

**REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS**

**PREPARATORY SURVEY
FOR
ROAD NETWORK DEVELOPMENT
PROJECT
IN
CONFLICT-AFFECTED AREAS
IN
MINDANAO**

**FINAL REPORT
< VOLUME-II >**

JUNE 2018

JAPAN INTERNATIONAL COOPERATION AGENCY

**CTI ENGINEERING INTERNATIONAL CO., LTD.
ORIENTAL CONSULTANTS GLOBAL CO., LTD.
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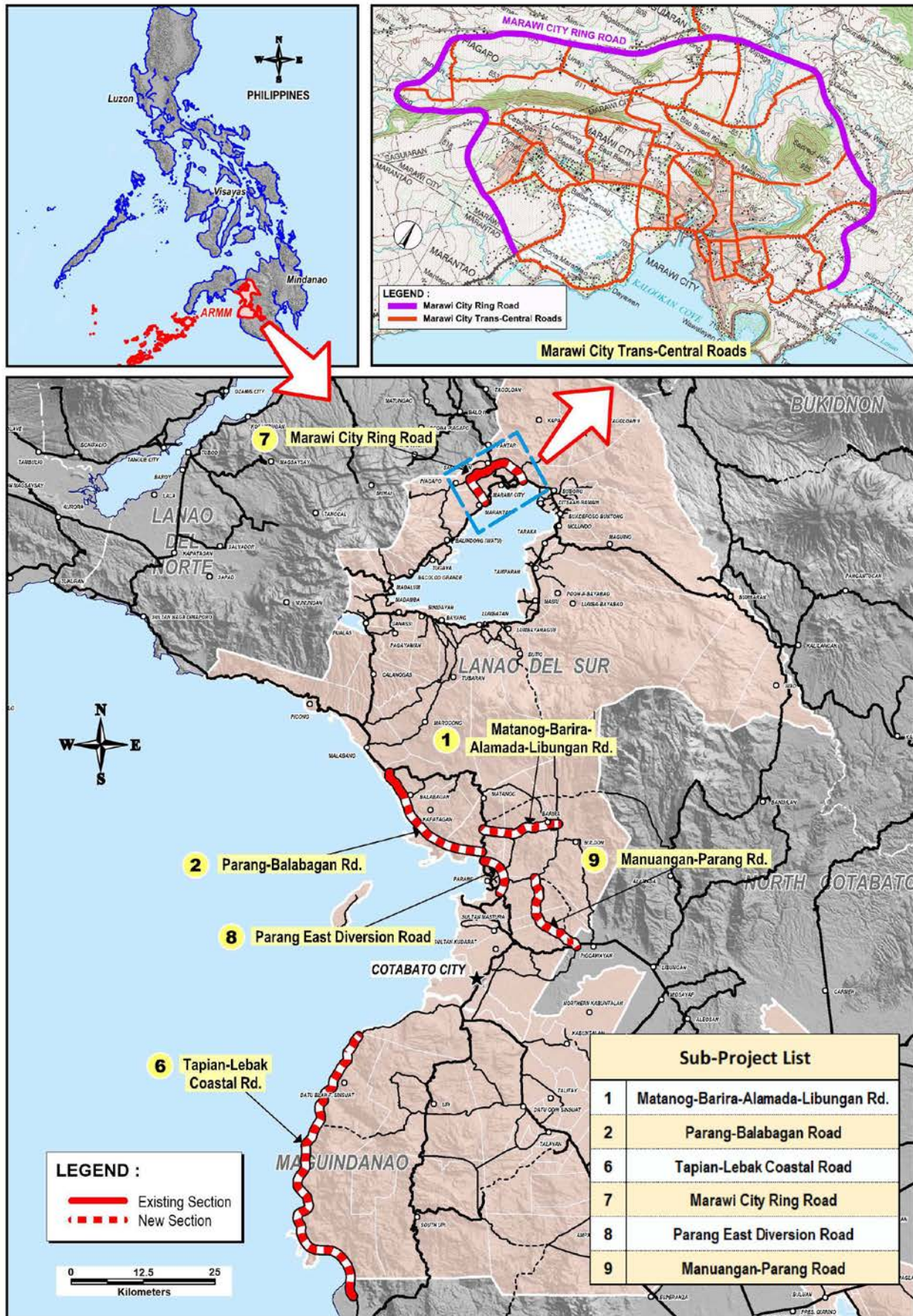
Exchange Rate

March 2018

1 USD = 108 YEN

1 USD = 51.8 PhP

1 YEN = 2.08 PhP



LOCATION MAP OF THE PROJECT AREA

**PREPARATORY SURVEY FOR ROAD NETWORK DEVELOPMENT PROJECT IN CONFLICT-AFFECTED
AREAS IN MINDANAO**
Final Report
< Volume-2 >

Location Map of The Project Area

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ACRONYMS AND ABBREVIATIONS

AADT	:	Annual Average Daily Traffic
AD	:	Ancestral Domain
ADT	:	Average Daily Traffic Volume
AFP	:	The Armed Forces of the Philippines
AH	:	Affected Households
AP	:	Affected Persons
ARMM	:	Autonomous Region of Muslim Mindanao
BBL	:	Bangsamoro Basic Law
BDA	:	Bangsamoro Development Agency
BIFF	:	The Bangsamoro Islamic Freedom Fighters
BIR	:	Bureau of Internal Revenue
BOD	:	Bureau of Design
BTC	:	Bangsamoro Transition Commission
B/C	:	Benefit/Cost Ratio
CAAM	:	Conflict Affected Areas in Mindanao
CAB	:	Comprehensive Agreement on the Bangsamoro
CADC	:	Certificate of Ancestral Domain Claim
CADT	:	Certificate of Ancestral Domain Title
CALT	:	Community of Ancestral Land Title
CCA	:	Community Consultative Assembly
CCCH	:	Coordinating Committee on the Cessation of Hostilities
CCDP	:	Comprehensive Capacity Development Project for the Bangsamoro
CCP	:	The Communist Party of the Philippines
CCTV	:	Closed-Circuit-Television
CNC	:	Certificate of Non-Coverage
COI	:	Corridor of Impact
CR	:	Critically Endangered
DAO	:	DENR Administrative Order
DED	:	Detailed Engineering Design
DEO	:	District Engineering Office
DENR	:	Department of Environment and Natural Resources
DENR-ARMM	:	Department of Environment and Natural Resources- ARMM
DENR-EMB	:	Department of Environment and Natural Resources -Environmental Management Bureau
DFR	:	Final Report
DGCS	:	Design Guidelines, Criteria and Standard
DILG	:	Department of the Interior and Local Government
DND	:	Department of National Defence
DOLE	:	Department of Labour and Employment
DPWH	:	Department of Public Works and Highways
DPWH-ARMM	:	Department of Public Works and Highways – ARMM
DPWH-National	:	Department of Public Works and Highways – National
DPWH-ESSD	:	Department of Public Works and Highways – ESSD
DRAM	:	DPWH ROW Acquisition Manual
EA	:	Executing Agency
ECAs	:	Environmentally Critical Areas
ECC	:	Environmental Clearance Certificate
ECPs	:	Environmentally Critical Projects
EIA	:	Environmental Impact Assessment
EIARC	:	Environmental Impact Assessment Review Committee
EIRR	:	Economic Internal Rate of Return
EIS	:	Environmental Impact Statement
EMA	:	External Monitoring Agent
EMP	:	Environmental Management Plan

EO	:	Executive Order
ESSD	:	Environment and Social Safeguards Division
FHWA	:	Federal Highway Administration
FIRR	:	Financial Internal Rate of Return
FPA	:	Final Peace Agreement
FPIC	:	Free and Prior Informed Consent
F/R	:	Final Report
GDP	:	Gross Domestic Product
GOJ	:	Government of Japan
GOP	:	Government of the Philippines
GRDP	:	Gross Regional Domestic Product
GRM	:	Grievance Redress Mechanism
ICC	:	Investment Coordinating Committee
IC/R	:	Inception Report
IDP	:	Internally Displaced Persons
IEE	:	Initial Environmental Examination
IMT	:	International Monitoring Team
IOL	:	Inventory of Loss
IP/ ICC	:	Indigenous Peoples/ Indigenous Cultural Communities
IPP	:	Indigenous Peoples Plan
IPRA	:	Indigenous Peoples Rights Act
IRR	:	Internal Rate of Return
IS	:	Islamic State
IT/R	:	Interim Report
JICA	:	Japan International Cooperation Agency
LARRIP	:	Land Acquisition, Resettlement, Rehabilitation and Indigenous People's Policy (DPWH 2007)
LGU	:	Local Government Units
MILF	:	Moro Islamic Liberation Front
MinDA	:	Mindanao Development Authority
MNLF	:	Moro National Liberation Front
MOU	:	Memorandum of Understanding
NAMRIA	:	National Mapping and Resource Information Authority
NCIP	:	National Commission on Indigenous Peoples
NEDA	:	National Economic and Development Authority
NGO	:	Non-Government Organization
NPA	:	New Peoples' Army
NPV	:	Net Present Value
OD	:	Origin and Destination
ODA	:	Official Development Assistance
OPAPP	:	Office of the Presidential Adviser on the Peace Process
OSCC-ARMM	:	Office of Southern Cultural Communities-ARMM
O&M	:	Operation and Maintenance
PAPs	:	Project-Affected Persons
PD	:	Presidential Decree
PEISS	:	Philippine Environmental Impact Statement System
PhP	:	Philippine Peso
PNP-SAF	:	Philippine National Police -Special Action Force
PPP	:	Public-Private Partnership
RA	:	Republic Act
RAP	:	Resettlement Action Plan
RIC	:	Resettlement Implementation Committee
RIPP	:	Resettlement and Indigenous Peoples Plan
ROW	:	Right of Way
RPDO-ARMM	:	Regional Planning Development Office-ARMM
SA	:	Social Assessment
SES	:	Socioeconomic Survey
SER	:	Shadow Exchange Rate

SIDP	:	The Study on the Infrastructure (Road Network) Development Plan for ARMM
SIA	:	Social Impact Assessment
SMT	:	Safety Management Team
SPS	:	Safeguard Policy Statement
SWR	:	Shadow Wage Rate
TCT	:	Torrens Certificate of Title
TOR	:	Terms of Reference
TTC	:	Travel Time Cost
TWG	:	Technical Working Group
UNHCR	:	The United Nations High Commissioner for Refugees
UPMO	:	Unified Project Management Office
USD	:	United States Dollar
UXO	:	Unexploded ordnance
VAT	:	Value Added Tax
VOC	:	Vehicle Operation Cost

Chapter 8 Indigenous Peoples in the Study Area

8.1 Introduction

For centuries, the Indigenous Peoples (IPs) living in the different areas of the country including in the Autonomous Region of Muslim Mindanao (ARMM) have been struggling for their rights and self-determination. The IPs struggles started way back in the early 1900's when wealthy and powerful families migrated to the Island of Mindanao taking advantage of government's policy of offering cheap lands, farms, and homestead in the island. As a result, these IPs families were driven off from their original homes and farm lands in the barangay or town proper and settled in the mountain areas nearby or elsewhere where they opened up new/small fields along the slopes of the mountain and planted corn, vegetables, and other root crops just to survive. Their houses and small farms are scattered in the mountains, not as a community, and it takes two-three hours hike just to reach a family. In these condition, children could hardly go to school or have to sacrifice walking along the mountain trails and cross rivers just to go to school in the barangay or town proper and back home. Sick family members or pregnant mothers about to deliver their babies have to be carried by men on a hammock made of bamboo poles and local materials. Transporting farm produce makes it very difficult and expensive due to absence of road, fetching drinking water from springs or open dug wells a distance away, no electricity, could make life so difficult for them and in constant struggle.

8.1.1 Definition of Terms

The following terms used in the **Republic Act 8371 (IPRA Law)** are defined for easy understanding of the succeeding sections.

- a) **Ancestral Domains** — Subject to Section 56 hereof, refer to all areas generally belonging to ICCs/IPs comprising lands, inland waters, coastal areas, and natural resources therein, held under a claim of ownership, occupied or possessed by ICCs/IPs, by themselves or through their ancestors, communally or individually since time immemorial, continuously to the present except when interrupted by war, force majeure or displacement by force, deceit, stealth or as a consequence of government projects or any other voluntary dealings entered into by government and private individuals/corporations, and which are necessary to ensure their economic, social and cultural welfare. It shall include ancestral lands, forests, pasture, residential, agricultural, and other lands individually owned whether alienable and disposable or otherwise, hunting grounds, burial grounds, worship areas, bodies of water, mineral and other natural resources, and lands which may no longer be exclusively occupied by ICCs/IPs but from which they traditionally had access to for their subsistence and traditional activities, particularly the home ranges of ICCs/IPs who are still nomadic and/or shifting cultivators;
- b) **Ancestral Lands** — Subject to Section 56 hereof, refers to land occupied, possessed and utilized by individuals, families and clans who are members of the ICCs/IPs since time immemorial, by themselves or through their predecessors in interest, under claims of individual or traditional group ownership, continuously, to the present except when interrupted by war, force majeure or displacement by force, deceit, stealth, or as a consequence of government projects and other voluntary dealings entered into by government and private individuals/corporations, including, but not limited to, residential lots, rice terraces or paddies, private forests, swidden farms and tree lots;

- c) Certificate of Ancestral Domain Title — refers to a title formally recognizing the rights of possession and ownership of ICCs/IPs over their ancestral domains identified and delineated in accordance with this law;
- d) Certificate of Ancestral Lands Title — refers to a title formally recognizing the rights of ICCs/IPs over their ancestral lands;
- e) Communal Claims — refer to claims on land, resources and rights thereon, belonging to the whole community within a defined territory;
- f) Customary Laws — refer to a body of written and/or unwritten rules, usages, customs and practices traditionally and continually recognized, accepted and observed by respective ICCs/IPs;
- g) Free and Prior Informed Consent — as used in this Act shall mean the consensus of all members of the ICCs/IPs to be determined in accordance with their respective customary laws and practices, free from any external manipulation, interference and coercion, and obtained after fully disclosing the intent and scope of the activity, in a language and process understandable to the community;
- h) Indigenous Cultural Communities/Indigenous Peoples — refer to a group of people or homogenous societies identified by self-ascription and ascription by others, who have continuously lived as organized community on communally bounded and defined territory, and who have, under claims of ownership since time immemorial, occupied, possessed and utilized such territories, sharing common bonds of language, customs, traditions and other distinctive cultural traits, or who have, through resistance to political, social and cultural inroads of colonization, nonindigenous religions and cultures, became historically differentiated from the majority of Filipinos. ICCs/IPs shall likewise include peoples who are regarded as indigenous on account of their descent from the populations which inhabited the country, at the time of conquest or colonization, or at the time of inroads of nonindigenous religions and cultures, or the establishment of present state boundaries, who retain some or all of their own social, economic, cultural and political institutions, but who may have been displaced from their traditional domains or who may have resettled outside their ancestral domains;
- i) Indigenous Political Structures — refer to organizational and cultural leadership systems, institutions, relationships, patterns and processes for decision making and participation, identified by ICCs/IPs such as, but not limited to, Council of Elders, Council of Timuays, Bodong Holders, or any other tribunal or body of similar nature;
- j) Individual Claims — refer to claims on land and rights thereon which have been devolved to individuals, families and clans including, but not limited to, residential lots, rice terraces or paddies and tree lots;
- k) National Commission on Indigenous Peoples (NCIP) — refers to the office created under this Act, which shall be under the Office of the President, and which shall be the primary government agency responsible for the formulation and implementation of policies, plans and programs to recognize, protect and promote the rights of ICCs/IPs;
- l) Native Title — refers to preconquest rights to lands and domains which, as far back as memory reaches, have been held under a claim of private ownership by ICCs/IPs, have never been public lands and are thus indisputably presumed to have been held that way since before the Spanish Conquest;
- m) Nongovernment Organization — refers to a private, non-profit voluntary organization that has been organized primarily for the delivery of various services to the ICCs/IPs and has an established track record for effectiveness and acceptability in the community where it serves;
- n) People's Organization — refers to a private, non-profit voluntary organization of members of an ICC/IP which is accepted as representative of such ICCs/IPs;
- o) Sustainable Traditional Resource Rights — refer to the rights of ICCs/IPs to sustainably use, manage, protect and conserve i) land, air, water, and minerals; ii) plants, animals and other organisms; iii) collecting, fishing and hunting grounds; iv) sacred sites; and v) other areas of

economic, ceremonial and aesthetic value in accordance with their indigenous knowledge, beliefs, systems and practices; and

- p) Time Immemorial — refers to a period of time when as far back as memory can go, certain ICCs/IPs are known to have occupied, possessed in the concept of owner, and utilized a defined territory devolved to them, by operation of customary law or inherited from their ancestors, in accordance with their customs and traditions.

8.2 Legal and Policy Framework

8.2.1 Basic and Relevant Laws

The mother law which governs project implementation that will benefit/affect the Indigenous Peoples/Indigenous Cultural Communities (IPs/ICCs) is the Republic Act 8371 or better known as the Indigenous Peoples Right Act (IPRA Law) of 1997. After the passage of the law, the NCIP in 1998 prepared the implementing guidelines to operationalize the procedures for undertaking Field-Based Investigation (FBI) and Free, Prior, and Informed consent (FPIC) – two key instruments of the law to advance rights and interest of the IP communities.

In the ARMM however due to the region's nature being an autonomous, the implementing guidelines was produced only in 2012. The process took a bit longer. It started by the adaptation of the ARMM's Regional Legislative Assembly (RLA) of IPRA Law in 2003 which paved way for the passage of a regional law called Muslim Mindanao Autonomy Act No. 241 of 2008 (MAA No. 241). This law which is equivalent of IPRA Law serves as the main vehicle of the ARMM in protecting the rights and interests of the IPs in the region. It should be noted that MAA No. 241 is based on the IPRA Law of 1997 hence similarities are observed. Comparison on the evolution of the two laws is depicted in **Figure 8.2.1-1**.

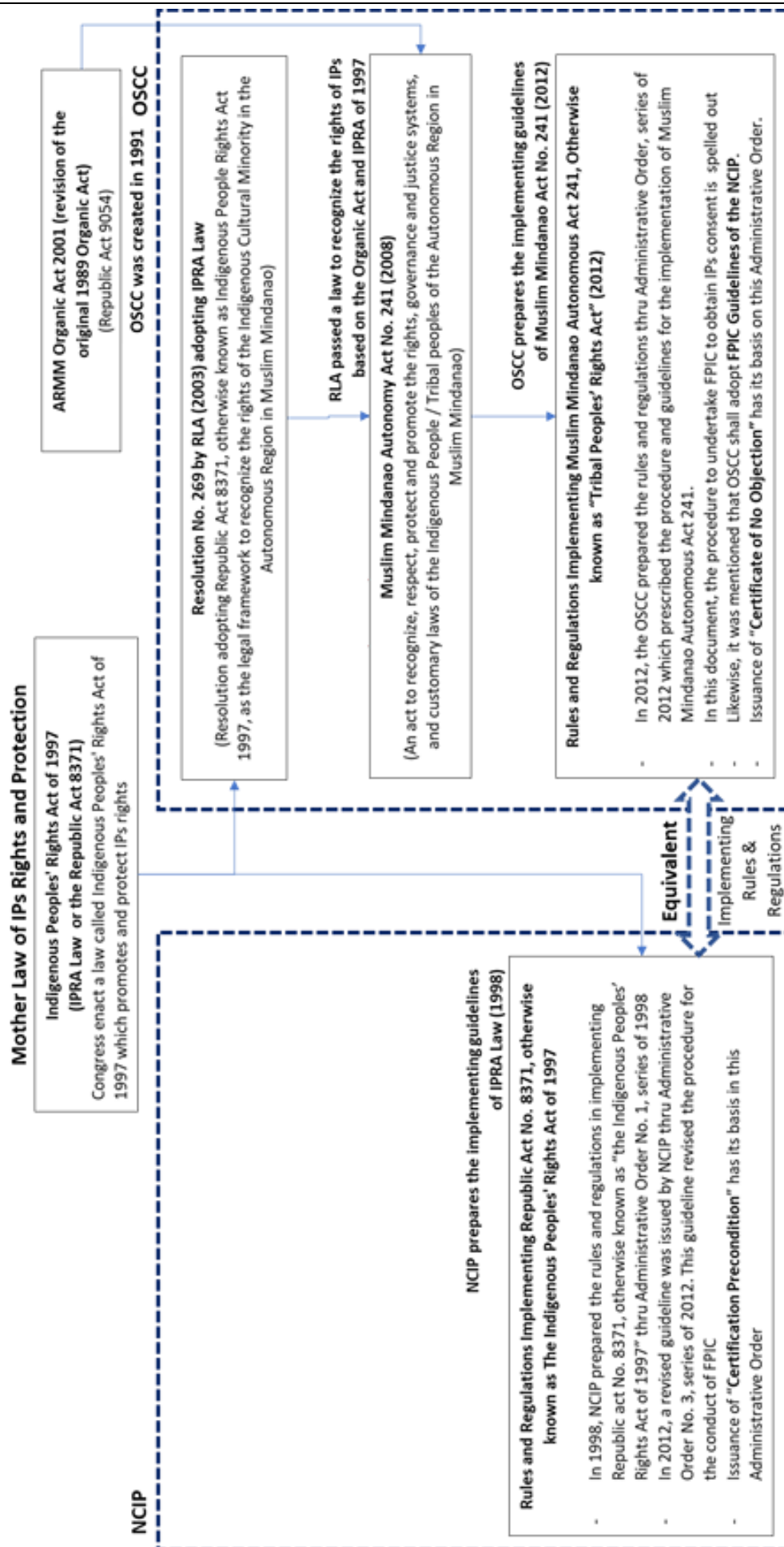


Figure 8.2.1-1 Legal Framework of FPIC by NCIP and OSCC

8.2.2 Gap Analysis of IPRA Law and Muslim Mindanao Act (MMA) 241

A gap analysis is carried out to determine the gap between the two laws which might have bearing on the rights of IPs for Free, Prior and Informed consent (FPIC). This FPIC is the key instrument of the IPRA Law to protect and promote the IPs interest. As seen in **Table 8.2.2-1**, the two laws are almost identical which is not surprising since the basis of Muslim Mindanao Act 241 is the IPRA Law. The only major difference is the lack of authority of the OSCC to issue Certificate of Ancestral Domain Title (CADT) and Certificate of Ancestral Lands Title (CALT). The OSCC's function is to receive applications and forward them to the NCIP Region XII. Likewise, it was learned that NCIP Region XII is reluctant to issue CADT and CALT inside the ARMM.

Another observed difference is the use of name in the certificate. While the NCIP called the document to be issued after FPIC is successfully concluded "Certification Precondition", the OSCC called it "Certificate of No Objection". The table below presented the findings of gap analysis between the two laws.

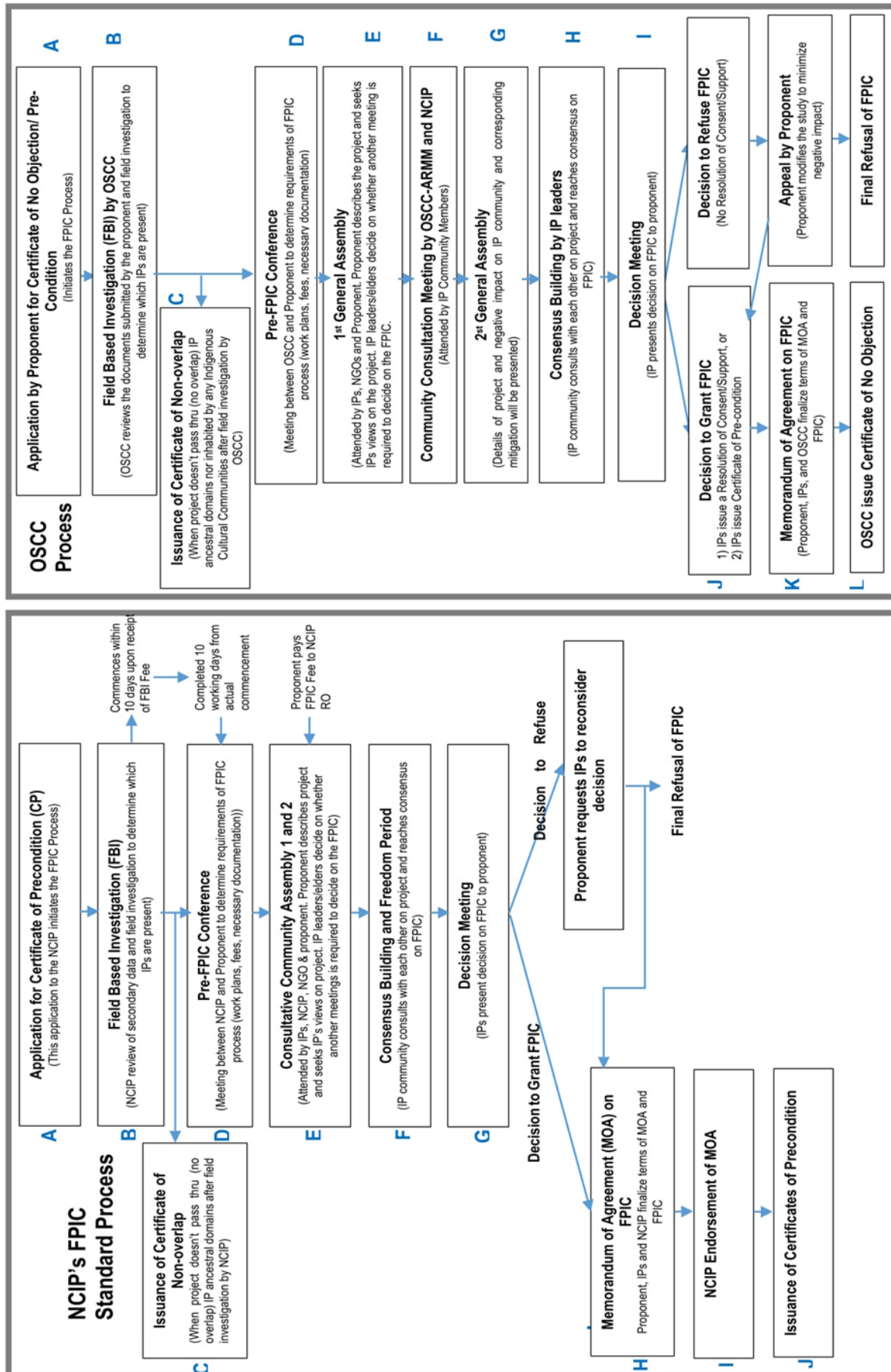
Table 8.2.2-1 Gap analysis of IPRA Law and MMA 241

Subject	IPRA Law (1997)	Muslim Mindanao Act 241 (2008)	Gap
a. General Purpose of the Law	An act to recognize, protect and promote the rights of Indigenous Cultural Communities/Indigenous Peoples.	An act to recognize, respect, protect and promote the rights, governance and justice systems, and customary laws of the Indigenous Peoples/Tribal Peoples of the Autonomous Region in Muslim Mindanao.	The MMA 241 reaffirms the policies embodied in the IPRA Law. Both laws are consistent in upholding the rights of the Indigenous Peoples/ Indigenous Cultural Communities (IPs/ICCs)
b. Issuance of Certificate of Ancestral Domain Title (CADT) and Certificate of Ancestral Lands Title (CALT))	Chapter 3, Sec 7. The Rights to Ancestral Domains – NCIP is empowered to issue a Certificate of Ancestral Domain Title (CADT)/ Certificate of Ancestral Lands Title (CALT)	Rule IX, Sec 1. Until the NCIP-ARMM is organized, the Office of Southern Cultural Communities (OSCC) shall accept applications for Certificate of Ancestral Domains Title (CADT) /Certificate of Ancestral Lands Title (CALT) as the authorized agent of the National Commission on Indigenous Peoples (NCIP). And upon acceptance of the application, forward such applications to NCIP for processing.	OSCC can only accept CADT and CALT applications and forward such application to NCIP for processing. OSCC has no power to issue CADT and CALT.
c. FBI and FPIC Process	After application for Issuance of Certification Precondition is filed by a proponent agency (e.g. DPWH), NCIP will constitute an FBI Team to either issue Certificate of Non-Overlap (if the project is not passing through ancestral domain of IPs) or go through the process of FPIC (if the project passing through ancestral domain of IP).	After application for Issuance of Certification Precondition is filed, the NCIP will constitute an FBI Team to either issue Certificate of Non-Overlap (if the project is not passing through ancestral domain of IPs) or go through the process of FPIC (if the project passing through ancestral domain of IP).	The same FBI and FPIC Processes of the NCIP is being practiced by the OSCC

d. Right to Self-governance and empowerment	The State recognizes the inherent right of ICCs/IPs to self-governance and self-determination and respects the integrity of their values, practices and institutions. Consequently, the State shall guarantee the right of ICCs/IPs to freely pursue their economic, social and cultural development.	The Regional Government shall recognize, respect and support the indigenous systems of leadership and governance, in all levels, of ICCs/IPs/TPs in pursuance of the latter's right to self-determination.	Both laws recognize and respect right
e. Issuance of Certification Precondition (CP)/ Certificate of No Objection	Section 59: Emphasized that CNO (certificate of non-overlap) can't be issued without field-based investigation (FBI). Certificate of Precondition (can't be issued without free and prior informed and written consent of ICCs/IPs concerned.	Sec 4, item 6: The OSCC shall facilitate the conduct of said for a/consultation (FPIC) with the ICCs/IPs/TPs.	OSCC completely adopted the NCIP process. The only difference is naming of the certificate being issued by the OSCC. While NCIP issues Certification Precondition the OSCC issues Certificate of No Objection. The purpose however is the same which is being issues after the consent of the IP communities is received.

8.2.3 FPIC Process by NCIP and OSCC

Figure 8.2.3-2 compares side-by-side the entire process of FPIC by the NCIP and OSCC. As seen in the figure, the FPIC process of the two government agencies are identical where the only difference is the title of certificate being issued: i.e. Certification Precondition for NCIP and Certificate of No Objection by the OSCC.



Note: The above is based on the Rules and Regulations Implementing the Indigenous Peoples' Rights Act (IPRA Law of 1997)

Figure 8.2.3-2 Standard process of NCIP and OSCC to Obtain Certificate of Precondition /Certificate of No Objection

8.3 Concerned Government Agencies and their Origins

The two main government agencies tasked to look after the rights and interests of the IP communities in the country are the National Commission on Indigenous Peoples (NCIP) and the Office of the Southern Cultural Communities for the IPs in the ARMM. The history of the two agencies are similar where both agencies traces their roots in 1987 during the administration of President Corazon C. Aquino.

Upon the assumption of the new administration in 1987, Executive Order No. 122A was signed creating the Office of Muslim Affairs (OMA), Executive Order No. 122B creating the Office of the Northern Cultural Communities (ONCC), and Executive Order No. 122C creating the Office of the Southern Cultural Communities (OSCC). The ONCC was entrusted the general welfare of tribal communities in Northern Philippines while the OSCC took care of the affairs of Southern Cultural Communities. Muslim affairs handled by the Office of Muslim Affairs (OMA). At that time, all three were directly under the Office of President of the Republic of the Philippines.

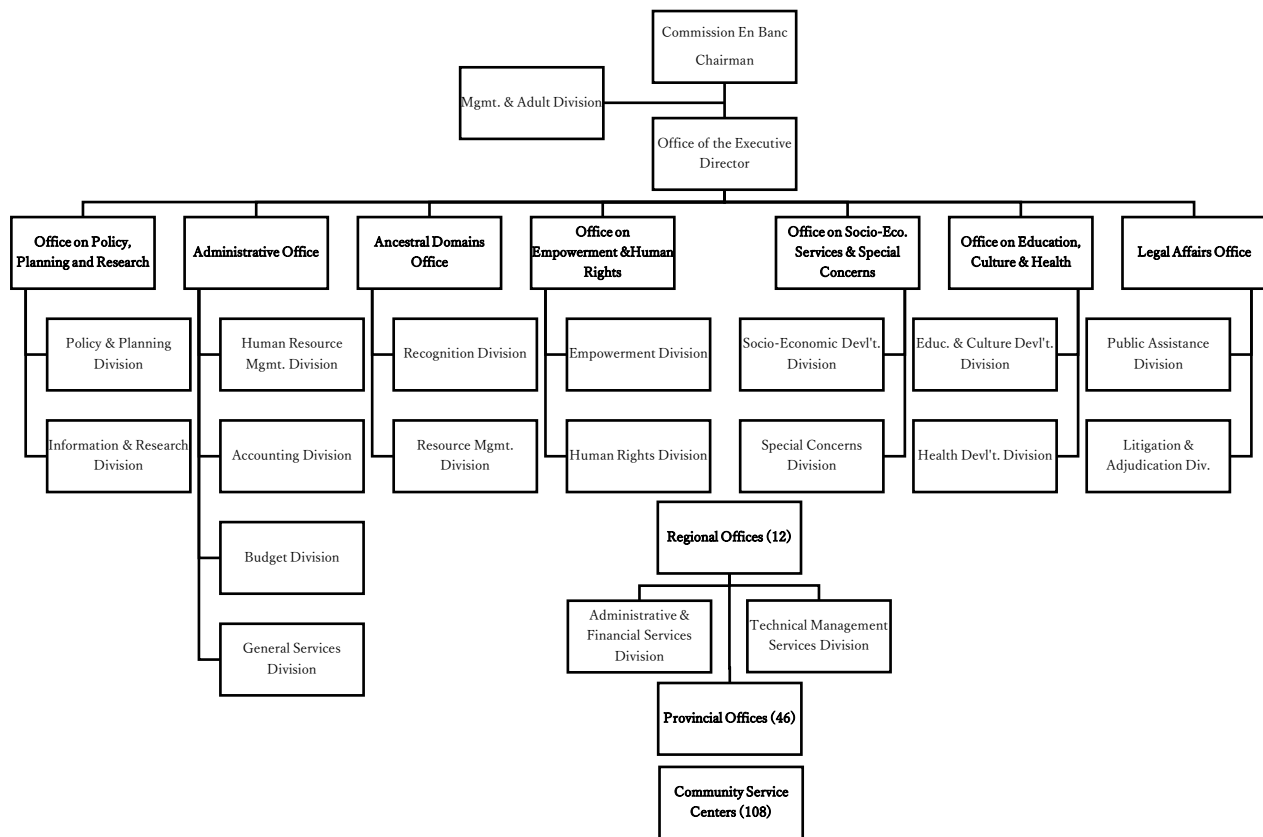
On one hand ONCC evolved to become the NCIP in 1997 through the Republic Act 8371 or Indigenous Peoples' Rights Act of 1997 which creates NCIP offices throughout the country where Indigenous Peoples are found, except in the ARMM. On the other hand, the OSCC devolved into the Autonomous Region in Muslim Mindanao (ARMM) in 1989. And finally, OMA in 2008 is replaced by the National Commission on Muslim Filipinos.

The above explains why NCIP has no presence in the ARMM and instead the rights and interests of IPs are handled by the OSCC.

8.3.1 National Commission on Indigenous People (NCIP) – National

The NCIP is mandated to protect and promote the interest and well-being of the Indigenous Cultural Communities/Indigenous Peoples with due respect to their beliefs, customs, traditions and institutions. Organization chart of the commission is depicted in **Figure 8.3.1-1**. To achieve its mandate, hereunder are some of its major functions, powers and jurisdictions, as follows:

- a) To serve as the primary government agency through which ICCs/IPs can seek government assistance and as the medium, through which such assistance may be extended;
- b) To review and assess the conditions of ICCs/IPs including existing laws and policies pertinent thereto and to propose relevant laws and policies to address their role in national development;
- c) To formulate and implement policies, plans, programs and projects for the economic, social and cultural development of the ICCs/IPs and to monitor the implementation thereof;
- d) Subject to existing laws, to enter into contracts, agreements, or arrangement, with government or private agencies or entities as may be necessary to attain the objectives of this Act, and subject to the approval of the President, to obtain loans from government lending institutions and other lending institutions to finance its programs; and,
- e) To issue appropriate certification as a pre-condition to the grant of permit, lease, grant, or any other similar authority for the disposition, utilization, management and appropriation for the private individual, corporate entity or any government agency, corporation or subdivision thereof on any part or portion of the ancestral domain taking into consideration the consensus approval of the ICCs/IPs concerned.



Source: Prepared by the Human Resource Management, NCIP Central Office

Figure 8.3.1-1 Organization Structure of NCIP

8.3.2 Office of the Southern Cultural Communities (OSCC) – ARMM

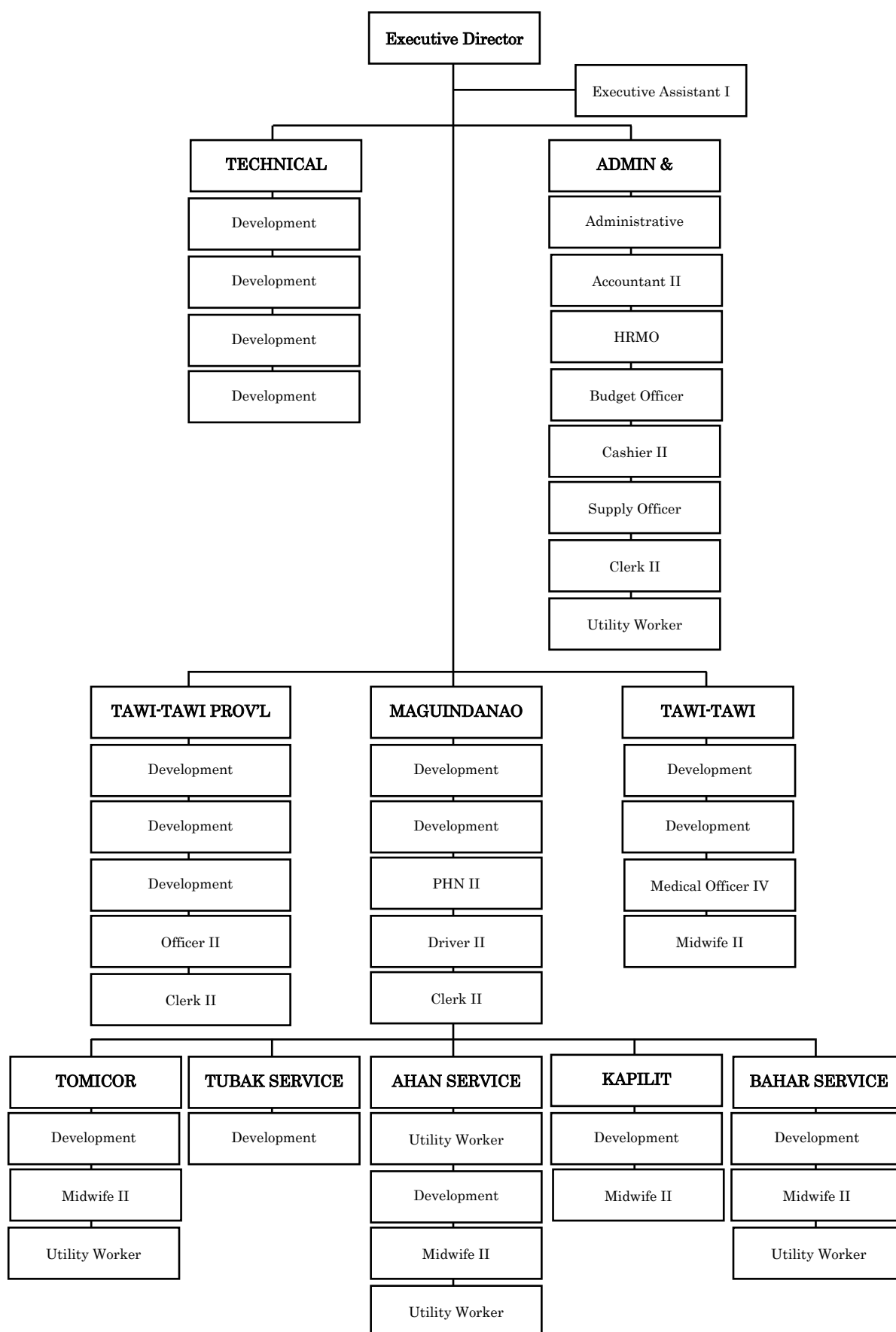
The 1989 Organic Act (Republic Act No. 6734) which created the ARMM tasked the Regional Government to “recognize, respect, protect, revive, develop, promote and enhance the culture, customs, traditions, beliefs and practices of the people in the area of autonomy and shall encourage and undertake the recovery, collection, collation, and restoration of historical and cultural properties for posterity”. The agency in-charge to execute the above is the OSCC which was empowered through Executive Order No. 462, s. 1991 and its organization chart is illustrated in **Figure 8.3.2-2**. Based on the said Executive Order, the functions of the OSCC are as follows:

- Formulation, coordination, implementation, and monitoring of policies, plans, programs and projects affecting the southern cultural communities within the Autonomous Region for Muslim Mindanao (ARMM); serve as the link between the Regional Governor and agencies, public or private, internal or external, involved in such programs and projects; and recommend such affirmative actions as may be necessary for their efficient and effective implementation;
- Undertake and coordinate development programs and projects for the advancement of southern cultural communities, including designing, implementing and maintaining settlements in the ARMM;

- c. Provide mechanism through which the southern cultural communities within the ARMM can seek the ARG assistance and through which such assistance may be extended to them;
- d. Serve as the custodian and administrator in charge of all existing OSCC settlements within the ARMM, subdivisions, allocations and distribution of public lands and those which shall hereinafter be reserved by the ARG for the southern cultural communities including ancestral lands as provided by law;
- e. Enter, subject to existing laws, policies and guidelines, into such contracts, agreements, or arrangements, with government or private agencies or entities as may be necessary to attain the objectives of the ARMM, including obtaining loans from lending institutions;
- f. Accept grants, donations, gifts, funds, and/or properties in whatever form and from whatever source, for the benefit of the southern cultural communities within the ARMM, and administer the same in accordance with the terms thereof, or in the absence of any condition, in such manner as may be consistent with the interest of southern cultural communities in ARMM as well as any existing laws;
- g. Undertake studies, formulate policies and plans and implement programs and projects for the preservation and development of the historical and cultural heritage of southern cultural communities within the ARMM as well as establish and maintain ethnographic research centers and museums on the culture and institution of the southern cultural communities in the ARMM as may be necessary;
- h. Coordinate the enforcement of policies and laws protecting the rights of the southern cultural communities to their ancestral lands, including the applications of customary laws governing property rights and relations, in determining the ownership and extent of ancestral lands, subject to procedures and standards established by the legislature or any other duly constituted authority and for this purpose, enlist the assistance of appropriate government agencies, including those concerned with law enforcement;
- i. Acquire, lease or own such properties or assets in whatever form as may be necessary and sell or otherwise dispose of the same and serve as the custodian or administrator of such lands or areas and other properties or assets as the ARG may reserve for the benefit of the southern cultural communities in the ARMM;
- j. Conduct inspections or surveys jointly with other appropriate agencies, and issue necessary certifications prior to the grant of any license, lease or permit for the exploitation of natural resources affecting the interests of the southern cultural communities in the ARMM;
- k. Provide legal and technical services for the survey, adjudication, titling and development of tribal ancestral lands as well as settlements proclaimed by the government for the southern cultural communities within the ARMM;
- l. Provide medical assistance and health programs in coordination with the Department of Health;
- m. Coordinate the formulation, design, integration and the implementation, where applicable, of development plans which will assist members of the southern cultural communities in the ARMM in developing their ancestral lands with respect to contiguous areas occupied by members thereof,

incorporating therein livelihood programs and ecological or environmental protection for traditional tribal domains, tribal hunting grounds and sacred ancestral places or tribal cultural assets;

- n. Assist, promote and support community schools, both formal and non-formal, for the benefit of members of the southern cultural communities, incorporating therein the cultural values of the beneficiary communities consistent with the Filipino values of good citizenship and love of country, preferably in areas where existing educational facilities are not accessible to members of the southern cultural communities in the ARMM, in coordination with the Department of Education, Culture and Sports;
- o. Encourage trade fairs and market centers to serve as outlets for the agricultural and handicraft products of the southern cultural communities; support the establishment of other marketing assistance and credit facilities for the promotion of trade and entrepreneurship among southern cultural communities in the ARMM;
- p. Promote peace and harmony within, between and among the southern cultural communities by acting as mediator and encouraging the peaceful settlement of tribal disputes in accordance with prevailing customary laws of each particular tribe; for such purpose, shall codify the customary laws of each particular tribe, specially those on the conduct of adjudication councils;
- q. Recommend appropriate legislative proposals intended to promote the interests of the cultural communities within the ARMM;
- r. Certify, whenever appropriate, membership of persons belonging to the southern cultural communities in the ARMM for purposes of establishing qualifications for specific requirements of government and private agencies and for other benefits as may be provided by law; and
- s. Perform such other functions as may be provided by law.



Source: Website of the OSCC accessed on 13 March 2018 (<http://www.osccarmmgov.ph/index.php/about/organization>)

Figure 8.3.2-2 OSCC-ARMM Organizational Structure

8.3.3 Collaboration between NCIP and OSCC to undertake FBI and FPIC

The mandate of the Office of the Southern Cultural Communities (OSCC) when it was devolved to the ARMM in 1989 was not totally in consonant with the provisions of RA 8371 like the FPIC Process and issuance of Certification Precondition. As such, the Regional Legislative Assembly of ARMM enacted Resolution 269 in 2003 and amended it through MMA 241 in 2008, adopting the provisions of RA 8371. OSCC-ARMM then issued its own guidelines in the implementation of the FPIC Process and authorized to issue Certificate of No Objection (CNO) after receiving the Resolution of Consent or Certification Precondition issued by the ICCs Leaders and Elders.

In the case of the Preparatory Survey for Road Network Development Project in Conflict-Affected Areas in Mindanao (RNDP-CAAM), there is a 1-2 kms section that will traverse two (2) barangays in the Municipality of Lebak in the Province of Sultan Kudarat for the Sub-Project 6 (Tapien-Lebak Coastal Road), which is no longer part of the ARMM, and have presence of Indigenous Peoples (IPs).

To facilitate the FPIC processes, the DPWH-National sent an official letter to the Chairperson of NCIP to inform and seek the support of NCIP National especially in the conduct of the FPIC process at the regional level. Likewise, the DPWH-ARMM sent an official letter as well to the Executive Director of OSCC to seek her agency's support in the conduct of FBI and FPIC. OSCC coordinated with NCIP XII Regional Office in Koronadal City, South Cotabato to assist in conducting the needed community assemblies and socio-economic survey or the FPIC process. This collaboration made possible with the signing of a Memorandum of Understanding (MOU) signed on December 2017 between OSCC-ARMM and NCIP XII Regional Office. The MOU is available in **Appendix 6-1** while a diagram showing the collaboration of the two agencies is presented in **Figure 8.3.3-3**.

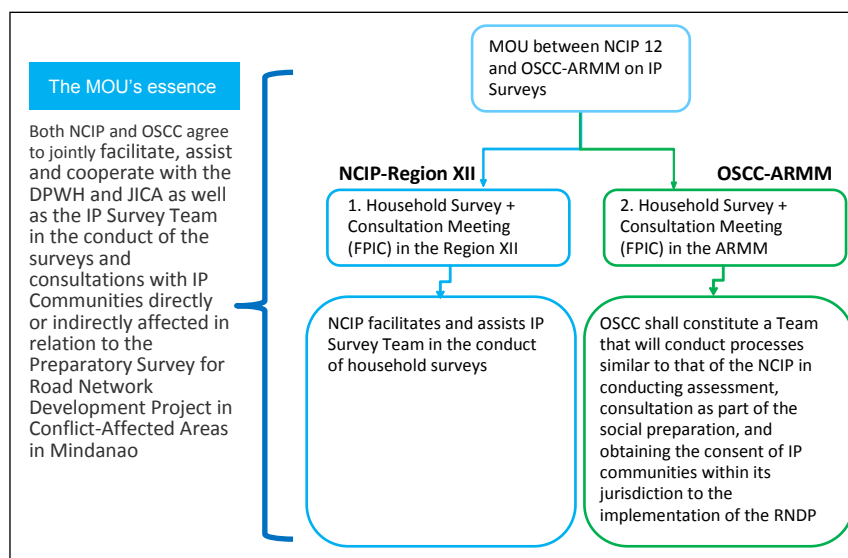


Figure 8.3.3-3 Collaboration of NCIP-12 and OSCC-ARMM for the IP Survey

8.4 Indigenous Peoples in the Study Area

8.4.1 Population

The Philippines is a culturally diverse country with an estimated 14-17 million Indigenous Peoples (IPs) belonging to 110 ethno-linguistic groups (UNDP Philippines, 2010). According to NCIP,

majority of these IPs are in Mindanao (61%) while a third reside in Luzon. The BDP-II quoted that according to the 2001 census, in Mindanao, Muslim ethnic groups, or Moros comprise 28.2%, non-Muslim Indigenous Peoples (IPs)/Lumads 5%, whereas Christians and migrant settlers comprise 71.8% of the population residing in Mindanao.

In the ARMM, it is estimated that more than 200,000 IPs are scattered in different areas with its largest population in Maguindanao. The 2014 EU-assisted study titled “Indigenous Peoples of the Mainland ARMM” revealed that in the mainland ARMM (Provinces of Maguindanao and Lanao del Sur), the IP population is about 117,189. **Figure 8.4.1-1** indicated the Sub-Projects which passes through IP communities. As see in the map, only two Sub-Projects (Sub-Project 5 and Sub-Project 6) are traversing IP communities. Likewise, the estimated number of IP populations per Sub-Project is presented in the table below. From the table, Sub-Project 6 (Tapián- Lebak Coastal Road) has the highest number of IPs.

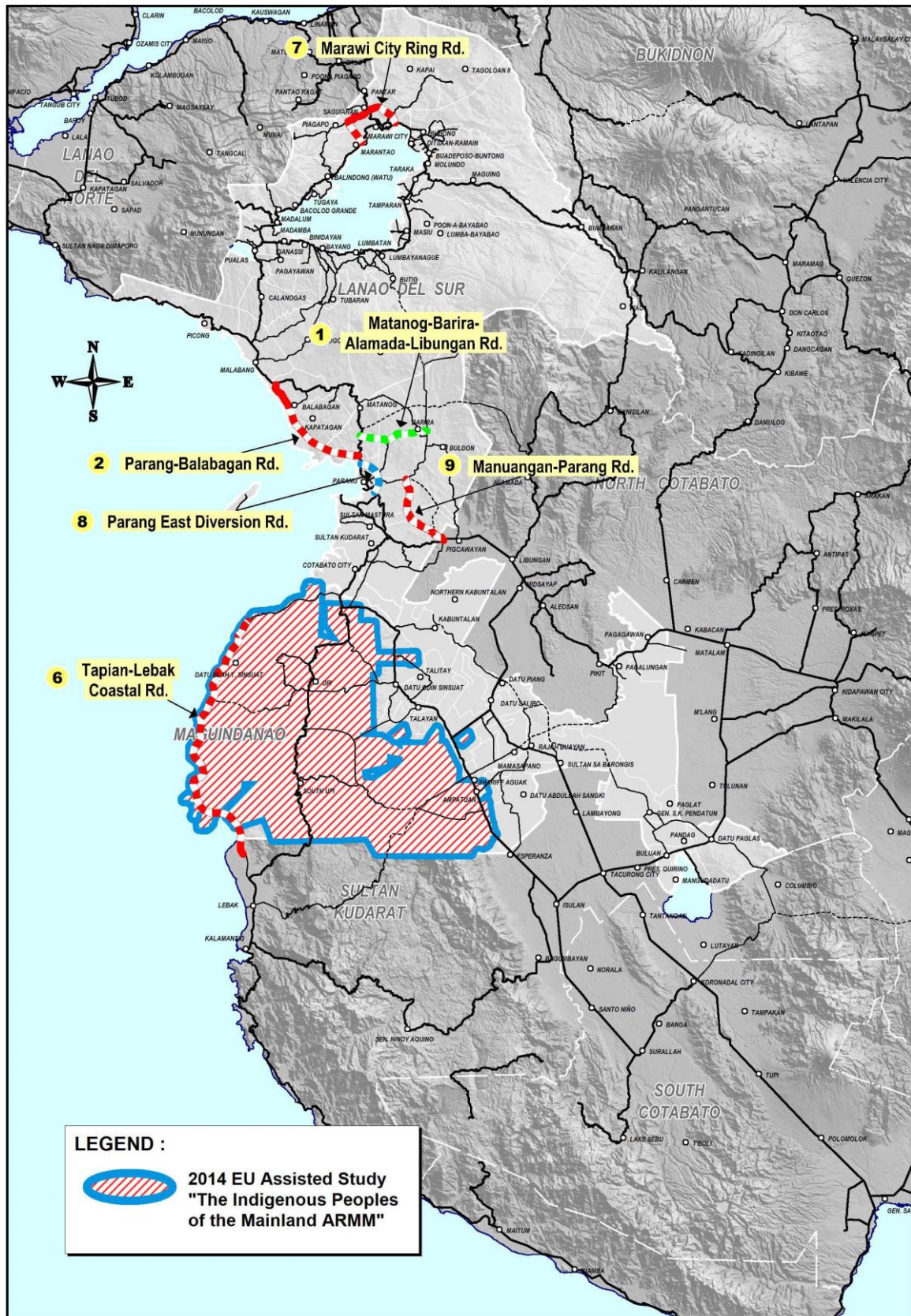
For this Project, validation of presence of IPs was done in three levels. The first level was through coordination with the OSCC which maintain a database of the list of IP communities and their locations. Another level of validation was done through meeting the municipal mayor who consulted the barangay officials to ascertain the presence or lack of presence of IP communities in their barangay. And the last level was done through the Social Survey where the assembled community were asked if they have known any IP communities in their area.

Table 8.4.1-1 Number of IPs along Each Sub-Project

Ethnic Affiliation	Sub-Project						
	No.1	No. 2	No. 5	No. 6	No. 7	No. 8	No. 9
Teduray	-	-	3,490	7,382	-	600 (Note)	-
Lambangian	-	-	1	5	-	-	-
Dulangan Manobo	-	-	1,922	4	-	-	-
T'boli	-	-	8	-	-	-	-
Higaonon	-	-	-	6	-	-	-
Others	-	-	16	82	-	6	-
Total	No IP	No IP	5,437	7,479	No IP	606	No IP

Note: They are migrant IPs who transferred to the place to work for a coconut plantation.

Source: Indigenous Peoples in the Mainland ARMM, 2014, EU



Sources: Prepared by the JICA Study Team based on the data of 2014-EU assisted study titled "The Indigenous Peoples of the Mainland ARMM"

Figure 8.4.1-1 Location of Sub-Projects traversing IP communities

8.4.2 Characteristics of Major IP Tribes

In the project influence area of Sub-Project 5 (Maganoy-Lebak Road) and Sub-Project 6 (Tapián-Lebak Coastal Road), the major IP tribes are Teduray, Lambangian and Dulangan Manobo. Of the three, Teduray is the dominant which has a share of about 94.34% (110,559 populations in total mainland ARMM) according to the EU-funded study.

The Teduray and Lambangian tribes are found in the areas of North and South Upi, in Maguindanao up to Lebak and Kalamansig of Sultan Kudarat. These are the areas to be served by the Sub-Project 6 (Tapián-Lebak Coastal Road). Dulangan Manobo on the other hand has strong presence in the mountain range that runs north-south from the municipality of Talayan in the province of Maguindanao (ARMM) to the Municipality of Lake Sebu in the province of South Cotabato (Region XII). These communities particularly those living in the municipalities of Datu Unsay, Datu Hofer, Ampatuan, Shariff Aguak and Esperanza – all in the province of Maguindanao except Esperanza (Region XII). Some of the major different beliefs and characteristics that distinguish IPs from the rest of the people in the country are as follows:

- **Land ownership** – as explained by the OSCC Executive Director and other IP leaders, their belief is land is a blessing and gift from God and ownership belongs to God. Humans are just temporary cultivators that have obligation to care the land to pass to the next generation. Although awareness to this concept of land ownership is still very much alive among the IPs as manifested during the consultation with their leaders, there's a view as well that ownership of the land is seen as vested upon the community as a whole. This practice is embodied in the IPRA Law where title is awarded through the Certificate of Ancestral Domain Title (CADT) to the community instead to individual.
- **Religion** – while most of the people in the country embraced catholic faith and most of the original inhabitants of Mindanao embraced Islam, the IP community continued to practice their indigenous beliefs such as *Kemamal Kaadatan* (Teduray belief), *Tenines* (ritual) and *Spiritista/Espiritista* (faith healing). Influence of in-migration to IP communities however is reshaping the religious belief of the communities. For instance, among the IP communities within the influence areas of the two projects (Sub-Project 5 and Sub-Project 6), more 89.1% of the IP communities in Sub-Project 6 embraces religions (Christianity and Islam) propagated by non-IPs. This leaves only 10.9% (11 households) out of 156 households still observing the indigenous religion. At Sub-Project 5 however, the story is encouraging where 45% of the total 113 IP households covered by the survey are still followers of indigenous beliefs. Religion can be an indicator to what extent their community is exposed to in-migration and foreign cultures – the more IP leaving their indigenous faith, the more likely level of intrusion in their community is greater.
- **Self-Governance and Recognition of leadership** –the IP has difference governance and administration of justice system compared with the rest of Filipinos. These self-governances are recognized by the government through the IPRA Law and MMA 241. For instance, the MMA 241 acknowledged the existing IP systems of governance of IPs in the ARMM such as the (i) Teduray Justice and Governance (TJG) of the Teduray and Lambangian peoples with the Ukit and Tegudon as their governing laws, (ii) Dulangan Manobo Tribal Justice and Self Governance (DMTJSG) Kena Menuwa based on the Tegudon of Dulangan Manobo Kitab governing laws since time immemorial and other IP tribal-based self-governance.

Table 8.4.2-1 presented other subjects which somehow differentiate the IP communities from the rest of Filipinos.

Table 8.4.2-1 Characteristics of Top 4 Tribal Affiliation, Muslims, and Christians

Aspect	Indigenous People (IP)			Other Affiliations	
	Teduray/ Lambangian	Dulangan/ Manobo	Higaonon	Muslim	Christian
Economy	Agriculture (shifting cultivation), fishing, handcraft	Slash and burn agriculture, plant rice, corn, and coffee	Agriculture, manage forest	Agriculture, Enterprise	Agriculture, Fishery, Enterprise
Courtship/ Marriage	Parental wish is obeyed	Parental Arrangement	Parental Arrangement	The rich family also practice parental engagement	Filipino tradition/ church
Baptismal	Officiated by tribal Chieftain	Officiated by Chieftain	Officiated by Datu	Ustadz	Priest
Burial	7 days' prayers before internment	Don't pray for the repose of the soul	Native way	Ustadz	Priest
Governance	Teduray Justice and Governance (TJG)	Dulangan Manobo Tribal Justice and Self Governance (DMTJSG)		Sultanate/ Phil Governance	Phil Governance
Language	Teduray	They have their own distinct dialect	They have their own distinct dialect	Distinct each tribe	English, Pilipino, 70 others
Religion	Tulos is their God traditionally. About 60% embraced Islam or Christianity.	Namula is their God traditionally. About 60% embraced Islam or Christianity.	No data	Allah	God
Land Ownership	God owns the land, human beings only cultivate.	God owns the land, human beings only cultivate.	God owns the land, human beings only cultivate.	In the past, communal land is the practice where land, resources and rights thereon, belonging to the whole community	
Education	About 48% attended up to elementary school	About 48% attended up to elementary school	About 48% attended up to elementary school		

Sources: Prepared by the JICA Study Team based on various documents including InfATrip July 2012; Portal of Plateau, Jude Ortega May 2017; & Institute for Autonomy and Governance November 2017; and, 'Recognition of the Rights of the Indigenous Peoples in the Autonomous Region in Muslim Mindanao for their Empowerment and Sustainable Development, EU, February 2012

Chapter 9 IP Survey and IP Plan

9.1 Sub-Project 5

9.1.1 Result of IP Survey

(1) Overview of the Survey

This IP Survey is part of the Field-Based Investigation (FBI) undertaken by the Office of the Southern Cultural Communities of the Autonomous Region in Muslim Mindanao (OSCC-ARMM). Likewise, Free, Prior and Informed Consent (FPIC) and other related activities necessary to carry out provisions of the IPRA Law **RA 8371 (1997)** and Muslim Mindanao **Act No. 241 (2012)** were undertaken jointly in Talibadok Multi-Purpose Building, Datu Hoffer Municipality for two (2) barangays, namely: Barangay Talibadok and Kubentong just before the suspension of field survey and consultations due to fighting between the Philippine military and lawless elements in the area. Results of FPIC however are presented in the Indigenous Peoples Plan which is in the other section of this report.

Similar to the Social Survey presented in the earlier section, a socioeconomic survey dedicated to the IPs in the barangays along the alignment of Sub-Project 5 was undertaken to get a deeper understanding of their socioeconomic condition. A two (2) page questionnaire is prepared for the household interview for IPs. A total of 10 households for each barangay were interviewed. However, the OSCC and the IP Survey Team interviewed a total of 113 respondents – more than the target of 100 samples.

Table 9.1.1-1 Surveys carried out

Survey Type	Number of samples	Description
(i) Household Interview Survey for IPs by OSCC with the support from the JICA Survey Team	10 barangays x 10 household = 100	A two (2) page questionnaire is prepared for the household interview for IPs. A total of 10 households for each barangay were interviewed. The objective is to collect basic information that would describe their living condition such as family income and family expenditure. Source of livelihood is also sought as well as their farming practices.
(ii) Free, Prior and Informed Consent (FPIC) by OSCC with the support from the JICA Study Team • Community Assembly 1 • Community Assembly 2	400 IPs 10 barangays x 3 IPs = 30 10 barangays x 40 households = 400. Actually 113 HH respondents were interviewed	At the joint Community Assembly 1 on December 20, 2017 for the two barangays (Talibadok & Kubentong) a total of 47 participants representing the 2 barangays participated, composed of 33 males and 14 females. The 13 others failed to attend due to difficult/bad road. One (1) page guide question was used to facilitate discussions about the expected impacts of road construction within the IP community. The objective is to facilitate consultation and approval of the projects affecting IP communities. A Community Assembly 2 was supposed to be undertaken, with 40 participants for each barangay to participate in the meeting. The objective is to consult and seek the approval of the IP communities for the road project and obtain Resolution of Consent. However, Community Assembly 2 was put on hold due to fighting between the Philippine military against rebels.

(2) Socio-economic condition of the IPs

The socio-economic characteristics of the Indigenous Peoples along the alignment of Sub-Project 5 are summarized based on the IP Survey. See **Table 9.1.1-2** and **Table 9.1.1-3**.

Table 9.1.1-2 Brief Characteristics of the Respondents

Variable	Description
Age	<ul style="list-style-type: none"> Mean average age of the interviewed household head is 38 years old.
Sex	<ul style="list-style-type: none"> Most respondents are male. Of the total respondents of 113, male were 89 or 78.8% and only 24 or 21.2% female respondents.
Years of Residency	<ul style="list-style-type: none"> Most of the respondents have been living in the area for over 60 to 64 years indicating this has been their place since birth. Mean average of years of stay of respondents is 22 years.
Number of family members	<ul style="list-style-type: none"> Out of the 113 respondents, most of the respondents or 63 or 56% of them have 4 to 6 family members. 22 or 19% of respondents have 7 to 9 family members and another 22 respondents have 1 to 3 members. The remaining 6 respondents have 10 or more family members. Compared to the non-IPs settlers based on the Social Survey in the same communities, large family members is almost the same.
Ethnicity	<ul style="list-style-type: none"> Most of the respondents or 97 or 86% of the total of 113 respondents belong to Teduray tribe while 9 respondents belong to Dulangan Manobo and the rest belong to Lambangian.
Religion	<ul style="list-style-type: none"> Majority of respondents claim adherence to Christianity along with other Christian denominations with total of 53 respondents. Fifty-one (51) of total respondents are followers of a belief/traditional ritual called Tenines (45%) and 8 respondents are followers of Islam. The influence of migrants to the Indigenous People is evident in terms of the religion. And compared with the IPs in Sub-Project 6 which only 10.7% (17 households out of 159) retained their traditional native religion, IPs in Sub-Project 5 have better preservation of their original faith.
Education attainment	<ul style="list-style-type: none"> 69% of the respondents have finished elementary level, and 14% in high school level and 1% reach in college level. Surprisingly, based on Social Survey, even among non-IP settlers 16% were not able to attend school. A large number of 61% reached elementary level, but smaller compared with the IP (69%). Almost the same number 19% attended college level compare to 14% among IP.
Source of drinking water	<ul style="list-style-type: none"> The major sources of drinking water are spring (92%), open dug well (5%), level 2 (2%) and level 3 (1%). Compared to non-IP settlers, based on Social Survey, 31% are able to buy water from private sellers or level 2/level 3 of water from lined or water pumps. A large number of 67% still rely on spring, river, and open dug well for source of water.

Table 9.1.1-3 Household Income and Expenditure

Variables	Description
Occupation	<ul style="list-style-type: none"> Majority of respondents are indulged in farming (99%) and 1% barangay official. Among non-IP settlers, based on Social Survey, 79% are also engaged in farming, the rests are working as labourer, or operating small business, or raising backyard poultry/livestock.
Monthly income	<ul style="list-style-type: none"> Family income of the respondents range from a low of 500 PhP to 25,000 PhP with an average of 5,184.31 per month
Source of income	<ul style="list-style-type: none"> The majority of the respondents (87.5%) earn their income from farming, 22% were raising livestock's, 20% from daily wage labor, 8% business and 1 respondent is a barangay official and part time driver.
Average monthly expenditure	<ul style="list-style-type: none"> Average family expenditure range in 500.00 to 20,000.00 PhP with an average mean of 5,031.00
Expenditure distribution	<ul style="list-style-type: none"> NO DATA
Ownership of Land	<ul style="list-style-type: none"> Among IPs only 1 or 1% has Torrens title and 48% have pending ancestral domain claim. Compared to non-IP settlers, based on Social Survey, 21% have Torrens Title and all the rests do not have any proof of ownership.

Figure 9.1.1-1 and **Figure 9.1.1-2** below shows a typical road, a typical IP house, IP children going to school, a corn plantation, and horse/single motorcycle as a means of transportation.



Figure 9.1.1-1 A typical road, an IP house and IP children going to school



Figure 9.1.1-2 A typical corn field, horses as transport means and a single motorcycle as transport

(3) Agricultural Practices of the IP Communities

All the farmers in these municipalities are planting yellow or white corn. This is the only viable crop they can plant considering absence of irrigation, condition of soil, and elevation of their area. Only one respondent said he plants rice occasionally when there is enough rain fall. And another one respondent said he plants peanut occasionally.



Figure 9.1.1-3 Corn is the common crop planted by the IP farmers in Maganoy – Lebak Road area

Table 9.1.1-4 Characteristics of Farm Production

Subject	Description
Farm Land Size	• The farm size of each farmer showed an Ave Mean of 1.6 has. This is smaller compared to the non-IP farmers in these same area whose average farm size is 2.24 has. based on the Social Survey result.
Farm Land Tenure	• Out of 113 respondents, only one said he hold a Torrens Title. Compared to non-IP settlers, at least, 21% said they have Torrens Title.
Types of Crop	• Only white or yellow corn
Constraints of Farming	• Rats/pests infestation and wild animals destroying crops is the biggest problem among farmers at 81% and lack of financial resources at 53%. Similarly, among non-IP farmers based on social survey result showed that rats/pests infestation is the major problem. Transportation problem was raised as well due to absence of roads.

(4) Expected Impacts of Road Construction

Respondents perceive the road project as providing both economic and social benefits. Most of them see more economic opportunities such as better access to market (for their agricultural products, work opportunities, opportunity to engage in retail business, among others). Some of them believe that the proposed road can usher better mobility and improve access to social services such as health, education, and general administration.

Almost half of the respondents cited that one of its positive effects is the accessibility of transport of construction supplies/materials and construction of government projects. Accessibility of all areas such as hospital, health center, school, other barangays/municipality and city is also a positive effect according to the 25% of the respondents.

9.1.2 IP Plan (Suspended)

Originally, the intention is to prepare an IP Plan for Sub-project 5 since presence of Indigenous People in the area is high and the proposed road is traversing areas claimed by the IP communities. The barangays along the alignment however experienced heighten level of confrontation between the Armed Forces of the Philippines (AFP) and the violent group Bangsamoro Islamic Freedom Fighters (BIFF) beginning in the early December 2017. This led to suspension of field activities. The idea was to lift the suspension order as soon as normalcy returns. However, as of this March 2018, the area is still unsafe for surveyors which led to permanent cancellation of IP Plan preparation.

9.2 Sub-Project 6

9.2.1 Result of IP Survey

(1) Overview of the Survey

This Survey is part of the Field-Based Investigation (FBI) undertaken by the Office of the Southern Cultural Communities of the Autonomous Region in Muslim Mindanao (OSCC-ARMM) and National Commission on Indigenous Peoples (NCIP-12). Likewise, Free, Prior and Informed Consent (FPIC) and other related activities necessary to carry out under the IPRA Law (1997) and Muslim Mindanao Act No. 241 (2012) were undertaken. Results of FPIC however are presented in the Indigenous Peoples Plan which is in the another section of this Report.

Similar to the Social Survey presented in the earlier section, a socioeconomic survey dedicated to the IPs in the barangays along the alignment of Sub-Project 6 was undertaken to get a deeper understanding of their socioeconomic condition. A two (2) page questionnaire is prepared for the household interview for IPs. A total of 10 households for each barangay were interviewed.

(2) Socio-economic condition of the IPs

Even though they are often the original inhabitants and that their population is quite significant in most of the areas where they are located, the economic condition of the IPs is often inferior. The below presents the socio-economic characteristics of the IP communities along the alignment of Sub-Project 6 based on the IP Household Survey.

Table 9.2.1-1 Characteristics of Household Survey Respondents

Variable	Description
Age	<ul style="list-style-type: none"> The respondents' age range from 18 to 82 with a mean average age is 38.
Sex	<ul style="list-style-type: none"> 61.0% of the respondents (97 household heads) are female and 39.0% are male (62 household heads).
Years of Residency	<ul style="list-style-type: none"> The longest stay of the respondents is 82 years while the shortest stay is half a year. Mean average of respondents' years of stay in the area is 34 which validates the notion that most of them are natives of the area and very few are migrants.
Number of family members	<ul style="list-style-type: none"> Family size is relatively large with 82 of the respondents (52.5%) having 4-6 members, 34 with 7-9, and 11 with 10 or more members. This family size however is not unique among the IP communities in Sub-Project 6. For instance, in the Social Survey, 47.1% revealed that their family members ranges from 4 to 6.
Ethnicity	<ul style="list-style-type: none"> All of the respondents belong to Teduray tribe.
Religion	<ul style="list-style-type: none"> The influence of migrants to the Indigenous People is evident in terms of the religion. Of the total number of respondents, 112 are Christians, 27 embraced Islam, and only 17 practice their traditional native religion.
Education attainment	<ul style="list-style-type: none"> Education condition paint a grimmer picture where more than 81% of the respondents failed to have any high school education. This number is higher than the 68.2% figure in 2014 reported by the EU-assisted study titled "The Indigenous Peoples of Mainland ARMM". Compared with non-IPs in Sub-Project 6, 73.2% have not reached high school education which is also a high number.
Source of drinking water	<ul style="list-style-type: none"> The major sources of drinking water are spring/river/rain (73.1%), communal or handpump wells (8.4%) and open dug wells (14.3%). Compared with the non-IPs in the Sub-Project 6, the IPs are a bit in disadvantage position in terms of access to drinking water. For instance, only 65.9% of the non-IPs were getting their drinking water from spring/river/rain. Both figures however show that both IPs and no-IPs have limited access to good quality of water.
Household income	<ul style="list-style-type: none"> IPs in Lebak Municipality side has an average monthly income of PhP 5,091 while those in Datu Blah Sinsuat Municipality has an average of PhP 3,390 per month. Perhaps one of the reason for a bit higher income of those in Lebak is their closer to national road and to the town center hence their access to jobs and markets is better. Compared with the non-IPs in the Sub-Project 6, majority of them have monthly income of PhP 6,000 per month or less which a bit higher than those income of the IPs.



Figure 9.2.1-1 Example of source of water of the IP communities along Sub-Project 6

(3) Agricultural Practices of the IP Communities

Like the non-IP communities in the barangay along the alignment of Sub-Project 6, farming and fishing are the major sources of income of the IP communities (see **Figure 9.2.1-2** and **Figure 9.2.1-3**). On one hand, it can be said that IP communities from the following barangays are mostly farmers: Matuber, Pura, Pinansaran, Tubuan, Nalkan, Kinimi, Tambak, and Sinipak. On the other hand, IP communities in barangays Lapaken and Sedem are mostly fishermen. For these fishermen, farming serves as alternative source of income during the time fishing is not possible due to bad weather condition. Apart from farming and fishing as sources of livelihood, some IPs are engaged in other farm-related activities such as providing labour services to other farmers, charcoal making, vinegar manufacturing among others. Likewise, there are some people earning income from off-farm livelihood activities such as operating sari-sari stores, driving public transport vehicles (tricycles) and managing food stalls.



Figure 9.2.1-2 Corn and coconut are the common crops planted by the IP farmers in
Tapián – Lebak Road area



Figure 9.2.1-3 Fishing is main source of income to most of the IP communities in barangays Lapaken and Sedem in the Municipality of Datu Blah Sinsuat

Table 9.2.1-2 Characteristics of Farm Production

Subject	Description
Farm land size	<ul style="list-style-type: none"> Total farm land of the 159 IP households are 348.8 ha. 44 household has no farmland and relying on other sources for income (example: fishing, sari-sari store, wage labor, etc). The average farm size is 3.17 ha. The largest farm size is 12 ha and the smallest is less than 1 hectare. Of the 348.8 ha, only 246.7 ha are actively cultivated by the IPs with an average of 2.24 ha per farmers. Most cited reasons for not cultivating the entire farm land is due to lack of capital to finance expansion. Compared with the non-IPs, there's no observed great differences in the size of land actively cultivated. For instance, IPs average size of actively cultivate land is 2.24 ha while non-IPs have 2.20 ha. Both groups (IPs and no-IPs) have the same reason why they could not cultivate their entire land which is due to lack of financial capital.
Farm land tenure	<ul style="list-style-type: none"> Among 159 IP household survey respondents, 38.3% farm their own land, 27.6% farm leased land, and 2.7% are tenant farmers. The remaining respondents answered others. Among the 61 respondents who farm their own land, 11.6% have Torrens title over the land that they are cultivating. The rest have absolutely no proof of ownership or anchor their claim on verbal agreements, "inheritance" from their parents, and other tenuous claim to possession. The lack of clear proof of ownership make the respondents vulnerable to displacement (as some claimants may have superior proof of ownership) and prevent them from legally disposing land or using land as collateral for loans. This where the IPs is a bit behind compared with the non-IPs. Whereas only 11.6% among the IPs have Torrens, 50.5% of the non-IPs have Torrens title (per Social Survey result) for those who owned their farm land.
Types of crops	<ul style="list-style-type: none"> Corn is the most produced crop by the IPs and are harvested 2 to 3 crops a year. The other major crops include coconuts, palay, soy beans and banana.

Subject	Description
	<ul style="list-style-type: none"> Among the 88 IP household respondents who cultivate crops, about 43.18% practice intercropping. Combinations of crops include corn, coconut, banana, vegetables, coffee, and others.
Constraints of farming	<ul style="list-style-type: none"> Fat/Pest Infestation (including animals destroying crops) is mentioned by 44 individuals and Weather Factor as claimed by 39 people. Lack of financial resources as well as lack of road access were mentioned as among the problems related to farming.

(4) Expected Impacts of Road Construction

Like the results of the Social Survey with the non-IPs, the IPs perceived the road project to have greater impact on their lives through increase of income due to better access to markets of their agriculture and fisheries products. The table below summarized the expected impact of the road construction.



Figure 9.2.1-4 Example of transportation system used by the IP communities

Table 9.2.1-3 Expected Impacts

Subject	Description
Economic	<ul style="list-style-type: none"> The barangays of Datu Blah Sinsuat lag behind in economic activities because of their isolation. It is difficult and very expensive to transport agriculture products from the IP communities that are mostly located in the uplands. To move products to Cotabato City, IPs have to transport their produce to the coast using horses or water buffalos, from there hire motor boats, and then hire land transport from Matuber. Thus, if they able to sell their products to buyers in Cotabato City, profit would be very minimal because of triple handling. Like the results of the Social Survey with the non-IPs, the IPs perceived the road project to have greater impact on their lives through increase of income due to better access to markets of their agriculture and fisheries products. Respondents perceive the Road project as providing both economic and social benefits. A greater number (83% of total respondents) see more economic opportunities such as better access to market (for their agricultural products, work opportunities, opportunity to engage in retail business, among others).
Social	<ul style="list-style-type: none"> More than half the IP respondent believe that the proposed Road Project can usher better mobility and improve access to social services such as health, education, and general administration.

Subject	Description
Gender	<ul style="list-style-type: none"> Since the IP communities are basically relying on agriculture and fishery for their livelihood, women are actively participating in this activity. It was revealed in the survey that the most difficult job of the women in the community is assisting men in their farming/fishery activities (76.8% of total respondents). Household chores/activities were also described by almost half of the Respondents as a difficult job, along with drawing of water, cutting and gathering of firewood, and washing. These household chores are made difficult because of the distance of the houses from sources of water for domestic consumption and firewood for cooking. The task done by women that will be most alleviated by the construction of the proposed road is getting or drawing water from the source (dug wells or spring) and bringing it to the house according to the 49.57% of respondents. Women could use modified wheel-barrow like carts instead of carrying the heavy water containers for hundreds of meters or even over a kilometer.
Support to the Project	<ul style="list-style-type: none"> During the 1st General Assembly of IP Leaders and Elders on December 16, 2017, all of the IPs leaders and elders answered affirmative when asked if they would agree with the plan of DPWH to construct the road passing their community.
Negative Impacts	<ul style="list-style-type: none"> In the same assembly, the IP leaders and elders enumerated their fear once the project is realized. These fears should be addressed in the IP Plan. <ul style="list-style-type: none"> Road alignment might pass through sacred places of the IPS (29%) Displacement due to easy entry of outsiders (23%) Disturb community harmony due to conflict brought by the development. This conflict may include land conflict, family conflict fighting for business opportunities among others (23%) Accident involving children due to vehicular traffic (23%) Land grabbers might enter the community (5%)

9.2.2 IP Plan

(1) Background of the IP Plan

a.) Introduction

With Indigenous Peoples identified as long-time residents of the areas that will be traversed by the Tapan – Lebak Coastal Road (Sub-Project 6), the DPWH and the JICA Study Team need to inform and consult the affected communities on their concerns/issues with regards to the proposed infrastructure development project, special attention is provided for to the Indigenous Peoples and their ancestral domains pursuant to policies of JICA, World Bank, and the Philippine Government. Thus, the necessity to conduct Socio-Economic Assessment and to facilitate the processing of Certificate of Non-Overlap or Certificate of Precondition from the National Commission for Indigenous People (NCIP) or the Office for Southern Cultural Communities (OSCC) for areas in the Autonomous Region in Muslim Mindanao.

b.) Legal Framework

The Indigenous Peoples (IPs) right to Ancestral Domains is specifically stipulated in the Indigenous Peoples Rights Act (IPRA) of 1997, Chapter III, Section 7 including, but not limited to, compensation for any resulting loss or injury, and other entitlements as a result of disturbances during introduction of changes. These compensation and relocation must be clearly put in a plan & program called

Ancestral Domain Sustainable Development & Protection Plan (ADSDPP) or for project affected people it is called the Indigenous Peoples Plan (IP Plan). The ADSDPP or IP Plan is prepared by concerned agencies/implementing agency as facilitated by NCIP/OSCC-ARMM in consultation with the affected families. The IP Plan becomes one prerequisite in the issuance of the Certificate of Precondition (CP) to be issued by the National Commission on Indigenous Peoples (NCIP) or the Certificate of No Objection (CNO) by the Office of the Southern Cultural Communities in the Autonomous Region in Muslim Mindanao (OSCC-ARMM). And, it is being used by both NCIP and OSCC-ARMM in monitoring compliance/non-compliance of the provisions as stipulated in the IP Plan; basis for handling/resolving grievances; and, as reporting mechanism. See **Chapter 8** for detailed discussion.

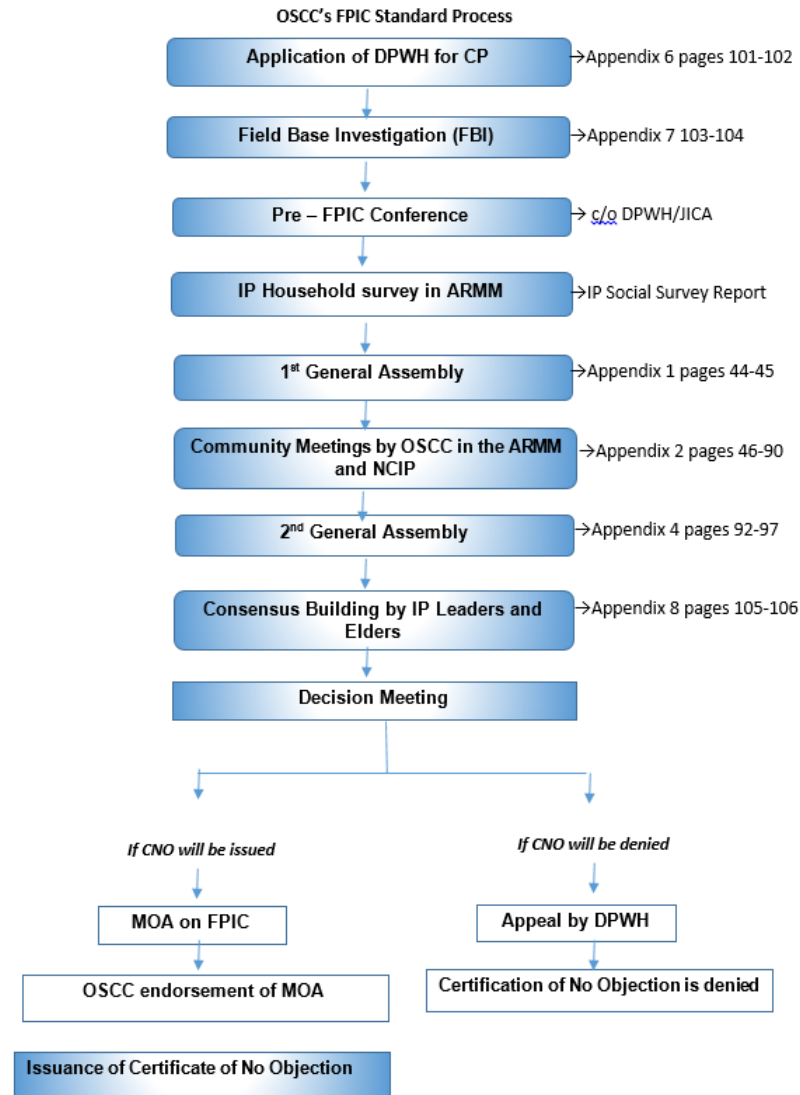
(2) Major Activities in the Preparation of IP Plan

a.) Field-based Investigation (FBI) and Free, Prior, Informed Consent (FPIC)

On 29 November 2017, the DPWH Central Office sent a request letter to NCIP Central Office to request for assistance in undertaking FBI/FPIC for the Tapan-Lebak Road for section outside the ARMM. Consequently, on 15 November 2017, DPWH-ARMM sent a request letter to OSCC to request for assistance in undertaking FBI/FPIC for the same road for section inside the ARMM. The two letters (available in the complete IP Plan report) triggered the conduct of FBI/FPIC whose data are the main source of this IP Plan.

In essence, after a government implementing agency (e.g. DPWH) submits a request/application to either NCIP or OSCC-ARMM for assistance in the conduct of FBI/FPIC and the eventual issuance of Certificate of Precondition, NCIP or OSCC-ARMM organizes their respective Field-Based Investigation Team (FBI Team) to: determine the particular area that will be affected; whether or not there are Indigenous Peoples to be affected by the project; and, the area has a Certificate of Ancestral Domain Title (CADT). If there is none, the FBI Team makes a report and recommends issuance of Certificate of No Overlap (CNO), and that conduct of FPIC is no longer needed.

On the other hand, if the findings are negative, the NCIP or OSCC-ARMM organizes its respective FPIC Team to conduct full FPIC process. On the part of the NCIP, they hold consultation meetings with the IP Leaders/Elders, present the project's effect, extent of affected area, facilitate decision-making process, help draft the Resolution of Consent/Non-Consent. On the part of the OSCC-ARMM, they conduct community consultation meetings and household survey, consultation meetings with the IP Leaders/Elders, discuss effects of the project and extent of affected areas, facilitate decision-making, and help draft the Resolution of Consent/Non-Consent. Final output from NCIP is the issuance of the Certificate of Precondition (CP), and of the OSCC-ARMM is the Certificate of No Objection (CNO). CNO from OSCC-ARMM was issued to DPWH-ARMM on 17 March 2018. CP on the other hand is still being processed by the NCIP.



Note: Appendix notes in the figure refer to the pagers in the IP Plan (separate volume)

Figure 9.2.2-1 FPIC Process undertaken by OSCC

b.) Establishment of Communication line with the IP communities

Figure 9.2.2-1 illustrates the communication and coordination process of OSCC down to the Indigenous Cultural Communities. Due to the absence of electricity in the Municipality of Datu Blah Sinsuat, establishing communication facilities like cellular sites could not be done. The only means of bringing down messages from Cotabato City to the Municipality of Datu Blah Sinsuat is for the OSCC Provincial Staff to travel by motorized banca (boat) and hand carry the official notices or letters or parcels.

Upon arrival in the Municipal Hall, the OSCC Provincial Staff hands the Letter of Invitation/Notice to the Office of the Mayor and the Mayor's Office disseminates the information to all Barangay Officials for them to be aware that such community meeting/assemblies will take place in their respective barangay on the specified date. Then, the Provincial Staff meets the OSCC-designated Municipal Indigenous Peoples Mandated Representative (Municipal IPMR) and explains the objective/s of the Invitation/Program. The Municipal IPMR in turn disseminates the Invitation/Notice to all OSCC-

designated Barangay IPMRs (Indigenous Peoples Mandated Representative). The Barangay IPMRs together with the community leaders/elders helps in informing the ICC members to participate in the meetings/assemblies.

It must be noted however, that sea travel to the Municipality of Datu Blah Sinsuat will also depend on the weather condition like when the sea is very turbulent, no motorized banca (boat) will be allowed to depart. So, schedules remain as guide, but actual conduct or implementation is largely dependent on the weather condition.

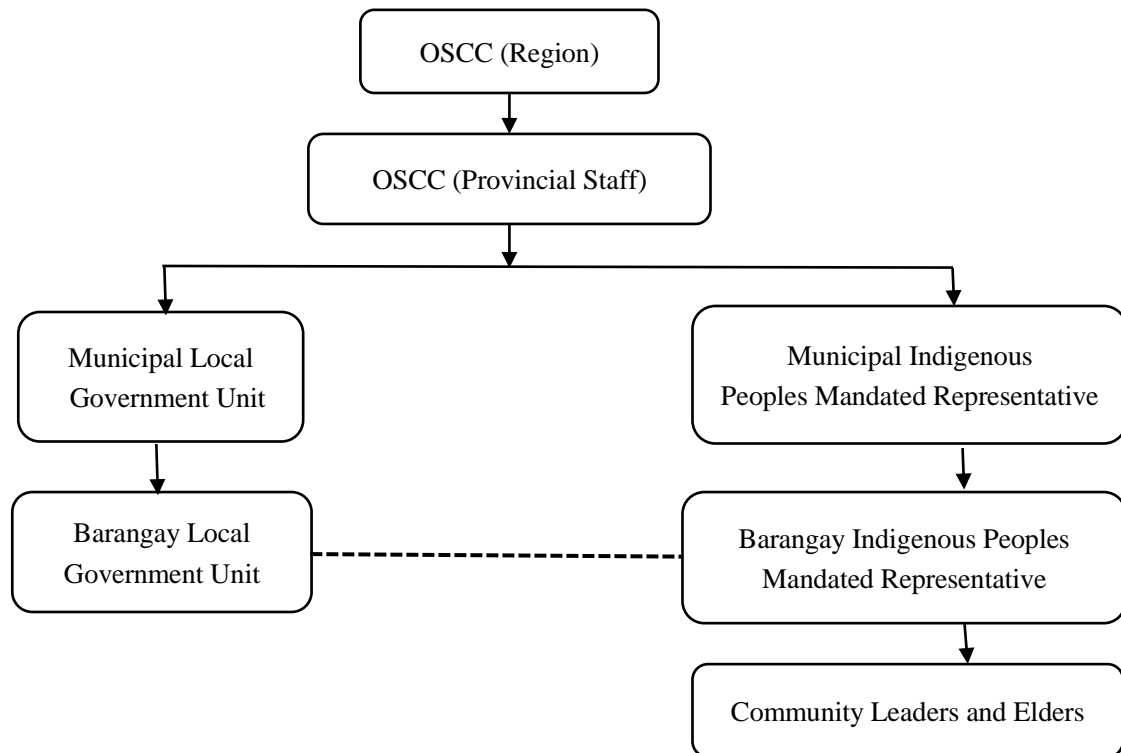


Figure 9.2.2-2 Established Communication/Coordination of OSCC Regional Office down to Indigenous Cultural Communities

c.) Surveys and Consultations Undertaken

Responding to the request of the DPWH ARMM Secretary, the OSCC Executive Director Fatima Kanakan created FBI/FPIC Team through a Memorandum Order issued on 17 November 2017. From said date, the FBI/FPIC Team of the OSCC and the IP Survey Team met on several occasions to identify activities, set schedules, and determine the requirements for undertaking a Field-Based Investigation (FBI) in the barangays of Datu Odin Sinsuat and Datu Blah Sinsuat, Maguindanao. The summary of activities is presented in **Table 9.2.2-1**.

Both general assemblies were held at St Joseph Retreat House, in the municipality of Datu Odin Sinsuat. This place is the most accessible venue for the IPs which are coming from different hard-to-access barangays. Motorcycles are the mode of transport due to its ability to penetrate even places without road. For the case of community assemblies, they were held either at the Barangay Hall if spacious enough or no conflict of schedule with other activities or at the school class room or day care center.

Since both FBI/FPIC Team and IP Survey Team have IP personnel (Teduray), this allows for smooth discussion between the IP communities and the two teams. In general, both tagalog and IP language were used for discussion.

As seen in the table, during the community assemblies, more IP women attended than men. This is due to fact that IP men has to attend their farm. Likewise, even non-IP attended which was not stopped by the FBI/FPIC Team and IP Survey Team as long as they won't create unnecessary tension in the meeting.

It should noted that the discussion in both levels (General Assembly and Community Assembly) touched both positive and negative impact of the project. After the RAP Team completed their survey, this output were shared with the IP. For example, IP houses to be affected and the final alignment were shown which would affect some land lots, crops and trees. It was explained using the compensation matrix what are the rights of those to be affected. Despite this, all of them sign the Statement of Consent to allow the project to proceed.

Table 9.2.2-1 Details of the General Assemblies

Title of activity	Date	Venue	Type and No. of Participants	Agenda	Language used	Materials used
1. First General Assembly of Elders and Leaders	Dec. 16, 2017	St. Joseph Retreat House, Datu Odin Sinsuat, Maguindanao	IPs Leaders/ Elders and Non-IPs/Barangay Officials: SP No. 5 - 39 participants; SP No. 6 - 26 participants; SP No. 8 – 3 participants. Total – 68	<ul style="list-style-type: none"> • Orientation on RNDP-CAAM • Orientation on FBI/FPIC • Identification of Positive and Negative Impacts • Consent of Leaders and Elders for OSCC and IP Survey Team to consult their communities with their assistance 	Tagalog and Teduray (IP language)	Power point presentation + group discussion
2. Second General Assembly of Elders and Leaders	Mar 5, 2018	St. Joseph Retreat House, Datu Odin Sinsuat, Maguindanao	IP Leaders and Elders: SP No. 6 – 35 participants; and, SP No. 8 – 3 participants. Total – 38	<ul style="list-style-type: none"> • Review of the RNDP-CAAM • Review of the FBI/FPIC Process and its actual implementation • Presentation of Positive and Negative Impacts • Presentation of the Components of the IP Plan (Requested Small Projects, Grievance Mechanism, Monitoring Mechanism, among others) • Consensus Building by the IP Leaders and Elders • Acceptance and Giving of Consent for SP No. 6 	Tagalog and Teduray (IP language)	Power point presentation + group discussion

Table 9.2.2-2 Details of the Community Assemblies

Barangay name	Date and Time	Venue	Type and No. of Participants	Agenda	Language used	Materials used
1. Matuber	Feb 4, 2018, 10:00 – 14:00	Matuber Day Care Center, Datu Blah Sinsuat, Maguindanao	<ul style="list-style-type: none"> 33 IP participants – 20 from Matuber, DBS and 13 from Tapanian, Datu Odin Sinsuat Municipal IPMR – OSCC FIPIC Team – Catuyan, Beling CFSI – Catubay JST Staff – Pinguaman, Yasen 	<ul style="list-style-type: none"> To orient and present the project to the IP Community To gather information on the pros and cons of the project to the IP Community To be able to secure the Statement of Consent by all the IP Participants 	Tagalog and Teduray (IP language)	Print out A0-sized map and open discussion
2. Pura	Feb 12, 2018, 10:30 – 14:30	Barangay Hall, Datu Blah Sinsuat, Maguindanao	<ul style="list-style-type: none"> 32 participants, with 10 IPs and 22 non-IPs – mostly Maguindanaons – including the Municipal and Barangay LGU officials OSCC FIPIC Team - Arlene Catuyan and Jeanette Beling Municipal IPMR - Alberto Lugasing 		Tagalog and Teduray (IP language)	Print out A0-sized map and open discussion
3. Penansaran	Feb 4, 2018, 13:00-14:00	Barangay Hall, Penansaran, Datu Blah Sinsuat, Maguindanao	<ul style="list-style-type: none"> 20 participants- Five (5) of them are indigenous peoples and sixteen (15) are non-IP (Maguindanaon) Municipal Tribal Chieftain and IPMR - Timuay Maningula OSCC – Dela Cruz, CFSI - Alforque 		Tagalog and Teduray (IP language)	Print out A0-sized map and open discussion
4. Tubuan	Feb 12, 2018, 10:00 – 14:00	Barangay Hall, Tubuan, Datu Blah Sinsuat, Maguindanao	<ul style="list-style-type: none"> 44 participants- composed of thirty-eight (38) IPs particularly Tedurays and six (6) non-IPs (Maguindanaon) Barangay IPMR - Timuay Mauro OSCC FIPIC Team – Dela Cruz, Bantol CFSI – Alforque 		Tagalog and Teduray (IP language)	Print out A0-sized map and open discussion
5. Nalkan	Feb 3, 2018, 11:00	Barangay Hall, Nalkan, Datu Blah Sinsuat, Maguindanao	<ul style="list-style-type: none"> 60 participants from Indigenous Peoples (Tedurays) Municipal Tribal Chieftain and IPMR - Timuay Maningula OSCC ARMM – Dela Cruz, CCFSI - Alforque 		Tagalog and Teduray (IP language)	Print out A0-sized map and open discussion
6. Tambak	Feb 3, 2018, 09:30 - 14:15	Barangay Hall, Tambak, Datu Blah Sinsuat, Maguindanao	<ul style="list-style-type: none"> 76 IP participants plus many non-IPs (did not sign the attendance sheet) OSCC FPIC Team – Catuyan, Beling CFSI - Catubay 		Tagalog and Teduray (IP language)	Print out A0-sized map and open discussion
7. Kimini	Feb 3, 2018, 10:30	Kinimi Purok, Datu Blah Sinsuat, Maguindanao	<ul style="list-style-type: none"> 105 participants- composed of thirty-five (35) IPs particularly Tedurays and sixty-nine (69) non-IPs (Maguindanaon) Municipal Tribal Chieftain and IPMR - Timuay Maningula 		Tagalog and Teduray (IP language)	Print out A0-sized map and open discussion

			<ul style="list-style-type: none"> • OSCC ARMM – Dela Cruz • CFSI - Alforque 			
8. Resa,	Feb 18, 2018, 11:00 – 15:25	Resa Purok, Datu Blah Sinsuat, Maguindanao	<ul style="list-style-type: none"> • 49 participants, with 39 IPs and 10 non-IPs – all Maguindanaons – including the Barangay LGU officials • OSCC FPIC Team – Catuyan, Beling • CFSI - Catubay 		Tagalog and Teduray (IP language)	Print out A0-sized map and open discussion
9. Lapaken	Feb 18, 2018, 09:30 – 14:00	Multi-purpose Hall, Lapaken, Datu Blah Sinsuat, Maguindanao	<ul style="list-style-type: none"> • 44 IP participants, with 2 Tausug barangay officials – the Barangay Captain and a Barangay Councilor • OSCC FPIC Team – Catuyan, Beling • CFSI - Catubay 		Tagalog and Teduray (IP language)	Print out A0-sized map and open discussion
10. Sedem	Dec 21, 2018,	Sedem Elementary School, Datu Blah Sinsuat, Maguindanao	<ul style="list-style-type: none"> • 43 participants, with 42 of them are indigenous peoples and a non-IP (Maguindanaon) • OSCC FPIC Team – Dela Cruz, Kadingilan, Marcos, Kadilingan • CFSI – Karim 		Tagalog and Teduray (IP language)	Print out A0-sized map and open discussion
11. Sinipak	Dec 20, 2017	Sinipak Multi-Purpose Building, Datu Blah Sinsuat, Maguindanao	<ul style="list-style-type: none"> • 60 participants, with 52 of them are indigenous peoples and 8 are non-IP (Maguindanaon) • OSCC FPIC Team – Dela Cruz, Marcos, Kadingilan • CFSI - Karim 		Tagalog and Teduray (IP language)	Print out A0-sized map and open discussion

Note: Power point presentation was not possible due to lack of power supply to most barangays

(3) Project Impacts

Project impacts were identified from two sources: (i) as envisioned by the IP communities during the two (2) General Assemblies and (ii) from the Relocation Action Plan Team (RAP Team).

a.) Project Impacts Identified by the IP Communities

There were two (2) occasions – First General Assembly and Second General Assembly - where the Indigenous People that may be affected by Sub-Project 6 were directly asked about their perception of the potential positive and negative impacts of the proposed road project. The succeeding two table present the positive and negative impacts identified by the participants during the First General Assembly. The impacts mentioned during the Second General Assembly are related to impacts they had mentioned in the former assembly and these are available in the separate report (IP Plan).

There were a variety of benefits that the attendees to the First General Assembly articulated during the Focus Group Discussion, ranging from economic gains, better mobility of people and materials, improved access to social facilities and services, and the potential entry of utilities and other basic needs. On economic gains, they cited easier movement of goods from and to markets, as well as, reduced transport cost. They also foresee better access of children to school and patients to hospitals in times of emergencies. They are also expecting the proposed road to make it easier for concerned entities to implement projects such as water systems and housing (**Table 9.2.2-3**).

Table 9.2.2-3 Positive Impacts Identified in First General Assembly

Identified Positive Impacts	Identified by which barangays
1. Easy Transport of Products to Market	Tapian, Matuber, Penansaran, Tubuan, Nalkan, Tambak, Kinimi, Lapaken, Sedem, and Sinipak
2. Easy Access to School of Children	Tapian, Matuber, Penansaran, Tubuan, Nalkan, Tambak, Kinimi, Lapaken, Sedem, and Sinipak
3. Reduce Transportation Cost of the Farm Products	Tapian, Matuber, Penansaran, Tubuan, Nalkan, Tambak, Kinimi, Lapaken, Sedem, and Sinipak
4. Improve Vehicle Accessibility to Community	Tapian, Matuber, Penansaran, Tubuan, Nalkan, Tambak, Kinimi, Lapaken, Sedem, and Sinipak
5. Easy access to Hospitals in Times of Emergency	Tapian, Matuber, Penansaran, Tubuan, Nalkan, Tambak, Kinimi, Lapaken, Sedem, and Sinipak
6. Easy to bring Materials to Barangays	Tapian, Matuber, Penansaran, Tubuan, Nalkan, Tambak, Kinimi, Lapaken, Sedem, and Sinipak
7. Improvement of local economy	Tapian, Matuber, Penansaran, Tubuan, Nalkan, Tambak, Kinimi, Lapaken, Sedem, and Sinipak

Source: Summary of Proceedings in First General Assembly, 16 December 2017 in Cotabato City

The potential negative impacts of having a road project are summarized in the table below. “Displacement of IPs” refers to the entrance of outsiders to their community who might grab their land. They are aware that since most of their lands lacked proper legal documents, possibility of displacement is high.

Table 9.2.2-4 Negative Impacts Identified in First General Assembly

Identified Negative Impacts	Identified by which barangays
1. Displacement of IPs	Tapian, Matuber, Penansaran, Tubuan, Nalkan, Tambak, Kinimi, Lapaken, Sedem, and Sinipak
2. Land Grabbers might enter the community	Tapian, Matuber, Penansaran, Tubuan, Nalkan, Tambak, Kinimi, Lapaken, Sedem, and Sinipak
3. Children may be prone to accident	Tapian, Matuber, Penansaran, Tubuan, Nalkan, Tambak, Kinimi, Lapaken, Sedem, and Sinipak
4. Road Alignment might pass through sacred places	Tapian, Matuber, Penansaran, Tubuan, Nalkan, Tambak, Kinimi, Lapaken, Sedem, and Sinipak
5. Disturb community harmony due to conflict brought by development	Tapian, Matuber, Penansaran, Tubuan, Nalkan, Tambak, Kinimi, Lapaken, Sedem, and Sinipak

Source: Summary of Proceedings in First General Assembly, 16 December 2017 in Cotabato City

b.) Project Impacts Identified by the RAP Team

(i) Method of Identifying affected IPs

A separate team (Relocation Action Plan Team or JICA Study Team) did the inventory of the possible negative impact of the project within the 30 meters width ROW. The said team walked through the alignment and check the project impact on lands, structures (including houses) and crops and trees. As much as possible, the affected person is an IP or non-IP and if affected properties are owned by an IP or non-IP. Overall, the following activities in the table below were undertaken:

Table 9.2.2-5 Summary of Methodology

Main activity	Purpose	Done through	Responsible Person	Materials used
Public Consultations	To inform and generate awareness and understanding, encourage participation of the project affected persons to participate in the decision-making	1 st round of Public Consultation	Persons and assets within the scope of thirty (30) meters width ROW	Information materials
		Barangay Meetings		
Inventory of Losses (IOL)	Identification of persons and assets that can be affected in the implementation of the project	Geo-tagging	Persons and assets within the scope of thirty (30) meters width ROW	Handheld GPS with photo capacity
		Ground Reconnaissance		Digital camera, appraisal forms
Socio-economic Survey	Profiling of the Socio-economic status of the possible project affected persons	House to house interview		Survey form
Land Value Assessment	Determination of the current land value	Actual land valuation conducted by a private value appraiser	Assets within the scope of thirty (30) meters width ROW	BIR Zonal Values, Landbank of the Philippines, Current market price
Structures Value Assessment	Determination of affected structure value	Actual structure valuation conducted by an engineer	Structures within the scope of thirty (30) meters width ROW	Current prices of the construction materials
Trees and Crops value assessment	Determination of the value of the affected trees and crops	Actual reconnaissance survey	Trees and crops within the scope of thirty (30) meters width ROW	Current market value of the trees and crops with reference from the Department of Agriculture

Source: JICA Study Team

(ii) Summary of Impacts

The summary of impacts of the project is shown in the table below and discussed as follows:

- In terms of houses affected, there are 22 houses to be affected of which 15 houses belong to the IPs. Of the 15 houses, 10 houses are located in the municipality of Lebak (Region 12) and only 5 houses are located in the municipality of Datu Blah (ARMM).
- Of 22 houses affected by the road project, and 21 families (note: there's a case where one family has two houses).
- All of the 10 houses in the side of Lebak Municipality are located in barangay Kalamongog inside a plantation owned by a certain Philip Eleazar. These IPs are tenants of the plantation owner.
- For the case of the IPs inside the plantation, the NCIP FBI Team together with the representatives of the municipal government visited them from February 22 to 24 as part of their Field-based Investigation. They confirmed that they are tenants of Mr. Eleazar. Thus, while they are IPs that could be affected by the road project, they are not living in acknowledged Ancestral Domains but in a private property.
- During the meeting between the NCIP 12 FBI Team and the local government unit of Lebak, since the IPs are living in a private property, the former requested the latter to shoulder relocation of the IPs. If such commitment by the Lebak LGU is made, then the NCIP 12 FBI Team will recommend issuance of Certificate of Non-Overlap (CNO) to the project proponent which is the DPWH Central Office.
- On May 1, 2018, the Lebak LGU sent a letter to NCIP 12 indicating their commitment to facilitate relocation of the IP houses. And on May 11, NCIP 12 issued the CNO to DPWH Central Office.

- For the 5 IP households located in Datu Blah Sinsuat, the mayor of the said municipality allocated 1 hectare barangay land per barangay (Pinansaran, Kinimi, Lapaken, Sedem, and Sinipak) to be used as resettlement area.
- In total, there are 86 IPs and 33 non-IPs affected by the road for a total of 119 persons. The average number of IP household is about 5.7 members and non-IP household is about 5.5.

Table 9.2.2-6 Summary of Impacts

	Item	Sub-Project 6		
		Non-IP	IP	Total
House is Affected	No. of Houses Affected	7	15	22
	No. of Households/Families Affected	6	15	21
	No. of People Affected (by Losing House)	33	86	119
Land is Affected	No. of Land Lots Affected	86	14	100
	No. of Structures Affected	8	15	23*
	No. of Improvements Affected			
	<i>Electric posts</i>	-	-	2
	<i>Water system/Wells</i>	-	-	-
	No. of Trees Affected			
	<i>Fruit bearing trees</i>	-	-	4,205
	<i>Non-fruit bearing trees</i>	-	-	160
	<i>Plant/Cash trees</i>	-	-	1,299
	Others			
	<i>Cemetery</i>	-	-	0
	<i>School</i>	-	-	0
	<i>Mosque</i>	-	-	0

Note: * 22 houses and 1 small shop (sari-sari store)

- Fruit Bearing Trees: Mango, Coconut/ Buco, Jackfruit/ Langka, Santol, Kamatchile, Duhat, Tamarind/ Sampaloc, Aratiles/ Mansanitas, Guava/ Bayabas, Macopa, Kaimito, Avocado, Atis, Casoy/ Kasuy
- Non-fruit: Timber, Non-fruit Bearing Trees: Narra, Acacia, Talisay, Bangkal, Balite, Gmelina, Falcata, Mahogany
- Plant, Cash Trees: Banana, Papaya, Atsuete, Cassava, Cacao

(4) Socio-economic Profile of Project-affected IPs

a.) Details of Impacts

A socio-economic survey was undertaken with the 21 household heads (15 IPs and 7 non-IPs) by the RAP Team. These are the people whose house are within the 30 meters width ROW. Another separate interview was carried out as well with the 100 people who owned a land along the alignment. It was learned that out of the 100 land owners, 14 land owners are IPs as shown in the table below.

Table 9.2.2-7 Summary of Potential Number Affected Structures and Land Lots

Loss category	Datu Blah Sinsuat		Lebak		Total		Grand Total
	Non-IP	IP	Non-IP	IP	Non-IP	IP	
Affected House Heads	1	5	5	10	6	15	21
Affected Structures *	1	5	6	10	7	15	22
Affected Land Lot Owners	63	10	23	4	86	14	100

Note: * Although there are 22 residential houses and one sari-sari store, there are only 21 owners listed. This is because one household owns two houses within the alignment, during the actual field reconnaissance, this house was not occupied.

Source: JICA Study Team

A total of 1,898,407 sq. m of land with crops and trees will be affected by the alignment as summarized in **Table 9.2.2-8**. Majority of the cultivated crops that will be affected are corn and palay. The high number of plant/cash trees at the side of Lebak refers to banana trees located inside a plantation.

Table 9.2.2-8 Summary of Affected Land and Types of Cultivated Crops

Loss category	Unit	Datu Blah Sinsuat	Lebak	Total
Affected agricultural lands with corn	m ²	72,843.00	1,289.00	74,132.00
Affected agricultural lands with palay	m ²	66,868.00	13,500.00	80,368.00
Affected Fruit bearing trees	No. of trees	2,135	2,070	4,205
Affected trees (Timber / non-fruit bearing)	No. of trees	102	58	160
Plant/Cash Trees	No. of trees	148	1,151	1,299
Total affected land area (sq. m.)	m ²	1,736,892	161,515.20	1,898,407

Source: JICA Study Team

b.) Socio-economic conditions of the Project-affected Persons (PAP)

The socio-economic characteristics of the project-affected persons – both IPs and non-IPs- are summarized in the table below. These are the people (21 families and 15 which are IP families) whose houses are within the 30 meters width ROW. Examples of the IP houses inside the ARMM and outside the ARMM are presented in the succeeding figures.

Table 9.2.2-9 Characteristics of Household Head Survey Respondents (IP and Non-IP)

Variable	Description	
	IP (15 household head)	Non-IP (6 household head)
Age and Sex	<ul style="list-style-type: none"> The respondents range from 22 to 77 years old with mean age of 47.0 years. 100% of the respondents are male. 	<ul style="list-style-type: none"> The respondents range from 22 to 72 years old with mean age of 48.0 years. 67% of the respondents are male, and 33% are female.
Number of family members	<ul style="list-style-type: none"> Among the respondents, the most frequent answer is 1 to 5 persons (60%), followed by 6 to 10 persons (20%) and 11 above (20%). 	<ul style="list-style-type: none"> Family size is large. Among the respondents, the most frequent answer is 6 to 10 persons (67%), followed by 1 to 5 persons (33%).
Ethnicity	<ul style="list-style-type: none"> The respondents' ethnic group is Teduray (100%). 	<ul style="list-style-type: none"> The largest ethnic group is Maguindanao (83%), followed by Cebuano (17%).
Religion	<ul style="list-style-type: none"> Islam is the majority (80%), and the remaining are Catholic (7%) and others (13%). 	<ul style="list-style-type: none"> Islam is the majority (50%), and the remaining are Catholic (33%), and others (17%).
Education attainment	<ul style="list-style-type: none"> 27% of the respondents have reached high school level, 20% reached college level, and 20% have finished elementary level, 13% finished high school level. 	<ul style="list-style-type: none"> 33% of the respondents have finished elementary level while 17% finished high school level, and 17% have reached high school level while 17% reached college level.
Household income	<ul style="list-style-type: none"> 67% of the households have monthly income of 10,001 to 20,000 pesos, 27% have 10,000 below while 7% have 20,001 to 30,000 pesos. Respondents' occupations are farmers (73%), fishermen (13%) and others (13%). Others include food venders, sari-sari store owners, nipa weavers, and housewives. 	<ul style="list-style-type: none"> 67% of the households have monthly income of 10,001 to 20,000 pesos while 17% have 10,000 below. Respondents' occupations are farmers (53%), businessman (7%), daycare staff (6%), driver (4%) and others (29%). Others include food venders, sari-sari store owners, nipa weavers, and housewives.



Figure 9.2.2-3 IP affected house and its household in barangay Kalamongog, Lebak (Region 12)



Figure 9.2.2-4 IP affected house in barangay Kinimi, Datu Blah Sinsuat (ARMM) during household survey

The socio-economic characteristics of the owners of the land to be traversed by the road is summarized in the table. Just to reiterate, 14 of the lots are owned by an IP.

Table 9.2.2-10 Characteristics of Land Owners affected by the Project (IP and Non-IP)

Variable	Description	
	IP with affected lots (14 respondents)	Non-IP with affected lots (86 respondents)
Age and Sex	<ul style="list-style-type: none"> The respondents range from 32 to 77 years old with mean age of 48.0 years. 86% of the respondents are male, and 14% are female. 	<ul style="list-style-type: none"> The respondents range from 22 to 77 years old with mean age of 46.0 years. 87% of the respondents are male, and 13% are female.
Number of family members	<ul style="list-style-type: none"> Family size is large. Among the respondents, the most frequent answer is 6 to 10 persons (46%), followed by 10 to 5 persons (31%). 	<ul style="list-style-type: none"> Family size is large. Among the respondents, the most frequent answer is 6 to 10 persons (57%), followed by 1 to 5 persons (43%).
Ethnicity	<ul style="list-style-type: none"> The largest ethnic group is Teduray (67%), followed by Maguindanao (25%), Cebuano (4%) and others (5%). 	<ul style="list-style-type: none"> The largest ethnic group is Maguindanao (79%), followed by Iranun (14%), Cebuano (3%) and others (4%).
Religion	<ul style="list-style-type: none"> Islam is the majority (64%), and the remaining are Catholic (11%) and others (25%). 	<ul style="list-style-type: none"> Islam is the majority (83%), and the remaining are Catholic (10%), Baptist (1%) and others (6%).
Education attainment	<ul style="list-style-type: none"> 40% of the respondents have reached high school level, 5% reached college level, and 18% have finished elementary level, 5% finished high school level and 5% finished certificate courses. 	<ul style="list-style-type: none"> 26% of the respondents have finished elementary level while 11% finished high school level, and 21% have reached high school level while 8% reached college level.
Household income	<ul style="list-style-type: none"> 54% of the households have monthly income of 10,001 to 20,000 pesos, 33% have 10,000 below while 10% have 20,001 to 30,000 pesos. Respondents' occupations are farmers (48%), fishermen (29%), businessman (4%) and others (15%). Others include food vendors, sari-sari store owners, nipa weavers, and housewives. 	<ul style="list-style-type: none"> 72% of the households have monthly income of 10,001 to 20,000 pesos, 21% have 10,000 below while 2% have 20,001 to 30,000 pesos. Respondents' occupations are farmers (55%), businessman (7%), daycare staff (7%), driver (3%) and others (29%). Others include food vendors, sari-sari store owners, nipa weavers, and housewives.

(5) Action Plan to Avoid, Mitigate and Compensate Negative Impacts

The guiding principle in determining the areas to be traversed by the Tapian – Lebak Coastal Road is “selecting the optimum alignment.” This means that houses and other structures are to be avoided as much as possible. It also means that the primary policy is to utilize existing road in the following manner:

- (i) The proposed alignment shall utilize the existing road as much as possible to minimize land acquisition.
- (ii) The proposed alignment shall avoid relocation of the houses/buildings as much as possible to minimize social impacts to people.
- (iii) The proposed alignment should follow the existing road elevation as much as possible.
- (iv) The proposed alignment shall satisfy the established design criteria.

In cases where a new alignment is unavoidable and must be made, the guidance is as follows:

- (i) The alignment shall avoid affecting existing houses/buildings as much as possible to minimize social impacts.
- (ii) The alignment shall meet the established design criteria.
- (iii) The alignment shall basically follow the topography as much as possible to minimize cutting and filling.
- (iv) Tunnel structure shall be avoided in consideration of local of contractors’ capability of tunnel construction.

Despite careful study of alignment to minimize the road project’s impact, there are still houses to be affected by the project (15 houses of IPs and 7 houses of non-IPs).

(6) Measures/Action to be Taken

The perspective of the IPs differs from the usual viewpoint of those who do that technical assessment of the potential negative impacts on people that could be affected by road projects, the latter more focused on structures, crops and trees, as well as, on the physical environment. As can be seen in the following tables, the lens of the IPs goes beyond the usual damages and losses and consider social impacts, safety and security, and threats to their culture and heritage.

Table 9.2.2-11 Mitigation of Negative Impacts Identified in the General Assembly

	Identified Negative Impacts	Proposed Preventive/ Mitigation Measures by the IPs	Identified by which barangay
Identified during 1 st General Assembly	Displacement	Secure proof of ownership (e.g CADT for IPs)	Tapian, Matuber, Penansaran, Tubuan, Nalkan, Tambak, Kinimi, Lapaken, Sedem, and Sinipak
	Land Grabbers might Enter the Community	Put up checkpoints to prevent land grabbers from entering	Tapian, Matuber, Penansaran, Tubuan, Nalkan, Tambak, Kinimi, Lapaken, Sedem, and Sinipak
	Children may be Prone to Accident	Strengthen barangays ordinances, including those that are designed to improve security	Tapian, Matuber, Penansaran, Tubuan, Nalkan, Tambak, Kinimi, Lapaken, Sedem, and Sinipak
	Road might pass through Sacred Places	Road alignment should avoid sacred places	Tapian, Matuber, Penansaran, Tubuan, Nalkan, Tambak, Kinimi, Lapaken, Sedem, and Sinipak
	Disturb Community Harmony; Road Development can bring Conflict	Avoid hiring people, during road implementation, who might have conflict with residents	Tapian, Matuber, Penansaran, Tubuan, Nalkan, Tambak, Kinimi, Lapaken, Sedem, and Sinipak
Identified during series	No community Consultation done prior	-To conduct consultation for the future projects	Tapian and Matuber

	Identified Negative Impacts	Proposed Preventive/ Mitigation Measures by the IPs	Identified by which barangay
of IP Community Consultations	to road construction (referring to past projects)		
	Claim of compensation for the damaged properties	-OSCC can work together with the BLGU and other concerned agencies to process and issue a land owner rights	Tapian, Matuber, and Lapaken,
	High price for the farm and fish products	-To pass an ordinance regulating prices for agri products and retain certain volume for the local market. -To put up a mini wet market to address concerns supply of products and prices. -DTI and other concerned government agencies will monitor pricing scheme.	Tapian, Matuber, Penansaran, Tubuan, Nalkan, Kinimi, and Lapaken,
	Loss of additional income for the boat owners	-Boat can be used for fishing only divert additional income to purchase motorcycle and other public utility vehicle.	Pura, Penansaran Tubuan, Nalkan, Kinimi, and Lapaken,
	Land property will be damaged	-Concerned agencies should process the compensation of the said damages.	Pura, Resa, Sinipak, and Sedem

Source: Summary of Proceedings in First General Assembly (16 December 2017) and Second General Assembly (5 March 2018), both held in Cotabato City

(7) Cost Estimate and Fund Procurement

The entitlement matrix presented in the Environmental Impact Assessment (EIA) and Relocation Action Plan (RAP) section of Chapter 17 is the basis for compensation/entitlements. In general the individual or IP families that are considered as Affected Persons or Affected Households are residing on privately-owned lots that are titled (although some are just claimants and could not present evidence of ownership). Thus, the resettlement of the affected IPs will essentially follow the ordinary procedures prescribed under the DPWH's Land Acquisition, Resettlement, Rehabilitation, and Indigenous People's Policy (3rd Edition, 2007) instead of the more complicated processes to be observed if the affected IPs are part of recognized or titled Ancestral Domains.

a.) Preliminary ROW Cost Estimates for Land

Estimated market values of affected land in the assumption that all affected land owners have the complete land title is presented in **Table 9.2.2-12**.

Table 9.2.2-12 Estimated Market Values of Affected Land

Municipality	Land Classification	Affected Land (Sq.M)	Unit Price (PhP)	Total Cost (PhP)
Datu Blah Sinsuat	Agricultural	1,717,838	20.00	34,356,760.00
	Residential	19,054	450.00	8,574,300.00
Lebak	Agricultural	133,934	30.00	4,018,020.00
	Residential	27,582	550.00	15,170,100.00
Total		1,898,408		62,119,180.00

Note: The estimated market values of affected land were computed in the assumption that all claimants were qualified for the compensation, provided that they have the Original Certificate of Title and Tax Declarations, or any of the two.

Source: JICA Study Team

b.) Preliminary ROW Replacement Cost Estimates for Structures

The replacement cost of the affected structures, in this case were referred to the affected houses, is shown in the table below. The computation of individual dwellings was based on the current unit price of materials and estimated for each reconstruction of building according to type of the building part and kind of materials used.

Table 9.2.2-13 Replacement Cost of Residential houses

Municipality	No. Of Houses	Total
Datu Blah Sinsuat	6	106,914.00
Lebak	17	993,439.40
Total	23	1,100,353.40

Source: JICA Study Team

The replacement cost of the affected utilities, identified as electrical post traversing the proposed alignment site, was shown in **Table 9.2.2-14**. the computation of the current unit price was based on the current prices incurred during the removal/transfer of the utilities in the area.

Table 9.2.2-14 Replacement Cost for Affected Utilities

Municipality	Electric Post	Unit Cost (PhP)	Total Cost (PhP)
Datu Blah Sinsuat	0	0	0
Lebak	2	35,000	70,000.00
Total	2	0	70,000.00

Source: JICA Study Team

c.) Preliminary Cost Estimates for Crops and Trees

The current market values provided by the Department of Agriculture (DA) for crops and perennials, and Department of Environment and Natural Resources (DENR) for the trees were used in the valuation of the trees and crops of affected areas. The computation for the total cost will be computed using the following: *yield x area x unit price*.

Table 9.2.2-15 Replacement Cost for crops

Municipality	Crops	Area (sq. m.)	Annual Yield (kg/sq.m.)	Unit Price (PhP)	Total Cost (PhP)
Datu Blah Sinsuat	Corn	72,843.00	0.28	14.00	285,544.6
	Palay	66,868.00	0.36	10.46	251,798.1
Lebak	Corn	1,289.00	0.30	14.51	5,611.017
	Palay	13,500.00	0.36	17.96	87,285.6
Grand Total		154,500.00			630,239.32

Source: JICA Study Team

Table 9.2.2-16 Replacement Cost for trees

Commodity	Municipality				Total Estimated Value
	Datu Blah Sinsuat	Total Cost	Lebak	Total Cost	
Fruit bearing trees	2,135	1,000,060	2,070	2,465,950	3,466,010.00
Timber / Non-fruit bearing trees	102	38,760	58	28,280	67,040
Plant/Cash Trees	148	31,240	1,151	1,011,480	1,042,720
Total					4,575,770.00

Source: JICA Study Team

d.) Preliminary Compensation and Entitlement Packages

The RAP will be implemented by various government agencies in partnership with the Project affected persons and road concessionaire. In this section, the various players involved in the RAP implementation are named together with their respective defined roles. While this project is pursued under the Japan funding, the implementation of the project is primarily a responsibility of the government, specifically the DPWH agency.

The recommended budget for RAP Implementation of Sub-Project 6 is **PhP 79,919,874.13** and is part of government counterpart, however the amount is exclusive of other entitlements that are yet to be determined after the completion of the parcellary survey of the DPWH. The indicative budget items covering land acquisition and replacement cost of structures, and cost for external monitoring. Contingencies and admin cost are also included. **Table 9.2.2-17** shows the details of the indicative budget to implement this RAP.

Table 9.2.2-17 Indicative Budget for RAP Implementation

Description	Cost Item	Amount	Remarks
Land Acquisition and Structures	Land	62,119,180.00	Estimated based on the current fair market value of Land
	Structures	1,100,353.40	Estimated based the replacement cost
	Improvements	70,000.00	Estimated based the replacement cost
	Subtotal A	63,289,533.40	
Compensation	Trees and Cash crops	4,575,770.00	Estimated based on the current market values of the Maguindanao Provincial Assessor's Office and Sultan Kudarat
	Damaged crops	630,239.32	Estimated based on the current market value of the Philippine Statistics Authority
	Subtotal for B	5,206,009.32	
External Monitoring		1,000,000.00	Estimated at PhP 1,000,000 per Sub-Project
	Subtotal for C	1,000,000.00	
Subtotal (A+B+C)		69,495,542.72	
Contingency	10%	6,949,554.27	
Admin Cost	5%	3,474,777.14	
GRAND TOTAL		79,919,874.13	

Source: JICA Study Team

(8) Grievance Procedure and Mechanism for Resolving Grievances

For the implementation of the Sub-Project 6 (Tapián-Lebak Coastal Road), some grievance could arise due to the handling of resettlement, compensation, disturbances that would be caused by the movement of vehicles, equipment, and construction materials among others. Likewise, there may be conflicts or complaints that would only concern members of the Indigenous Communities - between individuals, families, or individuals/families with the tribe. During the Second General Assembly, the IP Leaders and Elders in attendance recognized the possibility of local grievances or conflicts within and between members of the community. Considering such opinion, there will be two (2) Grievance Mechanisms and discussed below.

a.) Grievances on Conflicts within the Affect IP Community

Conflicts within the affected IP community will be addressed within the community itself in the context of its customary law and customary dispute resolution process and mechanisms, in the presence of the relevant staff of the Office for Southern Cultural Communities (OSCC) for communities within the ARMM and National Commission for Indigenous People (NCIP) for communities within Region 12 (see **Figure 9.2.2-5**). Their respective offices with jurisdiction over the area and project-related staff and other stakeholders that may be invited to help resolve conflicts.

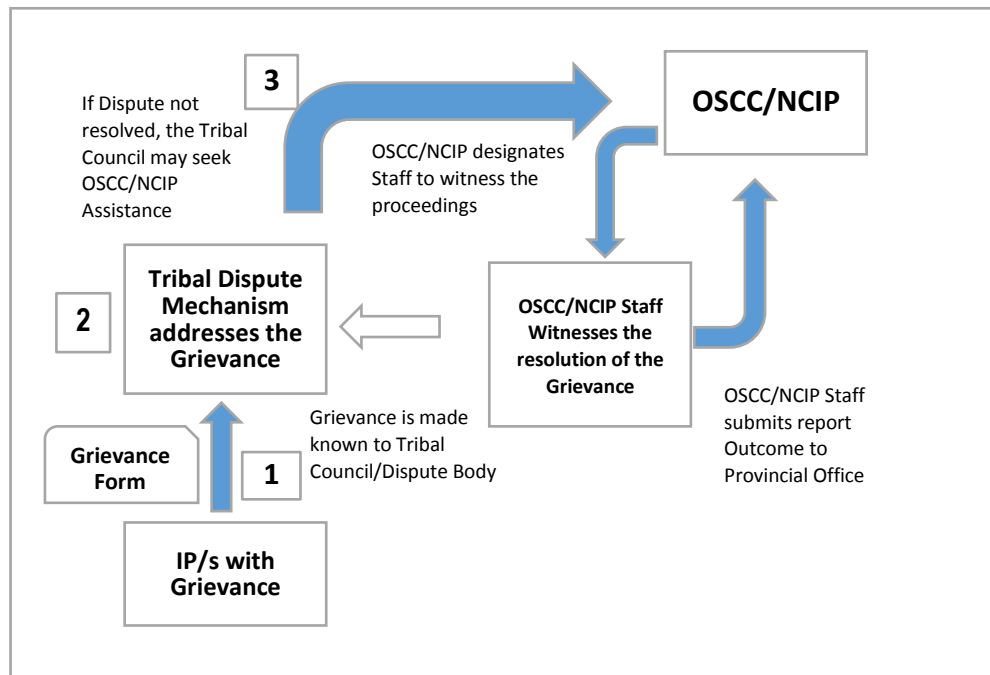


Figure 9.2.2-5 Resolution of Grievance (Within IP Community)

b.) Grievances Concerning Issues or Entities Outside the IP Communities

Grievances pertaining to matters beyond the IP community level will be referred to the agency and handled based on laws or administrative procedures, whatever is applicable. The affected individual IP or IP Community shall seek the assistance/intercession of the Office for Southern Cultural Communities (OSCC) to elevate the grievance to the proper agency or institution for appropriate action/s (see **Figure 9.2.2-6**).

The OSCC shall make necessary representation with the concerned agency/ies or institutions to ensure that the grievance lodged therein are satisfactorily resolved. The OSCC shall provide the Affected IP or IP community feedback on the status and final resolution of the grievance.

It should be noted that four levels of grievance redress are open to Affected IPs and other stakeholders during the implementation of the road project. (i) Level I - Municipal Level (ii) Level II - DPWH Regional Office Level (iii) Level III- Project Level (iv) Level IV- Appropriate Court of the Republic of the Philippines for adjudication. Other Grievances related with officials conducting the resettlement process will be handled as described in the DPWH Infrastructure Right-of-Way (IROW) Procedural Manual, 1 April 2003.

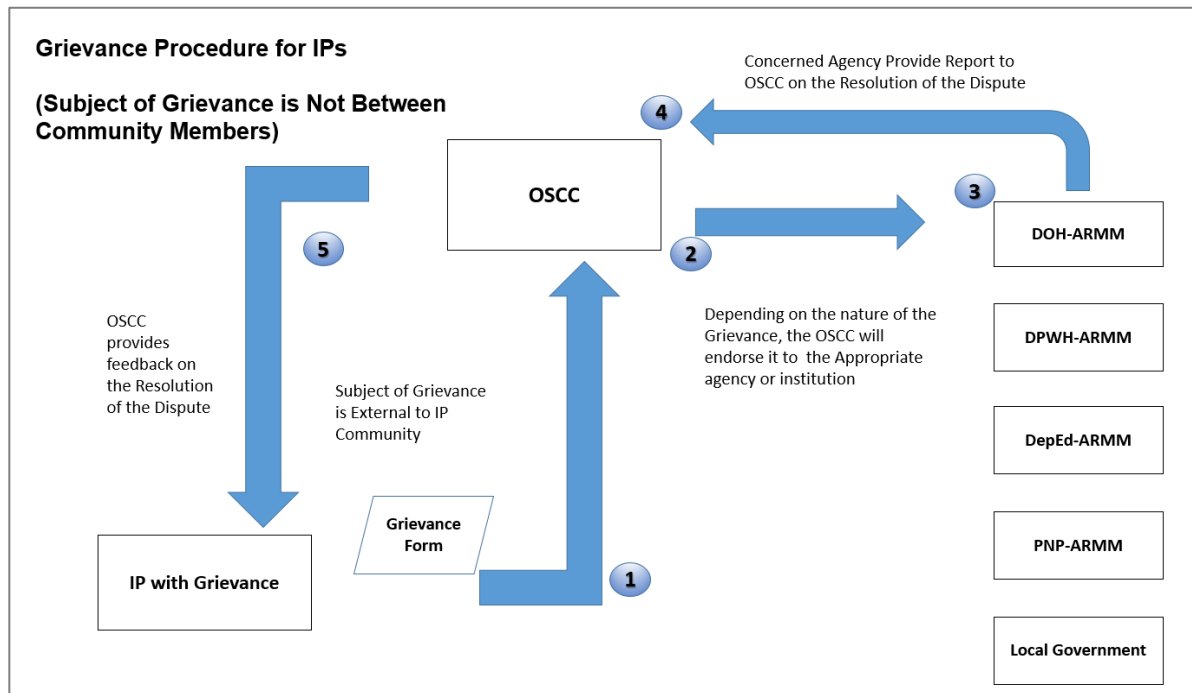


Figure 9.2.2-6 Resolution of Grievance (Not between IP Community Members)

(9) Monitoring, Evaluation, and Reporting of IP Plan

It is important that the faithful implementation of the Indigenous People's Plan will be assured. For this purpose, monitoring mechanisms need to be established. Monitoring would be done at two (2) levels, Internal Monitoring and External Monitoring.

a.) For Internal Monitoring

An Indigenous People's Plan Implementation Committee (IPPIC) shall be established to be composed of the OSCC, DPWH-ARMM, DPWH 12, and the Project Management Office (for implementation of Sub-Project 6). The DPWH-ARMM shall be the Chair of the Committee.

The IPAPIC shall ensure that the components of the Indigenous People Plan are faithfully observed and implemented.

b.) For External Monitoring

There will external monitoring is to provide an independent periodic review and assessment of the achievements of the (i) resettlement objectives; (ii) changes in income, living standards and livelihoods; (iii) restoration and/or improvement of the economic and social base of the affected Indigenous People; (iv) determine the need for additional mitigation measures. An External Monitoring Agent (EMA) shall be contracted through a procurement process by the DPWH for this purpose.

(10) Reporting and Disclosure

The DPWH shall be primarily responsible for the generation of data and the preparation of semi-annual monitoring reports to be submitted to JICA. The JICA shall review the Semi-Annual Monitoring

Reports and may post the same on it's the website and the project website for Public disclosure purposes.

DPWH, with the assistance of the OSCC, shall disclose results of monitoring pertinent to the sites specifically to the affected communities/persons in summary form, to wit: status of the Indigenous People's Plan including its updated versions, information on benefits sharing, and corrective action plans, if necessary. Community disclosures will be in the language commonly understood by the Indigenous People and posted at conspicuous places in the barangays. The following parameters in the table below are the suggested minimum indicators for Internal Monitoring on the Implementation of the IP Plan:

Table 9.2.2-18 Recommended General Parameters and Indicators for Internal Monitoring

Parameters of Monitoring	Proposed Indicators/Measures
Consultations and Meetings	<ul style="list-style-type: none"> • Number of Consultation and Meetings Conducted • Number of Participants per Meeting • Number of Women in Attendance per Meeting
Community Education/Information Dissemination	<ul style="list-style-type: none"> • Update on the Project and Its Implementation • Orientation of the Social Safeguards of the Project • Review of the Rights and Entitlements of IPs • Dissemination of Grievance Mechanism and Process of Accessing it
Provision/Delivery of Entitlements/ Benefits	<ul style="list-style-type: none"> • Verification and Finalization of IPs entitled to Compensation and other Benefits • Payments versus Schedule of Disbursement • Payments of Each Item of Entitlements (Compensation for Loss/Damage to Property, Compensation for Loss of Crops, Compensation for Loss of Trees, etc.)
Benefits to IPs and Communities	<ul style="list-style-type: none"> • Changes in occupation, livelihood, and use of resources compared to pre-implementation period • Differences in Income and Expenditure Levels and Patterns vis-à-vis pre-implementation period
Processing of Grievance	<ul style="list-style-type: none"> • Number of Grievance • Classification of Grievances (Internal to IPs/IP Community or Concerning Agencies, Institutions, and other External Concerns) • Number of Grievances Resolved and Unresolved • Status of Unresolved Grievances

Source: Interview with IP Community and OSCC officials

For the External Monitoring Agent, the entity that will be contracted could also use the above template as a minimum and include other parameters that would enhance the indicators for the effective implementation of the IP Plan particularly in the delivery of compensation and entitlements of the IPs and their communities.

(11) Budget and Financing of Monitoring Activities

DPWH shall provide adequate budget for appropriation that will facilitate the effective performance of monitoring activities by the Internal Monitoring mechanism. Guidance should be based on the relevant guidelines of DBM and/or DPWH on the allowable budgetary line items necessary in realizing the effective and efficient monitoring of the IP Plan.

(12) Certificates Issued

The following certificates have been issued, thus administrative procedures in connection with IP were completed;

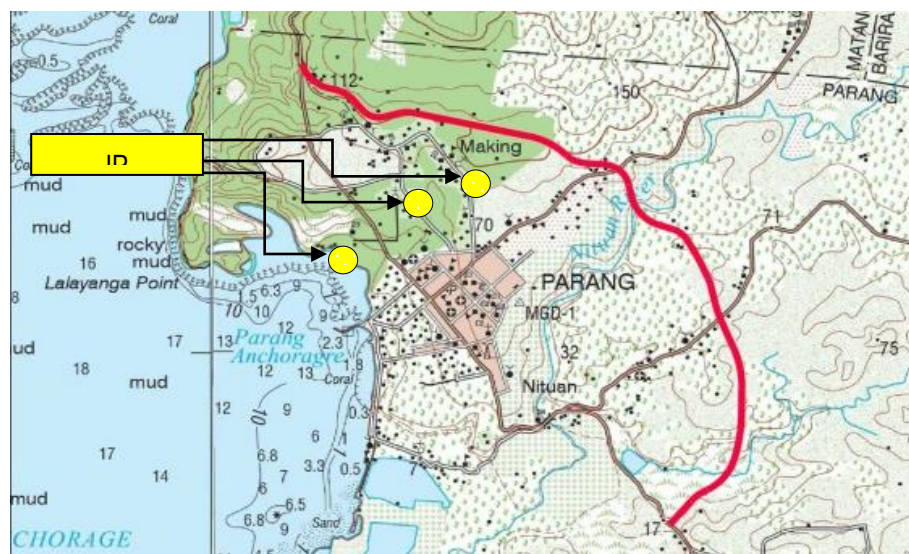
- Result of Field-based Investigation, December 22, 2017, OSCC -Appendix9-1-
- Validation Report, February 26, 2018, NICP-Region XII -Appendix9-2-
- Resolution of Second General Assembly, March 5, 2018, IP Representatives -Appendix9-3-
- Certification of No Objection, March 15, 2018, OSCC -Appendix9-4-
- Transmittal Letter to DPWH-National, April 2, 2018, OSCC -Appendix9-5-
- FBI Compliance Report, May 9, 2018, NCIP -Appendix9-6-
- Certificate of Non-overlap, May 11, 2018, NCIP Region XII -Appendix9-7-

9.3 Sub-Project 8

9.3.1 Brief background of the IPs in the Sub-Project

A majority of the Migrant IPs moved to Barangay Making, Parang following their parents who were mostly avoiding conflicts in their original domiciles (58%). The height of the migration was in the 1970s when the Moro rebellion and Communist insurgency raged in many parts of Mindanao. This means that these migrant IPs were just kids when their parents relocated in the area (age ranges from 28 to 65 years old and average stay in the barangay is 34 years). There are those (four IP families) however who claimed to leave their original community due to economic reasons: poverty or experiencing lack of food and limited source of income. And finally, one (1) family settled in Parang for reason of marriage to a local resident. Likewise, they revealed that they are no longer interested to go back to their original places because they find Barangay Making a good place to stay for various reasons: presence of economic opportunities, the local officials are welcoming and understanding, and the place is peaceful.

The Migrant IPs have clearly assimilated to the ways of the people in their adopted community in terms of their religious practices or affiliation. Of the twelve (12) samples, ten (10) identified themselves as Christians while two (2) are followers of Islam which indicated they had abandoned their indigenous religions and adopted the religions of the majority of Filipino (See **Table 9.3.3-1**).



Source: JICA Study Team

Figure 9.3.1-1 Location Map of Migrant IPs in Parang East Diversion Road (Sub-Project 8)

9.3.2 Overview of the Survey

This IP Survey is part of the Field-Based Investigation (FBI) undertaken by the Office of the Southern Cultural Communities of the Autonomous Region in Muslim Mindanao (OSCC-ARMM). Likewise, Free, Prior and Informed Consent (FPIC) and other related activities necessary to carry out provisions of the IPRA Law RA 8371 (1997) and Muslim Mindanao Act No. 241 (2012) were undertaken.

After consultation both with the Office of the Southern Cultural Communities (OSCC) - which is the primary government agency in the ARMM tasked to protect the rights and interests of the IPs - and LGU of Parang Municipality, it was confirmed that one of the barangays along the alignment of Sub-Project 8 (Parang East Diversion Road) has a presence of Indigenous Peoples. Further discussion with the two government agencies revealed that they are migrant IPs mostly came from the Municipality of Upi, Maguindanao and settled in the area. They are scattered in the three sitios of Barangay Making as illustrated in the figure below and their number is about forty (40) households.

Upon further discussion with OSCC, it was decided that based on the IPRA Law of 1997 and MAA No. 241 of 2008, Free, Prior and Informed Consent (FPIC) is not applicable due to lack of ancestral domain claims by the IPs on the land (barangay Making) hence no overlap will take place between the road project and their land (i.e. overlap occurs when the project is passing through their ancestral land). Nonetheless, it was agreed among the OSCC, LGU of Parang and the JICA Study Team that a consultation meeting with the Migrant IPs is carried out which not only useful to this road project but might be useful to the OSCC in planning their future programs of assistance to the three IP communities.

Two (2) surveys were undertaken to gain better understanding of the condition of the Migrant Indigenous Peoples (Migrant IPs) living in Barangay Making although a distant away from the alignment of the Sub-Project 8. A one-page questionnaire is prepared for the household interview and of the total forty (40) IP families living in the area, twelve (12) were interviewed. Likewise, a Focus Group Discussion (FGD) with one-page guide questionnaire is also carried out. Survey results are summarized to present a coherent story of the communities along the road alignment highlighting their current socio-economic condition, farming practices, and their perception of the impacts of the road project.

Table 9.3.2-1 Surveys carried out

Survey Type	Number of samples	Description
(i) Household Interview Survey for Migrant IPs	1 barangay x 12 households.	A one (1) page questionnaire is prepared for the household interview of migrant IPs. A total of 12 household were interviewed. The objective is to collect basic information that would describe their living condition and socio-economic condition as a whole.
(ii) Consultation Meeting with Migrant IPs	1 barangay x 40 household = 40	All IP families (40 in total) participated in the meeting. The objective is to facilitate discussions about the expected impacts of road construction and gain the support of the migrant IPs for the project.

9.3.3 Socio-economic condition of the IPs

Barangay Making in the Municipality of Parang seems to be an attractive place of refuge to Indigenous People from all over Mindanao. As seen in **Table 9.3.3-1**, two-thirds of the Migrant IPs in barangay Making belong to the Teduray tribe, two (2) each are Mandayas and Galis. The Tedurays came from Upi while the Gali is said to be a Manobo sub-tribe with Northern Mindanao (Bukidnon) as their place of origin. Mandaya tribe has its largest concentration in Davao provinces however one of the Mandaya family came from Cebu. Perhaps barangay Making is the second migration place of the family after Cebu.

Unlike the IP communities traversed by the Sub-Project 6 (Tapián – Lebak Coastal Road) and the Sub-Project 5 (Maganoy – Lebak Road), the Migrant IPs living near the Parang East Diversion Road are not generally engaged in agriculture or fishery. Only two (2) have agriculture-related employment and the majority are engaged in business or providing personal services that include doing laundry, driving, and retailing.

Table 9.3.3-1 Brief Characteristics of the Respondents

Variable	Description
Age	<ul style="list-style-type: none"> The respondents range from 28 to 65 years old with mean average age of 42 years.
Sex	<ul style="list-style-type: none"> 92% of the respondents are female, and 8% are male.
Years of Residency	<ul style="list-style-type: none"> The respondents have stayed longest in the area for 51 years while the newest arrived 10 years ago. The average period of residency of those covered by the Survey is 34 years.
Number of family members	<ul style="list-style-type: none"> The typical household size is 4 - 6 persons as revealed by 6 (or 50%) of the 12 respondents. Two respondents have small family size of 1 to 3 members while 1 has a big family size as the number of persons belonging to their family exceeds 10. Compared to the typical family size of Filipinos, the migrant IP communities in the area have just a little bit larger family sizes of 4 – 6 is-à-vis the national average family size of 4.4 persons.
Ethnicity	<ul style="list-style-type: none"> Most of the respondents belong to the Teduray tribe (66%) while some belong to the Mandaya Tribe (17%) and Gali Tribe (17%).
Religion	<ul style="list-style-type: none"> Ten (10) of the respondents claimed that they are Christians (83%), two (2) identified themselves as Muslims or 17%. This shows that the Migrant IPs had completely abandoned their indigenous religion and embraced the religious practices of the larger Filipino tribes.
Education attainment	<ul style="list-style-type: none"> There was one or 8% respondent who did not have any formal education, three or 25% claimed to have completed some elementary education, seven or 59% attained some high school education, and one or 8% reached the college level. There is a big disparity compared to the data gathered from the Social Survey of non-IPs in the same barangay where 44% completed elementary and 25% reached college level.
Source of drinking water	<ul style="list-style-type: none"> Most get water from Spring/River/Rain (66%) while the rest get water from Open/Dug Well (8%) and from both spring and Open/Dug Well (25%). Compared to non-IPs in the same barangay 31% are able to buy drinking water from stores, all the rests still rely on open dug wells, springs, river, and rain.

In terms of educational attainment, there was one (1) respondents who did not have any formal education at all, three (3) claimed to have completed some elementary education, seven (7) attained some high school education, and one (1) reached the college level. Compared to the data obtained by the study on the IPs supported by the European Union and completed in 2014 where it was found out that more than 68% of IPs in the ARMM failed to reach high school, the Migrant IPs are better off with more than 90% having reached at least some high school education.

Average family income of Migrants in Parang range from a low of One Thousand Two Hundred (PhP 1,200.00) to Seven Thousand Five Hundred (PhP 7,500). The average monthly income of an IP family almost PhP 3,600 is less than 20% of the average monthly income of Filipinos (See **Table 9.3.3-2**).



Figure 9.3.3-1 Example of water condition (left: hand pump well; right: migrant IP washing laundry in the river)

Table 9.3.3-2 Household Income and Expenditure

Variables	Description
Occupation	<ul style="list-style-type: none"> Five (5) of the respondents covered by the Household Survey disclosed that their main occupation is retailing, representing 42% of the total respondents. Four (4) are engaged in providing laundry services to households (33%), two (2) are tenant-farmers (17%), and one (1) is a driver by profession.
Monthly income	<ul style="list-style-type: none"> The amount of family income range from PhP 1,200 per month to PhP 7,500 with average monthly family income of PhP 3,541.
Source of income	<ul style="list-style-type: none"> Four of the respondents earn their income through laundry services, some earn through wage labour, driving, business, farming, and others.
Average monthly expenditure	<ul style="list-style-type: none"> Average family expenditure range One Thousand Two Hundred Pesos (PhP 1,200) to Seven Thousand Pesos (PhP 7,000) with the mean monthly expenditure being Three Thousand Four Hundred Fifty Pesos (PhP 3,450). This means that their income barely covered their expenditure.
Expenditure distribution	<ul style="list-style-type: none"> The priority expenditures of the Migrant IPs are for food (50%-70%), next is for children education (10%-30%), medical care (25%), clothing and beauty products (10%-20%) and lastly electricity and water (5%).



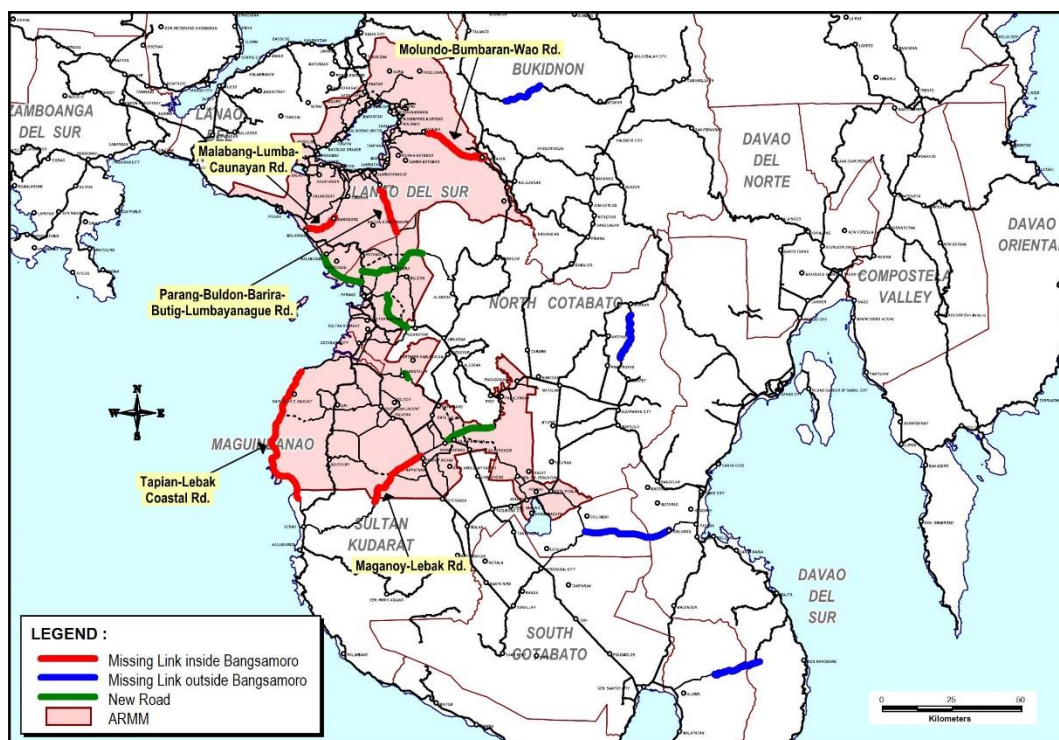
Figure 9.3.3-2 Example of a typical house of a Migrant IP in Barangay Making

Chapter 10 Necessity of the Project

10.1 Incomplete/Weak Formation of the Road Network

The 2016 JICA-assisted Bangsamoro Development Phase-2 identified shortage of infrastructure supply along with widespread poverty as some of the serious development issues to be addressed in the ARMM. At least five (5) missing links and five (5) new roads were recognised as critical sections to construct to complete the primary and secondary road network of ARMM as depicted in **Figure 10.1-1**. These missing sections of the network prevent access to wide areas rendering the land less productive and less useful. Likewise, this situation forced motorists to make long detour and exposed the vulnerability of network that once a section breaks down, alternative route might not be available to motorists.

This Project covered two (2) of the five (5) missing links identified in the ARMM network and three (3) of the five (5) new roads considered important for the formation of the network. Hence this Project directly addressed some of the most important infrastructure gap of the region.



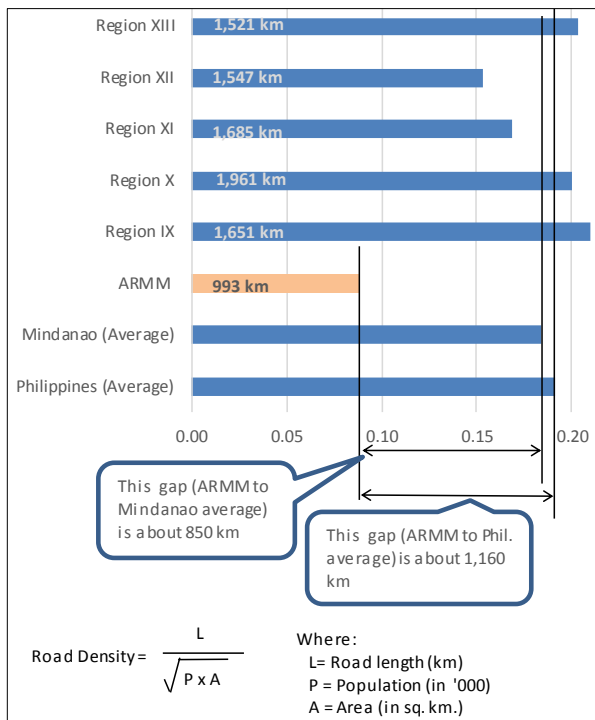
Source: The Study on Infrastructure (Road Network) Development Plan for the Autonomous Region in Muslim Mindanao, DPWH-ARMM, JICA, 2016

Figure 10.1-1 Missing links in the ARMM road network

10.2 Closing Road Density Gap with Other Regions

To close the gap in road density between the ARMM and the rest of the regions in Mindanao, construction of about 850km of new road in national standard is needed as illustrated in the figure below. This Project covers about 182km of new road which will bring the total road network of ARMM

into 1,175km if successfully constructed. As shown in the figure below, even with this addition of new road, the total length of the road network of ARMM is still way below the Mindanao average. This fact obviously calls for further intensification of road development in the region to catch up with the rest.



Region		Population in Thousand (2015)	Land Area (sq.km)	Road Length (km) (2017)	Road Density
Philippines		100,981.00	309,771	33,763	0.19
Mindanao (Average)		20,354.39	101,891	8,365	0.18
MIN-DANAO	ARMM	3,781.39	33,511	993	0.09
	Region IX	3,629.78	17,047	1,651	0.21
	Region X	4,689.30	20,496	1,961	0.20
	Region XI	4,893.32	20,357	1,685	0.17
	Region XII	4,545.28	22,513	1,547	0.15
	Region XIII	2,596.71	21,478	1,521	0.20

Source: DPWH-National, DPWH-ARMM, 2016 Philippine Statistical Yearbook

Figure 10.2-1 Road Density of Regions in Mindanao

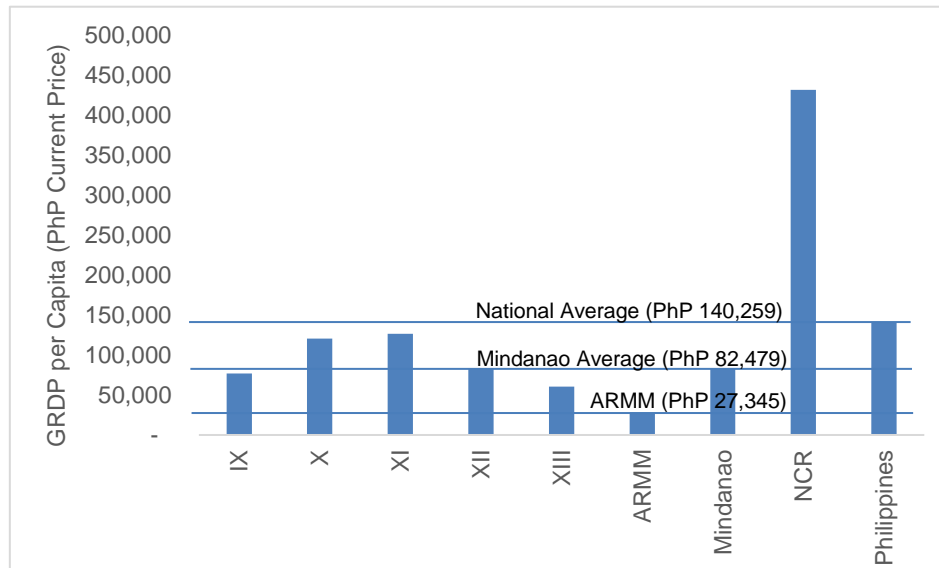
10.3 Closing Economic Gap with Other Regions

In the last five years (2012-2016), the country has registered an outstanding economic expansion with an annual average growth of 6.55%. Although lower than the country's growth, Mindanao as well made an impressive economic growth with an annual average of 5.16% in the same period. The ARMM however posted only an annual average growth of 1.67% in the same span indicating that while the country is enjoying economic boom, this is not extended to the ARMM.

Overall, the economic data of the ARMM is inferior compared with the other regions in Mindanao. For example, in 2015 while the gross regional domestic product (GRDP) of ARMM registered PhP 103.93 billion at current prices, this was way below the second worst performing region in Mindanao which is Caraga (PhP 167.7 billion). This poor economic output was reflected as well in the income and expenditure of families in the region. While the national average annual family income recorded at all time high (PhP 265,000), the family income in the ARMM of the same year reaches only PhP 139,000.

The economic disparity between the ARMM and the rest of the regions in Mindanao is huge; PhP 63.7 billion between the ARMM and Caraga (2nd worst performing region) and PhP 536.7 billion between the ARMM and Region XI (best performing region). In terms of GRDP per capita, while the country has an average of PhP 140,259 and Mindanao has an average of PhP 82,479, the ARMM has only PhP 27,345. One way of closing this economic gap is by construction of new roads to facilitate better

commodity movements and better access to markets. After all, the economic mainstay of the region is agriculture where good road is pre-requisite to remain competitive.



Source: 2016 Philippine Statistical Yearbook

Figure 10.3-1 2016 GRDP per Capita (Current Price)

10.4 Boosting Agricultural Production to Uplift the Poor

The agriculture sector continues to be the primary driver of the ARMM's economy with a share of 56.3% in 2016. Workers in the agriculture sector accounted to 587,322 persons or a share of 60.3% of the total employed population. Construction of new roads in support of this sector is therefore practical action that would benefit majority of the working population.

By utilizing the data from the Department of Agriculture which has developed a National Color-Coded Agricultural Guide Map of the Philippines, the JICA Study Team has able to calculate the total useful land for agricultural production in the immediate influence of the road (i.e. useful land for agriculture in a barangay traversed by the proposed alignment) as illustrated in the table below. As seen in the table, the seven (7) road projects are opening up about 67,661ha suitable areas for different agricultural crops of which 11% for palay, 4% for corn, 21% for banana, 29% for coconut, 11% for coffee and 24% for oil palm.

Table 10.4-1 Suitable Areas in Hectare for Crop Production in Barangays along the Alignment of Sub-Project

(Unit: ha)

Sub-Project	Palay	Corn	Banana	Coconut	Coffee	Oil palm
1. Matanog-Barira-Alamada Libungan	1,792	430	632	608	632	6,383
2. Parang-Balabagan Road	15	75	61	399	64	3,264
5. Maganoy-Lebak Road	700	149	4,259	7,343	0	1,120
6. Tapan-Lebak Coastal Road	2,660	802	3,513	8,741	0	1,766
7. Marawi City Ring Road	126	498	2,821	0	3,112	0
8. Parang East Diversion Road	487	113	727	749	749	1,361
9. Manuangan Parang Road	1,344	588	2,229	1,898	2,782	2,670
Total	7,123	2,655	14,242	19,737	7,339	16,564

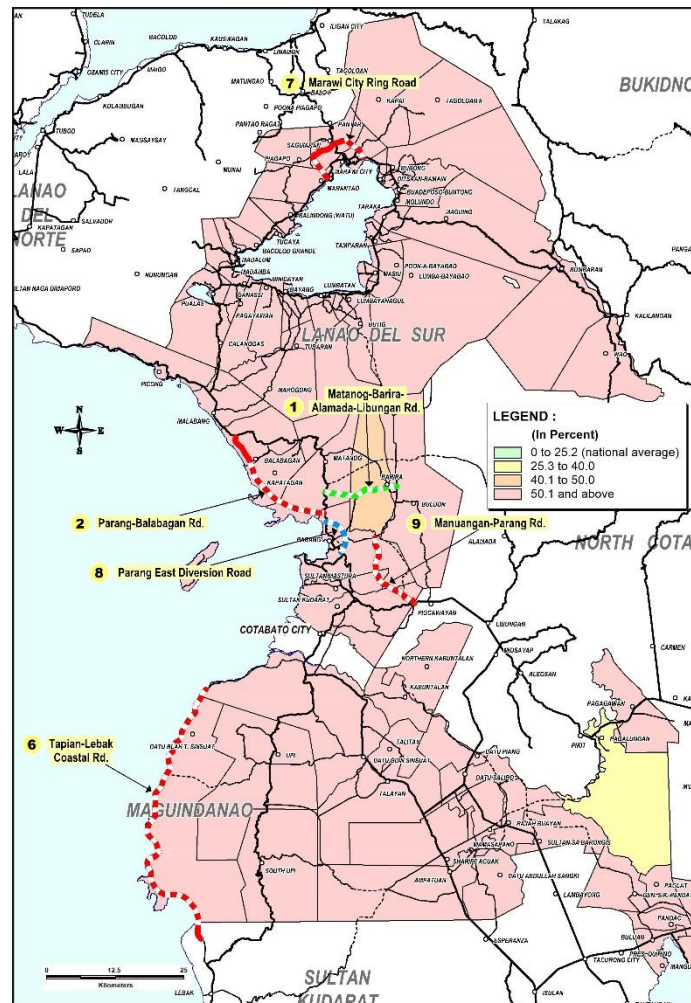
Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

10.5 Support to Poverty Alleviation

While the national poverty incidence is decreasing from 26.6% in 2006 to 21.6% in 2015, the trend in the ARMM is reversed where poverty incidence has increased from 47.1% in 2006 to 53.7% in 2015. The two provinces where the seven (7) Sub-Projects are located are experiencing much dramatic increased of poverty incidence. Poverty incidence in Lanao del Sur Province for instance climbed from 44.7% in 2006 to 71.9% in 2015. The same is true for Maguindanao Province where poverty incidence recorded a spike from 54.6% in 2006 to 57.2% in 2015.

Poverty incidence at municipal level in 2015 is not yet available in the 2016 Philippine Statistics Yearbook. However the 2012 municipal level poverty incidence data is available and plotted in **Figure 10.5-1**. As seen in the figure, all of the Sub-Projects except Sub-Project 1 (Matanog- Barira- Alamada- Libungan Road) are passing through municipalities with very high poverty incidence where poverty incidence is more than 50%.

Although addressing poverty requires addressing inter-related issues such as those relating to low income and employment, or the need to stimulate the local economy and to create jobs and increase markets for local agriculture and fishery products, this Project could be a part of the overall effort of the government to alleviate poverty in the Region by providing temporary jobs during construction period and by increasing access to productive lands.



Source: 2013 Philippine Statistical Yearbook

Figure 10.5-1 Poverty Incidence in the ARMM and Project Location

10.6 Contribution to Peace Building

One of the pressing issues now in the ARMM is the shortage of available jobs for the working population. Data from Philippine Statistics Authority (PSA) reveals that in 2015, the working force of the region is about 2.398 Million. Of these, 96.5% found a job while the remaining 83,930 are unemployed. Likewise, once the MILF finally joined the government through the implementation of the Comprehensive Agreement on Bangsamoro (CAB), providing jobs to their combatants – reported to be about 11,000 - to complete their transition from military to civilian life becomes an urgent concern.

The six (6) road projects are expected to generate about 1.68 Million jobs during construction period. Of these, 69.0% or equivalent to 1.16 Million jobs are classified under unskilled labor (see **Table 10.6-1**). This means that part of these labor forces might be sourced out from the community and even combatants of the MILF might be able to participate. Those with a set of skills may even target the jobs available under the skilled labor which is more than half million in total (523,714). Hence, this Project will contribute in Peace Building in the region by the following:

- Jobs created during construction and maintenance period maybe enjoined by the communities along the alignment including decommissioned MILF combatants when the Peace Agreement between the Government and MILF finally concluded.
- By construction of new roads to previously inaccessible communities, the reach of law enforcement is tremendously extended allowing the communities to benefit from the protection of the state's organs. To demonstrate, it was reported by IP leaders during the IP General Assembly that before the construction of Awang-Upi Road (in Maguindanao Province), the place was used to be haven of criminals. After the road construction, there's a turnaround of the area in terms of improved security and the communities along the road are observed to be fully engaged in tilling their farm land.
- By providing new roads for conflict-affected areas, it will support people's livelihoods through improved access to markets and greatly enhances their chances of escaping from poverty.

Table 10.6-1 Number of required labors during construction stage

Project Name	Length (km)	Number of required labors		Total (man-day)
		Unskilled labors (man-day)	Skilled labors (man-day)	
1. Matanog- Barira- Alamada- Libungan Road (Sub-Project 1)	13.90	146,597	66,210	212,807
2. Parang- Balabagan Road (Sub-Project 2)	35.26	274,549	122,854	397,403
3. Tapan- Lebak Coastal Road (Sub-Project 6)	65.40	484,266	217,703	701,969
4. Marawi City Ring Road (Sub-Project 7)	19.81	91,319	42,587	133,906
5. Parang East Diversion Road (Sub-Project 8)	6.96	56,866	25,936	82,802
6. Parang – Manuagan Road (Sub-Project 9)	16.77	106,602	48,425	155,027
Total	158.1	1,160,198	523,714	1,683,913

Source: JICA Study Team

Chapter 11 Traffic Study

11.1 Present Traffic Condition

11.1.1 Type of Surveys Carried Out

The JICA Study Team has carried out the following traffic surveys, 1) Traffic Count Survey that was conducted in nineteen (19) stations for sixteen (16) hours starting from 06:00 AM to 10:00 PM at each station. 2) Roadside Origin – Destination (OD) Interview Survey conducted in six (6) stations within the study area. The survey was conducted by roadside interview survey method on a random sample basis for twelve (12) hours from 06:00 AM to 06:00 PM each of the specified station. Survey details and locations are shown in **Table 11.1.1-1** and **Figure 11.1.1-1**.

As seen in the table below, the classified traffic count survey was just a 16-hour count. This was done because it was not practical to conduct a 24-hour count owing to security problems and limited number of vehicles in the evening. However, 24-hour count data is necessary input to project the future volume of traffic. In order to complete the 24-hour data, an expansion factor from the DPWH National was utilized since there is not regular traffic count programme by the DPWH-ARMM. Expansion factor at the DPWH National's nearest survey stations (Cotabato-Gen. Santos Road and Cotabato-Davao Road) to the study's survey stations were used as basis to expand the 16-hour count to 24-count. For the same reason where seasonal factor is not available in the ARMM, seasonal factor of DPWH National in Region 12 is used.

Table 11.1.1-1 Summary of Traffic Survey

Type of Survey	Purpose	No. of Day of Traffic Survey	Survey Hours	Survey Details	Remarks
Traffic Count Survey (at 19 stations)	To understand hourly traffic volume trends and determine vehicle classification within ARMM areas, to assess future traffic volume for the road design	One day during weekdays	16 hours (From 06:00 AM to 10:00 PM)	By direction, vehicle type and hour	
Roadside OD Survey (at 6 stations)	To understand/determine travel pattern of passengers and goods/commodities vehicles in ARMM areas	One day during weekdays (excluding Saturdays, Sundays, and National Holidays)	12 hours (From 06:00 AM to 06:00 PM)	For Vehicle other than Trucks and Trailers: • By direction, vehicle type, hour, OD trip purpose, No. of passengers, etc. For Trucks and Trailers: • In addition to the above, commodity type and its weight must be observed	Applied Interview Method

Source: JICA Study Team

Note: Traffic surveys were carried out as follows: Monday: TC-3, TC-17; Tuesday: TC-1, TC-2, TC-6, TC-18, TC-19

Wednesday: TC-5, TC-7, TC-10, TC-11, TC-12, TC-13, TC-14; Thursday: TC-4, TC-8, TC-9, TC-15, TC-16



Source: JICA Study Team

Figure 11.1.1-1 Traffic Survey Locations

11.1.2 Traffic Volume

The summary of traffic volume is shown in **Table 11.1.2-1** and illustrated in **Figure 11.1.2-1**. Based on these, following are observed:

- In general, the Cotabato City– Davao and Cotabato City – Gen. Santos have the most number of traffic due to high movement of passengers and goods in these two routes which confirm the high economic exchanges among them. Traffic in these backbone roads are much higher on the road linking Cotabato City to Marawi and Pagadian/Zamboanga.
- For the details, Cotabato City (Sinsuat Avenue) - Gen. Santos/Datu Odin Sinsuat (TC13) route has the highest traffic volume of 24,197 in total compared to the rest of the stations. This is a national road (AH26) which connect Cotabato City and General Santos City. The high volume of traffic can be attributed to its location at the center of Cotabato City where both through traffic and local traffic utilize the national road.
- This is followed by Cotabato City/Parang-Pagadian/Matanog (TC8) with a total of 18,282 vehicles. This national road (AH26) connects Cotabato City to Pagadian City and Marawi City. Likewise, the count station is inside the Municipality of Parang where the national road is servicing both local and through traffic hence the high volume of traffic.
- The route with lowest traffic volume is Cotabato City-Datu Blah Sinsuat (TC12). This road leads to Sub-Project 6 (Tapien- Lebak Coastal Road) which is a missing link. This could explain the low volume of traffic. Most traffic of this area are usually come to enjoy the beach aside from those living in the area.
- The Malabang-Marawi City road (TC18) has low traffic volume as well (1,995) which could be attributed to the on-going security crisis in Marawi City.

Table 11.1.2-1 Summary of Traffic Volume (AADT)

Survey Station No.	Survey Station Name	1	2	3	4	5	6	7	8	9	10	Sub-Total (1 to 2)	Sub-Total (3 to 10)	Total
		Motorcycle	Tricycle	Car/Taxi/Van	Jeepney	Mini Bus	Large Bus	2-axle Truck	3 or more axle Truck	Trailer	Special			
TC-1	Cotabato - Gen. Santos Road	3,196	2,919	3,058	365	0	59	907	191	41	54	6,115	4,675	10,790
TC-2	Awang - Upi Road	1,600	580	723	162	0	4	279	80	2	2	2,180	1,253	3,432
TC-3	Cotabato - Davao Road	5,353	1,730	5,638	1,286	0	133	929	349	27	0	7,083	8,362	15,446
TC-4	Cotabato - Davao Road	3,919	1,119	3,401	331	0	78	613	160	47	27	5,038	4,658	9,696
TC-5	Libungan-Alamada Road	2,165	1,098	594	89	0	1	173	41	4	0	3,263	903	4,165
TC-6	Cotabato -Malabang - Pagadian	674	1,099	904	46	0	2	254	25	0	6	1,772	1,237	3,009
TC-7	Cotabato -Upi-Lebak	3,916	1,490	434	2	2	0	358	73	0	38	5,406	907	6,313
TC-8	Cotabato/Parang - Pagadian/Matanog	3,134	12,305	1,938	578	0	4	301	22	0	0	15,439	2,843	18,282
TC-9	Cotabato - General Santos	4,472	2,099	4,403	29	4	309	758	327	131	35	6,571	5,996	12,566
TC-10	Cotabato-General Santos	2,279	1,760	2,471	435	0	48	380	76	11	14	4,039	3,434	7,473
TC-11	Cotabato - Upi-Lebak Road	3,911	1,491	437	2	2	4	357	71	0	36	5,402	909	6,311
TC-12	Cotabato City - Datu Bla Sinsuat	543	509	162	21	0	0	7	2	0	0	1,052	191	1,244
TC-13	Cotabato City (Sinsuat Avenue)- General Santos	5,794	1,277	8,110	8,569	3	6	343	91	3	2	7,071	17,126	24,197
TC-14	Cotabato - Davao Road	2,412	555	3,103	384	0	78	1,062	315	128	1	2,966	5,072	8,039
TC-15	Midsayap - Makar Road	1,974	1,595	536	13	0	0	97	27	0	11	3,569	684	4,253
TC-16	Parang -Buldon	682	1,134	170	478	0	0	114	32	0	0	1,815	794	2,609
TC-17	Cotabato- Pagadian	325	866	1,037	65	1	0	197	35	3	0	1,191	1,339	2,529
TC-18	Malabang - Marawi Road	395	519	872	46	1	0	162	1	0	0	914	1,081	1,995
TC-19	Cotabato-Pagadian Road	1,160	1,780	962	82	4	0	226	94	8	0	2,940	1,376	4,316

Note: Trailer defines 3 axle or more semi-trailer, special vehicle is composed ambulance, agricultural tractor etc

Source: JICA Study Team



Source: JICA Study Team

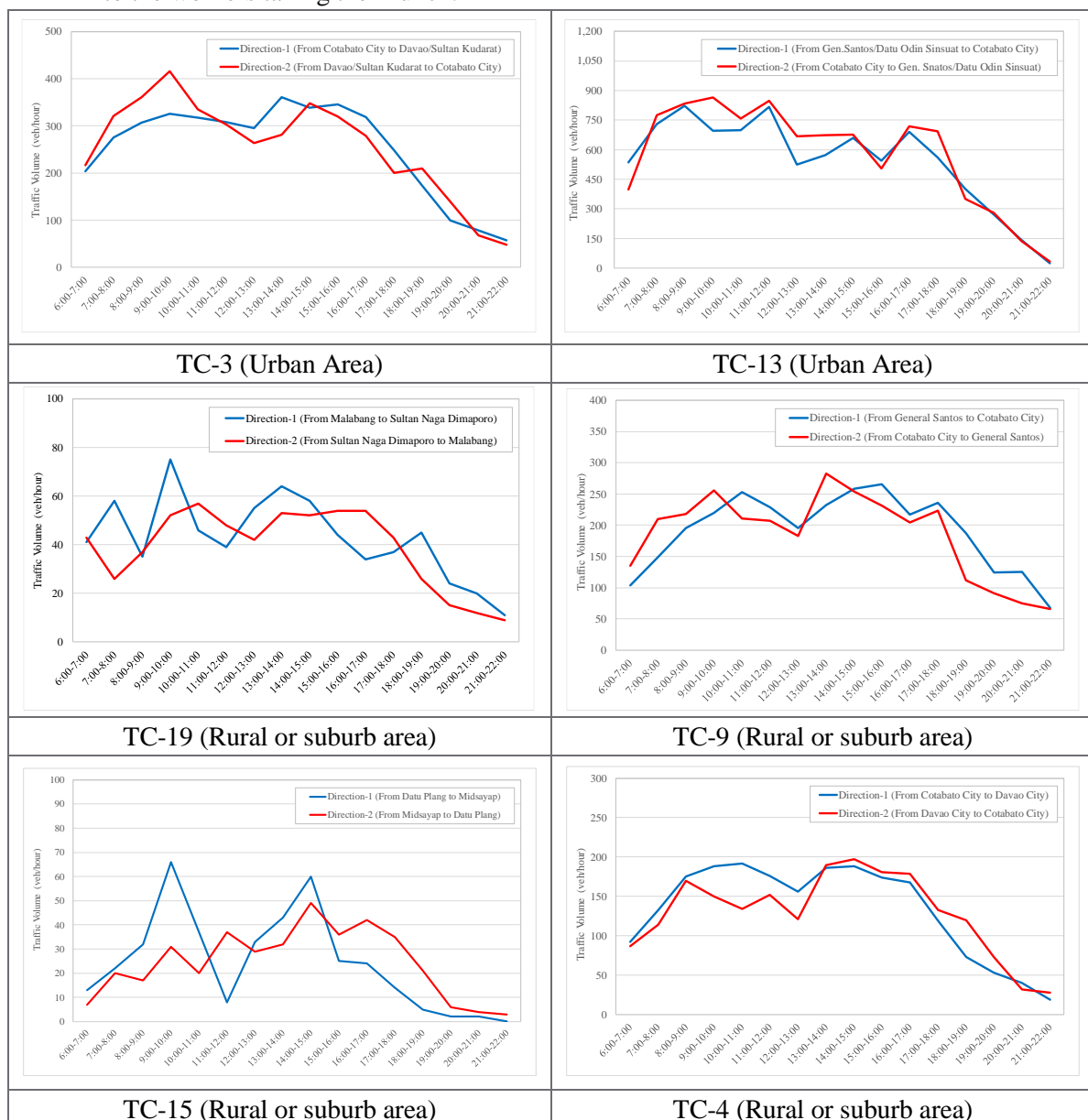
Figure 11.1.2-1 Result of Traffic Volume (AADT)

11.1.3 Hourly Traffic Variation

The figures below are the summary of hourly traffic variation in urban and rural or suburb areas of which shows the characteristics of hourly traffic variation within the study area.

(1) Urban Area

- TC-3 and TC-13 are both inside Cotabato City. Since most of the traffic are people in the city, traffic volume is high from morning until afternoon at 17:00 which is the time where most workers both in public and private sectors are returning to their homes.
- In the morning, the peak hour is observed from 09:00 AM to 10:00 PM which can be attributed to people going to the markets and other errands.
- In the afternoon, the peak hour is registered from 13:00 to 14:00 which is most likely attributed to the workers taking their lunch.



Source: JICA Study Team

Figure 11.1.3-1 Hourly Traffic Variation in Urban Area and Rural or Suburb Area

(2) Rural or Suburb Area

- For the rural area, most probably the traffic captured are inter-city traffic moving from Cotabato City to Davao City for the case of TC-4. This could explain the peak hour which from 9:00AM to 11:00AM since it would take two hours to reach the count station from Cotabato City. So perhaps the motorists left Cotabato City at 7:00 or 8:00 in the morning and reached the area by 9:00AM to 11AM depending on their speed.
- The same is true for other count stations located outside the city. Most probable, the traffic are moving from one city/municipality to another hence the peak hour is close to noon.

11.1.4 Traffic Composition

Traffic composition of all traffic count survey station is shown in **Table 11.1.4-1**. General characteristics of traffic are as follows:

- Count stations along the Cotabato City – Gen. Santos Road (TC-1, TC-9, TC-10) captured the buses plying this route as shown in the table below. Likewise, it clearly shows the high population of motorcycles and tricycles since all of the count stations are inside a city or municipality. Car has a high proportion as well in this road (Cotabato City – Gen. Santos City) which can be assumed to be travelling between the two major cities.
- Count stations along Cotabato City – Davao City Road (TC-3, TC-4, TC-14) have shown the same tendency as well where the buses servicing this route is also reflected (0.8% - 1.0%). Again, all these three count stations are inside the city hence the high share of motorcycles and tricycles where are servicing local passengers.
- Cotabato City – Upi- Lebak route (TC-7) has very high share of motorcycles which is main mobility means of people in the rural areas – for this case, in Lebak Municipality.
- Parang – Buldon road (TC-16) registered high share of Jeepneys at 18.3% which is the main transportation mode of the people of Buldon to the Municipality of Parang (trading center).
- The high share of Jeepneys in Cotabato City (TC-13) is attributed to local traffic where the main mode of transportation are Jeepneys and tricycles.
- For the high number of trucks, these are observed in the following routes: Cotabato City – Davao Road, Cotabato City – Gen. Santos Road and Cotabato City – Pagadian Road. These routes are connecting two or more major cities hence the high share of trucks.

Table 11.1.4-1 Traffic Composition of All Traffic Count Survey Station

Survey Station No.	Survey Station Name	1 Motorcycle	2 Tricycle	3 Car/Taxi/Van	4 Jeepney	5 Mini Bus	6 Large Bus	7 2-axle Truck	8 3 or more axle Truck	9 Trailer	10 Special	Sub-Total (1 to 2)	Sub-Total (3 to 10)	Total
TC-1	Cotabato - Gen. Santos Road	29.6%	27.1%	28.3%	3.4%	0.0%	0.6%	8.4%	1.8%	0.4%	0.5%	100.0%	0	1
TC-2	Awang - Upi Road	46.6%	16.9%	21.1%	4.7%	0.0%	0.1%	8.1%	2.3%	0.1%	0.1%	100.0%	0	1
TC-3	Cotabato - Davao Road	34.7%	11.2%	36.5%	8.3%	0.0%	0.9%	6.0%	2.3%	0.2%	0.0%	100.0%	1	2
TC-4	Cotabato - Davao Road	40.4%	11.5%	35.1%	3.4%	0.0%	0.8%	6.3%	1.6%	0.5%	0.3%	100.0%	0	1
TC-5	Libungan-Alamada Road	52.0%	26.4%	14.3%	2.1%	0.0%	0.0%	4.2%	1.0%	0.1%	0.0%	100.0%	0	1
TC-6	Cotabato -Malabang - Pagadian	22.4%	36.5%	30.0%	1.5%	0.0%	0.1%	8.4%	0.8%	0.0%	0.2%	100.0%	0	1
TC-7	Cotabato -Upi-Lebak	62.0%	23.6%	6.9%	0.0%	0.0%	0.0%	5.7%	1.2%	0.0%	0.6%	100.0%	0	1
TC-8	Cotabato/Parang - Pagadian/Matanog	17.1%	67.3%	10.6%	3.2%	0.0%	0.0%	1.6%	0.1%	0.0%	0.0%	100.0%	0	1
TC-9	Cotabato - General Santos	35.6%	16.7%	35.0%	0.2%	0.0%	2.5%	6.0%	2.6%	1.0%	0.3%	100.0%	0	1
TC-10	Cotabato-General Santos	30.5%	23.5%	33.1%	5.8%	0.0%	0.6%	5.1%	1.0%	0.1%	0.2%	100.0%	0	1
TC-11	Cotabato - Upi-Lebak Road	62.0%	23.6%	6.9%	0.0%	0.0%	0.1%	5.7%	1.1%	0.0%	0.6%	100.0%	0	1

Survey Station No.	Survey Station Name	1	2	3	4	5	6	7	8	9	10	Sub-Total (1 to 2)	Sub-Total (3 to 10)	Total
		Motorcycle	Tricycle	Car/Taxi/Van	Jeepney	Mini Bus	Large Bus	2-axle Truck	3 or more axle Truck	Trailer	Special			
TC-12	Cotabato City - Datu Bla Sinsuat	43.7%	40.9%	13.0%	1.7%	0.0%	0.0%	0.6%	0.1%	0.0%	0.0%	100.0%	0	1
TC-13	Cotabato City (Sinsuat Avenue)- General Santos	23.9%	5.3%	33.5%	35.4%	0.0%	0.0%	1.4%	0.4%	0.0%	0.0%	100.0%	1	2
TC-14	Cotabato - Davao Road	30.0%	6.9%	38.6%	4.8%	0.0%	1.0%	13.2%	3.9%	1.6%	0.0%	100.0%	1	2
TC-15	Midsayap - Makar Road	46.4%	37.5%	12.6%	0.3%	0.0%	0.0%	2.3%	0.6%	0.0%	0.2%	100.0%	0	1
TC-16	Parang -Buldon	26.1%	43.4%	6.5%	18.3%	0.0%	0.0%	4.4%	1.2%	0.0%	0.0%	100.0%	0	1
TC-17	Cotabato- Pagadian	12.9%	34.2%	41.0%	2.6%	0.1%	0.0%	7.8%	1.4%	0.1%	0.0%	100.0%	1	2
TC-18	Malabang - Marawi Road	19.8%	26.0%	43.7%	2.3%	0.1%	0.0%	8.1%	0.0%	0.0%	0.0%	100.0%	1	2
TC-19	Cotabato-Pagadian Road	26.9%	41.2%	22.3%	1.9%	0.1%	0.0%	5.2%	2.2%	0.2%	0.0%	100.0%	0	1

Source: JICA Study Team

11.2 Traffic Demand Forecast

11.2.1 Approach for Traffic Demand Forecast

The traffic demand forecast was conducted in order to estimate the future traffic volume on Sub-Project roads in 2020 and 2030. The traffic demand forecast procedure is shown in **Figure 11.2.1-1**. Based on this procedure, the JICA Study Team did the following: i) Updated the existing OD Table, ii) Confirmation of existing road network, iii) Validation of the Present traffic assignment, iv) Preparation of future OD table, and v) Conduction of future traffic assignment.

i) The present OD table (year 2017) was prepared and updated based on the result of the roadside interview survey in this project and year 2010 OD tables prepared by “The Study on the Infrastructure (Road Network) Development Plan for ARMM” (SIDP).

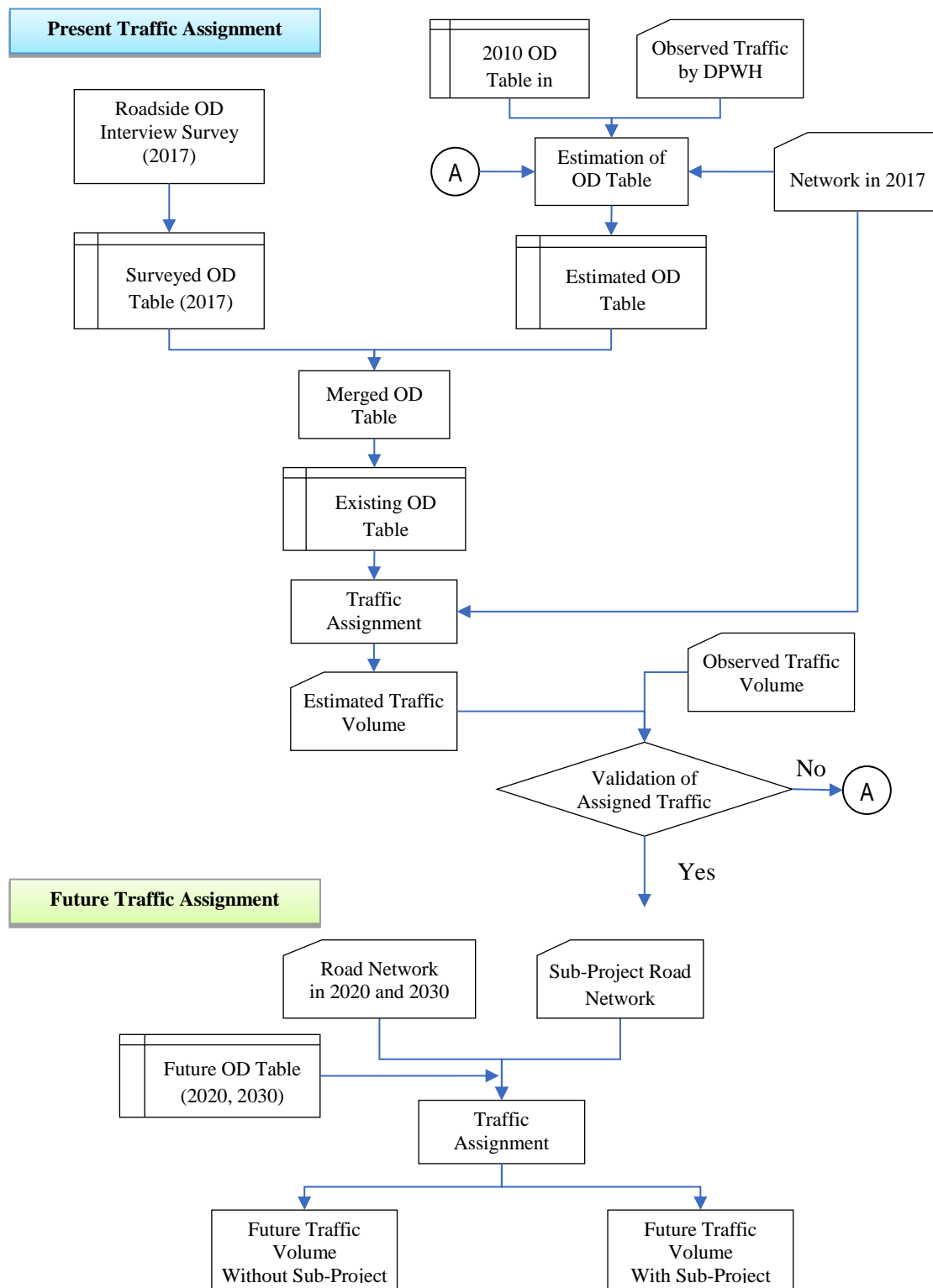
ii) The road network data in Mindanao based on SIDP road network was reviewed and updated based on the road condition survey result and the latest GIS data.

iii) The traffic assignment was prepared utilizing the updated existing OD table and the road network. And, validation of present traffic assignment was conducted for the traffic count data and assigned traffic volume for each link.

iv) After validation, the future OD table was estimated based on future socio-economic framework.

v) The future traffic assignment was prepared using the future OD table and the future road network (with Sub-Project Case and Without Sub-Project Case).

vi) Note that motorcycle is not considered in the demand forecast since this mode of transport is normally used for intra-city movement or short distance trips. The target in the demand forecast are trips normally moves from one city to another city/municipality (or from zone to zone) - inter-city movement.



Source: JICA Study Team

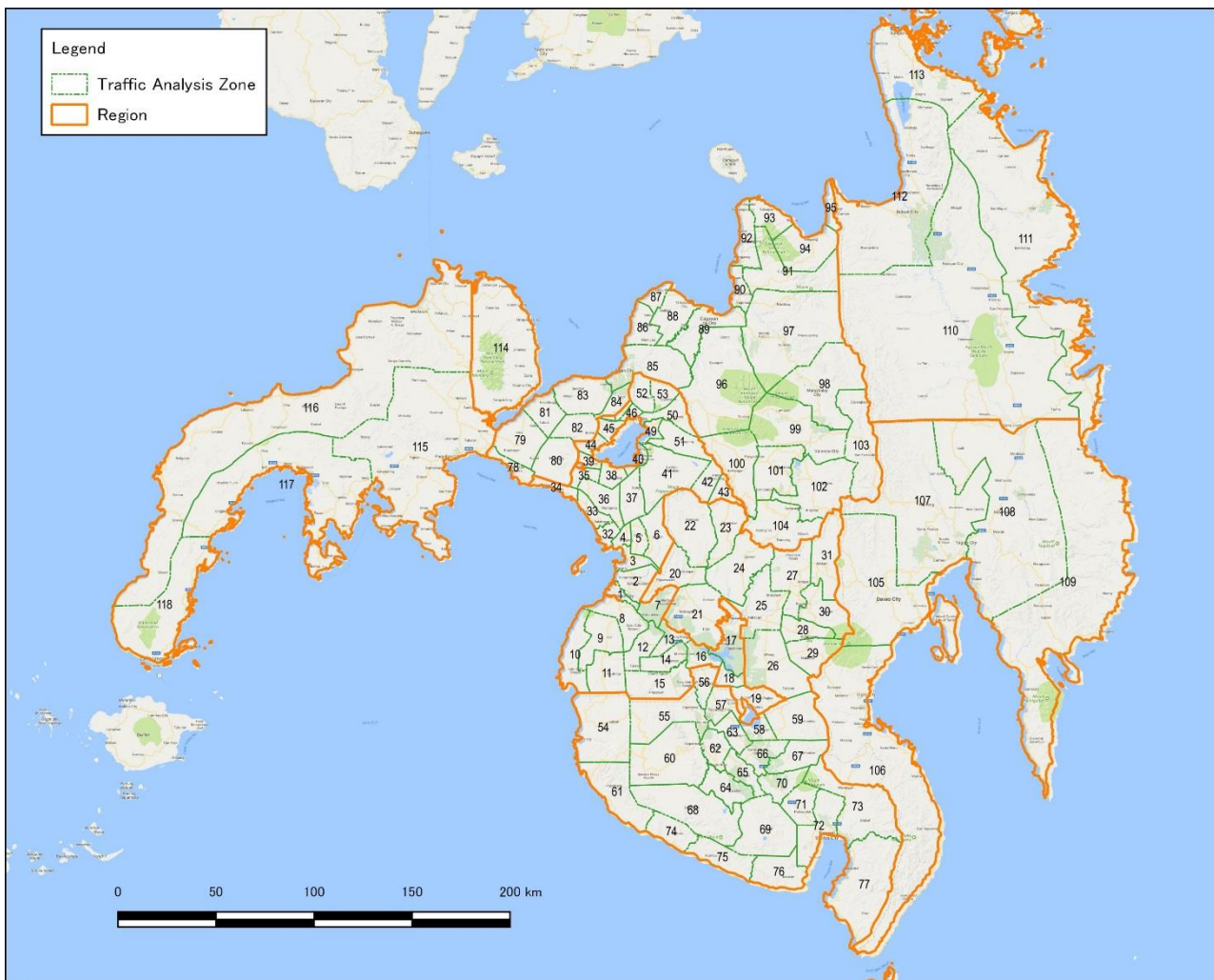
Figure 11.2.1-1 Traffic Demand Forecast Procedure

In this traffic assignment, the zoning system is comprised of the subject area (ARMM, Region X, Region XII) and outside subject area (Region IX, 11, and 13). The subject area is divided into 104 zones based on municipality and city. The total zoning number is 119 zones as shown in **Table 11.2.1-1** and **Figure 11.2.1-2**.

Table 11.2.1-1 Traffic Zoning System

Area		Province	Traffic Zone
Subject Area	ARMM	Maguindanao	2 - 19
		Lanao del Sur	32 - 53
	Region X	Bukidnon	96 - 104
		Lanao de Norte	78 - 85
		Misamis Oriental	86 - 95
	Region XII	Cotabato City	1
		North Cotabato	20 - 31
		South Cotabato	62 - 72
		Sultan Kudarat	54 - 61
		Sarangani	73 - 77
Outside Subject Area (Region IX, 11, and XIII)			105 - 118
Special Area	Polloc Port	119	

Source: JICA Study Team



Source: JICA Study Team, Google Map

Figure 11.2.1-2 Traffic Zoning System

11.2.2 Establishment of Existing OD Table

The existing OD tables will be established from the information obtained by transport surveys (Roadside OD Interview Survey, Traffic Count Survey). As explained in the earlier section, the roadside OD interview survey was conducted at several locations and the surveyed data was processed to develop OD tables for this project. However, the number of survey locations is not considered to be sufficient to obtain OD samples representing all trips generated in the subject area.

In the SIDP, the future vehicle trip OD tables were estimated in the years 2015, 2020, 2025. The estimated OD table in 2015 was calibrated with the existing traffic volume at around 200 DPWH survey locations where the OD interview survey locations conducted in this project don't seem to cover. For this purpose, 'OD Calibrator' in STRADA was applied. The calibrated OD table was merged with the surveyed OD table obtained the interview survey into an existing OD table that represents whole inter-city traffic in the subject area.

The OD Calibrator builds an OD matrix that is consistent with the results of a traffic count survey conducted on a selected number of links in the network. With an input file of the OD flow matrix, you can select from two alternative methods: the Route Mean square Error Minimizing Model and the Entropy Maximizing Model. The OD Calibrator handles only one mode and reads the total cross-sectional flows of the surveyed links. The OD Calibrator can build an OD matrix based on the observation of directional link flows, provided that you write the link specifications by direction in the network data.

Source: Manual for the OD Calibrator, JICA STRADA

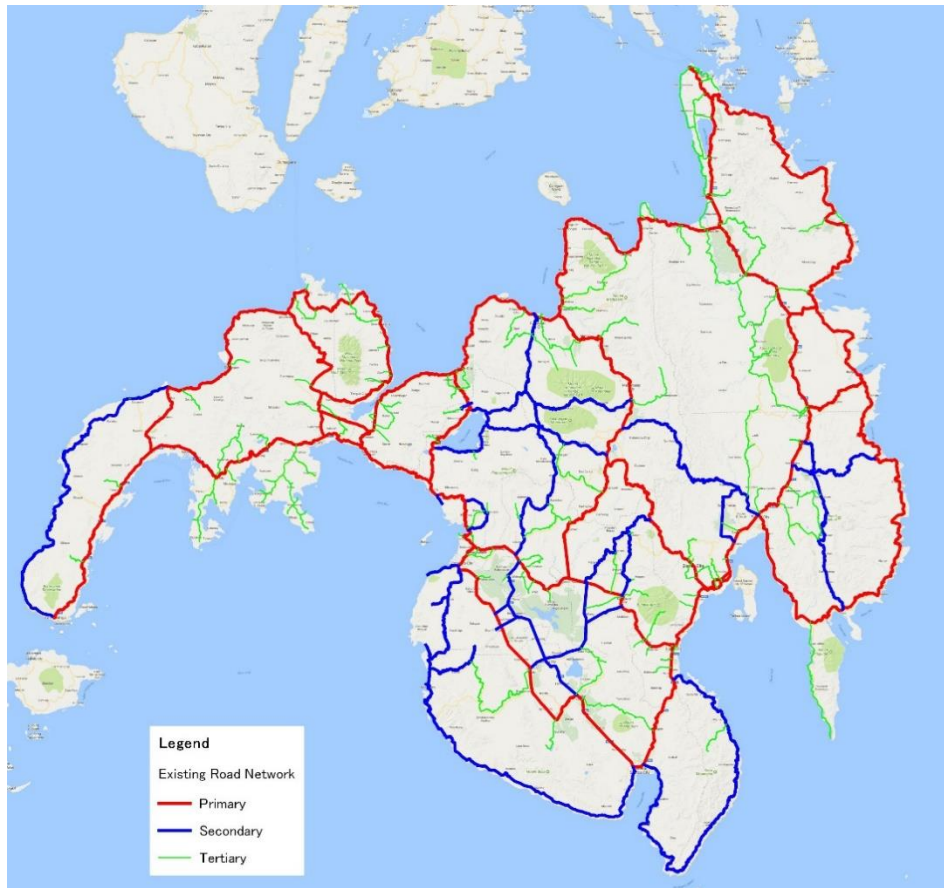
This merged OD table was assigned on an existing network by Assignment Model which is described in later section, in order to estimate traffic volume on each road section, and the traffic volume estimated at each survey location was compared with observed traffic volume to verify the accuracy of representation of the existing traffic situation in the OD table.

11.2.3 Road Network Database

(1) Existing Road Network

The existing network was established in consideration of the following points.

- Major roads that mainly connect cities and serve inter-city traffic are preferentially included in the existing network database.
- The level of service of each road such as free flow speed and capacity, should be decided by taking the classification of each road into account.
- Whether or not there is a missing link in each road and road surface is paved, are examined by reviewing "Comprehensive Capacity Development Project for the Bangsamoro Development Plan for the Bangsamoro" DRIMS Survey and aerial photographs.



Source: JICA Study Team, Google Map

Figure 11.2.3-1 Existing Road Network Data

The assignment is the procedure by which the minimum paths are searched and travel demand between each zone pair are loaded on the minimum paths on the network. For searching the minimum paths, each link in the road network should prepare link information such as travel speed and the relationship between travel speed and traffic volume. This project applied the following data for link information.

Table 11.2.3-1 Free Flow Speed and Capacity by Road Type

QV Type No.	Pavement	Road Classification	Topography	Lane	Vmax	Qmax
1	Paved	Interstate Highway	Mountains	4	30	42,000
2				2	25	12,600
3		Urban Arterial	Mountains	10	60	120,000
4				8	60	96,000
5				6	50	72,000
6				4	40	48,000
7				2	30	14,400
8		Local	Plain	4	40	40,000
9				2	30	12,000
10			Mountains	2	30	8,400
11	Unpaved		Plain	2	20	6,000
12			Mountains	2	10	4,200

Source: Preparatory survey for southern Mindanao economic corridor improvement (Davao city bypass construction) project

(2) Sub-Project Road Network

The road network in the future was developed by adding the project road sections to the existing road network established in the previous section. Therefore, the difference between the existing network and the future network is whether or not the project road sections are included. The project road sections in the future network are indicated by the green dash line in **Figure 11.2.3-2**.

The profile of each project road section was developed according to their plan.



Source: JICA Study Team, Google Map

Figure 11.2.3-2 Project Road Network

11.2.4 Present Traffic Demand Forecast

(1) Assignment Validation

The procedure of verification includes two steps: first, the existing OD table is assigned on an existing network, second, the assigned traffic volume is compared with the result of the traffic count surveys at each corresponding location. This verification aims to check the accuracy of both the existing OD table and an existing network modelled representing the existing transport situation.

Figure 11.2.4-1 shows the result of traffic assignment simulation. Traffic volume assigned is the sum of four types of vehicle: car, jeepney, bus, and truck, in terms of vehicle trips. And the width of lines indicates level of traffic volume.

Figure 11.2.4-2 shows the result of comparison between the traffic volumes assigned and observed traffic.

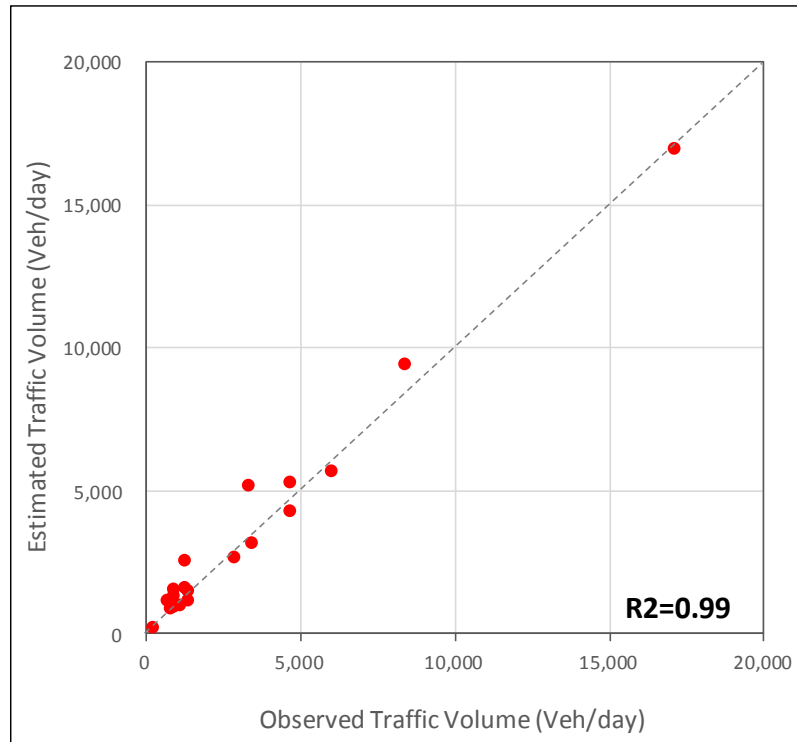
The correlation coefficient is useful to be able to indicate the level of accuracy on the relationship between two variables, such as estimated and observed traffic volume in the present situation. A set of the correlation coefficient are 0.99 for total vehicle.

Table 11.2.4-1 shows the estimated traffic volume compared with Annual Average Daily Traffic (AADT) of the total of four vehicles estimated based on the traffic count survey conducted at nineteen (19) locations in the subject area. In the figure, although there are several locations indicating difference between estimated and observed, the rate of errors, which is the difference of observed and estimated divided by the observed traffic volume, are 5.9%.



Source: Manual for the OD Calibrator, JICA STRADA, Google Map

Figure 11.2.4-1 Result of Traffic Assignment for Existing Situation



Source: Calculated by JICA Study Team

Figure 11.2.4-2 Validation between Estimated and Observed Volumes by Vehicle Type

Table 11.2.4-1 Estimated Traffic Volume by Survey Station

Survey Station	Observed Traffic Volume (veh/day)	Estimated Traffic Volume (veh/day)	Difference	Rate
TC-1	4,675	4,275	-400	-8.6%
TC-2	1,253	1,594	341	27.3%
TC-3	8,362	9,403	1,041	12.4%
TC-4	4,658	5,298	640	13.8%
TC-5	903	949	46	5.1%
TC-6	1,237	2,535	1,298	104.9%
TC-7	907	1,562	655	72.2%
TC-8	2,843	2,656	-187	-6.6%
TC-9	5,996	5,704	-292	-4.9%
TC-10	3,434	3,151	-283	-8.3%
TC-11	909	1,351	442	48.6%
TC-12	191	197	6	2.9%
TC-13	17,126	16,947	-179	-1.0%
TC-14	5,072	5,173	101	2.0%
TC-15	684	1,180	496	72.6%
TC-16	794	910	116	14.7%
TC-17	1,339	1,508	169	12.7%
TC-18	1,081	981	-100	-9.3%
TC-19	1,376	1,164	-212	-15.4%
Total	62,839	66,538	3,699	5.9%

Source: Calculated by JICA Study Team

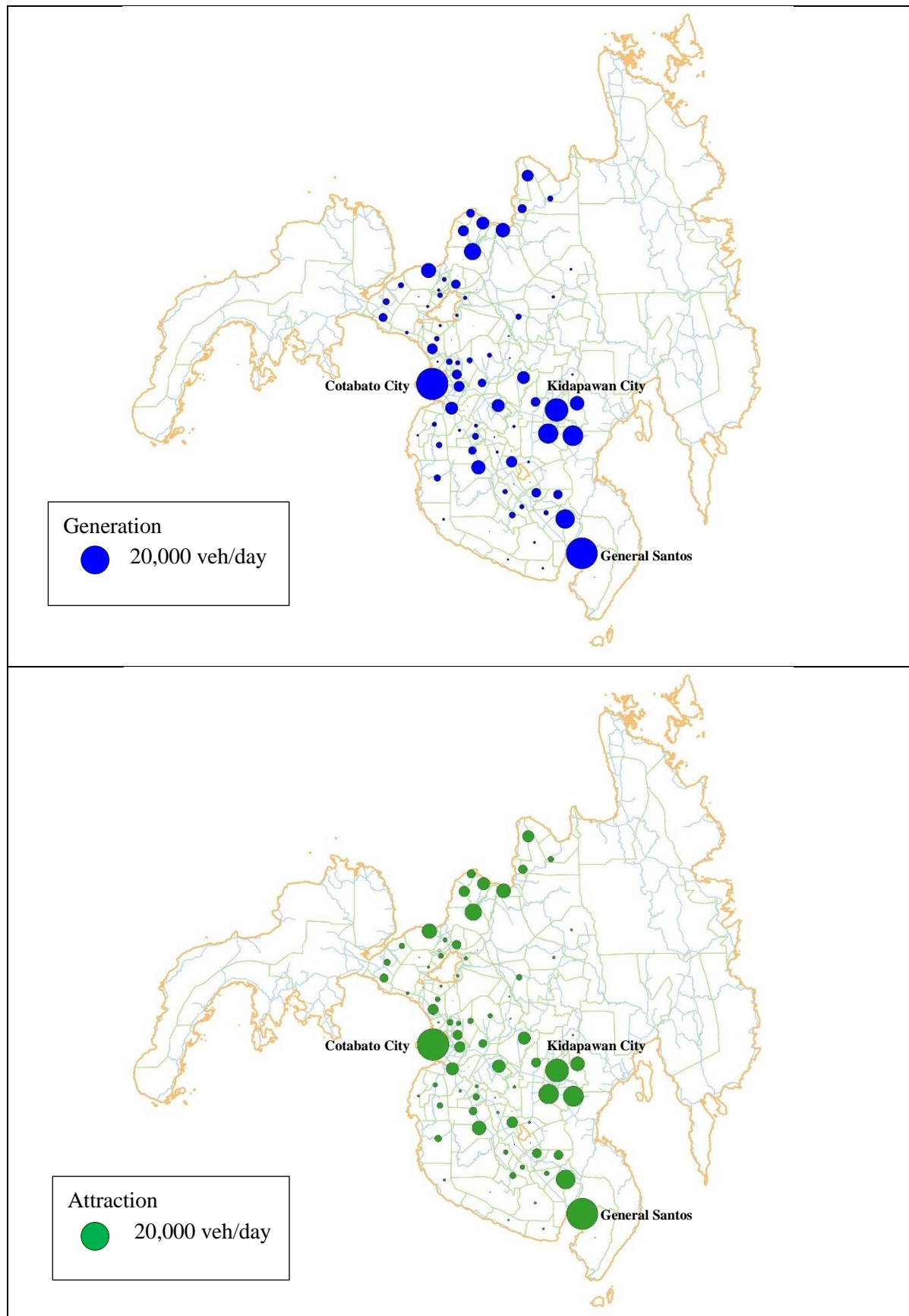
(2) Trip Generation and Attraction

Figure 11.2.4-3 shows trip generation and attraction by zone, which is the number of trips generating from and attracting to each zone.

The heaviest traffic volume of vehicles generating from the zone of Cotabato City is about 16,000 vehicle trips per day in the subject area, followed by the zone of General Santos City in South Cotabato, which is more than 15,000 trips per day. The amount of daily traffic actually generating from this zone of General Santos is probably to be much larger than this figure. Because, this traffic volume is only considered trips traveling the subject area captured by OD interview survey so that it is smaller.

In addition, the generation of many trips can be also seen in areas including Kidapawan City, in the southern part of North Cotabato Province.

The characteristics of the trip attraction to each zone show the same tendency as the trip generation.



Source: JICA Study Team

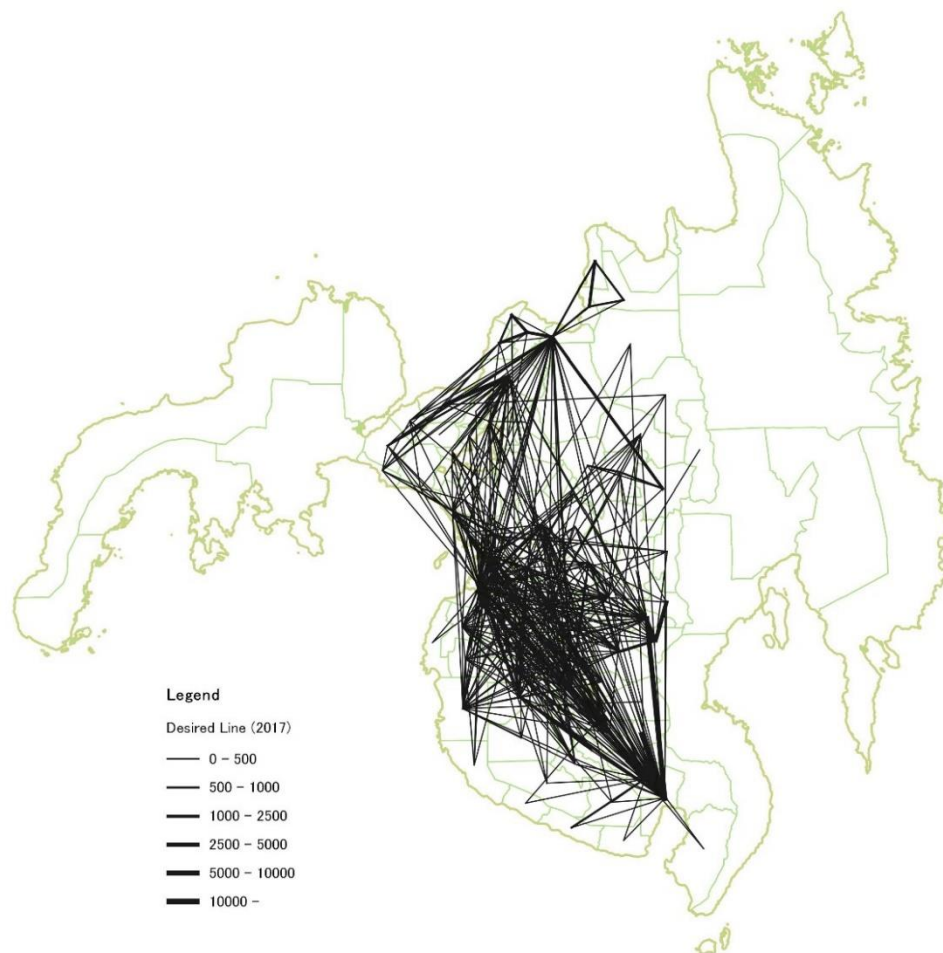
Figure 11.2.4-3 Trip Generation and Attraction by Zone (2017)

(3) Trip Distribution

Trip distribution of all vehicle types, car, jeepney, bus and truck between zones is shown in **Figure 11.2.4-4**. The width of the displayed lines is proportional to the traffic volume between the corresponding origin and destination zones.

The biggest inter-zonal trip distribution can be seen among adjacent zones around Cotabato City area.

There is a large trip distribution between zones including Cotabao City and General Santos City area. Almost travel demand generating from the northern part of the subject area, such as Iligan City and Cagayan de Oro City, seems to complete their trips within the northern part, and not reach Cotabato City area.



Source: JICA Study Team

Figure 11.2.4-4 Trip Distribution (2017)

11.2.5 Future Socio-economic Data

The formulation of the future socio-economic framework necessary for forecasting traffic demand is discussed in this section. As mentioned in the description of demand forecast models, it is necessary to examine two statistical indicators such as population and GRDP for estimating future OD tables.

(1) Population

Population is required for the trip generation model. The growth of the population of each zone is used to estimate the increase of trip generation of each zone.

The population by zone in the past for year 2000 and 2015 was established by aggregating population of Barangay surveyed in Census. On the other hand, population in Region X, Region XII, and ARMM was projected by using the past yearly growth rate between 2000 and 2015, and the province population was divided into population by zone according to the proportion of the population by zone.

Table 11.2.5-1 shows the result of the population projection by province for the year 2020 and 2030. Based on the future province population in the future, the future zonal population was projected and used to estimate the trip generation in the future.

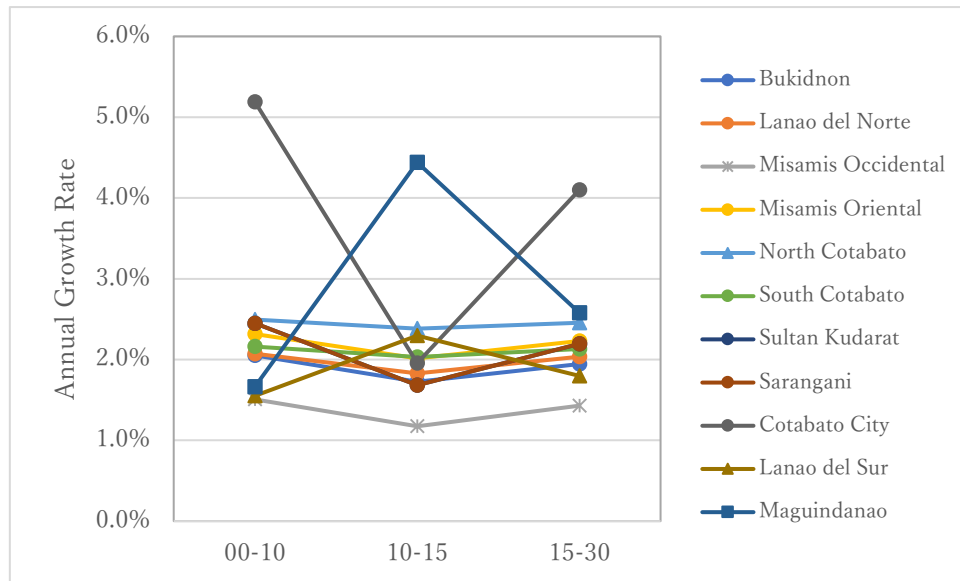
Table 11.2.5-1 Formulation of Future Population

Region	Province/City	Population					Yearly Growth Rate		
		2000	2010	2015	2020	2030	00-10	10-15	15-30
Region X	Bukidnon	1,060,415	1,299,192	1,415,226	1,558,149	1,888,755	2.05%	1.73%	1.94%
	Lanao del Norte	758,123	930,738	1,019,013	1,126,290	1,378,922	2.07%	1.83%	2.04%
	Misamis Occidental	560,955	651,449	690,604	741,363	854,348	1.51%	1.17%	1.43%
	Misamis Oriental	1,126,215	1,415,944	1,564,459	1,746,372	2,177,566	2.32%	2.01%	2.23%
Region XII	North Cotabato	958,643	1,226,508	1,379,747	1,557,807	1,985,830	2.49%	2.38%	2.46%
	South Cotabato	1,102,550	1,365,286	1,509,735	1,677,140	2,070,912	2.16%	2.03%	2.13%
	Sultan Kudarat	586,505	747,087	812,095	905,146	1,124,455	2.45%	1.68%	2.19%
	Saranggani	410,622	498,904	544,261	597,855	721,393	1.97%	1.76%	1.90%
	Cotabato City	163,849	271,786	299,438	366,096	547,230	5.19%	1.96%	4.10%
ARMM	Lanao del Sur	800,162	933,260	1,045,429	1,142,879	1,365,876	1.55%	2.30%	1.80%
	Maguindanao	801,102	944,718	1,173,933	1,333,404	1,720,279	1.66%	4.44%	2.58%

Source: Philippine Statistic Authority (PSA)

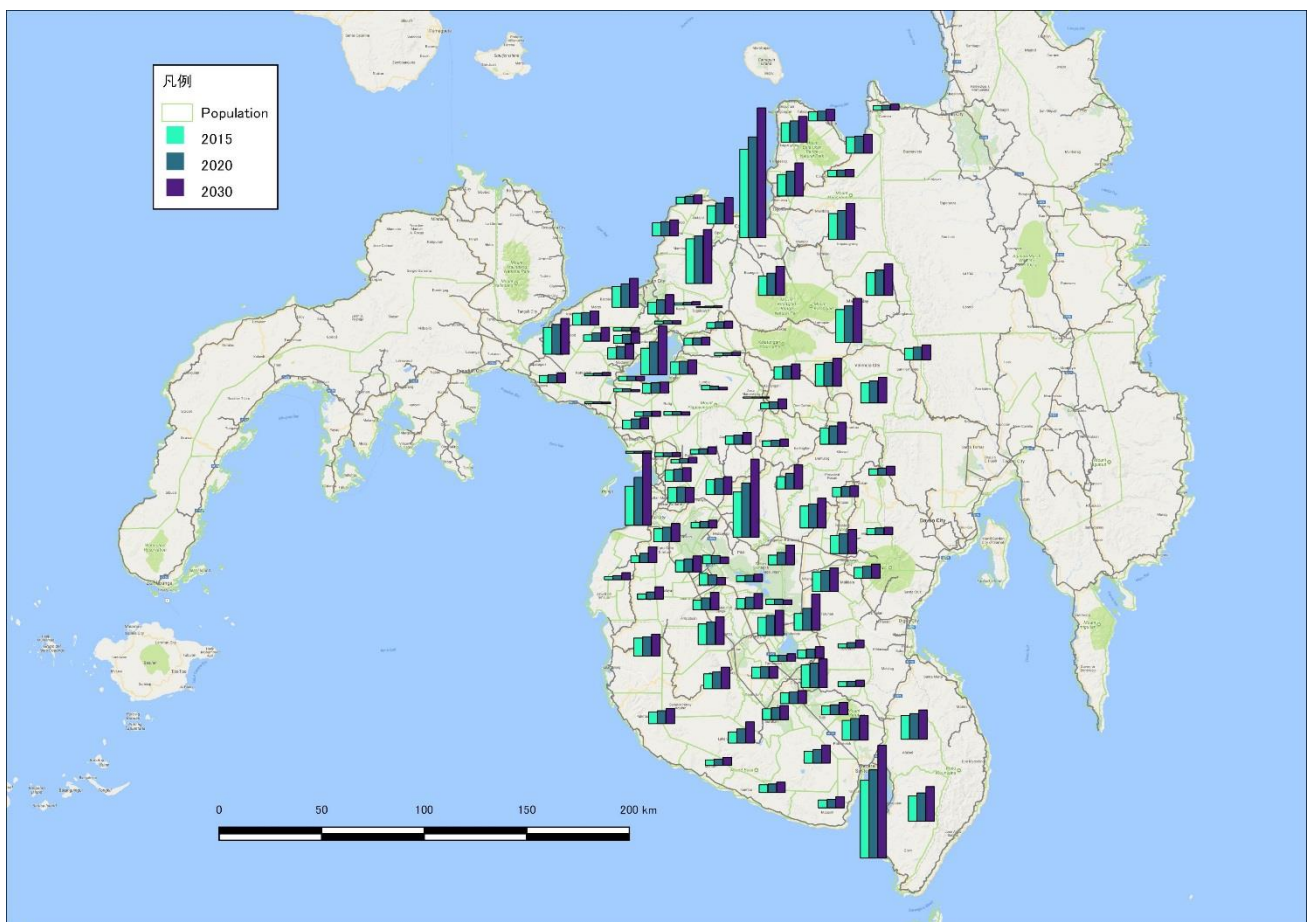
Figure 11.2.5-1 shows, the assumed yearly growth rate of population by province from 2000 to 2030. The growth rate of Cotabato City has been up and down in recent years. However, the growth rate for projection of future population is 1.8%.

Figure 11.2.5-2 shows the population projection by zone and **Figure 11.2.5-3** shows the population density.



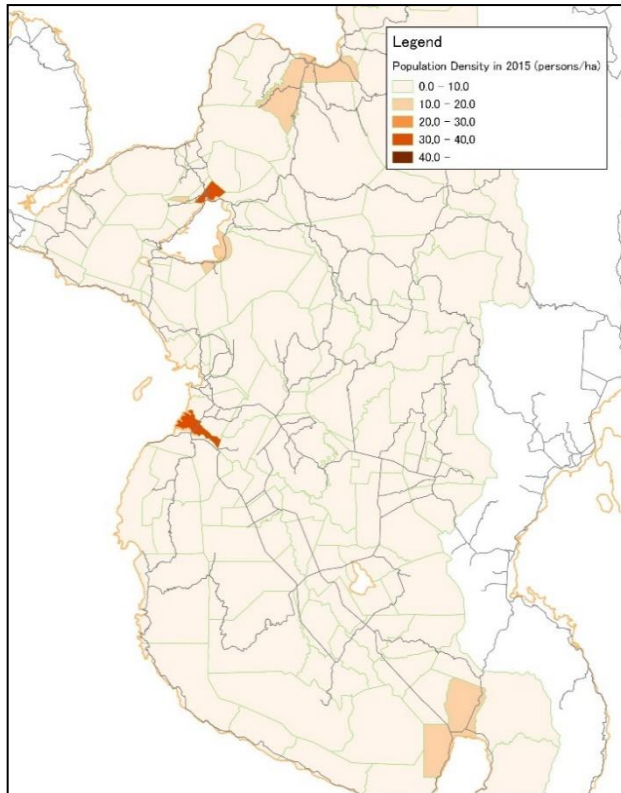
Source: Prepared by JICA Study Team based on PSA

Figure 11.2.5-1 Annual Growth Rate of Population Projection

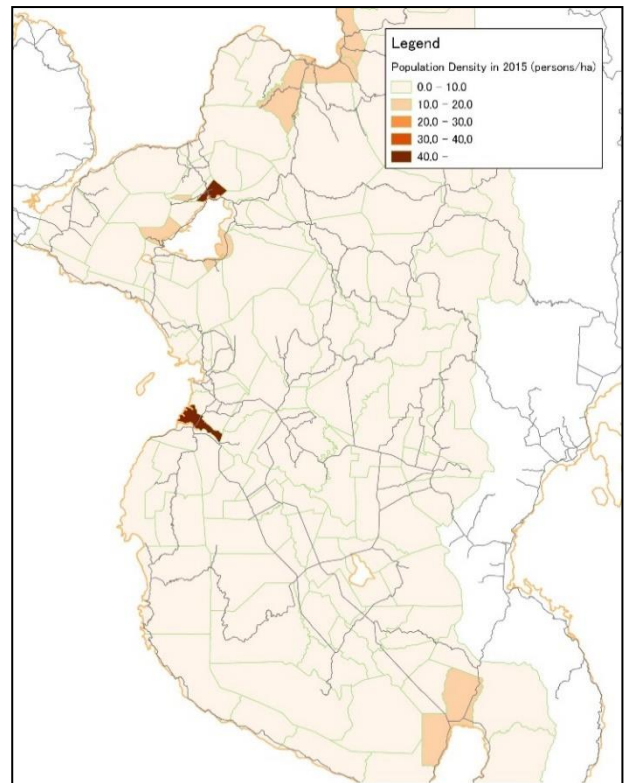


Source: Prepared by JICA Study Team based on PSA, Google Map

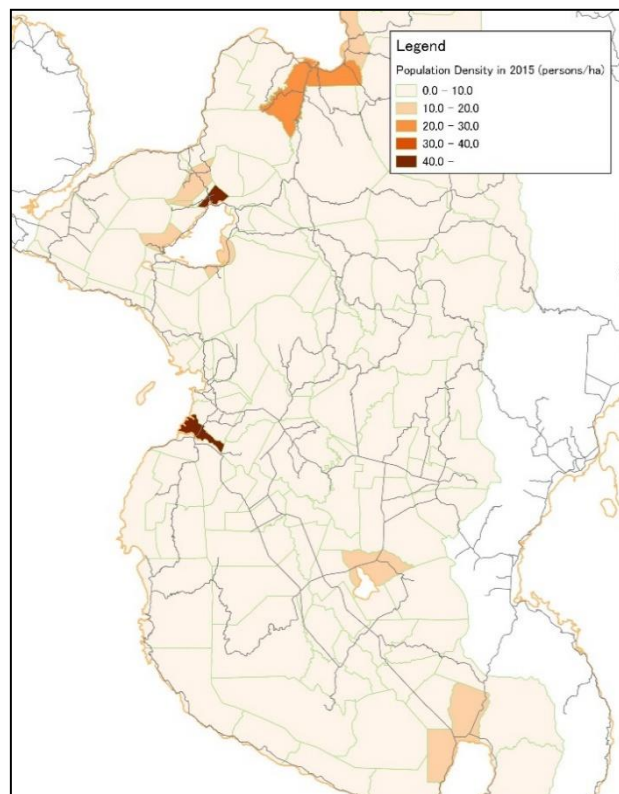
Figure 11.2.5-2 Projected Population in Zone



Year 2017



Year 2020



Year 2030

Source: JICA Study Team

Figure 11.2.5-3 Projected Population Density

(2) GRDP

The growth rate of GRDP in the subject area is required for estimates of the trip generation that is the total number of trips generated in the whole subject area.

Table 11.2.5-2 show the summary of GDP by region, and the estimated GRDP growth rate for ARMM in the near future is shown in **Table 11.2.5-3**.

Table 11.2.5-2 GDP by Region

Area	GDP (1,000 pesos)			Yearly Growth Rate	
	2014	2015	2016	14-15	15-16
<i>Philippines</i>	<i>7,165,478</i>	<i>7,600,175</i>	<i>8,126,403</i>	<i>6.1%</i>	<i>6.9%</i>
Region IX	146,321	157,641	165,108	7.7%	4.7%
Region X	268,424	283,769	305,448	5.7%	7.6%
Region XI	281,348	304,412	333,022	8.2%	9.4%
Region XII	196,770	203,183	213,302	3.3%	5.0%
Region XIII	92,420	96,588	99,019	4.5%	2.5%
ARMM	50,789	50,583	50,753	-0.4%	0.3%

Source: Philippine Statistics Authority

Table 11.2.5-3 Estimated GRDP Growth Rate in ARMM

	2015	2016	2017	2018	2019	2020	2021	2022
High	2.92	3.08	3.51	3.95	4.38	4.81	5.25	5.68
Low	2.53	2.92	3.08	3.51	3.95	4.38	4.81	5.25

Source: ARMM Regional Development Plan

The yearly growth rate in GRDP for Region X and Region XII has been more than 5.0%, while that for ARMM is nearly zero in recent years. On the other hand, it is expected that the regional GDP growth rate for ARMM would turn upward and increase.

It is assumed that the growth of GRDP is 3.9% from year 2017 to 2020, and 5.0% from 2020 to 2030, with taking the above-mentioned factors into consideration.

11.2.6 Preparation of Future OD Matrix

(1) Trip Generation

The estimation of trip generation is to calculate the total number of trips relating to the target area. Generally, three (3) types of model are commonly used which are (i) Trip rate model, (ii) Growth rate model, and (iii) Functional model. Brief characteristics of the three models are discussed below:

- Trip rate model

Under this model, the trip volume (zone trip volume) against a socioeconomic indicator (for example, population by zone in this survey) is calculated from the current trip traffic volume and the socio-economic index in the future is multiplied by this trip rate estimate which provides the number of future trips by zone.

- Growth rate model

Under this model, it is assumed that the current trip traffic volume fluctuates with the change rate of certain variables (economic growth indices). Specifically, the current traffic volume is multiplied by the rate of increase of GRDP to estimate future traffic volume.

- Functional model

Under this model, future traffic is estimated using various approaches such as a linear regression model with the socioeconomic index of the zone as explanatory variables. These variable indices can be considered to contribute to traffic generation and attraction.

In general, which model to apply largely depends on several factors such as amount of available data and level of disaggregation, amount of available time among others. The comparison of the three (3) models highlighting their advantages and disadvantages are presented in the table below. As seen in the table, in general, the Growth Rate Model is simple, easy to handle and easy to develop compared with the two other models.

Table Comparison of the characteristics of the three models

Model	Advantage	Disadvantage
Trip Rate Model	<ul style="list-style-type: none"> • Easy to develop • Possible to examine accuracy of rate • Possible to represent social structure change 	<ul style="list-style-type: none"> • Trip rate is assumed not to change in the future • Difficult to depict characteristics peculiar to each zone
Growth Rate Model	<ul style="list-style-type: none"> • Easy to develop • Possible to represent characteristics of each zone easily • Model can be built with only one indicator 	<ul style="list-style-type: none"> • Necessary to establish zonal indicator in the future
Functional Model	<ul style="list-style-type: none"> • Possible to represent characteristics of whole study area • Various factors of each zone can be involved • Based on statistical logic (e.g. linear regression, etc) 	<ul style="list-style-type: none"> • Various indicators are required • Development process takes time in order to obtain good fitness

Functional Model is complex and time-consuming due to several tasks involved such as selection of variables, selection of statistically dominant variables, selection of functions to collect and apply many variables among others. In this case, the only reliable zone-specific variable is the census of population which is not enough to provide good fit when tested. The table below is a sample of first run using Functional Model which shows poor fit of the model. The same is true with Trip Rate Model where identifying unique characteristics of each zone (e.g. a zone which attract and general high number of trucks might be an industrial area or port) is difficult perhaps due to low level of the development of the area. For the above reasons, the JICA Study Team decided to use Growth Rate Model.

Table Correlation Coefficient by Functional Model

Model		Car	Jeepney	Truck
Population	Formula	$Y=0.00994 \cdot P-223.4$	$Y=0.00617 \cdot P-242.0$	$Y=0.00637 \cdot P-372.8$
	t-value	-1.23, 7.07	4.98, -1.51	8.14, -3.69
	Correlation	0.62	0.57	0.68
Population + Zonal Potential	Formula	$Y=0.00865 \cdot P+168.4 \cdot Z-4563.2$	$Y=0.00633 \cdot P-21.4 \cdot Z+308.5$	$Y=0.00862 \cdot P-298.4 \cdot Z+7045.0$
	t-value	3.72, 0.69, -0.73	3.08, -0.10, 0.06	6.83, -2.25, 2.13
	Correlation	0.65	0.58	0.72

As mentioned, in this project, Growth rate model was applied for estimation the total number of trips by each mode, such as car, jeepney, bus and truck.

$$G_m^t = G_m^{t-1} \times \alpha^t$$

Where, G_m^t : the total number of trips for m -mode generated in the year of t

α^t : yearly growth rate in the period between the year of $t-1$ and t

For the yearly growth rate, growth rate of GRDP is employed. The detail number is discussed in the later section.

In the second step of the approach, models estimating trip generation and attraction are usually developed. However, the balance of trip generation and trip attraction is not correctly reflecting the current travel demand since the obtained existing OD table does not include intra-zonal trips. Therefore, trip generation model is only developed while trip attraction model is not applied. The Growth Rate Model can be expressed as follows:

$$P'_i = F_i \times P_i$$

Where, P'_i : the number of trip generation for i zone in the future

P_i : existing value of trip generation for i zone

F_i : growth rate of trip generation

The increase rate of population in each zone is applied as a growth rate, which is presented in the later section.

(2) Trip Distribution

Trip distribution model is to estimate the number of distributed trips by the combination of origin and destination zones, based of the trip generation and attraction by zone. The following present pattern distribution formula was applied in this project.

$$T'_{ij} = P'_i \times \frac{T_{ij}}{\sum_k T_{ik}}$$

Where, T'_{ij} : the number of trip distribution between i and j zones in the future

T_{ij} : existing value of trip distribution between i and j zones

(3) Trip Assignment

JICA STRADA, which is a transport analysis software developed by JICA, is used for traffic assignment stage. This software provides two major types of highway assignment model namely, incremental assignment and user equilibrium assignment. Equilibrium assignment is effective for a case when there are several alternative routes for each origin and destination pair in the network. Since alternative routes are few in the case of forecasting inter-city traffic as this project, incremental assignment may be applied. Besides, the result of incremental assignment is easy to analyse because the method is simple. Therefore, the incremental assignment was selected for this project.

The incremental assignment divides the input OD table data into several increments and assigns each increment to the minimum route where the generalized cost is the least. Once the increments are assigned, link cost of each link is calculated and the minimum route is found again for the next increments.

(4) Total Number of Trips Generated

The estimated number of the trip end that is the sum of trips generated and attracted for all mode in the subject area, which consists of Region X, Region XII and ARMM is about 224,700 vehicle trips per day in 2017.

The number of trip end in the future can be estimated at 259,500 vehicle trips, which is 1.15 times that in 2017, and at 404,500 vehicle trips, 1.80 times.

The modal choice ratio of car is estimated to increase from 55% to 67%. Since the car ownership will probably increase according to urbanization and economic development, this trend is considered to be reasonable.

Table 11.2.6-1 Total Number of Trips by Mode and Year

Region	2017					2018					2019				
	Car	Jeepney	Bus	Truck	Total	Car	Jeepney	Bus	Truck	Total	Car	Jeepney	Bus	Truck	Total
Region X	25,774	20,203	1,446	6,994	54,417	29,159	22,276	1,626	7,827	60,888	44,981	34,014	2,659	12,683	94,337
	47.4%	37.1%	2.7%	12.9%	100.0%	47.9%	36.6%	2.7%	12.9%	100.0%	47.7%	36.1%	2.8%	13.4%	100.0%
Region XII	70,554	32,375	1,266	28,004	132,199	79,494	36,498	1,412	31,476	148,880	131,932	50,676	2,298	51,965	236,871
	53.4%	24.5%	1.0%	21.2%	100.0%	53.4%	24.5%	0.9%	21.1%	100.0%	55.7%	21.4%	1.0%	21.9%	100.0%
ARMM	21,180	12,876	114	3,898	38,068	30,209	14,912	122	4,489	49,732	48,745	16,920	199	7,442	73,306
	55.6%	33.8%	0.3%	10.2%	100.0%	60.7%	30.0%	0.2%	9.0%	100.0%	66.5%	23.1%	0.3%	10.2%	100.0%
Total	224,684					259,500					404,514				
Growth						1.15					1.80				

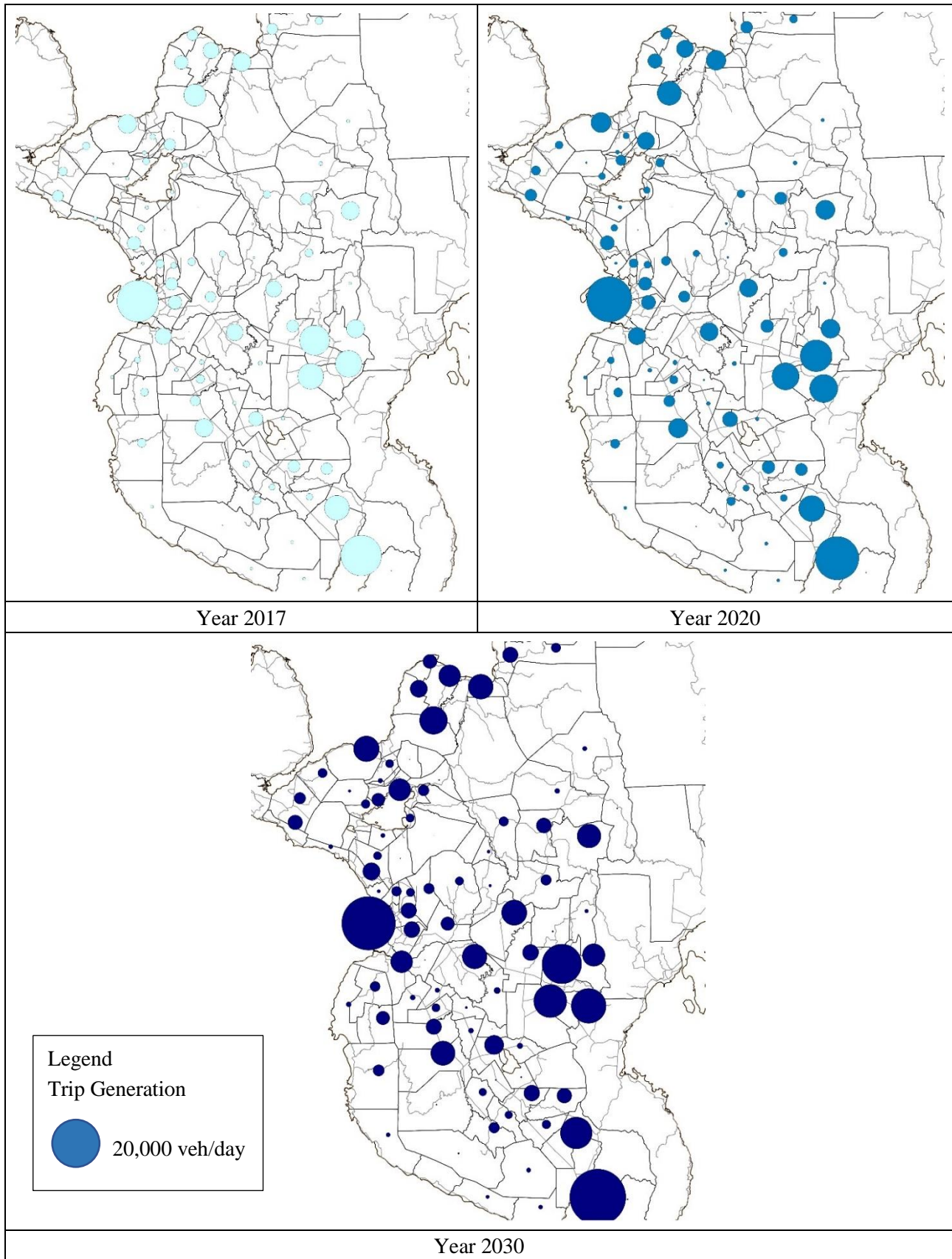
(5) Trips Generation by Zone

Next, the trip generation and attraction of each zone were calculated by using the model discussed in the previous section, and the total number of trips shown in **Table 11.2.6-2** was distributed into each zone in proportion with the model value for the trip generation.

Trip generation of each zone is described in the following table and shown in **Figure 11.2.6-1**.

Table 11.2.6-2 Trip Generation by Zone for Existing and Future (Total Trip of All Vehicles)

Zone	2017	2020	2030	17-20	17-30	Zone	2017	2020	2030	17-20	17-30
1	16,389	19,352	27,450	1.18	1.67	53	0	0	0	-	-
2	1,829	1,935	2,507	1.06	1.37	54	752	818	1,243	1.09	1.65
3	1,498	1,631	2,369	1.09	1.58	55	3,197	3,563	5,704	1.11	1.78
4	661	800	943	1.21	1.43	56	131	150	264	1.15	2.02
5	350	504	702	1.44	2.01	57	1,957	2,190	3,560	1.12	1.82
6	541	777	1,089	1.44	2.01	58	12	13	23	1.08	1.92
7	5	5	10	1	2	59	0	0	0	-	-
8	2,546	2,880	4,693	1.13	1.84	60	8	8	16	1	2
9	363	444	997	1.22	2.75	61	97	108	173	1.11	1.78
10	94	116	258	1.23	2.74	62	394	418	568	1.06	1.44
11	618	779	1,779	1.26	2.88	63	12	13	22	1.08	1.83
12	142	159	257	1.12	1.81	64	636	701	1,084	1.1	1.7
13	211	211	230	1	1.09	65	350	383	568	1.09	1.62
14	696	675	653	0.97	0.94	66	1,436	1,578	2,430	1.1	1.69
15	1,002	1,197	2,326	1.19	2.32	67	1,300	1,424	2,136	1.1	1.64
16	34	37	58	1.09	1.71	68	12	14	29	1.17	2.42
17	158	192	396	1.22	2.51	69	105	119	211	1.13	2.01
18	6	6	7	1	1.17	70	423	472	761	1.12	1.8
19	116	141	310	1.22	2.67	71	5,902	6,466	9,680	1.1	1.64
20	1,113	1,209	1,781	1.09	1.6	72	15,753	17,826	29,957	1.13	1.9
21	2,666	3,120	5,872	1.17	2.2	73	0	0	0	-	-
22	365	409	690	1.12	1.89	74	0	0	0	-	-
23	49	53	87	1.08	1.78	75	74	83	131	1.12	1.77
24	2,528	3,033	6,149	1.2	2.43	76	89	101	172	1.13	1.93
25	1,417	1,575	2,494	1.11	1.76	77	11	12	19	1.09	1.73
26	6,355	6,964	10,463	1.1	1.65	78	1,182	1,317	2,070	1.11	1.75
27	20	21	31	1.05	1.55	79	736	817	1,298	1.11	1.76
28	8,600	9,561	15,075	1.11	1.75	80	0	0	0	-	-
29	6,764	7,482	11,605	1.11	1.72	81	553	597	861	1.08	1.56
30	3,201	3,458	4,918	1.08	1.54	82	27	33	74	1.22	2.74
31	78	87	149	1.12	1.91	83	3,449	3,875	6,307	1.12	1.83
32	75	81	125	1.08	1.67	84	326	376	673	1.15	2.06
33	1,776	1,918	2,920	1.08	1.64	85	4,630	5,433	7,429	1.17	1.6
34	175	175	190	1	1.09	86	1,829	1,984	2,892	1.08	1.58
35	18	18	18	1	1	87	1,139	1,252	1,910	1.1	1.68
36	446	460	676	1.03	1.52	88	2,507	2,817	4,613	1.12	1.84
37	9	9	11	1	1.22	89	3,274	3,673	5,998	1.12	1.83
38	120	131	189	1.09	1.58	90	1,217	1,384	2,354	1.14	1.93
39	1	1	1	1	1	91	553	599	877	1.08	1.59
40	154	434	708	2.82	4.6	92	2,162	2,389	3,702	1.1	1.71
41	2	2	2	1	1	93	0	0	0	-	-
42	0	0	0	-	-	94	0	0	0	-	-
43	52	62	112	1.19	2.15	95	0	0	0	-	-
44	126	462	754	3.67	5.98	96	0	0	0	-	-
45	471	1,014	1,655	2.15	3.51	97	1	1	2	1	2
46	1,294	2,877	4,700	2.22	3.63	98	113	127	209	1.12	1.85
47	149	161	222	1.08	1.49	99	147	162	265	1.1	1.8
48	0	0	0	-	-	100	548	600	900	1.09	1.64
49	246	712	1,163	2.89	4.73	101	1,312	1,441	2,188	1.1	1.67
50	11	12	18	1.09	1.64	102	3,245	3,573	5,489	1.1	1.69
51	0	0	0	-	-	103	10	11	17	1.1	1.7
52	3	3	6	1	2	104	626	695	1,085	1.11	1.73



Source: JICA Study Team

Figure 11.2.6-1 Projected Trip Generation

(6) Future Trip Distribution

Figure 11.2.6-2, Figure 11.2.6-3 and Figure 11.2.6-4 shows desire lines of each vehicle trips in the years of 2017, 2020, and 2030. The present pattern method was employed for estimating the trip distribution, therefore, the trip distribution pattern does not change much in the future.

The trip distribution of car is widely distributed from neighbouring zone to distant zones. On the other hand, the movement pattern of truck has many long trips connecting relatively large cities.

The distribution of bus trip shows only the traffic between specific zones because the number of samples seems to have obtained in the OD interview survey conducted.

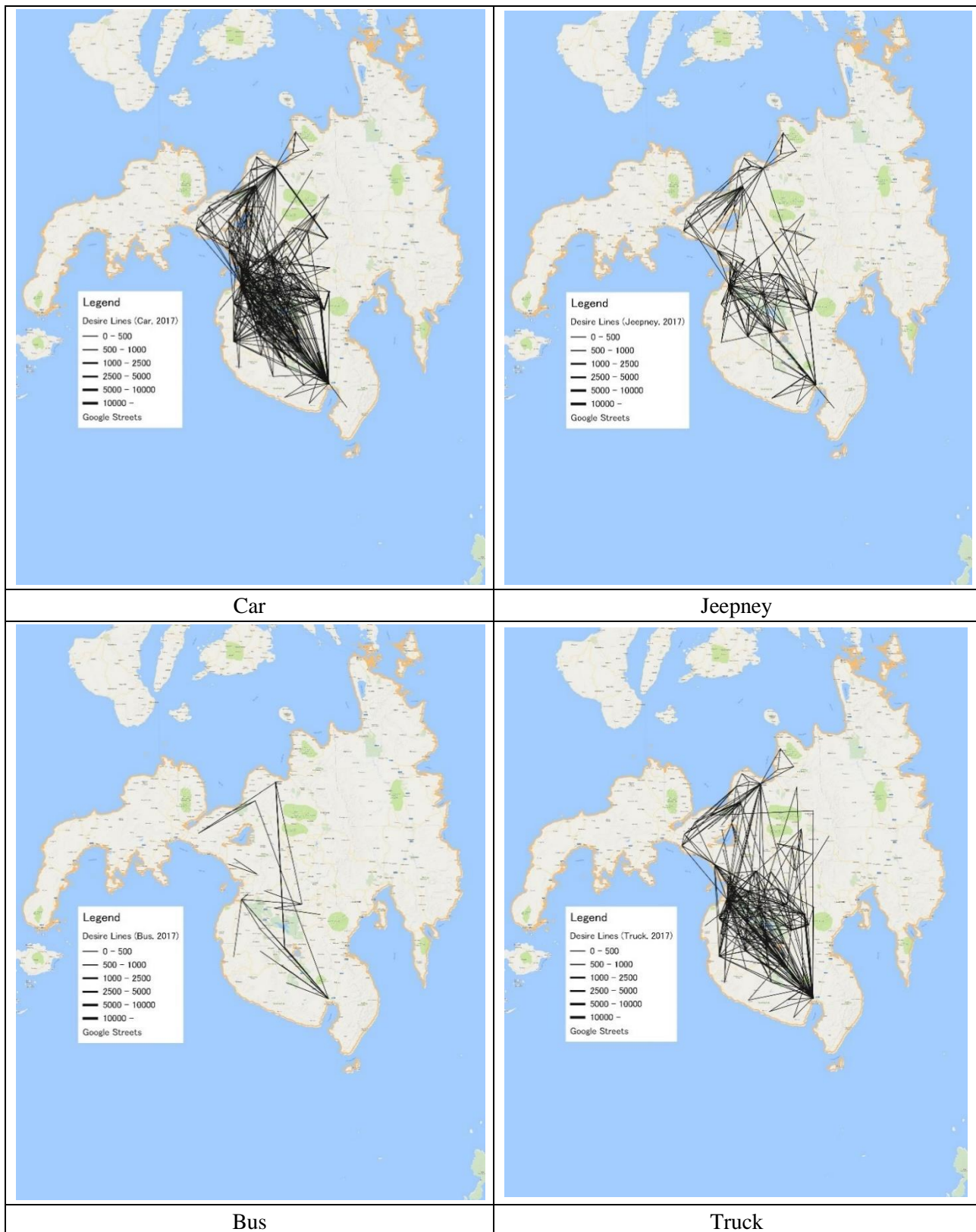
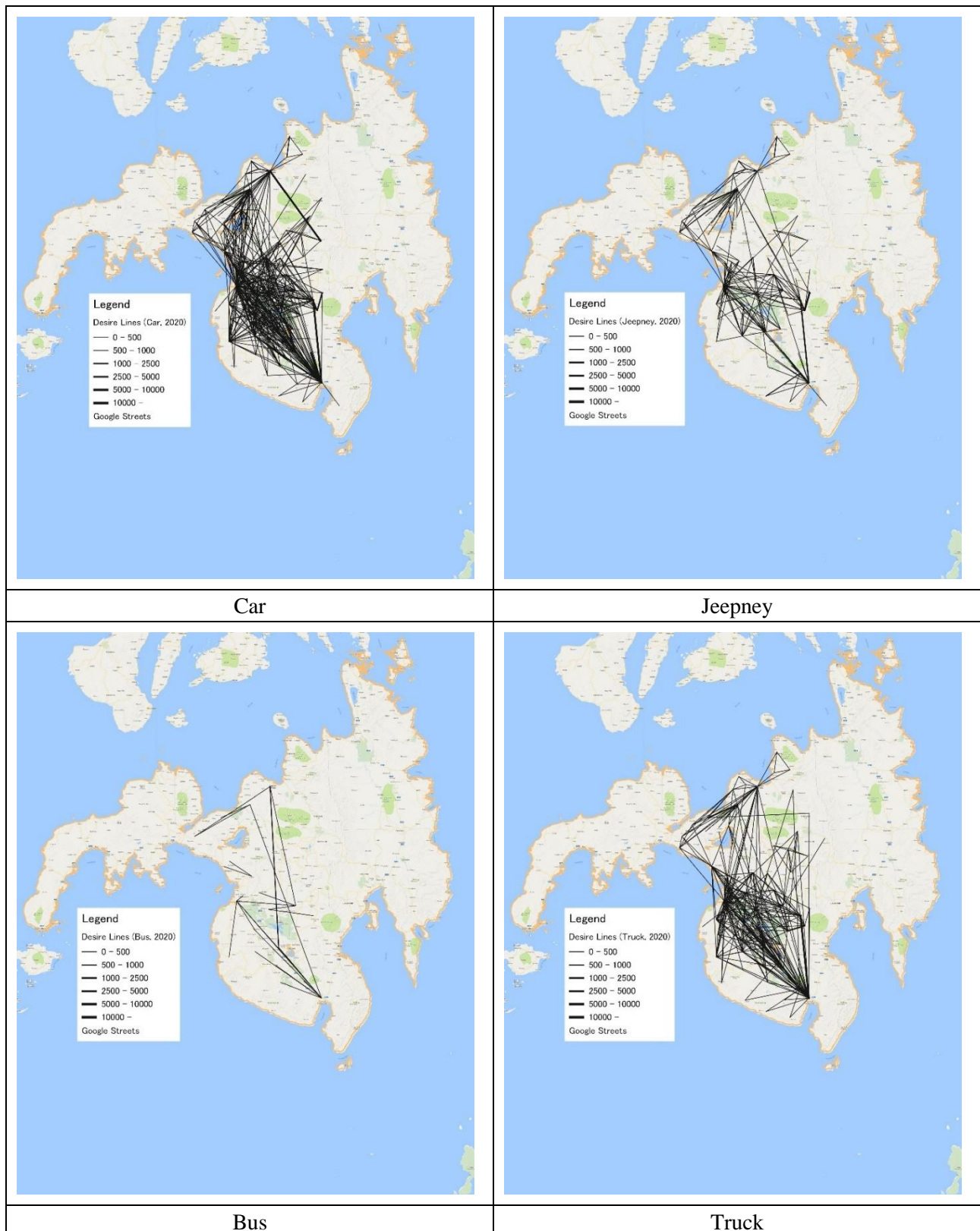
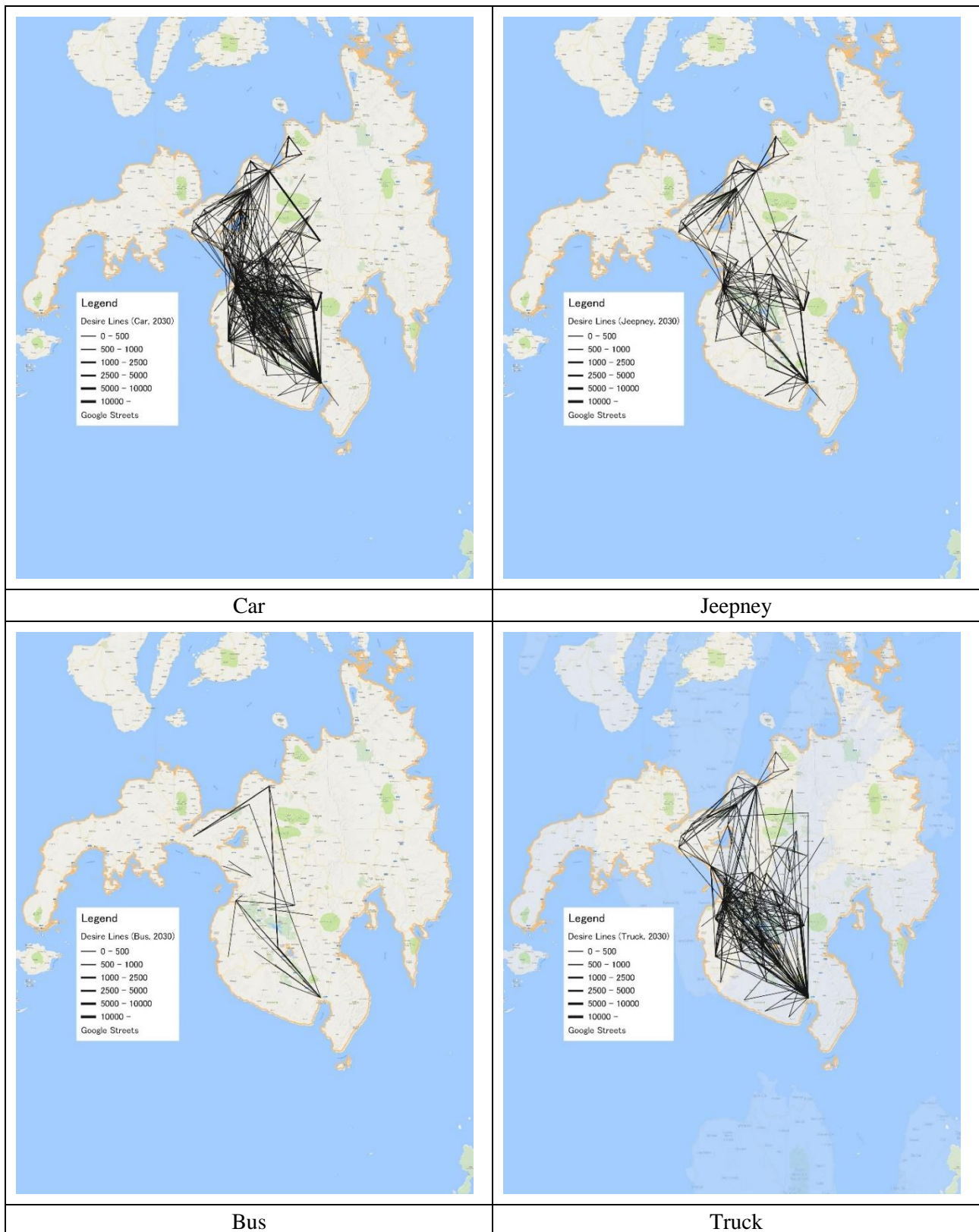


Figure 11.2.6-2 Desire Lines (2017)



Source: JICA Study Team, Google Map

Figure 11.2.6-3 Desire Lines (2020)



Source: JICA Study Team, Google Map

Figure 11.2.6-4 Desire Lines (2030)

11.3 Result of Future Traffic Demand Forecast

Result of future traffic demand forecast on Sub-Project roads are shown in the succeeding sections.

11.3.1 Future Traffic Volume Forecast on Sub-Project 1

Future traffic volume on Sub-Project 1 was estimated in 2020 and 2030 as shown in **Table 11.3.1-1**, **Figure 11.2.1-1** and **Figure 11.3.1-2**. Sub-Project 1 road is expected to attract a traffic of 927 veh/day in 2020 and 1,186 veh/day in 2030.

Table 11.3.1-1 Future Traffic Volume on Sub-Project 1 Road in 2020 and 2030

(Unit: Veh/day)

	Car	Jeepney	Bus	Truck	Total
2020	831	61	35	1	927
2030	1,044	88	52	3	1,186

Source: Estimated by JICA Study Team

The result of vehicle time saving and vehicle distance saving is shown in **Table 11.3.1-2**. Sub-Project 1 will be expected to save the vehicle distance and vehicle time by 4,189 veh*km and 270 veh*hour in 2020 and 5,752 veh*km and 374 veh*hour in 2030.

Table 11.3.1-2 Comparison of Vehicle Time Saving and Vehicle Distance Saving between With Case and Without Case

		Vehicle Distance Saving		Vehicle Time Saving	
		veh*km/day	'000 veh*km/year	veh*hour/day	'000 veh*hour/year
2020	With	12,470,114	4,551,592	381,016	139,071
	Without	12,474,304	4,553,121	381,286	139,169
	Difference	-4,189	-1,529	-270	-98
2030	With	21,619,493	7,891,115	788,889	287,944
	Without	21,625,244	7,893,214	789,263	288,081
	Difference	-5,752	-2,099	-374	-136

Source: Calculated by JICA Study Team



Figure 11.3.1-2 Future Traffic Volume on Sub-Project 1 Road and Surrounding Roads in 2030 (With Project and Without Project)

11.3.2 Future Traffic Volume Forecast on Sub-Project 2

Future traffic volume on Sub-Project 2 was estimated in 2020 and 2030 as shown in **Table 11.3.2-1**, **Figure 11.3.2-1** and **Figure 11.3.2-2**. Sub-Project 2 road is expected to attract the traffic of 1,528 veh/day in 2020 and 2,559 veh/day in 2030.

Table 11.3.2-1 Future Traffic Volume on Sub-Project 2 Road in 2020 and 2030

(Unit: Veh/day)

		Car	Jeepney	Bus	Truck	Total
2020	With	1,040	156	3	329	1,528
2030	With	1,779	234	4	542	2,559

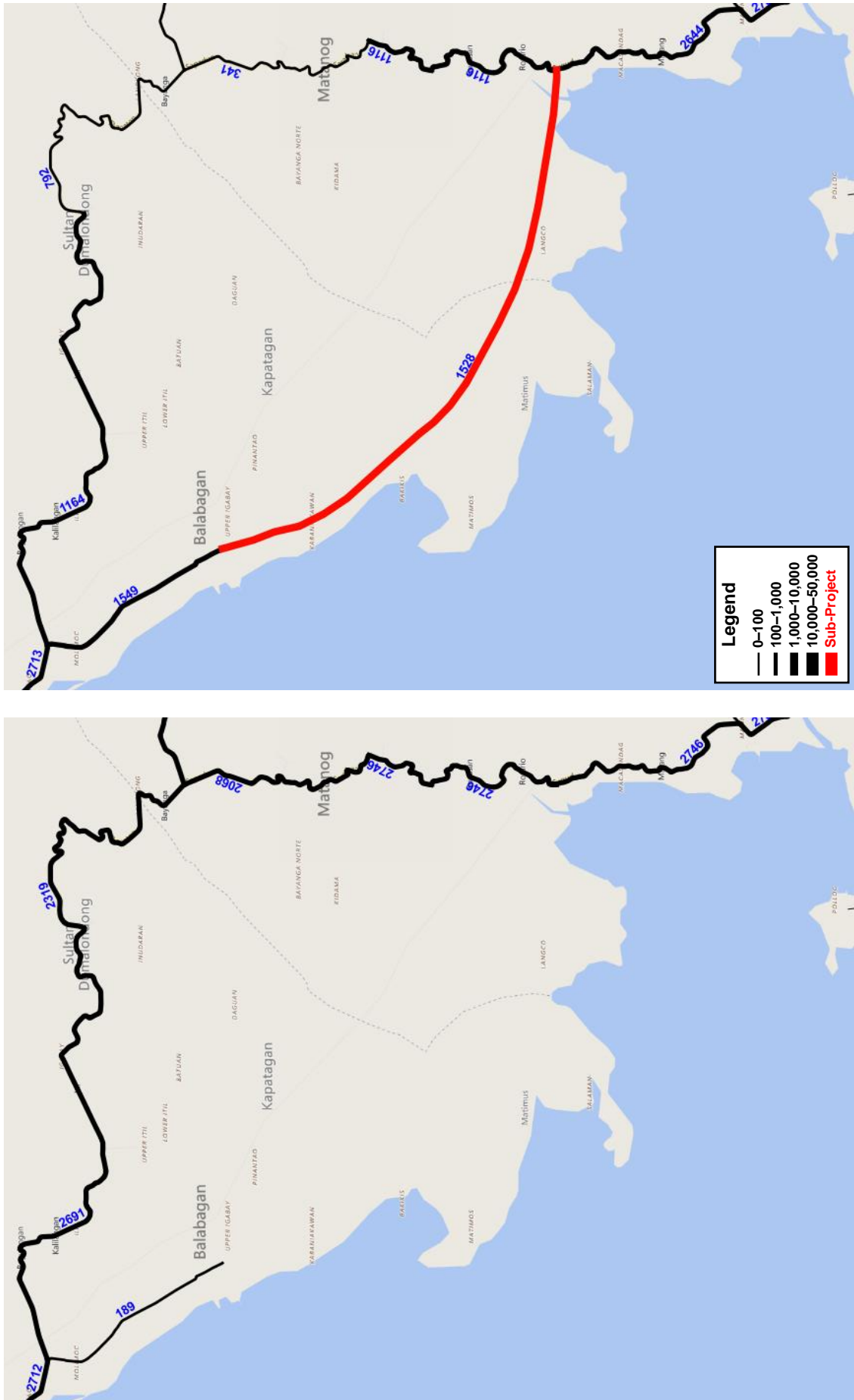
Source: Estimated by JICA Study Team

The result of vehicle time saving and vehicle distance saving is shown in **Table 11.3.2-2**. Sub-Project 2 will be expected to save the vehicle distance and vehicle time by 13,600 veh*km and 622 veh*hour in 2020 and 21,664 veh*km and 1,036 veh*hour in 2030.

**Table 11.3.2-2 Comparison of Vehicle Time Saving and Vehicle Distance Saving
between With Case and Without Case**

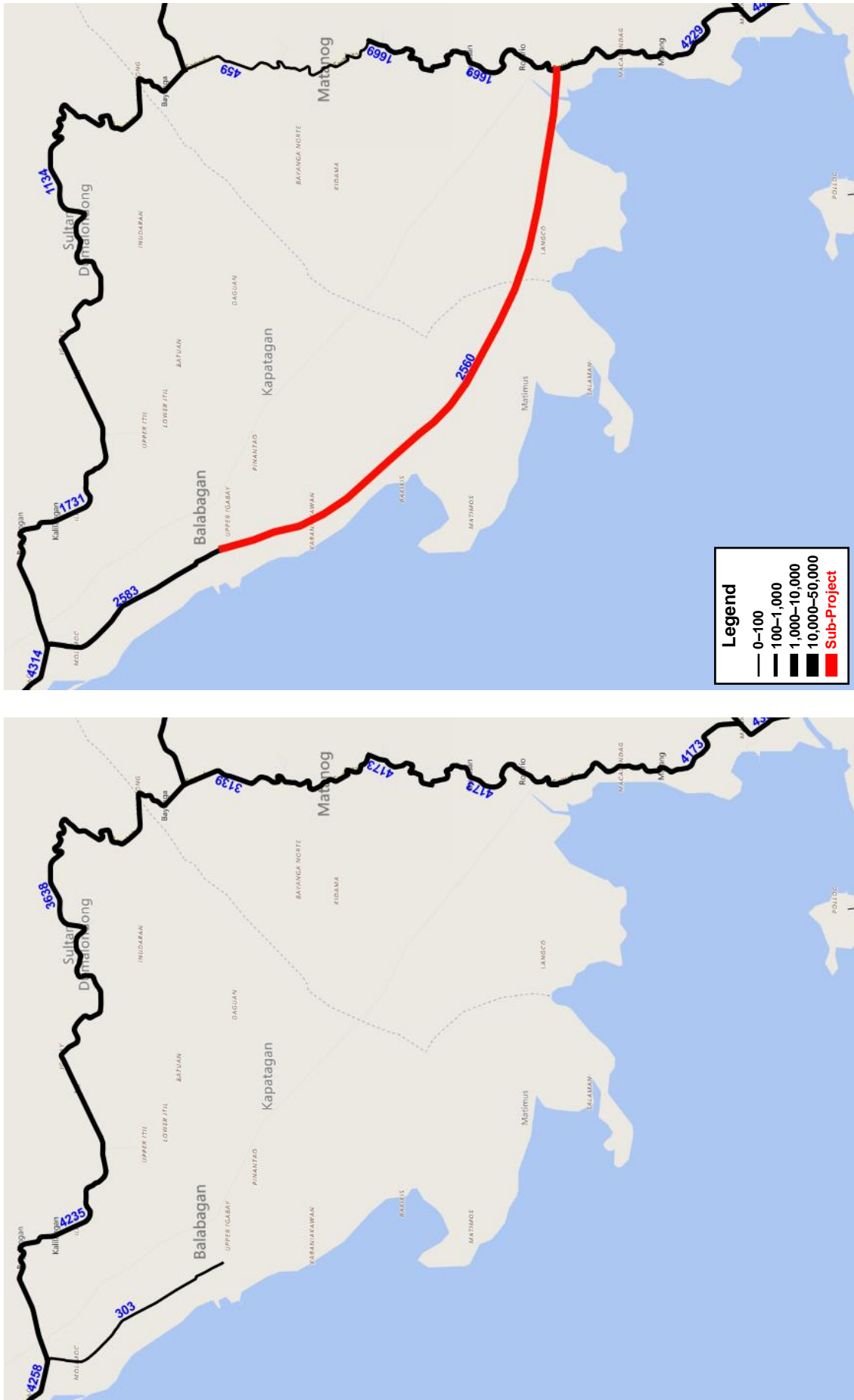
		Vehicle Distance Saving		Vehicle Time Saving	
		veh*km/day	'000 veh*km/year	veh*hour/day	'000 veh*hour/year
2020	With	12,460,703	4,548,157	380,664	138,942
	Without	12,474,304	4,553,121	381,286	139,169
	Difference	-13,600	-4,964	-622	-227
2030	With	21,603,581	7,885,307	788,227	287,703
	Without	21,625,244	7,893,214	789,263	288,081
	Difference	-21,664	-7,907	-1,036	-378

Source: Calculated by JICA Study Team



Source: Estimated by JICA Study Team

Figure 11.3.2-1 Future Traffic Volume on Sub-Project 2 Road and Surrounding Roads in 2020 (With Project and Without Project)



Source: Estimated by JICA Study Team

Figure 11.3.2-2 Future Traffic Volume on Sub-Project 2 Road and Surrounding Roads in 2030 (With Project and Without Project)

11.3.3 Future Traffic Volume Forecast on Sub-Project 5

Preparation of *Future Traffic Volume Forecast on Sub-Project 5* was cancelled due to **Security Problems** which hinder surveyors to visit the site.

11.3.4 Future Traffic Volume Forecast on Sub-Project 6

Future traffic volume on Sub-Project 6 was estimated in 2020 and 2030 as shown in **Table 11.3.4-1**, **Figure 11.3.4-1** and **Figure 11.3.4-2**. Sub-Project 6 road is expected to attract traffic of 1,069 veh/day in 2020 and 1,612 veh/day in 2030.

Table 11.3.4-1 Future Traffic Volume on Sub-Project 6 Road in 2020 and 2030

		(Unit: Veh/day)				
		Car	Jeepney	Bus	Truck	Total
2020	With	684	6	4	376	1,069
2030	With	982	11	7	613	1,612

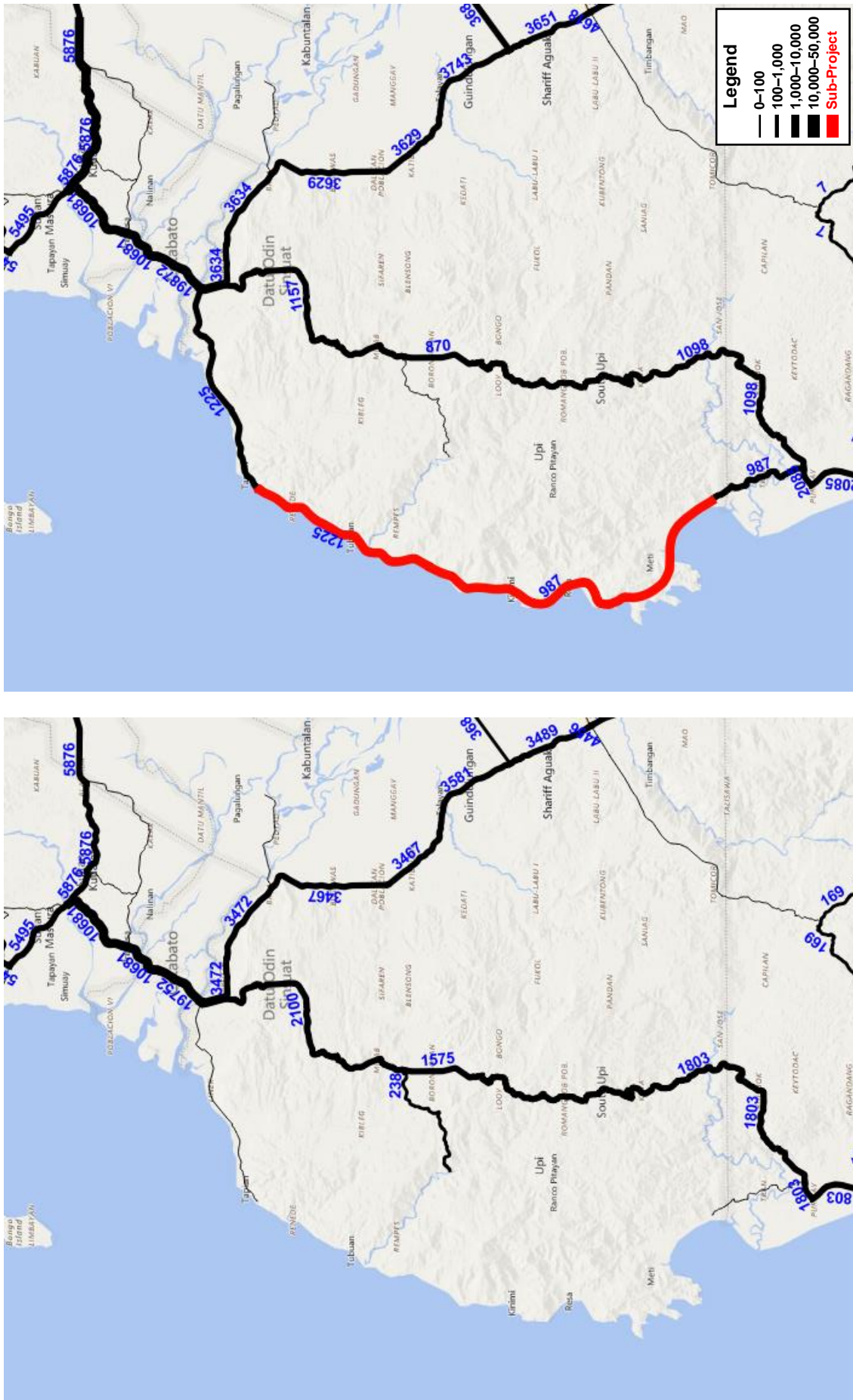
Source: Estimated by JICA Study Team

The result of vehicle time saving and vehicle distance saving is shown in **Table 11.3.4-2**. Sub-Project 6 will be expected to save the vehicle distance and vehicle time by 17,737 veh*km and 765 veh*hour in 2020 and 27,502 veh*km and 1,491 veh*hour in 2030.

Table 11.3.4-2 Comparison of Vehicle Time Saving and Vehicle Distance Saving between With Case and Without Case

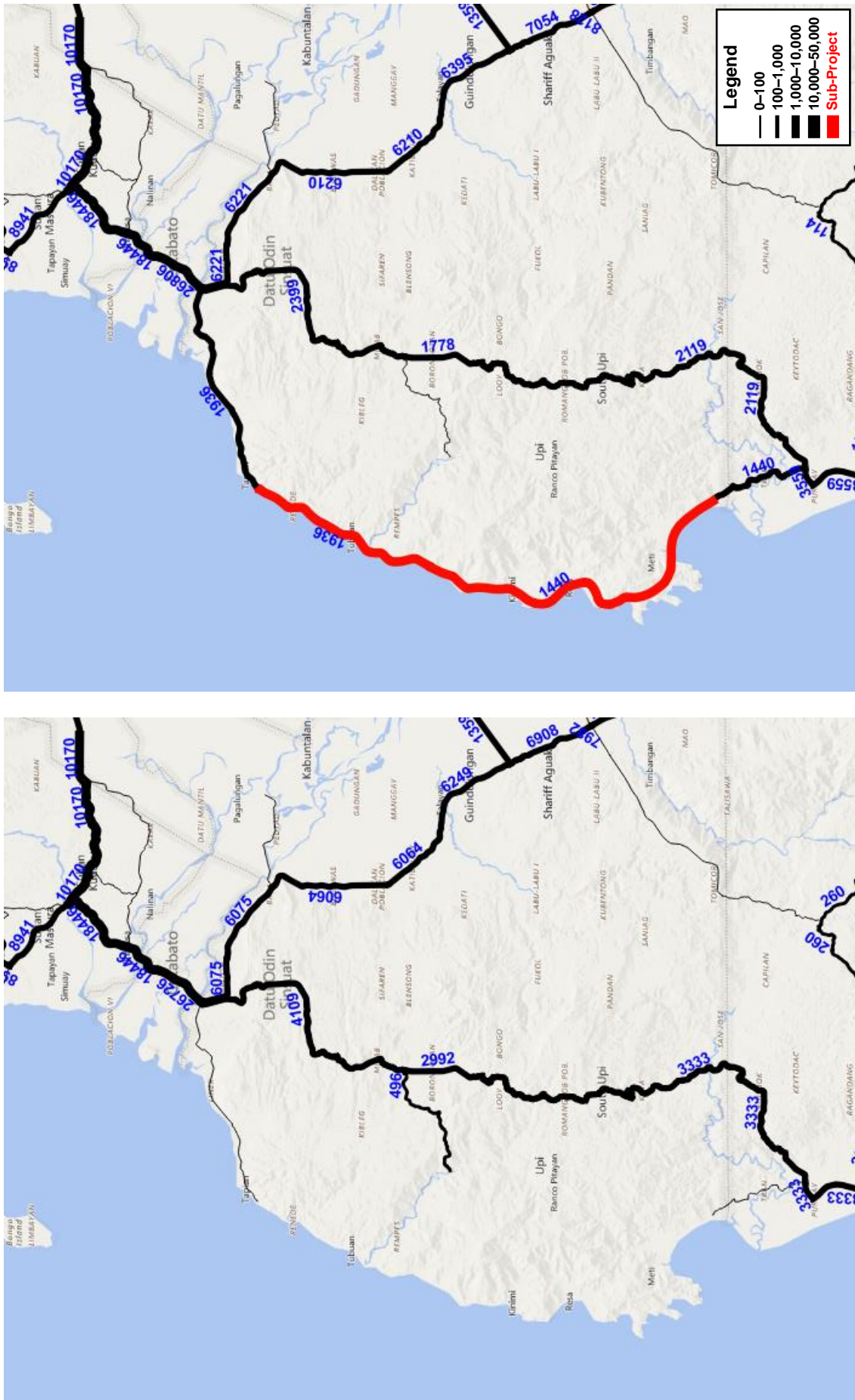
		Vehicle Time Saving		Vehicle Distance Saving	
		veh*km/day	'000 veh*km/year	veh*hour/day	'000 veh*hour/year
2020	With	12,463,802	4,549,288	380,757	138,976
	Without	12,481,539	4,555,762	381,522	139,256
	Difference	-17,737	-6,474	-765	-279
2030	With	21,602,387	7,884,871	787,932	287,595
	Without	21,629,889	7,894,909	789,423	288,139
	Difference	-27,502	-10,038	-1,491	-544

Source: Calculated by JICA Study Team



Source: Estimated by JICA Study Team

Figure 11.3.4-1 Future Traffic Volume on Sub-Project 6 Road and Surrounding Roads in 2020 (With Project and Without Project)



Source: Estimated by JICA Study Team

Figure 11.3.4-2 Future Traffic Volume on Sub-Project 6 Road and Surrounding Roads in 2020 (With Project and Without Project)

11.3.5 Future Traffic Volume Forecast on Sub-Project 7

Future traffic volume on Sub-Project 7 was estimated in 2020 and 2030 as shown in **Table 11.3.5-1**, **Figure 11.3.5-1** and **Figure 11.3.4-2**. Sub-Project 1 road is expected to attract a traffic of 1,657 veh/day in 2020 and 2,493 veh/day in 2030 from the existing road.

Table 11.3.5-1 Future Traffic Volume on Sub-Project 7 Road in 2020 and 2030

(Unit: Veh/day)

		Car	Jeepney	Bus	Truck	Total
2020	With	1,017	571	2	68	1,657
2030	With	1,448	912	2	131	2,493

Source: Estimated by JICA Study Team

The result of vehicle time saving and vehicle distance saving is shown in **Table 11.3.5-2**. Sub-Project 7 will be expected to save the vehicle distance and vehicle time by 6,132 veh*km and 1,057 veh*hour in 2020 and 5,664 veh*km and 1,744 veh*hour in 2030.

**Table 11.3.5-2 Comparison of Vehicle Time Saving and Vehicle Distance Saving
between With Case and Without Case**

		Vehicle Distance Saving		Vehicle Time Saving	
		veh*km/day	'000 veh*km/year	veh*hour/day	'000 veh*hour/year
2020	With	12,475,408	4,553,524	380,465	138,870
	Without	12,481,539	4,555,762	381,522	139,256
	Difference	-6,132	-2,238	-1,057	-386
2030	With	21,624,224	7,892,842	787,679	287,503
	Without	21,629,889	7,894,909	789,423	288,139
	Difference	-5,664	-2,068	-1,744	-637

Source: Calculated by JICA Study Team

11.3.6 Future Traffic Volume Forecast on Sub-Project 8

Future traffic volume on Sub-Project 8 was estimated in 2020 and 2030 as shown in **Table 11.3.2-1**, **Figure 11.3.2-1** and **Figure 11.3.4-2**. Sub-Project 8 road is expected to attract a traffic of 2,458 veh/day in 2020 and 3,814 veh/day in 2030.

Table 11.3.6-1 Future Traffic Volume on Sub-Project 8 Road in 2020 and 2030

(Unit: Veh/day)

		Car	Jeepney	Bus	Truck	Total
2020	With	1,602	479	3	374	2,458
2030	With	2,499	731	4	579	3,814

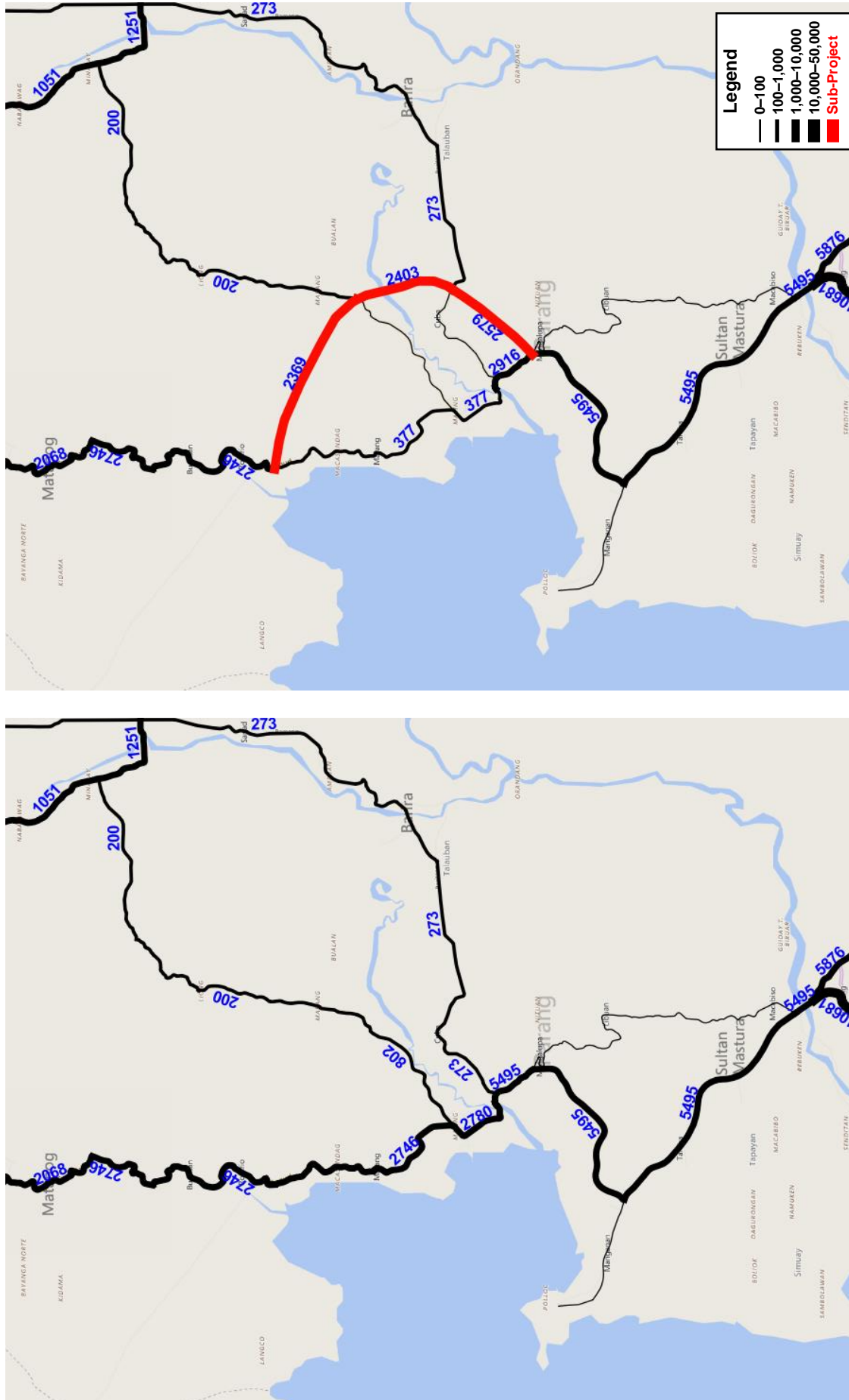
Source: Estimated by JICA Study Team

The result of vehicle time saving and vehicle distance saving is shown in **Table 11.3.2-2**. Sub-Project 8 will be expected to save the vehicle distance and vehicle time by 2,544 veh*km and 320 veh*hour in 2020 and 3,389 veh*km and 499 veh*hour in 2030.

**Table 11.3.6-2 Comparison of Vehicle Time Saving and Vehicle Distance Saving
between With Case and Without Case**

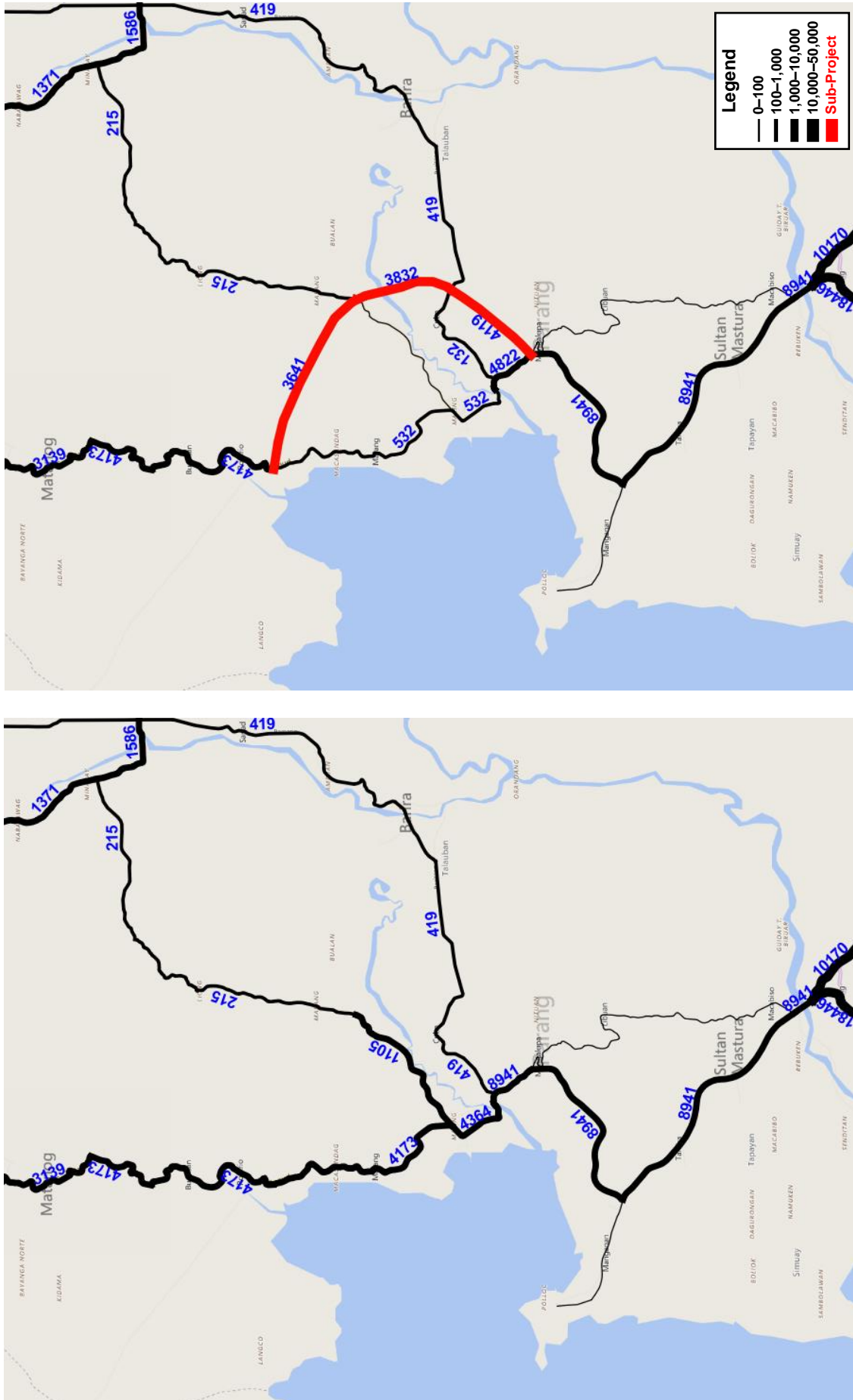
		Vehicle Distance Saving		Vehicle Time Saving	
		veh*km/day	'000 veh*km/year	veh*hour/day	'000 veh*hour/year
2020	With	12,477,697	4,554,359	381,202	139,139
	Without	12,480,241	4,555,288	381,522	139,256
	Difference	-2,544	-929	-320	-117
2030	With	21,625,213	7,893,203	788,924	287,957
	Without	21,628,601	7,894,439	789,423	288,139
	Difference	-3,389	-1,237	-499	-182

Source: Calculated by JICA Study Team



Source: Estimated by JICA Study Team

Figure 11.3.6-1 Future Traffic Volume on Sub-Project 8 Road and Surrounding Roads in 2020 (With Project and Without Project)



Source: Estimated by JICA Study Team

Figure 11.3.6-2 Future Traffic Volume on Sub-Project 8 Road and Surrounding Roads in 2020 (With Project and Without Project)

11.3.7 Future Traffic Volume Forecast on Sub-Project 9

Future traffic volume on Sub-Project 9 was estimated in 2020 and 2030 as shown in **Table 11.3.7-1**, **Figure 11.3.7-1** and **Figure 11.3.4-2**. Sub-Project 9 road is expected to attract a traffic of 1,109 veh/day in 2020 and 1,649 veh/day in 2030.

Table 11.3.7-1 Future Traffic Volume on Sub-Project 9 Road in 2020 and 2030

(Unit: Veh/day)

		Car	Jeepney	Bus	Truck	Total
2020	With	536	113	0	460	1,109
2030	With	799	165	0	685	1,649

Source: Estimated by JICA Study Team

The result of vehicle time saving and vehicle distance saving is shown in **Table 11.3.7-2**. Sub-Project 9 will be expected to save the vehicle distance and vehicle time by 1,573 veh*km and 170 veh*hour in 2020 and 2,916 veh*km and 297 veh*hour in 2030.

**Table 11.3.7-2 Comparison of Vehicle Time Saving and Vehicle Distance Saving
between With Case and Without Case**

		Vehicle Distance Saving		Vehicle Time Saving	
		veh*km/day	'000 veh*km/year	veh*hour/day	'000 veh*hour/year
2020	With	12,476,495	4,553,921	381,352	139,193
	Without	12,478,068	4,554,495	381,522	139,256
	Difference	-1,573	-574	-170	-62
2030	With	21,185,922	7,732,862	789,126	288,031
	Without	21,188,838	7,733,926	789,423	288,139
	Difference	-2,916	-1,064	-297	-108

Source: Calculated by JICA Study Team

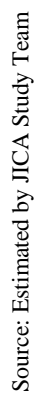


Figure 11.3.7-1 Future Traffic Volume on Sub-Project 9 Road and Surrounding Roads in 2020 (With Project and Without Project)

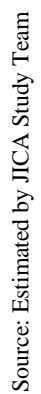
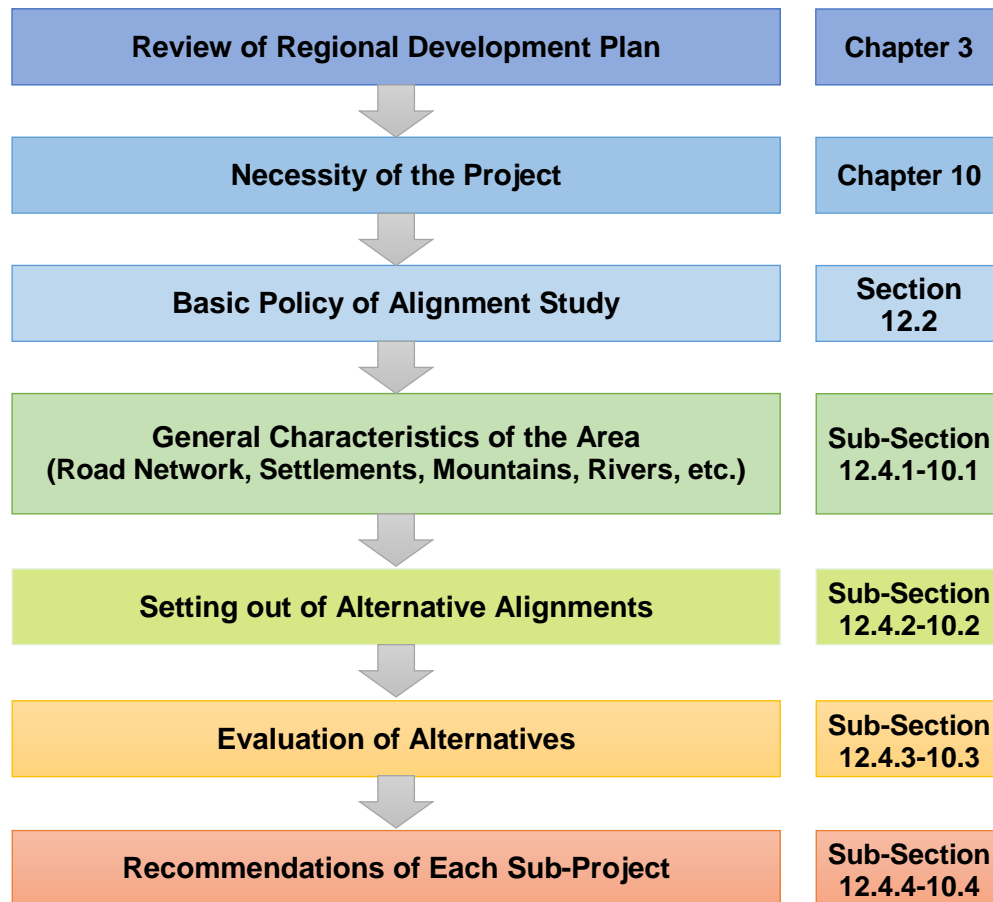


Figure 11.3.7-2 Future Traffic Volume on Sub-Project 9 Road and Surrounding Roads in 2020 (With Project and Without Project)

Chapter 12 Alignment Selection

12.1 Procedure of Alignment Study

The procedure of alignment study is shown in **Figure 12.1-1**.



Source: JICA Study Team

Figure 12.1-1 Procedure of Alignment Study

12.2 Basic Policy of Alignment Study

12.2.1 Policy on Utilization of Existing Roads

Basic policies for selecting optimum alignment in connection with existing road utilization were established as follows:

- The proposed alignment shall utilize the existing road as much as possible in order to minimize land acquisition.
- The proposed alignment shall avoid relocation of the houses/buildings as much as possible in order to minimize social impacts to people.
- The proposed alignment should follow the existing road elevation as much as possible.
- The proposed alignment shall satisfy the established design criteria.

12.2.2 Policy on Selection of New Road Alignment

Basic policies for selecting optimum alignment of new roads were established as follows:

- The alignment shall avoid to affect existing the houses/buildings as much as possible in order to minimize social impacts.
- The alignment shall meet the established design criteria.
- The alignment shall basically follow the topography as much as possible to minimize cutting and filling.
- Tunnel structure shall be avoided in consideration of local of contractors' capability of tunnel construction.

12.3 Evaluation Criteria of Alternative Alignments

Alternative alignments are evaluated from various viewpoints, such as cost, construction period, economic impacts, environmental impacts and technical features. Evaluation criteria for selection of optimum alignment was established as shown in **Table 12.3-1**.

Table 12.3-1 Evaluation Criteria

Indicators	Items	Unit	Criteria	Evaluation Item
Cost, Construction Period	Total Road Length	km	The shorter, the better.	● Evaluated
	Utilization of Existing Road/Trail	km	The longer, the better.	● Evaluated
	New construction road length	km	The shorter, the better.	(Not Evaluated)
	No. of bridges	nos	The lesser, the better.	(Not Evaluated)
	Total length of bridges	m	The lesser, the better.	● Evaluated
	No. of box culverts	nos	The lesser, the better.	(Not Evaluated)
	No. of pipe culverts	(nos)		● Evaluated
Economic Impact	No. of Direct Beneficiaries	persons	The more, the better.	● Evaluated
	Agricultural land areas to be served	km	The more, the better.	● Evaluated
Environment al Impact	High-filling section length (H= 10m or more)	m	The shorter, the better.	● Evaluated
	High-cutting section length (H= 10m or more)	m	The shorter, the better.	● Evaluated
	Number of houses/buildings affected	nos	The lesser, the better.	● Evaluated
Technical Features	Alignment	Total no. of curves	The lesser, the better.	(Not Evaluated)
		No. of curve radius < 200m	The lesser, the better.	● Evaluated
		Length of vertical grade \geq 5%	The lesser, the better.	● Evaluated

Evaluation method was established as shown below;

◆ Evaluation Method

- Best Alternative: Evaluated to be “Good” ○
- Within 10% difference from the Best Alternative: Also evaluated to be “Good” ○
- Within the 10% to 20% Difference from the Best Alternative: Also evaluated to be “Medium” △
- Within the 20% to 200% Difference from the Best Alternative: Evaluated as “Bad” X
- More than 200% Difference from the Best Alternative: Evaluated as “Very Bad” XX

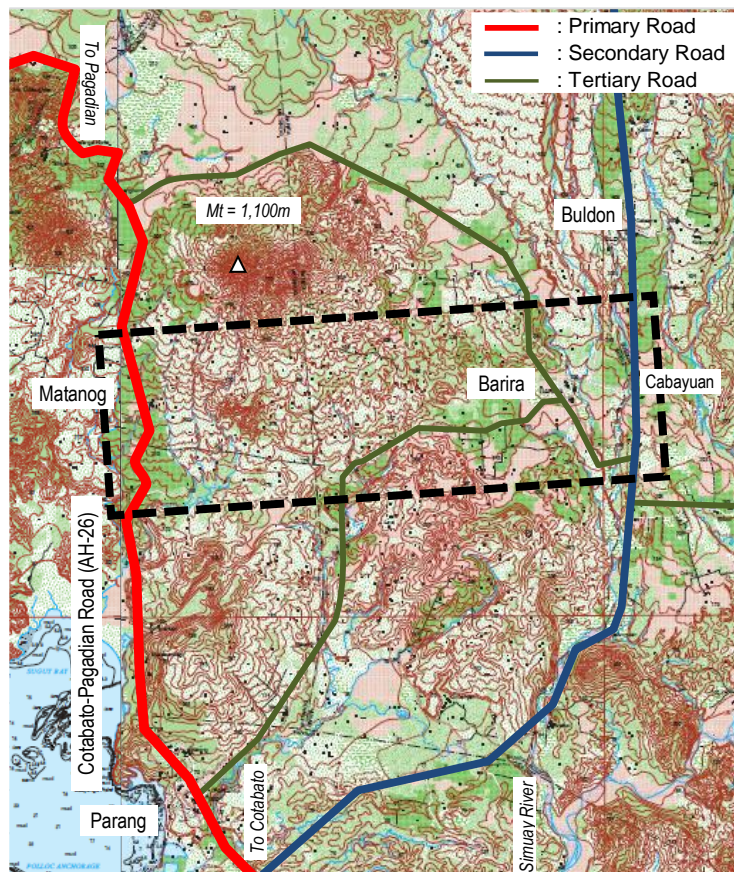
The alternative which gets the most number of “Best Alternative” is selected as the best alignment.

12.4 Alignment Selection for Sub-Project 1

12.4.1 General Characteristics

The topographical features of Sub-Project 1 are shown in **Figure 12.4.1-1**, and the general characteristics of Sub-Project 1 are as follows:

- The section links between the primary road (Cotabato-Pagadian Road: AH-26) near Matanog and the secondary road near Cabayuan, Buldon through Barira.
- It is located at the southern foot of a high mountain of 1,100 m in height, and crosses over a medium-scale river which is upstream of Simuay River before the secondary road.
- Due to the above locations, the terrain is undulating and there are steep slopes in some places.
- Houses/buildings are sparse.
- Plantations and cultivated lands are spread out, especially in the eastern parts.



Source: JICA Study Team

Figure 12.4.1-1 Topographic Feature of Sub-Project 1

12.4.2 Alternative Alignments

Three alternative alignments were studied as shown in **Figure 12.4.2-1**. The concepts of three alternatives are as follows:

ALT-1:

- Southern route

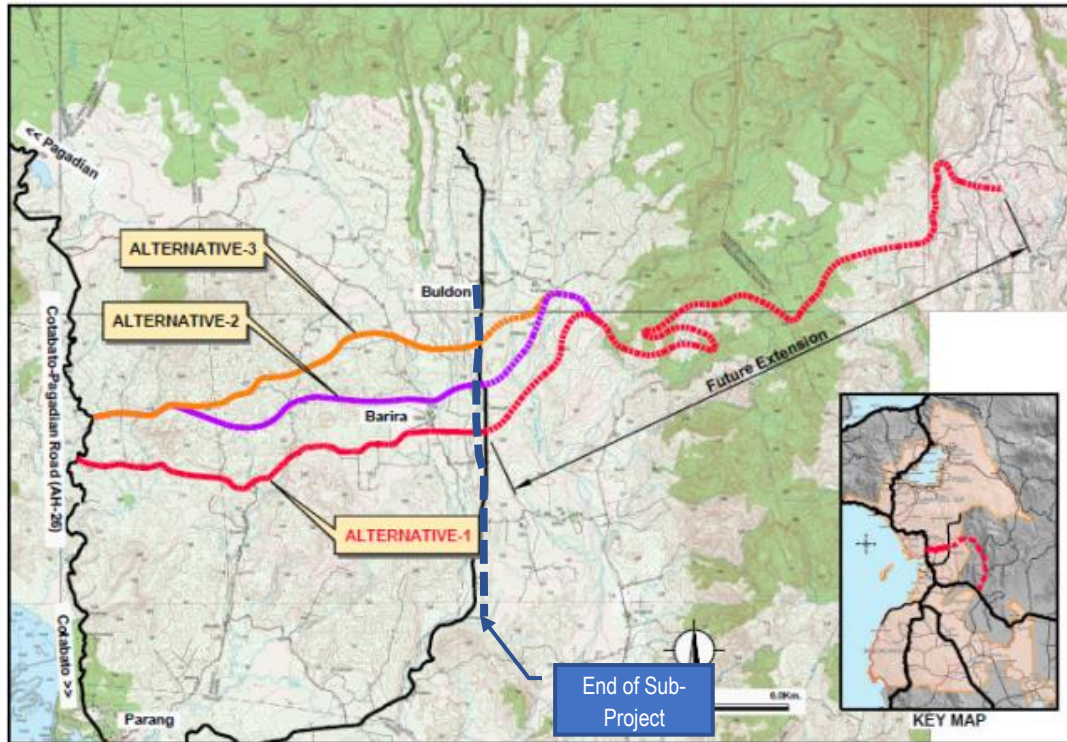
- Utilize the existing road as much as possible to minimize land acquisition

ALT-2:

- Middle route between ALT-1 and ALT-3
- Shortest route among three alternatives

ALT-3:

- Northern route



Source: JICA Study Team

Figure 12.4.2-1 Plan of Alternatives in Sub-Project 1

12.4.3 Evaluation of Alternatives

Three alternatives are evaluated as follows:

(1) Evaluation Items and Criteria

The evaluation criteria were established as shown in Table 12.4.3-1.

Table 12.4.3-1 Evaluation Criteria of Sub-Project 1

Indicators	Items	Unit	Criteria	Evaluation Item
Cost, Construction Period	Total Road Length	km	The shorter, the better.	● Evaluated
	Utilization of Existing Road/Trail	km	The longer, the better.	● Evaluated
	New construction road length	km	The shorter, the better.	(Not Evaluated)
	No. of bridges	nos	The lesser, the better.	(Not Evaluated)
	Total length of bridges	m	The lesser, the better.	● Evaluated
	No. of box culverts	nos	The lesser, the better.	(Not Evaluated)
Economic Impact	No. of Direct Beneficiaries	persons	The more, the better.	● Evaluated
	Agricultural land areas to be served	km	The more, the better.	● Evaluated
Environmental Impact	High-filling section length (H= 10m or more)	m	The shorter, the better.	● Evaluated
	High-cutting section length (H= 10m or more)	m	The shorter, the better.	● Evaluated
	Number of houses/buildings affected	nos	The lesser, the better.	● Evaluated
Technical Features	Alignment	Total no. of curves	The lesser, the better.	(Not Evaluated)
		No. of curve radius < 200m	The lesser, the better.	● Evaluated
		Length of vertical grade $\geq 5\%$	The lesser, the better.	● Evaluated

Evaluation method was established as shown below:

- Best Alternative: ○
- Within 10% difference from the Best Alternative: ○
- Within the 10% to 20% Difference from the Best Alternative: △
- Within the 20% to 200% Difference from the Best Alternative: ×
- More than 200% Difference from the Best Alternative: ××

Source: JICA Study Team

(2) Evaluation of Alternatives

Evaluation result is shown in Table 12.4.3-2.

Table 12.4.3-2 Evaluation of Alternatives of Sub-Project 1

Alternatives			ALT-1		ALT-2		ALT-3		
Main Objectives			<ul style="list-style-type: none">• Increase flexibility of the network by linking two primary inter-city roads (Cotabato-Pagadian Road and Cotabato-Davao Road)• Support small farmers by providing reliable access road that would result to reduced transport cost of their products.• Promote development of agri-industry such as banana plantation by provision of high capacity road.• Support peace building by improving access to MILF camps and other areas without stable road connection due to long-protracted armed conflicts.• Provide access to the areas with high poverty incidence (56.53%) to help them access social services and sell their products to urban centers with minimal transportation cost.						
Concept			<ul style="list-style-type: none">• Southern route• Utilize the existing road as much as possible to minimize land acquisition		<ul style="list-style-type: none">• Middle route between ALT-1 and ALT-3• Shortest route among 3 alternatives		<ul style="list-style-type: none">• Northern route		
Indicators	Items		Unit	Quantities	Point	Quantities	Point	Quantities	Point
Project Cost, Construction Period	Total Road Length		km	14.0	○	13.0	○	13.2	○
	Utilization of Existing Road/Trail		km	10.5	○	0.0	×	0.0	×
	New construction road length		km	3.5	-	13.0	-	13.2	-
	No. of bridges		nos	7	-	8	-	7	-
	Total length of bridges		m	1,450	×	820	○	1,120	×
Economic Impact	No. of box culverts		nos	0	-	4	-	9	-
	No. of Direct Beneficiaries		persons	23,476	○	17,610	×	18,591	×
Environmental Impact	Agricultural land areas to be served		km	3.44	○	0.26	×	0.65	×
	High-filling section length (H= 10m or more)		m	762	○	1,606	×	2,015	×
	High-cutting section length (H= 10m or more)		m	1,854	×	1,281	×	820	○
Technical Features	Number of houses/buildings affected		nos	30	×	24	○	35	×
	Alignment	Total no. of curves	nos	16	-	12	-	14	-
		No. of curve radius < 200m	nos	2	×	0	○	0	○
		Length of vertical grade \geq 5%	m	1,000	○	2,000	×	3,000	×
Evaluation				○ = 6 △ = 0 × = 4 ×× = 0		○ = 4 △ = 0 × = 6 ×× = 0		○ = 3 △ = 0 × = 6 ×× = 1	
Recommendation				Recommended		-		-	

Source: JICA Study Team

12.4.4 Recommendations

ALT-1 was recommended for the Sub-Project 1 due to the following main reasons:

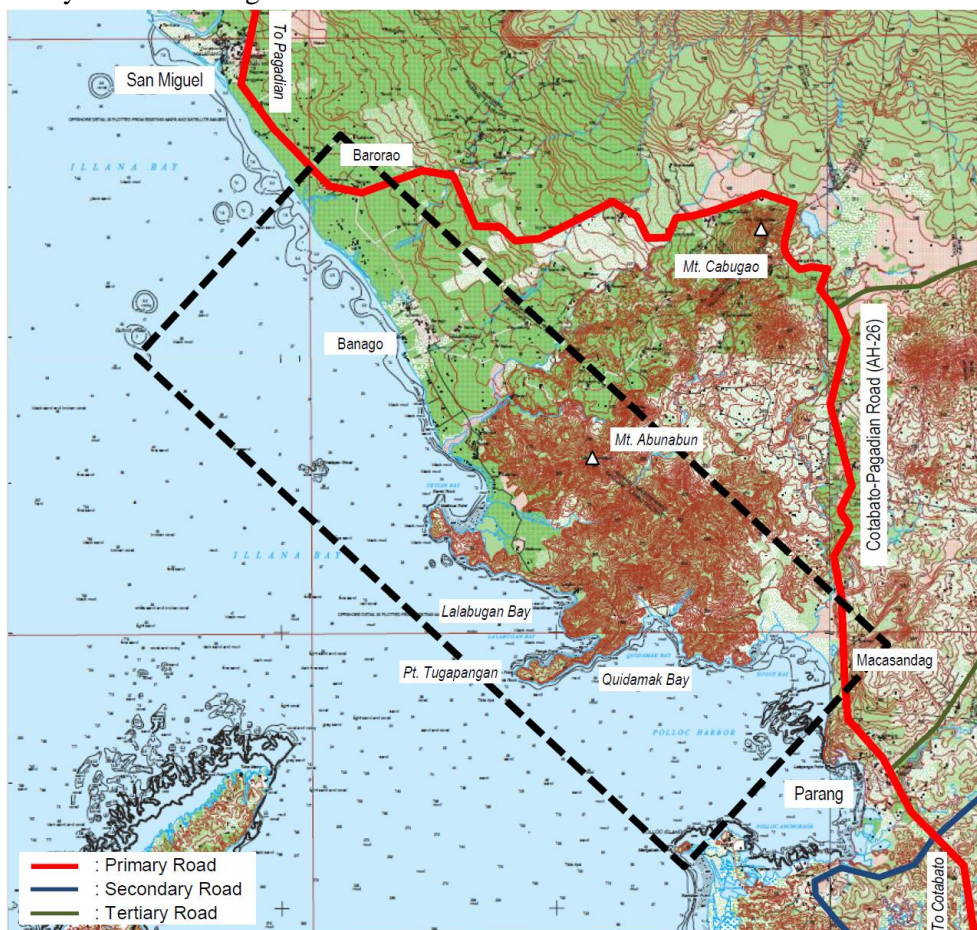
- Although ALT-1 has the longest length, three quarters of this alternative use existing roads and it has high advantage.
- The beneficiary population is the highest because this alternative passes near Barira Municipality, and the length to be passed through agricultural lands is longest.

12.5 Alignment Selection for Sub-Project 2

12.5.1 General Characteristics

The topographical feature of Sub-Project 2 is shown in **Figure 12.5.1-1**, and the general characteristics of Sub-Project 2 are as follows;

- The primary road (Cotabato-Pagadian Road: AH-26) is apart from the coastal side at the south of San Miguel, Malbang and is bound for the mountain side. And, it passes the north of Mt. Cabugao of 812 m in height and reaches to Parang.
- Sub-Project 2 diverts from the primary road at Barorao, Balabagan, continuously goes along coastal area through Banago and connects the primary road again near Macasandag, Matanog.
- It passes the plain at the south foot of Mt. Abunabun of 604 m in height and crosses several rivers and Tugapangan Point which divides Lalabugan Bay and Quidamak Bay.
- Due to the above locations, the terrain is flat in the first half and is steep in the second half.
- There is Banago Twon, Balabagan and several villages. In the other area, houses/buildings are sparse.
- There are mainly wood lands and some cultivated lands which are spread out, and also, some fishery areas are along beaches.



Source: JICA Study Team

Figure 12.5.1-1 Topographic Feature of Sub-Project 2

12.5.2 Alternative Alignments

Since Sub-Project 2 is located along the coastal area and it is difficult to consider another alternative with the other concept, two (2) alternative alignments were studied as shown in **Figure 12.5.2-1**.

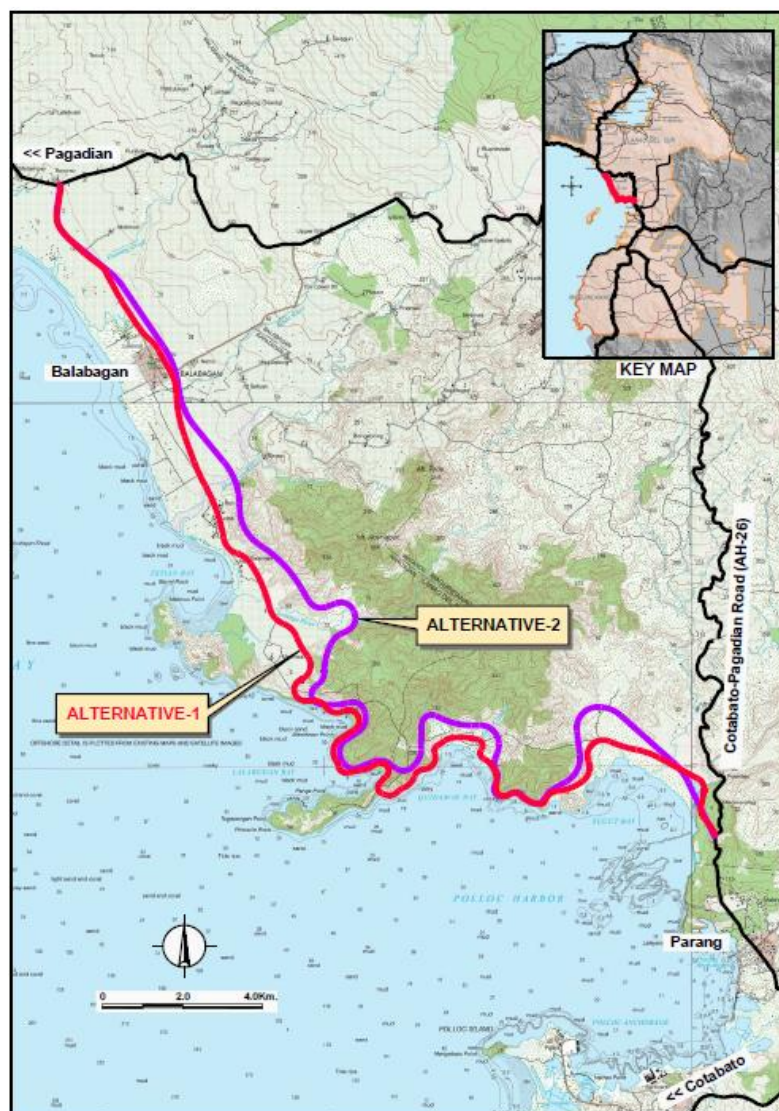
The concepts of two alternatives are as follows:

ALT-1:

- Pass through the coastal side to minimize high-filling and cut sections

ALT-2:

- Pass through the mountainous side to provide access to inland areas



Source: JICA Study Team

Figure 12.5.2-1 Plan of Alternatives in Sub-Project 2

12.5.3 Evaluation of Alternatives

Two alternatives are evaluated as follows:

(1) Evaluation Items and Criteria

The evaluation criteria were established as shown in Table 12.5.3-1.

Table 12.5.3-1 Evaluation Criteria of Sub-Project 2

Indicators	Items	Unit	Criteria	Evaluation Item
	Total Road Length	km	The shorter, the better.	● Evaluated
	Utilization of Existing Road/Trail	km	The longer, the better.	● Evaluated

Indicators	Items		Unit	Criteria	Evaluation Item
Cost, Construction Period	New construction road length		km	The shorter, the better.	(Not Evaluated)
	No. of bridges		nos	The lesser, the better.	(Not Evaluated)
	Total length of bridges		m	The lesser, the better.	● Evaluated
	No. of box culverts		nos	The lesser, the better.	(Not Evaluated)
Economic Impact	No. of Direct Beneficiaries		persons	The more, the better.	● Evaluated
	Agricultural land areas to be served		km	The more, the better.	● Evaluated
Environment al Impact	High-filling section length (H= 10m or more)		m	The shorter, the better.	● Evaluated
	High-cutting section length (H= 10m or more)		m	The shorter, the better.	● Evaluated
	Number of houses/buildings affected		nos	The lesser, the better.	● Evaluated
Technical Features	Alignment	Total no. of curves	nos	The lesser, the better.	(Not Evaluated)
		No. of curve radius < 200m	nos	The lesser, the better.	● Evaluated
		Length of vertical grade $\geq 5\%$	m	The lesser, the better.	● Evaluated

Evaluation method was established as shown below:

- Best Alternative: ○
- Within 10% difference from the Best Alternative: ○
- Within the 10% to 20% Difference from the Best Alternative: △
- Within the 20% to 200% Difference from the Best Alternative: ×
- More than 200% Difference from the Best Alternative: ××

Source: JICA Study Team

(2) Evaluation of Alternatives

Evaluation result is shown in Table 12.5.3-2.

Table 12.5.3-2 Evaluation of Alternatives of Sub-Project 2

Alternatives			ALT-1		ALT-2		
Main Objectives			<ul style="list-style-type: none">•Provide an alternative to AH26 which will ensure that the network function normally even when AH26 breaks down.•Connect two coastal municipalities (Balabagan and Kapatagan) to major urban center (Cotabato City) to facilitate better movement of people and goods.•Promote the local area as local tourism spot by providing access to the beautiful beaches of Illana Bay.•Provide better link to the areas with high poverty incidence (66.64%) to help them access social services and sell their products to urban centers with minimal transportation cost.•Support small fishermen by providing better access to markets by construction of high capacity road.				
Concept			•Pass through the coastal side to minimize high-filling and cut sections		•Pass through the mountainous side to provide access to inland areas		
Indicators	Items		Unit	Quantities	Point	Quantities	Point
Project Cost, Construction Period	Total Road Length		km	33.9	○	35.7	○
	Utilization of Existing Road/Trail		km	2.5	○	2.5	○
	New construction road length		km	31.4	-	35.7	-
	No. of bridges		nos	7	-	20	-
	Total length of bridges		m	1,410	○	7,300	xx
Economic Impact	No. of box culverts		nos	8	-	14	-
	No. of Direct Beneficiaries		persons	28,385	○	27,389	○
Environmental Impact	Agricultural land areas to be served		km	13.86	○	11.47	Δ
	High-filling section length (H= 10m or more)		m	1,581	○	9,375	xx
	High-cutting section length (H= 10m or more)		m	5,175	x	3,781	○
	Number of houses/buildings affected		nos	19	○	39	x
Technical Features	Alignment	Total no. of curves	nos	33	-	37	-
		No. of curve radius < 200m	nos	9	x	5	○
		Length of vertical grade ≥ 5%	m	912	○	5,695	xx
Evaluation			○ = 8 Δ = 0 x = 2 xx = 0		○ = 5 Δ = 1 x = 1 xx = 3		
Recommendation			Recommended		-		

Source: JICA Study Team

12.5.4 Recommendations

ALT-1 was recommended for the Sub-Project 2 due to the following main reasons:

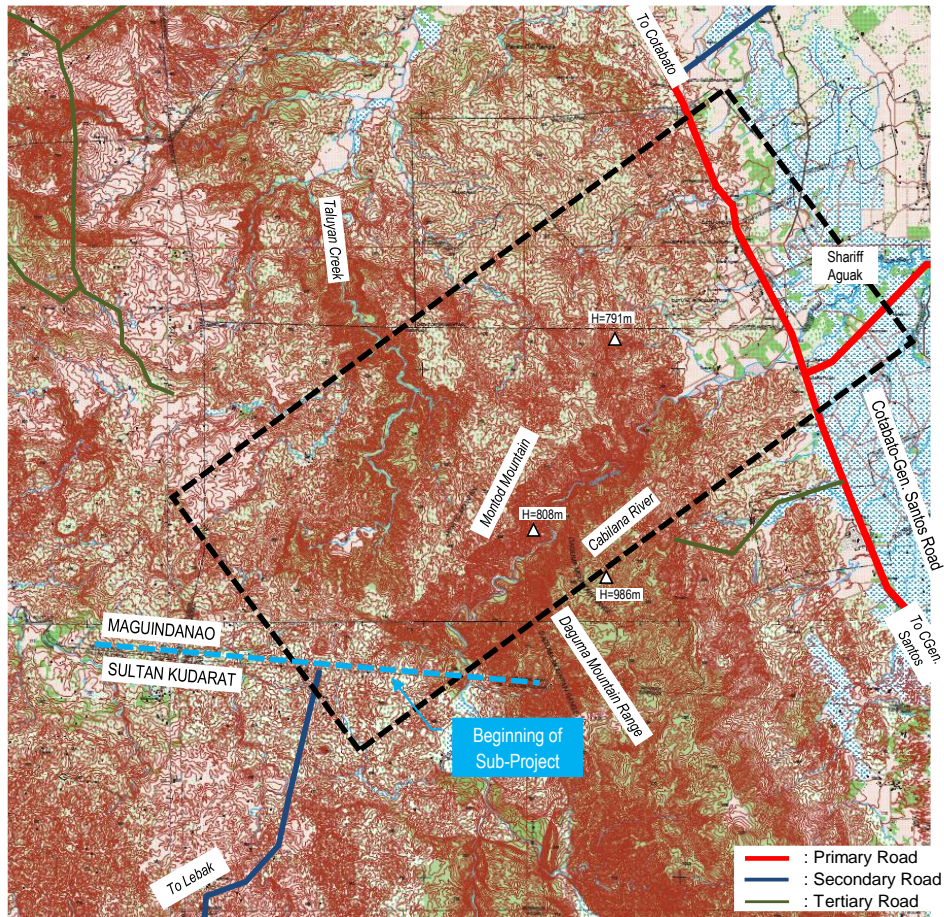
- ALT-1 has many advantages such as the shorter road length and the shorter bridge lengths regarding the project cost and construction period.
- Also, the number of the affected houses/buildings of ALT-1 is less than half of the one of ALT-2.
- And, ALT-1 passes through the coastal area so that contributes to the promotion of the fishery business.

12.6 Alignment Selection for Sub-Project 5

12.6.1 General Characteristics

The topographical feature of Sub-Project 5 are shown in **Figure 12.6.1-1**, and the general characteristics of Sub-Project 5 are as follows;

- The section extends the existing secondary road from Lebak to the primary road (Cotabato-General Santos Road) near Shariff Aguak, Datu Hofer Ampatuan.
- It is located on Montod Mountains of the range between 600 m and 800 m which runs to the northeast and southwestern axis and formulates a watershed.
- Along the south of Montod Mountains, there is the Cabilanan River which has deep valley which divides it from Daguma Mountains Range.
- Due to the above locations, the terrain is characterized by very steep slopes everywhere.
- There are few houses/buildings besides Shariff Aguak, Datu Hofer Ampatuan.
- Cultivated lands mixed with coconut basically and widely spread.



Source: JICA Study Team

Figure 12.6.1-1 Topographic Feature of Sub-Project 5

12.6.2 Alternative Alignments

Three alternative alignments were studied as shown in **Figure 12.6.2-1**.

The concepts of three alternatives are as follows:

ALT-1:

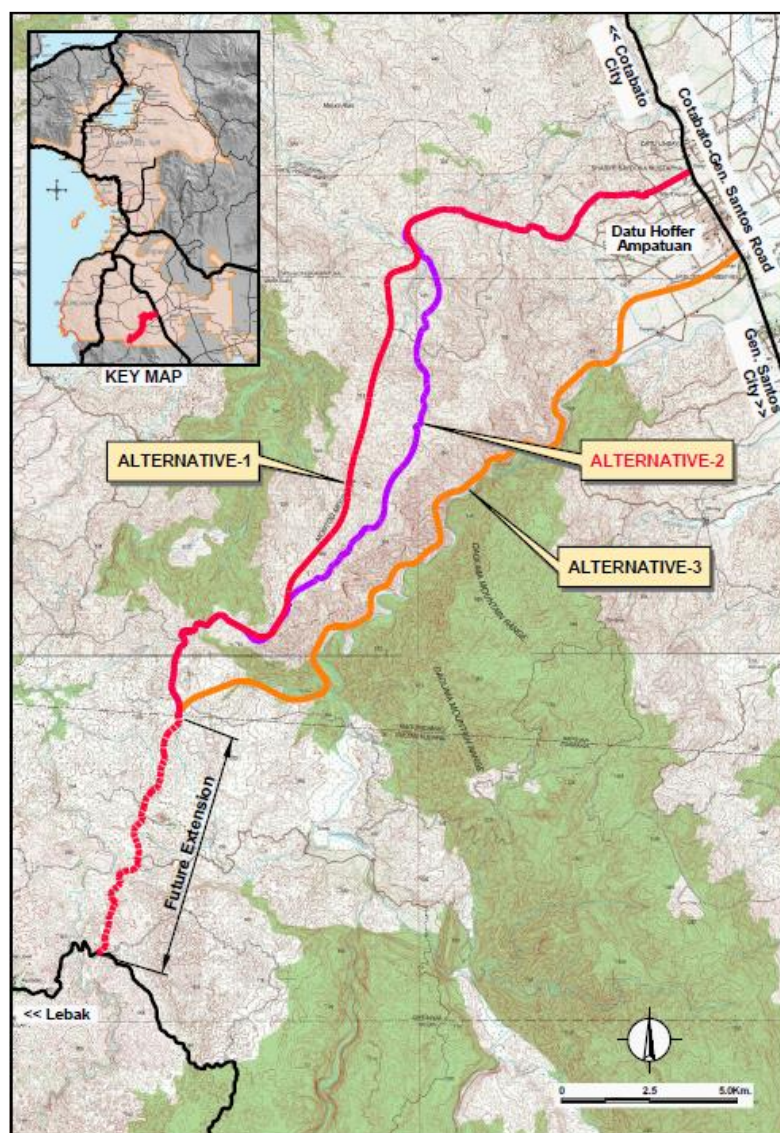
- Northern route
- Utilize the existing road as much as possible to minimize land acquisition

ALT-2:

- Middle route between ALT-1 and ALT-3
- Utilize the existing road as much as possible to minimize land acquisition

ALT-3:

- Southern route along valley
- Shortest length among three alternatives



Source: JICA Study Team

Figure 12.6.2-1 Plan of Alternatives in Sub-Project 5

12.6.3 Evaluation of Alternatives

Three alternatives are evaluated as follows:

(1) Evaluation Items and Criteria

The evaluation criteria were established as shown in Table 12.6.3-1.

Table 12.6.3-1 Evaluation Criteria of Sub-Project 5

Indicators	Items	Unit	Criteria	Evaluation Item
Cost, Construction Period	Total Road Length	km	The shorter, the better.	● Evaluated
	Utilization of Existing Road/Trail	km	The longer, the better.	● Evaluated
	New construction road length	km	The shorter, the better.	(Not Evaluated)
	No. of bridges	nos	The lesser, the better.	(Not Evaluated)
	Total length of bridges	m	The lesser, the better.	● Evaluated
	No. of box culverts	nos	The lesser, the better.	(Not Evaluated)
Economic Impact	No. of Direct Beneficiaries	persons	The more, the better.	● Evaluated
	Agricultural land areas to be served	km	The more, the better.	● Evaluated

Indicators	Items	Unit	Criteria	Evaluation Item
Environmental Impact	High-filling section length (H= 10m or more)	m	The shorter, the better.	● Evaluated
	High-cutting section length (H= 10m or more)	m	The shorter, the better.	● Evaluated
	Number of houses/buildings affected	nos	The lesser, the better.	● Evaluated
Technical Features	Alignment	Total no. of curves	The lesser, the better.	(Not Evaluated)
		No. of curve radius < 200m	The lesser, the better.	● Evaluated
		Length of vertical grade \geq 5%	The lesser, the better.	● Evaluated

Evaluation method was established as shown below:

- Best Alternative: ○
- Within 10% difference from the Best Alternative: ○
- Within the 10% to 20% Difference from the Best Alternative: △
- Within the 20% to 200% Difference from the Best Alternative: ×
- More than 200% Difference from the Best Alternative: ××

Source: JICA Study Team

(2) Evaluation of Alternatives

Evaluation result is shown in **Table 12.6.3-2**.

Here, ALT-3 passes along the deep valley of Cabilanan River and it is difficult to access to the opposite agricultural lands from ALT-3. Therefore, the agricultural land area of ALT-3 was evaluated in half.

Table 12.6.3-2 Evaluation of Alternatives of Sub-Project 5

Alternatives			ALT-1		ALT-2		ALT-3		
Main Objectives			<ul style="list-style-type: none">• Increase the flexibility of the network by linking primary-intercity road (Cotabato- Gen. Santos Road) and regional primary road (Awang-Upi-Lebak Road).• Connect coastal towns to major urban centers (Cotabato City, Koronadal City) to facilitate better movement of people and goods.• Provide reliable access road to a wide agricultural land (67,918 ha, total for annual crop and perennial crop)• Provide better link to the areas with high poverty incidence (63.30%) to help them access social services and sell their products to urban centers with minimal transportation cost.						
Concept			<ul style="list-style-type: none">• Northern route• Utilize the existing road as much as possible to minimize land acquisition		<ul style="list-style-type: none">• Middle route between ALT-1 and 3• Utilize the existing road as much as possible to minimize land acquisition		<ul style="list-style-type: none">• Southern route along valley• Shortest length among 3 alternative		
Indicators	Items		Unit	Quantities	Point	Quantities	Point	Quantities	Point
Project Cost, Construction Period	Total Road Length		km	27.9	Δ	27.1	○	25.1	○
	Utilization of Existing Road/Trail		km	6.6	○	6.6	○	4.5	×
	New construction road length		km	27.8	-	20.5	-	20.6	-
	No. of bridges		nos	6	-	7	-	8	-
	Total length of bridges		m	3,150	×	2,300	○	3,900	×
Economic Impact	No. of box culverts		nos	8	-	10	-	6	-
	No. of Direct Beneficiaries		persons	11,424	○	11,424	○	6,672	×
Environmental Impact	Agricultural land areas to be served		km	25.04	○	24.33	○	10.91	×
	High-filling section length (H= 10m or more)		m	4,798	×	4,906	×	2,303	○
	High-cutting section length (H= 10m or more)		m	12,985	○	13,050	○	12,002	○
Technical Features	Alignment	Number of houses/buildings affected	nos	20	Δ	20	Δ	17	○
		Total no. of curves	nos	28	-	24	-	33	-
		No. of curve radius < 200m	nos	2	○	2	○	2	○
Evaluation	Length of vertical grade ≥ 5%		m	11,259	×	7,759	×	6,023	○
				○ = 5 Δ = 2 × = 3 ×× = 0		○ = 7 Δ = 1 × = 2 ×× = 0		○ = 6 Δ = 0 × = 4 ×× = 0	
	Recommendation			-		Recommended		-	

Source: JICA Study Team

12.6.4 Recommendations

ALT-2 was recommended for the Sub-Project 5 due to the following main reasons:

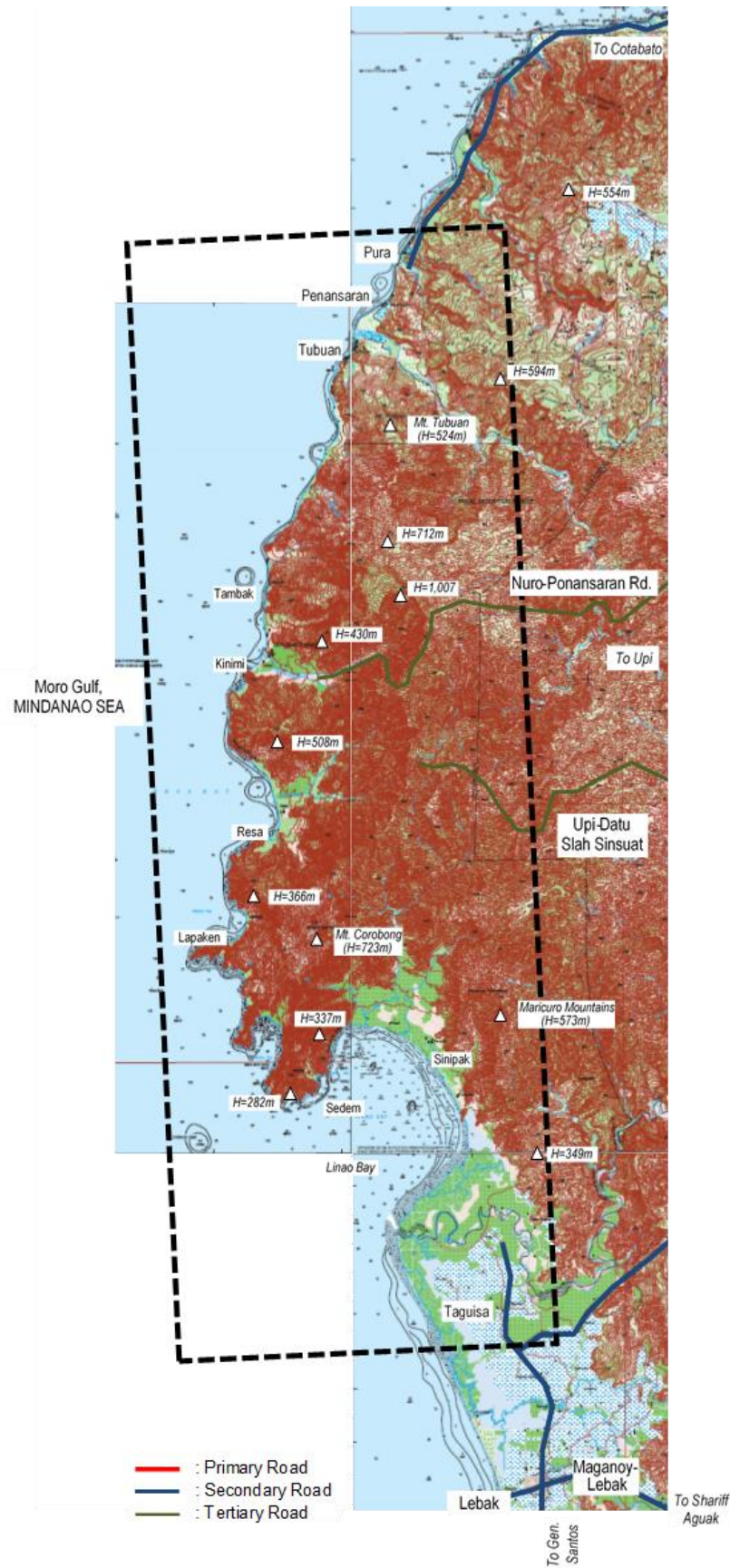
- Although ALT-2 has the longer length, the longest utilization of existing roads and shortest bridge length have high advantage regarding the project cost and construction period.
- The beneficiary population is the highest and the agricultural lands widely spread on the both sides because the length to be passed through agricultural lands is longer.

12.7 Alignment Selections for Sub-Project 6

12.7.1 General Characteristics

The topographical feature of Sub-Project 6 is shown in **Figure 12.7.1-1**, and the general characteristics of Sub-Project 6 are as follows;

- The section is missing link and connects between Cotabato and Lebak along coastal area.
- From Cotabato, the road constructed until Pura, Datu Blah Sinsuat. On the other hand, the road has been developed until Taguisa, Sultan Kudarat.
- It is located between Moro Gulf of Mindanao Sea and high mountains of 500 m in height protruding into the sea. Then, the section includes a lot of rivers and mountains.
- Due to the above locations, the terrain is extremely up and down, and there are continuously steep slopes through the whole section.
- Houses/buildings are isolated, especially fishery villages.
- There are mainly wood lands in mountains and cultivated lands/ cultivated lands mixed with coconut between wood lands, and also, some fishery areas are along the beaches and bays.



Source: JICA Study Team

Figure 12.7.1-1 Topographic Feature of Sub-Project 6

12.7.2 Alternative Alignments

Since Sub-Project 6 is located along the coastal area and it is difficult to consider another alternative with the other concept, two alternative alignments were studied as shown in **Figure 12.7.2-1**.

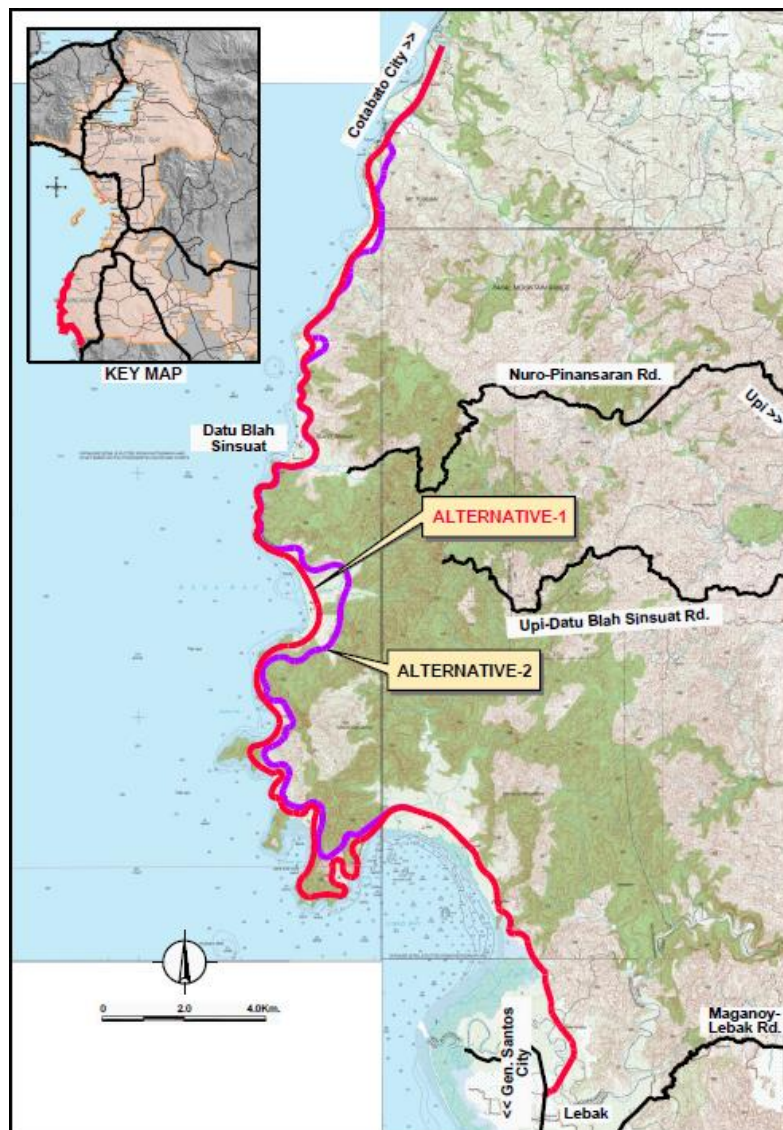
The concepts of two alternatives are as follows:

ALT-1:

- Pass through the coastal side

ALT-2:

- Pass through the mountainous side



Source: JICA Study Team

Figure 12.7.2-1 Plan of Alternatives in Sub-Project 6

12.7.3 Evaluation of Alternatives

Two alternatives are evaluated as follows:

(1) Evaluation Items and Criteria

The evaluation criteria were established as shown in **Table 12.7.3-1**.

Table 12.7.3-1 Evaluation Criteria of Sub-Project 6

Indicators	Items		Unit	Criteria	Evaluation Item
Cost, Consruction Period	Total Road Length		km	The shorter, the better.	● Evaluated
	Utilization of Existing Road/Trail		km	The longer, the better.	● Evaluated
	New construction road length		km	The shorter, the better.	(Not Evaluated)
	No. of bridges		nos	The lesser, the better.	(Not Evaluated)
	Total length of bridges		m	The lesser, the better.	● Evaluated
	No. of box culverts		nos	The lesser, the better.	(Not Evaluated)
Economic Impact	No. of Direct Beneficiaries		persons	The more, the better.	● Evaluated
	Agricultural land areas to be served		km	The more, the better.	● Evaluated
Environment al Impact	High-filling section length (H= 10m or more)		m	The shorter, the better.	● Evaluated
	High-cutting section length (H= 10m or more)		m	The shorter, the better.	● Evaluated
	Number of houses/buildings affected		nos	The lesser, the better.	● Evaluated
Technical Features	Alignment	Total no. of curves	nos	The lesser, the better.	(Not Evaluated)
		No. of curve radius < 200m	nos	The lesser, the better.	● Evaluated
		Length of vertical grade $\geq 5\%$	m	The lesser, the better.	● Evaluated

Evaluation method was established as shown below:

- Best Alternative: ○
- Within 10% difference from the Best Alternative: ○
- Within the 10% to 20% Difference from the Best Alternative: △
- Within the 20% to 200% Difference from the Best Alternative: ×
- More than 200% Difference from the Best Alternative: × ×

Source: JICA Study Team

(1) Evaluation of Alternatives

- Evaluation result is shown in **Table 12.7.3-2**.

Table 12.7.3-2 Evaluation of Alternatives of Sub-Project 6

Alternatives			ALT-1		ALT-2	
Main Objectives			<ul style="list-style-type: none">• Strengthen the ARMM’s road network by addressing one of the missing critical sections of the network.• Provide reliable access road to a wide agricultural land (67,918 ha, total for annual crop and perrenial crop.• Promote the area as local tourism spot by providing access to the beautiful beaches of Datu Blah Sinsuat.• Provide the coastal communities which currently travel by motor boats due to lack of road with reliable access road to urban center.• Support small fishermen by providing better access to markets by construction of high capacity road.• Provide better access to the areas with high poverty incidence (62.97%) to help them access social services.• Support the IP communities' access to basic social services and sell their products to urban centers with minimal transportation cost.			
Concept			• Pass through the coastal side to minimize high-filling and cut sections		• Pass through the mountainous side to provide access to inland areas	
Indicators	Items	Unit	Quantities	Point	Quantities	Point
Project Cost, Construction Period	Total Road Length	km	65.6	○	62.6	○
	Utilization of Existing Road/Trail	km	2.1	○	2.1	○
	New construction road length	km	63.5	-	60.5	-

	No. of bridges	nos	16	-	25	-
	Total length of bridges	m	2,800	○	4,100	×
	No. of box culverts	nos	19	-	23	-
Economic Impact	No. of Direct Beneficiaries	persons	34,023	○	34,023	○
	Agricultural land areas to be served	km	24.27	○	22.83	○
Environmental Impact	High-filling section length (H= 10m or more)	m	3,084	○	6,304	×
	High-cutting section length (H= 10m or more)	m	10,339	○	14,847	×
	Number of houses/buildings affected	nos	32	○	32	○
Technical Features	Alignment	Total no. of curves	nos	88	-	99
		No. of curve radius < 200m	nos	26	○	35
		Length of vertical grade \geq 5%	m	500	○	5,000
Evaluation			○ = 10 △ = 0 × = 0 ×× = 0		○ = 5 △ = 0 × = 4 ×× = 1	
Recommendation			Recommended		-	

Source: JICA Study Team

12.7.4 Recommendations

ALT-1 was recommended for the Sub-Project 6 due to the following main reasons:

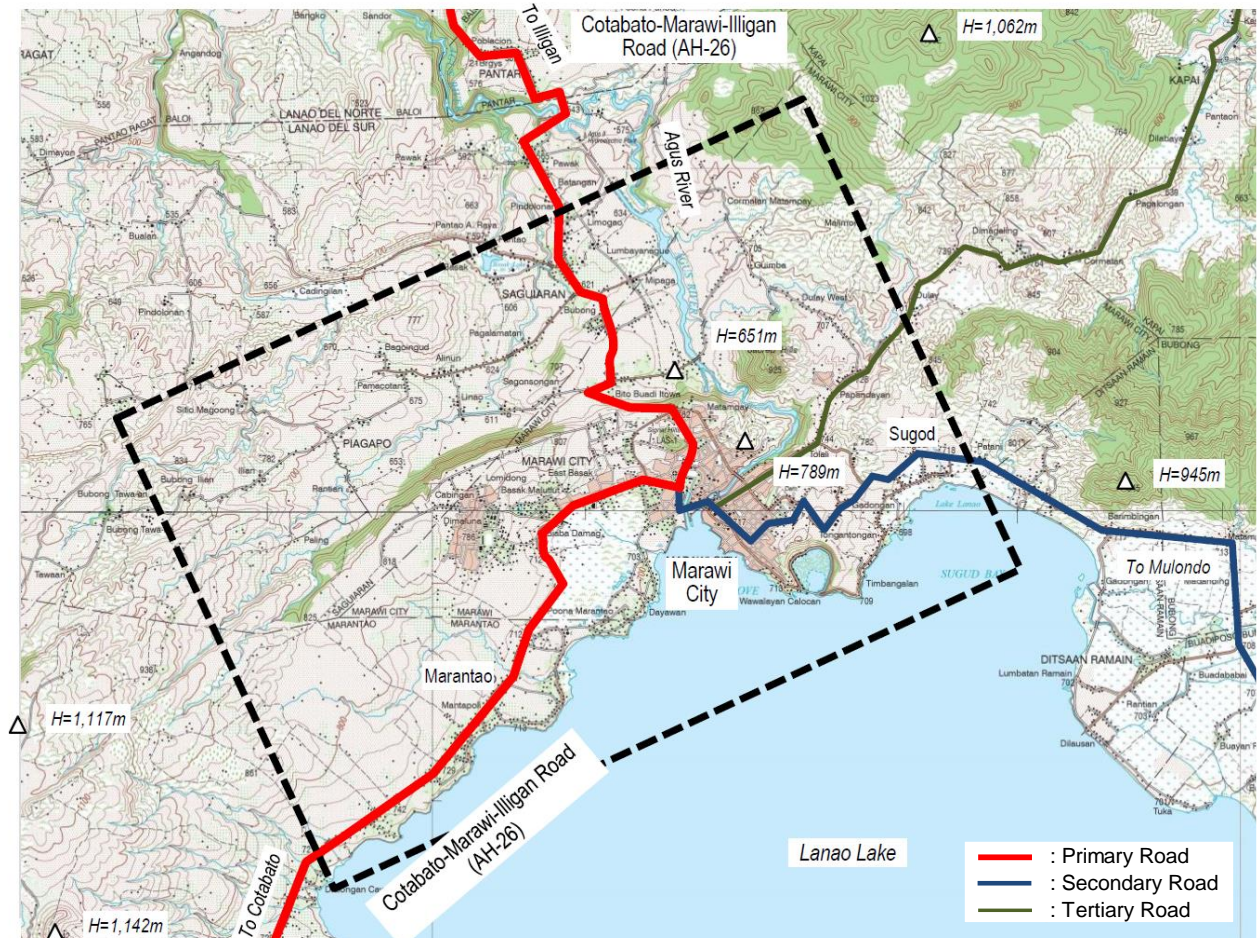
- Although ALT-1 has the longer length and the same existing road length, the bridge lengths of ALT-1 is shorter than the one of ALT-2 and it has high advantage regarding the project cost and construction period.
- The length of vertical grade with 5 % and more of ALT-1 is one-tenth the one of ALT-2 and it also has high advantage regarding the traffic safety.
- And, ALT-1 passes through the coastal area so that contributes to the promotion of the fishery business.

12.8 Alignment Selection for Sub-Project 7

12.8.1 General Characteristics

The topographical features of Sub-Project 7 are shown in **Figure 12.8.1-1**, and the general characteristics of Sub-Project 7 are as follows:

- Sub-Project 7 is a by-pass of Marawi City to mitigate the congestion on the primary road (Cotabato-Marawi-Iligan Road: AH-26).
- Marawi City is located on the top of a hill with approximately 750-800 m in height, facing Lake Lanao on the south side. The other three directions are surrounded by small mountains and hills.
- However, the immediate north side of Marawi City is a cliff with a 100 m head
- The section connects from the primary road (Cotabato-Marawi-Iligan Road: AH-26) near Marantao, crosses Agus River and reaches to the secondary road near Sugod in Marawi City.
- Due to the above locations, the terrain is very steep at the immediate north side of Marawi City and the other terrain is basically undulating.
- Houses/buildings in the central area of Marawi City are very crowded, and also there are many houses/buildings along AH-26 due to a ribbon development. Some small villages are scattered in many places due to undeveloped.
- Cultivated lands are widely spread, and the plantations including coconuts and wood lands are mixed.



Source: JICA Study Team

Figure 12.8.1-1 Topographic Feature of Sub-Project 7

12.8.2 Alternative Alignments

Four alternative alignments were studied as shown in **Figure 12.8.2-1**.

The concepts of four alternatives are as follows:

ALT-1:

- Pass under the hill, and climb up the hill along the cliffs at the far west side from the city
- Avoid houses/ buildings as much as possible
- Furthest from the city

ALT-2:

- Pass over the northern edge of the hill top and merge with ALT-1 at the west part
- Avoid houses/ buildings as much as possible
- Nearest to the city

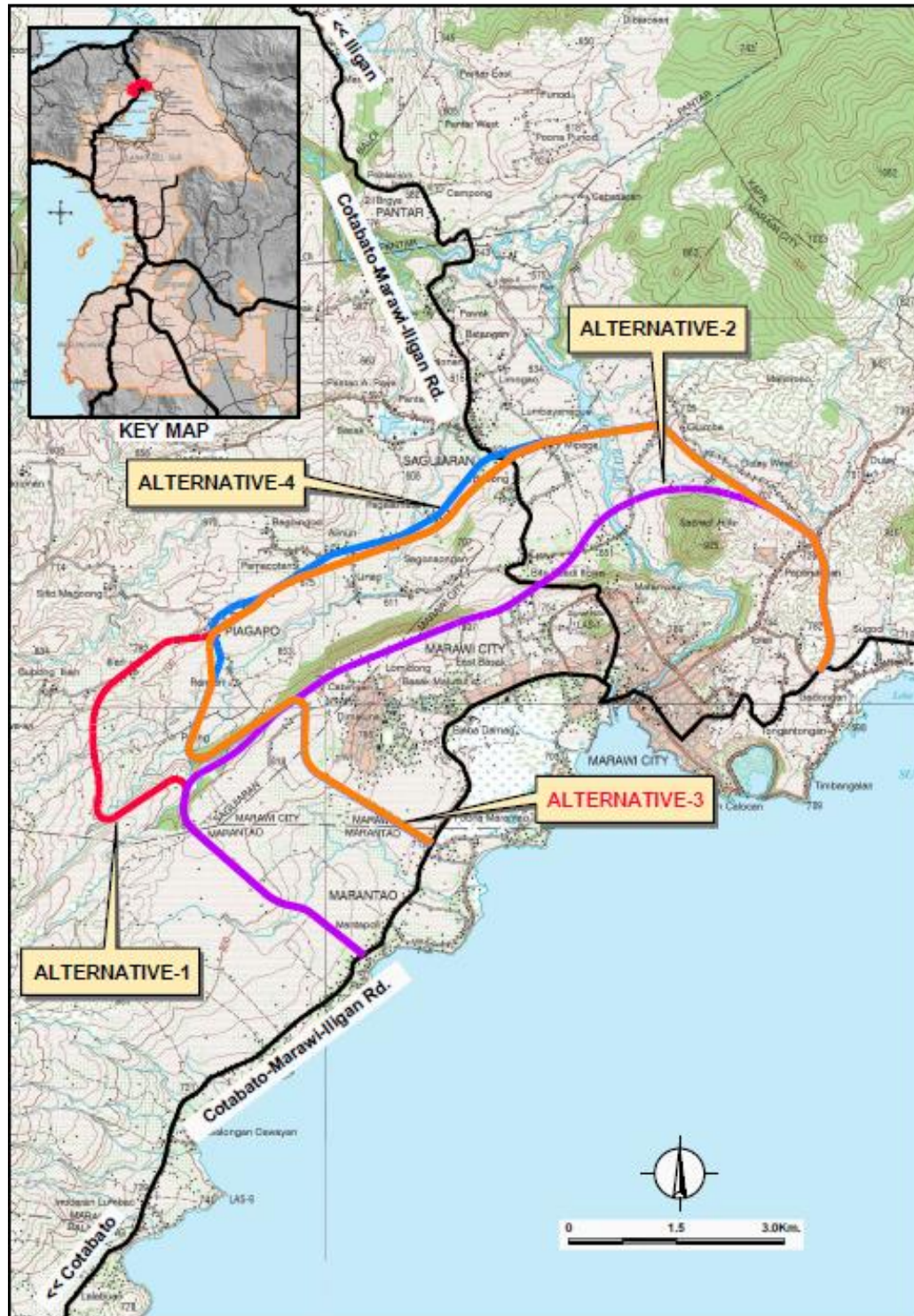
ALT-3:

- Pass under the hill, and climb up the hill along the cliffs on the close west side to the city
- Avoid houses/ buildings as much as possible

- Shortest route among three alternatives

ALT-4:

- Basically, the same route with ALT-3
- Utilize the existing road as much as possible



Source: JICA Study Team

Figure 12.8.2-1 Plan of Alternatives in Sub-Project 7

12.8.3 Evaluation of Alternatives

Four alternatives are evaluated as follows:

(2) Evaluation Items and Criteria

The evaluation criteria were established as shown in **Table 12.8.3-1**.

Table 12.8.3-1 Evaluation Criteria of Sub-Project 7

Indicators	Items		Unit	Criteria	Evaluation Item
Cost, Construction Period	Total Road Length		km	The shorter, the better.	● Evaluated
	Utilization of Existing Road/Trail		km	The longer, the better.	● Evaluated
	New construction road length		km	The shorter, the better.	(Not Evaluated)
	No. of bridges		nos	The lesser, the better.	(Not Evaluated)
	Total length of bridges		m	The lesser, the better.	● Evaluated
	No. of box culverts		nos	The lesser, the better.	(Not Evaluated)
Economic Impact	No. of Direct Beneficiaries		persons	The more, the better.	● Evaluated
	Agricultural land areas to be served		km	The more, the better.	● Evaluated
Environment al Impact	High-filling section length (H= 10m or more)		m	The shorter, the better.	● Evaluated
	High-cutting section length (H= 10m or more)		m	The shorter, the better.	● Evaluated
	Number of houses/buildings affected		nos	The lesser, the better.	● Evaluated
Technical Features	Alignment	Total no. of curves	nos	The lesser, the better.	(Not Evaluated)
		No. of curve radius < 200m	nos	The lesser, the better.	● Evaluated
		Length of vertical grade $\geq 5\%$	m	The lesser, the better.	● Evaluated

Evaluation method was established as shown below:

- Best Alternative: ○
- Within 10% difference from the Best Alternative: ○
- Within the 10% to 20% Difference from the Best Alternative: △
- Within the 20% to 200% Difference from the Best Alternative: ×
- More than 200% Difference from the Best Alternative: × ×

Source: JICA Study Team

Additionally, the following evaluation items was set up as the one of technical features

- **River Stabilities:** When an alignment passes through a river, it is desirable that the river condition is stable because there is a high possibility that roads and bridges will be destroyed or damaged when roads and bridges are constructed under unstable river conditions such as river meandering and rapid river-flow sections.
- **Suitability in View of Road Network:** The road not only expects a bypass function but also functions such as induction of urbanized areas and formulation of a good road network. Therefore, passing through a suburban area with open space is expected to be highly inductive toward urbanization.

(3) Evaluation of Alternatives

Evaluation result is shown in **Table 12.8.3-2**.

Table 12.8.3-2 Evaluation of Alternatives of Sub-Project 7

Alternatives				ALT-1		ALT-2		ALT-3		ALT-4	
Main Objectives				•Firm up the formation of the city’ s road network by providing a trunk road which would expand capacity of the network and resulted to improved flow of traffic.							
				•Improve traffic flow and urban amenities by separating through traffic from local traffic.							
				•Improve access to social services by providing trunk road at the edge of the built-up area.							
				•Guide sound urbanization of Marawi City by providing trunk road at the edge of the city which would result to efficient utilization of urban space.							
				•To contribute in early recovery of Marawi City by providing temporary jobs during construction stage.							
Concept				•Pass under the hill, and climb up the hill along the cliffs on the far west side from the city		•Pass over the northern edge of the hill top and merge with ALT-1 at the west part		•Pass under the hill, and climb up the hill along the cliffs on the close west side to the city		•Basically, the same route with ALT-3	
				•Avoid houses/ buildings as much as possible		•Avoid houses/ buildings as much as possible		•Avoid houses/ buildings as much as possible		•Utilize the existing road as much as possible	
				•Furthest from the city		•Nearest to the city					
Indicators	Items		Unit	Quantities	Point	Quantities	Point	Quantities	Point	Quantities	Point
Project Cost, Construction Period	Total Road Length		km	20.2	×	15.8	○	18.1	△	18.2	△
	Utilization of Existing Road/Trail		km	4.6	×	5.2	×	2.4	×	6.5	○
	New construction road length		km	15.6	-	10.6	-	15.7	-	11.7	-
	No. of bridges		nos	8	-	6	-	7	-	7	-
	Total length of bridges		m	1,550	○	1,750	△	1,550	○	1,550	○
	No. of box culverts		nos	2	-	7	-	2	-	2	-
Economic Impact	No. of Direct Beneficiaries		persons	39,172	×	45,536	△	53,343	○	53,343	○
	Agricultural land areas to be served		km	17.18	○	12.14	×	15.02	△	13.17	×
Environmental Impact	High-filling section length (H= 10m or more)		m	1,480	○	2,098	×	1,630	△	1,630	△
	High-cutting section length (H= 10m or more)		m	867	×	2,554	×	703	○	703	○
	Number of houses/buildings affected		nos	79	×	50	×	4	○	151	×
Technical Features	Alignment	Total no. of curves	nos	23	-	18	-	19	-	19	-
		No. of curve radius < 200m	nos	2	×	0	○	4	×	4	×
		Length of vertical grade ≥ 5%	m	4,385	○	5,433	×	5,644	×	5,644	×
	River stabilities		-	Pass through the section where the river channel is stable	○	Close to a tributary meandering	×	Pass through the section where the river channel is stable	○	Pass through the section where the river channel is stable	○
	Suitability in view of road network		-	Expected to induce the urban areas to the suburbs, however a bit far away	△	For the north side of the cliff, the expansion of urban areas is limited.	×	Expected to induce the urban areas to the suburbs	○	Expected to induce the urban areas to the suburbs	○
Evaluation				○ = 5 △ = 1 × = 5 ×× = 1		○ = 2 △ = 2 × = 6 ×× = 2		○ = 6 △ = 3 × = 3 ×× = 0		○ = 6 △ = 2 × = 3 ×× = 1	
Recommendation				-		-		Recommended		-	

Source: JICA Study Team

12.8.4 Recommendations

ALT-3 was recommended for the Sub-Project 7 due to the following main reasons:

- ALT-3 has many advantages regarding environmental impacts, especially the number of affected houses/buildings is low, and also high-cutting sections are the shortest among the four

alternatives.

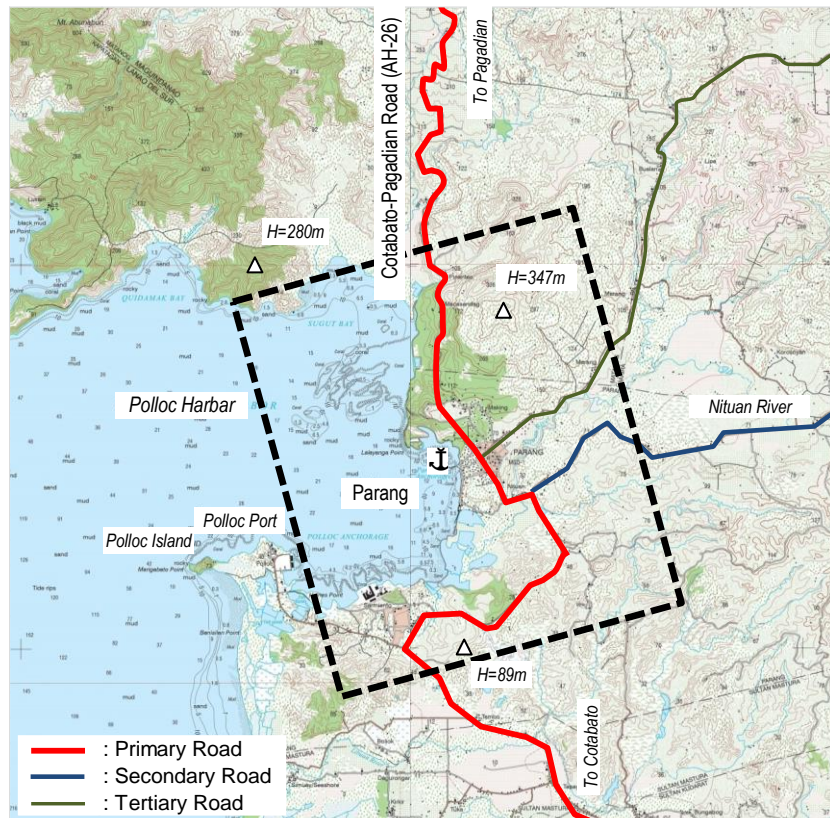
- And, ALT-3 passes through a stable river crossing point and is located at suburban area apart approximately 2 km from the edge of developed area in Marawi City. It has a high potential to induce urban areas along the route.
- Compared between ALT-3 and ALT-4, the length to utilize the existing road of ALT-3 is shorter than 60 % than that of ALT-4. However, the width of pavement width is only 4.7 m. On the other hand, ALT-3 has advantages for the shorter total road length and the longer length to be passed agricultural lands. Especially, the number of affected houses/buildings of ALT-3 is incredibly less than that of ALT-4. This will affect not only the rise in project costs but also the delay in project implementation.

12.9 Alignment Selection for Sub-Project 8

12.9.1 General Characteristics

The topographical feature of Sub-Project 8 are shown in **Figure 12.9.1-1**, and the general characteristics of Sub-Project 8 are as follows;

- Sub-project 8 is a by-pass of Parang Municipality to mitigate the congestion on the primary road (Cotabato-Pagadian Road: AH-26).
- Parang Municipality has a sea port facing Polloc Harbor because there are some small mountains on the north and south of Parang to create a good natural port.
- Hilly areas are spread around with some rivers on the east of Parang.
- Due to the above locations, the terrain on the north and south of Parang is steep. The terrain of the coastal area is flatter than the one of the inland area which is rolling.
- Houses/buildings in the central area of Parang are very crowded, and also there are many houses/buildings along AH-26 due to a ribbon development. The area in the sea side of Parang has still a lot of houses/ buildings. On the other hand, the area in the inland side of Parang has some small villages along the existing road due to undeveloped.
- Forestry is spread at the north and south of Parang. On the other hand, plantations, cultivated lands and rice fields are located around Parang, especially the eastern parts.



Source: JICA Study Team

Figure 12.9.1-1 Topographic Feature of Sub-Project 8

12.9.2 Alternative Alignments

Since the main requirement for Sub-Project 8 is a by-pass road and it is difficult to consider another alternative with the other concept, two alternative alignments were studied as shown in **Figure 12.9.2-1**.

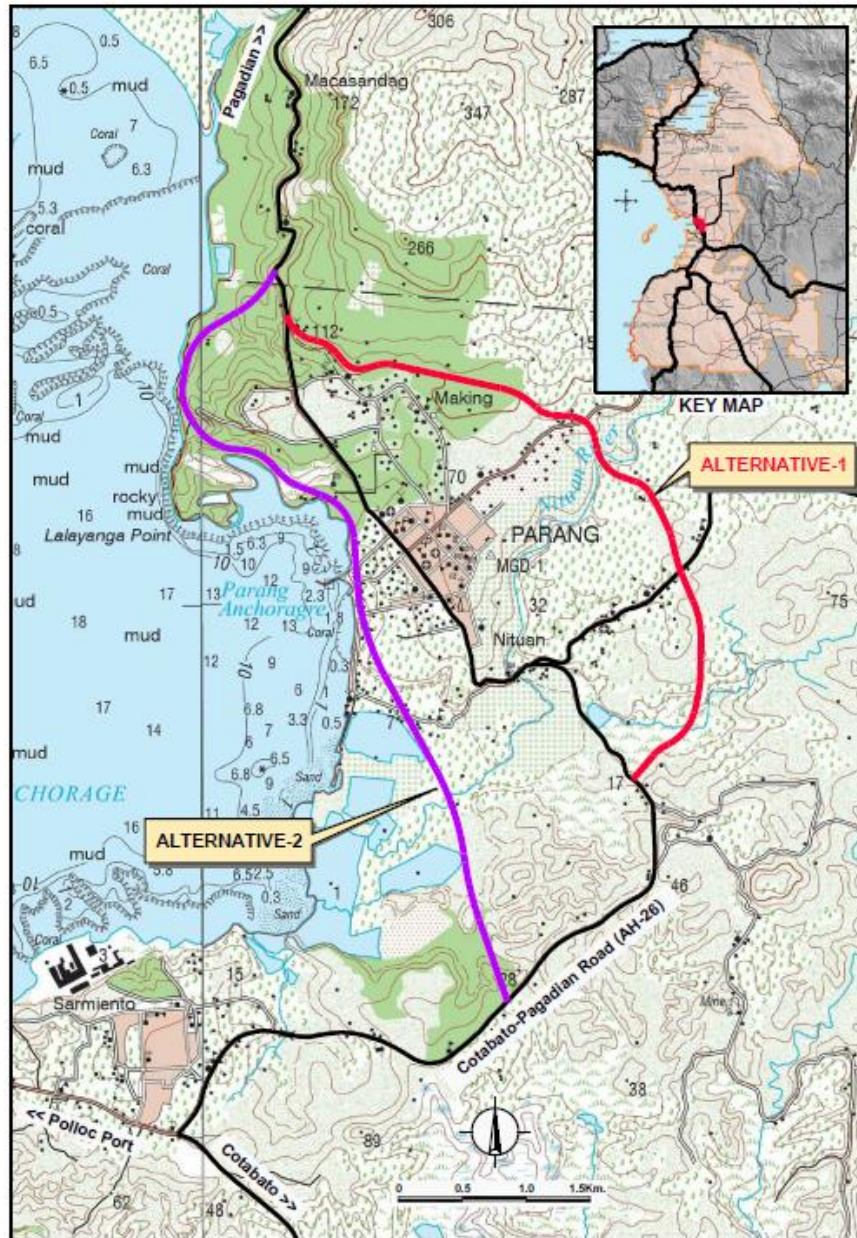
The concepts of two alternatives are as follows:

ALT-1:

- Detour the city area to the mountain (eastern) side

ALT-2:

- Pass along the coastal (western) side and partially through the city area



Source: JICA Study Team

Figure 12.9.2-1 Plan of Alternatives in Sub-Project 8

12.9.3 Evaluation of Alternatives

Two alternatives are evaluated as follows:

1. Evaluation Items and Criteria

The evaluation criteria were established as shown in **Table 12.9.3-1**.

Table 12.9.3-1 Evaluation Criteria of Sub-Project 8

Indicators	Items		Unit	Criteria	Evaluation Item
Cost, Consruction Period	Total Road Length		km	The shorter, the better.	● Evaluated
	Utilization of Existing Road/Trail		km	The longer, the better.	● Evaluated
	New construction road length		km	The shorter, the better.	(Not Evaluated)
	No. of bridges		nos	The lesser, the better.	(Not Evaluated)
	Total length of bridges		m	The lesser, the better.	● Evaluated
	No. of box culverts		nos	The lesser, the better.	(Not Evaluated)
Economic Impact	No. of Direct Beneficiaries		persons	The more, the better.	● Evaluated
	Agricultural land areas to be served		km	The more, the better.	● Evaluated
Environment al Impact	High-filling section length (H= 10m or more)		m	The shorter, the better.	● Evaluated
	High-cutting section length (H= 10m or more)		m	The shorter, the better.	● Evaluated
	Number of houses/buildings affected		nos	The lesser, the better.	● Evaluated
Technical Features	Alignment	Total no. of curves	nos	The lesser, the better.	(Not Evaluated)
		No. of curve radius < 200m	nos	The lesser, the better.	● Evaluated
		Length of vertical grade \geq 5%	m	The lesser, the better.	● Evaluated

Evaluation method was established as shown below:

- Best Alternative: ○
- Within 10% difference from the Best Alternative: ○
- Within the 10% to 20% Difference from the Best Alternative: △
- Within the 20% to 200% Difference from the Best Alternative: ×
- More than 200% Difference from the Best Alternative: ××

Source: JICA Study Team

Additionally, the following evaluation criteria was set up as the one of technical features

- Suitability in View of Road Network: The road not only is expected to function as a bypass but also to function such as the induction of urbanized areas and formulation of a good road network. Therefore, passing through a suburban area with open space is expected to be highly inductive toward urbanization.

2. Evaluation of Alternatives

Evaluation result is shown in **Table 12.9.3-2**.

Table 12.9.3-2 Evaluation of Alternatives of Sub-Project 8

Alternatives			ALT-1		ALT-2	
Main Objectives			<ul style="list-style-type: none">• Strengthen the AH26 by providing an alternative route to the congested section ensuring smooth flow of traffic.• Improve traffic flow and urban amenities inside the town proper by separating through traffic from local traffic.• Guide sound urbanization by providing a trunk road at the eastern portion of the town which would allow new settlements to establish.• Strengthen connection between the planned agri-industry area (banana plantation in Buldon, Barira, Matanog) which expected to generate high volume of truck traffic and the region's primary port (Polloc Port) by providing a bypass road.			
Concept			• Detour the city area to the mountain side		• Pass along the coastal side and partially through the city area	
Indicators	Items	Unit	Quantities	Point	Quantities	Point
Project Cost, Construction Period	Total Road Length	km	5.9	○	7.0	△
	Utilization of Existing Road/Trail	km	0.0	×	0.4	○
	New construction road length	km	5.9	-	6.6	-
	No. of bridges	nos	2	-	3	-
	Total length of bridges	m	460	○	850	×
	No. of box culverts	nos	1	-	2	-

Alternatives				ALT-1		ALT-2	
Economic Impact	No. of Direct Beneficiaries		persons	19,174	×	41,170	○
	Agricultural land areas to be served		km	0.45	○	0.00	×
Environmental Impact	High-filling section length (H= 10m or more)		m	700	○	709	○
	High-cutting section length (H= 10m or more)		m	400	○	865	×
	Number of houses/buildings affected		nos	14	○	178	×
Technical Features	Alignment	Total no. of curves	nos	5	-	10	-
		No. of curve radius < 200m	nos	0	○	0	○
		Length of vertical grade ≥ 5%	m	1,500	×	1,014	○
	Suitability in view of road network		-	Expected to induce the urban areas to the suburbs	○	Since facing the sea, the expansion of urban areas is limited.	×
	Evaluation			○ = 8 △ = 0 × = 3 ×× = 0		○ = 5 △ = 1 × = 4 ×× = 1	
Recommendation			Recommended		-		

Source: JICA Study Team

12.9.4 Recommendations

ALT-1 was recommended for the Sub-Project 8 due to the following main reasons:

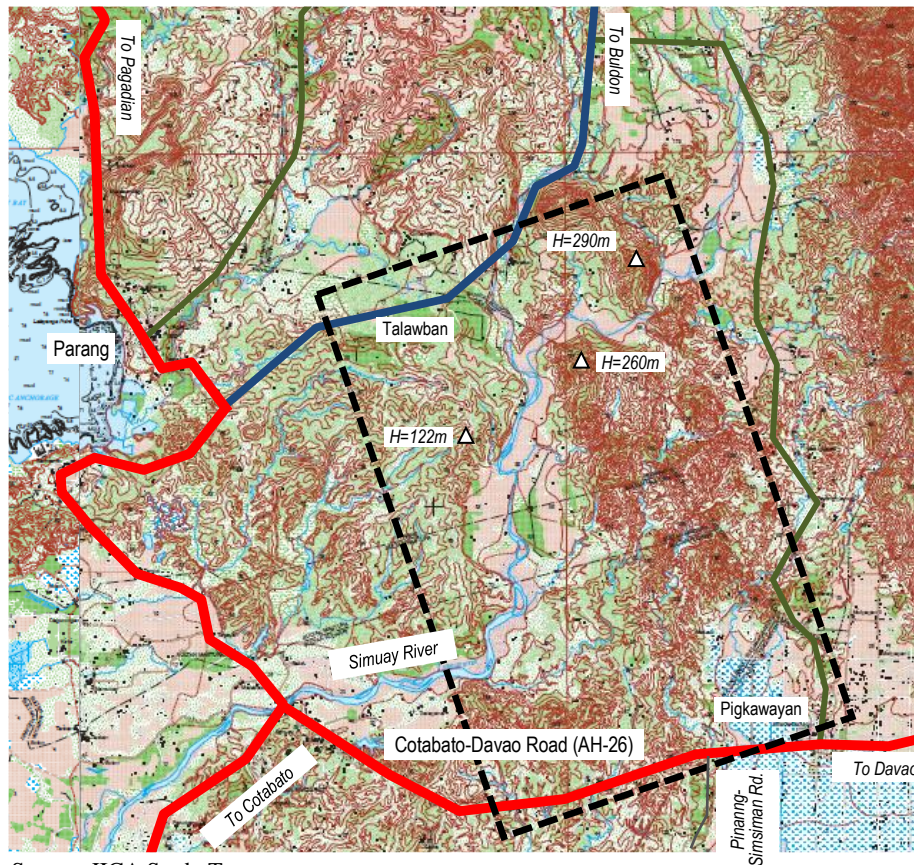
- ALT-1 has many advantages such as the shorter road length and the shorter bridge lengths regarding the project cost and construction period.
- Also, the number of the affected houses/buildings of ALT-1 is less than one-tenth than that of ALT-2.
- And, ALT-1 is located at a suburban area apart approximately 2 km from the center of Parang and has a high potential to induce urban area along the route.

12.10 Alignment Selection for Sub-Project 9

12.10.1 General Characteristics

The topographical feature of Sub-Project 9 are shown in **Figure 12.10.1-1**, and the general characteristics of Sub-Project 9 are as follows;

- The section links between the primary road (Codabato-Davao Road: AH-26) near Pigkawayan, North Cotabato and the secondary road near Talawaban, Parang.
- It is located at the Basin of Simuay River which runs from the north to the south.
- Along the left bank of Simuay River, there are mountains of 260 m in height. On the other hand, there are gentle mountains of 120 m in height on the right bank.
- Due to the above locations, the terrain is basically undulating. However, on the left bank, the terrain is steeper.
- Houses/buildings are basically sparse excluding the existing road side.
- Cultivated lands are spread along Simuay River, and there is wood land on mountains of the left bank.



Source: JICA Study Team

Figure 12.10.1-1 Topographic Feature of Sub-Project 9

12.10.2 Alternative Alignments

Four alternative alignments were studied as shown in **Figure 12.10.2-1**.

The concepts of four alternatives are as follows:

ALT-1:

- Pass along Simuay River
- Shortest route among four alternatives

ALT-2:

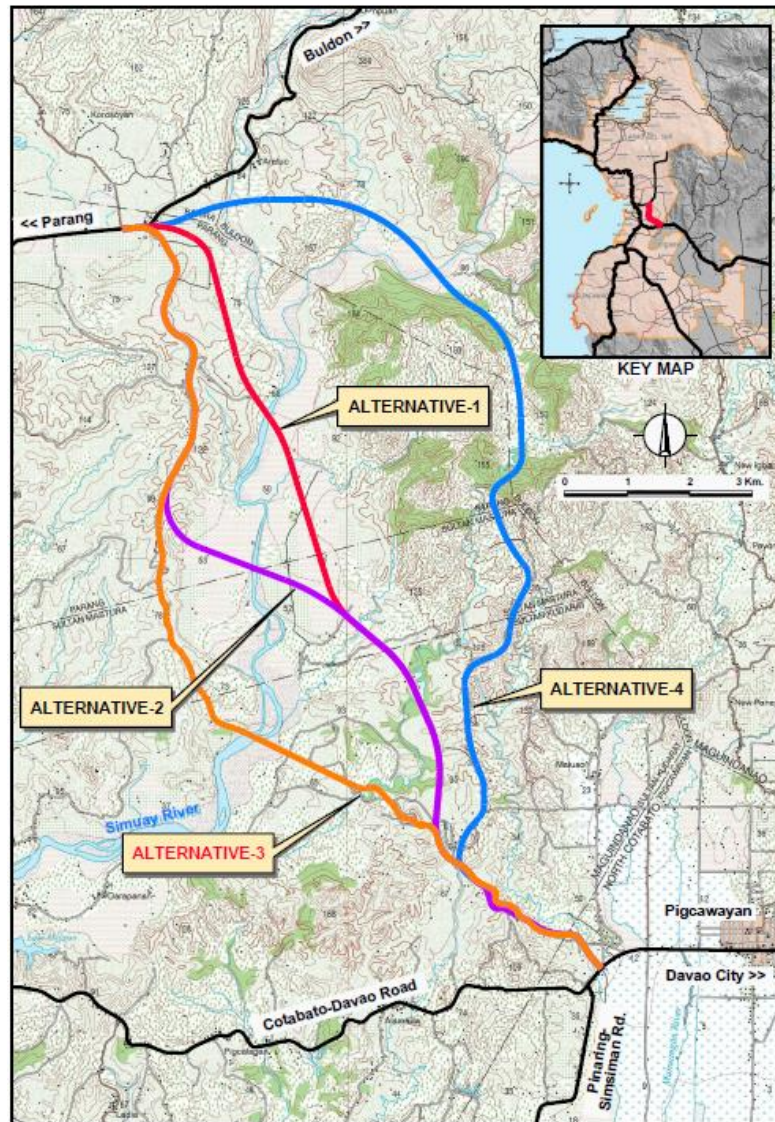
- Utilize the existing road and cross over Sumuay River at downstream of ALT-1

ALT-3:

- Western route
- Utilize the existing road as much as possible to minimize land acquisition
- Cross over Sumuay River at downstream of ALT-2

ALT-4:

- Cross over Simuay River on the upstream side and pass through the mountainous area
- Longest route among four alternatives



Source: JICA Study Team

Figure 12.10.2-1 Plan of Alternatives in Sub-Project 9

12.10.3 Evaluation of Alternatives

Four alternatives are evaluated as follows:

(1) Evaluation Items and Criteria

The evaluation criteria were established as shown in Table 12.10.3-1.

Table 12.10.3-1 Evaluation Criteria of Sub-Project 9

Indicators	Items	Unit	Criteria	Evaluation Item
Cost, Construction Period	Total Road Length	km	The shorter, the better.	● Evaluated
	Utilization of Existing Road/Trail	km	The longer, the better.	● Evaluated
	New construction road length	km	The shorter, the better.	(Not Evaluated)
	No. of bridges	nos	The lesser, the better.	(Not Evaluated)
	Total length of bridges	m	The lesser, the better.	● Evaluated
	No. of box culverts	nos	The lesser, the better.	(Not Evaluated)
Economic Impact	No. of Direct Beneficiaries	persons	The more, the better.	● Evaluated
	Agricultural land areas to be served	km	The more, the better.	● Evaluated

Indicators	Items	Unit	Criteria	Evaluation Item
Environmental Impact	High-filling section length (H= 10m or more)	m	The shorter, the better.	● Evaluated
	High-cutting section length (H= 10m or more)	m	The shorter, the better.	● Evaluated
	Number of houses/buildings affected	nos	The lesser, the better.	● Evaluated
Technical Features	Alignment	Total no. of curves	The lesser, the better.	(Not Evaluated)
		No. of curve radius < 200m	The lesser, the better.	● Evaluated
		Length of vertical grade \geq 5%	The lesser, the better.	● Evaluated

Evaluation method was established as shown below:

- Best Alternative: ○
- Within 10% difference from the Best Alternative: ○
- Within the 10% to 20% Difference from the Best Alternative: △
- Within the 20% to 200% Difference from the Best Alternative: ×
- More than 200% Difference from the Best Alternative: ××

Source: JICA Study Team

Additionally, the following evaluation criteria was set up as the one of technical features

- **River Stabilities:** When an alignment passes through a river, it is desirable that the river condition is stable because there is a high possibility that roads and bridges will be destroyed or damaged when roads and bridges are constructed under unstable river conditions such as river meandering and rapid river-flow sections.

(2) Evaluation of Alternatives

Evaluation result is shown in Table 12.10.3-2

Table 12.10.3-2 Evaluation of Alternatives of Sub-Project 9

Alternatives			ALT-1		ALT-2		ALT-3		ALT-4	
Main Objectives			•Form flexible network by linking three primary inter-city roads (Cotabato-Marawi Road, Cotabato- Davao Road, Cotabato- Gen. Santos Road). •Provide access to agri-industry production areas. •Support the quarrying industry at Simuay River which provides jobs to many people in the area by providing a new route which traverses the upstream section of the river.							
Concept			•Pass along Simuay River •Shortest route among 4 alternatives		•Utilize the existing road and cross over Sumuay River at downstream of ALT-1		•Western route •Utilize the existing road as much as possible to minimize land acquisition •Cross over Sumuay River at downstream of ALT-2		•Cross Simuay River on the upstream side and pass through the mountainous area •Longest route among 4 alternatives	
Indicators	Items	Unit	Quantities	Point	Quantities	Point	Quantities	Point	Quantities	Point
Project Cost, Construction Period	Total Road Length	km	15.9	○	17.0	○	17.0	○	19.9	×
	Utilization of Existing Road/Trail	km	3.0	×	8.8	×	11.1	○	3.0	×
	New construction road length	km	12.9	-	8.2	-	5.9	-	16.9	-
	No. of bridges	nos	4	-	4	-	3	-	5	-
	Total length of bridges	m	2,050	×	1,050	Δ	950	○	1,450	×
	No. of box culverts	nos	9	-	10	-	10	-	8	-
Economic Impact	No. of Direct Beneficiaries	persons	17,632	×	18,100	Δ	22,021	○	16,509	×
	Agricultural land areas to be served	km	3.72	○	2.83	×	0.50	×	0.98	×
Environmental Impact	High-filling section length (H= 10m or more)	m	978	○	1,109	Δ	1,593	×	1,909	×
	High-cutting section length (H= 10m or more)	m	808	○	1,290	×	999	×	1,221	×
	Number of houses/buildings affected	nos	21	×	15	○	20	×	53	×

Technical Features	Alignment	Total no. of curves	nos	12	-	15	-	13	-	22	-
		No. of curve radius < 200m	nos	0	○	0	○	0	○	0	○
		Length of vertical grade ≥ 5%	m	0	○	0	○	0	○	500	×
	River stabilities	-	Pass through the section where the river channel is unstable	×	Pass through the section where the river channel is unstable	×	Pass through the section where the river channel is stable	○	Has a possibility of erosion because it is located at the rapid flow section	×	
Evaluation				○ = 6 Δ = 0 × = 5 × × = 0		○ = 4 Δ = 3 × = 4 × × = 0		○ = 7 Δ = 0 × = 4 × × = 0		○ = 1 Δ = 0 × = 9 × × = 1	
Recommendation				-		-		Recommended		-	

Source: JICA Study Team

12.10.4 Recommendations

ALT-3 was recommended for the Sub-Project 9 due to the following main reasons:

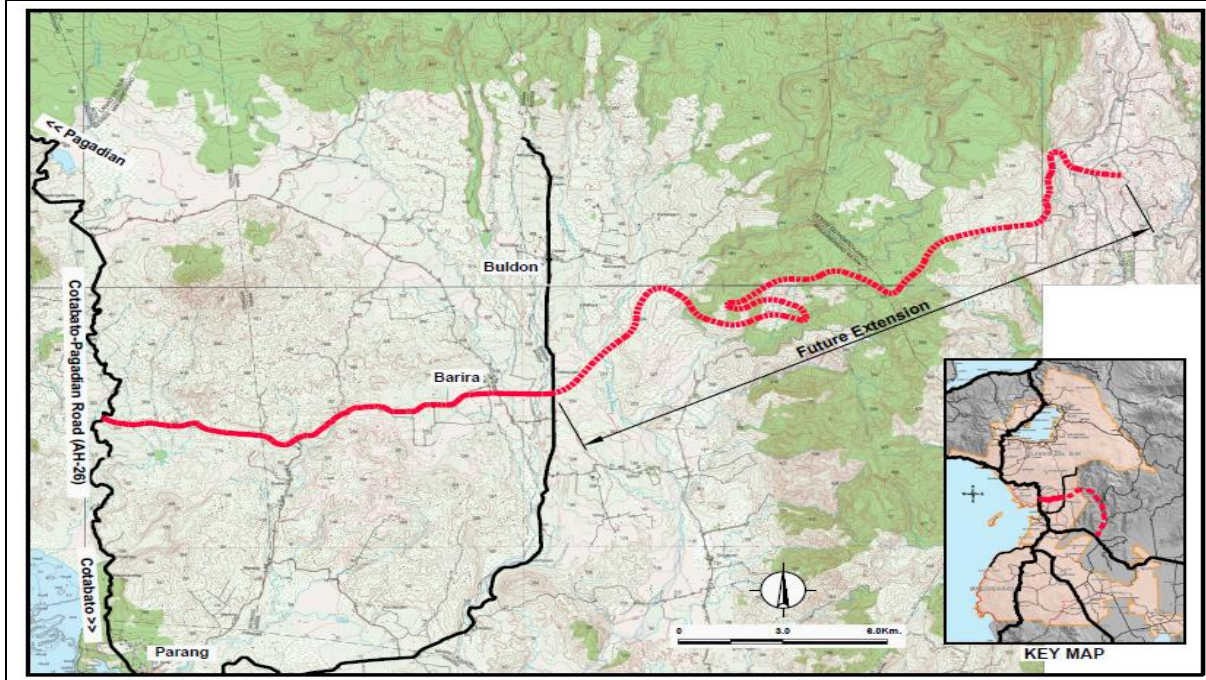
- Although ALT-3 has the longer length among the four alternatives, new construction road length is shortest and it has high advantage regarding the project cost and construction period.
- And, ALT-3 passes at the most suitable crossing point over Simuay River where the river width the river width is narrowed between small hills on the both banks.

Chapter 13 Outline of the Sub-Projects

13.1 Sub-Project 1

13.1.1 Outline of the Project

Location	The road is located in the Municipalities of Matanog, Barira, and Buldon.
Major Road to connect	<ul style="list-style-type: none"> Phase 1: Connecting AH-26 to Parang-Barira Road Phase 2: Connecting AH-26 to Cotabato-Davao Road
Road Description	<ul style="list-style-type: none"> Length: 13.9km Lane and lane width: 2-lane (total); 3.35m per lane Shoulder width: 3.0 m Classification: National Tertiary Road
Population	<ul style="list-style-type: none"> 7 barangays along the alignment (18,762) 3 municipalities: Matanog (29,770) +Barira (30,004) + Buldon (35,282) = 95,056
Agricultural land use (ha) of the 3 municipalities	<ul style="list-style-type: none"> Annual Crop=5,060 Perennial crop=30,308 TOTAL=35,369
Current main agricultural crops planted by farmers (2015 data)	<ul style="list-style-type: none"> Coconut (4,074 ha) White corn (5,482 ha) Upland palay (2,874 ha) Lowland palay (1,300) Yellow corn (540 ha)



13.1.2 Objectives of the Project

The objectives of the Matanog- Barira- Buldon- Alamad- Libungan Road are as follows:

- To increase flexibility of the network by linking two primary inter-city roads (Cotabato-Pagadian Road and Cotabato-Davao Road).
- To support small farmers by providing reliable access road that would result to reduced transport cost of their products.
- To promote development of agri-industry such as banana plantation by provision of high capacity road.
- To support peace building by improving access to MILF camps and other areas without reliable road connection.
- To provide access to the areas with high poverty incidence (56.53%) to help them access social services and sell their products to urban centers with minimal transportation cost.

13.1.3 Socio-economic Condition of the Project Area

(1) Population and Growth Rate

Maguindanao province, where Sub-Project 1 is located, has a total population of 1,173,993 and a population density of 118 persons/km² as of August 2015. The population density of Maguindanao is slightly higher than that of ARMM, but lower than that of all the other regions in Mindanao.

Table 13.1.3-1 Population and Population Density of Provinces in ARMM and Mindanao

	Population	Land area (km ²)	Population density (persons/km ²)
Lanao del Sur	1,045,429	15,056	69
Maguindanao	1,173,933	9,968	118
Mindanao	24,135,775	138,354	174
Region IX – Zamboanga Peninsula	3,629,783	16,904	215
Region X – Northern Mindanao	4,689,302	20,459	229
Region XI – Davao	4,893,318	20,433	239
Region XII – SOCCSKSARGEN	4,545,276	22,786	199
Region XIII - Caraga	2,596,709	21,121	123
ARMM	3,781,387	36,651	103
Philippines	100,981,437	300,000	337

Source: 2015 Census of Population and Housing, Philippine Statistics Authority

Maguindanao province has experienced rapid population growth in recent years. Its annual average growth rate between 2010 and 2015 is 4.22%, which is outstandingly high compared with 2.18% for Lanao del Sur, 2.89% for ARMM, and 1.79% for Mindanao.

Table 13.1.3-2 Population Growth of Provinces in ARMM and Mindanao

	Annual Average Growth Rate of influenced municipalities		
	2000-2010	2010-2015	2000-2015
Lanao del Sur	1.55%	2.18%	1.77%
Maguindanao	1.66%	4.22%	2.54%
Mindanao	1.89%	1.79%	1.86%
Region IX – Zamboanga Peninsula	1.87%	1.21%	1.64%
Region X – Northern Mindanao	2.06%	1.68%	1.92%
Region XI – Davao	1.97%	1.74%	1.89%
Region XII – SOCCSKSARGEN	2.46%	1.94%	2.28%
Region XIII - Caraga	1.49%	1.28%	1.42%

	Annual Average Growth Rate of influenced municipalities		
	2000-2010	2010-2015	2000-2015
ARMM	1.51%	2.89%	1.98%
Philippines	1.90%	1.72%	1.84%

Note: Annual average growth rate of Mindanao is simple average of annual average growth rate of 6 regions in each period.
Source: 2016 Philippine Statistics Yearbook, Philippine Statistics Authority

Matanog, Barira, and Buldon are the municipalities of Maguindanao province that will be affected by Sub-Project 1. The three municipalities have a total population of 95,056 and an average population density of 98 persons/km². Matanog has the smallest population among the three municipalities; however, its population density is much higher. The population density of Barira and Buldon are less than half that of Matanog, which makes the average population density of the three municipalities below the average for Maguindanao province.

Table 13.1.3-3 Population and Population Density of Municipalities Affected by Sub-Project 1

Province	Municipality	Population	Land area (km ²)	Population density (persons/km ²)
Maguindanao	Matanog	29,770	146.50	203
	Barira	30,004	392.61	76
	Buldon	35,282	429.40	82
Total		95,056	968.51	98

Source: 2015 Census of Population and Housing, Philippine Statistics Authority

In terms of population growth, Matanog and Barira experienced steep growth from 2010 to 2015 with annual average growth rates of 5.05% and 8.79% respectively. These growth rates are even higher than the Maguindanao average of 4.22% for the same period. However, population growth in Buldon occurred at a slower pace. This municipality's annual average growth rate is only 0.9% from 2010 to 2015, when Maguindanao and ARMM experienced high population growth.

Table 13.1.3-4 Population Growth of Municipalities Affected by Sub-Project 1

Province	Municipality	Annual Average Growth Rate		
		2000-2010	2010-2015	2000-2015
Maguindanao	Matanog	2.04%	5.05%	3.04%
	Barirara	0.73%	8.79%	3.35%
	Buldon	2.29%	0.90%	1.82%
Average		1.79%	4.39%	2.65%

Source: Various Statistics Report, Philippine Statistics Authority

The alignment of Sub-Project 1 passes through seven barangays in the three municipalities. The total population of the seven barangays is 18,762. Among the seven barangays, Bugasan Sur of Matanog municipality has a large population compared with the other six.

Table 13.1.3-5 Population of Barangays along the Alignment of Sub-Project 1

Province	Municipality	Barangay		Population
Maguindanao	Matanog	1	Bugasan Sur	6,412
	Barira	2	Liong	2,252
		3	Bualan	1,306
		4	Lipawan	2,370
	Buldon	5	Rumindas	1,974
		6	Minabay	2,134
		7	Cabayuan	2,314
Total				18,762

Source: 2015 Census of Population and Housing, Philippine Statistics Authority

(2) Income and Expenditure

Income and expenditure estimates are available only for regional and provincial levels. According to the Family Income and Expenditure Survey 2012 of the Philippine Statistics Authority, income and expenditure estimates for Maguindanao province are PhP 108,170 and PhP 106,330 respectively for the year. These estimates are lower than those for Lanao del Sur, which are close to the average estimates in ARMM. Among the six regions of Mindanao, ARMM has the lowest estimates both for income and expenditure. The income and expenditure estimates for Maguindanao are distinctively low compared with those for all the regions of Mindanao.

Table 13.1.3-6 Average Income and Expenditure Estimates in 2012 for Regions and Provinces

	Average income estimates (PhP)	Average expenditure estimates (PhP)
Lanao del Sur	129,953	110,739
Maguindanao	108,170	106,330
Mindanao		
Region IX – Zamboanga Peninsula	161,451	116,224
Region X – Northern Mindanao	189,158	137,298
Region XI – Davao	196,023	152,622
Region XII – SOCCSKSARGEN	165,214	137,923
Region XIII - Caraga	181,016	138,789
ARMM	129,350	112,342
Philippines	234,129	185,252

Source: Family Income and Expenditure Survey 2012, Philippine Statistics Authority

(3) Poverty Incidence

Poverty incidence is defined by the Philippine Statistics Authority as the proportion of families/individuals with per capita income/expenditure less than the per capita poverty threshold for the total number of families/individuals. The poverty threshold is set for each province and region. The table below shows the poverty threshold and poverty incidence in Maguindanao, Lanao del Sur, ARMM, and other regions in Mindanao. Poverty incidence in Maguindanao is 54.6% in 2006. The figure falls to 52.2% in 2009, rises to 63.7% in 2012, and declines again to 57.2% in 2015. This poverty incidence has always been higher than that in ARMM and any other region of Mindanao. More than half of the population of Maguindanao province has been in poverty throughout the period.

Table 13.1.3-7 Poverty Incidence of Provinces in ARMM and Mindanao

	Annual Per Capita Poverty Threshold (PhP)				Poverty incidence among population Estimate (%)			
	2006	2009	2012	2015	2006	2009	2012	2015
Lanao del Sur	13,116	17,024	22,665	22,802	44.7	56.6	73.8	71.9
Maguindanao	12,877	16,701	18,873	21,423	54.6	52.2	63.7	57.2
Mindanao								
Region IX – Zamboanga Peninsula	12,743	16,260	18,054	20,925	45.0	45.8	40.1	33.9
Region X – Northern Mindanao	12,917	16,878	19,335	22,345	39.0	40.1	39.5	36.6
Region XI – Davao	13,389	17,120	19,967	22,754	30.6	31.4	30.7	22.0
Region XII – SOCCSKSARGEN	13,319	16,405	18,737	21,025	37.9	38.3	44.7	37.3
Region XIII - Caraga	14,324	18,309	19,629	22,570	49.2	54.4	40.3	39.1
ARMM	12,647	16,683	20,517	21,563	47.1	47.4	55.8	53.7
Philippines	13,357	16,871	18,935	21,753	21.0	20.5	19.7	16.5

Source: Official Poverty Statistics of the Philippines Full Year 2015, Philippine Statistics Authority

Data for poverty incidence at municipality level are derived from the National Color-Coded Agricultural Guide Map of the Department of Agriculture, which contains a municipal poverty database created in 2010. The table below presents poverty incidence in the three municipalities affected by Sub-Project 1. Barira has the lowest poverty incidence of 43.70%, whereas the highest score is 65.10% for Buldon. Applying the population figures of each municipality from the 2015 Census of Population and Housing shows that the three municipalities together would have 53,734 persons living in poverty and that average poverty incidence in the three municipalities would be 56.53%.

Table 13.1.3-8 Poverty Incidence of Municipalities Affected by Sub-Project 1

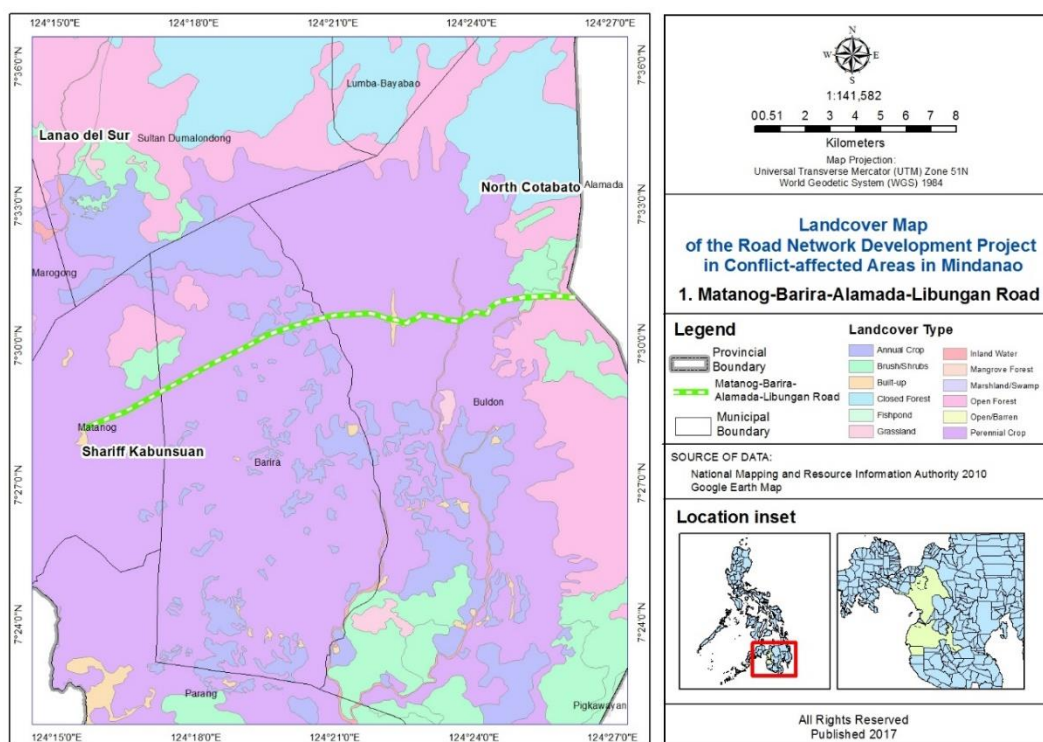
Province	Municipality	Poverty
Maguindanao	Matanog	59.30%
	Barirara	43.70%
	Buldon	65.10%
Average		56.53%

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

13.1.4 Agricultural Production and Potentials of the Area

(1) Agricultural Land Use and Land Holdings

The land cover map, which was developed based on the National Mapping and Resource Information Authority's 2010 Google Earth Map, shows the land cover of the three municipalities affected by Sub-Project 1. Perennial crops cover most of the land of Matanog and Barira, while some grassland and brush/shrubs spread across the land east and south of Buldon. There are patches of land covered by annual crops in Barira and Buldon.



Source: National Mapping and Resource Information Authority 2010 Google Earth Map

Figure 13.1.4-1 Land Cover Map of Municipalities Affected by Sub-Project 1

The three municipalities have a total of 5,060ha covered by annual crops and 30,308ha covered by perennial crops. Matanog has a total land area less than half the size of Barira and Buldon. The land used for annual and perennial crops in Matanog is also less than half that of Barira and Buldon.

Table 13.1.4-1 Agricultural Land Use in Hectare of Municipalities Affected by Sub-Project 1

(Unit: ha)

Province	Municipality	Annual crop	Perennial crop	Total
Maguindanao	Matanog	109	6,148	6,258
	Barirara	2,350	10,596	12,946
	Buldon	2,601	13,564	16,164
Total		5,060	30,308	35,369

Source: National Mapping and Resource Information Authority 2010 Google Earth Map

Among farmers, fisherfolk, and laborers, the most popular employment category in the three municipalities is “farmers, fisherfolk, laborers.” Over 30,000 people make their living from a combination of agriculture, fishing, and laboring. The second most popular category is “farmers, fisherfolk.” Nearly 20,000 people make their living from farming and fishing. There are 15,727 full-time farmers and 4,123 full-time fisherfolk.

With regard to land holdings, “owners, tenants” is the most popular category. Over 10,000 farmers cultivate their own land and leased land. There are 5,659 “owners” who cultivate only their own land, while 4,947 farmers cultivate only leased land.

Table 13.1.4-2 Farmers, Fisherfolk, Laborers and Land Holding of Municipalities Affected by Sub-Project 1

Province	Municipality	Farmers	Fisherfolks	Laborers	Farmers, Fisherfolks	Farmers, Fisherfolks, Laborers	Owners	Owners, Tenants	Tenants
Maguindanao	Matanog	6,769	320	5,898	7,089	12,987	4,165	6,764	2,599
	Barira	782	787	228	1,569	1,797	691	2,826	2,135
	Buldon	8,176	3,016	4,623	11,192	15,815	803	1,016	213
Total		15,727	4,123	10,749	19,850	30,599	5,659	10,606	4,947

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

(2) Agricultural Production

The table below is a summary of the areas planted with crops in the three municipalities based on three sources. The Department of Agriculture of Maguindanao Province provided information for Matanog and Barira. A field survey report prepared by the Comprehensive Capacity Development Project in Bangsamoro, supported by JICA, gave details of Buldon, which is missing in the Department of Agriculture’s documents. The Philippine Coconut Authority of ARMM provided information about coconuts and oil palm in the three municipalities.

Table 13.1.4-3 Area Planted by Crops in Municipalities Affected by Sub-Project 1

(Unit: ha)

Province	Municipality	Annual crop							
		Irrigated palay	Rainfed palay	Lowland palay	Upland palay	White corn	Yellow corn	Corn	Vegetables
Maguindanao	Matanog		45		1,218	2,506	15		35
	Barira	328	450		456	2,976	525		4
	Buldon			1,300	1,200			1,800	
Total		328	495	1,300	2,874	5,482	540	1,800	39
Province	Municipality	Perennial crop							
		Banana	Coconut	Coffee	Rubber	Oil palm	Durian	Jackfruit	
Maguindanao	Matanog	101	2,806	32	32		21	3	
	Barira	151	858	45	42	9	47	12	
	Buldon		410			14			
Total		252	4,074	77	74	23	68	15	

Source: Department of Agriculture of Maguindanao Province, Field Survey Report in Lanao del Sur and Maguindanao Provinces (2015) JICA Comprehensive Capacity Development Project in Bangsamoro for Buldon, Philippine Coconut Authority ARMM for coconut and oil palm

Among all the crops, white corn occupies the largest area of 5,482ha. The area for yellow corn is much smaller than that for white corn. In Buldon, there are 1,800ha that may have white or yellow corn; the details are unknown. Palay is divided into categories of irrigated palay, rain-fed palay, lowland palay, and upland palay. In Buldon, there are 1,300ha of lowland palay where the details of access to irrigation are unknown. The land used for all the palay categories amounts to almost 5,000ha. The areas devoted to corn and palay together exceed the land for annual crops, according to the National Mapping and Resource Information Authority's 2010 Google Earth Map. This situation may be because the corn and palay areas are counted as many times as they are planted and harvested. In those areas where farmers can harvest corn or palay twice a year, the same area can be counted twice.

With regard to perennial crops, coconut is far and away the most popular in the three municipalities, especially in Matanog. There are 101ha of bananas in Matanog and 151ha in Barira. No information is available about planted areas of bananas in Buldon. However, Buldon is one of the municipalities where Unifrutti, the largest investor of Cavendish banana production in ARMM, has established a banana plantation of 2,600ha. Besides coconuts and bananas, the areas planted with other perennial crops are rather small; moreover, there is a possibility that some planted areas have not been captured.

(3) Suitable and Potential Areas for Crop Production

The Department of Agriculture has developed a National Color-Coded Agricultural Guide Map of the Philippines, indicating suitable areas for priority crops using scientific criteria. The 20 priority crops include abaca, bananas, cacao, cassava, coconuts, coffee, corn, garlic/onions, legumes, mangoes, oil palm, pineapples, palay, rubber, sugarcane, sweet potatoes, taro, vegetables, and yam.

The following table presents the criteria for bananas, coconuts, coffee, corn, oil palm and palay, which are major crops grown in the municipalities affected by Sub-Projects.

Table 13.1.4-4 Scientific Criteria for Major Crops Grown in the Municipalities Affected by Sub-Projects

Crops	Edaphic / soil characteristics	Climatic	Biophysical
Banana	<ul style="list-style-type: none"> - Deep, loamy, well-drained, aerated and slightly to strongly acidic (pH 5.5 to 6.5) - River valley and well-drained alluvial soils are ideal for large-scale commercial banana growing. 	<ul style="list-style-type: none"> - At least 1,200 mm per year with no more than three successive dry months to maintain favourable growth and high yields - Between 15 °C and 30 °C 	<ul style="list-style-type: none"> - Low to medium elevation <=600 masl - Slope: 0-8%
Coconut	<ul style="list-style-type: none"> - Sandy, loamy, and clayey grades provided organic matter of all soil types constitutes at least 2%. - Flat to slightly sloping, rolling to moderately sloping (below 20 % slope) - Well drained and always aerated. - Soil pH between 5.5 and 6.5 	<ul style="list-style-type: none"> - Between 1,500 mm and 2,500 mm annually, almost uniformly distributed. No more than three successive dry months. - Annual temperature of 27°C and monthly mean temperature of 20°C with diurnal variation between five and seven degrees Celsius. 	<ul style="list-style-type: none"> - Lower than 500 meters above sea level. - Above 600 meters, palm flowering is impaired and bunch production is irregular with unstable yields.
Coffee	<ul style="list-style-type: none"> - Clay loam to sandy loam (Loamy soils) fairly drained - Soil pH: 5 to 6.5 	<ul style="list-style-type: none"> - Between 1,900 mm and 2,000 mm rainfall distributed annually (needs irrigation during dry months) - Temperature: 13 °C to 26 °C - Relative humidity: 70 % to 85 % 	<ul style="list-style-type: none"> - 900 meters to 2,000 meters above sea level for Arabica Robusta - Less than 900 meters above sea level for Liberica and Excelsa - Flat to slightly sloping (0-8 %)
Corn	<ul style="list-style-type: none"> - Loamy, silt loam, sandy clay loam, and silt clay loam - limited erosion 	<ul style="list-style-type: none"> - 500-900 mm rainfall - temperature of 18-35 °C 	<ul style="list-style-type: none"> - Slope between 0-3%
Oil palm	<ul style="list-style-type: none"> - Well drained soil loam soil and rich in organic matter 	<ul style="list-style-type: none"> - Temperature: 22°C-33°C - Rainfall: 1800 mm - 2000 mm annually; water deficit of less than 250 mm per year 	<ul style="list-style-type: none"> - Slope: 0%-18% - Elevation: <=400 masl
Palay	Rice ecosystems from NIA (National Irrigation Administration) and from NPAAAD (network of protected area for agriculture development) were integrated to show rice growing environment or ecosystems; i.e. irrigated, lowland rain-fed, and upland.		

Source: Methodology: Crop Productivity Potential in Agriculture (2016) Systems Wide Climate Change Office (DA-SWCCO) Adaptation and Mitigation Initiative in Agriculture (AMIA)

According to the National Color-Coded Agricultural Guide Map, Lanao del Sur and Maguindanao have suitable areas for palay, corn, bananas, coconuts, coffee, and oil palm, as summarized in the table below. Some areas are identified as suitable for multiple crops. In Lanao del Sur, bananas and coffee are the crops that have the largest and second-largest suitable areas respectively. In Maguindanao, palay and coconuts have the largest and second-largest suitable areas respectively. In the two provinces together, palay has the largest suitable area of 196,651ha, followed by 180,048ha for bananas, and 154,069ha for coconuts.

Table 13.1.4-5 Suitable Areas in Hectare for Crop Production in Lanao del Sur and Maguindanao

(Unit: ha)						
Province	Palay	Corn	Banana	Coconut	Coffee	Oil palm
Lanao del Sur	9,567	20,606	67,373	4,013	46,593	25,459
Maguindanao	187,084	54,226	112,675	150,056	15,981	97,715
Total	196,651	74,833	180,048	154,069	62,573	123,175

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

In the three municipalities of Matanog, Barira, and Buldon, oil palm has the largest suitable area, followed by palay, coffee, coconuts, and bananas. In the seven barangays along the alignment, oil palm still has the largest suitable area. Lipawan in the Barira municipality and Cabayuan in the Buldon municipality have relatively large suitable areas for palay.

Table 13.1.4-6 Suitable Areas in Hectare for Crop Production in Municipalities Affected by Sub-Project 1

(Unit: ha)

Province	Municipality	Palay	Corn	Banana	Coconut	Coffee	Oil palm
Maguindanao	Matanog		31	51	51	51	3,587
	Barira	1,929	533	1,223	1,397	1,223	8,654
	Buldon	5,353	2,010	5,288	5,353	5,813	12,371
Total		7,282	2,574	6,562	6,801	7,088	24,611

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

Table 13.1.4-7 Suitable Areas in Hectare for Crop Production in Barangays along the Alignment of Sub-Project 1

(Unit: ha)

Province	Municipality		Barangay	Palay	Corn	Banana	Coconut	Coffee	Oil palm
Maguindanao	Matanog	1	Bugasan Sur			20	20	20	1,422
	Barira	2	Liong	24	3	50	86	50	1,196
		3	Bualan	232	103	169	109	169	345
		4	Lipawan	807	159	199	199	199	1,771
	Buldon	5	Rumindas	248	68	96	96	96	497
		6	Minabay						
		7	Cabayuan	480	97	97	97	97	1,151
Total				1,792	430	632	608	632	6,383

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

The Department of Agriculture of Maguindanao Province has identified potential areas for expanding crop cultivation in the municipalities of Matanog and Barira, as shown in the table below. Information for Buldon is unavailable. Large potential areas are identified for corn (303ha) and upland palay (209ha), while high-value crops, which include bananas, coconuts, coffee, and oil palm, are given relatively small potential areas of 49ha.

Table 13.1.4-8 Potential Areas in Hectare for Crop Production in Municipalities Affected by Sub-Project 1

(Unit: ha)

Province	Municipality	Irrigated palay	Rainfed palay	Upland palay	All palay	Corn	High value crops	Total
Maguindanao	Matanog		32	143	175	38	30	243
	Barira	36	64	66	166	265	19	450
	Buldon	n/a	n/a	n/a	n/a	n/a	n/a	
Total		36	96	209	341	303	49	693

Source: Department of Agriculture of Maguindanao Province

13.1.5 Result of the Social Survey

(1) Overview of the Survey

Three surveys were undertaken to gain a better understanding of the socio-economic conditions of the communities in barangays, along the alignment of Sub-Project 1. The survey results are summarized below to present coherent information on the communities along the road alignment, highlighting their current socio-economic condition, farming practices, and perception on the impacts of the road project.

Table 13.1.5-1 Surveys Carried Out

Survey type	Number of observations	Description
(i) Household interview survey	20 households x 7 barangays = 140 households	A two-page questionnaire is used for the interview to collect basic information on living conditions such as family income and expenditure, sources of livelihood, and farming practices.
(ii) Focus group discussion	3 groups x 7 barangays	Participants are divided into three groups: youth, women, and household heads. A one-page guide is used to facilitate discussions on current road conditions and the expected impacts of road construction.
(iii) Barangay captain interview	7 barangay captains	A one-page questionnaire is used to collect information on agricultural production, marketing, and related activities.

(2) Socio-economic Condition of the Communities along the Road Alignment

The socio-economic characteristics of the communities along the alignment of Sub-Project 1 are summarized based on the household survey.

Table 13.1.5-2 Characteristics of Household Survey Respondents

Variable	Description
Age and gender	<ul style="list-style-type: none"> The respondents' ages range from 18 to 78, with a mean age of 42.0 years. 127 (90.7%) of the respondents are male, and 13 (9.3%) female.
Years of residency	<ul style="list-style-type: none"> The majority of respondents have lived in their community since birth. The average residence is 38.6 years.
Number of family members	<ul style="list-style-type: none"> Family size is large: 38.6% of households have 4–6 members and 47.1% seven or more members.
Ethnicity	<ul style="list-style-type: none"> The largest ethnic group is Iranun (89.3%), followed by Maguindanao (7.9%) and Maranao (2.9%).
Religion	<ul style="list-style-type: none"> All respondents are Muslims.
Education attainment	<ul style="list-style-type: none"> 55.5% of the respondents finished the elementary level and 21.2% reached the high school level.
Source of drinking water	<ul style="list-style-type: none"> The main sources of drinking water are spring/river/rain (46.8%) and open dug wells (31.7%).
Household income	<ul style="list-style-type: none"> 58.6% of the households have a monthly income below PhP 9,000. Nearly half of the households have an income below PhP 6,000. As the annual per capita poverty threshold in Maguindanao province in 2015 was PhP 21,423 and the food threshold PhP 14,982, a monthly household income of less than PhP 9,000 is considered low and one below PhP 6,000 may be below the subsistence level. Among the 115 respondents who specify their sources of income, 96.5% earn income from agriculture.

(3) Agricultural Practices of the Communities

Barangays along the alignment of Sub-Project 1 are agricultural communities, and farming is their major income source. Fishery is not a means of livelihood in the area. Few household survey respondents have other occupations such as government employees or drivers. For those engaged in farming, corn is the major cash crop, followed by coconut and palay.

The primary problem affecting agricultural activities are difficulty in product delivery and the high cost of transportation due to poor condition or lack of roads. Other major issues include expensive farm

inputs such as seedlings, fertilizers, and pesticides; lack of financial resources to purchase farm inputs and equipment; and pests damaging crops.

Table 13.1.5-3 Characteristics of Farm Production

Subject	Description
Farmland size	<ul style="list-style-type: none"> The total land under cultivation in the eight barangays along the alignment of Sub-Project 1 is over 16,600 ha. Among the 127 household survey respondents who cultivate crops, the size of cultivated land ranges from 0.5 to 12 ha, with a mean of 1.8 ha. More than half of respondents cultivate 1.5 ha or less. Most respondents said that they do not have land adequate for farming but not cultivated, which suggests that they maximize their land for production. However, 27 respondents have farmland not under cultivation because of lack of finances, roads, and seedlings.
Farmland tenure	<ul style="list-style-type: none"> Among the 129 household survey respondents who use farmland, 69.0% farm their own land and 20.9% farm leased land. Among the 89 respondents who farm their own land, 64.0% have Torrens titles and 36.0% have verbal agreements.
Types of crops	<ul style="list-style-type: none"> Corn, both yellow and white, is widely cultivated in all barangays. Among the 109 household survey respondents who cultivate corn, half produce yellow corn and the other half white corn. The majority of corn farmers, both yellow and white, harvest two crops per year. Palay is cultivated in all barangays, but cultivated areas are smaller than for corn. Most household survey respondents who produce palay harvest once a year because of lack of irrigation facilities. Among the 131 household survey respondents, 24.4% practice intercropping. The main combination is corn and coconut.
Constraints	<ul style="list-style-type: none"> Difficulties in product delivery and high cost of transportation are due to poor condition or lack of roads in the barangays. Expensive seedlings, fertilizers, and pesticides, and lack of finances to purchase farm inputs and equipment. Pests such as rats, black bugs, and other insects damage the crops.

Corn, coconuts, and palay are the major cash crops in the area. The majority of harvested crops are delivered to the markets in Parang, Maguindanao province. Most farmers transport their crops from farm areas to the market, while some farmers sell their crops to local traders in municipalities. Poor road conditions and high transportation costs are major constraints in marketing farm products.

Table 13.1.5-4 Characteristics of Marketing of Farm Products

Subject	Description
Types of crops	<ul style="list-style-type: none"> Corn, coconut, and palay are the major cash crops from which most people in the barangays derive their agricultural incomes. Among the 111 household survey respondents, 93 farmers earn income from corn, 39 from coconut, and 20 from palay. Some farmers obtain income from multiple crops. The most popular combination is corn and coconut.
Post-harvest treatment	<ul style="list-style-type: none"> After harvesting corn, corn cobs are transported from farm to corn shellers where corn is shelled, dried, and stored before being transported to markets.
Market location	<ul style="list-style-type: none"> Farmers sell their crops to Parang, Maguindanao. Some farmers send their crops to Pigcawayan, North Cotabato and Simuay, Sultan Kudarat. Some other farmers sell their crops to local traders in municipalities such as Buldon and Barira. Among the 101 household survey respondents to transport corn, the distance from farm to market ranges from 2 to 80 km, with an average of 19.5 km. Most farmers send their crops to Parang.
Transportation arrangements	<ul style="list-style-type: none"> Most farmers directly transport and sell their products on the market. Only a few sell their crops to middlemen in local areas. For coconut and fruits, there are buyers collecting products from farmers.

Subject	Description
Means of transportation	<ul style="list-style-type: none"> Horses and carabaos are the most common means of transporting products from farm areas to barangay centers. Those who transport their crops to the markets in Parang, Cotabato City or other locations need to hire trucks or multi-cabs. Farmers in barangays far from markets need to transport their commodities through various means. Transferring their products from one mode of transportation to another not only delays the marketing process but also increases expenditure.
Constraints	<ul style="list-style-type: none"> Poor road condition and high transportation costs are the major constraints that diminish farmers' profits from crops. Lack of post-harvest facilities and fluctuating market prices are also identified as constraints.

The following flowchart shows the flow of coconut from farm areas in Barangay Minabay, Buldon Municipality to the market in Parang. Barangay Bualan, Barira Municipality is another barangay whose major cash crop is coconut and has a similar flow of coconut from farm areas to the market.



Figure 13.1.5-1 Commodity Flow of Barangay Minabay of Buldon Municipality

(4) Expected Impacts of Road Construction

Survey participants expect that the road construction would help them transport their farm products to the market faster and easier. They also hope that access to better roads could bring them new business opportunities and develop their areas.

Table 13.1.5-5 Expected Impacts on Agriculture

Subject	Description
Transportation cost	<ul style="list-style-type: none"> With improved roads, transporting harvested crops to the market would be faster and easier, which would lead to reduced transportation costs. Transportation costs for farm inputs such as fertilizers could also be reduced.
Traders	<ul style="list-style-type: none"> Good roads might encourage more traders to come to the barangays.
Farmers' profits	<ul style="list-style-type: none"> Reduced transportation costs, better access to transportation services, and more market choices would increase the profit margins of farmers.
Farm production	<ul style="list-style-type: none"> Reduced transportation costs may encourage farmers to increase production. Among the 99 household survey respondents, half of them indicated future plans to increase cultivation areas if the road is built. Corn is the most popular crop farmers intend to increase production for, followed by coconut. Farmers could grow bananas and other crops. More vegetables could be produced and sold to the adjacent barangays.

Better access to basic social services is also seen as a positive impact of the road construction. Survey participants expect transportation costs to be reduced and more means of transportation to be made available. The road construction would improve access to health services and schools, which would greatly benefit the community. Women would find good roads useful for carrying out their marketing activities such as sending harvested crops to the market, and domestic duties such as traveling to the water sources to fetch water. Furthermore, access to improved roads is expected to bring business opportunities and development to the respective areas.

Table 13.1.5-6 Expected Social Impacts

Subject	Description
Means of transportation	<ul style="list-style-type: none"> People would not have to walk if expensive transportation costs decreased and more means of transportation were available.
Health	<ul style="list-style-type: none"> Patients could be easily brought to hospitals for treatment. It would be easier to respond to emergencies. This could lead to reduced mortality rates among patients.
Access to school	<ul style="list-style-type: none"> Schools would be more accessible if the road improved. Students would be encouraged to further their studies. Out-of-school youth numbers would decrease.
Women's work	<ul style="list-style-type: none"> Water sources for most people in the area are either springs or open dug wells. With good roads, women could use transportation to fetch water from those sources. Women could easily transport farm implements to the farm and harvest from the farm.
Business opportunities	<ul style="list-style-type: none"> With access to good roads, individuals could start businesses such as grocery stores. Reduced transportation costs might encourage youth to go into business.
Negative impacts	<ul style="list-style-type: none"> Road construction could increase road accidents due to speeding, car racing, and reckless driving. Survey participants suggested placing road signs and warnings.

13.2 Sub-Project 2

13.2.1 Outline of the Project

Location	The road is located in the Municipalities of Parang, Matanog, Kapatagan and Balabagan.
Major Roads to connect	<ul style="list-style-type: none"> Alternative road to AH26 (Parang-Balabagan section)
Road Description	<ul style="list-style-type: none"> Length: 35.3 km Lane and lane width: 2-lane (total); 3.35 m per lane Shoulder width: 2.5 m Classification: National Secondary Road
Population	<ul style="list-style-type: none"> 14 barangays along the alignment (22,269) 4 municipalities: Parang (89,194) +Matanog (29,770) +Kapatagan (15,521) + Balabagan (26,819) = 161,304
Agricultural land use (ha) of the 4 municipalities	<ul style="list-style-type: none"> Annual Crop=1,029 ha Perennial crop=28,193 ha TOTAL=29,222 ha
Current main agricultural crops planted by farmers (2015 data)	<ul style="list-style-type: none"> Oil Palm (26,933 ha) Coconut (5,495 ha) Coffee (4,383 ha) Banana (4,389 ha) Palay (3,486 ha) Corn (999 ha)



13.2.2 Objectives of the Project

The objectives of the Parang-Balabagan Road are as follows:

- To provide redundancy to AH26 (Narciso Ramos Highway) which will ensure that the network will function normally even when AH26 breaks down.
- To connect two coastal municipalities (Balabagan and Kapatagan) to major urban center (Cotabato City) to facilitate better movement of people and goods.
- To promote the area as local tourism spot by providing access to the beautiful beaches of Illana Bay.
- To provide better link to the areas with high poverty incidence (66.64%) to help them access social services and sell their products to urban centers with minimal transportation cost.
- To support small fishermen by providing better access to markets by construction of high capacity road.

13.2.3 Socio-economic Condition of the Project Area

(1) Population and Growth Rate

Lanao del Sur and Maguindanao provinces, in which Sub-Project 2 is located, have populations of 1,045,429 and 1,173,993 respectively. Population density is 69 persons/km² for Lanao del Sur and 118 persons/km² for Maguindanao as of August 2015. The population density of Maguindanao is slightly higher than the average population density of ARMM, while that of Lanao del Sur is very low compared with ARMM or any other region of Mindanao.

Table 13.2.3-1 Population and Population Density of Provinces in ARMM and Mindanao

	Population	Land area (km ²)	Population density (persons/km ²)
Lanao del Sur	1,045,429	15,056	69
Maguindanao	1,173,933	9,968	118
Mindanao	24,135,775	138,354	174
Region IX – Zamboanga Peninsula	3,629,783	16,904	215
Region X – Northern Mindanao	4,689,302	20,459	229
Region XI – Davao	4,893,318	20,433	239
Region XII – SOCCSKSARGEN	4,545,276	22,786	199
Region XIII - Caraga	2,596,709	21,121	123
ARMM	3,781,387	36,651	103
Philippines	100,981,437	300,000	337

Source: 2015 Census of Population and Housing, Philippine Statistics Authority

The population of Lanao del Sur has been growing at a slightly slower pace than the average growth rate in ARMM. Between 2000 and 2015, the annual average growth rate for Lanao del Sur is 1.77%, whereas the average for ARMM is 1.84%. Maguindanao, however, has experienced rapid population growth in recent years. Its annual average growth rate between 2010 and 2015 is 4.22%, which is outstandingly high compared with 2.18% for Lanao del Sur, 2.89% for ARMM, and 1.79% for Mindanao.

Table 13.2.3-2 Population Growth of Provinces in ARMM and Mindanao

	Annual Average Growth Rate of influenced municipalities		
	2000-2010	2010-2015	2000-2015
Lanao del Sur	1.55%	2.18%	1.77%
Maguindanao	1.66%	4.22%	2.54%
Mindanao	1.89%	1.79%	1.86%
Region IX – Zamboanga Peninsula	1.87%	1.21%	1.64%
Region X – Northern Mindanao	2.06%	1.68%	1.92%
Region XI – Davao	1.97%	1.74%	1.89%
Region XII – SOCCSKSARGEN	2.46%	1.94%	2.28%
Region XIII - Caraga	1.49%	1.28%	1.42%
ARMM	1.51%	2.89%	1.98%
Philippines	1.90%	1.72%	1.84%

Note: Annual average growth rate of Mindanao is simple average of annual average growth rate of 6 regions in each period

Source: 2016 Philippine Statistics Yearbook, Philippine Statistics Authority

Kapatagan and Balabagan in Lanao del Sur province and Parang and Matanog in Maguindanao province are the municipalities that will be affected by Sub-Project 2. The four municipalities have a total population of 161,304 and an average population density of 106 persons/km². Among the four municipalities, Parang has the largest population of 89,194. Polloc Port, an international port of mainland ARMM located in Parang, may have helped to attract many people. Because of the large land area, however, the population density of Parang is close to the average of the four municipalities. In contrast, Kapatagan has the smallest population of 15,521. Its population density is also the lowest.

Table 13.2.3-3 Population and Population Density of Municipalities Affected by Sub-Project 2

Province	Municipality	Population	Land area (km ²)	Population density (persons/km ²)
Lanao del Sur	Kapatagan	15,521	288.13	54
	Balabagan	26,819	230.00	117
Maguindanao	Parang	89,194	850.78	105
	Matanog	29,770	146.50	203
Total		161,304	1,515.41	106

Source: 2015 Census of Population and Housing, Philippine Statistics Authority

In terms of population growth, Kapatagan, with the lowest population density, has the highest annual average growth rate between 2000 and 2010. Further, between 2010 and 2015, Parang and Matanog have annual average growth rates that are higher than those of the other two municipalities. The average annual average growth rate in the four municipalities from 2000 to 2015 is 2.44%, which is above Lanao del Sur's average and below Maguindanao's average.

Table 13.2.3-4 Population Growth of Municipalities Affected by Sub-Project 2

Province	Municipality	Annual Average Growth Rate		
		2000-2010	2010-2015	2000-2015
Lanao del Sur	Kapatagan	5.58%	2.93%	4.69%
	Balabagan	0.23%	1.30%	0.59%
Maguindanao	Parang	1.87%	4.00%	2.57%
	Matanog	2.04%	5.05%	3.04%
Average		1.87%	3.60%	2.44%

Source: Various Statistics Report, Philippine Statistics Authority

The alignment of Sub-Project 2 passes through 14 barangays in the four municipalities. The total population of the 14 barangays is 22,269. In Maguindanao province, three barangays have more than 40% of the total population.

Table 13.2.3-5 Population of Barangays along the Alignment of Sub-Project 2

Province	Municipality	Barangay		Population
Lanao del Sur	Kapatagan	1	Salaman	1,425
		2	Matimos	609
		3	Bakikis	894
		4	Lusain	566
	Balabagan	5	Banago	2,203
		6	Narra	778
		7	Lorenzo	1,408
		8	Molimoc	754
		9	Barorao	1,862
		10	Batuan	1,163
		11	Budas	798
Maguindanao	Parang	12	Macasandag	1,837
	Matanog	13	Sapad	6,041
		14	Kidama	1,931
Total				22,269

Source: 2015 Census of Population and Housing, Philippine Statistics Authority

(2) Income and Expenditure

According to the Family Income and Expenditure Survey 2012 of the Philippine Statistics Authority, income and expenditure estimates for Lanao del Sur province are PhP 129,953 and PhP 110,739 respectively. These figures are close to the average income and expenditure estimates for ARMM. However, the income and expenditure estimates for Maguindanao province, PhP 108,170 and PhP 106,330 respectively, are lower than those for Lanao del Sur and ARMM. Among the six regions of Mindanao, ARMM has the lowest estimates for income and expenditure. The income and expenditure estimates for Maguindanao are distinctively low compared with all the regions of Mindanao.

Table 13.2.3-6 Average Income and Expenditure Estimates in 2012 for Regions and Provinces

	Average income estimates (PhP)	Average expenditure estimates (PhP)
Lanao del Sur	129,953	110,739
Maguindanao	108,170	106,330
Mindanao		
Region IX – Zamboanga Peninsula	161,451	116,224
Region X – Northern Mindanao	189,158	137,298
Region XI – Davao	196,023	152,622
Region XII – SOCCSKSARGEN	165,214	137,923
Region XIII - Caraga	181,016	138,789
ARMM	129,350	112,342
Philippines	234,129	185,252

Source: Family Income and Expenditure Survey 2012, Philippine Statistics Authority

(3) Poverty Incidence

Poverty incidence in Lanao del Sur is 44.7% in 2006. The figure increases to 56.6% in 2009 and 73.8% in 2012. It then slightly decreases to 71.9% in 2015. Provincial poverty incidence of over 70% is an alarming level. In Maguindanao, poverty incidence is 54.6% in 2006, 52.2% in 2009, 63.7% in 2012, and 57.2% in 2015. After 2009, poverty incidence in Maguindanao has been lower than that in Lanao del Sur but has always been higher than that in ARMM and other regions of Mindanao. More than half of the population of Maguindanao province has been in poverty throughout the period.

Table 13.2.3-7 Poverty Incidence of Provinces in ARMM and Mindanao

	Annual Per Capita Poverty Threshold (PhP)				Poverty incidence among population Estimate (%)			
	2006	2009	2012	2015	2006	2009	2012	2015
Lanao del Sur	13,116	17,024	22,665	22,802	44.7	56.6	73.8	71.9
Maguindanao	12,877	16,701	18,873	21,423	54.6	52.2	63.7	57.2
Mindanao								
Region IX – Zamboanga Peninsula	12,743	16,260	18,054	20,925	45.0	45.8	40.1	33.9
Region X – Northern Mindanao	12,917	16,878	19,335	22,345	39.0	40.1	39.5	36.6
Region XI – Davao	13,389	17,120	19,967	22,754	30.6	31.4	30.7	22.0
Region XII – SOCCSKSARGEN	13,319	16,405	18,737	21,025	37.9	38.3	44.7	37.3
Region XIII - Caraga	14,324	18,309	19,629	22,570	49.2	54.4	40.3	39.1
ARMM	12,647	16,683	20,517	21,563	47.1	47.4	55.8	53.7
Philippines	13,357	16,871	18,935	21,753	21.0	20.5	19.7	16.5

Source: Official Poverty Statistics of the Philippines Full Year 2015, Philippine Statistics Authority

Data for poverty incidence at municipality level are derived from the National Color-Coded Agricultural Guide Map of the Department of Agriculture, which contains a municipal poverty database created in 2010. The table below presents poverty incidence in the four municipalities affected by Sub-Project 2. Parang municipality of Maguindanao has a very high poverty incidence of 74.00%. Applying the population figures of each municipality from the 2015 Census of Population and Housing, the four municipalities together would have 107,487 persons living in poverty, and the average poverty incidence in the four municipalities would be 66.64%.

Table 13.2.3-8 Poverty Incidence of Municipalities Affected by Sub-Project 2

Province	Municipality	Poverty
Lanao del Sur	Kapatagan	60.40%
	Balabagan	53.90%
Maguindanao	Parang	74.00%
	Matanog	59.30%
Average		66.64%

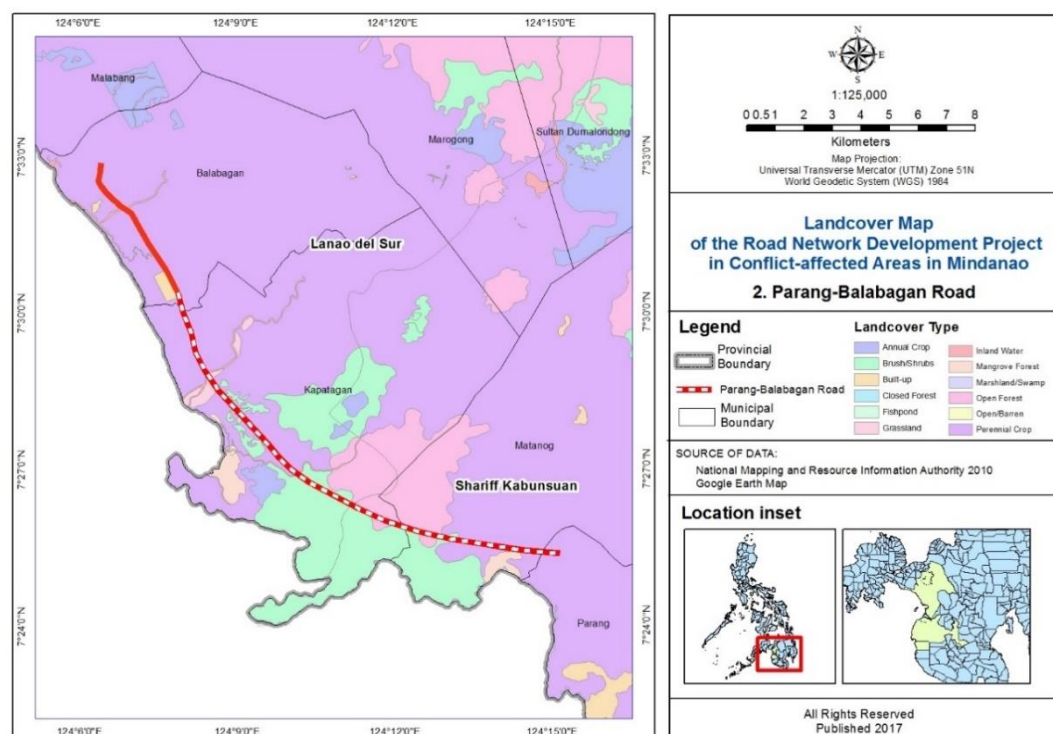
Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

13.2.4 Agricultural Production and Potentials of the Area

(1) Agricultural Land Use and Land Holdings

The land cover map, which was developed based on the National Mapping and Resource Information Authority's 2010 Google Earth Map, shows the land cover of the four municipalities affected by Sub-

Project 2. Perennial crops cover most of the land of the four municipalities. Grassland and brush/shrubs are spread along the borders of Kapatagan and Matanog.



Source: National Mapping and Resource Information Authority 2010 Google Earth Map

Figure 13.2.4-1 Landcover Map of Municipalities Affected by Sub-Project 2

The four municipalities have a total area of 1,029ha covered by annual crops and 28,193ha covered by perennial crops. All four municipalities have more perennial crop areas than annual crop areas. Parang, which has the largest land area of the four municipalities, has the largest areas of both perennial and annual crops.

Table 13.2.4-1 Agricultural Land Use in Hectare of Municipalities Affected by Sub-Project 2

(Unit: ha)

Province	Municipality	Annual crop	Perennial crop	Total
Lanao del Sur	Kapatagan	193	6,450	6,642
	Balabagan	64	6,096	6,160
Maguindanao	Parang	663	9,500	10,162
	Matanog	109	6,148	6,258
Total		1,029	28,193	29,222

Source: National Mapping and Resource Information Authority 2010 Google Earth Map

Among farmers, fisherfolk, and laborers, the most popular employment category in the four municipalities is “farmers, fisherfolk, laborers.” Over 38,000 people make their living from a combination of agriculture, fishing, and laboring. The second most popular category is “farmers, fisherfolk.” Over 20,000 people make their living from farming and fishing. There are 17,029 full-time farmers and 3,070 full-time fisherfolk. The number of full-time fisherfolk is small compared with other categories. Kapatagan has more than half of the full-time fisherfolk population in the four municipalities.

With regard to land holdings, “owners, tenants” is the most popular category. Over 12,000 farmers cultivate their own land and leased land. There are 7,337 “owners” who cultivate only their own land, while 5,622 farmers cultivate only leased land.

Table 13.2.4-2 Farmers and Holding of Municipalities Affected by Sub-Project 2

Province	Municipality	Farmers	Fisherfolks	Laborers	Farmers, Fisherfolks	Farmers, Fisherfolks, Laborers	Owners	Owners, Tenants	Tenants
Lanao del Sur	Kapatagan	2,274	1,733	1,274	4,007	5,281	1,808	4,102	2,294
	Balabagan	3,758	816	3,171	4,574	7,745	n/a	n/a	n/a
Maguindanao	Parang	4,228	201	7,619	4,429	12,048	1,364	2,093	729
	Matanog	6,769	320	5,898	7,089	12,987	4,165	6,764	2,599
Total		17,029	3,070	17,962	20,099	38,061	7,337	12,959	5,622

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

(2) Agricultural Production

The table below is a summary of the areas planted with crops in the four municipalities based on four sources. The Department of Agriculture of Lanao del Sur Province provided some information on planted areas in the municipalities. Unfortunately, however, most of their information about planted areas has been lost because of the crises in Marawi City. With regard to Kapatagan and Balabagan, information about the areas planted with crops was taken from a field survey report prepared by the Comprehensive Capacity Development Project in Bangsamoro, supported by JICA. The Department of Agriculture of Maguindanao Province provided information about Parang and Matanog. The Philippine Coconut Authority of ARMM provided information about coconuts and oil palm in the four municipalities.

Table 13.2.4-3 Areas Planted by Crops inha in Municipalities Affected by Sub-Project 2

(Unit: ha)

Province	Municipality	Annual crop								
		Irrigated palay	Rainfed palay	Lowland palay	Upland palay	White corn	Yellow corn	Corn	Cassava	Vegetables
Lanao del Sur	Kapatagan							1,560	1,680	250
	Balabagan			10	240			595	4,320	121
Maguindanao	Parang	334	303		814	132	605			
	Matanog		45		1,218	2,506	15			35
Total		334	348	10	2,272	2,638	620	2,155	6,000	406
Province	Municipality	Perennial crop								
		Banana	Coconut	Mango	Coffee	Rubber	Durian	Lanzones	Abaca	Other fruits
Lanao del Sur	Kapatagan		12,553		940				658	
	Balabagan		15,901		473				2,222	
Maguindanao	Parang	31	12,851	35	20		12	56		11
	Matanog	101	2,806		32	32	21			3
Total		132	44,111	35	1,465	32	33	56	2,880	14

Source: Department of Agriculture of Lanao del Sur Province, Department of Agriculture of Maguindanao Province, Field Survey Report in Lanao del Sur and Maguindanao Provinces (2015) JICA Comprehensive Capacity Development Project in Bangsamoro for Kapatagan and Balabagan, Philippine Coconut Authority ARMM for coconut and oil palm

Among all the crops, coconuts occupy the largest areas and are popular in all four municipalities. Among other perennial crops, abaca has 2,880ha in Kapatagan and Balabagan. In ARMM, abaca is

mainly grown in Lanao del Sur and Sulu provinces. It has been identified as one of the target crops for industrial cluster development by the Department of Trade and Industry of ARMM together with rubber, seaweed, oil palm, coffee, and coconuts.

Annual crops, which include cassava, corn, and upland rice, are planted over large areas. The Matling Industrial and Commercial Corporation, the largest cassava starch company in Mindanao, has processing facilities in Malabang municipality to the north of Balabagan. Another cassava flour/starch processing company, the Itil Plantation Corporation, is in Balabagan. These two companies source material from the two cassava-growing municipalities of Kapatagan and Balabagan.

(3) Suitable and Potential Areas for Crop Production

According to the National Color-Coded Agricultural Guide Map, oil palm has the largest suitable areas in the four municipalities, followed by coconuts, coffee, and bananas. Coconuts have suitable areas in most of the 14 barangays: 3,264ha in total. Salaman in Kapatagan municipality also has suitable areas for corn, bananas, coconuts, and coffee. The National Color-Coded Agricultural Guide Map does not indicate suitable areas for crops other than oil palm in the remaining barangays.

Table 13.2.4-4 Suitable Areas in Hectare for Crop Production in Municipalities Affected by Sub-Project 2

(Unit: ha)

Province	Municipality	Palay	Corn	Banana	Coconut	Coffee	Oil palm
Lanao del Sur	Kapatagan		75	61	399	64	6,095
	Balabagan						6,050
Maguindanao	Parang	3,486	893	4,277	5,046	4,277	11,201
	Matanog		31	51	51	51	3,587
Total		3,486	999	4,389	5,495	4,393	26,933

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

Table 13.2.4-5 Suitable Areas in Hectare for Crop Production in Barangays along the Alignment of Sub-Project 2

(Unit: ha)

Province	Municipality	Barangay		Palay	Corn	Banana	Coconut	Coffee	Oil palm
Lanao del Sur	Kapatagan	1	Salaman		75	61	399	64	69
		2	Matimos						388
		3	Bakikis						521
		4	Lusain						377
	Balabagan	5	Banago						166
		6	Narra						199
		7	Lorenzo						145
		8	Molimoc						145
		9	Barorao						196
		10	Batuan						169
		11	Budas						155
Maguindanao	Parang	12	Macasandag	15					
	Matanog	13	Sapad						735
		14	Kidama						
Total				15	75	61	399	64	3,264

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

The Department of Agriculture of Maguindanao Province has identified potential areas for expanding crop cultivation in Matanog municipality. Upland palay has the largest potential area of 143ha, followed by 38ha for corn, 32ha for rain-fed palay, and 30ha for high-value crops.

Table 13.2.4-6 Potential Areas in Hectare for Crop Production in Municipalities Affected by Sub-Project 2

(Unit: ha)

Province	Municipality	Irrigated palay	Rainfed palay	Upland palay	All palay	Corn	High value crops	Total
Maguindanao	Parang	n/a	n/a	n/a	n/a	n/a	n/a	
	Matanog		32	143	175	38	30	243

Source: Department of Agriculture of Maguindanao Province

13.2.5 Result of the Social Survey

(1) Overview of the Survey

Three surveys were undertaken to gain a better understanding of the socio-economic conditions of the communities in barangays along the alignment of Sub-Project 2. The survey results are summarized below to present coherent information on the communities along the road alignment, highlighting their current socio-economic condition, farming practices, and perception on the impacts of the road project.

Table 13.2.5-1 Surveys Carried Out

Survey type	Number of observations	Description
(i) Household interview survey	20-21 households x 14 barangays = 281 households	A two-page questionnaire is used for the interview to collect basic information on living conditions such as family income and expenditure, sources of livelihood, and farming practices.
(ii) Focus group discussion	3 groups x 14 barangays	Participants are divided into three groups: youth, women and household heads. A one-page guide is used to facilitate discussions on current road conditions and expected impacts of road construction.
(iii) Barangay captain interview	14 barangay captains	A one-page questionnaire is used to collect information on agricultural production, marketing, and related activities.

(2) Socio-economic Condition of the Communities along the Road Alignment

The socio-economic characteristics of the communities along the alignment of Sub-Project 2 are summarized based on the household survey.

Table 13.2.5-2 Characteristics of Household Survey Respondents

Variable	Description
Age and gender	<ul style="list-style-type: none"> The respondents' ages range from 20 to 85, with a mean age of 43.4 years. 230 (82.1%) of respondents are male and 50 (17.9%) female.
Years of residency	<ul style="list-style-type: none"> The average number of years of residency is 23.0 years, and 73.3% of respondents have lived in the community since birth.

Variable	Description
Number of family members	<ul style="list-style-type: none"> Family size is large: 48.6% of households have 4–6 members, and 27.7% seven or more members.
Ethnicity	<ul style="list-style-type: none"> The largest ethnic group is Iranun (53.4%), followed by Maranao (25.3%), Cebuano (11.4%), and Maguindanao (6.8%).
Religion	<ul style="list-style-type: none"> Muslims are dominant in the community (85.8%), and the rest are Catholic (13.2%) and others (1.1%).
Education attainment	<ul style="list-style-type: none"> 48.9% of respondents have finished elementary level schooling, and 29.0% reached the high school level.
Source of drinking water	<ul style="list-style-type: none"> The major source of drinking water is spring/river/rain (65.7%), followed by communal or hand pump (13.0%) and open/dug wells (9.4%).
Household income	<ul style="list-style-type: none"> 57.5% of the households have a monthly income below PhP 9,000. As the annual per capita poverty threshold in Lanao del Sur province in 2015 was PhP 22,802 and that of Maguindanao province PhP 21,423, a monthly household income below PhP 9,000 is low. The majority of the respondents (67.5%) earn their income from farming.

(3) Agricultural Practices of the Communities

Barangays along the alignment of Sub-Project 2 are agricultural communities, farming being their main income source. There are also fishermen in the area. Some residents earn income from both farming and fishing. For those engaged in farming, corn and coconut are the major cash crops. The common problems facing the survey respondents are the poor road condition and difficulty in transporting agricultural products. Other issues include bad weather, wild animals and pests damaging their crops, and lack of financial resources and farm equipment.

Table 13.2.5-3 Characteristics of Farm Production

Subject	Description
Farmland size	<ul style="list-style-type: none"> The total land under cultivation in the eight barangays along the alignment of Sub-Project 2 is 8,989.6 ha. Among the 111 household survey respondents who cultivate crops, the size of cultivated land ranges from 0.5 to 7.0 ha, with a mean of 1.7 ha. More than half of the respondents cultivate 1 ha or less. Among the 184 respondents who cultivate crops, 66.3% have no potential farmland to expand their production. On the other hand, for those who have potential land, the main reason for not cultivating it is financial constraint. Other reasons include high costs of product transportation, land in mountainous areas, being prone to floods, or damage by wild animals.
Farmland tenure	<ul style="list-style-type: none"> Among the 178 household survey respondents who farm land, 50.6% farm their own land, 0.6% are tenant farmers, 26.4% farm leased land, and 22.5% have other arrangements. Among the 90 respondents who farm their own land, 52.2% have Torrens titles, 7.8% inherited the land, 36.7% have verbal agreements, and 3.3% have other arrangements.

Subject	Description
Types of crops	<ul style="list-style-type: none"> Corn, more the white than yellow variety, is widely cultivated in the area. The majority of the household survey respondents who produce corn harvest two or three crops per year. Apart from corn and coconut, cassava and banana are also grown by numerous farmers. Among those engaged in farming, 23.4% practice intercropping. Popular crop combinations are corn-coconut, coconut-banana, and corn-banana.
Constraints	<ul style="list-style-type: none"> Wild animals that damage crops and pest infestation are common challenges. Another problem is the lack of financial resources to buy production inputs for farmers such as fertilizers and pesticides, and facilities such as fishnets and pump boats for fishermen.

Most harvested crops are delivered to markets in Parang, Maguindanao province, and Balabagan and Malabang, Lanao del Sur province. Most farmers transport crops to the markets by themselves. Poor road conditions and high transportation costs are major constraints.

Table 13.2.5-4 Characteristics of Marketing of Farm and Fisheries Products

Subject	Description
Types of products	<ul style="list-style-type: none"> Corn and coconut are common cash crops from which most farmers in the barangays derive their agricultural incomes. Cassava and banana are also marketed by many farmers. Among the 281 household survey respondents, 99 farmers earn income from corn, 50 from coconut, 28 from cassava, and 15 from banana. Some farmers earn income from multiple crops. 23 household survey respondents earn income from selling fish.
Market location	<ul style="list-style-type: none"> Most harvested crops are delivered to markets located in Parang, Maguindanao province, and Balabagan and Malabang, Lanao del Sur province. Corn is sold to markets in the three towns above. Among the 91 household survey respondents to transport corn, the distance from farm to market ranges from 0.2 to 70 km, with an average of 20.6 km. For coconut products, some copra is brought to Davao City and Datu Odin Sinsuat municipality, Maguindanao province. Some coconut products are sold to markets in Balabagan, Malabang, and Parang. The common market for cassava is the Matling Industrial and Commercial Corporation, located in Malabang. Some farmers also send their cassava to markets in Balabagan.
Transportation arrangements	<ul style="list-style-type: none"> Most farmers take the harvested crops directly to market locations, bearing all costs incurred for product transport. There are coconut bulk buyers who collect harvests from farm areas or companies that arrange trucks to pick up cassava from farm areas and charge farmers for transportation.
Means of transportation	<ul style="list-style-type: none"> Common means of transportation for farm and fisheries products to the market include horse, multi-cab, motor-sidecar, locally known as “payong-payong,” truck, jeepney, and pump boat.
Constraints	<ul style="list-style-type: none"> It is difficult to transport products on poor, rough, muddy, and damaged roads in the area. Crossing rivers is also a challenge.

Subject	Description
	<ul style="list-style-type: none"> Transporting products by horse could cause accidents especially during heavy rain. Transportation costs are very high.

The following flowchart shows the flow of corn from farm areas in Barangay Salaman, Kapatagan municipality to the market of Poblacion, Balabagan. The other neighboring barangays along the alignment of Sub-Project 2 have similar flows for coconut from farm areas to the market.



Figure 13.2.5-1 Commodity Flow of Barangay Salaman of Kapatagan Municipality

(4) Expected Impacts of Road Construction

The main positive impact of the road construction perceived by the survey participants is represented by benefits to agriculture. With the road construction, transporting farm and fisheries products to the market would be faster and easier. Transportation costs would decrease, and the profit margins of

farmers and fishermen would increase. This positive effect would encourage farmers and fishermen to engage and become more active in production.

Table 13.2.5-5 Expected Impacts on Agriculture

Subject	Description
Transportation cost	<ul style="list-style-type: none"> With improved roads, transporting harvested crops to the market would be faster and easier, which would lead to reduced transportation costs.
Access to traders and buyers	<ul style="list-style-type: none"> Good roads would give the farmers and fishermen better access to traders or buyers for their products.
Farmers' profits	<ul style="list-style-type: none"> Reduced transportation costs, better access to transportation services, and more market choices would increase the profit margins of farmers.
Farm production	<ul style="list-style-type: none"> Less time and lower costs for transporting products would encourage more residents to go into farming and sell their products. The majority of the household survey respondents indicated plans to increase cultivation areas if the road is constructed. Corn, coconut, and banana are crops that farmers intend to increase production.

Better access to basic social services and economic opportunities are also seen as positive impacts of the road construction. Further, the road construction would improve access to health services, especially in case of emergency; access to schools for children and youth; access for women to fetch water and perform other duties; and access to employment and business opportunities for residents.

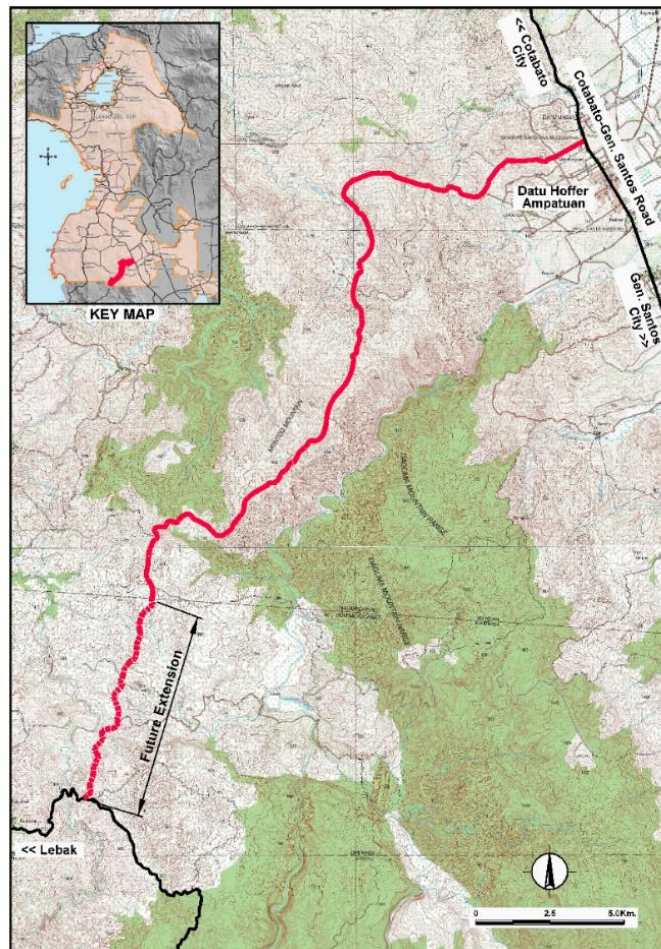
Table 13.2.5-6 Expected Social Impacts

Subject	Description
Health	<ul style="list-style-type: none"> With good roads, pregnant women, delivering mothers, and sick people in the area could be easily transported to nearest medical care centers, particularly in case of emergency.
Access to school	<ul style="list-style-type: none"> Walking to school and back home would be faster and easier with good roads, which would encourage children to attend school. Good roads would decrease the number of out-of-school youth.
Women's work	<ul style="list-style-type: none"> With good roads, women could use transportation to fetch water from springs instead of walking. Access to transportation would also ease delivery of crops to the market.
Business development	<ul style="list-style-type: none"> Better access would bring more investors to the area. Increased mobility would provide residents with more employment and business opportunities.
Negative impacts	<ul style="list-style-type: none"> More vehicular accidents might happen. The road construction might pave way for terrorists to enter communities and more crimes to be committed. There might be noise and air pollution along the road.

13.3 Sub-Project 5

13.3.1 Outline of the Project

Location	The road is located in the Municipalities of Shariff Aguak, Datu Unsay, Datu Hoffer, and Ampatuan
Major Road to connect	<ul style="list-style-type: none"> Phase 1: Connecting AH-26 (Cotabato-Gen. Santos Road) to Barangay Tubak (border of ARMM and Region 12) Phase 2: Connecting Barangay Tubak to Awang-Lebak-Palimbang Coastal Road
Road Description	<ul style="list-style-type: none"> Length: 27.9 km Lane and lane width: 2-lane (total); 3.35 m per lane Shoulder width: 2.5 m Classification: National Secondary Road
Population	<ul style="list-style-type: none"> 11 barangays along the alignment (16,385) 4 municipalities: Shariff Aguak (31,692) + Datu Unsay (11,813) + Datu Hoffer (25,012) + Ampatuan (24,801) = 93,318
Agricultural land use (ha) of the 4 municipalities	<ul style="list-style-type: none"> Annual Crop=16,021 ha Perennial crop=2,455 ha TOTAL=18,475 ha
Current main agricultural crops planted by farmers (2015 data)	<ul style="list-style-type: none"> Coconut (24,034 ha) Banana (15,145 ha) Palay (8,434 ha) Oil Palm (2,762 ha) Corn (1,859 ha)



13.3.2 Objectives of the Project

The objectives of the Maganoy – Lebak Road road are as follows:

- To increase the flexibility of the network by linking primary-inter city road (Cotabato – Gen. Santos Road) and regional primary road (Awang- Upi- Lebak Road)
- To connect coastal towns to major urban centers (Cotabato City, Koronadal City) to facilitate better movement of people and goods.
- To provide reliable access road to a wide agricultural land (67,918 ha, total for annual crop and perennial crop)
- To provide better link to the areas with high poverty incidence (63.30%) to help them access social services and sell their products to urban centers with minimal transportation cost.
- To support the IP communities' access to basic social services and sell their products to urban centers with minimal transportation cost.

13.3.3 Socio-economic Condition of the Project Area

(1) Population and Growth Rate

Maguindanao province, in which Sub-Project 5 is located, has a total population of 1,173,993 and a population density of 118 persons/km² as of August 2015. The population density of Maguindanao is slightly higher than that of ARMM but lower than that of all other regions in Mindanao.

Table 13.3.3-1 Population and Population Density of Provinces in ARMM and Mindanao

	Population	Land area (km ²)	Population density (persons/km ²)
Lanao del Sur	1,045,429	15,056	69
Maguindanao	1,173,933	9,968	118
Mindanao	24,135,775	138,354	174
Region IX – Zamboanga Peninsula	3,629,783	16,904	215
Region X – Northern Mindanao	4,689,302	20,459	229
Region XI – Davao	4,893,318	20,433	239
Region XII – SOCCSKSARGEN	4,545,276	22,786	199
Region XIII - Caraga	2,596,709	21,121	123
ARMM	3,781,387	36,651	103
Philippines	100,981,437	300,000	337

Source: 2015 Census of Population and Housing, Philippine Statistics Authority

Maguindanao province has experienced rapid population growth in recent years. Its annual average growth rate between 2010 and 2015 is 4.22%, which is outstandingly high compared with 2.18% for Lanao del Sur, 2.89% for ARMM, and 1.79% for Mindanao.

Table 13.3.3-2 Population Growth of Provinces in ARMM and Mindanao

	Annual Average Growth Rate of influenced municipalities		
	2000-2010	2010-2015	2000-2015
Lanao del Sur	1.55%	2.18%	1.77%
Maguindanao	1.66%	4.22%	2.54%
Mindanao	1.89%	1.79%	1.86%
Region IX – Zamboanga Peninsula	1.87%	1.21%	1.64%
Region X – Northern Mindanao	2.06%	1.68%	1.92%
Region XI – Davao	1.97%	1.74%	1.89%
Region XII – SOCCSKSARGEN	2.46%	1.94%	2.28%
Region XIII - Caraga	1.49%	1.28%	1.42%
ARMM	1.51%	2.89%	1.98%

	Annual Average Growth Rate of influenced municipalities		
	2000-2010	2010-2015	2000-2015
Philippines	1.90%	1.72%	1.84%

Note: Annual average growth rate of Mindanao is simple average of annual average growth rate of 6 regions in each period
Source: 2016 Philippine Statistics Yearbook, Philippine Statistics Authority

Datu Hoffer, Datu Unsay, Shariff Aguak and Ampatuan in Maguindanao province are the municipalities that will be affected by Sub-Project 5. The four municipalities have a total population of 93,318. The average population density is 131 persons/km², a figure that is higher than the average in Maguindanao province.

Table 13.3.3-3 Population and Population Density of Municipalities Affected by Sub-Project 5

Province	Municipality	Population	Land area (km ²)	Population density (persons/km ²)
Maguindanao	Datu Hoffer	25,012	193.45	129
	Datu Unsay	11,813	95.39	124
	Shariff Aguak	31,692	166.00	191
	Ampatuan	24,801	255.40	97
Total		93,318	710.24	131

Source: 2015 Census of Population and Housing, Philippine Statistics Authority

In terms of population growth, Datu Hoffer and Ampatuan have high annual average growth rates of 8.95% and 6.86% respectively from 2010 to 2015. These percentages are much higher than the annual average growth rate in Maguindanao for the same period. However, Datu Unsay and Shariff Aguak have negative annual average growth rates during this time. Datu Unsay was created in 2003 from the municipality of Shariff Aguak. Datu Hoffer was created in 2009. It consists of nine barangays from the municipality of Shariff Aguak and portions of two barangays from Datu Unsay.

Table 13.3.3-4 Population Growth of Municipalities Affected by Sub-Project 5

Province	Municipality	Annual Average Growth Rate		
		2000-2010	2010-2015	2000-2015
Maguindanao	Datu Hoffer	n/a	8.95%	n/a
	Datu Unsay	n/a	-1.11%	n/a
	Shariff Aguak	-3.59%	-1.61%	-2.93%
	Ampatuan	-5.96%	6.86%	-1.87%
Average			2.88%	

Source: Various Statistics Report, Philippine Statistics Authority

The alignment of Sub-Project 5 passes through 11 barangays in the four municipalities. The total population of the 11 barangays is 16,385. Among the barangays, Limpongo in Datu Hoffer municipality has the largest population of 3,557. The population in the remaining ten barangays ranges from 678 to 3,056. Mantao and Apas in Datu Hoffer municipality have no available data for 2015 since these barangays were created in 2008 out of Macalag barangay and Tuntungan barangay in Datu Unsay municipality.

Table 13.3.3-5 Population of Barangays along the Alignment of Sub-Project 5

Province	Municipality	Barangay		Population
Maguindanao	Datu Hoffer	1	Kubentong	1,648
		2	Talibadok	3,056
		3	Limpongo	3,557
		4	Sayap	2,015
		5	Mantao	n/a

Province	Municipality	Barangay		Population
		6	Taib	1,428
		7	Apas	n/a
	Datu Unsay	8	Macalag	678
		9	Panangeti	781
	Ampatuan	10	Tubak	902
	Shariff Aguak	11	Satan	2,320
Total				16,385

Source: 2015 Census of Population and Housing, Philippine Statistics Authority

(2) Income and Expenditure

According to the Family Income and Expenditure Survey 2012 of the Philippine Statistics Authority, income and expenditure estimates for Maguindanao province are PhP 108,170 and PhP 106,330 respectively. These estimates are lower than the income and expenditure estimates of PhP 129,953 and PhP 110,739 respectively for Lanao del Sur. Among the six regions of Mindanao, ARMM has the lowest estimates both for income and expenditure: PhP 129,350 and PhP 112,342 respectively. Income and expenditure estimates for Maguindanao are distinctively low compared with all the regions of Mindanao.

Table 13.3.3-6 Average Income and Expenditure Estimates in 2012 for Regions and Provinces

	Average income estimates (PhP)	Average expenditure estimates (PhP)
Lanao del Sur	129,953	110,739
Maguindanao	108,170	106,330
Mindanao		
Region IX – Zamboanga Peninsula	161,451	116,224
Region X – Northern Mindanao	189,158	137,298
Region XI – Davao	196,023	152,622
Region XII – SOCCSKSARGEN	165,214	137,923
Region XIII - Caraga	181,016	138,789
ARMM	129,350	112,342
Philippines	234,129	185,252

Source: Family Income and Expenditure Survey 2012, Philippine Statistics Authority

(3) Poverty Incidence

Poverty incidence in Maguindanao is 54.6% in 2006. This figure falls to 52.2% in 2009, increases to 63.7% in 2012, and declines again to 57.2% in 2015. Poverty incidence in Maguindanao has always been higher than that in ARMM and any other regions of Mindanao. More than half of the population of Maguindanao province has been in poverty throughout the period.

Table 13.3.3-7 Poverty Incidence of Provinces in ARMM and Mindanao

	Annual Per Capita Poverty Threshold (PhP)				Poverty incidence among population Estimate (%)			
	2006	2009	2012	2015	2006	2009	2012	2015
Lanao del Sur	13,116	17,024	22,665	22,802	44.7	56.6	73.8	71.9
Maguindanao	12,877	16,701	18,873	21,423	54.6	52.2	63.7	57.2
Mindanao								

	Annual Per Capita Poverty Threshold (PhP)				Poverty incidence among population Estimate (%)			
	2006	2009	2012	2015	2006	2009	2012	2015
Region IX – Zamboanga Peninsula	12,743	16,260	18,054	20,925	45.0	45.8	40.1	33.9
Region X – Northern Mindanao	12,917	16,878	19,335	22,345	39.0	40.1	39.5	36.6
Region XI – Davao	13,389	17,120	19,967	22,754	30.6	31.4	30.7	22.0
Region XII – SOCCSKSARGEN	13,319	16,405	18,737	21,025	37.9	38.3	44.7	37.3
Region XIII - Caraga	14,324	18,309	19,629	22,570	49.2	54.4	40.3	39.1
ARMM	12,647	16,683	20,517	21,563	47.1	47.4	55.8	53.7
Philippines	13,357	16,871	18,935	21,753	21.0	20.5	19.7	16.5

Source: Official Poverty Statistics of the Philippines Full Year 2015, Philippine Statistics Authority

Data for poverty incidence at municipality level are derived from the National Color-Coded Agricultural Guide Map of the Department of Agriculture, which contains a municipal poverty database created in 2010. The table below shows poverty incidence the municipalities affected by Sub-Project 5. Datu Unsay and Shariff Aguak have very high poverty incidence of 70.90% and 74.50% respectively.

Table 13.3.3-8 Poverty Incidence of Municipalities Affected by Sub-Project 5

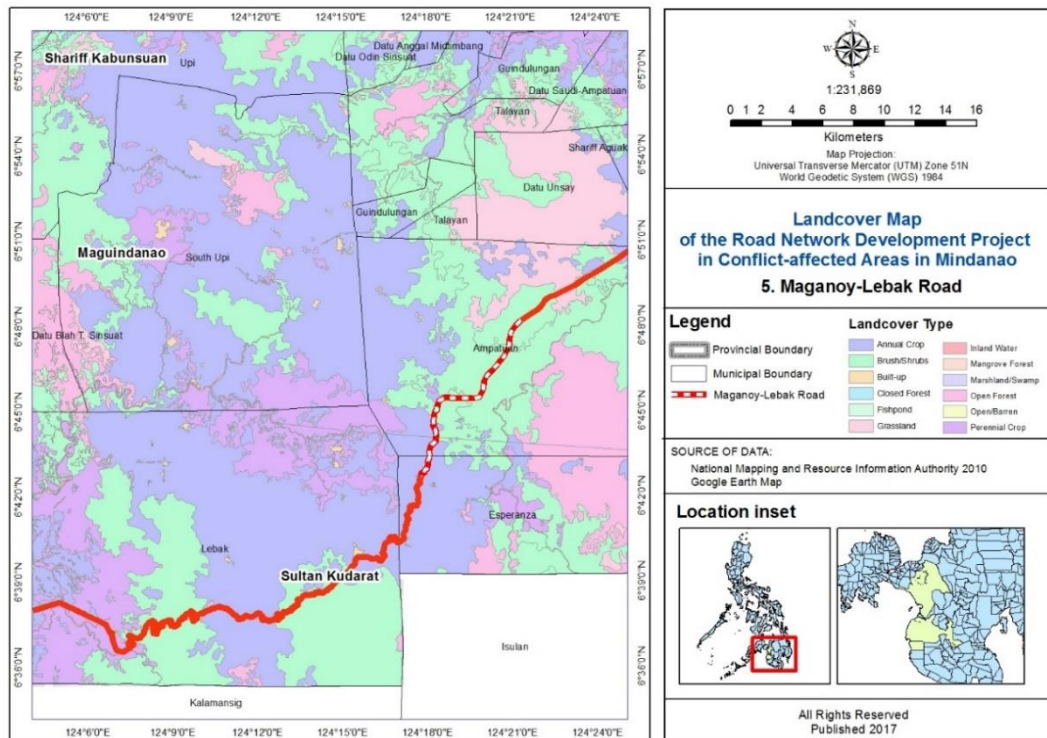
Province	Municipality	Poverty
Maguindanao	Datu Hoffer	69.00%
	Datu Unsay	70.90%
	Ampatuan	63.30%
	Shariff Aguak	74.50%
Average		65.75%

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

13.3.4 Agricultural Production and Potentials of the Area

(1) Agricultural Land Use and Land Holdings

The land cover map, which was developed based on the National Mapping and Resource Information Authority's 2010 Google Earth Map, shows the land cover of the four municipalities affected by Sub-Project 2. Perennial crops cover most of the land of the four municipalities. Grassland and brush/shrubs are spread along the borders of Kapatagan and Matanog. The land cover map, which was developed based on the National Mapping and Resource Information Authority's 2010 Google Earth Map, shows the land cover of the municipalities affected by Sub-Project 5. Datu Hoffer, which was created in 2009 and consists of nine barangays from the municipality of Shariff Aguak and portions of two barangays from Datu Unsay, is not reflected in the map. The alignment of Sub-Project 5 passes through Ampatuan municipality. Brush/shrubs and spread in the middle of the municipality. The west of the municipality is covered by annual crops, while the east has areas covered by open forest.



Source: National Mapping and Resource Information Authority 2010 Google Earth Map

Figure 13.3.4-1 Landcover Map of Municipalities Affected by Sub-Project 5

Ampatuan has 12,006ha covered by annual crops and 1,170ha covered by perennial crops. Shariff Aguak has 4,015ha covered by annual crops and 1,285ha covered by perennial crops. Information is not available for Datu Hoffer and Datu Unsay.

Table 13.3.4-1 Agricultural Land Use of Municipalities Affected by Sub-Project 5

(Unit: ha)

Province	Municipality	Annual crop	Perennial crop	Total
Maguindanao	Shariff Aguak	4,015	1,285	5,300
	Ampatuan	12,006	1,170	13,176
Total		16,021	2,455	18,475

Source: National Mapping and Resource Information Authority 2010 Google Earth Map

Among farmers, fisherfolk, and laborers, the most popular employment category in the four municipalities is “farmers, fisherfolk, laborers.” Over 13,000 people make their living from a combination of agriculture, fishing, and laboring. The second most popular category is “farmers, fisherfolk.” Over 8,000 people make their living from farming and fishing. There are 4,615 full-time farmers and 4,001 full-time fisherfolk. Many of the fisherfolk in the inland municipalities are engaged in inland aquaculture.

With regard to land holdings, “owners, tenants” and “tenants” are popular categories. The number of farmers who cultivate their own land and leased land is 4,718, while the number of farmers who cultivate only leased land is 4,712.

Table 13.3.4-2 Farmers and Holding of Municipalities Affected by Sub-Project 5

Province	Municipality	Farmers	Fisherfolks	Laborers	Farmers, Fisherfolks	Farmers, Fisherfolks, Laborers	Owners	Owners, Tenants	Tenants
Maguindanao	Datu Hoffer	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Datu Unsay	1,693	1,475	1,775	3,168	4,943	1,550	2,797	1,247
	Shariff Aguak	n/a	n/a	n/a	n/a	n/a	1,804	1,077	2,881
	Ampatuan	2,922	2,526	2,976	5,448	8,424	260	844	584
Total		4,615	4,001	4,751	8,616	13,367	3,614	4,718	4,712

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

(2) Agricultural Production

The table below is a summary of the areas planted with crops in the four municipalities based on two sources. The Department of Agriculture of Maguindanao Province provided information on all the crops. The Philippine Coconut Authority of ARMM provided information about coconuts and palm oil.

Table 13.3.4-3 Areas Planted by Crops inha in Municipalities Affected by Sub-Project 5

(Unit: ha)

Province	Municipality	Annual crop							
		Irrigat ed palay	Rainfed palay	Upland palay	White corn	Yellow corn	Cassav a	Peanu t	Vegetable s
Maguindanao	Datu Hoffer	203	155	1,929	1,692	2,952			31
	Datu Unsay	1,250	260	100	200	195			5
	Ampatuan	1,971	526	392	2,535	3,710	65	106	
	Shariff Aguak	2,728	250		220	102			4
Total		6,152	1,191	2,421	4,647	6,959	65	106	40
Province	Municipality	Perennial crop							
		Banana	Coconu t	Mango	Coffe e	Rubbe r	Oil palm		
Maguindanao	Datu Hoffer	395	955	34	12	2	2		
	Datu Unsay	20	72	15			2		
	Ampatuan	463	1,506	285	205		632		
	Shariff Aguak	2		14					
Total		880	2,533	348	217	2	636		

Source: Department of Agriculture of Maguindanao Province, Department of Agriculture of Lanao del Sur Province, Philippine Coconut Authority ARMM for coconut and oil palm

These four municipalities have more areas planted with annual crops than perennial crops. With regard to annual crops, yellow corn occupies the largest area of 6,959ha. Among the different categories of palay, irrigated palay has the largest area of 6,152ha. In contrast, rain-fed palay has the smallest area of 1,191ha. With regard to perennial crops, coconuts have the largest area of 2,533ha, followed by 880ha of bananas, and 636ha of oil palm.

Datu Hoffer has large areas of white and yellow corn and upland palay, but a small area of irrigated palay. Datu Unsay has a large area of irrigated palay compared with other crops. Ampatuan has large areas of irrigated palay, white and yellow corn, and coconuts. In addition, most planted areas of palm oil, mangoes, and coffee are in Ampatuan. Shariff Aguak has the largest area of irrigated palay among the four municipalities.

(3) Suitable and Potential Areas for Crop Production

The National Color-Coded Agricultural Guide Map provides information about suitable areas for crop production in Datu Unsay, Ampatuan and Shariff Aguak. Information for Datu Hoffer is not available because the map was developed prior to the municipality's creation. In the three municipalities, coconuts have the largest suitable area of 24,034ha, followed by 15,145ha for bananas.

There are suitable areas for coconuts in the 11 barangays along the alignment of Sub-Project 5. The total suitable area is 7,343ha. Of the 11 barangays, three have areas suitable for bananas. The total suitable area is 4,259ha.

Table 13.3.4-4 Suitable Areas in Hectare for Crop Production in Municipalities Affected by Sub-Project 5

(Unit: ha)

Province	Municipality	Palay	Corn	Banana	Coconut	Coffee	Oil palm
Maguindanao	Datu Hoffer	n/a	n/a	n/a	n/a	n/a	n/a
	Datu Unsay	1,583	626	2,175	7,029		1,601
	Ampatuan	2,965		11,450	12,328		
	Shariff Aguak	3,885	1,233	1,520	4,677		1,161
Total		8,434	1,859	15,145	24,034	0	2,762

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

Table 13.3.4-5 Suitable Areas in Hectare for Crop Production in Barangays along the Alignment of Sub-Project 5

(Unit: ha)

Province	Municipality	Barangay	Palay	Corn	Banana	Coconut	Coffee	Oil palm
Maguindanao	Datu Hoffer	1 Kubentong						
		2 Talibadok						
		3 Limpongo						
		4 Sayap						
		5 Mantao						
		6 Taib						
		7 Apas						
	Datu Unsay	8 Macalag				1,487		
		9 Panangeti			571	2,890		372
	Ampatuan	10 Tubak			3,251	1,619		
	Shariff Aguak	11 Satan	700	149	437	1,348		748
Total			700	149	4,259	7,343	0	1,120

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

The Department of Agriculture of Maguindanao Province has identified potential areas for expanding crop cultivation in Datu Hoffer, Datu Unsay and Ampatuan. Information for Shariff Aguak is not available. In Datu Hoffer and Ampatuan, corn has by far the largest potential area of 7,741ha. In Datu Unsay, on the other hand, irrigated palay has the largest potential area of 1,250ha.

Table 13.3.4-6 Potential Areas in Hectare for Crop Production in Municipalities Affected by Sub-Project 5

(Unit: ha)

Province	Municipality	Irrigated palay	Rainfed palay	Upland palay	All palay	Corn	High value crops	Total
Maguindanao	Datu Hoffer	50	50	385	485	1,320	241	2,046
	Datu Unsay	1,250	260	100	1,610		625	2,235
	Ampatuan	769	247	422	1,438	6,421		7,859
	Shariff Aguak							
Total		2,069	557	907	3,533	7,741	866	12,140

Source: Department of Agriculture of Maguindanao Province Alignment Selection

13.3.5 Result of the Social Survey

(1) Overview of the Survey

Three surveys were undertaken to gain a better understanding of the socio-economic conditions of the communities in barangays along the alignment of Sub-Project 5. The survey results are summarized below to present coherent information on the communities along the road alignment, highlighting their current socio-economic condition, farming practices, and perception on the impacts of the road project.

Table 13.3.5-1 Surveys Carried Out

Survey type	Number of observations	Description
(i) Household interview survey	19-22 households x 11 barangays = 223 households	A two-page questionnaire is used for the interview to collect basic information on living conditions such as family income and expenditure, sources of livelihood, and farming practices.
(ii) Focus group discussion	3 groups x 11 barangays	Participants were divided into three groups: youth, women, and household heads. A one-page guide is used to facilitate discussions on current road conditions and the expected impacts of road construction.
(iii) Barangay captain interview	11 barangay captains	A one-page questionnaire is used to collect information on agricultural production, marketing, and related activities.

(2) Socio-economic Condition of the Communities along the Road Alignment

The socio-economic characteristics of the communities along the alignment of Sub-Project 5 are summarized based on the household survey.

Table 13.3.5-2 Characteristics of Household Survey Respondents

Variable	Description
Age and Sex	<ul style="list-style-type: none"> The respondents' ages range from 17 to 90, with a mean age of 38.1 years. 168 (75.7%) of the respondents are male, and 54 (24.3%) female.
Years of residency	<ul style="list-style-type: none"> The mean years of residency is 31.5 years, and 72.6% of the respondents have lived in the community since birth.
Number of family members	<ul style="list-style-type: none"> Family size is large: 47.7% of the households have 4-6 members, and 34.7% have 7 or more members.

Variable	Description
Ethnicity	<ul style="list-style-type: none"> About half of the respondents are Maguindanao, and the other half are Indigenous People, mostly Teduray. There are a few other ethnic groups such as Cebano and Ilonggo.
Religion	<ul style="list-style-type: none"> 53.2% of the respondents are Muslim, while 23.9% are Catholic, and 23.0% have other religions.
Educational attainment	<ul style="list-style-type: none"> 63.3% of respondents have finished elementary-level education, and 16.7% have reached the high school level. 16.7% of respondents have not completed any education.
Source of drinking water	<ul style="list-style-type: none"> The major source of drinking water is spring/river/rain (61.5%), followed by communal or hand pump wells (18.8%) and open dug wells (12.4%).
Household income	<ul style="list-style-type: none"> 78.1% of the households have monthly incomes of less than PhP 6,000. As the annual per capita poverty threshold of Maguindanao province was PhP 21,423 and the food threshold was PhP 14,982 in 2015, a monthly household income below PhP 6,000 is very low. The majority of the respondents (88.3%) earn their income from agriculture.

(3) Agricultural Practices of the Communities

Barangays along the alignment of Sub-Project 5 are, for the most part, agricultural communities. Farming is the major source of income. Fishing is not a means of earning a livelihood in the area. Corn, coconut, and palay are the major crops that are grown widely in the area. Aside from the usual problems of pest infestation and the high cost of farm inputs, farmers are heavily burdened by high transport costs attributable to distant farms, and poor and rough road conditions.

Table 13.3.5-3 Characteristics of Farm Production

Subject	Description
Farmland size	<ul style="list-style-type: none"> The total land under cultivation in 11 barangays along the alignment of Sub-Project 5 is 10,909.8 ha. Among the 111 household survey respondents who cultivate crops, the size of cultivated land ranges from 0.5 to 25 ha, with a mean of 2.4 ha. About half of the respondents cultivate 1 to 2ha. Some of the household survey respondents have potential farmlands. The main reason that those farmlands are not cultivated is financial constraints. They lack funds for the inputs necessary to grow crops.
Farmland tenure	<ul style="list-style-type: none"> Among the 207 household survey respondents who use farmland, 52.7% farm their own land, 2.9% are tenant farmers, 38.6% farm leased land, and 5.8% have other arrangements. Among the 109 respondents who farm their own land, 42.2% have Torrens title, 19.3% have inherited the land, 33.9% have a verbal agreement, and 4.6% have other arrangements.
Types of crops	<ul style="list-style-type: none"> Corn, both yellow and white varieties, is widely cultivated in the area. Most of the household survey respondents who produce corn harvest two to three crops per year. Palay is cultivated in most barangays. Palay farmers in mountainous areas grow upland rice depending on rain, while some farmers in lowland areas grow irrigated palay. The

Subject	Description
	<p>household survey respondents who produce palay, both rain-fed and irrigated, harvest one to two crops per year.</p> <ul style="list-style-type: none"> Besides corn and palay, some farmers produce other crops, including coconut, banana, cassava, vegetables, and fruits. About 20% of farmers practice intercropping. Popular crop combinations are corn-banana, corn-vegetables, and corn-coconut.
Constraints	<ul style="list-style-type: none"> Pest infestation, including rats, insects, and monkeys is a major problem for those who cannot afford insecticides.

The majority of harvested crops are delivered to markets in the Shariff Aguak municipality. Some of the crops are transported to markets in the municipalities of Datu Hofer, Datu Unsay, Ampatuan and South Upi of Maguinadanao province and Esperanza of Sultan Kudarat province. Various modes of transportation are used, such as horse, carabao, motorcycle, multi-cab, or truck in marketing harvested crops. Poor road conditions or lack of roads are a big burden for farmers, especially with regard to product transport and delivery.

Table 13.3.5-4 Characteristics of Marketing of Farm Products

Subject	Description
Types of crops	<ul style="list-style-type: none"> Corn is the major cash crop, from where most people in the barangays derive their agricultural income. 188 out of the 223 household survey respondents sell either yellow or white corn, or both. Other cash crops include palay, banana, coconuts, cassava, coffee, vegetables, fruits, and peanuts.
Market location	<ul style="list-style-type: none"> The majority of harvested crops are delivered to markets in the Shariff Aguak municipality, while some farmers send products to markets in other neighboring municipalities such as Datu Hoffer, Datu Unsay, Ampatuan, and South Upi of Maguinadanao province and Esperanza of Sultan Kudarat province. Among the 185 household survey respondents who market corn, the distance from farm to market ranges from 1 km to 65 km, with an average of 16.68 km. More than 80% send their corn to markets in Shariff Aguak, while others market their corn to Datu Hoffer, Datu Unsay, Ampatuan, South Upi, and Esperanza. Those who send their products to the markets in Esperanza tend to transport them over longer distances.
Transportation arrangements	<ul style="list-style-type: none"> Most farmers take the harvested crops directly to the markets, bearing all the costs incurred in transporting the product. In some cases, if the farmers have large volumes of product, traders may come to the barangays to collect them.
Means of transportation	<ul style="list-style-type: none"> Various modes of transportation are used, such as horse, carabao, motorcycle, multi-cab, and truck in transporting harvested crops from farm areas to markets in Shariff Aguak and other municipalities. Because of rough roads, mechanized vehicles cannot enter some barangays, fearing that the rough terrain would damage the vehicles. In those areas, horse is a common means of transportation. Otherwise, people would have to carry their harvests manually over long distances.
Constraints	<ul style="list-style-type: none"> Poor road conditions and high transportation costs are the major constraints that diminish farmers' profits from the crops.

Subject	Description
	<ul style="list-style-type: none"> Product delivery delays, particularly when weather conditions are bad and unstable, cause crop spoilage and damage. Transporting harvested crops along rough roads also causes spillage.

The following shows the flow of peanuts from farm areas in Barangay Taib of the Datu Hoffer municipality to the market in the Shariff Aguak municipality. The majority of the farmers along the alignment of Sub-Project 5 send their products to Shariff Aguak.

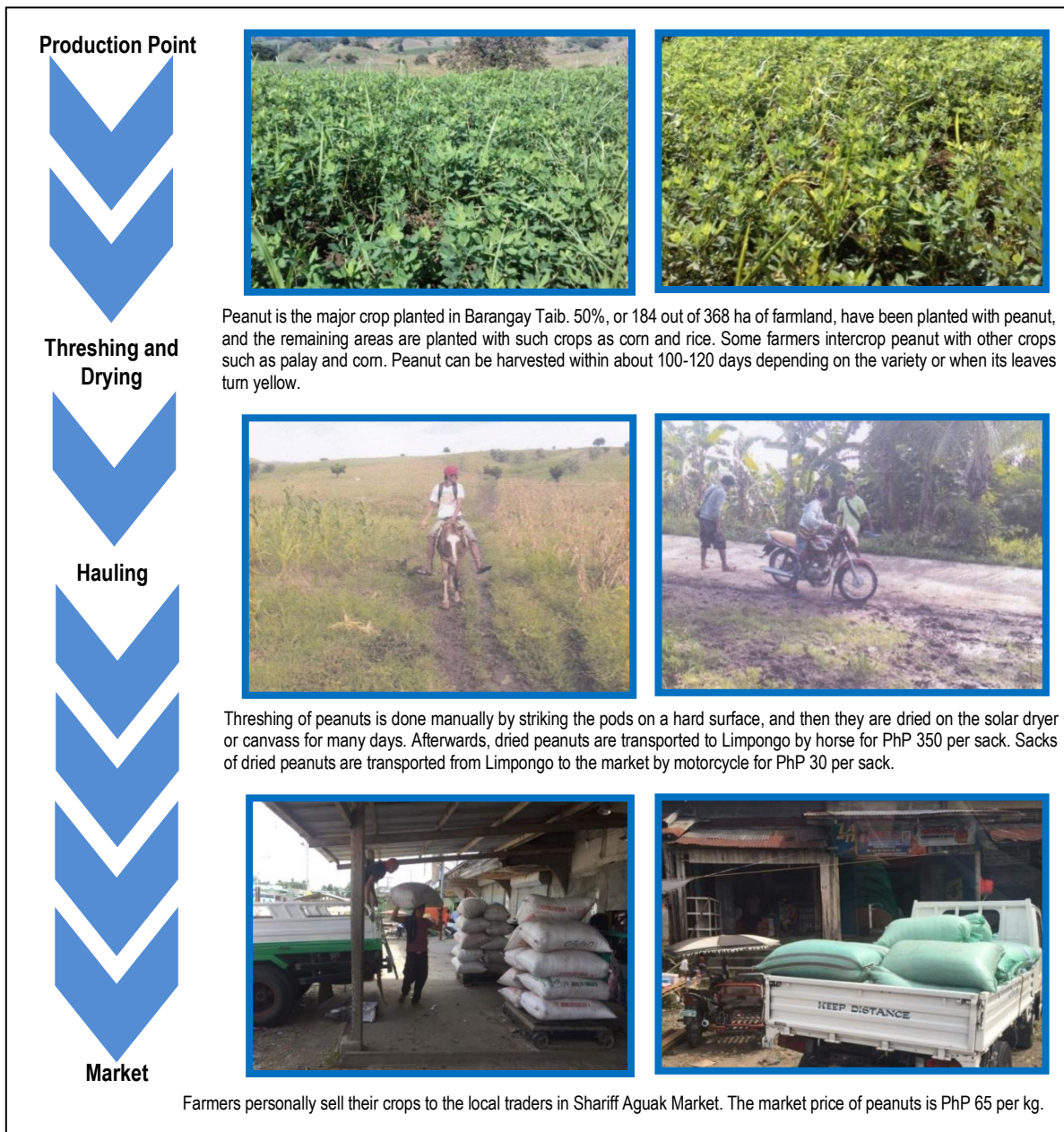


Figure 13.3.5-1 Commodity Flow of Barangay Taib of Datu Hoffer Municipality

(4) Expected Impacts of Road Construction

The greatest positive impact of the road construction, as perceived by the survey participants, is its benefit to agriculture. With the road construction, transporting harvested crops to the market would be faster and easier, and spoilage and spillage would decrease. Good roads would encourage transport services to open routes to the area to increase access and transportation options for farmers in the area. Faster and easier travel, and competition among transport services, would lead to reduced transportation costs. These would all increase the profit margin for farmers, which would encourage farmers to become more active in farming.

Table 13.3.5-5 Expected Impacts on Agriculture

Subject	Description
Transportation cost	<ul style="list-style-type: none"> With improved roads, transporting harvested crops to the market would be faster and easier, which would lead to reduced transportation costs. Spillage during transport would be lessened and spoilage due to travel delays would decline.
Access to transport services and markets	<ul style="list-style-type: none"> Delays in product delivery would also be prevented. Farmers could transport their crops even if it were raining. Good roads would encourage transport service providers to enter the area, which would give farmers more options. Competition among service providers would also lower transportation costs.
Farmers' profits	<ul style="list-style-type: none"> Reduced transportation costs, better access to transportation services, reduced loss of products from spoilage and spillage, and more market choices would increase the profit margin for farmers.
Farm production	<ul style="list-style-type: none"> When greater farm income is realized, farmers tend to increase cultivation by using potential farmlands that were previously left idle. Among the 199 household survey respondents, 63.8% indicated future plans to increase cultivation areas if the road were constructed. Corn is the most favored crop, followed by coconut, banana, coffee, rubber, palay, and others, such as cassava, peanuts, oil palm, fruits and vegetables. Corn can be both consumed by a family and sold for additional income. In addition, corn is easy to grow and market. On the other hand, some survey respondents expressed difficulty in expanding cultivation areas because of financial constraints and limited farm areas.

Better access to basic social services is seen as being another positive impact of road construction. The road construction would improve the mobility of local people in general. It would encourage children to attend school because travel to and from school would be easier. It would enable patients and pregnant women to be transported to medical facilities. Women's travel to and from markets would also be easier. In general, survey participants see better roads as resulting in better lives.

Table 13.3.5-6 Expected Social Impacts

Subject	Description
General accessibility	<ul style="list-style-type: none"> With good roads, transportation and travel for various purposes would be easier for the people in the area. Road accidents caused by muddy and slippery roads would decrease.

Subject	Description
Access to schools	<ul style="list-style-type: none"> • Children could take transportation instead of facing a long walk at dawn on muddy or dusty roads. Children would be encouraged to attend school. • Some children stay with relatives in Limpongo of the Datu Hoffer municipality, in order to commute to school. The road construction would bring those children back to live with their families.
Health	<ul style="list-style-type: none"> • Access to health services and medical care would be easier. Pregnant women, delivering mothers, and sick people in the area could be transported to the nearest medical care center more easily. Road construction would increase people's mobility, especially in cases of medical emergency.
Women's work	<ul style="list-style-type: none"> • Women would not have to walk five or six hours to markets to sell their farm products and buy daily necessities. • Women could open variety stores (Sari-sari stores) or vend along the road to sell vegetables, fruits, and food products.
Negative impacts	<ul style="list-style-type: none"> • There would be the possibility of road accidents involving children, and vehicular accidents due to speeding. • The road construction might open up communities to the possible entry of lawless elements such as criminals and terrorists.

13.4 Sub-Project 6

13.4.1 Outline of the Project

Location	The road is located in the Municipalities of Datu Blah Sinsuat and Lebak
Major Road to connect	Connecting AH-26 via the Tamontaka – Kusiong - Tampilan Road to Awang-Upi Lebak Road
Road Description	<ul style="list-style-type: none"> Length: 62.6 km Lane and lane width: 2-lane (total); 3.35 m per lane Shoulder width: 2.5 m Classification: National Secondary Road
Population	<ul style="list-style-type: none"> 15 barangays along the alignment (31,231) 2 municipalities: Datu Blah Sinsuat (25,024) + Lebak (88,868) = 113,892
Agricultural land use (ha) of the 2 municipalities	<ul style="list-style-type: none"> Annual Crop=22,143 ha Perennial crop=18,780 ha TOTAL=40,923 ha
Current main agricultural crops planted by farmers (2015 data)	<ul style="list-style-type: none"> Banana (22,350 ha) Coconut (18,436) Palay (7,077 ha) Corn (3,807 ha) Oil Palm (1,784 ha)



13.4.2 Objectives of the Project

The objectives of the Tapan-Lebak Coastal road are as follows:

- To strengthen the ARMM's road network by addressing one of the missing critical sections of the network.
- To provide reliable access road to a wide agricultural land (67,918 ha, total for annual crop and perennial crop)
- To promote the area as local tourism spot by providing access to the beautiful beaches of Datu Blah Sinsuat.
- To provide the coastal communities which currently travelled by motor boats due to lack of road with reliable access road to urban center.
- To support small fishermen by providing better access to markets by construction of high capacity road.
- To provide better access to the areas with high poverty incidence (62.97%) to help them access social services.
- To support the IP communities' access to basic social services and sell their products to urban centers with minimal transportation cost.

13.4.3 Socio-economic Condition of the Project Area

(1) Population and Growth Rate

Maguindanao province, in which Sub-Project 6 is located, has a total population of 1,173,993 and a population density of 118 persons/km² as of August 2015. The population density of Maguindanao is slightly higher than that of ARMM, but lower than that of all other regions in Mindanao. The southern end of the alignment of Sub-Project 6 is in the Sultan Kudarat province of the SOCCSKSARGEN region. Sultan Kudarat has a total population of 812,095 and a population density of 151 persons/km², which is higher than that of Maguindanao and lower than the average of SOCCSKSARGEN.

Table 13.4.3-1 Population and Population Density of Provinces in ARMM and Mindanao

	Population	Land area (km ²)	Population density (persons/km ²)
Maguindanao	1,173,933	9,968	118
Sultan Kudarat	812,095	5,364	151
Mindanao	24,135,775	138,354	174
Region IX – Zamboanga Peninsula	3,629,783	16,904	215
Region X – Northern Mindanao	4,689,302	20,459	229
Region XI – Davao	4,893,318	20,433	239
Region XII – SOCCSKSARGEN	4,545,276	22,786	199
Region XIII - Caraga	2,596,709	21,121	123
ARMM	3,781,387	36,651	103
Philippines	100,981,437	300,000	337

Source: 2015 Census of Population and Housing, Philippine Statistics Authority

Maguindanao province has experienced rapid population growth in recent years. Its annual average growth rate between 2010 and 2015 is 4.22%, which is outstandingly high compared with 2.18% for Lanao del Sur, 2.89% for ARMM, and 1.79% for Mindanao. However, the annual average growth rate for the same period in Sultan Kudarat province is 1.60%, which is lower than the average of the SOCCSKSARGEN region.

Table 13.4.3-2 Population Growth of Provinces in ARMM and Mindanao

	Annual Average Growth Rate of influenced municipalities		
	2000-2010	2010-2015	2000-2015
Maguindanao	1.66%	4.22%	2.54%
Sultan Kuradat	2.45%	1.60%	2.16%
Mindanao	1.89%	1.79%	1.86%
Region IX – Zamboanga Peninsula	1.87%	1.21%	1.64%
Region X – Northern Mindanao	2.06%	1.68%	1.92%
Region XI – Davao	1.97%	1.74%	1.89%
Region XII – SOCCSKSARGEN	2.46%	1.94%	2.28%
Region XIII - Caraga	1.49%	1.28%	1.42%
ARMM	1.51%	2.89%	1.98%
Philippines	1.90%	1.72%	1.84%

Note: Annual average growth rate of Mindanao is simple average of annual average growth rate of 6 regions in each period.

Source: 2016 Philippine Statistics Yearbook, Philippine Statistics Authority

Datu Blah of Maguindanao province and Lebak of Sultan Kudarat province are the municipalities that will be affected by Sub-Project 6. The two municipalities have a total population of 113,892 and an average population density of 184 persons/km². Their average population density is well above that of Maguindanao province (118 persons/km²) and Sultan Kudarat province (151 persons/km²). Although the two municipalities have similar population densities, Lebak has by far the largest population: 88,868 compared with 25,024 in Datu Blah.

Table 13.4.3-3 Population and Population Density of Municipalities Affected by Sub-Project 6

Province	Municipality	Population	Land area (km ²)	Population density (persons/km ²)
Maguindanao	Datu Blah	25,024	147.21	170
Sultan Kudarat	Lebak	88,868	470.86	189
Total		113,892	618.07	184

Source: 2015 Census of Population and Housing, Philippine Statistics Authority

With regard to population growth, the two municipalities show contrasting trends. From 2010 to 2015, Datu Blah experienced high population growth with an annual average growth rate of 8.64%. The annual average growth rate in Lebak was 1.31% for the same period, which is below the average of Sultan Kudarat province (1.60%). Datu Blah, formerly a part of the town of Upi, was created in 2006.

Table 13.4.3-4 Population Growth of Municipalities Affected by Sub-Project 6

Province	Municipality	Annual Average Growth Rate		
		2000-2010	2010-2015	2000-2015
Maguindanao	Datu Blah	n/a	8.64%	n/a
Sultan Kudarat	Lebak	1.62%	1.31%	1.52%
Average			2.67%	

Source: Various Statistics Report, Philippine Statistics Authority

The alignment of Sub-Project 6 passes through 15 barangays in the two municipalities. The total population of the 15 barangays is 31,231. The barangays have relatively homogeneous population sizes. The largest population is 3,801 in Taguisa in Lebak municipality, while the smallest population is 1,124 in Tambak in Datu Blah municipality.

Table 13.4.3-5 Population of Barangays along the Alignment of Sub-Project 6

Province	Municipality	Barangay		Population
Maguindanao	Datu Blah	1	Pensaran	3,048
		2	Tubuan	2,806
		3	Nalkan	2,139
		4	Tambak	1,124
		5	Kinimi	2,121
		6	Resa	2,007
		7	Lapaken	1,148
		8	Sedem	1,226
		9	Meti	1,703
		10	Sinipak	1,382
		11	Laguitan	1,569
Sultan Kudarat	Lebak	12	Tran	2,242
		13	Kalamongog	3,244
		14	Datu Karon	1,671
		15	Taguisa	3,801
Total				31,231

Source: 2015 Census of Population and Housing, Philippine Statistics Authority

(2) Income and Expenditure

According to the Family Income and Expenditure Survey 2012 of the Philippine Statistics Authority, income and expenditure estimates for Maguindanao province are PhP 108,170 and PhP 106,330 respectively. The income and expenditure estimates for Sultan Kudarat province are PhP 126,806 and PhP 99,139 respectively. These estimates are lower than those of ARMM (PhP 129,350 for income and PhP 112,342 for expenditure) and SOCCSKSARGEN (PhP 165,214 for income and PhP 137,923 for expenditure).

Table 13.4.3-6 Average Income and Expenditure Estimates in 2012 for Regions and Provinces

	Average income estimates (PhP)	Average expenditure estimates (PhP)
Maguindanao	108,170	106,330
Sultan Kudarat	126,806	99,139
Mindanao		
Region IX – Zamboanga Peninsula	161,451	116,224
Region X – Northern Mindanao	189,158	137,298
Region XI – Davao	196,023	152,622
Region XII – SOCCSKSARGEN	165,214	137,923
Region XIII - Caraga	181,016	138,789
ARMM	129,350	112,342
Philippines	234,129	185,252

Source: Family Income and Expenditure Survey 2012, Philippine Statistics Authority

(3) Poverty Incidence

Poverty incidence for Maguindanao is 54.6% in 2006. The figure falls to 52.2% in 2009, rises to 63.7% in 2012, and declines again to 57.2% in 2015. This poverty incidence has always been higher than that in ARMM and any other regions of Mindanao. More than half of the population of Maguindanao province has been in poverty throughout the period. However, poverty incidence in Sultan Kudarat is slightly lower than that of Maguindanao and has slowly declined over the years. It is 52.0% in 2006,

51.5% in 2009, 48.5% in 2012, and 48.0% in 2015. Nonetheless, poverty incidence in Sultan Kuradat has been much higher than the average of SOCCSKSARGEN.

Table 13.4.3-7 Poverty Incidence of Provinces in ARMM and Mindanao

	Annual Per Capita Poverty Threshold (PhP)				Poverty incidence among population Estimate (%)			
	2006	2009	2012	2015	2006	2009	2012	2015
Maguindanao	12,877	16,701	18,873	21,423	54.6	52.2	63.7	57.2
Sultan Kudarat	13,766	16,965	17,597	20,620	52.0	51.5	48.5	48.0
Mindanao								
Region IX – Zamboanga Peninsula	12,743	16,260	18,054	20,925	45.0	45.8	40.1	33.9
Region X – Northern Mindanao	12,917	16,878	19,335	22,345	39.0	40.1	39.5	36.6
Region XI – Davao	13,389	17,120	19,967	22,754	30.6	31.4	30.7	22.0
Region XII – SOCCSKSARGEN	13,319	16,405	18,737	21,025	37.9	38.3	44.7	37.3
Region XIII - Caraga	14,324	18,309	19,629	22,570	49.2	54.4	40.3	39.1
ARMM	12,647	16,683	20,517	21,563	47.1	47.4	55.8	53.7
Philippines	13,357	16,871	18,935	21,753	21.0	20.5	19.7	16.5

Source: Official Poverty Statistics of the Philippines Full Year 2015, Philippine Statistics Authority

Data for poverty incidence at municipality level are derived from the National Color-Coded Agricultural Guide Map of the Department of Agriculture, which contains a municipal poverty database created in 2010. Poverty incidence in Datu Blah is 66.8%, which is higher than the poverty incidence of Maguindanao province, ARMM, and other regions of Mindanao. Information about poverty incidence in Lebak is not available.

Table 13.4.3-8 Poverty incidence of Municipalities Affected by Sub-Project 6

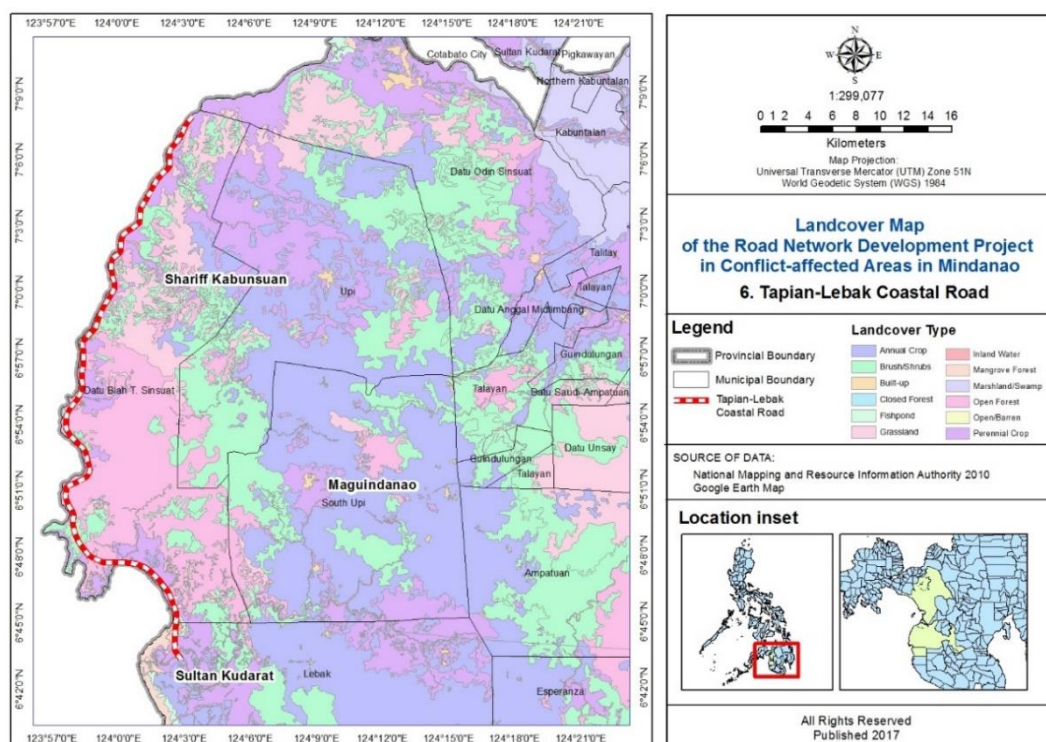
Province	Municipality	Poverty
Maguindanao	Datu Blah	66.80
Sultan Kudarat	Lebak	n/a
Average		

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

13.4.4 Agricultural Production and Potentials of the Area

(1) Agricultural Land Use and Land Holdings

The land cover map, which was developed based on the National Mapping and Resource Information Authority's 2010 Google Earth Map, shows the land cover of the municipalities affected by Sub-Project 6. The alignment of Sub-Project 6 passes along the coastal line in Datu Blah from the north to the south. The land cover of the northern half of Datu Blah is a mixture of perennial crops, annual crops, grassland, and brush/shrubs. The southern half is covered by open forest with some areas of perennial crops and brush/shrubs. Lebak, however, has more areas covered by annual crops and perennial crops.



Source: National Mapping and Resource Information Authority 2010 Google Earth Map

Figure 13.4.4-1 Landcover Map of Municipalities Affected by Sub-Project 6

Datu Blah has land areas of 1,771ha covered by annual crops and 6,792ha covered by perennial crops. Sultan Kudarat has 20,373ha of annual crops and 11,988ha of perennial crops. The areas under annual and perennial crops in Sultan Kudarat are nearly four times larger than those in Datu Blah.

Table 13.4.4-1 Agricultural Land Use of Municipalities Affected by Sub-Project 6

(Unit: ha)				
Province	Municipality	Annual crop	Perennial crop	Total
Maguindanao	Datu Blah	1,771	6,792	8,562
Sultan Kdarat	Lebak	20,373	11,988	32,361
Total		22,143	18,780	40,923

Source: National Mapping and Resource Information Authority 2010 Google Earth Map

Among farmers, fisherfolk, and laborers, the most popular employment category in the two municipalities is “farmers.” Over 11,000 people make their living from farming. The second most popular category is “farmers, fisherfolk, laborers.” Over 3,000 people make their living from a combination of farming, fishing, and laboring. There are 2,845 full-time fisherfolk and 2,412 people who make their living from both farming and fishing. If the numbers of “laborers,” “farmers, fisherfolk” and “farmers, fisherfolk, laborers” for Sultan Kuradat were available, the total figures of these categories may be larger.

With regard to in Datu Blah, “owners, tenants” is the most popular category. The number of farmers who cultivate their own land and leased land is 10,536. There are 5,415 “owners” who cultivate only their own land, while 5,121 farmers cultivate only leased land. Information about land holdings in Lebak is not available.

Table 13.4.4-2 Farmers and Holding of Municipalities Affected by Sub-Project 6

(Unit: ha)

Province	Municipality	Farmers	Fisherfolks	Laborers	Farmers, Fisherfolks	Farmers, Fisherfolks, Laborers	Owners	Owners, Tenants	Tenants
Maguindanao	Datu Blah	1,468	944	917	2,412	3,329	5,415	10,536	5,121
Sultan Kdarat	Lebak	10,117	1,901	n/a	n/a	n/a	n/a	n/a	n/a
Total		11,585	2,845	917	2,412	3,329	5,415	10,536	5,121

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

(2) Agricultural Production

The table below is a summary of the areas planted with crops in the two municipalities based on three sources. The Department of Agriculture of Maguindanao Province provided information about all the crops in Datu Blah. The Department of Agriculture of Lebak Municipality provided information about all the crops in Lebak. The Philippine Coconut Authority of ARMM provided information about coconuts and palm oil.

Table 13.4.4-3 Areas Planted by Crops inha in Municipalities Affected by Sub-Project 6

(Unit: ha)

Province	Municipality	Annual crop							
		Irrigated palay	Rainfed palay	Upland palay	White corn	Yellow corn	Corn	Cassava	Vegetables
Maguindanao	Datu Blah	200	160	200	251	492			
Sultan Kdarat	Lebak	2,595	1,077				7,700	24	240
Total		2,795	1,237	200	251	492	7,700	24	240
Province	Municipality	Perennial crop							
		Banana	Coconut	Mango	Rubber	Durian	Mangosteen	Lanzones	Rambutan
Maguindanao	Datu Blah		2,260						
Sultan Kdarat	Lebak	1,000	9,501	150	50	100	50	100	120
Total		1,000	11,761	150	50	100	50	100	120

Source: Department of Agriculture of Maguindanao Province, Department of Agriculture of Lebak Municipality, Philippine Coconut Authority ARMM for coconut and oil palm

Both Datu Blah and Lebak have large areas of coconuts. Lebak has areas of other perennial crops including bananas, mangoes, durian, lanzones, and rambutan. With regard to annual crops, Lebak has 7,700ha of corn, but whether the corn is white or yellow is unknown. Lebak also has 2,595ha of irrigated palay and 1,237ha of rain-fed palay that may include some upland palay. Datu Blah has areas planted with palay and corn; however, the areas are much smaller compared with those of Lebak.

(3) Suitable and Potential Areas for Crop Production

The National Color-Coded Agricultural Guide Map provides information about suitable areas for crop production in Datu Blah and Lebak. Bananas have the largest suitable area of 22,350ha within the two municipalities. Lebak, in particular, has 19,513ha suitable for bananas. The second-largest suitable area is 18,436ha in total for coconuts.

Coconuts have suitable areas in all 15 barangays along the alignment of Sub-Project 6. The total suitable area is 8,741ha. Of the 15 barangays, 13 have areas suitable for bananas. The total suitable

area is 3,513ha. Tubuan has 1,177ha, or one-third of the total suitable area for bananas. Palay has some suitable areas in many of the barangays. The total suitable area is 2,660ha. Palm oil has suitable areas only in the barangays of Datu Blah. The total area is 1,766ha.

Table 13.4.4-4 Suitable Areas in Hectare for Crop Production in Municipalities Affected by Sub-Project 6

(Unit: ha)

Province	Municipality	Palay	Corn	Banana	Coconut	Coffee	Oil palm
Maguindanao	Datu Blah	2,321	126	2,836	7,706		1,784
Sultan Kdarat	Lebak	4,756	3,681	19,513	10,730	n/a	n/a
Total		7,077	3,807	22,350	18,436	0	1,784

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

Table 13.4.4-5 Suitable Areas in Hectare for Crop Production in Barangays along the Alignment of Sub-Project 6

(Unit: ha)

Province	Municipality	Barangay		Palay	Corn	Banana	Coconut	Coffee	Oil palm
Maguindanao	Datu Blah	1	Pensaran			29	673		
		2	Tubuan	470		1,177	1,754		359
		3	Nalkan	350	97	632	1,087		597
		4	Tambak			567	145		20
		5	Kinimi			22	280		
		6	Resa	88			205		
		7	Lapaken	24		12	829		5
		8	Sedem	464		14	590		348
		9	Meti	298	25	118	226		411
		10	Sinipak	41	3	264	775		26
		11	Laguitan				1,002		
Sultan Kudarat	Lebak	12	Tran	456	351	352	448		
		13	Kalamongog	0	0	0	297		
		14	Datu Karon	13	4	4	108		
		15	Taguisa	458	322	322	322		
Total				2,660	802	3,513	8,741	0	1,766

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

The Department of Agriculture of Maguindanao Province has identified potential areas for expanding crop cultivation in Datu Blah. All these areas are allocated to irrigated palay, corn, and upland palay.

Table 13.4.4-6 Potential Areas in Hectare for Crop Production in Municipalities Affected by Sub-Project 6

(Unit: ha)

Province	Municipality	Irrigated palay	Rainfed palay	Upland palay	All palay	Corn	High value crops	Total
Maguindanao	Datu Blah	305		245	550	295		845

Source: Department of Agriculture of Maguindanao Province

13.4.5 Result of the Social Survey

(1) Overview of the Survey

Three surveys were undertaken to gain a better understanding of the socio-economic conditions of the communities in barangays along the alignment of Sub-Project 6. The survey results are summarized below to present coherent information on the communities along the road alignment, highlighting their current socio-economic condition, farming practices, and perception on the impacts of the road project.

Table 13.4.5-1 Surveys Carried Out

Survey type	Number of observations	Description
(iv) Household interview survey	20–24 households x 15 barangays = 314 households	A two-page questionnaire is used for the interview to collect basic information on living conditions such as family income and expenditure, sources of livelihood, and farming practices.
(v) Focus group discussion	3 groups x 15 barangays	Participants are divided into three groups: youth, women, and household heads. A one-page guide is used to facilitate discussions on current road conditions and the expected impacts of road construction.
(vi) Barangay captain interview	15 barangay captains	A one-page questionnaire is used to collect information on agricultural production, marketing, and related activities.

(2) Socio-economic Condition of the Communities along the Road Alignment

The socio-economic characteristics of the communities along the alignment of Sub-Project 6 are summarized based on the household survey.

Table 13.4.5-2 Characteristics of Household Survey Respondents

Variable	Description
Age and Sex	<ul style="list-style-type: none"> The respondents' ages range from 17 to 78, with a mean age of 42.0 years. 51.6% of the respondents are male, and 48.4% female.
Years of residency	<ul style="list-style-type: none"> The average number of years of residency is 35.7. 74.2% of the respondents have lived in the area since birth.
Number of family members	<ul style="list-style-type: none"> Family size is large. Among the respondents, the most frequent answer is 4 to 6 people (47.1%), followed by 7 to 9 people (27.7%).
Ethnicity	<ul style="list-style-type: none"> The largest ethnic group is Maguindanao (55.7%), followed by Indigenous People (31.2%), Ilonggo (5.4%), Iranun (3.5%), and others (1.6%). In Indigenous People, Teduray has the largest number, and other ethnic groups include B'laan and Lamgangian. For others, Tausug has the largest number, and there are a few Antiqueño and Julohano.
Religion	<ul style="list-style-type: none"> Islam is the majority religion (62.9%), followed by Catholicism (24.6%), and others (12.5%).
Educational attainment	<ul style="list-style-type: none"> 63.8% of the respondents have finished elementary-level education, and 25.3% have reached the high school level.
Source of drinking water	<ul style="list-style-type: none"> The major sources of drinking water are spring/river/rain (65.9%), communal or hand pump wells (18.3%), and open dug wells (10.9%).
Household income	<ul style="list-style-type: none"> 83.2% of the households have monthly incomes of less than PhP 6,000. As the annual per capita poverty threshold of Maguindanao province was PhP 21,423, and the food threshold was PhP 14,982 in 2015, the monthly household income of below PhP 6,000 is very low.

Variable	Description
	<ul style="list-style-type: none"> Respondents work as farmers (44.1%), fishermen (23.3%) and others (24.9%). Others include food vendors, sari-sari store owners, nipa weavers, and housewives.

(3) Agricultural Practices of the Communities

Barangays along the alignment of Sub-Project 6 are, for the most part, agricultural communities. Farming and fishing are the major sources of income. Apart from farming and fishing, some residents engage in other farm-related activities such as providing labor services to other farmers, and coco sugar and vinegar manufacturing. Moreover, some people earn income from off-farm activities such as operating sari-sari stores and vending food.

Table 13.4.5-3 Characteristics of Farm and Fisheries Production

Subject	Description
Farmland size	<ul style="list-style-type: none"> The total land under cultivation in 15 barangays along the alignment of Sub-Project 6 is 11,658.4 ha. Among the 164 household survey respondents who cultivate crops, the size of cultivated land ranges from 0.25 to 12 ha, with a mean of 2.2 ha. About half of the respondents cultivate 1 ha or less. 33 household survey respondents answered that they have some farmlands that are not cultivated. The main reason for not cultivating those farmlands is financial constraints. They lack funds for the inputs necessary to grow crops.
Farmland tenure	<ul style="list-style-type: none"> Among the 268 household survey respondents, 34.3% farm their own land, 26.1% farm leased land, and 2.2% are tenant farmers. The other 37.3% of the respondents have other arrangements. Most of them appear to be either fishermen or making their living in other occupations. Among the 91 respondents who farm their own land, 50.5% have Torrens title, 22.0% have inherited the land, 24.2% have a verbal agreement, and 3.3% have other arrangements.
Types of crops	<ul style="list-style-type: none"> Corn is the most produced crop in the area. More yellow corn is grown than white corn. Both yellow and white corn is harvested from 2 to 3 crops a year. The other major crops include palay, coconut, and banana. Irrigated palay are more widespread than rain-fed palay. They harvest 2 to 3 crops a year for irrigated palay, and 1 to 2 crops for rain-fed palay. Among household survey respondents who cultivate crops, about a half practice intercropping. Combinations of crops include corn, coconut, banana, vegetables, coffee, and others.
Constraints of farming	<ul style="list-style-type: none"> Major problems include the lack of financial capital to buy adequate farm materials and equipment, lack of farm-to-market roads to transport their farm products, floods and droughts, and pests damaging crops. The lack of a farm-to-market road makes the marketing of products expensive. Some farmers have no other option but to sell their crops to local traders in the barangay who might only offer very low buying prices compared to those of the buying stations in Lebak or Cotabato City.

Subject	Description
Fishing	<ul style="list-style-type: none"> Fishing in the area is typically small-scale. The majority of fishermen use small pump boats and depend primarily on the supply of fish around artificial fish sanctuaries. They typically catch tuna, tulingan, matambaka, squid, bolinao, and sari-sari.
Constraints of fishing	<ul style="list-style-type: none"> The majority lack the funds to own a pump boat or buy enough fishing nets for their fishing activities. Fishermen cannot use any refrigeration facilities due to a lack of electricity in their area.

The majority of harvested crops are delivered to markets in Lebak of the Sultan Kudarat municipality and Cotabato City. Because the barangays are mainly located in the coastal section of the province, their agricultural inputs and products are mainly transported by sea using pump boats and barges. Transporting them by land might have been a better alternative, but the poor condition of the roads for most of the barangays discourages the farmers from doing so.

Table 13.4.5-4 Characteristics of Marketing of Farm and Fisheries Products

Subject	Description
Types of products	<ul style="list-style-type: none"> Corn, coconut, and palay are the major cash crops from which people in the barangays derive their agricultural income. Among the 314 household survey respondents, 101 farmers earn income from corn, 63 from coconut, 42 from palay, and 87 from fish.
Market location	<ul style="list-style-type: none"> Farm and fish products are mainly sold to markets in Lebak and Cotabato City. Some farm and fish products are also marketed to neighboring barangays.
Transportation arrangements	<ul style="list-style-type: none"> Farmers or fishermen deliver their products to trading centers outside the barangay. Traders collect the products at the trading centers and transport them to wholesalers in the markets of Lebak or Cotabato City. Some farmers or fishermen transport and market their products to Lebak or Cotabato City by themselves.
Modes of transportation	<ul style="list-style-type: none"> Because of poor road conditions, the products are mostly transported via pump boats and reloaded to a truck or another vehicle. Some farmers need to pay for hired labor or use a horse/cattle-drawn carriage to move their farm products within their barangay.
Constraints	<ul style="list-style-type: none"> Poor road conditions and high transportation costs are the major constraints that diminish farmers' and fishermen's profits. Products cannot be delivered to Lebak or Cotabato if the weather is not good.

The following shows the flow of fish from Barangay Resa of Datu Blah Sinsut Municipality to Tapan or Tamontaka of Cotabato City. The other barangays along the alignment of Sub-Project 6 that are engaged in fishing have similar flows of fish to markets in either Cotabato City or Lebak.

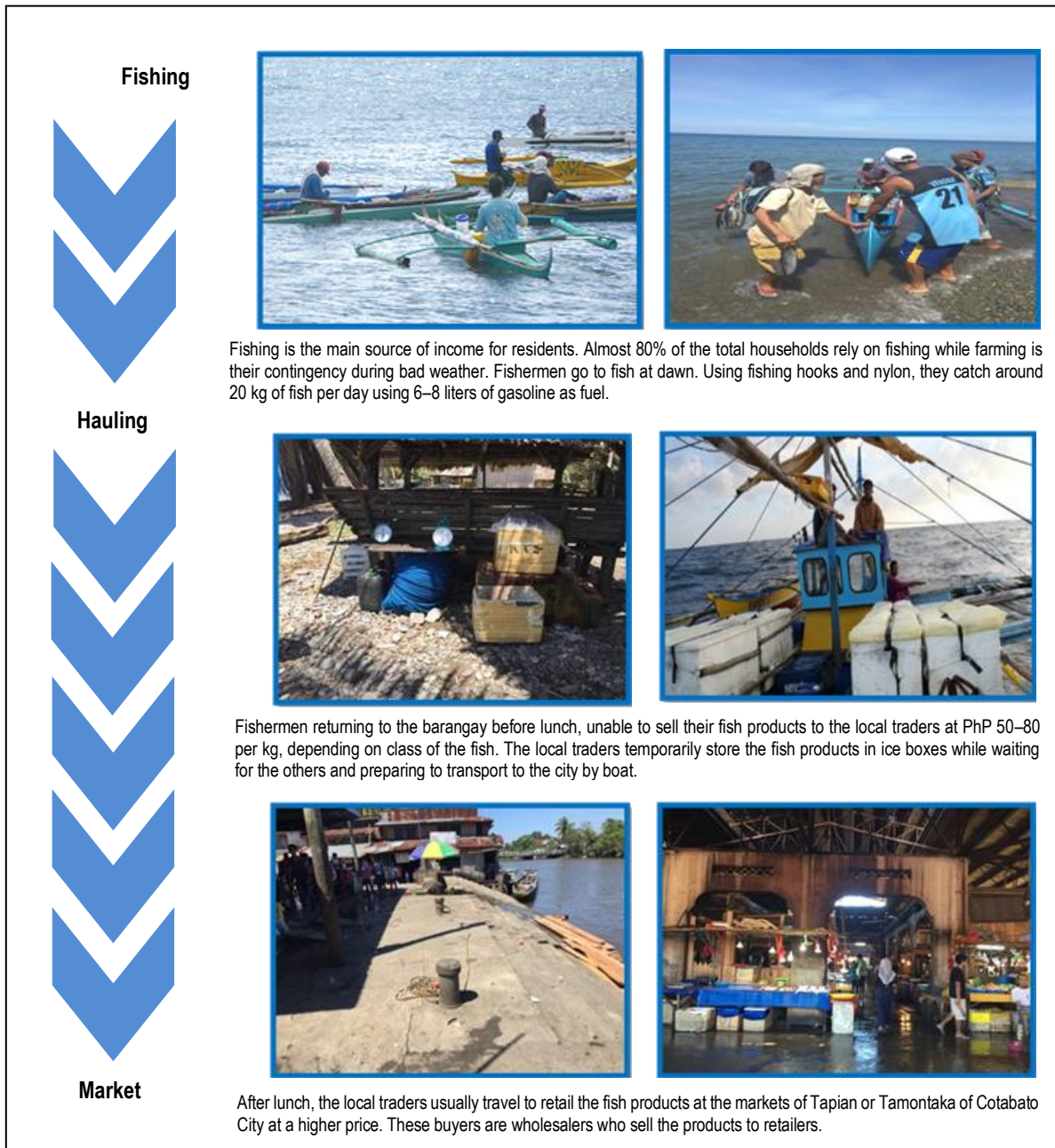


Figure 13.4.5-1 Commodity Flow of Barangay Resa of Datu Blah Sinsut Municipality

(4) Expected Impacts of Road Construction

The greatest positive impact of the road construction, as perceived by the survey participants, is its benefit to agriculture and fisheries. With the road construction, transporting farm and fishery products to the market would be faster and easier. Farmers and fishermen could transport their products by road instead of by sea with pump boats, which would reduce transportation costs and improve access to markets. All this would increase the profit margin for the farmers and fishermen, which would encourage farmers and fishermen to become more active and engaged in the production and marketing of their products.

Table 13.4.5-5 Expected Impacts on Agriculture

Subject	Description
Quality of transportation services	<ul style="list-style-type: none"> Transporting products by road would be a good alternative to travelling by sea. Products could be delivered to the market immediately, and fresh farm and fish products could be delivered. People would not have to take the risk of transporting products by boat, especially when there is a typhoon.
Transportation cost	<ul style="list-style-type: none"> With improved roads, transporting crops and fish to the market would be faster and easier, which would lead to reduced transportation costs.
Access to transport services and markets	<ul style="list-style-type: none"> Farm and fishery products would not have to be transported via pump boats and reloaded to a truck or another vehicle. Farmers and fishermen could sell their products directly to their end markets such as Lebak and Cotabato City. More bulk buyers would be encouraged to come to the barangays to buy farm and fishery products.
Farmers' and fishermen's profits	<ul style="list-style-type: none"> Higher profits from farming and fishing are anticipated because of lower transportation costs. Savings from increased profits could be put toward production expenses such as hiring laborers in farming and renting a harvester machine.
Farm production	<ul style="list-style-type: none"> The majority of household survey respondents who are engaged in farming indicated future plans to increase cultivation areas if the road were constructed. Corn is the most popular crop, followed by coconut and palay. Other crops include banana, coffee, peanut, mung bean, and vegetables. The focus group discussion participants shared their view that the road construction would encourage fishermen to increase their catch.

The survey participants expect benefits of road construction in various areas including (1) economic opportunities, (2) education, (3) health and healthcare services, (4) better living conditions, and (5) security and public safety.

Table 13.4.5-6 Expected Social Impacts

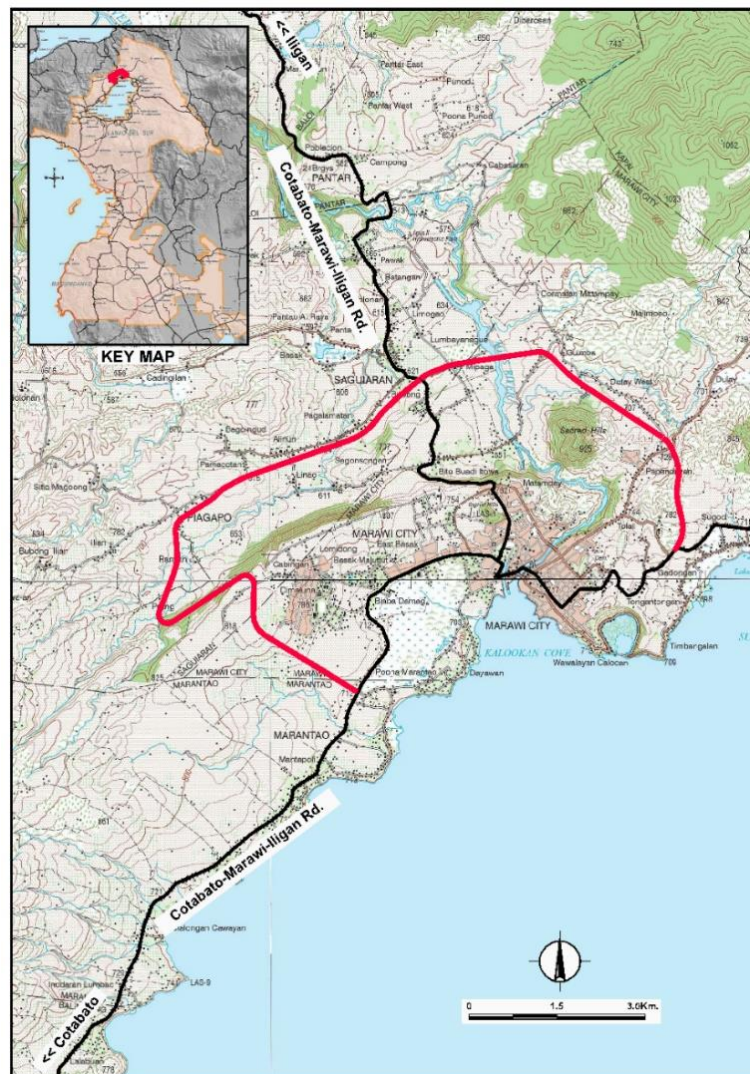
Subject	Description
Economic Opportunities	<ul style="list-style-type: none"> Survey participants perceived the road construction as a way of creating more business and employment and providing them with better livelihood opportunities and income. More investors would come into the area and create more employment opportunities for local people. The area has beautiful beaches; road construction would pave the way for the development of beach resorts. The residents could start businesses along the road such as selling food and other products. Women could be engaged in other livelihood activities such as growing vegetables and running sari-sari stores.
Education	<ul style="list-style-type: none"> Most students walk to school along muddy and slippery roads. In some barangays, roads are easily flooded or the only means of transport is pump boats, which prevent students from going to school during bad weather. The road construction would allow children to commute to school much more quickly and more easily.

Subject	Description
	<ul style="list-style-type: none"> Students could commute to college and work on a farm at the same time.
Health and healthcare services	<ul style="list-style-type: none"> The road construction would enhance access to health and healthcare services. With better road conditions, the barangays could easily transport patients to hospitals, especially during emergencies. They would be able to use better alternative means of transportation, instead of crossing the sea. Patients and pregnant women could be brought to hospitals safely even at times of bad weather. The residents could travel to Lebak or Cotabato City for regular medical check-ups.
Better living condition	<ul style="list-style-type: none"> Road construction in the area would allow the residents to easily and conveniently travel to other barangays and larger towns such as Lebak and Cotabato City. More modes of transportation would be available for people, besides walking. Residents would no longer have difficulty securing food from other barangays or from the city, even in bad weather conditions. At times of disasters, the barangays could receive immediate relief assistance from the government or from other concerned agencies. Nipa weavers would not need to bring their products to the market because buyers would come to the barangay to buy them.
Security and public safety	<ul style="list-style-type: none"> The new road would allow police authorities and the military to respond to any incidents immediately. Lawless elements in the area could be easily apprehended. The area would become peaceful and progressive.
Negative impacts	<ul style="list-style-type: none"> Household heads specifically fear that the road might cause easy entry for criminals and armed groups. Some of the survey participants are concerned about traffic accidents that the road could cause to people and property. Landslides could happen along mountainous or steep areas where the road traverses.

13.5 Sub-Project 7

13.5.1 Outline of the Project

Location	The road is located in the Municipalities of Marantao, Piagapo, Saguilaran, and City of Marawi.
Major Road to connect	<ul style="list-style-type: none"> Connecting Lake Lanao Circumferential Road to Marawi-Iligan Road (both roads to be linked are national)
Road Description	<ul style="list-style-type: none"> Length: 19.8km Lane and lane width: 2-lane (total); 3.35 m per lane Shoulder width: 2.5 m Classification: National Secondary Road
Population	<ul style="list-style-type: none"> 23 barangays along the alignment (21,704) 3 municipalities & 1 City: Marantao (32,974) +Piagapo (25,440) +Saguilaran (24,619) +Marawi City (201,785) = 284,818
Agricultural land use (ha) of the 3 municipalities and 1 City	<ul style="list-style-type: none"> Annual Crop=11,726 ha Perennial crop=203 ha TOTAL=11,956 ha
Current main agricultural crops planted by farmers (2015 data)	<ul style="list-style-type: none"> Banana (11,683 ha) Coffee (8,258 ha) Corn (2,302 ha) Palay (307 ha)



13.5.2 Objectives of the Project

The objectives of the Marawi City Ring Road are as follows:

- To firm up the formation of the city's road network by providing a trunk road which would expand capacity of the network that would result to improved flow of traffic.
- To improve traffic flow and urban amenities by separating through traffic from local traffic
- To improve access to social services by providing trunk road at the edge of the built-up area.
- To guide sound urbanization of Marawi City by providing trunk road at the edge of the city which would result to efficient utilization of urban space.
- To contribute to early recovery of Marawi City by providing temporary jobs during construction stage.

13.5.3 Socio-economic Condition of the Project Area

(1) Population and Growth Rate

Lanao del Sur province, in which Sub-Project 7 is located, has a population of 1,045,429 and a population density of 69 persons/km² as of August 2015. The population density of Lanao del Sur is very low compared with the average population density of ARMM and that of other regions of Mindanao. The population of Lanao del Sur has been growing at a slightly slower pace than the average growth rate in ARMM. Between 2000 and 2015, the annual average growth rate for Lanao del Sur is 1.7%, whereas the average for ARMM is 1.84%.

Table 13.5.3-1 Population and Population Density of Provinces in ARMM and Mindanao

	Population	Land area (km ²)	Population density (persons/km ²)
Lanao del Sur	1,045,429	15,056	69
Maguindanao	1,173,933	9,968	118
Mindanao	24,135,775	138,354	174
Region IX – Zamboanga Peninsula	3,629,783	16,904	215
Region X – Northern Mindanao	4,689,302	20,459	229
Region XI – Davao	4,893,318	20,433	239
Region XII – SOCCSKSARGEN	4,545,276	22,786	199
Region XIII - Caraga	2,596,709	21,121	123
ARMM	3,781,387	36,651	103
Philippines	100,981,437	300,000	337

Source: 2015 Census of Population and Housing, Philippine Statistics Authority

The Marawi City, Saguilaran, Piagapo, and Marantao municipalities in Lanao del Sur province will be affected by Sub-Project 7. The capital cities of Lanao del Sur and the three municipalities have a total population of 284,818 and an average population density of 224 persons/km². Marawi City has the highest population density among all the cities and municipalities in Mindanao, followed by Cotabato City (1,701 persons/km²) and Cagayan de Oro City (1,637 persons/km²). Saguilaran, Piagapo, and Marantao, located to the west of Marawi City, have much smaller populations and much larger land areas.

Table 13.5.3-2 Population and Population Density of Municipalities Affected by Sub-Project 7

Province	Municipality	Population	Land area (km ²)	Population density (persons/km ²)
Lanao del Sur	Marawi City	201,785	87.55	2,305
	Saguilaran	24,619	182.89	135

Province	Municipality	Population	Land area (km ²)	Population density (persons/km ²)
	Piagapo	25,440	340.07	75
	Marantao	32,974	660.00	50
Total		284,818	1,270.51	224

Source: 2015 Census of Population and Housing, Philippine Statistics Authority

In terms of population growth, Marawi City has experienced faster growth from 2000 to 2010 compared with 2010 to 2015. The annual average growth rate for Marawi City is 3.62% from 2000 to 2010 and 1.52% from 2010 to 2015. In contrast, the population growth in Sanguiaran and Marantao from 2000 to 2010 is small. The annual average growth rates are 0.02% in Sanguiaran and 1.48% for Marantao. Both municipalities have higher annual average growth rates from 2010 to 2015. Piagapo, on the other hand, has experienced faster growth from 2000 to 2010, but its annual average growth rate is negative from 2010 to 2015.

Table 13.5.3-3 Population Growth of Municipalities Affected by Sub-Project 7

Province	Municipality	Annual Average Growth Rate		
		2000-2010	2010-2015	2000-2015
Lanao del Sur	Marawi City	3.62%	1.52%	2.92%
	Sanguiaran	0.02%	1.66%	0.56%
	Piagapo	3.83%	-6.07%	0.42%
	Marantao	1.48%	2.92%	1.96%
Average		3.05%	0.84%	2.31%

Source: Various Statistics Report, Philippine Statistics Authority

The alignment of Sub-Project 7 passes through 23 barangays in Marawi City and three municipalities. The total population of the 23 barangays is 21,704. The barangays of Marawi City have relatively large populations. The largest barangay is Papandayan Caniogan, with a population of 2,027, followed by Guimba (Lilod Proper) (1,980) and Rorogagus East (1,587).

Table 13.5.3-4 Population of Barangays along the Alignment of Sub-Project 7

Province	Municipality	Barangay	Population
Lanao del Sur	Marawi City	1 Kilala	1,277
		2 Dulay West	831
		3 Papandayan Caniogan	2,027
		4 Guimba (Lilod Proper)	1,980
		5 Pantaon (Langcaf)	696
		6 Rorogagus East	1,587
		7 Boganga	1,453
	Sanguiaran	8 Mipaga	593
		9 Bubong	1,408
		10 Pagalamatan	590
		11 Lumbaca Toros	836
		12 Bagoaingud	714
		13 Alinun	601
		14 Linao	692
		15 Lombayanague	754
	Piagapo	16 Rantian	605
		17 Banga	n/a
		18 Paling	654
		19 Bobo	811
	Marantao	20 Palao (Ranarano)	1,014

Province	Municipality	Barangay		Population
		21	Matampay	551
		22	Bacong	1,039
		23	Daanaingud	991
Total				21,704

Source: 2015 Census of Population and Housing, Philippine Statistics Authority

(2) Income and Expenditure

According to the Family Income and Expenditure Survey 2012 of the Philippine Statistics Authority, income and expenditure estimates for Lanao del Sur province are PhP 129,953 and PhP 110,739 respectively. These figures are higher than the averages in Maguindanao province (PhP 108,170 for income and PhP 106,330 for expenditure) and close to the average income and expenditure estimates in ARMM (PhP 129,350 for income and PhP 112,342 for expenditure).

Table 13.5.3-5 Average Income and Expenditure Estimates in 2012 for Regions and Provinces

	Average income estimates (PhP)	Average expenditure estimates (PhP)
Lanao del Sur	129,953	110,739
Maguindanao	108,170	106,330
Mindanao		
Region IX – Zamboanga Peninsula	161,451	116,224
Region X – Northern Mindanao	189,158	137,298
Region XI – Davao	196,023	152,622
Region XII – SOCCSKSARGEN	165,214	137,923
Region XIII - Caraga	181,016	138,789
ARMM	129,350	112,342
Philippines	234,129	185,252

Source: Family Income and Expenditure Survey 2012, Philippine Statistics Authority

(3) Poverty Incidence

Poverty incidence in Lanao del Sur is 44.7% in 2006, which is lower than that in Maguindanao (54.6%) and the average in ARMM (47.1%). However, poverty incidence in Lanao del Sur increases to 56.6% in 2009 and 73.8% in 2012, and then slightly decreases to 71.9% in 2015. Provincial poverty incidence of more than 70% is an alarming level.

Table 13.5.3-6 Poverty Incidence of Provinces in ARMM and Mindanao

	Annual Per Capita Poverty Threshold (PhP)				Poverty incidence among population Estimate (%)			
	2006	2009	2012	2015	2006	2009	2012	2015
Lanao del Sur	13,116	17,024	22,665	22,802	44.7	56.6	73.8	71.9
Maguindanao	12,877	16,701	18,873	21,423	54.6	52.2	63.7	57.2
Mindanao								
Region IX – Zamboanga Peninsula	12,743	16,260	18,054	20,925	45.0	45.8	40.1	33.9
Region X – Northern Mindanao	12,917	16,878	19,335	22,345	39.0	40.1	39.5	36.6
Region XI – Davao	13,389	17,120	19,967	22,754	30.6	31.4	30.7	22.0
Region XII – SOCCSKSARGEN	13,319	16,405	18,737	21,025	37.9	38.3	44.7	37.3
Region XIII - Caraga	14,324	18,309	19,629	22,570	49.2	54.4	40.3	39.1
ARMM	12,647	16,683	20,517	21,563	47.1	47.4	55.8	53.7
Philippines	13,357	16,871	18,935	21,753	21.0	20.5	19.7	16.5

Source: Official Poverty Statistics of the Philippines Full Year 2015, Philippine Statistics Authority

Data for poverty incidence at the municipality level are derived from the National Color-Coded Agricultural Guide Map of the Department of Agriculture, which contains a municipal poverty database created in 2010. The table below shows poverty incidence in Marawi City and the three municipalities affected by Sub-Project 7. Their poverty incidence rates are all high. Applying the population figures of each municipality from the 2015 Census of Population and Housing shows that Marawi City would have 121,071 persons living in poverty. In the same way, Sanguiaran, Piagapo, and Marantao would have 17,715, 20,708, and 19,850 persons respectively living in poverty.

Table 13.5.3-7 Poverty Incidence of Municipalities Affected by Sub-Project 7

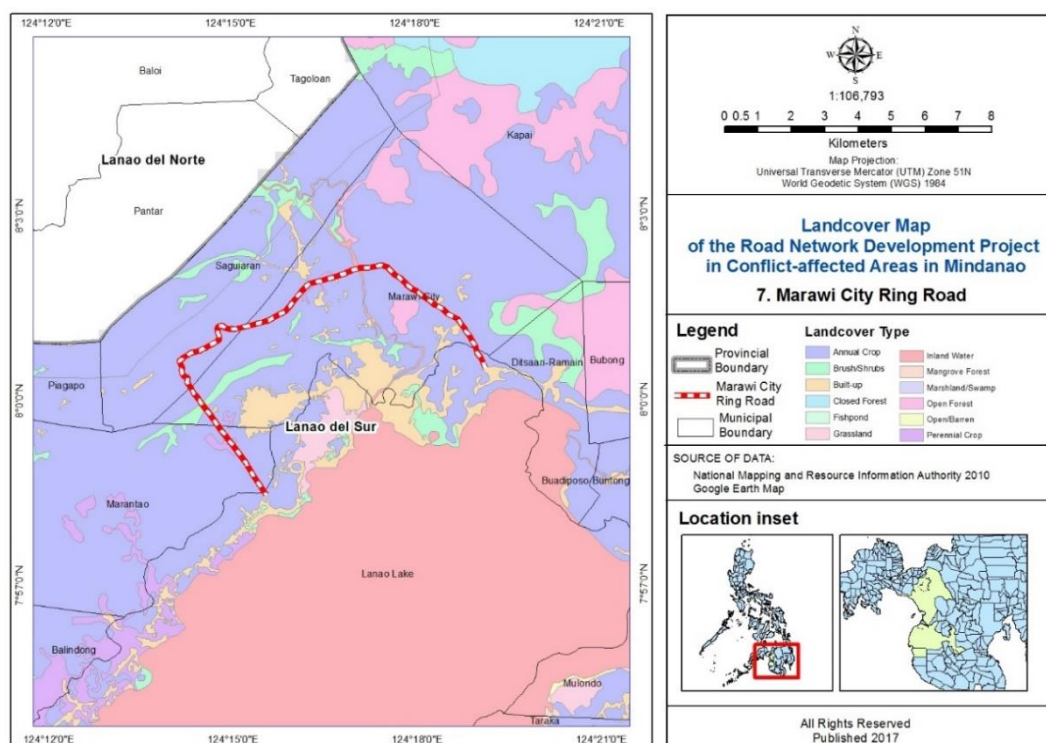
Province	Municipality	Poverty
Lanao del Sur	Marawi City	60.00%
	Sanguiaran	72.00%
	Piagapo	81.40%
	Marantao	60.20%
Average		62.97%

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

13.5.4 Agricultural Production and Potentials of the Area

(1) Agricultural Land Use and Land Holdings

The land cover map, which was developed based on the National Mapping and Resource Information Authority's 2010 Google Earth Map, shows the land cover of the municipalities affected by Sub-Project 7. Other than built-up areas and the grassland and brush/shrubs in the centre of Marawi City, annual crops cover most of the land.



Source: National Mapping and Resource Information Authority 2010 Google Earth Map

Figure 13.5.4-1 Landcover Map of Municipalities Affected by Sub-Project 7

Marawi City, Saguilaran, and Marantao have land areas covered by annual crops of 11,726ha in total. In contrast, the land covered by perennial crops is only 230ha. Information about landcover in Piagapo is not available.

Table 13.5.4-1 Agricultural Land Use of Municipalities Affected by Sub-Project 7

(Unit: ha)

Province	Municipality	Annual crop	Perennial crop	Total
Lanao del Sur	Marawi City	3,760	21	3,781
	Saguilaran	2,621		2,621
	Piagapo	n/a	n/a	n/a
	Marantao	5,345	209	5,554
Total		11,726	230	11,956

Source: National Mapping and Resource Information Authority 2010 Google Earth Map

Among farmers, fisherfolk, and laborers, the most popular employment category in Marawi City and the three municipalities is “farmers, fisherfolk, laborers.” Over 28,000 people make their living from a combination of agriculture, fishing, and laboring. The second most popular category is “farmers, fisherfolk.” Over 17,000 people make their living from farming and fishing. There are 9,864 full-time farmers and 7,265 full-time fisherfolk.

Table 13.5.4-2 Farmers and Holding of Municipalities Affected by Sub-Project 7

Province	Municipality	Farmers	Fisherfolks	Laborers	Farmers, Fisherfolks	Farmers, Fisherfolks, Laborers	Owners	Owners, Tenants	Tenants
Lanao del Sur	Marawi City	4,503	1,513	5,632	6,016	11,648	n/a	n/a	n/a
	Saguilaran	913	3,896	332	4,809	5,141	n/a	n/a	n/a
	Piagapo	2,999	1,207	3,491	4,206	7,697	n/a	n/a	n/a
	Marantao	1,449	649	2,041	2,098	4,139	n/a	n/a	n/a
Total		9,864	7,265	11,496	17,129	28,625	n/a	n/a	n/a

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

(2) Agricultural Production

According to the Department of Agriculture and Fisheries of ARMM, information about areas planted with crops in Marawi City and the three municipalities has been lost because of the crises in Marawi City. The only information available concerns coconuts and palm oil. According to the Philippine Coconut Authority of ARMM, coconuts have planted areas of 311ha in Marawi City, 484ha in Saguilaran, and 277ha in Marantao. There are no planted areas for palm oil in the city and municipalities.

(3) Suitable Areas for Crop Production

The National Color-Coded Agricultural Guide Map provides information about suitable areas for crop production in Marawi City and the two municipalities. In contrast to the land cover map, large areas are identified as suitable for bananas (11,683ha) and coffee (8,258ha). Most of the 23 barangays along the alignment of Sub-Project 7 have areas suitable for coffee. Most of them also have areas suitable for bananas.

Table 13.5.4-3 Suitable Areas in Hectare for Crop Production in Municipalities Affected by Sub-Project 7

(Unit: ha)

Province	Municipality	Palay	Corn	Banana	Coconut	Coffee	Oil palm
Lanao del Sur	Marawi City	52	845	2,881		2,762	
	Saguiaran			3,157		2,173	
	Piagapo			786		786	
	Marantao	254	1,457	4,859		2,538	
Total		307	2,302	11,683	0	8,258	0

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

Table 13.5.4-4 Suitable Areas in Hectare for Crop Production in Barangays along the Alignment of Sub-Project 7

(Unit: ha)

Province	Municipality	Barangay		Palay	Corn	Banana	Coconut	Coffee	Oil palm
Lanao del Sur	Marawi City	1	Kilala		12				
		2	Dulay West			167		7	
		3	Papandayan Caniogan			40		40	
		4	Guimba (Lilod Proper)			199		122	
		5	Pantaon (Langcaf)			83		83	
		6	Rorogagus East			38		38	
		7	Boganga		34	134		134	
	Saguiaran	8	Mipaga			36			
		9	Bubong			13		13	
		10	Pagalamatan			13		13	
		11	Lumbaca Toros			25		25	
		12	Bagoaingud			165		165	
		13	Alinun			378		378	
		14	Linao			22		22	
		15	Lombayanague			13			
	Piagapo	16	Rantian			46		46	
		17	Banga						
		18	Paling			34		34	
		19	Bobo			56		56	
	Marantao	20	Palao (Ranaranao)		186	1,360		1,017	
		21	Matampay	126	104			758	
		22	Bacong		93			93	
		23	Daanaingud		70			70	
Total				126	498	2,821	0	3,112	0

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

13.5.5 Result of the Social Survey

(1) Overview of the Survey

Three surveys were undertaken to gain a better understanding of the socio-economic conditions of the communities in barangays along the alignment of Sub-Project 7. The survey results are summarized below to present coherent information of the communities along the road alignment, highlighting their current socio-economic conditions, farming practices, and perception on the impacts of the road project.

Table 13.5.5-1 Surveys Carried Out

Survey type	Number of observations	Description
(i) Household interview survey	20 households x 23 barangays = 460 households	A two-page questionnaire is used for the interview to collect basic information on living conditions such as family income and expenditure, sources of livelihood, and farming practices.
(ii) Focus group discussion	3 groups x 23 barangays	Participants are divided into three groups: youth, women, and household heads. A one-page guide is used to facilitate discussions on current road conditions and the expected impacts of road construction.
(iii) Barangay captain interview	23 barangay captains	A one-page questionnaire is used to collect information on agricultural production, marketing, and related activities.

(2) Socio-economic Condition of the Communities along the Road Alignment

The socio-economic characteristics of the communities along the alignment of Sub-Project 7 are summarized based on the household survey.

Table 13.5.5-2 Characteristics of Household Survey Respondents

Variable	Description
Age and Sex	<ul style="list-style-type: none"> The respondents' ages range from 16 to 83, with a mean age of 41.3 years. Of the respondents, 199 (43.3%) are male, and 261 (56.7%) are female.
Years of residency	<ul style="list-style-type: none"> The average resident has lived in the community for 33.5 years. Of the respondents, 64.3% have lived in the community since birth.
Number of family members	<ul style="list-style-type: none"> Families are large: 37.0% of the households have 4–6 members, and 52.3% have 7 or more members.
Ethnicity	<ul style="list-style-type: none"> Almost all the respondents (99.3%) are ethnic Maranao.
Religion	<ul style="list-style-type: none"> All the respondents are Muslim, except for one Catholic.
Education attainment	<ul style="list-style-type: none"> Of the respondents, 37.6% have obtained elementary-school-level education; 35.2% have reached the high-school level; and 16.8% have attended college.
Source of drinking water	<ul style="list-style-type: none"> The major sources of drinking water are spring/river/rain water (52.6%) and communal or hand-pump wells (44.8%).
Household income	<ul style="list-style-type: none"> Of the households, 77.6% have an income below PhP 9,000, and 61.7% have an income below PhP 6,000. As the annual per capita poverty threshold of Lanao del Sur province in 2015 was PhP 22,802 and the food threshold was PhP 15,920, a monthly household income below PhP 9,000 is considered low, and one below PhP 6,000 may be below the subsistence level. The respondents earn their income from various sources including agriculture (32.6%); business (18.0%); employment (6.1%); and other sources such as construction, driving, and dress-making (42.8%).

(3) Agricultural Practices of the Communities

Some of the barangays along the alignment of Sub-Project 7 are basically agricultural communities, while others are less dependent on agriculture. For those agricultural barangays, farming is the major source of income. The major crop in the area is white corn.

Table 13.5.5-3 Characteristics of Farm Production

Subject	Description
Farmland size	<ul style="list-style-type: none"> The total land under cultivation in the 23 barangays along the alignment of Sub-Project 7 is 7,759.1 ha. Among the 150 household survey respondents who cultivate crops, the size of the cultivated land ranges from 0.3 to 5.0 ha with a mean of 1.8 ha. More than one-third of the respondents cultivate 1 ha or less. Among the 150 household survey respondents who cultivate crops, only 13 respondents have some farmland to expand their production. For most of those respondents, the reason for not cultivating the farmland is the lack of financial resources.
Farmland tenure	<ul style="list-style-type: none"> Among the 153 household survey respondents who use farmland, 55.6% farm their own land; 11.1% are tenant farmers; 32.0% are leaseholders; and 1.3% have other arrangements. Among the 85 respondents who farm their own land, 52.9% have a Torrens title; 7.1% have inherited the land; and 40.0% have a verbal agreement.
Types of crops	<ul style="list-style-type: none"> White corn is widely cultivated in the agricultural barangays. The majority of the household survey respondents who produce white corn harvest two crops per year. Among the 150 household survey respondents who cultivate crops, 26.7% practice inter-cropping.
Constraints	<ul style="list-style-type: none"> The financial capacity to invest in farming is limited. Pests and unstable weather conditions cause damage to the crops. Heavy rain, typhoons, and landslides affect farming productivity. The Marawi Crisis has caused many residents to shift to non-farming activities such as driving, carpentry, and furniture-making. Although many evacuees have returned to their respective barangays, agricultural production has been low.

Marawi City was a major market for all their crops before the Marawi Crisis. While the city is still in the rehabilitation phase, farmers deliver their harvest to neighboring towns and municipalities. Various means of transportation are used such as carabao, horse, truck, jeepney, multi-cab, and motorcycle from farm areas to markets.

Table 13.5.5-4 Characteristics of Marketing of Farm Products

Subject	Description
Types of crops	<ul style="list-style-type: none"> White corn is the major cash crop from which most farmers in the agricultural barangays derive their income.
Market location	<ul style="list-style-type: none"> The most common market locations identified are Bacawayan in Marantao municipality, the Poblacion market in Balo-I municipality, traders in Saguian municipality, and Palao barangay in Iligan City.

Subject	Description
Transportation arrangements	<ul style="list-style-type: none"> Farmers take their crops directly to the market location bearing all the cost of delivery. On the other hand, a few farmers sell their crops to local traders in their own barangays. Those farmers accept lower buying prices rather than take the crops to the outside market and bear the poor road conditions and the high cost of transportation.
Means of transportation	<ul style="list-style-type: none"> Farmers use carabaos, horses, trucks, jeeps, and motorcycles depending on the distance and bulk of products to be delivered to the market. The use of multiple modes of transportation increases costs to farmers.
Constraints	<ul style="list-style-type: none"> Because of lack of farm-to-market roads, costs for transporting crops from farm areas to the barangay centers are high. Although most of the barangays are passable by mechanized vehicles, transport facilities are still inadequate.

The following shows the flow of white corn from farm areas in Barangay Palao of Marantao municipality to the traders in Saguiran Municipality.

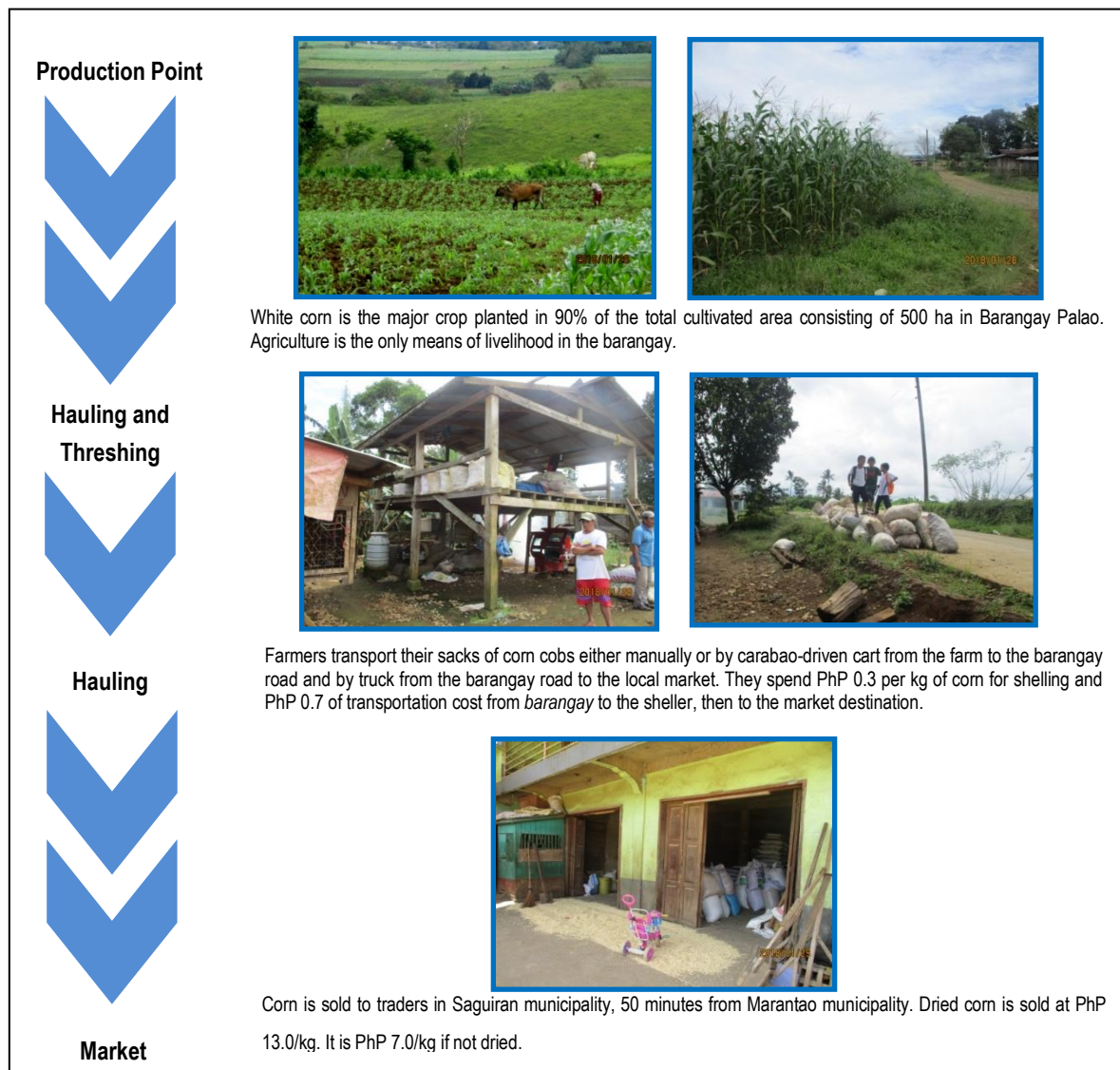


Figure 13.5-1 Commodity Flow of Barangay Palao, Marantao, Lanao del Sur

(4) Expected Impacts of Road Construction

The greatest positive impact of the road construction as perceived by the survey participants is the easy and speedy transportation of farm products to market and the reduced cost of transportation and labor expenses for farming activities. The road construction is also expected to motivate farmers to grow more crops to generate additional income.

Table 13.5.5-5 Expected Impacts on Agriculture

Subject	Description
Quality and cost of transportation	<ul style="list-style-type: none"> With improved roads, transport of farm inputs from sources to farm areas, as well as delivery of harvested crops from farm area to market locations, would be easier, faster, and cheaper. As transport quality improves, crop damage would diminish.
Farmers' profits	<ul style="list-style-type: none"> Reduced transportation costs, better access to transportation services, and more market choices would increase the profit margins of farmers.
Farm production	<ul style="list-style-type: none"> If greater farm income is realized, farmers would be motivated to produce more crops to achieve even better income. Among the 150 household survey respondents, 64.0% indicated plans to increase cultivation areas if the road is constructed. Corn and vegetables are the favored crops to expand production.

Road construction is also expected to have positive impacts on socio-economic, educational, health, and community development. Greater mobility to and from their barangays is good for the children attending school. The road would provide easy access to health clinics and hospitals for emergency cases. It would also ease women's work, particularly in their household responsibilities such as securing water and washing clothes near the river.

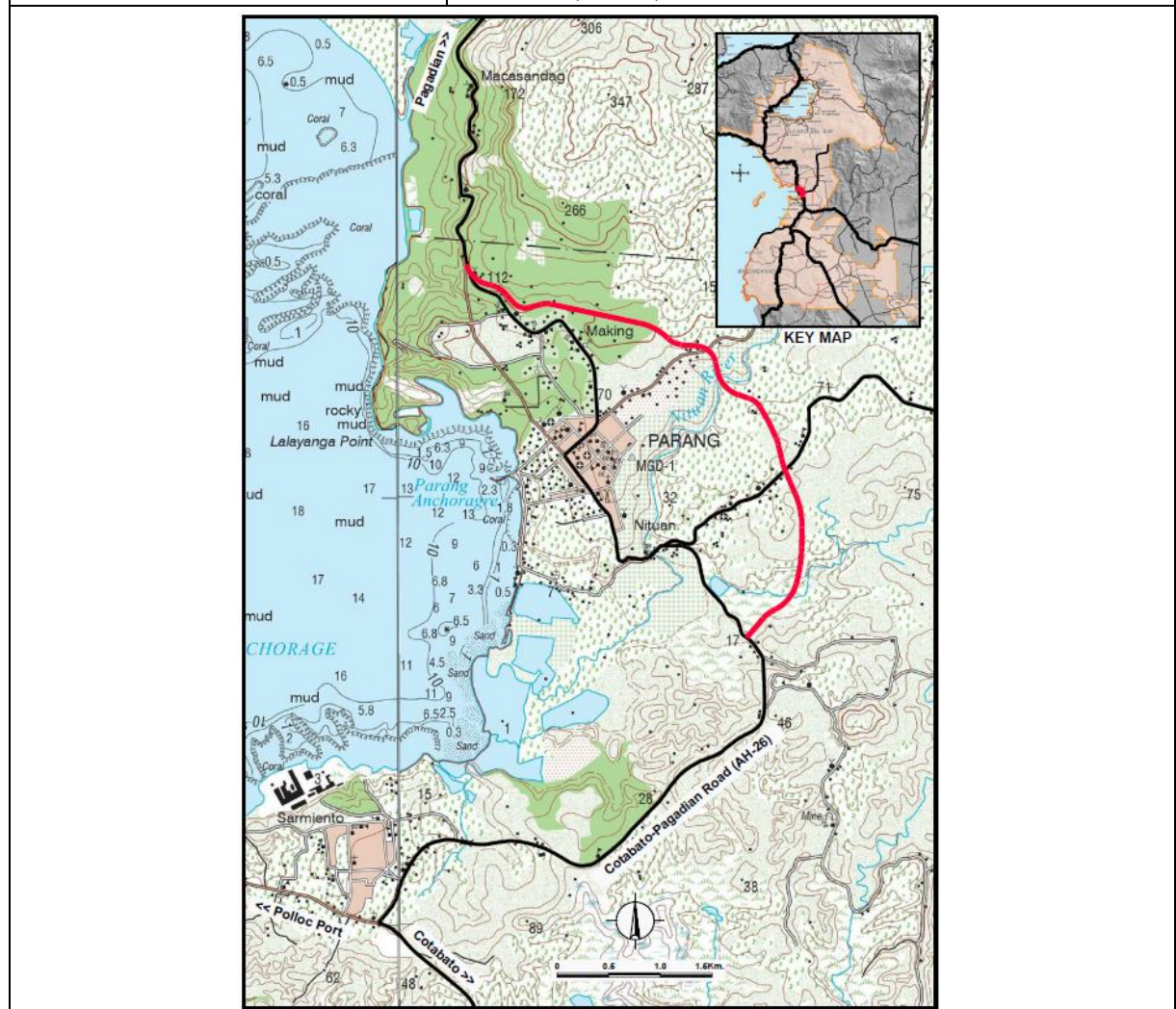
Table 13.5.5-6 Expected Social Impacts

Subject	Description
Access to school	<ul style="list-style-type: none"> School-age children would no longer have to walk on muddy and slippery roads. Instead, they could just ride their way to the schools by whatever transportation means were available.
Health and sanitation	<ul style="list-style-type: none"> Good roads would improve people's access to health facilities such as hospitals in the case of emergencies.
Women's work	<ul style="list-style-type: none"> Good roads would help women fetch water at the water source and wash clothes near the river.
Economic development	<ul style="list-style-type: none"> People could easily go to commercial centers and look for jobs. Good roads would attract visitors to the natural springs, promoting eco-tourism and development in the area.
Negative impacts	<ul style="list-style-type: none"> People with ill intentions such as thieves and terrorists, as well as avengers in cases of <i>rido</i> (family feuds), might find it easier to enter communities with the constructed road. Good roads might increase noise and air pollution, and vehicle accidents particularly involving children due to reckless driving and speeding.

13.6 Sub-Project 8

13.6.1 Outline of the Project

Location	<ul style="list-style-type: none"> The road is located in the Municipality of Parang.
Major Road to connect	<ul style="list-style-type: none"> Connecting AH-26 (Cotabato-Parang section) to AH-26 (Parang-Pagadian section)
Road Description	<ul style="list-style-type: none"> Length: 7.0km Lane and lane width: 2-lane (total); 3.35 m per lane Shoulder width: 2.5 m Classification: National Secondary Road
Population	<ul style="list-style-type: none"> 4 barangays along the alignment (13,207) 1 municipality: Parang = 89,194
Agricultural land use (ha) of the 1 municipality	<ul style="list-style-type: none"> Annual Crop=663 ha; Perennial crop=9,500 ha TOTAL=10,162 ha
Current main agricultural crops planted by farmers (2015 data)	<ul style="list-style-type: none"> Oil Palm (11,201 ha) Coconut (5,046 ha) Coffee (4,277 ha) Banana (4,277 ha) Palay (3,486) Corn (893 ha)



13.6.2 Rationale of the Study

The Municipality of Parang is large municipality in terms of land area and population. It has the third largest population (89,194) among the municipalities in the Province of Maguindanao and second largest land area (898.76 km²). The other characteristics of the municipalities are as follows:

- It is a first-class municipality (per Department of Finance's Department Order No. 23-08, first class municipality has to achieve an annual income of PhP 55 Million or more) which serves as the convergent point of the nearby municipalities such as Buldon, Barira, Matanog, Kapatagan and Sultan Mastura. Most of the agricultural products from these municipalities are sold in Parang Municipality which support its local economy.
- The municipality is located between major cities (General Santos and Cotabato City on the south side and Pagadian City, Zamboanga City, Marawi City, Iligan City and Cagayan de Oro on the north side) through the AH-26 (National Road No. 1). Motorists moving between these cities normally pass through Parang Municipality. At the town center, both local traffic and through traffic compete for road space which creates serious traffic congestion.
- In terms of importance to the economy of the ARMM, the municipality is hosting the only international port of mainland ARMM which is the Polloc Port. Although at present the share of trucks (all types) passing through the town center is minimal (11% or 323), once the planned banana plantation in Buldon is realized, volume of trucks will dramatically increase.

Due to the above, the municipality is experiencing serious traffic congestion inside the town center hence the need for a diversion road. Likewise, to maintain the function of the national road (AH-26) with reasonable speed, a diversion road to avoid the congested town center is necessary.

13.6.3 Objectives of the Project

The objectives of the Parang East Diversion Road are as follows:

- To strengthen the AH26 (Narciso Ramos Highway) by providing an alternative route to the congested section ensuring smooth flow of traffic.
- To improve traffic flow and urban amenities inside the town center by separating through traffic from local traffic.
- To guide sound urbanization by providing a trunk road at the eastern portion of the town which would allow new settlements to establish.
- To strengthen connection between the planned agri-industry areas (banana plantation in Buldon, Barira, Matanog) which is expected to generate high volume of truck traffic and the region's primary port (Polloc Port) by providing a bypass road at the congested section of the national highway.

13.6.4 Socio-economic Condition of the Project Area

(1) Population and Growth Rate

Maguindanao province, in which Sub-Project 8 is located, has a total population of 1,173,993 and a population density of 118 persons/km² as of August 2015. The population density of Maguindanao is slightly higher than that of ARMM, but lower than that of all other regions in Mindanao. Maguindanao province has experienced rapid population growth in recent years. Its annual average growth rate

between 2010 and 2015 is 4.22%, which is much higher than 2.18% for Lanao del Sur, 2.89% for ARMM, and 1.79% for Mindanao.

Table 13.6.4-1 Population and Population Density of Provinces in ARMM and Mindanao

	Population	Land area (km ²)	Population density (persons/km ²)
Lanao del Sur	1,045,429	15,056	69
Maguindanao	1,173,933	9,968	118
Mindanao	24,135,775	138,354	174
Region IX – Zamboanga Peninsula	3,629,783	16,904	215
Region X – Northern Mindanao	4,689,302	20,459	229
Region XI – Davao	4,893,318	20,433	239
Region XII – SOCCSKSARGEN	4,545,276	22,786	199
Region XIII - Caraga	2,596,709	21,121	123
ARMM	3,781,387	36,651	103
Philippines	100,981,437	300,000	337

Source: 2015 Census of Population and Housing, Philippine Statistics Authority

Parang municipality of Maguindanao province will be affected by Sub-Project 8. Parang is a large municipality with regard to population and land area. It has a total population of 89,194 and a total land area of 850.78 km². Its average population density is 105 persons/km². In Maguindanao province, Parang has the third largest population after Datu Odin Sinsuat (99,210) and Sultan Kudarat (95,201), and the second largest land area after Pagalungan (898.76 km²).

Table 13.6.4-2 Population and Population Density of Municipalities affected by Sub-Project 8

Province	Municipality	Population	Land area (km ²)	Population density (persons/km ²)
Maguindanao	Parang	89,194	850.78	105
Total		89,194	850.78	105

Source: 2015 Census of Population and Housing, Philippine Statistics Authority

With regard to population growth, Parang has experienced faster growth between 2010 and 2015 compared with the prior 10 years between 2000 and 2010. The annual average growth rate in Parang from 2010 to 2015 is 4.00%, while that from 2000 to 2010 is 1.87%. These rates are close to the averages in Maguindanao province (4.22% for 2010 to 2015 and 1.66% for 2000 to 2010).

Table 13.6.4-3 Population Growth of Municipalities affected by Sub-Project 8

Province	Municipality	Annual Average Growth Rate		
		2000-2010	2010-2015	2000-2015
Maguindanao	Parang	1.87%	4.00%	2.57%
Average		1.87%	4.00%	2.57%

Source: Various Statistics Report, Philippine Statistics Authority

The alignment of Sub-Project 8 passes through four barangays of Parang municipality. The total population of the five barangays is 13,207. Nituan and Making have large populations of 3,764 and 5,989 respectively.

Table 13.6.4-4 Population of Barangays along the Alignment of Sub-Project 8

Province	Municipality	Barangay		Population
Maguindanao	Parang	1	Nituan	3,764
		2	Gumagadong Calawag	1,513
		3	Making	5,989
		4	Manion	1,941
Total				13,207

Source: 2015 Census of Population and Housing, Philippine Statistics Authority

(2) Income and Expenditure

According to the Family Income and Expenditure Survey 2012 of the Philippine Statistics Authority, income and expenditure estimates for Maguindanao province are PhP 108,170 and PhP 106,330 respectively. These estimates are lower than those of Lanao del Sur: PhP 129,953 and PhP 110,739 for income and expenditure respectively. Among the six regions of Mindanao, ARMM has the lowest estimates for income and expenditure: PhP 129,350 and PhP 112,342 respectively. The income and expenditure estimates for Maguindanao are much lower than all the regions of Mindanao.

Table 13.6.4-5 Average Income and Expenditure Estimates in 2012 for Regions and provinces

	Average income estimates (PhP)	Average expenditure estimates (PhP)
Maguindanao	108,170	106,330
Sultan Kudarat	126,806	99,139
Mindanao		
Region IX – Zamboanga Peninsula	161,451	116,224
Region X – Northern Mindanao	189,158	137,298
Region XI – Davao	196,023	152,622
Region XII – SOCCSKSARGEN	165,214	137,923
Region XIII - Caraga	181,016	138,789
ARMM	129,350	112,342
Philippines	234,129	185,252

Source: Family Income and Expenditure Survey 2012, Philippine Statistics Authority

(3) Poverty Incidence

2009, rises to 63.7% in 2012, and declines again to 57.2% in 2015. This poverty incidence has always been higher than that in ARMM and any other regions of Mindanao. More than half of the population of Maguindanao province has been in poverty throughout the period.

Table 13.6.4-6 Poverty Incidence of Provinces in ARMM and Mindanao

	Annual Per Capita Poverty Threshold (PhP)				Poverty incidence among population Estimate (%)			
	2006	2009	2012	2015	2006	2009	2012	2015
Lanao del Sur	13,116	17,024	22,665	22,802	44.7	56.6	73.8	71.9
Maguindanao	12,877	16,701	18,873	21,423	54.6	52.2	63.7	57.2
Mindanao								
Region IX – Zamboanga Peninsula	12,743	16,260	18,054	20,925	45.0	45.8	40.1	33.9
Region X – Northern Mindanao	12,917	16,878	19,335	22,345	39.0	40.1	39.5	36.6
Region XI – Davao	13,389	17,120	19,967	22,754	30.6	31.4	30.7	22.0
Region XII – SOCCSKSARGEN	13,319	16,405	18,737	21,025	37.9	38.3	44.7	37.3
Region XIII - Caraga	14,324	18,309	19,629	22,570	49.2	54.4	40.3	39.1
ARMM	12,647	16,683	20,517	21,563	47.1	47.4	55.8	53.7
Philippines	13,357	16,871	18,935	21,753	21.0	20.5	19.7	16.5

Source: Official Poverty Statistics of the Philippines Full Year 2015, Philippine Statistics Authority

According to the National Color-Coded Agricultural Guide Map of the Department of Agriculture, which contains a municipal poverty database created in 2010, poverty incidence in Parang is 74.0%. This figure is very high compared with the average poverty incidence in Maguidanao and ARMM.

Table 13.6.4-7 Poverty Incidence of Municipalities Affected by Sub-Project 8

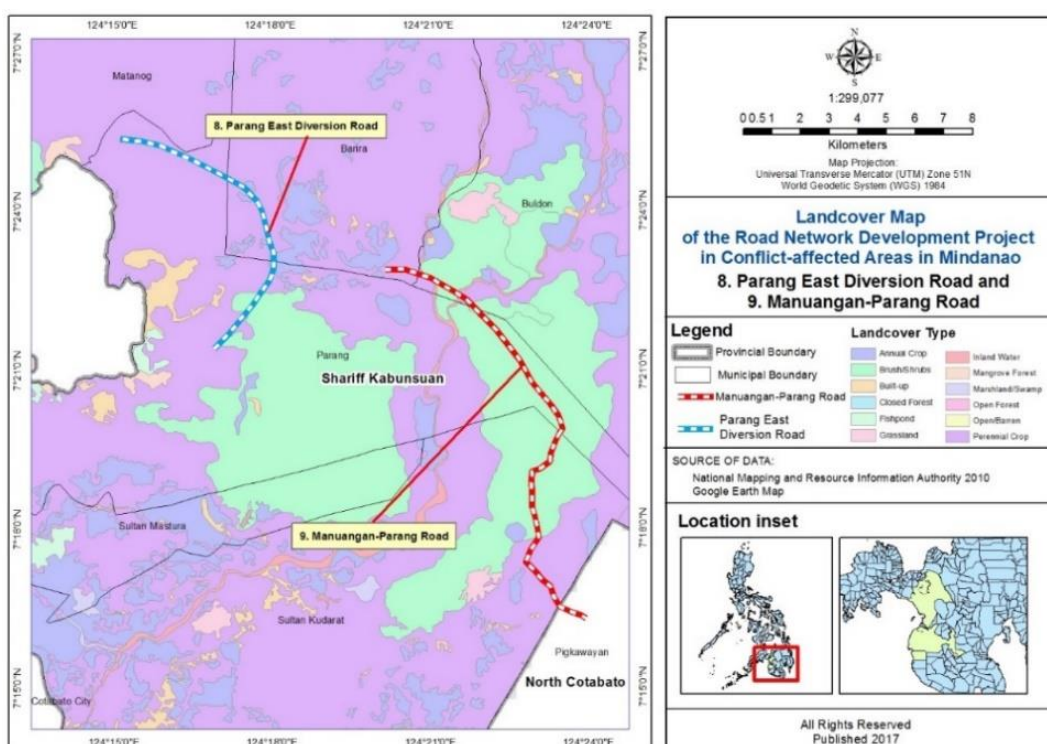
Province	Municipality	Poverty
Maguidanao	Parang	74.00%
Average		74.00%

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

13.6.5 Agricultural Production and Potentials of the Area

(1) Agricultural Land Use and Land Holdings

The land cover map, which was developed based on the National Mapping and Resource Information Authority's 2010 Google Earth Map, shows the land cover of Parang, a municipality affected by Sub-Project 8. In the areas along the alignment, perennial crops are the dominant land cover. A vast area of brush/shrubs is spread along the southern part of the alignment. Parang has land areas of 663ha covered by annual crops and 9,500ha covered by perennial crops. It should be noted that the current proposed alignment does not pass through Barira municipality.



Source: National Mapping and Resource Information Authority 2010 Google Earth Ma

Figure 13.6.5-1 Landcover Map of Municipalities Affected by Sub-Project 8 and 9

Table 13.6.5-1 Agriculture Land Use of Municipalities Affected by Sub-Project 8

(Unit: ha)				
Province	Municipality	Annual crop	Perennial crop	Total
Maguidanao	Parang	663	9,500	10,162
Total		663	9,500	10,162

Source: National Mapping and Resource Information Authority 2010 Google Earth Map

Among farmers, fisherfolk, and laborers, the most popular employment category in the Parang municipality is “farmers, fisherfolk, laborers.” Over 12,000 people make their living from a combination of agriculture, fishing, and laboring. The second most popular category is “farmers, fisherfolk.” The total number of people who make their living from farming and fishing is 4,429. There are 4,228 full-time farmers. In contrast, the number of full-time fisherfolk is very small.

Table 13.6.5-2 Farmers and Holding of Municipalities Affected by Sub-Project 8

Province	Municipality	Farmers	Fisherfolks	Laborers	Farmers, Fisherfolks	Farmers, Fisherfolks, Laborers	Owners	Owners, Tenants	Tenants
Maguindanao	Parang	4,228	201	7,619	4,429	12,048	1,364	2,093	729
Total		4,228	201	7,619	4,429	12,048	1,364	2,093	729

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

(2) Agricultural Production

The table below is a summary of the areas planted with crops in Parang based on two sources. The Department of Agriculture of Maguindanao Province provided information about all the crops. The Philippine Coconut Authority of ARMM provided information about coconuts and palm oil. In Parang, coconuts are planted in vast areas, while other perennial crops have rather small areas. With regard to annual crops, upland palay has the largest area of 814ha, followed by 605ha of yellow corn.

Table 13.6.5-3 Area Planted by Crops inha in Municipalities Affected by Sub-Project 8

(Unit: ha)

(Unit: ha)

Province	Municipality	Annual crop						
		Irrigated palay		Rainfed palay	Upland palay		White corn	Yellow corn
Maguindanao	Parang	334		303	814		132	605
Total		334		303	814		132	605
Province	Municipality	Perennial crop						
		Banana	Coconut	Mango	Coffee	Durian	Lanzones	Other fruits
Maguindanao	Parang	31	12,851	35	20	12	56	11
Total		31	12,851	35	20	12	56	11

Source: Department of Agriculture of Maguindanao Province, Department of Agriculture of Lanao del Sur Province, Philippine Coconut Authority ARMM for coconut and oil palm

(3) Suitable and Potential Areas for Crop Production

The National Color-Coded Agricultural Guide Map provides information about suitable areas for crop production in Parang. Palm oil has the largest suitable area of 11,201ha, followed by coconuts, bananas, coffee, and palay. Of the four barangays, Making and Manion have suitable areas for oil palm. Gumagadong Calawag and Manion have suitable areas for palay. Nituan and Manion have suitable areas for bananas, coconuts, and coffee.

Table 13.6.5-4 Suitable Areas in Hectare for crop production in Municipalities Affected by Sub-Project 8

(Unit: ha)

Province	Municipality	Palay	Corn	Banana	Coconut	Coffee	Oil palm
Maguindanao	Parang	3,486	893	4,277	5,046	4,277	11,201
Total		3,486	893	4,277	5,046	4,277	11,201

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

Table 13.6.5-5 Suitable Areas in Hectare for crop production in Barangays along the alignment of Sub-Project 8

(Unit: ha)

Province	Municipality	Barangay		Palay	Corn	Banana	Coconut	Coffee	Oil palm
Maguindanao	Parang	1	Nituan			117	117	117	
		2	Gumagadong Calawag	199	22	13	35	35	
		3	Making	28					566
		4	Manion	259	91	597	597	597	795
Total				487	113	727	749	749	1,361

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1

13.6.6 Result of the Social Survey

(1) Overview of the Survey

Three surveys were undertaken to gain a better understanding of the socio-economic conditions of the communities in barangays along the alignment of Sub-Project 8. The survey results are summarized below to present coherent information of the communities along the road alignment, highlighting their current socio-economic conditions, farming practices, and perception on the impacts of the road project.

Table 13.6.6-1 Surveys Carried Out

Survey type	Number of observations	Description
(i) Household interview survey	20 households x 4 barangays = 80 households	A two-page questionnaire is used for the interview to collect basic information on living conditions such as family income and expenditure, sources of livelihood, and farming practices.
(ii) Focus group discussion	3 groups x 4 barangays	Participants are divided into three groups: youth, women, and household heads. A one-page guide is used to facilitate discussions on current road conditions and the expected impacts of road construction.
(iii) Barangay captain interview	4 barangay captains	A one-page questionnaire is used to collect information on agricultural production, marketing, and related activities.

(2) Socio-economic Condition of the Communities along the Road Alignment

The socio-economic characteristics of the communities along the alignment of Sub-Project 8 are summarized based on the household survey.

Table 13.6.6-2 Characteristics of Household Survey Respondents

Variable	Description
Age and Sex	<ul style="list-style-type: none"> The respondents' ages range from 20 to 71, with a mean age of 45.5 years. 61 (76.3%) of the respondents are male, and 19 (23.8%) female.
Years of residency	<ul style="list-style-type: none"> The average number of years of residency is 37.4%. 66.3% of the respondents have lived in the community since birth.

Variable	Description
Number of family members	<ul style="list-style-type: none"> Family size is large: 53.2% of the households have 4–6 members, and 20.3% have 7 or more members.
Ethnicity	<ul style="list-style-type: none"> The major ethnic groups are Iranun (42.5%) and Cebuano (33.8%).
Religion	<ul style="list-style-type: none"> Among the respondents, 47.5% are Muslim, and 52.5% are Catholic.
Education attainment	<ul style="list-style-type: none"> 47.5% of the respondents have obtained elementary school level education, 33.8% have reached the high school level, and 11.3% have attended college.
Source of drinking water	<ul style="list-style-type: none"> The major sources of drinking water are spring/river/rain water (39.7%) and open dug wells (34.9%). Additionally, 19.0% of respondents are using communal or hand-pump wells.
Household income	<ul style="list-style-type: none"> 37.5% of the households have a monthly income over PhP 12,000. Meanwhile, 50.0% of the households have an income below PhP 9,000. As the annual per capita poverty threshold of Maguindanao province in 2015 was PhP 21,423, a monthly household income below PhP 9,000 is low. Most of the respondents (95.4%) earn their income from agriculture.

(3) Agricultural Practices of the Communities

The barangays along the alignment of Sub-Project 8 are basically agricultural communities. Farming is the major source of income. Fisheries are not a popular means of livelihood in the area. The major crops in the area are corn, coconut, and palay. The production of fruits such as banana, durian, and lanzones has the potential to improve farm income.

Table 13.6.6-3 Characteristics of Farm Production

Subject	Description
Farmland size	<ul style="list-style-type: none"> The total land under cultivation in the eight barangays along the alignment of Sub-Project 8 is 2,096.5 ha. Among the 111 household survey respondents who cultivate crops, the size of the cultivated land ranges from 0.5 to 6.0 ha with a mean of 2.0 ha. Around half of the respondents cultivate 1 ha or less. Among the 64 household survey respondents who grow crops, 68.8% do not have any farmland to expand their production. On the other hand, for those who have some potential farmland, the reasons for not cultivating the farmland include unfavorable land features such as the land being rocky, flooded, hilly, or infertile, and the lack of financial resources.
Farmland tenure	<ul style="list-style-type: none"> Among the 64 household survey respondents who use farmland, 35.9% farm their own land, 26.6% are lease holders, and 37.5% have other arrangements which consist mainly of farming within the military reservation. Among the 23 respondents who farm their own land, 52.2% have a Torrens title, 64.3% have inherited the land, 34.8% have a verbal agreement, and 8.7% have other arrangements.
Types of crops	<ul style="list-style-type: none"> Corn, both yellow and white varieties, is widely cultivated in all the barangays. The majority of the household survey respondents who produce corn harvest two to three crops per year.

	<ul style="list-style-type: none"> Palay, both irrigated and rain-fed, and coconut are also produced in the area. The household survey respondents who grow palay harvest one to three crops per year. Among the 64 household survey respondents who cultivate crops, 31.3% practice inter-cropping. Popular crop combinations are corn-coconut, coconut-banana, and corn-cassava.
Constraints	<ul style="list-style-type: none"> The financial capacity to invest in farming is limited. Pests and unstable weather conditions cause damage to the crops. Other constraints include the lack of farm equipment and irrigation, the high market price of inputs, and the low yield of the farm production.

Harvested crops are delivered to markets located within Parang as well as other municipalities including Simuay of Sultan Kudarat and Pigcawayan of North Cotabato, depending on the kinds of crops. Various means of transportation are used such as carabao, horse, motorcycles, and trucks from farm areas to markets.

Table 13.6.6-4 Characteristics of Marketing of Farm Products

Subject	Description
Types of crops	<ul style="list-style-type: none"> Corn, coconut, and palay are the major cash crops from which most people in the barangays derive their agricultural income. Among the 62 household survey respondents, 44 farmers earned income from corn, 7 from coconut, 10 from palay, 5 from cassava, 4 from banana, and 6 from others. Some farmers have income from multiple crops.
Market location	<ul style="list-style-type: none"> For corn, the major markets are in Parang. Most of the household survey respondents sell their corn to the markets in Parang. For palay, the major markets are in Pigcawayan of Sultan Kudarat province and Libungan of North Cotabato Province. Among the household survey respondents, some farmers market palay to Pigcawayan, while some others sell their palay to markets in Simuay of Sultan Kudarat and Parang.
Transportation arrangements	<ul style="list-style-type: none"> Farmers transport their harvested crops to markets. The majority of the household survey respondents send their products to the markets in Parang. When farmers have large volumes of coconuts (20–30 sacks), traders come to collect them from the farm.
Means of transportation	<ul style="list-style-type: none"> The means of transportation for agricultural products to markets are motorcycles, motor-sidecars known as payong-payong, jeepneys, and trucks. Carabao and horses are also used to transport harvested crops from farm areas to the nearest roads, from which the crops are transported by mechanized vehicles.
Constraints	<ul style="list-style-type: none"> Poor road conditions and high transportation costs are the major constraints that diminish farmers' profits from the crops. Inadequate post-harvest facilities such as millers, dryers, and storage facilities are also identified as constraints.

The following shows the flow of corn from farm areas in Barangay Manion of Parang municipality to the market in Pigcawayan of Sultan Kudarat municipality. The other barangays along the alignment of Sub-Project 8 have a similar flow of palay from farm areas to markets in Parang.

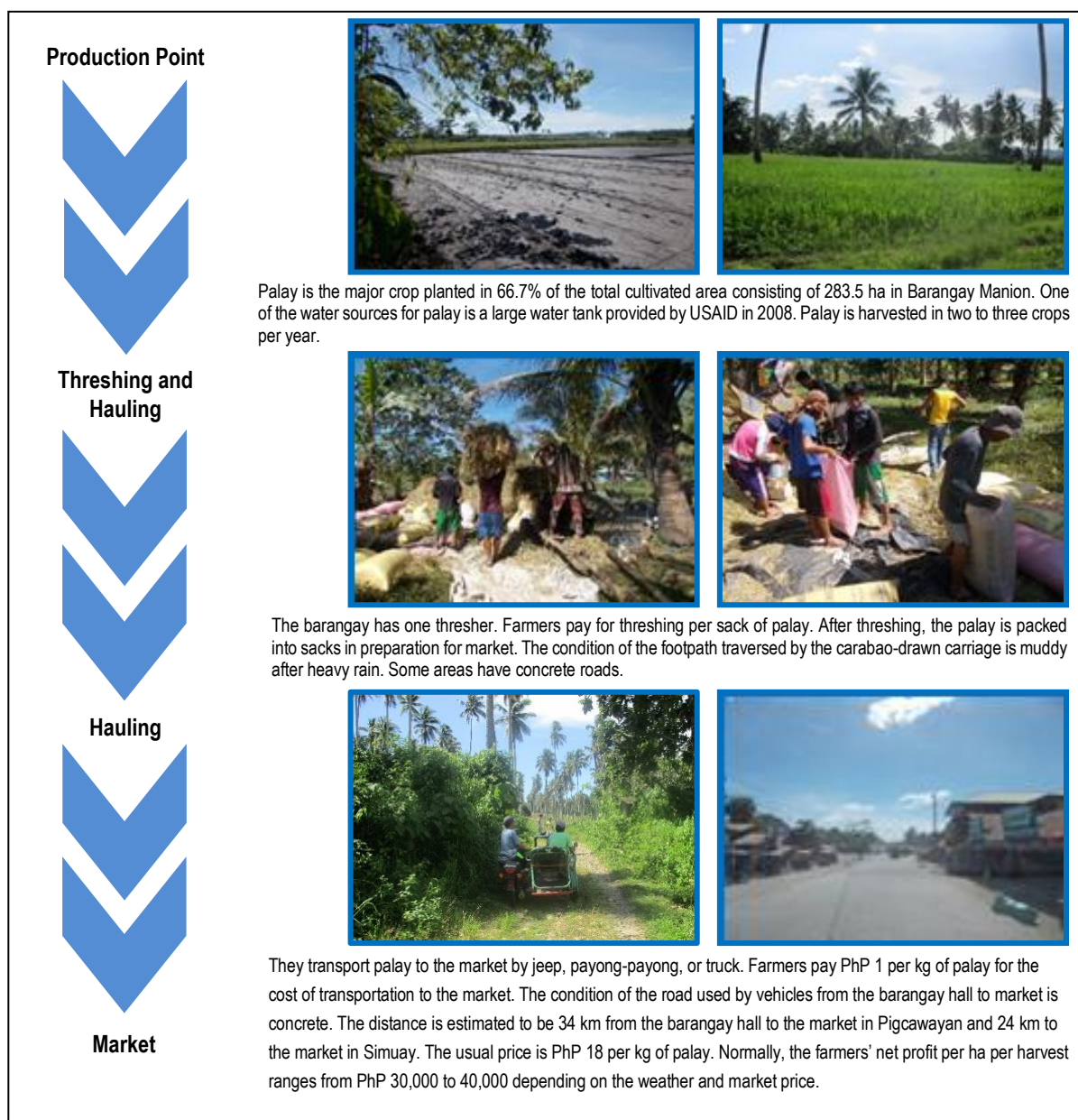


Figure 13.6.6-1 Commodity Flow of Barangay Manion of Parang Municipality

(4) Expected Impacts of Road Construction

The greatest positive impact of the road construction perceived by the survey participants is the easy and speedy transportation of farm products to market and the reduced cost of transportation and labor expenses for farming activities. The road construction is also expected to motivate farmers to grow more crops to generate additional income.

Table 13.6.6-5 Expected Impacts on Agriculture

Subject	Description
Quality and cost of transportation	<ul style="list-style-type: none"> With improved roads, transporting harvested crops to the market would be faster and easier, which would lead to reduced transportation costs.

Subject	Description
Farmers' profits	<ul style="list-style-type: none"> Reduced transportation costs, better access to transportation services and more market choices would increase the profit margins of farmers.
Farm production	<ul style="list-style-type: none"> If greater farm income is realized, farmers would be motivated to produce more crops to achieve better income. Among the 60 household survey respondents, 65.0% indicated plans to intensify farming activities and increase cultivation areas if the road is constructed. Corn and coconut are the favored crops to expand production.

Road construction is also expected to have positive impacts on socio-economic, educational, health and community development. Greater mobility to and from their barangays is good for the children attending school. The road would provide easy access to health clinics and hospitals for emergency cases. It would also ease women's work, particularly in their household responsibilities such as going to the market, securing water and firewood, washing clothes near the river, and sending children to school. The transport costs for the family would be reduced as more vehicles could access the barangays.

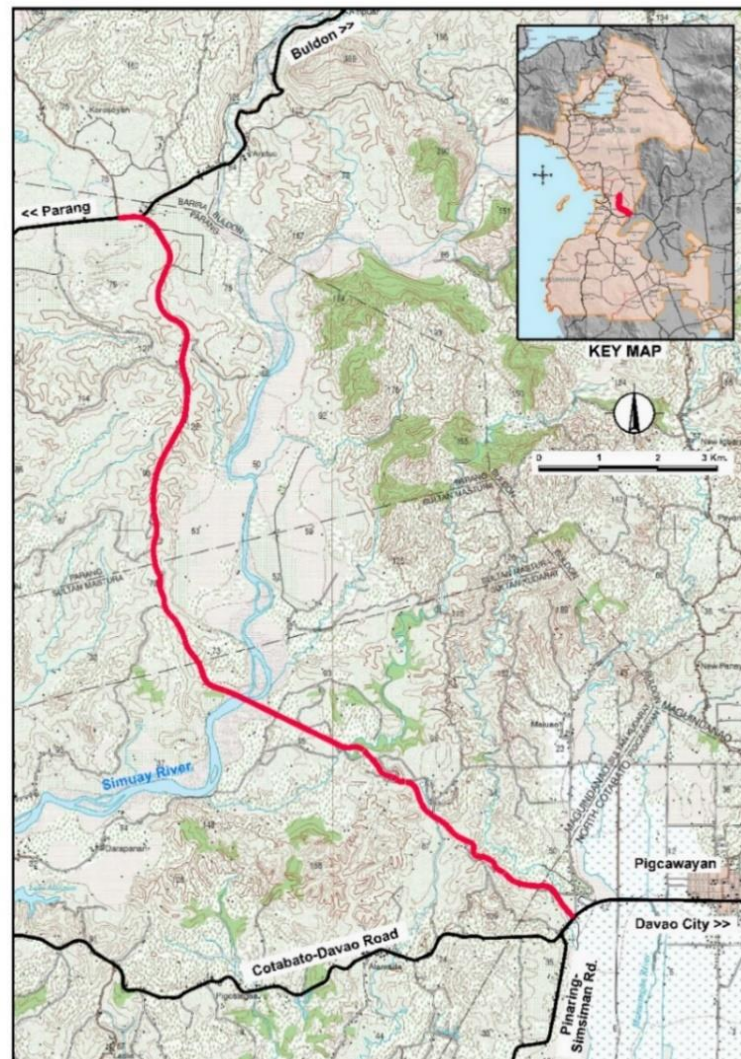
Table 13.6.6-6 Expected Social Impacts

Subject	Description
Health and sanitation	<ul style="list-style-type: none"> Good roads would improve people's access to health facilities such as hospitals in the case of emergencies. Sanitation could also be better maintained because trucks could collect the garbage in the community.
Access to school	<ul style="list-style-type: none"> Walking to school and back home would be much faster and easier with good roads, which would encourage children to attend school.
Women's work	<ul style="list-style-type: none"> Good roads would help women in going to the market, securing water and firewood, washing clothes near the river, and sending children to school. As the number of transport vehicles would increase, this would also reduce transport costs for families. Women's contributions in farming activities would also be enhanced by the road construction. It would be easier for women to go to the farm to plant vegetables and help with farm work. Women would have good opportunities to engage in business and other opportunities for livelihood.
Negative impacts	<ul style="list-style-type: none"> Some families living near the road could be displaced because of the road construction. The number of accidents could increase as traffic increases and vehicles are able to travel on the road with greater speed.

13.7 Sub-Project 9

13.7.1 Outline of the Project

Location	The road is located in the Municipalities of Parang, Sultan Mastura, Sultan Kudarat, and Pigcawayan.
Major Road to connect	<ul style="list-style-type: none"> Connecting AH-26 to Cotabato-Davao Road
Road Description	<ul style="list-style-type: none"> Length: 16.8km Lane and lane width: 2-lane (total); 3.35 m per lane Shoulder width: 1.5 m Classification: National Tertiary Road
Population	<ul style="list-style-type: none"> 8 barangays along the alignment (11,892) 4 municipality: Parang (89,194)+Sultan Mastura (22,261)+Sultan Kudarat (95,201)+Pigcawayan (66,796) = 273,452
Agricultural land use (ha) of the 4 municipalities	<ul style="list-style-type: none"> Annual Crop=10,720 ha Perennial crop=25,386 ha TOTAL=36,106 ha
Current main agricultural crops planted by farmers (2015 data)	<ul style="list-style-type: none"> Oil Palm (25,161 ha) Palay (24,060 ha) Coconut (17,625 ha) Banana (9,925 ha) Coffee (8,893 ha) Corn (3,194 ha)



13.7.2 Objectives of the Project

The objectives of the Manuangan – Parang Road are as follows:

- To form flexible network by linking three primary inter-city roads (Cotabato- Marawi Road, Cotabato- Davao Road, Cotabato- Gen. Santos Road)
- To provide access to agri-industry production areas
- To support the quarrying industry at Simuay River which provides jobs to many people in the area by providing a new route which traverses the upstream section of the river.

13.7.3 Socio-economic Condition of the Project Area

(1) Population and Growth Rate

Maguindanao province in which Sub-Project 9 is located has a total population of 1,173,993, and its population density was 118 persons/km² as of August 2015. The population density of Maguindanao is slightly higher than that of ARMM, but lower than all other regions in Mindanao. The southern end of the alignment of Sub-Project 9 is in North Cotabato province in the SOCCSKSARGEN region. North Cotabato has a total population of 1,379,747, and its population density is 148 persons/km², which is higher than Maguindanao and lower than the average of SOCCSKSARGEN.

Table 13.7.3-1 Population and Population Density of Provinces in ARMM and Mindanao

	Population	Land area (km ²)	Population density (persons/km ²)
Maguindanao	1,173,933	9,968	118
North Cotabato	1,379,747	9,317	148
Mindanao	24,135,775	138,354	174
Region IX – Zamboanga Peninsula	3,629,783	16,904	215
Region X – Northern Mindanao	4,689,302	20,459	229
Region XI – Davao	4,893,318	20,433	239
Region XII – SOCCSKSARGEN	4,545,276	22,786	199
Region XIII - Caraga	2,596,709	21,121	123
ARMM	3,781,387	36,651	103
Philippines	100,981,437	300,000	337

Source: 2015 Census of Population and Housing, Philippine Statistics Authority

Maguindanao province has experienced rapid population growth in recent years. Its annual average growth rate between 2010 and 2015 is 4.22%, which is much higher than 2.18% for Lanao del Sur, 2.89% for ARMM, and 1.79 for Mindanao. On the other hand, North Cotabato province's annual average growth rate for the same period is 2.27%, which is above the average of the SOCCSKSARGEN region and below the average of Maguindanao province. For the longer period of 2000–2015, Maguindanao and North Cotabato have similar annual average growth rates of 2.54% and 2.41%.

Table 13.7.3-2 Population Growth of Provinces in ARMM and Mindanao

	Annual Average Growth Rate of influenced municipalities		
	2000-2010	2010-2015	2000-2015
Maguindanao	1.66%	4.22%	2.54%
North Cotabato	2.49%	2.27%	2.41%
Mindanao	1.89%	1.79%	1.86%
Region IX – Zamboanga Peninsula	1.87%	1.21%	1.64%
Region X – Northern Mindanao	2.06%	1.68%	1.92%

	Annual Average Growth Rate of influenced municipalities		
	2000-2010	2010-2015	2000-2015
Region XI – Davao	1.97%	1.74%	1.89%
Region XII – SOCCSKSARGEN	2.46%	1.94%	2.28%
Region XIII - Caraga	1.49%	1.28%	1.42%
ARMM	1.51%	2.89%	1.98%
Philippines	1.90%	1.72%	1.84%

Note: Annual average growth rate of Mindanao is simple average of annual average growth rate of 6 regions in each period.

Source: 2016 Philippine Statistics Yearbook, Philippine Statistics Authority

Three municipalities in Maguindanao province as well as Pigkawayan municipality of North Cotabato province will be affected by Sub-Project 9. The four municipalities have a total population of 273,452, and an average population density of 127 persons/km². Their population density is higher than the average of Maguindanao province (118 persons/km²) but lower than Sultan Kudarat province (151 persons/km²). The population density of Pigkawayan is much higher than the other three municipalities.

Table 13.7.3-3 Population and Population Density of Municipalities Affected by Sub-Project 9

Province	Municipality	Population	Land area (km ²)	Population density (persons/km ²)
Maguindanao	Parang	89,194	850.78	105
	Sultan Mastura	22,261	242.07	92
	Sultan Kudarat	95,201	712.91	134
North Cotabato	Pigkawayan	66,796	340.11	196
Total		273,452	2,145.87	127

Source: 2015 Census of Population and Housing, Philippine Statistics Authority

With regard to population growth, the four municipalities have various trends. For the more recent years between 2010 and 2015, the annual average growth rate of Parang, Sultan Kuradat and Pigkawayan range from 2 to 4%. Sultan Mastra has the highest growth rate at 3.16% between 2000 and 2010, but the lowest growth rate at 0.5% between 2010 and 2015.

Table 13.7.3-4 Population Growth of Municipalities Affected by Sub-Project 9

Province	Municipality	Annual Average Growth Rate		
		2000-2010	2010-2015	2000-2015
Maguindanao	Parang	1.87%	4.00%	2.57%
	Sultan Mastura	3.16%	0.50%	2.26%
	Sultan Kudarat	-1.36%	2.84%	0.02%
North Cotabato	Pigkawayan	1.63%	2.18%	1.81%
Average		0.66%	2.84%	1.38%

Source: Various Statistics Report, Philippine Statistics Authority

The alignment of Sub-Project 9 passes through eight barangays in four municipalities. The total population of the eight barangays is 11,892. All eight barangays have a relatively homogeneous population size. The largest population is 2,465 in Matengen of Sultan Kudarat municipality, while the smallest population is 700 in Nekitan of the same municipality.

Table 13.7.3-5 Population of Barangays along the Alignment of Sub-Project 9

Province	Municipality	Barangay	Population
Maguindanao	Parang	1 Gadungan	1,547
		2 Orandang	1,330
		3 Kabuan	1,278
	Sultan Mastura	4 Bungabong	1,167
	Sultan Kudarat	5 Olas	943

Province	Municipality	Barangay		Population
North Cotabato	Pigcawayan	6	Nekitan	700
		7	Matengen	2,465
		8	North Manuangan	2,462
Total				11,892

Source: 2015 Census of Population and Housing, Philippine Statistics Authority

(2) Income and Expenditure

According to the Family Income and Expenditure Survey 2012 by the Philippines Statistics Authority, income and expenditure estimates for Maguindanao province are PhP 108,170 and PhP 106,330 respectively.

For North Cotabato province, income and expenditure estimates are PhP 149,739 and PhP 126,934 respectively. These estimates for North Cotabato are higher than those of Maguindanao, but lower than the average of the SOCCSKSARGEN region.

Table 13.7.3-6 Average Income and Expenditure Estimates in 2012 for Regions and Provinces

	Average income estimates (PhP)	Average expenditure estimates (PhP)
Maguindanao	108,170	106,330
North Cotabato	149,739	126,934
Mindanao		
Region IX – Zamboanga Peninsula	161,451	116,224
Region X – Northern Mindanao	189,158	137,298
Region XI – Davao	196,023	152,622
Region XII – SOCCSKSARGEN	165,214	137,923
Region XIII - Caraga	181,016	138,789
ARMM	129,350	112,342
Philippines	234,129	185,252

Source: Family Income and Expenditure Survey 2012, Philippine Statistics Authority

(3) Poverty Incidence

The poverty incidence for Maguindanao is 54.6% in 2006. It has come down to 52.2% in 2009, has increased to 63.7% in 2012, and has declined again to 57.2% in 2015. It has always been higher than the poverty incidence for ARMM and for any other regions of Mindanao. More than half of the population of Maguindanao province has been in poverty throughout the period. On the other hand, the poverty incidence for North Cotabato has been much lower than Maguindanao. It is 31.4% in 2006, 30.6% in 2009, has increased to 52.4% in 2012, and declined to 41.4% in 2015. The poverty incidence of North Cotabato after 2012 has been higher than the average of SOCCSKSARGEN.

Table 13.7.3-7 Poverty Incidence of Provinces in ARMM and Mindanao

	Annual Per Capita Poverty Threshold (PhP)				Poverty incidence among population Estimate (%)			
	2006	2009	2012	2015	2006	2009	2012	2015
Maguindanao	12,877	16,701	18,873	21,423	54.6	52.2	63.7	57.2
North Cotabato	12,077	14,862	18,340	20,555	31.4	30.6	52.4	41.4
Mindanao								
Region IX – Zamboanga Peninsula	12,743	16,260	18,054	20,925	45.0	45.8	40.1	33.9
Region X – Northern Mindanao	12,917	16,878	19,335	22,345	39.0	40.1	39.5	36.6
Region XI – Davao	13,389	17,120	19,967	22,754	30.6	31.4	30.7	22.0
Region XII – SOCCSKSARGEN	13,319	16,405	18,737	21,025	37.9	38.3	44.7	37.3
Region XIII - Caraga	14,324	18,309	19,629	22,570	49.2	54.4	40.3	39.1

	Annual Per Capita Poverty Threshold (PhP)				Poverty incidence among population Estimate (%)			
	2006	2009	2012	2015	2006	2009	2012	2015
ARMM	12,647	16,683	20,517	21,563	47.1	47.4	55.8	53.7
Philippines	13,357	16,871	18,935	21,753	21.0	20.5	19.7	16.5

Source: Official Poverty Statistics of the Philippines Full Year 2015, Philippine Statistics Authority

For the poverty incidence at the municipality level, the data are derived from the National Color-Coded Agricultural Guide Map of the Department of Agriculture, which contains a municipal poverty database created in 2010. The poverty incidence for the four municipalities ranges from 41.90% for Pigkawayan to 74.00% for Parang.

Table 13.7.3-8 Poverty Incidence of Municipalities Affected by Sub-Project 9

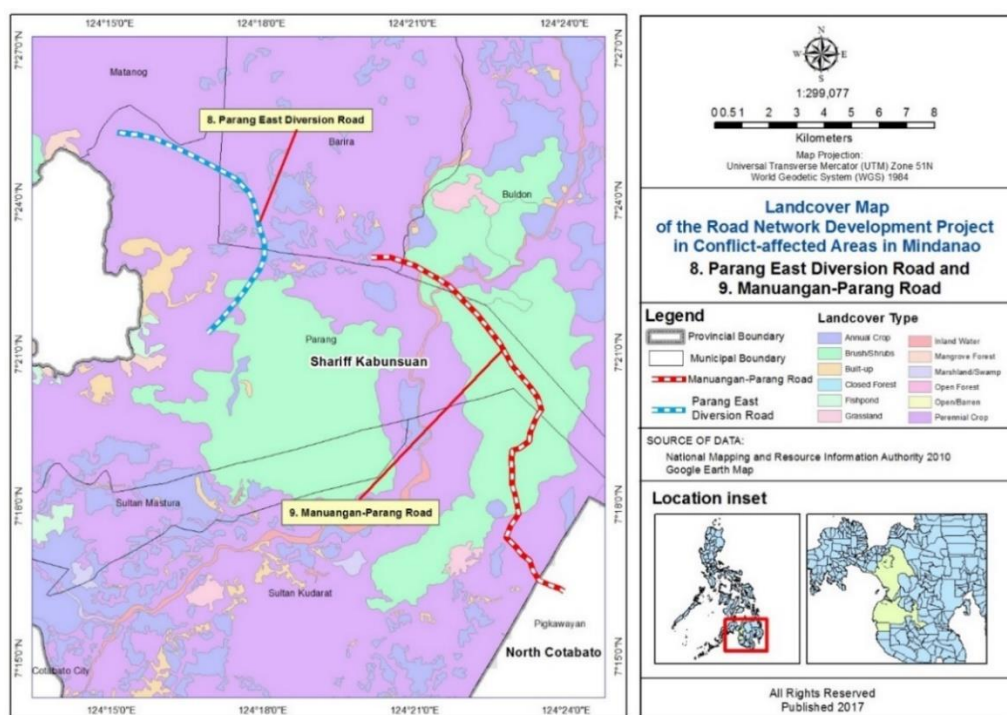
Province	Municipality	Poverty
	Parang	74.00%
	Sultan Mastura	62.80%
	Sultan Kudarat	54.70%
North Cotabato	Pigkawayan	41.90%
Average		58.53%

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

13.7.4 Agricultural Production and Potentials of the Area

(1) Agricultural Land Use and Land Holdings

The land cover map, which was developed based on the National Mapping and Resource Information Authority's 2010 Google Earth Map, shows the land cover of the municipalities affected by Sub-Project 9. There is a long area covered by brush/shrubs stretching from the north to the south along the alignment. Areas east and west of the brush/shrubs land are covered mainly by perennial crops.



Source: National Mapping and Resource Information Authority 2010 Google Earth Map

Figure 13.7.4-1 Landcover Map of Municipalities Affected by Sub-Project 8 and 9

For the municipalities of Maguindanao province, excluding Sultan Mastura for which information is not available, the areas covered by perennial crops are much larger than areas covered by annual crops. In Pigkawayan, on the other hand, areas covered by annual crops and areas covered by perennial crops are essentially balanced.

Table 13.7.4-1 Agricultural Land Use of Municipalities Affected by Sub-Project 9

(Unit: ha)

Province	Municipality	Annual crop	Perennial crop	Total
	Parang	663	9,500	10,162
	Sultan Mastura	n/a	n/a	n/a
	Sultan Kudarat	4,669	11,699	16,368
North Cotabato	Pigkawayan	5,389	4,187	9,576
Total		10,720	25,386	36,106

Source: National Mapping and Resource Information Authority 2010 Google Earth Map

Although information is incomplete for the four municipalities, there are many “farmers, fisherfolk, laborers” in Parang. Parang also has over 4,000 full-time “farmers” and “farmers, fisher folks.” As for land holdings, among the three municipalities except for Pigkawayan, the most popular category is “owners, tenants” who cultivate their own land as well as leased land.

Table 13.7.4-2 Farmers and Holding of Municipalities Affected by Sub-Project 9

Province	Municipality	Farmers	Fisherfolks	Laborers	Farmers, Fisherfolks	Farmers, Fisherfolks, Laborers	Owners	Owners, Tenants	Tenants
Maguindanao	Parang	4,228	201	7,619	4,429	12,048	1,364	2,093	729
	Sultan Mastura	n/a	n/a	n/a	n/a	n/a	1,985	2,927	942
	Sultan Kudarat	n/a	n/a	n/a	n/a	n/a	1,689	3,257	1,568
North Cotabato	Pigkawayan	6,849	2,018	n/a	n/a	n/a	n/a	n/a	n/a
Total		11,077	2,219	7,619	4,429	12,048	5,038	8,277	3,239

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

(2) Agricultural Production

The table below is a summary of areas planted with crops in the three municipalities based on two sources. The Department of Agriculture of Maguindanao Province provided the information about all the crops. The Philippine Coconut Authority of ARMM provided the information about coconuts and oil palms. Among the three municipalities excluding Pigkawayan, coconuts have by far the largest planted areas close to 20,000ha. Parang and Sultan Kudarat are two major municipalities with coconut plantations. For annual crops, Sultan Kudarat has over 1,000ha of irrigated palay and yellow corn.

Table 13.7.4-3 Areas Planted by Crops inha in Municipalities Affected by Sub-Project 9

(Unit: ha)

Province	Municipality	Annual crop					
		Irrigated palay	Rainfed palay	Upland palay	White corn	Yellow corn	Vegetables
Maguindanao	Parang	334	303	814	132	605	
	Sultan Mastura	466	451	354	101	440	87
	Sultan Kudarat	518	1,341	166	771	1,124	19
North Cotabato	Pigkawayan	n/a	n/a	n/a	n/a	n/a	n/a
Total		1,318	2,095	1,334	1,004	2,169	106

Province	Municipality	Perennial crop							
		Banana	Coconut	Mango	Coffee	Rubber	Oil palm	Durian	Jackfruit
Maguindanao	Parang	31	12,851	35	20			12	
	Sultan Mastura	73		46	16		44	56	
	Sultan Kudarat	630	6,711	44			136		
North Cotabato	Pigkawayan	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total		734	19,562	125	36	-	180	68	-

Source: Department of Agriculture of Maguindanao Province, Department of Agriculture of Lanao del Sur Province, Philippine Coconut Authority ARMM for coconut and oil palm

(3) Suitable and Potential Area for Crop Production

The National Color-Coded Agricultural Guide Map provides information about suitable areas for crop production in the four municipalities. Oil palm production has the largest suitable area at 25,161ha, followed by palay, coconuts, bananas and coffee. For the nine barangays, oil palm production still has the largest suitable area followed by coffee and bananas. All the barangays except for North Manuangan of Pigkawayan municipality have suitable areas for coffee. Also, all of the barangays except for Gadungan of Parang municipality have suitable areas for bananas.

Table 13.7.4-4 Suitable Areas in Hectare for Crop Production in Municipalities Affected by Sub-Project 9

(Unit: ha)

Province	Municipality	Palay	Corn	Banana	Coconut	Coffee	Oil palm
Maguindanao	Parang	3,486	893	4,277	5,046	4,277	11,201
	Sultan Mastura	2,298	546	1,330	1,808	1,330	1,772
	Sultan Kudarat	10,057	866	3,285	7,142	3,285	12,189
North Cotabato	Pigkawayan	8,220	889	1,032	3,629	n/a	n/a
Total		24,060	3,194	9,925	17,625	8,893	25,161

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

Table 13.7.4-5 Suitable Areas in Hectare for Crop Production in Barangays along the Alignment of Sub-Project 9

(Unit: ha)

Province	Municipality	Barangay		Palay	Corn	Banana	Coconut	Coffee	Oil palm
Maguindanao	Parang	1	Gadungan		76			593	
		2	Orandang	654	209	731		731	
		3	Kabuan	103	53	320	709	320	741
	Sultan Mastura	4	Bungabong	163	110	373	373	373	426
		5	Olas	95	64	64	70	64	202
	Sultan Kudarat	6	Nekitan	199	37	44	44	44	251
		7	Matengen	30		657	657	657	1,050
North Cotabato	Pigcawayan	8	North Manuangan	101	40	40	45		
Total				1,344	588	2,229	1,898	2,782	2,670

Source: Godilano, E.C. (2017). Department of Agriculture. Integrated Climate Change and Geospatial Information Systems (ICCGIS). Adaptation and Mitigation Initiative in Agriculture (AMIA) Project 1.

On the other hand, the Department of Agriculture of Maguindanao Province identifies potential areas for expanding crop cultivation in Sultan Mastra and Sultan Kudarat. For Sultan Mastra, palay and corn have large potential areas of 4,841ha and 4,843ha respectively. For Sultan Kudarat, in contrast, high value crops which may include oil palms, coffee and bananas, are allocated 1,529ha.

Table 13.7.4-6 Potential Areas in Hectare for Crop Production in Municipalities Affected by Sub-Project 9

(Unit: ha)

Province	Municipality	Irrigated palay	Rainfed palay	Upland palay	All palay	Corn	High value crops	Total
Maguindanao	Parang							
	Sultan Mastura		2,908	1,933	4,841	4,843		9,684
	Sultan Kudarat	42	1,262	263	1,567	406	1,529	3,502
Total		42	4,170	2,196	6,408	5,249	1,529	13,186

Source: Department of Agriculture of Maguindanao Province

13.7.5 Result of the Social Survey

(1) Overview of the Survey

Three surveys were undertaken to gain a better understanding of the socio-economic conditions of the communities in barangays along the alignment of Sub-Project 9. The survey results are summarized below to present coherent information on the communities along the road alignment, highlighting their current socio-economic condition, farming practices, and perception on the impacts of the road project.

Table 13.7.5-1 Surveys Carried Out

Survey type	Number of observations	Description
(i) Household interview survey	20 households x 8 barangays = 160 households	A two-page questionnaire is used for the interview to collect basic information on living conditions such as family income and expenditure, sources of livelihood, and farming practices.
(ii) Focus group discussion	3 groups x 8 barangays	Participants are divided into three groups: youth, women, and household heads. A one-page guide is used to facilitate discussions on current road conditions and the expected impacts of road construction.
(iii) Barangay captain interview	8 barangay captains	A one-page questionnaire is used to collect information on agricultural production, marketing, and related activities.

(2) Socio-economic Condition of the Communities along the Road Alignment

The socio-economic characteristics of the communities along the alignment of Sub-Project 9 are summarized based on the household survey.

Table 13.7.5-2 Characteristics of Household Survey Respondents

Variable	Description
Age and Sex	<ul style="list-style-type: none"> The respondents' ages range from 15 to 92, with a mean age of 42.6 years. 150 (93.8%) of the respondents are male, and 10 (6.3%) female.
Years of residency	<ul style="list-style-type: none"> Many of the respondents have lived in the community for more than 40 years. The majority has lived in their community since birth.
Number of family members	<ul style="list-style-type: none"> Family size is large: 42% of the households have 4 to 6 members, and 36% have 7 or more members.

Variable	Description
Ethnicity	<ul style="list-style-type: none"> The largest ethnic group is Iranun (70.6%), followed by Maguindanao (15.0%), Ilonggo (10.6%), and others (1.3%).
Religion	<ul style="list-style-type: none"> The dominant religion is Islam (88.1%), followed by Catholicism (11.9%).
Education attainment	<ul style="list-style-type: none"> 60.0% of the respondents have finished the elementary level, and 19.4% have reached the high school level.
Source of drinking water	<ul style="list-style-type: none"> The major sources of drinking water are open dug wells (40.6%), communal or hand-pump wells (25.0%), and spring/river/rain (23.1%).
Household income	<ul style="list-style-type: none"> 65.0% of the households have a monthly income of less than PhP 9,000, which is far below PhP 21,423, the annual per capita poverty threshold of Maguindanao province in 2015. The majority of the respondents (87.5%) earn their income from agriculture.

(3) Agricultural Practices of the Communities

Barangays along the alignment of Sub-Project 9 are agricultural communities. Farming is the major source of income, and fishery is not a means of livelihood in the area. Engagement in non-farm livelihood sources is a means for families to subsist while waiting for the crops to be ready for harvest. For those engaged in farming, corn, palay, and coconut are the major cash crops. Corn farming in the area is generally active and in uptrend. In fact, some of the barangays are top producers of corn in the Autonomous Region in Muslim Mindanao (ARMM).

However, constraints on agriculture overwhelm most barangays in the area. Aside from the usual problems of pest infestation and high cost of farm inputs, farmers face the high transport cost attributable to distant farms and poor and rough road conditions. A large portion of the post-harvest sales is bound to pay for high-interest bearing loans incurred during the production phase.

Table 13.7.5-3 Characteristics of Farm Production

Subject	Description
Farmland size	<ul style="list-style-type: none"> The total land under cultivation in eight barangays along the alignment of Sub-Project 9 is 9,612 ha. Among the 111 household survey respondents who cultivate crops, the size of cultivated land ranges from 0.5 to 5 ha with the mean of 1.7 ha. More than half of the respondents cultivate 1 ha or less. Most of the household survey respondents have some potential farmlands. The main reason that those lands are not cultivated is financial constraints. They lack funds for necessary inputs to grow crops.
Farmland tenure	<ul style="list-style-type: none"> Among the 136 household survey respondents who use farmland, 55.1% farm their own land, 33.1% are tenant farmers, and 11.8% have other arrangements. Among the 75 respondents who farm their own land, 48.0% have Torrens title, 6.7% have inherited the land, 41.3% have verbal agreement, and 4.0% have other arrangements.
Types of crops	<ul style="list-style-type: none"> Corn, both yellow and white varieties, is widely cultivated in all but one barangay in a palay producing area. The majority of the household survey respondents who produce corn harvest three crops per year.

	<ul style="list-style-type: none"> Palay is cultivated in all barangays. Upland and rain-fed palay have more areas than irrigated palay. Most of the household survey respondents who produce palay harvest irrigated palay twice a year and rain-fed palay once a year. Coconut is intercropped with corn, although not in all barangays. Banana is the most planted minor crop along with vegetables and other fruits
Constraints	<ul style="list-style-type: none"> High cost of farm inputs and lack of financial resources are the major constraints, which tend to make farmers resort to credits with excessive interest rates. Pests and unstable weather conditions cause damage to the crops.

The majority of harvested crops are delivered to markets in the neighboring towns of Simuay and Tapayan as well as the nearby municipalities of Pigcawayan, Libungan, and Midsayap. Only a few farmers deliver their harvest directly to Cotabato City. Because of lack of local buyers, farmers transport the crops to the barangay center, and from there to markets. In marketing, the largest expense pertains to labor and transport. It is costly to transport, load, and unload crops by manual labor, especially when the road is muddy and slippery. It is also expensive to ship crops by horse and mechanized vehicles because farms are distant and roads are rough.

Table 13.7.5-4 Characteristics of Marketing of Farm Products

Subject	Description
Crop types	<ul style="list-style-type: none"> Corn, palay and coconut are the major cash crops from which most people in the barangays derive their agricultural income. Among the 114 household survey respondents, 100 farmers earn income from corn, 10 from palay, 9 from coconut, and 8 from others including banana, other fruits, and vegetables. Some farmers have income from multiple crops.
Post-harvest treatment	<ul style="list-style-type: none"> After corn is harvested, corn cob is transported from farm to corn shellers where corn is shelled, dried and stored before being transported to markets. After the harvest of palay, paddy is transported from farm to threshers. Rice harvesters are used only by those who can bear the cost. After threshing, paddy is transported to markets.
Market location	<ul style="list-style-type: none"> Most of harvested crops are delivered to markets in the neighboring towns of Simuay and Tapayan; and in the nearby municipalities of Pigcawayan, Libungan and Midsayap. Only a few farmers deliver their crops directly to Cotabato City. For corn and palay, Parang and Pigcawayan are two major markets. Among the 101 household survey respondents who transport corn, the distance from farm to market ranges from 1 to 35 km with the average of 16.4 km.
Transportation arrangements	<ul style="list-style-type: none"> Farmers in all but one barangay take the harvested crops directly to the markets, bearing all the costs incurred in the transport process. In one barangay, farmers and a local buyer meet at the barangay center that serves as a drop-off point for the farmers.
Means of transportation	<ul style="list-style-type: none"> Transport by horse is common in all barangays except one. Horses are mostly used as a means of transportation from farm areas to the barangay center where mechanized vehicles await harvested crops. Mechanized vehicles that take harvested crops to the markets are mostly trucks, jeepneys, and multi-cabs. Other means are single motorcycles and motor-sidecars that are locally known as payong-payong.

Subject	Description
Crop types	<ul style="list-style-type: none"> • Corn, palay and coconut are the major cash crops from which most people in the barangays derive their agricultural income. • Among the 114 household survey respondents, 100 farmers earn income from corn, 10 from palay, 9 from coconut, and 8 from others including banana, other fruits, and vegetables. Some farmers have income from multiple crops.
Constraints	<ul style="list-style-type: none"> • Poor road condition and high transportation cost are the major causes of reducing farmers' profits from the crops. • Inadequate post-harvest facilities such as millers, dryers and storages are also identified as constraints.

The following shows the flow of corn from farm areas in Barangay Orandang of Parang Municipality to the market of Parang. The other barangays along the alignment of Sub-Project 9 have a similar flow of corn and palay from farm areas to markets.



Figure 13.7.5-1 Commodity Flow of Barangay Orandang of Parang Municipality

(4) Expected Impacts of Road Construction

The greatest positive impact of the road construction expected by the survey participants is benefits to agriculture. With improved roads, it would be faster and easier to transport harvested crops to the market, and spoilage and spillage would likely decrease. Good roads would encourage transport services to open routes to the barangays, increasing access and options for the farmers in the area and eventually decreasing the transportation cost. All this would increase the profit margin of farmers, and encourage them to be more productive and innovative.

Table 13.7.5-5 Expected Impacts on Agriculture

Subject	Description
Transportation cost	<ul style="list-style-type: none"> With improved roads, transporting harvested crops to the market would be faster and easier, which would lead to reduced transportation cost. Spillage during transport would decrease, and spoilage due to travel delays would decline.
Access to transport services and markets	<ul style="list-style-type: none"> Good roads would encourage transport services to open routes to the barangays, increasing access and options for the farmers in the area. Competition among service providers would also lower transportation cost. Competing bulk buyers would be encouraged to come to the barangays, rather than the farmers bringing their crops to the buyers.
Farmers' profits	<ul style="list-style-type: none"> Reduced transportation cost, better access to transportation services, and more market choices would increase the profit margin of farmers. Savings derived from the reduced costs and increased profits might be used to address immediate subsistence needs.
Farm production	<ul style="list-style-type: none"> When greater farm income is realized, farmers tend to increase cultivation by using potential farmlands that are currently left idle. The majority of the household survey respondents indicated plans to intensify farming activities and increase cultivation areas if the road is constructed. Corn and coconut are the top crops that most farmers in all barangays intend to increase production.
Government support	<ul style="list-style-type: none"> Improved roads, active farmers, and higher productivity would encourage government agencies to support farming and provide post-harvest facilities such as solar dryers, storage facilities, and corn shellers.

Better access to basic social services is likewise seen as a positive impact of road construction. Road construction would improve access to safe drinking water and health services, which would greatly benefit the community. Second is the impact on education. Road improvement would encourage children to attend school because travel to and from school would be easier. It would also bring children back to live with their families instead of staying in boarding houses. Women too would find good roads beneficial as they carry out marketing duties; domestic duties such as going to water sources to fetch water and doing the laundry; and attending school meetings, barangay meetings, and consultations. In general, the survey participants see better lives with better roads.

Table 13.7.5-6 Expected Social Impacts

Subject	Description
Health	<ul style="list-style-type: none"> • Good roads may help save lives if pregnant women, delivering mothers and sick people in the area could be easily transported to nearest medical care centers, particularly at night. • Health workers may be able to visit the area more frequently. • Access to safe drinking water may increase. Delivery tankers may be encouraged to go to the area more frequently to serve the community needs. • There would be less knee-deep mud that causes skin irritations. Road dust might also decrease.
Access to school	<ul style="list-style-type: none"> • Walking to school and back home would be much faster and easier with good roads, which would encourage children to attend school. • Good roads would bring children back to live with their families. School children would no longer need to stay in boarding houses in the Poblacion areas. This would reduce family expenses in education. • Road construction might be an opportunity for school building improvements and recruiting more teachers to the area.
Women's work	<ul style="list-style-type: none"> • Water sources for most people in the area are either open dug wells or communal and hand-pump wells. With good roads, women could use transportation to water sources instead of walking with water containers or laundry. • Access to transportation would also make it easier to deliver their crops to the market. • Increased mobility would allow women to perform social duties such as attending school meetings and barangay meetings. Better roads would promote women's involvement in community functions.
Negative impacts	<ul style="list-style-type: none"> • Women and youth are apprehensive that the road construction might generate negative effects including the following: possible occurrence of drag racing, vehicular accidents involving children, corruption during the construction phase, and increased access by the military which might provoke resistance from anti-government groups and lawless elements. The last one might undermine peace and stability in the area. • Survey participants suggested placing road signs and warnings, forbidding drag racing, and preventing children from playing alongside the road.