ANNEX

ANNEX-1 Minutes of Meetings

1-1 Kickoff Meeting or Technical Working Group Meeting or Steering Committee Meeting

1-1-1 Kickoff Meeting for Component 1-2 (15 February, 2012)

MINUTES OF MEETING

ON

KICKOFF MEETING

FOR

SUBCOMPONENT 1-2 OF

PROJECT FOR COMPREHENSIVE FLOOD MANAGEMENT PLAN FOR THE CHAO PHRAYA RIVER BASIN IN KINGDOM OF THAILAND

AGREED UPON BETWEEN
OFFICE OF NATIONAL ECONOMIC AND SOCIAL DEVELOPMENT BOARD (NESDB)
ROYAL IRRIGATION DEPARTMENT, MINISTRY OF AGRICULTURE AND COOPERATIVES (RID/MOAC)
DEPARTMENT OF WATER RESOURCES, MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT (DWR/MNRE)
AND
THE CONSULTANT TEAM OF JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

Bangkok, February 15, 2012

Mr. Prasit Sitho
Chief Engineer (Executive Advisor in Survey and/or Design), RID

Mr. Yoshiharu MATSUMOTO
Leader,
The Consultant Team of Japan International Cooperation Agency

I. Introduction

Based on the Record of Discussions on the Project for Comprehensive Flood Management Plan for the Chao Phraya River Basin (hereinafter referred to as "the Project") signed on 13 January 2012 among National Economic and Social Development Board (hereinafter referred to as NESDB), Royal Irrigation Department, Ministry of Agriculture and Cooperatives (hereinafter referred to as "RID"), Department of Water Resources, Ministry of Natural Resources and Environment (hereinafter referred to as "DWR") and the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the Kickoff Meeting of its Subcomponent 1-2 was held on 15 February 2012 with the presence of 36 participants from the headquarters and the regional offices of RID, DWR, the Thai International Cooperation Agency (hereinafter referred to as "TICA"), and JICA.

The agenda for the meeting is Item 1: Introduction, Item 2: Report of Record of Discussions and substantial issues, Item3: 3.1 Presentation of Work Plan, 3.2 Requested information, 3.3 Propose Counterpart Team/Technical Working Group, Item 4: Other business (if any)

In this meeting the Work Plan for Subcomponent 1-2 was presented by the JICA Consultant Team and was generally accepted by the Thai side. The manner for data collection was also discussed in the meeting.

The list of attendance is presented in Annex.

II. Major Items Discussed

Major discussions made in the Kickoff Meeting among NESDB, TICA, DWR, RID and JICA are as follows:

1. Report on Record of Discussions

It was explained that the cooperation agreement on the Project between Thailand and Japan had been made in the Record of Discussions dated 13 January 2012. The backgrounds, components, and implementation period of the Project, set-up of a steering committee and inputs from JICA and Thai side were also explained in the meeting.

2. Updating of Other Components

Mr. Taniguchi of the JICA Thailand Office updated the progress of the other project components.

- Flight permission for the LiDAR survey (Subcomponent 1-1) will be applied for on 22 February 2012. The flight will be hopefully possible from a week after the permission is issued.
- Department of Highway and RID agreed on the grant-aid projects (Component-2). Official requests prepared by the two agencies will be sent to the Japanese Embassy through TICA. This process is going to be finished by 24 February 2012.
- There is no specific project for the Pilot Project (Component-3) at this time due to the urgent implementation schedule. Candidate projects are still welcomed.

3. Work Plan

Mr. Matsumoto, the Leader of the JICA Consultant Team presented the Work Plan for the Subcomponent 1-2. The Work Plan is composed of four chapters, Chapter 1: Introduction, Chapter 2: Outline of Master Plan proposed by Strategic Formulation Committee for Water Resources Management (hereinafter referred to as "SCWRM"), Chapter 3: Plan of Operation and Chapter 4: Inputs and Undertakings. After the presentation, discussions were made as

summarized below:

(1) Involvement of Other Agencies

RID expressed their concern how to involve other concerned organizations besides RID and DWR to participate in the Study. The JICA Consultant Team answered that NESDB should play a role as a coordinator among relevant agencies as agreed in the Minutes of Meetings dated 22 December 2011 (Annex-1 of the Work Plan).

(2) Detailed Work Plan

RID requested the JICA Consultant Team to make clear scope and details of the Work Plan , since RID have to study by themselves on the tasks that the JICA Study could not be covered within the JICA Study period (1.5-year). The JICA Consultant Team answered the study in principle will cover the project components of the action plan of integrated and sustainable flood mitigation in Chao Phraya River basin, which were unveiled by Thai Government Master Plan in January 20, and more concrete work plans based on preliminary studies by the Integrated Study Project on Hydro-meteorological Prediction and Adaptation to Climate Change in Thailand (hereinafter referred to as "IMPAC-T") and the International Center for Water Hazard and Risk Management (hereinafter referred to as "ICHARM") could be presented to Thai side in April 2012.

(3) Flood Simulation Software and Technical Transfer

It was agreed that MIKE series software would be used for the flood simulation in the Study. The JICA Consultant Team also agreed to convey a request of Thai side on seminar or training on the software application.

(4) Other Suggestions

The JICA Consultant Team generally agreed to take into consideration the following requests by RID:

- Study based on topographic data for appropriate design of dikes and flood walls.
- Concept of shelter that is accessible and away from potential flood area.
- Inclusion of the 2008 and 2010 floods in addition to those in 1995, 1996, 2006 and 2011 for verification of the flood simulation model, depending on the available time of project study.

4. Data Collection

Mr. Katayama, Deputy Leader of the JICA Consultant Team requested RID to urgently appoint counterpart personnel to facilitate the data collection. RID proposed to set up an inter-department committee as well as a technical working group for the purpose of inter-department coordination including data collection and agreed to appoint such representatives by the end of this week. Mr. Kanchadin of RID will act as a coordinator of RID. Regarding the set up of the inter-department committee and technical working group, JICA Consultant Team answered that the Team would convey the proposal to JICA.

ANNEX

List of Attendance

Thai Attendants (Royal Irrigation Department)

NAME	POSITION
Mr. Prasit Sitho	Chief Engineer (Executive Advisor in Survey and/or Design)
Mr. Pongsthakorn Suvanpimol	Expert on Hydrology for Deputy Director General on Operation and Management
Mr. Somkiat Prajamwong	Director of Project Management Office
Mr. Suwanna Yuvananon	Senior Expert on Survey and Photogrammetry, For Director of Office of Engineering and Topographical and Geotechnical Survey
Mr. Phonchai Klinkhachorn	Chief of Hydrological Information and Forecast Group, For Director of Office of Water Management and Hydrology
Mr. Tosapol Wongwan	Chief of Budget Analysis Group, For Director of Budget Programming Division
Mr. Chatchai Boonlue	Director of Foreign Financed Project Administration Division, Office of Project Management
Mrs. Phattaporn Mekpruksawong	Chief of Project Planning Group 1, Office of Project Management
Mr. Kanchadin Srapratoom	Chief of Loan Project Branch, Foreign Financed Project Administration Division,
Mrs. Sakuntala Bhatitrummarak	Foreign Relations Officer (Professional Level) For Director of International Cooperation Division
Mrs. Janjira Buddhawong	Foreign Relations Officer (Professional Level) Foreign Financed Project Administration Division
Ms. Sakaoduan Khayanying	Foreign Relations Officer (Professional Level) International Cooperation Division
Mrs. Jira Sukklam	Chief of Research and Applied Hydrology Group, Office of Water management and hydrology
Ms. Wanwisa Mama	Engineer Office of Water management and hydrology
Mrs. Patcharawee Suwannik	Civil Engineer (Professional Level) Office of Water management and hydrology
Mr. Weera Wangworawong	Engineer (Professional Level) Foreign Financed Project Administration Division
Mr. Vipob Teamsuwan	Civil Engineer (Professional Level) Office of Water management and hydrology
Mr. Charoen Amornmorakot	Engineer (Professional Level) Foreign Financed Project Administration Division

Thai Attendants (Royal Irrigation Department)

NAME	POSITION
Mr. Noppadol Kowsuwan	Representative of Regional Irrigation Office 1
Mr. Kanching Kawsard	Representative of Regional Irrigation Office 3
Mr. Boonthum Panpiamphot	Representative of Regional Irrigation Office 4
Mr. Teerawat Thamniyom	Representative of Regional Irrigation Office 10
Mr. Chairat Chaisawat	Representative of Regional Irrigation Office 12
Mr. Sekchai Chauewanitchakorn	Representative of Regional Irrigation Office 13

Thai Attendants (Other Agencies)

NAME	POSITION
Mr. Pradet Sangsawang	Representative of Department of Water Resources
Mr. Satja Promsorn	Representative of Department of Water Resources
Mrs. Somsuan How	Representative of Thailand International Development Cooperation Agency
Mrs. Panthila Sangjun	Representative of Thailand International Development Cooperation Agency

NESDB: National Economic and Social Development Bureau
TICA: Thailand International Development Cooperation Agency
DWR: Department of Water Resources
RID: Royal Irrigation Department

Japanese Attendants

NAME	POSITION
Mr. Hajime Taniguchi	JICA Thailand Office
Mr. Kobchai Songsrisanga	JICA Thailand Office
Mr. Matsumoto Yoshiharu	JICA Study Team
Mr. Katayama Masami	JICA Study Team
Mr. Akio Shichijugari	JICA Study Team
Mr. Takayuki Hatano	JICA Study Team
Mrs. Mizuyori Tomoko	JICA Study Team
Mr. Kazutoshi Masuda	JICA Study Team

1-1-2 Technical Group Meeting for Component 1-2 (24 April, 2012)

MINUTES OF MEETING
ON
THE TECHNICAL GROUP MEETING
FOR
COMPONENT 1-2

OF

PROJECT FOR COMPREHENSIVE FLOOD MANAGEMENT PLAN FOR
THE CHAO PHRAYA RIVER BASIN IN THE KINGDOM OF THAILAND

AGREED UPON BETWEEN
ROYAL IRRIGATION DEPARTMENT, MINISTRY OF AGRICULTURE AND COOPERATIVES
(RID/MOAC)
AND
THE STUDY TEAM OF JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

Bangkok, April 24, 2012

Dr. Somkiat PRAJAMWONG
Director of Office of Project Management
Royal Irrigation Department
Ministry of Agriculture and Cooperatives

Mr. Yoshiharu MATSUMOTO
Leader,
JICA Study Team for Subcomponent 1-2

I. Introduction

In accordance with the proposal in the Kickoff Meeting held on February 24th, Technical Working Group (hereinafter referred as The Technical Group) was organized by the RID Order No. Chor 314 /B.E. 2555 (AD 2012) in order to proceed the smooth and effective implementation of the study on the Project for Comprehensive Flood Management Plan for the Chao Phraya River Basin (hereinafter referred as Study). The mandates of the Technical Group include (1) to work with the JICA Study Team, (2) to give appropriate and useful technical options which are necessary for the study, and (3) to coordinate with other agencies in order to achieve the objectives of the study. The First Technical Working Group Meeting between members of the Technical Group and the JICA Study Team was held on 24 April 2012 with the presence of 31 participants from the headquarters and the regional offices of RID, the JICA Tokyo office, the JICA Thailand office, and the JICA Study Team. On this occasion, the Technical Group requested JICA to introduce the contents of the materials used in the meeting on the Integrated Plan for Flood Mitigation in Chao Phraya River Basin organized by Office of the National Economic and Social Development Board, Royal Irrigation Department, Department of Water Resources, and Japan International Cooperation Agency by JICA held on February 26th. Then, the topic on the meeting was also included in the agenda of this Technical Working Group Meeting.

The agenda for the meeting is Item 1: Opening Address and Acknowledgement by Chair, Item 2: Presentation of Contents for Meeting Held on April 26th, Item 3: Presentation on Study Strategy by JICA Study Team, Item 4: Confirmation of Further Data Collection and Item 5: Others.
The list of attendees is presented in Annex.

II. Presentation and Discussion

1. Item 2: Presentation on Contents for Meeting held on April 26th

For the introduction of contents of meeting held on April 26th, Mr. Takaya, a member of JICA advisory committee of the Study, presented the following contents:

- Progress of Laser Profiler Airborne Survey covering the area of 26,000 km^2 including inundated area. (The final product will be available in July 2012 and will be shared with RID and the JICA Study Team.)
- Historical background of flood control conducted by Japanese Government
- Introduction of output by IMPAC-T on hydrological analysis including flood runoff analysis together with proposal on modification of current dam operation rule
- Introduction of output by ICHARM on simulation results using flood inundation analysis model together with the effectiveness of the flood diversion channel

For the presentation, the Technical Group expressed a sincere gratitude and asked JICA to have opportunity for the discussion on the models used for hydrological analysis, runoff analysis and flood inundation analysis. JICA agreed to have an opportunity for discussions with Japanese experts from IMPAC-T and ICHARM on April 26th after the meeting. And also, the Technical Group

requested the LiDAR to be included in the simulation model for the detailed analysis. JICA answered that the simulation results presented today is in the phase one and the detailed analysis will be conducted in the phase two by replacing the current topographic data with the LiDAR data.

2. Item 3: Presentation on Study Strategy by JICA Study Team

Mr. Matsumoto, the Leader of the JICA Study Team, presented the study strategy for the Component 1-2 including study procedures of important flood mitigation measures, study schedule and items to be confirmed.

In the meeting the study strategy for Component 1-2 was generally accepted by the Thai side.

In the meeting, the following comments, proposals and information were brought from the Technical Group members:

- The Technical Group informed that there are several flood control measures which are currently under consideration, including a drainage system in the east side of the mid Chao Phraya River basin between Chainat and the Gulf of Thailand with the cooperation of the Department of Highways, improvement works on the existing drainage system in the west side of the Chao Phraya, and construction of diversion dams of which dimensions will be similar to the Chao Phraya diversion dam.
- The Technical Group proposed that for cost-benefit analysis, the direct and indirect benefits should be analyzed.
- The Technical Group proposed joint activities and on-the-job training between the Technical Group members and the JICA Study Team so that the transfer of the JICA project will be smoothly and effectively conducted between the Technical Group and the JICA Study Team once the study is completed in 2013.
- The Technical Group proposed to review the meeting handouts and provide the JICA Study Team with comments by 30 April, 2012.

For the above comments, proposals and information, the JICA Study Team answered as follows:

- For the several flood control measures currently undertaken, the JICA Study Team carefully examines their effectiveness and/or influence to this JICA Master Plan Study. In this connection, the JICA Study Team will ask to Thai side to provide more detailed information for these measures.
- Regarding the cost benefit analysis, the JICA Study Team will carefully conduct cost-benefit analysis including the direct and indirect benefits.
- Regarding the proposal on joint activities and on-the job training, the JICA Study Team proposed and agreed to have periodical meeting with the Technical Group, in principle, once a month in order to present the progress of the study and also to transfer of knowledge of the methodology relating to formulation of the Master Plan, especially on the flood inundation analysis model as well as run-off and rainfall analysis model.
- Regarding the comments, the JICA Study Team will welcome comments from the Technical Group, if any.

3. Item 4: Confirmation of Further Data Collection

Ms. Watanabe, the JICA Study Team, briefly presented the progress on the data collection and requested the RID regional offices to provide the JICA Study Team with the requested data listed in the handouts in a timely manner. The Technical Group agreed to continuously cooperate with the JICA Study Team on providing the requested data.

ANNEX

LIST OF ATTENDEES

Thai Side Attendees (Royal Irrigation Department)

No.	NAME		ORGANIZATION
1	Mr. Somkiet	Prajumwong	Office of Project Management
2	Mr. Thana	Suwatkon	Office of Project Management
3	Mrs. Suwanna	Yuwananon	Office of Engineering Topographical and Geotechnical Survey
4	Mr. Pongsathorn	Sirion	Office of Engineering and Architecture Design
5	Mr. Somjit	Amnatsarn	Office of Hydrology and Water Management
6	Mr. Noppadol	Kosuwan	Regional Irrigation Office 1
7	Mr. Witoon	Thitithanapat	Regional Irrigation Office 2
8	Mr. Kanching	Kawsaart	Regional Irrigation Office 3
9	Mr. Boontham	Panpiamphot	Regional Irrigation Office 4
10	Mr. Atthaporn	Panyachohm	Regional Irrigation Office 10
11	Mr. Pongsak	Arunwichitkul	Regional Irrigation Office 11
12	Mr. Chawalit	Wanprasert	Regional Irrigation Office 12
13	Mr. Pisarn	Pongnorrapat	Regional Irrigation Office 13
14	Mr. Supanat	Pariyachat	Office of Project Management
15	Mr. Kanchadin	Srapratoom	Office of Project Management
16	Mr. Pratya	Chaiwatthana	Office of Project Management
17	Mr. Chatchai	Boonlue	Office of Project Management
18	Mrs. Phattaporn	Mekpruksawong	Office of Project Management
19	Mr. Kuersak	Thathong	Office of Project Management
20	Mr. Dachapol	Rukamatu	Office of Project Management
21	Mr. Weera	Wangwarawong	Office of Project Management

Japanese Side Attendees

No.	NAME		ORGANIZATION
22	Mr. Shinya	Ejima	JICA
23	Mr. Kimio	Takeya	JICA
24	Mr. Taichi	Minamitani	JICA
25	Mr. Tomoyuki	Kawabata	JICA
26	Mr. Yoshiharu	Matsumoto	JICA Study Team
27	Mr. Masami	Katayama	JICA Study Team
28	Ms. Akira	Watanabe	JICA Study Team
29	Mr. Donpapob	Manee	JICA Study Team Technical Assistant
30	Ms. Kamolnit	Ariyakamolpat	JICA Study Team Interpreter
31	Ms. Nattamon	Tanyapanit	JICA Study Team Interpreter

1-1-3 Progress Meeting for Subcomponent 1-2 and Component 2 and Inception Meeting for Component 3 (27 July, 2012)

(49)

MINUTES OF MEETINGS
ON
PROGRESS MEETING FOR SUBCOMPONENT 1-2 AND COMPONENT 2
AND
INCEPTION MEETING FOR COMPONENT 3
OF
PROJECT FOR COMPREHENSIVE FLOOD MANAGEMENT PLAN
FOR THE CHAO PHRAYA RIVER BASIN IN THE KINGDOM OF THAILAND

AGREED UPON BETWEEN
THE OFFICE OF NATIONAL ECONOMIC AND SOCIAL DEVELOPMENT BOARD (NESDB)
AND
ROYAL IRRIGATION DEPARTMENT, MINISTRY OF AGRICULTURE AND COOPERATIVES (RID/MOAC)
AND
DEPARTMENT OF WATER RESOURCES, MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT (DWR/MNRE)
AND
THE CONSULTANT TEAMS OF JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

Bangkok, July 27, 2012

Mr. Chachawal Punyavateenun
Deputy Director General for Engineering
Royal Irrigation Department,
Ministry of Agriculture and Cooperative

Mr. NUNOMURA Akihiko
Leader
Consultant Team for Component 3

Mr. MISHINA Takahiro
Leader
Consultant Team for Subcomponent 1-2 and Component 2

1. Introduction

Based on the Minutes of Meetings on the Amendment of Record of Discussions for the Project for Comprehensive Flood Management Plan for the Chao Phraya River Basin (hereinafter referred to as "the Project") singed on May 31, 2012 between Japan International Cooperation Agency (hereinafter referred as "JICA") and the Authorities Concerned of the Government of the Kingdom of Thailand, which are composed of National Economic and Social Development Board (hereinafter referred to as "NESDB"), Royal Irrigation Department, Ministry of Agriculture and Cooperatives (hereinafter referred to as "RID" and Department of Water Resources, Ministry of Natural Resources and Environment (hereinafter referred to as "DWR").

For confirmation of the understanding of the Inception Report of the Component 3, JICA Headquarters dispatched Mr. AMANO Yusuke on June 26, 2012 to Bangkok. The Thai side, the JICA Headquarters' Mission and the Consultant Teams held a meeting on the Inception Report of the subcomponent 3 and the progress of the subcomponent 1-2 and Component 2 at RID on July 27, 2012. The meeting was chaired by Mr. Chachawal Punyavateenun, Deputy Director General for Engineering, RID.

Mr. AMANO explained about the relation of the three components, the new Consultant Team from the Foundation of River & Basin Integrated Communications, Japan (hereinafter referred as "FRICS" for the component 3 and a new JICA expert to RID. The progress of the subcomponent 1-2 (the Master Plan Study) was briefed by Mr. TANAKA Hajime and the component 2 (the Grant Aid Project) was done by Mr. MISHINA Takahiro, and the Inception Report for the component 3 was presented by Mr. KURIKI Minoru.

After short explanation and presentation of the projects, discussions were made by the participants. As a result of the discussion, the Thai side accepted the basic concept, approach and plan of operation proposed in the Inception Report (July 2012) in principle.

Through the discussions, several items were clarified as presented in "2. Discussion" below.

2. Discussion

Major points of the discussions are summarized as follows:

Subcomponent 1-2

(1) Periodical reporting of progress of the study

RID requested the Consultant Team to report the progress for the master plan study about once a month to RID in order to let them understand what are going on and to have timely discussions on encountered problems during the study between RID and the Consultant Team and also suggested the delay of submission of Interim Report 1.

The Consultant Team answered that the Consultant Team will report the progress about once a month to RID in order to avoid any misunderstanding between RID and the Consultant Team.

(2) Schedule of technology transfer seminar or workshop

RID asked the Consultant Team about arrangement of technology transfer seminar or workshop

during the study because it will be most beneficial for Thai engineers to get technology transfer for formulation of comprehensive master plan.

The consultant team explained that we have a plan to hold seminars in December after submission of Interim Report 2 (December 2012), March before submission of Draft Final report (May 2013) and in May after submission of Draft Final Report (May 2013). The consultant team would like to have meeting with RID staff on Rainfalls, run-off meeting (September 5, 2012).

Component 2

(3) The Royal Irrigation Department and JICA selected to construct Kra Mang and Han Tra floodgates as Grant Aid Project. The Consultant Team explained the following schedule:

- The Exchange of Notes between the Government of Japan and the Government of the Kingdom of Thailand dated July 5, 2012,
- The reference documents necessary for tendering will be submitted at the end of August,
- Tender opening of the Project will be in December in Japan,
- The Contract between RID and Contractor will be in December in Japan and
- The construction period is estimated to be 17 months.

Component 3

(4) Real-time data collection

Mr. Somkiat Prajamwong, Director of Project Management Office, RID, while not objecting any data request by the JICA Consultant Team, asked clarification on the nature of the real-time data.

The Consultant Team answered that real-time data that it required for the flood forecasting were daily (rainfall) data routinely collected and tabled by different organizations concerned for their own use.

(5) Time frame of developing forecasting system

Mr. Somkiat asked the developing timeframe of a flood forecasting system. He was afraid that the system would not be formulated before the rainy season 2012, considering the time required for setting models up.

The Consultant Team explained that the models to be used in the flood forecasting were those already had developed, calibrated, and verified in the Chao Phraya River by research organizations in Japan. The team would establish a prototype system in early September 2012, which would provide some information including predictions. The accuracy of the system would be improved continuously incorporating data would become available time to time. The Consultant Team was expecting that LiDAR data would improve the accuracy of the system.

The Consultant Team explained that the accuracy of flood forecasting was a big issue. That was why the risk of forecasting flood should be properly managed, and presenting a range (minimum, maximum) of forecast, rather than a single figure, was proposed. Will the counterpart of

Component 3 be appointed. The Office of Water Management and Hydrology is required to assign an additional staff/official to co-operate to the Study Team.

All Components

(6) Improvement of data collection

JICA Consultant Teams have requested an enormous amount of data from NESDB and other agencies individually. NESDB recommended that the Consultant Teams are to make a list of what data is needed and from which agency, so NESDB can accommodate and provide accurate data smoothly.

The Consultant Teams agree to improve the method of data collection.

The list of participants is shown in Annex-1.

Annex-1: List of Attendees for the Meeting on July 27, 2012 at 3rd Floor Meeting Room of RID Samsen

1. Thai Attendants (RID, NESDB and DWR)

No	Name	Position
1	Mr. Chachawal Punyavateenun	Deputy Director General for Engineering (Chairman)
2	Mr. Prasit Sitho	Chief Engineer (Executive Advisor in Survey or Design) (Consultant)
3	Mr. Phuwanade Thongrungroj	Chief Engineer (Executive Advisor in Water Allocation and Maintenance) (Consultant)
4	Mr. Somkiat Prajamwong	Director of Project Management Office
5	Mr. Kosol Tienthongnukul	Director of Office of Engineering Topographical and Geotechnical Survey
6	Mr. Panuphan Artsalee (representative of Mr. Somkiet Tangjatuporn)	Civil Engineer, Expert Level (Design)
7	Mr. Thongpeaw Kongjun	Director of Office of Engineering and Architecture Design
8	Mr. Noppadol Kosuwan (representative of Mr. Winai Pongjinda)	Chief of Improvement and Maintenance Division
9	Mr. Chaiyong Jongaresachart	Director of Regional Irrigation Office 2
10	Mr. Kanching Kawsard (representative of Mr. Sophon Thamraksa)	Chief of Operation and Maintenance Division of Regional Irrigation Office 3
11	Mr. Boonthum Panpiamphot (representative of Mr. Arejit Suwanitchawong)	Chief of Water Management of Regional Irrigation Office 4
12	Mr.Ugrid Thawonklaikool (representative of Mr. Nopporn Chaipichit	Director of Operation and Maintenance Division of Regional Irrigation Office 10
13	Mr. Chainarin Panpinyaporn	Director of Regional Irrigation Office 11
14	Mr. Darongkorn Somton	Director of Regional Irrigation Office 12
15	Mr. Preecha Jarnthong	Director of Regional Irrigation Office 13
16	Mr. Jamnong Phungpuk (representative of Mr. Montri Boonpanit)	Director of Office of the National Economic and Social Development Board (NESDB)
17	Mr. Jirawat Ratisunthorn (representative of Mr.Boonjong Jaratdamrongnit)	Director of Water Crisis Prevention Center
18	Mr. Chatchai Boonlue	Director of Foreign Financed Project Administration Division, Office of Project Management
19	Mr. Jirawat Prachimlang (representative of Mr. Sathit Seuprasertsuk)	Civil Engineer, Practitioner Level
20	Mr.Kanchadin Srapratoom	Chief of Loan Project Branch, Foreign Financed Project Administration Division
21	Ms. Sukontha Airkarat (representative of Mr. Singhadet Chu-Amnat)	Representative of Director Bureau of Coordination for International Cooperation
22	Mr. Prayoon Yenjai (representative)	Chief of Water Management Division of Regional Irrigation Office 13
23	Mr. Chonlathep Thatri	Chief of Water Management Division of Regional Irrigation Office 3
24	Mr. Suparat Kosumapinan	Chief of Design Group of Regional Irrigation Office 10
25	Mr. Klaileuk Inchayanan	
26	Mr. Pinyo Gessa	Policy Analyst of Department of Water Resources
27	Ms. Kobkul Rangsiyaroj	Plan and Policy Analyst, Senior Professional Level
28	Mr. Jaroern Amornmorakot	Engineer, Professional Level, Foreign Financed Project Administration Division
29	Mr.Weera Wangworawong	Irrigation Engineer, Professional Level, Foreign

		Financed Project Administration Division

2. Japanese Attendants

No	Name	Position
1	Mr. AMANO Yusuke	JICA Headquarters
2	Mr. NUNOMURA Akihiko	Consultant Team (Component 3)
3	Mr. KURIKI Minoru	Consultant Team (Component 3)
4	Mr. KANAZAWA Hirokatsu	Consultant Team (Component 3)
5	Mr. INOUE Yasushi	Consultant Team (Component 3)
6	Mr. MISHINA Takahiro	Consultant Team (Subcomponent 1-2 and Component 2)
7	Mr. TANAKA Hajime	Consultant Team (Subcomponent 1-2 and Component 2)
8	Mr. Chuchat Suwut	Consultant Team (Subcomponent 1-2 and Component 2, Local Staff)
9	Ms. Kamolnit Ariyakamolpat	Consultant Team (Subcomponent 1-2 and Component 2, Local Staff)
10	Ms. Melyn Chutumstid	Consultant Team (Subcomponent 1-2 and Component 2, Local Staff)

1-1-4 Second Technical Working Group Meeting for Subcomponent 1-2 and Component 3 (29 October, 2012)

MINUTES OF MEETING
ON
THE SECOND TECHNICAL WORKING GROUP MEETING
FOR
SUBCOMPONENT 1-2 AND COMPONENT 3

OF

PROJECT FOR COMPREHENSIVE FLOOD MANAGEMENT PLAN FOR
THE CHAO PHRAYA RIVER BASIN IN THE KINGDOM OF THAILAND

AGREED UPON BETWEEN

TECHNICAL WORKING GROUP
AND
THE STUDY TEAMS OF JAPAN INTERNATIONAL COOPERATION
AGENCY (JICA)

Bangkok, October 29, 2012

Dr. Somkiat Prajamwong	Mr. Takahiro MISHINA	Mr. Akihiko NUNOMURA
Director , Office of Project Management Royal Irrigation Department	Leader, The Study Team of Japan International Cooperation Agency (Subcomponent 1-2)	Leader, The Study Team of Japan International Cooperation Agency (Component 3)

I. Introduction

The Second Technical Working Group Meeting between members of the Working Group and the JICA Study Teams for Subcomponent 1-2 and Component 3 was held on 29th October, 2012 with the presence of 35 participants from the headquarters and the regional offices of RID, the JICA Tokyo office, and the JICA Study Teams.

The agenda for the meeting is divided into those for Subcomponent 1-2 and Component 3, as follows:

Program I: Subcomponent 1-2

1. Presentation of "Progress of master Plan's Basic Concept" by JICA Study Team Subcomponent 1-2
2. Comments and Suggestions of RID Technical Working Group

Program II: Component 3

1. Presentation of "Urgent Action Plan Report" by JICA Study Team Component 3
2. Monitor Responses to the Flood Risk Information System
3. Comments and Suggestions of RID Technical Working Group

Contents of the presentations by the two JICA Study Teams were generally accepted by the RID Technical Working Group.

The list of attendees is presented in Annex.

II. Presentation and Discussion for Program I: Subcomponent 1-2

1. Presentation of "Progress of Master Plan's Basic Concept"

Mr. Mishina, the Leader of JICA Study Team for Subcomponent 1-2, presented "Progress of Master Plan's Basic Concept" including six (6) basic conditions and seven (7) action plans as shown in Figure 2.1.1 in the meeting material, focusing on:

- Basic Approach of Master Plan Study
- Evaluation of Flow Capacity including Flood Analysis Model
- Setting Protection Area
- Habitual Flood Area
- Countermeasures such as Flood Diversion Channel

2. Comments and Suggestions of RID Technical Working Group

The Working Group stated that it would provide comments and suggestions on the presentation in writing to the JICA Study Team. The Working Group also requested the JICA Study Team to have opportunities for further discussions on three items including (1) the models used for hydrological

analysis, runoff analysis and flood inundation analysis, (2) the data which are used in the Study and (3) the countermeasures which are proposed in the presentation. The JICA Study Team agreed to have separate meetings for each item with appropriate representatives from both sides.

III. Presentation and Discussion for Program II: Component 3

1. Presentation of "Progress of Master Plan's Basic Concept"

Mr. Kuriki, the Deputy Leader of JICA Study Team for Component 3 explained "The Urgent Activities Action Plan Report", which described the necessary activities for establishment of a flood data analysis and flood forecasting system (the Flood Risk Information system for the Chao Phraya River basin) to serve as a flood countermeasure during 2012 flood season.

The Flood Risk Information system for the Chao Phraya River basin, the prototype of which became operational in mid-September 2012, provided the past, present, and forecast (up to 7 days) flow rate and water level, as well as forecast (up to 7 days) inundation extent. Information was expressed in (i) the schematic diagram of the river, (ii) flow rate and water level graphs, and (iii) inundation extent on Google map. The schematic diagram provided color-coded risk level of stations. The flow rate graph and water level graph would be shown after users click at station from the schematic diagram. The flow rate graph would show maximum forecast values (corresponded to maximum rainfall), and minimum forecast values (with no rain). The forecast inundation extent indicated the flood risk (1-7 day flood forecast) using color-coded high risk level (dark blue) and risk level (light blue) legends, shown on Google map. The definition of "High Risk Area" was the area with the possibility of inundation (with the inundation depth of 20 cm. or more) in case of the minimum rainfall; "Risk Area" was the area with the possibility of inundation in case of the maximum rainfall.

In order to introduce and receive feedbacks and comments on the Flood Risk Information system from potential users, briefing seminars were held on 4 September 2012, hosted by the JICA, for some 200 Japanese firms, and 9 September 2012, hosted by the JICA and the National Economics and Social Development Board, for some 70 representatives from the Thai government organizations related to the water management. As of 26 October, there were 218 Japanese monitors and 53 Thai monitors.

Outstanding issues of the Flood Risk Information system were categorized into three:

(i) Technical Issues, such as rainfall forecast and inundation risk;
(ii) Operational Issues, such as observation data acquisition and operation of the system; and
(iii) Utilization Issues, such as information delivery and user interface.

The Study Team proposed a small Task Force composed of experts from RID, DWR and other related organizations to discuss the solution strategies for these issues.

2. Comments and Suggestions of RID Technical Working Group

Dr. Somkiat, Director of Project Management Office and Chairman of the meeting, commented that the Technical Working Group must assist the Study Team in verifying the contents of the system before presenting it to the public.

Comment and suggestions given by the participants were as follows:

(1) "No rain" for the minimum expected rainfall should be reconsidered;
(2) System should help decision makers to warn people;
(3) Satellite images and the LiDAR data should be properly utilized;
(4) Factors required by the simulation models should reflect the conditions of Thailand;
(5) Definition of inundation risk should be defined taking the difference in agricultural areas and city areas into consideration;
(6) Schematic diagrams used by the Components should be the same;
(7) Information of upper Chao Phraya River areas should be added;
(8) Data of side flow rivers should be added to the system;
(9) Schematic diagram should include more facilities, such as branch canals, canal retention, floodgates, big pumps, dams, and retention areas at the downstream; and
(10) Projects of upper rivers should be considered.

The Chairman suggested that all factors that help people to better understand the situation should be included, such as location of pumping stations and water gates, as well as their operation status.

Mr. Nunomura, Team Leader of Study Team, Component 3, replied that while it might be difficult to materialize all of the requests and suggestions at a time, important ones would be prioritized, and the system should be improved in collaboration with the Thai experts. He also pointed out that system output would become "information" only when it is utilized by the users.

Dr. Somkiat concluded the meeting by assigning the secretary of the meeting to arrange a meeting between the Study Team for Subcomponent 1-2 and Component 3, and the Technical Working Group the following week to make all issues clear and for the JICA study team and RID to go on the same direction. He also assigned the RID representatives who will go to the training in Japan to cooperate with the Study Team to learn and understand the concepts of the training and also requirements from Japan side before departure.

ANNEX

LIST OF ATTENDEES

THAI SIDE ATTENDEES (Royal Irrigation Department)

TECHNICAL WORKING GROUP MEMBER		
No.	**NAME - SURNAME**	**OFFICE**
1	Mr. Somkiat Prajamwong	Director of Project Management Office Office of Project Management
2	Mr. Pongsatorn Sirion	Chief of Irrigation System Design Group Office of Engineering and Architecture Design
3	Mrs. Phatcharawi Suwannik	Irrigation Engineer, Profession Level Office of Water Management and Hydrology
4	Mr. Noppadol Kowsuwan	Representative of Regional Irrigation Office 1 Regional Irrigation Office 1
5	Mr. Somwang Phonsitthito	Chief of Water Management Branch Regional Irrigation Office 2
6	Mr. Kanching Kawsard	Representative of Regional Irrigation Office 3 Regional Irrigation Office 3
7	Mr. Boonthum Panpiampoth	Chief of Water Management Branch Regional Irrigation Office 4
8	Mr. Chonlathep Thatree	Chief of Water Management Branch Regional Irrigation Office 4
9	Mr. Athaporn Punyachom	Chief of Water Management Branch Regional Irrigation Office 10
10	Mr. Thanaroj Worraratprasert	Chief of planning and water issue solution division Regional Irrigation Office 12
11	Mr. Phaisan Phongnoraphat	Director of Operation and Maintenance Division Regional Irrigation Office 14
12	Mr. Supanat Pariyachat	Chief of Project planning Group 4 Office of Project Management
13	Mr. Kanchadin Srapratoom	Chief of Loan Project Branch, Foreign Financed Project Administration Division Office of Project Management
14	Mr. Prachya Chaiwatthana	Civil Engineer, Professional level Office of Project Management

THAI SIDE ATTENDEES (Royal Irrigation Department)

SPECIAL INVITATION		
No.	NAME - SURNAME	OFFICE
15	Mr. Chatchom Chompadist	Director of Water Management Division Department of Royal Irrigation
16	Mr. Zombhob Intaraksa	A Specialist in Hydrology Hydrology Division
17	Mr. Thada Sukapunaphan	Director of Hydrology Division Hydrology Division
18	Mr. Chatchai Boonlue	Director of Foreign Financed Project Administration Division Office of Project Management

JAPANESE SIDE ATTENDEES

No.	NAME - SURNAME	OFFICE
19	Mr. Yusuke Amano	Senior Advisor to the Director General JICA Tokyo
20	Mr. Hideaki Matsumoto	Deputy Director, Disaster Management Division 1 JICA Tokyo
21	Mr. Tatsuo Kunieda	JICA Expert to Royal Irrigation Department JICA Expert to RID
22	Mr. Takahiro Mishina	Leader, JICA Study Team Subcomponent 1-2
23	Mr. Hajime Tanaka	Deputy Leader, JICA Study Team Subcomponent 1-2
24	Mr. Takashi Ono	JICA Study Team Subcomponent 1-2
25	Ms. Akira Watanabe	JICA Study Team Subcomponent 1-2
26	Mr. Satoshi Takata	JICA Study Team Subcomponent 1-2
27	Mr. Masami Katayama	JICA Study Team Subcomponent 1-2
28	Mr. Kazuhiro Nakamura	JICA Study Team Subcomponent 1-2
29	Mr. Chuchat Suwat	JICA Study Team Subcomponent 1-2
30	Ms. Kamolnit Ariyakamolpat	JICA Study Team Subcomponent 1-2
31	Mr. Akihiko Nunomura	Leader, JICA Study Team Component 3
32	Mr. Minoru Kuriki	Deputy Leader, JICA Study Team Component 3
33	Mr. Kiyotaka Koga	JICA Study Team Component 3
34	Ms. Nutthanicha Kasiolarn	JICA Study Team Component 3
35	Ms. Wanlaya Manutkasemsirikul	JICA Study Team Component 3

MINUTES OF MEETING
ON
THE TECHNICAL MEETING ON MODELING
FOR
SUBCOMPONENT 1-2

OF

PROJECT FOR COMPREHENSIVE FLOOD MANAGEMENT PLAN FOR THE CHAO PHRAYA RIVER BASIN IN THE KINGDOM OF THAILAND

AGREED UPON BETWEEN

TECHNICAL WORKING GROUP, ROYAL IRRIGATION DEPARTMENT, MINISTRY OF AGRICULTURE AND COOPERATIVES (RID/MOAC)

AND

THE STUDY TEAM OF JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

Bangkok, November 13, 2012

Dr. Somkiat PRAJAMWONG

Director,
Office of Project Management
Royal Irrigation Department
Ministry of Agriculture and Cooperatives

Mr. Takahiro MISHINA

Leader,
The Study Team of Japan International
Cooperation Agency (Subcomponent 1-2)

I. INTRODUCTION

At the RID Technical Working Group Meeting held on 29th October, 2012, as part of "Project on Comprehensive Flood Management Plan for the Chao Phraya River Basin in the Kingdom of Thailand" (hereinafter called as "Project"), the Technical Working Group (hereinafter called as "the Technical Group") requested the JICA Study Team (hereinafter called as "The Study Team") to have opportunities for further discussions on selected topics, which includes a meeting about the models which are used for hydrological and hydraulic analyses, runoff analysis and flood inundation analysis.

In response to the request, the technical meeting on modeling between members of the RID representatives (hereinafter called as "RID") and the Study Team for Subcomponent 1-2 was held on the 13th November, 2012 with the presence of 26 participants from the headquarters and the regional offices of RID and the Study Team. Of the 26 participants, seven (7) participants were the JICA Hydrologists and Hydraulic Engineers from Japan attended via internet to provide the technical supports.

The agenda for the meeting is as follows:

1. Presentation by JICA Expert: "Flood Analysis Model Used for the Project"
2. Discussion: comments and suggestions from RID representatives

Contents of the presentations by the Study Team were generally accepted by RID at the meeting.

The list of attendees is presented in Annex 1.

II. PRESENTATION AND DISCUSSION

1. Presentation of "Progress of Master Plan's Basic Concept"

Mr. Katayama, the River Basin Management Engineer of the Study Team for Subcomponent 1-2, presented "Flood Analysis Model" including six (6) topics:

- Overview of Modeling Work
- Flood Runoff Model (DHI-NAM)
- River Network Model (DHI-MIKE 11)
- Inundation Model (DHI-MIKE FLOOD)
- Flood Analysis Model; and
- Model Calibration

2. Comments and Suggestions of RID Representatives

RID stated that they would provide additional data and information as listed in Annex 2 which would be beneficial to the model analysis as discussed at the meeting.

[Runoff Model]

RID requested the Study Team to elaborate further on the criteria which were applied to divide the Chao Phraya River basin into twenty-seven sub-basins as listed in Table 1.2.1 in the meeting material. The Study Team responded that it is based on the watershed characteristics such as topographic, land slope, watershed size, land cover, locations of major features (dams, rivers, tributaries, canals), flood control points (at hydrological station such as C.2. Nakhon Sawan etc) and the 1999 JICA Study results.

The Study Team requested RID to provide with previously conducted studies related to the sub-basin division of Tha Chin River basin, if there is any. This is to confirm the basic idea of RID about how it needs to be made. RID agreed to provide the information to the Study Team.

RID suggested to use the term of "evapotranspiration" instead of "evaporation". The Study Team agreed to modify the term accordingly.

RID requested the runoff ratio for each basin in the model. The Study Team presented the analysis results that the ratio values vary from basin to basin, for example 50% for the Ping River basin and 70% for the Nan River basin, of which values are somewhat affected by the dam operations at the Bhumibol Dam and the Sirikit Dam, respectively. As an example of the river networks under a natural condition (without the influence of the dam operation), the Yom River basin would be referred with 60% runoff ratio. The Study Team emphasized that these values must be used only as a guide.

RID requested the upstream area adjacent to Yom and Nan Rivers, "Bang Ragam Area" (approximately 500,000 rai) as shown in Annex 3 also be considered as inland flooding area similar to the downstream of Chainat. The Study Team suggested analyzing calibration results. If the model can not represent the 2011-yr Flood reasonably well without the setting of the upper inland flooding area, the Study Team will to look into LiDAR Data and check the land features as suggested by RID.

[River Network Model]

RID agreed the Study Team's proposal that dummy cross section data generated from LiDAR data would be used where RID cross section data is not available.

RID agreed to provide the Study Team with the information of roughness coefficient of river and canal which were previously applied in the RID's models or studies.

The Study Team agreed that additional structures, such as DR2.8 Regulator, the cut-off on the Chao Phraya shall be included in the model and will be shown in the schematic diagram shown in Figures 1.3.3, 1.6.1 and 1.6.2 of the meeting material.

RID suggested that the location of hydrological stations of Y.16 and N. 60 be changed to the right locations in the schematic diagram shown in Figures 1.3.3, 1.6.1 and 1.6.2 in the meeting material. The suggested locations are shown in Annex 4. The Study Team agreed on the change.

The Study Team agreed to provide RID with a location map which indicates the areas to be modeled by one and two dimensional model.

[Inundation Model]

RID requested the Study Team to elaborate further on how to simulate the situation when the dyke will be breached. The Study Team explained that several steps will be taken (1) the breached location will be identified based on the 2011 observed/collected information by RID, and (2) a gate/weir will be virtually built in the model which will control the overflow condition of the dyke breach at each location.

RID requested an inundation map which will be generated based on the simulation results of flood analysis model. The Study Team agreed to prepare the map when the modeling results are ready to present.

RID requested the further explanation about how the continuous structures such as road shall be presented in the model. The Study Team explained that (1) extract elevation data of such structure features from LiDAR data, and (2) give the extracted elevation values to each mesh as the ground elevation value at location to represent such continuous structures in the model. In the inundation analysis, it is set that the flow will start overtopping when the water level exceeds the height of dyke/road.

RID requested to include additional pump stations in the model. The requested pump stations are included in Annex 2.

[Flood Analysis Model]

RID suggested that the upper boundary conditions set in Yom and Nan River networks be changed from Y.3A to Y.14 for the Yom River basin and from the Naresuan Dam to N.60 for the Nan River basin, respectively. In addition, RID suggested that the observed data at the Klong Hok Baht Regulator be utilized to reproduce the flow diversion into the Yom Koa River for the 2011-yr Flood flow instead of using the Ban Hat Saphan Chan Regulator (which is currently not considered in the calibration model due to low accuracy of data). The Study Team agreed to include the suggestions in the model.

RID suggested that the flood mark survey conducted in 2012 as one of sub-contract surveys by the Study Team be further utilized in the Project. The Study Team agreed with the suggestion.

RID requested that opportunities shall be given to RID representatives so that they have proper trainings to learn and fully utilize the Flood Analysis Model once it is handed over from the Study Team to RID after the completion of the Project. The Study Team agreed to look into the possibility of setting up the training opportunities for RID officers.

[Model Calibration]

RID requested that the Study Team to present results of the model analysis including the calibration analysis for chosen scenarios as early as possible.

Meeting adjourns at 16:30 pm.

ANNEX 1

LIST OF ATTENDEES

THAI SIDE ATTENDEES (Royal Irrigation Department)

TECHNICAL WORKING GROUP MEMBER				
No.	**NAME – SURNAME**			**OFFICE**
1	Mr.	Somkiat	Prajamwong	Office of Project Management
2	Mr.	Chonlathep	Thatree	Regional Irrigation Office 3
3	Mr.	Lerboon	Udomsap	Regional Irrigation Office 11
4	Mr.	Boonthum	Panplampoth	Regional Irrigation Office 4
5	Mrs.	Phattaporn	Mekpruksawong	Office of Project Management
6	Mr.	Supanat	Pariyachat	Office of Project Management
7	Mr.	Kanchadin	Srapratoom	Office of Project Management
8	Mrs.	Patcharawee	Suwannik	Office of Water Management and Hydrology
9	Mr.	Wirod	Khochalerd	Office of Project Management
10	Mr.	Pongpich	Yodying	Office of Project Management
11	Ms.	Supinda	Wattanakorn	Office of Project Management
Special Invitation				
12	Mr.	Tatsuo	Kunieda	Expert to JICA
13	Ms.	Paweesuda	Boonchuwong	Secretary of JICA Expert

JAPANESE SIDE ATTENDEES

No.	**NAME - SURNAME**			**OFFICE**
14	Mr.	Hajime	Tanaka	JICA Study Team, Component 1-2
15	Mr.	Masami	Katayama	JICA Study Team, Component 1-2
16	Ms.	Akira	Watanabe	JICA Study Team, Component 1-2
17	Mr.	Chuchat	Suwut	JICA Study Team, Component 1-2
18	Ms.	Melyn	Chutumstid	JICA Study Team, Component 1-2
19	Ms.	Nichapat	Rakpongthai	JICA Study Team, Component 1-2
Attended via Internet				
20	Mr.	Kazuhiro	Nakamura	JICA Study Team, Component 1-2
21	Mr.	Yoshitomo	Yonese	JICA Study Team, Component 1-2
22	Mr.	Tatsuya	Koga	JICA Study Team, Component 1-2
23	Ms.	Saeka	Yamada	JICA Study Team, Component 1-2
24	Mr.	Takayuki	Kawashima	JICA Study Team, Component 1-2
25	Mr.	Hitoshi	Nagata	JICA Study Team, Component 1-2
26	Ms.	Natsumi	Okamine	JICA Study Team, Component 1-2

ANNEX 2

LIST OF DATA RID AGRRED UPON
TO PROVIDE WITH THE JICA STUDY TEAM

NO.	DATA TO BE PROVIDED		CONTACT INFORMATION
	ITEM	DATA	
1	Khlong Hok Baht Regulator	Q (daily)	Regional Irrigation Office 4
2	Ban Hat Saphan Chan Regulator	Q (daily)	Regional Irrigation Office 4
3	Y.14 Gauging Station	Q, WL (daily)	Hydro-Center 2
4	N.60 Gauging Station	Q, WL (daily)	Hydro-Center 2
5	Bang Rakam Monkey Cheek Report	Report	Project Planning Group 1
6	Tha Chin River Basin Report	Report	Project Planning Group 1
7	Data of Pumping Stations in RID 11	-	Regional Irrigation Office 11
8	Khwae Noi Dam Break Report	Report	Project Planning Group 1

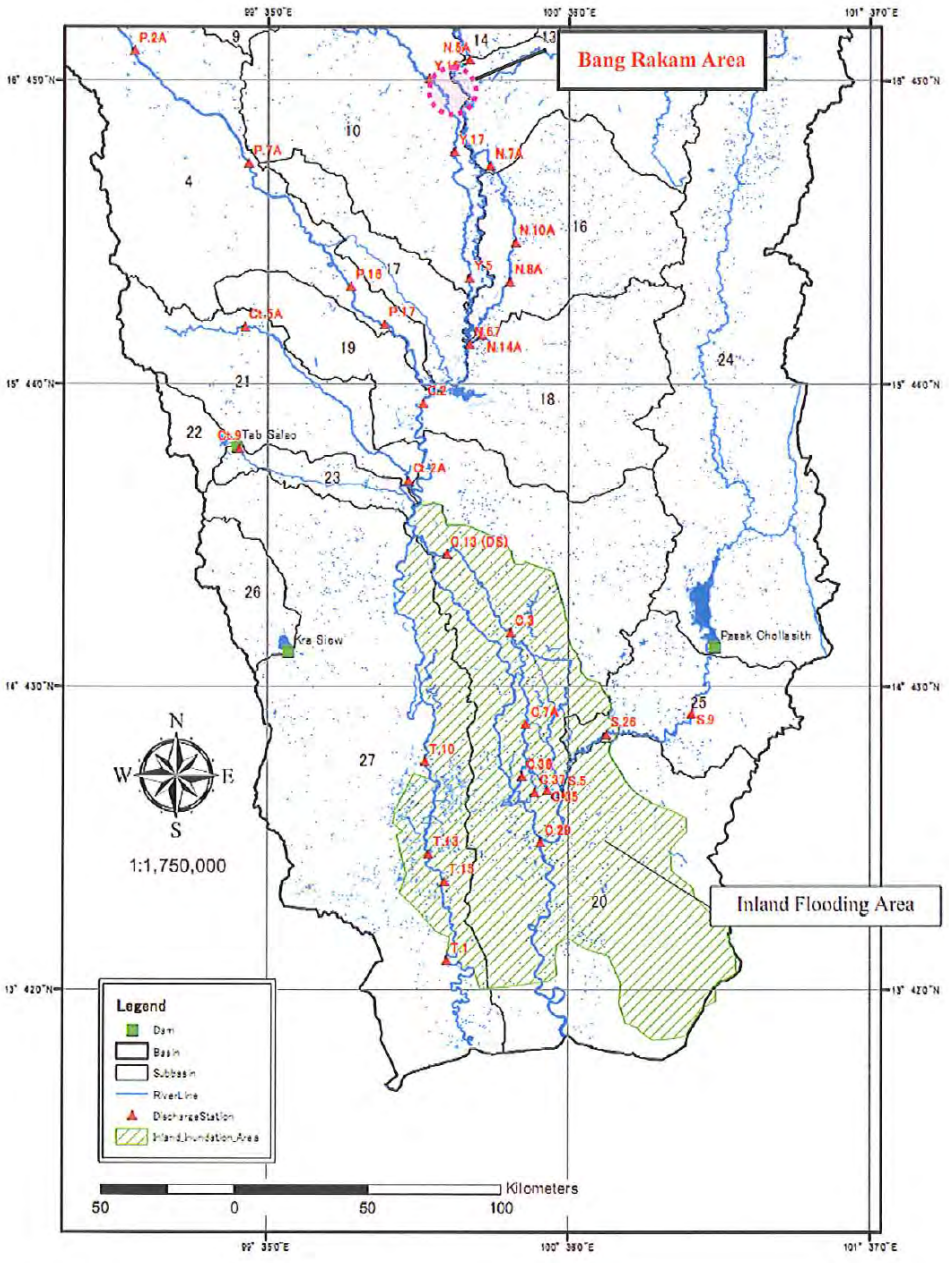
Remark

Q = Discharge

WL = Water Level

ANNEX 3

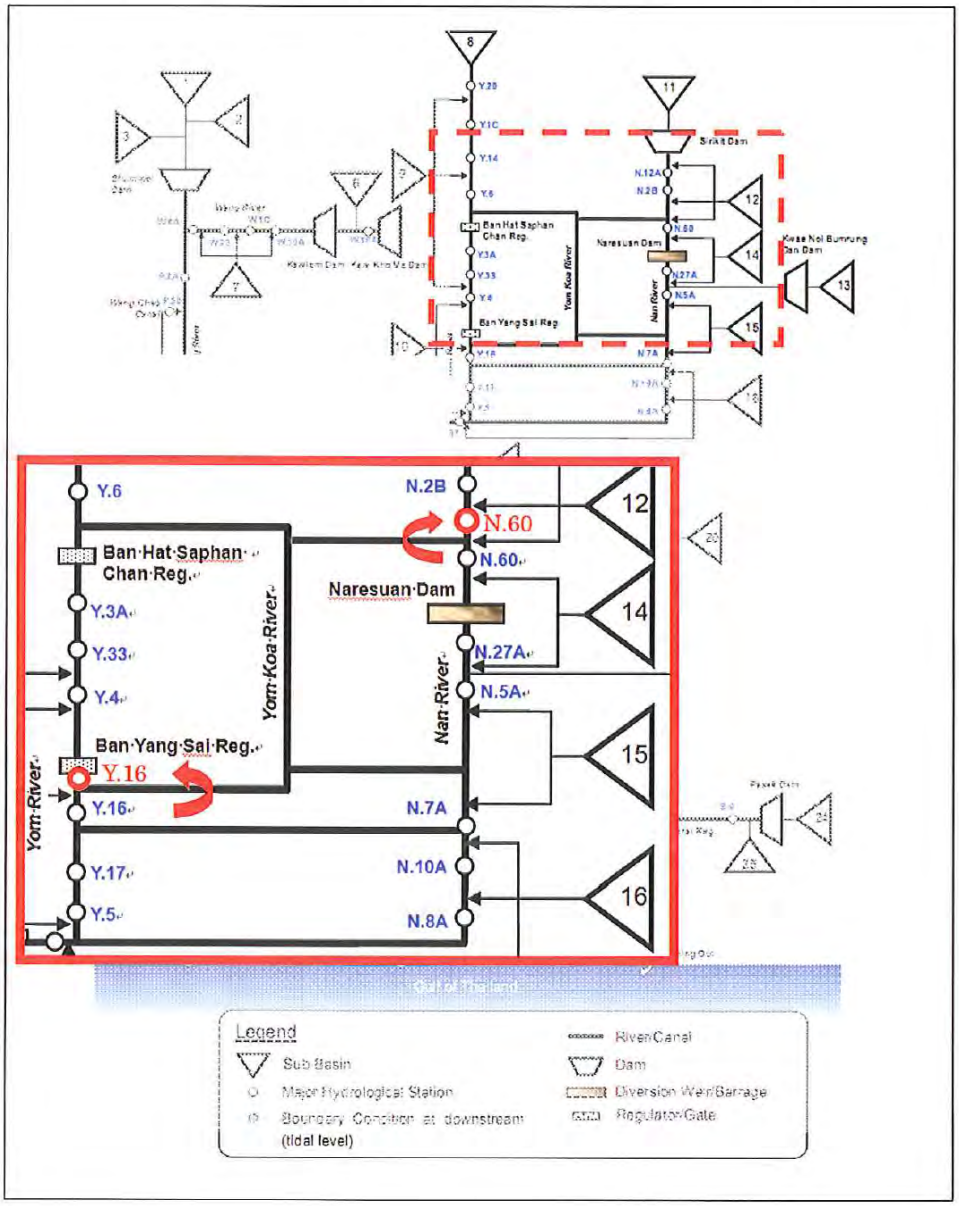
LOCATION MAP OFBANG RAKAM AREA



ANNEX 4

SKEMATIC DIAGRAM

LOCATION OF SUGGESTED CHANGE ON HYDROLOGICAL STATIONS



MINUTES OF MEETING

ON

THE STEERING COMMITTEE MEETING FOR SUBCOMPONENT 1-2 AND COMPONENT 3

OF

PROJECT FOR COMPREHENSIVE FLOOD MANAGEMENT PLAN

FOR THE CHAO PHRAYA RIVER BASIN IN THE KINGDOM OF THAILAND

AGREED UPON BETWEEN

THE ROYAL IRRIGATION DEPARTMENT, MINISTRY OF AGRICULTURE AND COOPERATIVES (RID/MOAC)

AND

THE JICA STUDY TEAMS OF JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

Bangkok, December 12, 2012

Mr. Chachawal Punyavateenun
Deputy Director General for Engineering
Royal Irrigation Department,
Ministry of Agriculture and Cooperatives

Mr. NUNOMURA Akihiko
Leader
JICA Study Team for Component 3

Mr. MISHINA Takahiro
Leader
JICA Study Team for Subcomponent 1-2

1 Introduction

The Steering Committee Meeting between members of the Steering Committee (The Committee) and the JICA Study Teams (The Study Team) for Subcomponent 1-2 and Component 3 was held on the 12th December, 2012 with the presence of 45 participants from the headquarters and the regional offices of RID, NESDB, DWR, the JICA Tokyo office, the JICA Thailand office and the Study Teams.

The agenda for the meeting is divided into two for Subcomponent 1-2 and Component 3, as follows:

Program I: Subcomponent 1-2

1. Presentation of "Interim Report on Formulation of Master Plan: Comprehensive Flood Management Plan for the Chao Phraya River Basin" by the Study Team Subcomponent 1-2; and
2. Comments and Suggestions of Steering Committee members.

Program II: Component 3

1. Presentation of "Overall Structure and State of Progress of Component 3" by the Study Team Component 3;
2. Preparation Status of Prototype and Open-to-public Version Flood Risk Information System;
3. Specific Ideas to be Included in the Flood Management System Basic Plan; and
4. Comprehensive Flood Management System Preparation Plan (to be implemented in Phase 2).

Contents of the presentations by the two JICA Study Teams were generally accepted by the Steering Committee. The list of attendees is presented in Annex.

2 Program I: Subcomponent 1-2

2.1 Presentation

Mr. Mishina, the leader of the Component 1-2, presented the interim report of the Master Plan. The main items presented are as follows:

1. Flood Condition of the 2011 year flood;
2. Basic Approach and Study Items;
3. Basic Study including Design Flood, Design High Water Level, Flood Capacity, Protection Area, Habitual Flood Area;
4. Study on Counter Measures including, Improvement of Dykes and River Channel, Effective Operation of Existing Dams, Flood Control Volume with New Dams, Flood Control with Diversion Channels, Possible Flood Control Volume in Retarding Basin and Retention ponds; and
5. Results of the Inundation Analysis.

2.2 Comments and Suggestions of Steering Committee Members

The Committee questioned about the Design High Water Level (DHWL) that how the JICA selected DHWL as 3.5 meters. The Committee also raised a question if the structures owned by

the Bangkok Metropolitan Administration (BMA) could accommodate the maximum water level at 3.50 meters level, as at the current condition BMA structures could only withstand against water level at 2.5 to 3.0 m. The Study Team answered that they knew the limitation within the Bangkok area. DHWL as 3.5 meters is selected at the point of 90 km from the river mouth. Around the Bangkok area, DHWL should be modified following water level at 2.5 m to 3.0 m. Also the DHWL showed in the meeting is the initial setting and the DHWL will be adjusted and decided after simulation with various countermeasures studied in the Master Plan of which the conceptual framework and countermeasures proposed are shown in the Figure attached.

The Committee questions that about the proposed floodways on the east and west sides of the Chao Phraya River that why the total discharge through floodways on both the west and east sides was calculated as 2,000 m^3/s. The existing structures on both sides are able to convey water at 250 m^3/s through the Chai Nat-Pasak Canal and at 500 to 600 m^3/s through the canals on the west side. The Study Team answered that the total discharge at 2,000 m^3/s was calculated based on the SCWRM proposal presented in January 2012 and the optimum flow capacity of the floodway would be evaluated based on the analysis of various alternative measures to be proposed in the Master Plan.

The Committee commented that the Study Team may need to discuss with BMA and WRFMC about setting DHWL. The Committee also commented about the current BMA's plan for the dyke improvement that Section from Spanput to Sangi hospital, BMA would increase the dyke height to 2.8 m, another section, Sangi Hospital to the Gulf of Thailand increase to 3.2 m msl. The Committee suggested that DHWL discussion would be continued at the Technical Meeting scheduled in the afternoon on December 12, 2012. The Study Team answered that the information of current BMA's plan for the dyke improvement has been collected. The Study Team agreed to discuss this matter further with the RID representatives at the Technical Meeting.

The Committee commented about the proposed total area of the retention area/monkey cheek that if this land area is outside of the already discussed 2.1 million rai of land, the subject should first be discussed with the Ministry of Agriculture and Cooperatives. The Study Team explained that the current study with the retention areas of 1.2 million rai followed the M/P and F/S conducted by RID in 2008. The Study Team agreed on the comment and the subject will be discussed again to formulate the optimum combination of countermeasures.

The Committee questioned about the presented four (4) floodway alternatives that why the Study Team conducted these four Alternatives although the difference between Alternative 1 and 2, and between Alternative 3 and 4 are insignificant. Also, relation between the proposed countermeasures and issues caused by the flood are not clear. The Study Team answered that without considering the various alternatives from the basin wide perspective, the solid conclusion

could not be reached. The Study Team will make clear the necessity of each countermeasure and propose the optimum combination of countermeasures for further discussion based on the additional cases of flood inundation analysis.

The Committee suggested and the Study Team agreed that several additional meetings with a small group of concerned RID representatives shall be set up and details must be discussed with them in depth before presenting the study results at the Committee.

3 Program II: Component 3

3.1 Presentation

The Study Team explained to the Committee the progress of the studies carried out under Component 3. Studies were on the following items:

1. Basic Concept;
2. Basic Plan;
3. Action Plan (urgent activity);
4. Implementation Plan (urgent activity); and
5. Establishment of Flood Data Analysis/Flood Forecasting System (urgent activity)

Flood Risk Information System (prototype) was developed in two months (July-August, 2012), and registered monitors were provided with daily-updated forecast information (water level, flow rate, and inundation area) in the Chao Phraya River Basin during 2012 flood season. Upon development, careful considerations were given to information needs, characteristics of the Chao Phraya River, accuracy/uncertainty of the forecast values, and calibration procedures. A simple and user-friendly website was realized. To upgrade the prototype system to the "open-to-public" version of the system, there remained a number of issues (technical, operational, utilization). Selected members of RID, DWR, HAII and SCC discussed these issues in multiple meetings in November 2012, to formulate proposed solutions (tentative). These proposals, combined with suggestions given in the responses to questionnaire surveys to the registered monitors, would be examined by the Study Team for consultation with the Thai government regarding their adoption in the system upgrading.

Basic Plan was being prepared with the following considerations taken into:

- Attach most importance not to the sender of information, but to the receiver of information, and how well they utilize the information;
- Understand the actual situation of Thailand appropriately, in comparison with the experiences and devices of Japan;
- Introduce effective new technologies, utilizing existing facilities in Thailand;
- Present specific proposals rather than abstract ones;
- Conduct unprecedented surveys and analyses related to information to formulate plans

and to be utilized in various considerations in the future by the Thai Government.

The draft Basic Plan would be presented at a workshop tentatively scheduled in end-January 2013 in Bangkok, to which executives of the Thai Government, individuals of flood-related government organizations, and mass media would be invited.

The report also described the following activities to be taken under the Phase 2 (February-June 2013) of the Component:

1. Action Plan on Construction and Operation of Flood Management System; and
2. Function Improvement of Flood Forecast System

3.2 Discussion

The Committee heard an opinion that the officials of RID, DWR and HAII being trained in Japan would be responsible for conveying the acquired knowledge to related officers and supporting phase 2 of the Component.

Regarding the agency in charge of the System, the Study Team explained that, while the servers were installed at RID, other agencies would be able to operate the system: It, however, would depend on the government's assignment that which agencies should be able to operate the system. JICA representative suggested that RID and DWR would be appropriate organizations in operating the system. However, the system operator(s) should cooperate with HAII to achieve the unity of appropriate flood forecasting system in Thailand as the government's requirement. In this regard, the Committee agreed that HAII and the Single Command Center, as well, should be involved in the system operation in order to cross check information from various agencies and unify the flood information of Thailand.

4 JICA Seminar Schedule

Mr. Matsumoto of the JICA Tokyo Office presented the schedule of the upcoming JICA Seminars as follows:

1) Seminar of the JICA Project
   Date: In late January 2013
   Place: Bangkok
   Participants: Executives and Officials of the Government of Thailand, and Medias
   Contents: 1) Draft Basic Plan of Flood Management System
   2) Preliminary Draft Master Plan of Comprehensive Flood Management

2) Seminar of the JICA Project
   Date: 20th February, 2013
   Place: Bangkok
   Participants: Executives and Officials of the Government of Thailand, International

Donors, Firms applying to the International Competition

Contents: 1) Draft Master Plan of Comprehensive Flood Management

2) Impact on Climate Change (IMPAC-T) <Tentative>

3) Establishment of Simulation Model (ICHARM) <Tentative>

Meeting adjourns at 12:20 pm.

ATTENDEES LIST

[THAI SIDE]

Member of the Steering Committee

No	Name-Surname	Position	Committee
1	Mr. Prasit Sitho	Chief Engineer on Civil Engineering (Survey and Design)	Advisor
2	Mr. Phuwanet Thongrungrot	Chief Engineer on Irrigation Engineering (Water Distribution and Maintenance)	Advisor
3	Mr. Chachawal Punyavateenun	Deputy Director-general (Technical)	Chairman
4	Mr. Koson Thianthongnukun	Director of Office of Engineering Topographical & Geotechnical Survey	Member
5	Mr. Thongplew Kongjun	Director of Office of Water Management & Hydrology	Member
6	Mr. Montri Bunpanit	Director of Agriculture, Natural Resource and Environment Planning Office (NESDB)	Member
7	Mr. Kanchadin Srapratoom	Chief of Loan Project Branch	Member
8	Mr. Sathit Sueprasoetsuk	Director of Specific Area Protection (DWR)	Member
9	Mr. Surasit Indarapracha	Director of Office of Engineering and Architecture Design	Member

[SPECIAL INVITATION]

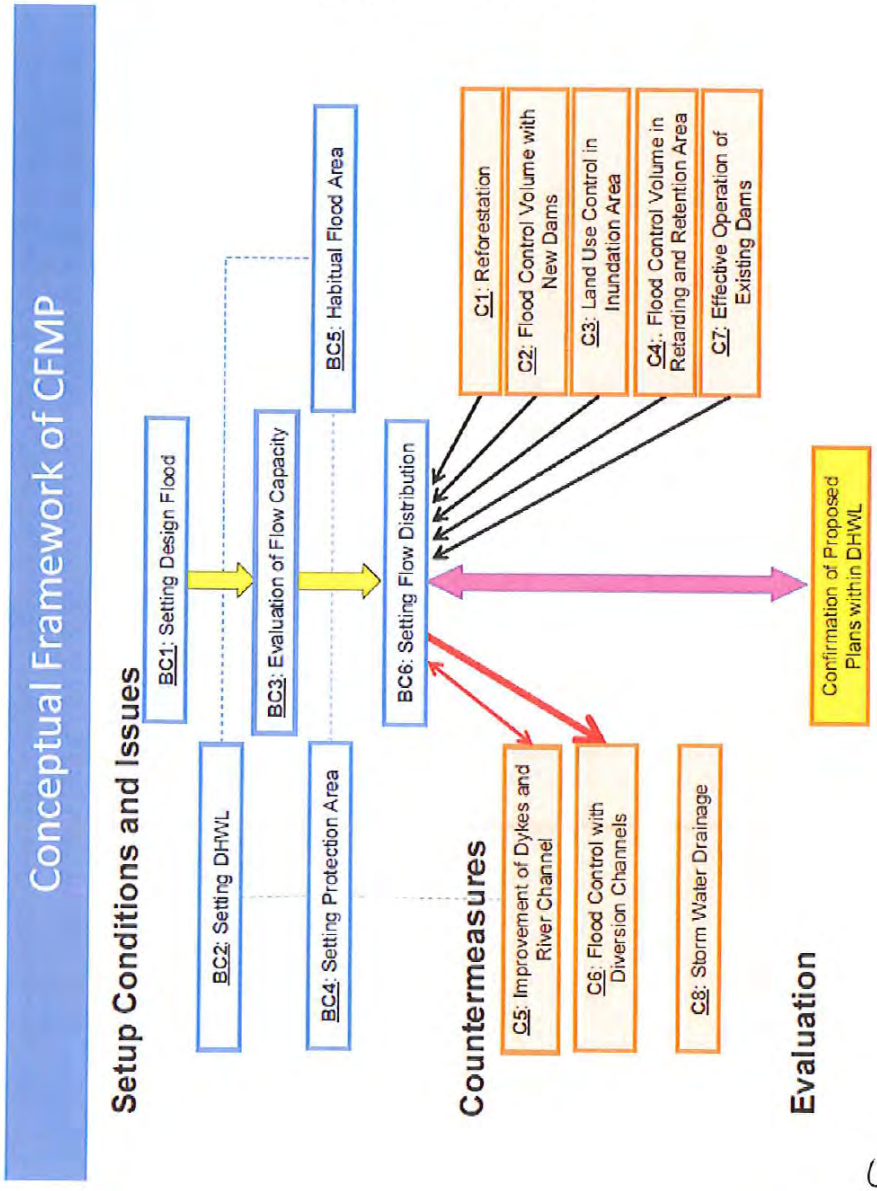
No	Name-Surname	Position
12	Mr. Sirawit Koit	Representative of Director of Regional Irrigation Office 2
13	Mr. Kanching Kowsard	Representative of Director of Regional Irrigation Office 4
14	Mr. Athaporn Punyachom	Representative of Director of Regional Irrigation Office 10
15	N/A	Representative of Director of Regional Irrigation Office 11
16	Mr. Nirut Riansuwong	Representative of Director of Regional Irrigation Office 12
17	N/A	Representative of Director of Regional Irrigation Office 13
18	Mr. Supanat Pariyachat	Chief of Project Planning Group 4
19	Mr. Thada Sukhapunnaphan	Director of Hydrology Division
20	Mr. Lerboon Udomsap	Chief of Water Management Branch
21	Mr. Pornchai Kansit	Representative of Project Planning Group 1
22	Mr. Thada Phunthawi	Representative of Water Management Division
23	Mr. Chaiwat Thamthong	Representative of Director of Regional Irrigation Office 4
24	Mr. Athons Suttigarn	Chief of Grant Projects Branch
25	Mr. Wasin Phutphat	Irrigation Engineer

[JAPANESE SIDE]

No.	Name	Affiliation	Position
26	Mr. Kimio TAKEYA	JICA Tokyo Office	-
27	Mr. Yusuke AMANO	JICA Tokyo Office	-
28	Mr. Hideaki MATSUMOTO	JICA Tokyo Office	-
29	Mr. Takahiro MISHINA	JICA Study Team, Component 1-2	Team Leader
30	Mr. Hajime TANAKA	JICA Study Team, Component 1-2	Deputy Leader
31	Mr. Masami KATAYAMA	JICA Study Team, Component 1-2	Senior Engineer
32	Mr. Kazuhiro NAKAMURA	JICA Study Team, Component 1-2	Engineer
33	Ms. Akira WATANABE	JICA Study Team, Component 1-2	Engineer
34	Mr. Chuchat Suwut	JICA Study Team, Component 1-2	Interpreter
35	Ms. Kamolnit Ariyakamolpat	JICA Study Team, Component 1-2	Interpreter
36	Ms. Nattamon Tanyapanit	JICA Study Team, Component 1-2	Interpreter
37	Mr. Paitaya Puenpatom	JICA Study Team, Component 1-2	Interpreter
38	Ms. Nichapat Rakpongthai	JICA Study Team, Component 1-2	Administrator
39	Mr. Akihiko NUNOMURA	JICA Study Team, Component 3	Team Leader
40	Mr. Minoru KURIKI	JICA Study Team, Component 3	Deputy Leader
41	Mr. Kiyotaka KOGA	JICA Study Team, Component 3	Engineer
42	Ms. Wanlaya MANUTKASEMSIRIKUL	JICA Study Team, Component 3	Secretary
43	Mr. Suchat Chutrakul	JICA Study Team, Component 3	Interpreter
44	Mr. Yoji Miyashita	JICA Thailand Office	-
45	Mr. Kobchai Songsrisanga	JICA Thailand Office	Program Officer

Attachment

Conceptual Framework of CFMP



1-1-7 Technical Group Meeting for Subcomponent 1-2 (19 December, 2012)

MINUTES OF MEETING
ON
TECHNICAL GROUP MEETING FOR SUBCOMPONENT 1-2
OF
PROJECT FOR COMPREHENSIVE FLOOD MANAGEMENT PLAN
FOR THE CHAO PHRAYA RIVER BASIN IN THE KINGDOM OF THAILAND

AGREED UPON BETWEEN
ROYAL IRRIGATION DEPARTMENT, MINISTRY OF AGRICULTURE AND COOPERATIVES
(RID/MOAC)

AND

THE JICA STUDY TEAM OF JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

Bangkok, December 19, 2012

Dr. Somkiat Prajamwong
Director ,
Office of Project Management
Royal Irrigation Department
Ministry of Agriculture and Cooperatives

Mr. MISHINA Takahiro
Leader
JICA Study Team for Subcomponent 1-2

1 Introduction

The Technical Group Meeting between members of the RID Technical Group (The Technical Group) and the JICA Study Team (the Study Team) for Subcomponent 1-2 was held on the 19th December, 2012 with the presence of 22 participants from the headquarter Offices of RID, the JICA Tokyo office, and the JICA Study Team.

The agenda for the meeting is as follows:

1. Presentation by Mr. Takeya of JICA Head Quarter;
2. Questions, Comments and Suggestions raised during the Sub-Meeting with RID Representatives;
3. Presentation of "Issued to be Discussed" and
4. Questions, Comments and Suggestions from RID Representatives.

Contents of the presentations by the Study Team were generally accepted by the Technical Group. The list of attendees is presented in Annex.

2 Presentation by Mr. Takeya of JICA Head Quarter

Mr. Takeya of JICA Head Quarter presented the background of the project.

3 Questions, Comments and Suggestions raised during Sub-Meetings

Refer to the Steering Committee Meeting held on the 12th of December, 2012, several sub-meetings with RID representatives are held, and RID submitted questions, comments and suggestions to the Study Team. Mr. Mishina, the Leader of Sub-Component 1-2, presented the answers as follows.

3.1 General

RID suggested that the Master Plan should clearly state that the countermeasures described in SCWRM's Master Plan are carefully considered. The Study Team answered that the eight (8) Countermeasures proposed by the Study Team are formulated based on the careful consideration of the SCWRM's Master Plan.

3.2 DHWL

RID commented that the Study should consider that DHWL managed by BMA is currently 2 to 2.5 m. The Study Team answered that the current condition has been taken into account to set up the DHWL.

RID suggested that the countermeasures proposed by the Master Plan should accommodate not only the 2011 flood, but the other historical floods. The Study Team explained to evaluate the

effectiveness of the countermeasures against the other historical six floods including 1970, 1975, 1980, 1994, 1995 and 2005 floods.

3.3 Ayutthaya Diversion Channel

RID said that as for the Ayutthaya Flood Diversion Channels, the Study should consider the optimal scale, backwater effects, alignment and impacts. Both positive and negative impacts on Ayutthaya Flood Diversion Channels should be carefully examined. The appropriate scale of Ayutthaya Flood Diversion Channels should be sought. The Study Team expressed that the optimal scale of Ayutthaya Flood Diversion Channel is evaluated by using the Flood Model Analysis. Both positive and negative impacts on Ayutthaya Flood Diversion Channels shall be examined and the analysis results shall be presented to the RID.

3.4 Diversion Channel

RID requested to examine if it is possible to discharge flood water into the sea by gravity. The Study Team answered that to evaluate the flow capacity of diversion channels, non-steady flood analysis is utilized.

3.5 Retarding Area or retention Area

RID requested to evaluate the effectiveness of Retarding and Retention Area. The Study Team explained that the Flood Model Analysis is utilized to evaluate the effectiveness of retarding and retention areas.

3.6 Case to be considered

RID requested to study a case without the construction of new dams. The Study Team agreed to include the case without new dams.

4 Presentation "Issues to be Discussed"

Mr. Mishina presented the issues to be discussed with RID representatives. The main items presented are as follows:

1. Basic Approach and Study Items;
2. Defining the Design Flood;
3. Defining the Preliminary Design High Water Level;
4. Evaluation of Current Flow Capacity: Tide Effect;
5. Defining Areas to be Protected and Flood Prone Area to be remained;
6. Eight Countermeasures;
7. Evaluation Method on Floodway Flow Capacity.

5 Questions, Comments and Suggestions from RID Representatives

Basic Condition BC2: Setting DHWL (Design High Water Level)

Dr. Somkiat confirmed that there are two kinds of dykes along the river namely the primary dyke to

protect communities located adjacent to the river, and the secondary dyke to protect the irrigation lands from flooding. Dr. Somkiat commented that the impacts on the areas between the primary and secondary dykes must be analyzed. In order to reduce or mitigate the risk due to flooding, the dyke height must be set with additional allowance. He also commented that if the excess amount of water is managed better in the upper basin, the height of the dykes may not need to be so high in the lower basin. Also the new dykes must be blended in the surrounding scenery without spoiling the existing condition.

Dr. Somkiat requested the Study Team to provide the following data/information:

1) The elevation data where the heightening of dykes is proposed.
2) The criteria that the Study Team set to analyze the proposed dyke height.

Basic Conditions BC4 & BC5: Setting Protection Area & Habitual Flood Area

Dr. Somkiat requested the Study Team to provide the following data/information:

3) The reasons behind the selection of the protection area proposed by the Study Team.

Countermeasures: Overall

Dr. Somkiat requested that the Study Team to propose their opinion based on RID's information, rather than just following the RID's current proposed projects. Dr. Somkiat requested that the JICA Study should not mention the specific dam name in their proposal/report. RID is currently in discussion with the Department of Highways about utilizing the Inner Ring Road and the floodway as the logistic route.

Dr. Somkiat requested the Study Team to provide the following data/information:

4) Targets for each countermeasure, such as how much water shall be stored in the retention and retarding areas, what the effects on these countermeasures, and the implementation plan.
5) How the each countermeasure effective for flooding and draught events.
6) "Know-How" on how to communicate with communities and local people in order to proceed with proposed projects at timely matter and smoothly.
7) Analyze various cases such as under the high-tide condition, and with barrage, against Tsunami, storm water drainage in Bangkok area.
8) Analyze the possible evacuation and logistic routes, including the route along the East Floodway which can be utilized as the evacuation road when a flood water flowing from the upper reach to lower reach.
9) Set priorities for countermeasures, such as (1) Must do, (2) Should Do, (3) Better to Do.

Countermeasure C6: Flood Control with Diversion Channels

Dr. Somkiat agreed with the proposal of three floodways including West Floodway, East Floodway and Ayutthaya Floodway. However, Dr. Somkiat commented that the RID's proposed flow capacity

of each floodway is much lower than the one proposed by the Study Team. Dr. Somkiat suggested the Study Team to share the information/idea with the RID experts on this matter.

RID requested the Study Team to provide the following data/information:

10) The reason why the Study Team selected the flow capacity of the floodway as 1,000 m^3/s. Is it because of selecting a permanent measure, or is it based on the economic implication?

Explanations to RID Representatives

Mr. Mishina explained that 8 countermeasures have been studied technically on the assumption of their structure scale including flow capacity. The Study Team already started to evaluate the relation between effectiveness of each countermeasure and its structure scale using the flood model analysis. In the next stage, the Study Team will make clear the necessity of the countermeasures and their structure scale including flow capacity.

6 Schedule of Next Meeting

Dr. Somkiat, the Chairman, proposed to set up the next meeting tentatively on the 10th of January, 2013 with the Study Team to discuss further on the Master Plan. The meeting details will be finalized between Dr. Somkiat and Mr. Kunieda (JICA Expert to RID) and the Study Team. The finalized meeting agenda shall be distributed among the meeting attendees in the beginning of January, 2013.

Meeting adjourns at 15:30 pm.

List of Meeting Attendees

Technical Group Meeting
December 19, 2012 at 1 PM
RID IEC Room 300

[Thai Side]

No.	Name-Surname		Position
Office of Project Management			
1	Mr. Somkiat	Prajamwong	Director of Project Management Office
2	Mr. Arthons	Suttigarn	Chief of Grant Projects Branch
3	Mr. Kanchadin	Sraprathoom	Chief of Loan Project Branch
4	Mrs. Phattaporn	Mekpruksawong	Chief of Project Planning Group 1
5	Mr. Supanat	Pariyachat	Chief of Project Planning Group 4
6	Mr. Chatchai	Boonlue	Director of Loan and Grant Project Division
7	Mr. Wirod	Khochalerd	Project Planning Group 1, Engineer
8	Mr. Jakraphan	Choyhiran	Civil Engineer
Office of Hydrology and Water Management			
9	Ms. Jira	Sukklam	Chief of Research and Applied Hydrology Group
RID			
10	Mr. Tatsuo	Kunieda	JICA Expert
11	Ms. Paweesuda	Boonchawang	Secretary to JICA Expert

[Japanese Side]

No.	Name-Surname		Position
JICA Head Quarter			
12	Mr. Kimio	Takeya	Senior Adviser
13	Mr. Yusuke	Amano	JICA HQ
14	Mr. Hideaki	Matsumoto	Deputy Director, Disaster Management Division 1, Global Environment Department
JICA Study Team, Component 1-2			
15	Mr. Takahiro	Mishina	Team Leader
16	Mr. Hajime	Tanaka	Deputy Leader
17	Ms. Akira	Watanabe	Civil Engineer
18	Mr. Paitaya	Puenpatom	English Interpreter
19	Ms. Nattamon	Tanyapanit	English Interpreter
20	Mr. Chuchat	Suwut	Japanese Interpreter
21	Mr. Peerasak	Chantngarm	Conference Interpreter
22	Ms. Rangsima	Boonsindulh	Conference Interpreter

1-1-8 Technical Group Meeting for Subcomponent 1-2 (10 January, 2013)

MINUTES OF MEETING
ON
THE TECHNICAL GROUP MEETING FOR SUBCOMPONENT 1-2
OF
PROJECT FOR COMPREHENSIVE FLOOD MANAGEMENT PLAN
FOR THE CHAO PHRAYA RIVER BASIN IN THE KINGDOM OF THAILAND

AGREED UPON BETWEEN
ROYAL IRRIGATION DEPARTMENT, MINISTRY OF AGRICULTURE AND COOPERATIVES
(RID/MOAC)

AND

THE STUDY TEAM OF JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

Bangkok, January 10, 2013

Dr. Somkiat PRAJAMWONG
Director ,
Office of Project Management
Royal Irrigation Department
Ministry of Agriculture and Cooperatives

Mr. Takahiro MISHINA
Leader
JICA Study Team for Subcomponent 1-2

1 INTRODUCTION

The Technical Group Meeting between members of the RID Technical Working Group (The Technical Group) and the JICA Study Team (The Study Team) for Subcomponent 1-2 was held on the 10th January, 2013 with the presence of 30 participants from the RID Headquarter Office, the JICA Headquarter office, and the JICA Study Team. The list of attendees is presented in Annex A.

The agenda for the meeting is as follows:

1 Presentation of "Results of Flood Analysis Model"
  1.1 Reproduction of the 2011 Flood Inundation;
  1.2 Reproduction of the 2011 Flood Inundation without Dyke Breach;
  1.3 Evaluation of Effectiveness of Countermeasures including Floodway; and
2 Questions, Comments and Suggestions from RID Representatives.

Contents of the presentations by the Study Team were generally accepted by the Technical Group.

2 PRESENTATION "RESULTS OF FLOOD ANALYSIS MODEL"

Mr. Mishina presented results of Flood Analysis Model conducted with seventeen (17) Study Cases presented in Annex B. The Study Team presented the following findings from the results of Flood Analysis Model as of January 2013;

1. In case of installation of diversion channels with 1,500 m^3/s flow capacity, effectiveness is reduced at the downstream area;
2. Increase of river flow by the construction of the Ayutthaya Diversion Channel does not cause major problems in combined operation with central diversion channel (Diversion channel along Outer Ring Road);
3. Combination of (1) Effective Operation of Existing Dams, (2) Ayutthaya Diversion Channel and (3) Central Diversion Channel (Diversion Channel along Outer Ring Road) has high priority; and
4. Detail study on flow capacity of Ayutthaya diversion channel, habitual inundation area, required dyke height, etc. will be continued.

The Study Team concluded that the analysis results of the Master Plan Study recommends Study Case 10, (combination of four (4) countermeasures such as, 1) C7: Improvement of Existing Dam Operation, 2) C5: Ayutthaya Diversion Channel: Capacity 1,400 m^3/s, 3) C6: Construction of Ring Road Diversion Channel: Capacity 500 m^3/s and 4) Control of Habitual Inundation Area) to RID/Thai Government.

3 QUESTIONS, COMMENTS AND SUGGESTIONS FROM RID REPRESENTATIVES

Dr. Somkiat, Chairman of the meeting, requested that the opportunities must be presented to the RID officers to learn in detail about the developed MIKE FLOOD model for the Chao Phraya River Basin in order for them to maximize understanding and utilization of the program. The JICA Headquarter Office accepted the RID's suggestion and offered to organize training courses upon RID's request.

RID also commended the following items;

Presentation Materials

- As for the presentation of various figures and graphs, location layout maps should be included in the handouts so that comparison can be made and the meeting attendees can follow the discussion effectively;
- In order for public to easily understand, the Risk Index Table needs to be presented in an image form with the information of the inundation duration;
- As for the results of Case 10 and Case 11, the presentation figure needs to be modified so that the significant difference in the inundated water depth between these cases can be easily seen; and
- In the longitudinal profiles, maximum values of each parameter (e.g. water level and discharge) shall be presented for the non-tidal effect sections whereas maximum and minimum values shall be presented for the tidal effect sections.

Analysis

- Prepare a comparison of project costs among proposed countermeasures;
- As a third party, discussion on operations of dams and other water management structures in 2011 needs to be included in the report, to answer publically raised questions whether mismanagement of such structures contributed to the 2011 flood or not;
- Develop 1) flood hazard map and 2) monitoring criteria for the Chao Phraya River Basin;
- Recommend the combination of countermeasures which gives maximum and minimum results (in terms of costs, impacts and inundated area etc.). Present a holistic view including the areas to be protected or the impacts to be reduced/minimized by the countermeasures;

4 NEXT STAGE

The Study Team presented that the items to be included in the next stage of the Master Plan Study are (1) analysis of storm surge in the Gulf of Thailand and (2) adaptation of climate change.

MEETING ADJOURNS AT 15:30 PM.

ANNEX A

List of Meeting Attendees

Technical Group Meeting
January 10, 2013 at 1 PM
RID IEC Room 300

[Thai Side]

No.	Name		Position
Project Management Office			
1	Dr. Somkiat	Prajamwong	Chair person, Director of Project Management Office
2	Mr. Kanchadin	Sraprathoom	Chief of Loan Project Branch, Foreign Financed Project Administration Division
3	Dr. Phattaporn	Mekpruksawong	Chief of Project Planning Group 1
4	Mr. Wirod	Khochalerd	Project Planning Group 1, Engineer
5	Mr. Supanat	Pariyachat	Chief of Project Planning Group 4
6	Mr. Chadin	Songchon	Civil Engineer
7	Mr. Wasin	Phutphat	Irrigation Engineer
Hydrology and Water Management Office			
8	Mr. Thada	Sukhapunaphan	Director of Hydrology Division
9	Mr. Chatchom	Chompradit	Director of Water Management Division
10	Mr. Somchit	Amnatsan	Chief of Water Management Group
11	Mr. Adisorn	Champathong	Irrigation Engineer
12	Ms. Patcharawee	Suwannik	Irrigation Engineer
Regional Irrigation Office			
13	Mr. Apiwat	Poomthaisong	Representative of RIO1
14	Mr. Chonlathep	Thatree	Representative of RIO 3
15	Mr. Boonthum	Panpiamphot	Chief of Water Management Branch, RIO 4
16	Mr. Thanaroj	Worraratprasert	Chief of Planning and Water Issue Solution Division, RIO 12
Others			
17	Mr. Tatsuo	Kunieda	JICA Expert to RID

ATTENDEE LISTS (continued)

[Japanese Side]

No.	Name-Surname		Position
JICA			
18	Mr. Kimio	Takeya	Headquarter Office
19	Mr. Yusuke	Amano	Headquarter Office
JICA Study Team, Component 1-2			
20	Mr. Takahiro	Mishina	Team Leader
21	Mr. Hajime	Tanaka	Deputy Leader
22	Mr. Masami	Katayama	Engineer
23	Mr. Satoshi	Takata	Engineer
24	Ms. Akira	Watanabe	Engineer
25	Ms. Nattamon	Tanyapanit	English Interpreter
26	Mr. Chuchat	Suwut	Japanese Interpreter
27	Mr. Peerasak	Chantngarm	Conference Interpreter
JICA Study Team, Component 3 (Special Invitation)			
28	Mr. Minoru	Kuriki	Deputy Leader
29	Mr. Yasushi	Inoue	-
30	Ms. Wanlaya	Manutkasemsirikul	Secretary

ANNEX B
LIST OF STUDY CASE FOR FLOOD ANALYSIS MODEL

Case	Rainfall in the Downstream Area	Dyke Breaching	Dyke elevating around the Economic Zone (by DOH, DOR and so on near Bangkok Area)	C2. Flood Control Volume with New Dams	C4. Flood Control Volume in Retention Ponds	C5-1. Dyke Raising up to DHWL + Freeboard of 0.5m	C5-2. Flood Control with Ayutthaya Diversion Channel	C6-1. Flood Control with East or West Diversion Channels	C6-2. Flood Control with Central Diversion Channels	C7. Effective Operation of Existing Dams	Primary Dyke elevating up to Peak Water Level
Case 0	◎	◎									
Case 0-0	◎										
Case 0-1			◎								
Case 9-1			◎							◎	
Case 9-2			◎	◎							
Case 9-3			◎		◎						
Case 9-4			◎				◎ 1,400 m^3/s				
Case 9-5			◎						◎ 500 m^3/s		
Case 9-6			◎					◎ 1,500 m^3/s			
Case 5			◎			◎					
Case 1			◎	◎	◎	◎		◎ 1,500 m^3/s		◎	
Case 2			◎	◎	◎	◎	◎ 1,400 m^3/s	◎ 1,500 m^3/s		◎	
Case 2-1			◎	◎	◎	◎	◎ 1,400 m^3/s	◎ 1,500 m^3/s	◎ 500 m^3/s	◎	
Case 7			◎			◎		◎ 1,500 m^3/s			
Case 8			◎								◎
Case 8-1			◎	◎	◎			◎ 1,500 m^3/s		◎	◎
Case 10			◎				◎ 1,400 m^3/s		◎ 500 m^3/s	◎	
Case 11			◎						◎ 500 m^3/s	◎	
Case 2-1-R	◎		◎	◎	◎	◎	◎ 1,400 m^3/s	◎ 1,500 m^3/s	◎ 500 m^3/s	◎	
Case 10-R	◎		◎				◎ 1,400 m^3/s		◎ 500 m^3/s	◎	

ANNEX B
LIST OF STUDY CASE FOR FLOOD ANALYSIS MODEL (continued)

1. Results of Flood Model Analysis

Using the flood model of reproducing the 2011 flood, cases with countermeasures are analyzed.

<CASE>

Case 0-0	- 2011 Flood without dyke breaches,
Case 0-1	- 2011 Flood without dyke breaches, - Dyke elevating around the economic zone by DOH, DOR near Bangkok area.
Case 9-1	- 2011 Flood without dyke breaches, - Dyke elevating around the economic zone by DOH, DOR near Bangkok area, C7 : Effective operation of existing dams.
Case 9-2	- 2011 Flood without dyke breaches, - Dyke elevating around the economic zone by DOH, DOR near Bangkok area, C2 : Flood control volume with new dams.
Case 9-3	- 2011 Flood without dyke breaches, - Dyke elevating around the economic zone by DOH, DOR near Bangkok area, C4 : Flood control volume in retention ponds.
Case 9-4	- 2011 Flood without dyke breaches, - Dyke elevating around the economic zone by DOH, DOR near Bangkok area, C5-2 : Flood control with Ayutthaya diversion channel (1,400m^3/s).
Case 9-5	- 2011 Flood without dyke breaches, - Dyke elevating around the economic zone by DOH, DOR near Bangkok area, C6-2 : Flood Control with central diversion channels (500 m^3/s).
Case 9-6	- 2011 Flood without dyke breaches, - Dyke elevating around the economic zone by DOH, DOR near Bangkok area, C6-1 : Flood control with east or west diversion channels (1,500 m^3/s).
Case 5	- 2011 Flood without dyke breaches, - Dyke elevating around the economic zone by DOH, DOR near Bangkok area, C5-1 : Dyke elevating up to DHWL + freeboard of 0.5m.
Case 1	- 2011 Flood without dyke breaches, - Dyke elevating around the economic zone by DOH, DOR near Bangkok area, C2 : Flood control volume with new dams, C4 : Flood control volume in retention ponds, C5-1 : Dyke elevating up to DHWL + freeboard of 0.5m, C6-1 : Flood control with east or west diversion channels (1,500 m^3/s), C7 : Effective operation of existing dams.
Case 2	- 2011 Flood without dyke breaches, - Dyke elevating around the economic zone by DOH, DOR near Bangkok area, C2 : Flood control volume with new dams, C4 : Flood control volume in retention ponds, C5-1 : Dyke elevating up to DHWL + freeboard of 0.5m, C5-2 : Flood control with Ayutthaya diversion channel (1,400m^3/s), C6-1 : Flood control with east or west diversion channels (1,500 m^3/s), C7 : Effective operation of existing dams.
Case 2-1	- 2011 Flood without dyke breaches, - Dyke elevating around the economic zone by DOH, DOR near Bangkok area, C2 : Flood control volume with new dams, C4 : Flood control volume in retention ponds, C5-1 : Dyke elevating up to DHWL + freeboard of 0.5m, C5-2 : Flood control with Ayutthaya diversion channel (1,400m^3/s), C6-1 : Flood control with east or west diversion channels (1,500 m^3/s), C6-2 : Flood Control with central diversion channels (500 m^3/s), C7 : Effective operation of existing dams.
Case 7	- 2011 Flood without dyke breaches - Dyke elevating around the economic zone by DOH, DOR near Bangkok area,

	C5-1 : Dyke elevating up to DHWL + freeboard of 0.5m, C6-1 : Flood control with east or west diversion channels (1,500 m^3/s).
Case 8	- 2011 Flood without dyke breaches, - Dyke elevating around the economic zone by DOH, DOR near Bangkok area, - Primary dyke elevating up to peak water level.
Case 8-1	- 2011 Flood without dyke breaches, - Dyke elevating around the economic zone by DOH, DOR near Bangkok area, C2 : Flood control volume with new dams, C4 : Flood control volume in retention ponds, C6-1 : Flood control with east or west diversion channels (1,500 m^3/s), C7 : Effective operation of existing dams, - Primary dyke elevating up to peak water level.
Case 10	- 2011 Flood without dyke breaches, - Dyke elevating around the economic zone by DOH, DOR near Bangkok area, C5-2 : Flood control with Ayutthaya diversion channel (1,400m^3/s), C6-2 : Flood Control with central diversion channels (500 m^3/s), C7 : Effective operation of existing dams.
Case 11	- 2011 Flood without dyke breaches, - Dyke elevating around the economic zone by DOH, DOR near Bangkok area, C6-2 : Flood Control with central diversion channels (500 m^3/s), C7 : Effective operation of existing dams.

MINUTES OF MEETING
ON
THE TECHNICAL GROUP MEETING FOR SUBCOMPONENT 1-2
OF
PROJECT FOR COMPREHENSIVE FLOOD MANAGEMENT PLAN
FOR THE CHAO PHRAYA RIVER BASIN IN THE KINGDOM OF THAILAND

AGREED UPON BETWEEN
ROYAL IRRIGATION DEPARTMENT, MINISTRY OF AGRICULTURE AND COOPERATIVES
(RID/MOAC)

AND

THE STUDY TEAM OF JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

Bangkok, January 21, 2013

Dr. Somkiat PRAJAMWONG
Director,
Office of Project Management
Royal Irrigation Department
Ministry of Agriculture and Cooperatives

Mr. Takahiro MISHINA
Leader
JICA Study Team for Subcomponent 1-2

1 INTRODUCTION

The Technical Group Meeting between members of the RID Technical Group (The Technical Group) and the JICA Study Team (The Study Team) for Subcomponent 1-2 was held on the 21st January, 2013 with the presence of 48 participants from the Headquarter Offices of RID, the JICA Headquarter office (Tokyo), and the JICA Study Team. The list of attendees is presented in Annex A.

The agenda for the meeting is as follows:

1 Presentation of "Results of Flood Analysis Model" by JICA Study Team;
2 Presentation of "West Floodway Project" by Panya Consultant;
3 Presentation of "East Floodway Project" by Sigma Consultant; and
4 Discussion on Presented Materials.

Contents of the presentations by the Study Team were generally accepted by the Technical Group.

2 PRESENTATIONS

Mr. Amano from the JICA Headquarter presented about the method to calculate Risk Index (RI), and comparison among three selected cases including (1) East/West Diversion Channel (1,500 m^3/s) with Operation Efficiency of Existing Dams, (2) Ayutthaya Bypass Channel and Outer Ring Road Diversion Channel (500 m^3/s) with Operation Efficiency of Existing Dams, (3) all countermeasures. The Study Team concluded that the best combination of countermeasures to prevent the protected areas from flooding is Case (2) Ayutthaya Bypass Channel and Outer Ring Road Diversion Channel with Operation Efficiency of Existing Dams.

Mr. Mahunnopnatee of Panya Consultant, the RID's consultant for the East Floodway Project, presented the final finding of the East Floodway Project. This project covers 12 provinces with total area of 3.78 million rai which consists of agricultural area (65%), community-industrial areas (28%) and others (7%). The proposed project is divided into two sections (1) Chainat-Pasak Canal to be extend and improved, and (2) Pasak-Gulf of Thailand to construct new drainage canal with maximum drainage at 1,000 m^3/s. The project on the Chainat-Pasak Canal further divided into three components (1) lined concrete canal on the right bank of Chainat-Pasak Canal to distributes water at 210 m^3/s, (2) Chainat-Pasak Drainage Canal with maximum capacity at 1,000 m^3/s, and (3) Parallel canal on left bank to distribute water at 30 m^3/s (maximum capacity) with flume in the section where the canal passes Muang Lop Buri. This is the 113,989 million baths project with environmental/social impacts on agricultural lands (21,000 rai) and fisheries industry in coastal areas.

Dr. Boonprasert of Sigma Hydro, the RID's consultant for the West Floodway Project, presented

the Phase I Investigation of Conceptual Plan on the West Floodway Project. The detailed hydraulic analysis on the proposed floodway shall be conducted in February. This project was commenced on August 30th, 2012 and will be completed on October 23rd, 2013 to cover the study area of 17,557 km^2. After February 2013, the project proposal shall be presented to the public to obtain their consensus. The proposed project includes five cases including (1) Chao Phraya River Drainage Capacity Improvement, (2) Ta Chin River Drainage Capacity Improvement, (3) Improvement of Lower Western Chao Phraya Area (including Monkey Cheek area), (4) Improvement of Lower Western Ta Chin Area, and (5) Western Floodway Improvement. Regarding the Western Floodway project proposal, three routes shall be proposed to the public for their consideration including (A) Chao Phraya (Krokphra) – Mae Klong (Ban Pong), (B) Chao Phraya (Kao Loew) – Mae Klong (Ban Pong) and (C) Ping River (Khanu Woraluck Buri) – Mae Klong (U/S of Mae Klong Barrage, Tha Muang).

3 DISCUSSION ON PRESENTED NATERIAL

RID requested the Study Team to present;

- The study results regarding predicted water levels of Case 10 and Case 11 in order to show the difference between these two cases to prove the effectiveness of the Ayutthaya bypass canal.
- The site specific (upper, mid and lower basins) countermeasures with more detailed information to manage the basin with the holistic approach.
- The countermeasures to manage the inundation in areas between Chai Nat to Ayutthaya.
- The simulation results of the case with the floodway diverting water from the upstream of Nakhon Sawan.

RID also suggested to the Study Team

- To include the West Floodway project as a countermeasure in the JICA Study Report.
- To organize the results of Flood Analysis Model by presenting the inundation depth and period.
- To evaluate Risk Index for the Mid and Upper Basins to evaluate the effectiveness of countermeasures in the enter Chao Phraya River Basin.

Mr. Takeya from the JICA Headquarter responded to RID that the combination of countermeasures which brings the most effective outcome must be implemented first. Initially, the probability of the 2011 year flood was assumed to be about the 1 in 70 year; however the rainfall analysis concluded that it can be as close as the 1 in 100-year-flood which led the Study Team to propose the 1 in 100-year-flood as the target flood. With the Laser Profiler data (topography data with 10 cm vertical accuracy), the Study Team investigates the effectiveness of each countermeasure and the combination of these countermeasures under the 2011 flood event as well as the additional 6 severe rainfall events in the past. Current agricultural practice in Thailand tolerates inundation in agricultural lands in some extent that flood may not always bring damages but may also bring some

benefits to the public. If it changes to more modernized practice with less tolerance to inundation in the future, the effectiveness of countermeasures must be re-evaluated to reflect the changes. The lower basin can be protected from flooding by letting the controlled inundation occur in the upper reach.

MEETING ADJOURNS AT 17:30 PM.

ANNEX A

List of Meeting Attendees

Technical Group Meeting
January 21, 2013 at 15:00 PM – 17:30 PM
RID Meeting Room #2, Office of Project Management

[Thai Side]

No.	Name		Position
Project Management Office (RID)			
1	Dr. Somkiat	Prajamwong	Chair person, Director of Project Management Office
2	Dr. Phattaporn	Mekpruksawong	Chief of Project Planning Group 1
3	Mr. Arthon	Suttigarn	Chief of Grant Project Branch
4	Mr. Supanat	Pariyachat	Chief of Project Planning Group 4
5	Mr. Chadin	Songchon	Civil Engineer
6	Mr. Prachya	Chaiwattana	Civil Engineer
7	Mr. Pongpich	Yodying	Civil Engineer
8	Mr. Ratthapan	Thiramanat	Civil Engineer
9	Mr. Olan	Vesurai	Civil Engineer
10	Mr. Puvanet	Thongrungroj	Chief Engineer of Operation and Maintenance Division
Hydrology and Water Management Office (RID)			
12	Mr. Thada	Sukhapunaphan	Director of Hydrology Division
13	Mr. Chatchom	Chompradit	Director of Water Management
14	Ms. Patcharawee	Suwannik	Irrigation Engineer
15	Mr. Kosit	Lorsirirat	Hydrologist
Office of Engineering Topographical and Geotechnical Survey (RID)			
16	Ms. Suwanna	Euvananont	Survey Engineering
Office of Engineering and Architectural Design			
17	Mr. Sakchai	Thepkamai	Engineer
Regional Irrigation Office			
18	Mr. Athaporn	Panyachom	Chief of Water Management Branch, RIO 10
19	Mr. Pongsak	Arulvijitskul	Director of Operation and Maintenance Division, RIO 11
20	Mr. Boonthum	Panpiamphot	Chief of Water Management Branch, RIO 4
21	Mr. Somvong	Pholprasittito	Representative of RIO 2
22	Mr. Chanin	Kongyai	Representative of RIO 12
Special Invitation			
23	Mr. Tatsuo	Kunieda	JICA Expert to RID

[Thai Side] Continued

Bangkok Metropolitan Administration (BMA)			
24	Mr. Visnu	Charoen	-
25	Mr. Surart	Jaroenchaisakul	-
Thai Meteorological Department (TMD)			
26	Mr. Maytee	Mahayosanant	Meteorologist
Panya Consultants Co., Ltd.			
27	Mr. Nirand	Pluthikarmpae	Engineer
28	Mr. Somchai	Mahunnopnatee	Engineer
Sigma Hydro Consultants Co., Ltd.			
29	Mr. Sompong	Boonprasert	Senior Water Resource Engineer
30	Mr. Kittisak	Chotmunee	GIS/Water Resource Engineer
31	Mr. Paopong	Kararum	Irrigation Engineer

[Japanese Side]

No.	Name-Surname		Position
JICA			
32	Mr. Kimio	Takeya	Senior Advisor
33	Mr. Yusuke	Amano	Senior Advisor
JICA Study Team, Component 1-2			
34	Mr. Takahiro	Mishina	Team Leader
35	Mr. Hajime	Tanaka	Deputy Leader
36	Mr. Masami	Katayama	Engineer
37	Mr. Kazuhiro	Nakamura	Engineer
38	Mr. Satoshi	Takata	Engineer
39	Ms. Akira	Watanabe	Engineer
40	Ms. Kamolnit	Ariyakamolpat	English Interpreter
41	Mr. Chuchat	Suwut	Senior Administrator
42	Ms. Nichapat	Rakpongthai	Administrator
43	Mr. Peerasak	Chantngam	Conference Interpreter
JICA Study Team, Component 3			
44	Mr. Minoru	Kuriki	Deputy Leader
45	Mr. Yasushi	Inoue	-
46	Ms. Natthanicha	Kasiolarn	Japanese Interpreter
47	Ms. Wanlaya	Manutkasemsirikul	Secretary
Other			
48	Mr. Akihiko	Nanchuna	Kansai University

Original

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MINUTES OF MEETING

ON

THE TECHNICAL GROUP MEETING FOR SUBCOMPONENT 1-2

OF

PROJECT FOR COMPREHENSIVE FLOOD MANAGEMENT PLAN
FOR THE CHAO PHRAYA RIVER BASIN IN THE KINGDOM OF THAILAND

AGREED UPON BETWEEN

ROYAL IRRIGATION DEPARTMENT, MINISTRY OF AGRICULTURE AND COOPERATIVES (RID/MOAC)

AND

THE STUDY TEAM OF JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

Bangkok, February 18, 2013

Dr. Somkiat PRAJUMWONG Director, Office of Project Management Ministry of Agriculture and Cooperatives	Mr. Takahiro MISHINA Leader JICA Study Team for Subcomponent 1-2

1 INTRODUCTION

The Technical Group Meeting between members of the RID Technical Working Group (The Technical Group) and the JICA Study Team (The Study Team) for Subcomponent 1-2 was held on the 18th February 2013 with the presence of 18 participants from the RID Headquarter Office, the JICA Headquarter office, and the JICA Study Team. The list of attendees is presented in Annex A.

The agenda for the meeting is as follows:

1 Detail Explanation on Master Plan for Chao Phraya River Flood Management Plan;
2 Result of Preliminary Analysis of Storm Surge;
3 Adaptation to Climate Change;
4 Questions and Answers.

Contents of the presentations by the Study Team were generally accepted by the Technical Group.

2 PRESENTATION "RESULTS OF FLOOD ANALYSIS MODEL"

Mr. Amano of JICA HQ presented the following items which are summarized in the distributed handout: Executive Summary.

1 Controlled Inundation Areas;
2 Adaptation to Climate Change and Result of Preliminary Analysis of Storm Surge;
3 Project Effectiveness; and
4 Evaluation Method.
5 Recommendations

Mr. Amano presented that by regulating land use appropriately, inundation with a similar scale of the 2011 flood can be under control. The prospective controlled inundation areas are classified into five in accordance with the flood features. With implementing structural and non-structural measures, the low-lying areas can maintain its function which can lead the reduction in flood disaster risks and the enhancement of people's living conditions by considering co-existing with floods.

Mr. Amano also mentioned about study results on climate change and storm surge. Literature review concluded there will be precipitation increase and sea water level rise in some extent for next several decades. The storm surge simulation model was established, and these simulation results showed that the effect of the simulated storm surge is negligible in term of flood inundation.

Finally Mr. Amano presented the effectiveness of combination of countermeasures which was checked by flood discharge distribution, and the project evaluation which was evaluated by comparing both 1) cost of each project combination and 2) Degree of Reducing Dyke-Breach Risk..

Three combinations are studied and presented, including 1) SCWRM M/P, 2) JICA Proposed Combination 1 and 3) JICA Proposed Combination 2. The SCWRM M/P is consisted of six countermeasures 1) Effective operation of existing dams, 2) Construction of new dams, 3) Improvement of retarding/retention areas, 4) East/west diversion channel (capacity if 1,500 m^3/s), 5) Outer ring road diversion channel (Capacity of 500 m^3/s) and 6) River channel improvement works. The JICA Proposed Combinations 1 and 2 include 1) Effective operation of existing dams, 2) Outer ring road diversion channel (Combination 1: Capacity of 500 m^3/s and Combination 2: Capacity of 1,000 m^3/s), 3) River channel Improvement works and 4) Ayutthaya bypass channel (capacity of 1,400 m^3/s).

The results showed that the costs of the JICA Proposed Combinations were less than 40% of SCWRM M/P cost while the effectiveness was same as SCWRM M/P in terms of Degree of Reducing Dyke Breach Risk.. EIRR and Benefit/Cost of each combination were not presented at this meeting; however Mr. Amano mentioned that these will be prepared and presented at the Seminar on February 20th. Based on the current analysis on effectiveness and evaluation of project combinations, the JICA Study Team recommended that the Government should concentrate on implementing the proposed combination of projects (Proposed Combinations 1 or 2), 1) Effective Operation of Existing Dams, 2) Outer Ring Road Diversion Channel (Capacity: 500 or 1,000 m^3/s), 3) River Improvement Works and 4) Ayutthaya Bypass Channel (Capacity: 1,400 m^3/s). In addition, it is not recommendable for the Government to execute almost all of the projects proposed.

3 QUESTIONS, COMMENTS AND SUGGESTIONS FROM RID REPRESENTATIVES

Mr. Thada questioned about Controlled Inundation Areas in Figure 13, Executive Summary, that the reason why the areas LO6 and LO9 located west of Tha Chin River are divided into two separate categories, and also how to improve the inundation conditions in LO6 and LO9 as it takes time to drain water from these areas. Mr. Amano answered that it was divided in order to conduct an in-depth analysis on the inundation pattern in these areas, such as the inundation in LO6 was almost over by December 1, however LO9 inundation was still ongoing.

Mr. Thada questioned the inundation situation in LO14. Mr. Amano answered that LO14 is a complicated case, which the volume of flood water gets worse (increased) in LO14 as the land along the Bunlue Canal is elevated and the flood water is blocked within LO14.

Mr. Thada questioned about the effective countermeasures to improve/mitigate the inundation condition in the Lower Chao Phraya. Also Mr. Thada requested to present the effectiveness of each countermeasure by summarizing the results on maps similar to Figures 2.4, 2.5 and 2.6 in

Handout Document 4. In addition, Mr. Thada requested the JICA Study Team to propose countermeasures to mitigate inundation along the Tha Chin River including how to reduce the inundation time. Mr. Amano responded that the SCWRM M/P is effective to improve the condition only in LO6. The JICA Study Team agreed to analyze the Tha Chin River countermeasures.

Mr. Adisorn commended that there are more reports available on the impact of the climate change in Thailand, why the JICA Study Team only reviewed two reports by World Bank and START? Mr. Amano answered that more than two reports were reviewed and findings were presented in Handout Document 2. It should be noted that, according to the literature review, the sea level raise in the Gulf of Thailand is not significant.

Mr. Adisorn questioned about the reason why the costs of the JICA Proposed Combinations are much lower than the SCWRM M/P cost. Mr. Amano answered that it is because the proposed countermeasures are different, such as SCWRM M/P includes the floodway with 1,500 m^3/s connected to the Gulf of Thailand, whereas in the JICA Proposed Combinations in stead of constructing such large scale floodway, only countermeasures which will protect Bangkok and Ayutthaya areas were included. In the presentation at the seminar on February 20th, 2013, the JICA Study Team will explain these effectiveness and evaluation results by using EIRR (Risk Index will not be used).

Mr. Amano commented that even though all countermeasures proposed by SCWRM are implemented, there will be flood. It is necessary to inform the local people about the remaining risk of inundation, such as the unexpected inundation can be mitigated / minimized; on the other hand the expected inundation must be accommodated within the flood-prone zones. Mr. Thada responded that the Government idea is to implement countermeasures for each river basin, Ping, Wang, Yom and Nan River basins. Mr. Thada agreed the JICA's classifications of controlled inundation areas presented in Figure 12, Handout Executive Summary, however he is unclear about how to manage / drain water from these inundation areas in the Upper Chao Phraya, especially UP7 located along the Ping River, and the areas along Yom River. In addition, he requested the JICA to present the effective measures to mitigate the inundation in the area north of Bangkok (not necessary to be structural measures, but it can be non-structural measures such as implementing the effective operation rule at the existing structures, etc.), which measures, if reasonable, RID would like to implement in 2013 Flood season. Mr. Amano responded that the countermeasures for the Upper Chao Phraya will be analyzed after the seminar on February 20th including how to utilize the inundation area effectively etc. In order to conduct the in-depth analysis, the JICA Study Team requested RID to provide the information on the protected area (which area to be protected, such as Sukho Thai etc.) within the Upper Chao Phraya area.

Mr. Somkiat commended that 1) more explanation is needed on the proposed project costs, 2) Master Plan must cover everything, such as countermeasures to protect farmers and agricultural lands, 3) additional information is required on how to select which floodways (west or east) to be implemented. Mr. Takeya answered that with laser profiler data, Master Plan analyzed the holistically, and it is concluded that the inundation in the great Chao Phraya Basin cannot be eliminated completely even though all countermeasures are implemented. Our plan considers mitigating not only the inundation of the industrial areas but also the agricultural areas by proposing the 25 technical papers (prepared by another JICA Study Team).

Mr. Somkiat requested the JICA Study Team to provide the opportunities for RID officers to attend technical transfer and training sessions so that the JICA proposal to be fully utilized by RID officers in future.

Remarks:
LO = Lower Chao Phraya
UP = Upper Chao Phraya

MEETING ADJOURNS AT 12:10 PM.

ANNEX A

List of Meeting Attendees

Technical Group Meeting
February 18, 2013 at 9 AM
RID IEC Room 300

No.	Name – Surname	Title
[THAI SIDE]		
Office of Project Management		
1	Dr. Somkiat Prajamwong	Director, Office of Project Management
2	Mr. Kanchadin Sraprathoom	Chief of Loan Project Branch
3	Dr. Phattaporn Mekpruksawong	Chief of Project Planning Group 1
4	Mr. Wirod Khochalerd	Engineer, Project Planning Group 1
Office of Hydrology and Water Management		
5	Mr. Thada Sukhapunaphan	Director of Hydrology Division
6	Mr. Adisorn Champathong	Irrigation Engineer, Professional Level
[JAPANESE SIDE]		
JICA HQ		
7	Mr. Masami Fuwa	Director Genteral, Global Environment Department
8	Mr. Kimio Takeya	Visiting Senior Advisor
9	Mr. Yusuke Amano	Senior Advisor to Director General
10	Mr. Hidenaki Matsumoto	Deputy Director, Diasater Management Division 1
JICA Study Team (Component 1-2)		
11	Mr. Takahiro Mishina	Team Leader
12	Mr. Hajime Tanaka	Deputy Team Leader
13	Mr. Kazuhiro Nakamura	Engineer
14	Mr. Satoshi Takata	Engineer
15	Ms. Akira Watanabe	Engineer
16	Mr. Chuchat Suwut	Senior Administrator
17	Ms. Nattamon Tanyapanit	Interpreter
18	Mr. Peerasak Chantngam	Conference Interpreter

MINUTES OF MEETING

ON

THE TECHNICAL WORKING GROUP MEETING

FOR

SUBCOMPONENT 1-2 AND COMPONENT 3

OF

PROJECT FOR COMPREHENSIVE FLOOD MANAGEMENT PLAN FOR THE CHAO PHRAYA RIVER BASIN IN THE KINGDOM OF THAILAND

AGREE UPON BETWEEN

TECHNICAL WORKING GROUP

AND

THE SYUDY TEAMS OF JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

Bangkok, June 10, 2013

Dr.Somkiat Prajamwong	Mr.Takahiro MISHINA	Mr.Akihiko NUNOMURA
Director, Office of Project Management Royal Irrigation Department	Leader, The Study Team of Japan International Cooperation Agency (Subcomponent 1-2)	Leader, The Study Team of Japan International Cooperation Agency (Component 3)

I. Introduction

The Technical working Group Meeting between members of the Working Group and the JICA study Teams for Subcomponent 1-2 and Component 3 was held on 10th June, 2013 with the presence of 30 participants from the headquarters and the regional offices of RID, DWR, JICA headquarters and the JICA Study teams.

The agenda for the meeting is divided into those for Subcomponent 1-2 and Component 3, as follows:

Program I: Subcomponent 1-2

1) River Improvement Plan in the Tha Chin River
2) Verification of Effectiveness of the Management Plan by other floods
3) Others

Program II: Component 3

1) Transfer of System Management
2) Action Plan of Flood Management Information System
3) Presentation for the Final Seminar on 20 June, 2013

II. Presentation and discussion for Program I: Subcomponent 1-2

1) Presentation of Subcomponent 1-2

Mr. Yusuke Amano, Senior Adviser to the Director General of JICA, shared the results of the Master Plan Study on Flood Management for the Chao Phraya River. It is important to take note of ways and ideas to enhance in the Study. There are five materials distributed to the participants.

1. Executive Summary (revised version in June 2013)
2. TWG-Meeting Material 01 : River Improvement Plan in the Tha Chin River
3. TWG-Meeting Material 02 : Verification of Effectiveness of the Management Plan by other floods
4. TWG-Meeting Material 03 : Results of Model Analysis
5. TWG-Meeting Material 04 : Results of Model Analysis (New TOR)

The executive summary has already been distributed to the public in February 2013. The one given out today is a revised version. Mr. Amano then explained some finding on the Tha Chin River, as shown in Material 01. He mentioned about the status of the dike heightening for protection of the economic area that may affect flow of flood waters. He further shared that the after the completion of the dike heightening, flood water volume at west side of the Tha Chin River will be increasing, making it high risk for everyone residing the area. As the first step toward countermeasures for the Tha Chin River, design high water level is set up similar to the one of Chao Phraya River. The JICA team studied and finally selected two counter-measures in the Tha Chin River flood management:

1. Construct 4 shortcuts—this will contribute to drain water flood quickly.
2. Elevate existing dyke crest level and newly construction of dyke at the left side of Tha Chin River

The last page of the material show cases the result of the study. If countermeasures are not taken, waters could easily overflow from the dike.
Previous design high water level of the Chao Phraya River has stepwise part, and stepwise/horizontal part of design high water level is eliminated and slanted design high water level is set-up newly. The material showed the calculated water Level in the Chao Phraya River. It described how revised designed high water level be affected by 7 representative flood.

Mr. Amano then shifted to Technical Working Group Material 02 which shows the frequency and level of rainfall and flood water in the last 50 years. He refers back to the executive summary. Six representative floods (1970, 1975, 1980, 1994, 1995 and 2006) that have occurred in the Chao Phraya and Ta Chin Rivers are studied. Page 32 of Executive Summary provided information of the Verification Results of Project Effectiveness against 7 rainfalls. Mr. Amano said that there is not much difference between Combination 1 and Combination 2 studied at Nakhon Sawan, Ayutthaya and Bang Sai.
Mr. Amano said that the Thai Government prioritizes the following effective combinations:

1. Effective Operation of Existing Dams
2. Outer Ring Road Diversion Channel
3. River Improvement Works
4. Ayutthaya By-Pass Channel
5. Flood Forecasting

TWG Material 04 shows that effectiveness countermeasures mentioned in the new TOR issued on March 19, 2013. It also provided a chart on the Water Level/Discharge which includes a comparison among Combinations 1, 2 and SCWRM M/P.

2) Question & Answer for the First Part of the TWG Meeting

1. Mr. Sanae, representative of Mr. Phaisan Phongnorapha of Regional Irrigation Office 13: The participant explained that at the Tha Chin River and Pha Sri Charoen, water level has reached 2.13 meter, it even hit the level of at 3.996. There are dikes with an average height of 3-4.5 meters at that area. He also stressed that only an average of 100 cms can be released from the Tha Chin River. He insisted that these dikes are

important and pumping stations are important to manage water at the basin point. He asked if this is feasible and most recommended.

Mr. Amano said that the comment is very complicated. He referred to page 1-18 of Material 01. There is an attempt to set-up a high water level. The design high water level at the confluence/outlet of Pra Ya Bonlue canal is set at 4.7 meters. Dike height is 5.2 meters if considering that freeboard of dike is 50 cm. The Mahasawat channel has 3.7 meters of high water level. The JICA team would like to know more of these measurements and actions taken by RID.

Thai participant said that they already have a pumping structure that will help redirect/discharge flood water to the sea.

Mr. Amano complimented this comment.

2. Mr. Supanat Pariyachat begged for more articulation of the feasibility of a Pumping Station at the areas discussed in the report. There is a need to evaluate the number of Pumping stations to be recommended in the report. He also acknowledged that they did not include a study on Bang Pakong River.

   The Bang Pakong River is another river basin. The JICA team said that he will mention in the study report why they did not include Bang Paklong River.

3. Mr. Jirawat of the Water Resource Department said that there is a need to concentrate on water management. This directly affects water discharge on the lower reaches of the Chao Phraya River. He stressed on the need to focus on the process and the concept of countermeasure. This is for the sustainability of projects to be realized by the Thai Side. They must clearly provide guidelines on how to understand and execute the projects.

   Mr. Amano responded by pointing everyone to Page 30 of the Executive summary. They have already conducted a study on the river systems. They have also researched on the systems of Chao Phraya and Tha Chin River in terms of water discharge. Figure 24-Page 30 showed how flood discharge from one river affects water systems of other rivers.

4. At Page 34, it was recommended that government should implement the five proposed combination of projects. But the participant is confused about the statement: "it is not recommendable for the Government to execute almost all of the projects proposed."

Mr. Amano said that the English is not so good for this recommendation. He reiterated that all the five recommendations must be prioritized by the Thai Government.

5. Mr. Vitoon Thitinapak, Regional Irrigation Office 2: He had worked in Phitsanulok. He shared that the water drainage at the upper basin cannot release considerable amount of water from the Bhumibol and Sirikit dams due to existing paddy fields with low elevation. He asked for recommendation for water management, especially drainage in early rainy season.

   Dr. Somkiat Prajamwong, Director of Project Management, said that the JICA study is different from the RID study. The JICA study focuses on the lower basin. This is the reason why this issue is not well articulated. He also wanted to share about the limitations of RID in conducting research and performing relevant activities.

   Mr. Amano responded that the TWG meeting had already provided information about effective management of existing dam. The dam operation before 2011 had been effective. It is also undeniable that the dams worked well during the 2011 floods. Dam operations after the 2011 need to be enhanced and made more resilient and strong.

   For the first question, Page 27 of Material 03 showed the inundation area of the Chao Phraya River. The upper part of the basin had a flood depth of 4.0 to 5.0 meters. Mr. Amano said that water level on this area is discharged and inundated because of their low elevation. It actually serves a natural dam which they may utilize to effectively mitigate potential flood waters. The JICA team will review their analysis to examine further the possibility of water storage and mitigation, especially early rainy season.

6. Dr. Somkiat: It was requested to provide guidelines of effective management of reservoir operation rule curves. They must define the assumptions and risks of applying rule curves. These constrains must be stated in the report. They are worried about criticisms from other stakeholders.

   Mr. Amano said the proposal does not include any assumption on rule curves. He stressed that the rule curve guideline had been analyzed using more than 40 years inflow and outflow records. They will be preparing more information about the reservoir operation rule curve.

   Dr. Somkiat said that the efficiency of rule curves depends on case-to-case basis. Moreover, it comes in many forms and may be operate in various situations.

7. Mr. Kanching Kawsaard, Regional Irrigation Office 3: at page 31 of the Executive Summary, the participant is curious about the difference between the calculated and observed values used in the verification of project effectiveness. He also wondered that while the water levels in 2006 and 2011 are similar, why floods are not that severe during 2006.

   Mr. Amano said that studies performed during the periods when there were no dams yet. In 1993, they discovered that there was minimal flood occurrence. The calculation is anchored on similar preconditions.

8. Mr. Kanching observed that the observed and calculated values studied were particularly distinct and peculiar. He requested the JICA team to verify this by doing more research especially on the 2006 and 2011 flood rates.

   The JICA team also faced the same problem. They acknowledged that it is a strange observable value determined during 2006 at Nakhon Sawan. Water levels in 2006 are lower than in 2011. Moreover, water discharge during the former is more than the later year. What happened in Nakhon Sawan still remains strange values for the Japanese team. Mr. Amano said that they will do preliminary study and will tell them if there is an applicable method to verify this phenomenon.

9. Ms. Suphaporn wanted to know about the cost of the project evaluation. She wanted to know if the values is accurate.

   Mr. Amano said that they will include the conditions of cost estimate in the report.

10. Mr. Thanaraj Worraratprasert, Regional Irrigation Office 12, asked JICA to provide more information about water management measures on Chao Phraya basin because shortcuts create higher water levels to the left side of Tha Chin River especially around Bang Pla Ma and Song Pee Nong fields. The study should include appropriate water levels in the basin and amount of water to discharge from lower basins in each period.

    Mr. Amano will look for this in details.

III. Presentation and discussion for Program II: Component 3

1) Flood Management Information System

1.1 Transfer of System Management

The draft of transfer of system management was presented. There are 6 issues of system transfer; Opening of information delivery schedule (Early September 2013), Installation of system equipment (delayed to start in June), Technical transfer (by training course for Thai authorities in July), Publicity (by Thai Government with support of JICA/FRICS), Task Allocation to Thai government - RID (Telemetering Center and Hydro Center), DWR, TMD, SCC and others, and follow-up (FRICS will support Thai government on full-scale operation until late October.) Detail explanation will be made at a later date.

1.2 Action plan of Flood Management Information System

The basic plan of Flood Management Information System was already published in English and Thai and presented on February 20, 2013. The study team has consulted with RID and DWR technical officials and collected 6 suggestion items based on the request from Thai Government, as follows:

Development of the simulator for decision making on optimum operation of facilities such as dams and water gates;

Development of simulator for optimum emergency countermeasures such as installing emergency drainage pumps and large-scale sandbag;

Evaluation of forecasting and warning on landslide disasters such as flash flood and steep slope failure;

Evaluation of water level standards for warning information;

Set-up of issuing forecast and warning for disaster alleviation actions; and

Economic evaluation of flood forecasting system based on benefit analysis of non-structural countermeasures.

TWG agreed to proceed with development of action plans composed of these items.

1.3 Presentation for the final seminar on June 20, 2013

The study team will present current situation and future prospects of Flood Management Information System and also development and improvement of the system at the final seminar on June 20, 2013. At the seminar, the study team will also present the simulator function as water management judgment tool for government's internal tool.

2) Training Course for Technical Transfer

As the discussion on the schedule of training course, the meeting members agreed to hold the training on 29 July – 2 August 2013 at RID. The training consists of 2 levels – Basic knowledge level (Introduction and overview of the system) for executives, experts and practitioner officers and System operation and utilization for system operators (water management and equipment management). The trainees will be officials from RID and DWR. Secretary of the meeting (Mr. Supanat Pariyachat) and Mr. Somchit Amnatsan will consider list of trainees.

Dr. Somkiat Prajumwong, Chairman of the meeting asked the study team to submit letter, requesting for arranging a small working group meeting to discuss trainee list, agenda and contents of the training on June 21, 2013 together with agenda of the meeting.

IV. Schedule

Mr. Amano said that the Final Seminar involving government agencies and departments concerned will only be the ones invited. This is not open to the public. He reminded everyone to provide comments and inputs for the improvement of the executive summary and other materials. By the end of June, the draft final report will be distributed.

Timeframe to Remember: (as proposed by the JICA Team)

10 June: Technical Working Group Meeting
13 June: Deadline for Submission of Comments
20 June: Final Seminar (which includes government agencies and departments concerned will be invited)
By the end of June: Provision of Draft Final Report
Within two weeks after the Provision: Deadline for submission of comments on the Draft Final Report

END

List of Attendees

Thai side attendees

No.	Name - Surname		Office
1	Mr. Somkiat	Prajamwong	RID, Director of Project Management Office, Office of Project Management
2	Mrs. Suphaphorn	Wongweerakhan	RID, Expert on Economics Analysis for Water Resource Development Project
3	Mr. Thanar	Suwattana	RID, Director of Project Planning Division , Office of Project Management
4	Mr. Somchit	Amnatsan	RID, Chief of Water Management Group , Office of Water Management and Hydrology
5	Mr. Vitoon	Thititanapak	RID, Caretaker of Director of Operation and Maintenance Division, Regional Irrigation Office 2
6	Mr. Kanching	Kawsard	RID, Representative of Regional Irrigation Office 3, Regional Irrigation Office 3
7	Mr. Boonthum	Panpiamphot	RID, Chief of Water Management Branch, Regional Irrigation Office 4
8	Mr. Athaporn	Punyachom	RID, Chief of Water Management Branch, Regional Irrigation Office 10
9	Mr. Thanaroj	Worraratprasert	RID, Chief of Water Crisis Planning and Management Branch, Regional Irrigation Office 12
10	Mr. Phaisan	Phongnoraphat	RID, Director of Operation and Maintenance Division, Regional Irrigation Office 13
11	Mr. Supanat	Pariyachat	RID, Chief of Project planning Group 4, Office of Project Management
12	Mr. Kanchadin	Srapratoom	RID, Chief of Loan Project Branch, Foreign Financed Project Administration Division, Office of Project Management
13	Mr. Jiravat	Ratisoontorn	DWR, Director of Policy and Plan Division
14	Mr. Pitak	Dangprom	DWR, Policy and Plan Division
15	Mr. Satit	Sueprasertsuk	DWR

Japanese side attendees

No.	Name - Surname		Office
1	Mr. Yusuke	Amano	JICA Headquarter
2	Mr. Hideaki	Matsumoto	JICA Headquarter
3	Mr. Tomoya	Kikuta	JICA Headquarter
4	Mr. Takahiro	Mishina	JICA Study Team Component 1-2
5	Mr. Kazuhiro	Nakamura	JICA Study Team Component 1-2
6	Mr. Tatsuo	Kunieda	JICA Expert to RID
7	Mr. Akihiko	Nunomura	JICA Study Team Component 3
8	Mr. Yasushi	Inoue	JICA Study Team Component 3
9	Mr. Chuchat	Suwut	JICA Study Team Component 1-2
10	Ms. Gessarin	Gunthawong	JICA Study Team Component 1-2
11	Mr. Weerawat	Ittipanyakul	JICA Study Team Component 1-2
12	Ms. Kamolnit	Ariyakamolpat	JICA Study Team Component 1-2
13	Ms. Krittiya	Peerphayak	JICA Study Team Component 1-2
14	Ms. Wanlaya	Manutkasemsirikul	JICA Study Team Component 3
15	Ms. Paweesuda	Boonchuwong	JICA Study Team