

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

REPUBLIC OF THE PHILIPPINES

**PREPARATORY SURVEY FOR FLOOD RISK
MANAGEMENT PROJECT FOR
CAGAYAN DE ORO RIVER (FRIMP-CDOR)**

FINAL REPORT

**VOLUME - I
EXECUTIVE SUMMARY
FOR DISCLOSURE**

MARCH 2014

JAPAN INTERNATIONAL COOPERATION AGENCY

**NIPPON KOEI CO., LTD.
CTI Engineering International Co., Ltd.
PASCO Corporation**

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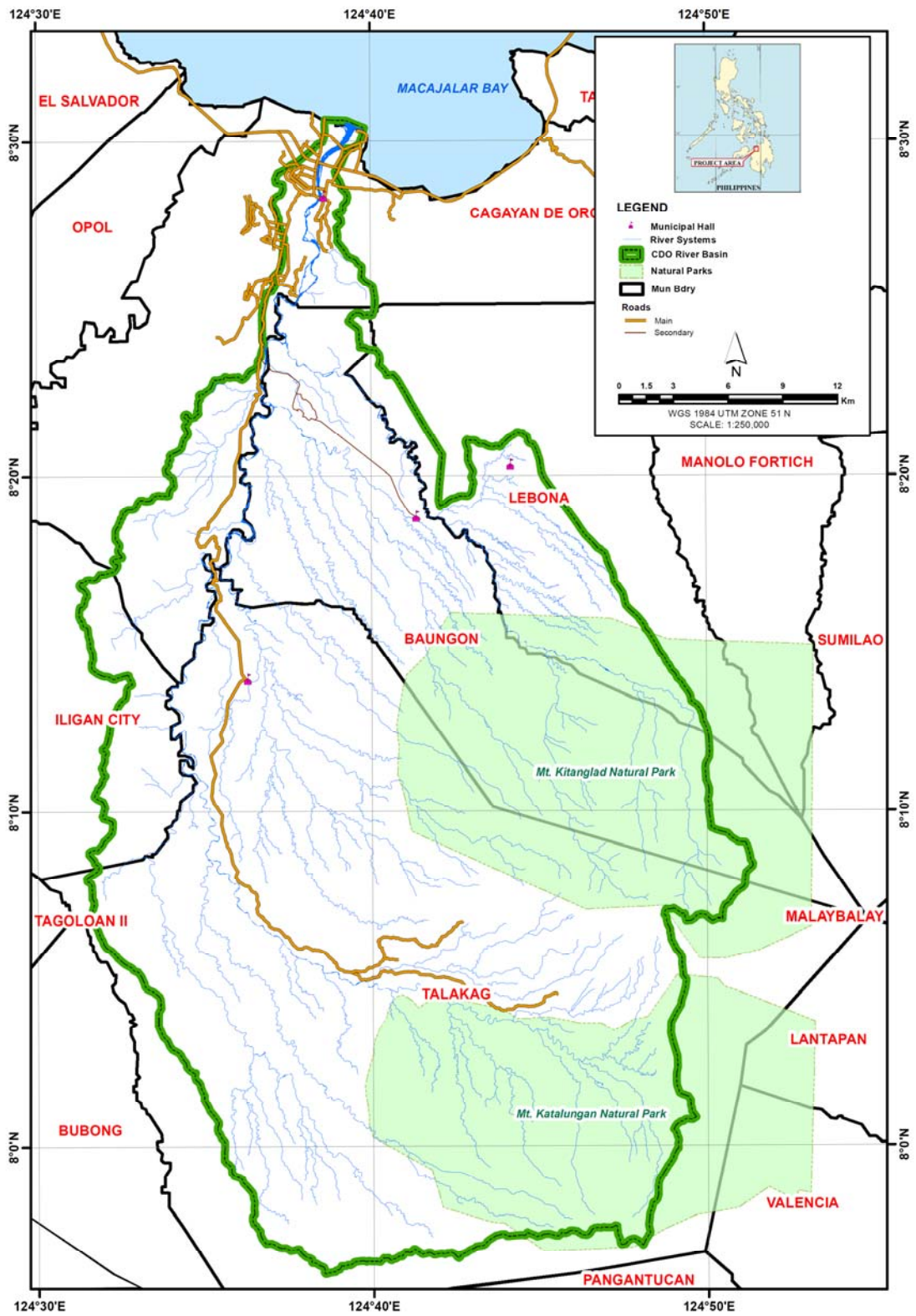
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Exchange Rate

US Dollar (US\$) 1.00 = Philippine Pesos (PHP) 42.85 = Japanese Yen (Y) 97.43

(1 Philippine Peso = 2.274 Japanese Yen)

(as of July 2013)



Location Map of Cagayan de Oro River Basin

PREPARATORY SURVEY
FOR
FLOOD RISK MANAGEMENT PROJECT
FOR
CAGAYAN DE ORO RIVER (FRIMP-CDOR)
IN
THE REPUBLIC OF THE PHILIPPINES

FINAL REPORT

VOLUME I EXECUTIVE SUMARRY
FOR DISCLOSURE

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Abbreviations / Acronyms

ID	One-dimensional
AASHTO	American Association of State Highway and Transportation Officials
ACEL	Association of Carriers and Equipment Lessors, Inc.
ACI	American Concrete Institute
AD	Ancestral Domain
A&D	Alienable and Disposable area
ADB	Asian Development Bank
AfD	Agence française de développement (French Development Agency)
AFP	Armed Force of Philippines
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ALOS	Advanced Land Observing Satellite
AMSL	Above Mean Sea Level
ANR	Assisted Natural Regeneration
AO	Administrative Order
ARG	Automatic Rain Gauge
ARMM	Autonomous Region in Muslim Mindanao
ASTM	American Society for Testing and Materials
AusAid	Australian Agency for International Development)
AWS	Automatic Warning System
BC Ratio	Benefit-Cost Ratio
BENRO	Bukidnon Environment and Natural Resource Office
BDRRMC	Barangay Disaster Risk Reduction and Management Council
BFAR, DA	Bureau of Fisheries and Aquatic Resources, DA
BH	Borehole
BOC, DPWH	Bureau of Construction, DPWH
BOD	Biochemical Oxygen Demand
BOD, DPWH	Bureau of Design, DPWH
BOM, DPWH	Bureau of Maintenance, DPWH
BP	Before Present
BS	British Standard
BSWM	Bureau of Soils and Water Management, DA
BWPDC	Bukidnon Watershed Protection and Development Council
BWRBF	Bukidnon Watershed and River Basin Forum
CAP	Comprehensive Action Plan
CARI	Contractor's All Risk Insurance
CATDDO	Catastrophe Deferred Drawdown Option
CBEWS	Community-Based Early Warning System
CBFEWS	Community Based Flood Early Warning System
CBFMA	Community-Based Forest Management Agreement
CCA	Climate Change Adaptation
CDIA	Cities Development Initiative for Asia, ADB
CDO	Cagayan de Oro
CDOR	Cagayan de Oro River
CDORBMC	Cagayan de Oro River Basin Management Council
CDP	Comprehensive Development Plan
CDRRMC	City Disaster Risk Reduction and Management Council
CENRO, DENR	Community Environment and Natural Resources Office, DENR
CEPALCO	Cagayan Electric Power and Light Company, Inc.
CGIAR-CSI	Consortium for Spatial Information of the Consultative Group on International Agricultural Research
CHED	Commission on Higher Education
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLENRO,	City Local Environment and Natural Resource Office, LGU
CLUP	Comprehensive Land Use Plan

CO	Central Office
COA	Commission on Audit
COCICM-TWGPMET	Cagayan de Oro City Integrated Coastal Management – Technical Working Group and Project Monitoring and Evaluation Team
COWD	Cagayan de Oro Water District
CPDO	City Planning and Development Office
CPI	Consumer Price Index
CPR	Cardiopulmonary Resuscitation
CRM	Coastal Resources Management
CRMP	Coastal Resources Management Plan
CSCAND	Collective Strengthening of Community Awareness for Natural Disaster
CSO	Civil Society Organization
CU	Consolidated Undrained
C/V	Calibrated / Validated
CY	Calendar Year
DA	Department of Agriculture
DANA	Damage Assessment & Needs Analysis
DAO	Department Administrative Order
DBM	Department of Budget and Management
DCC	Disaster Coordinating Council
DD	Detailed Design
DEM	Digital Elevation Model
DENR	Department of Environment and Natural Resources
Dep ED	Department of Education
DFA	Department of Foreign Affairs
DF/R	Draft Final Report
DHWL	Design High Water Level
DILG	Department of Interior and Local Government
DND	Department National Defense
DO / D.O.	Department Order
DO	Dissolved Oxygen
DOE	Department of Energy
DOF	Department of Finance
DOH	Department of Health
DOJ	Department of Justice
DOLE	Department of Labor and Employment
DOST	Department of Science and Technology
DOT	Department of Tourism
DOTC	Department of Transportation and Communication
DP/R	Draft Progress Report
DPWH	Department of Public Works and Highways
DRM	Disaster Risk Management
DRRM	Disaster Risk Reduction Management
DRRMC	Disaster Risk Reduction and Management Committee
DSWD	Department of Social Welfare and Development
DTI	Department of Trade and Industry
DTM	Digital Terrain Model
DUPA	Detailed Unit Price Analysis
ECA	Environmentally Critical Areas
ECC	Environmental Compliance Certificate
ECP	Environmentally Critical Project
EIA	Environmental Impact Assessment
EIAPO	Environmental Impact Assessment Project Office
EIRR	Economic Internal Rate of Return
EIS	Environmental Impact Statement
EISS	Environmental Impact Statement System
EL	Elevation
EMB, DENR	Environmental Management Bureau, DENR

EMD	Estate Management Division, LGU
EMoP	Environmental Monitoring Plans
ENCA	The Project for Enhancement of Capabilities in Flood Control and Sabo Engineering of the Department of Public Works and Highways
ENPV	Economic Net Present Value
ENRO	Environment and Natural Resource Office, LGU
EO	Engineering Office
EO	Executive Order
EP	Exploration Permit
EPRMP	Environmental Performance Report and Management Plan
ERDS, DENR	Ecosystems Research and Development Service, DENR
ESSO, DPWH	Environmental and Social Services Office, DPWH
EU	European Union
FCSEC, DPWH	Flood Mitigation and Sabo Engineering Center, DPWH
FEWC	Flood Early Warning Center
FEWS	Flood Early Warning System
FFWS	Flood Forecasting and Warning System
FIRR	Financial Internal Rate of Return
FMB, DENR	Forest Management Bureau, DENR
FMC	Flood Mitigation Committee
FMS, DENR	Forest Management Service, DENR
F/R	Final Report
FRIMP-CDOR	The Preparatory Survey for Flood Risk Management Project for Cagayan de Oro River
F/S	Feasibility Study
FWL	Flood Water Level
GDP	Gross Domestic Products
GIS	Geographic Information System
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Agency for International Cooperation)
GOJ	Government of Japan
GOP	Government of the Philippines
GPS	Global Positioning System
GRDP	Gross Regional Domestic Products
GSIS	Government Service Insurance System
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (German Technical Cooperation)
HEC-RAS	Hydrologic Engineering Center River Analysis System
HIV/AIDS	Human Immunodeficiency Virus / Acquired Immune Deficiency Syndrome
HLURB	Housing and Land Use Regulatory Board
HUDCC	Housing and Urban Development Coordinating Council
HVCC	High Value Commercial Crop
ICC	Indigenous Cultural Community
ICC	Investment Coordination Committee
IC/R	Inception Report
ICS	Incident Command System
IDP	Internally Displaced Person
IEC	Information, Education and Communication
IEE	Initial Environmental Examination
IEEC	Initial Environmental Examination Checklist
IEER	Initial Environmental Examination Report
IFMA	Industrial Forest Management Agreement
INREM	Integrated Natural Resources and Environmental Management
IP	Indigenous People
I/P	Implementation Program
IRBMDMP	Integrated River Basin Management and Development Master Plan
IRR	Implementing Rules and Regulations
IT/R	Interim Report

IUCN	International Union for Conservation of Nature and Natural Resources
JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
JIS	Japanese Industrial Standards
LCP	League of Cities of the Philippines
LDRRMC	Local Disaster Risk Reduction and Management Council
LDRRMF	Local Disaster Risk Reduction and Management Fund
LGU	Local Government Unit
LIAC	Local-Inter Agency Committee
LIDAR	Light Detection and Ranging, Laser Imaging Detection and Ranging
LMP	League of Municipalities of the Philippines
LNB	<i>Liga Ng mga</i> Barangay (League of Barangays of the Philippines)
LP	Laser Profile
LPP	League of Provinces of the Philippines
LSB	Local Special Body
MBDA	Macahalar Bay Development Alliance
MCL	Maximum Contamination Level
MDRRMC	Municipal Disaster Risk Reduction Management Council
MENRO	Municipal Environment and Natural Resource Office, LGU
MFC&DP	Major Flood Control & Drainage Project
MFCDP-II	Major Flood Control and Drainage Project – Cluster II
MFL	Maximum Flood Level
MGB, DENR	Mines and Geosciences Bureau, DENR
MinDA	Mindanao Development Authority
MKRNP	Mt. Kitanglad Range Natural Park
MLLW	Mean Lower Low Water
MLLWL	Mean Lowest Low Water Level
MMC	McKeough Marine Center
MOA	Memorandum of Agreement
M/P	Master Plan
MPDO	Municipal Planning and Development Office
MSL	Mean Sea Level
MTSAT	Multi-functional Transport Satellite
MWSS	Metropolitan Waterworks and Sewerage System
NAMRIA	National Mapping and Resources Information Authority
NAPC-VDC	National Anti-Poverty Commission- Victims of Disasters and Calamities
NBCP	National Building Code of the Philippines
NCIP	National Commission on Indigenous Peoples
NCRFW	National Commission on the Role of <i>Filipino</i> Women
NDCC	National Disaster Coordinating Council
NDRRMC	National Disaster Risk Reduction and Management Council
NDRRMF	National Disaster Risk Reduction and Management Fund
NEDA	National Economic Development Agency
NFMO	National Flood Mitigation Office
NGA	National Government Agency
NGO	Non-Government Organization
NGP	National Greening Program
NHA	National Housing Authority
NIA	National Irrigation Administration
NIPAS	National Integrated Protected Areas System
NOAA	National Oceanic and Atmospheric Administration - Satellites
NOAH	Nationwide Operational Assessment of Hazards
NON-ECA	Non-Environmentally Critical Area
NON-ECP / NECP	Non-Environmentally Critical Project
NORMECA	Northern Mindanao Electric Cooperatives Association
NPAA	Network of Protected Areas for Agriculture
NPC	National Power Corporation
NSCB	National Statistical Coordinating Board

NSO	National Statistics Office
NWRB	National Water Resources Board
NWRMO	National Water Resources Management Office
OCD	Office of Civil Defense
O&M	Operation and Maintenance
OPACC	Office of the Presidential Adviser on Climate Change
OPAPP	Office of the Presidential Adviser on Peace Process
PAGASA	Philippine Atmospheric, Geophysical and Astronomical Services Administration
PAWCZMS, DENR	Protected Areas, Wildlife and Coastal Zone Management Services, DENR
PAWB, DENR	Protected Areas and Wildlife Bureau, DENR
PC	Precast
PCBARMA	Protected Area Community-based Forest Management Agreement
PCDG	Prestressed Concrete Deck Girder
PCG	Philippine Coast Guard
PD	Presidential Decree
PDO	Planning and Development Office
PDR	Project Description Report
PDRRMC	Provincial Disaster Risk Reduction Management Council
PEISS	Philippine Environmental Impact Statement System
PENRO, DENR	Provincial Environment and Natural Resources Office, DENR
PEPRMP	Programmatic Environmental Performance Report and Management Plan
PES	Payment of Environmental Services
PFS	Prefeasibility Study
PhilHealth	Philippine Health Insurance Corporation
PHIVOLCS	Philippine Institute of Volcanology and Seismology
PIA	Philippine Information Agency
PM	Particular Matter
PMO	Project Management Office
PMO	Presidential Memorandum Order
PNP	Philippine National Police
PNRC	Philippine National Red Cross
PO	People's Organization
PP	Presidential Proclamation
PPA	Philippine Ports Authority
PPP	Public-Private Partnership
P/R	Progress Report
PRC	Philippine Red Cross
PSGC	Philippine Standard Geographic Code
PTM	Philippine Traverse Mercator
QRF	Quick Response Fund
RA	Republic Act
RAP	Resettlement Action Plan
RBCO	River Basin Control Office, DENR
RBO	River Basin Organization
RC	Reinforced Concrete
RDC	Regional Development Council
RDRRMC	Regional Disaster Reduction Management Council
RED	Regional Executive Director
REDAS	Rapid Earthquake Damage Assessment System
RIDF	Rainfall Intensity Duration Frequency
ROW	Right of Way
ROWA	Right of Way Acquisition
RR	Rainfall-Runoff
SALT	Sloping Agricultural Land Technology
SAPA	Special Agreement in Protected Areas
SCF	Standard Conversion Factor
SDR	Social Discount Rate

SEA	Strategic Environmental Assessment
SIFMA	Socialized Industrial Forest Management Agreement
SPT	Standard Penetration Test
SRLSF	Safer River, Life Saver Foundation, Inc
SRTM	Shuttle Radar Topography Mission
SSS	Social Security System
Sta.	Station
TA	Technical Assistance
TAC	Technical Advisory Committee
TDS	Total Dissolved Solid
TIN	Triangulated Irregular Network
TOR	Terms of Reference
TS	Tropical Storm
TSP	Total Suspended Particulates
TSS	Total Suspended Solids
TTS	Telegraphic Transfer Selling
TUREDECO	Turbines Resource and Development Corporation
TWG	Technical Working Group
TY	Typhoon
ULAP	Union of Local Authorities of the Philippines
UNDP	United Nations Development Programme
USACE	United States Army Corps of Engineers
USBR	United States Bureau of Reclamation
USLE	Universal Soil Loss Equation
UU	Unconsolidated Undrained
VAT	Value Added Tax
WB	World Bank
WL	Water Level

Measurement Unit

Extent		Volume	
km ²	square-kilometer (1.0 km x 1.0 km)	m ³	cubic-meter
ha	10,000 square-meter (100 m x 100 m)	l	litter
acre		Ncm / NCM	Normal Cubic Meter
		MCM	Million Cubic Meters
Length		Weight	
mm	millimeter	g	gram
cm	centimeter (10 mm)	kg	kilogram (1,000 g)
m	meter (100 cm)	ton	metric ton (1,000 kg)
km	kilometer (1,000 m)	mg	milligram (10 ⁻³ g)
l.m	linier meter	µg	microgram (10 ⁻⁶ g)
Currency		Time	
US\$	United State Dollars	sec	second
PHP	Philippine Pesos	min	minute (60 sec.)
		hr	hour (60 min.)
Number		yr	year
million	10 ⁶	Ma	Mega annum (10 ⁶ years)
billion	10 ⁹		
Temperature		Others	
°C	Degree Celsius	dB (A)	decibel
		kN/m ²	kilonewtion per square-meter
		d/s	down stream

PART I : MASTER PLAN STUDY

1 INTRODUCTION

1.1 Background of the Survey

The Government of the Philippines (GOP) has set measures for flood mitigation such as watershed management and efficient and appropriate infrastructure development as one of the important policies in the Philippine Development Plan (2011-2016) with the following strategies:

- To give priority to construction of flood mitigation structures for high flood risk area,
- To consider climate change adaptation in planning and design for flood mitigation structures, and
- To execute flood mitigation and management by structural and non-structural measures.

The Cagayan de Oro River Basin in this Survey was selected from the fifty six (56) priority river basins in “Nationwide Flood Risk Evaluation and Flood Damage Mitigation Plan in Selected River Basin, 2006-2008” by Department of Public Works and Highway (DPWH) under technical assistance of Japan International Cooperation Agency (JICA). Then, due to urgent need, DPWH has conducted a Master Plan (M/P) and Feasibility Study (F/S) in the Cagayan de Oro River Basin in June 2011, by their national budget.

Tropical Storm Sendong in December 2011, after the conduct of the said M/P and F/S, had brought about serious damages in the north Mindanao area. About 1,170 thousand people were affected and about 1,250 persons were lost. One of the serious damaged cities was Cagayan de Oro City, which is located at the downstream of the Cagayan de Oro River Basin, where about 600,000 people live. Due to tremendous changes in natural and social conditions by the Sendong, review and update of M/P and F/S are urgently necessary.

Under aforementioned circumstance, a project regarding urgent flood risk management measures for the Basin is requested in order to strengthen the disaster resilience of communities around the Basin. In March 2012, DPWH and JICA have agreed to conduct the technical assistance of JICA on the Preparatory Survey for Flood Risk Management Project for Cagayan de Oro River(the Survey) intending to formulate a Yen loan project for the Cagayan de Oro River Basin.

1.2 Objectives of the Survey

- 1) To review and update previous M/P and F/S based on the inspection and investigation of the latest topographic conditions, development situation, damage surveys and current changes of GOP for flood mitigation policy in the Cagayan de Oro River Basin, and
- 2) To assist the GOP in formulating of Yen loan project for flood mitigation, which includes structural and non-structural measures in the Cagayan de Oro River Basin based on the above review study results.

1.3 Survey Area

The area of the Survey is the Cagayan de Oro River Basin in Mindanao Island as shown in Location Map. The Cagayan de Oro River Basin is one of the Major River Basins in the Philippines.

The National Water Resources Board (NWRB) has specified 12 Water Resources Regions in the whole country and designated 421 principal river basins with catchment area of over 40 km² so as to formulate a comprehensive water resources development plan in 1976. Among those principal river basins, the 18 river basins with catchment area of over 1,400 km² have been classified as Major River Basins.

Location of the Major River Basins are shown in Figure 1.1

The Cagayan de Oro River, as one of the 18 Major River Basins, is the particular one to suffer the most serious flood damages in recent years, due to the tropical low-pressure in 2009, the tropical storm Sendong(TS. Sendong) in 2011 and the typhoon Pablo in 2012.

It has been believed that the northern Mindanao region is “Typhoon Free Zone” and few passing of typhoon has been ever experienced. However, due to influence of climate change and facts of frequent disasters by typhoons, the region is now to be assumed as typhoon disaster-stricken area.

Furthermore, the Cagayan de Oro River has so steep average river slope in particular in the major rivers that flood runoff time is short and that it is prone to cause a flush flood which is apt to hit the Cagayan de Oro City.

Consequently, the Cagayan de Oro River is regarded as one of the river basins which have the highest flood risk in the Philippines.

At the Cagayan de Oro City located in the downstream reach of the Cagayan de Oro River basin, particularly the area along the river where severe flood damages including high death toll were caused by TS.Sendong, awareness of flood damage countermeasures have been raised that building and residence are to be prohibited and refrained in the very high flood risk area.

1.4 Implementation Agency of the Project

Implementation Agency of the Flood Risk Management Project for Cagayan de Oro River Basin (FRIMP-CDOR, the Project) is DPWH as the counterpart agency for the Survey.

The Steering Committee is established by the Department Order (No.61 Series of 2012) dated August 30, 2012 with the following members:

- Assistant Secretary for Planning and PPP, DPWH (Chair person)
- Project Director PMO-MFCDP, Cluster II (Vice-Chairperson)
- Director, Planning Service, DPWH
- Project Director, PMO-FCSEC, DPWH
- Director, Bureau of Design, DPWH
- Regional Director, DPWH Region X
- Department of Environment and Natural Resources (DENR)-RBCO Representative
- DENR Region X Representative
- National Economic Development Authority (NEDA) Representative
- Office of Civil Defense (OCD) Representative
- Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA) Representative
- National Irrigation Administration (NIA) Representative
- National Water Resources Board (NWRB) Representative

A Technical Working Group (TWG) is also created in accordance with the same Department Order in order to assist the Steering Committee in its function. Appointed member of TWG is presented in the said Department Order compiled in Annex 1.

1.5 Survey Schedule

(1) Overall Schedule

The Survey works in the Philippines was commenced on August 27, 2012 upon arrival of the Survey Team after preparatory works in Japan and carried out for about twenty (20) months from August 2012 to March 2014.

The work schedule was divided into the following three stages:

[Stage 1] Basic Survey Stage : August 2012 to February 2013

[Stage 2] Master Plan Stage : March 2013 to July 2013

[Stage 3] Feasibility Study Stage : August 2013 to March 2014

(2) Steering Committee

The Steering Committee Meetings were held for five (5) times in Manila to have discussion on the respective reports submitted in the course of the Survey. After the series of discussions and exchange of views in the meeting, the Steering Committee and JICA Survey Team agreed upon the contents of each report. The Minutes of Meeting of the respective meetings are compiled in Annex of this volume.

First Steering Committee Meeting

It was held on August 31, 2012 that the Inception Report was discussed on objectives, schedule and approaches for successful implementation of the Survey.

Second Steering Committee Meeting

It was held on December 13, 2012 that the Draft Progress Report was discussed on the results of studies including findings, assessment and analyses interim results incorporated in the report.

Third Steering Committee Meeting

It was held on July 2, 2013 that the Progress Report was discussed on the results of studies including findings, assessment and analyses interim results in the Basic Survey Stage.

Fourth Steering Committee Meeting

It was held on October 17, 2013 that the Interim Report was discussed with respect to the Master Plan formulation as well as related studies and surveys including findings, assessment and analyses results in the Basic Survey Stage and Master Plan Stage.

Fifth Steering Committee Meeting

It was held on February 21, 2014 that the Draft Final Report was discussed with respect to the all surveys, findings, analyses, recommendation and conclusion including Master Plan formulation as well as the Feasibility Study result.

(3) Stakeholder Meetings

In the course of the Survey, the Stakeholder Meetings were held in the following manner:

First Stakeholder Meeting

It was held at the Cagayan de Oro City and three Municipalities including Talakag, Baungong and Libona during a period of January 23 through January 25, 2013.

Second Stakeholder Meetings

It was held at the Cagayan de Oro City including Cluster Meetings on July 20 and 27, and Wrap-up Meeting on September 5, 2013.

Third Stakeholder Meeting

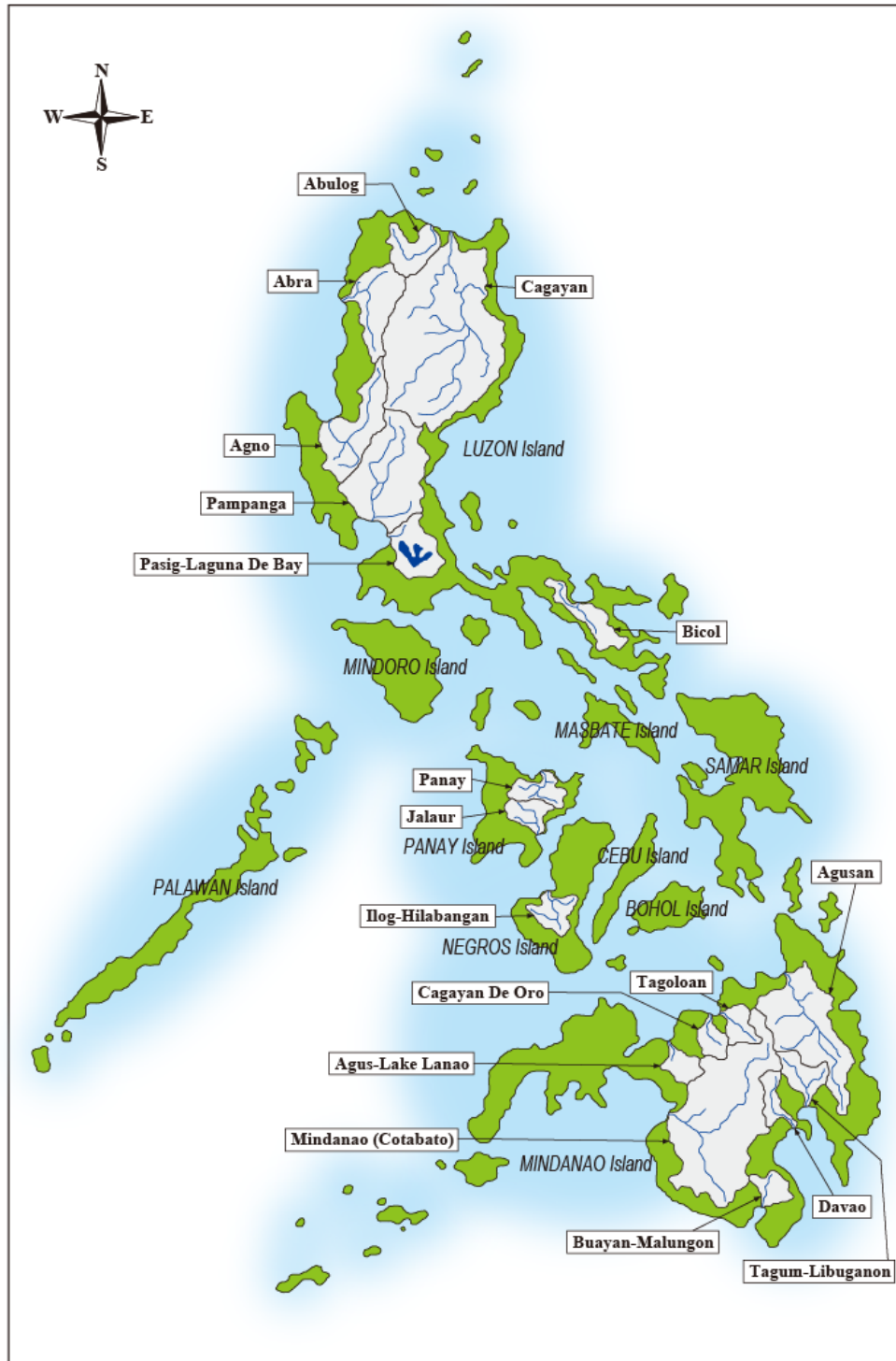
It was held at the Cagayan de Oro City on October 24, 2013 on the Master Plan of FRIMP-CDOR and Strategic Environmental Assessment (SEA).

Fourth Stakeholder Meeting (Consultation Meeting)

It was held at the Cagayan de Oro City on November 5 - 6, 2013 on the Resettlement Action Plan (RAP).

Fifth Stakeholder Meeting

It was held at the Cagayan de Oro City on November 15, 2013 related to Feasibility Design of structural measure, Environmental Impact Assessment (EIA) study result and RAP & report on the Consultation Meetings held on Nov. 5 and 6.



Source: JICA Survey Team

Figure 1.1 Major 18 River Basins in the Philippines

2 THE SURVEY AREA

2.1 Survey Area

The Cagayan de Oro River Basin is situated in the Northern Mindanao Region as shown in Figure 2.1, which is administratively called Region X and specifically located under five local government units namely, Cagayan de Oro City (highly urbanized city) and three municipalities of Talakag, Baungon and Libona in Bukidnon and Illigan City in Misamis Oriental.

The project objective area is the most downstream section of the Cagayan de Oro River for about 12 km from the Pelaez Bridge to the river mouth as shown in Figure 2.2.

2.2 Climate Condition

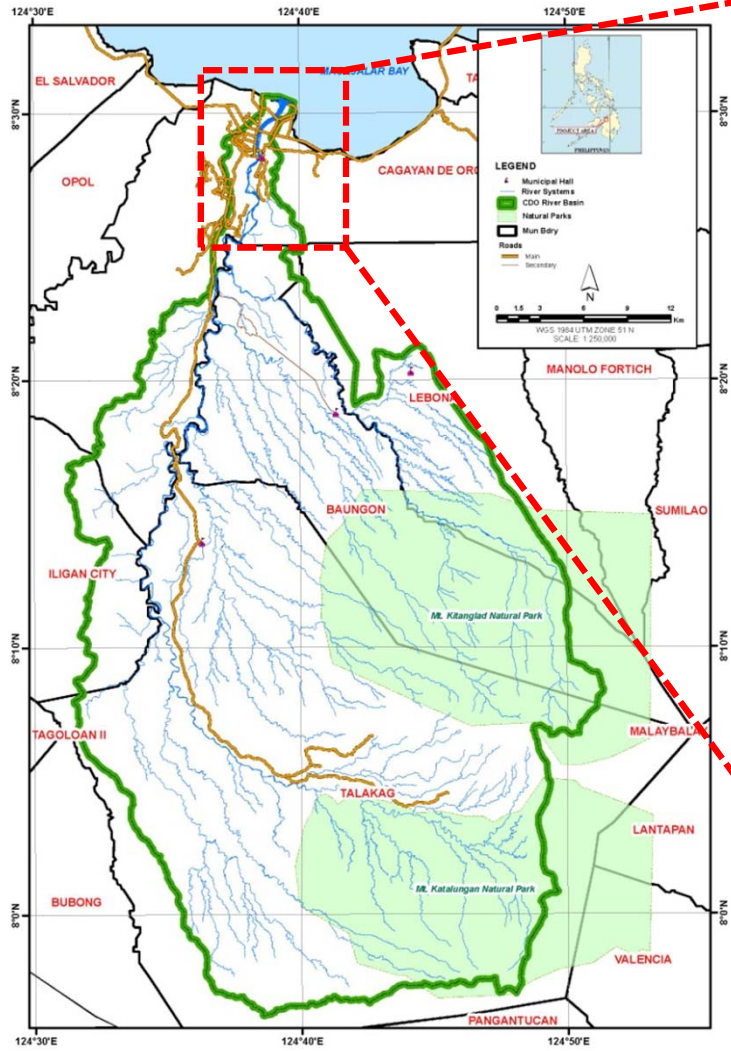
Cagayan De Oro River Basin has a tropical climate with two (2) distinct types of climate: types III and IV based on the PAGASA climate map. Type III climate is characterized by a not so distinct wet and dry season with a “relatively dry period from November to April and wet from May to October.

Throughout a year, no distinct fluctuation of the monthly rainfall is recorded in the Cagayan de Oro City. The driest month in the City is April while the wettest is July. The wet season in the City starts in May and ends in October. The relatively drier period starts in November and ends in April.

2.3 River Condition

The lowland area is relatively flat with development in the City of Cagayan de Oro. Most of the developed area in the lowland is bounded by the contour lines with an elevation of 20 m. Mount Kitanglad is the highest spot in the area with an elevation of 2,927 m. From the top of the mountains in the south, rivers run through from southern parts of the river basin towards Macajalar Bay.

The Cagayan de Oro River is 97 km long from its origin to the river mouth with total catchment area of 1,364 km².



Source: JICA Survey Team

Figure 2.1 Cagayan de Oro River Basin

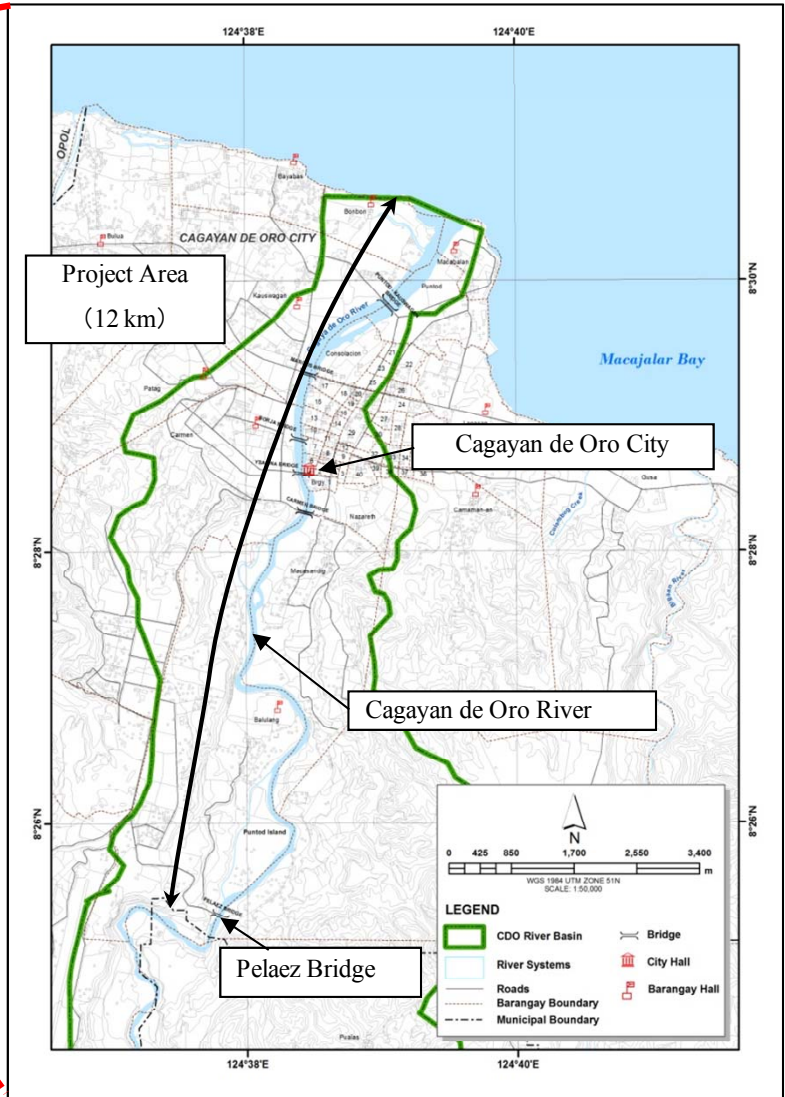


Figure 2.2 Project Area in the Downstream of the Cagayan de Oro River

2.4 Inundation and Flood Damage

(1) Record of Flood Damages

Large flood events in the Cagayan de Oro River Basin have been recorded in 1916, 1957, 1982, 1998 and 2009. In 2011 and 2012, Tropical Storm (TS) Sendong and Typhoon (TY) Pablo produced widespread inundation bringing about extensive loss of life, damage to infrastructure and disruption in socio-economic activities.

(2) Flood Damages by TS Sendong Flood (December 16th -17th, 2011)

Scale of the Sendong flood is estimated at around 50-year flood return period which was identified as the recorded maximum flood experienced in Cagayan de Oro (CDO) City. Flood damages were most seriously occurred at Bgy. Balulang (Left Bank), Bgy. Macasandig (Cala-Cala Area) (Right Bank), Bgy. Carmen (Left Bank), Isla de Oro and Isla Delta Areas (Right Bank). The floodwaters rapidly increased and flowed directly towards the populated area within floodplains of the Cagayan de Oro River which killed a large number of people and caused destruction of properties mainly for the people living in the flood plain along the river bank (ref. to Figure 2.3).



Source: JICA Survey Team

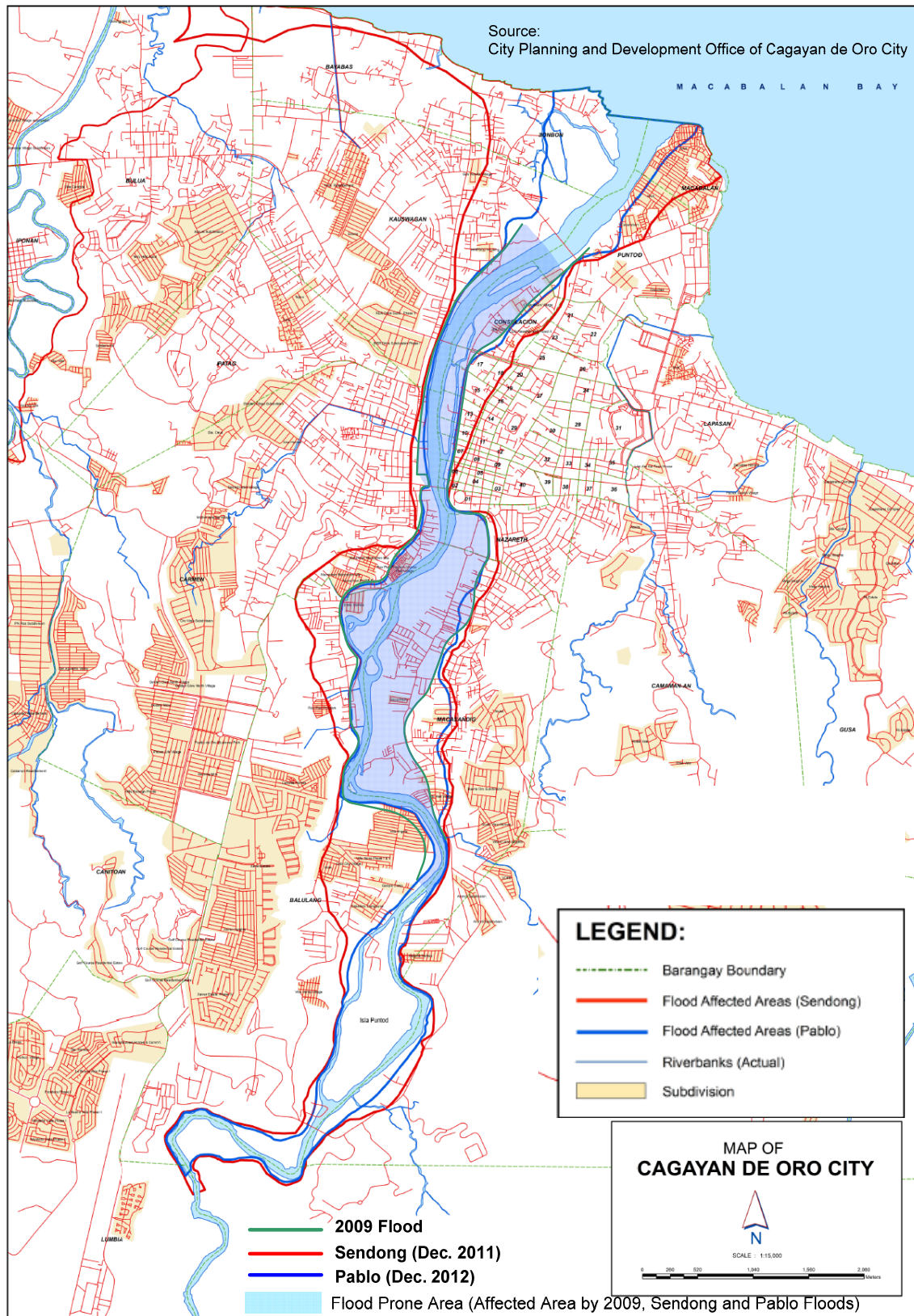
Figure 2.3 Photographs of Flood-Mark on House (Left Bank: Sta.5+570)

(3) Flood Damages by TY Pablo Flood (December 4th, 2012)

Typhoon Pablo hit Cagayan de Oro City on December 4th, 2012 after passing over Mindanao Island causing flood damages after TS Sendong in 2011.

As the result of ocular inspection and flood mark survey by the JICA Survey Team, the flood inundation maps showing inundation lines caused by TY Pablo and TS Sendong was prepared for the purpose of comparing the extent between the two flood inundation areas as presented in Figure 2.4.

It was confirmed during the site investigation that flood inundation area caused by the TY Pablo did not extend to that of TS Sendong as seen in Figure 2.4. In addition, because of the communities' preparedness activation against disaster such as early warning and pre-evacuation, no serious loss of human lives was observed during TY Pablo.



Source: CPDO

Figure 2.4 Flood Inundation Map (TS "Sendong" and TY "Pablo")

2.5 Environmental Condition

(1) Environmental Components Surveyed in the Survey

Current environmental condition was surveyed in terms of 1) physical-chemical environment and 2) natural environment. Physical-chemical environment is composed of air quality, noise, river water quality, riverbed sediment quality, traffic and groundwater in this Study. Natural environment is composed of terrestrial flora, mangrove forests, terrestrial fauna, aquatic biota, and protected area.

(2) Physical-Chemical Environment

Survey results of shows that Cagayan de Oro City is evaluated as suffering from Dust (TSP) and noise pollution. The Cagayan de Oro River is characterized by high coliform and TSS. The riverbed sediment of the Cagayan de Oro River is safe level of hazardous materials. Road service level in Cagayan de Oro City is characterized as moderately or highly crowded situation. Groundwater is one of the main water sources of Cagayan de Oro City, taking the groundwater from 27 deep wells of Cagayan de Oro Water District (COWD).

(3) Biological Environment

An inventory survey conducted in 2013 identified 82 species belonging to 38 different families of plants from the Kagayan bridge up to Pelaez Bridge (study area). A Mangrove forests develops along the both banks of the Cagayan de Oro River and marshy area at the west side of the river mouth. Census survey identified that a total of 27 species of wildlife vertebrates in the study area. As for aquatic biota, 21 species of phytoplankton, seven (7) species of zooplankton, five (5) species of macro-invertebrates and six (6) species of fish were identified in the Cagayan de Oro River. There are no protected areas designated as national park, nature reserve and natural park by laws or regulations of the Philippines in the project area.

2.6 Socio-economic Conditions

(1) Jurisdiction of Concerned Local Government Units

In the project area, the 19 barangays of the city are located within the inundation area of TS Sendong.

(2) Population in Cagayan de Oro City

In Cagayan de Oro City, population rapidly increased in 10 years from 2000 to 2010 with an average annual growth rate of 2.69%, which is higher than the national growth rate (2.04%) and the regional growth rate (1.67%) of the same period. This rapid growth is observed, due mainly to inflowing migration to the city from neighboring provinces, cities and municipalities for job and income opportunities.

(3) Regional Socioeconomic Conditions

Cagayan de Oro City is functioned as the trade and commercial center of the Northern Mindanao Region as well as the transport hub of the Region.

The Gross Regional Domestic Products (GRDP) of the Northern Mindanao Region showed a remarkable annual average growth rate at 5.4 % that GRDP increased from 56 billion Philippine Pesos in 2004 to 73.2 billion Philippine Pesos in 2009. The highest growth rate of the Region in 2009 in Mindanao indicated as high as 5.5 % against 4.45 % in the whole Philippines.

The Region is in the process of a gradual economic transformation from a traditionally agriculture-led economy to being more of a service and industry-oriented economy with improvements in productivity competitiveness in all sectors. It is noted that both industry and services sectors attained GDRP by sector at 8.6 % in 2007 for the industry sector and 8.1 % for the services sector.

3 BASIC SURVEY

3.1 Topographic and River Surveys

Topographic and river surveys were conducted respectively to produce grid data showing terrain surface and to draw up river profile and cross section for the river stretch from river mouth to 12 km upstream along the Cagayan de Oro River. The topographic survey was conducted by employing single LiDAR survey system.

(1) Topographic Survey

Airborne LiDAR survey, Digital aerial photography and Ortho imagery production were conducted for the following area:

- 1) Topographic survey (scale of 1/1,000) : 40km² in the most downstream area
- 2) Topographic survey (scale of 1/10,000) : 1,500 km² of the whole river basin.

(2) River Survey (Master Plan Stage)

River survey was conducted with the following condition:

- 1) River profile survey : 12 km
- 2) River cross section survey : 38 lines (500 m interval and the existing bridge sites)

(3) River Survey and Topographic Survey (Feasibility Study Stage)

The profile and cross section surveys were conducted based on the following scope of works as well as the topographic survey:

- 1) River cross section survey : 24 sections
- 2) Cross section survey of the existing road and structures : 18 sections
- 3) Profile survey of the existing structures : 5 sites, 335 m in total
- 4) Topographic survey at the proposed structure sites : 4.02 ha in total

3.2 Geotechnical Investigations

(1) Geotechnical Investigation in Master Plan Stage

Boring surveys were conducted at eight (8) locations (BH- 1 to 8) including i) Borehole drilling, ii) Soil sampling from boreholes, iii) In-situ test and iv) Laboratory test. Out of those locations, seven (7) drilling points were in flood prone area in downstream of Cala-Cala and Macasandig of Cagayan de Oro City, while, a drilling hole of BH-8 was conducted about 30 km upstream location from the estuary of the Cagayan de Oro River to examine the Sabo dam planning.

The riverbed material investigation was conducted at ten (10) sites, out of which five (5) sites were set in the flood area between the Ysalina Bridge and the river mouth for about 4 km section.

(2) Geotechnical Investigations (Feasibility Study Stage)

Geotechnical investigation works were conducted to obtain required additional geological information for design of structural measures in the Feasibility Study Stage. The survey

was composed of the borehole drilling and standard penetration test (SPT) at 11 holes, 4 locations of test pit and the material sampling for laboratory test for 125 samples.

(3) Results of the Investigation

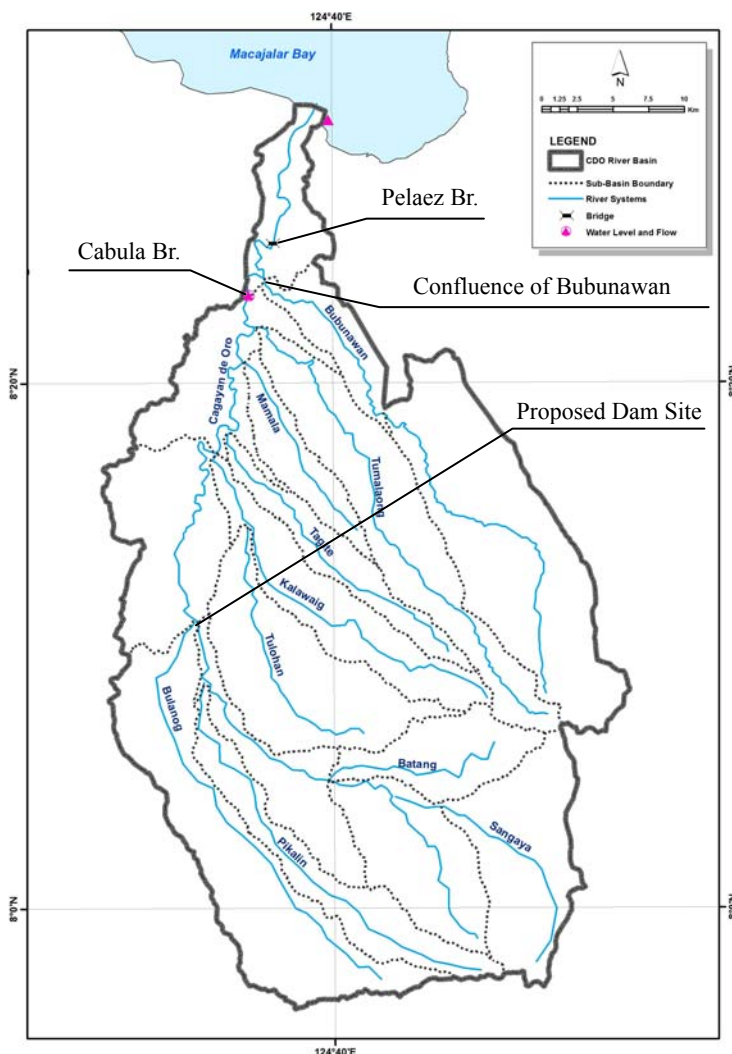
Regarding consistent with the general geology of the Cagayan de Oro River, it is found that thick beds of alluvial deposit reach to 30m to 40m depth at least.

From results of the geotechnical investigation, liquefaction and settlement probably exist in the project site as the most serious soil issues for the design of flood control structures. These outstanding matters were examined in the preliminary design of weak foundation improvement works.

3.3 Rainfall and Runoff Analyses

(1) Rainfall and Runoff Analyses and Objective Area

The rainfall and runoff analyses were undertaken for a whole Cagayan de Oro River Basin. The rainfall analysis was targeting at the whole basin, while the runoff analysis is made so as to obtain the discharge hydrograph at the Pelaez Bridge point which is about 12.0 km upstream from the river mouth as shown in Figure 3.1.



Source: JICA Survey Team

Figure 3.1 Cagayan de Oro River Basin

The discharge hydrograph at the Pelaez Bridge is to be given as an upstream boundary condition for the flood inundation analysis as well as the riverbed fluctuation analysis.

(2) Rainfall and Water Level Observation

There are 73 rainfall stations in and around the Cagayan de Oro River basin of which data are available for the analysis including those under Del Monte Philippine Inc, DOST PAGASA Synoptic stations, Department of Agriculture (DA) Agromet stations, DA-Municipal Agriculture Office (MAO) in LGUs., etc. Hourly data are available at only a few stations for a short recent period.

There is only one regular water level and flow observation station maintained by DPWH located at the Cabula Bridge(C.A.=1,094km²) in the Cagayan de Oro River.

(3) Probable Rainfall Analysis

Based on the daily rainfall data observed at the selected rainfall stations, the probable rainfall analysis was undertaken that the Generalized Pareto (GP) distribution was concluded as the most appropriate pattern for the statistical analysis on the partial duration series of basin mean 1-day rainfall.

The return period of the rainfall during TS Sendong was estimated at 57-year return period. The return period of the rainfall during TY Pablo was estimated at 14 year according to TY Pablo's rainfall which was separated in 2-day (4th December is 111.7mm, 5th December is 27.8mm) and totaled 139.5mm.

Table 3.1 Basin Average 1-day Rainfall

Return Period	Basin Average 1-day Rainfall (GP Distribution)
2-year	88.2 mm
5-year	113.2 mm
10-year	132.2 mm
25-year	159.7 mm
50-year	182.8 mm
80-year	199.8 mm
100-year	208.3 mm
Sendong	187.2 mm
Pablo	139.5 mm

Source: JICA Survey Team

(4) Run-off Analysis

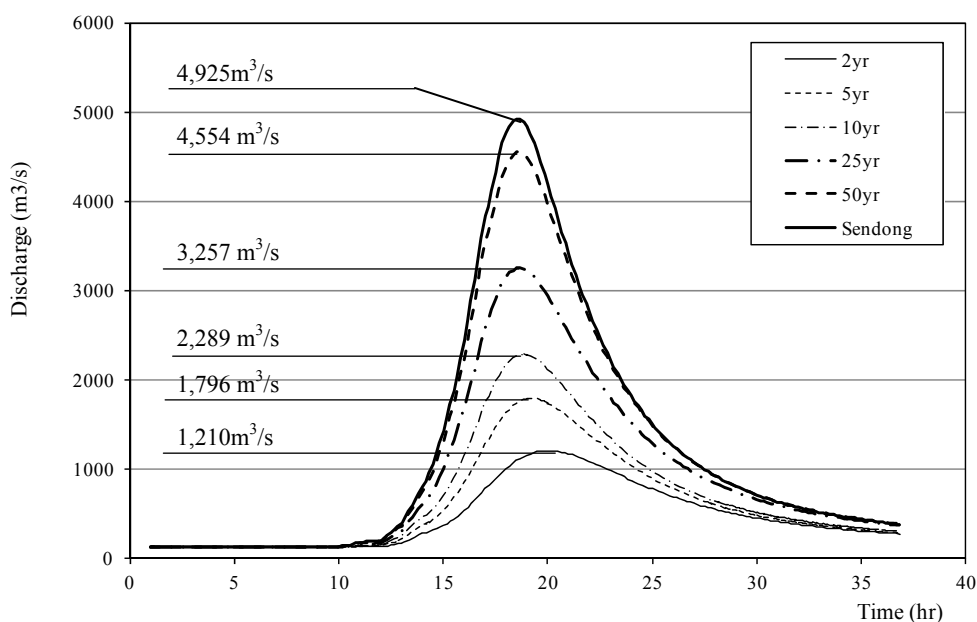
The runoff analysis was conducted based on the obtained probable rainfall by the rainfall analysis as well as actual flood runoff and its patterns observed during TS Sendong and TY Pablo. Considering the available observed flow at Cabula Bridge with a catchment area of 1,094 km², a runoff model was calibrated at the Cabula Bridge point.

Meanwhile, objective flood hydrograph was worked out at the Palaez Bridge site where is the most upstream point of the 12 km river section for the project.

(5) Probable Flood Hydrograph

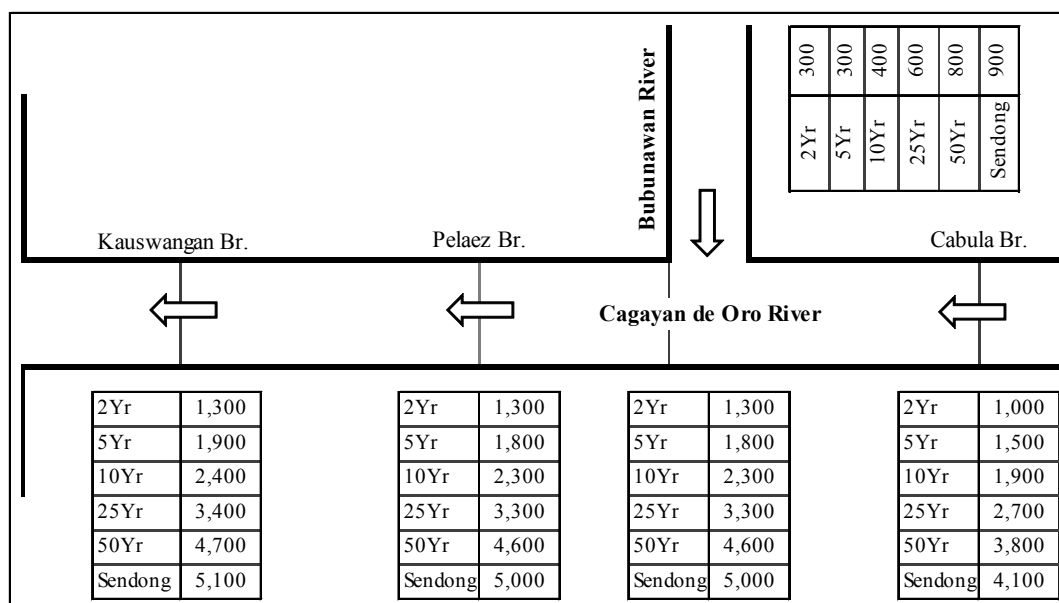
Probable flood hydrograph at the Pelaez Bridge for the probable 2-yr, 5-yr, 10-yr, 25-yr and 50-yr as well as the one equivalent to TS Sendong scale are shown in Figure 3.2. In Figure 3.3, the flood discharge distribution is presented for the section from the Cabula

Bridge to the river mouth.



Source: JICA Survey Team

Figure 3.2 Probable Flood Hydrographs at Pelaez Bridge

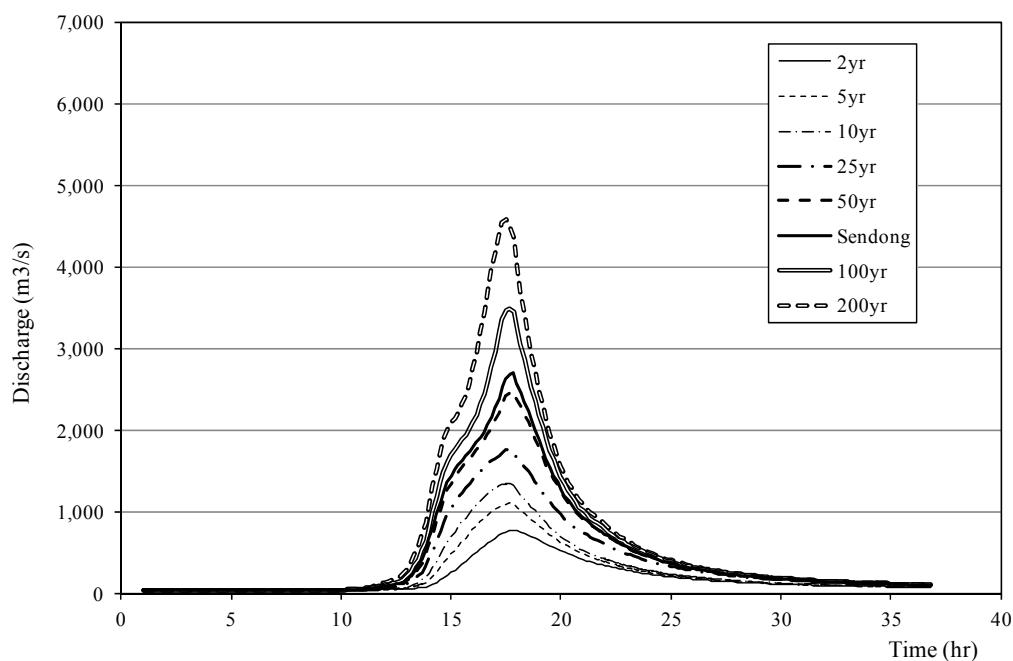


Source: JICA Survey Team

(unit m³/sec)

Figure 3.3 Flood Discharge Distribution (Probable Flood and Sendong Flood)

The flood inflow hydrograph at the proposed dam site as shown in Figure 3.1 is shown in Figure 3.4.



Source: JICA Survey Team

Figure 3.4 Probable Flood Hydrograph at the Proposed Dam Site

3.4 Hydraulic Analysis

(1) Inundation Analysis

For the most downstream stretch of the Cagayan de Oro River for 12 km distance, the inundation analysis was conducted to simulate flood water level, extent of inundation area and inundation depth to assess the flood risk levels as well as the flood damages in the affected area to be used in the economic analysis.

In the course of the hydraulic study, past inundation and flood marks during TS Sendong in 2011 and TY Pablo in 2012 were examined in detail. Inundation analysis model was developed through calibration comparing with the actual results of flood inundations.

(2) Results of Inundation Analysis for TS Sendong and TY Pablo

Inundation analysis was preliminarily conducted to simulate the actual flooding situation during TS Sendong and TY Pablo.

The analysis was done with one dimensional hydraulic computation. Therefore, inundation depth rank map was made by the following method:

- 1) Water levels at any point on the survey lines are estimated with linear interpolation based on the calculated values on the survey lines. The format of the dataset is one (1) meter mesh.
- 2) Inundation depths were obtained from calculating the difference between the water level derived in 1) and the ground elevation (DEM).
- 3) Inundation depth distribution of each occurrence frequencies for estimating damages was one (1) meter mesh. It was obtained by averaging inundation depths above.

(3) Result of Flood Inundation Analysis for Probable Flood

The inundation depth (H) was evaluated per 100 m squares and classified into five (5) ranks; i) $H < 0.5\text{m}$, ii) $0.5\text{m} \leq H < 1.0\text{m}$, iii) $1.0\text{m} \leq H < 2.0\text{m}$, iv) $2.0\text{m} \leq H < 3.0\text{m}$ and v) $3.0\text{m} \leq H$. The inundation maps of 1/25 and 1/50 probable flood used for the economic analysis are shown in Figure 3.5, respectively.

Comparing the results of inundation analysis with the actual inundation areas of TY Pablo and TS Sendong, the inundation areas of 1/50 probable flood is simulated well that of TS Sendong, and the inundation area of 1/25 probable flood is a little bigger than that of TY Pablo corresponding to the difference of the discharge.

(4) Study for Riverbed Movements

1) Assessment of riverbed variation based on cross section data

The riverbed variation from the river mouth to the Pelaez Bridge was assessed comparing with the results of cross section surveys between 2012 and 2013.

As characteristics of the river profile variation of the Cagayan de Oro River, it was assessed that:

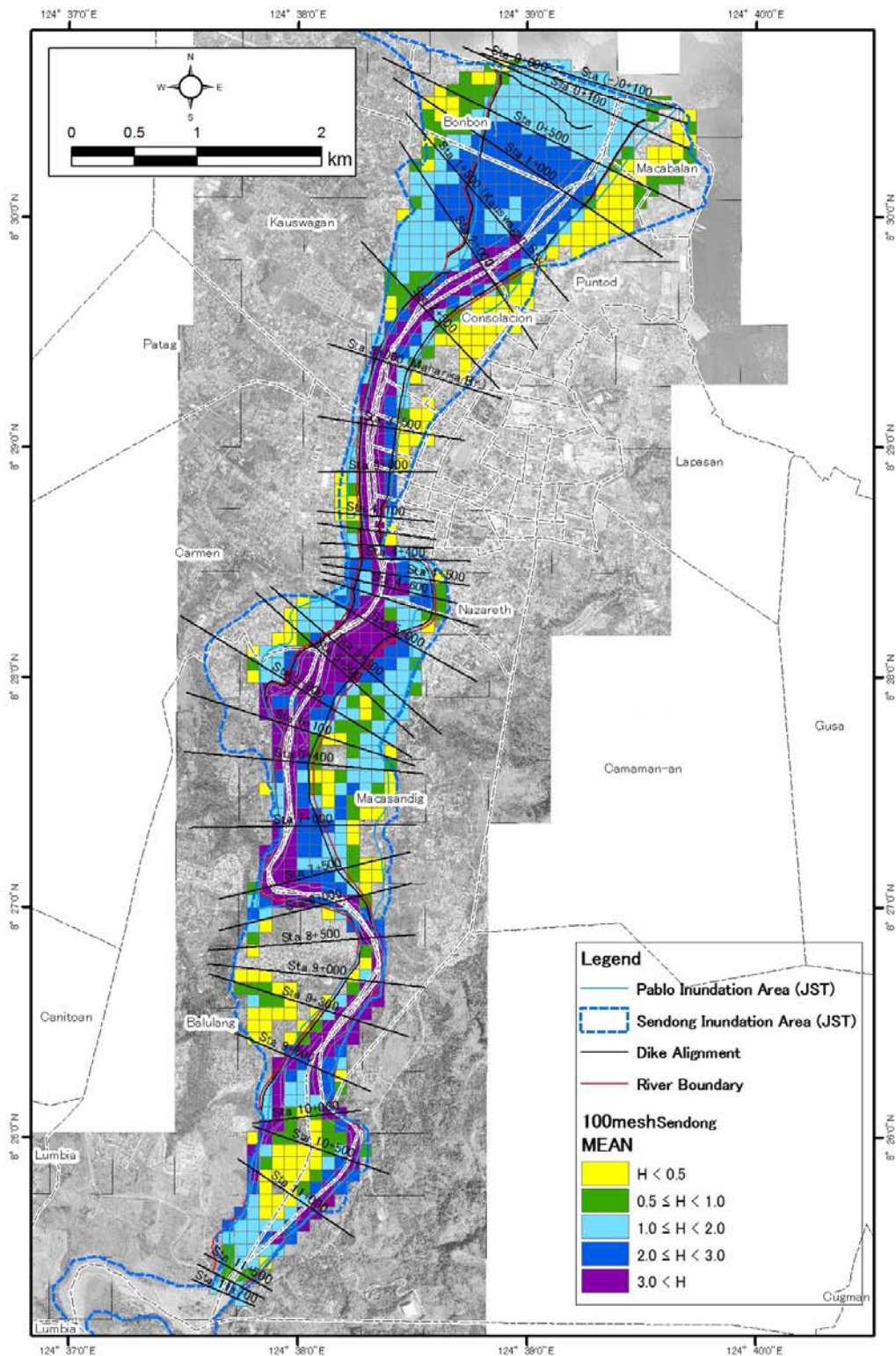
- a) There is a tendency of riverbed degradation from 2011 to 2012 in the downstream stretch from Sta.0+000 – Sta.5+000. It was considered that it had been caused by a large scale of flushing of riverbed materials during TS Sendong flood with about 50 year return period.
- b) On the other hand, from 2012 to 2013, the riverbed was aggregated in this stretch. In that period, though a flood of TY Pablo occurred resulting minor flushing of the riverbed materials, continuous sediment deposition might have been surplus than the flushing by TY Pablo. The trend of riverbed aggradation is corresponding with the result of hearing about sedimentation in the downstream stretch. Sediment deposition volume in the stretch from Sta.0+000 to Sta.5+000 was preliminary estimated at around $162,000\text{ m}^3$ from 2012 to 2013 as per comparison of the cross section data.

2) Study for deepening of river channel in the downstream of the river

Channel excavation/dredging in the downstream of the river is one of the measure to increase flow capacity of the channel but not effective in the downstream stretch due to tide level and sedimentation. It will be difficult to maintain the deeply dredged sections due to sediment transportations from the upstream area and coastal areas.

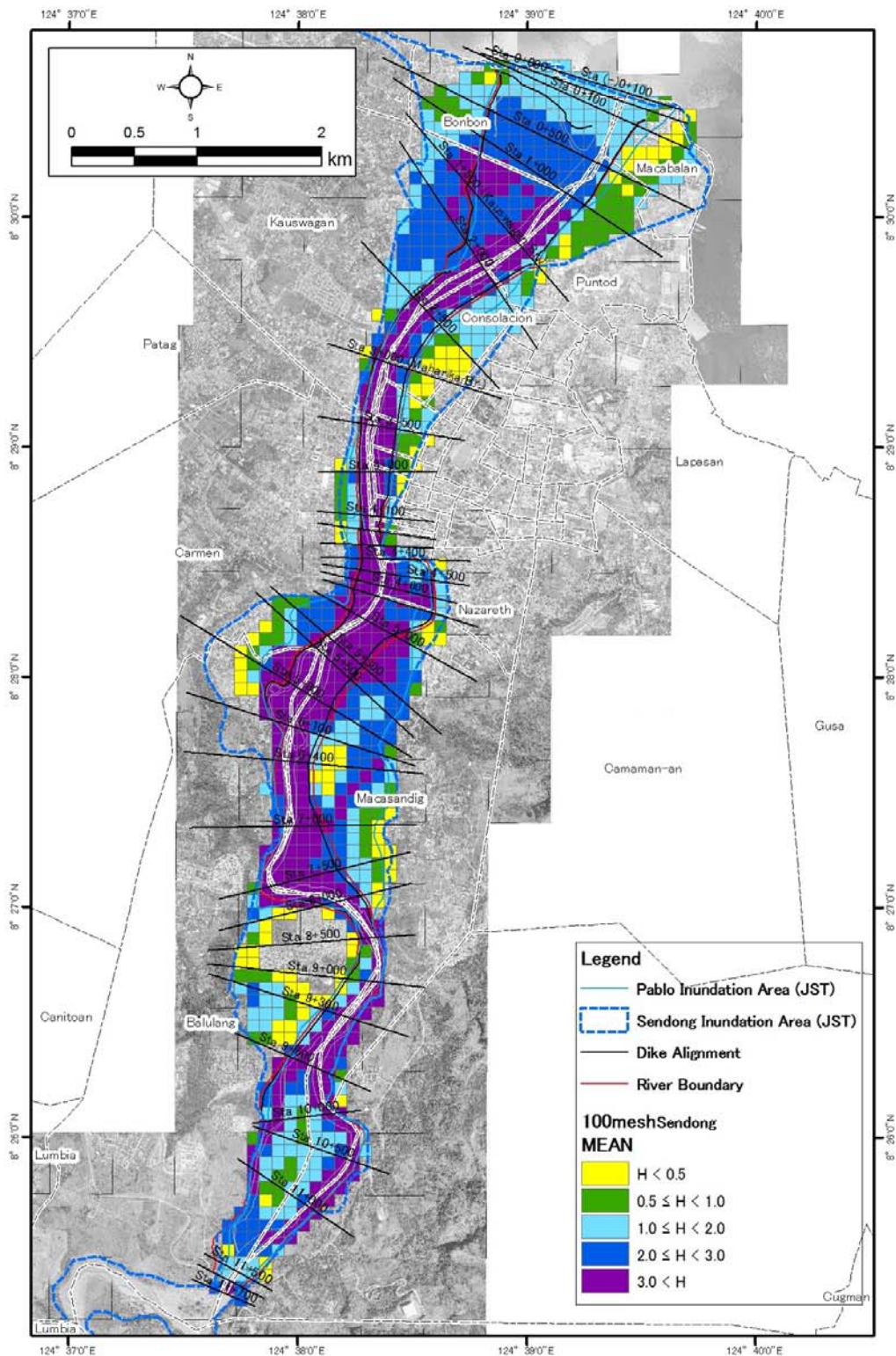
3) Necessity of periodical maintenance dredging in the downstream river and river mouth

Deepening of channel in the downstream river is not recommendable option. However, siltation in the downstream of the river is a trend of the Cagayan de Oro River. Visible sediment depositions occur over the river mouth and in downstream of the river. Instead of deepening of the river channel, periodic monitoring of channel cross section is proposed and regular maintenance dredging/channel excavation is recommended to remove sediment deposition.



Source: JICA Survey Team

Figure 3.5 Result of Inundation Analysis, (1) Probable 25- year Flood



Source: JICA Survey Team

Figure 3.5 Result of Inundation Analysis, (2) Probable 50- year Flood

4) Riverbed fluctuation analysis

Riverbed fluctuation analysis model was preliminary set up aiming at simulating riverbed movement in the downstream stretch from the river mouth to the Pelaez Bridge.

The result of the dry run could not simulate the actual sediment deposition in the downstream stretch and was not consistent with the actual trend of riverbed fluctuation. One of the reasons of inconsistency is quality and quantity of sampling data of the suspended sediment. The riverbed fluctuation analysis is very sensitive on input condition of the sediment discharge given at the upstream boundary. It was considered that sediment discharge and grain size distribution of the suspended sediment were not estimated exactly.

Annual sediment discharge from the upstream basin was preliminary estimated by using the said sediment rating curve and available discharge data from 1991 to 2012. It was estimated about 260,000 m³/year. On the other hand, annual sediment yield in the Cagayan de Oro River basin was roughly estimated from 1,300,000 to 2,700,000 m³/year. It was considered that the sediment discharge derived from the sediment rating curve was underestimated due to constrain of accuracy of the sediment rating curve. In order to improve the riverbed fluctuation analysis model in the Cagayan de Oro River, it is recommended to continue suspended sediment sampling particularly during floods and to conduct periodical river cross section survey to monitor actual riverbed fluctuation.

3.5 Study on Sediment Movement Characteristics and Sabo Facilities

(1) Activity of the Sediment Production in the Present Stage from the Perspective of Topography

The topography of Cagayan de Oro River watershed consists of a broad and gentle slope which contains the volcanic deposits of the old volcanoes and the terraces. Historical development of landform of this watershed is characterized by volcanic activities in Quaternary, deposits of the volcanic products (pyroclastic flow, lava, ash) and erosion of deposits.

A large amount of sediment has flowed out toward the lowland or shallow sea before, therefore, the activity of sediment production is presumed to be the lowest condition in the Holocene period.

(2) Condition of the Sediment Production before and after TS Sendong

According to the satellite photos, the mountain is covered by vegetation before Sendong. Obvious slope failures and debris flow deposits were not observed by satellite photos. After Sendong, landslides and slope failures are not almost observed by satellite photos that the new sediment production is discriminated to be a little.

(3) Sediment Discharge

Except for steep mountain area, the riverbed gradient of the river sections at accessible middle reach, downstream and the estuary are 1/30, 1/100 and 1/450, respectively. The sediment movement form is considered to be changed from “bed load”, “suspended load” and “wash load”.

In CEPALCO dam on Bubunawan River, the sediment deposit of fine materials in reservoir was confirmed to be removed every year. This is one of the characteristics of the sediment outflow in this watershed, and is presumed to be closely related to sedimentation of the fine materials in the estuary.

(4) Sabo Facilities

The sediment productivity is not active and sediment disasters were not observed so that there is no object that obviously need conservation in the upstream and middle reaches of the river. Consequently the check dam was judged to be not necessary.

(5) Issues of Outflow of Fine Material on the Sediment Management

The cultivated land on the plateau is distributed vastly in the northern part of the Mt. Kitanglad, where it is planted by pineapple, banana fields etc. The cultivated lands on the plateau are assumed to be the source area of the fine materials.

The fine materials transported in the form of wash load is assumed to be mostly deposited around the estuary which will cause not only riverbed aggradation but also impact to the ecosystem in the sea.

Therefore, the quantitative observation of the fine materials is considered to be important for the sake of the comprehensive sediment management.

3.6 Non-structural Measures

(1) Present Non-Structural Measures in Flood Management

1) Philippine Government's Non-Structural Measures for Flood Risk Mitigation

Regarding policies in disaster preparedness and flood mitigation, it was assessed and to be reasonable that the change of flood disaster management from top-down approach to more responsive and accountable local government approach by decentralization by Republic Act (RA) 7160 and that increase of local government funds to program disaster preparedness activities from 2% to 5% by RA 8185, and 70% of the 5% Calamity fund for Disaster Risk Reduction Management (DRRM) allowed for LGUs to program without the need for actual declaration of a "State of Calamity" by RA 10121. Further change in policy by RA on disaster preparedness and flood mitigation was expected according to change in situation in the future.

Regarding organization structure for flood management, Disaster Risk Reduction and Management Councils (DRRMCs) at the national, regional, provincial, municipal/city and barangay levels together with concerned agencies have played important roles for mitigation of disaster including flood in the Survey area.

2) Assessment of Existing Non-Structural Measures on Flood Management in the Cagayan de Oro River Basin

Community Based Flood Early Warning System (CBFEWS), contingency planning and watershed management recommended in the previous Master Plan and Feasibility Study prepared by DPWH in 2010, were judged reasonable and considered to be implemented as quickly as possible. However, more detailed plans will be prepared and its implementation.

In November 2010, the Cagayan de Oro River Basin Management Council (CDORBMC) was organized. It was recommended that the CDORBMC would formulate the Comprehensive Watershed Management Plan for promotion of soil and water conservation of watershed to be attained through activities including monitoring of the conditions of watershed and river course.

As an assessment of existing non-structural measures on land use management, draft Comprehensive Land Use Plan (CLUP) for the Cagayan de Oro City was referred to as

future urban land use. The majority of the areas in the left and right banks along the Cagayan de Oro River, were planned as residential area. Therefore, the plan for these areas should be changed based on the “River Boundary” set in this Survey. In this connection, the Cagayan de Oro City has been working to finalize the CLUP incorporating the disaster related plan into the CLUP.

(2) Study on Flood Management

Basically, prevention and mitigation, preparedness, response and recovery compose the four (4) pillars of the flood management cycle. Of those, prevention/mitigation and preparedness are mainly measures to be made before flooding, which will be important for non-structural measures in this Survey. The following questionnaire surveys were undertaken mainly to grasp current situation/problems and measures mainly for prevention/mitigation and preparedness.

- 1) Questionnaire survey for barangays in the Cagayan de Oro City flooded by TS Sendong
- 2) Interview and questionnaire surveys for DRRMCs in the Cagayan de Oro River Basin

Main survey results and assessment are presented in the Main Report as well as the detailed results in Appendix.

Based on the results of review of the existing non-structural measures in this Survey, questionnaire/ interview surveys for the DRRMCs, 5-Year DRRM Plan (2013-2017) of the Cagayan de Oro City, MOA signed by Bukidnon province, 3 Municipalities of Bukidnon, (Talakag, Libona and Baungon), Cagayan de Oro City and Iligan City, FFWS in the Cagayan de Oro River Basin, current activities of other foreign countries and NGOs, non-structural measures required for each area and agencies concerned were considered as shown in Table 3.2:

Table 3.2 Non-Structural Measures required for Each Area and Agencies Concerned (Flood Management)

No.	CDO City	Talakag	Baungon	Libona	PAGASA
(1) Reinforcement of DRRMCs	✓	✓	✓	✓	
(2) Preparation of Contingency Plan and DRRMP, which includes Preparation/Update of Flood Hazard Map, Evacuation Planning, etc.	✓	✓	✓	✓	
(3) FFWS					✓
(4) Community Based Flood Early Warning System (CBFEWS)	✓	✓	✓	✓	✓
(5) Information, Education and Communication (IEC)	✓	✓	✓	✓	
(6) Land Use Regulation for Flood Plain	✓				

Source: JICA Survey Team

(3) Watershed Management

Review of activities of DENR and related agencies for watershed management were undertaken in this Survey. Further, discussions with DENR, LUGs (Cagayan de Oro City and municipalities of Bukidnon, etc.), DPWH, etc. were conducted, studies on improvement for plans and activities were undertaken, and recommendations on watershed management were made as shown below.

1) Assessment of Land Classification and Forest Distribution in the Cagayan de Oro River Basin

All the lands in the Philippines are categorized into the Forestlands and Alienable & Disposal (A&D) Lands, and forestlands occupy 57% in the Cagayan de Oro River Basin, and A&D Lands 43%. DENR has responsibility to manage the forestlands, whilst DA and LGUs for A&D Lands.

The forest cover ratio in the Cagayan de Oro River Basin was almost 100% in 1900s, and decreased to 42% in 1970s, and 24% in 1999, and increased to 27% in 2003. The forest areas decrease significantly in the south and central part of Mindanao, compared to those in the Cagayan de Oro River Basin.

2) Assessment of Existing Non-Structural Measures (Watershed Management)

Organization Structures for the Watershed Management for the Cagayan de Oro River Basin

The members of the Board of Stakeholders of the Cagayan de Oro River Basin Management Council (CDORBMC) were composed in the organizations and LGUs only from the downstream of the Cagayan de Oro River Basin at the start. Three (3) municipalities were chosen as one of the members of the Board of Stakeholders in 2012, and such organizations as DPWH and MBDA in April 2013.

Bukidnon Watershed Protection and Development Council (BWPDC) was established by the Presidential Decree in 1995 to manage and protect forest areas in the Bukidnon Province.

Macajalar Bay Development Alliance (MBDA) is composed in 14 LGUs along the Macajalar Bay for the proper management and development of the natural environment and coastal resources of the Macajalar Bay. The MBDA has become one of the members of CDORBMC, based on the “Ridge to Reef Approach”.

Watershed Management Plans for the Cagayan de Oro River Basin

The Cagayan (de Oro) River Watershed Management Plan in 1999 was prepared for Cagayan de Oro River Basin, and the Characterization Study (2007).

RBCO-DENR is formulating the Integrated River Basin Management and Development Master Plans (IRBMDMPs) for 18 major rivers in the Philippines, including the Cagayan de Oro River Basin. The study was commenced in April 2013.

ADB conducted the pre-feasibility study for the wastewater, watershed management and solid waste management for Cagayan de Oro City in 2012. The Cagayan de Oro River Basin was out of the focus as of the watershed management component.

There are two (2) Protected Areas (Natural Parks) located on the upmost part of the Cagayan de Oro River Basin, managed by PAWCZMS-DENR Region X, and the management plans for those two Protected Areas have been already formulated.

Based on the Executive Order 53, Cagayan de Oro City is formulating the coastal resource management plan (CRMP), but not yet finalized it because the contents of CRMP are being integrated into the CLUP. There are six (6) candidate Marine Protected Areas along the coast in the Cagayan de Oro City, and the management plans of those areas are already prepared.

Watershed Management-related Activities in Cagayan de Oro River Basin

The several national-level authorities; i.e. DENR, local-level authorities: i.e. LGUs, and international donors: i.e. ADB, have been implementing many kinds of activities related to the watershed management inside the Cagayan de Oro River Basin.

DENR is implementing the Community-Based Forest Management (CBFM) activities with People's Organizations (POs) inside the forestlands after allocating the land tenures to the POs. Based on the recommendations by CDORBMC, DENR is promoting to plant bamboos along the river side areas, however, there are issues that bamboo and palm trees along the river were easily uprooted during the flood at the time of the TS Sendong. Therefore, it is recommended to promote dee-rooted and indigenous tree species for the riparian areas

The Protected Area Management Boards (PAMBs) are established for each of two (2) Protected Areas inside the Cagayan de Oro River Basin to conduct the participatory management activities for the Protected Areas.

Agricultural Productivity Office (APO) of Cagayan de Oro City is promoting to plant mangrove propagules along the coastal areas in cooperation with DENR.

ADB is conducting the technical assistances in updating the current municipal watershed management plans, and the conduct of capability building activities. And this is considered as the start-up program for the up-coming ADB-loan project (INREM). The French Development Agency (Afd) has a plan to conduct the technical assistances on the forest management, watershed management and conservation agriculture in Bukidnon.

3.7 Current Main Laws/Regulations/Orders related to Flood Risk Management

(1) Main Laws/Regulations/Orders

1) Republic Act 10121 (RA10121)

RA10121, otherwise known as "Philippines Disaster Risk Reduction and Management Act of 2010" enacted on May 2010. The Act has the following four main objectives:

- Strengthening the Philippines disaster risk and reduction and management system
- Providing for the National Disaster Risk Reduction Framework
- Institutionalizing the Disaster Risks and Management Plan
- Appropriating funds for disaster risk and reduction and management

2) Water Code (PD1067)

The Philippines has a water related law, Presidential Decree (PD) No. 1067 December 31, 1976, otherwise known as "the Water Code of the Philippines". This Law stipulates several water uses and the rights in the water bodies of the Philippines. In relation to flood risk management, the Water Code regulates the following articles and amended the latest implementing rules and regulations, shown in Table 3.4.

3) National Water Security Act of 2012

Although the Water Code (PD1067) is still effective at present, amendment of the Water Code had been discussed recently. Then, the Act renaming the Water Code into "National Water Security Act of 2012" was proposed on November, 2012

The National Water Security Act of 2012 promotes a more comprehensive approach for flood risk management; on the other hand, the Act may cause unclear lead governmental agency for declaration and management of the Flood Control Areas.

Table 3.3 Important Features of RA10121

Main Items	Important Features
Declaration of Policy (Section 2)	Adopting a DRRM approach that is holistic, comprehensive, integrated, and proactive in lessening the socio-economic and environmental impacts of disasters including climate change, and promote the involvement and participation of all sectors and all stakeholders concerned, at all levels, especially the local community
Scope (Section 4)	Providing for the development of policies and plans and the implementation of actions and measures pertaining to all aspects of disaster risk reduction and management, including good governance, risk assessment and early warning, knowledge building and awareness raising, reducing underlying risk factors, and preparedness for effective response and early recover
Institutional Mechanisms (Section 5, 6, 7, 8, 9, 10, 11, 12, 13)	Providing the following four institutional mechanisms for DRRM: <ul style="list-style-type: none"> - DRMMC networks from the national, regional, provincial, city/municipal levels, and Barangay DRRM Committee - Local DRRM Offices in every PDRRMC, every CDRRMC/MDRRMC, and in Barangay DRRM Committee - Powers and functions of Office of Civil Defense (OCD) - Disaster Volunteers
Funding (Section 21, 22)	<ul style="list-style-type: none"> - Regulating “Local Disaster Risk Reduction and Management Fund (LDRRMF)”; <i>Not less than five percent of the estimated revenue from the regular sources shall be set aside as the LDRRMF to support disaster risk management activities.</i> - Regulating “National Disaster Risk Reduction and Management Fund (NDRRMF)”

Source: Republic Act 10121, May 2010

Table 3.4 Main Statements of Articles/ Amended Implementing Rules and Regulations of the Water Code related to Flood Risk Management

Article 5: Rivers and their natural beds <u>belong to the State.</u>
Article 51: The bank of rivers and streams and the shores of the seas and lakes throughout their entire length and <u>within a zone of three (3) meters in urban areas, twenty (20) meters in agricultural areas and forty (40) meters in forest areas,</u> along their margins are subject to the easement of public use in the interest of recreation, navigation, floatage, fishing and salvage. No person shall be allowed to stay in this zone longer than what is necessary for recreation, navigation, floatage, fishing or salvage or to build structures of any kind.
Article 53: To promote the best interest and the coordinated protection of flood plain lands, the Secretary of Public Works, Transportation and Communication may declare flood control areas and promulgate guidelines for governing flood plain management plans in these areas.
Article 54: In declared flood control areas, rules and regulations may be promulgated to prohibit or control activities that may damage or cause deterioration of lakes and dikes, obstruct the flow of water, change the natural flow of river, increase flood losses or aggregate flood problems.
Article 55: The government may construct necessary flood control structures in declared flood control areas, and for this purpose it shall have a legal easement as wide as may be needed along and adjacent to the river bank and outside the bed or channel of the river.
Article 56: River beds, sand bars and tidal flats may not be cultivated except upon prior permission from the Secretary of the Department of Public Works, Transportation and Communication and such permission shall not be granted where such cultivation obstructs the flow of water or increase flood levels so as to cause damage to other areas.

Source: “Water Code of the Philippines and the Amended Implementing Rules and Regulations”, House of Representative, 2012, National Water Resources Boards, March 2005

- 4) Local Government Code of 1991, Local Disaster Risk Reduction and Management Fund (LDRRMF), and Municipal Executive Orders related to flood risk management are specified below:

- Local Government Codes (RA7160)
- Local Disaster Risk Reduction and Management Fund (LDRRMF)
- Municipal Executive Orders related to flood risk management

5) Other laws, regulation, decrees closely related to flood risk management

The other Philippines laws, regulations, and decrees closely related to flood risk management are specified below:

- Presidential Decree 1152, 1977
- DENR Administrative Order No. 13, 1992
- Executive Order No.510, 2006

(2) Legal Aspects related to River Boundary and a Preliminary Conceptual Proposal of the River Area

1) Related laws and orders

The Philippines have the Water Code, the proposed National Water Security Act of 2012, as well as administrative orders by DENR which are related to the river boundary. However, these laws and orders do not define the river area clearly, and may cause unclear lead governmental agency issues related to river boundary.

2) Present main issues and recent enactment situations in the Cagayan de Oro City

Present main issues

Based the present findings, present main issues related to river boundary in the Philippines is summarized as follows:

- DPWH had never invoked the Article 53 of the Water Code to declare Flood Control Area for protection of flood plain land
- In spite of the provision of Article 56 of the Water Code, river beds, sand bars, and tidal flats are being disorderly developed
- Many local people living along the rivers, including informal settlers still settled or may come back to previous settlement areas, unsuitable for settlement because these are highly flood-prone

A clear or reasonable definition of the River Area and delineation of boundaries of the river area would be essentially required to deal with flood risk management as well.

Recent enactment situations in the Cagayan de Oro (CDO) City

Main enactment process and the latest situations related to river boundary of the Cagayan de Oro River in the Cagayan de Oro City shown in Figure 3.6.

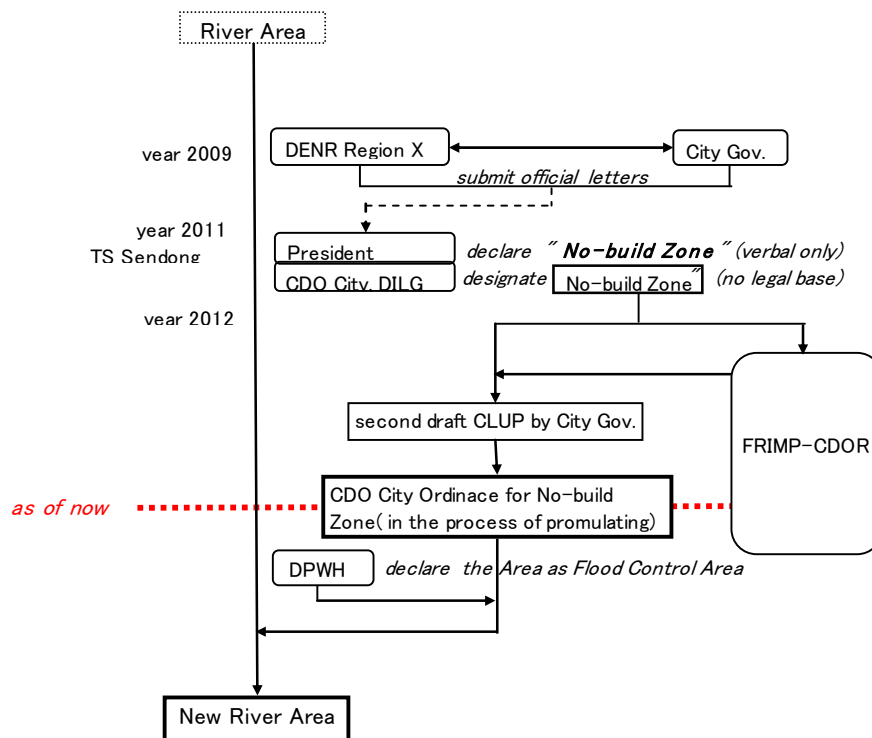
In 2009, the “DENR Region X Committee” recommended to the City Government of Cagayan de Oro that entry of new inhabitants and construction of new units in some highly flood prone areas, including small islands in the Cagayan de Oro River basin should strongly be prohibited and that the existing residents in those areas should be programmed for relocation to a safer site, based on the Letters between DENR Region X and Cagayan de Oro City.

Just after occurrence of the Sendong in December 2011, the President of the Philippines declared five “No-build Zones”, which are mainly the small islands inside Cagayan de Oro River. However, this declaration is verbal, and there is no written document.

Furthermore, City Planning and Development Office of Cagayan de Oro City and DILG designated a total of nine areas, including the said five areas as “No-build Zones”. This additional “No-build Zone” is derived from a geo-hazard assessment by the Geosciences Division of the Mines and Geosciences Bureau, Region X, DENR. However, all of the “No-build Zones” have no formal legal bases yet.

On the other hand, the No-build Zones also have to correspond to the Comprehensive Land Use Plan (CLUP) by each LGU. The second draft plan of the CLUP of the Cagayan de Oro City is being reviewed. At present, Cagayan de Oro is in the process of promulgating the City Ordinance for the “No-build Zone”, which can be one of the River Areas.

Finally, it is necessary that the DPWH Secretary will declare these areas as Flood Control Area, in order to protect the flood plain land and to enforce the relocation of settlers in the area another area based on the Water Code.



Source: JICA Survey Team

Figure 3.6 Main Enactment Process and Present Situations related to River Boundary in the Cagayan de Oro City

3.8 Current Organizations for Flood Risk Management and FRIMP-CDOR

(1) Main Organizations

The following are the main organizations for flood risk management in the Philippines as well as references for the proposed measures by the FRIMP-CDOR.

1) NDRRMC

The National Disaster Risk Reduction and Management Council (NDRRMC) is the highest policy, coordinating, and supervising body at the national level for disaster risk reduction management and the highest allocator of resources in the country to support the efforts of the lower Disaster Risk Reduction and Management Councils (DRRMCs).

Under the NDRRMC, the Disaster Risk Reduction Management Council (DRRMC) in the Regional level; is called RDRRMC, in the Provincial level; it is called PDRRMC, in the City or Municipal level; it is called CDRRMC/MDRRMC, and Barangay level; it is called BDRRMC were set up based on the RA10121.

2) Department of Public Works and Highway (DPWH)

3) Concerned LGUs

(2) Main Related Organizations

The following are the main related organizations for flood risk management in the Philippines as well as for the proposed measures by the FRIMP-CDOR.

1) National Economic and Development Authority (NEDA)

The NEDA is the country's independent economic development and planning agency, as mandated by the Constitution of the Philippines.

2) Office of the Civil Defense (OCD), Department of National Defense (DND)

The basic task of the OCD is to coordinate the activities and functions of various governmental agencies, private institutions, and civil organizations for protection and preservation of life and properties during emergencies.

Regarding the flood risk management, the OCD serves as the Executive Arm and Secretariat of the National Disaster Risk Reduction and Management Council (NDRRMC). The NDRRMC is headed by the Secretary of DND as chairperson.

3) River Basin Control Office (RBCO), DENR

RBCO under the DENR is the leading governmental agency for the integrated planning, planning, management, rehabilitation and development of the country's major river basins. The Cagayan de Oro River is one of the 18 major river basins in the Philippines. The RBCO has the PMO/Focal Office in the Cagayan de Oro River Basin.

4) The Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), DOST

Concerning flood mitigation management, National Flood Mitigation Office (NFMO) under the PAGASA, is now known as Hydrometeorology Division. It undertakes operational activities in flood forecasting and warning covering important major river basins in the Philippines, which does not include the Cagayan de Oro River Basin.

5) The National Water Resources Board (NWRB) and National Water Resources Management Office (NWRMO)

The National Water Resources Board (NWRB) was established to formulate and coordinate the policies, programs, and standards relating to all water sectors in the Philippines based on the laws such as a series of presidential decrees.

6) Office of Civil Defense (OCD), Region X

Concerning the flood risk management, OCD Region X acts as the Regional Disaster Reduction Management Council (RDRRMC) Region X. The RDRRMC Region X office has the following four components and their vice chairpersons; i) disaster prevention & mitigation; ii) disaster preparedness, iii) disaster response, iv) disaster rehabilitation & recover. The RDRRMC is composed of 50 organizations, including one private sector representative.

7) Department of Interior and Local Government (DILG), Region X

In relation to flood risk management, the main role of the DILG Region X is presently to strengthen, particularly in flood preparedness, the capabilities of related provincial, city/municipality government, as well as at the barangay level.

8) Cagayan de Oro River Basin Management Council (CDORBMC)

When the CDORBMC was established before the occurrence of TS Sendong on November 2010, the members were limited the Cagayan de Oro City and the organizations within the Cagayan de Oro City. However, the Board of the Stakeholders of the present CDORBMC are most of the concerned governmental organizations from the upstream to downstream of the Cagayan de Oro River, including the DENR-Region X, all the concerned LGUs, OCD, Region X, -DILG, and Academic Organization such as Xavier University, as well as NGOs, Private Sectors. Furthermore, the DPWH became one of the Board of Stakeholder of the CDORBMC on April, 2013.

4 MASTER PLAN STUDY

4.1 Approach to Master Plan

(1) General

Cagayan de Oro River runs the center of the Cagayan de Oro City, which is the regional center and most-highly urbanized city in northern Mindanao. However, despite its important role in the region and Mindanao, flood control measures have not been implemented except for the partial construction of dikes.

Due to urgent need under such situation and serious flood damages caused by January 03 flood in 2009, DPWH conducted the master plan and the feasibility study in the Cagayan de Oro River Basin in June 2011 by their national budget. The master plan was formulated, which target year was set at Year 2035, with design scale of 25-year return period to attain the maximum flood control effects of the Cagayan de Oro River basin.

Tropical Storm Sendong (TS Sendong) in December 2011, after the conduct of the said master plan and feasibility studies, had brought about serious damages in the North Mindanao area. About 1,170 thousand people were affected and about 1,250 persons were lost. One of the serious damaged cities was Cagayan de Oro City, where about 600,000 people live. Due to tremendous changes in natural and social conditions by TS Sendong which flood magnitude is estimated at over 50-year return period, review and update of M/P and F/S were urgently required.

(2) Premises and Conditions for Master Plan

The objective area is whole Cagayan de Oro River basin with catchment area of 1,364 km². The target year was set at the year 2035, which is the same target year having applied in the previous master plan that a year after the final year of the four (4) Medium-Term Philippine Development Plans that has started from 2011.

There is existing land use plan prepared by Cagayan de Oro City. At present, taking into consideration of the flood damages of TS Sendong, the local government is undertaking resettlement activities in the area and updating comprehensive land use plans including establishment of Non-Build Zone along the Cagayan de Oro River, which was identified at seven(7) areas in or adjacent the river. While, the DENR is preparing a map showing

hazard area and river area in which policy of the River Boundary established by DPWH is to be incorporated.

(3) Characteristics and Issues of Flood Damage in Cagayan de Oro River

In the Cagayan de Oro River Basin, past flood damage record shows that there were several large floods hit the basin in 1916, 1957, 1982, 1998 and 2009. In the recent years, TS Sendong in December 2011 and Typhoon Pablo (TY Pablo) in December 2012 passed over the Cagayan de Oro River Basin resulting in serious inundation damages in the area.

Table 4.1 shows the characteristics and issues of the flooding in the Cagayan de Oro River obtained in the course of the Survey.

Table 4.1 Characteristics and Issues of Flooding in the Cagayan de Oro River

Characteristic	Issue
Flashflood	<ul style="list-style-type: none"> ● Short lead time for warning, evacuation before flooding ● Difficulty in evacuation during flood due to rapid increase of flood level ● Risk on sudden action/response for flood occurrence during night time
Occurrence of extraordinary floods in recent years	<ul style="list-style-type: none"> ● Inadequate existing structural flood mitigation measures (flow capacity of existing river channel is only for 2-5 year flood) ● Partial dike system ● Very high flood risk in case of higher flood level and deeper inundation ● Risk of bridge collapsing (almost no freeboard at some of existing bridges during TS Sendong)
Flooding water passing over the narrow inundation area	<ul style="list-style-type: none"> ● Relatively high speed flood flow passing through narrow inundation area ● Strong force of fast flow velocity posing disadvantage for evacuation and serious damages on structures such as shanties and wooden houses

Source: JICA Survey Team

(4) Basic Principles for Formulation of Master Plan

Following six (6) basic principles were established for formulation of Master Plan for Flood Risk Management:

- 1) Consistency with Philippines National Development Plan (2011-2016)
- 2) Formulation of Master Plan and Feasibility Study referring to Comprehensive Flood Mitigation Measures
- 3) Consideration for Climate Change Adaptation in Planning and Design for Flood Mitigation Structures
- 4) Execution of Flood Mitigation and Management by Structural and Non-structural Measures
- 5) Considerations on Natural and Social Environmental Impacts by the Flood Mitigation Measures
- 6) Establishment of River Boundary (Land Use Control, Restriction of Construction and Living in High Risk Area)

4.2 River Boundary

(1) Objective of Establishment of the River Boundary

Through the establishment of river alignment for clear demarcation of flood control area and easement as well as clear definition of the river boundary, it will contribute to prevent recurrence of calamity such as TS Sendong by:

- 1) securing required land to let flood water flow down safely,
- 2) protection from living and reconstruction of houses in highly flood prone areas,
- 3) control land use and development in the river area not to obstruct flood flow, and
- 4) securing necessary construction area for river structures such as dike embankment, flood plain, revetment, sluice gate, etc.

This policy will mitigate flood risks, loss of human lives and damages on properties, buildings and infrastructures in the flood prone area, and contribute to regional developments and economic growth of the LGUs, and peace and safe of residents living adjacent to the river.

(2) Establishment of River Boundary

The river boundary along the Cagayan de Oro River was established, in consideration with existence of wider flood-prone area than the NBZ declared after TS Sending, and based on results of studies for river morphology, inundation analysis and flood risk assessment. The established river boundary is shown in Figure 4.1.

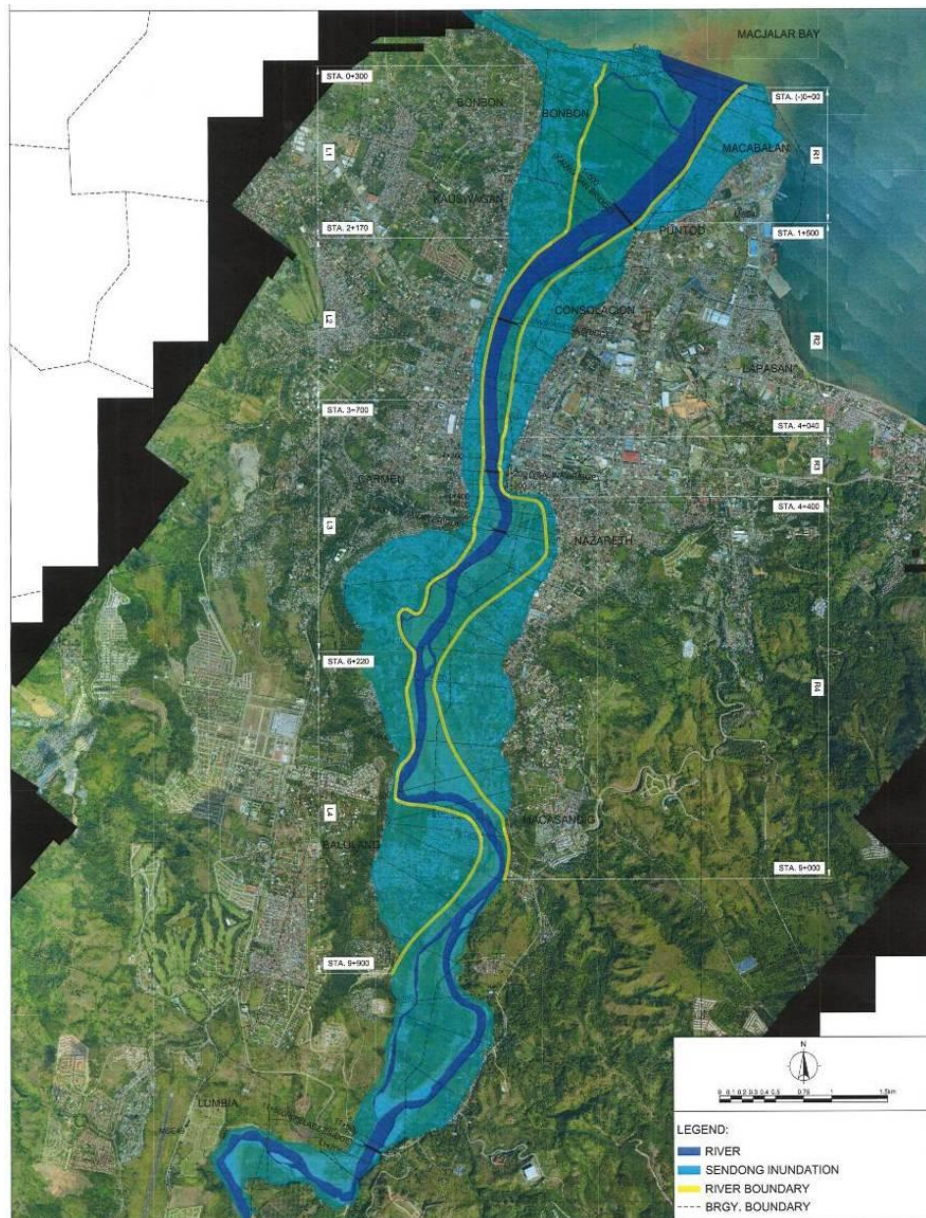
(3) River Boundary and Assessment of Flood Risk Level

The flood risk was assessed in reference to the evaluation criteria adapted by the World Bank Study on the Flood Management Master Plan for Metro Manila and Surrounding Areas (2010). The criteria for assessment of flood risk level is shown in Figure 4.2 and classified into 4 levels as follows:

- Flood Risk Level 4 (Very High Risk of Casualty: $5.0 \text{ m} < D$),
- Flood Risk Level 3 (High Risk of Casualty: $2.0 \text{ m} < D \leq 5.0 \text{ m}$),
- Flood Risk Level 2 (Medium Risk of Casualty: $0.5 \text{ m} < D \leq 2.0 \text{ m}$), and
- Flood Risk Level 1 (Low Risk of Casualty ($D \leq 0.5 \text{ m}$)).

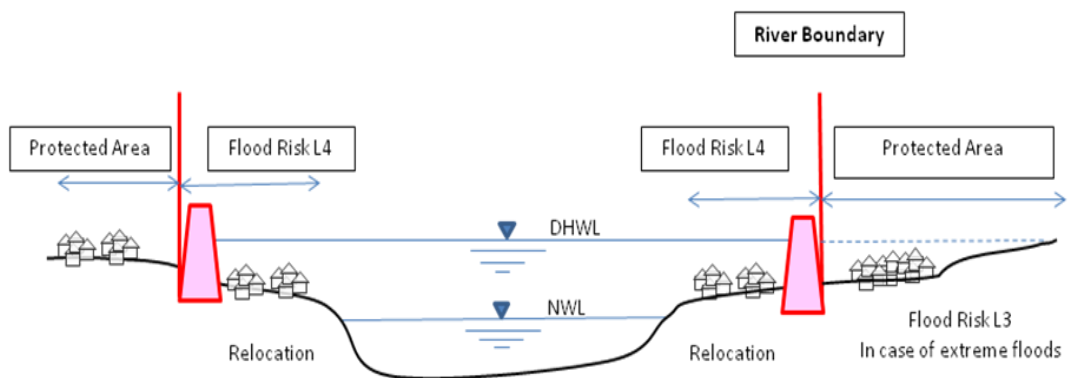
According to the assessment of flood risk level, the river boundary was set along the outer line of the Flood Risk Level 4 where local residents are impossible to evacuate, and lose the safety place in their house during flood event. The area of Flood Risk Level 4 was seriously damaged by recent floods repeatedly.

The basic concept of flood risk management of the Project is, therefore, to relocate people living in the area of the Flood Risk Level 4 to safe place and to protect people in the Flood Risk Levels 1 to 3 based on the established river boundary, as shown in Figure 4.2.



Source: JICA Survey Team

Figure 4.1 River Boundary in Cagayan de Oro River



Source: JICA Survey Team

Figure 4.2 Conceptual Illustration of Flood Risk Management of the Project

4.3 Target Safety Level and Design Scale

(1) Target Safety Level of Master Plan

The target safety level was set so as to correspond to the largest recorded flood in the Northern Mindanao Region, which is TS Sendong scale flood in accordance with the memorandum from the DPWH Secretary regarding upgrading the design standard of flood control works. The flood return period of TS Sendong is corresponding to approx.50-year return period.

(2) Design Scale

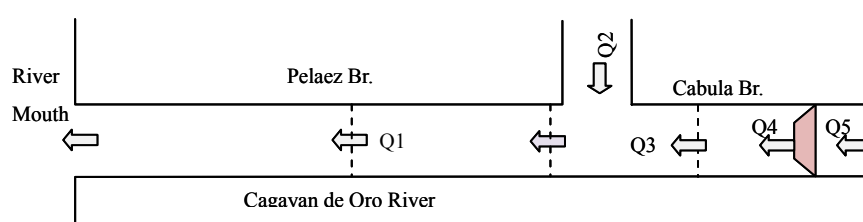
The suitable design scale of the Feasibility Study for the river improvement works in the downstream stretch was determined at 25-year flood because it is not reasonable to adopt higher design scale for actual implementation of the Project considering the existing flow capacity, design scales of other major rivers in the Philippines, existing river improvement works and site development conditions, and social impacts.

- i) Design Scale of Master Plan : Sendong scale (around 50-year probability)
- ii) Design Scale of Feasibility Study: probable 25-year flood

The design discharge distribution was prepared for the cases of with/without the proposed long term plan (flood control dam).

Table 4.2 Design Discharge Distribution (Sendong Scale)

Return Period	Case	Pelaez Bridge (Q1)	Bubunawan River (Q2)	Cabula Bridge (upstream of Bubunawan Conf.) (Q3)	Proposed Dam Site (Q4)	Proposed Dam Site (Q5)
25-year	Without Dam	3,300 m ³ /s	600 m ³ /s	2,700 m ³ /s	-	-
Sendong Scale	Without Dam	5,000 m ³ /s	900 m ³ /s	4,100 m ³ /s	-	-
	With Dam	3,300 m ³ /s	900 m ³ /s	2,400 m ³ /s	1,000 m ³ /s	2,700 m ³ /s



Source: JICA Survey Team

4.4 Basic Design of River Channel

The alignment of the proposed river improvement work shall basically follow the alignment of the existing channel. The design cross section was, therefore, proposed to have compound section composed of low water channel and high water channel.

- Cross section : results of cross section survey and topographic survey in 2012,
- Water level at river mouth : H.W.L +1.01 m above MSL,
- DHWL was designed not to be lower than the calculated water level in whole stretch and recorded high tide level of +1.34 m (above MSL) in the downstream

- DHWL was set to consider required clearance at bridge sections, previous highest flood levels, flood risk against extraordinary flood, land use, and environmental aspect.

Table 4.3 Design High Water Level

Station	Design High Water Level	Gradient of DHWL
Sta.0+000	+1.34 m (HHWL) +2.50 m	1/1200
Sta8+000	+9.17m	
Sta.10+000	+14.88m	1/350

Source: JICA Survey Team

The design crest level of the proposed dike is set considering required freeboard above the Design High Water Level. The required freeboard of the downstream of the Cagayan de Oro River is 1.2 m corresponding to the design flood discharge of 3,300 m³/s based on the design guideline of DPWH.

4.5 Examination of Alternatives of Structural Measures

(1) Setting of Alternatives

1) Basic policy for flood risk mitigation

Overall goal of the project is to mitigate flood risks in the Cagayan de Oro River based on the following basic policies for Flood Risk Management:

- i) Increase of flow capacity of river channel
- ii) Control of flood inflow from river basin
- iii) Increase of flood outflow discharge of river channel
- iv) Improvement of drainage functions in inundation area
- v) Evacuation from high flood risk area

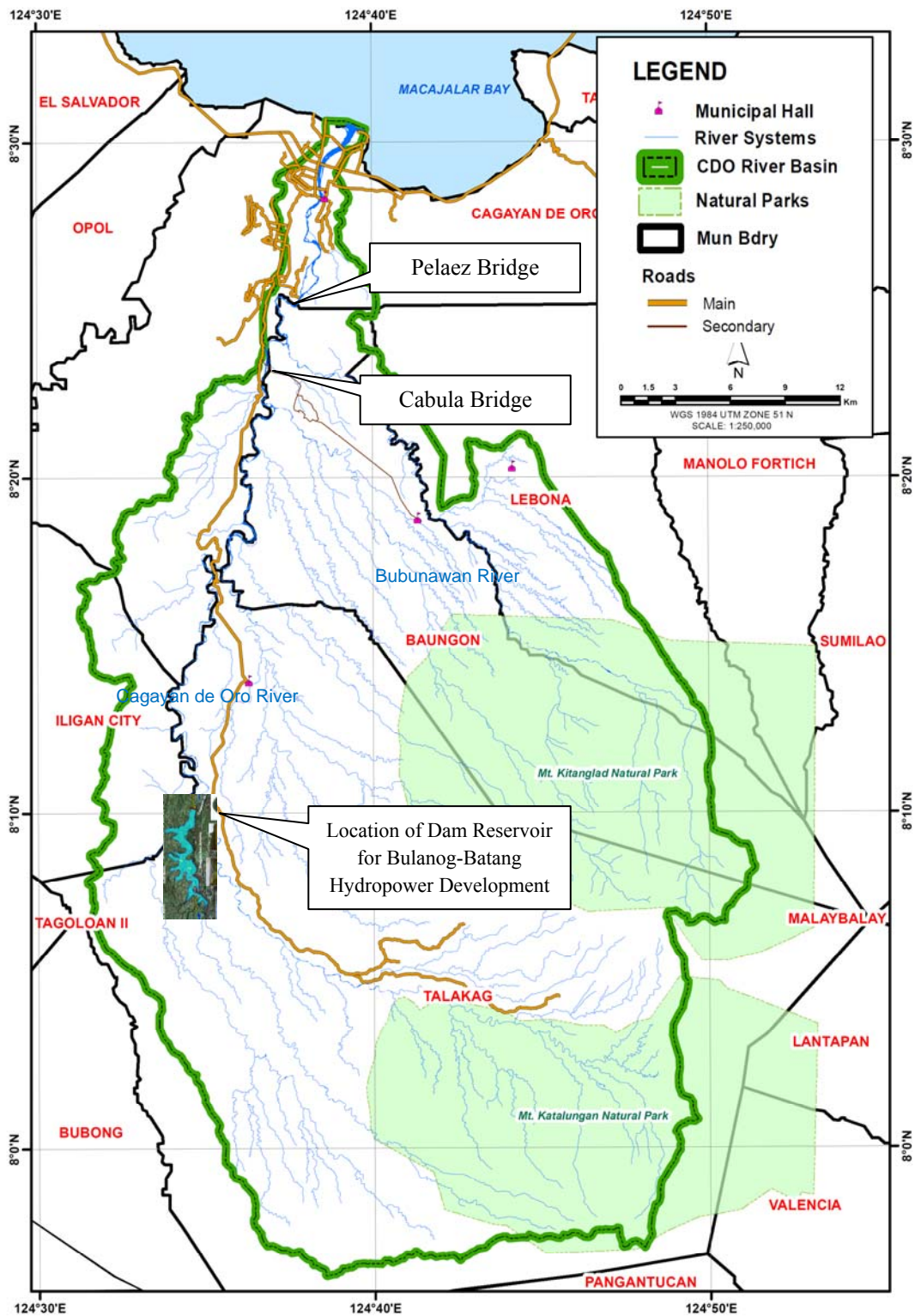
2) First screening of candidate components

Among these measures, first screening was conducted in order to preliminarily evaluate adaptability for the Cagayan de Oro River taking into consideration the characteristics and issues of the flooding in the basin. The criteria of flood risk management and climate change adaptation, socio-environmental conditions, operation and maintenance, organization institutional aspect and cost are adopted for the first screening.

Based on the result of the first screening for alternative components in the M/P, the following three measures were adopted.

- River improvement, targeting for the downstream areas of Cagayan de Oro River basin.
- A flood control dam aims to mitigate flood risk for Cagayan de Oro City in the middle to upstream area of Cagayan de Oro River basin.
- A flood diversion channel to divert flood water before a river flows down in urban areas.

Watershed conservation would be a measure to be effective for retarding small or middle scale flood by planting, however, it is difficult to predict the effect quantitatively and in general it takes time to see the effect. Consequently, although watershed conservation is effective as flood mitigation measure, the degree of flood mitigation effect is not always clarified. Thus, it was considered separately as a non-structural measure.



Source: JICA Survey Team

Figure 4.3 Location of Pealez and Cabula Bridges, Bubunawan River and Existing Dam Construction Plan

3) Setting of alternatives

Considering the target for flood risk management mentioned above, and various other conditions in the Cagayan de Oro River basin, the following alternatives were set as candidate programs:

Alternative 1: River improvement by widening of the river area to cope with TS Sendong scale flood (approx. 50 years return period)

Alternative 2: River improvement by heightening of river banks by structures to cope with TS Sendong scale flood,

Alternative 3: River improvement and utilization of existing dam construction plan (Bulanog-Batang Hydropower Development Project) to cope with TS Sendong scale flood ,

Alternative 4: Dam construction without river improvement works to cope with TS Sendong scale flood, and

Alternative 5: Construction of flood diversion channel without river improvement works to cope with TS Sendong scale flood.

Among those alternatives, the Alternative 4 was not adopted as an alternative because river planning should consider integration of river system from upper basin to lower basin.

As for the Alternative 5, the diversion channel would pass through the city center, considering the topographic conditions, with the width of approx. 220 m and the length of approx. 2.8 km. It would, however, cause substantial resettlement of residents and relocation of infrastructures, and splitting of city center. Consequently, this measure could be regarded as an adequate measure because the social environment impacts are crucial, and flood diversion channel, therefore, was not adopted as an alternative of this project.

The examination of alternatives for the components in the M/P was done for three (3) alternatives and another alternative of “Without Project” as reference for the examination of alternatives.

(2) Examination of Alternatives and Conclusion

Alternative 1 and Alternative 2 were not recommended since the following reasons:

Alternative 1 : - Social impacts are critical and it would take time for realization.
- Cost is expensive.

Alternative 2 : - Social impacts are critical and it would take time for realization.
- Potential flood risk (in alternative of extreme flood) is high.

Alternative 3 has the following merits:

- Social impacts are less than the other alternatives.
- Cost is the least among the Alternatives 1 to 3.

In the alternative of “No Action”, the situation will not change where frequent flooding disaster continue. Considering the recent climate change due to the global warming as they pointed out, the risk of flooding might be worsened in the future. Thus, the alternative of “No Action” was not recommended.

Among the three alternatives for flood risk management, Alternative 3 (River improvement and utilization of existing dam construction plan to cope with Sendong scale flood) was recommended as the optimum alternative.

4.6 Proposed Structural Measures

As the results of first screening and alternative study for the structural measures and taking into account the present situations on the objective areas and the budget source, three (3) phases of implementation was formulated i.e. urgent, short-middle term and long term measures.

(1) Urgent Measures

Damaged existing dikes and retaining walls during TS Sendong be rehabilitated and/or improved to cope with a 25-year design flood.

(2) Short-Mid Term (Core Components)

As a main component of the short-mid. term structural measures, continuous dike system durable for a 25-year design flood composed of the earth dike, concrete flood wall and road dike shall be implemented.

(3) Short-Mid Term (Supporting Components)

As the supporting components of the structural measures in the short-middle term, construction of drainage gate and outlets, improvement of the existing Kagay-an Bridge approach, and improvement of a natural retarding basin shall be implemented to complement the effects of the core components.

(4) Long Term Measures

1) TS Sendong as target safety level

The target safety level or return period of the design flood discharge applied in the Master Plan is the level which is equivalent to the largest recorded flood caused by TS. Sendong which flood scale is assessed to be 50-year probable flood or more. However, the safety level to be secured by the structural measures will be 25 year only in downstream reach of the Cagayan de Oro River in Cagayan de Oro City area. It is required in the upstream reaches to regulate a flood peak discharge of TS. Sendong scale flood to the peak discharge of probable 25-year flood or less so as not to cause flooding damages in the downstream reach.

2) Existing dam plan and proposed sites

As for the existing plan and study for the high dam which would have discharge regulation capacity, the feasibility study was conducted for a hydropower dam at the confluence of Batang-Blanog Rivers by NPC-NORMECA (Northern Mindanao Electric Cooperatives Association) as shown in Figure 4.3. The proposed Batang-Bulanog dam would have enough capacity for flood regulating function. Though the purpose of the existing plan for dam development is hydro power generation so far, it could be considered to add flood control purpose on the dam as one of the flood risk mitigation measures of Cagayan de Oro River basin.

3) Flood regulation effect by dam reservoir

According to a preliminary analysis on dam regulation effect, the dam reservoir would regulate peak inflow discharge of TS. Sendong scale probable flood at dam site to a certain outflow discharge so that the peak flow discharge in the downstream section would be reduced to discharge equivalent to 25-year probable flood. The estimated discharge distribution incorporating dam regulation effect is shown in Table 4.2

(5) Maintenance Works

Siltation in the downstream of the river is a trend of the Cagayan de Oro River. Visible sediment depositions occur over the river mouth and in downstream of the river. In the master plan, periodic monitoring of cross section survey is proposed and regular maintenance dredging/channel excavation is recommended to remove siltation in the downstream reach.

4.7 Proposed Non-structural Measures

(1) Flood Management

The structural measures proposed in the Project will attain the safety level of the 25-year flood for river improvement measures (50-year flood for Master Plan) in the Cagayan de Oro River Basin. Since it will normally take several years to attain the design level, and even if the target design level would be attained, non-structural measures are still necessary before the level is attained as well as for extreme flood after the design level is attained.

Based on the above consideration, the following six (6) major non-structural measures were formulated as a master plan for the Cagayan de Oro River Basin:

- 1) Reinforcement of DRRMCs
- 2) Preparation of Contingency Plan and DRRMP, which includes preparation/update of Flood Hazard Map, Evacuation Planning, etc.
- 3) Flood Forecasting and Warning System (FFWS)
- 4) Community Based Flood Early Warning System (CBFEWS)
- 5) Information, Education and Communication (IEC)
- 6) Land Use Regulation for Flood Plain

Based on the current situation on the budget, human resources, etc., three (3) phases of implementation plan for the Cagayan de Oro River Basin were formulated for the flood management plan as non-structural measures: namely, urgent plan for the period from 2013 to 2014, short-mid term plan for the next 5 years from 2015 to 2019, and long term plan for the period from 2020 to 2035.

(2) Watershed Management

Based on the reviews of the watershed management activities and natural conditions inside the Cagayan de Oro River Basin, the current status and constraints, necessary measures and present implementation status, the implementation plan of the Watershed Management for the Cagayan de Oro River Basin was organized as shown below:

Table 4.4 Watershed Management for the Cagayan de Oro River

No. and Location	Activity	Urgent Plan	Short-Mid Term Plan	Long Term Plan	Remarks
		2013-2014	2015-2019	2020-2035	
A. Mid and Upper Watershed					
A-1. Forestland in Mid and Upper Watershed					
1.1 Forests					
1.1.1	Reforestation by Indigenous Tree Species	✓	✓	✓	Assumed to be done by DENR, ADB and LGU, and AfD future Project
1.1.2	Implementation of Assisted Natural Reforestation (ANR)	✓	✓	✓	Assumed to be done by DENR, ADB and LGU, and AfD future Project
1.1.3	Adequate Utilization of the Non-Timber Forest Products (NTFP)	✓	✓	✓	Assumed to be done by DENR, ADB and LGU, and AfD future Project

No. and Location	Activity	Urgent Plan	Short-Mid Term Plan	Long Term Plan	Remarks
		2013-2014	2015-2019	2020-2035	
1.2 Agricultural Lands					
1.2.1	Introduction of Agro-Forestry		✓	✓	Assumed to be done by ADB and AfD future Project
1.3 Slope Agricultural Land					
1.3.1	Introduction of Slope Agricultural Methods		✓	✓	Assumed to be done by AfD future Project
1.4 Riparian Areas					
1.4.1	Enforcement of Riparian Forests by Indigenous tree Species	✓	✓	✓	Being implemented and planned to be done by DENR, MENRO and BENRO
A-2 A&D Land in the Mid and Upper Watershed					
2.1 Riparian Areas					
2.1.1	Establishment of Riparian Forests to Mitigate Soil Flow and Sedimentation	✓	✓	✓	Being implemented by MENRO, BENRO, DENR and private sectors, but only in small scale
2.2 Agricultural Areas					
2.2.1	Establishment of Riparian Forests along the Waterways and Irrigation to mitigate Soil Flow and Sedimentation	✓	✓	✓	Assumed to be done by AfD future Project
2.3 Slope Agricultural Areas					
2.3.1	Introduction of Slope Agricultural Methods		✓	✓	Assumed to be done by AfD future Project
A-3 Overall for the Mid and Upper Watershed					
3.1 Overall					
3.1.1	Formulation of CDO River Watershed Management Plan	✓			Being implemented by DENR
3.1.2	Formulation of Watershed Management Plans for Tributaries of CDO River	✓	✓		Planned to be partially implemented by DENR
3.1.3	Formulation of the Watershed Management Plans for each Municipality in Bukidnon Province	✓	✓		Partially implemented by ADB
3.1.4	Formulation of the Watershed Management Plans of each Barangays in Bukidnon Province	✓	✓		Planned to be implemented by BENRO and MENRO
B. Lower Watershed					
B-1 Riparian Areas of CDO River in the Lower Watershed					
1.1 Riparian Areas					
1.1.1	Distribution of Seedlings to each Barangay for Establishment of Riparian Forest and Tree Park	✓	✓	✓	Being implemented by CLENRO
B-2 Overall for the Lower Watershed					
2.1 Overall					
2.1.1	Formulation of the Watershed Management Plan for CDO City		✓		Not planned yet by CLENRO
2.1.2	Formulation of the Forest Management Plan for CDO City		✓		Not planned yet by CLENRO

No. and Location	Activity	Urgent Plan	Short-Mid Term Plan	Long Term Plan	Remarks
		2013-2014	2015-2019	2020-2035	
C. River Mouth and Coastal Areas					
C-1 River Mouth and Coastal Areas					
1.1 River Mouth and Coastal Areas					
1.1.1	Reforestation and Rehabilitation of Mangrove Forests	✓	✓	✓	Being implemented by APO and DENR, but in small scale
C-2 Overall in the River Mouth and Coastal Areas					
2.1 Overall					
2.1.1	Formulation of the Coastal Resource Management Plans	✓			Being implemented by APO, in coordination with DENR and MBDA

Note: BENRO : Bukidnon Environment and Natural Resource Office, MENRO: Municipal Environment and Natural Resource Office, MAO: Municipal Agricultural Office, CLENRO: City Local Environmental and Natural Resource Office, APO/CAO: Agriculture Productivity Office / City Agriculture Office

Source: JICA Survey Team

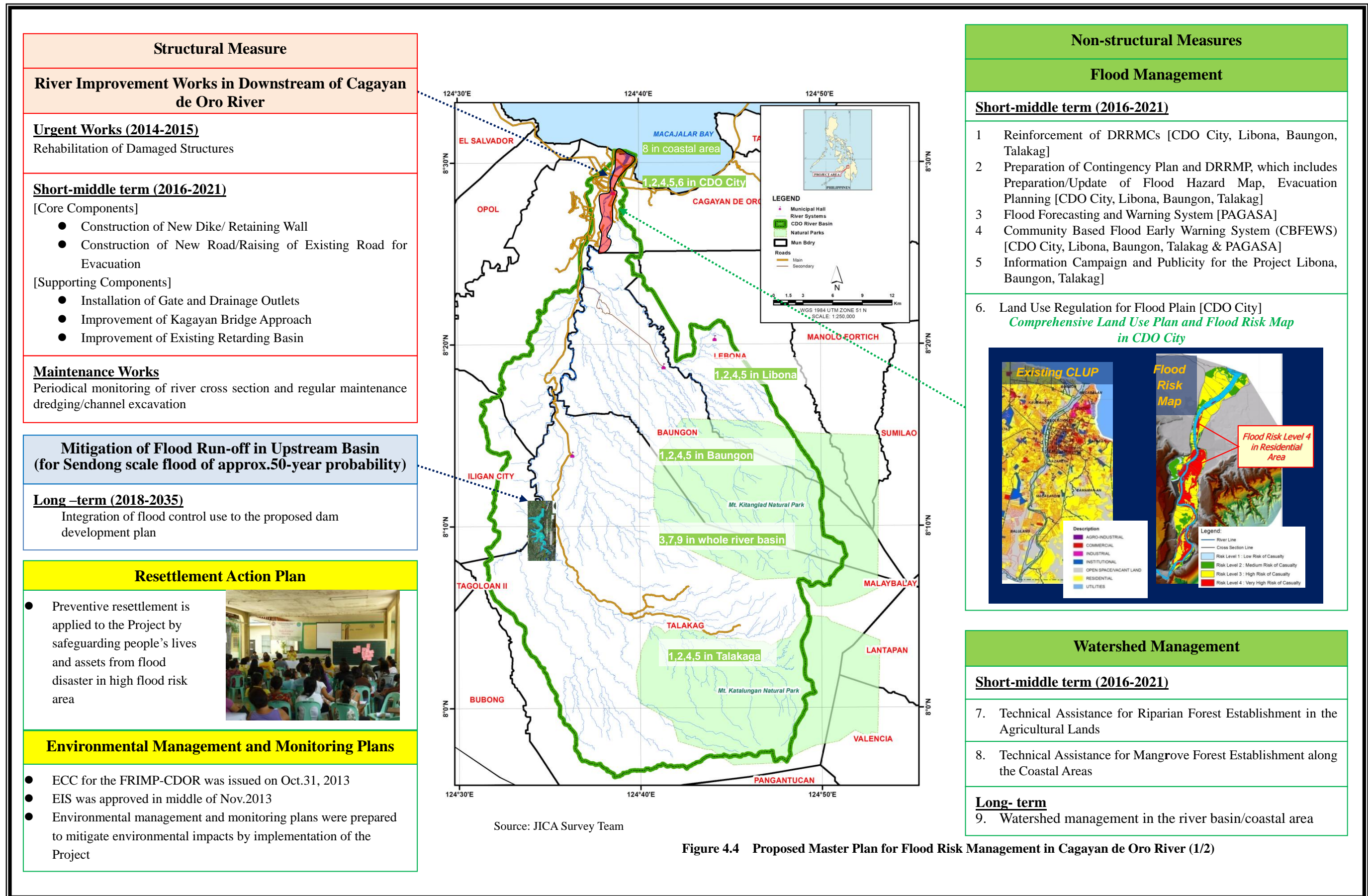
4.8 Proposed Master Plan

The Master Plan for flood risk management in the whole basin of the Cagayan de Oro River was formulated as summarized in Table 4.5. The general map of proposed measures of the Master Plan is presented in Figure 4.4.

Table 4.5 Master Plan for Flood Risk Management in Cagayan de Oro River

Structural measures	Urgent Work	(1) Rehabilitation of Damaged Structures
	Short-Mid Term (Core Components)	<u>River improvement in downstream (for floods of 25- year probability)</u> (1) Construction of New Dike/ Retaining Wall (2) Construction of New Road/Raising of Existing Road for Evacuation (3) Installation of Gate and Drainage Outlets (4) Improvement of Kagayan Bridge (5) Improvement of Existing Retarding Basin
	(Supporting Components)	(3) Installation of Gate and Drainage Outlets (4) Improvement of Kagayan Bridge (5) Improvement of Existing Retarding Basin
	Long Term	<u>Mitigation of flood run-off in upstream (for Sendong scale floods of approx 50- year probability)</u> (1) Integration of Flood Control Use to the Proposed Dam development Plan
	Maintenance Works	(1) Periodical Monitoring of River Cross Section and Regular Maintenance Dredging/Channel Excavation
Non-structural measures	Short-Mid Term	(1) Preparation/Update of Flood Hazard Map, Evacuation Planning (2) Technical Assistance for FFWS (Initial Stage for Full Spec) (3) Community Based Flood Early Warning System (CBFEWS) (4) Information Campaign and Publicity for the Project (Structural Measures) (5) Technical Assistance for Land Use Regulation for Habitual Inundation Area (6) Technical Assistance for Riparian Forest Establishment in the Agricultural Lands (7) Technical Assistance for Mangrove Forest Establishment along the Coastal Areas
	Long Term	(8) Watershed Management

Source: JICA Survey Team



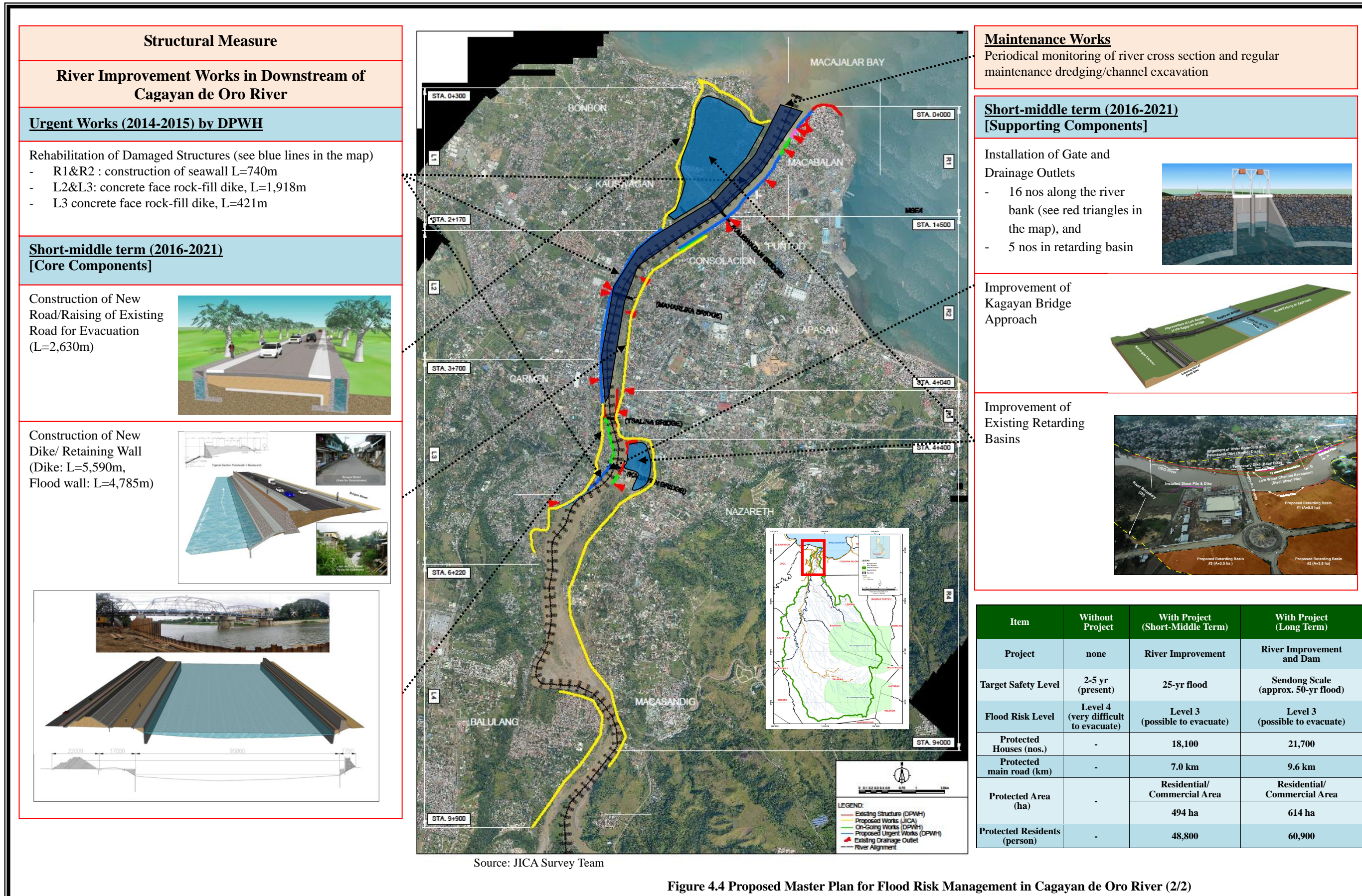


Figure 4.4 Proposed Master Plan for Flood Risk Management in Cagayan de Oro River (2/2)

4.9 Cost Estimation for Master Plan

(1) Conditions and Assumptions for Cost Estimate

Costs for construction works were essentially estimated on a unit price basis. The main items of the project cost are Direct Construction cost, Land Acquisition cost, Government Administration cost, Engineering Services cost, Physical Contingency, Price Contingency, and Taxes (VAT).

The cost estimate was at the price level as of 1st of June, 2013. Exchange rates applied that 1 Philippine Peso = 2.274 Japanese Yen; 1 United States Dollar = 97.43 Japanese Yen, hence, 1 United States Dollar = 42.85 Philippine Pesos.

(2) Cost Estimation for River Improvement Works

Total Project cost was estimated at XXX Philippine Pesos composing of XXX Philippine Pesos in the local currency portion and XXX Philippine Pesos in the foreign currency portion.

Total construction cost of the civil works was estimated for the river improvement works at XXX Philippine Pesos composing of XXX Philippine Pesos in the local currency portion and XXX Philippine Pesos in the foreign currency portion.

(3) Cost Estimation for Flood Control Dam

In the Master Plan, it is proposed that the existing dam plan for hydropower generation (Batang-Bulanog Dam Plan) will be integrated as multipurpose use with flood regulation to mitigate flood risk in the Cagayan de Oro River Basin.

The dam operation is assumed to be commenced from 2031 based on the implementation schedule. Annual cost of XXX Philippine Pesos from 2031 to 2080 can be converted as Net Present Value (NPV) at 2013 level of XXX Philippine Pesos with discount rate of 15%. This NPV is considered as investment cost to secure flood control space.

(4) Operation and Maintenance Cost

The annual operation and maintenance cost for structures was estimated at zero point five percent (0.5%) of the construction cost referring to the other JICA funded projects in the Philippines. The annual operation and maintenance cost for the dam was estimated at one percent (1.0%) of the construction cost referring to the other similar projects.

4.10 Economic Evaluation on the Master Plan

(1) Basic Conditions for Economic Evaluation

Variables and assumptive parameters applied to the analysis are shown in Table 8.2, while referring to the latest data of the Bank of Japan and the IMF as well as the recent JICA study reports, and others of relevance.

(2) Economic Cost

The financial and economic cost required for accomplishment of the Master Plan was estimated at XXX Philippine Pesos and XXX Philippine Pesos, of which breakdown is shown in Table 8.3.

(3) Economic Benefit

The economic benefit to be obtained by implementing the Project was defined as the reduction of flood damage cost. The probable damage under “without the Project” condition was estimated by utilizing the result of flood inundation simulation. The

damage expected to occur under “with the Project” condition was assumed to be zero under the design flood of 50-year return period or less. The flood damages are composed of (1) Damage in fixed assets, (2) other direct damage and (3) indirect damage as shown in Table 4.6.

Table 4.6 Expected Deduction of Annual Flood Damage Cost

Unit: Million PhP

Type	Category	Return Period(Yr.)				
		2	5	10	25	50
(1) Direct Damage Cost	Buildings	750.1	1,306.9	1,855.5	3,496.9	6,143.2
	Other Assets	1,443.9	2,429.9	3,485.7	6,402.9	10,364.7
	Total	2,194.0	3,736.8	2,262.5	9,899.8	16,507.9
(2) Other Direct cost and (3) Indirect Cost		22.0	37.4	53.5	99.1	165.3
Total Damage Cost		2,216.0	3,783.6	5,408.8	10,005.7	16,673.2

Source: JICA Survey Team

Table 4.7 Benefit Estimation

Unit: Million PhP

Return Period	Pro-bability	Damage without Project	Indirect Damage without Project	Damage with Project	Reduction of Damage Cost	Aver. Damage Cost	Expected Annual Ave Damage Cost	Economic Benefit with Project
2-yr	0.50	2,194.0	21.1	0.0	2,216.0	0	0	0
5-yr	0.20	3,736.8	36.7	0.0	3,774.2	2,995.1	898.5	898.5
10-yr	0.10	5,341.2	52.5	0.0	5,394.7	4,584.4	458.4	1,357.0
25-yr	0.04	9,899.8	98.2	0.0	9,998.9	7,696.8	461.8	1,818.8
50-yr	0.02	16,508.0	165.3	0.0	16,673.3	13,336.1	266.7	2,085.5

Source: JICA Survey Team

The annual benefits due to the Master Plan were worked out as (i) 1,819 million Philippine Pesos for flood control to cope with a probable 25-year flood as the Short-middle Term Plan, (ii) 2,086 million Philippine Pesos for flood control to cope with 50-year probable flood.

(4) Result of Economic Analysis

The economic internal rate of return (EIRR) of the project is presented below which shows the project is judged economically feasible.

- EIRR : XXX %
- NPV : XXX Philippine Pesos
- BC Ratio : XXX

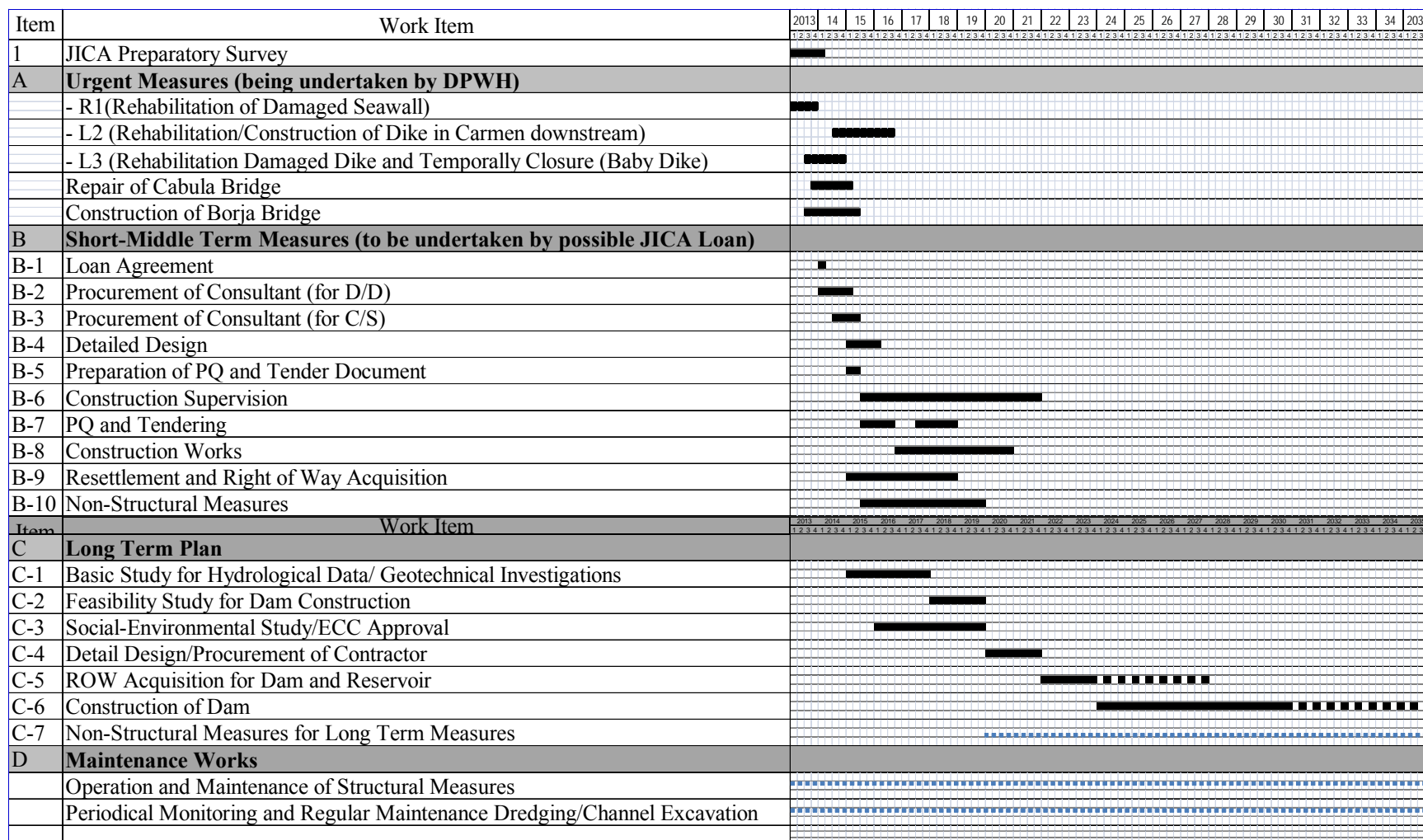
4.11 Implementation Schedule of Master Plan

The implementation schedule of the proposed Master Plan is presented in Figure 4.5.

The urgent measures being undertaken by DPWH will be completed until third quarter of 2016. While implementing the urgent measures, the short-middle term measures composed of structural and non-structural measures shall be started in 2014. The target completion year of the short-middle term measures is the end of 2021.

The proposed dam construction in the long-term plan will need basic study, social and environmental study and ROW acquisition prior to start construction works. The schedule of the long term plan is proposed from 2015 to 2035.

As well as the said structural and non-structural measures, the operation and maintenance works of the proposed structural measures and periodical monitoring and regular maintenance dredging should be implemented continuously to sustain the function of the Project.



Source: JICA Survey Team

Figure 4.5 Implementation Schedule of Master Plan

4.12 Priority Project

Among the components of the proposed Master Plan, the urgent and short-middle term measures should be implemented as priority projects for the Flood Risk Management Project for the Cagayan de Oro River.

(1) Mitigation of Flood Disaster Risk (Improvement of social vulnerability)

The design flood discharge for the Priority Project is probable 25-year flood. The inundation area due to a flood of 25-year return period is estimated at 790 ha (500 ha excluding for the area within river boundary) according to the inundation simulation analysis. Hence, such inundation damages would not be encountered upon completion of the Project.

Such benefit of flood damage reduction are brought not only by the structural measures but also by establishment of the river boundary which is the worthy results of the project as well as the establishment of river area to be legalized.

The technical assistance to be conducted as a part of the consulting services in the Priority Project as the non-structural measure would contribute flood damage reduction.

(2) Flood Disaster Risk Management (Improvement of disaster prevention power in local area)

Total cost of the Priority Project was estimated at about XXX Philippine Pesos including the direct cost for the structural measures of XXX Philippine Pesos (equivalent to XXX Japanese Yen), the consulting services cost of about XXX Philippine Pesos (equivalent to XXX Japanese Yen), land acquisition and compensation cost of XXX Philippine Pesos, indirect cost and contingencies.

Cost for the non-structural measures in the Project was estimated as the cost for the consulting service cost only.

(3) Adaptation of Climate Change (Easiness for climate change adaptation)

One of the basic principles of formulation of the Master Plan is “Consideration for CCA in Planning and Design for Flood Mitigation Structures” taking into account the strategy in the Philippine Development Plan (2011-2016). The one of major impacts of climate change is increase of occurrence of extra-ordinary flood. In this Project, the following approaches were applied in planning and design to cope with occurrence of the extra-ordinary flood.

- i) The target safety level of the Master Plan is set so as to cope with the largest recorded flood in Northern Mindanao Region, which is TS Sendong flood equivalent to approximately 50-year probable flood.
- ii) To attain the target safety level, the objective area of the Master Plan is the whole river basin where the watershed management and integration of flood control use to the proposed dam development plan are proposed.
- iii) Basic concepts of the established river boundary in the Master Plan are a) to lower flood water level as much as possible and b) to protect from living and construction of structures in the area where evacuation would be very difficult in case of the extra-ordinary flood.

- iv) In the said concepts, non-structural measures such as evacuation road, disaster preparedness, flood forecasting and early warning systems will have an important role to protect human lives and mitigate flood damage in case the extra ordinary flood.
- (4) Integrated Water Resources Management
- i) It would cause a risk of high water level in the river channel by constructing tall dike to protect from extra-ordinary flood. Effect of a retarding basin was incorporated to reduce flood water level and dike height although suitable area for the retarding basin is limited.
 - ii) Construction and installation of drainage sluice gate and/or sluice were included in the Priority Project to be constructed in parallel so that river improvement works by construction of dike system will not prevent drainage of water behind dike.
 - iii) As one of the non-structural measures to be conducted through consulting services, the technical assistance for Riparian Forest Establishment in the agricultural land will encourage mitigation of fine sand discharge to river so as to control sedimentation in the river course and river mouth area to maintain river flow capacity.
- (5) Natural and Social Environmental Impact
- i) The Priority Project is based on that present aquatic environment shall be basically sustained without particular change of the present river width or moving river course.
 - ii) Mangrove forest along the coastal area at left bank of the river will be sustained as the Natural Preservation Area and also to be used as retarding basin. Area in upstream river bank of the Cathedral will be functioned as a retarding basin as well including encouragement of drainage of inland rain water without changing the present condition much.
 - iii) Environmental impact due to implementation of the project including construction works was assessed and mitigation measure as well as monitoring program are recommended through EIA study in accordance with the JICA Guideline. The said monitoring will be conducted as a part of the consulting services during construction supervision stage.
 - iv) The scope of works of the Priority Project still requires a certain scale of resettlement, which was assessed among the alternatives including that with much more resettlement. The assessment was made incorporating mitigation effect of flood high risk by resettlement from the high risk area.
 - v) Technical assistance for Mangrove Forest Establishment along the coastal areas aims to support people living therein to secure their livelihood as well as to plan quality improvement of ecosystem in the coastal area.
- (6) Possibility of Implementation from the Technical Point of View
- Particular consideration shall be paid to the following structures in the Priority Project in the aspects of design and construction planning:
- i) Weak foundation was found in the Isla de Oro section where flood wall and a boulevard is planned to be constructed. The countermeasure method of construction need to be further studied taking account of technical soundness and viability, economic aspect and environmental impacts conceivable during construction.
 - ii) As one of the components of the Priority Project is improvement of the Kagay-an Bridge including abutment at left bank and approach road at right bank, extensive design and construction plan are quite necessary not only in structural views but also taking into consideration a countermeasure of creating traffic obstruction.

(7) Organization and System

The Priority Project will be implemented by the Unified Project Management Office for Flood Control (UPMO-FC) as the project implementing office under DPWH as the Implementing Agency. Upon completion of project turn-over, DPWH Region X Office would be the one to be fully responsible for the operation and maintenance works. However, indirect and/or direct supportive activities by LGU shall be executed through an agreement (such as MOU) with DPWH concerning work demarcation and so forth of the O&M services. It is probable that related structures in the project to drain of land side water will be managed by LGU of operation and maintenance works.

The policy of the river boundary is closely related to the No Built Zone to be legalized to put it in practice by the Cagayan de Oro City, so that early enactment of the Comprehensive Land Use Plan of the Cagayan de Oro City is indispensable.

Furthermore, it is important to establish the River Area legally by DENR so that flood damage mitigation would be also achieved through land use control.

4.13 Conclusion and Recommendation of Master Plan

(1) Conclusion of Master Plan

The Master Plan aiming at flood risk management in the whole basin of the Cagayan de Oro River was formulated in this Survey. The Master Plan is composed of both structural measures and non-structural measures. The proposed Master Plan was evaluated technical point of view and assessed as economically viable. Social environmental issues were also assessed in initial stage of IEE/EIA study and Resettlement Action Plan mentioned in Chapter 9 of Main Report.

- A. Structural Measures :
 - i) Urgent Works
 - ii) Short-Mid Term Works (Priority Project)
 - iii) Long Term Works
 - iv) Maintenance Works
- B. Non-structural Works :
 - i) Short-Mid Term Works (Priority Project)
 - ii) Long Term Works

(2) Recommendation of Master Plan

- 1) Early Implementation of the Priority Project
- 2) Study and Planning on Introduction of Flood Control Function to the Proposed Dam Development Plan

It is required in the upstream reaches to regulate a flood peak discharge of TS. Sendong scale flood to the peak discharge of 25 year probability or less in the downstream reach so as not to cause flooding damages therein. Conceivable measure to meet such flood peak mitigation is to secure regulation effect by dam reservoir in the upstream of the Cagayan de Oro River basin.

It is recommended to encourage the implementation of the dam development including flood control component and to carry out necessary study and investigation to proceed to the next stage.

- 3) Improvement and Enhancement of Hydrological Observation System

Improvement and enhancement of the hydrological observation system in the basin is recommended for the survey and investigation in the next stage, such as feasibility study and detailed design for the development of the dam, to implement

flood forecasting and warning in the basin and to accumulate the observation records.

4) Improvement of Local Drainage and Sewerage System

The study on improvement project of drainage of landside water and sewerage system in the downstream area are required for the further flood risk mitigation measures as well as comprehensive plan formulation and feasibility studies.

5) Incorporation of Policies on River Boundary and River Area in the Comprehensive Land Use Plan:

- As one of the main measures employed in the FRIMP-CDOR Project, DPWH has established the River Boundary along the river stretch in downstream reaches. The River Area inside the River Boundary shall be controlled of its land use.
- It is necessary through discussion and exchange of opinions among stakeholders including the concerned agencies, the local government and the local residents that building and living are restricted in the river area as well as land use control and effective use of unused land.
- Definitive area and policies on the River Boundary should be incorporated and stipulated in the Comprehensive Land Use Plan of the Cagayan de Oro City which has being under updating.

6) Recommendations on the Non-structural Measure of Long-term Activities

- i) Coordination and Monitoring on Implementation of Non-structural Measures
- ii) Watershed Management

Aside from the proposed activities for the Priority Project, the following issues are recommended on the watershed management to DPWH, DENR and LGUs which have responsibilities to conserve and manage the natural environment.

- a) Mitigation of fine sand sedimentation, recovery of forest area through compliance with the CLUP,
- b) Confirmation of the sources of fine sands and monitoring,
- c) Promotion of planting indigenous tree species along the riparian areas by replacing from the bamboos,
- d) Formulation of the watershed management plan and forest management plan for Cagayan de Oro City, and
- e) Early realization of the Coastal Resource Management Plan.

5 PRIORITY PROJECT AND PRELIMINARY DESIGN OF STRUCTURAL MEASURES

5.1 Priority Project

(1) Outline of the Priority Project

Among the proposed measures in the Master Plan, the following measures were assessed and recommended as the short-mid term project to effectively mitigate the flood risks in the Cagayan de Oro River Basin:

Table 5.1 Outline of the Proposed Project

Structural Measures	Short-Mid Term	River improvement works in downstream reach (for probable 25- year flood) (1) Construction of New Dike/ Retaining Wall (2) Installation of Gate and Drainage Outlets (3) Construction of New Road/Raising of Existing Road for Evacuation (4) Improvement of Kagayan Bridge (5) Improvement of Existing Retarding Basin
	Maintenance Work	(6) Removal of Sedimentation and Sandbar
Non-structural Measures	Short-Mid Term	(1) Preparation/Update of Flood Hazard Map and Evacuation Planning (2) FFWS (Initial Stage for Full Spec) (3) Community Based Flood Early Warning System (CBFEWS) (4) Information Campaign and Publicity for the Project (Structural Measures) (5) Technical Assistance for Land Use Regulation for Habitual Inundation Area (6) Technical Assistance for Riparian Forest Establishment in the Agricultural Lands (7) Technical Assistance for Mangrove Forest Establishment along the Coastal Areas

Source: JICA Survey Team

(2) Objective Area of the Priority Project

The objective area of the flood risk management works is about 12.0 km long stretching from the river mouth to the Pelaez Bridge considering the topographic, social and development conditions in the area as well as the flood damage in Tropical Storm (TS) Sendong.

The Cagayan de Oro City is the capital and leading central city of the Northern Mindanao Region (Region X) and has been recognized as “Highly Urbanized City”.

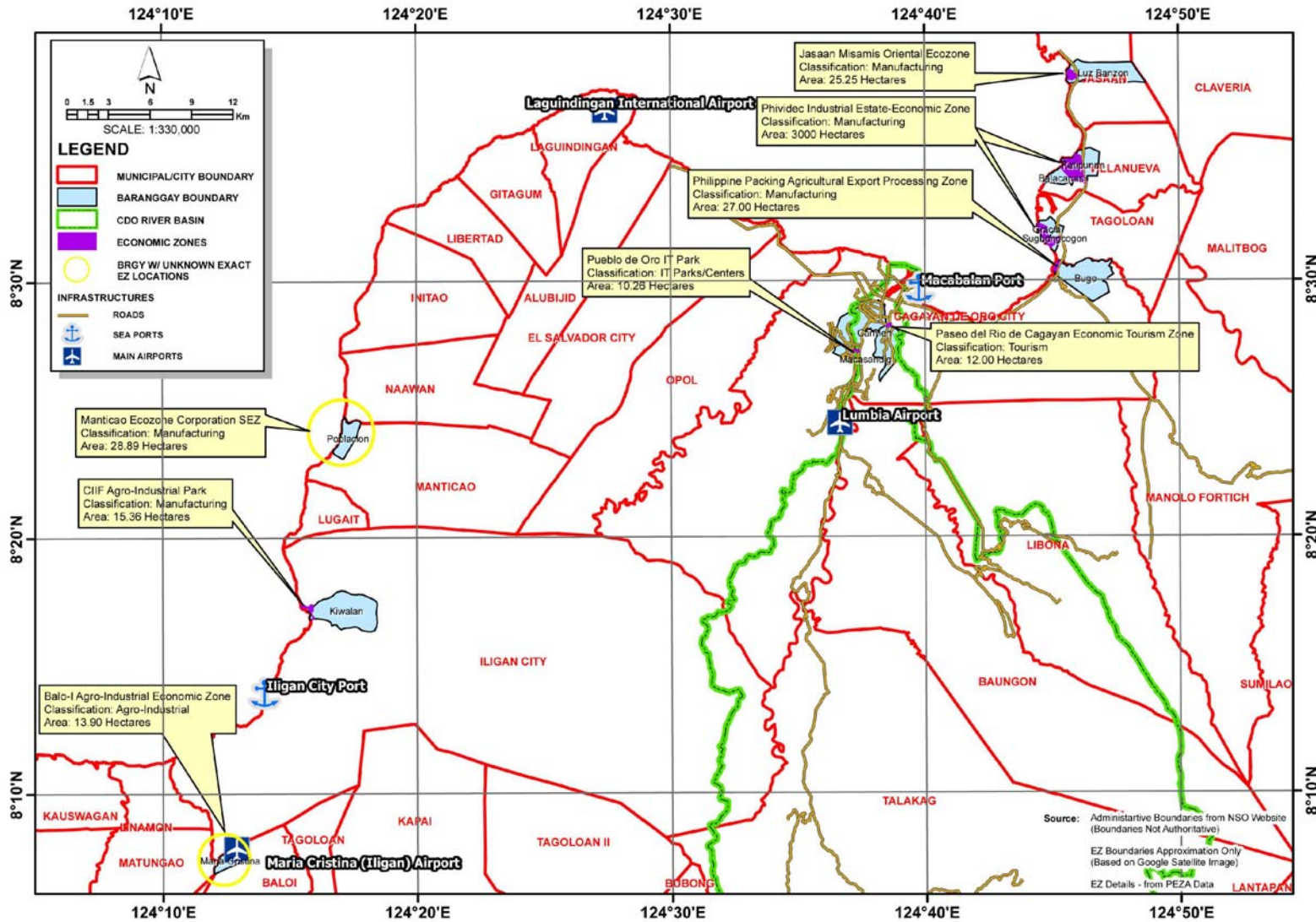
“Highly Urbanized City” is defined in the Local Government Code of 1991 (RA-7160) , Book III-Local Government Units, Section452, as Cities with a minimum population of two hundred thousand inhabitants, as certified by the National Statistics Office, and with the latest annual income of at least Fifty Million Pesos based on 1991 constant prices, as certified by the city treasurer.

The Cagayan de Oro City is located geographically at the center of the Region X where the seaport with container terminal exists for importing and exporting materials and products to National Capital Region as well as Cebu. All land transportation routes of the materials and supplies as well as products intersects each other in the city which is connecting the economic zones in the Region.

As for economic growth rate in the Northern Mindanao Region, it showed at about 5.5% in annual average during 2004 to 2009 which was well above the rate of the whole Philippines at 4.45 %. The GRDP of the Region X by sector is 38.0% for the service sector, 30.4 % for the industrial sector and 31.6% for agriculture, fishery and forestry (AFF) sector, which shows the main industries in the Region are commerce and industry. It is practically assumed that Cagayan de Oro City is evidently play a central role in the Region X of the economic activities. Furthermore, development of the Misamis Oriental Economic Zones including eight (8) economic zones have been progressed recently where four (4) Japanese companies are operating. The said economic zones in Region X and major transportation infrastructures are shown in Figure 5.1, which shows that Cagayan de Oro City locates at the center of economic zone and connecting transportation routes.

Meanwhile, the Cagayan de Oro River basin is situated in the climate zone where rainy and dry seasons have no clear distinction and number of typhoons or tropical cyclone hitting this area is not so many as comparing to the other regions in the Philippines. No particular countermeasures for flood disasters had been taken in the Cagayan de Oro River basin recently although severe flood damages had been caused in the past including disasters due to the tropical cyclone in 1982. However, the tropical cyclone Urduja attacked the Cagayan de Oro River basin in November 2009 and caused severe flooding damages. To cope with such flood damages, a formulation of the master plan and the feasibility study were conducted in 2011 with a design scale of 25 year return period.

However, the TS Sendong attacked the Northern Mindanao Region in December 2011 and caused extreme severe damages. TS Sendong's flood occurrence probability is estimated to be over 50 years. The number of families suffered from the flood damages caused by the TS Sendong was over 60,000, which was equivalent to almost half of the population of the city.



Source: City Development and Planning Office

Figure 5.1 Location Map of Misamis Oriental Economic Zones

5.2 Structure Measures of the Priority Project

- (1) The structural measures evaluated as the Priority Project is the “Short-Medium Term” measures as presented in Table 5.1.

The following are structural measures selected in the project site along the Cagayan de Oro River. Earth Dike and Concrete Floodwall are major structures in the priority project for flood control / river improvement works.

- (a) Earth Dike and Concrete Floodwall
 - (a-1) Earth Dike,
 - (a-2) Concrete Floodwall,
- (b) Raising Road and Evacuation Road,
- (c) Improvement of the Kagay-an Bridge,
- (d) Drainage Outlet Facilities and Gates, and
- (e) Improvement of Existing Retarding Basin

Each design of the structures (a) to (e) was examined considering the site conditions at each work site, technical, economic and social/environmental view points.

- (2) Locations of Structural Measures

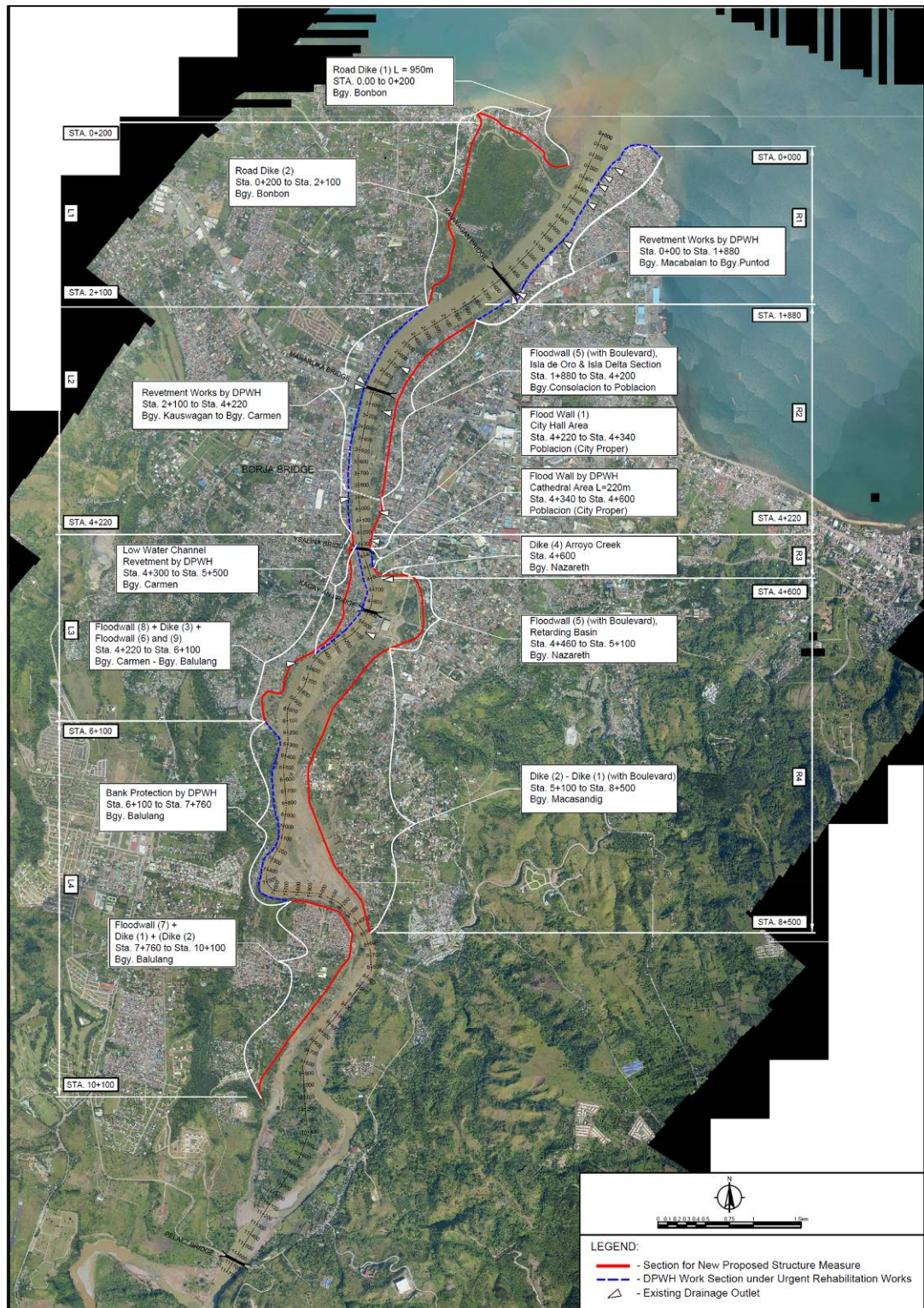
Structural measures of the priority project are proposed to be provided along the Cagayan de Oro River from river mouth to the Pelaez Bridge about 12 km upstream from the river mouth as shown in Figure 5.2..

Proposed structural measures at each section are summarized in Table 5.2 by work section; L1 to L4 on the left bank and R1 to R4 on the right bank.

Table 5.2 Structural Measures by Work Section

	Work Section	Priority Project		Works by DPWH	Remarks
		Dike/Floodwall	Other Structures		
Left Bank	L1	- Road Dike (Earth Dike) - Floodwall + Earth-fill	- Slide Gates - Drainage outlet	—	Road Dike (Earth Dike): - Raising Existing Road - Evacuation Road
	L2	—	—	Floodwall	DWPH’s Urgent Works
	L3	- Earth Dike, - Floodwall	- Asphalt road - Gate and Drainage outlet - Kagay-an Bridge Improvement	Sheet Pile revetment	Low water channel revetment works are provided by DPWH’s Urgent Works.
	L4	- Earth Dike, - Floodwall	- Asphalt road - Gates and Drainage outlet Works	—	
Right Bank	R1	—	—	Concrete Dike	DWPH’s Urgent Works
	R2	- Floodwall	- Asphalt road - Gates and Drainage outlet Works	Floodwall	
	R3	- Floodwall - Earth Dike	- Gates and Drainage outlet Works	Floodwall (partial)	DWPH’s Urgent Works will be made partially.
	R4	- Floodwall - Earth Dike	- Retarding Basin - Gates and Drainage outlet Works - Kagay-an Bridge Improvement	—	

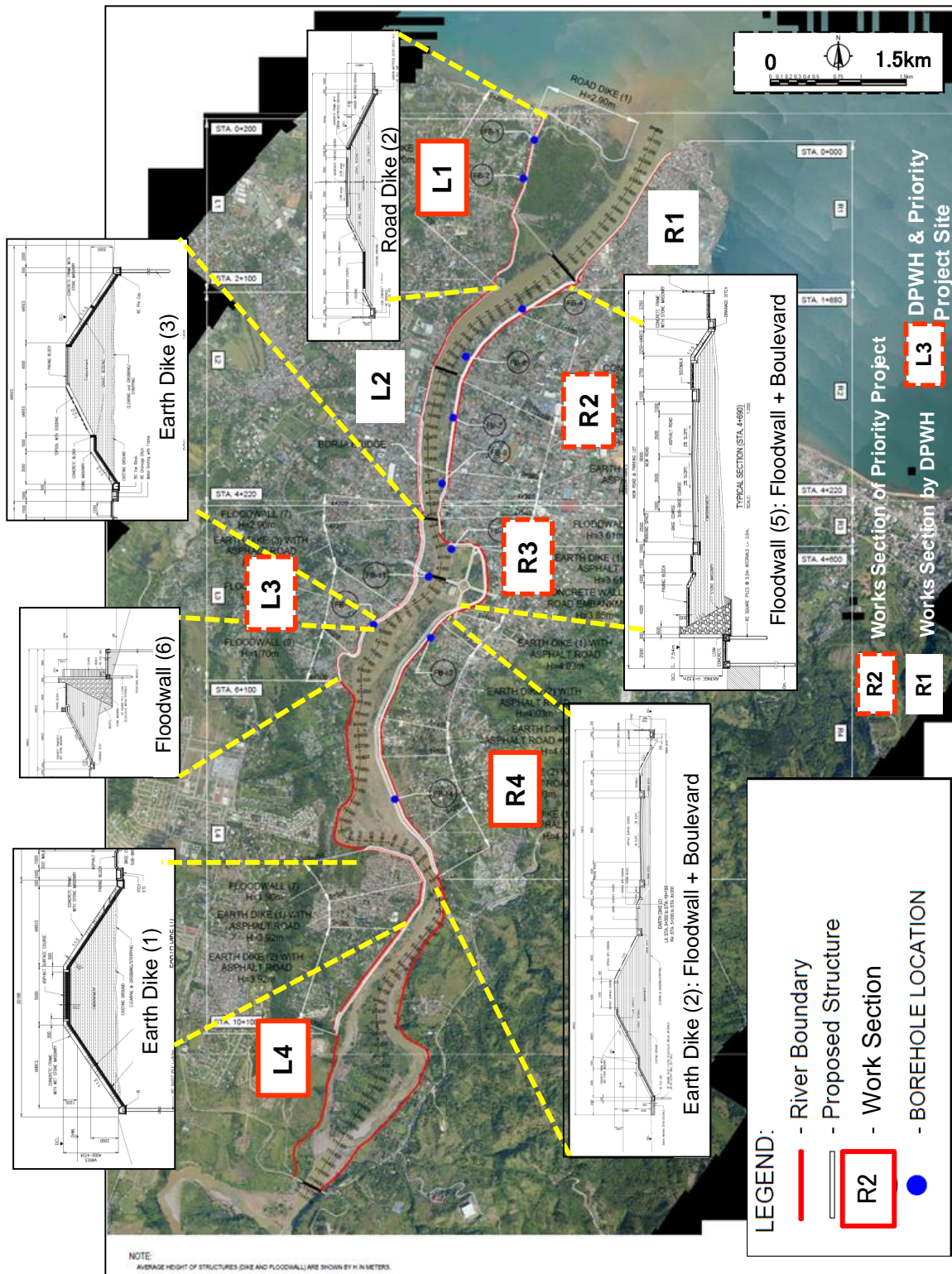
Source: JICA Survey Team



Source: JICA Survey Team

Figure 5.2 Location of Structural Measures

Location of major structures (earth dike and floodwall), typical section and work sections are shown in Figure 5.3.



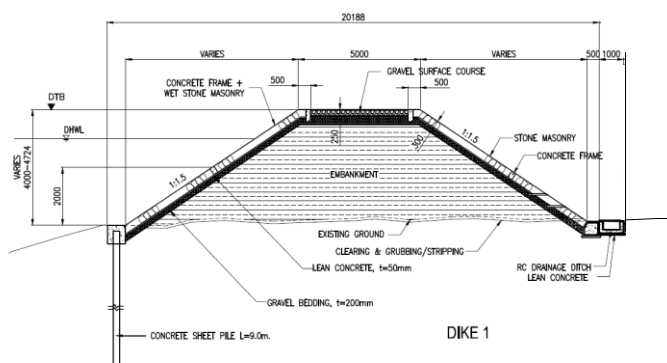
Source: JICA Survey Team

Figure 5.3 Location of Structures (Earth Dike and Floodwall) and Work Sections

(3) Basic Design of Earth Dike

Two types of earth dike designs were applied considering constriction of Right of Way Acquisition (ROWA) based on construction space of river structures, for which the designs of two type of earth dike are basically classified based on embankment slope as shown in Figures 5.4 and 5.5.

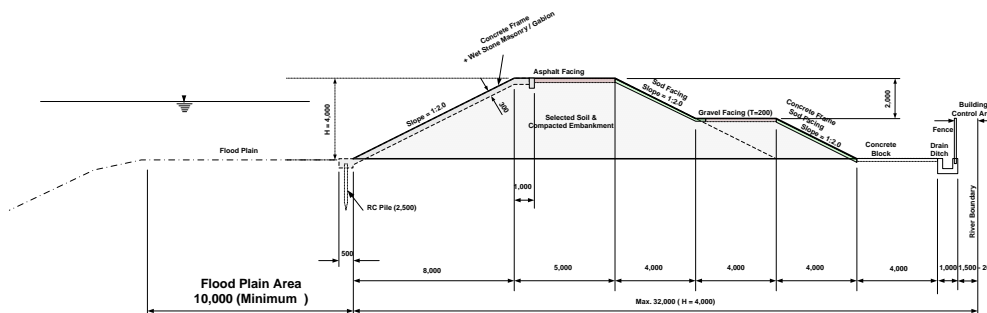
Earth Dike-Type 1: Designed slope of 1:1.5 covered with concrete slope protection and sheet pile foundation for the areas with limited land. Required length of sheet pile is applied to avoid seepage failure and lateral slide of soil.



Source: JICA Survey Team

Figure 5.4 Typical Section of Earth Dike Type 1 (Earth Dike (1) in Figure 5.3)

Earth Dike-Type2: Designed slope of 1:2.0 without sheet pile foundation for the areas with sufficient land space. Sufficient seepage length (width of dike) and sufficient width of flood plain are designed to avoid seepage failure and lateral slide of soil.



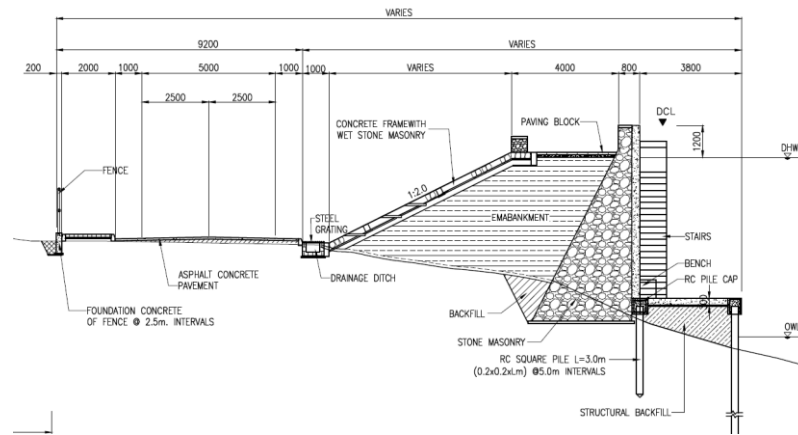
Source: JICA Survey Team

Figure 5.5 Typical Section of Earth Dike Type 2 (Earth Dike (2) in Figure 5.3)

(4) Basic Design of Concrete Floodwall

Concrete flood walls were designed for the area with very limited land space in order to minimize land acquisition and social impacts.

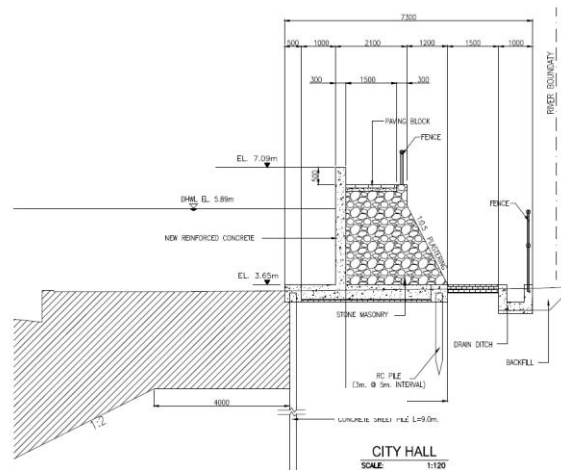
Floodwall- Type1: Retaining type of masonry wall and embanked river-sidewalk (width=4.0m) are constructed with reinforced concrete and sheet pile to stabilize and maintain seepage length of the wall. Asphalt road will be provided in just behind of the river-sidewall embankment for the purposes of inspection on river structures and public road use.



Source: JICA Survey Team

Figure 5.6 Typical Section of Concrete Floodwall Type 1 (Flood Wall (6) in Figure 5.3)

Floodwall- Type 2: This type of floodwall was designed for quite limited land space such as narrow river area (in front of City Hall) located along the upstream and downstream of the Ysalina Bridge, for which width of crest of the wall and inspection sidewalk are minimized.



Source: JICA Survey Team

Figure 5.7 Typical Section of Concrete Floodwall (Type 2)

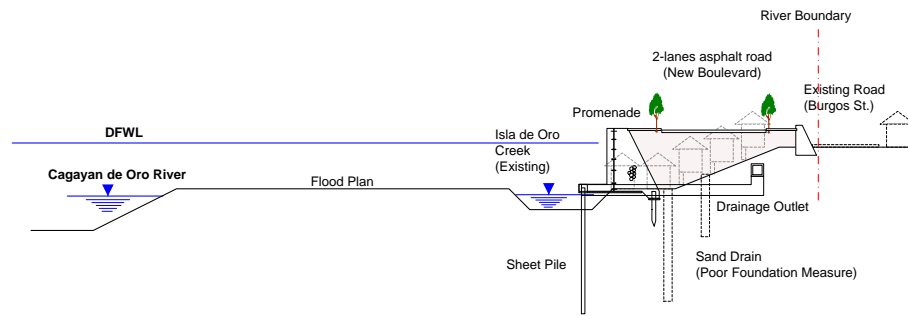
(5) Basic Design of Floodwall with Boulevard

Burgos Street

So as to design the floodwall in R2 section on the right bank along the Burgos Street, the following considerations were incorporated in the design of the floodwall in comply with the request of DPWH after setting of River Boundary at river bank along the Burgos Street:

- 1) To provide Boulevard (2-lanes asphalt road) with the floodwall / dike in urban development view point;
- 2) To maintain the existing drainage channel; and
- 3) To maintain the existing “Burgos Street”.

Floodwall was selected as structural measures in this section in a hydraulic view point, which were designed subject to provision of Boulevard (2-lanes asphalt road) as shown in Figure 5.8.

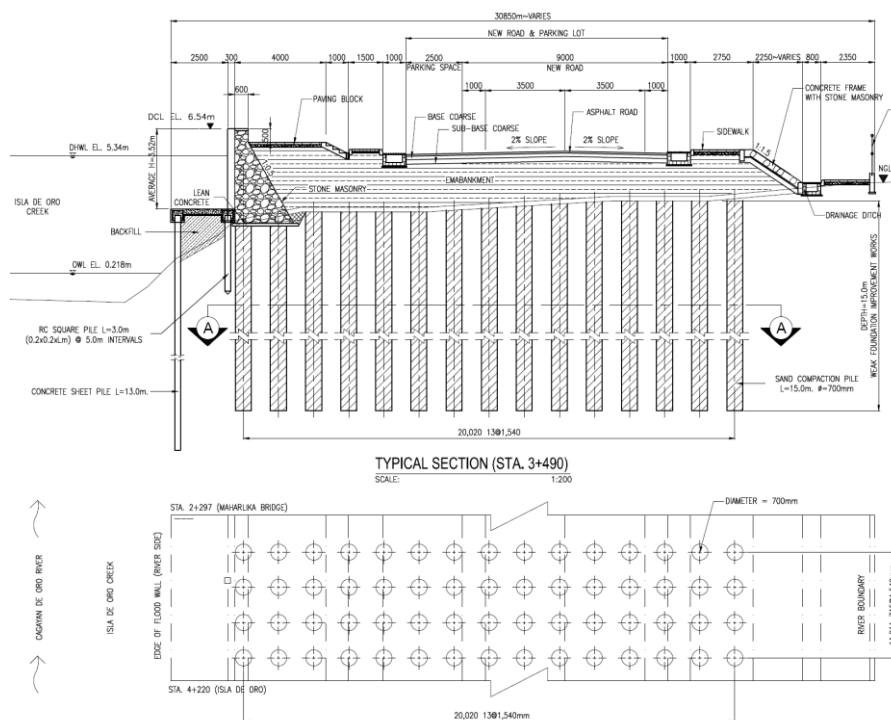


Source: JICA Survey Team

Figure 5.8 Selected Design of Floodwall with Boulevard in R2 Section

According to the geological investigation along the R2 section, the geological condition on foundation of this section is basically composed of sand / sandy soil layer with 30 m thickness. N-value of standard penetration test (SPT) on the sandy soil foundation of 0 to 20m layer was estimated to be N=0 to 10 – 15 which is categorized as weak foundation.

Weak foundation improvement works should be made in the section to prevent structural measures such as earth dike and floodwall from damages due to settlement and liquefaction of the foundation. Sand Compaction Piling (SCP) method is selected as proper weak foundation improvement works for sandy foundation of this section compared with Cement Deep Mixing (CDM) Method. Typical section and plan of structures, floodwall & boulevard and SCP method at R2 section is shown in Figure 5.9.

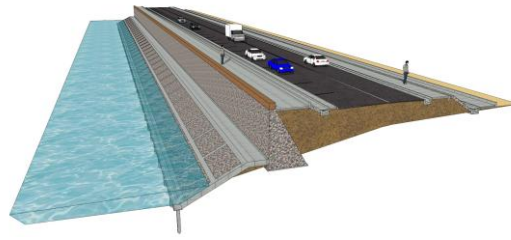


Source: JICA Survey Team

Figure 5.9 Typical Design of Floodwall with Boulevard and Sand Compaction Pile (SCP) in R2 Section

Perimeter section of the natural retarding basin

Floodwall with Boulevard (2-lanes road) structure at section R4 as same design as structure situated at section R2 will be provided without SCP method along the outer line of proposed retarding basin which is running along the River Boundary.



Source: JICA Survey Team

Figure 5.10 3D-Image of Floodwall with Boulevard

(6) Distance and Height of Dike System

Total length of dike and floodwall is summarized in the Table 5.3. Total length of the proposed dike system is 13,005 m.

Table 5.3 Total Length of Dike System (Earth Dike & Concrete Floodwall)

Total Length of Structure (Left & Right Bank)			
Dike & Floodwall			
Dike	L =		5,590 m
Floodwall	L =		3,845 m
Road Dike	L =		2,630 m
Floodwall (outer of Retarding Basin)	L =		940 m
Total (Left & Right)			L = 13,005 m

Source: JICA Survey Team

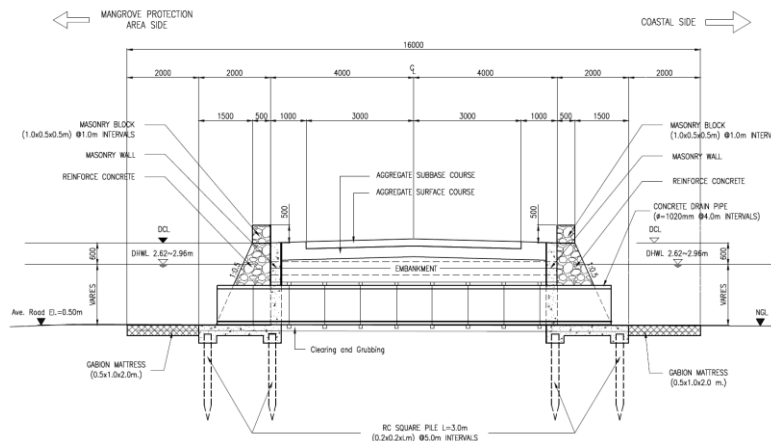
Weighted average height of the dike system (earth dike & concrete floodwall) is 3.5m in which the average height of left and right banks are 3.2m and 3.9m, respectively.

(7) Evacuation Roads and Raising of the Existing Road

The proposed structural measures along the left bank of the river mouth are road dike with the following functions, i.e. evacuation road from flood inundation or damages and protection of flood intrusion into the residential area or public spaces.

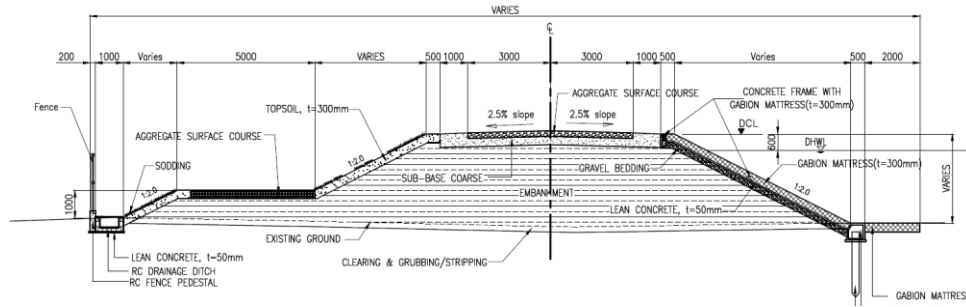
The road dike (evacuation road) will be provided on left bank of the river mouth area, low-laying area along the outer line of the Mangrove Protection Area (distance about 2.6 km) between Sta. 0+000 and Sta. 2+200:

- 1) Road Dike (1); Floodwall type, Coastal Line, Distance = 950m
- 2) Road Dike (2); Earth Dike type, Outer line of Mangrove Area, Distance = 1,680 m



Source: JICA Survey Team

Figure 5.11 Typical Section and Elevation of Road Dike (1)



Source: JICA Survey Team

Figure 5.12 Typical Section of Road Dike (2)



Source: JICA Survey Team

Figure 5.13 Location and Alignment of Road Dike at L1 Section

(8) Improvement of the Kagay-an Bridge and Raising Approach Road

The Kagay-an Bridge is located at the narrow river section (Sta. 4+000 to Sta.5+000). As shown in Figure 5.14, the approach road of the bridge on the left bank is made with embankment. This portion will work as if a spur dike blocks water flow downstream within the river area. On the other hand, the intersection located at the end of the approach road on the right bank was not passable during TS Sendong and TY Pablo due to inundation.

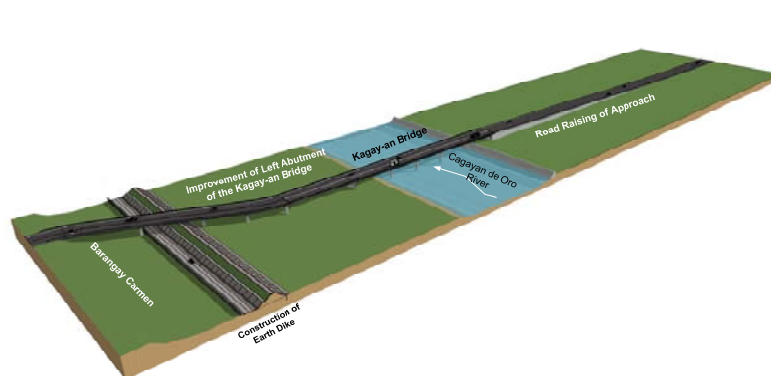
- a) Left Abutment and Approach : The existing abutment and approach road will be demolished and be replaced with new bridge structures such as piers to provide river flow area.
- b) Right Abutment and Approach : The approach road will be raised to the design bank crest level to maintain public transportation, access and evacuation during flood.

Designs of improvement works of the Kagay-an Bridge should be made with consideration of temporary detour to maintain traffic during construction time.



Source: JICA Survey Team

Figure 5.14 Plan of the Kagayan Bridge and Approach Roads



Source: JICA Survey Team

Figure 5.15 Typical Section of Improvement of the Kagayan Bridge

(9) Gates and Drainage Outlets

There are several local creeks and local drainages discharging to the river at present. In connection with the construction of dikes, installation and improvement of drainage outlets with gates are to be undertaken in parallel with construction of the dike systems. Installations of five (5) units of gates were proposed on the left bank and 17 gates on the right bank, respectively.

(10) Improvement of Existing Retarding Basin

Swamp low land area is located at just upstream of the St. Augustin Cathedral, where a tributary and local drainage channels (Arroyo Creek) enter into as shown in Figure 5.16. The swamp area can be considered as a small scale retarding basin or regulating pond for flood mitigation in the city area, which is proposed to be prohibited for land development and other land use based on the proposed river boundary.



Source: JICA Survey Team

Figure 5.16 Aerial Photo and Location Map of Retarding Basin

The following design concept i) was adopted in the preliminary design stage of the improvement of the natural retarding basin:

- i) Natural retarding basin (without spillway and deepening of retarding pond),
- ii) Structural retarding basin (with spillway, deepening of the pond and flap-gates).

(11) Work Quantity

Works quantities of each priority project are estimated as shown in Table 5.4 based on the feasibility designs.

Table 5.4 Work Quantities of Priority Project

No.	Major Works	Unit	River Structure	Retarding Basin	Kagay-an Bridge Improvement	Total
1	Excavation	m ³	37,964	255,451	36,170	329,586
2	Embankment	m ³	509,905	44,422	42,999	597,326
3	Concrete	m ³	33,336	12,143	12,257	57,736
4	Reinforcement Bar	ton	2,436	1,024	1,623	5,083
5	Concrete Sheet Pile	m	123,009	26,416	7,542	156,967
6	Concrete Square Pile	m	5,565	998	667	7,230
7	Bored Pile	m	0	-	1,312	1,312
8	Stone Masonry	m ³	60,044	18,043	18,775	96,862
9	Sodding	m ²	48,021	-	-	48,021
10	Pre-stressed Concrete Girder (L=35.0m)	nos	0	-	40	40
11	Asphalt Pavement	m ²	78,651	10,945	-	89,596
12	Gravel Pavement	m ²	10,708	-	27	10,735
13	PCC Pavement	m ²	0	-	1,080	1,080
14	Riprap	m ³	0	-	2,645	2,645
15	Sand Compaction Pile (Total Depth)	m	192,840	-	-	192,840
16	Flap Gate	nos	23 (21 sites)	-	-	23
17	Sluice Gate	nos	7 (4 sites)	-	-	7

Source: JICA Survey Team

6. NON-STRUCTURAL MEASURES

6.1 Priority Projects

Priority projects were selected based on the following criteria:

- 1) Projects expected to obtain big and effective impacts on flood mitigation
- 2) Projects economically feasible
- 3) Projects which can be implemented quickly without problems in view of natural environment, social environment and political problems, etc.

6.2 Scoping for the Project

The non-structural measures proposed for Japanese Yen Loan Project were set through the selection criteria as below:

Flood Management

- 1) Projects contribute to transfer of Japanese technology (Flood Hazard Mapping, etc.)
- 2) Projects reinforced and/or supplement to completed or on-going projects assisted by Japanese ODA (FFWS, etc.)
- 3) Projects supplement to the structural measures to be implemented by JICA Loan (CBFEWS, etc.)
- 4) Projects to understand importance of the structural and non-structural measures to be implemented by JICA Loan (Information Campaign and Publicity, etc.)

Watershed Management

- 1) Projects contribute to enhance the cooperation and relationship between the downstream and middle / upper stream areas (establishment of riparian forests along the rivers inside the A&D Lands on the middle and upper watershed)
- 2) Projects contribute to enhance the living environments for the residential areas and habitat environment for the aquatic biota along the coast or river mouth (mangrove plantation along the river mouth and coastal areas)

6.3 Non-structural Measures for Japanese Yen Loan Project

(1) Preparation/Update of Flood Hazard Map, Evacuation Planning

Following measures are to be conducted in a certain number of Barangays to be selected:

- Preparation/Update of Flood Hazard Map with more accurate elevation and big scale
- Evacuation Planning

(2) Flood Forecasting and Warning System (FFWS)

PAGASA is planning to introduce FFWS for the Cagayan de Oro River Basin with an open-ended type as an initial development stage with a limited number of monitoring stations (rain gauges and water level gauges), which is to be connected to "River Center" to be constructed in PAGASA compound in El Salvador, however, details of the type of the system are not known. Review of FFWS model

- Technical assistance for establishment of FFWS for the Cagayan de Oro River Basin with an open-ended type, which includes study on additional rainfall and water level stations and revision of model due to the addition
- Preliminary study on future System to be connected between PAGASA Central Office- Hydro Meteorological Division and PAGASA River Center in El Salvador

(3) Community Based Flood Early Warning System (CBFEWS)

It will aim at one of the non-structural measures for selected barangays in the Cagayan de Oro River Basin. Selection of Conventional Rainfall and River Water Level Stations

- Technical Assistance for Warning by Rainfall, River Water Level, etc.
- Capacity Development for LGUs

(4) Information Campaign and Publicity for the Project (Structural Measures)

- Information Campaign and Publicity for Proposed Structural Measures (by Web site, leaflet, etc.)
- Capacity Development by Seminar, Workshop, etc.
- Disaster Education w/ DepED/PAGASA, etc. (Understanding of Disaster, Evacuation, Illegal Disposal of Garbage to River, etc.)

(5) Technical Assistance for Land Use Regulation for Habitual Inundation Areas

It will aim to inform the areas are risky for floods to residents in the vicinity and to minimize flood damages.

- Database for Land Use Regulation of Habitual Inundation Areas
- Study on Land Use Regulation based on Flood Hazard Map

(6) Technical Assistance for Riparian Forest Establishment in the Agricultural Lands

To mitigate the fine sand flow into the rivers and creeks directly and indirectly from the forests and agricultural lands in the middle and upper watershed.

- Institutional arrangement and technical assistances on reinforcement in cooperation with LGUs both in the upper and lower watersheds and DPWH as the executing agency of the Project
- Technical advices on selection of the target rivers and creeks to establish the riparian forests
- Institutional arrangement and technical assistances on establishment and maintenances of the riparian forests in coordination with LGUs both in upper and lower watersheds and DPWH

Implementation organization: Consultant in cooperation with CLENRO/MENRO, DENR and DPWH

(Remarks: Actual cost for producing tree seedlings and planting will be borne by LGUs and private companies.)

(7) Technical Assistance for Mangrove Forest Establishment along the Coastal Areas

To improve living environments and to secure livelihood for the villagers through improving the biodiversity at the river mouth areas and coastal areas by establishing the mangrove forests.

- Technical advices on selection of the target areas to establish the mangrove forests
- Institutional arrangement and technical assistances on establishment and maintenances of the mangrove forests in coordination with barangays, LGUs, DENR and DPWH

Implementation organization: Consultant in cooperation with CLENRO, DENR and DPWH

(Remarks: Actual cost for producing propagules and planting will be borne by LGUs, private companies and NGOs.)

Target LGU organizations, such as DRRMCs, BENRO/CLENRO/MENRO, and related agencies / organizations for the above measures are shown in Tables 6.1 and 6.2, respectively.

Table 6.1 Non-Structural Measures proposed for JICA Loan on the Flood Management

No.	CDO City	Talakag	Baungon	Libona	PAGASA
(1) Technical Assistance for Flood Hazard Mapping and Evacuation Planning	✓	✓	✓	✓	
(2) Technical Assistance for FFWS					✓
(3) Technical Assistance for Community Based Flood Early Warning System (CBFEWS)	✓	✓	✓	✓	✓
(4) Technical Assistance for Information Campaign and Publicity for the Project (Structural Measures)	✓	✓	✓	✓	
(5) Technical Assistance for Land Use Regulation for Flood Plain	✓				

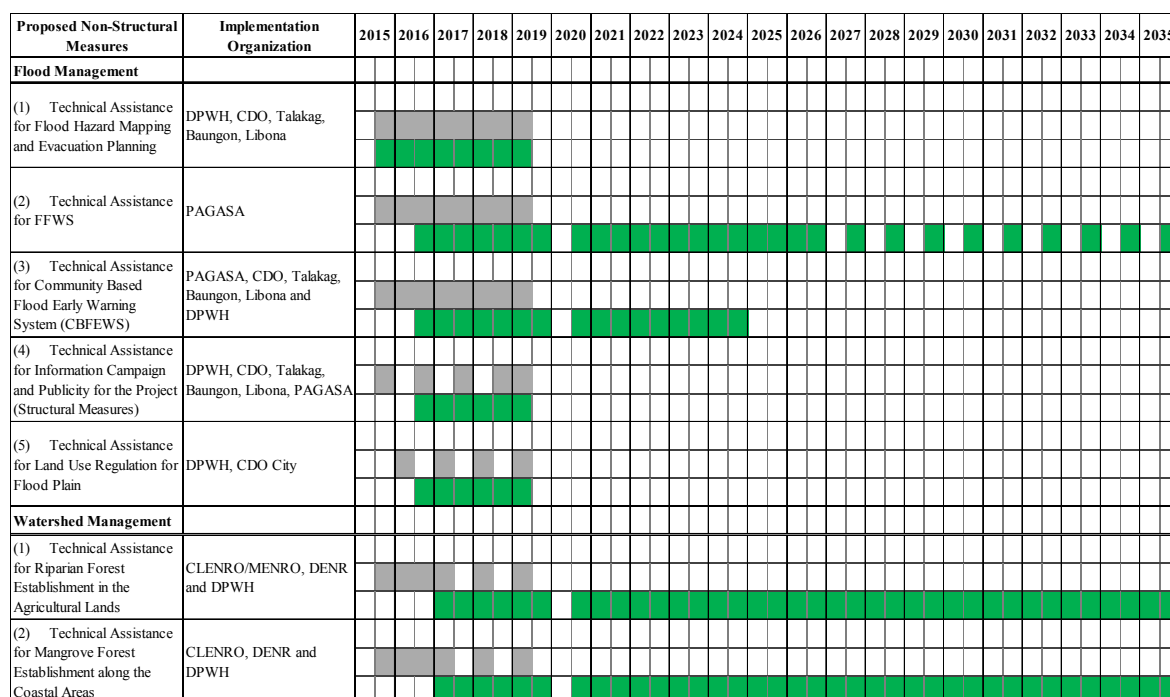
Source: JICA Survey Team

Table 6.2 Non-Structural Measures proposed for JICA Loan on the Watershed Management

No.	CDO City	Talakag	Baungon	Libona	Private Sector
(1) Technical Assistance for Riparian Forest Establishment in the Agricultural Lands	✓	✓	✓	✓	✓
(2) Technical Assistance for Mangrove Forest Establishment along the Coastal Areas	✓				✓

Source: JICA Survey Team

Proposed implementation schedules of the technical assistances for the Non-Structural Measures proposed above are shown in Figure 6.1.



TA
Implementation

Note: Implementation Schedule of the proposed Non-Structural Measures is preliminary prepared based on assumptions considering the present site conditions. This schedule shall be reviewed and updated through discussion and coordination with the concerned agencies during D/D.

Source: JICA Survey Team

Figure 6.1 Implementation Schedule of Non-Structural Measures proposed for JICA Loan on the Flood Management and Watershed Management

7 CONSTRUCTION PLAN AND COST ESTIMATE

7.1 Construction Plan and Schedule

(1) Scope of Work

1) Main work items of construction works

The Priority Project along downstream reaches of the Cagayan de Oro River consists of the following structures and works:

- River structures (Earth Dike and Concrete Floodwall)
- Construction of Raising Road and Evacuation Road
- Kagay-an Bridge Improvement
- Drainage outlet Facilities and Gates
- Improvement of Existing Retarding basin

2) Quantity of major work

The principal dimensions of the major works are presented in Table 7.1.

Table 7.1 Principal Dimensions of the Major Works

	Major Works	Length (m)
1.	River Structures	
1-1	Earth Dike	5,590
1-2	Concrete Wall	3,845
1-3	Road Dike(Evacuation road and road raising)	2,630
1-4	Concrete Wall(along the natural retarding basin)	940
2.	Improvement of the natural Retarding Basin	
2-1	Earth Dike(along Arroyo channel)	220
2-2	Concrete Wall (Road Raising)	1,285
2-3	Slope protection surrounding the natural retarding basin	175
3.	Improvement of Kagayan Bridge	500

Required work quantities of the major works shown in Table 7.1 such as river structures, improvement of the natural retarding basin and improvement of Kagayan Bridge are approximately shown as follows:

- Earth Excavation : 330,000 m³
- Earth Embankment : 597,000 m³
- Concrete Volume : 57,700 m³
- Reinforcement Bar : 5,080 ton
- Concrete Sheet Pile : 157,000 m

Details of the work quantities are presented in Appendix-H.

3) Procurement of Construction Material

Most of the construction includes earth work and concrete works. Most of the material can be procured in Cagayan de Oro City and surrounding areas including concrete sheet piles and concrete square piles. However, a flap gate made of fiber reinforced plastic is not produced in Philippines. Hence, such materials and related tools will be procured and transported from Japan or the third countries.

(2) Packaging of Contract

The project will be implemented through an international/local tendering in accordance with the guideline of JICA. The contract packages are broken down into four (4) taking account of amount of direct construction cost, geographic layout of each segment for construction, trafficability of construction equipment/material, etc. as follows:

- Package 1: Construction of Dike and Floodwalls
in Carmen-Balulang Stretch:(L3: L=2,015 m), Consolation-Poblacion
Stretch(R2: L=2,140 m)
- Package 2: Construction of Dike and Floodwalls
in Balulang Stretch (L4: L=2,280 m), Poblacion Stretch (R3: L=350 m),
Poblacion-Nazareth-Macasandig Stretch (R4:L=3,590m)
- Package 3: Construction of New Road and Raising Existing Road for Evacuation
in Bonbon-Kauswagan stretch (L1:L = 2,630 m)
- Package 4: Improvement of Kagayan Bridge

(3) Proposed Construction Plan

The overall construction plan of all packages is proposed in Figure 7.1.

7.2 Cost Estimate

(1) Conditions and Assumptions for Cost Estimate

Costs for construction works are essentially estimated on a unit price basis. The main items of the Project Cost are Direct Construction Cost, Land Acquisition Cost, Government Administration Cost, Engineering Services Cost, Physical Contingency, Price Contingency, and Taxes (VAT).

The cost estimate is at the price level as of 1st of June, 2013 with the price escalation as of the target year of the project.

Exchange rates were referred to the monthly rate for a consultant contract posted on the JICA web site. The ones on 1st of June, 2013 (1 Philippine Peso = 2.274 Japanese Yen, 1 United States Dollar = 97.43 Japanese Yen, hence, 1 United States Dollar = 42.85 Philippine Pesos) were applied in this project.

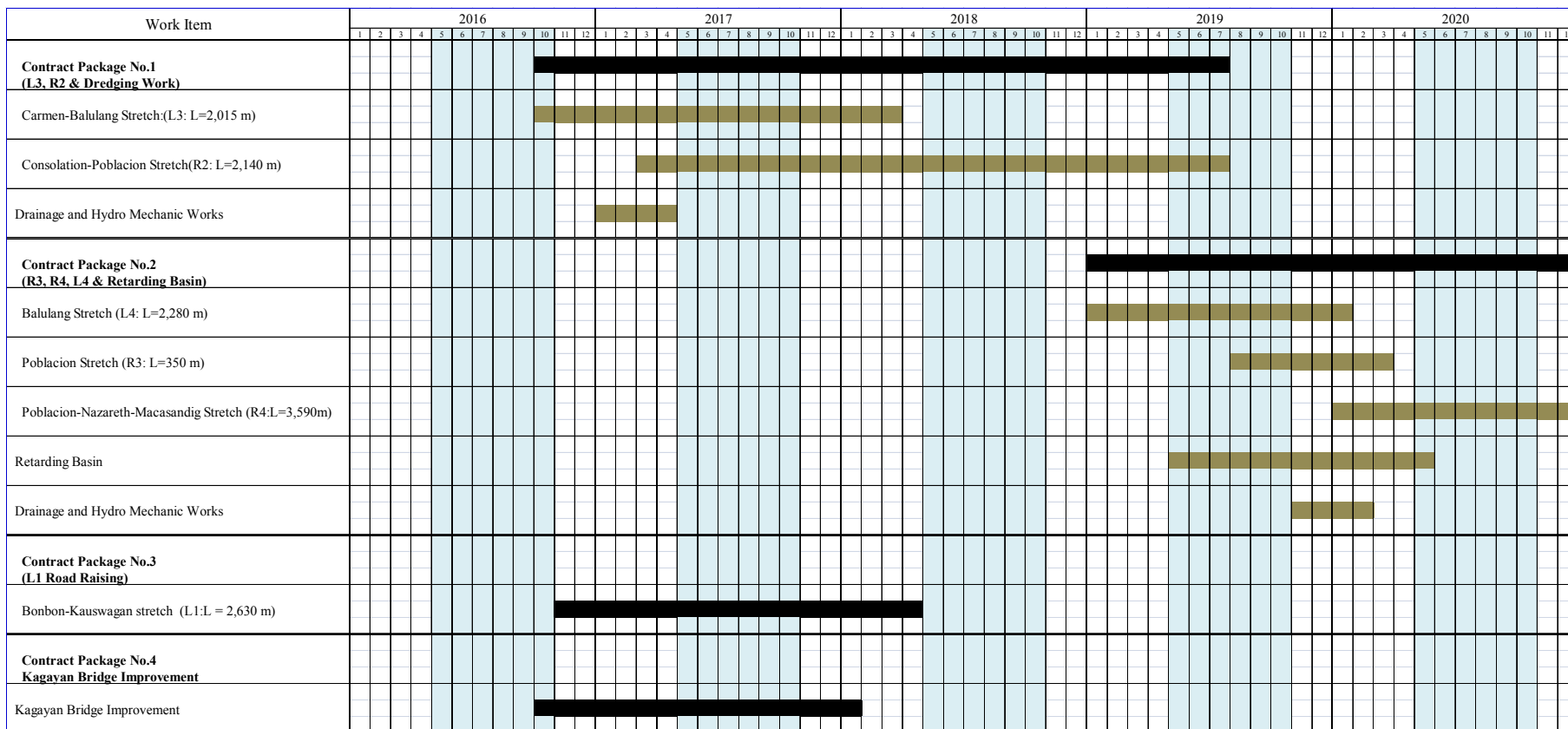
The project cost component shall consist of local and foreign currency portions. Philippine Peso is used for both the local and foreign currency portions in this estimate.

(2) Direct Construction Cost

The direct cost consists of a labor cost, a material cost and an equipment cost. Additional one percent (1%) of the estimated direct cost will be added as mobilization and demobilization cost.

Contractor's Indirect Cost is, as shown in D.O. No. 72, the indirect cost generally consists of overhead expenses, temporary construction cost and field expense, (explained as "contingencies" in D.O. No. 72), miscellaneous expenses, contractor's profit margin and Value Added Tax (VAT) component. In this project, VAT portion is excluded from this category and separately estimated. As a result, the ratio of the contractor's indirect cost excluding VAT becomes 14 % of the direct cost.

Preliminary and General cost was estimated at five percent (5%) of the sum of direct and indirect cost. Miscellaneous cost was estimated at ten percent (10%) of the sum of direct and indirect cost.



Source : JICA Survey Team

Figure 7.1 Overall Construction Plan of All Packages

(3) Cost for Land Acquisition and Compensation

The cost for land acquisition was calculated with the land value multiplied by its area. The land value is the zonal value available in Bureau of Internal Revenue (BIR) and target area are the directly affected area by the proposed structure and the area in the river.

Table 7.2 Land Acquisition and Compensation Cost

Item		Structure Area	River Side	Total
		Directly Affected	Indirectly Affected	
Land	Area (m ²)	316,250	431,046	747,296
	Amount (PhP)	XXX	XXX	XXX
Compensation	Nos. of Buildings	703	499	1202
	Amount (PhP)	XXX	XXX	XXX
Total	Amount (PhP)	XXX	XXX	XXX

Source: JICA Survey Team

(4) Administration Cost

This cost is usually estimated at 3.5% of the construction cost in DPWH. However, according to the Memorandum of the Office of Secretary DPWH dated October 3, 2013, since the rationalization of the DPWH is being undertaken at present, it will change the budgetary allocation system for administration cost of the project from the national budget. Referring to it, the administration cost will be no longer applicable for the project cost.

(5) Engineering Services Cost

Referring to Implementing Rules and Regulations on the Procurement of Consulting Services for Government Projects, NEDA, October 1998, the cost for the consulting service was set at six percent (6%) of the direct construction cost for the detailed design services and ten percent (10%) of the same cost for the construction supervision works.

(6) Contingencies

The escalation rate of price contingency for the foreign and local currency portions was set in accordance with JICA's current guidance at 1.3 % per year and 2.1 % per year, respectively.

The physical contingency for unforeseen conditions was assumed at about 1.4% of the construction cost and cost for consultation service and tax and duties so that the total cost of contingencies shall not be exceeded 10% of total cost of construction cost and engineering service cost (as per the Memorandum of the Office of Secretary DPWH dated October 3, 2013).

7.3 Operation and Maintenance Cost

The operation and maintenance cost covers the cost for maintenance of the structures, such as the patrol and inspection of the slope protection, embankment and gate and so on. This cost also includes the cost for operation and maintenance of the facilities for the management of the project area.

The annual operation and maintenance cost was estimated at 0.5% of the direct cost and it becomes XXX Philippine Pesos per year.

7.4 Project Cost

Project cost is estimated as shown in the table below:

Table 7.3 Project Cost

Unit : million PhP

No.	Item	LC	FC	Total
1	River Improvement Works in Lower Reach	XXX	XXX	XXX
2	River Improvement Works in Upper Reach	XXX	XXX	XXX
3	Evacuation Road	XXX	XXX	XXX
4	Improvement of Kagayan Bridge	XXX	XXX	XXX
Construction Cost		XXX	XXX	XXX
5	Consultation Service	XXX	XXX	XXX
6	Land Acquisition and Compensation	XXX	XXX	XXX
7	Administration (to be allocated from GOP budget)	XXX	XXX	XXX
8	Price Contingency	XXX	XXX	XXX
9	Physical Contingency	XXX	XXX	XXX
10	Tax and Duties (12% of Construction Cost, Engineering Service, Land Acquisition, Compensation, Price Contingency and Physical Contingency)	XXX	XXX	XXX
Total Cost		XXX	XXX	XXX

Source: JICA Survey Team

8 PROJECT EVALUATION

8.1 Project Implementation Schedule

The project will be implemented for about six (6) years upon signing of the Loan Agreement to be scheduled in March 2014. The project activities will start from the procurement of the consultants for the detailed design services as shown in Figure 10.1.

8.2 Consulting Services

During the project implementation, the consulting services are scheduled to be conducted including the detailed design, the construction supervision services and the formulation of the non-structural measures.

8.3 Project Benefit

The project economic benefit by the river improvement works in the Cagayan de Oro River Basin was estimated assuming that the economic benefit is the reduction amount of economic costs (damages and losses) by the concerned flood risk management project, and estimated as the difference (reduction) in costs between the “Without-” and “With-the Project” as estimated by the flood hydraulic analysis model. Those costs were estimated by flood occurrence probability.

Based on the results of hydraulic flood inundation analysis, expected annual flood damage costs by economic entity and return period are figured out as Table 8.1.

8.4 Economic Evaluation

(1) Assumptions for Economic Evaluation

Variables and assumptive parameters applied to the analysis are shown in the following Table 8.2, while referring to the latest data of the Bank of Japan and the IMF, as well as the recent JICA study reports, and others of relevance.

Table 8.1 Expected Reduction of Annual Flood Damage Costs

Unit: Million PhP

Return Period	Probability	Without Project		Damage with Project	Reduction of Damage Cost	Aver. Damage Cost	Expected Annual Ave Damage Cost	Economic Benefit due to Project
		Direct Damage Cost	Indirect Damage Cost					
2-yr	0.50	2,194.0	22.0	0.0	2,216.0			
5-yr	0.20	3,736.8	37.4	0.0	3,774.2	2,995.1	898.6	898.5
10-yr	0.10	5,341.2	53.5	0.0	5,394.7	4,584.4	458.4	1,357.0
25-yr	0.04	9,899.8	99.1	0.0	9,998.9	7,696.8	461.8	1,818.8

Source: JICA Survey Team

Table 8.2 Variables and Assumptive Parameters

	Variables	Assumptive Parameters
1.	Design Scale (Safety Level)	1/25-year flood probability
2.	Benefit generation period	50 years after construction
3.	Exchange rate (JPY/PhP)	2.274
4.	Physical Contingency	1.4%
5.	Price Contingency (Foreign)	1.3%
6.	Price Contingency (Local)	2.1%
7.	OM cost (% of Direct cost)	0.5%
8.	Discount rate (NEDA)	15%
9.	Local cost conversion factor (Direct construction cost)	0.79
10.	Local cost conversion factor (House compensation cost)	0.57
11.	Local cost conversion factor (Administration cost)	0.97
12.	Local cost conversion factor (Consulting service cost)	1.19

Source: JICA Survey Team

(2) Economic Cost

The cost items by procurement source (foreign and local costs portions: LC and FC) are realigned. The purpose of this alignment is to convert the financial costs to the economic costs and conversion factors of LC and FC are different from each other. Conversion rate from the financial cost to the economic costs are given in Tables 8.2.

Table 8.3 Economic and Referential Financial Costs

Unit: million PhP

Economic Cost	FC	LC	Total	Financial Cost	FC	LC	Total
Construction	XXX	XXX	XXX	Construction	XXX	XXX	XXX
Land Acquisition		XXX	XXX	Land Acquisition	XXX	XXX	XXX
House compensation		XXX	XXX	House compensation	XXX	XXX	XXX
Consulting Services	XXX	XXX	XXX	Consulting Services	XXX	XXX	XXX
Taxes and Duties	XXX	XXX	XXX	Taxes and Duties	XXX	XXX	XXX
Base Cost	XXX	XXX	XXX	Base Cost (BC)	XXX	XXX	XXX
Physical Contingency	XXX	XXX	XXX	Physical Contingency	XXX	XXX	XXX
Base cost + Physical Contingency	XXX	XXX	XXX	Base cost + Physical Contingency	XXX	XXX	XXX
Price Contingency	XXX	XXX	XXX	Price Contingency	XXX	XXX	XXX
Total Cost	XXX	XXX	XXX	Total Cost	XXX	XXX	XXX

Source: JICA Survey Team

(3) Result of Economic Analysis

Investment Feasibility by Indices

The economic internal rate of return (EIRR) of the project is presented below, which shows the project is judged economically feasible.

- EIRR : XXX %
- NPV : XXX Philippine Pesos
- BC Ratio : XXX

The analysis of the project was conducted for the period until 2070 with assumption of 50-years project life after the completion of the last package of the civil works.

Sensitivity Analysis

The sensitivity analysis was made to indicate resiliency of the concerned intersections against an increase in investment costs or a decrease in benefit; specifically cost overrun at 20%, benefit reduction at 20% and combination of both risks. They are less the threshold of the designated social discount rate by NEDA.

	<u>Base Case</u>	<u>Cost 20% Up</u>	<u>Benefit 20% Down</u>	<u>Combination</u>
E.I.R.R (%)	XXX	XXX	XXX	XXX

8.5 Environmental Evaluation

(1) Environmental Compliance Certificate (ECC)

Based on the Philippine Environmental Impact Statement System (PEISS), the Initial Environmental Evaluation (IEE) Report was submitted in Sep. 2013 and inspected by DENR-EMB Region 10, the competent authority of issuance of ECC. The ECC for the FRIMP-CDOR was issued on October 31, 2013.

EIS has been prepared based on the EIA Study of the Preparatory Survey. The EIS was approved by the competent authority in the middle of November 2013.

(2) Scoping and Evaluation Results

The scoping and the evaluation results of potential impacts for each component based on the EIA Study are as shown in Main Report and Appendix.

(3) Environmental Evaluation

- 1) The Project is based on that present aquatic environment shall be basically sustained without particular change of the present river width or moving river course.
- 2) Mangrove forest along the coastal area at left bank of the river will be sustained as the Natural Preservation Area and also to be used as retarding basin. Area in upstream river bank of the Cathedral will be functioned as a retarding basin as well including encouragement of drainage of inland rain water without changing the present condition much.
- 3) Environmental impact due to implementation of the project including construction works is assessed and mitigation measures as well as monitoring program are recommended through EIA study in accordance with the JICA Guideline. The said monitoring shall be conducted as a part of the consulting services during construction supervision stage.

8.6 Socioeconomic Evaluation

(1) Consideration of Disaster Risk Reduction and Management on the Project

Considering that the Philippines is known as one of the most disaster-prone countries in the world, particularly under prevailing phenomenon of climate change observed over the country in the past years, the Government of the Philippines enacted the Philippine Disaster Risk Reduction and Management Act (R.A. 10121) in May 2010, which basically emphasizes preventive measures to reduce people's and infrastructure's exposure to natural hazards.

In this regard, the preventive measure of flood risk is a key concept to a basic design of as well as resettlement of the project.

(2) Presumed Scale of Resettlement under the Project

According to the Preparatory Survey, the number of structures to be relocated within the right-of-way area of the project is preliminarily presumed to be about 700, and about 500 structures are presumed to be relocated within the river area between dike and river channel, totally accounting for about 1,200 structures to be relocated.

(3) Preventive Resettlement under the Project

Unlike planned resettlement often associated with development projects that is usually not necessarily implemented for benefits of the population to be resettled, the objective of preventive resettlement under the project is to protect human lives and assets of persons at high flood risk and to provide opportunities for improving or at least restoring their living conditions.

(4) Socioeconomic Aspects of Preventive Resettlement under the Project

Protecting Human Lives Living in High Flood Risk Area

By resettling those living in high flood risk area, it is to prevent direct impacts of flood disaster and its associated costs in terms of human lives and injuries.

Protecting Assets in High Flood Risk Area

The private, community and institutional assets can be relocated to a place where they will not be damaged or destroyed. The relocation of these assets is important in terms of social and economic activities to be continued.

(5) Social Evaluation

The scope of works of the Project still requires a certain scale of resettlement, which has been assessed among the alternatives including that with much more resettlement. The assessment was made incorporating mitigation effect of flood high risk by resettlement from the high risk area. Therefore, such resettlement is not only for construction of the project structures but also for reduction of high flood risk to live therein. Taking into consideration such situations including scale of structures, requirement of resettlement and risk mitigation effect, the Project plan is the most appropriate one among those conceivable and practical.

8.7 Technical Evaluation

The respective sub-projects involved in the Master Plan were assessed in every angle including the technical aspects shown below:

- 1) Mitigation of Flood Disaster Risk (Improvement of social vulnerability)
- 2) Adaptation of Climate Change (Easiness for climate change adaptation)

- 3) Integrated Water Resources Management
- 4) Engineering Point of View

For the Priority Project evaluated in the aforementioned manner, the Feasibility Design was conducted on the basis of the technical data and information obtained by the basic field surveys.

Consequently it is evaluated to be technically feasible for proceeding to implementation that the Project is composed of the facilities and structures which have technical soundness with appropriate feasibility design.

Among those, particular considerations have been paid to the following structures in the Project in view of design and construction planning:

- 1) Weak foundation is found in the Isla de Oro section where flood wall and a boulevard is planned to be constructed. The countermeasure of construction in such condition was studied and examined in the Feasibility Design so that the most appropriate way are incorporated in the design taking account of technical soundness and viability as detailed in Main Report (Section 5.2.2) as well as economic aspect and environmental impacts conceivable during construction.
- 2) One of the components of the Project is improvement of the Kagay-an Bridge including abutment at left bank and approach road at right bank. For such design and construction planning as presented in Main Report (Section 5.2.2), extensive design and construction plan are examined in the design and formulation of the construction plan not only in structural views but also taking into consideration a countermeasure of creating traffic obstruction.

8.8 Overall Evaluation of the Project

The FRIMP-CDOR Project is confirmed to be feasible for implementation through evaluations in individual aspects in terms of economic feasibility, socioeconomic appropriateness, environmental soundness and technical soundness. As such, early commencement of the Project would earnestly be recommended under the secure financing scheme.

Meanwhile, the project feasibility is somewhat vulnerable to inverse impacts on costs and benefits simultaneously taken place, careful project administration during the construction period would be required.

Besides the saved economic costs accrued to physical damages by flood hazards, an improved accessibility to safe conditions as well as ambience in settlement and business environments would be a primary benefit for people in the city. In particular, a betterment of business conditions in the region would attract more attention for foreign and domestic investors to further business involvement with inherent macroeconomic effect of increasing employment opportunities.

Meanwhile, in the light of manageability of DPWH, the Project will generate economic benefit in the days that come by further enhancing DPWH institutional and human capacity that will bring about lower cost and better quality of construction and maintenance works for similar projects in the future. This is unquantifiable but impeccable effect on beneficiaries of flood management activities and the national economy.

Other benefits would be expected owing to flood risk management such as cost and time savings of bypassing of road transportation in the occasion of traffic suspension by flood.

9 ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

9.1 Environmental Impact Assessment

(1) Environmental Compliance Certificate (ECC) and Approval of EIS

Based on the Philippine Environmental Impact Statement System (PEISS), the Initial Environmental Evaluation (IEE) Report was submitted in Sep. 2013 and inspected by DENR-EMB Region 10, the competent authority of issuance of ECC. The ECC was issued on Oct. 31, 2013. In parallel, Environmental Impact Statement (EIS) was prepared based on the EIA Study of the Preparatory Survey following the JICA Guidelines for Environmental and Social Considerations. The EIS was inspected by DENR-EMB-10 and finally approved as of Nov. 20, 2013.

(2) Scoping and Evaluation Results

The scoping and the evaluation results of potential impacts based on the EIA Study are summarized as follows.

1) Physical-Chemical Environment

Among nine (9) components of pollution, there is no component of which potential impact is evaluated as A-. Four (4) components are evaluated as B- during pre-construction and construction phases based on the survey results, including 1) Air pollution, 2) Water pollution, 3) Wastes, and 4) Noise and vibration. The impacts on these components are predicted to occur by the construction works because the construction activities will cause physical modification on the ground and generate emission gasses from construction equipment.

2) Natural Environment

Among 12 components of natural environment, there is no component of which potential impact is evaluated as A- (Significant negative impact is expected.). Six (6) components are evaluated as B- (Negative impact is expected to some extent) during pre-construction and construction phases based on the survey results, including 1) Topography and geology, 2) Soil erosion, 3) Mangrove forest, 4) Terrestrial flora, fauna and biodiversity, 5) Aquatic biota, and 6) Threatened species. The impacts on these components are to be caused by the construction works as the same case as Physical-chemical environments because the construction works will cause physical modification of ground and vegetation, namely the habitat condition of flora and fauna.

3) Social Environment

Among sixteen (16) components of social environment, the most considerable impact induced by the project is the involuntary resettlement as evaluated as A- during pre-construction and construction phases to relocate a total of 1,087 households. Involuntary resettlement is closely related to other seven (7) social environment components as evaluated as B- during pre-construction, construction and/or operation phases, such as impacts on poverty group, local economy, sensitive facilities (social infrastructure), sensitive facilities (cultural and historical heritage), gender and socially vulnerable groups, rights of children and labor environment. In addition, there are also four (4) social environment components evaluated as B- during pre-construction, construction and/or operation phases, which are effects of the flood control structures of the project on local residents and communities, particularly for those located along the

river. These effects are the use of the river, the utilization of resources in the river by local residents and communities, infectious diseases such as HIV/AIDS and landscape.

(3) Environmental Management and Monitoring Plans

1) Physical-Chemical Environment

Environmental management and monitoring plans are formulated for the environmental component of which potential impacts are evaluated as B- or C- (Possibility of impact and its magnitude are unknown. A further examination is needed.) in the previous section, including air quality, water quality, soil contamination, waste, noise and vibration, and riverbed sediment contamination. In addition, environmental management measures for traffic are described taking into account the importance of minimizing the project-related traffic accidents for the local community. The environmental management and monitoring plans also specified the implementation organization / responsible (supervisory) organization aiming to clarify the responsibility to achieve the environmental management of the Project. The cost for the environmental management measures is not estimated because the cost for management measures are not to be separately defined but usually be included in the whole construction cost. However, the cost for environmental monitoring activity was estimated and shown in the Main Report. These policies for responsibility and cost estimate were applied for natural environment and social environment.

2) Natural Environment

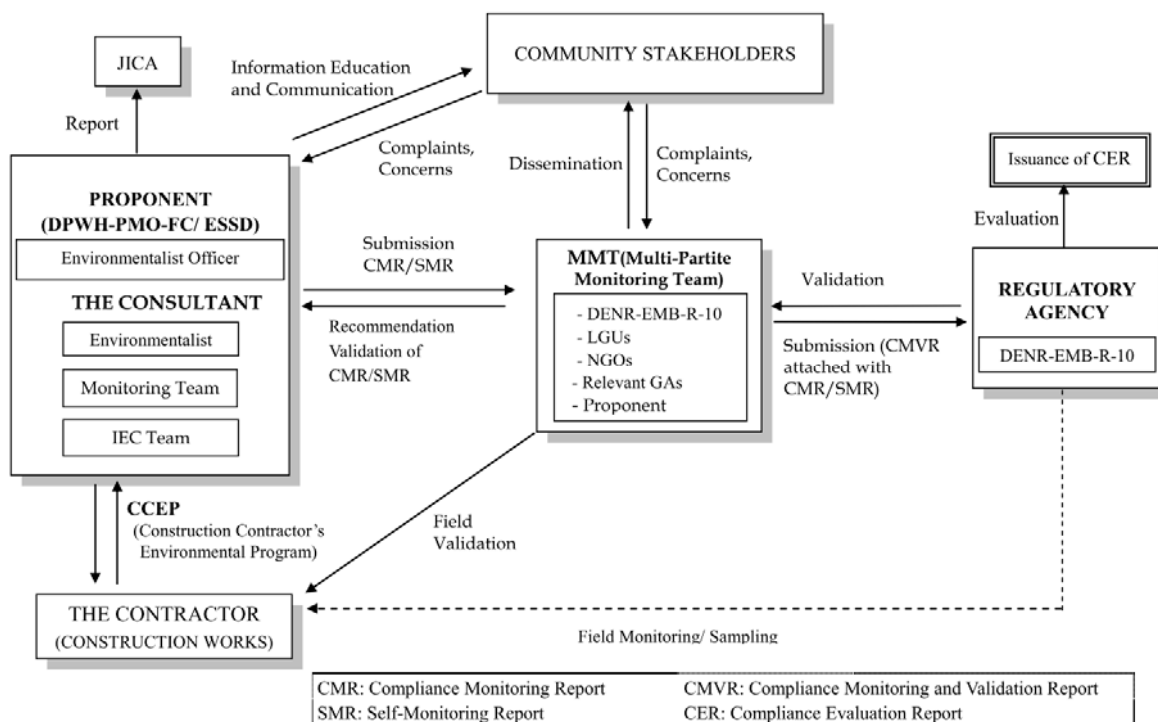
As the same as physical-chemical environment, environmental management and monitoring plans for natural environment are formulated for the environmental component of which potential impacts are evaluated as B- or C-, including topography, geology and soil erosion, coral reef, mangrove forests, terrestrial flora, fauna and biodiversity, aquatic biota, and threatened species.

3) Social Environment

Environmental management and monitoring plans for social environmental components are described with potential impacts evaluated as A- and B-, including involuntary resettlement, poverty group, local economy, land use and utilization of local resources, water usage, existing social infrastructures and services, misdistribution of benefits and damage, local conflicts of interest, cultural heritage, historical and religious sites, landscape, gender/socially vulnerable groups, rights of children, infectious diseases such as HIV/AIDS, and labor environment.

(4) Organizational Chart for Implementation of Environmental Management and Monitoring

Expected organizational chart for implementation of environmental management and monitoring is shown in Figure 9.1. This organizational chart shows a functional check and balance mechanism of the environmental management and monitoring of the Project which is aiming at realizing the procedures stipulated in the Revised Procedural Manual for DAO No.03-30.



Source: JICA Survey Team

Figure 9.1 Organization Chart for Environmental Management and Monitoring for FRIMP-CDOR

9.2 Social Impact

Major social impact of the Project is resettlement. This section outlines impacts, scale and necessity of the resettlement under the Project and its Resettlement Action Plan (RAP).

(1) Extent of Impacts by the Project

Based on the basic concept of flood risk management of the Project, extent of major impacts of the Project was identified and is outlined below.

- Impacts on people – There are two kinds of people to be affected by the Project in principle: (a) people who reside in the project affected area and have a title or tax declaration on lands, which are termed as formal settlers and (b) people who reside in the project affected area and have no title or no tax declaration on lands, which are termed as informal settlers.
- Impacts on land – There are two kinds of land to be acquired for the Project in principle: (a) lands required for the right-of-way of construction of structures of the Project such as dike and floodwall and (b) lands which become river area at very high flood risk after structures of the Project are constructed.
- Impacts on structures – There are structures required to be relocated for the Project such as residential, commercial, institutional, and any other kind of structures which are located in the right-of-way area and the river area.
- Impacts on improvements, trees and crops – There are improvements to be affected by the Project such as sheds, toilets, fences, storerooms, other structures and trees.

(2) Scope of Resettlement Impact

Based on the extent of major impacts of the Project, scope of resettlement impact was identified and summarized as below:

Table 9.1 Summary of Scope of Resettlement Impact

Affected Units	Type / Use	Sub-Total	Total
Household (HH)	Formal Settlers	201HH (867persons)	1,087HH (4,743 persons)
	Informal Settlers	886HH (3,876 persons)	
Commercial Business Enterprises (CBEs) and Community Owned Structures (COSs)	Structures on Titled Land	14 structures (21 persons)	72 structures (106 persons)
	Structures on Untitled Land	58structures (85 persons)	
Land	Right-of-Way / River Areas	-	747,296 m ²

* According to the survey conducted by the JICA Study Team, 1087 households live in 949 house structures.

Source: JICA Survey Team

(3) Necessity of the Resettlement under the Project

Under the Project, based on the concept of preventive resettlement applied to the Project, the people living in the area at very high flood risk are to be relocated to a safe place where these people are provided with support in rebuilding their livelihoods, which include not only permanent housing at resettlement sites, but also necessary facilities, services, and livelihood improvement measures, in order to restore standard of living and normal development and to ensure sustainability of living at new settlement.

(4) Principal Objective of RAP of the Project

The principal objective of RAP of the Project is to ensure that resettlement activities of the Project are properly planned so that resettlement becomes an opportunity for project affected persons (PAPs), in order to re-establish and/or improve living conditions in a safe place and reduce exposure to flood disaster risk.

(5) Components of RAP

- 1) Necessity of resettlement of the Project,
- 2) Identification of impacts and scale of resettlement of the Project,
- 3) Assessment of socioeconomic characteristics of PAPs of the Project including socioeconomic status, magnitude and extent of loss of PAPs,
- 4) Provision of legal framework of the Project including policies and gap analysis of resettlement and land acquisition of the Project,
- 5) Provision of policies on eligibility for compensation and entitlements including definition of PAPs, eligibility for compensation and assistance measures, inventory of loss with valuation method for compensation for loss,
- 6) Resettlement site plan including assessment of existing resettlement sites, site selection, and assessment and plan for necessary houses, facilities,
- 7) Grievance redress mechanism of resettlement of the Project,
- 8) Participation of community,

- 9) Provision of institutional framework of the Project, organizational framework and responsibilities of resettlement implementation of the Project,
- 10) Implementation schedule of resettlement of the Project,
- 11) Cost and budget of resettlement of the Project, and
- 12) Provision of monitoring and evaluation procedures of the Project.

10 PROJECT IMPLEMENTATION

10.1 Project Organization

(1) Organizational Framework of Project Implementation for the Structural Measures

1) Core Offices

The Unified Project Management Office – Flood Control (UPMO-FC), has a capacity to implement flood control projects as the overall implementing office for all the proposed measures including issues and concern related to project preparation, procurement, contracting, disbursement, and so on, in coordination with other concerned offices within the DPWH.

The Unified Project Management Office - Flood Control Management Office (UPMO-FCMO) could act as an engineering advisor as well as planning and research group for the Project implementation in cooperation with the UPMO-FC.

2) Main Concerned Offices in DPWH

Bureau of Design (BOD)

The Water Resources Project Division of BOD shall be involved for the Project implementation mainly at pre-construction stage for the FRIMP-CDOR including i) to review the schemes, designs, specifications under the Project and ii) to review and approve the detailed plans and specifications of the Projects

Bureau of Construction (BOC)

The BOC shall be involved for the Project at pre-construction and construction stage including to review cost estimates, evaluate programs, contracts and to inspect, check and monitor the progress of the Project

Environmental and Social Services Division (ESSD)

The ESSD shall assist the UPMO-FC in the activities regarding environmental and social considerations, in particular, facilitation of consultation and information dissemination to the project affected persons and other stakeholders, conducting environmental and social monitoring/evaluation, and providing assistance to regional offices.

(2) Organizational Framework of Operation and Maintenance for the Structural Measures

1) Core Offices

After completion of the project, UPMO-FC will undertake the O&M of structures until the structures are turned-over to the DPWH Regional Office X.

On the other hand, the Cagayan de Oro City has responsibilities for maintaining and preserving the current situations of the Right of Way (ROW) and other concerned areas of the Cagayan de Oro River. Also, the Cagayan de Oro City has roles to conduct regular

patrol or to enforce appropriate measures for illegal activities surrounding areas of the proposed structural measures.

These responsibilities and roles of the Cagayan de Oro City are one of the operation and maintenance (O&M) works for the proposed structural measure. Therefore, it is recommended that a Memorandum of Agreement (MOA) between the DPWH and the Cagayan de Oro City, which are stipulated each responsibility for the operation and maintenance works for the proposed structural measures, shall be initiated.

2) Main Concerned Offices

Main concerned offices for the O&M for the proposed structural measures will be DPWH Central, DPWH Region X and DPWH Region X, District Engineering Offices.

(3) Recommendations for Memorandum of Arrangement (MOA)

1) Necessity of MOA for the Project Operation and Maintenance

It is appropriate that the DPWH Region X could manage almost all the main works and activities of the Project operation and maintenance.

However, it is broadly understood that one of the significant issues on flood control projects is the insufficient operation and maintenance (O&M) activities for measures provided, especially flood control structures. In order to improve these situations, a Memorandum of Agreement (MOA) on project implementation between the Central Government (DPWH) and the concerned LGUs are initiated in the Philippines.

Although there are some basic problems such as cost sharing issues whether the DPWH or the LGU should pay for the O&M costs, any MOA in many similar flood control projects is prepared, in order to implement the project more smoothly.

It is recommended that any MOA for the Project at O&M stage could initiate between DPWH and the Cagayan de Oro City.

2) Important Items to be Included in MOA for this Project O&M

It is necessary to prepare the basic items of the MOA for this Project, based on the recent similar flood control projects by the DPWH. In addition to this, it is indispensable that the MOA for this Project should be stated clearly the following important items:

- Undertaking of the O&M works/activities such as patrol by the Cagayan de Oro City with the work detailed items and each estimated cost
- The Cagayan de Oro City shall maintain and preserve the current situation of the Right of Way (ROW)
- Other O&M work items, which should be done by the Cagayan de Oro City

3) Other Important Recommendation

The above MOA for this Project is indispensable to assure the collaborative works among the DPWH and the Cagayan de Oro City at O&M stage of the Project. It is recommended that the concerned DPWH central office shall clearly state and assure necessary O&M budgets and human resources for the project.

(4) Organizations for the Proposed Non-Structural Measures

1) Main Implementation Offices

i) CDRRMC, MDRRMCs,

Basically, the implementation organizations of the non-structural measures are LGUs. In recent times, all the concerned municipalities and city for the FRIMP-CDOR established each MDRRMC or CDRRMC, based on the Republic Act (RA) 10121. Actually, most of the officials of each Planning Development Office or Engineering Office of each LGU are the same each member of CDRRMC or MDRRMCs.

Each CDRRMC or MDRRMC has also responsibility to prepare own Disaster Risk Reduction and Management Plan (DRRMP). At present, the CDRRMC prepared “five year CDRRMP, but MDRRMC of Libona, Baungon, Talakag could not prepared own MDRRMP. The PDRRMP of Bukidnon prepared, but did not updated so far.

The CDRRMC and MDRRMCs under each LGU has responsibilities to conduct most of the proposed non-structural measures of this Preparatory Survey, based on the RA10121. The CDORRMC and the MDRRMCs are actually conducting the measures such as preparation of contingency plan.

However, the MDRRMCs are still lack of capacity to prepare each DRRMP or conduct the measures of the DRRMP at present. The proposed non-structural measures are also need to strengthen the capacities of the MDRRMCs.

ii) UPMO- FCMO

2) Main Coordination/Collaboration Organizations for the Proposed Non-Structural Measures

i) RDRRMC Region X (OCD Region X)

Concerning the flood risk management, the OCD Region X has secretarial functions of the RDRRMC Region X. The RDRRMC Region X has legal based authorities to coordinate, integrate, supervise, and evaluate the activities of the PDRRMCs, CDRRMC, MDRRMCs, and PDRRMCs in the Region X, based on the Republic Act (RA) RA10121. The RA10121 also stipulates the following functions of RDRRMC.

ii) CDORBMC

When the CDORBMC was established, the members were limited the Cagayan de Oro City and the organizations within the Cagayan de Oro City. However, the Board of the Stakeholders of the present CDORBMC are most of the concerned governmental organizations from the upstream to downstream of the Cagayan de Oro River, including the DENR Region X, all the concerned LGUs, OCD, DILG Region X, and Academic Organization such as Xavier University, as well as NGOs/Private Sectors. Furthermore, the DPWH became one of the Board of Stakeholder of the CDORBMC on April, 2013.

On the other hand, the CDORBMC has a symbolic integration power as the most influential advocating organization in the Cagayan de Oro River basin due to the Bishop as the Chairperson of the CDORBMC.

Table 10.1 shows the main implementation, operation and maintenance organizations for each proposed non-structural measures as future yen loan project.

Table 10.1 Organizations for Proposed Non-Structural Measures

Proposed Non-Structural Measures	Implementation Organization/Offices	Coordination/Collaboration Organizations/Offices
(1) Information Campaign and Publicity	DPWH UPMO-FCMC, LGUs (CDRRMC/MDRRMCs)	RDRRMC Region X, LGUs (Concerned BDRRMCs), CDORBMC, etc.
(2) Preparation of Contingency Plan (preparation/revision of hazard map, etc.)	LGUs (CDRRMC/MDRRMCs), and Selected BDRRMCs)	RDRRMC Region X, LGUs (CDRRMC/MDRRMCs, and PDRRMCs), etc.
(3) Installation of Flood Forecasting and Warning System (FFWS)	PAGASA	
(4) Set-up a Community Based Flood Early Warning System (CBFEWS)	LGUs (CDRRMC/MDRRMCs), and Selected BDRRMCs)	PAGASA, RDRRMC Region X, LGUs (CDRRMC/MDRRMCs, and PDRRMCs),etc.
(5) Watershed Management	BENRO, MENRO, CLENRO, APO-CDO City, PAWCZMS-DENR Region X	DENR Region X, RBCO-DENR, CDORBMC, etc.
(6) Land use control in river area and flood plain areas	Cagayan de Oro City	RDRRMC Region X, etc.

Source: JICA Survey Team

- Notes :
- 1) RDRRMC Region X: Regional Disaster Reduction and Management Council (RDRRMC), Region X.
 - 2) PDRRMCs: Provincial Disaster Risk Reduction and Management Council of Misamis Oriental, Bukidnon
 - 3) CDRRMC: City Disaster Risk Reduction and Management Council of Cagayan de Oro City
 - 4) MDRRMCs: Municipal Disaster Risk Reduction and Management Council of Libona, Baungon, and Talakag
 - 5) BDRRMCs: Barangay Disaster Risk Reduction and Management Committees
 - 6) CDORBMC: Cagayan de Oro River Basin and Management Council
 - 7) BENRO: Bukidnon Environment and Natural Resources Office
 - 8) MENROs: Municipal Environment and Natural Resources Offices of Libona, Baungon, Talakag
 - 9) CLENRO of Cagayan de Oro City: City Local Environment and Natural Resources Office of Cagayan de Oro City
 - 10) APO-CDO City: Agriculture Productivity Office of the Cagayan de Oro City
 - 11) PAWCZMS-DENR Region X: Protection Area, Wildlife and Coastal Zone Management Services, DENR Region X

10.2 Procurement Method

The civil construction works of the project involve dike embankment and concrete revetment works for the construction of dike system as well as concrete flood wall within limited construction time but with close quality control.

Under these situations, it is planned to implement this project by an international/local competitive tendering in accordance with the guidelines of JICA which precedes to the borrower's guideline.

In order to complete the project effectively, the project is divided into the following four (4) packages:

- (i) Package 1 : Construction of Dike and Floodwalls in Carmen-Balulang Stretch (L3; 2,149m) and Consolation-Poblacion Stretch (R2; 1,736m)

- (ii) Package 2 : Construction of Dike and Floodwalls in Balulang Stretch (L4; 2,181m), Poblacion Stretch (R3; 325m) Poblacion-Nazareth-Macasandig Stretch (R4; 3,105m) and Improvement of the natural retarding basin
- (iii) Package 3 : Construction of New Road and Raising Existing Road for Evacuation in Bonbon-Kauswagan Stretch (L1; 2,756m)
- (iv) Package 4 : Improvement of Kagayan Bridge

An international engineering consultancy firm associated with a local engineering group will be procured and engaged to provide consulting services in terms of the provision of the detailed design, construction supervision services and formulation of non-structural measures to the UPMO-FC.

10.3 Implementation Schedule

The project works covering Cagayan de Oro River will be divided into four (4) packages. The construction works will be implemented within the period of about four (4) years from 4th quarter of 2016 to 4th quarter of 2020 as follows: The project implementation schedule for the Flood Risk Management for Cagayan de Oro River (FRIMP-CDOR) Packages 1 through 4 is shown in Figure 10.1.

- 1) Procurement of Consultant : 12 months
Preparation of the Pre-qualification : 5 months
- 2) Detailed Design and Preparation of Tender Documents
by the Consultant selected in (1) : 12 months
- 3) Procurement of Construction Contractors : 15 months
- 4) Construction Works (whole) : 51 months period
 - Package 1 : (34 months)
 - Package 2 : (24 months)
 - Package 3 : (18 months)
 - Package 4 : (16 months)
- 5) Consulting Services for PQ & Tender
/Construction Supervision including
Defective Liability Period (12 months) : 78 months period

10.4 Funding / Finance

Total cost required for the project implementation was estimated at XXX Japanese Yen and XXX Philippine Pesos, respectively, out of which a proposed foreign loan amount required for the project would be XXX Japanese Yen and XXX Philippine Pesos, respectively, or equivalent to XXX Philippine Pesos. (exchange rate PHP 1.0 = JPY2.274) .

10.5 Consulting Services

The actual project execution is to be entrusted to the Unified Project Management Office for the Flood Control (UPMO-FC). The consultants are to be employed to conduct the detailed design and for preparation of the pre-qualification document and the tender document, and also be employed to support the UPMO-FC in the pre-construction and construction supervision as the Engineer.

The scope of the consulting services by the consultants is presented herein below.

(1) Scope of Services

The Consulting Services is to carry out the following tasks:

- 1) Detailed design, Cost estimate and preparation of Prequalification and Tender documents
- 2) a) Assistance for pre-qualification and tendering for selection of civil work contractors and Construction supervision services

During the period for the above services, the following services will be conducted in accordance with the other consulting services with similar scope of works:

- b) Technical Assistance for formulation of Non-structural measures including flood management planning, hydrologic study and Watershed management.

The specific scope of the consulting services covers the following activities (tentative):

- 1) Consulting services for the detailed design and Preparation of prequalification and tender documents;
- 2) Consulting services for Tendering assistance, the Construction supervision and Technical Assistance

Tendering assistance, Construction supervision and Technical Assistance

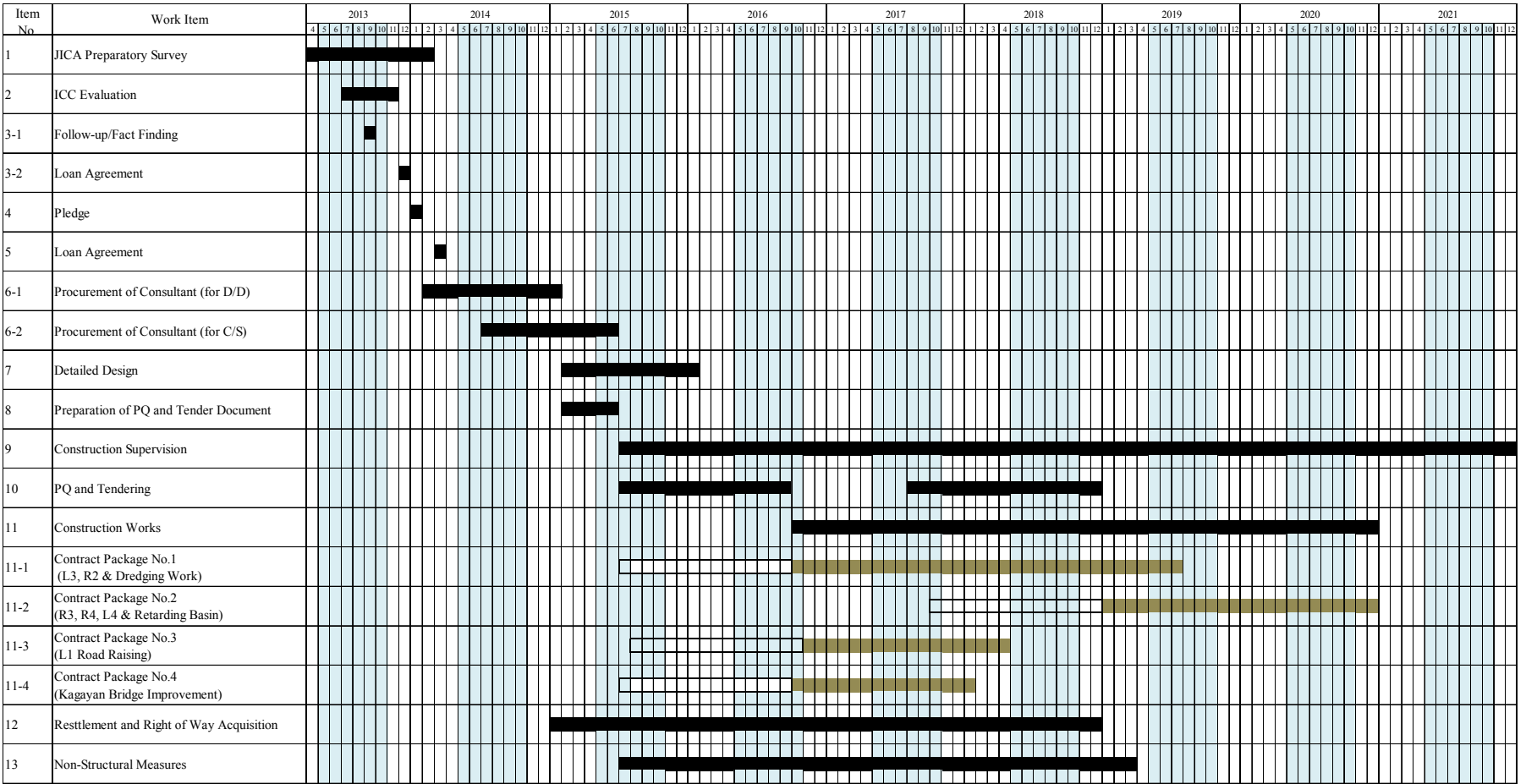
- a) Assistance for tendering and contracting
- b) Construction supervision services as the Engineer
- c) Technical assistance for operation and maintenance works including preparation of the manuals
- d) Environmental management and monitoring
- e) Monitoring on implementation of RAP
- f) Transfer of knowledge

Technical assistance for formulation of Non-structural measures

(2) Schedule of Consulting Services

Summary of service period of respective consulting services are shown below:

- Detailed Design : 12 months
Construction Supervision : (66+12)= 78 months including Defective Liability Period



Source: JICA Survey Team

Figure 10.1 Implementation Schedule of the Project

10.6 Effect of the Project and Performance Indicator

(1) Effect of the Project

The objective of the Project is to mitigate flood risk in the most downstream area of the Cagayan de Oro River basin. Target safety level of flood risk management is to cope with 25-year probable flood. Target area of the project is the downstream sections of the Cagayan de Oro River from the river mouth to the Pelaez Bridge for about 12 km as shown in Figure 10.2.

As a principle of flood risk management, the following measures are proposed:

- 1) It is to be prohibited to live in the area, as “No Build Zone” and/or “River Area”, where is of Very High Risk Area (Flood Risk Level 4) so that no human damage and no inundation in the structures is anticipated.
- 2) The landside area where the Flood Risk Level is 3 or lower shall be protected by the structural measure from the disasters of 25-year probable flood or lower scale.

Figure 10.3 shows the present situation (without Project) of flood inundation area which is estimated by numerical analysis in 25-year probable flood case. With the project, such inundation area is expected to be eliminated (zero inundation area). Figure 10.4 shows the respective areas of the Flood Risk Level 1 to 4, respectively.

(2) Project Performance Indicator

1) Operation Indicator

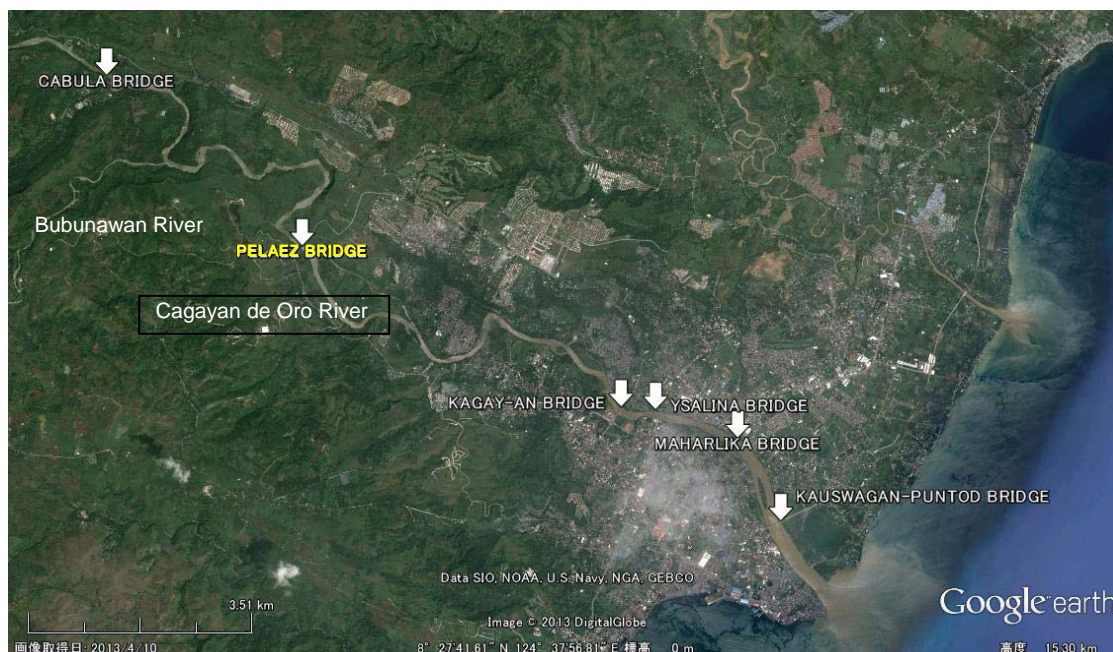
It is recommended that the annual highest water level or the highest water level of each flood at Pelaez Bridge is to be defined as the “Operation Indicator”.

Table 10.2 Operation Indicator

	Operation Indicator	Reference Information	
	Annual Maximum Water Level at Pelaez Bridge (to be Observed)	Calculated Water Level (with Project) at Pelaez Bridge (El., m; AMSL)	
Year 1		5-Yr. Flood	15.28
Year 2		10-Yr. Flood	15.74
- - -		25-Yr. Flood	16.38
Year N		50-Yr. Flood	17.05

Source: JICA Survey Team

In order to realize such observation, it is also required to install new water level observation facilities at the Pelaez Bridge site with the following consideration:



Source : JICA Survey Team

Figure 10.2 Location of Pelaez Bridge

2) Effect Indicator

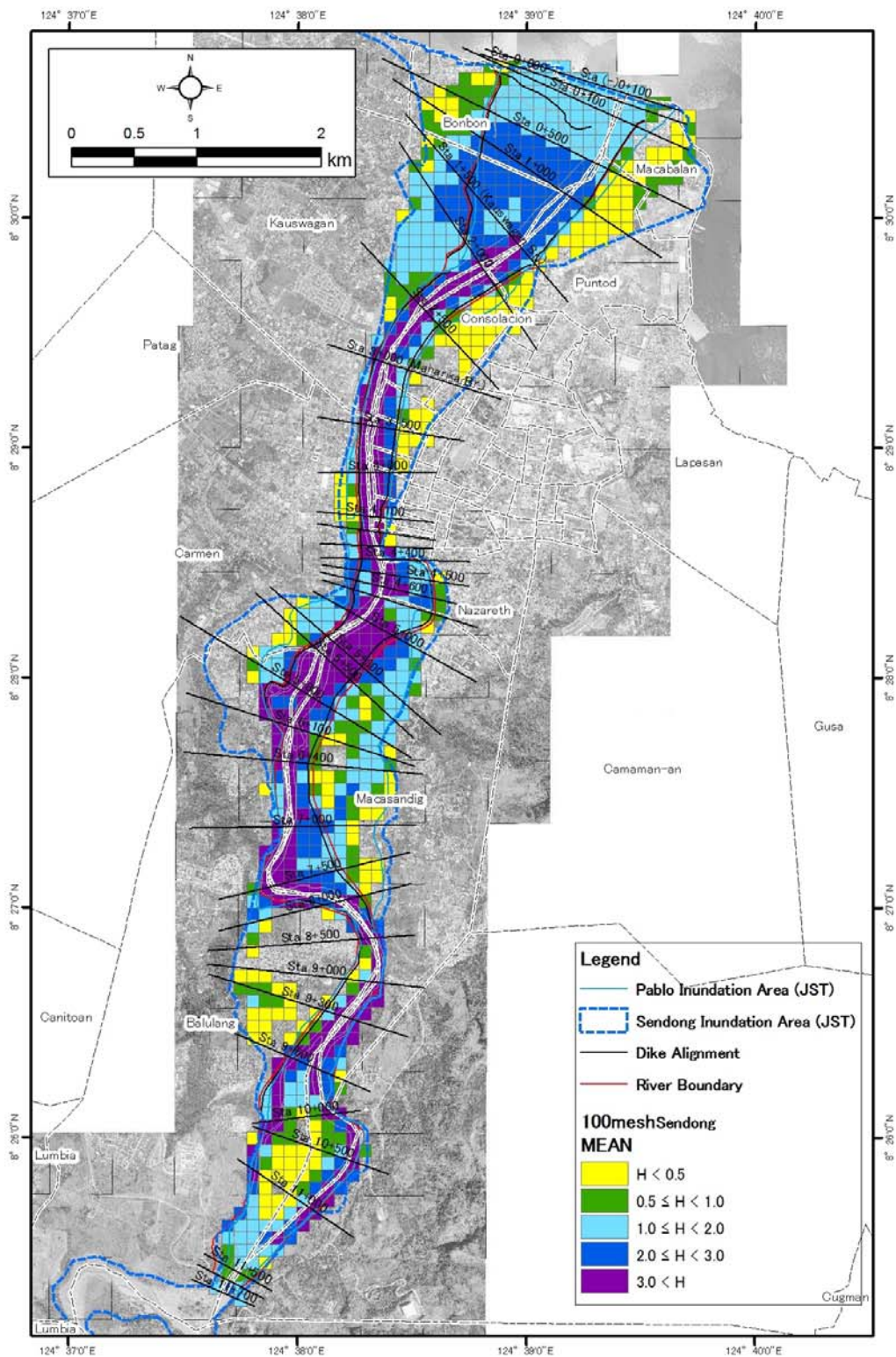
It is recommended that the Effect Indicator shall be “Largest Inundation Area and its Location” due to flood caused by the Cagayan de Oro River”, that is to be null at the objective 25-yr flood. However, as aforementioned, the inundation might be caused by landside water even otherwise by overflowing due to river flood if it exceeds probable 25-year scale.

Therefore, inundation shall be assessed about not only its area but also the cause why inundation being encountered.

Table 10.3 Effect Indicator

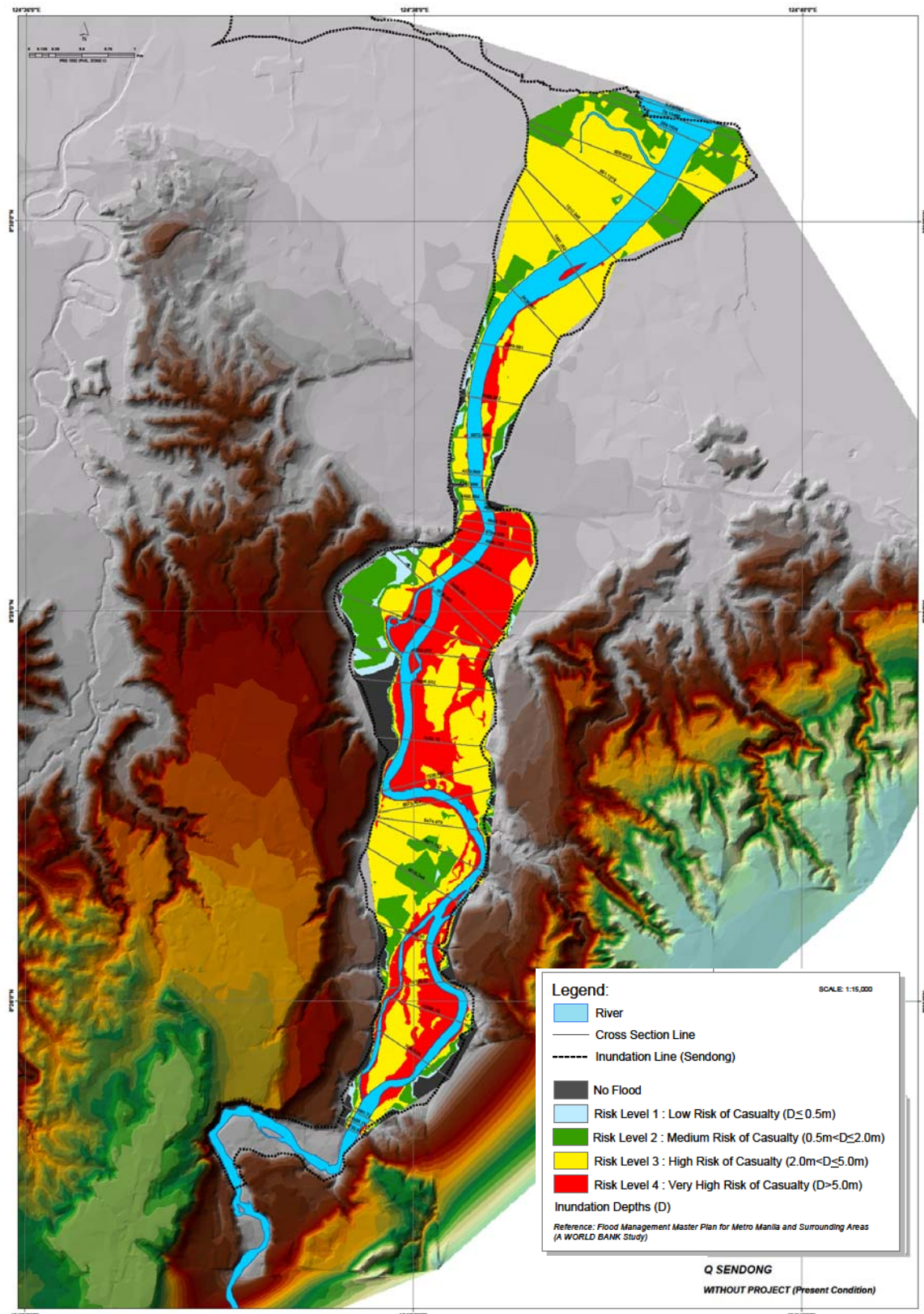
	Effect Indicator			Reference Information		
	Target Inundation Area to <u>25yr Flood</u>	Observed (Actual)			Recorded/Estimated Inundation Area (without Project)	
		Inundation Area	Location	Cause		
Year ₁	0 ha	ha			TS.Sendong	614 ha
Year ₂	0 ha	ha			TY.Pablo	438 ha
- - -	0 ha	ha			25-Yr. Flood	497 ha
Year _i	0 ha	ha				

Source: JICA Survey Team



Source: JICA Survey Team

Figure 10.3 Result of Inundation Analysis for 25 year Scale Flood



Source: JICA Survey Team

Figure 10.4 Flood Risk Level in the Cagayan de Oro River Basin

11 RECOMMENDATION FOR DISASTER RISK REDUCTION AND MANAGEMEWNT

11.1 General

In the course of the Basic Survey, Master Plan Study and Feasibility Study in this Survey, issues on the disaster risk reduction and management in the Cagayan de Oro River Basin have been identified and closely examined. Taking into account of the overall results and outputs of the Survey, solutions and improvements of the said issues in the basin is recommended hereinafter.

Through the survey, the following disasters have been specifically identified in the Cagayan de Oro River Basin:

- 1) Flood and Inundation disasters : this is the remarkable disasters encountered in the Cagayan de Oro River Basin, for which the flood disaster risk reduction and management measures are recommended particularly hereinafter.
- 2) Sediment disaster : this is sediment disasters including landslide, slope failure and debris flow. However, the sediment disasters were not observed so far in the basin and the risk of sediment disaster is considered to be low in the future except that the sediment production in the upstream is active, and the sediment disaster might be concerned in the future, for which a recommendation is made as a part of the watershed management.

11.2 Principle of the Flood Disaster Risk Reduction and Management

(1) Principles of Flood Risk Management

The following principles of the flood risk management are recommended:

- 1) It is to be prohibited to live in the area, as “No Build Zone” and/or “River Area”, where is of Very High Risk Area (Risk Level 4) so that no human damage and no inundation in the structures is anticipated.
- 2) The landside area where the flood risk level is 3 or lower shall be protected by the structural measure from the disasters of 25-year probable flood or lower scale.

(2) Incorporation of Policies on River Boundary and River Area in the Comprehensive Land Use Plan

- 1) The River Boundary along the river stretch has established by DPWH in downstream reaches. The River Area inside the River Boundary shall be controlled of its land use.
- 2) It is necessary building and living are restricted in the river area as well as land use control and effective use of unused land.
- 3) Definitive area and policies on the river boundary should be incorporated and stipulated in the Comprehensive Land Use Plan of the Cagayan de Oro City which has being under updating.

11.3 Flood Risk Management Project for Cagayan de Oro River (FRIMP-CDOR)

(1) Priority Project

Early implementation of the Priority Project of the Flood Risk Management Project for the Cagayan de Oro River (FRIMP-CDOR) is strongly recommended. The priority projects for the FRIMP-CDOR are the following three measures:

- 1) Urgent rehabilitation of existing damaged structures by DPWH,
- 2) Structural measures : River improvement works in downstream reach to cope with 25-year probable flood comprising of:
 - (i) Construction of New Dike/ Retaining Wall
 - (ii) Construction of New Road/Raising of Existing Road for Evacuation
 - (iii) Installation of Gate and Drainage Outlets
 - (iv) Improvement of Kagayan Bridge
 - (v) Improvement of the Natural Retarding Basin
- 3) Non-structural measures

The structural measure was designed with safety level of the structures at 25-year flood for river improvement works, while 50-year flood protection was planned in the Master Plan incorporating flood control effect by the existing dam development plan in the Cagayan de Oro River Basin. Since completion of the structural measure normally take several years, and even if the target design level will have been attained, non-structural measures are still necessary to cope with the disasters due to excess flood.

The following non-structural measures are recommended to be implemented in the priority project of FRIMP-CDOR:

- (i) Preparation/Update of Flood Hazard Map, Evacuation Planning
- (ii) Technical Assistance for FFWS (Initial Stage for Full Spec)
- (iii) Community Based Flood Early Warning System (CBFEWS)
- (iv) Information Campaign and Publicity for the Project (Structural Measures)
- (v) Technical Assistance for GIS for Land Use Regulation for Habitual Inundation Area
- (vi) Technical Assistance for Riparian Forest Establishment in the Agricultural Lands
- (vii) Technical Assistance for Mangrove Forest Establishment along the Coastal Areas

Early implementation of the priority project is recommended in accordance with the implementation schedule as shown in Figure 10.1

The actual project execution is to be entrusted to the Unified Project Management Office for the Flood Control (UPMO-FC). The consultants are to be employed to conduct the detailed design and for preparation of the pre-qualification document and the tender document, and also be employed to support the agency in the pre-construction and construction supervision as the Engineer.

For the relocation for project affected people and non-structural measures of flood mitigation, the other responsible agencies such as LGUs and DSWD are expected to undertake the respective activities through the coordination of DPWH.

(2) O&M Works for FRIMP-CDOR

O&M Works Demarcation

MOA between DPWH and LGU is important for effective O&M for structures and land use control.

Among those specified in Table 11.1, all O&M works related to the main structures (A)-1) are recommended to be under the responsibility of DPWH including major and minor O&M as well as regular inspection and maintenance works except the evacuation road as specified below.

O&M works related to (A) - 2) and (B) are recommended as the works to be generally assigned to LGU so that it would encourage the initiative of LGU in the project implementation as well as project O&M activities.

Further, it is recommended that Joint Inspection of the project will be carried out DPWH and LGU including DPWH Head Quarter, DPWH Region X and DPWH District Office as well as Cagayan de Oro City and concerned Barangays, which is conceivable to be undertaken periodically; twice a year such as before and after flood season.

Table 11.1 Proposed Operation and Maintenance Organization

OBJECTIVE STRUCTURES		DPWH(Region X)	LGU(City)
Whole Project Facilities		Joint Inspection	
(A) Structures			
1) Main Structure (Dike, Flood wall, Revetment, Retarding basin, Maintenance road)		X	-
- Embankment Road	DPWH Road	X	-
	City /Barangay Road	X (restoration for heavy structural damage)	X (regular and preventive maintenance)
2) Related Structure		X (structural repair)	X (Preventive maintenance)
- Sluice & Sluice gate	Main structure	X (structural repair)	X (Preventive maintenance)
	Drainage channel (inland side)	-	X
	Operation of sluice gate		X
(B) Land Use Control			
1) River Area 1(River side land; flood plain etc.)		-	X
<i>Temporary use with structure of flood control area(long term)</i>		<i>To be coordinated in the Inter-agency Flood Plain Management</i>	
2) River Area 2 (Dike, Flood wall, Revetment, Retarding basin)	On the structure	X	-
	Land	-	X
	Joint Inspection	(LGU, National Police, DILG)	
3) Embankment Road	DPWH Road	X	-
	City /Barangay Road	-	X

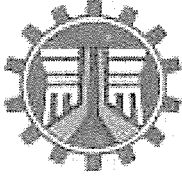
Source: JICA Survey Team

Required Land Use Control for the Project Implementation

- 1) River Area 1-(River side land such as flood control area)
 - (i) LGU shall be responsible for Land(river side area/flood control area) Use Control and Permit in accordance with the Local Government Code, City regulations and the other related regulation i.e. CLUP.
 - (ii) Inspection and guidance activities shall be undertaken by LGU.
 - (iii) Temporary use with structure of flood control area (long term) shall be coordinated in the Inter-agency Flood Plain management.
 - (iv) Temporary use with structure of flood control area (short term) may be permitted by City Ordinance.
 - (v) Revenues from the use of the flood plain may be used for O&M.
- 2) River Area 2-(structures such as Dike, Flood wall, Revetment, Retarding basin)
 - (i) Inspection and advice activities shall be undertaken by the Joint Monitoring Team with LGU, National Police and DILG for any illegal use of structural area.
 - (ii) Space use control shall be a responsibility of DPWH.

Annex 1

**Creation of Steering Committee
for the Preparatory Survey for
Flood Risk Management
Project for Cagayan de Oro
River (FRIMP-CDOR)
(DPWH Department Order
No.61 of 2012)**



REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
OFFICE OF THE SECRETARY
MANILA

697-13 DPWH
69.28.2012

AUG 30 2012

DEPARTMENT ORDER

No. **61**)
Series of 2012. *DPWH*

Subject: Creation of Steering Committee for the Preparatory Survey for Flood Risk Management Project for Cagayan de Oro River (FRIMP-CDOR)

To ensure the effective and coordinated implementation of the Preparatory Survey for Flood Risk Management Project for Cagayan de Oro River with technical assistance from the Government of Japan (GOJ) through the Japan International Cooperation Agency (JICA), a Steering Committee for the said Study is hereby created with the following composition:

1.	Assistant Secretary for Planning and PPP, DPWH	Chairperson
2.	Project Director, PMO-MFCDP, Cluster II	Vice-Chairperson
3.	Director, Planning Service, DPWH	Member
4.	Project Director, PMO-FCSEC, DPWH	Member
5.	Director, Bureau of Design, DPWH	Member
6.	Regional Director, DPWH Region X	Member
7.	DENR-RBCO Representative	Member
8.	DENR Region X Representative	Member
9.	NEDA Representative	Member
10.	OCD Representative	Member
11.	PAGASA Representative	Member
12.	NIA Representative	Member
13.	NWRB Representative	Member

The In-House JICA River Management Advisor in the Planning Service shall be Honorary Member of the Committee.

The main functions of the Steering Committee are as follows:

- a. Monitor the progress of the study;
- b. Provide guidance, resources and support to the Study Team;
- c. Review and evaluate the results and recommendations of the Study Team;
and
- d. Ensure the success and desired outcome of the Study.

The Steering Committee shall hold meetings during the presentation of Status Reports and as may be requested by the Study Team.

A Technical Working Group (TWG) is hereby correspondingly created to be composed of the following:

CAROLINA S. CANUEL OIC-Division Chief, DPD-Planning Service	Chairperson
ALEJANDRO A. SOSA, CEO-VI OIC-Assistant Project Director, PMO-MFCDP, Cluster II	Co-Chairperson
DOLORES M. HIPOLITO Project Manager II, FCSEC	Member
BELINDA I. FAJARDO OIC-Chief, Environmental and Social Services Office (ESSO)	Member
MARCELIANO A. CARLOTA, II Engineer III, Bureau of Design (BOD)	Member
NEDA Representative	Member
OCD Representative	Member
DENR-RBCO Representative	Member
PAGASA Representative	Member
NWRB Representative	Member
NIA Representative	Member

The TWG shall assist the Steering Committee in its functions. It shall hold regular monthly (or as the need arises) coordination meetings with the JICA Study Team to discuss/monitor the progress of the Study.

This order shall take effect immediately.


ROGELIO L. SINGSON
Secretary



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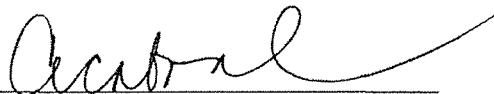
Annex 2

Minutes of Meetings for Steering Committee Meetings

**MINUTES OF MEETING
ON
THE FIRST STEERING COMMITTEE MEETING
ON
INCEPTION REPORT
FOR
PREPARATORY SURVEY FOR FLOOD RISK MANAGEMENT PROJECT
FOR
CAGAYAN DE ORO RIVER**

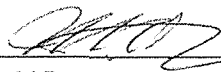
1. In accordance with the Scope of Works on the Preparatory Survey for Flood Risk Management Project For Cagayan de Oro River (hereinafter referred to as “the Survey”) agreed upon between Japan International Cooperation Agency (hereinafter referred to as “JICA”) and Department of Public Works and Highways (hereinafter referred to as “DPWH”), the JICA Survey Team prepared the Inception Report, and has submitted to DPWH on August 31, 2012.
2. The first Steering Committee Meeting was held to have discussion on the Inception Report on August 31, 2012 at the NRIMP Conference Room, DPWH NCR Compound, 2nd St., Port Area, Manila with respect to objectives, schedule and approaches for successful implementation of the Survey.
3. After the series of discussion and exchange of views in the meeting, the Steering Committee and JICA Survey Team hereby agreed upon the contents of the Inception Report and Main Points Discussed as per Annex 1.

Manila, August 31, 2012

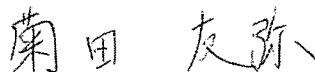


Maria Catalina E. Cabral, PhD
Assistant Secretary
Department of Public Works and Highways

MC



Masaki Ito
Team Leader
JICA Survey Team



Tomoya Kikuta
Team Leader
JICA Advisory Team
Japan International Cooperation Agency

MAIN POINTS OF DISCUSSION

1. Assistant Secretary Maria Catalina E. Cabral, PhD acknowledged the presence of those in attendance, the meeting was called to order at 9:30 A.M. She continued her opening speech with condolence on the calamity brought by the Tropical Storm Sendong in December, 2011.
2. Team Leader of JICA Advisory Team, Tomoya Kikuta expressed his appreciation on the coordination of the DPWH for implementation of the Survey and explained background and objectives of the Survey with introduction of the Survey Team.
3. Team Leader of JICA Survey Team, Masaki Ito presented the main contents of Inception Report using the power point presentation as Attachment.
4. The main results of the discussion which were agreed in the Steering Committee Meeting are as follows:
5. The Steering Committee included the National Water Resources Board (NWRB) in consideration that the Survey Area covers the whole basin of the Cagayan de Oro River and the Scope of Works includes soft components such as the watershed and water resource managements. The Embassy of Japan and JICA Philippine Office recommended to include Department of Social Welfare and Development (DSWD) in the Steering Committee since the project implementation will be closely related to resettlement.
6. Embassy of Japan informed that Non-Project Grant Aid is being arranged to assist resettlement activities in coordination with DSWD after the calamity of Tropical Storm Sendong in the Cagayan de Oro River Basin and Iligan area. They also informed that photographic data taken from a helicopter immediately after the Storm is available in the Cagayan de Oro River Basin.
7. In accordance with the Minutes of Discussion (MOD), the DPWH provided a suitable office space with necessary equipment in Manila at FCSEC office. The office space in the City of Cagayan de Oro is under preparation by DPWH Regional Office at their compound.
8. DPWH organized a Technical Working Group (TWG) chaired by the Chief, Development Planning Division, Planning Service, with appropriate staff from concerned offices that will support the Survey Team instead of assignment of full time counterpart personnel. The counterpart personnel will be nominated upon the request from the Survey Team. DPWH will provide supporting letters to collect all necessary data, documents and information from other agencies.
9. The Survey Team will clarify definition of the river boundary and propose river alignment

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④

through discussions with DPWH, DENR-RBCO and related LGUs.

10. Memorandum of Secretary which was recently issued states upgrading of the standard design scale of river improvements in consideration of climate change and recent calamities. The Survey Team will refer to the Memorandum and the design scale will be studied considering the previous flood damages, design scale of other major rivers, technical viability, economic feasibility and social impact.
11. The Survey Team will conduct environmental assessment under JICA Guidelines for Environmental and Social Considerations" (April 2010). For acquisition of Environmental Compliance Certificate (ECC), the Survey Team should clarify requirements of DENR.
12. DPWH and Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA) will provide their recent results of studies on climate change. The Survey Team will propose alternatives of river improvement plans taking into account those study results on the climate change.
13. The detail member of stakeholders will be determined through the stakeholder analysis in the beginning of the Survey. The Stakeholder Meetings will be held at three (3) times.
14. PAGASA explained their activities in the Cagayan de Oro River Basin. At present they are going to extend early flood forecasting warning system in the area and establish a Flood Forecasting and Warning Center. DOST has launched Nationwide Operational Assessment of Hazards (NOAH) including the Cagayan de Oro River Basin. DPWH and PAGASA has confirmed that the data of the Survey Team and PAGASA should be shared each other in order to contribute for hazard map preparation in the river basin.

Mu

End of Documents

a



**Attendant list
of
Steering Committee Meeting (1)**

Date : 31 August 2012
Place : NREIMP Conference Room, DPWH NCR Compound,
2nd St., Port Area, Manila


No	Name	Position	Organization
1	Asst. Sec. Maria Catalina E. Cabral	Assistant Secretary	Department of Public Works and Highways (DPWH)
2	Dir. Gilberto S. Reyes	Director	Department of Public Works and Highways – Bureau of Design (DPWH – BOD)
3	Dir. Resito V. David	Project Director	Department of Public Works and Highways – Flood Control and Sabo Engineering Center (DPWH – FCSEC)
4	Dir. Rogelio O. Ang	OIC - Project Director	Department of Public Works and Highways, Project Management Office – Major Flood Control and Drainage Project Cluster II (DPWH, PMO – MECDP II)
5	Dr. Nathaniel T. Servando, PhD	Administrator	Department of Science and Technology – Philippine Atmospheric, Geophysical & Astronomical Services Administration (DOST – PAGASA)
6	Dr. Susan Espinueva, PhD	Chief, Hydrometeorological Division	Department of Science and Technology – Philippine Atmospheric, Geophysical & Astronomical Services Administration (DOST – PAGASA)
7	Ryan Tagle	Representative	Office of Civil Defence (OCD)
8	Akihira Okuda	Advisor	Department of Public Works and Highways – Japan International Cooperation Agency (DPWH – JICA)
9	Dolores M. Hipolito	Project Manager II	Department of Public Works and Highways, – Flood Control and Sabo Engineering Center (DPWH – FCSEC)
10	Alejandro A. Sosa	Project Manager II	Department of Public Works and Highways, Project Management Office – Major Flood Control and Drainage Project Cluster II (DPWH, PMO – MECDP II)
11	Maximo F. Bulanadi	Engineer III	Department of Public Works and Highways, Project Management Office – Major Flood Control and Drainage Project Cluster II (DPWH, PMO – MECDP II)
12	Yolanda T. Egam	Chief, Planning Design Division	Department of Public Works and Highways, Region X – Planning Design Division (DPWH, Region X – PDD)
13	Elmo F. Atilano	Engineer III – Project Development Division	Department of Public Works and Highways – Planning Service (DPWH – PS)
14	Mae B. del Rosario	Senior Environmental Management Specialist	Department of Public Works and Highways, Environmental and Social Services Office – Planning Service (DPWH, ESSO – PS)
15	Alvin Y. Diaz	Engineer II	Department of Public Works and Highways, Project Management Office – Major Flood Control and Drainage Project Cluster II (DPWH, PMO – MECDP II)

**Attendant list
of
Steering Committee Meeting (1)**

Date : 31 August 2012
Place : NREIMP Conference Room, DPWH NCR Compound,
2nd St., Port Area, Manila

No	Name	Position	Organization
<u>EOJ, JICA</u>			
1	Akio Yonezawa	Second Secretary	Embassy of Japan
2	Tomoya Kikuta	Team Leader	Japan International Cooperation Agency (JICA) Advisory Team
3	Hayato Nakamura	Project Formulation Advisor	Japan International Cooperation Agency (JICA) Philippine Office
4	Cathy Palanca	Program Officer	Japan International Cooperation Agency (JICA) Philippine Office
<u>JICA Survey Team</u>			
1	Masaki Ito	Team Leader/Flood Control	Consultant
2	Tadahiro Fukuda	Co-team Leader/Water Resource Management	Consultant
3	Yousuf Mamun	Hydraulic Analysis	Consultant
4	Hiroshi Ogawa	Sediment Balance	Consultant
5	Hiroyuki Katsuro	Sabo Engineer	Consultant
6	Narihiro Morisaki	Structure Design	Consultant
7	Tsuyoshi Ito	Institutional Development	Consultant
8	Yasushi Shimano	Non-structural Measures	Consultant
9	Kazuhiko Dobeta	Social Consideration	Consultant
10	Imelda Pagtulon-An	Public Relations	Consultant
11	Akihito Sakurai	Watershed Management	Consultant
12	Naohisa Nakashima	Operation Coordinate	Consultant
13	Rogelio G. Pelaez	Flood Control /Water Resource Management	Consultant
14	Mimi S. Estaris	Social Consideration Specialist	Consultant
15	Gina Reyes	Administration Assist./PKII	Consultant
16			

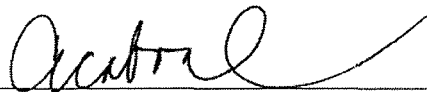
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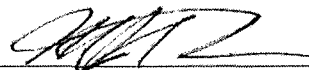
**MINUTES OF MEETING
ON
THE SECOND STEERING COMMITTEE MEETING
ON
DRAFT PROGRESS REPORT
FOR
PREPARATORY SURVEY FOR FLOOD RISK MANAGEMENT PROJECT
FOR
CAGAYAN DE ORO RIVER**

1. In accordance with the Scope of Works on the Preparatory Survey for Flood Risk Management Project For Cagayan de Oro River (hereinafter referred to as “the Survey”) agreed upon between Japan International Cooperation Agency (hereinafter referred to as “JICA”) and Department of Public Works and Highways (hereinafter referred to as “DPWH”), the JICA Survey Team prepared the Draft Progress Report, and has submitted the same to DPWH on December 12, 2012.
2. The second Steering Committee Meeting was held to have discussion on the Draft Progress Report on December 12, 2012 at the NRIMP Conference Room, DPWH NCR Compound, 2nd St., Port Area, Manila with respect to overall schedule, results of the Basic Survey consisting of topographic and river survey, geotechnical investigation, rainfall and run-off analysis, initial study for first draft design and river boundary, sediment balance/sabo facilities, environmental and social consideration, non-structural measures and policy for organization for Project implementation.
3. After the series of discussion and exchange of views in the meeting, the Steering Committee and JICA Survey Team hereby agreed upon the contents of the Draft Progress Report and Main Points Discussed as per Annex 1.

Manila, December 13, 2012



MARIA CATALINA E. CABRAL, PhD
Assistant Secretary
Department of Public Works and Highways



MASAKI ITO
Team Leader
JICA Survey Team

MAIN POINTS OF DISCUSSION

1. Director Rogelio O. Ang, Project Director of DPWH-MFCDP Cluster II chaired the meeting on behalf of the chairperson of the Steering Committee, Assistant Secretary Maria Catalina E. Cabral, PhD. He acknowledged the presence of those in attendance. The meeting was called to order at 9:30 A.M. He continued his opening speech with outline of the Survey and condolence on the calamity brought by the Tropical Storm Pablo in December 4, 2012.
2. Team Leader of JICA Survey Team, Masaki Ito with corresponding experts of the Survey Team presented the main contents of Draft Progress Report using the power point presentation as Attachment.
3. The main results of the discussion which were agreed in the Steering Committee Meeting are as follows:
 - a. The DPWH Region X is currently conducting rehabilitation works of damaged dikes during Tropical Storm Sendong and construction of new dikes in the downstream area of the Cagayan de Oro River, and preparing the plans for additional works. At present, they are discussing with DPWH-BOD for the design of these plans. The Survey Team was requested to join the discussion of this matter which they agreed.
 - b. Engineer Perfecto Zaplan, representative of DPWH-BOD, inquired if there is a proposal for construction of retarding basin in the Project, which is one of key concern of the DPWH Secretary Singson. The Survey Team replied that if construction of dam will be proposed it will be considered as one of retarding basins in the upstream which can regulate peak flood discharge; since it needs large area for construction of retarding basin the Survey Team cannot find an appropriate area in the lower and middle reach of the basin due to topographic condition; however in the lower stretch the Team was able to identify a low lying area at upstream of the Cathedral which might be applicable as retarding basin, but it would be a smaller one.
 - c. Engineer Eugenio O. Diaz Jr., representative of DENR-RBCO, asked if the Survey Team has any basis or results of soil erosion analysis why the sediment flow from the plantation in the upper basin is significant because it will be good input for DENR to improve their environmental programs in arresting soil erosion. The Survey Team explained that the soil erosion issues coming from plantations is covered in the part of non-structural measures, in particular, watershed management is included in the TOR hence the Team will estimate sediment volume comparing the cross sections before and after Sendong.

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- d. Engineer Aldrin S. Albano, DPWH Region X, inquired if the proposed Batang-Bulanog Dam can accommodate the design flood of TS Sendong scale. The Survey Team replied that this dam is planned to be used for a hydropower plant, and in general the water level of reservoir is kept higher for generation of hydropower, on the other hand, there is a conflict for flood control dam the water level should be kept lower to regulate the peak flood. The proposed dam has a 100 m in height and 80 million m³ in volume of storage, therefore it is recommended to propose/negotiate that dam should maintain flood control storage though it needs further study.
- e. Engineer Aldrin continued if the rainfall and run-off analysis considered the run-off from the Bubunawan and Tumalaong Rivers which are major tributaries of the Cagayan de Oro River. The Survey Team explained the rainfall and run-off model developed by the Survey Team have already included the run-off from those rivers.
- f. In term of the river boundary along the Cagayan de Oro River, the Survey Team proposed two options; Option 1 is the ideal river boundary adapted the Water Code of the Philippines and Option 2 is an alternative to protect residential area. DPWH explained that Article 51 of Water Code cited provisions on river easement areas for residential, forest, and agricultural areas, while Article 54 - 56 provide that in declared flood control areas, the government may construct necessary legal easement as wide as maybe needed even beyond or outside the river bed, in addition, the Secretary of DPWH can declare flood control area. DPWH suggested if DPWH accept proposed Option 1, then the measures will be adapted with declaration of the river area by Secretary Singson in accordance with the Water Code, but they also pointed out they will have to consider affected people and the local government taking into account the actual site conditions.
- g. JICA Survey Team pointed out that DPWH had never declared “flood control area” based on the Water Code so far. That is a critical enforcement issue for inappropriate settlement/development within the flood plain area. Also, a challenge for enactment of “No build Zone” related to river boundary is in the process in the Cagayan de Oro City.
- h. JICA Survey Team explained that the Comprehensive Land Use Plan (CLUP), which is considered to include the “No build Zone”, of the Cagayan de Oro City is reviewed the 2nd draft “ at present.
- i. Dr. Susan Espinueva, representative of PAGASA, Hydrometeorological Division, gave an update of their projects that i) early next year Cagayan de Oro River Basin Flood Early Warning Center will be built with accompanying staff, ii) early warning system will be installed beginning next year in Cagayan de Oro River

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Basin under “PHOENIX” project.

- j. Team Leader Masaki Ito requested the Steering Committee to send their comments/recommendations on the Draft Progress Report by January 8, 2013, one (1) week before the next arrival of the Survey Team in particular for comments on proposed options and design for river boundaries. The Steering Committee members agreed to reply through E-mail which will be followed by official letter.



End of Documents

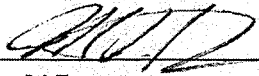
ATTENDEES:		Name	Designation	Organization
Contact Personnel: Team Member:	1	Rogelio O. Ang	Project Director Steering Committee Vice-Chairperson	Department of Public Works and Highways, Project Management Office – Major Flood Control and Drainage Project Cluster II (DPWH, PMO – MFCDP II)
	2	Resito V. David	Project Director Steering Committee Member	Department of Public Works and Highways, Flood Control and Sabo Engineering Center (DPWH – FCSEC)
	3	Alejandro A. Sosa	Assistant Project Director	Department of Public Works and Highways, Project Management Office – Major Flood Control and Drainage Project Cluster II (DPWH, PMO – MFCDP II)
	4	Perfecto Zaplan	Engineer V, Steering Committee DPWH – BOD Representative	Department of Public Works and Highways, Bureau of Design (DPWH, BOD)
	5	Bonifacio R. Lora	OIC – District Engineer, Steering Committee DPWH Region 10 Representative	Department of Public Works and Highways, Region 10, 1st District Engineering Office
	6	Aldrin S. Albano	Engineer II	Department of Public Works and Highways, Region 10
	7	Susan Espinueva	Chief, Hydrometeorological Division, Steering Committee PAGASA Representative	Philippine Atmospheric, Geophysical & Astronomical Services Administration (PAGASA)
	8	Uzein Corcuera	Economic Development Specialist 2, Steering Committee NEDA Representative	National Economic and Development Authority
	9	Eugenio O. Diaz Jr.	Engineer II, Steering Committee DENR – RBCO Representative	Department of Environment and Natural Resources – River Basin Control Office (DENR – RBCO)
	10	Masaki Ito	Team Leader/ Flood Control	Nippon Koei Co., Ltd.
	11	Tadahiro Fukuda	Co-Team Leader/ Water Resource Management	Nippon Koei Co., Ltd.
	12	Hiroyuki Katsuro	Sabo Engineer	Nippon Koei Co., Ltd.
	13	Narihiro Morisaki	Structure Design	Nippon Koei Co., Ltd.
	14	Naohisa Nakashima	Operation Coordinator	Nippon Koei Co., Ltd.
	15	Tsuyoshi Ito	Institutional Development	CTI Engineering International Co., Ltd.
	16	Kazuhiko Dobeta	Social Consideration	PhilKoei International, Inc.
	17	Imelda G. Pagtolun-an	Public Relations	PhilKoei International, Inc.
	18	Mimi S. Estaris	Social Consideration	PhilKoei International, Inc.
	19	Gina E. Reyes	Administration Assistant	PhilKoei International, Inc.
	20	Iris Ann C. Ragusante	Computer Operator I	Department of Public Works and Highways, Project Management Office – Major Flood Control and Drainage Project Cluster II (DPWH, PMO – MFCDP II)

MINUTES OF MEETING
THE THIRD STEERING COMMITTEE MEETING
ON
PROGRESS REPORT
FOR
PREPARATORY SURVEY FOR FLOOD RISK MANAGEMENT PROJECT
FOR
CAGAYAN DE ORO RIVER

1. In accordance with the Scope of Works on the Preparatory Survey for Flood Risk Management Project For Cagayan de Oro River (hereinafter referred to as “the Survey”) agreed upon between Japan International Cooperation Agency (hereinafter referred to as “JICA”) and Department of Public Works and Highways (hereinafter referred to as “DPWH”), the JICA Survey Team prepared the Progress Report, and has submitted to DPWH in June, 2013.
2. The third Steering Committee Meeting was held to have discussion on the Progress Report on July 2, 2013 at the NRIMP Conference Room, DPWH NCR Compound, 2nd St., Port Area, Manila with respect to overall schedule, results of the rainfall and run-off analysis, river improvement plan and river boundary, sediment balance/sabo facilities, environmental and social consideration, non-structural measures, organization for project implementation and operation and maintenance.
3. After the series of discussion and exchange of views in the meeting, the Steering Committee and JICA Survey Team hereby agreed upon the contents of the Progress Report and Main Points of Discussion as per Annex 1.

Manila, July 3, 2013

Maria Catalina E. Cabral, PhD
Assistant Secretary for Planning and PPP
Department of Public Works and Highways



Masaki Ito
Team Leader
JICA Survey Team

MAIN POINTS OF DISCUSSION

1. Maria Catalina E. Cabral, PhD, Assistant Secretary of DPWH chaired the meeting. She acknowledged the presence of those in attendance, the meeting was called to order at 10:00 a.m. She continued her opening speech with outline of the Survey.
2. Team Leader of JICA Survey Team, Masaki Ito with relevant experts of the Survey Team presented the main contents of Progress Report using the power point presentation as Attachment.
3. The main results of the discussion which were agreed in the Steering Committee Meeting are as follows:

Main Points:

1. The Environmental and Social Consideration Category of the JICA Survey was changed from B to A (likely to have a significant impacts) by JICA, due to the increased number of project affected persons (approximately 660 houses or 3,000 persons) identified through the preliminary counting of structures using the aerial photographs taken in December 2012. With the requirements of JICA Guideline for Environmental and Social Consideration, the JICA Survey is required to prepare the EIA and the Resettlement Action Plan with its schedule to be extended by about two (2) months.
2. As the result of Master Plan Study to be conducted, a comprehensive plan (blueprint) shall be needed to emphasize the information on protected area "without the dam scenario" at 25-year protection level, and the final goal "with the dam scenario" to show how it will graduate to a 50-year protection level. This is to present the phasing implementation of the project, and also serve as a basis for the decision of the DPWH to push for the dam construction for a 50-year protection level in the future.
3. The River Boundary along the downstream of the Cagayan de Oro River was determined through the deliberation in the meeting with the DPWH Secretary Singsong on March 19, 2013. As the next step, DPWH shall consider declaration of the flood control area in accordance with the Water Code. If otherwise, the City Government of Cagayan de Oro will continue issuing building permits, subdivision permits and so on when the Comprehensive Land Use Plan (CLUP) does not include any provision on the flood control areas. DPWH may declare the flood control areas with the assistance of DENR-MGB that has prepared hazard maps and also assistance of the JICA Survey. Further, identification of steps (mechanisms) leading to declaring flood control areas should be discussed through the technical working group in consideration of the legal basis. DENR-RBCO stated that the hazard maps had been prepared by DENR-MGB with the scale of 1:50,000 and is at present.



being updated to the scale of 1:10,000. DPWH, therefore, can declare flood control areas using said hazard maps in the proposed project areas.

4. At present, urgent structural measures along the Cagayan de Oro River are being implemented or proposed by DPWH Office of Region X. DPWH needs to validate that these measures should be integral to the overall master plan to be recommended by the JICA Survey. The JICA Survey Team has stated that these urgent works include construction of a small dike to temporarily close all sections of the left banks in the upstream of the Ysalina Bridge and immediate rehabilitation of damaged dikes and seawalls are inevitable to mitigate flood risks in the Cagayan de Oro River while waiting implementation of the priority projects. Upon coordinating with DPWH Office of Region X on the proposed structural measures, the JICA Survey Team confirmed the integrality of the proposed diking system along the Cagayan de Oro River based on an official letter from the Regional Office.
5. In order to organize institutional set-up for the project implementation and operation and maintenance, a Memorandum of Understanding (MOU) shall be prepared between DPWH and other stakeholders on the Operation and Maintenance of proposed measures. This will be one of the requirements of the JICA Appraisal Mission.
6. Economic evaluation of the Project shall be discussed prior to submission of the Implementation Program (IP). Major evaluation points of NEDA-ICC on IP are: (a) the project costs and benefits composed of both quantifiable and non-quantifiable benefits such as income and opportunity loss, schooldays missed, food security related to loss of crops when there is flooding and (b) technical and financial justification for ODA such as expertise not locally available, expanded expertise requirement, equipment, etc..
7. The construction of the dam will be evaluated as a proposed long term measure from the viewpoint of flood management. It will be needed to consider integrated water management including hydropower generation, irrigation, water supply, and recreation, etc. in the future.
8. The JICA Survey Team is to show outcome of economic analysis by various structural intervention in the interim report.



End of Documents

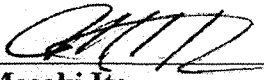
DATE:	2 July 2013		TIME:	9:00 – 12:30
VENUE:	NRIMP Conference Room, Department of Public Works and Highways (DPWH) NCR Compound, 2 nd St., Port Area, Manila			
SUBJECT:	Steering Committee Meeting			
ATTENDEES:		Name	Designation	Organization
Contact Personnel: Team Member:	1	Maria Catalina E. Cabral	Assistant Secretary	Department of Public Works and Highways, Planning and PPP (DPWH, P & PPP)
	2	Rogelio O. Ang	Project Manager	Department of Public Works and Highways, Project Management Office – Flood Control
	3	Alejandro A. Sosa	Project Manager	Department of Public Works and Highways, Project Management Office – Flood Control, Flood Risk Management Project (DPWH, PMO – FRIMP)
	4	Dolores M. Hipolito	Project Manager	Department of Public Works and Highways, Project Management Office – Flood Control, Flood Control and Sabo Engineering Center (DPWH, PMO - FCSEC)
	5	Carolina S. Canuel	OIC, Division Chief	Department of Public Works and Highways, Planning Service – Development Planning Division(DPWH, PS – DPD)
	6	Perfecto Zaplan	Engineer V	Department of Public Works and Highways, Bureau of Design (DPWH, BOD)
	7	Maximo F. Bulanadi	Engineer IV	Department of Public Works and Highways, Project Management Office – Flood Control, Flood Risk Management Project (DPWH, PMO – FRIMP)
	8	Milagrosa Estandarte	Engineer II	Department of Public Works and Highways, Region 10
	9	Ramon F. dela Cruz	Engineer II	Department of Public Works and Highways, Region 10
	10	Eugenio Diaz Jr.	Engineer II	Department of Environment and Natural Resources – River Basin Control Office (DENR – RBCO)
	11	Roy Badilla	Assistant Weather Services Chief	Philippine Atmospheric, Geophysical & Astronomical Services Administration (PAGASA)
	12	Nivagine Nievares	Weather Specialist I	Philippine Atmospheric, Geophysical & Astronomical Services Administration (PAGASA)
	13	Sachiko Takeda	Senior Representative	Japan International Cooperation Agency (JICA)
	14	Takaaki Kusakabe	Advisor	Japan International Cooperation Agency – Office of Civil Defense (JICA -OCD)
	15	Hayato Nakamura	Project Formulation Advisor	Japan International Cooperation Agency (JICA) Philippine Office
	16	Masaki Ito	Team Leader/ Flood Control	Nippon Koei Co., Ltd.
	17	Tadahiro Fukuda	Co-Team Leader/ Water Resource Management	Nippon Koei Co., Ltd.
	18	Narihiro Morisaki	Structure Design	Nippon Koei Co., Ltd.
	19	Naohisa Nakashima	Operation Coordinator	Nippon Koei Co., Ltd.
	20	Kazuhiko Dobeta	Social Consideration	PhilKoei International, Inc.
	21	Annie L. Ambrosio	Resettlement Survey Team Leader	PhilKoei International, Inc.
	22	Mimi S. Estaris	Social Consideration	PhilKoei International, Inc.
	23	Gina E. Reyes	Administration Assistant	PhilKoei International, Inc.

MINUTES OF MEETING
THE FOURTH STEERING COMMITTEE MEETING
ON
PROGRESS REPORT
FOR
PREPARATORY SURVEY FOR FLOOD RISK MANAGEMENT PROJECT
FOR
CAGAYAN DE ORO RIVER

1. In accordance with the Scope of Work of the Preparatory Survey for flood Risk Management Project for Cagayan de Oro River (hereinafter referred to as the "Survey") upon the agreement between Japan International Cooperation Agency (hereinafter referred to as the "JICA") and Department of Public Works and Highways (hereinafter referred to as "DPWH"), the Interim Report was prepared by the JICA Survey Team.
2. The Fourth Steering Committee Meeting was held on October 17, 2013 at the NRIMP Conference Room, DPWH NCR Compound, 2nd St., Port Area, Manila to discuss the contents of the aforementioned Interim Report; overall schedule, result of the inundation analysis, master plan, structural short-term measures, non-structural measures, institutional development, environmental and social conditions.
3. After the discussion and exchange of views in the meeting, the Steering Committee and JICA Survey Team have agreed upon the contents of the Interim Report and Main Points of Discussion as per Annex 1.

Manila, October 17, 2013

Maria Catalina E. Cabral, PhD
Assistant Secretary for Planning and PPP
Department of Public Works and Highways



Masaki Ito
Team Leader
JICA Survey Team

MAIN POINTS OF DISCUSSION

1. Ms. Nenita R. Jimenez, OIC-Chief, DPWH, Development Planning Division chaired the meeting on behalf of DPWH Assistant Secretary for Planning and PPP Maria Catalina E. Cabral and was called to order 9:30 a.m. Mr. Alejandro A. Sosa, DPWH, Project Manager, PMO-FRIMP, opened the meeting by discussing the outline of the Survey.
2. The Minutes of Meeting of 3rd Steering Committee were reviewed and approved with amendments.
3. Mr. Masaki Ito, JICA Survey Team Leader, together with the Survey Team experts presented the main contents of the Interim Report as provided in the Attachment.
4. Mr. Alejandro A. Sosa, Project Manager, DPWH, PMO-FRIMP, relayed that a Memorandum dated October 3, 2013 states that the conditions of the Project Cost estimation be guided by the Secretary's policy instruction taken on previous ODA Projects. This Memorandum shall be complied with in the preparation of the Implementation Program with NEDA ICC PE Form.
5. The main points in the discussion as agreed upon during the Steering Committee Meeting are as follows:

Main Points:

1. Ms. Coy Roncesvalles, NEDA, suggested that since there are around 1,200 structures affected by implementation of the Project requiring resettlement and compensation, consultation meetings should be held and it is necessary that the cost should include all affected structures.
The JICA Survey Team explained that a series of Stakeholder Meetings have been held since this January, and the replacement cost of all affected structures were included and computed by building typology. In addition, land acquisition cost includes the lands required for right-of-way for the construction of structures and the river area at high flood risk level excluding areas in the No Build Zones.
2. Mr. Eugenio Diaz, RBCO-DENR, conveyed that a Study for Integrated Watershed Management Master Plan in the Cagayan de Oro River Basin is being conducted at present aside from the JICA Survey. It can strengthen the integrated watershed management projects in the basin if these are also proposed in the Master Plan of FRIMP-CDOR.
3. Mr. Eugenio Diaz, RBCO-DENR, also asked if there is any actual investment for watershed management and other non- structural measures in the proposed Master Plan.

The JICA Survey Team replied that technical assistance for riparian forest establishment in the agricultural lands and mangrove forest establishment along the coastal areas under the Consulting Service of the Project is proposed but no investment is included in the Project cost.

Mr. Diaz suggested that while it is important to conserve the mangrove at the river mouth, it is really needed to do reforestation in the upper basin of the Cagayan de Oro River.

JICA Philippines Office stated that non-structure measure is a concern by several agencies that makes project implementation more complicated, therefore, it is not decided yet for DPWH to include these non- structural measures in the Loan project.

4. Ms, Coy Roncesvalles, NEDA asked about implementation status of the proposed urgent measures and NEDA-ICC process.

Mr. Alejandro A. Sosa, DPWH, explained that at the moment DPWH Region X is implementing the rehabilitation works of damaged river structures along the Cagayan de Oro River as urgent measures and the short-middle term measures proposed in the Master Plan will be the Priority Project to be conducted under the possible JICA Loan. Furthermore, the endorsement of the City Development Council was obtained on October 14 but the DPWH has not yet officially submitted the NEDA ICC PE Form awaiting the finalization of F/S cost estimation and will try to meet the schedule.

5. Ms. Sachiko Takeda, JICA Philippine Office inquired about the following:

- 1) Calculation of the EIRR
- 2) Adaptation of Japanese Technology as discussed in the 3rd Steering Committee Meeting.
- 3) Concern of the Cagayan de Oro City Mayor regarding the dike alignment, resettlement, and attention to cultural heritage assets, if any, in the EIA preparation, along Burgos Street.
- 4) Progress of incorporating the river boundary into the Comprehensive Land Use Plan (CLUP) and readiness of DPWH to declare the river boundary.

JICA Survey Team replied:

- 1) Project benefit is estimated based on the comparison of flood damages between “with” and “without” project. To estimate the flood damages, inundation analysis model in the downstream of Cagayan de Oro River was developed and analysis was done for each return period. Land enhancement benefit was included in the economic analysis in the FS stage.
- 2) There are some Japanese Technologies adopted and/or to be adopted for the FRIMP-CDOR. The river boundary which is an essential issue for Flood Risk Management was established along the Cagayan de Oro River in the course of the JICA Survey under the technical guidance of the Survey The design and construction methods of the countermeasure of soft foundation ground were proposed for the construction of the dike and floodwall taking into account the experience in Japan. The detail construction method for improvement of the abutment of the Kagay-An Bridge will be studied in reference to Japanese

technology so that main parts of the existing bridge can be used effectively and construction works would not disturb local traffic conditions as much as possible.

- 3) Burgos Street concerns are found in Item 6.
- 4) While the update of the CLUP by the City Government of Cagayan de Oro is ongoing, the river boundary has not been included because it is not yet officially declared by the DPWH. However, in the meeting of the RDC-Regional Land Use Committee on October 9, 2013, there was a statement that river boundary shall be incorporated into the updated CLUP.

6. Mr. Maximo Bulanadi, DPWH, mentioned that the inclusion of a boulevard in the Project was officially requested by DPWH based on a RDC-RAC Resolution in May/June 2013. Although further discussions are needed on the design and technical details as well as the extent of relocation for Burgos Street, the approval and future implementation of the project shall be given priority at this stage as expressed by the Mayor Moreno at the City Development Council on October 14, 2013. The DPWH will continue to discuss with and convince the City Mayor in order to confirm the dike alignment along the Burgos Street with the original plan as basis.

The JICA Survey Team explained that Burgos Street is definitely an old settlement in the city proper where many people have lived for a long time however the result of the Socio-Economic Survey confirmed that no heritage site or structure of historical or cultural significance is present along Burgos Street.

7. Mr. Marceliano Carlota, DPWH-BOD, mentioned that the proposed Master Plan can address flooding in the magnitude of Sendong in reference to the Memorandum from DPWH Secretary Rogelio Singson regarding the design scale in relation to climate change adaptation. He asked if there are other considerations for climate change adaptation in the Master Plan like countermeasures taking into account increasing sea water level and setting of freeboard.

The JICA Survey Team explained that the river improvement works is designed for 25-year flood scale and the construction of a dam in the upper basin is designed for the recorded maximum flood of TS Sendong (approximately 50-year return period). The proposed retarding basin at river mouth will alleviate backwater caused by the increase of sea level. Freeboard is set at 1.2 m above DHWL according to the design criteria of DPWH. BOD recommended that the JICA Survey Team confirm if the proposed freeboard can accommodate the condition stipulated in the Memorandum of DPWH Secretary Singson.

8. Mr. Marceliano Carlota, DPWH-BOD, suggested that channel excavation and dredging will have impacts on surrounding river structures and quarry activities. Ms. Cathy Palanca, JICA Philippine Office, asked about the necessity of channel excavation and dredging in the proposed Project.

The JICA Survey Team clarified that the river survey has just been completed in this Master Plan Stage and it is necessary to continue monitoring the fluctuation of river cross section and sedimentation in the channel. In the Master Plan, maintenance

dredging/excavation is proposed as per the result of interviews at the site and assessment of the latest cross section survey data that the river bed is likely to rise in the downstream stretch near the river mouth.

Mr. Eugenio Diaz, RBCO-DENR, asked about the status of sediment transportation and riverbed fluctuation analysis.

The JICA Survey Team explained that the riverbed fluctuation analysis has been done preliminarily. However, input condition (sediment load, riverbed material and cross section) are insufficient in quality and quantity so that the analysis is limited to dry-running. In the future, it is required that collecting the said data and developing the model be done continually.

9. Ms, Coy Roncesvalles, NEDA, asked about the impacts on existing bridges in the project area for capacity of flood design and construction of the proposed dike.

The JICA Survey Team replied that it is necessary to improve the left abutment of the Kagaya-An Bridge because the abutment and approach road embankment is blocking the waterway in flow area. For the Ysalina Bridge, because the existing slope protection works are encroaching in the river area and had been damaged during TS Sendong, it is proposed to rehabilitate and set back so as not to obstruct the flow area at the bridge section. The other bridges do not need to be improved.

10. Mr. Higinio Mangosing, NWRB, suggested the inclusion of drainage improvement behind the dike in the Project.

The JICA Survey Team replied that improvement of the drainage system is not included in the Project, however outlets of the drainage channels with sluice gates are to be constructed properly as river structures.

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End of Documents

DATE:	17 October 2013		TIME:	9:00 – 12:00 noon
VENUE:	NRIMP Conference Room, Department of Public Works and Highways (DPWH) NCR Compound, 2 nd St., Port Area, Manila			
SUBJECT:	4 th Steering Committee Meeting			
ATTENDEES:		Name	Designation	Organization
Contact Personnel: Team Member:	1	Alejandro A. Sosa	Project Manager	Department of Public Works and Highways, Project Management Office – Flood Control, Flood Risk Management Project (DPWH, PMO – FRIMP)
	2	Nenita R. Jimenez	Engineer IV (OIC-Chief)	Department of Public Works and Highways, (DPWH-Planning Service)
	3	Maximo F. Bulanadi	Engineer IV	Department of Public Works and Highways, Project Management Office – Flood Control, Flood Risk Management Project (DPWH, PMO – FRIMP)
	4	Jerry Fano	Engineer III	Department of Public Works and Highways, (DPWH-FCSEC)
	5	Emmie Ruales	Engineer IV	National Water Resources Board (Policy & Program Division)
	6	Higino C. Mangosing	Engineer IV	National Water Resources Board (Monitoring and Enforcement Division)
	7	Ramon F. dela Cruz	Engineer II	Department of Public Works and Highways, Region X
	8	Ivy Ramos	Engineer III	Department of Public Works and Highways, (DPWH-ESSO)
	9	Leonila R. Mercado	Engineer IV	Department of Public Works and Highways (DPWH-PMO-FC)
	10	Eugenio Diaz Jr.	Engineer II	Department of Environment and Natural Resources – River Basin Control Office (DENR – RBCO)
	11	Marceliano A. Carlota II	Engineer IV	Department of Public Works and Highways (Water Project Division-Bureau of DesignBOD)
	12	Rosalie C. Pagulayan	Weather Specialist 2	Philippine Atmospheric, Geophysical and Astronomical Services Administration
	13	Coy Roncesvalles	Supervisor,EDS	National Economic and Development Authority (NEDA-IS)
	14	Sachiko Takeda	Senior Representative	Japan International Cooperation Agency (JICA) Philippine Office
	15	Hayato Nakamura	Project Formulation Advisor	Japan International Cooperation Agency (JICA) Philippine Office
	16	Cathy Palanca	Program Officer	Japan International Cooperation Agency (JICA) Philippine Office
	17	Masaki Ito	Team Leader/ Flood Control	Nippon Koei Co., Ltd.
	18	Tadahiro Fukuda	Co-Team Leader/ Water Resource	Nippon Koei Co., Ltd.

			Management	
19	Narihiro Morisaki	Structure Design	Nippon Koei Co., Ltd.	
20	Naohisa Nakashima	Operation Coordinator	Nippon Koei Co., Ltd.	
21	Kazuhiko Dobeta	Social Consideration	PhilKoei International, Inc.	
22	Gina E. Reyes	Administration Assistant	PhilKoei International, Inc.	

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Annex 3

Minutes of Meetings for Courtesy Call

**Preparatory Survey for
Flood Risk Management Project for Cagayan de Oro River – FRIMP-CDOR**

MINUTES OF MEETING

		Prepared by:	Mimi S. Estaris
DATE:	03 September 2012	TIME:	10:30 – 11:00AM
VENUE:	Office of the Governor, Misamis Oriental Provincial Capitol, Cagayan de Oro City		
SUBJECTS:	Courtesy Visit to the Governor of Misamis Oriental		
ATTENDEES:		Name	Designation
		Office of Provincial Government	
	1	Governor Oscar S. Moreno	Governor , Provincial Government of Misamis Oriental
	2	Chedilyn Aissa D. Sajulga	OIC, Provincial Planning Officer , Provincial Planning and Development Office (PPDO), Provincial Government of Misamis Oriental
	3	Teodoro A. Sabugaa Jr.	Head Officer, PSWD , Provincial Social Welfare and Development Office (PSWD), Provincial Government of Misamis Oriental
	4	Roxanne Jul L. Tandang	Planning & Development Officer I , Provincial Planning and Development Office (PPDO), Provincial Government of Misamis Oriental
		JICA	
	1	Tomoya Kikuta	Team Leader of JICA Advisory Team
	2	Hayato Nakamura	Project Formulation Advisor, JICA Philippine Office
	3	Akihisa Okuda	JICA-DPWH Advisor
		DPWH	
	1	Maximo F. Bulanadi	Engineer- III, Project Management Office- Major Flood Control and Drainage Project Cluster II (PMO-MFCDP-II, DWPH)
	2	Roy R. Quilaton	Project Coordinator, Project Management Office- Major Flood Control and Drainage Project Cluster II (PMO-MFCDP II- DPWH)
		JICA SURVEY TEAM	
	1	Masaki Ito	Team Leader/Flood Control
	2	Tadahiro Fukuda	Co-Team Leader/Water Resource Management
	3	Yousuf Mamun	Hydraulic Analysis
	4	Hiroshi Ogawa	Sediment Balance
	5	Hiroyuki Katsuro	Sabo Engineer
	6	Narihiro Morisaki	Structure Design
	7	Tsuyoshi Ito	Institutional Development
	8	Yasushi Shimano	Non-Structural Measures
	9	Kazuhiko Dobeta	Social Consideration
	10	Akihito Sakurai	Watershed Management
	11	Naohisa Nakashima	Operation Coordinator
	12	Imelda G. Pagtolun-an	Public Relations
	13	Rogelio G. Pelaez	Flood Control/ Water Resource Management
	14	Mimi S. Estaris	Social Consideration
	15	Sonia Dumaraog	Administrative Assistant

No.	Issues	Summary of Discussion
1	Project Information	<p>The Governor was provided with an overview of the project description, objective, and duration. The study will:</p> <ul style="list-style-type: none"> ▪ Formulate and propose plans for imminent implementation. ▪ Coordinate with local government and other stakeholders.
2	Support of Provincial Government for FRIMP - CDOR	<p>JICA is not new in the city and has been a key partner of Northern Mindanao. The province and the city are linked and will help the project (FRIMP – CDOR) even if there are legal boundaries. The Provincial Government will help in any they can:</p> <ul style="list-style-type: none"> ▪ The Provincial Social Welfare and Development Office (PSWDO) and Provincial Planning and Development Office (PPDO) and the respective heads of office were named to assist the project. ▪ Participation in the upcoming meetings.
3	Suggestion of the Provincial Government	<p>The Governor recommended that the Study Team coordinates with the Cagayan de Oro River Basin Management Council (CDORBMC) headed by Cagayan de Oro Archbishop Antonio J. Ledesma and is actively involved in the development of the river basin.</p>

End of Document

**Preparatory Survey for
Flood Risk Management Project for Cagayan de Oro River – FRIMP-CDOR**

MINUTES OF MEETING

		Prepared by:	Rogelio G. Pelaez
DATE:	03 September 2012	TIME:	2:00 PM
VENUE:	DPWH- Region X Conference Hall CDO		
SUBJECTS:	Kick-off Meeting for FRIMP - CDOR		
ATTENDEES:	Name	Designation	
	1	Efren A. Berba	Assistant Regional Director, DPWH, Region - X
	2	Yolanda T. Egam	Chief, Planning Division, DPWH Region - X
	3	Ana C. Cañeda	Regional Director, Office of Civil Defense, Region-X
	4	Ricardo A. Mercado	Chief Regional Services Division, DOST-PAGASA
	5	Fidel P. Gamos Jr.	Chief, Forest Resources Division, DENR Region - X
	6	Chedilyn Aissa Dulguime-Sajulga	OIC- Provincial Planning Officer, Provincial Planning and Development Division, Province of Misamis Oriental (PPDO, MIS OR)
	7	Jaime H. Pecampara	Chief, Economic Development Specialist, Project Monitoring and Evaluation Division, (PMED- NEDA)
	8	Nestor A. Lisondra	Supervising Economic Development Specialist, Project Monitoring and Evaluation Division, (PMED- NEDA)
	9	Madelaine Gilda S. Abellera	Program Head, National Housing Authority (NHA)
	10	Bonifacio R. Lora	OIC- District Engineer, 1 st District Engineering Office,, DPWH Cagayan de Oro City (DPWH, 1st DEO)
	11	Allan S.Borromeo	OIC-District Engineer, 2 nd District Engineering Office, DPWH Cagayan de Oro City (DPWH, 2 nd DEO)
	12	Jaime S. Cayabyab	Chief, Equipment Maintenance Division, 1 st District Engineering Office (DPWH, CDO 1 ST DEO)
	13	Maximo F. Bulanadi	Engineer- III, Project Management Office- Major Flood Control and Drainage Project Cluster II (PMO-MFCDP-II, DWPH)
	14	Roy R. Quilaton	Project Coordinator, Project Management Office- Major Flood Control and Drainage Project Cluster II (PMO-MFCDP II- DPWH)
	15	Lomer G. Caldes	Engineer- III, DPWH Region - X
	16	Aldrin S. Albano	Engineer- II, DPWH Region - X
	17	Leowald L. Pecore	Engineer- II, DPWH Region - X
	18	Vincent B. Saldua	Engineer- II, DPWH Region - X
	19	Roxanne Jul L. Tandang	Planning and Development Officer –I, Provincial Planning and Development Office , Province of Misamis Oriental (PPDO-MIS OR)
	20	Luciana T. Mercada	Specialist –I, DOST- PAGASA
	21	Daisy B. Gaerlan	Human Resources Management Officer – I, DPWH Region - X
	22	Percival Palamine	Administrative Assistant-III, DPWH Region - X
	23	Alma Quepes	Administrative Assistant –III, DPWH Region - X
	24	Ama Lonto	Administrative Assistant – I, DPWH Region - X
	25	Tomoya Kikuta	Team Leader of JICA Advisory Team
	26	Akihisa Okuda	JICA –DPWH Advisor

	27	Hayato Nakamura	Project Formulation Advisor (Disaster Management)
	28	Masaki Itoh	Team Leader -Nippon Koei Co.,Ltd.
	29	Tadahiro Fukuda	Co- Team Leader - Nippon Koei Co., Ltd.
	30	Norihiko Morisaki	Structural Engineer - Nippon Koei Co., Ltd.
	31	Yousuf Mamun	Hydrologist - Nippon Koei Co.,Ltd.
	32	Kazuhiko Dobeta	Social Consideration Expert – Nippon Koei Co., Ltd
	33	Hiroshi Ogawa	Sediment Balance Expert – Nippon Koei Co., Ltd
	34	Hiroyuki Katsuro	Sabo Engineer – Nippon Koei Co.. Ltd
	35	Akihito Sakurai	Watershed Mangmt Expert Nippon Koei Co., Ltd
	36	Tsuyoshi Ito	Institutional Dev. Expert - CTII
	37	Yasushi Shimano	Non- Structural Measures
	38	Naohisa Nakashima	Operation Coordinator
	39	Imelda G. Pagtolun -an	Public Relations
	40	Rogelio G. Pelaez	Flood Control Engineer/Water Resource Management Philkoei Int'l Inc.
	41	Mimi Estaris	Social Consideration Expert
	42	Sonia Dumaraog	Administrative Assistant, Philkoei Int'l Inc.

ISSUES AND DISCUSSIONS

	Issues	Summary of Discussion
1	Project Purpose /Introduction of all participants	Mr. Tomoya Kikuta, Team Leader of JICA Advisory Team, started the meeting by introducing the FRIMP – CDOR Project and its purpose in upgrading the existing CDOR Master Plan for possible mitigating measures to be design due to effects of tropical storm “Sendong” . Mr. Hayato Nakamura of JICA Philippine office also clarified the Survey Team task for this MS/FS upgrading work.
2	Review of the Project Inception Report topics for the Kick-Off Meeting	Mr. Masaki Ito, Team Leader of the Survey presented the various tasks to be undertaken during the duration of this MS/FS upgrading work and hope that all needed data collected by the various LGU’s after tropical storm “ Sendong” will be made available to the survey Team. The Kick-off Meeting was Chaired by Assist. Dir. Efren A. Berba of Region-X in the absence of Dir. Barroso.
3	Composition of Steering Committee	Engr. Max Bulanadi from DPWH-PMO –Cluster II, serve as the moderator for the Kick-off Meeting and informed the composition of the Steering Committee that will oversee the Survey Team Studies.
4	River Boundary and “NO BUILD ZONE” area established by NHA	Mrs. Adelina, Gilda S, Abellera, NHA Program Head informed the body that NHA have put up a “NO BUILD ZONE” area on the affected river portion and hope that the river boundary of more than 3.0m shall be considered in this study. Mr. M. Ito and Mr. T. Fukuda explained that the Survey Team will study/consider the establishment of firmament river boundary on this study, however, this could be done only after the result of the Aerial Topographic survey had been completed. Mr. M. Ito also explained that the final recommended river boundaries shall be presented to the stake holder for final decision.
5	MS/FS Study and proposed loan coverage	PMED-NEDA inquired if this project will be financed under the loan and if it will cover the new river boundaries or it will only consider portion/or one river basin of the CDOR MS Plan. Mr. Ito explained that the study is financed under JICA grant but the Project will be under Loan, and the Survey Area will consider all the whole river basin of CDOR. It was added that previous M/P and F/S was prepared by DPWH under GOP.
6	Prior Study of CDOR mitigating measures made by different LGU’s	NHA head also informed that there had been numerous risk management studies prepared by different LGU’s so they are concerned that these studies shall be adopted for the JICA Survey Team. Mr. Ito explained that all available studies made after tropical storm “ Sendong” shall be considered and collated under this MS/FS

		upgrading work to come up with one unified result for FRIMP-CDOR.
7	OCD Concern	Ms. Ana C Caneda of OCD – X expressed their concern about the displacement of residents' in the river boundary study areas and recommended it will be addressed in the Survey.
8	Courtesy Call to Archbishop, chairman of Cagayan de Oro River Basin Management Council	DENR informed that Cagayan de Oro River Basin Management Council (CDORNMC) was established recently, and recommended to have a courtesy call to Archbishop, Antonio Ledesma, the Chair of CDORBMC.

**Preparatory Survey for
Flood Risk Management Project for Cagayan de Oro River – FRIMP-CDOR**

MINUTES OF MEETING

		Prepared by:	Mimi S. Estaris	
DATE:	03 September 2012		TIME:	4:00 -4:30PM
VENUE:	OFFICE OF THE MAYOR, CAGAYAN DE ORO CITY HALL			
SUBJECTS:	Courtesy Call for FRIMP - CDOR			
ATTENDEES:		Name	Designation	
		Office of City Mayor		
	1	Mayor Vicente Y. Emano	Cagayan de Oro City Mayor	
	2	Cheryl Moncay	Staff	
	3	Gigi Lazaga	Staff	
		JICA		
	4	Tomoya Kikuta	Team Leader of JICA Advisory Team	
	5	Hayato Nakamura	Project Formulation Advisor, JICA Philippine Office	
	6	Akihisa Okuda	JICA-DPWH Advisor	
		DPWH	Team Leader of JICA Advisory Team	
	7	Maximo F. Bulanadi	Engineer- III, Project Management Office- Major Flood Control and Drainage Project Cluster II (PMO-MFCDP-II, DWPH)	
	8	Roy R. Quilaton	Project Coordinator, Project Management Office- Major Flood Control and Drainage Project Cluster II (PMO-MFCDP II- DPWH)	
		JICA SURVEY TEAM		
	9	Masaki Ito	Team Leader/Flood Control	
	10	Tadahiro Fukuda	Co-Team Leader/Water Resource Management	
	11	Yousuf Mamun	Hydraulic Analysis	
	12	Hiroshi Ogawa	Sediment Balance	
	13	Hiroyuki Katsuro	Sabo Engineer	
	14	Narihiro Morisaki	Structure Design	
	15	Tsuyoshi Ito	Institutional Development	
	16	Yasushi Shimano	Non-Structural Measures	
	17	Kazuhiko Dobeta	Social Consideration	
	18	Akihito Sakurai	Watershed Management	
	19	Naohisa Nakashima	Operation Coordinator	
	20	Imelda G. Pagtolun-an	Public Relations	
	21	Rogelio G. Pelaez	Flood Control/ Water Resource Management	
	22	Mimi S. Estaris	Social Consideration	
	23	Sonia Dumaraog	Administrative Assistant	
	35			
	36			
No.	Issues	Summary of Discussion		
1	Introduction	Mr. Kikuta and Mr. Nakamura conveyed briefly the description, objective, and duration of the Preparatory Survey for Flood Risk Management Project for Cagayan de Oro River to Cagayan de Oro City Mayor Vicente Emano.		

2	Comments from Mayor Emano (Cagayan de Oro City)	<p>The city is grateful and supportive of JICA and its projects. JICA has done so much not only for the city but for the whole province since he was the former governor. Mayor's support for the Preparatory Survey for Flood Risk Management Project for Cagayan de Oro River and request for its result:</p> <ul style="list-style-type: none"> ▪ The Study Team may come to the Mayor's Office for assistance regarding the project and the mayor holds office until 10 in the evening. ▪ Aside from updates on the progress of the study, the proposed measures resulting from its completion can be incorporated in the plans of the city.

End of Document

**Preparatory Survey for
Flood Risk Management Project for Cagayan de Oro River – FRIMP-CDOR**

MINUTES OF MEETING

		Prepared by:	Mimi S. Estaris
DATE:	04 September 2012	TIME:	14:10 – 15:20
VENUE:	Conference Room, Provincial Economic Enterprise Development Management Office, Bukidnon Provincial Capitol, Malaybalay City, Bukidnon		
SUBJECTS:	Courtesy Visit to the Governor of Bukidnon		
ATTENDEES:		Name	Designation
		Office of Provincial and Municipal Governments	
	1	Rebecca S. Capistrano	Planning Officer IV , Provincial Planning and Development Office
	2	Cecille M. Egnar	Senior Environmental Management Specialist , Bukidnon Environment and Natural Resources Office (BENRO)
	3	Bonifacio G. Suarez	Engineer IV , Provincial Engineering Office - Bukidnon
	4	Robinson Calam	Municipal Engineer , Municipal Engineer's Office, Municipality of Talakag
	5	Ramon R. Malabo	Municipal Engineer , Municipal Engineer's Office, Municipality of Libona
	6	Romie L. Balingos	Draftsman II , Municipal Engineer's Office, Municipality of Libona
	7	Melinda Tulba	Administrative Officer , National Commission on Indigenous Peoples (NCIP), Provincial Office – Bukidnon
	8	Javlin Cordova	Administrative Assistant II , Provincial Social Welfare and Development Office / Provincial Disaster Risk Reduction and Management Council – Bukidnon (PSWDO / PDRRMC)
		JICA	
	1	Hayato Nakamura	Project Formulation Advisor, JICA Philippine Office
		DPWH	
	1	Maximo F. Bulanadi	Engineer- III, Project Management Office- Major Flood Control and Drainage Project Cluster II (PMO-MFCDP-II, DWPB)
	2	Roy R. Quilaton	Project Coordinator, Project Management Office- Major Flood Control and Drainage Project Cluster II (PMO-MFCDP II- DPWH)
		JICA SURVEY TEAM	
	1	Masaki Ito	Team Leader/Flood Control
	2	Tadahiro Fukuda	Co-Team Leader/Water Resource Management
	3	Yousuf Mamun	Hydraulic Analysis
	4	Hiroshi Ogawa	Sediment Balance
	5	Hiroyuki Katsuro	Sabo Engineer
	6	Narihiro Morisaki	Structure Design
	7	Tsuyoshi Ito	Institutional Development
	8	Yasushi Shimano	Non-Structural Measures
	9	Kazuhiko Dobeta	Social Consideration
	10	Akihito Sakurai	Watershed Management
	11	Naohisa Nakashima	Operation Coordinator
	12	Imelda G. Pagtolun-an	Public Relations

	13	Rogelio G. Pelaez	Flood Control/ Water Resource Management
	14	Mimi S. Estaris	Social Consideration
	15	Jemuel M. Perino	Water Shed Management
	16	Sonia Dumaraog	Administrative Assistant
No.	Issues		Summary of Discussion
1	Project Information		<p>Based on the discussions of the Department of Public Works and Highways (DPWH) and the Japan International Cooperation Agency (JICA), the study will update the previous master plan done before Sendong and review the condition of the Cagayan de Oro River after Sendong. The overview of the study in relation to Bukidnon includes:</p> <ul style="list-style-type: none"> ▪ One main focus of the study is how to mitigate floods in the future. ▪ One of its outputs is a topographic survey. ▪ Exchange of information between the Study Team and local government agencies / offices regarding the upstream portions of the Cagayan de Oro River in Bukidnon. ▪ Duration of the study is from September, 2012 until November, 2013.
2	Project Area		<p>The study will include not only Cagayan de Oro City but the 3 municipalities of Bukidnon; Baungon, Libona, and Talakag where the Cagayan de Oro River upstream portions are. The courtesy visits and site inspections in the said municipalities of the Study Team members with different fields of expertise will begin the next day. The assistance of the local government units (LGUs) is requested for this study.</p> <p>The municipal engineers present in the meeting will assist in the survey aside from the other concerned local government offices.</p>
3	Project Coverage		<p>The study is mainly on flood risk management but it includes environmental and social considerations. The project is in the study stage: feasibility study and master plan only; generally to propose structural and non-structural measures.</p>
4	Inquiry on the Master Plan for the Cagayan de Oro River		<p>The master plan for Cagayan de Oro River done in 2010, before Sendong, referred to in this project is with the DPWH, Project Management Office – Flood Control and Sabo Engineering Center (PMO – FCSEC). This previous study will be updated since the condition of the Cagayan de Oro River and surrounding areas have changed since Sendong.</p>
5	Project Funding		<p>The study, Preparatory Survey for Flood Risk Management for Cagayan de Oro River (FRIMP – CDOR), is a grant.</p>
6	Water Monitoring Stations within the Municipalities		<p>Presence of water monitoring stations, discharges, sediment yields, and observation points;</p> <ul style="list-style-type: none"> ▪ DPWH, Talakag. ▪ Small dams, also in Baungon
7	Indigenous Peoples		<p>Bukidnon is home to many indigenous peoples (IP) and they are present in the aforementioned 3 municipalities. The Study Team has social consideration experts to conduct a survey on the social aspects of the project, including IP concerns, in areas surrounding the Cagayan de Oro River. As for the Free and Prior Informed Consent (FPIC) requirement, the project is only on a study stage.</p>

8	Watershed Areas	The Study Team has Watershed Management experts to handle matters on the watershed areas of the municipalities adjacent to the Cagayan de Oro River.

End of Document

**Preparatory Survey for
Flood Risk Management Project for Cagayan de Oro River – FRIMP-CDOR**

MINUTES OF MEETING

		Prepared by:	Jemuel Perino
DATE:	05 September 2012	TIME:	10:00 AM
VENUE:	Talakag Conference Room, Talakag, Bukidnon		
SUBJECTS:	Courtesy Call to Mayor Nestor Macapayag for FRIMP – CDOR		
ATTENDEES:		Name	Designation
		LGU Officials	
	1	Hon. Nestor Macapayag	Mayor
	2	Engr. Nilo Delapena	MPDC
	3		MSDO; Local DRRC
	4		DILG Municipal Officer
	5		SB Member; Chairman, Environment Committee
		DPWH	
	6	Maximo F. Bulanadi	Engineer- III, PMO-MFCDP-II, DWPB
	7	Roy R. QUILATON	Project Coordinator, PMO-MFCDP-II, DWPB
		JICA Survey Team	
	8	Tadahiro FUKUDA	Survey Team Acting Leader
	9	Yousuf MAMUN	Hydraulic Analysis
	10	Hiroshi OGAWA	Sediment Balance
	11	Hiroyuki KATSURO	Sabo Engineer
	12	Narihiro MORISAKI	Structural Design
	13	Yasushi SHIMANO	Non-Structural Measures
	14	Akihito SAKURAI	Watershed Management Expert
	15	Naohisa Nakashima	Operation Coordinate
	16	Rogelio PELAEZ	Local Counterpart, Flood Control / Water Resource Management
	17	Jemuel PERINO	Local Counterpart, Watershed Management
ISSUES AND DISCUSSIONS			
No.	Issues	Summary of Discussion	
		At about 1000 hrs, after the initial expression of welcome by the Municipal Mayor of Talakag, Hon. Nestor Macapayag, Mr. Fukuda, the JICA Survey Team Acting Team Leader, explained to the Local Government Unit (LGU), representatives the primary purpose of the JICA Team Courtesy Call to the Local Chief Executive (LCE), and the LGU of Talakag.	
1	Participants	All the persons inside the Conference Room that were participating in the group discussions were given the opportunity to introduce themselves to everybody personally. The Municipal Engineer could not attend this meeting because he is attending a workshop in Malaybalay City.	
2	Project Information	Following the JICA briefing kit earlier distributed to the participants, Mr. Fukuda explained the nature and coverage of the project, objectives, schedule of activities, expected output, and the participating agencies in this project. The previous DPWH Flood Control for Cagayan de Oro River	

		Master Plan concentrated on the downstream portion only.
3	The DPWH Flood previous Master Plan for Cagayan de Oro needs to be updated due to damage caused by Typhoon Sendong. The MP updating will consider the whole River Basin	Mr. Fukuda emphasized that this “Flood Risk Management Project for Cagayan de Oro River Basin (PRIMP- CDOR)”, is a Grant from the Japanese Government. It is intended to update the existing DPWH Feasibility Study for Flood Control of Cagayan de Oro River, in order to reflect the present situation after Typhoon Sendong hit the area in December 2011; and this time, taking into account the whole River Basin, which includes the municipalities of Talakag, Baungon, and Libona in the headwaters.
4	There is no ongoing river discharge monitoring in Talakag	The JICA Team verified with the MPDC, whether or not, there is any ongoing river discharge monitoring in Talakag, particularly, at the Uguiaban Bridge or Talakag Bridge; and he said, ” There is none. Perhaps, the DPWH is doing this.”
5	Some Landslides along the Cagayan de Oro Riverbanks	During the Typhoon Sendong, the municipality of Talakag was not affected very much because it is located in the headwaters of Cagayan de Oro River. There are a number of Landslides within Talakag, as a result of Typhoon Sendong, but these are only concentrated along the Riverbanks of Cagayan de Oro River.
6	Portion of Bgy San Isidro, along the riverbanks were damaged by Typhoon Sendong	There are some houses at Bgy San Isidro, particularly, those along the Riverbanks of Cagayan de Oro River were damaged during the Typhoon Sendong
7	There is river sedimentation in Talakag, even before Typhoon Sendong	River Sedimentation in Talakag is also prevalent, not only during the Typhoon Sendong, due to high soil erosion rate from the denuded portions of the headwaters of Cagayan de Oro River.
8	Large area in the headwaters of Cagayan de Oro River Basin is deforested	There is also a very large area within Talakag that do not have forest cover, and these are located within the headwaters of Cagayan de Oro River.
9	The Local Disaster Risk Reduction Management Plan of Talakag for 2012 is not yet finalized	The municipality of Talakag has an existing Disaster Emergency Plan for the year of 2011, but the one for 2012 is still being finalized by the committee.
10	Talakag LGU is not able to receive quick storm signal/ information directly from PAGASA due to weak signal	There is no Storm Signal/ Information from PAGASA that reaches LGU Talakag because the LGU does have internet connection. Besides, there is very weak cellphone signal within the Barangay Poblacion of Talakag. So, the residents of Talakag get their Storm Signal/ Information from the radio and television media.
11	Operation of	There is an existing manually-operated standard Raingauge situated near the

	manually-operated standard Rainguage has been stopped	municipal hall of Talakag. It has been operational since 2009 but has not been in operation recently, as soon as the automatic/ recording Rainguage was installed by DOST in Talakag after Typhoon Sendong, under the Project Noah. The rainfall data collection in Talakag is under the care of the Municipal Agricultural Officer (MAO).
12	Recording Rainguage by DOST is newly installed in Talakag, as response to Typhoon Sendong under Project NOAH	Project Noah is being carried-out by DOST nation-wide, as an offshoot of the Typhoon Sendong, and one of the weather instruments that they establish in various provinces, is the automatic/ recording Rainguage; for which, they also established one in Talakag. The said automatic/ recording Rainguage is capable of automatically transmitting the data to the central control station in DOST Manila Office.
13	There ongoing White Clay mining	The only mining ongoing in Talakag is the White Clay mining.
14	There is ongoing commercial quarry operation near riverbank of Cagayan de Oro	There is an ongoing commercial quarry operation for basalt rocks in Talakag near the Cagayan de Oro River.
15	DENR Program not clear to LGU Talakag. The NGP information is only with the DENR	There is no ongoing Logging operation in Talakag, but regarding the question on, whether or not, there is ongoing small scale timber poaching, it is better to ask the DENR CENRO. As far as the National Greening Program is concerned, it is better to inquire directly from DENR CENRO.
16	Riparian Zone needs to be protected	There is ongoing timber harvesting for planted trees in Talakag because there are some farmers that planted trees in their farms.
17	The unfinished NIA Irrigation Water Intake/ Dam is 70% done. Irrigable area for rice is only 230 ha now, instead of 1,900 ha in the feasibility study. Some rice farmers shifted to Banana and Pineapple	The NIA Irrigation Water Intake is located at Bgy Cosina, along headwater of Cagayan de Oro River; and the irrigable area of about 1,900 ha, is situated within Bgys Cosina, Cacawon, Lingion, Sto. Nino, San Isidro. However, most of the potential paddy field have already been planted to, either banana or pineapple; and only about 300 ha are currently planted to lowland rice. The Irrigation Water Intake, with the diversion dam, is now 70% finished but construction activities have stopped. During the Typhoon Sendong, a very large cut log and other debris, got stocked into the sluice gate of said Irrigation Water Intake and until now, it is still there (as of 08 September 2012).
18	The tapping point for drinking water supply was not damaged	Upstream of NIA Irrigation Water Intake (i.e., in Barangay Colawingon), is the tapping point for drinking water supply of the household in Barangay Poblacion of Talakag. So far, it was not damaged by Typhoon Sendong.
19	Damaged Poultry House by private businessman	A Poultry House at Bgy San Isidro was damaged.
20	There a designated MENRO, but coming from	MENRO for Talakag? There is none, but one (1) BENRO Staff has been assigned in Talakag to assist the LGU.

	BENRO	
21	There is an existing Municipal Watershed Management Plan but no copy is available as of the moment	The MPDC informed the JICA Team that the LGU has an existing Municipal Watershed Management Plan, formulated in 2002; and which is undergoing updating through the existing Capacity Development Technical Assistance (CDTA), from the Asian Development Bank (ADB).
22	DENR CENRO was not in the Courtesy Call to the Mayor	There is an existing DENR CENRO for Talakag, but he also covers two (2) other municipalities (i.e., Baungon, and Libona).
23	There is need to see the damage NIA Water Intake on 08 Sep 2012	The JICA Team requested the LGU Talakag for one (1) guide to the NIA Water Intake, on Saturday, 08 September 2012, 0900 hrs; and the MPDC agreed to accompany the JICA Team.
24		After the JICA Team finished asking some questions from the Municipal Mayor of Talakag and his Department Heads, the JICA Survey Team Leader, Mr. Fukuda, thanked the Mayor and his staff, for spending time and sharing information with the JICA Team.
25	As seen through telescope, a footbridge damaged by Typhoon Sendong along Kalawaig River before the junction with Cagayan de Oro River was noticed	After the briefing at the LGU Conference Room, the MPDC and the SB Member and Chairman of Environment Committee, led the JICA Team to a higher place near the road, where both the Kalawaig River and the Cagayan de Oro River can be seen.
26		After the brief site visit, the Mayor hosted a lunch for everyone at his office, courtesy of the LGU.
27		

**Preparatory Survey for
Flood Risk Management Project for Cagayan de Oro River – FRIMP-CDOR**

MINUTES OF MEETING

		Prepared by:	Jemuel Perino
DATE:	06 September 2012	TIME:	10:00 AM
VENUE:	Office of the Mayor, Baungon, Bukidnon		
SUBJECTS:	Courtesy Call to Mayor Pedro A. Alvarez for FRIMP – CDOR		
ATTENDEES:		Name	Designation
		LGU Officials	
	1	Hon. Pedro A. Alvarez	Mayor
	2	For. Maria Socorro Orejana	MENRO, BENRO
	3	Ms. Nenita B. Navarez	MSWDO; MDRRMO
	4	Gladys Ragandang	DILG Municipal Officer
	5	Rolando S. Seiojale	Assistant Staff, MPDO
	6	George S. Magaun	Staff, Municipal Office
	7	Lezette Iresoro	Staff, Municipal Office
	8	Nadeth L. Mercado	BWSSO
	9	Janel C. Repondo	OIC - NIA
		DPWH	
	10	Roy QUILATON	Project Coordinator, PMO-MFCDP-II, DPWH
		JICA Survey Team	
	11	Akihito SAKURAI	Watershed Management Expert
	12	Hiroshi OGAWA	Sediment Balance
	13	Hiroyuki KATSURO	Sabo Engineer
	14	Yasushi SHIMANO	Non-structural Measures
	15	Jemuel PERINO	Local Counterpart, Watershed Management
ISSUES AND DISCUSSIONS			
	Issues	Summary of Discussion	
1		Prior to the arrival of the Mayor of Baungon, the JICA Survey Team started to talk to the staff of the Mayor about the purpose of the visit, as well as the expected officials to be present during the Courtesy Call, and the needed data/information.	
2	Participants	At about 1000 hrs, upon the arrival of Hon. Pedro A. Alvarez, the Municipal Mayor of Baungon, Mr. Roy Quilaton, DPWH Project Coordinator, introduced the JICA Survey Team, and introduced Mr. Akihito Sakurai, the JICA Watershed Management Expert, who then explained to the Local Chief Executive (LCE), the nature and primary purpose of the study, the coverage, the expected output, the timetable, and the cooperating agencies for this particular activity. The Municipal Engineer and Municipal Planning and Development Officer wer not present during the Courtesy Call to the LGU Local Chief Executive because they have a training in Malaybalay City.	
3	Damaged Cabula Bridge, the main bridge that connects	Cabula bridge, the primary bridge that connects Baungon to Cagayan de Oro, was damaged during Typhoon Sendong. Currently, a private business firm (i.e., Phil Agro Industrial Corporation), is operating a barge across Cagayan	

	Baungon to Cagayan de Oro City.	de Oro River, where Cabula Bridge used to be.
4	No reliable water level monitoring along the Cagayan de Oro River at Cabula Bridge.	It was mentioned by the LGU that there was no water level sensor along Cabula Bridge. However, after the Typhoon Sendong, the automatic recording Rain gauge was installed on the Cabula Bridge by DOST through NOAH Program.
5	Many people died, and many houses and other properties lost during the typhoon.	There were many people that died during the Typhoon Sendong and many houses and other properties were damaged during the Typhoon Sendong. A copy of the LGU detailed damage report was given to the JICA Survey Team by the Head of MSWD (who is the concurrent LDRRM Officer).
6	Damaged Bridge and washed-out Buildings.	Along Bubunawan River, upstream of the CEPALCO Mini Hydropower Plant, the Bridge was damaged during the Typhoon Sendong, but has been recently rehabilitated. It is now usable to all kinds of vehicles.
7	There is heavy a riverbank erosion along the Bubunawan River, upstream of the CEPALCO Mini Hydropower Plant.	Along Bubunawan River, the CEPALCO Mini Hydropower Plant was damaged by Typhoon Sendong, including the Office buildings and other structures that were situated within the banks of Bubunawan River. There were 11 Engineers (were employees of the company), who died during the said incident. The CEPALCO Water Intake is about 10yrs old and is designed to generate 7MW.
8	The headwaters of Bubunawan River is within the MKNP, a Protected Area.	Some portions of the headwater of Bubunawan River fall within the Mt. Kitanglad Natural Park or MKNP, which is Protect Area under the NIPAS Act. The MKNP belongs to seven (7) Municipalities of Bukidnon.
9	A very wide area of the headwaters are under critical slopes, including the Riparian Zones,	A large portion of the headwaters of Bobonawan River is already deforested, and some areas are already cultivated for various high value commercial agricultural crops [i.e., pineapple= 50ha, banana= 450ha, papaya= 150ha, and Cassava= ?). As the wide area of the headwaters are under critical slopes, including the riparian zones, those areas need to be under forest cover. Some bio-engineering measures are also needed.
10	Problem on banana diseases	Currently, Banana plantations have problems on pests and diseases, and about 120 ha have already been affected. Based on past experiences of some provinces of Mindanao on Banana, it takes a long time to solve the problem on banana diseases
11	The group of Datu Vic Saway is using the "Native Title" as their right to Ancestral Domain	The whole MKNP is being claimed as the Ancestral Domain of the Talaandig Tribe (i.e., one of the 7 tribes of Bukidnon), headed by Datu Vic Saway.
12	Rain gauges recording in Baungon.	There is a need to maintain the manually-operated standard 8-inch Rain gauge at Baungon, simultaneously with the DOST automatic recording rain gauge. There is one (1) manually-operated standard Rain gauge existing in Baungon, and has been in operation since 2005. The rainfall on Dec. 16, 2010 that was monitored at Baungon was only 89mm.
13	National Greening Program (NGP) in	The National Greening Program (NGP), is also being implemented in Baungon but this is under the management of the DENR CENRO. The

	Baungon	DENR, Civil Society Groups, and LGU need to work together, in the NGP implementation for better impact to the Environment . The DENR CENRO that covers Talakag and Libona, is the same DENR CENRO that covers Baungon.
16	Lunch at Municipal Hall, Baungon	After the brief site visit, the Mayor hosted a lunch for everyone at the Municipal Hall of Baungon, courtesy of the LGU.
17	Access to the NIA Water Intake needs urgent repair for maintenance purposes of the system	During the quick site visit to Bubunawan River, the LGU led the JICA Team to the NIA Water Intake (for Irrigation), but along the way, we had to turned back because the road, which is actually the canal shoulder, was no longer safe for our passage. The said NIA Water Intake and the canal, were partially damaged by Typhoon Sendong, but right now, it is already partially repaired operational.
18	The operation of the manually-operated Rainguage is not sustained	The JICA Team was also able to visit the NIA Office at Baungon. NIA has a standard 8-inch manually-operated Rainguage and has operated from 2003 to 2012. The said NIA Office is under the supervision of the NIA Office in Valencia City, Bukidnon.
19	Newly operated under Project NOAH of DOST	The DOST has installed automatic recording Rainguages at the NIA site and Municipal Office in Baungon which were installed in June 2012.
20	Access to the neighboring barangay has been disrupted. The people cross the river to get to the next barangay	The JICA Team was able to visit the site of the Bailey-type Tumalaong Bridge to connect with Bgys Lingating and Nicdao along Tumalaong River, that was damaged by Typhoon Sendong. Before Typhoon Sendong, the LGU was already constructing a spillway, about 50m downstream of the said Bailey Bridge, but it was partially damaged by the Typhoon. More than 10 villagers were passed away by flood, including the Barangay Captain of Bgy Lingating.
21	Heavy Riverbank Erosion	The JICA Team was able to visit the site in Sitio Mando, Bgy Imbatug, Baungon, along Tumalaong River, where a steel hanging bridge was damaged by Typhoon Sendong. The portion of the Tumalaong River where the steel hanging bridge used to be operating, was just relatively narrow before Typhoon Sendong, but after the Typhoon, the riverbank was eroded and the width was expanded by more than 10m.

**Preparatory Survey for
Flood Risk Management Project for Cagayan de Oro River – FRIMP-CDOR**

MINUTES OF MEETING

		Prepared by:	Jemuel Perino
DATE:	07 September 2012	TIME:	10:00 AM
VENUE:	Office of the Mayor, Libon, Bukidnon		
SUBJECTS:	Courtesy Call to Mayor Leonardo Genesis T. Calingasan for FRIMP – CDOR		
ATTENDEES:		Name	Designation
		LGU Officials	
	1	Hon. Leonardo Genesis T. Calingasan	Mayor
	2	Mr. Simeon Angcot	Community Development Assistant (MENRO-Designate)
	3	Ms. Ursula C. Buta	MSWDO; Local DRRC
	4	Mr. Gil	Forest Ranger, Libona, DENR10
	5	Ms. Christrie C. Cubero	DILG Municipal Officer (joined in the site visit after lunch)
		JICA Survey Team	
	6	Akihito SAKURAI	Watershed Management Expert
	7	Hiroshi OGAWA	Sediment Balance
	8	Hiroyuki KATSURO	Sabo Engineer
	9	Yosushi SIMANO	Non-Structural Measures
	10	Jemuel PERINO	Local Counterpart, Watershed Management
ISSUES AND DISCUSSIONS			
	Issues	Summary of Discussion	
1		As soon as the JICA Survey Team arrived in the Municipal Hall of Libona, there was Mr. Simeon Angcot, CDA and MENRO-designate waiting for the group, and immediately, we were led to the Office of the Mayor.	
2	The MPDC and the Municipal Engineer were not present during the Courtesy Call to the LGU Local Chief Executive because they have an ongoing training in Malaybalay City.	At about 1000 hrs, we met Hon. Leonardo Genesis T. Calingasan, the Municipal Mayor of Libona. After the brief introduction of each member of the JICA CDO Team, Mr. Akihito Sakurai, the JICA Watershed Management Expert, explained to the Local Chief Executive (LCE), the nature and primary purpose of the study, the coverage, the expected output, the timetable, and the cooperating agencies for this particular activity.	
3	Preparations for the incoming disasters was not seriously thought of	The Mayor of Libona mentioned that his municipality suffered damages to lives and properties during the Typhoon Sendong. Libona has 14 barangays and before the Typhoon Sendong, disaster was just taken for-granted by the Officials, as well as by the residents. Therefore, there were no rescue materials prepared before the disaster, however, they procured those materials after the Sendong and they realized the necessity of trainings and materials for the rescue and disaster preparedness.	
4	The Municipal Watershed	The municipality of Libona has an existing Watershed Management Plan. The municipality falls within two (2) River Watersheds: 1) Agusan River	

	Management Plan of Libona should be updated	Watershed; and 2) Cagayan de Oro River Watershed. This Municipal Watershed Management Plan is under updating through ADB-assisted project.
5	Greening of Riparian Zones and denuded forestlands badly needed	Critical Slopes within the Riparian Zones are being tilled and cultivated for Agricultural Crops. Some Riparian Zones have inappropriate land uses. Bamboo propagules were planted along one riparian zone in Bry Capihan in May 2012 by NGP (National Greening Program) through CENRO-DENR10.
6	Seriousness on dealing with disaster preparedness in very important	The DILG has trained the LGU Officials for 3 days about disaster preparedness (including rescue), on 07 December 2011, but during the Typhoon Sendong, they were not able to use their recent training on disaster preparedness.
7	Material support to the Typhoon Sendong victims are given to their relatives, where they decided to stay	There were 64 people that were affected by Typhoon Sendong. The survivors preferred to stay with their relatives, instead of living in the evacuation centers.
8	Structures damaged: 1) Capihan (2 foot bridges), 2) Kiliog (1 foot bridge), 3) Nangka (1 foot bridge), and 4) Pungol (1 foot bridge).	There were four (4) barangays along the Bubunawan River that were badly affected by Typhoon Sendong; 1) Capihan (2 foot bridges damaged), 2) Kiliog (1 foot bridge damaged), 3) Nangka (1 foot bridge damaged), and 4) Pungol (1 foot bridge damaged).
9	Separate River Watershed	The Agusan River does not join the Cagayan de Oro River, inasmuch as it has its own Watershed. However, the Agusan bridge that links Barangay Sta. Fe, Libona, to Barangay Camp Phillips, Manolo Fortich, was partially damaged by Typhoon Sendong. The damage was in its approach.
10	The operation of the manually-operated standard 8-inch Rainguage not sustained.	There is an existing manually-operated standard 8-inch Rainguage in Libona and it is situated near the Municipal Hall. However, during Typhoon Sendong, there was no data collected.
11	During severe Typhoon, the budgetary allocation for Calamity Fund will not be enough.	The municipality of Libona has an Internal Revenue Allotment (IRA) of P76Million, and its Calamity Fund is P3Million per year. Out of the budget for Calamity Fund, 30% of which is for Contingency Plan.
12	Needs more capacity building on Disaster Preparedness.	The municipality of Libona has a 3-yr Program for Risk Reduction. They are being assisted by the Provincial Disaster Risk Reduction Management Council (PDRRMC), which is under the Provincial Social Welfare Development Office (PSWD) of the Bukidnon Province. Ms. Buta is the Municipal Social Welfare Development Officer, and she is also in-charge of the Local Disaster Risk Reduction Management Program. The municipality of Libona has undergone a 6-day training on Disaster Preparedness on Sep 15-19, 2012, under the assistance of the PDRRMC.

13	Resettlement for the suffered families	The Municipality had a resettlement plan for the suffered families to resettle to Brg Kinowe, however, the Province did not allow to make resettlement areas there, because those sites are very near to the river. Therefore, the Municipality is now preparing the resettlement area nearby the Municipal Hall of Libona.
14	Totally damaged Swimming Pool and Hatchery.	After the discussions at the Office of Mayor Calingasan, the JICA CDO Team was led to see the damaged barangays of Libona. The JICA CDO Team has seen the site of the damaged Swimming Pool of the LGU, including the Hatchery. There were four (4) persons that died from that particular area during the Typhoon Sendong.
15		The Mayor of Libona hosted lunch for the JICA CDO Team at the Bungallow within the Camp Phillips, Manolo Fortich, Bukidnon (the adjacent municipality to Libona). During lunch, the Municipal DILG Officer of Libona joined the group, up to the site visits.
16	Washed out culvert at barangay Pungol.	A culvert along Pangi Creek, within barangay Pungol, Purok 2 appears to be inadequate to handle the surface runoff, which the reason why it was washed out.
17	Damaged hanging bridge and partially damaged spillway bridge.	At barangay Capihan, the hanging bridge was damaged. There is also an spillway bridge along the tributary to Bobonawan River, and during Typhoon Sendon, and the approach was eroded/ damaged. It is currently being rehabilitated. The overflow bridge connects to Sitio Kalasuyan, Bgy Capihan.
18	Existing Small-Scale Gold Mining Area within Libona.	The JICA CDO Team learned that the Mining Area at Gango, Libona falls within a separate River Watershed, which does not join the Cagayan de Oro River. So, the Team decided not to do the site visit to Gango Mining Area, even if it is part of Libona.
19		The JICA CDO Team returned to the Municipal Hall to pick-up the documents that were photocopied, and headed back to Cagayan de Oro City via the road at barangay Indahag, Cagayan de Oro City.

**Preparatory Survey for
Flood Risk Management Project for Cagayan de Oro River – FRIMP-CDOR**

MINUTES OF MEETING

		Prepared by:	Rogelio G. Pelaez
DATE:	24 September 2012	TIME:	2:30 PM
VENUE:	FCSEC Hall Conference Room, NHCS Bldg.		
SUBJECTS:	1st Coordination Meeting for FRIMP – CDOR Project		
ATTENDEES:		Name	Designation
Contact Personnel: Team Member:	1	Engr. Andy Sosa	OIC-Asst. PD; PMO-MFCDP- II - DPWH
	2	Maximo Bulanadi	Engr. III; PMO-MFCDP –II – DPWH
	3	Ms. Dolores Hipolito	PM-II, FCSEC DPWH
	4	Engr. Jerry Fano	Engr. III – PMO- FCSEC DPWH
	5	Grecile Christopher Damo	Engr. III – PMO-FCSEC
	7	Ireneo Cabig	Eng’g Asst.- PMO-FCSEC
	8	Yvette Wong	Data Encoder; PMO-FCSEC
	9	Yolanda T. Egam	Engr. V, DPWH Region - X
	10	Binifacio R. Lora	OIC-DE; Dist. 1, CDO
	11	Jose Villanueva	Engr. II, NAMRIA
	12	Akihisa Okuda	Adviser- DPWH-JICA
	13	Tadahiro Fukuda	Co-Team Leader Nippon Koei Co., Ltd.
	14	Yousuf Mamun	Hydrologist - Nippon Koei Co.,Ltd.
	15	Yasushi Shimano	Non-Structural Consideration
	16	Ken Dobeta	Social Consideration
	17	Mimi Estaris	Social Consideration
	18	Rogelio G. Pelaez	Flood Control Engineer – Philkoei Int’l Inc.
	19	Yutaka Kokufu	Aerial Survey Expert PASCO
	20	Mary Grace Desusa	Secretary, PASCO
	21	Gina Reyes	Admin- JICA Study Team
	Summary of Discussion		
	Issues	Summary of Discussion	
1	Outline of Status of the Survey	Co-Team Leader T. Fukuda presented the status of the Survey and results of the 1 st field works in Cagayan de Oro City and Province of Bukidnon in Philippines in September 2012. He also explained the overall schedule of the survey and subsequent subcontracts works, such as topographic and river profile and cross section surveys and geotechnical investigation.	
2	Preparation Status for Hydraulic Analysis	Mr. Yousuf Mamun, Hydraulic Analysis Expert presented his initial evaluation of the available data received from different agencies. He also explained a brief methodology comprising of developing steps for hydrologic and hydrodynamic models and time frame for his assignment. In his presentation he showed that the northern part of CDO basin lacks of rainfall stations which is a bottleneck of the model to be developed. He then emphasized on the availability of quality as well as quantity of data of other rainfall station in and around the vicinity of the basin. He is still looking forward for some more hydrometric data such as water level, flow, rainfall, evaporation etc. from PAGASA and those from Private Companies/entities at Bukidnon which have private rainfall gauges facilities such as Delmonte, Dole, NAMRIA etc. He stressed that with the inadequate rainfall data now collected it is highly improbable to come up with a good Hydrologic Model, so he needs more data as much as possible to develop CDOR basin hydrologic model. He informed that after developing the hydrologic model, the	

		river model ie. Hydrodynamic model will developed based on the rainfall-runoff connection into that model.
3	Non- Structural Measures	<p>Mr. Y. Shimano: Non-Structural Measures Specialist presented progress of works for data collection, site inspections, meetings with Disaster Risk Reduction and Management (DRRM) officials of 16 barangays affected by TS Sendong, CDO city, Municipalities of Talakag, Baungon & Libona, Provinces of Misamis Oriental & Bukidnon, and OCD Region-X, as well as concerned agencies such as PAGASA & Xavier University, etc.</p> <p>He showed results of rapid assessment survey by questionnaires and interviews for barangays affected by TS Sendong, such as status of BDRRMC, contingency plan, etc. As a result, he selected and proposed five (5) barangays (Barangays No. 13 and Balulang in CDO city, Barangay San Isidro in Municipality of Talakag, Barangay Pualas in Municipality of Baungon, and Barangay Pongol in Municipality of Libona) for Community Survey to be undertaken by local NGO from January to April 2013, which TOR is under evaluation by JICA. He noted that Center for Disaster Preparedness Foundation, Inc. (CDP), Philippine Relief and Development Services, Inc. (Philrads), and People's Disaster Risk Reduction Network, Inc. (PDRRN) will be the three (3) short listed local NGOs for selection of the Community Survey.</p> <p>He also explained progress of works for Watershed Management Activities in the CDO River Basin and overall schedule for Non-Structural Measures to be conducted in the next stage.</p>
4	Flood Control and Water Resource Management	<p>Co-T/L, T. Fukuda explained the situations of a large amount of rainfall, surface run-off discharging and flooding in the CDOR basin during Tropical Storm Sendong based on data and information collected through the Survey.</p> <p>He also explained the initial idea of the design scale for the flood mitigation project in CDOR that i) there is a Memorandum from the DPWH Secretary which shall be adopted to all projects in the Philippines, and ii) one of alternative options to comply with this memorandum is to implement the river improvement works by diking system and widening/deepening of the river channel in lower stretch adopting the design scale of 25 year, and to construct series of retarding basins/reservoirs in the upper stretch to regulate the floodwater along the CDOR with the magnitude of 50-100 year return period. He mentioned the study team have investigated areas for possible construction of a series of dams and weirs that can help in the reduction of floodwaters. He suggested about the possibility to construct SABO dams to prevent/reduce rapid siltation brought about by large amount of sediment carried by floodwaters, and also the possibility to recommend the construction of possible Hydroelectric Power dam and Irrigation supply facilities with further detail studies and investigation out of this survey.</p>
5	River Boundary	<p>Co-T/L, T. Fukuda showed the basic approach to define the River Boundary along the CDOR basin in the presentation. He explained that based on the field reconnaissance, considerations on No-Build Zone declared after Sendong, previous river morphology and the preliminary design of the river structures, alternatives of the river boundary will be prepared and studied through the discussion with concerned agencies and City of Cagayan de Oro in CDOR Basin. He suggested that the bottleneck section in front of the City Hall is recommended to be widen in order to mitigate backwater affect in the upstream.</p>

6	Social Consideration	Mr. Dobeta, Social Consideration Expert presented his findings so far. He noted that there are still a certain number of informal houses observed along the river, even the Typhoon Sendong washed away many of those houses. He emphasized that the relocation of informal residents to be affected by proposed structures of the Project may probably be required, depending on the proposed structures. In addition, what had been undertaken by the LGU's in the aftermath of "Sendong" floodwaters such as the affected families relocated/in and around CDO are also reported.
7	Topographic Survey	Mr. Y. Kukufu of PASCO the aerial survey team representative, explained the extent and manner of aerial survey that will be undertaken for this project and the scale of each aerial topography that will be presented later.
8	Design Parameters to be used	Ms. D Hipolito, PM- FCSEC, enquired about what the design scale of the Survey will be used because the existing DPWH Design Code stipulated only for 25 years flood return period while the newly issued Memorandum calls for higher design scale of no less than 50- 75 years anticipating the effects of climate change. Mr. T. Fukuda explained that the existing design requirement of DPWH is 25 years which will be referred to the initial design in the lower stretch of CDOR, however, when hydrology and hydraulic studies have been completed, the team will likely study to increase the design scale as per the Memorandum of the DPWH Secretary. The 50 or 75 years flood level shall be studied also and compared with the 25 years result. If the results are not so significant in construction cost and social-environmental impacts, the most economical and feasible result shall be adopted in conjunction with the recommended flood mitigation measures to be followed.

**PREPARATORY SURVEY FOR FLOOD RISK MANAGEMENT PROJECT
FOR CAGAYAN DE ORO
MINUTES OF MEETING**

		Prepared by:	Mimi S. Estaris	
DATE:	2 Octoberber 2012		TIME:	15:00 – 16:00
VENUE:	City Council Session Hall, Cagayan de Oro City Hall			
SUBJECT:	FRIMP - CDOR Presentation to the City Council, Committee on Public Works			
ATTENDEES:		Name	Designation	Organization
Contact Personnel: Team Member:	1	Emmanuel D. Abejuela	City Councilor, Chairman – Committee on Public Works	Cagayan de Oro City Council
	2	Alexander S. Dacer	City Councilor, Member – Committee on Public Works	Cagayan de Oro City Council
	3	Virginia S. Deguinion	Officer in Charge	City Local Environment and Natural Resources Office, Cagayan de Oro
	4	Isidro Borja	City Planning and Development Officer	City Planning and Development Office, Cagayan de Oro
	5	Simeon Josafat J. Licayan	Information System Analyst III	Geographic Information Systems (GIS), City Planning and Development Office, Cagayan de Oro
	6	Armen Cuenca	Engineer, Oro Alert	Risk Reduction Management Office
	7	Bonfacio R. Lora	OIC – District Engineer	Department of Public Works and Highways, Region10, 1st District Engineering Office
	8	Gabriel L. Guinitaran	Engineer III	Department of Public Works and Highways, Region10, 2nd District Engineering Office
	9	Aldrin S. Albano	Engineer II	Department of Public Works and Highways, Region10
	10	Manny L. Ramonal	Engineer	City Engineer’s Office, Cagayan de Oro
	11	Paul M. Abian	Engineer	City Engineer’s Office, Cagayan de Oro
	12	Carmelito Q. Obsid	Tax Mapper III	City Assessor’s Office
	13	Roy R. Quilaton	Project Coordinator	DPWH, Project Management Office – Major Flood Control and Drainage Project Cluster II (PMO – MFCDP II)
	14	Tadahiro Fukuda	Co-Team Leader/ Water Resource Management	Nippon Koei Co., Ltd.
	15	Kazuhiko Dobeta	Social Consideration	PhilKoei International, Inc.
	16	Mimi S. Estaris	Social Consideration	PhilKoei International, Inc.
	17	Sonia E. Dumaraog	Administrative Assistant	PhilKoei International, Inc.
ISSUES AND DISCUSSION				
	Issues	Summary of Discussion		
1	Survey Presentation	<p>The presentation of the Preparatory Survey for Flood Risk Management Project for Cagayan de Oro River (FRIMP-CDOR) consisted of:</p> <ul style="list-style-type: none"> ▪ Survey objectives and area ▪ Overall Survey schedule ▪ Initial findings/outcomes of the Survey <ul style="list-style-type: none"> i. Land management along the low-lying area along the right bank of Cagayan de Oro River between the Kagay-an Bridge and Ysalina Bridge ii. River boundary along the City Hall iii. Countermeasures in the estuary of Cagayan de Oro River iv. Countermeasures in Isla de Oro and Macasandig ▪ Maps and Sendong data 		

**PREPARATORY SURVEY FOR FLOOD RISK MANAGEMENT PROJECT
FOR CAGAYAN DE ORO
MINUTES OF MEETING**

2	Public Works Committee Chairman Remarks	<ul style="list-style-type: none"> ▪ The Cagayan de Oro (CDO) City Council Public Works Committee has invited concerned offices such as the CDO City Planning and Development, City Assessor's, City Engineer's, City Local Environment and Natural Resources for continuity and appreciation of the Study. ▪ The City Government of Cagayan de Oro is finalizing the revision of its Comprehensive Land Use Plan (CLUP) including the Physical Plans and is intended for release in November 2012. ▪ Some options in the presentation based on the initial findings of the Study regarding alignment can be considered while others are hard to attain. Some may be ideal but not be feasible given the pre-existing conditions surrounding the river like settlements so meeting halfway can be done. It is understood though that making a study good for 50 years or more and ensuing proposals for flood mitigation as tools for infrastructure projects are very important to Cagayan de Oro. ▪ Coordination with the City Planning and Development Office to integrate the inputs and results of the Study to facilitate revision of related parts in the City's CLUP especially the Physical Plans. ▪ Possible replication of the Study for Iponan River and other river basins because rainfall spoils go down to the Cagayan de Oro River. ▪ The Committee as well as the other concerned offices in the City Government will support the goals of Study and consequent implementation of proposed measures and can be contacted and relied on for whatever exchange of ideas and assistance the Study will request.
3	City Planning and Development Officer's Request	<ul style="list-style-type: none"> ▪ Mr. Isidro Borja of the CDO City Planning and Development Office has requested for the presentation materials for further review, consultation, and comments.

Annex 4

**Executive Committee
Resolutions No.18 (s.2012) of
Regional Development Council
10 (15 October 2012)**



REGIONAL DEVELOPMENT COUNCIL-X
Executive Committee Resolution No. 18 (s. 2012)

**SUPPORTING THE PREPARATORY SURVEY FOR FLOOD RISK MANAGEMENT
PROJECT FOR CAGAYAN DE ORO RIVER (FRIMP-CDOR)**

WHEREAS, the DPWH, with the technical assistance of the Japan International Cooperation Agency (JICA), is currently undertaking the preparatory survey for FRIMP-CDOR;

WHEREAS, a JICA study team composed of Japanese and Filipino specialists has been deployed to carry out such preparatory survey;

WHEREAS, the objectives of the survey are the following:

- a) To review and update previous Master Plan and Feasibility Study based on the inspection and investigation of latest topographic conditions, development situation, damage surveys and current changes in the flood mitigation policy of the Government of the Philippines (GOP) for the Cagayan de Oro River Basin; and,
- b) To assist GOP in formulating Yen loan project for flood mitigation, which includes structural and non-structural measures for the Cagayan de Oro River Basin based on the results of the above-cited review;

WHEREAS, the survey area shall cover Cagayan de Oro City and three municipalities of Bukidnon namely: Baungon, Libona and Talakag;

WHEREAS, the study is implemented from August 2012 until November 2013 with the following three stages:

- a) Basic survey stage (August 2012-February 2013);
- b) Master plan stage (March 2013-July 2013); and,
- c) Feasibility study stage (August 2013-November 2013);

WHEREAS, specific outputs from the survey shall include:

- a) Survey reports for master plan and feasibility study;
- b) Implementation Program;
- c) Initial environmental examination;
- d) Abbreviated Resettlement Plan;
- e) Stakeholder Meetings (3);
- f) Seminar (Technology Transfer); and,
- g) Topographic Survey (40 sq. km for 1/1,000 map and 1,500 sq. km for 1/10,000);

WHEREAS, the ongoing study is deemed supportive to the realization of the construction/improvement of dike and retaining wall along Cagayan de Oro River, one of the projects proposed under the Region 10 Strategic Action Plan (SAP) for the Rehabilitation and Recovery of Areas Affected by Typhoon Sendong;

WHEREAS, the importance of the study in firming up the structural and non-structural measures for flood mitigation of the Cagayan de Oro River Basin is being recognized;


BE IT RESOLVED, THEREFORE, AS IT IS HEREBY RESOLVED, that the RDC-X Executive Committee supports the conduct of the preparatory survey for Flood Risk Management Project for Cagayan De Oro River (FRIMP-CDOR);

FINALLY RESOLVED, that copies of this resolution be furnished to the Central and Region-10 offices of the member-agencies of the FRIMP-CDOR Preparatory Survey Steering Committee (DPWH, DENR, NIA, OCD, NEDA, PAGASA, and NWRB); the local chief executives of the city government of Cagayan de Oro, provincial government of Bukidnon, municipal governments of Baungon, Libona and Talakag; and other parties concerned for their appropriate action.

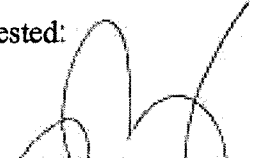
APPROVED, 23 October 2012
101st RDC-10 Executive Committee meeting
Main Conference Room, NEDA/RDC-10 Building,
Capistrano-Echem Streets, Cagayan de Oro City

-oOo-


Certified Correct:



FE D. DOMINGO, PhD
Secretary, RDC-10
Assistant Regional Director, NEDA-10

Attested:


LEON M. DACANAY, JR., CESO III
Vice-Chairperson, RDC-10
Regional Director, NEDA-10

Approved:


ARSENIO L. SEBASTIAN III
Co-Chairperson, RDC-10
RDC-10 Private Sector Representative


LAWRENCE LL. CRUZ
Chairperson, RDC-10
Mayor, Iligan City
(Presiding Officer)

Annex 5

**Resolution No003-2013 City
Development Council
(14 October 2013)**

CITY DEVELOPMENT COUNCIL

Resolution No. 003- 2013

RESOLUTION APPROVING THE PROJECT IMPLEMENTATION PROGRAM ON FLOOD RISK MANAGEMENT PROJECT FOR CAGAYAN DE ORO RIVER AND ENDORSING THE SAME TO THE REGIONAL DEVELOPMENT COUNCIL, NEDA-X

WHEREAS, mitigating flood risks in the Cagayan de Oro River Basin is our prime and utmost concern considering climate change impacts;

WHEREAS, in order to strengthen disaster resilience of communities around and outside of Cagayan de Oro City, there is a need of an urgent flood risk management measures for the River Basin of both non-structural and structural measures;

WHEREAS, the Cagayan de Oro River Basin was among the selected priority river basins for technical assistance under the Japan International Cooperation Agency (JICA);


WHEREFORE, on motion jointly made and seconded by the members present, it was;

RESOLVED, as the City Development Council hereby resolved to approve the Project Implementation Program on Flood Risk Management Project for Cagayan de Oro River and endorse the same to the National Economic and Development Authority – X, Regional Development Council for further appropriate action.

UNANIMOUSLY APPROVED.

Done in the City of Cagayan de Oro this 14th day of October 2013.

I HEREBY CERTIFY to the correctness of the above Resolution.


CHEDILYN AISSA P. DULGUIME-SAJULGA
City Planning and Development Office
HEAD-City Development Council Secretariat

APPROVED:


OSCAR S. MORENO

City Mayor

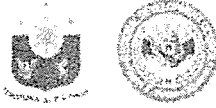
Chairperson, City Development Council

10-17-13



Annex 6

**Resolution No.51 (s.2013) of
Regional Development Council
10
(5 December 2013)**



Republic of the Philippines

REGIONAL DEVELOPMENT COUNCIL-NORTHERN MINDANAO

**REGIONAL DEVELOPMENT COUNCIL-X
Resolution No. 51 (s. 2013)**

**ENDORISING AND APPROVING THE PROPOSED FLOOD RISK MANAGEMENT
PROJECT FOR CAGAYAN DE ORO RIVER (FRIMP-CDOR)**

WHEREAS, the Cagayan de Oro River Basin is one of the 56 priority river basins under the "Nationwide Flood Risk Assessment and the Flood Mitigation Plan for the Selected Areas 2006-2008" study by the Department of Public Works and Highways (DPWH), with the technical assistance of the Japan International Cooperation Agency (JICA) and consequently, the DPWH prepared the Master Plan and Feasibility Study (FS) for the Cagayan de Oro River Basin which was completed in June 2011,

WHEREAS, Tropical Storm (TS) Sendong hit Northern Mindanao on 16-17 December 2011 and caused widespread and severe flooding which resulted to loss of lives and damage to properties and one of the seriously damaged cities is Cagayan de Oro City located at the downstream of the Cagayan de Oro River Basin, where about 600,000 people live;

WHEREAS, due to the geo-physical changes brought about by TS Sendong, the DPWH with technical assistance from JICA in March 2012, started the conduct of the Preparatory Survey for Flood Risk Management Project for Cagayan de Oro River and the results of the survey was used in the formulation of a Yen Loan Project for flood risk management of the Cagayan de Oro River;

WHEREAS, on the 14th of October 2013, the City Development Council of Cagayan de Oro passed Resolution No. 003-2013 entitled "Resolution Approving the Project Implementation Program on Flood Risk Management Project for Cagayan de Oro River and Endorsing the same to the Regional Development Council";

WHEREAS, the primary objective of the project is to mitigate flood risk in the Cagayan de Oro River Basin through flood mitigation measures, which include structural and non-structural measures;

WHEREAS, the identified structural and non-structural measures to be implemented in the short to medium-term (2014-2021) are the following:

STRUCTURAL MEASURES	NON-STRUCTURAL MEASURES
1. Construction of new dike/retaining wall	1. Preparation/update of flood hazard map, evacuation planning
2. Installation of gate and drainage outlets	2. Flood Forecasting and Warning System (FFWS)
3. Construction of new road/raising of existing road for evacuation	3. Community Based Flood Early Warning System (CBFEWS)
4. Improvement of Kagayan Bridge	
5. Construction of retarding basin	

6. Periodic monitoring of river cross section and regular maintenance dredging/channel excavation	4. Information campaign and publicity for the project (Structural Measures) 5. Technical assistance for land use regulation for habitual inundation area 6. Technical assistance for riparian forest establishment in the agricultural lands 7. Technical assistance for mangrove forest establishment along the coastal areas
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WHEREAS, the estimated project cost is Php8.747 Billion and is proposed to be funded under a Yen Loan Package by the Government of Japan of Php5.118 Billion and counterpart of Php3.559 Billion from the Government of the Philippines:

WHEREAS, based on the initial project proposal, the design of the flood structures will only respond to a 25-year return period, the RDC-10 Infrastructure and Utilities Development Committee, therefore, emphasized to the DPWH on the need to design the flood structures to respond to a TS Sendong like flood scale:


WHEREAS, fully recognizing the relevance and urgency of the project, the RDC-10 Infrastructure and Utilities Development Committee, during its meeting on 29 November 2013, favorably recommended for endorsement and approval by RDC-10, the proposed Flood Risk Management Project for Cagayan de Oro River (FRIMP-CDOR):

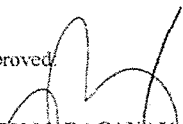
NOW, THEREFORE, BE IT RESOLVE, AS IT IS HEREBY RESOLVED, on motion duly seconded, to endorse and approve, the proposed Flood Risk Management Project for Cagayan de Oro River (FRIMP-CDOR).

RESOLVED FINALLY, to furnish copies of this resolution to the Mayor of Cagayan de Oro City, Secretary of the Department of Public Works and Highways (DPWH), Secretary of the Department of Budget and Management (DBM), Secretary of Socioeconomic Planning and Director General of NEDA, Regional Director of DPWH-10, Regional Director of the DBM-10, for their support and appropriate action.

Approved, 5 December 2013
99th RDC-X Full Council Meeting
Function Hall 1, Tangub City

Certified Correct:


FE D. DOMINGO, PhD
Secretary, RDC-X
Assistant Regional Director, NEDA-X

Approved: 
LEON M. DACANAY, JR., CESO III
Vice-Chairperson, RDC-X
Regional Director, NEDA-X
(Presiding Officer)