (Nitrate and Phosphate)	Wastewater from: a. Produced water b. Oily contaminated water c. Chemically contaminated water d. Sewage e. Desalination unit	a. Collect effluent water samples from common outfall b. Conduct trend analysis by comparing the discharge water quality with the seawater quality for Nitrate and Phosphate	Common outfall	Once every 6 months	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Seawater Quality affected by the treated wastewater discharge (Clarity, Turbidity, TSS, temperature, pH, DO, Oil and Grease, Total Phenol, H_2S, Ammonia, Total Ammonia, Nitrate, Phosphate, Mercury, Chromium, Arsenic, Cadmium, Copper, Lead and Nickel)	a. Effluent from the treatment plants: 1) Produced water 2) Oily contaminated water 3) Chemically contaminated water b. Sewage	a. Collect seawater samples from upstream and downstream of the common outfall at a 100 m radius and conduct analysis for the required parameters b. Conduct compliance evaluation by comparing analysis results with the regulatory standards in the Minister of Environment Decree no. 51 Year 2004 (refer to Table in Appendix I), also taking into consideration baseline conditions during AMDAL c. Conduct trend analysis	Upstream and downstream of the common outfall at a 100 m radius	Once every 3 months	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Groundwater level and groundwater quality (pH, TDS, TSS, Fecal Coliform, Nitrite, Nitrate, ammonia, Sulphate, Sulphide, Total Phosphate, Chloride, BOD, COD, Mercury, Arsenic, Cadmium, Zinc, Iron, Manganese, Copper and Lead)	Non-hazardous waste landfill	a. Collect groundwater samples from monitoring wells and analyse for the required parameters by using an accredited laboratory b. Conduct compliance evaluation by comparing analysis results with the Class I groundwater quality regulatory standards in Government Regulation No. 82 Year 2001, also taking into consideration baseline conditions during AMDAL c. Conduct trend evaluation	1 Monitoring Well upstream and 3 Monitoring Wells downstream of the Non-hazardous waste Landfill	Once every 6 months	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Surface water quality	Wastewater	a. Collect surface water samples	Upstream and	Once every 6 months	BP Berau Ltd.	Ministry of Environment,	Ministry of Environment,

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
		(pH, DO, TDS, TSS and other main parameters related to the characteristic of the wastewater)	discharge	and conduct analysis for the required parameters by an accredited laboratory b. Conduct compliance evaluation by comparing analysis results with the Class 2 surface water regulatory standards in Government Regulation No. 82 Year 2001, also taking into consideration baseline conditions during AMDAL c. Conduct trend evaluation	downstream of the surface water from the discharge point or settling pond			Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
4	Decline in the abundance and diversity of plankton and benthos and any change in the sediment quality	Abundance, diversity index and equitability index of marine plankton and benthos	Treated wastewater discharge to sea	a. Collect plankton and benthos samples b. Calculate the abundance, diversity index and equitability index of the plankton and benthos c. Collection, identification and calculation will use an accredited laboratory d. Compare the calculation with the baseline data taken during the AMDAL study (monitoring results will be compared with monitoring results from the implementation of AMDAL LNG 1 and 2 if available) e. Conduct trend evaluation if possible f. Collect sediment samples and analyse for the required parameters using an accredited laboratory g. Conduct trend evaluation	Upstream and downstream of the common outfall at a 100 m radius	Once every 6 months for plankton and benthos	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Sediment quality (Cu, Cr, Cd, Hg, Pb, As, Zn, Sb, Ni, Ag)		a. Collect sediment samples and analyse for the required parameters using an accredited laboratory b. Conduct trend analysis	Upstream and downstream of the common outfall at a 100 m radius	Once every 6 months for sediment monitoring			
5	Change from natural hydrogeology with the potential to disturb the community groundwater wells and land subsidence	Groundwater use flowrate	Freshwater source from the groundwater extraction alternative	Maintain daily records of groundwater use from the production wells	Production wells	Daily	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat, Energy and Mineral Resources Agency at Teluk Bintuni Regency	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Groundwater quality		Collect groundwater samples and conduct groundwater quality analysis for salinity and TDS	Production wells and monitoring wells	a. Weekly for the production wells b. Once every 3 months for the monitoring wells			

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
		Groundwater level		Maintain records of the groundwater levels of the production wells, monitoring wells and community wells	Production wells, monitoring wells and the community wells	a. Weekly for the production wells b. Monthly for the monitoring wells c. Once every 3 months for the community wells			
		Ground level		Maintain records of the landscape change at the land subsidence monitoring station	Land subsidence monitoring station around the production wells	Once every 3 months			
6	Terrestrial flora and fauna change	Flora and fauna diversity	Operation of the LNG Plant and its supporting facilities	Conduct flora and fauna survey in the Buffer Zone	Buffer zone location in Tangguh	Flora fauna survey is conducted once every 5 years during Operations phase	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
7	Decline in abundance and diversity of marine biota	a. Nekton type and abundance b. Marine mammal diversity	Sea transportation for personnel, equipment and materials	Conduct fishery (nekton sample collection and fishermen catch data collection) and marine mammal (visual, if possible using a hydrophone) survey	Bintuni Bay and Berau Bay	Once every 3 years	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Marine mammal awareness training		Check the marine mammal awareness training records given to the vessel crew and compare the records with the training matrix	Onshore or in the vessel	During sea transportation activities in the Operations phase			
		Vessel engine maintenance records		Conduct records check of vessel engine maintenance to ensure that maintenance is conducted in accordance with the determined schedule	Vessel	Once every 6 months			
8	Hazardous material and waste spill leading to soil contamination	Facility condition and hazardous material and waste management	a. Fuel and chemical storage and management b. Hazardous waste storage and management	a. Inspect hazardous material and waste storage facility prior to operation in accordance with the applicable procedure b. Conduct weekly inspection of containers, storage system, storage warehouse condition, emergency response system, and other facilities	a. Fuel and chemical storage warehouse b. Temporary hazardous waste storage c. Refuelling station	a. Storage facility inspection is conducted once before it is used b. Routine inspection is done on a weekly basis	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
		Spill clean-up, the soil TPH concentration and management of hydrocarbon contaminated materials		a. Visual monitoring to ensure that the oil spill response is conducted in accordance with the procedure b. If required, conduct soil TPH analysis (as per the Minister of Environment Decree No. 128 Year 2003) on location after the soil has been cleaned up to ensure that the contaminated soil excavation has been done as per the procedure	a. Location of the spill and the contaminated soil b. Temporary hazardous waste storage	During clean-up of contaminated soil			
		Hazardous material and waste spill records		Record any spill, noting the amount and type of the spilled hazardous material and waste, spill location and the spill handling efforts	Location of the spill and the contaminated soil	When a spill occurs			
9	Solid non-hazardous waste and hazardous waste	Amount of solid non-hazardous waste and hazardous waste that has been produced and managed	Solid non-hazardous waste and hazardous waste management	a. Check records of the amount and type of waste that has been produced and delivered to the storage and treatment facilities in Tangguh b. Check records of waste that has been treated in Tangguh (for example incineration, composting, etc) c. Check records of the solid waste amount disposed to the Non-hazardous waste landfill d. Check records of the recyclable waste sent to the external recycling company e. Check records and delivery of the hazardous waste manifest f. Conduct weekly inspection of the solid waste and hazardous waste treatment facilities	Solid waste and hazardous waste treatment facilities in Tangguh	Throughout the management of solid waste and hazardous waste	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Solid waste and hazardous waste facility condition and management		Conduct weekly inspection of the solid waste and hazardous waste treatment facilities in accordance with the applicable procedure	Solid waste and hazardous waste treatment facilities in Tangguh	Inspection is done on a weekly basis			
III.2 Social Impact									
1	Demographic (Migration, Population Structure and Population Growth)	a. The availability of Socio-Economic and population data b. Conducting a study of incoming migration and its negative impact c. Functioning of population control system d. Indigenous People lead the village development process e. Availability of Civil	Job opportunities and business opportunities during the operation phase due to workforce recruitment and mobilization which emerge honey pot syndrome; influence new settler and their families to settle in villages in area surrounding Tangguh LNG	a. Method : Direct observation, census, and survey b. Analysis: correlational and descriptive statistics	• The villages of Indigenous People in surrounding area of Tangguh LNG • Local Government of Teluk Bintuni and Fakfak Regency Offices	The Operation Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
		Administration and Information System	operation site						
2	Workforce	a. Strategies for workforce recruitment and demobilization in operation phase b. Graduates from selected Indigenous People to continue higher education in leading university in Papua and National based on accreditation issued by Directorate of Higher Education c. Achieved the target of workforce percentage complies with workforce table d. At the end of contract, workers accept their rights and are demobilized to their previous point of hire	Job opportunities for Indigenous People and local community	a. Method : Direct observation b. Analysis: correlational and descriptive statistics	a. The villages of Indigenous People in surrounding area of Tangguh LNG b. Bintuni-Fakfak Cities c. Manokwari City d. Jakarta	The Operation Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation
3	Changes in Local Business Growth, Changes in livelihood pattern and level of income	a. Absorption of local products from agriculture and fisheries sector; data of local products of agriculture and fisheries sectors absorbed from the villages in surrounding area of Tangguh LNG b. Indigenous People get the capital access and business loan c. The formation of business administration of local products marketing in the market located in and outside Bintuni	Job and business opportunities during operation phase	a. Method : Direct observation and survey b. Analysis: correlational and descriptive statistics	a. The villages of in surrounding area of Tangguh LNG b. Bintuni, Babo and Kokas City	The Operation Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
		Bay Region d. The availability of intermediate good/service which offer services for Tangguh LNG e. Percentage of contribution of local government revenue derived from economic activities centered on Tangguh LNG							
4	Assimilation, Acculturation, Changes in Social Values and Norms, Changes in Cultural Heritage	a. Note taken from regular art and cultural activities in art and cultural center of Indigenous People b. Development of traditional houses in the selected villages c. Activities of Art and cultural promotions with economic value	Job opportunities and business opportunities emerge honey pot syndrome; influence new settler and their families to settle in villages in area surrounding Tangguh LNG operation site	a. Method : Direct observation b. Analysis: correlational and descriptive statistics	The villages of Indigenous People in surrounding area of Tangguh LNG	The Operation Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
5	Community Perception and Social Tension related to the impact of Tangguh LNG activities, namely workforce, business opportunities, fishery activityand sea transportation disturbances, and seawater intrusion. In addition, the growing expectations of community also needs to be managed considering the impact that community expect greater benefits from Tangguh LNG, such as education program, health program, livelihood program, Papuan entrepreneurship program, and Papuan development program, revenue-sharing (DBH), adat recognition, gas to power, electricity for community, housing development, expansion area, expansion of the coverage area of social programs and infrastructure improvement on a large scale.	a. Notes from public consultation with local community b. Notes from public consultation with local government c. Functioning of grievance procedure for local community d. The establishment and functioning of the Stakeholder Forum in Bintuni Bayand Berau Bay	Operation activity of LNG Plant including job opportunities and business opportunities	a. Method : Direct observation and perception survey b. Analysis: correlational and descriptive statistics	a. The villages in surrounding area of Tangguh LNG b. Local Government of Teluk Bintuni and Fakfak Regency Offices	The Operation Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation
6	Marginalization of Indigenous People and vulnerable group	a. The main beneficiaries of social program is Indigenous People b. Activities of Art and cultural promotion with economic value c. Indigenous People and vulnerable group have access to livelihood program	Social competition between Indigenous People and new settlers	c. Method : Direct observation, census, and survey d. Analysis: correlational and descriptive statistics	The villages of Indigenous People in surrounding area of Tangguh LNG	The Operation Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
7	Decline in Access to Public Service including Education	a. Tangguh LNG contribution in infrastructure development in villages in area surrounding Tangguh LNG b. Students derived from Indigenous People have access and service to obtain good education as well as quality of education significantly c. Development of flagship schools	Job opportunities and business opportunities emerge honey pot syndrome; influence new settler and their families to settle in villages in area surrounding Tangguh LNG operation site	a. Method : Direct observation and survey b. Analysis: correlational and descriptive statistics	The villages in surrounding area of Tangguh LNG	The Operation Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
8	Changes in Disease Pattern, Changes in Disease Prevalence, Changes in Access to Healthcare, and Changes in Environmental Health	a. Indigenous People have access and service to healthcare appropriate with good standard b. Hospital in Bintuni become referral hospital and changes into Local Public Service Agency c. Controlled the spread and prevalence of communicable diseases in villages surrounding Tangguh LNG operation site d. Maintaining environmental health in the destination villages of the new settlers	Job opportunities and business opportunities emerge honey pot syndrome; influence new settler and their families to settle in villages in area surrounding Tangguh LNG operation site	a. Method : survey and direct observation b. Analysis: correlational and descriptive statistics	a. The villages in surrounding area of Tangguh LNG b. Bintuni City	The Operation Phase of LNG Plant	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation
IV. Post-Operations Phase									
Post-operations activity (facility decommissioning) will be conducted in accordance with applicable regulations in Indonesia. Decommissioning procedure will be prepared at the latest 5 years before decommissioning will be conducted, in coordination with related government institutions and other stakeholders.									

3.4 SUMMARY OF EMP FOR MARINE FACILITY ACTIVITY RINGKASAN

Table III-4 Summary Matrix of EMP for Marine Facility Activity

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
I. Pre-Construction Phase									
No environmental and social impacts during Pre-Construction phase									
II. Construction Phase									
II.1 Environmental Impact									
1	Noise Level	Noise level complies with applicable standards	Construction activity of BOF Facility, LNG 2 Jetty and Combo Dock Extension	a. Measure noise level using the Sound Level Meter which conducted both by internal or accredited laboratory b. Conduct compliance evaluation by comparing analysis results with the Minister of Environment Decree No. 48 Year 1996 (refer to Table in Appendix I) c. Conduct trend evaluation	Noise level measurement is conducted at 2 locations at Tangguh LNG perimeter fence location, and 2 locations at Tanah Merah Baru village	a. Internal measurement is conducted monthly b. Measurement by an external laboratory is conducted 6 monthly especially at the peak of activities (Marine Facility construction)	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Engine/Equipment Maintenance Records		Check engine/equipment maintenance records to ensure that maintenance is conducted in accordance with the determined schedule	Record checking of engine/equipment maintenance is conducted at workshop	Record checking for engine/equipment is conducted 6 monthly			
2	Water quality	TSS concentration in seawater	Dredging and Disposal of Dredged Material for Marine Facility construction	a. Collect seawater samples and measure TSS concentration both by Internal and accredited laboratory b. Conduct compliance evaluation by comparing analysis results (TSS concentration) with seawater standards according to MoE Decree No. 51 Year 2004 (See Table in Attachment 1) with environmental baseline data during AMDAL study c. Monitor the activity record of dredging contractor to understand dredging	a. At the nearest Safety Exclusion Zone (for Marine Facility) from dredging location or 500 meter distance from dredging location b. 500 meter distance from dredged material disposal location (point) 1 point in the upstream, 1 point in the downstream and 1 point control from disposal location c. Record checking is conducted at vessel/office	a. Internal monitoring (seawater quality analysis: TSS parameter) is conducted weekly during dredging activity. In one monitoring period, sampling will be conducted before, during and after dredging activity b. External monitoring (seawater quality analysis: TSS parameter) by laboratory is conducted once during dredging activity and once after dredging is completed c. Record checking of	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
				location and volume and ensure disposal of dredged material is conducted according to approved location in AMDAL		dredging activity implementation is conducted 3 monthly			
		Ballast water exchange	Ballast water exchange	a. Conduct record checking of ballast water exchange (at minimum : date, location, volume and vessel's name)	a. Conducted at required vessel according to MARPOL requirements or at office (administratively)	a. During ballast water exchange			
3	Hazardous material and waste spill leading to seawater contamination	Conditions of hazardous material and waste facility and management	a. Offshore fuel and chemical storage and management b. Offshore hazardous waste storage and management	a. Conduct inspection to hazardous material and waste storage facility prior to use according to applicable procedure b. Conduct weekly inspection to container, storage system, storage warehouse condition, available emergency response system and other facilities according to applicable procedure	a. Fuel and chemical storage warehouse b. Temporary hazardous waste storage c. Refueling station d. Spill location	a. Storage facility inspection is conducted once prior to be used b. Routine inspection is conducted weekly	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Spill and Oil & Grease concentration clean up activity at spill location also oily contaminated material management		a. Visual monitoring of oil film at sea to ensure oil spill response has been conducted following procedure	Spill location	a. During spill b. During offshore spill clean up			
				b. If necessary, seawater quality analysis for Oil & Grease parameter will be conducted according to applicable procedure (emergency response procedure) to ensure that spill clean up process has been conducted following procedure					

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
		Recording of hazardous material and waste spill event		Conduct recording of spill event which informs (at the minimum) about type and amount of hazardous material and waste spill, spill location, and the response conducted	Spill location	During spill			
4	Non-hazardous solid waste and hazardous waste	Amount of generated and managed non-hazardous solid waste and hazardous waste	Non-hazardous solid waste and hazardous waste management	a. Conduct record checking of amount and type of waste that being generated and sent to storage and treatment facility at Tangguh site b. Conduct record checking of amount and disposal location of comminuted food waste discharged to sea c. Conduct record checking and hazardous waste Manifest transmittal	Solid waste and hazardous waste treatment facility at vessel	Record checking is conducted monthly during solid waste and hazardous waste management	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Condition of Solid waste and Non-hazardous waste facility and treatment		Weekly inspection of solid waste and hazardous waste management facility according to applicable procedure	Solid waste and Hazardous waste management at vessel	Inspection is conducted weekly			
5	Benthos and plankton abundance	Plankton and benthos abundance, diversity index, equitability index at sea	Dredging and Disposal of Dredged Material for Marine Facility construction	a. Plankton and benthos sampling b. Calculate plankton and benthos abundance, diversity index, and equitability index c. Sampling, identification and calculation will use accredited laboratory d. Compare calculation result with data from environmental baseline taken during AMDAL study (monitoring result will be compared with monitoring from AMDAL implementation of	a. Plankton monitoring: 1) Nearest Safety Exclusion Zone (for Marine Facility) from dredging location or 500 meters distance from dredging location 2) 500 meters distance from dredged material disposal location (point) 1 point at upstream, 1 point at downstream and 1 control at disposal location b. Benthos monitoring: 1) 1 point at dredging location and 1 control 2) 1 point at disposal	Once during dredging activity and once after dredging has been completed	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
				LNG 1 and 2 (if available)	location and 1 control				
		a. Nekton type and abundance b. Marine mammal type	a. Dredging and Disposal of Dredged Material for Marine Facility construction b. Sea Transportation for Work Force, Equipment and Material c. Construction of BOF facility, LNG 2 Jetty, and Combo Dock Extension	Conduct fisheries (nekton sampling and data collection of fishermen catch) and marine mammal survey (visual, if possible using hydrophone)	Berau and Bintuni Bay	a. Once during peak of construction phase b. Once after construction phase	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Marine Mammal Awareness training		Record checking of completed Marine Mammal Training to vessel crew and compare it with training matrix	Onshore or at vessel	Record checking of training is conducted 6 monthly during Construction Phase			
6	Sediment quality	Sediment quality (parameter Cu, Cr, Cd, Hg, Pb, As, Zn, Sb, Ni, Ag)	a. Disposal of Dredged Material for Marine Facility maintenance	a. Collect sediment samples and conduct analysis according to determined parameter using accredited laboratory b. Compare sediment analysis result with ANZECC Guideline (see Table in Attachment 1) and environmental baseline during AMDAL c. Conduct trend evaluation of sediment quality	a. 1 point at dredging location and 1 control b. 1 point at disposal location and 1 control	Once during dredging activity and once after dredging has been conducted	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
II.2 Social Impact									
1	Fishery activity disturbance	a. Note taken from public consultation with local fishermen b. Implementation of livelihood program for affected local fsihermen k	Dredging activity for new jetty and BOF construction activity (*Bulk Offloading Facility*)	a. Method : direct observation, survey and questionnaire b. Analysis: correlational and descriptive statistics	Tanah Merah and Saengga Villages	The Construction of Marine Facilities	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
2	Disturbance on Sea Transportation Lane of community	a. Notes from public consultation with local community b. Installation of sea signs and sea transportation line in national shipping channel c. Availability of alternative transportation access for affected local community d. Announcement letter of activity from Syahbandar Bintuni, Babo, as well as Kokas	Application of safety exclusion zone along vessel transportation support for construction activitiy	a. Method : Direct observation b. Analysis: correlational and descriptive statistics	a. Tanah Merah, Saengga, Onar, and Babo Villages b. Watershed surrounding Saengga River Estuary c. Waters of Bintuni Bay is a public route for local transportation d. Kesyahbandaran Office in Bintuni, Babo and Kokas Cities	The Construction of Marine Facilities	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation
3	Community Perception and Social Tension as impacts of job opportunities, disturbance of fishing activities, sea transportation, noise and cultural heritage.	a. Notes from public consultation with local community b. Functioning of grievance procedure for local community and data of grievance by local community	a. Dregdring activity for new jetty and BOF construction activity b. Traffic of support Vessel for construction and safety exclusion zone application along the transportation channel of support vessel for construction activity c. BOF Piling activity	a. Method : Direct observation and survey perception b. Analysis: correlational and descriptive statistics	Tanah Merah, Saengga, Babo, and Onar Villages	The Construction of Marine Facilities	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
4	Changes in Cultural Heritage	a. Note taken from regular art and cultural activities in art and cultural center of Indigenous People b. Development of traditional houses in the selected villages c. Activities of Art and cultural promotions with economic value	BOF construction activitiy	a. Method : Direct observation b. Analysis: correlational and descriptive statistics	a. Tanah Merah and Saengga Villages b. Sacred stone, sacred river, and sacred house located inside and outside Tangguh LNG	The Construction of Marine Facilities	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation
III. Operations Phase									
III.1 Environmental Impact									
1	Seawater Quality	TSS concentration in seawater	Dredging and Disposal of Dredged Material for Marine Facility maintenance	a. Conduct seawater sampling and measure TSS concentration by both Internal and accredited laboratory b. Conduct compliance evaluation by comparing TSS concentration analysis result with seawater standards according to MoE Decree No. 51 Year 2004 (See Table at Attachment I) and analysis result will also be compared with environmental baseline data from AMDAL study c. Monitor the activity record of dredging contractor to understand dredging location and volume and ensure disposal of dredged material is conducted according to approved location in AMDAL	a. At the nearest Safety Exclusion Zone (for Marine Facility) from dredging location or 500 meter distance from dredging location b. 500 meter distance from dredged material disposal location (point) 1 point in the upstream, 1 point in the downstream and 1 point control from disposal location c. Record checking is conducted at vessel/office	a. Internal monitoring (seawater quality analysis: TSS parameter) is conducted weekly during dredging activity. In one monitoring period, sampling will be conducted before, during and after dredging b. External monitoring (seawater quality analysis: TSS parameter) by laboratory is conducted once during dredging activity and once after dredging is conducted c. Record checking of dredging activity implementation is conducted 3 monthly	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
2	Coastline changes	Actual coastline	Marine Facility	a. Regular coastline monitoring b. Monitoring can be done through satellite image of coastline condition around the location	Coastline location around activity location	Monitoring is conducted twice in 5 years	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
3	Hazardous material and waste spill leading to seawater contamination	Condition of hazardous material and waste facility and management	a. Offshore fuel and chemical storage and management b. Offshore hazardous waste storage and management	a. Conduct inspection to hazardous material and waste storage facility prior to use according to applicable procedure b. Conduct weekly inspection to container, storage system, storage warehouse condition, available emergency response system and other facilities according to applicable procedure	a. Fuel and chemical storage warehouse b. Temporary hazardous waste storage c. Refueling station	a. Storage facility inspection is conducted once prior to be used b. Routine inspection is conducted monthly	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Spill and Oil & Grease concentration clean up activity at spill location also oily contaminated material management		a. Visual monitoring of oil film at sea to ensure oil spill response has been conducted following the procedure b. If necessary, seawater quality analysis for Oil & Grease parameter will be conducted according to applicable procedure (emergency response procedure) to ensure that spill clean up process has been conducted following procedure	Spill location	a. During spill b. During offshore spill clean-up			
		Recording of hazardous material and waste spill event		Conduct recording of spill event which informs (at the minimum) about type and amount of hazardous material and waste spill, spill location, and the response conducted	Spill location	During spill			

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
4	Non-hazardous solid waste and hazardous waste	Amount of generated and managed non-hazardous solid waste and hazardous waste	Non-hazardous solid waste and hazardous waste management	a. Conduct record checking of amount and type of waste that being generated and sent to storage and treatment facility at Tangguh site b. Conduct record checking of amount and disposal location of comminuted food waste discharged to sea c. Conduct record checking and hazardous waste manifest transmittal	Solid waste and hazardous waste treatment facility at vessel	Record checking is conducted monthly during solid waste and hazardous waste management activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Condition of Solid waste and Non-hazardous waste facility and treatment		Monthly inspection of solid waste and hazardous waste management facility according to applicable procedure	Solid waste and Hazardous waste management at vessel	Inspection is conducted monthly			
5	Marine biota abundance and diversity	Plankton and benthos abundance, diversity index, equitability index at sea	Dredging and Disposal of Dredged Material for Marine Facility maintenance	a. Plankton and benthos sampling b. Calculate plankton and benthos abundance, diversity index, and equitability index c. Sampling, identification and calculation will be conducted by accredited laboratory d. Compare calculation result with data from environmental baseline taken during AMDAL study (monitoring result will be compared with monitoring from AMDAL implementation of LNG 1 and 2 (if available)	a. Plankton monitoring: 1) Nearest Safety Exclusion Zone (for Marine Facility) from dredging location or 500 meters distance from dredging location 2) 500 meters distance from dredged material disposal location (point) 1 point at upstream, 1 point at downstream and 1 control at disposal location b. Benthos monitoring: 1) 1 point at dredging location and 1 control 2) 1 point at disposal location and 1 control	Once during dredging activity and once after dredging has been conducted	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Marine Mammal Awareness training	a. Dredging and Disposal of Dredged Material for Marine Facility maintenance b. Sea Transportation	Record checking of completed Marine Mammal Training to vessel crew and compare it with training matrix	Onshore	Record checking is conducted 6 monthly during activity in the Operations Phase			

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
			for Work Force, Equipment, Material and LNG and Condensate product transportation						
6	Sediment quality	Sediment quality (parameter Cu, Cr, Cd, Hg, Pb, As, Zn, Sb, Ni, Ag)	Disposal of Dredged Material for Marine Facility maintenance	a. Collect sediment sample and conduct analysis according to determined parameter using accredited laboratory b. Compare sediment analysis result with ANZECC Guideline (see Table in Attachment 1) and environmental baseline during AMDAL c. Conduct trend evaluation of sediment quality	a. 1 point at dredging location and 1 control b. 1 point at disposal location and 1 control	Once during dredging activity and once after dredging has been conducted	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
7	Water quality and sediment also plankton and benthos abundance	a. Seawater quality (parameter TSS and Oil & Grease) b. Sediment quality (parameter TPH, Cu, Cr, Cd, Hg, Pb, As, Zn, Sb, Ni, Ag) c. Plankton and benthos abundance, diversity index, equitability index	Marine Facility operational activity	a. Collect seawater samples and conduct analysis according to determined parameter using accredited laboratory b. Conduct compliance evaluation by comparing analysis result with standards according to MoE Decree No. 51 Year 2004 by considering environmental baseline during AMDAL c. Collect sediment samples and conduct analysis according to determined parameter using accredited laboratory d. Compare sediment analysis result with ANZECC Guideline (see Table at Attachment I) by considering environmental baseline data during AMDAL e. Plankton and benthos sampling	Upstream, Downstream and Control at Safety Exclusion Zone (for Marine Facility)	6 monthly during Marine Facility operational activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
				f. Calculate plankton and benthos abundance, diversity index, and equitability index g. Sampling, identification and calculation activity by using accredited laboratory h. Compare calculation result with data from environmental baseline taken during AMDAL study (monitoring result will be compared with monitoring from AMDAL implementation of LNG 1 and 2 (if available) Conduct trend evaluation of water quality, sediment, plankton and benthos diversity					

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
III.2 Social Impact									
1	Disturbance on fishing ground and sea transportation channel	a. Note taken from public consultation with local fishermen b. Implementation of livelihood program for affected local fsihermen c. Installation of sea signs and sea transportation line in national shipping channel d. Announcement letter of activity from Syahbandar Bintuni, Babo, as well as Kokas e. Availability of alternative transportation access for affected local community	Sea transportation activity for operation need	a. Method : Direct observation and survey b. Analysis: correlational and descriptive statistics	a. Tanah Merah, Saengga, Onar, and Babo Villages b. Kesyahbandaran Office in Bintuni, Babo and Kokas c. Watershed in surounding safety exclusion zone of Tangguh LNG and sea transportation channel	The operation phase of Marine Facilities	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation
2	Community Perception and Social Tension due to sea transportation lane for operation need	a. Notes taken from public consultation with local community b. Functioning of grievance procedure for local community and data of grievance by local community	Sea transportation activity for operation need	a. Method : Direct observation and survey b. Analysis: correlational and descriptive statistics	Tanah Merah, Saengga, Onar and Babo Villages	The operation phase of Marine Facilities	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation
IV. Post-Operations Phase									
Post-operations activity (facility decommissioning) will be conducted in accordance with applicable regulations in Indonesia. Decommissioning procedure will be prepared at the latest 5 years before decommissioning is conducted, in coordination with related government institutions and other stakeholders.									

3.5 SUMMARY OF EMP FOR SURVEY, SEISMIC, AND EXPLORATION WELL AND EXPLORATION AND APPRAISAL WELL ACTIVITY

Table III-5 Summary Matrix of EMP fpr Survey, Seismic, and Exploration and Appraisal Well Drilling Activity

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
I.1 Environmental Impact									
1	Air Quality	a. Well test duration b. Flaring emission volume	Well Test Activity	a. Record checking of well test duration b. Record checking of flaring emission volume	Drilling Platform (Rig)	During well test at each well	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Generator emission quality a. Capacity < 570 KWth (parameter NOx, CO, H_2S) b. Kapasitas Capacity 570 KWth < x < 3MWth (parameter Total Particulate, SO_2, NOx, CO and H_2S) c. Record checking of Generator Maintenance	Power generation from the diesel generator	a. Collect air emission samples at sampling points of the stack and conduct analysis for the concentration of the required parameters done by an accredited laboratory b. Conduct compliance evaluation by comparing analysis results with the Minister of Environment Regulation No. 13 Year 2009 and the General EHS Guidelines 2007 (refer to Table in Attachment I) c. Conduct trend evaluation d. Conduct record checking of Generator maintenance to ensure maintenance is conducted as per planned schedule	a. Sampling point at Diesel Generator Stack b. Record checking of Generator Maintenance is conducted at Drilling Platform (Rig) or seismic vessel	a. Capacity < 570 KWth : once every 3 years b. Capacity 570 KWth < x < 3MWth : once a year c. Record checking of Generator Maintenanc is conducted 6 monthly	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
2	Seawater quality	a. TSS and Oil and Grease of the seawater b. Amount of drilling mud and cutting discharged overboard	Overboard Discharge alternative for Drilling Mud and Cutting	a. Collect seawater samples and conduct analysis for the concentration of the required parameters done by an accredited laboratory b. Conduct compliance evaluation by comparing analysis results with the Minister of Environment Regulation No. 51 Year 2004 (refer to Table in Appendix I), also considering environmental baseline during AMDAL c. Conduct record checking of amount of drilling mud and cutting discharged overboard	a. 1 station upstream, 1 station downstream and 1 control station at a 500 m radius from the overboard discharge location, taking into consideration the actual current direction b. Drilling Platform (Rig)	a. Once during overboard discharge activity b. Once after overboard discharge activity is completed c. Records check is conducted for every discharge activity. Report will be summarised in 3 monthly basis	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Effluent quality from the Sewage Treatment Plant (Chlorine residue and floating material/foam) or as per the Wastewater Discharge to Sea Permit	Sewage	a. Collect samples of the treated effluent(at the discharge pipe) and conduct analysis for the concentration of the required parameters done by an accredited laboratory b. Conduct visual monitoring for floating material and foam at the discharge pipe c. Conduct compliance evaluation by comparing analysis results and visual monitoring with the standards set in the Wastewater Discharge to Sea Permit d. Record the sewage flowrate. If possible, measurement is done with a flowmeter e. Conduct trend analysis	Effluent discharge pipe from the Sewage Treatment Plant on the Rig	Monthly	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
		Effluent quality from the Oil Water Separator (OWS) unit (Oil film and Oil and Grease) or as per the Wastewater Discharge to Sea Permit	Oily contaminated water from the Oil Water Separator (OWS) unit	Visual monitoring: a. Conduct visual monitoring for oil film on the seawater at the discharge pipe from the Oil Water Separator unit Laboratory analysis a. Collect samples of the treated effluent (at the outlet pipe) and conduct analysis for the concentration of the required parameters done by an accredited laboratory b. Conduct compliance evaluation by comparing analysis result with applicable standards in Wastewater Discharge Permit to Sea and MARPOL c. Record the wastewater flowrate. If possible, measurement is done with a flowmeter d. Conduct trend evaluation	Visual monitoring: a. Seawater at the outlet pipe of the Oil Water Separator (OWS) unit Laboratory analysis a. Outlet pipe from the OWS unit on the rig	Visual monitoring a. Internal monitoring is conducted daily b. External monitoring is conducted monthly Laboratory analysis a. Monthly	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Seawater Quality (pH, Temperature, BOD, Oil Film, Oil and Grease)	Wastewater treatment from the Sewage Treatment Plant and the Oil Water Separator (OWS) Unit	a. Collect seawater samples and conduct analysis for the concentration of the required parameters done by an accredited laboratory b. Conduct compliance evaluation by comparing analysis results with the Minister of Environment Regulation No. 51 Year 2004 (refer to Table in Appendix I), by considerating environmental baseline during AMDAL c. Conduct trend evaluation	1 upstream location, 1 downstream location and 1 control location 100 m away from the wastewater discharge location on the rig, taking into consideration the actual current direction	Once every 3 months			
		Record checking of ballast water exchange	Ballast water exchange	Record checking of ballast water exchange to be	Vessels required by MARPOL requirement	Record checking is conducted 6-monthly			

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
				compared with MARPOL requirements (at least date, location, volume, and vessel's name)					
3	Sediment Quality	Parameter TPH and Total Metal content (parameter Cu, Cr, Cd, Hg, Pb, As, Zn, Sb, Ni, Ag)	Overboard discharge alternative for drilling mud and cutting	a. Collect sediment samples and conduct analysis for the concentration of the required parameters done by an accredited laboratory b. Conduct compliance evaluation by comparing analysis results with the ANZECC Guidelines (refer to Table in Appendix I), also taking into consideration baseline condition during AMDAL	1 sampling point at the discharge location and 1 control site	a. Once during overboard discharge activity b. Once after overboard discharge activity is completed	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
4	Marine biota abundance and diversity	Aquatic plankton and benthos abundance, diversity index, equitability index (only for overboard discharge acitivity)	Overboard discharge alternative for drilling mud and cutting	a. Collect samples of plankton and benthos b. Calculate abundance, diversity index and equitability index for plankton and benthos c. Collection, identification and calculation will be conducted by an accredited laboratory d. Conduct trend evaluation by comparing analysis results with baseline condition during AMDAL	a. Plankton monitoring is conducted at 1 upstream station, 1 downstream station and 1 control station at a 500 m radius from the overboard discharge location, taking into consideration the actual current direction b. Benthos monitoring is conducted at 1 point at the discharge location and 1 control site	a. Once during overboard discharge activity b. Once after overboard discharge activity is completed	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Plankton abundance, diversity index, equitability index	Offshore activity including wastewater management	a. Plankton sampling b. Calculate plankton abundance, diversity index and equitability index c. Collection, identification and calculation will be conducted by an accredited laboratory d. Conduct trend evaluation by comparing analysis results with baseline condition during	1 upstream station, 1 downstream station and 1 control station at a 100 m radius from the wastewater discharge location, taking into consideration the actual current direction	a. Once during activity b. Once after activity is completed	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
				AMDAL					
		a. Type of marine mammal b. Record of vessel engine maintenance	a. Overboard discharge alternative for drilling mud and cutting b. Sea Transportation for Work Force, Equipment and Material	a. Conduct routine visual monitoring and sightings record of marine mammal b. Conduct record checking of vessel engine maintenance to ensure conducted maintenance is according to planned schedule	Vessel activity location	a. Marine mammal visual monitoring is conducted daily b. Record checking of vessel engine maintenance is conducted 6-monthly c.	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
5	Hazardous material and waste spill leading to seawater contamination	Facility condition and hazardous material and waste management	a. Offshore fuel and chemical storage and management b. Offshore hazardous waste storage and management	a. Conduct hazardous material and waste storage facility inspection prior to use according to applicable procedure b. Conduct weekly inspection to available container, storage system, storage warehouse condition, emergeny response system and other facilities according to applicable procedure	a. Fuel and Chemical Storage Warehouse b. Hazardous waste storage facility c. Refueling station	a. Storage facility inspection isconducted once prior to use b. Routine inspection is conducted weekly	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Spill and Oil & Grease concentration clean-up activity at spill location and management of oily contaminated material		a. Visual monitoring of oil film on the water to ensure that the oil spill response is conducted in accordance with the procedure b. If necessary, seawater analysis of Oil & Grease parameter is conducted to ensure spill clean-up process is following the procedure	Spill location	a. During spill b. During spill response			

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
		Recording of hazardous material and waste spill		Conduct recording of spill event which informs (at minimum) about amount and type of hazardous material and waste spill, event location and the response conducted	Spill location	During spill			
6	Hazardous material and waste spill leading to soil contamination	Condition of hazardous material and waste facility and management	a. Fuel and chemical storage and management b. Hazardous waste storage and management	a. Conduct hazardous material and waste storage facility inspection prior to use according to applicable procedure b. Conduct weekly inspection to available container, storage system, storage warehouse condition, emergeny response system and other facilities according to applicable procedure	a. Fuel and Chemical Storage Warehouse b. Hazardous waste storage facility c. Refueling station	a. Initial facility inspection is conducted once prior to use b. Routine inspection is conducted weekly	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, and Environmental Impact Management Agency Papua Barat	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation Directorate General
		Spill clean-up activity, Soil TPH concentration and oily contaminated material management		a. Visual monitoring to ensure that the oil spill response is conducted in accordance with the procedure b. If required, conduct soil TPH analysis (as per the Minister of Environment Decree No. 128 Year 2003) on location after the soil has been cleaned up to ensure that the contaminated soil excavation has been done as per the procedure	Spill and contaminated soil location	a. During spill b. During contaminated soil clean-up			
		Hazardous material and waste spill records		Conduct recording of spill event which informs (at minimum) of amount and type of hazardous material and waste spill, spill location and the response conducted	Spill and contaminated soil location	During spill			
7	Non-hazardous solid waste and hazardous waste	Amount of non-hazardous solid waste and hazardous waste which are being generated and managed	Non-hazardous solid waste and hazardous waste management	a. Conduct record checking of amount and type of waste that being generated and transported to storage and treatment facility at Tangguh site b. Conduct record checking of amount	Solid waste and hazardous waste treatment facility	Record checking is conducted monthly during Solid Waste and Hazardous Waste Management activity	BP Berau Ltd.	Ministry of Environment, Environmental Office at Teluk Bintuni Regency for activities located in the Teluk Bintuni Regency, Environmental Agency at Fakfak Regency for activities located in the Fakfak Regency and Environmental Impact	Ministry of Environment, Environmental Office at Teluk Bintuni Regency, Environmental Agency at Fakfak Regency, Environmental Impact Management Agency Papua Barat , Oil and Gas Directorate General, and Sea Transportation

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
				and location of comminuted food waste discharged to sea c. Conduct record checking and Manifest transmittal of hazardous waste transfer				Management Agency Papua Barat	Directorate General
		Condition of Solid Waste and Hazardous Waste facility and management		Weekly inspection of Solid Waste and Hazardous Waste Management facility according to applicable procedure	Solid Waste and Hazardous Waste treatment facility	Inspection is conducted weekly			
I.2 Social Impact									
1	Community Perception and Social Tension	a. Notes from public consultation with local community b. Functioning of grievance procedure for local community and data of grievance by local community	Exploration activity, either Seismic activities and/or Well Drilling Exploration	a. Method : Direct observation and perception survey b. Analysis: correlational and descriptive statistics	The nearest villages to seismic and/or drilling activities location	Before and during the exploration activity running	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate General of Oil and Gas, Directorate of Sea Transportation
2	Fishery activity and sea transportation disturbances	a. Notes from public consultation with local community and local fishermen b. Implementation of income recovery program for local fishermen with fishing activities surrounding WDA platform area c. Instalation of sea signs d. Sea transportation channel in nationa shipping channel e. Announcement letter of activity from Syahbandar Bintuni, Babo, as well as Kokas	Exploration activity, either Seismic activities and/or Well Drilling Exploration	a. Method : Direct observation b. Analysis: correlational and descriptive statistics	a. The nearest villages to exploration activity of Tangguh LNG b. Kesyahbandaran Office in City of Bintuni, Babo dan Kokas c. Watershed in suroundin exploration and drilling activities	During the exploration activity running	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua, Kesyahbandaran Office of Bintuni, Kesyahbandaran Office of Babo, Kesyahbandaran Office of Kokas	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate of Sea Transportation

No	Environmental Impact to Monitor			Environmental Monitoring Plan			Environmental Management Institution		
	Environmental Impact	Indicator / Parameter	Source of Impact	Method of Data Collection and Analysis	Monitoring Location	Time and Frequency	Implementer	Supervisor	Reports Recipient
3	Workforce and business opportunities	a. Data of local community and Papua workforce recruited in seismic activitiy b. Data of local products absorbed from Indigenous People	Exploration activity, either Seismic activities and/or Well Drilling Exploration	a. Method : Direct observation b. Analysis: correlational and descriptive statistics	The nearest villages to Tangguh LNG exploration activities	During the exploration activities	BP Berau Ltd.	Ministry of Environment, Environmental Office (KLH) of Teluk Bintuni control activities located in Teluk Bintuni Regency, Environmental Agency (BLH) of Fakfak Regency control activities located in Fakfak Regency, Bapedalda (The Regional Environmental Management Agency) of West Papua, and Regional Department of Manpower of Teluk Bintuni, Regional Department of Manpower of Fakfak Regency, Regional Department of Manpower of West Papua Province	Ministry of Environment, Environmental Regional Office (KLH) of Teluk Bintuni Regency, Environmental Institution (BLH) of Fakfak Regency, Bapedalda (Regional Institution of Environmental Impact Control) of West Papua, Directorate of Sea Transportation

CHAPTER IV
AMOUNT AND TYPE OF REQUIRED ENVIRONMENTAL PROTECTION AND MANAGEMENT PERMIT (PPLH)

Before starting the construction and operations activity of Tangguh Expansion Project, Tangguh LNG has identified several Environmental Protection and Management Permits (PPLH) which are required based on environmental management plan and Tangguh LNG interpretation to applicable environmental regulations in Indonesia.

The required Environmental Protection and Management Permit (PPLH) for construction and operations phase are as follows:

Construction Phase for Offshore Platform Installation including Gas Production Well Drilling:

1. Reinjection and Drilling Mud and Cutting Dumping to Sea Permit from Drilling Activity;
2. Dredged Material Dumping to Sea Permit from Dredging Activity;
3. Temporary Hazardous Waste Storage Permit;
4. Hazardous Waste Transportation Permit; and
5. Wastewater Discharge to Sea from Rig Permit.

Construction Phase for Other Activities:

1. Temporary Hazardous Waste Storage Permit;
2. Hazardous Waste Treatment Permit including waste from Hazardous Waste Incinerator;
3. Hazardous Waste Transportation Permit; and
4. Wastewater Discharge Permit.

Operations Phase:

1. Wastewater Discharge Permit;
2. Temporary Hazardous Waste Storage Permit from Unburnable Hazardous Waste including ash from hazardous waste incinerator;
3. Hazardous Waste Treatment Permit including hazardous waste incinerator;
4. Hazardous Waste Transportation Permit; and
5. Hazardous Waste Utilization Permit if necessary.

CHAPTER V
COMMITMENT STATEMENT ON RKL-RPL IMPLEMENTATION

I, the undersigned:

Name	: **Roberto Reichard**
Title	: VP Projects, Tangguh
Office Address	: Perkantoran Hijau Arkadia, Tower D - E
	Jl. Letjen T.B. Simatupang Kav.88
	Jakarta 12520, Indonesia
	Telephone/Fax : 62-21-7883 8000 / 62-21-7854 9177

Acting in my above capacity, as the person in charge of Tangguh LNG Expansion Project activities including its environmental management with the data as follows:

Company Name	: **BP Berau, Ltd.**
Company Address	: Perkantoran Hijau Arkadia, Tower D - E
	Jl. T.B. Simatupang Kav.88
	Jakarta 12520, Indonesia
	Telephone/Fax : 62-21-7883 8000 / 62-21-7854 9177
Project Location	: Teluk Bintuni Regency, Papua Barat Province
Project Type	: Tangguh LNG Expansion Project

Hereby state that, in connection with Tangguh LNG Expansion Project, I will:

1. Implement Environmental Management and Monitoring as described in this Environmental Impact Assessment (*Analisis Mengenai Dampak Lingkungan* - AMDAL).
2. be responsible if proven to have failed to implement this Environmental Impact Assessment (*Analisis Mengenai Dampak Lingkungan* - AMDAL).

Jakarta, July 2014

Roberto Reichard
VP Projects, Tangguh

APPENDIX

APPENDIX I

ENVIRONMENTAL QUALITY STANDARD

APPENDIX II

ENVIRONMENTAL AND SOCIAL MONITORING MAP