

Republic of the Union of Myanmar  
Foreign Economic Relations Department, Ministry of Planning and Finance  
Department of Highways, Ministry of Construction  
Department of Bridges, Ministry of Construction  
Department of Rural Road Development, Ministry of Construction  
Electricity Supply Enterprise, Ministry of Electricity and Energy  
Department of Rural Development, Ministry of Agriculture, Livestock and Irrigation

# Data Collection Survey on Regional Infrastructure in Myanmar Final Report (Executive Summary)

January 2019

Japan International Cooperation Agency (JICA)

Yachiyo Engineering Co., Ltd.  
Oriental Consultants Global Co., Ltd.  
RECS International Inc.

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# Table of Contents

## Abbreviation

Chapter 1 Introduction .....	ES-1
1.1 Background of the Data Collection Survey .....	ES-1
1.2 Objective and Outcome of the Survey .....	ES-1
1.3 Target Areas of the Survey .....	ES-1
Chapter 2 Current Situation of Regional Development and Infrastructure Development.....	ES-1
2.1 Condition of Basic Infrastructure.....	ES-1
2.2 Status of Regional development related Government Agencies in Myanmar .....	ES-2
2.3 Procedure and financial capacity for repayment of external loan.....	ES-4
Chapter 3 Evaluation of Sub-Projects .....	ES-5
3.1 Long List.....	ES-5
3.2 Method for Sub-Projects Evaluation.....	ES-5
3.3 Rules for Changing and Substituting Sub-Projects.....	ES-9
3.4 Shortlist (Tentative) .....	ES-11
Chapter 4 Necessity of Infrastructure Development and Recommendations toward the Project Implementation based on the Lessons Learned.....	ES-23
4.1 Lessons learnt from the Plans and Projects in Previous Years .....	ES-23
4.2 Recommendation for Project Implementation.....	ES-24
4.3 Expected Development Effect through the Project .....	ES-28
4.4 Issues of Concern towards the Project Implementation .....	ES-29
4.5 Community Development and Gender Considerations.....	ES-29
Chapter 5 Road and Bridge Sector.....	ES-31
5.1 Outline of Sub-Projects .....	ES-31
5.2 Project Schedule.....	ES-31
5.3 Procurement Plan .....	ES-32
5.4 Organization for Implementation .....	ES-32
5.5 Consulting Service .....	ES-32
5.6 Necessity and Recommendation based on the Lessons learnt.....	ES-32
Chapter 6 Power Supply (On-Grid) Sector.....	ES-33
6.1 Outline of Sub-Projects.....	ES-33
6.2 Project Schedule.....	ES-33
6.3 Procurement Plan .....	ES-33
6.4 Organization for Implementation.....	ES-34
6.5 Consulting Services .....	ES-35
6.6 Necessity and Recommendation based on the Lessons learnt .....	ES-35
Chapter 7 Water Supply Sector .....	ES-35
7.1 Outline of Sub-Projects.....	ES-35
7.2 Project Schedule.....	ES-36
7.3 Procurement Plan .....	ES-36
7.4 Organization for Implementation.....	ES-37
7.5 Consulting Service.....	ES-38
7.6 Necessity and Recommendation based on the Lessons learnt .....	ES-38

## List of Figures

Figure 2.1 : Organizational Structure of MoPF .....	ES-2
Figure 2.2 : Organizational Structure of Ministry of Construction (MOC) .....	ES-3
Figure 2.3 : Organizational Structure of Ministry of Electricity and Energy (MoEE).....	ES-4
Figure 2.4 : Organizational Structure of Department of Rural Development (DRD).....	ES-4
Figure 3.1 : Screening Sub-Projects within 50 km radius of the Growth Poles.....	ES-7
Figure 3.2 : Screening Sub-Projects within 20 km radius of the Growth Poles.....	ES-7
Figure 3.3 : Location of Regional Road and Bridge Sub-Projects (Shortlist, tentative).....	ES-14
Figure 3.4 : Location of Rural Road and Bridge Sub-Projects (Shortlist, tentative) .....	ES-15
Figure 3.5 : Location of Power Supply (On-Grid) Sub-Projects (Shortlist, tentative).....	ES-16
Figure 3.6 : Location of Regional Water Supply Sub-Projects (Shortlist, tentative) .....	ES-17
Figure 3.7 : Location of Sub-Projects in Kayin State (Shortlist, tentative) .....	ES-18
Figure 3.8 : Location of Sub-Projects in Mon State (Shortlist, tentative).....	ES-19
Figure 3.9 : Location of Sub-Projects in Rakhine State (shortlist, tentative).....	ES-20
Figure 3.10 : Location of Sub-Projects in Chin State (Shortlist, tentative) .....	ES-21
Figure 3.11 : Location of Sub-Projects in Tanintharyi Region (Shortlist, tentative).....	ES-22
Figure 4.1 : Project Implementation Structure (proposed).....	ES-25
Figure 4.2 : Maintenance Management System of DOH, DOB and DRRD.....	ES-25
Figure 4.3 : Maintenance Management Structure of Electricity Supply Enterprise .....	ES-26
Figure 4.4 : Maintenance Management System of Department of Rural Development .....	ES-26
Figure 4.5 : Relevance of the Project to Regional Development .....	ES-29
Figure 5.1 : Project Schedule of Road and Bridge Sub-Projects (tentative).....	ES-31
Figure 5.2 : Procurement Flow for Road and Bridge Sector.....	ES-32
Figure 6.1 : Project Schedule of Power Supply Project (tentative).....	ES-33
Figure 6.2 : Flow chart of Procurement for Power Supply Project.....	ES-34
Figure 6.3 : Organization Chart for Implementation of Power Supply Sub-Project (On-Grid)....	ES-34
Figure 7.1 : Schedule of the Sub-Project for Water Supply Sector (tentative).....	ES-36
Figure 7.2 : Procurement flow of water supply sector .....	ES-37
Figure 7.3 : Implementation Structure of Sub-Project for Water Supply Sector.....	ES-38

## List of Tables

Table 2.1 : Status of Infrastructure Development in each State and Region.....	ES-2
Table 3.1 : Number of Sub-Projects in the Long list as of July 2018 .....	ES-5
Table 3.2 : Evaluation Perspectives of Data Collection Survey.....	ES-5
Table 3.3 : Evaluation and Scoring of Sub-Projects for Ranking .....	ES-8
Table 3.4 : Evaluation Criteria for “Needs and Urgency” for each Sector .....	ES-9
Table 3.5 : Evaluation Criteria for “Feasibility” for each Sector .....	ES-9
Table 3.6 : Rules for Changing and Substituting Sub-Projects .....	ES-10
Table 3.7 : Outline of the Shortlist (tentative) (by State and Region).....	ES-11
Table 3.8 : Outline of the Shortlist (tentative) (by Sector).....	ES-11
Table 3.9 : Sub-Projects in the Shortlist (tentative) .....	ES-11
Table 4.1 : Responsibilities of PMU, PCS (tentative).....	ES-27
Table 4.2 : Gender Considerations in Infrastructure Development.....	ES-30
Table 5.1 : Shortlist of Road and Bridge Sector Sub-Projects (expected) .....	ES-31
Table 7.1 : Major Components of Sub-Projects (tentative).....	ES-35

## Abbreviation List

A	: Ampere
AADT	: Annual Average Daily Traffic
ABC	: Aerial Bundled Cable
ABSDF	: All Burma Students' Democratic Front
AC	: Alternating Current
ACSR	: Aluminum Conductor Steel Reinforced
ADB	: Asian Development Bank
AIS	: Air Insulated Switchgear
ALP	: Arakan Liberation Party
AMDA	: Association of Medical Doctors of Asia
A-RAP	: Abbreviated Resettlement Action Plan
ASEAN	: Association of South-East Asian Nations
Aus AID	: Australia Agency for International Development
BOD	: Biological Oxygen Demand
BOQ, BQ	: Bill of Quantity
BOT	: Build Operation and Transfer
CB	: Circuit Breaker
CBI	: Capacity Building Initiative
CBO	: Community Based Organization
CDZ	: Central Dry Zone
CESID	: Central Equipment Statistics & Inspection Department
CFC	: Compensation Fixation Committee
CNF	: Chin National Front
COD	: Chemical Oxygen Demand
CSOs	: Civil Society Organizations
CSO	: Central Statistics Office
CT	: Current Transformer
DACU	: Development Assistance Coordination Unit
D/D	: Detailed Design
DC	: Direct Current
DDA	: Department of Development Affairs
DFID	: Department for International Development
DHSHD	: Department of Human Settlement and Housing Development
DICA	: Directorate of Investment and Company Administration
DKBA	: Democratic Karen Buddhist Army
DO	: Dissolved Oxygen
DOB	: Department of Bridges
DOH	: Department of Highways
DPTSC	: Department of Power Transmission and System Control
DRD	: Department of Rural Development
DRRD	: Department of Rural Road Development
DS	: Disconnecting Switch
EC	: Executive Committee
ECD	: Environmental Conservation Department

EcoDev	: Economically Progressive Ecosystem Development
EIA	: Environmental Impact Assessment
EMOP	: Environmental Monitoring Plan
EMP	: Environmental Management Plan
ES	: Earthing Switch
ESE	: Electricity Supply Enterprise
EW	: Earthing Wire
EWEC	: East West Economic Corridor
F/S	: Feasibility Study
FERD	: Foreign Economic Relations Department
FSWG	: Food Security Working Group
GAD	: General Administration Department
GCB	: Gas Circuit Breaker
GDP	: Gross Domestic Product
GEN	: Gender Equality Network
GI	: Galvanized Iron
GIS	: Gas Insulated Switchgear
GoM	: Government of Myanmar
GMS	: Greater Mekong Sub-region
GRDP	: Gross Regional Domestic Product
GRO	: Grievance Redress Officer
HDBC	: Hard Drawn Bare Copper
HDPE	: High Density Polyethylene
HH	: House Hold
HV	: High Voltage
Hz	: Hertz
ICB	: International Competitive Bidding
ICDF	: International Cooperation and Development Fund
IDP	: Internally Displaced Person
IEC	: International Electrotechnical Commission
IECEE	: IEC System for Conformity Assessment Schemes for Electrotechnical Equipment and Components
IEE	: Initial Environmental Examination
IMF	: International Monetary Fund
ISO	: International Organization for Standardization
JBTC	: Joint Border Trade Committee
JFPR	: Japan Fund for Poverty Reduction
JICA	: Japan International Cooperation Agency
JICA GL	: JICA Environmental and Social Consideration Guidelines
JICS	: Japan International Cooperation System
JPY	: Japanese Yen
JV	: Joint Venture
KfW	: Kreditanstalt für Wiederaufbau
KNU	: Karen National Union
KOICA	: Korea International Cooperation Agency
KPC	: Karen State Peace Committee

kV	: 10 <sup>3</sup> V, Kilo Volt
kVA	: 10 <sup>3</sup> VA, Kilo Volt Ampere
L/A	: Loan Agreement
LAD	: Land Administration Department
LCB	: Local Competitive Bidding
LDU	: Lahu Democratic Union
LED	: Light-Emitting Diode
LMIC	: Low and Middle Income Countries
LV	: Low Voltage
MCDC	: Mandalay City Development Committee
MEPE	: Myanmar Electric Power Enterprise
MESC	: Mandalay Electricity Supply Corporation
M/M	: Man Month
MMK	: Myanmar Kyat
MNCWA	: Myanmar National Committee for Women's Affairs
MoAI	: Ministry of Agriculture and Irrigation
MoALI	: Ministry of Agriculture, Livestock and Irrigation
MoC	: Ministry of Construction
MoD	: Minutes of Discussion
MoE	: Ministry of Education
MoEE	: Ministry of Electricity and Energy
MoEP	: Former Ministry of Electric Power
MoH	: Ministry of Health
MoHA	: Ministry of Home Affairs
MoLFRD	: Former Ministry of Livestock, Fisheries and Rural Development
MoNPED	: Former Ministry of National Planning and Economic Development
MoNREC	: Ministry of Natural Resources and Environmental Conservation
MoPF	: Ministry of Planning and Finance
MOU	: Memorandum Of Understanding
MPWNI	: Myanmar Positive Women's Network Initiative
MTO	: Myanmar Trade Organization
MTZ	: Myawaddy Trade Zone
MV	: Medium Voltage
MVA	: 10 <sup>6</sup> VA, Mega Volt Ampere
MW	: 10 <sup>6</sup> W, Mega Watt
MWAF	: Myanmar Women's Affairs Federation
MWh	: 10 <sup>6</sup> Wh, Mega Watt-hour
NAD	: National Archives Department
NAG	: Network Activities Group
NATALA	: Ministry for the Progress of Border Areas and National Races and Development Affairs
NCA	: Nationwide Ceasefire Agreement
NCDDP	: National Community Driven Development Project
NEMC	: National Energy Management Committee
NEP	: National Electrification Project
NGO	: Non Governmental Organization

NLD	: National League for Democracy
NMSP	: New Mon State Party
NPT	: Nay Pyi Taw
NTU	: Nephelometric Turbidity Unit
O&M	: Operation and Maintenance
ODA	: Official Development Assistance
OISCA	: The Organization for Industrial, Spiritual and Cultural Advancement-International
OJT	: On-the-Job Training
PAP	: Project Affected Person
PAU	: Project Affected Unit
PCU	: Passenger Car Unit
PD	: Planning Department
PDML	: Public Debt Management Law
pH	: potential of Hydrogen
PI	: Performance Indicator
PMO	: Project Management Office
PMU	: Project Management Unit
PNLO	: Pa-O National Liberation Army
PS	: Permanent Secretary
PSC	: Project Steering Committee
PSR	: Project Status Report
PV	: Photo Voltaic
PVC	: Polyvinyl Chloride
PVRS	: PV GAP Recommended Specification (PVGAP: Global Approval Program for Photovoltaics)
PW	: Public Works
RAP	: Resettlement Action Plan
RC	: Reinforced Concrete
RCSS	: Restoration Council of Shan State
RDC	: Region Development Committee
RFD	: Request for Disbursement
ROW	: Right of Way
RRL	: Road Research Laboratory
SAC	: Space Aerial Cable
SDC	: State Development Committee
SEA	: Strategic Environmental Assessment
SEFA	: Social Enterprise Finance Australia
SEZ	: Special Economic Zone
SHS	: Solar Home System
SI	: International System of Units
SLRD	: Settlement and Land Record Department
SS, S/S	: Substation
TDC	: Township Development Committee
TOR	: Terms of Reference
TS	: Township
TTW	: Thai Tap Water Supply Public Company Limited



TWG	:	Technical Working Group
UEHRD	:	Union Enterprise for Humanitarian Assistance, Resettlement, and Development
UN	:	United Nations
UNAIDS	:	Joint United Nations Programme on HIV/AIDS
UNDP	:	United Nations Development Programme
UNFC	:	United Nationalities Federal Council
UNICEF	:	United Nations Children's Fund
USAID	:	United States Agency for International Development
USD	:	United States dollar
V	:	Volt
VAT	:	Value Added Tax
VEC	:	Village Electrification Committee
VT	:	Voltage Transformer
VWC	:	Villager Water Committee
W	:	Watt
WB	:	World Bank
Wh	:	Watt-hour
WHO	:	World Health Organization
WON	:	Women's Organizations Network of Myanmar
WTP	:	Water Treatment Plant
XSA	:	XLPE /SWA/PVC Armored
YCDC	:	Yangon City Development Committee
YESB	:	Yangon Electricity Supply Board
YESC	:	Yangon Electricity Supply Corporation
ZCT	:	Zero-phase Current Transformer
ZPT	:	Zero-phase Voltage Transformer

# Executive Summary

## 1. Introduction

### 1.1 Background of the Data Collection Survey

The Republic of the Union of Myanmar (hereinafter referred to as “Myanmar”) started a transition to democracy in 2011, and has put great efforts into national reconciliation. The Union Government of Myanmar (hereinafter referred to as “the Union government”), under the administration led by the National League of Democracy since 2016, has set economic development policies to strengthen “democratization”, “peacemaking”, and “economic development.” In the economic policies announced in July 2016, regional development and poverty reduction are stated as important issues for balanced development across states and regions.

The Japanese government is assisting regional development and reconciliation as Japanese government realizes that restoring peace is essential to strengthen Myanmar's reforms. The government is also actively engaged in the minority ethnic areas to assist the reconciliation process and sustainable development of Myanmar. Japan International Corporation Agency (hereinafter referred to as “JICA”) has been implementing various ODA projects including grant and loan projects, and in so doing, assists Myanmar in enhancing trading activities within Indochina countries and increasing foreign direct investment.

This data collection survey focuses on four (4) States: Kayin, Mon, Rakhine and Chin, and one (1) Region: Tanintharyi, where the reconciliation is expected to be successful. The survey is intended to ascertain the needs for regional infrastructure development (road, bridge, electricity supply and water supply) and collect basic data for examining possibilities of assistance for new infrastructure development that can be expected to generate synergistic development effects with past Japanese assistance and contribute to achieving stable socio-economic development in regional areas. The survey is intended to ascertain the needs for regional infrastructure development (road, bridge, electricity supply and water supply) and collect basic data for examining possibilities of assistance for new infrastructure development that can be expected to generate synergistic development effects with past Japanese assistance and contribute to achieving stable socio-economic development in regional areas.

### 1.2 Objective and Outcome of the Survey

Based on the technical assistance projects “*Integrated regional development for Ethnic Minorities in South East Myanmar,*” and “*Data collection survey on Integrated regional development for Ethnic Minorities in South East Myanmar Phase-II*” and information from confirmed priority sub-projects of “*Preparatory Survey for regional development Project for Poverty Reduction Phase I and Phase II*” (hereinafter referred to as “Phase I Project” and “Phase II Project”) and information provided by the Union government, this data collection survey aims to assess the benefits that can be brought about by developing road, bridge, power supply and water supply facilities in regional cities and their surrounding areas.

### 1.3 Survey Target Areas

Kayin State, Mon State, Rakhine State, Chin State, and Tanintharyi Region are selected for the survey target areas.

## 2. Current Situation of Regional and Infrastructure Development

### 2.1 Condition of Basic Infrastructure

Road pavement ratio in Myanmar is 59.7% as an average for nationwide road network. In Chin State, this is 29.4%, while Kayin State shows 49.7% and Rakhine State 56.9%. Regarding the electrification rate, it is 8.0% in Tanintharyi Region, 12.8% in Rakhine State, 15.4% in Chin State, and 26.9% in Kayin State. The rates in the above mentioned States and regions are below 32.4% of the average electrification rate in Myanmar. Water supply rate in Myanmar is only 9.0% at the national level, while the rate is 4.5% in Kayin State, 4.9% in Rakhine State and 7.6% in Mons State, much lower than the national average. Besides, Chin State and Rakhine State show the first and second highest poverty ratios. The following Table 2.1 illustrates development status of infrastructure in Myanmar as of 2014.

Table 2.1 : Status of Infrastructure Development in each State and Region

State / Region	Area	Population	Poverty Ratio	Ratio of Paved Road	Ratio of Access to Electricity	Ratio of Water Supply
	(2014) km <sup>2</sup>	(2014) 1,000 people	(2010) %	(2014) %	(2014) %	(2014) %
Kachin	89,041.80	1,689	28.6	25.7	30.3	5.2
Kayah	11,731.51	287	11.4	57.5	48.6	23.0
Kayin	30,382.77	1,574	17.4	49.7	26.9	4.5
Chin	36,018.90	479	73.8	29.4	15.4	68.2
Sagaing	93,702.48	5,325	15.1	51.4	24.2	7.5
Tanintharyi	43,344.91	1,408	32.6	62.9	8.0	11.0
Bago	39,404.43	4,867	18.3	80.5	27.7	1.9
Magway	44,820.58	3,917	27.0	80.2	22.7	7.8
Mandalay	30,888.09	6,166	26.6	97.1	39.4	11.2
Mon	12,296.64	2,054	16.3	84.8	35.7	7.6
Rakhine	36,778.05	3,189	43.5	56.9	12.8	4.9
Yangon	10,276.71	7,361	16.1	95.5	69.3	13.3
Shan	155,801.38	5,824	33.1	53.9	33.4	20.0
Ayeyarwady	35,031.88	6,185	32.2	69.6	12.0	0.5
Nay Pyi Taw	7054.37	1,160	-	-	-	-
Union	676,577.23	51,486	25.6	59.7	32.4	9.0

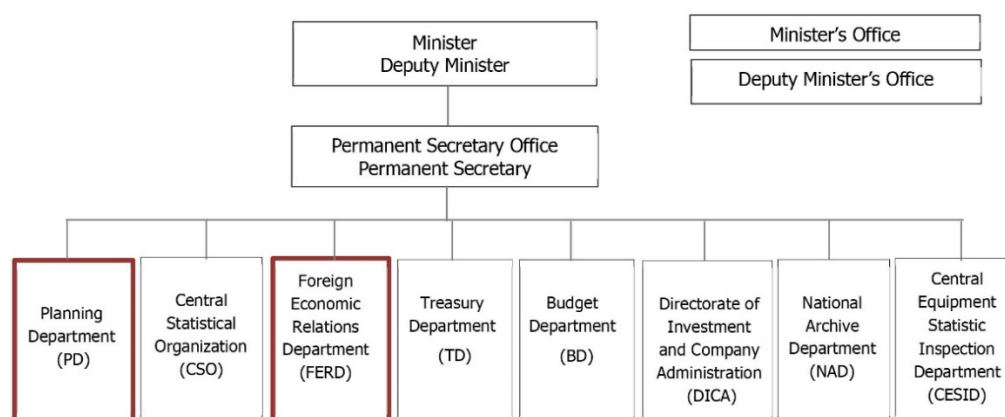
Source:

- Area, Population: Integrated Household Living Conditions Survey in Myanmar (2009-2010) Poverty Profile / 2011/ IHLCA PROJECT TECHNICAL UNIT (UNDP etc.)
- Poverty Ratio : Integrated Household Living Conditions Survey in Myanmar (2009-2010) Poverty Profile / 2011/ IHLCA PROJECT TECHNICAL UNIT (UNDP etc.)
- Ratio of Paved Road: Data provided by Ministry of Construction
- Ratio of Access to Electricity: Myanmar Population and Housing Census/ 2014 (Population Department, Ministry for Labour, Immigration and Population). "Ratio of Access to Electricity" here considers the access to the Grid Power Supply.
- Ratio of Water Supply: Myanmar Population and Housing Census/ 2014 (Population Department, Ministry for Labour, Immigration and Population).

## 2.2 Status of Regional development related Government Agencies in Myanmar

### 2.2.1 Organization of Ministry of Planning and Finance (MoPF)

The Planning Department of MoPF is the core department which is responsible for planning, organizing and implementing the policy on national development, such as National Comprehensive Development Plan, 5 Years Development Plans of Union, states and regions. The Central Statistics Organization (CSO) collects and organizes the regional economic statistics and social statistics, while Foreign Economic Relations Department (FERD) is responsible for foreign economic affairs (refer to Figure 2.1).



Source: MoPF

Figure 2.1 : Organizational Structure of MoPF

## 2.2.2 Road and Bridge Sector

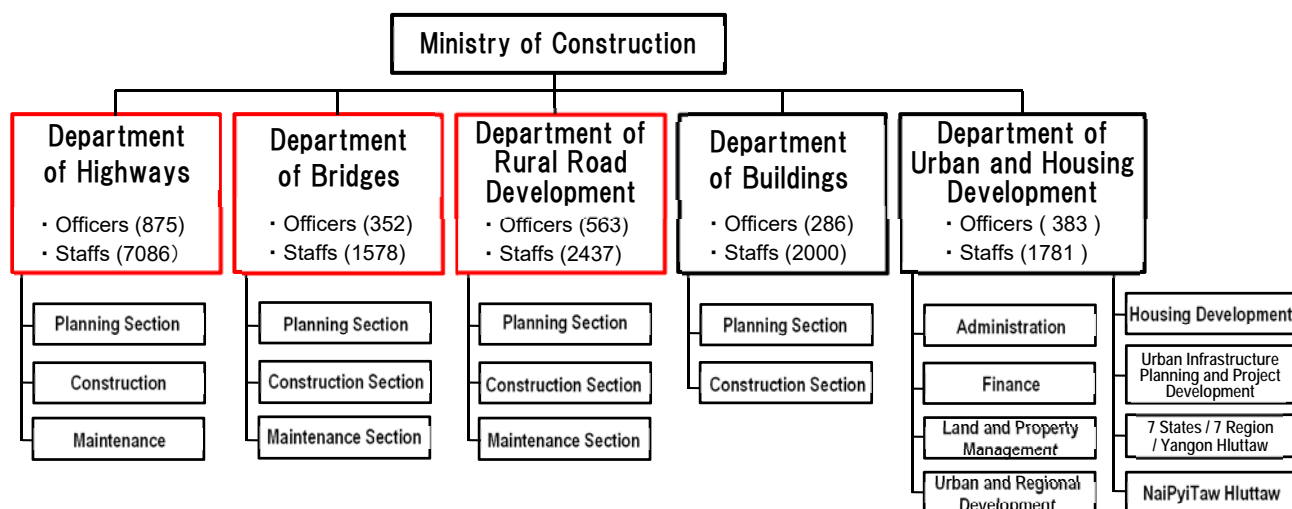
### (1) Upper-Level Development Plans and Sector Duties

The implementation of national highway road and the bridge development is based on the 30-year Long Term Plan. Currently the Third 5-Years Plan and Fourth 5-Years Plan out of 30-year Long Term Plan are under implementation.

Under the Ministry of Construction (MOC), Department of Highways (DOH) is responsible for constructing and maintaining main roads and bridges less than 50m long. Department of Bridges (DOB) is responsible for constructing and maintaining bridges over 50m in length. Department of Rural Road Development (DRRD), which was transferred from the Ministry of Agriculture, Livestock and Irrigation to the Ministry of Construction in July 2017, is responsible for rural roads and bridges and is in the process of reviewing and implementing the “National Strategy for Rural Roads and Access.”

### (2) Technical Performance

MOC in Nay Pyi Taw has set regional offices in each state and region. MOC is composed of DOH, DOB, DRRD, Department of Buildings, and Department of Urban and Housing Development. Each Department has a Planning Sub-Department Construction Sub-Development (refer to Figure 2.2).



Source: MOC

Note: Detailed staff information of Department of Urban and Housing Development have not been provided.

Figure 2.2 : Organizational Structure of Ministry of Construction (MOC)

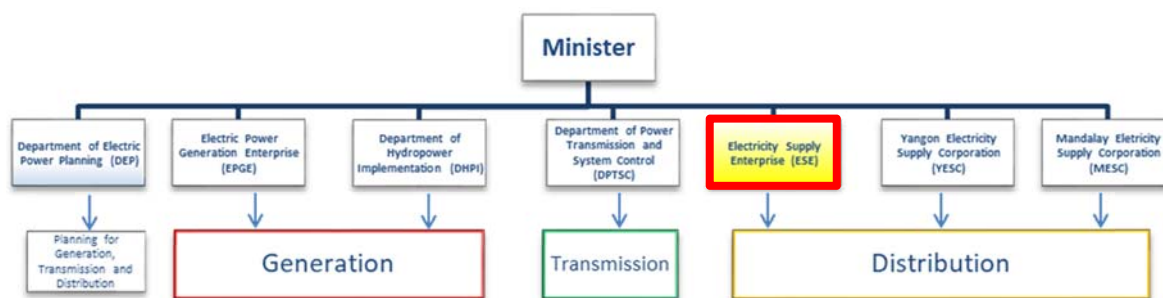
## 2.2.3 Power Supply Sector

### (1) Upper-Level Development Plans and Sector Duties

Ministry of Electricity and Energy (MoEE) has developed the National Electrification Plan with the assistance of World Bank, which aims to achieve universal access to electricity by 2030, and ESE is implementing various electrification projects together with international donor agencies. .

### (2) Technical Performance

ESE has a total number of 14,000 staff, and all are working for distribution projects which include the installation, operating and maintenance. ESE head office is responsible for procurement, budget calculating, tendering, contracting and payment management. State/Division offices are responsible for planning, designing, monitoring, operating and maintenance and collecting bills (refer to Figure 2.3).



Source: Prepared by the JICA Survey Team based on the information provided by ESE, MoEE  
 Figure 2.3 : Organizational Structure of Ministry of Electricity and Energy (MoEE)

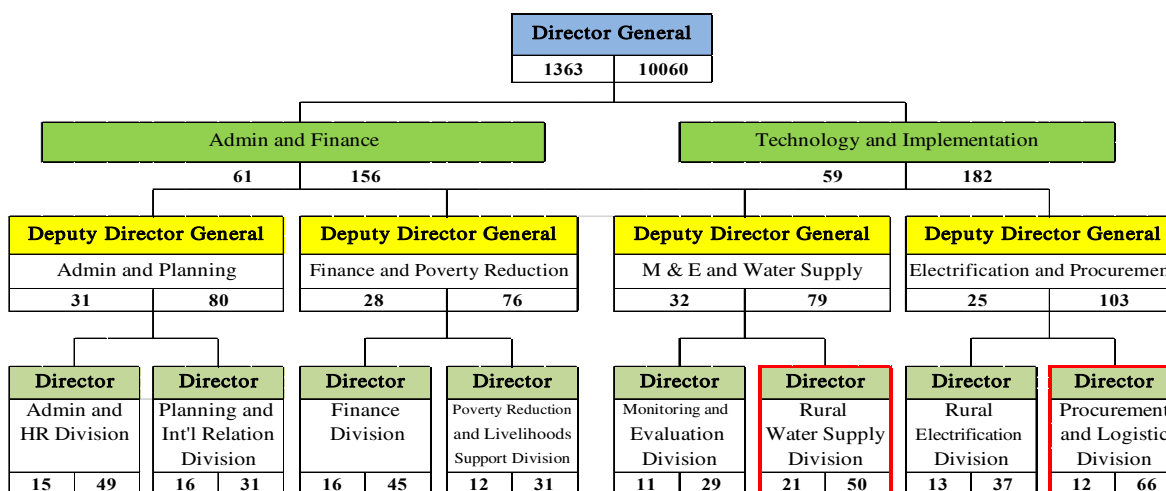
## 2.2.4 Water Supply Sector

### (1) Upper Development Plans and Sector Duties

There is no the Union government level organization to manage water supply projects at township level in Myanmar. State and region governments consider and include some related facilities to their 5-years infrastructure development plan as Township Development Committee (TDC) projects. TDCs cannot operate overall nationwide or state wide project works. For this reason, Department of Rural Development (DRD) under the Ministry of Agriculture, Livestock and Irrigation (MoALI) has been appointed as responsible agency for such large-scale project management, while TDC is actually implementing township level projects. TDC coordinates with concerned parties for designing and construction.

### (2) Technical Performance

A DRD office exists in every township and implements water supply projects only for village level, and TDC therefore is responsible for township level water supply (refer to Figure 2.4). There are very limited departments in TDC for managing the water distribution pipes and there is no engineer to design the water distribution pipe system and infrastructure in most TDC. There is supporting structure between TDC and DRD, Region or State Development Committees (RDC or SDC) for effective project management.



Note: Total number of DRD staffs (HQ, State, Region, District and Township Offices) is 11,423. Among them, the number of gazette government officials is 1,363 and the number of non-gazette government employees is 10,060.  
 Source: DRD

Figure 2.4 : Organizational Structure of Department of Rural Development (DRD)

## 2.3 Procedure and financial capacity for repayment of external loan

It is important for the Japanese government to continue supporting its effort by the Union government towards the reform and development of Myanmar. The debt management ability of the Union government is the key to the repayment ability of future foreign loans, however as described in the analysis of the World Bank Report (refer to the main report Chapter 2), the current status is that the loan is managed at a level that

can be repaid. It is necessary to continue to monitor the repayment status of ODA-loan by continuing to share information on the situation of debt management with the Union government.

### 3. Evaluation of Sub-Projects

#### 3.1 Long List

The summary of the long list as of July 2018 is shown in the following table.

Table 3.1 : Number of Sub-Projects in the Long list as of July 2018

State/Region	Road and Bridge Sector			Power Supply Sector	Water Supply Sector	Number in State/Region
	Regional road	Regional Bridge	Rural road/bridge	Power Supply On-Grid	Regional Water Supply	
Kayin State	1	1	7	19	7	35
Mon State	1	3	6	7	3	20
Rakhine State	4	9	16	11	2	42
Chin State	0	0	0	12	0	12
Tanintharyi Region	3	8	3	7	1	22
Sagaing Region	3	0	0	31	0	34
Kachin State	0	0	0	0	1	1
Kayah State	0	0	0	0	1	1
Number in Sector	12	21	32	87	15	167

Source: Prepared by Survey Team based on the long list provided by the counterpart agencies.

Note: The number of sub-project in rural road and bridge sector indicates the number of townships.

#### 3.2 Method for Sub-Projects Evaluation

##### 3.2.1 Evaluation Perspectives of Data Collection Survey

The New Phase Project will focus on promoting regional economic development by effectively connecting with the broad arterial transportation road network, especially the East-West and Southern Economic Corridors, which have high potential for economic relationship development with the southern GMS. The Project also aims at enhancing regional development potential. Therefore, it is essential to set proper evaluation criteria for selecting the sub-projects in order to achieve such objectives.

The *Regional development Project for Poverty Reduction Phase II* (Phase II Project) aims at poverty reduction through improving basic infrastructure in regional areas. These two Projects take similar approach of infrastructure development in regional areas but set the different goals. Therefore, the four evaluation perspectives of Phase II Project are applied to the New Phase but with some minor modifications, that is, Purposiveness, Cost-Benefit Performance, Needs urgency, Feasibility (refer to Table 3.2).

Table 3.2 : Evaluation Perspectives of Data Collection Survey

Evaluation Perspective	Summary
Purposiveness	Sub-projects that are consistent with Union / regional / regional development policies and plans, and are highly prioritized by each sector counterpart are evaluated in order to reflect the needs of the Union government.
Cost-Benefit Performance	It is expected to implement strategic development plans focusing on regional economic development by connecting to broader arterial transportation road network. Sub-projects that highly contribute to the development of regional cities and to promote the development of regional industries are highly evaluated.
Needs / Urgency	Sub-projects with higher needs and urgency are evaluated considering the current situations of each sector.
Feasibility	The Union government and its executing agencies should be the actual implementation bodies in case the Project is implemented under ODA-loan. Therefore, sub-projects which can be smoothly implemented without technical, operation and maintenance difficulties are evaluated.

Source: Prepared by the JICA Survey Team

### 3.2.2 Shortlisting Procedures

The procedure of shortlisting is described as follows.

#### **STEP-1 Screening sub-projects from the viewpoint of smooth loan project implementation**

Sub-projects are reviewed against the following criteria, and any sub-project that falls into any of the following conditions shall be dropped:

- (1) Already funded or possibly funded by other sources,
- (2) Located in an area with security concerns,
- (3) Categorized as “A” under the *JICA Environmental and Social Consideration Guidelines*,
- (4) Existing facilities or equipment satisfy the current demand (of water and power supply), so there is no need to implement the proposed sub-project,
- (5) Project size is too small for ODA-loan project (total construction cost is approximately less than 10 million JPY), and
- (6) Standard design and project cost are not appropriate considering the purpose of the Project (specification and/or cost is too high).

#### **STEP-2 Screening sub-projects from the perspective of “Improving connectivity to broader arterial transportation road network including economic corridors” and “Increasing potential of regional development”**

The conditions of the Project target areas (four states and one region) vary in terms of living conditions as well as surrounding environments for possible regional development in regional cities. Among the targeted States and region, Kayin State, Mon State and Tanintharyi Region are located along the economic corridors, ASEAN Highway and ASIA Highway networks within the GMS, and effective development actions should be expected through integrated economic infrastructure development in both local and Mekong regional countries. Developing regional infrastructures integrated with economic corridor centered in core regional cities and intermediary cities can be expected to strengthen and to expand industries.

Chin State and Rakhine State have the highest poverty rates in Myanmar: 73.3% and 43.5%, respectively. Basic infrastructures, such as roads, power supply and water supply, are not sufficient considering the living conditions in these two states. The infrastructure development can extend the potential of regional development in these two states.

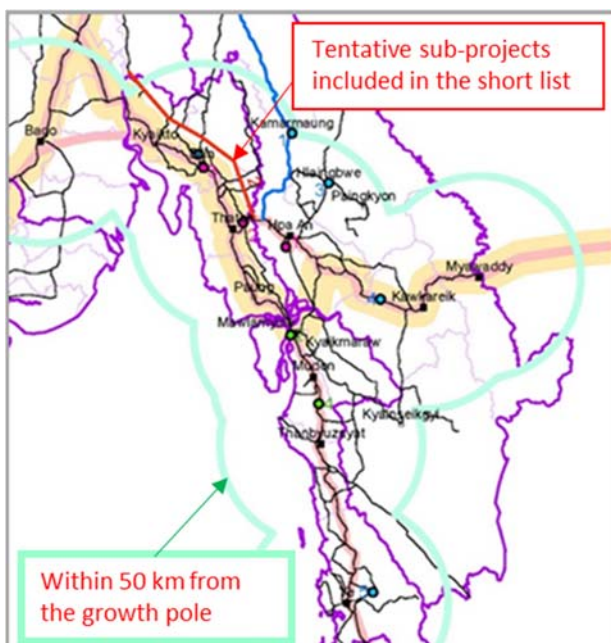
Taking the above-described points into consideration, the sub-projects are consistently evaluated for shortlisting by STEP-2 procedure in accordance with their respective objectives: Kayin State, Mon State and Tanintharyi Region for “improving the connectivity to arterial regional transportation road network including economic corridors,” and Chin State and Rakhine State for “increasing the potential of regional development.”

In practice, the core cities and important cities of Kayin State, Mon State and Tanintharyi Region, which are situated along the economic corridors (ASEAN Highway, and ASIA Highway networks within GMS), are set as “Growth Poles” earmarking them as centers of industrial and trading activities. It is aimed to develop capacity of industry and trading by developing infrastructures in the areas around the Growth Poles. The sub-projects which are within 50 km radius of the Growth Poles are selected for provisional shortlisting. Rakhine State cities with over 100,000 population, Chin State cities with over 50,000 population, and cities expecting regional development through border trading activities are set as Growth Poles<sup>1</sup>. The following figures illustrates the selection methods.

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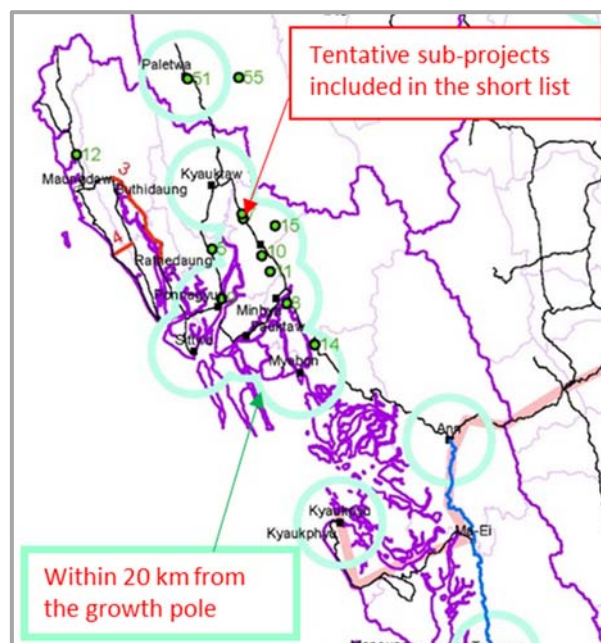
<sup>1</sup> Although there are no major transportation network such as international economic corridor in Rakhine State and Chin State, regional development can be expected, and cities with more than 100,000 population in Rakhine State and 50,000 population in Chin State are set as “Growth Poles” and sub-projects in 20km radius of growth Poles are evaluated. However, in case of having population fewer than 100,000 and 50,000 respectively, the development of industrial zones and potential of becoming a trading center are considered to set Growth Poles, and sub-projects within 20km radius of the Growth Poles are evaluated.





Source: Prepared by the JICA Survey Team

Figure 3.1 : Screening Sub-Projects within 50 km radius of the Growth Poles



Source: Prepared by the JICA Survey Team

Figure 3.2 : Screening Sub-Projects within 20 km radius of the Growth Poles

### **STEP-3 Scoring sub-projects based on evaluation index for ranking and shortlisting**

It is necessary to effectively evaluate the sub-projects to fulfill the objective of the Project: “Improving connectivity to arterial regional transportation road network” and “Enhancing regional development potential.” The four evaluation perspectives that are the same as those of Phase II Project in general should be introduced: Purposiveness, Needs and Urgency, Cost-Benefit Performance, and Feasibility.

In the New Phase Project, the implementation of strategic “regional development” plan which will shape regional economic development is expected. Accordingly, the index for “cost-benefit performance” perspective, which considers development of industries in regional cities, should also be scored higher than those of other perspective indices. All the sub-projects selected after screening by STEP-2 will be the target of score-based ranking.

### **STEP-4 Adjustment of Shortlist considering Priority set by the Local government and Balance among Target Areas based on the Consensus reached by both the Myanmar and Japanese governments**

The shortlist based on STEP-1 through STEP-3 processes is reviewed and adjusted through the consultation to obtain the understanding of both the Myanmar and Japanese governments to finalize the list of sub-projects. There are mainly two (2) focal points for this step to finalize the shortlist, and the points are summarized hereafter.

- I. Additional sub-project selection considering the balanced distribution of development effects among states/regions
- II. Additional sub-project selection reflecting the latest development priority of state/regional governments



### 3.2.3 Evaluation Criteria and Procedure

#### 3.2.3.1 Evaluation Index and Scoring

The evaluation indices and scoring weight of the sub-projects for the ranking are shown in Table 3.3 hereafter.

Table 3.3 : Evaluation and Scoring of Sub-Projects for Ranking

Perspective	Criteria		Weight	
Purposiveness	All sectors	Priority of concerned government and counterpart agencies (Note 1)	20 points	
Cost-Benefit Performance	All sectors	Potential for development of industries in hinterlands Potential of trading centers Distance to regional major cities, national roads and economic corridors Integrated synergistic effects of infrastructure development	40 points	
Needs / Urgency	Road/ Bridge sector	Regional road	Complement to non-connectivity	20 points
		Regional bridge	Deterioration of bridges (maintenance period)	
		Rural road and bridge	Current condition of rural roads and bridges (pavement conditions and existence of bridges)	
	Power supply sector	Electrification rate		
	Water supply sector	Water supply rate		
Feasibility	All sectors	Difficulty in project implementation, operation and maintenance	20 points	

Source: Prepared by the JICA Survey Team

Note 1: Prioritized sub-projects which are included or considered in the upper development plans of states and regions should be considered.

#### 3.2.3.2 Evaluation Procedure

##### (1) Purposiveness

The sub-projects are evaluated from the purposiveness perspective, which reflects the need of the Union government and the priority of concerned government and counterpart agencies. The prioritized sub-projects to be implemented should be confirmed through the interviews with the counterpart agencies.

##### (2) Cost-Benefit Performance

There are four (4) indices for evaluation of the sub-projects from the economic effectiveness perspective, specifically the potential of economic development in regional cities:

- a) Potential for development of industries in hinterlands
- b) Potential of trading centers
- c) Distance to regional major cities, national roads and economic corridors
- d) Integrated synergistic effects of infrastructure development

Each of the above four indices will be given 10 points.

- a) Potential for development of industries in hinterlands

The potential for development of industries in the targeted regional cities is evaluated as “hinterland industrial potential.” “Potential for hinterland industries” should evaluate the possibilities of industrial concentration and industrial cluster establishment for manufacturing industries should be evaluated.

- b) Potential trading center

“Potential of trading center” should be evaluated in order to identify industrial potential of targeted regional cities. In particular, spatial evaluation is applied by setting the hierarchy of regional cities as “points,” and transportation network system as “lines.”

- c) Distance to the country's major cities, national roads and economic corridors

The sub-projects that are within 50 km radius of the Growth Poles are evaluated considering connectivity with international economic corridors in the form of the “distance to regional major cities, national roads and economic corridors.” Any sub-project located within 20 km radius should be evaluated higher. Similarly, sub-projects, which have higher accessibility to the major regional cities that can function as the regional logistic centers, should be evaluated higher. Sub-projects located in industrial development areas or in areas where there are plans to directly link them to the regional roads should be evaluated as well.

- d) Integrated synergistic effects for infrastructure development

Sub-projects that should expect integrated development benefit of road and bridge, power, water supply and other infrastructure projects are evaluated as “integrated synergistic effects of infrastructure development.” It is based on the expectation of increasing beneficiary population through regional infrastructure development and on the strengthening synergistic economic growth among cities as well as between cities and villages through transportation networking.

### (3) Needs and Urgency

Each sub-project is evaluated from the “needs and urgency” perspective with the following criteria.

Table 3.4 : Evaluation Criteria for “Needs and Urgency” for each Sector

Sector		Evaluation Criteria
Road and Bridge Sector	Regional road	Confirming current conditions, location information and surrounding area of each sub-project by conducting site survey, sub-projects should be evaluated based on the necessity of complementing missing links.
	Regional bridge	Confirming the maintenance period and current condition of existing bridges as the sub-project targets by conducting site survey, sub-projects that have deteriorated parts and require urgent rehabilitation, etc. should be evaluated.
	Rural road and bridge	Confirming the pavement condition of rural road sub-projects, the currently earth/dirt road sub-projects are evaluated. Confirming the existence of rural bridge, sub-projects that intend to build new bridge are evaluated.
Power Supply Sector		Confirming the electrification rate of each township based on 2014 census data, sub-projects located in townships with low electrification rate are evaluated.
Water Supply Sector		Confirming the water supply rate of each township based on 2014 census data, sub-projects located in townships with low water supply rate are evaluated.

Source: Prepared by the JICA Survey Team

### (4) Feasibility

The information gathered through site survey and/or interviews with the concerned government agencies should be utilized to evaluate the “feasibility” in order to assure smooth implementation of the Project without delays and to keep effective operation and maintenance.

Table 3.5 : Evaluation Criteria for “Feasibility” for each Sector

Sector	Evaluation Criteria
Road and Bridge Sector	Difficulty in construction and land acquisition, and difficulty in operation and maintenance
Power Supply Sector	Difficulty in land acquisition, and difficulty in operation and maintenance
Water Supply Sector	Location and size of water purification plant development, construction cost and comparative beneficiary population (where beneficiary population is less, it will be difficult to repay the loan with operation profit), volume of water supply per year, difficulty in land acquisition, and difficulty in operation and maintenance

Source: Prepared by the JICA Survey Team

## 3.3 Rules for Changing and Substituting Sub-Projects

Assuming the ODA-loan Project is implemented, there might be possibility of cancelling, changing and substituting sub-projects of the shortlist due to changes in local needs after the Project starts. Based on the lessons learned from the Phase I and II Projects, it is recommended that changing or substituting with newly added sub-projects will be decided by applying the following STEP-1 and STEP-2 (refer to Table 3.6).

Table 3.6 : Rules for Changing and Substituting Sub-Projects

<b>STEP-1 : Screening based on the viewpoint of smooth implementation of sub-projects under loan project</b>		
Proposed new sub-projects shall be evaluated by taking the following steps, and the sub-projects that fall under any of the following conditions shall be considered as inappropriate for the loan project.		
<b>General Conditions</b>	<b>Sectoral Conditions</b>	
<ul style="list-style-type: none"> <li>• Already funded or having high possibility of other financial source,</li> <li>• Located in areas with security concerns (near border area, conflict area, restricted area, etc.),</li> <li>• Categorized as “A” by the JICA Environmental and Social Consideration Guidelines,</li> <li>• (for water and electricity) Existing facilities or equipment satisfy the current demand so there is no need to implement the proposed sub-project,</li> <li>• Project size is too small for ODA-loan project (total construction cost shall be 10pprox.. less than 10 million JPY),</li> <li>• Difficulty in land acquisition,</li> <li>• Insufficient preparation for loan-project (feasibility study is not conducted yet), and</li> <li>• Standard design and project cost are not appropriate considering the purpose of the Project (specification and/or cost is too high).</li> </ul>	<p><u>Road and Bridge Sector</u> (especially rural road and bridges)</p> <p>It is a difficult situation to implement as one sub-project. (DRRD sub-projects are evaluated as township level packages and there are several smaller sub-projects in one township. Moreover, the scale of each sub-project is small; thus, these are combined on the township level as one lot, and each lot requires certain cost value to implement as one sub-project. In case of cancelling sub-projects from a lot (township level sub-project group), it may be substituted by another sub-project that does not exceed the budget ceiling for the concerned township. The substitute sub-project shall be nominated within the same township or nearby township. (It can also substitute with a sub-project from nearby township that can be tendered within one lot.))</p> <p><u>Power Supply Sector</u></p> <ul style="list-style-type: none"> <li>• Lack of equipment for higher grid system infrastructure including power distribution capacity, and uncertainty in installation</li> </ul> <p><u>Water Supply Sector</u></p> <ul style="list-style-type: none"> <li>• Insufficient land area for water treatment plant development</li> <li>• Water source containing elements which are difficult to remove (salinity, arsenic, fluorine, etc.)</li> <li>• Less beneficiaries against the Project cost</li> <li>• Difficulty in securing sufficient water to supply throughout the year</li> </ul>	
<b>STEP-2 : Screening based on “increasing potential for regional development” and “improving connection to arterial regional transportation road network including economic corridors”</b>		
Taking the Project objective, that is to contribute to regional socio-economic development, new sub-projects shall be evaluated from the viewpoint of “improving connection to arterial regional transportation road network including economic corridors” and “increasing potential for regional development.”		
Objective	Evaluation Criteria	Possible Appropriate State/Region
Improving connection to arterial regional transportation road network including economic corridors	The sub-projects located outside of 50 km radius of the Growth Poles along the concerned economic corridors, ASIAN Highway and ASEAN Highway networks are eliminated.	Kayin State, Mon stateshan State, Yangon Region, Mandalay Region, Tanintharyi Region
Increasing potential of regional development	Sub-projects located outside of 20 km radius of the Growth Poles with more than 100,000 populations are eliminated (more than 50,000 population for Chin State).	Kachin State, Kayah State, Rakhine State, Chin State, Magway Region, Ayeyarwaddy Region.
<b>STEP-3 : Adding to the Shortlist</b>		
The sub-projects that meet above-mentioned criteria shall be added to the shortlist.		

Source: Prepared by the JICA Survey Team

### 3.4 Shortlist (Tentative)

The outline of shortlist (tentative) is shown in Table 3.7 and Table 3.8. The shortlisted sub-project details are shown in Table 3.9. The sub-project locations for each sector are shown in Figure 3.3 through Figure 3.6, and each state and region are illustrated in Figure 3.7 through Figure 3.11.

Table 3.7 : Outline of the Shortlist (tentative) (by State and Region)

State/Region	Long list			Draft Shortlist			Ratio %
	Number	Estimated Cost		Number	Estimated Cost		
		Million Kyats	Million Japanese Yen		Million Kyats	Million Japanese Yen	
Kayin State	35	190,976	14,897	15	6,9881	5,451	21
Mon State	20	80,543	6,283	14	64,674	5,045	20
Rakhine State	42	155,903	12,161	26	115,941	9,043	35
Chin State	12	49,164	3,835	5	23,812	1,857	7
Tanintharyi Region	22	95,198	7,425	10	54,786	4,273	17
Sagaing Region	34	73,899	5,764	0	0	0	0
Kachin State	1	3,675	287	0	0	0	0
Kayah State	1	3,990	311	0	0	0	0
Total	167	653,348	50,963	70	329,096	25,669	100

Source: Prepared by the JICA Survey Team

Note: Total figure has slight difference due to digit rounding.

Table 3.8 : Outline of the Shortlist (tentative) (by Sector)

Sector	Longlist			Short list Draft			Ratio %
	Number	Estimated Cost		Number	Estimated Cost		
		Million Kyats	Million Japanese Yen		Million Kyats	Million Japanese Yen	
Regional road	12	121,666	9,490	6	102,200	7,972	-
Regional bridge	21	78,087	6,090	14	22,448	1,751	-
Rural road and bridge	32	124,144	9,684	15	81,196	6,333	-
Road and Bridge Sector	65	323,897	25,264	35	205,844	16,056	62
Power Supply Sector	87	272,943	21,290	25	78,233	6,102	24
Water Supply Sector	15	56,509	4,409	10	45,019	3,511	14
Total	167	653,348	50,963	70	329,096	25,669	100

Source: Prepared by the JICA Survey Team

Note 1: The number of rural road and bridge sub-projects to be implemented by DRRD indicates the number of townships.

Note 2: The exchange rate of August, 2018 (Monthly exchange rate in JFY 2018: JICA) is applied.

1 USD = 110 YEN, 1 MMK = 0.078 YEN, 1 USD = 1410 MMK

Note 3: Total figure has slight difference due to digit rounding.

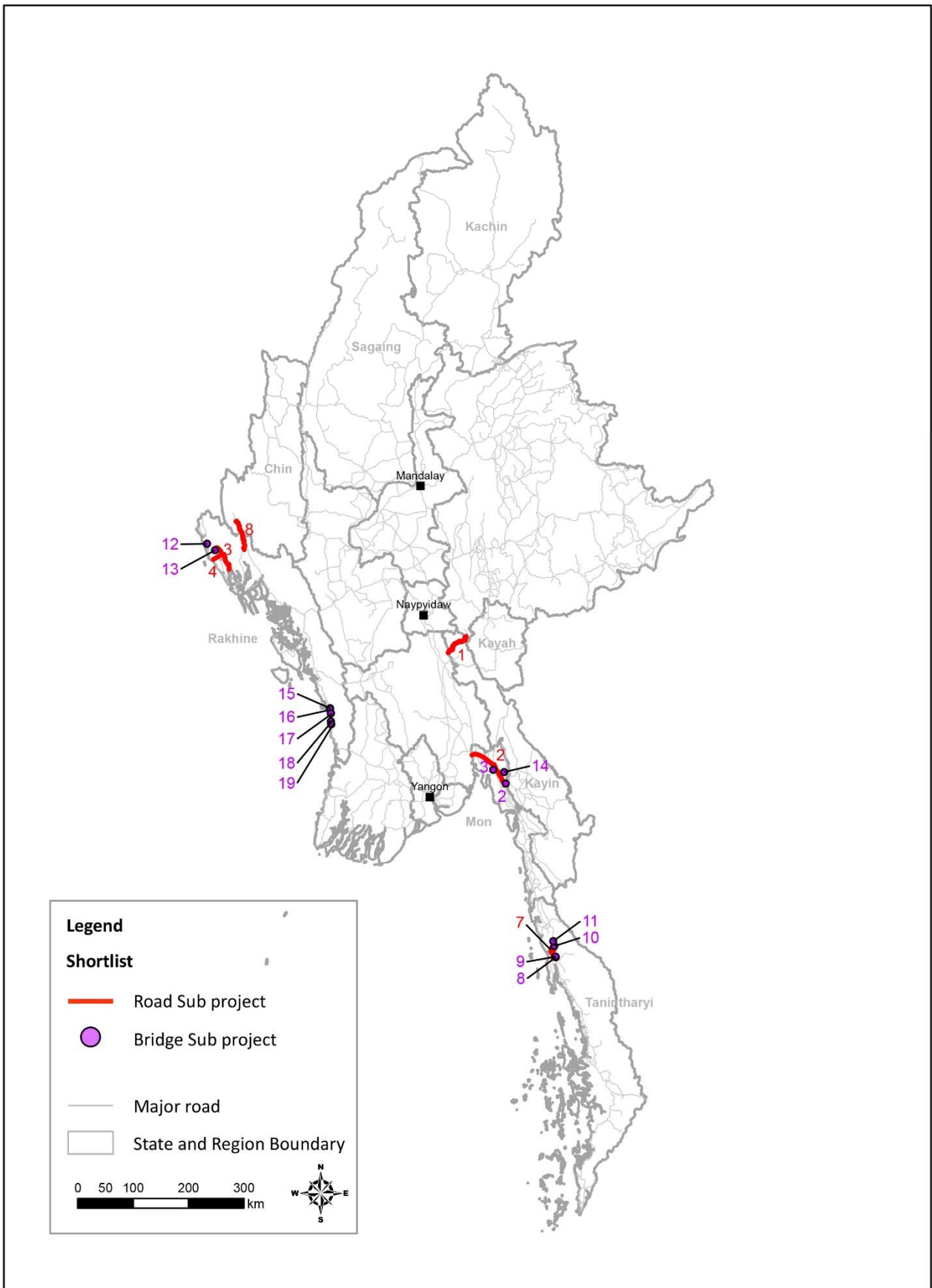
Table 3.9 : Sub-Projects in the Shortlist (tentative)

Sector	Sub-project No	State/Region	Sub-Project Name
Road and Bridge	DOH 1	Kayin State	Taungoo-LeikTho – YarDo – Loikaw – HoPone
Road and Bridge	DOH 2	Mon State	District Link Road No (2) (Kyarpan-Winkan section)
Road and Bridge	DOH 3	Rakhine State	Rathedaung-Buthidaung
Road and Bridge	DOH 4	Rakhine State	KyaukPanDu-ZayDiPyin
Road and Bridge	DOH 7	Tanintharyi Region	Yebyu-KaMyawKin
Road and Bridge	DOH 8	Rakhine State	KyaukTaw-PaLetWa Road
Road and Bridge	DOB 2	Mon State	Don Tha Mi Bridge on Tha Hton – Hpa-An Road Section (8/1 – 8/2)(Mile) ( 2 Lane)
Road and Bridge	DOB 3	Mon State	Bee Linn Chaung Bridge on Yangon-Myaik Road Section (127/0) Mile (2 Lane)

Sector	Sub-project No	State/Region	Sub-Project Name
Road and Bridge	DOB 8	Tanintharyi Region	Bridge No.(1/5), Pu Lu Kon Chaung Bridge on Dawei-Yay Road Section (8.0Km-8.5Km)
Road and Bridge	DOB 9	Tanintharyi Region	Bridge No.(1/6), Za Har Chaung Bridge on Dawei-Yay Road Section (9.5Km-10.0Km)
Road and Bridge	DOB 10	Tanintharyi Region	Bridge No.(1/20), Ta Line Yar Bridge on Dawei-Yay Road Section (33.00 Km-33.5Km)
Road and Bridge	DOB 11	Tanintharyi Region	Bridge No.(5/26), Thet Kal Kauk Bridge on Dawei –Yay Road Section (42.5 Km-43.0Km)
Road and Bridge	DOB 12	Rakhine State	Maung Taw-Kyee Kan Pyin-Kyein Chaung Road Section Total Small bridges and Box Culverts (67 Nos)
Road and Bridge	DOB 13	Rakhine State	Bu Thee Taung-Maung Taw Road Section Total Small bridges and Box Culverts (22 Nos)
Road and Bridge	DOB 14	Mon State	Thel Phyu Chaung Bridge (2 Lanes), Phayar Kyi-Tha Hton Road Section
Road and Bridge	DOB 15	Rakhine State	Bridge No.(1/22), Kyauk Kyi Bridge on Than Twel-Gwa Road Section ( 2 Lanes)
Road and Bridge	DOB 16	Rakhine State	Bridge No.(1/55), Kywe Chaing Bridge on Than Twel-Gwa Road Section ( 2 Lanes)
Road and Bridge	DOB 17	Rakhine State	Bridge No.(1/58), Bagan Taung Bridge on Than Twel-Gwa Road Section ( 2 Lanes)
Road and Bridge	DOB 18	Rakhine State	Bridge No.(9/76), Ywar Thit Kone Bridge on Than Twel-Gwa Road Section ( 2 Lanes)
Road and Bridge	DOB 19	Rakhine State	Bridge No.(4/80), Shawl Phyu Taung Bridge on Than Twel-Gwa Road Section ( 2 Lanes)
Road and Bridge	DRRD 1	Kayin State	Hpa-An
Road and Bridge	DRRD 5	Kayin State	Kawkareik
Road and Bridge	DRRD 6	Kayin State	Myawaddy
Road and Bridge	DRRD 10	Mon State	Ye
Road and Bridge	DRRD 13	Mon State	Kyaikto
Road and Bridge	DRRD 14	Rakhine	Rathedaung
Road and Bridge	DRRD 16	Rakhine State	Sittwe
Road and Bridge	DRRD 17	Rakhine State	Ponnagyun
Road and Bridge	DRRD 18	Rakhine State	Pauktaw
Road and Bridge	DRRD 21	Rakhine State	Gwa
Road and Bridge	DRRD 25	Rakhine State	Kyauktaw
Road and Bridge	DRRD 26	Rakhine State	Kyaukpyu
Road and Bridge	DRRD 30	Tanintharyi Region	Yebyu
Road and Bridge	DRRD 31	Tanintharyi Region	Myeik
Road and Bridge	DRRD 32	Tanintharyi Region	Tanintharyi
Power Supply	ESE 1	Kayin State	Thandaung
Power Supply	ESE 2	Mon State	Mu Pon
Power Supply	ESE 4	Mon State	Ka Mar Wet
Power Supply	ESE 5	Rakhine State	King Taung
Power Supply	ESE 8	Rakhine State	Awa
Power Supply	ESE 9	Rakhine State	Satthwa
Power Supply	ESE 10	Rakhine State	Poe Chi Pyin
Power Supply	ESE 11	Rakhine State	Kywal Tae (Mrauk-U)
Power Supply	ESE 13	Rakhine State	Maungnama
Power Supply	ESE 14	Rakhine State	Kyar Inn Taung
Power Supply	ESE 16	Tanintharyi Region	Maungmagan
Power Supply	ESE 49	Chin State	Tidim
Power Supply	ESE 50	Chin State	Rihkawdar
Power Supply	ESE 51	Chin State	Paletwa
Power Supply	ESE 55	Chin State	Samee
Power Supply	ESE 57	Chin State	Barlon
Power Supply	ESE 61	Kayin State	Shan Lae Pyin

Sector	Sub-project No	State/Region	Sub-Project Name
Power Supply	ESE 65	Kayin State	Kyay Ka Taugh
Power Supply	ESE 68	Kayin State	Myawaddy + Mae Pa Lach + Shwe Koat Koul + Hti War Ka Lay
Power Supply	ESE 70	Kayin State	Minn Saw
Power Supply	ESE 71	Kayin State	Thar Moe Lar Hta
Power Supply	ESE 75	Mon State	Thayet Nyi Naung
Power Supply	ESE 76	Mon State	Ka Yote Pi
Power Supply	ESE 78	Mon State	Paung
Power Supply	ESE 86	Kayin State	Taung Dee
Water Supply	DRD 1	Kayin State	Ka-ma-maung
Water Supply	DRD 3	Kayin State	Hlaingbwe
Water Supply	DRD 4	Kayin State	Kyone Do
Water Supply	DRD 5	Mon State	Ye
Water Supply	DRD 6	Mon State	Ka Zine Dam
Water Supply	DRD 7	Mon State	Pa-Ga Village
Water Supply	DRD 8	Tanintharyi Region	Yebyu
Water Supply	DRD 10	Kayin State	Leik Tho
Water Supply	DRD 12	Rakhine State	Sittwe
Water Supply	DRD 13	Rakhine State	Gwa

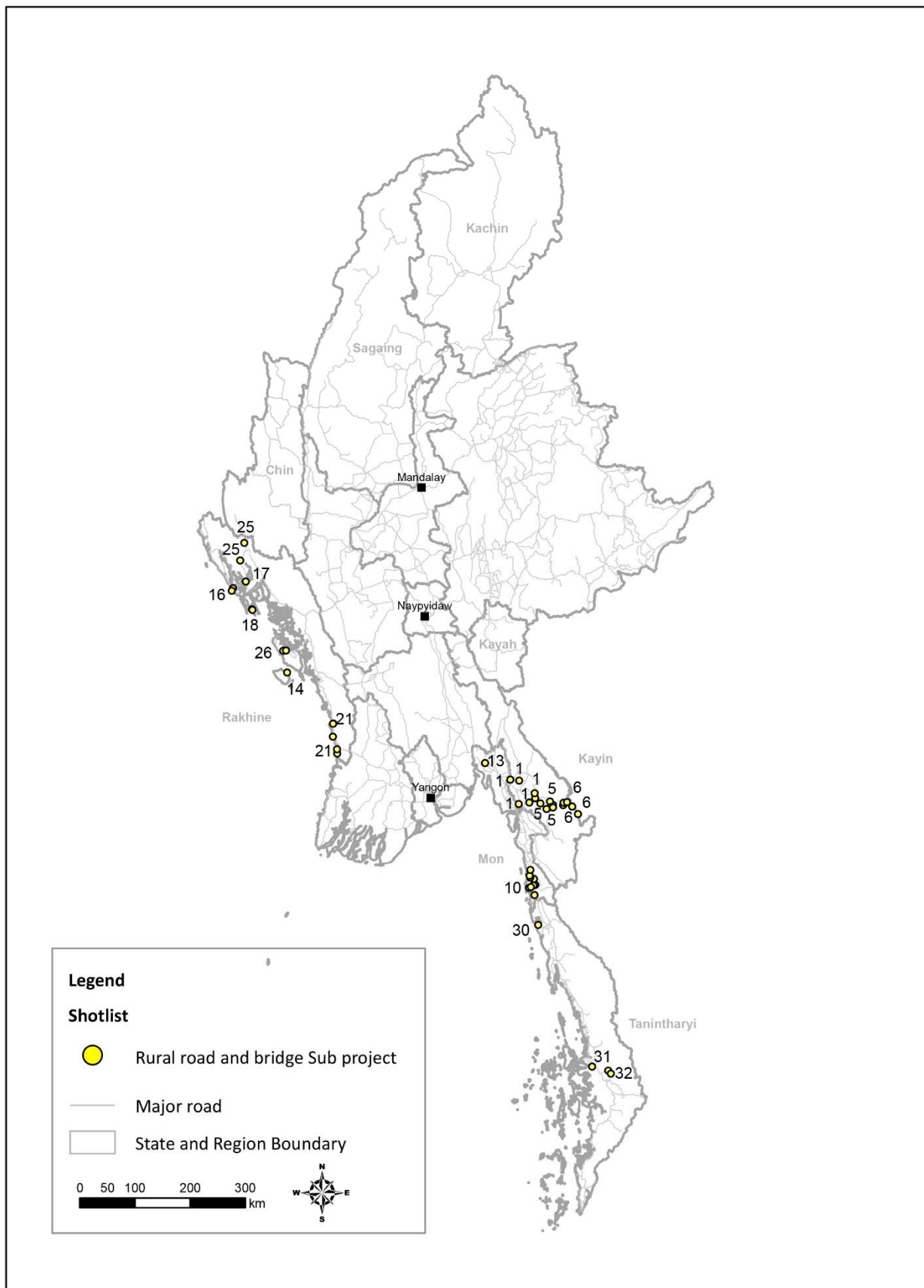
Source: Prepared by the JICA Survey Team



Source: Prepared by the JICA Survey Team

Figure 3.3 : Location of Regional Road and Bridge Sub-Projects (Shortlist, tentative)





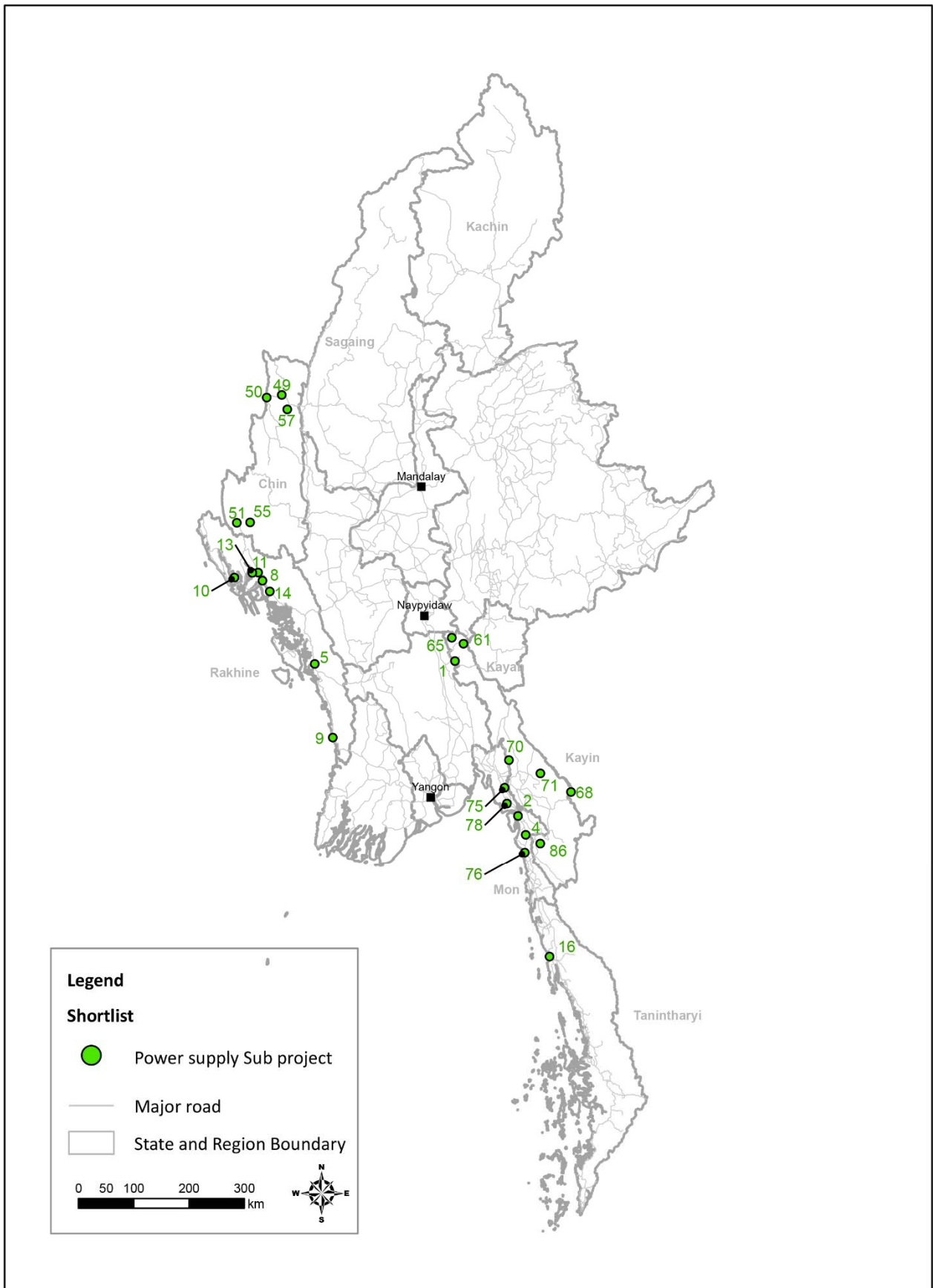
Source: Prepared by the JICA Survey Team

Note 1: Since the provided location information of Sub-Project “DRRD17: Pononar Kyun” was not clear, it is illustrated in the middle of township area and the actual location might be different.

Note 2: Some sub-projects are indicated with multiple dots as these sub-projects consist of several project components.

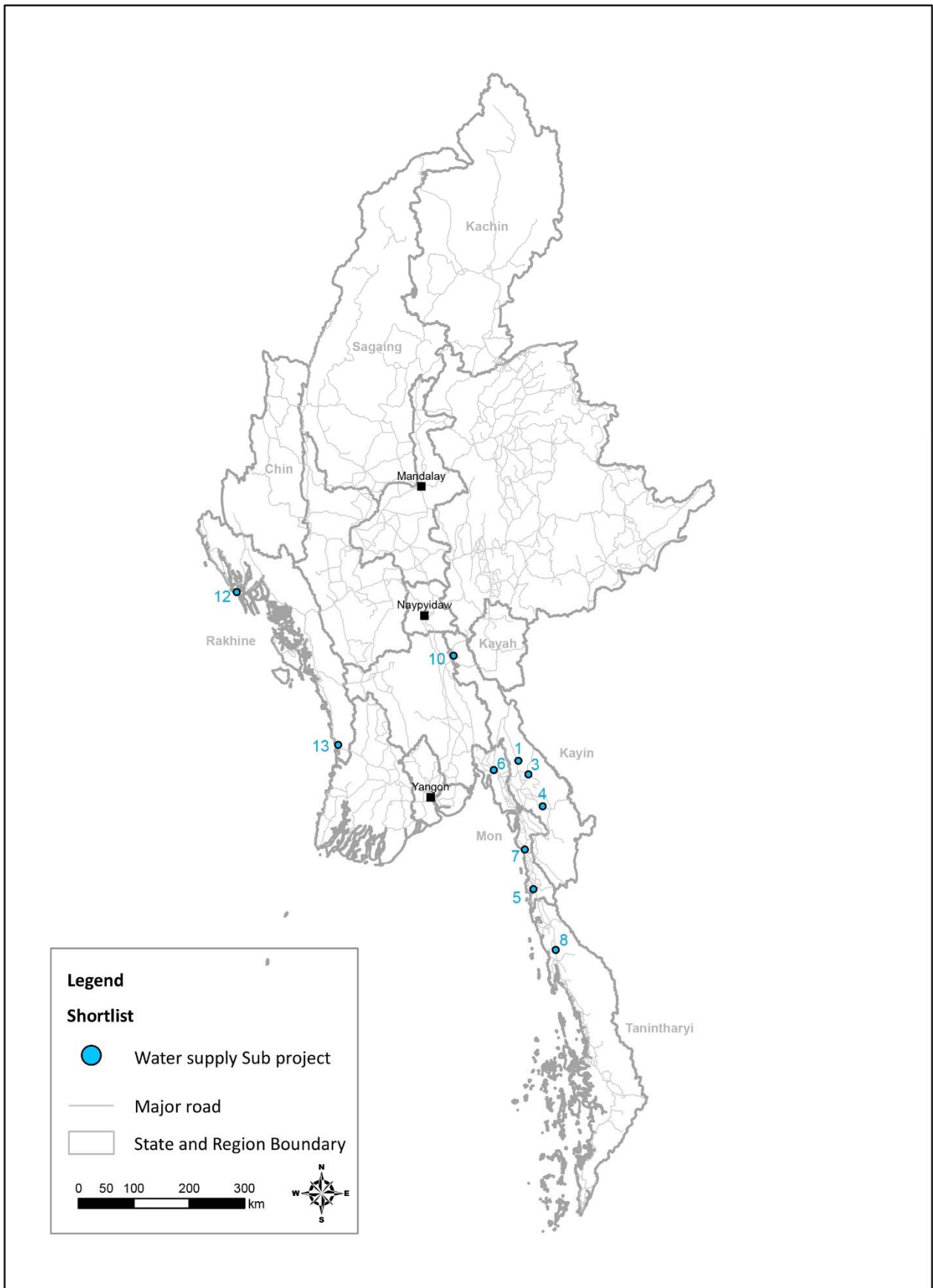
Figure 3.4 : Location of Rural Road and Bridge Sub-Projects (Shortlist, tentative)





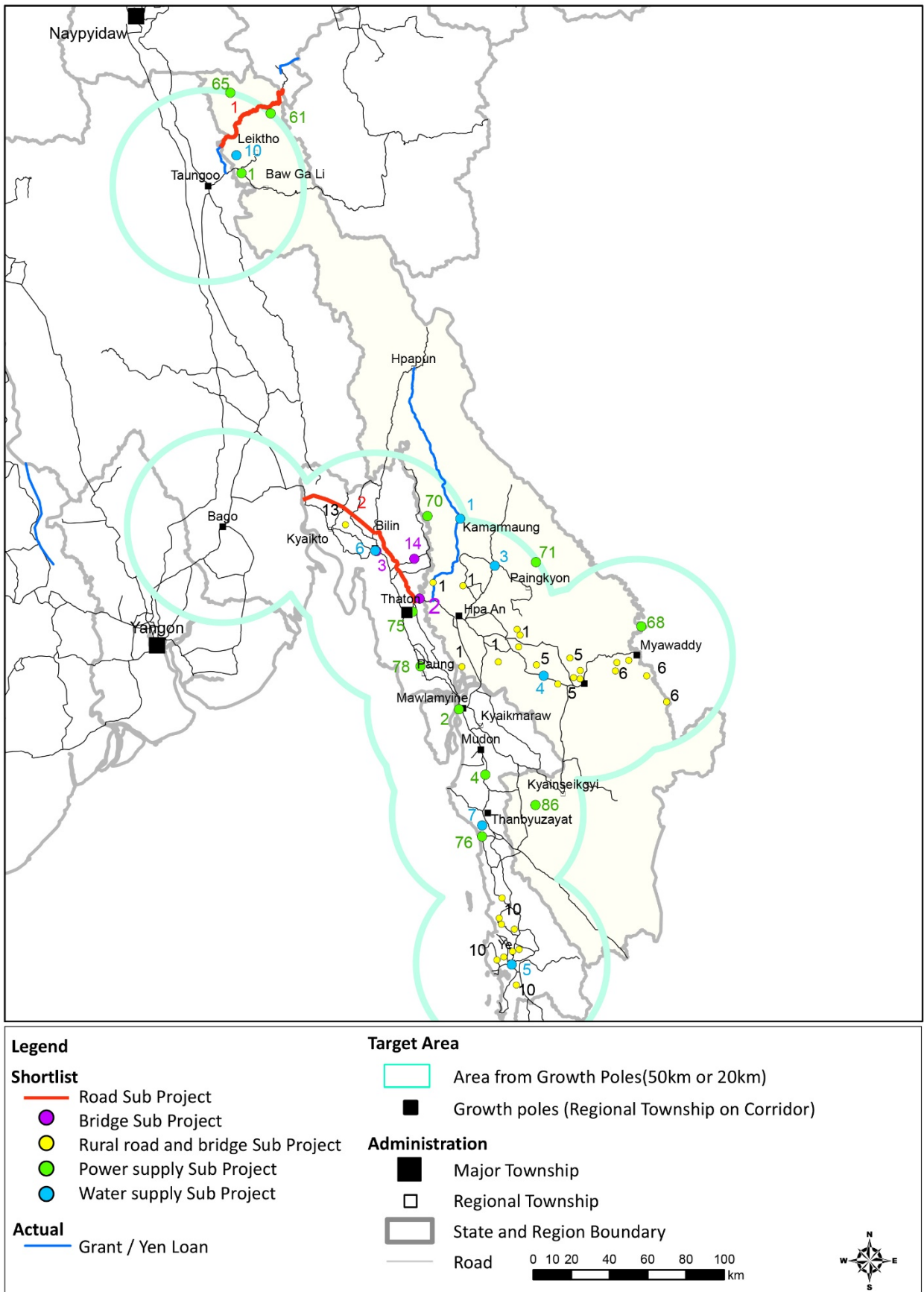
Source: Prepared by the JICA Survey Team

Figure 3.5 : Location of Power Supply (On-Grid) Sub-Projects (Shortlist, tentative)



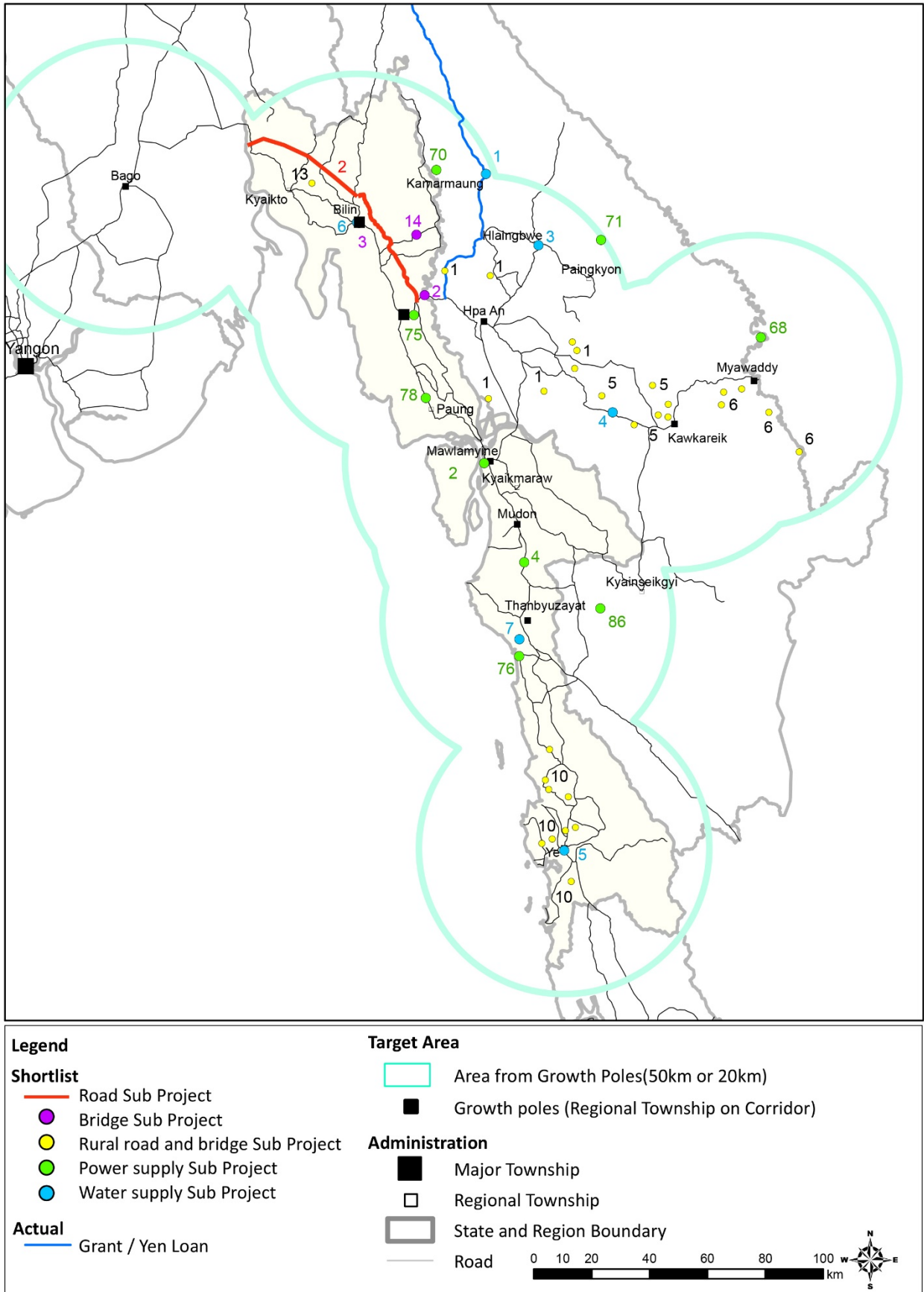
Source: Prepared by the JICA Survey Team

Figure 3.6 : Location of Regional Water Supply Sub-Projects (Shortlist, tentative)



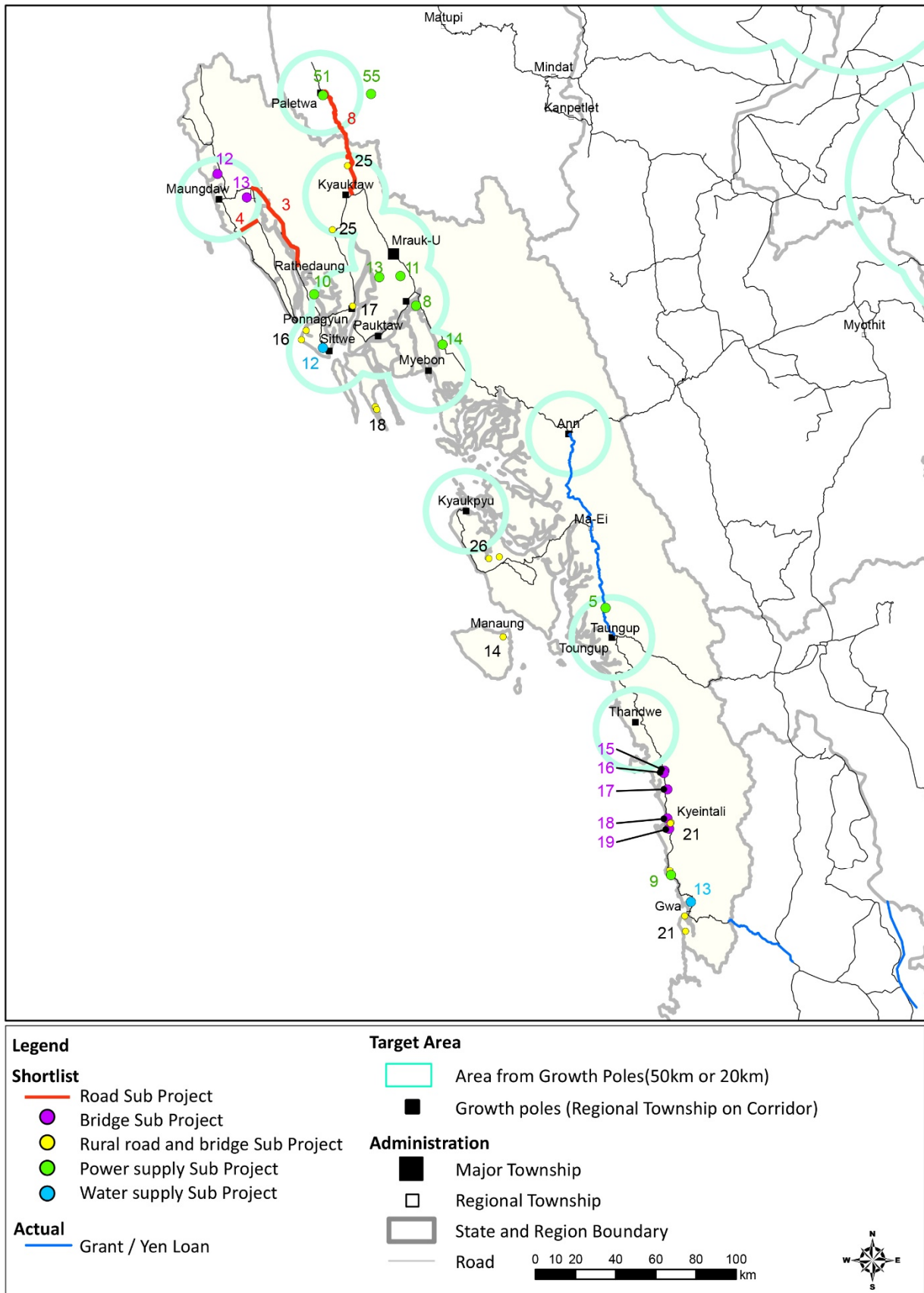
Source: Prepared by the JICA Survey Team

Figure 3.7 : Location of Sub-Projects in Kayin State (Shortlist, tentative)



Source: Prepared by the JICA Survey Team

Figure 3.8 : Location of Sub-Projects in Mon State (Shortlist, tentative)

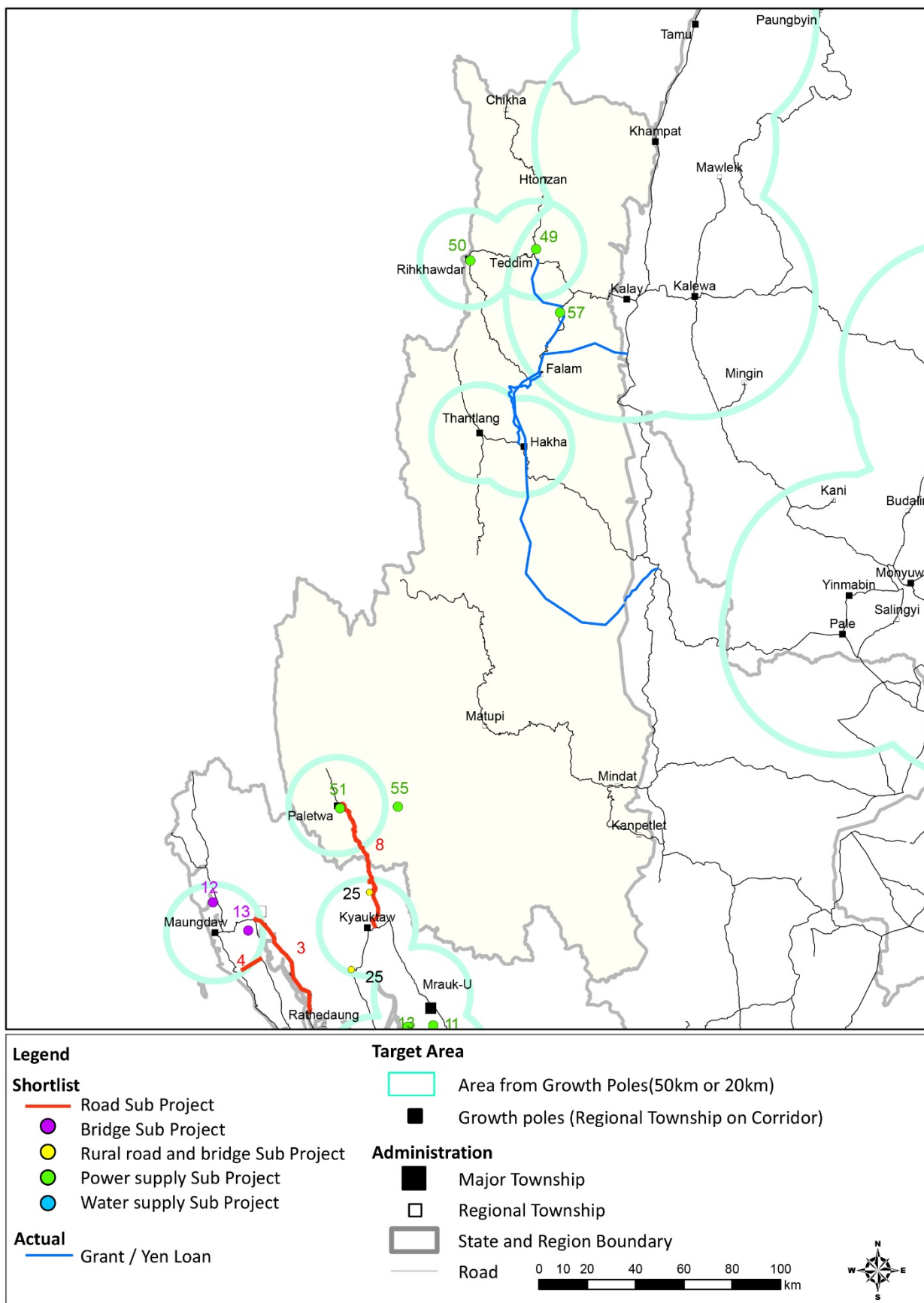


Source: Prepared by the JICA Survey Team

Note: Since the provided location information of Sub-Project “DRRD17: Pononar Kyun” was not clear, it is illustrated in the middle of township area and the actual location might be different.

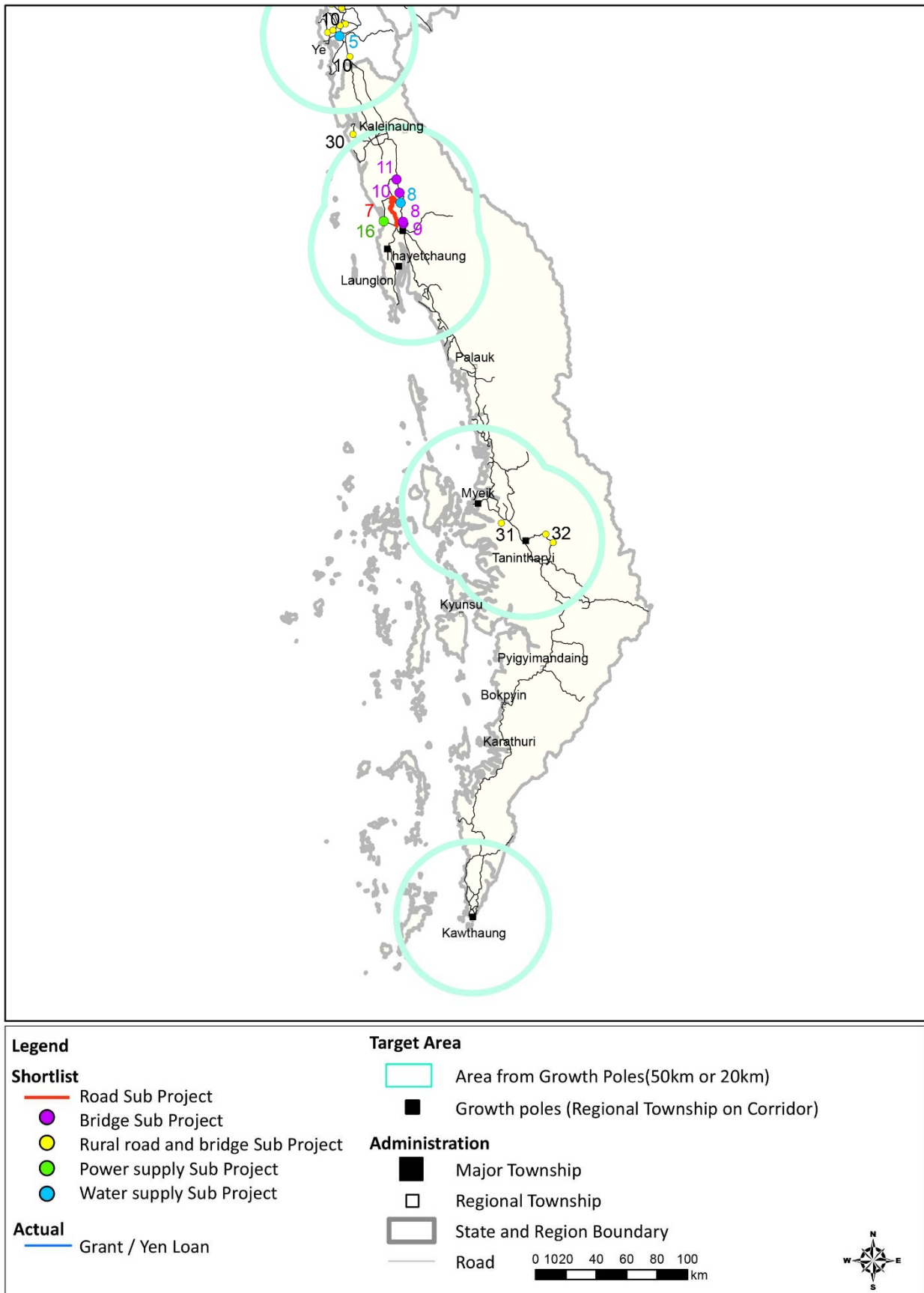
Figure 3.9 : Location of Sub-Projects in Rakhine State (shortlist, tentative)





Source: Prepared by the JICA Survey Team

Figure 3.10 : Location of Sub-Projects in Chin State (Shortlist, tentative)



Source: Prepared by the JICA Survey Team

Figure 3.11 : Location of Sub-Projects in Tanintharyi Region (Shortlist, tentative)

## 4. Necessity of Infrastructure Development and Recommendations toward the Project Implementation

### 4.1 Lessons learnt from the Plans and Projects in Previous Years

The New Phase Project is expected to obtain better effects using the lessons learnt through the plans and projects implemented in previous years. For the implementation of projects, lessons learnt from the two ODA-loan projects of “Regional Development Project for Poverty Reduction” (Phase I Project and Phase II Project) are the best experiences and knowledges to be utilized. In addition, regarding the policy for regional development, lessons learned from “The Project for the Integrated Regional Development Plan to Support Ethnic Minorities in the South-East” (2013-2017) should be considered as appropriate sources.

#### 4.1.1 Lessons to the Overall Project

##### (1) Project Implementation Structures

(Project Implementation Unit: PMU / Project Steering Committee: PSC)

##### 1) Project Implementation Structure of PMU

FERD was appointed as an overall coordinator of the PMU in the Phase I Project implementation. However, several problems and issues were identified.

- FERD did not receive the budget for PMU operation, since PMU was not an actual sub-project executing agency.
- It was not easy to achieve the roles of organizing and instructing the three executing agencies, as it was the first multi-sector infrastructure development project in Myanmar.
- FERD’s influence among the executing agencies was relatively small, since FERD itself didn’t have a development sub-project.

Besides, it was decided to establish an independent implementation structure for each sector for the Phase II Project implementation. There is a concern that joint efforts towards the development of synergistic effects between sectors may not be easily made and the overall goal of the Project for poverty reduction may not be easily achieved. There are more concerns that the smooth operation may not be so easy, since the Project progress of each sector may be different (some can be fast and some can be slow), and it may be difficult to achieve sector-integrated Project control. Thus, it is important to have effective PMU body with cooperative implementing structure to achieve comprehensive development among sectors.

##### 2) Project Implementation Structure of PSC

PSC is a high-level decision-making body in the Project implementation, and is responsible for reporting the project progress status to Regional government agencies. PSC also makes the Union-level decisions related to the Project. For the Phase I Project, the information transfer was inadequate due to insufficient information sharing structure between the Union government and the regional government, and the transferring path was not established effectively. Therefore, when implementing the New Phase Project, it is necessary to strengthen the cooperation between PSC and JICA by having JICA as an observer of PSC, and to establish an effective information sharing and collaboration mechanism among the Union government and regional government agencies.

##### (2) Change of Sub-Projects

There were total of six (6) cancellations of sub-projects and two (2) additional sub-projects in road sector, five (5) cancellations of sub-projects and thirteen (13) additional sub-projects in power supply sector, and seven (7) cancellations of sub-projects in water supply sector taken place in the Phase I Project. Common reason with the sub-project cancelation is caused by different project budget allocation by other donors, etc. to the sub-projects, and the same can occur in the New Phase Project as well. It is highly recommended for all executing agencies to set up the framework for change or replacement of sub-projects in order to make quick response and action to the demands or needs of each agency or other government bodies. It is recommended also to follow “Rules for Changing and Substituting Sub-Projects (refer to Section 3.3)” to properly consider adequacy of addition and replacement of sub-projects.

##### (3) Securing Necessary Budget for Items under Responsibility of the Union government

The Union government as the Project counterpart needs to secure necessary budget for “land acquisition,” “project management/administration cost,” “commercial tax,” “import tax,” “interest during construction,” and



“front end fee” for the expected Project. It would be more appreciated if the consultant can provide such assistance to the executing agencies for budget management in the New Phase Project. There can be possible policy change on the budget request and approval procedure in Myanmar, hence it is highly recommended to gather the latest information in this regard to ensure smooth implementation of the Project.

#### (4) Response to Environmental and Social Considerations

In promoting the New Phase Project, all executing agencies are required to confirm “the environmental and social consideration system / organization in Myanmar,” “laws, regulations and standards related to environmental and social considerations (environmental impact assessment / resettlement / public participation / information disclosure),” “consistency with the JICA environmental guidelines and role of related organizations,” etc. For the implementation of the Project, the executing agencies are responsible for conducting the Environmental Impact Assessment (EIA) procedures under the Environmental Conservation Agency (ECA) of the Ministry of Natural Resources and Environmental Conservation (MoNREC) for each sub-project. It is necessary to undertake all necessary EIA procedures in about eight months before the scheduled date of construction commencement. For some sub-projects, the feasibility study (F/S) of which has not been completed or the project scope is unclear, EIA procedures need to be conducted in parallel with F/S. However, the executing agencies have limited experience in hiring environmental consultants or conducting EIA procedures by themselves.

#### 4.1.2 Lessons learnt for Regional Development through Infrastructure Development

In order to effectively promote regional development through infrastructure development, mutual cooperation between the Union government and regional governments is indispensable. In addition, when a Project site is located in a minority ethnic region, the special project approach that considers community development is vital.

##### (1) Mutual Cooperation between Union government and Regional Government

The Southeast Regional Integrated Development Project promotes the development of the Southeastern region in medium to long term in line with the regional comprehensive development plan formulated by using the participatory approach by the Project. The importance for rural development is to improve qualitative information sharing between central and rural areas. It is necessary to strengthen the mutual coordination among the Union government and regional government in order to build a system that can comprehensively cooperate.

##### (2) Community Based Cooperative Approach for Regional Development

Understanding trends in ethnic minority groups is important for provincial development, and infrastructure development can have a significant impact. It is necessary for communication between the Myanmar government and ethnic minority groups to be conducted more closely. As an effective approach to achieving this, it is desirable to implement the Project according to the principle of “Do No Harm” emphasizing the community-based approach having “bottom-up” as the key concept.

## 4.2 Recommendation for Project Implementation

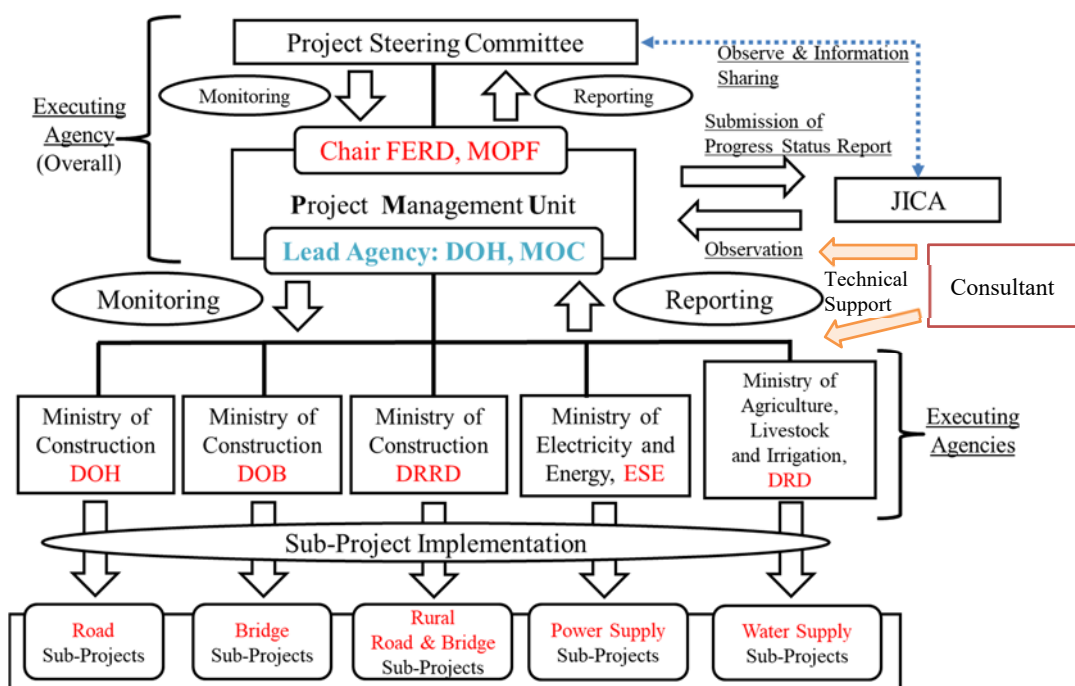
### 4.2.1 Implementation Schedule

If the infrastructure development is implemented by ODA-loan project, the total required period from the signing of the Loan Agreement to the completion of the Project excluding defect liability period is estimated at 61 months.

### 4.2.2 Implementation Structure

#### (1) Project Implementation

DOH, DOB and DRRD (MOC), ESE (MoEE), and DRD (MoALI) shall be the Project executing agencies. In addition, FERD (MOPF) is expected to be a coordination agency with tasks and responsibilities of overall coordination among the executing agencies. However, it might be difficult for FERD to take on the same role as Phase I Project. Therefore, DOH (MOC) is highly expected to act as a “lead agency” to take the lead in more technically oriented coordination among the executing agencies, as DOH has large experiences of project implementation through the Phase I and II Projects (refer to Figure 4.1).



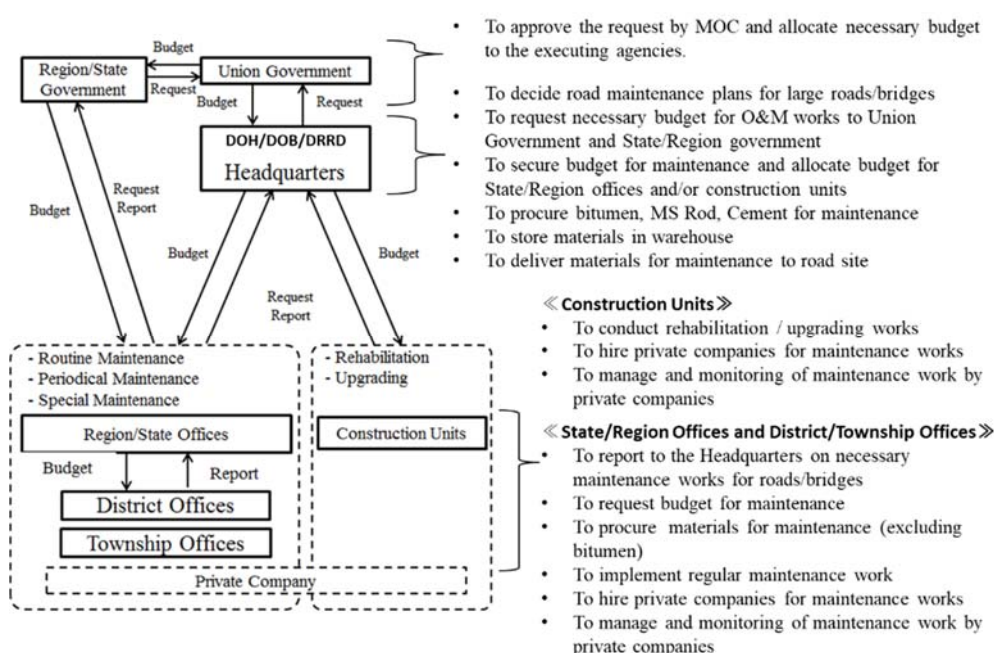
Source: Prepared by the JICA Survey Team

Figure 4.1 : Project Implementation Structure (proposed)

(2) Long-term Maintenance Management System

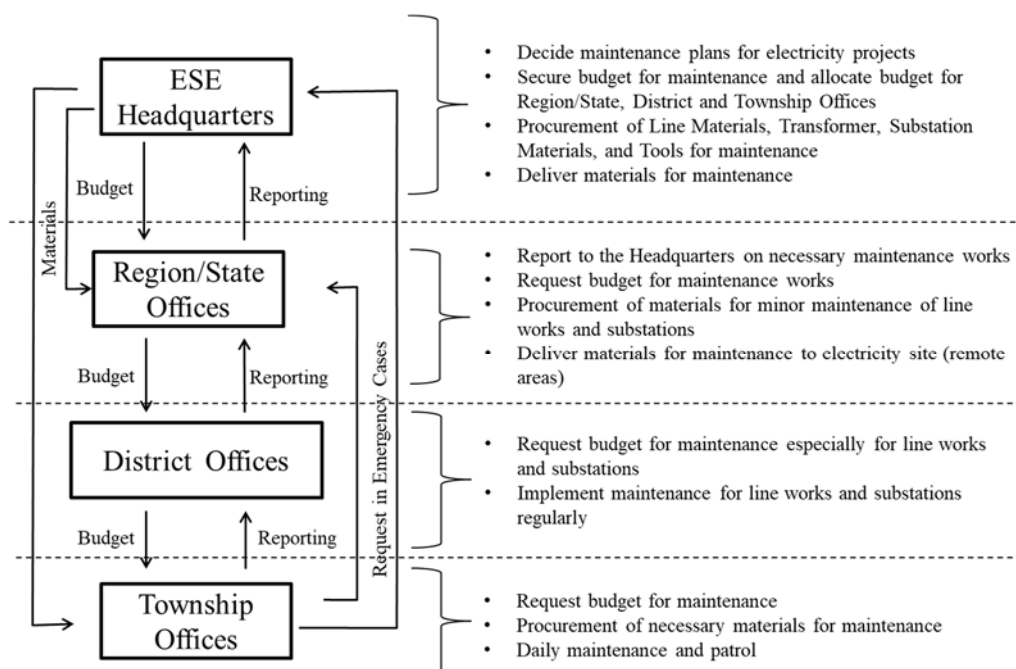
The long-term maintenance management systems of DOH, DOB, DRRD, ESE and DRD are shown in Figure 4.2 through Figure 4.4. By applying the following strategies, improvement of the long-term maintenance management system can be achieved together with the financial and operational managements.

- Transform from corrective maintenance system to preventive maintenance system,
- Establish the long-term maintenance management offices (2 to 3 offices per state/region) in each state and region to store the equipment and technical transfer to regional officers,
- Perform market-based analysis in order to employ the private sector,
- Apply a suitable method to achieve smooth implementation and equipment procurement where direct construction management becomes necessary, etc.



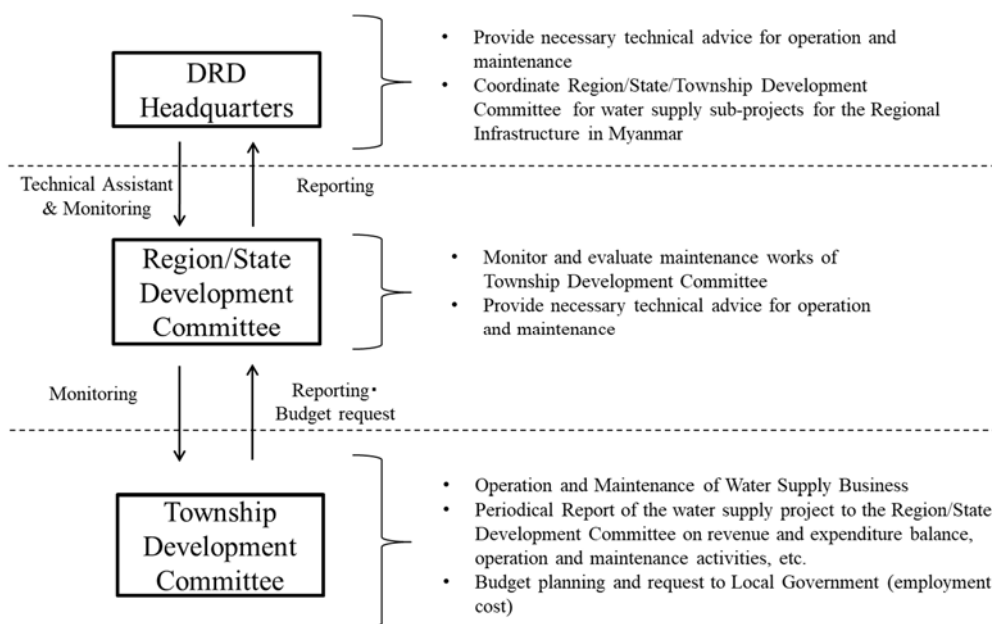
Source: Prepared by the JICA Survey Team

Figure 4.2 : Maintenance Management System of DOH, DOB and DRRD



Source: Prepared by the JICA Survey Team

Figure 4.3 : Maintenance Management Structure of Electricity Supply Enterprise



Source: Prepared by the JICA Survey Team

Figure 4.4 : Maintenance Management System of Department of Rural Development

### (3) PMU and PSC

The following table summarizes the possible roles and expected members of PMU and PSC toward Project implementation. Although there are various parts that follow the Phase I Project, some are modified based on lessons learned from the Phase I Project experiences.

Table 4.1 : Responsibilities of PMU, PSC (tentative)

	Roles	Expected Core Members
PSC	<ul style="list-style-type: none"> <li>Assumption of overall responsibility for Project implementation</li> <li>Coordination of stakeholders</li> <li>Reporting to and information sharing with the state/regional governments</li> <li>Monitoring progress status of sub-projects</li> <li>Resolving impediments/issues at national policy level</li> <li>Monitoring a balanced Project implementation among states and regions</li> <li>Timely reviews and confirmation of any Project-related concerned matters including changes in components and designs of a sub-project, cost overrun, and addition of new sub-projects proposed or requested by the Project Management Unit</li> <li>Confirmation of utilization of contingency allocated for new sub-projects</li> </ul>	<ul style="list-style-type: none"> <li>Chairperson (Permanent Secretary, MoPF)</li> <li>Member (Director General, FERD)</li> <li>Member (Director General, Budget Department, MoPF)</li> <li>Member (Director General, Treasury Department, MoPF)</li> <li>Member (Director General or Deputy Director General, DOH)</li> <li>Member (Director General or Deputy Director General, DOB)</li> <li>Member (Director General, DRRD)</li> <li>Member (Managing Director, ESE)</li> <li>Member (Director or Deputy Director General, DRD)</li> <li>Member (Representatives from Priority Target Area*)</li> </ul> <p>* Other states and regions will be invited to join PSC as necessary.</p>
PMU	<ul style="list-style-type: none"> <li>Overall Project Management</li> <li>Project Coordination / Management with Loan Consultants</li> <li>Monitoring and Evaluation of Sub-projects</li> <li>Financial and Disbursement Management</li> <li>Monitoring on Environmental and Social issues</li> <li>Examination of replacement, addition, modification and cancellation of sub-projects</li> <li>Reporting to JICA in a timely manner including submission of quarterly progress report (Project Status Report) and Project Completion Report</li> <li>Coordination with Union Auditor-General's Office regarding the Project-specific auditing</li> </ul>	<ul style="list-style-type: none"> <li>Chairperson (Director General or Deputy Director General, FERD, MoPF)</li> <li>Member (Director or Deputy Director, FERD, MoPF)</li> <li>Member (Deputy Director, Planning Department, MoPF)</li> <li>Member (Chief Engineer or Director, DOH)</li> <li>Member (Chief Engineer or Director, DOB)</li> <li>Member (Chief Engineer or Director, DRRD)</li> <li>Member (Deputy Chief Engineer, ESE)</li> <li>Member (Director or Deputy Director, DRD)</li> </ul>

Source: Prepared by the JICA Survey Team, (Proposed based on the result of meetings and workshops related to PMU /PSC Organization Structure)

Note 1: Representatives from each agency for both PMU and PSC are tentatively listed in the table, as they will be finalized later.

Note 2: There can be possible participation by representatives from Auditor Office and MoNREC to the PMU meetings.

### 4.2.3 Procurement (Consultant's Roles)

#### (1) Consultant Selection

Assuming that the New Phase Project is to be implemented as a Japanese ODA-loan scheme, for smooth implementation of the Project, it is recommended to select an international consultant properly and promptly in accordance with the consultant procurement guideline of JICA. For the selection of consultant, international experience, technical experience and qualification and total capability shall be fairly evaluated. The loan consultant is expected to provide advice and technical support for the executing agencies so that they can ensure the smooth project implementation in terms of quality control and schedule management.

#### (2) Necessary Actions to be taken by the Executing Agencies before Procurement of Consultant

Based on the experiences of Phase I Project, each executing agency is responsible for the following activities from the beginning of the Project implementation:

- Each executing agency needs to prepare the design documents and the bidding documents to select the contractor based on detailed design soon after the Project starts. These actions shall be taken without delay.

- Gathering the necessary information for the detailed design process for the sub-projects of MOC and DRD is important as most of the sub-projects are not ready with detailed designs. Consultant services may be procured by executing agencies to implement site survey, soil investigation, and detailed design service.
- All executing agencies need to gather necessary information and prepare all necessary documents to meet the law and regulations of Myanmar regarding environmental and social considerations without delay.
- The land acquisition and resettlement action need to be completed before construction starts, and executing agencies are required to complete all documentation and approval procedure without delay.
- The Union government is responsible for sharing the information, and coordination with ethnic minority groups for smooth implementation if the Project is located in conflict areas.
- Earlier action for procuring the loan consultant is necessary to gain quality services as soon as possible, as earlier preparation of the formation is necessary for the smooth implementation of the Project.
- The Project can be expected to be a sector loan project and there can be substitution of the sub-projects with flexibility. Timely and effective coordination and cooperation at PMU is necessary to receive benefit of the sector loan scheme with the smooth substitution of sub-projects without delaying the process (it is based on the condition that all PSC and PMU members are duly selected and both organizations are formulated, so that the Project can be smoothly implemented by coordination among all members and agencies).

### (3) Effectiveness of Consultant

There might be lack of human resources and technical performance with the executing agencies. Executing agencies may request to the loan consultant assistant for document reviews and technical advisory. Executing agency should understand that it is their responsible to maintain quality control, work progress reporting and overall project management, and the executing agencies shall achieve all the tasks of the Project management by utilizing technical knowledge transfer and advisory services to be provided by the loan consultant.

## 4.3 Expected Development Effect through the Project

The New Phase Project targets three infrastructure sectors, namely roads and bridges, power supply, and water supply. Synergistic effects can be expected to occur by an individual sub-project development or by two or more projects which may contribute to solve the development issues in each state or region. The representative development effects through the New Phase Project from a micro level viewpoint are expected as summarized below.

### «Road and Bridge Development Projects»

- Accessibility to urban markets can be improved to transport more products from the provinces.
- Accessibility to schools, companies and work places in urban areas can be improved for commuting people.
- It enables critical patients to access hospitals with well-equipped medical facilities.
- It secures emergency evacuation route(s) when a natural disaster occurs.

### «Power Supply Projects»

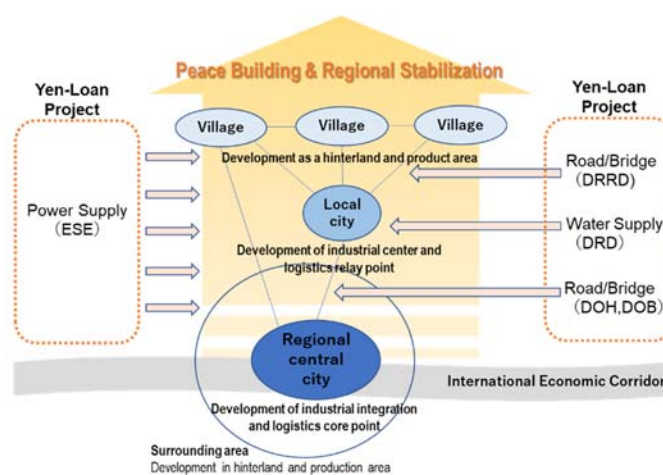
- It can introduce bright and safe night living condition with lights, extend study time for children, and enable people to work at night.
- It enables introduction of electric equipment such as computer, projector, photocopier, lighting equipment and improves the quality of education.
- Power supply to TVs and charging of mobile phones can secure steadily and opportunities for obtaining better and more information.
- Hospitals and public health centers can gain stable power supply, therefore they will be able to do night time emergency treatment, maternal care treatment, etc.
- Prevention of deterioration of medicines and vaccine can be expected due to the improvement of function of refrigeration storage by the stable supply of electricity.
- It promotes the introduction of advanced medical devices and PCs, which enables the improvement of the quality of medical services.

## «Water Supply Projects»

- It can help reduce the morbidity rate of water-borne diseases by improvement of the accessibility to safe and secure water. As a result, people's health can be maintained well to secure healthy laborers, thus regional economy may be improved.
- It can reduce work load of women and children for fetching water every day.
- The costs for purchasing bottled water can be reduced, and the surplus cash can be used for other activities such as education, job opportunities and healthcare.

The development of infrastructure tends to promote industrial and economic development that contributes to regional development, considering the entire target area and the regional characteristics. Mutual development is essential in the urban area for the regional industrial development and the regional areas or hinterland for its regional production.

To extend the effects of the development along these economic corridors to rural areas, the development around major regional cities and of regional urban areas located between regional central cities and rural areas is considered important for the regional economic development. It is also expected that the contribution of urban infrastructure to the target areas' population growth and the strengthening of economic links between cities and between urban and rural areas by transport infrastructure will generate synergistic effects. Rakhine State, in particular, needs to improve people's living condition and quality of life, thus there should be balanced regional development (refer to Figure 4.5).



Source: Prepared by the JICA Survey Team

Figure 4.5 : Relevance of the Project to Regional Development

## 4.4 Issues of Concern towards the Project Implementation

The Union government has been preparing a new policy regarding the budget request and approval procedures. This policy has not been confirmed or become effective at the time of the survey, however, in order for effective as well as timely implementation of the Project, updated information regarding the new budget allocation policy shall be further obtained.

## 4.5 Community Development and Gender Considerations

### 4.5.1 Policy and Consideration of Community Development

To achieve peace with the EAGs, national reconciliation is at the top of the agenda for Myanmar, which has been suffering from the long and endless civil war since independence. The implementation of the New Phase Project should avoid triggering any conflict or tensions among citizens. Policies and considerations which should be taken in implementing the new phase are summarized below.

#### (1) Follow-up of the political dialogue and peace conference

The progress and directions of the political dialogues and peace conferences (Panglong Conference) following the National Ceasefire Agreement (NCA) should be followed up. Internally Displaced Persons (IDP) and refugees will return to their homelands, if the peace process moves forward. It is necessary to follow up the trends of return to see its influence over the sub-projects and communities in the target areas.

#### (2) Project explanation to local residents

There is a need to explain carefully to local communities about the Project in the new phase in advance via the existing communication channels to dispel doubts and answer their questions. The social groups that are likely to be excluded, such as women and ethnic minorities, in the decision-making process should be reached

and engaged. If community members are explained properly, it is expected they will start discussion how to use the infrastructure to be constructed.

### (3) Approach in Rakhine State

Particular consideration was given to the balanced selection of the target areas in order not to worsen conflicting emotions and the fragmented nature of society by choosing only one side. It is necessary to follow up the progress of problems in Rakhine State and strike a right balance, etc. among all communities in the state in changing and implementing the sub-projects.

#### 4.5.2 Gender Considerations in Infrastructure Development

The next table is a summary of gender considerations at three stages: design stage, construction stage, and post-construction/operation and maintenance stage by sector.

Table 4.2 : Gender Considerations in Infrastructure Development

Sector	Design stage	Construction stage	Post-construction/operation and maintenance stage
Road and bridge sector	N/A	The executing departments and their contractors have hired female workers for construction work in the past. The female ratio was sometimes over 50%. Therefore, employment opportunities for women shall be created in the New Phase Project too. The executing departments and their contractors have prepared female toilets and accommodation where the number of female workers was high. Such measures should be taken in the New Phase Project.	Employment opportunities will be created for women, such as clearing weeds and cleaning drains along roads.
Power supply (On-Grid)	N/A		There are many female office workers and meter readers. Employment opportunities will be created for women if the ESE needs more staff.
Water supply	A female toilet is included in the design so that female engineers can work at the treatment facility.		Water meters are to be installed as part of the sub-projects, which can result in employment opportunities being created for women.

Source: Prepared by the JICA Survey Team

It is expected that women will start new small businesses and be engaged in new types of work due to infrastructure development. The executing agencies should collaborate with the Department of Social Welfare, as well as the GAD responsible for coordinating with the ward/village tract administrators and the concerned departments, in order to exploit infrastructure development with the aim of maximizing benefits for women. Road and Bridge Sector.



## 5. Road and Bridge Sub-Projects

### 5.1 Outline of Sub-Projects

#### 5.1.1 Shortlisted Sub-Projects

The road and bridge sub-projects have been shortlisted, and DOH sector consists of 6 sub-projects, DOB sector consists of 14 sub-projects and DRRD sector consists of 15 township sub-projects as described in Section 3.4.

#### 5.1.2 Project Component

Expected project components of the road and bridge sector are shown below.

Table 5.1 : Shortlist of Road and Bridge Sector Sub-Projects (expected)

Sub-Project by DOH	Sub-Project by DOB	Sub-Project by DRRD
<ul style="list-style-type: none"> <li>• Widening of regional trunk roads</li> <li>• Pavement improvement</li> <li>• Upgrading small bridges</li> <li>• Upgrading box culverts</li> <li>• Installation of drainages</li> <li>• Installation of retaining walls</li> <li>• Installation of guardrails</li> </ul>	<ul style="list-style-type: none"> <li>• Construction of new bridges on regional trunk roads</li> <li>• Replacement of existing bridges</li> <li>• Construction of approach roads</li> <li>• Removal of old existing bridges</li> <li>• Installation of box culverts</li> </ul>	<ul style="list-style-type: none"> <li>• Improvement of rural village roads</li> <li>• Construction of rural bridges</li> <li>• Replacement of existing rural bridges</li> <li>• Installation of box culverts on rural roads</li> </ul>

Source: Prepared by the JICA Survey Team based on the scope of sub-projects by MOC

## 5.2 Project Schedule

The estimated project schedule of the three executing agencies (DOH, DOB, and DRRD) is shown in the following figure 5.1.

Executing Agency	Construction Method	Work Item	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	
(Overall E/As)	Procurement of Consultant		■	■	■				
DOH	Contractor Procurement	Design	■	■	■				
		Procurement		■	■				
		Construction			■	■	■	■	
		Defect Liability Period						■	■
	Direct Construction	Design	■	■	■				
		Construction			■	■	■	■	■
DOB	Contractor Procurement	Design	■	■	■				
		Procurement		■	■				
		Construction			■	■	■	■	
		Defect Liability Period						■	■
	Direct Construction	Design	■	■	■				
		Construction			■	■	■	■	■
DRRD	Contractor Procurement	Design	■	■	■				
		Procurement		■	■				
		Construction			■	■	■	■	
		Defect Liability Period						■	■

Source: Prepared by the JICA Survey Team

Note 1: The schedule illustrates typical construction duration based on common exercise in Myanmar.

Note 2: DRRD considers outsourcing detailed design work, and the procurement is assumed to take place earlier period of first year. The actual design work may take place in the later first year while the Project consultant is being procured.

Figure 5.1 : Project Schedule of Road and Bridge Sub-Projects (tentative)



### 5.3 Procurement Plan

The executing agencies (DOH, DOB, and DRRD) will, basically, contract out road and bridge sub-projects and hire Contractors through local competitive bidding (LCB).

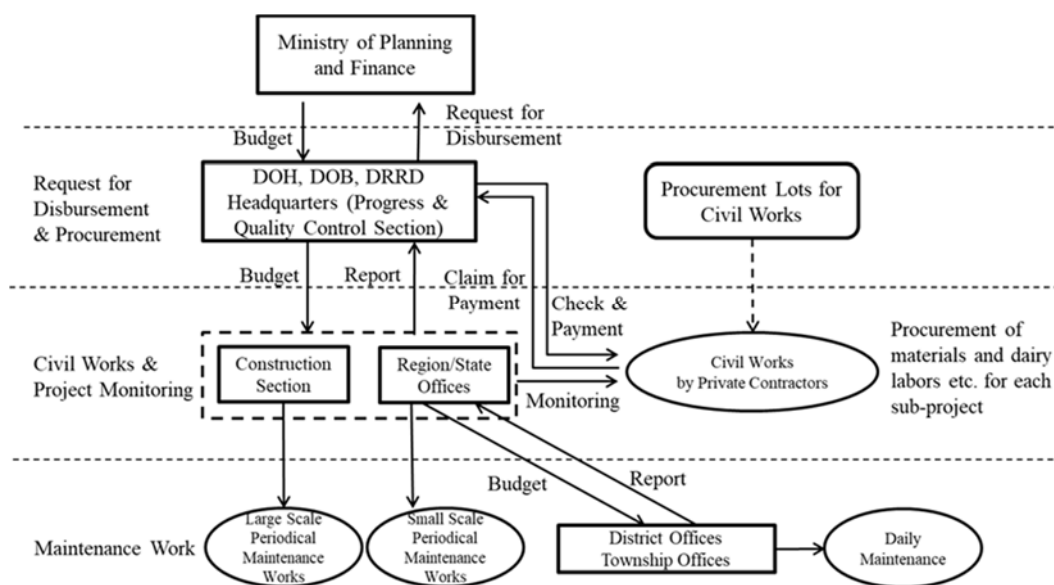


Figure 5.2 : Procurement Flow for Road and Bridge Sector

### 5.4 Organization for Implementation

Each Department (DOH, DOB and DRRD) will be responsible for the implementation of particular sub-projects.

### 5.5 Consulting Services

Cooperating closely with executing agencies (DOH, DOB, DRRD), it is recommended that the consultant will review and advise on detailed designs, procurement procedures and construction supervision (summarized below), which shall be implemented by the executing agencies in order to support and improve their technical capacities and knowledge.

- Review and advice on detailed design
- Review and advice on procurement procedure
- Review and advice on construction supervision
- Others (Inspection during Defect Liability Period)

### 5.6 Necessity and Recommendation based on the Lessons learnt

#### (1) Procurement Method

Basically, road construction managed by DOH in this New Phase Project will outsource the local contractor by LCB based on the unit price contract. However, roads would better be constructed under the direct construction method by DOH, if construction by a private company is assumed difficult due to security issues in, for instance, northern part of Rakhine State, and only materials are procured by LCB. Meanwhile, it can be better with DOB to outsource the construction of small bridge sub-projects to private contractors by lump sum contract method, and to construct the large bridge, which have no construction record by the local contractor, with direct construction method by DOB with procurement of materials including upper and superstructure works by LCB. It also would be better with DRRD plans to outsource all construction works basically, according to the government policy.

#### (2) Implementation schedule

In the New Phase Project, DOH can avoid delay of construction using the unit price contract method as same as the Phase II Project. Meanwhile, DOB and DRRD keep using the conventional contract method and

it is considered that construction work of the same scale will require a longer construction period than that of DOH sub-projects. Therefore, it is recommended to set precise implementation schedule.

### (3) Consulting Services

It is important to limit the service target sub-projects for the New Phase Project in order to maintain the service quality of the international experts of the Consultant as equal as that of Phase I Project. The consulting services for DRRD, in particular, may need to apply more concentrated support by foreign consultant in order to reduce DRRD's technical work loads, since there would be more design changes and modifications to be expected after the signing of the construction contracts and this can lead delay in construction work. The reason is that many design works would be made without referring the local design standard and details, and these design documents would be used as parts of bid document for procurement of contractors.

### (4) Maintenance

Maintenance costs of infrastructures after the construction would be borne by Myanmar's internal revenue resources. DOH, DOB and DRRD as Executing Agencies are responsible for securing maintenance costs on the basis of budget request to the expected New Phase Project.

## 6. Power Supply (On-Grid) Sector

### 6.1 Outline of Sub-Projects

#### 6.1.1 Shortlisted Sub-Projects

Sub-projects of power supply sector have been shortlisted tentatively, and total 25 sub-projects are selected as described in the earlier Section 4.4.

#### 6.1.2 Project Component

Expected Power Supply (On-Grid) Sector Sub-Project component is summarized below.

- Construction of 66kV/33kV substations
- Construction of 66kV/11kV substations
- Construction of 33kV/11kV substations
- Construction of 66kV transmission lines
- Construction of 33kV transmission lines

### 6.2 Project Schedule

Material procurement and construction for transmission lines and distribution lines are continuously implemented. The tentative implementation schedule, which includes the procedure before construction work, period for pre-qualification of contractors and others, is illustrated below.

Work Item	1st Year	2nd Year	3rd Year	4th Year	5th Year
Procurement of Consultant, Preliminary Designing	█	█	█		
Detailed Design, Cost Estimation, Bid Document Review		█	█		
Procurement of Contractor			█	█	
Construction Supervision			█	█	█
Defect Liability Period					█

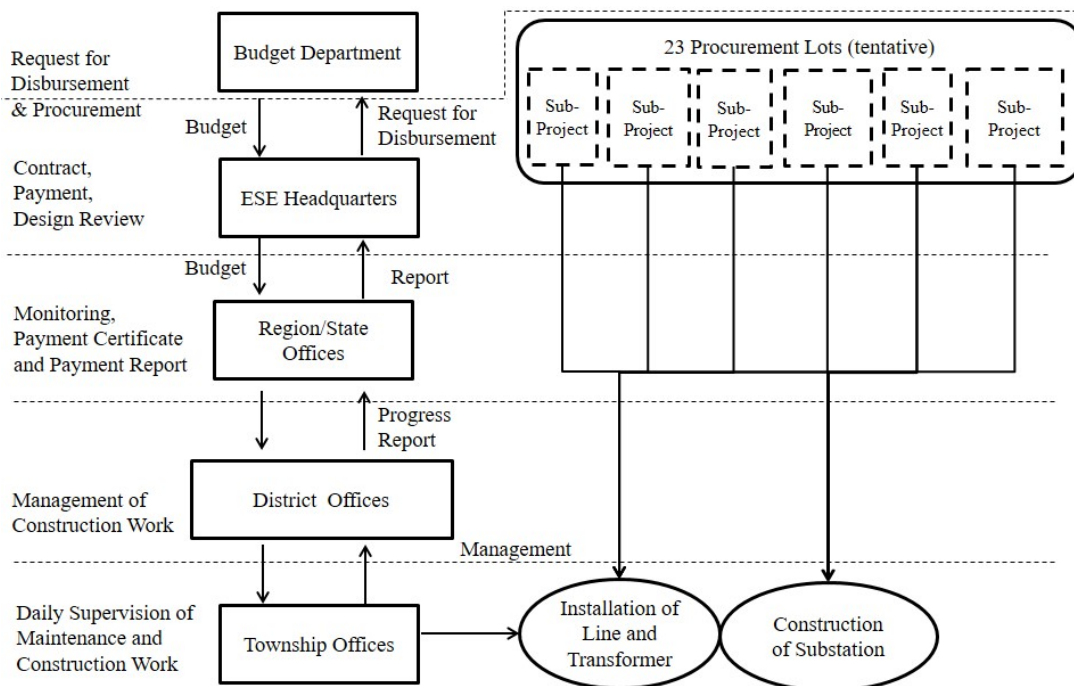
Source: Prepared by the JICA Survey Team

Note: The schedule illustrates typical construction duration based on common exercise in Myanmar.

Figure 6.1 : Project Schedule of Power Supply Project (tentative)

### 6.3 Procurement Plan

The ESE's tender method commonly applies "Turn-Key," which is a local term utilized in the ESE and basic design is done by the ESE.

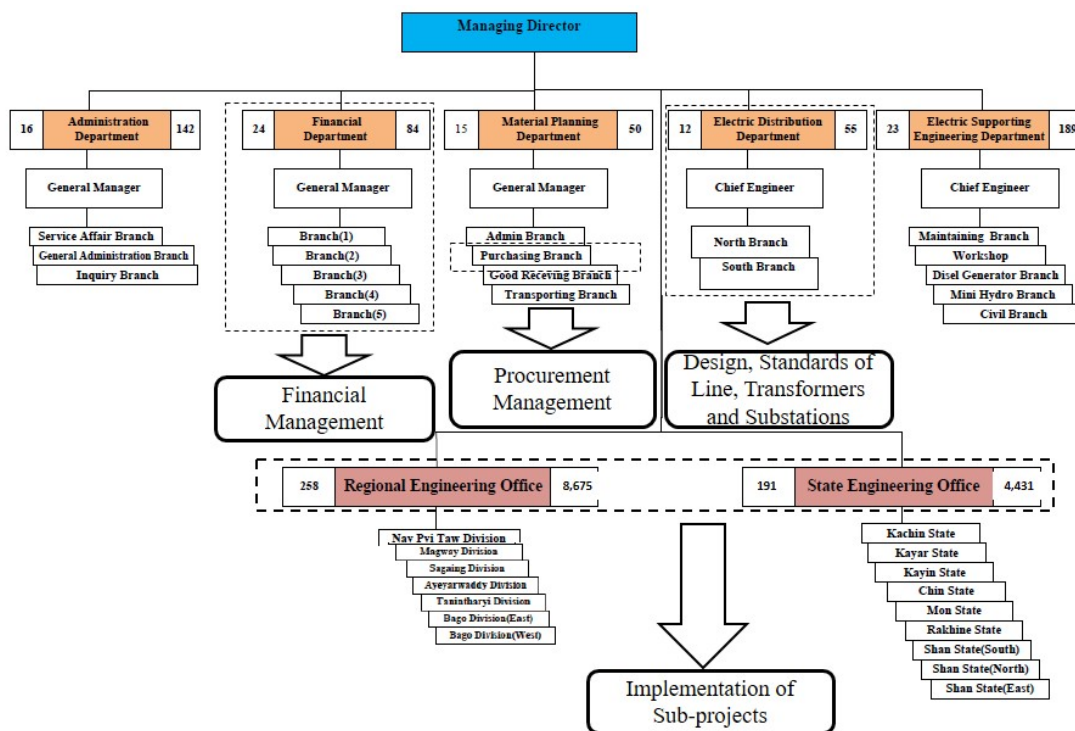


Source: Prepared by the JICA Survey Team

Figure 6.2 : Flow chart of Procurement for Power Supply Project

### 6.4 Organization for Implementation

The executing agency for power supply sector (on-grid) is considered with ESE (refer to Figure 6.3). During the course of implementation, organizational strengthening, including capacity development of full-time staff members in charge of the Project, will be necessary. Operation and maintenance structure as well as operation rules should be clearly defined so that the facilities installed can be operated for a long time in good condition. The structure and the rules should cover not only newly-installed facilities but also existing equipment in order to improve reliability.



Source: Prepared by the JICA Survey Team

Figure 6.3 : Organization Chart for Implementation of Power Supply Sub-Project (On-Grid)

## 6.5 Consulting Services

The Consultant should work closely with the ESE on the supervision from the design review to construction. It is recommended that the consultant will review and advise in order to support and improve ESE officials' technical capacity and knowledge.

- Detailed Design and Preparation of Bidding Documents
- Public Bid and Contract
- Procurement Management
- Supervision of Contractors' Field Works
- Commissioning Test and Inspection for Defect Liability Period

## 6.6 Necessity and Recommendation based on the Lessons learnt

### (1) Procurement Method

As existing facilities in the power sector are procured and installed by domestic contractors, there is no problem with the LCB system. Following the international standard technology of the entire energy sector in Myanmar is important to make local contractors able to participate in the ICB bid.

### (2) Implementation Schedule

There was no delay from the schedule against the original schedule; it took time to change the sub-project and to acquire the land, and it was completed just before the performance deadline. The Project will be carried out in light of lessons learned from the Phase I Project, such as policy change for sub-project replacement and advance land acquisition.

### (3) Consulting Services

In order to ensure effective and enough support to the executing agency, international experts shall be considered for full deployment throughout the construction period. The number of sub-projects proceeding simultaneously can be expected to be large at the beginning and end of the Project implementation, thus at least two (2) engineers (one Substation Engineer and one Distribution Engineer) should be deployed simultaneously for supervision.

### (4) Maintenance

The budget for operation and management for the infrastructure after the Phase I Project has been allocated without problems, and the budget for operation and management for the expected New Phase Project will necessarily be secured on the budget request basis through ESE as well.

## 7. Water Supply Sector

### 7.1 Outline of Sub-Projects

#### 7.1.1 Shortlisted Sub-Projects

Draft shortlist for regional with total of 10 water supply sub-projects are tentatively selected as described in earlier Section 3.4.

#### 7.1.2 Project Components

Expected Project components of the Water Supply Sector are summarized in Table 7.1.

Table 7.1 : Major Components of Sub-Projects (tentative)

Components	Contents
Water Source Facilities	<ul style="list-style-type: none"> <li>• Dam / Reservoir : Pontoon with pump or intake tower</li> <li>• River water : Pontoon or radial collector well</li> <li>• Stream water (sapling water) : Intake dam / tank</li> </ul>
Water Conveyance Facilities	<ul style="list-style-type: none"> <li>• Pipelines and auxiliary facilities (including necessary pumps) to send raw water from intake facility to water treatment plant</li> </ul>
Water Treatment Facilities	<ul style="list-style-type: none"> <li>• Water treatment plant (mixing chamber, roughing filter, slow sand filter, treated water tank, chlorination facility)</li> </ul>

Components	Contents
Water Transmission Facilities	<ul style="list-style-type: none"> <li>Pipelines and auxiliary facilities (including necessary pumps) to transport the water from water treatment plant to water reserving tanks</li> </ul>
Water Reserve Facilities	<ul style="list-style-type: none"> <li>Grand tank and/or elevated tank for water storage and /or pressure regulation for distribution</li> <li>Water distribution pumps if necessary</li> <li>Capacity for 12 hours storage</li> </ul>
Water Distribution Facilities	<ul style="list-style-type: none"> <li>Pipelines and auxiliary facilities (including pump) to transport the water from water reserving tanks to house hold</li> </ul>
Electric Power Receiving Facilities	<ul style="list-style-type: none"> <li>Transformer</li> <li>11KV line</li> </ul>
Equipment for Operation & Monitoring	<ul style="list-style-type: none"> <li>Meters for water flow</li> <li>Water quality analysis equipment</li> </ul>

Source: Prepared by the JICA Survey Team

## 7.2 Project Schedule

Using the detailed design and construction separate ordering method, six months are necessary to prepare construction tender document, announcement and contract. Construction period is estimated at 18 months for large-scale construction and 12 months for medium-/small-scale projects, based on the Phase I experience.

Work Item	1st Year	2nd Year	3rd Year	4th Year
Procurement of Consultant, Preliminary Designing	█	█	█	█
Preliminary Design Review, Preparation of Bid Document and		█	█	
Detailed Design, Design Review, Bid Document Preparation		█	█	
Public Notice, Procurement of Contractor			█	
Construction Supervision			█	█
Defect Liability Period				█

Note: The schedule illustrates typical construction duration based on common exercise in Myanmar.

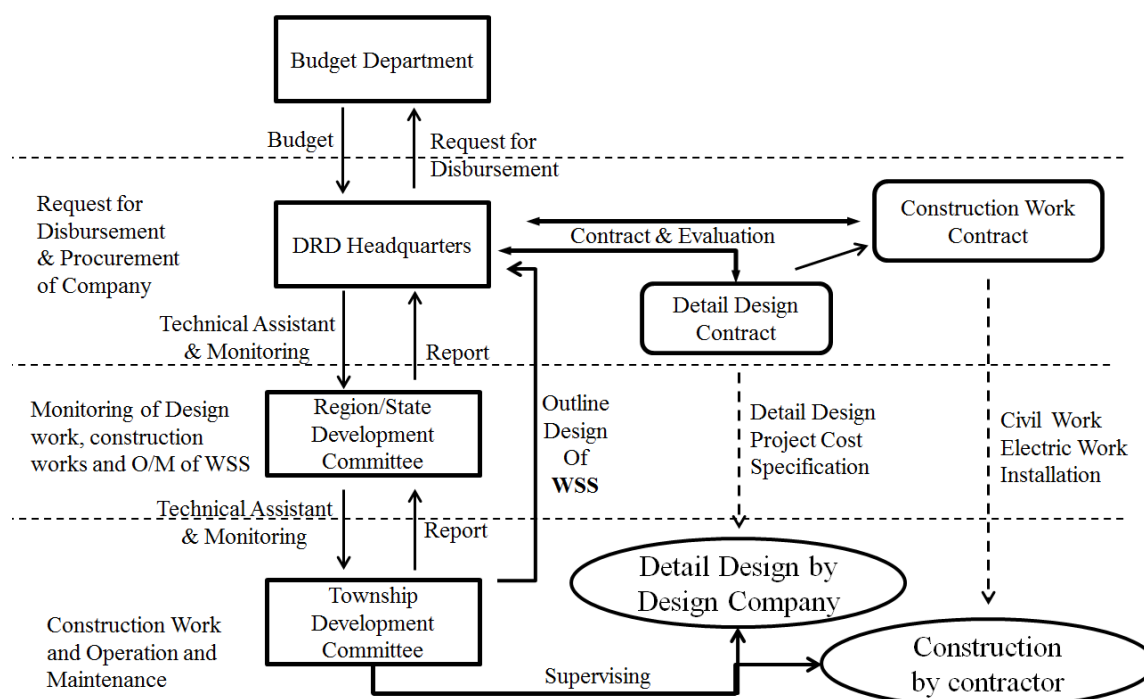
Source: Prepared by the JICA Survey Team

Figure 7.1 : Schedule of the Sub-Project for Water Supply Sector (tentative)

## 7.3 Procurement Plan

The procurement method for the water supply sector can assumed by separate ordering of design and construction. The lump sum method can be recommended as per the reasons listed below. Procurement flow of water supply sector is shown in the following Figure 7.2.

- Payment method based on the unit price and quantity calculation (BOQ method) increases the office clerical work and also site work on-checking and approval of the amount of construction work claims in the project contract and construction management.
- In the case of using groundwater, the detailed design of well drilling depth, water discharge amount and pump capacity must be modified based on the result of groundwater level and pump test in the construction implementation. However, groundwater will not be utilized in the New Phase Project.



Source: Prepared by the JICA Survey Team

Figure 7.2 : Procurement flow of water supply sector

### 7.3.1 Role of Contractor

In the Phase I Project, delay in implementation was encountered related to the detailed design work and process of contracting with the Construction Company. The delay affected not only to extend project implementation period but also the office work and coordination work among the contractor, DRD and TDC. When design and construction works are contracted separately, problem may arise in assigning defect responsibility occurring after construction, which might become unclear. Therefore, it is important to consider admitting the design and build contract system.

#### (1) Detailed Design

Detailed design would be contracted to a design company based on the concept design provided from TDC for the New Phase Project. Drawings of the detailed design, specification and project cost estimation are requested as deliverables from the design company. DRD would prepare the tender document including the subsequent tendering and contract award for construction company based on the detailed design.

#### (2) Construction

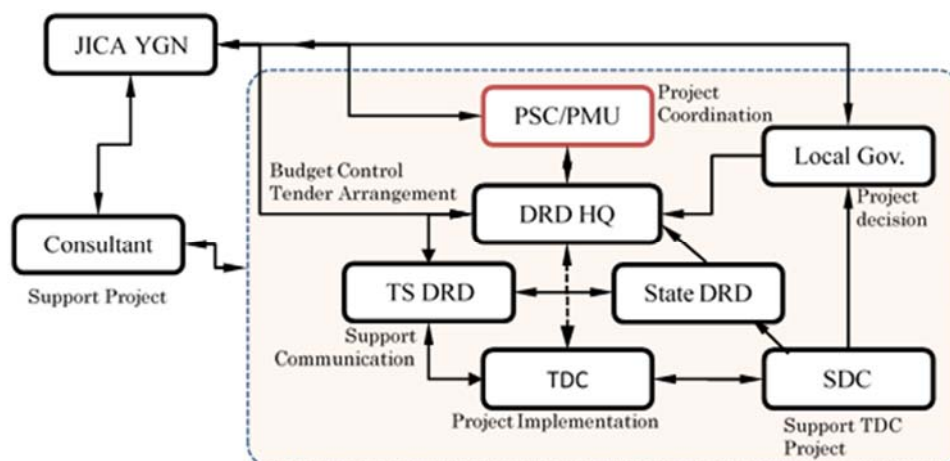
It is planned to order bulk instead of dividing it into lots in previous project works for the New Phase Project same as the Phase II Project for the following reasons.

- It is considered that ordering the procurement of material / equipment and construction in bulk, it will lead to the shortening of the construction period.
- By contracting procurement of material / equipment with construction work, the contractor can be in control of both procurement and construction, and could reduce any delays caused by a waiting for delivery of equipment / material.

## 7.4 Organization for Implementation

In the New Phase Project, DRD is responsible as an executing agency for the sub-projects of water supply. Additionally, TDC is responsible for the management of operation and maintenance, and SDC/RDC is responsible for inspection and audit of the Project (refer to Figure 7.3).





Source: Prepared by the JICA Survey Team

Figure 7.3 : Implementation Structure of Sub-Project for Water Supply Sector

## 7.5 Consulting Services

The Consultant shall work closely with DRD, S/RDC and TDCs on the supervision of conceptual design work, review of detailed design work and construction supervision works. It is recommended that the consultant will review and advise, especially, on DRD and TDC works and activities in order to support and improve concerned officials' technical capacity and knowledge. Through the above work, training of local staffs as support engineers for the water supply project is highly recommended.

- Conceptual Plan and Basic Design Review and Advice
- Review and Advice for Tendering Work
- Review and Advice for Detailed Design
- Review and Advice for Construction Supervision
- Advice on the Training of Operation and Inspection of Defect Period

## 7.6 Necessity and Recommendation based on the Lessons learnt

### (1) Procurement Method

It is recommended to procure all material and equipment for the sub-projects including that of water treatment plant under the contractor's lump sum contract for the New Phase Project that will also cover all civil construction works separated as specific contract for each water supply system development sub-project.

### (2) Implementation Schedule

The total of two-year project period is recommended for small-scale sub-projects considering one year for reviewing of the plan to procurement of detailed design and construction services and one year for execution of construction works. In case of large-scale sub-projects total project period of 2.5 years is recommended with the execution of construction work period being extended to 1.5 years. This recommendation is made based on lessons learned in the Phase I Projects and also the experience gained in conducting project plan review and detailed design for the Phase II Project.

### (3) Consulting Services

There were several critical issues identified during the Phase I Project, such as dam water deplete and difficulty of water suction due to lowered water level of reservoir. Based on such experiences, it is recommended to assign a Hydrologist who would evaluate water resources capacity in the New Phase Project as there are some sub-projects that would use dam water or stream water as water source. These water resources shall be carefully analyzed for the available water amount considering other uses, such as agriculture and water supply for other villages.

### (4) Maintenance

In the Phase I project, there were some cases of insufficient budget allocated by DRD for TDCs' facility maintenance and operation in some states and regions. Maintenance budget allocation should be carefully managed. In the New Phase Project, it is recommended that maintenance fee would be secured on a budget request basis through the executing agency, regional government or TDC.