

**Banda Aceh to Lamno  
Rehabilitation and Reconstruction Road Project**

Environmental Management Effort  
Environmental Monitoring Effort

Final Report  
October 2005

## TABLE OF CONTENT

### PREFACE

<b>1</b>	<b>INTRODUCTION .....</b>	<b>2</b>
1.1	BACKGROUND .....	2
1.2	PURPOSE AND ADVANTAGE OF UKL & UPL .....	3
1.2.1	<i>The Purpose of UKL</i> .....	3
1.2.2	<i>The Purpose of UPL</i> .....	3
1.2.3	<i>The Advantage of UKL</i> .....	3
1.2.4	<i>The Advantage of UPL</i> .....	3
1.3	RULES AND LEGISLATION.....	3
<b>2</b>	<b>EFFORT FOR ENVIRONMENTAL MANAGEMENT AND EFFORT FOR ENVIRONMENTAL MONITORING .....</b>	<b>1</b>
2.1	IDENTITY OF INITIATOR.....	1
2.2	IDENTITY OF WRITER.....	1
2.3	PLAN OF ACTIVITY.....	2
<b>3</b>	<b>OUTLINE OF THE PLAN OF ACTIVITY.....</b>	<b>11</b>
3.1	PRE-CONSTRUCTION STAGE.....	11
3.2	CONSTRUCTION STAGE .....	11
3.3	POST CONSTRUCTION STAGE .....	15
<b>4</b>	<b>CONDITION OF INITIAL ENVIRONMENT .....</b>	<b>16</b>
4.1	PHYSICAL COMPONENT OF CHEMICAL .....	16
4.1.1	<i>Climate</i> .....	16
4.1.2	<i>Temperature</i> .....	16
4.1.3	<i>Rainfall</i> .....	16
4.1.4	<i>Topography and Geology</i> .....	16
4.1.5	<i>Air quality</i> .....	17
4.1.6	<i>Noisiness</i> .....	20
4.1.7	<i>Hydrology</i> .....	20
4.2	BIOLOGICAL COMPONENT.....	22
4.2.1	<i>Land Flora</i> .....	22
4.2.2	<i>Land Fauna</i> .....	26
<b>5</b>	<b>ENVIRONMENTAL IMPACT THAT WILL OCCUR.....</b>	<b>28</b>
5.1	PRE-CONSTRUCTION STAGE.....	28
5.2	CONSTRUCTION STAGE .....	29
5.3	POST CONSTRUCTION STAGE .....	33
<b>6</b>	<b>EFFORT FOR ENVIRONMENTAL MANAGEMENT (UKL) .....</b>	<b>34</b>
6.1	PRE-CONSTRUCTION STAGE.....	34
6.2	CONSTRUCTION STAGE .....	36
6.3	POST CONSTRUCTION STAGE .....	47

<b>7</b>	<b>EFFORT FOR ENVIRONMENTAL MONITORING (UPL)</b> .....	<b>60</b>
7.1	PRE-CONSTRUCTION STAGE.....	60
7.2	CONSTRUCTION STAGE.....	61
7.3	POST CONSTRUCTION STAGE.....	68
<b>8</b>	<b>CLOSING</b> .....	<b>78</b>

**APPENDIX**

### LIST OF TABLES

Table 2.1	Description for activity of road construction.....	5
Table 2.2	The Plan for the Need of Material for Betterment and Rehabilitation of Road between Banda Aceh – Lamno (10 km).....	6
Table 2.3	The Plan for the Need of Construction Equipment.....	6
Table 2.4	The plan concerning type and the need of manpower and Educational Qualification.....	7
Table 4.1	Analysis Result of Air Quality.....	17
Table 4.2	Measurement Result of Noisiness Level.....	20
Table 4.3	Inventory Result of Fauna Existing in Study Location.....	26
Table 6.1	UKL Matrix Of Road Rehabilitation And Reconstruction Activities Banda Aceh – Lamno, Nanggroe Aceh Darussalam Province.....	49
Table 7.1	UPL Summary Matrix Of Rehabilitation And Reconstruction Activities Banda Aceh – Lamno Roadway, Nanggroe Aceh Darussalam Province.....	70

### LIST OF FIGURES

Figure 2.1	Site Location.....	4
Figure 2.2	Contoh Disain Jalan.....	8
Figure 2.3	Contoh Disain Jembatan.....	9
Figure 2.4	Contoh Disain Box Culvert.....	10
Figure 4.1	Land use map.....	18
Figure 4.2	Geology map.....	19
Figure 4.3	Hydrology map.....	21
Figure 4.4	Condition of damage mangrove vegetation and activity for replanting of mangrove.....	22
Figure 4.5	Condition of vegetation along costal area engulfed by tsunami.....	23
Figure 4.6.	Condition of Vegetation.....	25
Figure 4.7	The existence of long tailed monkey (Macaca fascicularis) in the area of Grotee Mountain.....	27

## PREFACE

We would like to express our gratitude to God Almighty for the completion of documents of Environmental Management Effort (UKL) and Environmental Monitoring Effort (UPL) relating to the activity for betterment and reconstruction of Road from Banda Aceh - Lamno in the Province of Nanggroe Aceh Darussalam (NAD). This report is prepared in the framework to fulfill obligation to realize environment oriented development as mandated by rules and legislation.

We realize that even though with our maximum effort, but some deficiencies can still be found in this report. Hereby we would like to request inputs in the effort to improve this document.

Finally, we hereby would like to submit our appreciation and to say thank you for various parties that have provided their assistance for smooth process of preparation of this report and we expect that our effort to establish environment oriented development can be realized.

Banda Aceh, July 25, 2005

**Initiator of activity,**

The Head of Temporary Work Unit for  
Planning and Supervision of Road and Bridge  
In the Province of Nanggroe Aceh Darussalam

IR. KHALIDIN, MT  
NIP. 390013175

# 1 INTRODUCTION

## 1.1 BACKGROUND

The occurrence of earthquake with 8.9 Richter scale and followed by tsunami wave some minutes later which was as the biggest tsunami during the last 200 years, has caused victims of more than 200,000 persons other than destruction of various infrastructures in western part and northern part of Province of Nanggroe Aceh Darussalam and many countries in the world have declared their concern and sadness for such natural disaster by providing their extraordinary help both during emergency response and in the framework to carry out improvement and reconstruction of Aceh.

The United States Government through USAID (United States Agency for International Development) will provide assistance in the framework to handle lane from Banda Aceh - Meulaboh with length of more or less 240 km that has been destructed by tsunami. For that purpose Indonesian Government through the Ministry of Public Works has signed cooperation (MOU) with the Government of United States of America on May 8, 2005 on the bridge of Kr. Raba, Lhoknga Sub-district, Aceh Besar Regency, in the Province of Nanggroe Aceh Darussalam that constitutes one of destroyed bridges that will be handled immediately.

In view of such road construction shall be conducted soon, the implementation of betterment and reconstruction of such road will be conducted in two phases, the first phase between Banda Aceh - Lamno of 60 km length with relocation of 10 km, and pursuant to the existing provision, Environmental Impact Analysis (AMDAL) is not obligated and it is considered sufficient to carry out Environmental Management Effort (UKL) and Environmental Monitoring Effort (UPL), while for the road between Banda Aceh - Meulaboh of 240 km length shall be obliged to carry out study concerning Environmental Impact Analysis (AMDAL) in view of more than 90% of such road must be relocated. Therefore in order to ensure the improvement and reconstruction shall remain as environment oriented development, then for the first phase this environmental document shall be prepared in the form of UKL (Environmental Management Effort) and UPL (Environmental Monitoring Effort).

## 1.2 *PURPOSE AND ADVANTAGE OF UKL & UPL*

### 1.2.1 *The Purpose of UKL*

To be used as reference in the effort to prevent, control and minimize negative impact arising from the planned activity to implement improvement and reconstruction of Road between Banda Aceh - Lamno and to develop the existing positive impact.

### 1.2.2 *The Purpose of UPL*

- a. To monitor the result of implementation of environmental management that has been conducted in the activity to improve and reconstruct Road between Banda Aceh - Lamno by method of observing environmental alteration caused by such activity.
- b. To provide input to related parties in the implementation of environmental management if there is occurrence of environmental alteration in the activity to implement improvement and reconstruction of such road.

### 1.2.3 *The Advantage of UKL*

- a. To provide guidance concerning procedure to handle any arising impact so that any negative impact can be prevented and managed in the earliest possible time.
- b. To provide guidance to the initiator/organizer of project and the related institution concerning their scope of work and responsibility in the effort to implement environmental management.

### 1.2.4 *The Advantage of UPL*

As material for input relating to the implementation of evaluation against the effectiveness of Effort for implementation of Environmental Management (UKL).

## 1.3 *RULES AND LEGISLATION*

Rules and legislation used as reference in the preparation of UKL and UPL documents for improvement and reconstruction of Road between Banda Aceh - Lamno are as follows:

- a. Law No.5 of 1960 concerning Basic Regulation of Agrarian Affairs;
- b. Law No. 11 of 1974 concerning Irrigation;
- c. Law No.13 of 1980 concerning Road;
- d. Law No.5 of 1990 concerning Conservation of Bio Natural Resources and Its Ecosystem;
- e. Law No.4 of 1992 concerning Housing & Settlement;
- f. Law No.14 of 1992 concerning Traffic & Road Transportation;
- g. Law No.24 of 1992 concerning Spatial Layout;
- h. Law No.23 of 1997 concerning Environmental Management;
- i. Government Regulation No.26 of 1985 concerning Road;
- j. Government Regulation No.27 of 1991 concerning Swampy Area;
- k. Government Regulation No.26 of 1991 concerning River;
- l. Government Regulation No.27 of 1999 concerning Environmental Impact Analysis;
- m. Government Regulation No.41 of 1999 concerning Control to Air Pollution;
- n. Government Regulation No.25 of 2000 concerning Government Authority and Authority of Province as Autonomous Region;
- o. Government Regulation No.82 of 2001 concerning Water Quality Control and Control to Water Contamination;
- p. Presidential Decree No.55 of 1993 concerning Land Procurement for Implementation of Development for Public Interest;
- q. Decree of Minister of Public Works No.296/KPTS/1996 concerning Technical Guideline for Preparation of Effort for Environmental Management and Effort for Environmental Monitoring;
- r. Decree of Minister of Public Works No.377/KPTS/1996 concerning Guideline for Procedure of Implementation of Effort for Environmental Management & Effort for Environmental Monitoring;

- s. Decree of Minister of Public Works No. 481/KPTS/1996, List concerning type of activity in the field of Public Works that shall be obliged to equip with Environmental Impact Analysis.
- t. Decree of State Minister of Environment No.17/2001 concerning Type of Plan of Business and/or Activity that shall be obliged to equip with AMDAL (Environmental Impact Analysis).
- u. Decree of State Minister of Environment No.86 of 2002 concerning Guideline for the Implementation of Effort for Environmental Management and Effort for Environmental Monitoring;
- v. Decree of Minister of Resettlement and Regional Infrastructure No.17/KPTS/M/2003, concerning Stipulation for the Type of Business and/or Activity in the field of Resettlement and Regional Infrastructure that shall be obliged to equip with Effort of Environmental Management and Effort of Environmental Monitoring.

## 2 ***EFFORT FOR ENVIRONMENTAL MANAGEMENT AND EFFORT FOR ENVIRONMENTAL MONITORING***

Pursuant to the Decree of State Minister of Environment Number 86 of 2002 concerning Guideline for the Implementation of Effort for Environmental Management (UKL) and Effort for Environmental Monitoring (UPL), the description concerning UKL and UPL is provided below relating to the plan of activity for reconstruction and betterment of road between Banda Aceh - Lamno:

### 2.1 *IDENTITY OF INITIATOR*

1. Name of Project/

Activity : Project for Betterment and Reconstruction of Road between Banda Aceh - Lamno, NAD Province.

2. Name of Responsible

Person : the Head of Temporary Work Unit for Planning and Supervision of Road and Bridge of Ministry of Publics, NAD Province.

3. Office Address : Jalan Sudirman No.1, Banda Aceh

Telephone/Facsimile : 0651 (41750)

4. Source of Fund : USAID

### 2.2 *IDENTITY OF WRITER*

1. Name of Company : PT. ERM Indonesia

2. Address : Wisma Aldiron Dirgantara 2<sup>nd</sup> Floor Suite 238-239,

Jl. Jenderal Gatot Subroto Kav. 72 Jakarta  
12780

Telephone/Fax (021) 79181904/79181905

3. Responsible person  
for Study : Dr. Karlheinz Spitz

While members of Team for Study of UKL and UPL for the activity of betterment and reconstruction of Road between Banda Aceh - Lamno are as follows:

No.	Name		Professional
1.	Ir. Hasbullah Hasan	:	Fisic and Chemist Expert , Amdal A dan B Certificate
2.	Steven Brown, M.Eng	:	Hidrogeology Expert
3.	Drs. Rafeldy Noviar	:	Biology Expert, Amdal A Certificate
4.	Ir. Syarif Bastaman	:	Socio Economic Expert, Amdal A dan B Certificate

### 2.3

#### *PLAN OF ACTIVITY*

1. Name of Plan of Activity: Betterment and Reconstruction of Road between Banda Aceh - Lamno, with length of 10 Km, NAD Province.
2. Location of Plan of Activity: Banda Aceh - Lamno, of 60 Km length (the relocated road of 10 Km length. For more information, refer to Figure 2.1.

In outline, the plan of activity can be divided into the following stages:

**a. Reconstruction and/or construction of new road/bridge;**

- Segment #1, to improve and construct road segment starting from KM.54 or surrounding Village of Krueng Kala leading to south direction until Pudeng village, near Gruetee Mountain i.e., 10 km length. This construction work shall be implemented soon following the existence of notification from USAID for implementing the work.

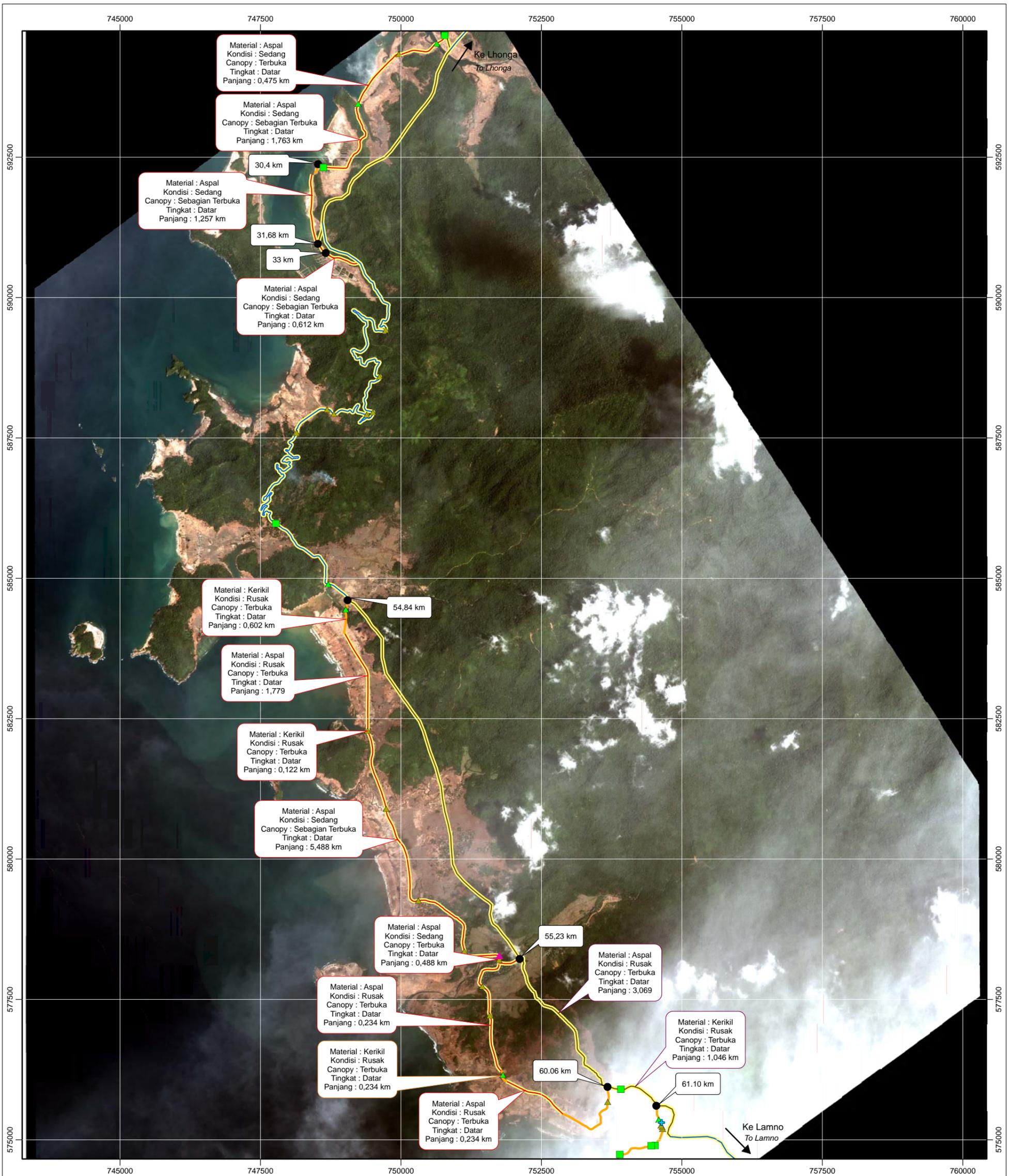
- Segment #2, to improve and construct road segment starting from KM. 26.4 leading to south direction of 4.7 km length. (This construction work shall be commenced following obtaining approval for AMDAL (Environmental Impact Analysis), estimated in September 2005).
- Segment #3, it needs design for improvement and construction of road segment starting from KM.60 until 1.9 km length leading to south direction. (This work shall be commenced following obtaining approval for AMDAL, estimated in September, 2005).
- Priority #1 is Bridge. To construct concrete bridge in KM.14.4.(This work shall be commenced following the selection of location is approved by Planner Company of A-E, expected before September 2005).
- Segment #4, to construct road segment starting from KM.13.9 to south direction. (This work shall be commenced following obtaining approval of location by Planner Company of A-E, expected before September 2005).

#### **b. Betterment and Maintenance of the Existing Road**

Activity for betterment and maintenance of the existing road. A part of such road is in the form of temporary stony road constructed by Indonesian soldiers and it needs regular maintenance. Additional road may be needed. The purpose of betterment and maintenance of the existing road is to prepare road for traffic of local community (as determined by CTO). Maintenance of temporary road is maintenance conducted during contract period for planning and construction.

#### **c. Removal of metal reminder from bridge**

The activity for removal of metal reminder of bridge that can not be used from the original construction that fall into waters. Contractor shall place such metal reminder in the location as specified by Indonesian government. This work shall be commenced following the existence of notification for implementing the work.



**UPAYA PENGELOLAAN LINGKUNGAN (UKL)  
DAN UPAYA PEMANTAUAN LINGKUNGAN (UPL)**  
ENVIRONMENTAL MANAGEMENT EFFORT  
AND ENVIRONMENTAL MONITORING EFFORT

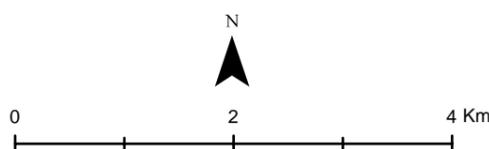
Sumber :  
Source :  
U.S Army Corps of Engineers, Honolulu District  
Sistem koordinat universal transverse mercator (UTM),  
Zona 46 Utara, WGS 84

No Gambar	2 - 1	Digambar Oleh	GGG
No. Revisi	0	Diperiksa Oleh	HAS
Tanggal Revisi	01/07/05	Digabung Oleh	ERM

**LOKASI PROYEK**  
PROJECT LOCATION

**Legenda**  
Legend

- |                                 |  |  |
|---------------------------------|--|--|
| Kuburan Umum<br>Mass Grave      | Bailey Bridge<br>Bailey Bridge             | Rute P2JJ - Prioritas 1<br>P2JJ - Priority 1         |
| Saluran Air<br>Culvert          | Truss Bridge<br>Truss Bridge               | Rute P2JJ - Prioritas 2<br>P2JJ - Priority 2         |
| Jembatan Semen<br>Cement Bridge | Referensi Kilometer<br>Kilometer Reference | Rute yang Ada (tidak dipakai lagi)<br>Existing Route |
|                                 |  | Rute Sementara (TNI)<br>Temporary TNI                |



### 3. Scale of activity:

#### a) Activity for road construction

The plan for activity of road construction shall refer to ASEAN standard (as enclosed) as described in Table 2.1 below:

**Table 2.1** Description for activity of road construction

<i>No</i>	<i>Description</i>	<i>Dimension</i>	
1.	Road	10	km
2.	ROW	30	M
3.	Asphalting	7	M
4.	<i>Sholder</i>	2,5 x 2,5	M
5.	<i>Subbase coarse</i>	45	Cm
6.	<i>Base coarse</i>	30	Cm
7.	<i>Pavement</i>	10	Cm
8.	<i>side dith</i>	1,5	m

Source : ASEAN Highway Standard

For more information refer to Figure 2.2 (example of road design)

#### b). Bridge:

The plan for bridge construction conducted in KM.14.4 is in the form of concrete bridge.

The typical of bridge that will be constructed as shown in Figure 2.3 (example of bridge design).

#### c). Box culvert

The plan for construction of culvert/Box Culvert by using:

- Reinforced concrete with quality: K 350
- Fabricated culvert (ARMCO).

For more information refer to Figure 2.4 (Example of Culvert Design/Box Culvert)

#### d) Soil Work

The plan for the need of material for road and bridge constructions is described as follows:

**Table 2.2** The Plan for the Need of Material for Betterment and Rehabilitation of Road between Banda Aceh - Lamno (10 km)

<i>No</i>	<i>Description</i>	<i>Total</i>	<i>Unit</i>
1.	Tanah urug	107.520	M <sup>3</sup>
2.	Geotextile	20.020	M <sup>2</sup>
3.	Aspal 5 cm	1.078	M <sup>3</sup>
4.	Basecourse 15 cm	3.234	M <sup>3</sup>
5.	Subbase 20 sampai 25 cm	10.249	M <sup>3</sup>

Source : US Army Corp of Engineers (2005)

#### e) Type and number of equipment needed

The plan for the need of equipment that is required for construction of road and bridge is described as follows:

**Table 2.3** The Plan for the Need of Construction Equipment

<i>No</i>	<i>Description</i>	<i>Unit</i>
1.	Excavator	1
2.	Dump truck. 8 ton	4
3.	Flat Bed Truck, 4 ton	1
4.	Bulldozer	2
5.	Grader	1
6.	Roller	1
7.	Shovel	1
8.	Tired Roller	1
9.	Dozer	1
10.	Asphalt Sprayer	1
11.	Concrete Mixer	2
12.	Generator 200 KVA	1
13.	Asphalt Finisher	1
14.	Tandem Roller	1
15.	Stone Crusher	1
16.	Asphalt Mixing Plant (AMP)	1
17.	Water Tank	1

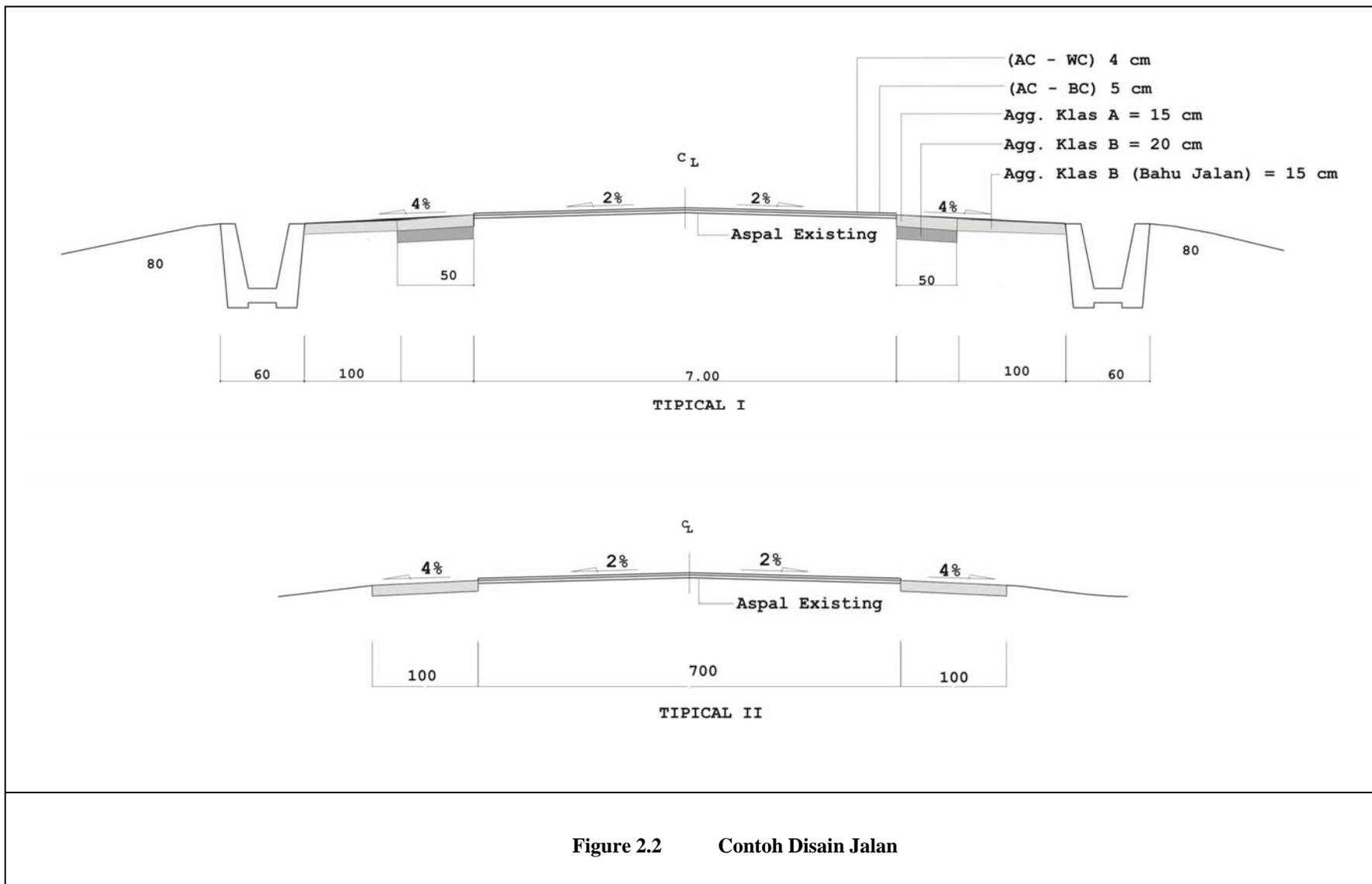
Note : Data diambil dari analogi kegiatan sejenis

**f) Qualification and number of manpower required**

Description concerning type, qualification and number of manpower required in the plan of activity for construction is as follows:

**Table 2.4** The plan concerning type and the need of manpower and Educational Qualification

<i>No</i>	<i>Type of Concerning</i>	<i>Qualification Required</i>	<i>Quantity (people)</i>
1.	Field Engineer	Bachelor of Technican	2
2.	Quality Engineer	Bachelor of Technican	4
3.	Quality Engineer/Chief Inspector	Bachelor of Technican	4
4.	Lab Technicians	Diploma of Technican	2
5.	Surveyor	Technican School	4
6.	Inspector	Diploma of Technican	4
7.	Administrator	Diploma of Economic	2
8.	Drafter	Technican School	2
9.	Mandor	Technican School	2
10.	Driver	-	10
11.	Operator equipment	Technican School	6
12.	Skilled Worker	Technican School	10
13.	Unskilled worker	-	30
Total			82



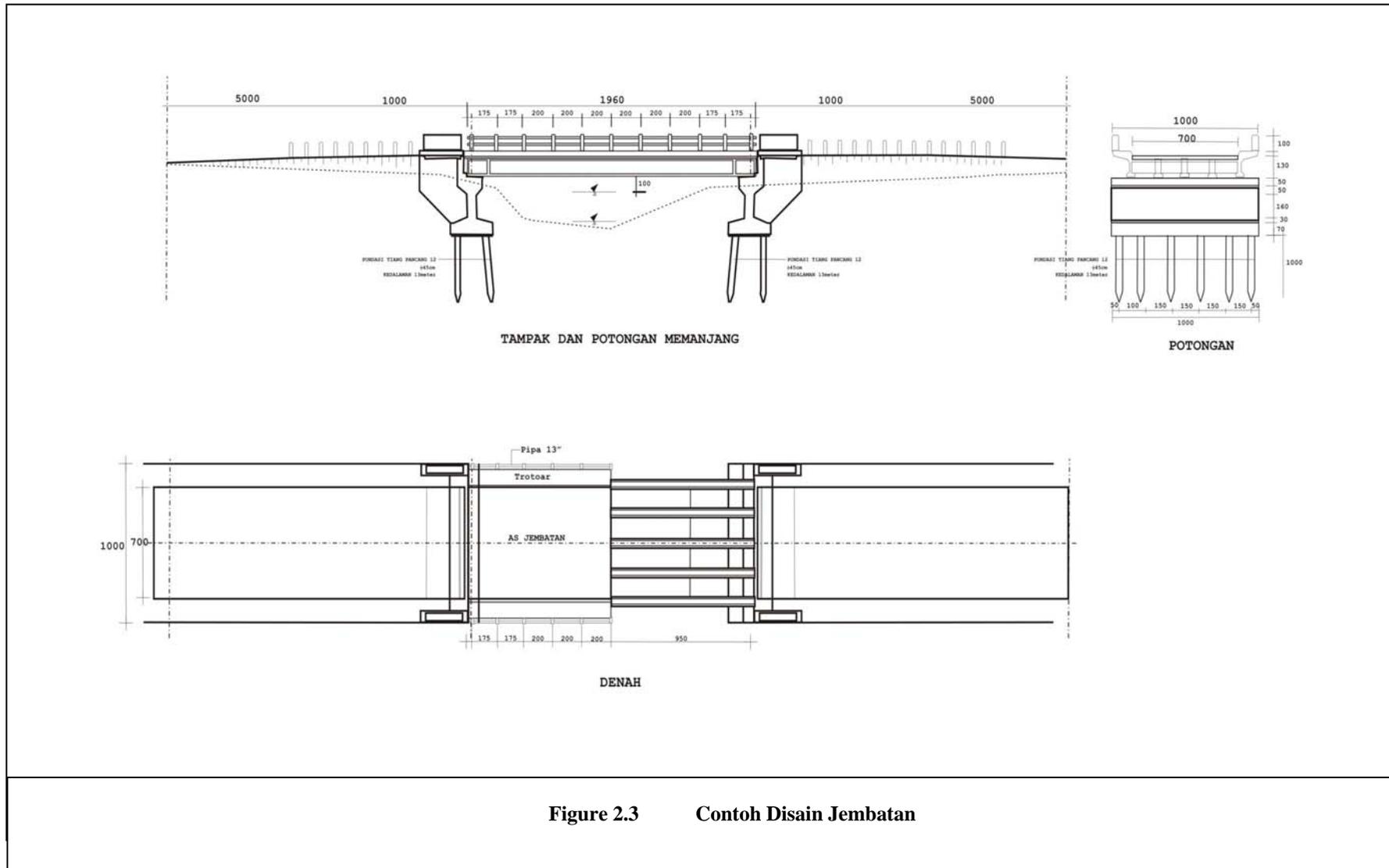


Figure 2.3 Contoh Disain Jembatan

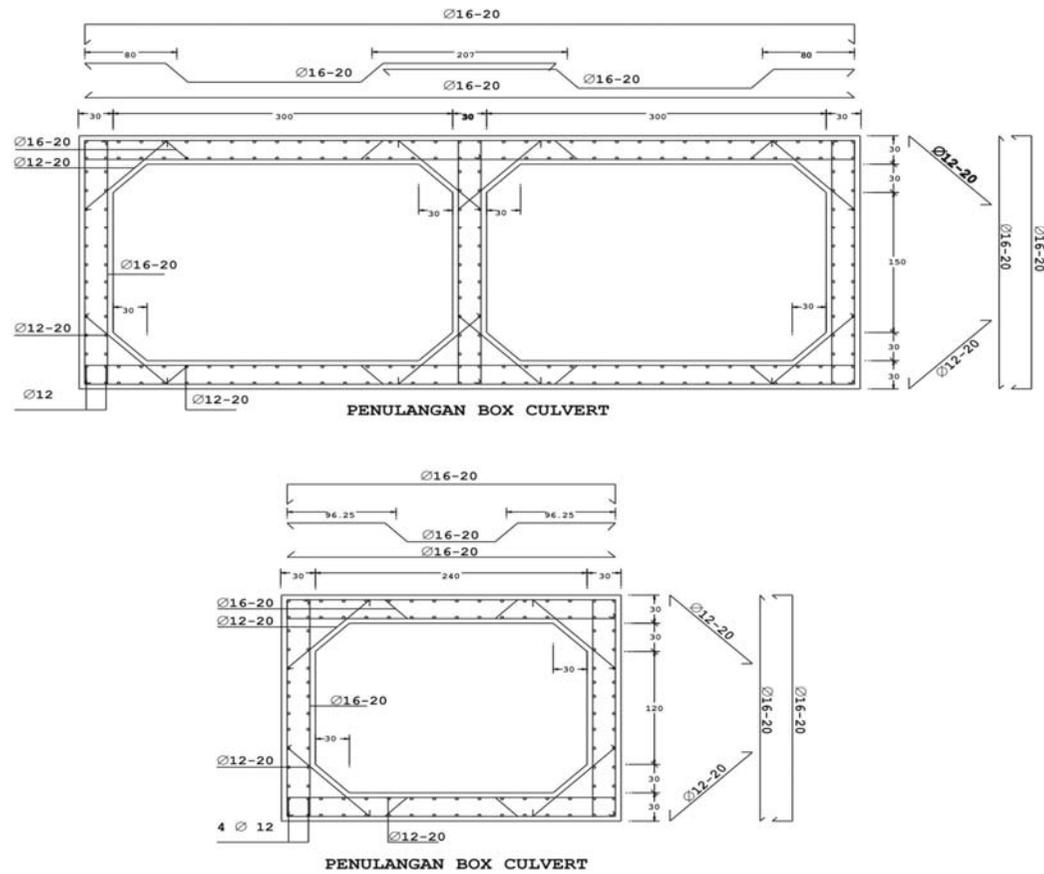


Figure 2.4 Contoh Disain Box Culvert

### 3 **OUTLINE OF THE PLAN OF ACTIVITY**

#### 3.1 **PRE-CONSTRUCTION STAGE**

The activity in this stage shall cover:

##### **1) Survey and measurement:**

This activity shall be conducted in the beginning of construction stage in order to determine route of road design that is relocated by conducting activity for installation of poles stating road axis and road shoulder, poles stating Right of Way, poles of plan for culverts, box culvert and bridge, location of borrow area and disposal area and base camp location / working barrack for project, because of the nature of work is very urgent, this activity will be implemented simultaneously with physical implementation in the field (design-built), so that different with the sequence of activities in normal condition.

##### **2) Land acquisition**

In the activity of betterment and reconstruction of this road, land acquisition will be needed at the right and left hand sides of the road because road standard will be built by using ASEAN Standard of Class II with the width of Right of Way shall be 30 m, so that the road lane (alignment) shall be adjusted as specified in the provision of such standard, especially in the location which was destroyed by tsunami disaster it is expected without land acquisition because population in that area is relocated to a new settlement that is relatively safe from disaster, especially if the road will pass through productive lands and community gardens that up to now are still utilized by community because of not destroyed by tsunami, careful action shall be conducted in order to prevent community restlessness because in principle road construction shall not cause any loss to community.

#### 3.2 **CONSTRUCTION STAGE**

##### **1) Manpower and personnel mobilization**

For the implementation of betterment and reconstruction of the road between Banda Aceh - Lamno, manpower involved covers Expert of Civil Engineer/Transportation, medium level of manpower as

foreman for the work and labors. Medium level of manpower and labors are expected coming from local community surrounding location of activity.

## **2) Mobilization and Demobilization of Equipment**

Heavy equipment as mentioned above are originated from out of Province of Nanggroe Aceh Darussalam and shall be entered through sea port of Malahayati Krueng Raya having distance of 40 km from the city of Banda Aceh by using trailer to transport it to Base Camp location located surrounding project.

## **3) Construction of Base Camp/Working Barrack**

Base camp is planned to be located in Leupung area having distance of 25 km from the city with strategic location and not so far from the plan of relocation and source of material, and based on the result of initial survey it is known that material of sand, stone and gravel (stony sand) are many available in Sarah (Krueng) River. Besides, parking lot for heavy equipment can also be functioned as temporary workshop for the equipment with minor damage and also for location of project office. While location for Asphalt Mixing Plant and Stone Crusher shall be located not so far one with another as to make easy for transportation of such material.

## **4) Land Clearing**

Land clearing by using grader shall be conducted along the route of road that will be relocated also including the existing road, because the width of existing road is varied between 4.50 - 6.00 meter, while the plan of the new road will become 7.00 meter (pavement), with shoulders at the right and left hand sides of the road that have been covered by bush, this land clearing shall be conducted on the land with width of 30.00 meter.

## **5) Stripping**

Stripping shall be conducted along the road that will be relocated with the depth of stripping of 50 cm by using bulldozer and the result of stripping work shall be disposed to disposal area by using Dump Truck by using assistance of Excavator/Shovel. While for the existing road striping shall be conducted only in segments that experience damage of its pavement until its base course, this work shall be conducted because the road shall use quality standard of AASHTO (American Association of States Highway and Transportation Officials).

## **6) Cut and Fill Work**

Excavation work by using excavator shall be conducted against the road that passes through hilly area, because the existing road in hilly area has width of pavement only 4.50 meter while the plan of road that will be constructed has width of pavement of 7.00 meter. Soil obtained as the result of excavation that still meets requirement of construction shall be utilized for filling of road location that is still relatively low and also for filling material of bridge entrance, culvert and box culvert, any shortage will be supplied from the nearest borrow area.

## **7) Subgrade improvement**

Compaction of subgrade shall be conducted in road segment that is relocated i.e., between 21.50 km - 25.50 km and 59.80 km -63 km by using heavy equipment among other, vibro roller, shepfoot roller, compactor.

## **8) The work for subbase course**

Material for subbase is supplied from borrow area that has been examined concerning its soil condition among other, water content, porosity, specific gravity, liquid limit by using laboratory from Regional Infrastructure Service of NAD Province for the purpose of conducting test. Equipment used for this work are combination from some types of equipment among others, grader, compactor and vibro roller, and for the purpose of testing of layer thickness and hardness, some samples (cores) shall be taken from some locations and tested concerning its quality in laboratory of Regional Infrastructure Service of NAD Province.

## **9) The work of base course**

This work shall be implemented following completion of work for subbase course with material used shall be material produced by stone crusher with quality and hardness as required by AASHTO standard, prior to spreading, approval shall be obtained from project manager and site engineer. The equipment used is combination of some heavy equipment, among others, grader and compactor. In order to know thickness and hardness of layer in some locations, quality test shall be conducted in laboratory of Regional Infrastructure Service, Province of NAD.

## **10) Pavement work**

This work shall use concrete asphalt as the result of Asphalt Mixing Plant (AMP), so that its composition and quality of its mixture can be guaranteed pursuant to the prevailing provision, while the equipment used is combination from some equipment such as tide roller, asphalt finisher, compactor, and compressor while for the purpose of testing of thickness and hardness of layer some samples (cores) shall be taken from some locations and tested concerning their quality in laboratory of Regional Infrastructure Service of NAD Province.

## **11) Work of side ditch**

The construction of side ditch even though as minor work, but it has very important function in order to prevent road from water inundation, whether water from rain or water penetration from slope of mountain, so that the construction of body road can be maintained in long period. The size of side ditch is strongly determined by volume of water that will be drained and the construction shall be made from stone masonry.

## **12) The work of culvert and box culvert**

In any water crossing shall be built culvert or box culvert, its size is strongly depended on water debit that will be drained and culvert also has function to drain water originated from side ditch, in culvert outlet shall be built controlling dam or groundsill in order to absorb kinetic energy produced by water as to prevent body road from erosion by water flow. The construction of culvert constitutes fabricated construction (ARMCO) that can be installed directly in the field, so that relatively shorter time is needed with its guaranteed quality, while box culvert shall be made from reinforced concrete construction with minimum quality of K-350.

## **13) Bridge work**

There were some bridges that have been drag by water flow during tsunami disaster on December 26, previously because the location of such bridges were in estuaries of rivers, among others in location of rivers of Kr. Raba, Lhoknga, Lepung or Lhong and Lhok-seudu, while there are some small bridges such as bridges crossing Kr. Rieting and Kr. Kala. Those bridges will be constructed by using pre-stressed concrete girder (pre-tension) for big rivers and by conventional concrete bridge for small rivers.

#### **14) Installation of traffic signs, etc.**

The installation of traffic signs shall be conducted in location that is needed based on road geometry in order to prevent road user from any accident while concerning shape, size, color, etc., shall be adjusted based on standard prevailing in Indonesia.

### 3.3

#### *POST CONSTRUCTION STAGE*

##### **1) Demobilization of Equipment and Personnel**

Demobilization of equipment shall be conducted following the work of road construction has been completed, but not all equipment shall be demobilized because the contractor still has responsibility for maintenance of the road, the period for road maintenance minimum of 180 working days or pursuant to consensus as stated in work contract. Also similar with personnel, a part of them shall remain staying in project in order to complete administrative work, while unskilled labor is no longer used for this activity.

##### **2) Road maintenance**

The duration of maintenance period is depended on consensus stated in the work contract. During such maintenance period any damage of road and its deficiency shall become contractor's responsibility, in general the duration of maintenance period is between 6-12 months. Following completion of maintenance period, road maintenance shall become government responsibility. In view of road between Banda Aceh - Meulaboh constitutes National road, the responsibility for conducting maintenance shall be assumed by central government by using fund originated from State Budget (APBN), for that purpose Provincial Government in this case Regional Infrastructure Service of Province of Nanggroe Aceh Darussalam shall submit request for budget every year to Central Government through the Ministry of Public Works in order to allocate budget for the need of such road maintenance.

## 4 *CONDITION OF INITIAL ENVIRONMENT*

### 4.1 *PHYSICAL COMPONENT OF CHEMICAL*

#### 4.1.1 *Climate*

Cities in the Province of Nanggroe Aceh Darussalam, in general, have pattern of Seasonal climate. This Seasonal climate is marked by cycle of climate once every six months between rainy and dry seasons. From data obtained from Station of Meteorology and Geophysics of Sultan Iskandar Muda that the type of climate in study area is the type of C with Q = 50.1%.

#### 4.1.2 *Temperature*

Temperature condition in study area seems without any significant difference. The obtained data shows that average monthly temperature is ranged between 25°C until 28°C with minimum temperature is 23°C and maximum temperature is 30°C.

#### 4.1.3 *Rainfall*

Cities in the Province of Nanggroe Aceh Darussalam, in general has the highest rainfall of 639 mm/month with average rainy day of 6 until 21 days in December. The lowest rainfall is 3 mm with average rainy day of 2 days in March. While the average rainfall is between 33 mm zand 291 mm.

#### 4.1.4 *Topography and Geology*

##### **A. Morphology**

Morphology of Banda Aceh city and the surrounding area shows low land with slope of 0-3% with height of 0-3 meter on sea water surface. Morphological unit is composed and dominated by alluvial sediment of river and coastal area.

##### **B. Geology**

Geological structure composing Banda Aceh city is dominated by alluvial sediment of river and coastal area consisting of big gravel, gravel and silt having nature of not integrated, in general with gray until brownish color. While to west direction from Banda Aceh

leading to Lamno, the composition of rock found consists of formations of Lho'nga, raba limestone, Lhong and Lamno rock formation. In general, bearing capacity of this rock is low until medium, so that the occurrence of land slide is still possible mainly on the slope of hills and rivers. This condition can be managed by using construction of slope reinforcement in the form of stone masonry or retaining wall for specific treatment in order to prevent occurrence of land slide following completion of construction work. Figure of geological map relating to location of activity is shown in Figure 4.2.

#### 4.1.5 Air quality

Parameter of air quality needs to be measured is carbon monoxide (CO), Sulfur Dioxide (SO<sub>2</sub>), Nitrogen Oxide (NO<sub>x</sub>), Dust (TSP), Lead (Pb), Oxidant (O<sub>3</sub>) and Hydrocarbon (HC). Analysis result of air quality can be referred to the following table:

**Table 4.1** Analysis Result of Air Quality

No.	Parameter	Unit	BML *)	Result	Method
1.	Debu	µg/m <sup>3</sup>	230	157	SNI 19-4840-1998
2.	Hidro Karbon (HC)	µg/m <sup>3</sup>	160	150	SNI 19-2879-1992
3.	Karbon Monoksida (CO)	µg/m <sup>3</sup>	10.000	1.371	Cox meter ex Sibata
4.	Nitrogen Dioksida (NO <sub>2</sub> )	µg/m <sup>3</sup>	150	15,81	SNI 19-4841-1996
5.	Sulfur Dioksida (SO <sub>2</sub> )	µg/m <sup>3</sup>	365	8,08	SNI 19-4174-1996
6.	Oksidan (O <sub>x</sub> )	µg/m <sup>3</sup>	235	74,18	SNI 19-4842-1998
7.	Timah Hitam (Pb)	µg/m <sup>3</sup>	2	0,14	SNI 19-2966-1992
8.	Amonia (NH <sub>3</sub> )	µg/m <sup>3</sup>	1.360**)	6,63	JIS K 009919-1995
9.	Hidrogen Sulfida (H <sub>2</sub> S)	µg/m <sup>3</sup>	28**)	< 1	SNI 19-4818-1998

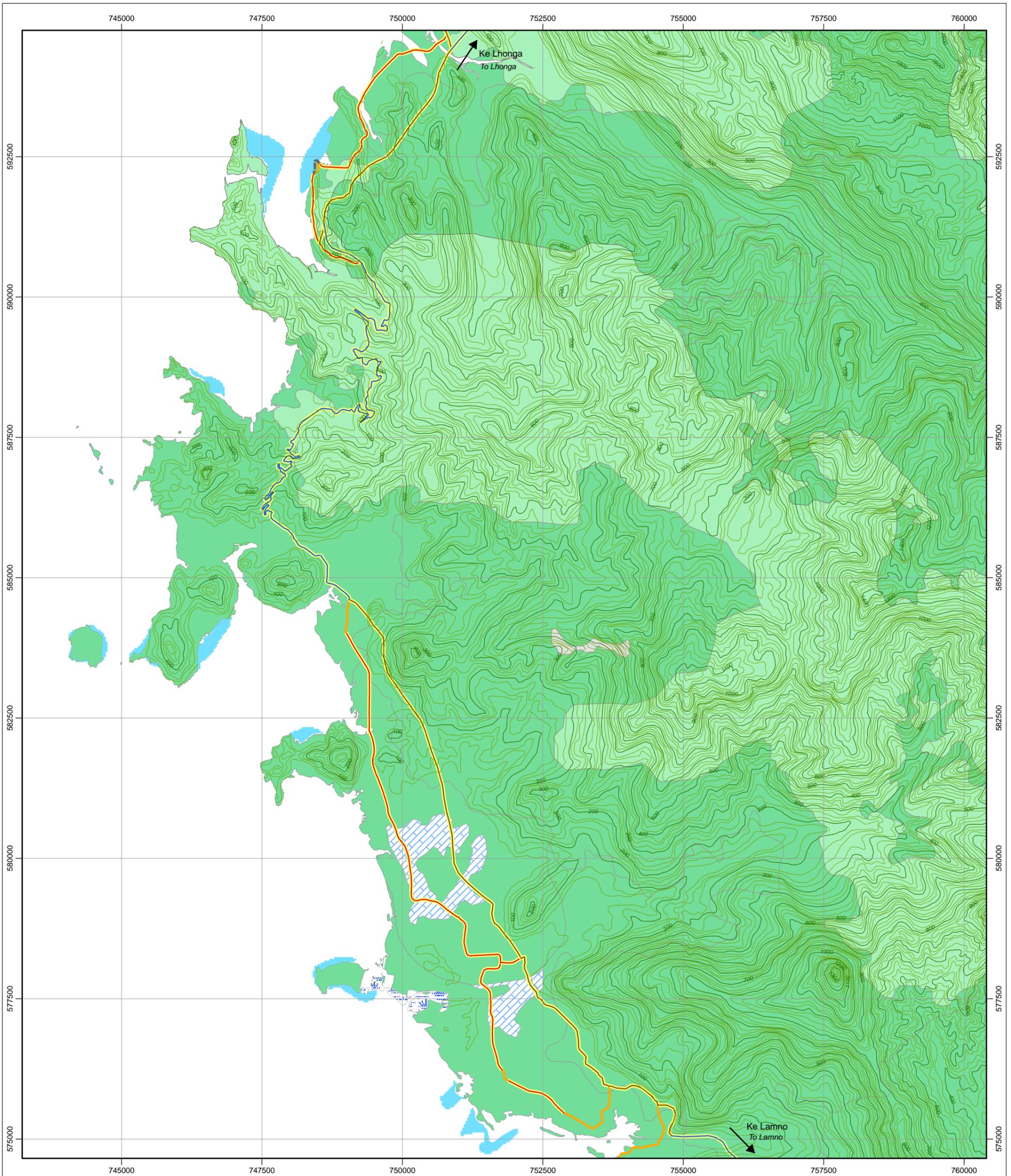
Source Unilab Perdana Laboratory, Jakarta (2005)

\*) BML = Government Regulation No.41 of 1999, Quality Standard of National Ambient Air.

\*\*\*) BML = Decree of Minister of Environment No.50 of 1996, Quality Standard of Odor.

Location: Simpang Lampuuk, Sub-district of Lhok Nga, Aceh Besar Regency.

The data obtained concerning air quality analysis shows that current condition of air quality is still under the specified quality standard, so that we can say that the current air condition is still in good condition.



**UPAYA PENGELOLAAN LINGKUNGAN (UKL)  
DAN UPAYA PEMANTAUAN LINGKUNGAN (UPL)**  
ENVIRONMENTAL MANAGEMENT EFFORT  
AND ENVIRONMENTAL MONITORING EFFORT

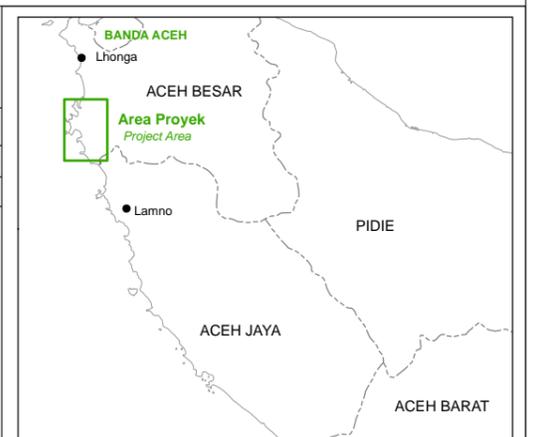
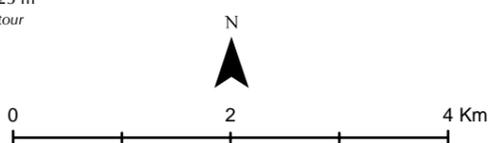
**TOPOGRAFI DAN PENGGUNAAN LAHAN**  
TOPOGRAPHY AND LANDUSE

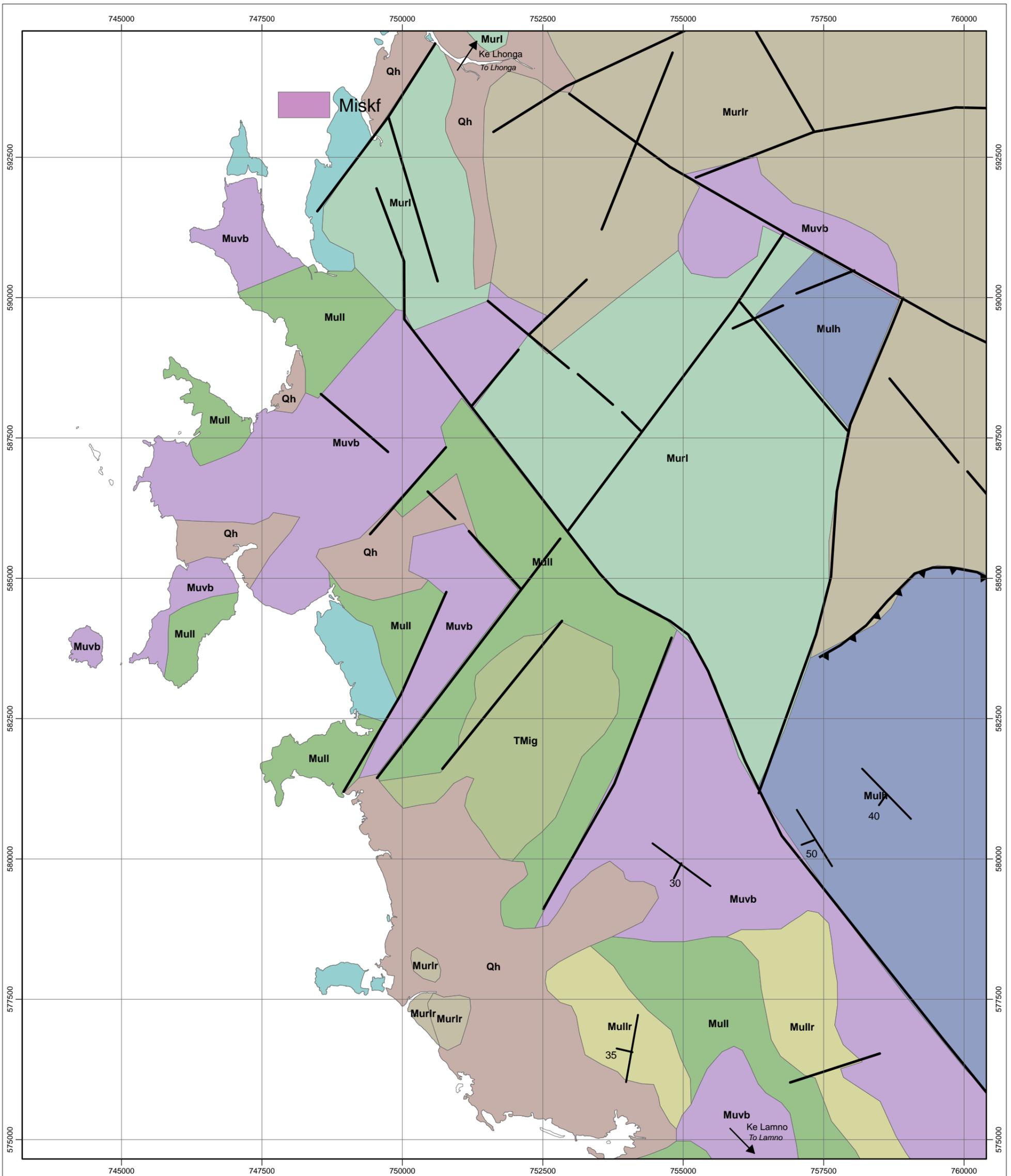
Sumber :  
Source :  
U.S Army Corps of Engineers, Honolulu District  
Sistem koordinat universal transverse mercator (UTM),  
Zona 46 Utara, WGS 84

No Gambar	4 - 1	Digambar Oleh	GGG
No. Revisi	0	Diperiksa Oleh	HAS
Tanggal Revisi	01/07/05	Digabung Oleh	ERM

**Legenda**  
Legend

- |   |  |   |
|---|--|---|
| Pemukiman<br>Village                          | Daerah Terbuka<br>Cleared/Bare Soil          | Kontur interval 25 m<br>Interval 25 m Contour |
| Hutan Primer<br>Primary Forest                | Sawah<br>Rice Paddies                        |   |
| Hutan Sekunder<br>Secondary Forest            | Karang<br>Reef                               |   |
| Pertanian Lahan Kering<br>Dryland Agriculture | Area Dampak Tsunami<br>Tsunami Affected Area |   |



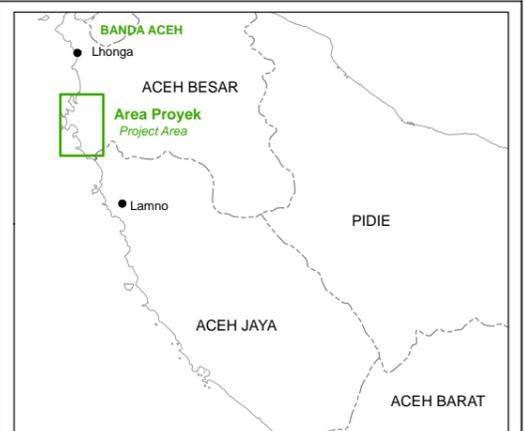


**UPAYA PENGELOLAAN LINGKUNGAN (UKL)  
DAN UPAYA PEMANTAUAN LINGKUNGAN (UPL)  
ENVIRONMENTAL MANAGEMENT EFFORT  
AND ENVIRONMENTAL MONITORING EFFORT**

**PETA GEOLOGI  
GEOLOGY MAP**

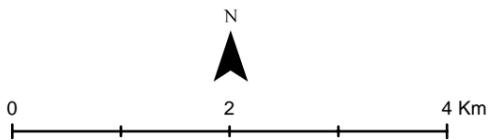
Sumber :  
Source :  
U.S Army Corps of Engineers, Honolulu District  
Sistem koordinat universal transverse mercator (UTM),  
Zona 46 Utara, WGS 84

No Gambar	4 - 2	Digambar Oleh	GGG
No. Revisi	0	Diperiksa Oleh	HAS
Tanggal Revisi	01/07/05	Digabung Oleh	ERM



**Legenda**

<b>Qh</b> Alluvium : Endapan tepi pantai (dengan gosong pasir tepi pantai) Alluvium : Shoreline deposits (with sandbars) fluvial and coastal plain deposits.	<b>Mul</b> FORMATION BATU LAMNO : batugamping berwarna gelap dengan rombakan batuan gunungapi. LAMNO LIMESTONE FORMATION : dark limestones with volcanic debris.	<b>Murl</b> FORMASI BATUGAMPING RABA : batugamping lempungan dan silikaan berwarna gelap berlapis tipis. RABA LIMESTONE FORMATION : dark, thin bedded argillaceous and siliceous limestone.	<b>Murlr</b> Anggota Terumbu : batugamping bak terumbu, kelabu prejal. Reef Member : massive grey reef like facies.	<b>Sesar Fault</b> <b>Jurus Strike</b>
<b>Muhl</b> FORMATION BATU LHOONG : Wake, batulanau, batuan gunungapi mafik, batupasir. LHOONG FORMATION : Wackes, siltstones, mavic volcanics, sandstones.	<b>TMig</b> GRANODIORIT GEUNTEUT : granodiorit dan diorit tambahan GEUNTEUT GRANODIORITE : granodiorite and subsidiary diorite.			



#### 4.1.6 *Noisiness*

Initial level of noisiness is based on level of noisiness caused by a number of vehicles that operate in study area. Measurement result concerning noisiness level in the location of study can be referred to in the following Table 4.2:

**Table 4.2** Measurement Result of Noisiness Level

<i>No.</i>	<i>Location</i>	<i>Result (dBA)</i>	<i>BML (dBA)**</i>
1.	Simpang Lampuuk - Lhok Nga	59,2	70,0

Source: Unilab Perdana Laboratory, Jakarta (2005)

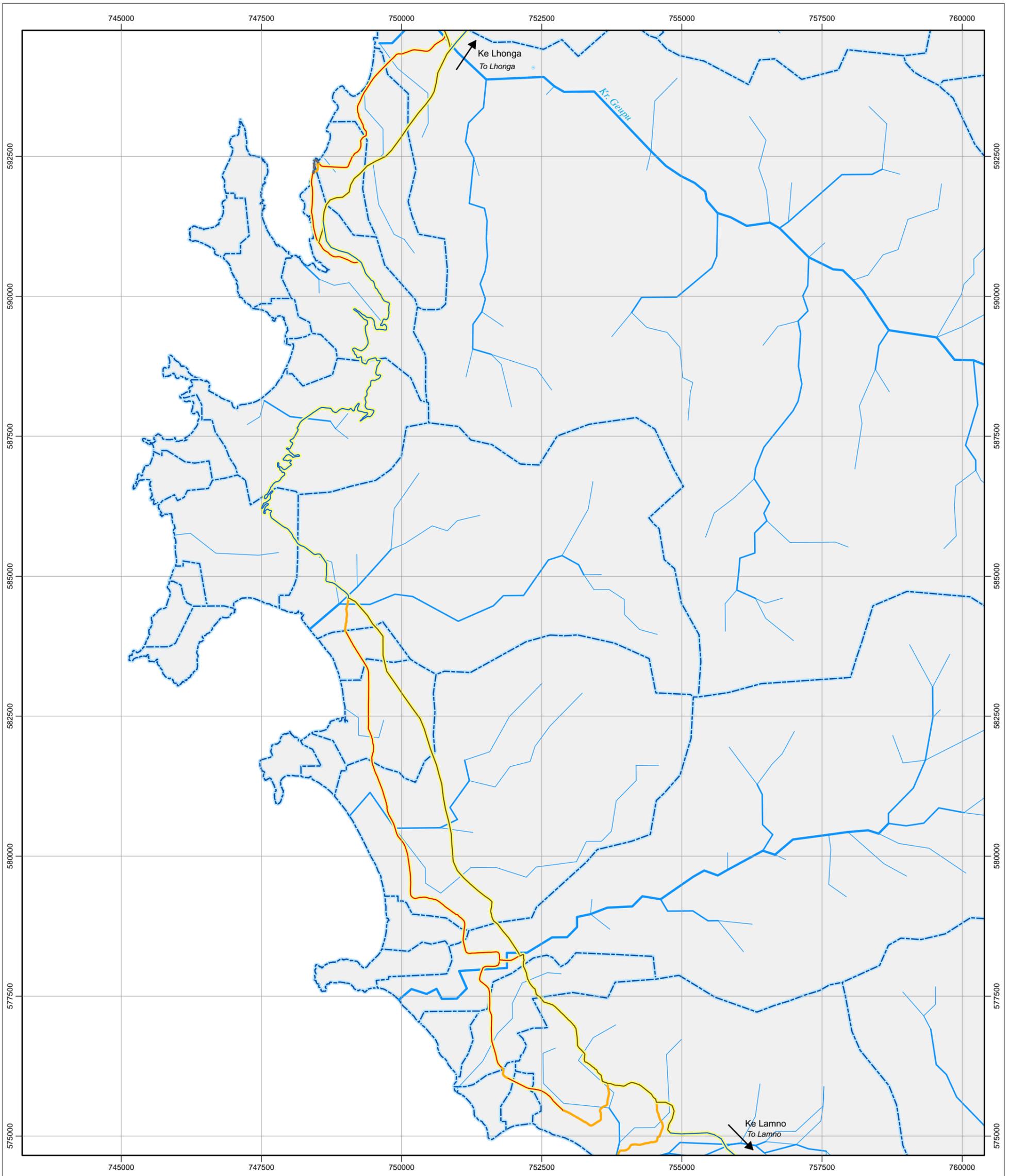
Remark: \*) Noisiness value is equivalent value during measurement time of 10 minutes with interval of 5 seconds.

\*\* ) BML = KEP.48/MENLH/11/1996, (Outside environment).

The result of measurement concerning noisiness level shows that the level of noisiness is still under quality standard. This condition is caused by number of traffic passing study area is relatively small, so that contribution to the level of noisiness is relatively small.

#### 4.1.7 *Hydrology*

In general, hydrological condition in the planned location of activity is influenced by tsunami typhoon, so that the existing hydrological system is not same with the previous condition. Illustration concerning hydrological condition in the planned location of activity before the occurrence of tsunami is shown in the following Figure 4.3.



**UPAYA PENGELOLAAN LINGKUNGAN (UKL)  
DAN UPAYA PEMANTAUAN LINGKUNGAN (UPL)**  
ENVIRONMENTAL MANAGEMENT EFFORT  
AND ENVIRONMENTAL MONITORING EFFORT

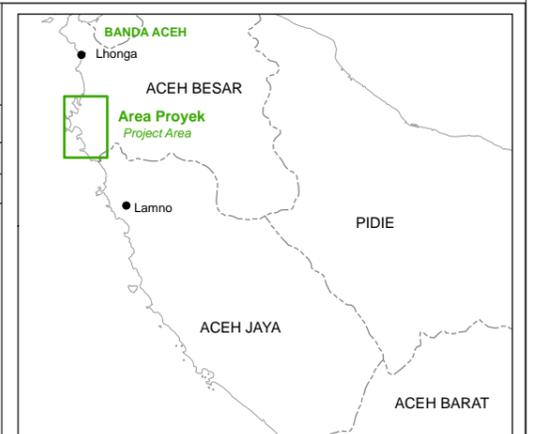
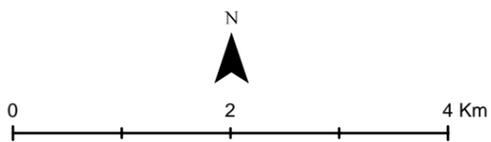
**HIDROLOGI**  
HYDROLOGY

**Legenda**  
Legend

-  Sungai  
River
-  Daerah Aliran Sungai  
Watershed

Sumber :  
Source :  
U.S Army Corps of Engineers, Honolulu District  
Sistem koordinat universal transverse mercator (UTM),  
Zona 46 Utara, WGS 84

No Gambar	4 - 3	Digambar Oleh	GGG
No. Revisi	0	Diperiksa Oleh	HAS
Tanggal Revisi	01/07/05	Digabung Oleh	ERM



## 4.2 *BIOLOGICAL COMPONENT*

### 4.2.1 *Land Flora*

Land flora found in the location of observation along the road from Banda Aceh - Lamno is in the form of mangrove ecosystem, coastal area, area of mixed agriculture/garden and secondary natural forest existing surrounding road location.

#### a. **Mangrove vegetation**

This ecosystem constitutes an unique ecosystem growing surrounding coastal area with the existence of fresh water having estuary to the sea. From the result of observation in the field shows that the condition of such ecosystem has experienced damage caused by tsunami. This condition can be seen along coastal area near the road from Banda Aceh leading to Lamno. The types of flora still exist among other, formation of Nipah (*Nypa fruticans*) and Mangrove (*Rhizophora* sp). Currently, replanting has been conducted for mangrove along coastal area.



**Figure 4.4** Condition of damage mangrove vegetation and activity for replanting of mangrove.

#### b. **Vegetation of Coastal Area**

Ecosystem of coastal area found also has experienced damage caused by tsunami. From observation in the field, it can be seen that this ecosystem has been damage and the types still growing was small in number, while there were many found remainder of dead plants. Plants still exist among others: waru (*Hibiscus tiliaceus*), sea pine (*Casuarina equisetifolia*) and banyan tree (*Ficus benjamina*). Besides,

along coastal area was also found remainder of coconut trees (*Cocos nucifera*) both still growing and the dead ones/fell down.



**Figure 4.5** Condition of vegetation along costal area engulfed by tsunami

#### c. Vegetation of mixed garden/agriculture

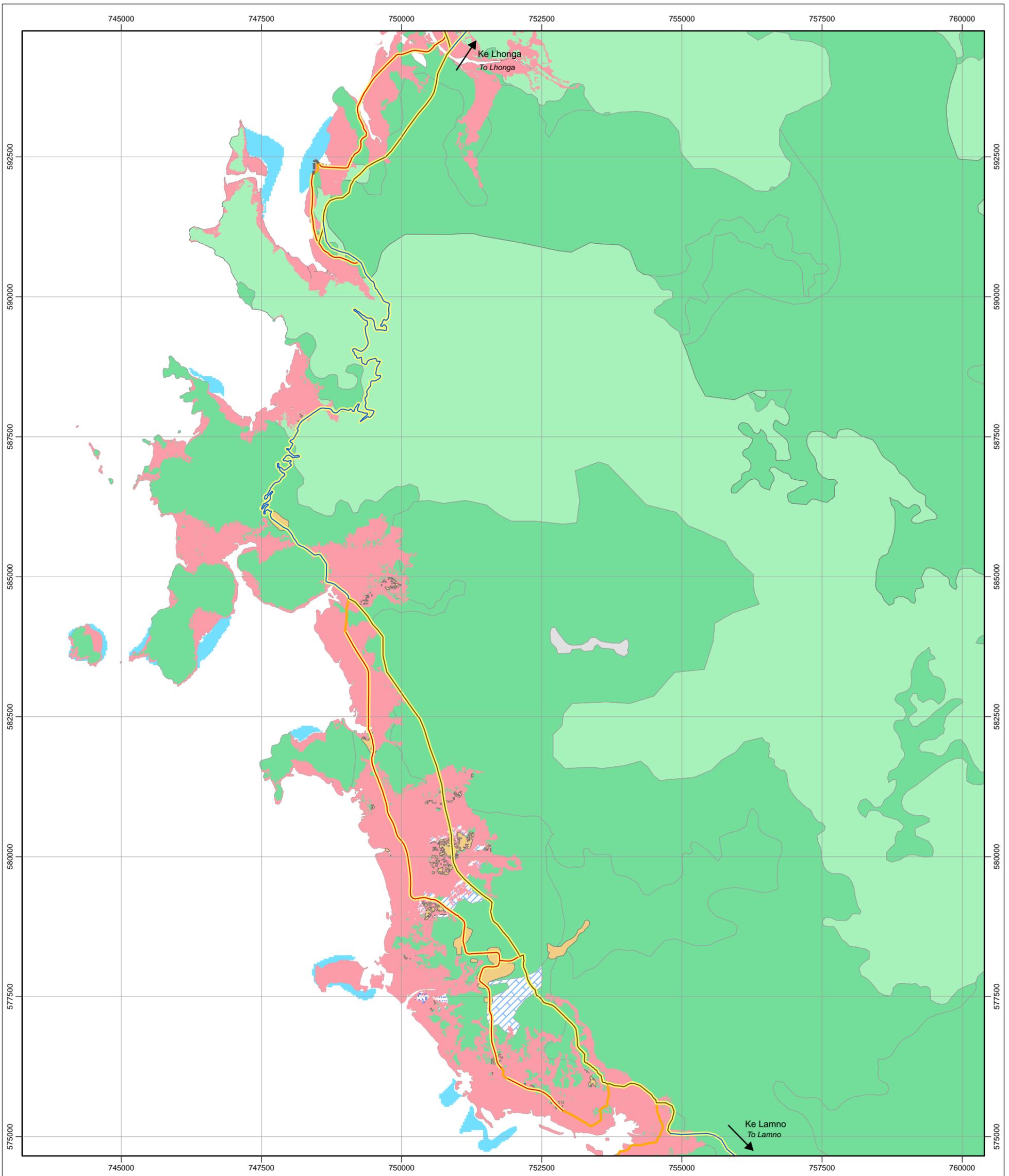
Ecosystem formation in mixed garden/agriculture basically constitutes cultivated plant that is intentionally planted by community both having economic value and just only protective plants. From the result of observation, the types of dominant plants cultivated by community in the area without being hit by tsunami found along the lane among others: mango (*Mangifera indica*), jack fruit (*Artocarpus heterophylla*), jambu mete (*Anacardium occidentale*), coconut (*Cocos mucifera*), banana (*Musa paradisiaca*), rambutan (*Nephelium lappaceum*), papaya (*Carica papaya*), durian (*Durio zibethinus*), areca nut (*Arecha catechu*), mlinjo (*Gnetum gnemon*). Other than plant having economic value, also there are shadowing plants for road such as mahoni (*swietenia mahagoni*), akasia (*Acacia auriculiformis*), angsana (*Pterocarpus indica*), ketapang (*Terminalia catappa*), sengon (*Albizzia chinensis*) and tamarin tree (*Tamarindus indica*). While in some locations there are agricultural land in the form of rice-field and garden cultivated by community.

#### d. Vegetation of secondary forest

Ecosystem of vegetation of secondary forest existing along the lane surrounding the road between Banda Aceh - Lamno in general without obtaining impact by tsunami and also the existence of such

secondary forest. From the result of observation, types of plant that were found in the location of observation among others: teakwood (*Tectona grandis*), trembesi (*Samanea samans*), durian (*Durio Zibethinus*), waru (*Hibiscus tiliaceus*), dedap (*Erythrina sp*), petai (*Parkia speciosa*), tampu (*macaranga sp*), areca nut (*Arecha catechu*), ketapang (*Terminalia catappa*), sengon (*Albizzia chinensis*) and bamboo (*Bambussa sp*).

For more information the condition of vegetation is shown in Figure 4.6.



**UPAYA PENGELOLAAN LINGKUNGAN (UKL)  
DAN UPAYA PEMANTAUAN LINGKUNGAN (UPL)**  
ENVIRONMENTAL MANAGEMENT EFFORT  
AND ENVIRONMENTAL MONITORING EFFORT

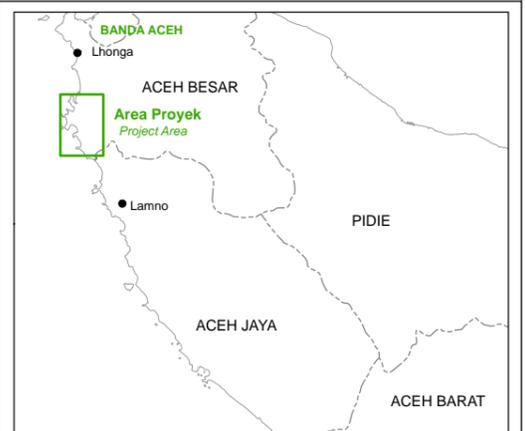
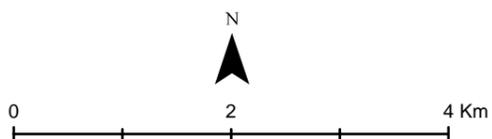
**KONDISI FLORA DARAT (VEGETASI SETELAH MENGALAMI TSUNAMI)**  
VEGETATION AFTER TSUNAMI

**Legenda**

- |   |  |
|---|--|
| Pemukiman<br>Village                          | Daerah Terbuka<br>Cleared/Bare Soil          |
| Hutan Primer<br>Primary Forest                | Sawah<br>Rice Paddies                        |
| Hutan Sekunder<br>Secondary Forest            | Karang<br>Reef                               |
| Pertanian Lahan Kering<br>Dryland Agriculture | Area Dampak Tsunami<br>Tsunami Affected Area |

Sumber :  
Source :  
U.S Army Corps of Engineers, Honolulu District  
Sistem koordinat universal transverse mercator (UTM),  
Zona 46 Utara, WGS 84

No. Gambar	4 - 6	Digambar Oleh	GGG
No. Revisi	0	Diperiksa Oleh	HAS
Tanggal Revisi	01/07/05	Digabung Oleh	ERM



#### 4.2.2

#### Land Fauna

The condition of vegetation along the lane surrounding the road between Banda Aceh - Lamno provides influence to the habitat of wild animal. The result of observation against wild animal is shown in the following table:

**Table 4.3 Inventory Result of Fauna Existing in Study Location**

No.	Species	Local name	Note
MAMALIA			
1.	<i>Canis sp</i>	Kucing	
2.	<i>Canis familiaris</i>	Anjing	
3.	<i>Bos sp</i>	Sapi	
4.	<i>Bubalus bubalus</i>	Kerbau	
5.	<i>Capricornis sp</i>	Kambing	
6.	<i>Macaca fasciculiformis</i>	Monyet ekor panjang	
AVES/BURUNG			
1.	<i>Egretta sp</i>	Kuntul	Dilindungi
2.	<i>Paser montanus</i>	Burung gereja	
3.	<i>Cisticola juncidis</i>	Cici padi	
4.	<i>Dicaeum sp</i>	Cabe-cabean	
5.	<i>Pycnonotus aurigaster</i>	Kutilang	
6.	<i>Dendrocygna</i>	Belibis	
7.	<i>Hirundo tahitica</i>	Layang-layang	
8.	<i>Columba livia</i>	Merpati/dara	
9.	<i>Collocalia esculenta</i>	Walet sapi	
10.	<i>Sterna sp</i>	Dara laut	Dilindungi
11.	<i>Gallus gallus</i>	Ayam	
12.	<i>Anas sp</i>	Bebek	
REPTILIA/REPTIL			
1.	<i>Varanus sp</i>	Biawak	

Source : Primary data (2005)

Remark : \*) Government Regulation No. 7, year 1998 regarding the preservation of certain types of plants and animals.

From the result of observation against wild life, in general land animals/wild life consist of 6 types of mammal, 12 types of birds and 1 type of reptile. From 6 types of mammal found, almost all of them (5 types) constitute domesticated animals while 1 type i.e., long tailed monkey (*Macaca fascicularis*) constitute wild animal that are many found along the lane of road mainly in the area of Grotee Mountain

(Figure 4.7). From all of wild life found, there are 2 types constitute protected animals (Government Regulation No.7 of 1999) i.e., kuntul bird (*Egretta* sp) and sea pigeon (*Sterna* sp).



**Figure 4.7 The existence of long tailed monkey (*Macaca fascicularis*) in the area of Grotee Mountain.**

## 5 ENVIRONMENTAL IMPACT THAT WILL OCCUR

### 5.1 PRE-CONSTRUCTION STAGE

#### 1) Survey and Measurement

The impact estimated to occur as the consequence of such activity:

- a. The occurrence of community restlessness because information concerning the plan of activity has not obtained by them, let alone almost all of their lands have been lost as the consequence of tsunami disaster, so that further impact may be in the form of trouble that may cause impediment or even trouble to survey team who shall be assigned to install poles for road construction such as for road axis, etc., besides also there will be land speculators who will utilize condition where community does not know concerning the plan of construction and they will act for their own interest or for their group.
- b. The occurrence of community restlessness due to the existence of negative information that Government will force its intention by using the reason for public interest and Government will utilize their lands without providing or any indemnification or with improper indemnification which is not pursuant to Sale Value of Tax Object (NJOP) as contained in the prevailing provision.
- c. Community members will have feeling of fear for the occurrence of traffic accident against their domesticated animals such as buffalos, cows and goats that up to now are left wandering freely.

From the above description, environmental impact that will occur is in the form of community restlessness and community perception.

#### 2) Land acquisition

- a. The occurrence of community fear and restlessness concerning the value of indemnification for their lands and plants which is considered as unreasonable price, so that can not obtain

substitute land in other location, as the result, there is possibility that trouble will occur against the implementation of relocation of such road.

- b. The occurrence of community restlessness due to loss of their business for obtaining income for their family that possibly as the only land owned by them so that it is possible to cause new jobless persons which ultimately may decrease the level of community welfare.

Environmental impact estimated to occur is community restlessness, loss of livelihood and community perception.

## 5.2 CONSTRUCTION STAGE

### 1) Mobilization of manpower/personnel

At the time of conducting mobilization for manpower, there is possibility to occur social jealousy against medium level of manpower and labor so that impediment will occur against project activity for betterment and reconstruction of such road and this matter shall be considered seriously by project organizer. The impact that is possible to occur is community restlessness and community perception.

### 2) Mobilization of Equipment

Heavy equipment shall be supplied by land transportation from Malahayati seaport through Banda Aceh directly leading to location of base camp in project site.

The impact that is possible to occur is traffic jam when heavy equipment will pass through Banda Aceh city mainly in junction of jambo tape, Surabaya junction and along Teuku Umar road. In view of traffic condition in those roads is very crowded during working days, the second alternative for equipment mobilization is that following reaching Surabaya junction, then directly leading to Elak Lamboro - Keutapang road, but traffic jam may occur at traditional market of Lamboro and in morning market of Keutapang.

### 3) Construction of Base Camp/Working Barrack

Environmental impact that is possible to occur at the time of operation of base camp/working barrack i.e., noisiness caused by activity of project vehicles that come-in and come-out of base camp

and traffic trouble that passes in front of base camp, operation of generating plant and workshop activity.

Besides, the occurrence of contamination caused by waste of oil/lubricant, and impact of socio-culture caused by the existence of manpower coming from outside of location whose custom is not pursuant to the condition of socio-culture of local community.

#### **4) Land Clearing**

Land clearing shall be conducted within borders of Right of Way (DAMIJA). At the time of conducting land clearing the possible impact will occur is air contamination in the form of dust, traffic trouble along that road and noisiness. Equipment that will be used is in the form of Bulldozer and other supporting tools such as chainsaw and axes. Besides, if operator of heavy equipment and supervisor are carelessly in conducting their work, plants in gardens of community near project may fall down and hit them. The result of land clearing if disposed improperly, may cause trouble to water flow and further will cause erosion and sedimentation at downstream.

#### **5) Stripping**

Stripping shall be conducted against body road that will be relocated until 30-50cm depth so that body road shall be free from any remaining root of plant that may cause decrease to the quality of body road. The possible impact that may occur is air contamination in the form of dust, traffic trouble along that road caused by transportation of soil as the result of such land stripping when it is transported to disposal area, let alone if dump truck is driven with high speed. Besides, noisiness will occur from the equipment used such as combination of bulldozer and excavator (back hoe).

#### **6) The work of cut and fill**

The work of excavation shall be conducted for obtaining elevation of body road surface (grade) that is pursuant to the plan drawing. The possible impact will occur against environment i.e., noisiness, traffic trouble surrounding such activity caused by activity of dump truck to transport excavation result, occurrence of landslide in the steep slope of hill or riverbank which condition is still unstable. At the time of land slide, it will involve community land surrounding it, air contamination will occur in the form of dust and contamination of road surface by soil drop during its transportation so that if rain falls road surface will become slippery and prone to traffic accident. Soil as the result of this excavation having good quality, can be utilized

for filling material of body road the elevation of which is still low beside soil supplied from borrow area.

#### **7) Improvement of subgrade**

Prior to spreading material for subbase course, subgrade shall be compacted pursuant to the standard of AASHTO (American Association of States Highway and Transportation Officials), while the equipment used is depended on condition of such subgrade, normally combination of some compactor equipment such as vibro roller, sheepfoot roller and compactor assisted by water-tank car in order to keep water content to reach 90% of optimum density. Environmental impact will occur i.e., noisiness, vibration, air contamination, trouble of traffic passing such road.

#### **8) The work of subbase course**

Subbase course can be implemented if improvement work to subgrade has been completed and pursuant to the specified requirement. Material for base course is supplied from borrow area while equipment used is combination of some equipment such as vibro roller, compactor, grader for leveling. Possible environmental impact will occur i.e., noisiness, air contamination (dust), vibration, trouble of traffic passing that area.

#### **9) The work of base course**

This work can be implemented if the work for subbase course has been completed with quality that is accountable technically while material used is originated from crushed stone produced by stone crusher with size pursuant to the specification as required by standard of AASTHO. Equipment used for compaction is same as those used for the work of subbase course, but it has higher level of compaction. Environmental impact will occur are air contamination (dust), noisiness, traffic trouble caused by activity of dump truck to transport such material.

#### **10) Asphaltting work (pavement)**

Asphaltting work can be conducted if the work for base course has been fully completed, raw material for pavement can be obtained from production of Asphalt Mixing Plant (AMP), while equipment used is combination from some equipment such as compressor, asphalt finisher, tide roller, asphalt sprayer, and assisted by truck of water tank. Environmental impact that will occur are noisiness and influence against traffic flow.

### **11) The work of side ditch**

The work for excavation of side ditch shall be implemented concurrently with construction of body road, so that body road can be prevented from water inundation when rain falls, the width of side ditch is planned of 1.50 meter. This side ditch shall be constructed for total length of the road both the existing road and the relocated road because the existing road is not fully equipped with side ditch. Excavation of side ditch shall be conducted by excavator (backhoe) and other supporting tools such as hoe, shovel, etc. Environmental problem may occur among others, noisiness, trouble to activity of community because such side ditch is constructed in their house yards and piles of material that also cause influence to their plants or trees, especially in the area not hit by tsunami disaster (Lhong). Some utilities such as poles of electricity and telephone, especially in urban area shall be relocated or re-adjusted pursuant to the existing condition, so that convenience of community during the implementation of activity will temporarily obtain trouble, while social problem may occur if manpower used without involving local community.

### **12) The work for Culvert and Box Culvert**

This work shall be implemented in any location of water crossing or drainage that many available along the road and also in location having low topography so that water inundation will not occur as the consequence of construction of body road. Environmental impact that may occur are traffic trouble, impediment to water flow caused by garbage if size of culvert is too small as to cause inundation and flood at the upstream part.

### **13) Bridge work**

At the time of bridge construction, equipment used constitute combination of some heavy equipment among other, excavator, crane, compactor for compaction of bridge entrance. Environmental impact that may occur i.e., traffic trouble, water contamination caused by spill of lubricant, dust and noisiness.

### **14) Installation of traffic sign, etc**

Environmental impact that will occur is that community is not familiar with specific traffic sign that will be installed in that planned road such as in the bend road will be equipped with convex mirror and there is possibility that this mirror will be taken by community for their mirror at home.

### 5.3 *POST CONSTRUCTION STAGE*

In this stage the possible impact will occur is loss of job for manpower due to their termination from construction work and also traffic accident because in good condition of road, road users will become careless without paying attention to the readiness of their vehicles such as vehicle's tires, brake, safety belt, etc.

## 6 *EFFORT FOR ENVIRONMENTAL MANAGEMENT (UKL)*

### 6.1 *PRE-CONSTRUCTION STAGE*

#### 1. **Impact of activity to stipulate location and land acquisition**

##### a. The affected component of environment

Community perception

##### b. Source of impact:

The stipulation of location of road lane and land acquisition.

##### c. Effort for Environmental Management:

- Socialization through newspaper media especially in local area, besides it also can be conducted directly in the form of meeting in project location by involving local community figures, authorities of village or sub-district.
- The day of meeting shall be chosen when community is not so busy with their daily activities and informed to them 7 (seven) days prior to the commencement of agenda of socialization, with place in meeting hall of sub-district or village or in refugee camp, because meeting hall of village is currently not available due to totally damage by tsunami disaster, location for agenda of socialization shall be easy to reach without using vehicle, so that community can attend to hear explanation.
- Socialization concerning land acquisition and very limited financial capability of government shall be informed openly that government has not enough budget to pay indemnification as the prevailing regulation. Community shall know well that budget used for betterment and reconstruction of road between Banda Aceh - Lamno of 60 km length is fully funded by grant obtained from American government through USAID Program, so that if this matter is informed transparently, community will surely support the plan for betterment and reconstruction of such road, so that the implementation for betterment and reconstruction of such road can completed on time.

- In conducting socialization the related institution shall be involved both in the levels of Province of NAD and Regency/City, among others Bapedalda (Regional Environmental Impact Supervisory Agency) of Regency/City and Province of NAD, National Land Agency (BPN), Bappeda (Regional Development Planning Agency), local Muspika (Sub-district Head, Rayon Military Commander and Head of Police Precinct) and Betterment and Reconstruction Agency (BRR).
  - Community support shall be requested in writing at the time of meeting signed by local Head of Village on behalf of community.
  - Community shall be provided with opportunity to deliver their opinion or view at the time of conducting such socialization.
  - In the occurrence of conflict/dispute shall be settled amicably for obtaining consensus by involving various related elements, including community figures.
- d. Location of Environmental Management:
- Settlement of population surrounding location of activity.
- e. Period of Environmental Management
- As of stipulation of location for road lane until completion of land acquisition.
- f. Cost for Environmental Management
- Cost for Environmental Management shall be borne by Contractor.
- g. Institution of Environmental Management:
- Initiator of Environmental Management: Contractor that implements construction.
  - Supervisor of Environmental Management: Regional Infrastructure Service of NAD Province, Supervisory Consultant and Bapedalda of NAD Province.
  - Report of Result of Environmental Management: To be submitted to Regional Infrastructure Service of NAD

Province, USAID, Reconstruction and Rehabilitation Agency (BRR) and Bapedalda of NAD Province.

## 6.2 CONSTRUCTION STAGE

### 1. Impact of Activity of Manpower Mobilization

#### a. The affected environmental component:

Community Perception and Working Opportunity.

#### b. Source of impact:

Stipulation of project location and land acquisition.

#### c. Effort For Environmental Management:

- Recruitment of unskilled labors is recommended to be recruited from population of local villages, while middle class manpower if not available in local villages shall be recruited from neighboring villages in the same sub-district. Any employed manpower shall be furnished with work agreement.
- Recruitment of manpower shall be conducted openly and announced in village meeting hall or in small mosque with stating various requirement which is expected not so strict, except for professional/skilled manpower.
- Payment of wage shall be standardized without discrimination pursuant to capability of manpower and paid on time.
- To manpower having lack discipline prior to termination shall be provided with warning both orally and in writing minimum 3 (three) times.
- Manpower shall be provided with opportunity for conducting worship at the specified time including to carry out Friday praying.
- Counseling shall be conducted for manpower coming from other region.

d. Location of Environmental Management:

Within location of activity

e. Period of Environmental Management

As of commencement of construction stage.

f. Cost for Environmental Management

Cost for Environmental Management shall be borne by Contractor.

g. Institution of Environmental Management:

- Initiator of Environmental Management: Contractor that implements construction.
- Supervisor of Environmental Management: Regional Infrastructure Service of NAD Province, Supervisory Consultant and Bapedalda of NAD Province.
- Report of Result of Environmental Management: To be submitted to Regional Infrastructure Service of NAD Province, USAID, Reconstruction and Rehabilitation Agency (BRR) and Bapedalda of NAD Province.

**2. Impact of Activity for Mobilization and Demobilization of Equipment**

a. The affected component of environment:

Traffic jam

b. Source of impact:

Activity for mobilization and demobilization of equipment.

c. Effort for Environmental Management:

- It is better that activities for mobilization and demobilization to be conducted at night time instead of during busy hours.

- Bridge that will be passed by equipment shall be checked of its condition whether it is capable to support load from heavy equipment or not.
- In the traveling leading to base camp shall be accompanied by security personnel (Police).
- At the first time to commence construction activity, it is better with conducting ceremony with local community by slaughtering animal to be consumed together with them.

d. Location of Environmental Management:

Within location of activity

e. Period of Environmental Management

As of commencement of construction stage.

f. Cost for Environmental Management

Cost for Environmental Management shall be borne by Contractor.

g. Institution of Environmental Management:

- Initiator of Environmental Management: Contractor that implements construction.
- Supervisor of Environmental Management: Regional Infrastructure Service of NAD Province, Supervisory Consultant and Bapedalda of NAD Province.
- Report of Result of Environmental Management: To be submitted to Regional Infrastructure Service of NAD Province, USAID, Reconstruction and Rehabilitation Agency (BRR) and Bapedalda of NAD Province.

**3. Construction and operation of Base Camp/Working Barrack**

a. The affected component of environment:

The increase of noisiness, air contamination (dust) and water contamination.

b. Source of impact:

Construction and operation of base camp/working barrack.

c. Effort of Environmental Management:

- At the time of Friday praying all activities shall be stopped.
- It is not recommended to dispose waste lubricant to the ground or waters (river), but it shall be collected in special location, then transported to outside of project location for further process.
- The road for coming in and coming out from base camp shall be watered periodically in order to prevent air contamination (dust).
- The inner part of base camp shall be equipped with facilities in the form of electricity, water, First Aid Kit (P3K) and other facilities such as small mosque and closed bathroom.
- Temporary garbage disposal (TPS) shall be prepared.
- Adequate facility for sanitation shall be available.

d. Location of Environmental Management:

Within and surrounding location of activity

e. Period of Environmental Management

As of commencement of construction stage.

f. Cost for Environmental Management

Cost for Environmental Management shall be borne by Contractor.

g. Institution of Environmental Management:

- Initiator of Environmental Management: Contractor that implements construction.
- Supervisor of Environmental Management: Regional Infrastructure Service of NAD Province, Supervisory Consultant and Bapedalda of NAD Province.

- Report of Result of Environmental Management: To be submitted to Regional Infrastructure Service of NAD Province, USAID, Reconstruction and Rehabilitation Agency (BRR) and Bapedalda of NAD Province.

#### **4. Land clearing and stripping and cut and fill**

##### **a. The affected component of environment:**

Traffic trouble, air contamination, noisiness dan influence against plants of community.

##### **b. Source of impact:**

The activity of land clearing and stripping and cut and fill.

##### **c. Effort for Environmental Management:**

- To assign field personnel to control traffic passing in such area.
- To cover deck of transporting vehicle in order to prevent dropping and flying of material when it is transported to location of disposal area.
- Any horn shall not be activated when vehicle passes in front of mosque at the time community is praying.
- Any activity shall be stopped at the time of conducting Friday praying between 12.00-13.30 WIB (Western Indonesia Time).
- If plant of community hit unintentionally by operator of heavy equipment, any solution shall be conducted with owner of the plant and local community figure/Head of village/Keucik, also if there is domesticated animal of community hit by project vehicle.
- If there is traffic accident experienced by member of community, he/she shall be immediately transported to the nearest Health Center and reports it to security personnel (Police) and further with victim's family it shall be settled amicably pursuant to local tradition and culture.
- Dump truck shall be forbidden to transport person/member of community during its operation.

- Every driver shall be furnished with Driving License (SIM) pursuant to the type of vehicle.
- d. Location of Environmental Management:
- Within and surrounding location of activity.
- e. Period of Environmental Management
- As of commencement of construction stage.
- f. Cost for Environmental Management
- Cost for Environmental Management shall be borne by Contractor.
- g. Institution of Environmental Management:
- Initiator of Environmental Management: Contractor that implements construction.
  - Supervisor of Environmental Management: Regional Infrastructure Service of NAD Province, Supervisory Consultant and Bapedalda of NAD Province.
  - Report of Result of Environmental Management: To be submitted to Regional Infrastructure Service of NAD Province, USAID, Reconstruction and Rehabilitation Agency (BRR) and Bapedalda of NAD Province.
- 4. The work for improvement of subgrade, subbase course, base course and pavement.**
- a. The affected component of environment:
- Traffic trouble, air contamination, noisiness.
- b. Source of impact:
- The work for improvement of subgrade, subbase course, base course and pavement.
- c. Effort for Environmental Management:
- To assign field personnel to control traffic passing in such area.

- To cover deck of transporting vehicle in order to prevent dropping and flying of material when it is transported to the work location.
- Activity for compaction shall be conducted immediately following material of subbase and base have been spread on body road.
- Material obtained from quarry shall be furnished with mining permit of type C material from local Mine Service.
- The remaining material that is no longer used shall be returned to original location and shall not be disposed except in disposal area.
- Any horn shall not be activated when vehicle passes in front of mosque at the time community is praying.
- Any activity shall be stopped at the time of conducting Friday praying between 12.00-13.30 WIB (Western Indonesia Time).
- If plant of community hit unintentionally by operator of heavy equipment, any solution shall be conducted with owner of the plant and local community figure/Head of village/Keucik, also if there is domesticated animal of community hit by project vehicle.
- If there is traffic accident experienced by member of community, he/she shall be immediately transported to the nearest Health Center and reports it to security personnel (Police) and further with victim's family it shall be settled amicably pursuant to local tradition and culture by involving local community figure/Head of Village .
- Dump truck shall be forbidden to transport person/member of community during its operation.
- When operator of heavy equipment takes a rest (for eating/drinking), heavy equipment shall be parked at proper location without causing trouble to any public vehicle passing in that area.
- If straight road is too long, at some points shall be made jolt in order to prevent driver from becoming negligent/sleepy.

- Every driver shall be furnished with Driving License (SIM) pursuant to the type of vehicle.
- d. Location of Environmental Management:  
Within and surrounding location of activity.
- e. Period of Environmental Management  
As of commencement of construction stage.
- f. Cost for Environmental Management  
Cost for Environmental Management shall be borne by Contractor.
- g. Institution of Environmental Management:
  - Initiator of Environmental Management: Contractor that implements construction.
  - Supervisor of Environmental Management: Regional Infrastructure Service of NAD Province, Supervisory Consultant and Bapedalda of NAD Province.
  - Report of Result of Environmental Management: To be submitted to Regional Infrastructure Service of NAD Province, USAID, Reconstruction and Rehabilitation Agency (BRR) and Bapedalda of NAD Province.

## 5. The work of side ditch

- a. The affected component of environment:  
Inconvenience of community, local inundation, community perception and noisiness.
- b. Source impact:  
The work of side ditch.
- c. Effort for Environmental Management:
  - The remainder of excavated material shall be removed immediately from work location in order to prevent trouble to road users.

- Crossing bridge shall be constructed immediately between house yard and location of planned road by using reinforced concrete with minimum quality of K225.
- Elevation of bottom of side ditch shall be lower than surrounding ground, so that rain water and any other inundation can flow smoothly into such drainage.
- Crossing culvert shall be adequately constructed in order to drain water quickly to the lower location (river).
- Drainage shall be constructed by stone masonry with mixture of 1 cement : 4 sand.
- Fence owned by community if becoming damage caused by construction of side ditch shall be reconstructed with same or better quality of construction.
- Public facility such as pipeline of drinking water (PAM) or electricity pole that is broken at the time of conducting excavation shall be improve accordingly.
- Piles of material for such activity shall not be located in house yard or on public road in order to prevent trouble to activity of house owner/public.

d. Location of Environmental Management:

Within and surrounding location of activity.

e. Period of Environmental Management

As of commencement of construction stage.

f. Cost for Environmental Management

Cost for Environmental Management shall be borne by Contractor.

g. Institution of Environmental Management:

- Initiator of Environmental Management: Contractor that implements construction.
- Supervisor of Environmental Management: Regional Infrastructure Service of NAD Province, Supervisory Consultant and Bapedalda of NAD Province.

- Report of Result of Environmental Management: To be submitted to Regional Infrastructure Service of NAD Province, USAID, Reconstruction and Rehabilitation Agency (BRR) and Bapedalda of NAD Province.

## 7. The work of Culvert and Box Culvert

### a. The affected component of environment:

Trouble to convenience of community, local inundation, community perception.

### b. Source of impact:

The work for Culvert and Box Culvert.

### c. Effort for Environmental Management:

- Culvert/Box Culvert shall be located in location of water crossing with cross section of wet condition shall be able to flow water inundation and free board shall be able to pass garbage drift.
- In its outlet shall be constructed controlling dam for preventing erosion against foundation of culvert or box culvert.
- Pile of material for such activity shall be located properly in order to prevent trouble against public traffic.
- Box Culvert made by construction of reinforced concrete shall be with minimum quality of K350.
- Remainder of cover-dam shall be removed following completion of foundation work.

### d. Location of Environmental Management:

Within and surrounding location of activity.

### e. Period of Environmental Management

As of commencement of construction stage.

f. Cost for Environmental Management

Cost for Environmental Management shall be borne by Contractor.

g. Institution of Environmental Management:

- Initiator of Environmental Management: Contractor that implements construction.
- Supervisor of Environmental Management: Regional Infrastructure Service of NAD Province, Supervisory Consultant and Bapedalda of NAD Province.
- Report of Result of Environmental Management: To be submitted to Regional Infrastructure Service of NAD Province, USAID, Reconstruction and Rehabilitation Agency (BRR) and Bapedalda of NAD Province.

**8. Bridge work**

a. The affected component of environment:

Traffic trouble and convenience of community, water contamination.

b. Source of impact:

The work of bridge.

c. Effort of Environmental Management:

- To assign field personnel in order to control traffic passing in that area.
- Pile of material for such activity shall be located properly without causing trouble to public traffic.
- The operated heavy equipment shall be in good condition in order to prevent spill of lubricant into the river.
- Poles of scaffolding temporary installed when constructing bridge pier shall be immediately removed from the river in order to prevent any trouble against flow of river water, also similar with remainder of cover-dam.

- Material used for filling of bridge entrance shall be originated from good condition of filling soil so that between surface of bridge entrance and bridge surface there is no protrusion that is possible to cause trouble to convenience of road user and prone to traffic accident.
- d. Location of Environmental Management:  
Within and surrounding location of activity.
- e. Period of Environmental Management  
As of commencement of construction stage.
- f. Cost for Environmental Management  
Cost for Environmental Management shall be borne by Contractor.
- g. Institution of Environmental Management:
- Initiator of Environmental Management: Contractor that implements construction.
  - Supervisor of Environmental Management: Regional Infrastructure Service of NAD Province, Supervisory Consultant and Bapedalda of NAD Province.
  - Report of Result of Environmental Management: To be submitted to Regional Infrastructure Service of NAD Province, USAID, Reconstruction and Rehabilitation Agency (BRR) and Bapedalda of NAD Province.

### 6.3 *POST CONSTRUCTION STAGE*

#### **1. Demobilization of Manpower (Laid off).**

- a. The affected component of environment:  
Restlessness of manpower.
- b. Source of impact:  
Demobilization of manpower.

c. Effort for Environmental Management:

- Some weeks prior to conducting demobilization of manpower (Laid off), project manager shall provide explanation to such manpower that they are no longer needed, if possible with farewell ceremony and at that time they shall also be provided with certificate concerning working experience.
- To carry out routine maintenance against such road the budget of which shall be allocated from State Budget and Regional Budget of Province, so that life time of such road can be achieved.

d. Location of Environmental Management:

Within and surrounding location of activity.

e. Period of Environmental Management

As of completion of construction stage.

f. Cost for Environmental Management

Cost for Environmental Management shall be borne by Contractor.

g. Institution of Environmental Management:

- Initiator of Environmental Management: Contractor that implements construction.
- Supervisor of Environmental Management: Regional Infrastructure Service of NAD Province, Supervisory Consultant and Bapedalda of NAD Province.
- Report of Result of Environmental Management: To be submitted to Regional Infrastructure Service of NAD Province, USAID, Reconstruction and Rehabilitation Agency (BRR) and Bapedalda of NAD Province.

**Table 6.1 UKL Matrix Of Road Rehabilitation And Reconstruction Activities Banda Aceh – Lamno, Nanggroe Aceh Darussalam Province**

Impact Source	Impacted Environmental Components	Environmental Management Efforts	Management Location	Management Period	Environmental Management Institution		
					Initiator	Supervisor	Reporting
<b>I. RECONSTRUCTION STAGE</b>							
1. Location survey and Land Acquisition	Communities Perception	<ul style="list-style-type: none"> <li>• Direct discussion at project location with local community leader, villagers or local government.</li> <li>• The time of discussion will be selected when the communities have less daily activities.</li> <li>• Publication of land acquisition. The communities will support the road construction plan if transparent publication is done.</li> <li>• Publication should involve related authorities from NAD province level or regional level.</li> <li>• Supporting from communities should be requested at that time, signed by village chief that represent the communities.</li> <li>• Communities should be assigned to give opinion at the publication program</li> <li>• Different opinion should be handled by discussion and deliberation.</li> </ul>	Housing around the Banda Aceh - Lamno road segmentation	From determination of road location until land acquisition is done.	Regional government of NAD Province (Public Working Department of NAD Province)	Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of Banda Aceh City, Local Regional Infrastructure Official of Aceh Besar, Local Regional Infrastructure Official of Aceh Jaya and Local Environmental Management Agency of NAD Province.	To Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of Banda Aceh City, Local Regional Infrastructure Official of Aceh Besar and Local Environmental Management Agency of NAD Province.

Impact Source	Impacted Environmental Components	Environmental Management Efforts	Management Location	Management Period	Environmental Management Institution		
					Initiator	Supervisor	Reporting
		•					
<b>II. CONSTRUCTION STAGE</b>							
2. Construction labours mobilisation/recruitment	<ul style="list-style-type: none"> <li>• Social jealousy</li> <li>• Communities perception</li> </ul>	<ul style="list-style-type: none"> <li>• Local labor should be recruited to the extent possible. Supervisors may be recruited from neighbor villagers if not locally present, but still from the same local regional area. Accepted labors should be provided by working agreement.</li> <li>• Recruitment should be transparent and advertised in the village offices or mosques, specifying requirements. The requirements should not be too strict except for the experts/professionals.</li> <li>• Salary payment should be accordance with the standard without any discrimination. However, it should be assessed based on their capabilities and payments should be made on time.</li> <li>• The praying for employees should be provided including Friday's praying time.</li> </ul>	In the project location	During construction phase	Construction contractor	Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of Banda Aceh City, Local Regional Infrastructure Official of Aceh Besar, Local Regional Infrastructure Official of Aceh Jaya, Local Environmental Management Agency of NAD Province and Manpower Official of NAD	To Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of Banda Aceh City, Local Regional Infrastructure Official of Aceh Besar Local Regional Infrastructure Official of Aceh Jaya, Local Environmental Management Agency of NAD Province and Manpower Official of NAD

Impact Source	Impacted Environmental Components	Environmental Management Efforts	Management Location	Management Period	Environmental Management Institution		
					Initiator	Supervisor	Reporting
						Province.	Province.
3. Equipment mobilisation and demobilisation	<ul style="list-style-type: none"> <li>Traffic</li> </ul>	<ul style="list-style-type: none"> <li>Mobilization of equipment should avoid in rush hour.</li> <li>Bridges should be checked before crossing with heavy equipment to determine whether heavy equipment could pass or not.</li> <li>Base camp should be guarded by security/ police.</li> <li>In the initial construction phase, the costume ceremonial should be done by butchering a goat/cow, which is then eaten together with local communities.</li> </ul>	In the project location and surrounding area	During construction phase	Construction contractor	Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of Banda Aceh City, Local Regional Infrastructure Official of Aceh Besar, Local Regional Infrastructure Official of Aceh Jaya, Local Environmental Management Agency of NAD Province and Transportation Official of NAD	To Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of Banda Aceh City, Local Regional Infrastructure Official of Aceh Besar, Local Regional Infrastructure Official of Aceh Jaya, Local Environmental Management Agency of NAD Province and Transportation Official of NAD

Impact Source	Impacted Environmental Components	Environmental Management Efforts	Management Location	Management Period	Environmental Management Institution		
					Initiator	Supervisor	Reporting
						Province.	Province.
4. Construction and Operation of Base Camp	<ul style="list-style-type: none"> <li>Nuisance,</li> <li>Air quality (dust)</li> <li>Surface water quality</li> </ul>	<ul style="list-style-type: none"> <li>Activities should be stopped during Friday praying time.</li> <li>Used lubricants are collected in designated areas then transported outside of project location for further processing.</li> <li>The unpaved road should be sprayed periodically as required to avoid air pollution (dust).</li> <li>The base camp should be equipped with electrical facilities, water, first air equipment, and other infrastructure such as mosques, sport center, necessary and closed bath rooms.</li> <li>The temporary waste disposal should be provided.</li> </ul>	In the project location and surrounding area	During construction phase	Construction contractor	Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of Banda Aceh City, Local Regional Infrastructure Official of Aceh Besar, Local Regional Infrastructure Official of Aceh Jaya, and Local Environmental Management Agency of NAD Province	To Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of Banda Aceh City, Local Regional Infrastructure Official of Aceh Besar, Local Regional Infrastructure Official of Aceh Jaya, and Local Environmental Management Agency of NAD Province
5. Land Clearing and Stripping, and cut and fill	<ul style="list-style-type: none"> <li>Nuisance,</li> <li>Air quality (dust)</li> <li>Transportation</li> </ul>	<ul style="list-style-type: none"> <li>The field officers should be located to control traffic condition at the project area.</li> </ul>	In the project location and	during construction	Construction contractor	Regional Infrastructure	To Regional Infrastructure

Impact Source	Impacted Environmental Components	Environmental Management Efforts	Management Location	Management Period	Environmental Management Institution		
					Initiator	Supervisor	Reporting
	continuity, • Community perception	<ul style="list-style-type: none"> <li>• Closed transportation should be applied to avoid spill and flying wastes during transportation to disposal location.</li> <li>• Prohibited to sound the car horn in mosques area during praying time.</li> <li>• The activities should be terminated during Friday praying time at 12.00 - 13.30</li> <li>• In case of activities of heavy equipment unintentional impacting the farming area, should be solved properly by land owners/ chief of villagers/ keucik. This also applicable for pet animals</li> <li>• In case of accident, the victim should be carried to nearest hospital/ puskesmas and be reported to police officer. Then, it should be solved properly with victim's families according to local cultures.</li> <li>• Prohibited to transport people by Dump Truck during operations.</li> <li>• Drivers should be provided with a driving license (SIM) that is suitable with the type of vehicles.</li> </ul>	surrounding area	phase		Official of NAD Province, Regional Infrastructure Official of Banda Aceh City, Local Regional Infrastructure Official of Aceh Besar, Local Regional Infrastructure Official of Aceh Jaya, and Local Environmental Management Agency of NAD Province	Official of NAD Province, Regional Infrastructure Official of Banda Aceh City, Local Regional Infrastructure Official of Aceh Besar, Local Regional Infrastructure Official of Aceh Jaya, and Local Environmental Management Agency of NAD Province

Impact Source	Impacted Environmental Components	Environmental Management Efforts	Management Location	Management Period	Environmental Management Institution		
					Initiator	Supervisor	Reporting
6. Subgrade, subbase coarse; base coarse; and pavement activities	<ul style="list-style-type: none"> <li>Nuisance</li> <li>Air quality (dust)</li> <li>Transportation continuity</li> </ul>	<ul style="list-style-type: none"> <li>The field officers should be located to control traffic condition at the project area</li> <li>Closed transportation should be applied to avoid spill and flying wastes during transportation to disposal location</li> <li>Compacting the subbase and base materials after spreading.</li> <li>The materials from quarry should be provided with excavation C material permit from local Mining Official.</li> <li>Unused material should be transported to first location and prohibited to dispose unless to the disposal area.</li> <li>Prohibited to sound the car horn in mosques area during praying time.</li> <li>The activities should be terminated during Friday praying time at 12.00 - 13.30</li> <li>In case of activities of heavy equipment unintentional impacting the farming area, should be solved properly by land owners/ chief of villagers/ keucik.</li> </ul>	In the project location and surrounding area	During construction phase	Construction contractor	Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of Banda Aceh City, Local Regional Infrastructure Official of Aceh Besar, Local Regional Infrastructure Official of Aceh Jaya, and Local Environmental Management Agency of NAD Province	To Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of Banda Aceh City, Local Regional Infrastructure Official of Aceh Besar, Local Regional Infrastructure Official of Aceh Jaya, and Local Environmental Management Agency of NAD Province

Impact Source	Impacted Environmental Components	Environmental Management Efforts	Management Location	Management Period	Environmental Management Institution		
					Initiator	Supervisor	Reporting
		<p>This also applicable for pet animal</p> <ul style="list-style-type: none"> <li>• In case of accident, the victim should be carried to nearest hospital/ puskesmas and reported to police officer. Then, it should be solved properly with victim's families according to local cultures and involved local community leader</li> <li>• Prohibited to transport peoples by Dump Truck during operations.</li> <li>• During rest time/ lunch time, operators should park the heavy equipments at proper location to avoid disturbing of public transportation.</li> <li>• In case of long road, there should be a speed hump to avoid the accident caused by sleepy drivers.</li> <li>• Drivers should be provided with a driving license (SIM) suitable with the type of vehicles.</li> </ul>					
7. Side ditch activities	<ul style="list-style-type: none"> <li>• Public comfort</li> <li>• Water hazards</li> <li>• Community perception</li> <li>• Nuisance</li> </ul>	<ul style="list-style-type: none"> <li>• The rest of cutting soil should be transported from project location so that not disturb to anyone.</li> <li>• The crossing bridge should be constructed between yards and road planning locations by</li> </ul>	In the project location and surrounding area	During construction phase	Construction contractor	Regional Infrastructure Official of NAD Province, Regional	To Regional Infrastructure Official of NAD Province, Regional

Impact Source	Impacted Environmental Components	Environmental Management Efforts	Management Location	Management Period	Environmental Management Institution		
					Initiator	Supervisor	Reporting
		concrete construction according to K225 concrete quality. <ul style="list-style-type: none"> <li>• Elevation of the side ditch should be lower than surrounding land, therefore the rain and other puddles could be flown through that drainage.</li> <li>• Crossing gutters should be provided properly to help water from drainage flowing to the lower location (river)</li> <li>• The water channel is made with the stone composition of 1 pc : 4 psr</li> <li>• In case of boundaries ore is damaged by side ditch activities, it should be re-constructed with same or better construction.</li> <li>• Public facilities such as drinking water pipeline or electricity pillar that damage during this activities, should be renovated properly.</li> <li>• The materials for this activity should not be located in the yard of public road to avoid disturbing of communities activities.</li> </ul>				Infrastructure Official of Banda Aceh City, Local Regional Infrastructure Official of Aceh Besar, Local Regional Infrastructure Official of Aceh Jaya, and Local Environmental Management Agency of NAD Province	Infrastructure Official of Banda Aceh City, Local Regional Infrastructure Official of Aceh Besar, Local Regional Infrastructure Official of Aceh Jaya, and Local Environmental Management Agency of NAD Province
8. Gutter and Box Culverts	<ul style="list-style-type: none"> <li>• Public comfort</li> <li>• Water hazards</li> </ul>	<ul style="list-style-type: none"> <li>• Gutters/box culvert should be located in crossing water channel with suitable dimension so that</li> </ul>	In the project location and	During construction	Construction	Regional Infrastructure	To Regional Infrastructure

Impact Source	Impacted Environmental Components	Environmental Management Efforts	Management Location	Management Period	Environmental Management Institution		
					Initiator	Supervisor	Reporting
	<ul style="list-style-type: none"> <li>Community perception</li> </ul>	<p>water can flow properly and free.</p> <ul style="list-style-type: none"> <li>The outlet should be completed by a flip construction to avoid erosion of gutters or box culvert foundation.</li> <li>The materials for this activity should be located in proper area to avoid disturbing householder or public transportation.</li> <li>Box culvert from concrete construction should be in accordance with K350 quality standard.</li> <li>The rest of coverdam should be disposed of properly after completion of foundation activities.</li> </ul>	surrounding area	phase	contractor	Official of NAD Province, Regional Infrastructure Official of Banda Aceh City, Local Regional Infrastructure Official of Aceh Besar, Local Regional Infrastructure Official of Aceh Jaya, and Local Environmental Management Agency of NAD Province	Official of NAD Province, Regional Infrastructure Official of Banda Aceh City, Local Regional Infrastructure Official of Aceh Besar, Local Regional Infrastructure Official of Aceh Jaya, and Local Environmental Management Agency of NAD Province
9. Bridge Activity	<ul style="list-style-type: none"> <li>Transportation continuity</li> <li>Public comfort</li> <li>Water surface quality</li> </ul>	<ul style="list-style-type: none"> <li>The field officers should be located to control traffic condition at the project area</li> <li>The materials for this activity should be located in proper area to avoid disturbing of public transportation.</li> </ul>	In the project location and surrounding area	During construction phase	Construction contractor	Regional Infrastructure Official of NAD Province, Regional Infrastructure	To Regional Infrastructure Official of NAD Province, Regional Infrastructure

Impact Source	Impacted Environmental Components	Environmental Management Efforts	Management Location	Management Period	Environmental Management Institution		
					Initiator	Supervisor	Reporting
		<ul style="list-style-type: none"> <li>The heavy equipment on the project should be in good condition to avoid oil spill to the rivers.</li> <li>The temporary supporting pillars and coverdam should be removed from the rivers to avoid the disturbing of water stream</li> <li>Material for oprit filling should be came from filling good soil to avoid different level between oprit and bridge surface that potentially cause an accident and uncomfortable situatuin.</li> </ul>				Official of Banda Aceh City, Local Regional Infrastructure Official of Aceh Besar, Local Regional Infrastructure Official of Aceh Jaya, and Local Environmental Management Agency of NAD Province	Official of Banda Aceh City, Local Regional Infrastructure Official of Aceh Besar, Local Regional Infrastructure Official of Aceh Jaya, and Local Environmental Management Agency of NAD Province
<b>III. OPERATION</b>							
10. Labors demobilization	<ul style="list-style-type: none"> <li>Community</li> <li>Community perception</li> </ul>	<ul style="list-style-type: none"> <li>The project manager should announce to labors in earlier time that their working period will be completed, if possible farewell party could be done and working experience certificate could be awarded.</li> <li>For periodic maintenance of the road, the budget will come from APBN or APBD I, subsequently the age planning of the road could</li> </ul>	In the project location and surrounding area	During construction phase	Contractor construction and Regional Infrastructure of NAD Province	Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of Banda Aceh City, Local Regional	To Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of Banda Aceh City, Local Regional

Impact Source	Impacted Environmental Components	Environmental Management Efforts	Management Location	Management Period	Environmental Management Institution		
					Initiator	Supervisor	Reporting
		be maintained.				Infrastructure Official of Aceh Besar, Local Regional Infrastructure Official of Aceh Jaya, Local Environmental Management Agency of NAD Province, and Manpower Official of NAD Province	Infrastructure Official of Aceh Besar, Local Regional Infrastructure Official of Aceh Jaya, Local Environmental Management Agency of NAD Province, and Manpower Official of NAD Province

## 7 **EFFORT FOR ENVIRONMENTAL MONITORING (UPL)**

### 7.1 **PRE-CONSTRUCTION STAGE**

#### **1. Impact of Activity for Stipulation of Location and Land Acquisition**

a. The monitored environmental component:

Perception of community

b. Source of impact:

Stipulation of project location and land acquisition.

c. Method of Environmental Monitoring:

- Method for collection and analysis of data: conducting interview with community and community figures surrounding location of activity. The data obtained shall be analyzed descriptively.
- Location for Environmental Monitoring: Surrounding location of project.
- Period and Frequency of Monitoring: Once during 3 (three) months as of stipulation of project location until commencement of construction stage.

h. Cost for Environmental Monitoring:

Cost for Environmental Monitoring shall be borne by Contractor.

e. Institution of Environmental Monitoring:

- Initiator of Environmental Monitoring: Contractor that implements construction.
- Supervisor of Environmental Monitoring: Regional Infrastructure Service of NAD Province, Supervisory Consultant and Bapedalda of NAD Province.
- Report of Result of Environmental Monitoring: To be submitted to Regional Infrastructure Service of NAD

Province, USAID, Reconstruction and Rehabilitation Agency (BRR) and Bapedalda of NAD Province.

## 7.2

### CONSTRUCTION STAGE

#### 1. Impact of Activity for Manpower/Personnel Mobilization

- a. The monitored environmental component:

Community perception

- b. Source of impact:

Mobilization of manpower/personnel.

- c. Method of Environmental Monitoring:

- Method for collection and analysis of data: conducting interview with community and community figures surrounding location of activity. The data obtained shall be analyzed descriptively.
- Location for Environmental Monitoring: Surrounding location of project.
- Period and Frequency of Monitoring: Once during 1 (one) month as of stipulation of project location until commencement of construction stage.

- d. Cost for Environmental Monitoring:

Cost for Environmental Monitoring shall be borne by Contractor.

- e. Institution of Environmental Monitoring:

- Initiator of Environmental Monitoring: Contractor that implements construction.
- Supervisor of Environmental Monitoring: Regional Infrastructure Service of NAD Province, Supervisory Consultant and Bapedalda of NAD Province.
- Report of Result of Environmental Monitoring: To be submitted to Regional Infrastructure Service of NAD Province, USAID, Reconstruction and Rehabilitation Agency (BRR) and Bapedalda of NAD Province.

## 2. Impact of activity for mobilization of equipment

a. The monitored environmental component:

Traffic jam

b. Source of impact:

Mobilization of construction equipment.

c. Method of Environmental Monitoring:

- Method for collection and analysis of data: Conducting field observation. The data obtained shall be analyzed descriptively.
- Location for Environmental Monitoring: Surrounding location of project.
- Period and Frequency of Monitoring: Once during 3 (three) months as of commencement of construction stage.

d. Cost for Environmental Monitoring:

Cost for Environmental Monitoring shall be borne by Contractor.

e. Institution of Environmental Monitoring:

- Initiator of Environmental Monitoring: Contractor that implements construction.
- Supervisor of Environmental Monitoring: Regional Infrastructure Service of NAD Province, Regional Infrastructure Surface of Aceh Besar Regency, Regional Infrastructure Service of Aceh Jaya Regency and Bapedalda of NAD Province.
- Report of Result of Environmental Monitoring: To be submitted to Regional Infrastructure Service of NAD Province, Regional Infrastructure Service of Banda Aceh City, Regional Infrastructure Service of Aceh Besar Regency and Bapedalda of NAD Province.

### **3. Construction and operation of Base Camp/Working Barrack**

a. The monitored component of environment:

Noisiness, air quality (dust) and quality of water surface.

b. Source of impact:

Construction and operation of Base Camp/Working Barrack.

c. Method of Environmental Monitoring:

- Method for collection and analysis of data: Measurement and taking field sample. The data obtained shall be analyzed in laboratory and the result shall be compared with quality standard.
- Location for Environmental Monitoring: Surrounding location of project.
- Period and Frequency of Monitoring: Once during 3 (three) months as of commencement of construction stage.

d. Cost for Environmental Monitoring:

Cost for Environmental Monitoring shall be borne by Contractor.

e. Institution of Environmental Monitoring:

- Initiator of Environmental Monitoring: Contractor that implements construction.
- Supervisor of Environmental Monitoring: Regional Infrastructure Service of NAD Province, Supervisory Consultant and Bapedalda of NAD Province.
- Report of Result of Environmental Monitoring: To be submitted to Regional Infrastructure Service of NAD Province, USAID, Reconstruction and Rehabilitation Agency (BRR) and Bapedalda of NAD Province.

### **4. Land clearing, stripping and cut and fill**

a. The monitored component of environment;

Noisiness, air quality (dust), quality of surface water and community perception.

b. Source of impact:

Land clearing, stripping and cut and fill.

c. Method of Environmental Monitoring:

- Method for collection and analysis of data: Measurement and taking sample in the field. The data obtained shall be analyzed in laboratory and the result shall be compared with quality standard, while for data concerning community perception shall be conducted interview and data to be analyzed descriptively.
- Location for Environmental Monitoring: Surrounding location of project.
- Period and Frequency of Monitoring: Once during 3 (three) months as of commencement of construction stage.

d. Cost for Environmental Monitoring:

Cost for Environmental Monitoring shall be borne by Contractor.

e. Institution of Environmental Monitoring:

- Initiator of Environmental Monitoring: Contractor that implements construction.
- Supervisor of Environmental Monitoring: Regional Infrastructure Service of NAD Province, Supervisory Consultant and Bapedalda of NAD Province.
- Report of Result of Environmental Monitoring: To be submitted to Regional Infrastructure Service of NAD Province, USAID, Reconstruction and Rehabilitation Agency (BRR) and Bapedalda of NAD Province.

**5. The work for improvement of subgrade, subbase course, base course and pavement.**

a. The monitored component of environment:

Noisiness, air quality (dust) and traffic condition.

b. Source of impact:

The work for improvement of subgrade, subbase course, base course and pavement.

c. Method of Environmental Monitoring:

- Method for collection and analysis of data: Measurement and taking sample in the field. The data obtained shall be analyzed in laboratory and the result shall be compared with quality standard, while concerning data of traffic condition shall be conducted observation and data to be analyzed descriptively.
- Location for Environmental Monitoring: Surrounding location of project.
- Period and Frequency of Monitoring: Once during 3 (three) months as of commencement of construction stage.

d. Cost for Environmental Monitoring:

Cost for Environmental Monitoring shall be borne by Contractor that implements construction.

e. Institution of Environmental Monitoring:

- Initiator of Environmental Monitoring: Contractor that implements construction.
- Supervisor of Environmental Monitoring: Regional Infrastructure Service of NAD Province, Supervisory Consultant and Bapedalda of NAD Province.
- Report of Result of Environmental Monitoring: To be submitted to Regional Infrastructure Service of NAD Province, USAID, Reconstruction and Rehabilitation Agency (BRR) and Bapedalda of NAD Province.

## 6. The work of side ditch

a. The monitored component of environment:

Society convenience, local inundation, community perception and noisiness.

b. Source of impact:

The work of side ditch.

c. Method of Environmental Monitoring:

- Method for collection and analysis of data: Measurement and taking sample in the field. The data obtained shall be analyzed in laboratory and its result shall be compared with quality standard, while for data of community convenience, local inundation, and community perception shall be conducted with observation in the field and interview and data shall be analyzed descriptively.
- Location for Environmental Monitoring: Surrounding location of project.
- Period and Frequency of Monitoring: Once during 3 (three) months as of commencement of construction stage.

d. Cost for Environmental Monitoring:

Cost for Environmental Monitoring shall be borne by Contractor that implements construction.

e. Institution of Environmental Monitoring:

- Initiator of Environmental Monitoring: Contractor that implements construction.
- Supervisor of Environmental Monitoring: Regional Infrastructure Service of NAD Province, Supervisory Consultant and Bapedalda of NAD Province.
- Report of Result of Environmental Monitoring: To be submitted to Regional Infrastructure Service of NAD Province, USAID, Reconstruction and Rehabilitation Agency (BRR) and Bapedalda of NAD Province.

## 7. The work for Culvert and Box Culvert

a. The monitored component of environment:

Convenience of community, local inundation and community perception.

b. Source of impact:

The work for Culvert and Box Culvert.

c. Method of Environmental Monitoring:

- Method for collection and analysis of data: conducting interview and field observation. The data obtained shall be analyzed descriptively.
- Location for Environmental Monitoring: Surrounding location of project.
- Period and Frequency of Monitoring: Once during 3 (three) months as of commencement of construction stage.

d. Cost for Environmental Monitoring:

Cost for Environmental Monitoring shall be borne by Contractor that implements construction.

e. Institution of Environmental Monitoring:

- Initiator of Environmental Monitoring: Contractor that implements construction.
- Supervisor of Environmental Monitoring: Regional Infrastructure Service of NAD Province, Supervisory Consultant and Bapedalda of NAD Province.
- Report of Result of Environmental Monitoring: To be submitted to Regional Infrastructure Service of NAD Province, USAID, Reconstruction and Rehabilitation Agency (BRR) and Bapedalda of NAD Province.

## 8. Bridge work

a. The monitored component of environment:

Convenience of community, traffic condition and quality of surface water.

b. Source of impact:

The bridge work.

c. Method of Environmental Monitoring:

- Method for collection and analysis of data: Measurement and taking sample of surface water in the field. The data obtained shall be analyzed in laboratory and the result to be compared with quality standard, while for data concerning convenience

of community and traffic condition shall be conducted observation in the field and interview and data shall be analyzed descriptively.

- Location for Environmental Monitoring: Surrounding location of project.
  - Period and Frequency of Monitoring: Once during 1 (one) month as of commencement of construction stage.
- d. Cost for Environmental Monitoring:
- Cost for Environmental Monitoring shall be borne by Contractor that implements construction.
- e. Institution of Environmental Monitoring:
- Initiator of Environmental Monitoring: Contractor that implements construction.
  - Supervisor of Environmental Monitoring: Regional Infrastructure Service of NAD Province, Supervisory Consultant and Bapedalda of NAD Province.
  - Report of Result of Environmental Monitoring: To be submitted to Regional Infrastructure Service of NAD Province, USAID, Reconstruction and Rehabilitation Agency (BRR) and Bapedalda of NAD Province.

### 7.3

#### *POST CONSTRUCTION STAGE*

##### **1. The work for demobilization of manpower (Laid off)**

- a. The monitored component of environment:  
Restlessness and perception of community.
- b. Source of impact:  
The work for demobilization of manpower (Laid off).
- c. Method of Environmental Monitoring:
  - Method for collection and analysis of data: conducting interview and observation in the field. The data obtained shall be analyzed descriptively.

- Location for Environmental Monitoring: Surrounding location of project.
  - Period and Frequency of Monitoring: Once during 1 (one) month as of completion of construction stage.
- d. Cost for Environmental Monitoring:
- Cost for Environmental Monitoring shall be borne by Contractor that implements construction.
- e. Institution of Environmental Monitoring:
- Initiator of Environmental Monitoring: Contractor that implements construction.
  - Supervisor of Environmental Monitoring: Regional Infrastructure Service of NAD Province, Supervisory Consultant and Bapedalda of NAD Province.
  - Report of Result of Environmental Monitoring: To be submitted to Regional Infrastructure Service of NAD Province, USAID, Reconstruction and Rehabilitation Agency (BRR) and Bapedalda of NAD Province.

**Table 7.1 UPL Summary Matrix Of Rehabilitation And Reconstruction Activities Banda Aceh - Lamno Roadway, Nanggroe Aceh Darussalam Province**

Impact Source	Monitored Environmental Component	Monitoring Method			Monitoring Official/Body		
		Data acquisition and analysis	Monitoring Location	Period/Frequency	Initiator	Supervisor	Reporting
<b>I. PRE CONSTRUCTION STAGE</b>							
1. Location survey and land acquisition	Public Perception	Interview. Descriptive analysis of data.	In the vicinity of project location.	Once every three months from location survey up to completion of land acquisition.	Local government of NAD Province (Department of Public Work of NAD Province).	Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of the City of Banda Aceh, Regional Infrastructure Official of the Regency of Aceh Besar, Regional Infrastructure Official of the Regency of Aceh Jaya, and Environmental Impact Control Official of NAD Province	To Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of the City of Banda Aceh, Regional Infrastructure Official of the Regency of Aceh Besar, Regional Infrastructure Official of the Regency of Aceh Jaya, and Environmental Impact Control Official of NAD Province, once in six months

Impact Source	Monitored Environmental Component	Monitoring Method			Monitoring Official/Body		
		Data acquisition and analysis	Monitoring Location	Period/Frequency	Initiator	Supervisor	Reporting
<b>II. CONSTRUCTION STAGE</b>							
1. Mobilisation and recruitment of construction workforce	<ul style="list-style-type: none"> <li>• Social jealousy</li> <li>• Public Perception</li> </ul>	Interview. Descriptive analysis of data.	In the vicinity of project location.	Once in three months during construction.	Contractor for the construction.	Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of the City of Banda Aceh, Regional Infrastructure Official of the regency of Aceh Besar, Regional Infrastructure Official of the regency of Aceh Jaya, and Regional Environmental Impact Agency and Employment Official of NAD Province.	Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of the City of Banda Aceh, Regional Infrastructure Official of the regency of Aceh Besar, Regional Infrastructure Official of the regency of Aceh Jaya, and Regional Environmental Impact Agency and Employment Official of NAD Province, once in six months
2. Equipment Mobilisation and Demobilisation	<ul style="list-style-type: none"> <li>• Traffic</li> </ul>	Field observation. Descriptive analysis of data.	In the vicinity of project location.	Once every three months during construction.	Construction contractor	Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of the City of Banda Aceh,	To Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of the City of Banda Aceh,

Impact Source	Monitored Environmental Component	Monitoring Method			Monitoring Official/Body		
		Data acquisition and analysis	Monitoring Location	Period/Frequency	Initiator	Supervisor	Reporting
						Regional Infrastructure Official of the regency of Aceh Besar, Regional Infrastructure Official of the regency of Aceh Jaya, and Regional Environmental Impact Agency and Transportation Official of NAD Province	Regional Infrastructure Official of the regency of Aceh Besar, Regional Infrastructure Official of the regency of Aceh Jaya, and Regional Environmental Impact Agency and Transportation Official of NAD Province, once in six months
3. Base Camp/ Workforce accommodation Preparation and Operations	<ul style="list-style-type: none"> <li>Noise pollution,</li> <li>Air quality (dust)</li> <li>Surface water quality</li> </ul>	Field measurement and sampling. Data analysis in laboratory, comparison of the result with guidelines/ standards	In the vicinity of project location.	Once every three months during construction.	Construction contractor	Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of the City of Banda Aceh, Regional Infrastructure Official of the regency of Aceh Besar, Regional Infrastructure Official of the regency of Aceh	To Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of the City of Banda Aceh, Regional Infrastructure Official of the regency of Aceh Besar, Regional Infrastructure Official of the regency of Aceh

Impact Source	Monitored Environmental Component	Monitoring Method			Monitoring Official/Body		
		Data acquisition and analysis	Monitoring Location	Period/Frequency	Initiator	Supervisor	Reporting
						Jaya, and Environmental Impact Control Official of NAD Province	Jaya, and Environmental Impact Control Official of NAD Province, once in six months
4. Land Clearing, Stripping, and cut and Fill	<ul style="list-style-type: none"> <li>• Noise pollution,</li> <li>• Air quality (dust)</li> <li>• Traffic</li> <li>• Public Perception</li> </ul>	Field measurement and sampling. Data analysis in laboratory, comparison of the result with guidelines/ standards. For public perception, interview and descriptive data analysis.	In the vicinity of project location.	Once every three months during construction.	Construction contractor	Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of the City of Banda Aceh, Regional Infrastructure Official of the regency of Aceh Besar, Regional Infrastructure Official of the regency of Aceh Jaya, and Environmental Impact Control Official of NAD Province	To Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of the City of Banda Aceh, Regional Infrastructure Official of the regency of Aceh Besar, Regional Infrastructure Official of the regency of Aceh Jaya, and Environmental Impact Control Official of NAD Province, once in six months

Impact Source	Monitored Environmental Component	Monitoring Method			Monitoring Official/Body		
		Data acquisition and analysis	Monitoring Location	Period/Frequency	Initiator	Supervisor	Reporting
5. Improvement of Subgrade, Subbase coarse, Base coarse, and Asphalt laying	<ul style="list-style-type: none"> <li>Noise pollution,</li> <li>Air quality (dust)</li> <li>Traffic</li> </ul>	Field measurement and sampling. Data analysis in laboratory, comparison of the result with guidelines/ standards. For public perception, interview and descriptive data analysis.	In the vicinity of project location.	Once every three months during construction.	Construction contractor	Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of the City of Banda Aceh, Regional Infrastructure Official of the regency of Aceh Besar, Regional Infrastructure Official of the regency of Aceh Jaya, and Environmental Impact Control Official of NAD Province	To Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of the City of Banda Aceh, Regional Infrastructure Official of the regency of Aceh Besar, Regional Infrastructure Official of the regency of Aceh Jaya, and Environmental Impact Control Official of NAD Province, once in six months
6. Side Ditch Activity	<ul style="list-style-type: none"> <li>Public comfort,</li> <li>Locally water drainage</li> <li>Public perception</li> <li>Noise pollution</li> </ul>	Field observation and interview. Descriptive analysis of data.	In the vicinity of project location.	Once every three months during construction.	Construction contractor	Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of the City of Banda Aceh, Regional Infrastructure	To Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of the City of Banda Aceh, Regional Infrastructure

Impact Source	Monitored Environmental Component	Monitoring Method			Monitoring Official/Body		
		Data acquisition and analysis	Monitoring Location	Period/Frequency	Initiator	Supervisor	Reporting
						Official of the regency of Aceh Besar, Regional Infrastructure Official of the regency of Aceh Jaya, and Environmental Impact Control Official of NAD Province	Official of the regency of Aceh Besar, Regional Infrastructure Official of the regency of Aceh Jaya, and Environmental Impact Control Official of NAD Province, once in six months
7. Gutter and Box Culvert Construction Activities	<ul style="list-style-type: none"> <li>Public comfort</li> <li>Locally water pool formation</li> <li>Public perception</li> </ul>	Field observation and interview. Descriptive analysis of data.	In the vicinity of project location.	Once in three months during construction.	Construction contractor	Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of the City of Banda Aceh, Regional Infrastructure Official of the regency of Aceh Besar, Regional Infrastructure Official of the regency of Aceh Jaya, and Environmental Impact Control	To Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of the City of Banda Aceh, Regional Infrastructure Official of the regency of Aceh Besar, Regional Infrastructure Official of the regency of Aceh Jaya, and Environmental Impact Control

Impact Source	Monitored Environmental Component	Monitoring Method			Monitoring Official/Body		
		Data acquisition and analysis	Monitoring Location	Period/Frequency	Initiator	Supervisor	Reporting
						Official of NAD Province	Official of NAD Province, once in six months
8. Bridge Construction	<ul style="list-style-type: none"> <li>Traffic</li> <li>Public comfort</li> <li>Surface water quality</li> </ul>	Field water sampling. Data analysis in laboratory, comparison of the result with guidelines/ standards. For traffic flow and public comfort, interview and descriptive analysis.	In the vicinity of project location.	Once every three months during construction.	Construction contractor	Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of the City of Banda Aceh, Regional Infrastructure Official of the regency of Aceh Besar, Regional Infrastructure Official of the regency of Aceh Jaya, and Environmental Impact Control Official of NAD Province	To Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of the City of Banda Aceh, Regional Infrastructure Official of the regency of Aceh Besar, Regional Infrastructure Official of the regency of Aceh Jaya, and Environmental Impact Control Official of NAD Province, once in six months

Impact Source	Monitored Environmental Component	Monitoring Method			Monitoring Official/Body		
		Data acquisition and analysis	Monitoring Location	Period/Frequency	Initiator	Supervisor	Reporting
<b>III. POST CONSTRUCTION STAGE</b>							
1. Workforce Demobilisation	<ul style="list-style-type: none"> <li>Public Perception</li> </ul>	Field observation and interview. Descriptive analysis of data.	In the vicinity of project location.	Once every months up to completion of workforce demobilisation	Contractor and Transportation Official of NAD Province.	Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of the City of Banda Aceh, Regional Infrastructure Official of the regency of Aceh Besar, Regional Infrastructure Official of the regency of Aceh Jaya, and Regional Environmental Impact Agency and Employment Official of NAD Province.	To Regional Infrastructure Official of NAD Province, Regional Infrastructure Official of the City of Banda Aceh, Regional Infrastructure Official of the regency of Aceh Besar, Regional Infrastructure Official of the regency of Aceh Jaya, and Regional Environmental Impact Agency and Employment Official of NAD Province, once in six months

8

**CLOSING**

Environmental document concerning Effort for Environmental Management (UKL) and Effort for Environmental Monitoring (UPL) is a part of Contract and constitutes one unit with physical document which shall be obliged to implement by contractor that implements construction work, so that in conducting management and monitoring in the field shall be pursuant to the matters written and mandated in the documents of UKL and UPL, therefore in order to ensure its implementation, following signing the Contract, initiator shall immediately establish environmental monitoring team with cost shall be charged to supervisory consultant or other source without binding while monitoring team shall consist of elements of initiator, Bapedalda (Regional Environmental Impact Supervisory Agency) and the related Service pursuant to the monitored activity.

This environmental document of UKL and UPL is prepared for the plan of activity for Betterment and Reconstruction of Road from Banda Aceh - Lamno (with relocation of 10 km) and we promise to comply with any requirement and obligation mentioned above and also any provision relating to permit as specified by official from the authorized institution.

**Banda Aceh, July 25, 2005**

**Initiator of Activity,**

**The Head of Temporary Working Unit for  
Planning and Supervision of Road and Bridge,  
Nanggro Aceh Darussalam Province**

**IR. KHALIDIN, MT**

**NIP.390013175**

## Appendix A

# Laboratory Data Result



## Appendix B

# Curriculum Vitae

# Hasbullah Hasan

Senior Consultant, ERM Indonesia



Hasbullah Hasan is a Senior Consultant within ERM based in Indonesia

Mr Hasbullah Hasan is Environmental Impact Assessment Specialist. He has extensive experience in environmental impact assessments especially in oil and gas sector and manufacture.

Before joining PT. ERM Indonesia he worked as Environmental Baseline Study Group Leader at PT. Corelab Indonesia. He had experience in ANDAL RKL-RPL, UKL-UPL and Environmental Baseline Study

## Fields of Competence

- Environmental Impact Assessment (EIA)
- Environmental due diligence audit

## Education and Course

- Chemistry, B.Sc., Faculty of Mathematics and Natural Science, Padjadjaran University, 1989.
- Environmental Impact Analysis Course, Department of Agriculture, 1994
- Environmental Impact Analysis Course Type A, Institute of Technology Bandung, 1996.
- Environmental Impact Analysis Course Type B, University of Indonesia, 2001.
- Environmental Impact Control in Oil and Gas Sector, Directorate General of Oil and Gas, Department of Energy and Mineral Resources, 2002.
- Environmental Due Diligence Lead Assessor Training Course, ERM Group, Hongkong, 2004

## Languages

- Indonesia, native speaker
- English, good

## Key Industry Sectors

- Mining
- Oil and gas
- Chemical

## Key Projects

### **Environmental Site Assessment of tin mining area of ex illegal miners, Bangka Province, PT. Koba Tin, 2004 Project Manager**

PT. Koba Tin wanted ERM to conducted site visit of ex illegal tin mining area and proposed the rehabilitation strategy for the site of ex illegal mining area. Hasbullah was carried out site visit and formulated the rehabilitation strategy for ex illegal mining area

### **Environmental Compliance Audit, Tangerang West Java, PT. Multi Bintang Indonesia (member of Heineken International), 2004**

#### **Team Member**

PT. Multi Bintang Indonesia asked ERM to conducted of a compliance audit at the Multi Bintang Brewery, member of the Heineken International, to assess compliance against corporate organization goals and principles. Hasbullah as team member was responsible to assess PT. Multi Bintang Indonesia activities whether comply with regulation and legislation

### **Environmental Impact Assessment (AMDAL) of Oil Field Development KE-38, KE-39 and KE-54 Field, West Madura Offshore Block, Kodeco Energy Co. Ltd, 2004**

#### **Project Coordinator**

Kodeco needed an AMDAL study as a complementary of Oil Field Development. The AMDAL study comprises of Public Consultation, Term of Reference (KA) ANDAL and RKL-RPL. Hasbullah worked as Project Coordinator and was responsible to managed and coordinated AMDAL project includes arranged and coordinated public consultation, field study, report writing and driving the approval process with AMDAL Committee.

### **Environmental Management and Monitoring Plan Revision (RKL-RPL Revision) SES FEED Gas Project, CNOOC, 2003**

#### **Project Coordinator**

CNOOC was developed a new gas plant, drilling gas wells and constructed a pipeline from Pabelokan to Serang Regency, the project required a RKL-RPL Revision Study. As a Project Coordinator Hasbullah was responsible to managed and coordinated the project includes field study, report writing and led for driving the approval process with the AMDAL Committee.

### **Environmental Management Program and Environmental Monitoring Program (UKL&UPL), Of 2 D Seismic Survey at Bukat Block, Sulawesi Sea, ENI Bukat, 2003**

#### **Project Coordinator**

ENI Bukat BV intended to conducted 2D Seismic Survey, prior to executed the seismic survey ENI Bukat BV required to provided Environmental Management Program and Environmental Monitoring Program (UKL&UPL). Hasbullah acted as Project Coordinator and his responsibilities was managed the project and led for driving approval process.

### **Environmental Management Program and Environmental Monitoring Program (UKL&UPL) of Pipeline Gas Construction from Block Samberah to PLTD Karang Asam and PLTD Tanjung Batu, PT. Semberani Persada Oil, East Kalimantan, 2003.**

#### **Project Coordinator**

PT. Semberani Persada Oil planned transfer gas by pipeline to PLTD Karang Asam and PLTD Tanjung Batu as fuel gas. Hasbullah worked as Project Coordinator and was responsible for overall project management and for driving the approval process with the AMDAL Committee of Ditjen Migas

### **Environmental Management Program and Environmental Monitoring Program (UKL&UPL) of Rajawali #1 and Jangkrik #1 Exploration Wells, Eni Muarabakau B.V., East Kalimantan, 2003**

#### **Project Coordinator**

Eni Muarabakau B.V. was planned to drill three exploration wells in offshore of Makassar Strait, East Kalimantan. Before implemented the drilling activity Eni Muarabakau required to provided Environmental Management Program and Environmental Monitoring Program (UKL&UPL). Hasbullah acted as Project Coordinator and his responsibilities was managed the project and led for driving approval process.

### **Environmental Management Program and Environmental Monitoring Program (UKL&UPL) of NE-O1, AJA-1, NE-AJA, AJI-1, KABRA-1 and NE KABRA-1 Exploration wells, Petrochina International Bermuda, Sorong Regency, Papua Province, 2003**

#### **Project Coordinator**

Petrochina International Bermuda was planned to drill five drilling exploration wells in onshore of Sorong, West Papua. An Environmental Management Program and Environmental Monitoring Program required for this drilling activities. Hasbullah acted as Project Coordinator, his responsibilities was managed the project and led for driving approval process with the AMDAL Committee of Ditjen Migas.

**Environmental Management Program and Environmental Monitoring Program (UKL&UPL), of Wakamuk #1 and Klatoa #1 Exploration Wells, Petrochina International (Bermuda) Ltd. Sorong Regency, Papua Province, 2003**  
**Project Coordinator**

Petrochina International Bermuda was planned to drill two drilling exploration wells in onshore of Sorong, West Papua. An Environmental Management Program and Environmental Monitoring Program required for this drilling activities. Hasbullah acted as Project Coordinator, his responsibilities was managed the project and led for driving approval process with the AMDAL Committee of Ditjen Migas.

**Environmental Baseline Study of Donggala Block, TotalFinaElf, Makassar Strait, East Kalimantan, 2002**  
**Team Member**

TotalFinaElf was plan to developed the deep-water oil field in Makassar Strait. Prior to develop the oil field TotalFinaElf needed an initial environmental baseline data The Environmental Baseline Study collected data of benthos (macro and micro) in 2000-meter water depth, air quality, water quality in surface, middle and bottom of the sea and hydrology and meteorology data. Hasbullah was a team member had responsibility for collected water quality data.

**Environmental Management and Monitoring Plan Revision (RKL-RPL Revision) of Sengkang Block Natural Gas Field, Energy Equity (Sengkang) Pty. Ltd., South Sulawesi Province, 2002**  
**Team Leader**

Energy Equity (Sengkang) planned to expands gas production capacity regarding increasing demand of fuel gas from PLTGU Sengkang. Expansion of gas production capacity required an Environmental Management and Monitoring Plan Revision (RKL-RPL Revision) study. Hasbullah worked as Team Leader and was responsible for coordinating the team members for field study, report writing, presentation of the document and driving the approval process with the AMDAL Committe.

**Environmental Management Program and Environmental Monitoring Program (UKL&UPL) of Halimun #1 and Papandayan #1 Exploration Wells, Amerada Hess-Tanjung Aru) Ltd., East Kalimantan, 2002**  
**Team Leader**

Amerada Hess (Tanjung Aru) Ltd prepared for drilling two exploration wells in offshore Makassar Strait. The drilling activity required an Environmental Management Program and Environmental Monitoring Program (UKL&UPL). Hasbullah worked as Team

Leader and was responsible for coordinating the team members for field study, report writing, presentation of the document and driving the approval process with the AMDAL Committee of Ditjen Migas.

**Environmental Management Program and Environmental Monitoring Program (UKL&UPL) of Popodi #1 Exploration Well, Unocal Indonesia Company, Makassar Strait, East Kalimantan Province, 2002**  
**Team Leader**

Unocal required an Environmental Management Program and Environmental Monitoring Program (UKL&UPL) for drilling one exploration well in offshore of Makassar Strait. For this project, Hasbullah acted as Team Leader and was responsible for coordinating the team members for field study, report writing, presentation of the document and driving the approval process with the AMDAL Committee of Ditjen Migas

**Environmental Management Program and Environmental Monitoring Program (UKL&UPL) of 3 D Seismic Survey in NIB Block, Unocal Indonesia Company, East Kalimantan, 2002**  
**Team Leader**

Unocal required an Environmental Management Program and Environmental Monitoring Program (UKL&UPL) for 3 D Seismic Survey in NIB Block, Makassar Strait  
Hasbullah worked as Team Leader and was responsible for coordinating the team members for field study, report writing, presentation of the document and driving the approval process with the AMDAL Committee of Ditjen Migas.

**Environmental Management and Monitoring Plan Revision (RKL-RPL Revision) of Tarakan Oil and Gas Field, East Kalimantan, Exspan Tarakan, 2001**  
**Team Member**

Exspan Tarakan planned to expansion their gas production capacity and required an Environmental Management and Monitoring Plan Revision (RKL-RPL Revision) study. Hasbullah worked as Water Quality Expert and was responsible for site research, taking water sample and writing the document for water quality aspect.

**Oil Spill Response Document for Seram #1 Exploration Well, Nexen Petroleum Indonesia Ltd., 2001**  
**Compiler**

Nexen Petroleum Indonesia Ltd. prepared to drill Seram #1 Exploration Well and required Oil Spill

Response Document. Hasbullah worked as a compiler of the document

**Environmental Management Program and Environmental Monitoring Program (UKL&UPL) of 3D Seismic Survey in Sambidoyong Block, KNOC Sambidoyong Ltd., 2001**

**Team Leader**

KNOC Sambidoyong Ltd. required Environmental Management Program and Environmental Monitoring Program (UKL&UPL) for 3D Seismic Survey. Hasbullah worked as Team Leader and was responsible for coordinating the team members for field study, report writing, presentation of the document and driving the approval process with the AMDAL Committee of Ditjen Migas.

**Environmental Management Program and Environmental Monitoring Program (UKL&UPL) of Lombosang #1 Exploration Well, Sangkarang Block, Unocal Indonesia., Flores Sea Offshore, South Sulawesi Province, 2001**

**Team Leader**

Unocal required Environmental Management Program and Environmental Monitoring Program (UKL&UPL) for Lombosang #1 drilling exploration well. Hasbullah worked as Team Leader and was responsible for coordinating the team members for field study, report writing, presentation of the document and driving the approval process with the AMDAL Committee of Ditjen Migas

**Environmental Monitoring Study of Lasmo Runtu Block Close Out Program, East Kalimantan, Lasmo Runtu, 2000**

**Team Leader**

Lasmo Runtu was relinquished the Runtu Block to Pertamina. Before closed out the block, Lasmo Runtu conducted environmental monitoring study to evaluated environmental condition after Lasmo Runtu operated in that block. The aim of the study was evaluated environmental condition of Runtu Block and evaluated the environmental management conducted by Lasmo Runtu i.e. revegetation program. Hasbullah acted as team leader and was responsible for coordinated team member in field study and report writing.

**Environmental Management Program and Environmental Monitoring Program (UKL&UPL) of Five Drilling Exploration Wells at Muriah Block, East Java, bp Indonesia, 2000**

**Team Leader**

BP Indonesia required Environmental Management Program and Environmental Monitoring Program

(UKL&UPL) for five drilling exploration wells in offshore Java Sea.

Hasbullah worked as Team Leader and was responsible for coordinating the team members for field study, report writing, presentation of the document and driving the approval process with the AMDAL Committee of Ditjen Migas

**Environmental Monitoring Program VICO Indonesia, East Kalimantan, 2000**

**Team Member**

VICO Indonesia was implemented the Environmental Monitoring Program as a part of RKL-RPL implementation. The study was evaluated the environmental condition in VICO operational area. Environmental aspect was evaluated for air quality, water quality, soil, seawater quality, flora and fauna and socio economic and culture. Hasbullah worked as water quality, air quality and seawater quality and was responsible for taking sample and writing the document

**Environmental Impact Assessment of Oil and Gas Field Development of Southern and Northern Area, Unocal Indonesia Company, Kutai and Pasir Regencies, East Kalimantan, 1999**

**Team Member**

Unocal Indonesia was developed the Southern and Northern operational area and required an AMDAL study. Hasbullah worked as water quality expert and his responsibilities were taking water quality sample, writing the report for water quality aspect.

**Baseline Study of The Manna Block, Manna Regency, Bengkulu Province, Canadian Petroleum Manna Ltd., 1999.**

**Team Member**

Canadian Petroleum Manna Ltd planned to develop the Manna Block and required an initial environmental baseline data The objective of Environmental Baseline Study was to provided the data of flora and fauna, air quality sample, soil sample, water quality sample, and socio economic and culture prior to exploration activities commencing. Hasbullah worked as water quality expert and was responsible for taking water quality sample and report writing for water quality aspect

**Revision of Environmental Management and Monitoring Plan (Revision RKL-RPL) of Mutiara-Beras Field, Pamaguan and Nilam Fields, as well as Mutiara-Nilam Piping Facilities, VICO Indonesia, East Kalimantan, 1999**

**Team Member**

VICO Indonesia was developed a new gas plant, drilling gas wells and constructed a pipeline from Mutiara to Nilam. Environmental. Vico Indonesia required Revision of Environmental Management and Monitoring Plan (Revision RKL-RPL). Hasbullah worked as water quality expert and his responsibilities were taking water quality sample, writing the report for water quality aspect.

**Environmental Management Program and Environmental Monitoring Program (UKL&UPL) of the Jetty Construction, Riau Island Regency, Gulf Resources Ltd., 1999**

**Team Member**

Gulf Resources Ltd., planned to developed Jetty in Matak Island to support their operation in Natuna Sea Block. Hasbullah worked as water quality expert and his responsibilities were taking water quality sample, writing the report for water quality aspect and involving in approval process with AMDAL Committee of Departemen Perhubungan

**Environmental Baseline Study of the Malagot Block, Inanwatan Sub District, Sorong Regency, Irian Jaya, Lasmo Malagot Ltd., 1999**

**Team Member**

Lasmo Malagot prepared for developed their onshore block in Sorong, West Papua. Prior to execute the exploration activities Lasmo Malagot required initial environmental baseline data. Hasbullah worked as water quality expert and was responsible for taking water quality sample and report writing for water quality aspect

**Environmental Management Program and Environmental Monitoring Program (UKL&UPL) of Mina#1 and Belalang #1 Drilling Exploration Wells, East Nusa Tenggara Province, Japex Sabo Ltd., 1999**

**Team Leader**

Japex Sabo Ltd. required an Environmental Management Program and Environmental Monitoring Program for two drilling exploration wells in offshore East Nusa Tenggara. Hasbullah worked as Team Leader and was responsible for coordinating the team members for field study, report writing, presentation of the document and driving the approval process with the AMDAL Committee of Ditjen Migas

**Environmental Management Program and Environmental Monitoring Program (UKL&UPL) of Saritu#1, Saritu #2 and Sajengga Drilling Exploration Wells, Irian Jaya Province, Arco Bomberai Inc., 1998**

**Team Leader**

Arco bomberai required an Environmental Management Program and Environmental Monitoring Program for three drilling exploration wells in onshore Bintuni West Papua. Hasbullah worked as Team Leader and was responsible for coordinating the team members for field study, report writing, presentation of the document and driving the approval process with the AMDAL Committee of Ditjen Migas

**Baseline Study of Ketapang Block, Northern Madura Island Offshore, East Java Province, Gulf Resources Katapang Ltd., 1998**

**Team Member**

Gulf Resources Ketapang required an initial environmental baseline data for Ketapang Block, Northern Madura offshore. Hasbullah worked as water quality expert and was responsible for taking water quality sample and report writing for water quality aspect

**Environmental Impact Assessment of Development Makmur Oil and Gas Field, Tanjung Jabung Regency, Jambi Province, Santa Fe Energy Resources, 1997**

**Team Member**

Santa Fe Energy Resources needed an AMDAL for development Makmur Block oil and gas field. Hasbullah acted as water quality aspect an was responsible for taking water quality sample and report writing for water quality aspect

# Steven Brown

Senior Consultant, ERM Indonesia



Steven Brown is a Senior Consultant within ERM based in Jakarta.

Mr. Brown is an expert in social and environmental sustainability, with wide experience throughout Indonesia working with local communities and multinational corporations.

Steven's main interest lies in integrating large developments into the social environment, and minimizing conflicts between various parties. This is achieved mainly by helping clients to forge trusting partnerships with stakeholders. Steven has broad project experience including stakeholder engagement, social impact assessment and conflict resolution for major international companies.

Before joining ERM, Steven was Project Manager on a mine site in Kalimantan, where he coordinated community involvement in an environmental project associated with the mine. Steven joined ERM as a Consultant and then Senior Consultant, mainly working on stakeholder management and sustainable development projects.

## Professional Affiliations & Registrations

- Member International Association for Public Participation (IAP2).
- Member of the Institution of Engineers, Australia (IEAust).
- Member and Moderator of Community Development Division, Indonesian Oil and Gas Community (KMI).

## Fields of Competence

- Environmental and social impact assessment
- Socio-economic studies
- Community management and policy
- Stakeholder engagement
- Conflict resolution and community relations strategies
- Community participation planning
- Community investment

## Education

- Master of Engineering Science, School of Civil & Environmental Engineering, University of New South Wales, Sydney, NSW, Australia
- Bachelor of Engineering with Honours (Civil), School of Civil & Environmental Engineering, University of New South Wales, Sydney, NSW, Australia
- ERM Global Social Consulting Services Training Programme, Shanghai, China

## Languages

- English, native speaker
- Indonesian, fluent
- Javanese, working knowledge

## Key Industry Sectors

- Mining
- Oil & gas
- Engineering & Construction

## **Key Projects**

### **Stakeholder Analysis, South Sumatra, ConocoPhillips, 2003**

#### **Project Manager**

ConocoPhillips wanted to identify all important stakeholders at the regional level around its two operating sites in South Sumatra. ERM was commissioned to map important stakeholders, identify the relations between the stakeholders, and explore potential opportunities to develop stronger relationships.

Steven was Project Manager and was highly involved in developing a suitable framework that allowed detailed engagement with the stakeholders without compromising the sensitive nature of the project.

### **Community Participation Program, Central Kalimantan, Aurora Gold, 2001-2002.**

#### **Project Manager**

As part of its mine closure program, Aurora Gold Limited wanted to rehabilitate all past exploration areas over the entire site of its Mount Muro mine. The rehabilitation process was used to involve local community groups in the mine operations, and provide them with short-term employment. There was also a need to consult with village leaders, illegal miners and landowners for permission to undertake the work and suitable end land-uses.

Steven acted as project manager and was responsible for the project team and six separate contractors comprising of over 50 local workers. Using his engineering knowledge, he designed all rehabilitation works, and also recruited and developed contractual agreements with local villagers to undertake the work.

### **Social Assessment and Management Plan, Jambi, ConocoPhillips, 2004.**

#### **Project Manager**

ConocoPhillips was preparing to begin operations on a greenfields site in Jambi, and required a social assessment and management plan for the site. ERM carried out the assessment, which included interviewing a range of community and government stakeholders, and then developed the social management plan to address key issues amongst stakeholders.

Steven was project manager, and provided a number of recommendations regarding community development, stakeholder engagement, social risk screening and government relations.

### **Community Well Sampling, West Java, Confidential Client, 2002.**

#### **Team Leader**

ERM was commissioned to survey the surrounding facilities of a plant in Cimanggis, and assess the feasibility of community well sampling. Following the assessment, ERM conducted sampling to determine the extent of contamination and its true source. The contamination issues arose due to complaints from the local community over well water quality.

Steven was involved in reviewing the site data and existing information to gain an insight into the potential contamination issues. He conducted a site visit that involved talking to locals about well water and possible sampling programs. He also led the subsequent well sampling program.

### **Social Impact Assessment, North Maluku, Nusa Halmahera Minerals, 2002**

#### **Co-Team Leader**

PT Nusa Halmahera Minerals was preparing to extend their Gosowong mining project in the Toguraci area. As part of the overall environmental impact assessment, ERM was commissioned to conduct a Social Baseline Study of the villages around the proposed mine site. A major part of the study involved interviews with local villagers.

Steven was responsible for preparation of the social survey questionnaire and for identifying preliminary issues for the area. He also played a key role on site, working as a lead interviewer, and visiting the major villages around the proposed site.

### **AMDAL (EIA) study, North Maluku, Nusa Halmahera Minerals, 2003.**

#### **Co-Team Leader**

Newcrest were preparing to extend their mining operations at the NHM mine in Gosowong to a new reserve located in the Toguraci area of Halmahera. Environmental and Social baseline studies had already been completed, however the client wanted to prepare AMDAL documents, including the terms of reference, environmental management plan and environmental monitoring plan, prior to submitting the results to the Indonesian authorities.

Steven lead the preparation of all AMDAL documents, preparing detailed management and monitoring plans, with close consultation with NHM site personnel at Gosowong. The management plan included details of community engagement plans and a pathway to maximise community benefits from the proposed development.

**Community Development Program Evaluation, South Sumatra, ConocoPhillips, 2003-2004**

**Project Manager**

ConocoPhillips wanted to evaluate their community development program in South Sumatra for the period 2000 to 2003. ERM was involved in the evaluation as a specialist advisor and reviewer.

Steven was project manager, and conducted interviews with the ConocoPhillips senior management team to develop clear objectives and criteria for the evaluation. He then developed a detailed scope of work and methodology, and provided review of the evaluation report.

**Socialisation of Community Eye Clinic, Bali, Rotary Foundation, 1998.**

**Project Advisor**

Rotary Australia were operating a Community Eye Clinic in Denpasar, Bali. Specialist advice and training were delivered by ophthalmologists and optometrists who visited the clinic for short periods.

Steven provided advice to redirect the project so that it was suitable and practical for local conditions. The results of Steven's advice provided significant improvements to the clinic's performance.

**AMDAL (EIA) study, Maluku, PT Weda Bay Nickel, 2001.**

**Technical Support**

PT Weda Bay Nickel is a joint Canadian-Indonesian company, holding Contract of Work on Halmahera Island, Indonesia. In 2001, the mine was in the pre-feasibility stage and began to compile an AMDAL document, as required by Indonesian law.

Steven was involved in the early stages of the AMDAL document development, with particular inputs in the AMDAL Terms of Reference.

**Environmental Action Plan and EIS Addendum, West Kalimantan, International Finance Corporation, 2000**  
**Technical Support**

The International Finance Corporation (IFC) was providing financial assistance for PT Aneka Tambang's proposed Bauxite mine in West Kalimantan, and required additional documents to be prepared to supplement the existing EIA. These documents included an Environmental Action Plan, and an EIS Addendum to supplement the deficiencies of Aneka Tambang's original assessment.

Steven assisted in compiling both of these documents, with particular inputs regarding red mud management and tailings management, as well as social impacts. He also conducted a site visit to Aneka Tambang's existing bauxite mine on Bintan Island to assess and report on the mine's existing environment management practices.

**Corporate Social Responsibility Benchmarking Pilot, Jakarta, IBL, 2004**

**Advisor**

Indonesia Business Links (IBL) was developing a benchmarking tool to assist companies assess their strengths and weaknesses in Corporate Social Responsibility (CSR). The pilot program involved developing the tools for the CSR assessment, and trialling them with a number of companies.

Steven provided expert advice throughout the pilot program, and also performed some of the early pilot interviews with participating companies.

**Environmental Due Diligence Audit, West Java, Confidential Client in Manufacturing Industry, 2004.**  
**Project Manager and Lead Auditor**

An international metal packaging manufacturer was assessing a site in Indonesia for potential investment. Steven was lead auditor for the environmental due diligence of the site. The key issue of concern was past wastewater disposal practices and the impact on nearby waterways used by the local community.

**Solid Waste Audit, Sydney Australia, McDonalds, 2000.**

**Auditor**

A number of McDonalds food outlets were taking steps to reduce the amount of solid wastes produced on site, due to public concerns over waste issues. A phased study was developed consisting of audits to determine waste types and amounts, followed by analysis and recommendations on waste reduction.

Steven was involved as an auditor and conducted waste classification studies at two separate outlets. He also conducted walk-through visits and surveys at several McDonalds outlets.

**Sewer Integrity Testing, West Java, Warner Lambert and Capsugel, 1999.**

**Site Assessor**

Two pharmaceutical factories owned by Warner Lambert and Capsugel wanted to have their wastewater pipes inspected for possible leaks. This was undertaken by using a closed circuit television (CCTV) device that used a small camera to view wastewater pipes from the inside. Following the camera inspection, recommendations were made for corrective action and future monitoring activities.

Steven was responsible for monitoring the CCTV sub-contractor and for reporting progress to the clients during the inspection phase.

**Environmental Training Program, Riau, Lasmo, 2000.  
Technical Support**

PT Lasmo Indonesia was preparing its oil and gas exploration and mining operations in Sumatra for ISO14001 certification. In an effort to initiate the development of an Environmental Management System (EMS), a training program was undertaken for all senior staff. This training program prepared the staff to create and maintain an EMS, with a goal of achieving ISO14001 certification.

Steven was heavily involved in preparing the training program, and tailoring the program to the needs of the client.

**Environmental Due Diligence Audit, Central Java, Papertech, 2002.**

**Auditor**

ERM was commissioned to conduct an environmental due diligence audit on a paper factory, on behalf of Papertech, who wanted to acquire the factory. Steven was one of the auditors, and conducted a Phase 1 investigation of the site. He was also involved in research of relevant national and international regulations, report writing, due diligence findings, recommendations and cost estimations.

**Phase 2 Site Investigation, Jakarta, Clariant, 2003.**

**Team Leader**

ERM had already conducted a Phase 1 Investigation at the Clariant chemicals factory in East Jakarta. As a result of that investigation, ERM was commissioned to perform a phase 2 investigation, including installation of 8 groundwater monitoring wells and 11 soil borings. Steven conducted all fieldwork of both the Phase 1 and Phase 2 investigations. He was also responsible for analysis of all results, and preparation of the final report.

**Soil Investigation, East Java, Matsushita, 2004.**

**Project Manager**

Matsushita required a soil investigation at one of their sites in Surabaya. The investigation involved soil sampling and analysis on a grid layout. Steven acted as the local project manager, and organised the team for the study. He was also responsible for reviewing all analysis results, preparing a report and recommending further actions for the client.

**Register of Regulatory Requirements, East Kalimantan, KPC, 2003.**

**Team Leader**

KPC needed a register of their legal requirements for a range of topic areas associated with their coal mining operations. ERM developed this register, with a clear

report outlining exactly what KPC is required to do, with reference links to the relevant government regulations.

Steven's role in the project was to conduct a site visit to the coal mine in Kalimantan. The aim of the visit was to review the coal mine operations and determine which requirements are applicable.

**Regulations Database, South Sumatra, Placer Dome, 2003.**

**Project Manager**

Placer Dome wanted to obtain a customized database of environmental, health and safety legislation for their gold exploration activities in South Kalimantan. ERM developed an efficient and user-friendly system that also contains useful regulations summaries.

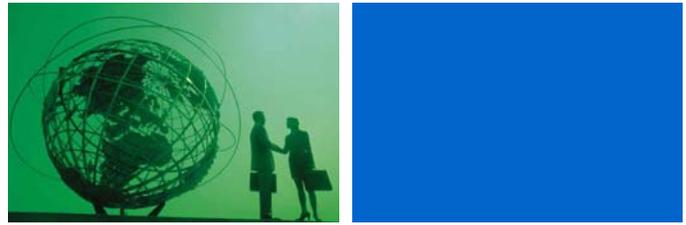
Steven was project manager for the development of this database, and also prepared the regulations summaries for the Placer Dome system.

**Regulations Database, Riau, Lasmo Indonesia 2000.  
Technical Support**

This CD Rom covers all regulations issued by the President, ministry, province, region or related sector. Steven was responsible for collecting and translating many of the regulations, and updating and revising the review of environmental, health and safety regulations for this oil and gas client in Sumatra, Indonesia.

# Raveldy Noviar, S.Si

Associate Consultant



Raveldy Noviar has extensive experience in environmental impact assessment. Graduated from Faculty of Biology.

With his specialization in Biology, he involved at numbers of Environmental Impact Analyses Studies and Environmental Management projects throughout Indonesia.

## Fields of Competence

- Environmental Impact Assessment (EIA)

## Education and Course

- Graduated from Faculty of Biology, National Unviersity, jakarta

## Languages

- Indonesia, native speaker
- English, good

## Key Industry Sectors

- Mining
- Oil & Gas
- Manufacture
- Pharmaceutical
- Public Service

### **Environmental Impact Assesemnt (EIA) Projects**

- EIA study for Pharmaceutical Industry, PT. Aventis Pharma, East Jakarta, 2005
- EIA study for Manufacture Industry, PT. Nikomas Gemilang, Serang, Banten, 2005
- EIA study for Controlled Dam II Sepinggan River, Balikpapan, East Kalimantan, 2004
- Environmental Management Effort and Environmental Monitoring Effort, Kabuyutan Bridge, Brebes District, Central Java, 2004
- Environmental Management Effort and Environmental Monitoring Effort Duwung Bridge, Brebes, Central Java, 2004
- EIA Study for Kayan River, Bulungan District, East Kalimantan, CV Mikros Konsultan, 2003
- Environmental Management Effort and Environmental Monitoring Effort Batching Plant Adhimix Precast Indonesia at Tanjugn Duren Location, West Jakarta, 2002
- Environmental Management Effort and Environmental Monitoring Effort for Kasih Insani Hospital, Cilegon City, West Java, 2002
- Environmental Management Effort and Environmental Monitoring Effort for Swamp Area Muara Adang, East Kalimantan, CV Wydia Aika, 2001
- Environmental Management Effort and Environmental Monitoring Effort Swamp Area, Tanjung Aru, East Kalimantan, CV Reka Citra, 2001
- Institutional Developing Department of Cleanliness Research Study, Department of Cleanliness DKI Jakarta, Pt. Sewun Indo Konsultan, 2000
- EIA revision study for Train A - G LNG Factory and Train H Expansion roject, Bontang, East Kalimantan, 1997
- EIA Study for Industry Area PT Grahapermai rharja, Tangerang, West Java, 1997
- Environmental Management Effort and Environmental Monitoring Effort Steel Industry, PT. Jakarta Kyoei Steel, 1996
- EIA study for Industry Area Median PT KIM, Median, South Sumatera, 1996
- Technical Guideliness Environmental Audit Sea Transportation Study, Communciation Department - Research Institute IPB, 1995
- EIA study for Apartment and Hotel Atap Merah, Jakarta, 1995
- EIA study, PT Nikomas Gemilang, West Java, 1995
- EIA study, PT Siti Swadaya, Karawang, West Java, 1995
- EIA Study PT Pancapuri Indoperkasa, Karawang, West Java, 1995
- EIA study Golden Industrial Park Area, Karawang, West Java, 1995
- EIA study for Casablanca Apartment, Jakarta 1995
- Technical Guidelines Compiling Environmental Management Effrot and Environmental Monitoring Effort Air Study, Communications Sector, Communication Department - Research Institute IPB, 1994
- EIA study for Reagent Hotel, 1994