The Republic of the Philippines
National Mapping and Resources Information Authority
Mindanao Development Authority

Topographic Mapping for Peace and Development in Mindanao in the Republic of the Philippines

Final Report

February 2013

Japan International Cooperation Agency

PASCO Corporation

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13-030

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List of Abbreviations and Acronyms

ALOS	Advanced Land Observing Satellite
BDA	Bangsamoro Development Agency
DA	Department of Agriculture
DEM	Digital Elevation Models
DENR	Department of Environment and Natural Resources
DOTC	Department of Transportation and Communication
DGPS	Differential Global Positioning System
DPWH	Department of Public Works and Highways
GCP	Ground Control Point
GIS	Geographic Information System
GOJ	Government of Japan
GOP	Government of the Philippines
GRP	Government of the Republic of the Philippines
GPS	Global Positioning System
I/A	Implementation Agreement
J-CCCH	Joint GRP-MILF Coordinating Committee on the Cessation of Hostilities
JICA	Japan International Cooperation Agency
LGU	Local Government Unit
NAMRIA	National Mapping and Resources Information Authority
MILF	Moro Islamic Liberation Front
MinDA	Mindanao Development Authority
RPC	Rational Polynomial Coefficient
TCC	Technical Coordinating Committee

Appendices

1. Outline of the Project

1.1 Background

In Mindanao, the topographic maps at a scale of 1:50,000 produced in the 1950s are still used as base maps for regional planning and infrastructure development.

In the Philippines, the National Mapping and Resource Information Agency (hereinafter referred to as "NAMRIA") is responsible for producing, updating, and distributing topographic maps. The Agency has the potential of carrying out the tasks; however, because of shortage of funds and human resources, the potential has not realized to update the topographic maps in Mindanao. The delay has been affecting various planning and development activities: road; disaster prevention mitigation; environmental management; social services; and so forth.

In order to cope with the situation, the Government of the Republic of Philippines (hereinafter referred to as "GOP") requested to conduct a digital mapping project at a scale of 1:50,000 in Mindanao to become the basic information for development planning and implementation in the Mindanao regions to the Government of Japan (hereinafter referred to as "GOJ").

In response to the request GOJ has conducted a preliminary study in December 2009. On January 11, 2010, both parties have signed the Implementation Arrangement to conduct the "Project on Topographic Mapping for Peace and Development in Mindanao (hereinafter referred to as "the Project").

1.2 Objectives of the Project

The objectives of the Study are as follows:

Production of 1:50,000 digital topographical maps in all the regions in Mindanao

In accordance with the Rule and Regulations on Survey and Mapping, the digital topographic maps at a scale of 1:50,000 are produced as utilizing satellite stereo images, ground survey and existing topographic maps.

Technical assistance required for the usage of the digital topographic maps

The Project Team studies current uses of maps in organizations of the Technical Coordinating Committee members. Based on the result of the study, the Project Team presents an example application at the technology transfer seminar.

1.3 Project Area

1) Project Area

The Project area covers the entire Mindanao area including the Basilan Island and the southern island with a total are of 100,500 km^2.

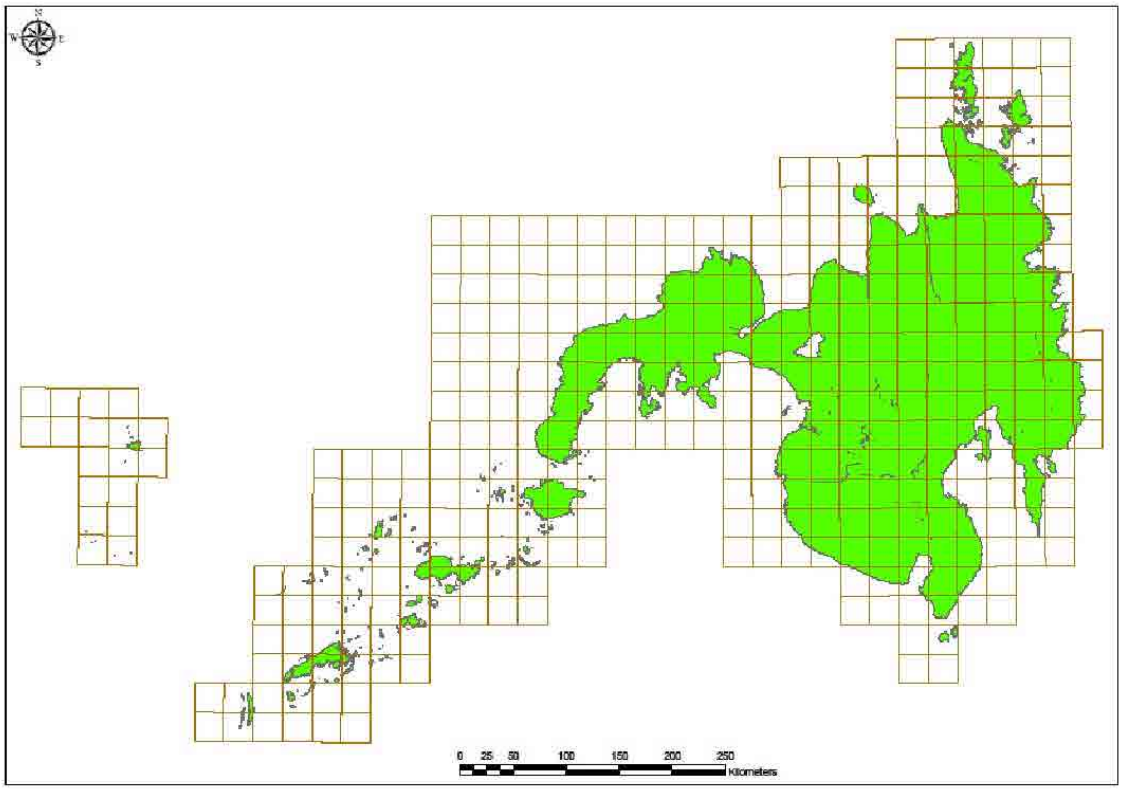


Figure 1.1 Project Area

2) Original Project Area

During the discussion on the Inception Report, in the beginning of the Project, the Project Area was 95,000 km^2 excluding the island areas of the Basilan Island and the southern islands. The counterpart organizations of NAMRIA and Mindanao Development Authority (MinDA) requested to include the Basilan Island and the southern island areas to be included in the project areas during the discussion on the Inceptions Report. The request which was included in the Minutes of Discussions on Inception Report and the request letter, to include the Basilan Island and the southern island areas, was sent to the JICA Philippine Office.

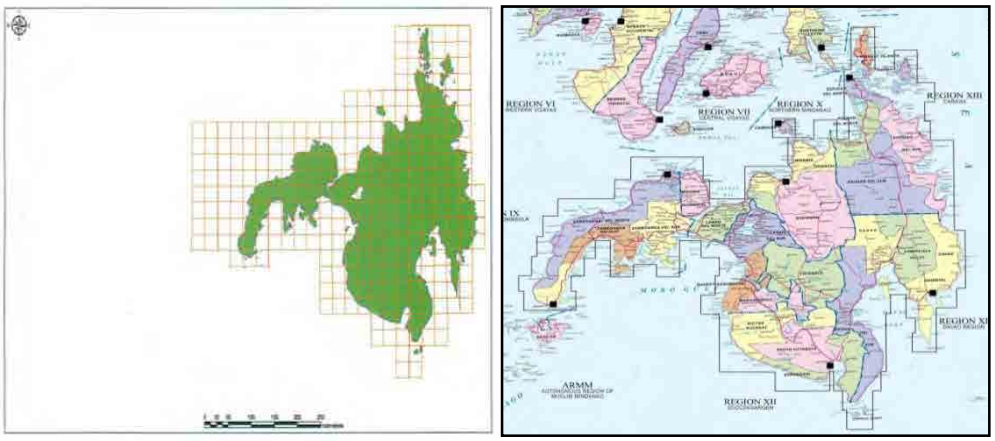


Figure 1.2 Original Project Area

In the beginning of the Project, the Project Team has conducted a research on securing the accuracy and operational possibility of the ground surveys. As a result of the on-site research, acquisition of the satellite images and the control point data from NAMRIA were confirmed as possible. It became clear that there was a survey and mapping company which has experiences in the island areas including bathymetric data creation. Therefore, the Project Team has concluded the implementation of the Project in the area was possible.

For this reason, JICA has changed the Project Area of the 1:50,000 digital topographic mapping to about 100,500 km^2 which included the Basilan Island and the southern islands.

The expansion of the project area became part of the reasons for extension for the project period.

1.4 Target Organizations of Data Application

The members of the Technical Coordinating Committee are the major targets for supporting data application. NAMRIA, MinDA, DENR, NEDA, DOTC, DA and other regional line agencies of the central government in the jurisdiction and LGUs in the Project area are the target organizations.

1.5 Amended Work Plan and Others

1.5.1 Change of Project Period (Partial Amendment to I/A)

In the Implementation Arrangement (I/A), the Project for Topographic Mapping for Peace and Development in Mindanao was planned to be completed in February 2012.

1) On March 16, 2010, JICA notified a restriction of entry to Mindanao to the Project Team. The restriction of entry during the presidential election from May 1, 2010 to May 16, 2010 was a notification from the Embassy of Japan.

The Project Team resumed the work from June 24, 2010.

2) The Project Team planned to select the contractors and to sign the contracts before the end of July. From July 27, 2010, the contractors were supposed to commence the work.

However, NAMRIA informed the Project Team that MinDA had requested to commence the work in the beginning of September 2010 after the Project Team held TCC meetings in major cities and after all the LGUs were notified the commencement of the work. (Regarding this matter, MinDA sent an official letter saying that the commencement of the work shall be the second week of September after the additional TCC meetings would be completed.) The commencement of the work, therefore, became on September 13 after the last meeting held in Cagayan de Oro on September 9.

Moreover, the Project Team had a meeting with a person in-charge from J-CCCH in accordance with the safety requirements of JICA with participation of all the contractors on August 9, 2010. The Project Team was advised on safety management and security arrangement for the contractors, and at the same time, the Project Team and J-CCCH had a discussion over requirement of weekly schedule submission to J-CCCH from the contractors and arrangement of security escort. Further, on August 9, 2010, the Project Team had a discussion with the ARMM Government, and on September 16, the Project Team also had a meeting with MILF to explain the contents of the project and to provide necessary support to the contractors during the field work.

With the above reasons mentioned, the Project schedule was extended.

3) On January 31, 2011, the contractors requested support from the Project Team to secure entry to barangays with entry restriction. The contractors requested to extend the work period because some time was needed to secure entry permits from barangay chiefs, to coordinate with local police and J-CCCH regarding permission of entry and security escorts.

The Project Team had discussions with the counterparts and JICA regarding the contractors' extension of work periods and safety measures. The counterparts and the Project Team decided to support the safety measures for the contractors to secure permission and to hold meetings with LGU leaders. The Project Team and the counterparts discussed over extension of contractors' work periods. The Project Team and the counterparts studied the schedule of data inspection on the contractors' work, and concluded that the work period shall have additional three months. The due date was decided to be May 31, 2011.

The GOP and JICA had a meeting over some areas which had some security issues to conduct the survey work. On October 13, 2011, the GOP and JICA agreed to extend the Project period to March 2013 to complete the Project. Both sides signed the Minutes of Meeting on Amendment of Schedule in order to secure sufficient time to complete the mapping process including the expanded areas and technology transfer.

1.5.2 Inclusion of Bathymetric Data

On February 18, 2011 during the discussion on the Progress Report, NAMRIA notified an officer in charge of JICA Philippine Office that the specifications of the bathymetric data were included in the specifications of 1:50,000 digital topographic maps produced during the Project.

The Project Team reported NAMRIA that the bathymetric data was not included in the scope of the Project.

On February 25, 2011, NAMRIA submitted a letter of request to change the specifications to include the bathymetric data in the digital topographic maps of the Project.

The Project Team had a meeting with NAMRIA regarding the area, specifications, methods, and schedule of creating bathymetric data including availability of existing bathymetric data. After the meeting the followings were confirmed by both sides:

- The digital topographic data at a scale of 1:50,000 included the bathymetric data as default;
- The area of bathymetric mapping was 58,000 km^2;
- The existing topographic maps included the bathymetric data; and
- The existing topographic data would be digitized to create the bathymetric data.

The Project Team examined the specifications, operation procedure, schedule, and quantity of bathymetric data creation based on the above information. After thorough examination, the Project Team came to the conclusion that creation of the bathymetric data was possible based on the specifications of the bathymetric data within the time schedule of the digital topographic map production at a scale of 1:50,000 with an area of 58,000 km^2.

In response to the plan of the Project Team, JICA agreed to include the bathymetric data with an area of 58,000 km^2, and decided to add the bathymetric data creation to the Minutes of Meeting on Amendment of Schedule on October 13, 2011. The list of output of the bathymetric data is in Section 1.10.

1.5.3 Resolved Issues on Topographic Map Preparation

1) Field Completion in Critical Areas

JICA, the Project Team, and the counterparts have recognized the critical areas as the hindering factor of implementing the field surveys conducted by the contractors from the experiences since September 2010.

The Project Team, the counterparts and the contractors have requested support to receive the entry permits to the military office, the local police and LGUs.

However, there are some critical areas, about 2% of the Project area, without the entry permits. For this reason, NAMRIA, MinDA and the JICA Project Team discussed and agreed to use secondary data in these critical areas.

2) Satellite Images

The Project Team procured the new ALOS images that covered the entire Project area. The images had cloud cover exceeding 20%; therefore, the Project Team, after discussing the matter with JICA, procured the archives of all ALOS images for the past five years and the latest SPOT images to solve the problem.

3) Work Period of Field Completion

JICA and the Project Team discussed the issues of the critical areas and the cloud situation of the satellite images with consideration of the Project period, and agreed to produce the digital topographic maps with all data acquired from the data of field completion completed by August 2012 and the satellite images already acquired.

1.6 Basic Policy Directions on Map Utilization

The Project Team has conducted the technology transfer seminar based on the results of the capacity assessment survey. The map utilization component of the Project was completed; however, there are more to be done for future map utilization. Since the topographic maps were prepared for peace and development, the uses of the maps shall be targeted to the conflict areas and development planning. With the peace agreement between the Philippine government and MILF, it will be high time to accelerate development in ARMM and succeeding Bangsamoro Government using the topographic map data, GIS data and satellite images.

1.6.1 Managing Spatial Information

The purpose of map utilization is clear; it is for peace and development. How to manage spatial information needs to be discussed further between MinDA and NAMRIA. The basic spatial data management direction, the Project Team recommends, would be: NAMRIA focuses on nation-wide basic data as it manage the Geo-portal system; MinDA focuses on thematic data and project monitoring data using GIS for development in Mindanao.

1.6.2 Development Planning

The scale of 1:50,000 is suited for provincial and regional levels of planning. For those cities and municipalities without large scale maps can utilize the 1:50,000 topographic maps.

A general development planning model has four components in a development cycle--current analysis, planning, implementation, monitoring and evaluation. The new maps can be used in all the processes.

Regions, provinces, cities and municipalities prepare development plans based on their Physical Framework Plans and Comprehensive Land Use Plans; however, since the newly produced spatial data had not been available, such planning and development activities may not have been as rational as they should have been. Those development plans can be updated with the new topographic maps. Also, all the sectors in the central government agencies and their line agencies in Mindanao can use the new maps for their sector planning as well as to provide sector information to LGUs.

The high-resolution ortho-imanges can have an accuracy equivalent to 1:10,000 topographic maps; therefore, when higher accuracy is required, the images can be used for various planning and development activities.

1.6.3 Distribution of Outputs

Digital Data

All the digital data can be uploaded to the Geo-portal system developed by NAMRIA. The viewer is open to all the internet users. The three-phased project of the first phase started in 2011. Different government agencies such as Department of Agriculture (DA), Department of Environment and National Resources (DENR) among others have contributed to the system to share spatial data.

Accessibility of topographic map information may be limited if the media are in digital, but the digital format is flexible and easily edited with appropriate computer equipment, while the printed maps will be printed and become available, the data shall be distributed at least to the TCC members. MinDA has agreed to distribute "e-copies" to all the TCC members.

Printed Maps

Printed topographic maps would be used by all map users without computer facilities or internet connection. Especially those cities and municipalities with limited facilities would be able to utilize printed maps for planning and development.

The Project Team has confirmed that NAMRIA will prioritize printing of the new topographic maps covering the Project area with a new Computer-to-Print system to be purchased in early 2013. The current capacity of printing is about 150 map sheets with 300 copies each, but the capacity will be increased with the new equipment. Also, if the capacity of printing does not meet the demand of printed maps, NAMRIA could out-source the printing job.

1.7 Organizational Setting

The Project is implemented by four organizations: JICA; counterpart agencies (NAMRIA and MinDA); and the Project Team.

In the Project, TCC was formed to establish communication channels with LGUs in the Project area for smooth operation of the Project. The counterparts initiate formation of TCC independently as they invite LGUs and the regional line agencies in the Project area. TCC is a committee, which shares information, exchange, and coordinate members' opinions regarding aspects of topographic mapping in Mindanao.

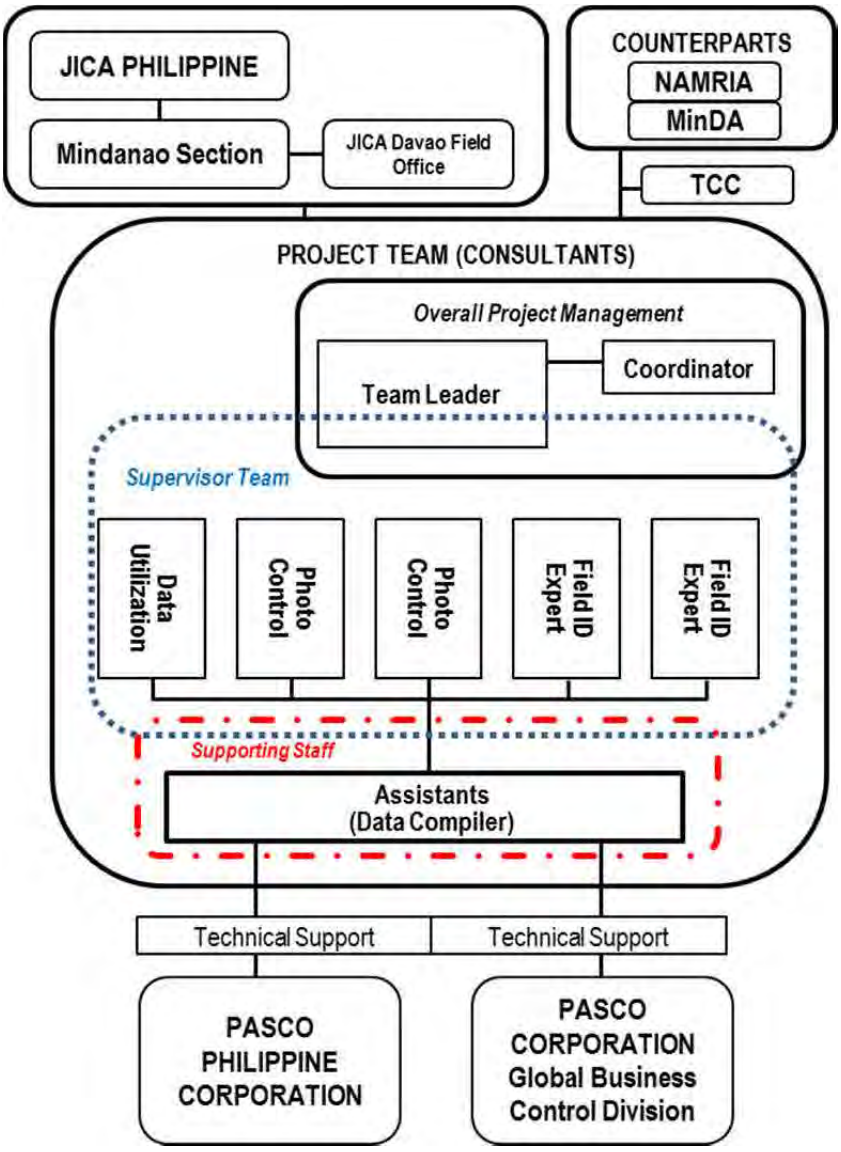


Figure 1.3 Organization Setting for Project Implementation

Table 1.1 Project Participants

Project Team Member		
Mr. Yutaka Kokufu	Team Leader, Field Identification/Field Completion	
Mr. Kazunobu Kamimura	Map Utilization	
Mr. Koichi Kamimura	Control Point Survey 1	
Mr. Koichi Wakisaka	Control Point Survey 2	
Mr. Kiyofumi Tamari	Field Identification/Field Completion 1	
Mr. Toshinori Otsu	Field Identification/Field Completion 2	
Mr. Kensuke Kimura	Project Coordination/Field Identification, Field Completion	
JICA		Note
Mr. Akihito Sanjo	Peace Building and Urban and Regional Development Division 1, Peace Building and Urban and Regional Development Group, Economic Infrastructure Department	
Ms.Ai Wakamiya	Urban and Regional Development Division 2, Urban and Regional Development Group, Economic Infrastructure Department	March, 2010

Mr. Kaori Higashi	Urban and Regional Development Division 2, Urban and Regional Development Group, Economic Infrastructure Department	April, 2010 - March, 2012
Mr. Sho Takano	Peace Building and Urban and Regional Development Division 1, Peace Building and Urban and Regional Development Group, Economic Infrastructure Department	April, 2012
Ms. Saori Fukuhara	Peace Building and Urban and Regional Development Division 1, Peace Building and Urban and Regional Development Group, Economic Infrastructure Department	May, 2012 - February, 2013
Mr. Masafumi Nagaishi	Philippine Office, Senior Representative	March, 2010 - September, 2010
Mr. Shinichi Masuda	Philippine Office, Senior Representative	October, 2010 - March, 2013
Mr. Masashi Yamamoto	Philippine Office, Representative	March, 2010 - April, 2011
Ms. Shiho Akamatsu	Philippine Office, Project Formulation Adviser	April, 2010 - March, 2012
Ms. Chieko Yokota	Philippine Office	April, 2012 - October, 2012
Ms. Yoko Ujike	Philippine Office, In-house Consultant	October, 2012 - February, 2013
Ms. Maria Celestina Totanes	Philippine Office, In-house Consultant	March, 2010
Mr. Hernan Pineda	Philippine Office, In-house Consultant	April, 2010 - March, 2012
Ms. Mary Bernadette P. Suarez	Philippine Office, In-house Consultant	March, 2010 - February, 2013

Technical Coordinating Committee Members	
Counterpart	**National Mapping and Resource Information Authority**
Mr. Jose Galo P. Isada, Jr.	Director, Mapping & Geodesy Department
Mr. Ruel DM. Belen	Asst. Director, Mapping & Geodesy Department
Ms. Ofelia T. Castro	Division Chief, Photogrammetry Division
Mr. Ronaldo C. Gatchalian	Officer-in-Charge, Geodesy and Geophysics Division
Mr. Joaquin T. Borja, Jr.	Officer-in-Charge, Cartography Division
Mr. Jose Villanueva	Engineer II, Cartography Division
Ms. Sheila Eugenio	Engineer III, Cartography Division
Ms. Jane Roque	Engineer III, Cartography Division
Ms. Imelda Cabatay	Engineer II, Cartography Division
Counterpart	**NAMRIA Binondo Office**
Comm. Romeo I. Ho	Director, Hydrography Department
Capt. Virgilio P. Antonio	OIC – Asst. Director, Hydrography Department
Capt. Jacinto M. Cablayan	OIC – Asst. Director, Hydrography Department
Counterpart	**Mindanao Development Authority**
Ms. Janet M. Lopez	Director for Operation
Ms. Corazon Ginete	Asst. Secretary
Ms. Charlita Escano	Chief, Economic Development Specialist
Ms. Joan Barrera	Supervisor, Economic Development Specialist
Mr. Ernesto Tomas	OIC- Chief, Office of Knowledge Management
Mr. Raymond Tejano	Information Technology Officer 1
Ms. Donna Jane Dumanig	Economic Development Specialist
National Line Agencies	Department of Energy and Natural Resources
	National Economic Development Authority
	Department of Interior and Local Government
	Armed Forces of the Philippines
	Department of Agrarian Reform

	National Commission on Indigenous People
	Department of Agriculture
	National Irrigation Administration
	Regional Disaster Coordination Council
	Department of Public Works and Highways
	Land Management Sector
	Mines and Geosciences Bureau
	Environmental Management Bureau
	National Statistics Office
	Forest Management Sector
	Department of Tourism
	Office of Civil Defense
	Housing and Land Use Regulatory Bureau
Provinces	Provincial Planning and Development Offices
Cities	City Planning and Development Offices
Others	Other Academic and Research Institutes
	Autonomous Region of Muslim Mindanao
	Bangsamoro Development Agency

1.8 Major Conferences and Meetings

The Project Team and the JICA Philippines Office held the following meetings with the counterparts, J-CCCH, LGUs of Mindanao, ARMM, MILF, and the contractors from April, 2010 to October, 2011. The contents of the meetings were: explanation, discussion, and agreement of the Inception Report; discussion and agreement of the specifications; preparation and implementation of TCC meetings; explanation of the safety-management criteria of operation of the work to the contractors; explanation of the safety measures from J-CCCH; discussion of the critical area problem, and entry permission arrangements and acquisition; reporting project progress, discussion on the specifications of bathymetric maps, discussion on the questionnaire, the interim report, etc.

The major meetings `are listed as follows:

Table 1.2 Major Meetings and Discussion Records

Date	Subject	Contents	Place
April 23, 2010	Meeting on Minutes of Discussions on Inception Report	The contents of the Inception Report were approved and signed by both sides.	Richmonde Hotel, Ortigas
December 8, 2011	Explanation and Discussion of Interim Report; Confirmation of the Minutes of Meeting for the coordination Meeting on November 29, 2011 in Davao City	The Project Team explained and presented the progress of the Project. Changes in the Project areas and period were reported and confirmed. Issues on capacity building in MinDA were mentioned. Inclusion of ARMM to TCC was mentioned by JICA.	Conference Room, NAMRIA
April 8, 2010	Distribution and Explanation of Inception Report	The Project Team distributed and presented the Inception Report.	MGD Multi-purpose room, NAMRIA

Date	Subject	Contents	Place
April 12, 2010	Discussion of Inception Report	Major items of discussions on the Inception Report were as follows: A. Objectives: Empowerment of MinDA and LGU should be emphasized; map utilization should be included. B. TCC: NAMRIA and MinDA discuss and prepare to hold a TCC meeting by June. C. Technology Transfer: The capacity and needs assessment shall be conducted to selected members of TCC; Financial Support on Holding TCC Meetings; The seminar was planned to be conducted once, but for sustainable topographic data utilization, GIS related technical training would be necessary; Trainers' training will be necessary; Capacity development activities and the technology transfer seminar/ workshop; Facility support for map utilization; D. Digital map data: The Project area should include the Basilan Island and the southern islands to be the entire Mindanao; Participation and financial support during the field survey for NAMRIA and TCC members; Financial support for materials on print maps	MGD Multi-purpose room, NAMRIA
April 19, 2010	Meeting on Inception Report	Major items of discussions on the Inception Report were as follows: A. Objectives: map utilization should be included. B. TCC: NAMRIA and MinDA discuss and prepare to hold a TCC meeting by June. C. Technology Transfer: The capacity and needs assessment shall be conducted to selected members of TCC; Financial Support on Holding TCC Meetings; The seminar was planned to be conducted once, but for sustainable topographic data utilization, GIS related technical training would be necessary; Trainers' training will be necessary; Capacity development activities and the technology transfer seminar/ workshop; Facility support for map utilization; D. Digital map data: The Project area should include the Basilan Island and the southern islands to be the entire Mindanao.	Conference Room, MinDA
April 26, 2010	Discussion on the Specifications of 1:50,000 Topographic Map	Agreement on specifications: SPECIFICATIONS 2008 (1)THE SPECIFICATIONS FOR 1:50,000 TOPOGRAPHIC MAPS, (2)THE SPECIFICATIONS FOR MAP SYMBOLIZATION, (3) THE MANUAL FOR ORTHO-PHOTO PREPARATION) prepared during the "Study for Mapping Policy and Topographic Mapping for Integrated National Development Plan in the Republic of the Philippines" with a JICA funding from 2006 to 2008.	Director's Office, NAMRIA
August 9, 2010	Explanation of Inception Report	Explanation of the project implementation plan: the Project Team requested support to the contractors during the field surveys.	ARMM Office, Cotabato
September 16, 2010	Explanation of Inception Report	The Project Team explained the project implementation plan. The Project Team requested support from LGUs during the field work.	MILF Office, Cotabato
November 7, 2012	Technical Transfer Seminar and Final TCC Meeting	The morning session was the technology transfer seminar and the afternoon session was the fourth TCC meeting. During the technology transfer seminar, basic operations of ArcGIS and AutoCAD were presented.	The Ritz Hotel at Garden Oases, Davao City
November 9, 2012	Technical Transfer Seminar and Final TCC Meeting	The morning session was the technology transfer seminar and the afternoon session was the fourth TCC meeting. During the technology transfer seminar, basic operations of ArcGIS and AutoCAD were presented.	N Hotel, Cagayan De Oro City
December 13, 2012	Discussion on the Draft Final Report	The Team Leader, Mr. Kokufu, explained the contents of the Draft Final Report. NAMRIA and MinDA accepted the report. On the final outputs, both sides agreed that NAMRIA will edit the data after the completion of the Project, if such editing will become necessary. Map utilization and ceremony of the Project completion were discussed, also.	MGD Multi-purpose room, NAMRIA

Table 1.3 TCC Meetings and Discussion Records

Date	Subject	Contents	Place
July 27, 2010	Holding the Seminar (Project Launching & Technical Coordinating Committee)	The Project Team explained the project implementation plan and explained and distributed the questionnaire survey for map utilization. The Project Team requested support from LGUs during the field work. TCC was formally established.	Marco Polo Hotel, Davao City
July 27, 2010	Technical Coordinating Committee 1	The launching of the Project was held. The TCC members were approved. The Project Team explained the project implementation plan and explained and distributed the questionnaire survey for map utilization. The Project Team requested support from LGUs during the field work.	Marco Polo Hotel, Davao City
September 7, 2010	Holding TCC in General Santos	The Project Team explained the project implementation plan and explained and distributed the questionnaire survey for map utilization. The Project Team requested support from LGUs during the field work.	Tierra Montana Hotel, General Santos City
September 8, 2010	Holding TCC in Zamboanga	The Project Team explained the project implementation plan and explained and distributed the questionnaire survey for map utilization. The Project Team requested support from LGUs during the field work.	Pasonanca, Zamboanga
September 9, 2010	Holding TCC in Cagayan de Oro	The Project Team explained the project implementation plan and explained and distributed the questionnaire survey for map utilization. The Project Team requested support from LGUs during the field work.	Dynasty Court Hotel, Cagayan De Oro City
September 15, 2010	Meeting on Project Status	The Project Team reported progress of the Project	ARMM Office, Cotabato
January 24, 2012	Technical Coordinating Committee 2	The Project Team explained the progress of the Project, and distributed the draft maps to the TCC members for validation.	Microtel Inns and Suites, Davao City
January 25, 2012	Technical Coordinating Committee 2	The Project Team explained the progress of the Project, and distributed the draft maps to the TCC members for validation.	Tierra Montana Hotel, General Santos City
January 27, 2012	Technical Coordinating Committee 2	The Project Team explained the progress of the Project, and distributed the draft maps to the TCC members for validation.	Dynasty Court Hotel, Cagayan De Oro City
January 27, 2012	Technical Coordinating Committee 2	The Project Team explained the progress of the Project, and distributed the draft maps to the TCC members for validation.	Grand Astoria Hotel, Zamboanga City
January 31, 2012	Technical Coordinating Committee 2	The Project Team explained the progress of the Project, and distributed the draft maps to the TCC members for validation.	El Manuel Hotel, Cotabato City
May 10, 2012	Technical Coordinating Committee 3	The Project Team explained progress of the Project and collected validated maps from the TCC members.	Grand Men Seng Hotel, Davao City
May 11, 2012	Technical Coordinating Committee 3	The Project Team explained progress of the Project and collected validated maps from the TCC members.	Del Rio Splash Hotel, Koronadal City
May 14, 2012	Technical Coordinating Committee 3	The Project Team explained progress of the Project and collected validated maps from the TCC members.	Estosan Hotel, Cotabato City
May 15, 2012	Technical Coordinating Committee 3	The Project Team explained progress of the Project and collected validated maps from the TCC members.	Almont Hotel, Butuan City
May 16, 2012	Technical Coordinating Committee 3	The Project Team explained progress of the Project and collected validated maps from the TCC members.	Dynasty Court Hotel, Cagayan De Oro City
May 16, 2012	Technical Coordinating Committee 3	The Project Team explained progress of the Project and collected validated maps from the TCC members.	Pagadian Bay Plaza Hotel, Pagadian City
November 07, 2012	Technical Coordinating Committee 4	The Project Team explained progress of the Project and distributed the maps to the TCC members for final validation.	The Ritz Hotel at Garden Oases, Davao City
November 09, 2012	Technical Coordinating Committee 4	The Project Team explained progress of the Project and distributed the maps to the TCC members for final validation.	N Hotel, Cagayan De Oro City

Table 1.4 Technical Meetings and Discussion Records

Date	Subject	Contents	Place
August 2, 2010	Technical Briefing on Field Identification work for Contractor And Explanation of Safety Standards by JICA	An explanation meeting: JICA Philippine Office explained the safety management standards to the contractors.	Assistant Director's Office, NAMRIA
December 2, 2010	Technical Meeting (1/2) on Field Survey by Contractors	The contractor reported progress of the work.	Microtel Inns and Suites, Davao City
December 3, 2010	Technical Meeting (2/2) on Field Survey by Contractors	Report and discussion on status of entry permits to the critical areas.	Microtel Inns and Suites, Davao City
December 14, 2010	Meeting on Critical Area of Field Identification by Contractors (2)	The contractor reported progress of the work.	MGD Multi-purpose room, NAMRIA
December 16 2010	Meeting on Critical Area of Field Identification by Contractors	The contractor reported progress of the work.	MGD Multi-purpose room, NAMRIA
December 29, 2010	Meeting on Critical Area of Field Identification by Contractors	The contractor reported progress of the work.	MGD Multi-purpose room, NAMRIA
January 20, 2011	Technical Meeting on Field Survey and Project Status	The contractor reported progress of the work.	MGD Multi-purpose room, NAMRIA
January 21, 2011	Meeting on Critical Area of Field Identification by Contractors	The contractor reported progress of the work.	MGD Multi-purpose room, NAMRIA
January 25, 2011	Meeting on Critical Area of Field Identification by Contractors	The contractor reported progress of the work.	MGD Multi-purpose room, NAMRIA
January 27, 2011	Meeting on Critical Area of Field Identification by Contractors	The contractor reported progress of the work.	MGD Multi-purpose room, NAMRIA
January 28, 2011	Meeting on Critical Area of Field Identification by Contractors	The contractor reported progress of the work.	MGD Multi-purpose room, NAMRIA
February 11, 2011	Technical Meeting on Field Survey	The Project Team reported progress of the Project. The contractors reported progress of the work and the field conditions for entry. The Project Team ordered to resolve the issues of entering insecure areas by coordinating with the military offices, local police to secure entry permission and LGU staff to accompany visits to barangay chiefs. The JICA Davao office advised to work on the technical issues and entry issues separately. JICA suggested that MinDA secured entry permits from Army Group for security reasons.	Meeting room , Microtel, Davao

Date	Subject	Contents	Place
May 18, 2011	Technical Meeting on Field Survey	The Project Team reported the work progress in Japan, and NAMRIA reported data inspection work in the Philippines.	MGD Multi-purpose room, NAMRIA
May 23, 2011	Meeting of Project Status	The Project Team reported progress of the Project. NAMRIA, JICA Philippine Office and the Project Team discussed over the request from NAMRIA on the creation of ortho-maps and seamless topographic map preparation and bathymetric data. The Project Team has reported the change of the completion of the project from August 2012 to March 2013 because of the presidential election, security issues, and delay of work due to the critical area issues. NAMRIA reported that it had requested some budget to the Department of Budget and Management for the Project. The Project Team reported NAMRIA and JICA Philippine Office that a project report meeting would be held on May 25, 2011 to report the progress of the work of the contractors	MGD Multi-purpose room, NAMRIA
August 12, 2011	Technical Meeting on Requested Bathymetric Data by NAMRIA	JICA Philippine Office notified that the request document dated February 25, 2011, from NAMRIA over creation of bathymetric data has been reported and reviewed by the JICA headquarters. It was reported that the contract between JICA and Pasco did not include the creation of the bathymetric data. JICA Philippine Office requested to report the details of bathymetric data creation: information on bathymetric data; area; specification; map symbols; work method; and work schedule. The Project Team acknowledged the request and agreed to provide the said data and information by September 6, 2011. The Project Team reported that next technical meeting would be held on August 12, 2011.	Director's Office, NAMRIA
August 16, 2011	Technical Meeting on Project Status	The Project Team reported that 95% of the work of the contractors had been completed. The Project Team explained that all the minutes of meetings would be written by the Project Team. NAMRIA and MinDA acknowledged the explanation. NAMRIA and MinDA agreed on: revising the questionnaire on map utilization by August 2011 together; distributing them in April 2012; and collecting them in May 2012 and August 2012 during the TCC meetings. NAMRIA canceled revision on the specifications of GIS data structurization mentioned during the discussion on the Progress Report in April 2010. It was agreed to follow the specifications agreed during the discussion on the specifications.	Assistant Director's Office, NAMRIA
February 7, 2012	Clarification on the Layers for the topographic Maps; Schedule of 3rd TCC Meetings	The Project Team confirmed the layers for the topographic maps and schedule of the third TCC meetings.	MGD Multi-purpose room, NAMRIA
February 7, 2012	Technical Briefing on Field Completion and Safety Management Meeting	The Project Team explained operational guidelines to the contractors during the field completion work. The contractors requested endorsement letters from MinDA.	MGD Multi-purpose room, NAMRIA
August 23, 2012	Project Progress Reporting; Conformation of Specification of 1:50,000 of Topographic Map	The Project Team reported progress of editing work in Japan. Discussions on the specifications included topics on the bathymetric data, bench marks, magnetic declination and others.	MGD Multi-purpose room, NAMRIA
October 24, 2012	Technical Meeting (JICA Project Team and NAMRIA)	A draft seminar program was presented by the Project Team. The contents and order of presentations were discussed.	MGD Multi-purpose room, NAMRIA

Table 1.5 Coordination Meetings and Discussion Records

Date	Subject	Contents	Place
July 8, 2010	Meeting on preparation for the Seminar	The Project Team and the counterparts discussed on the schedule of TCC. The Project Team requested to hold a one day Project Launching from 19 to 23, 2010. The secretary of MinDA was occupied during the requested period and did not accept the schedule. The Project Team requested to limit the number of participant from an LGU to one. The counterparts requested to give financial support on transportation and lodging fees for the participants who need to travel far. The discussion was decided to be continued on the matter on July 13, 2010 during the next TCC preparation meeting.	MGD Multi-purpose room, NAMRIA
July 13, 2010	Meeting on preparation for the Seminar	The Project Team and the counterparts discussed on the Project Launching and TCC preparation. Both sides agreed to have the Project Launching and TCC on July 26, 2010. The supporting fees for transportation and lodging were considered only for those from the Basilan Island and the southern islands based on actual expenditure by the participants. Note) The date of the Project Launching and TCC was changed to July 27 at 9 am because of the schedule of Secretary of MinDA.	Conference Room, MinDA
July 28, 2010	Discussion on the Short List for the Conduct of Field Survey and Ground Control Survey	The Project Team explained the requirements of survey works to subcontractors.	Director's Office, NAMRIA
August 9, 2010	Meeting on Security clearance of J-CCCH	An explanation meeting: J-CCCH explained safety measures during the Project.	Estosan Hotel, Cotabato City
August 31, 2010	Meeting on Security Control of field survey work	The Project Team briefed before the commencement of field work regarding security management in Mindanao.	Assistant Director's Office, NAMRIA
September 2, 2010	Meeting on Project Steering Committee	Secretary of MinDA questioned if the Palawan islands were included in the Project to JICA. JICA said no.	Conference Room, NAMRIA
December 3, 2010	Meeting on Project Coordination	All the contractors were called to reaffirm operation security and safety in Mindanao.	Conference Room, MinDA
February 18, 2011	Meeting on Project Coordination	The Project Team reported progress of the Project. The Project Team and NAMRIA have confirmed that the areas where field identification could not be conducted would be studied during field completion. MinDA requested to conduct the TCC meetings to the member LGUs to explain the critical areas and to request support on the Project during the field surveys. NAMRIA requested include the ortho-maps and bathymetric data in the final outputs. JICA Philippine Office told the Project Team that the Project Team were not allowed to enter the part of the eastern area to hold an TCC meeting and that reasons would be necessary to request the inclusion of the ortho-maps and bathymetric data.	MGD Multi-purpose room, NAMRIA
May 25, 2011	Meeting on Project Coordination	The Project Team reported progress of the Project. The Project Team explained the amended schedule till March 2013. NAMRIA and MinDA reported schedules on discussion of the revision of the questionnaire survey on map utilization and on redistribution. It was agreed that the decision would be made after the Project Team, NAMRIA and MinDA had discussed.	Conference Room, MinDA

Date	Subject	Contents	Place
May 30, 2011	Meeting of Project Status	The Project Team reported that the contractors completed about 90% of the work. The Project Team ordered the contractors to request MinDA directly to support to acquire the entry permits to the critical areas. NAMRIA and MinDA agreed on the revision of the questionnaire on map utilization. The Project Team reported to purchase the SPOT 5 satellite data. The Project Team conveyed a message from JICA that the digital topographic maps would be created using existing satellite images, existing maps, and field data that could be acquired.	MGD Multi-purpose room, NAMRIA
November 29, 2011	Discussion on Interim Report Presentation Schedule; Discussion on TCC Activities and Schedule (Handout: Formation of TCC)	The Project Team and MinDA discussed scheduling on the Interim Report presentation and TCC activities.	Conference Room, MinDA
May 18, 2012	Progress of the TCC Meetings	The Project Team reported progress of the third TCC meetings. Status of work conducted in Japan was reported also. Progress of the three contractors were reported also.	Conference Room, MinDA
July 24, 2012	Project Progress Reporting; Schedule of Technical Transfer Seminar	The Project Team reported progress of work; field completion was completed. Status on data validation from provinces was reported.	Conference Room, MinDA
August 28, 2012	Project Progress Reporting; Schedule of Technical Transfer Seminar	The Project Team reported progress of work; field completion data were validated by NAMRIA. Status of data validation from provinces was reported.	Conference Room, MinDA
September 28, 2012	Project Progress Reporting; Technical Transfer Seminar	The Project Team reported progress of map validation. Schedule of technology transfer seminar was discussed and agreed.	Conference Room, NAMRIA
October 12, 2012	Confirmation of Seminar Details	The seminar schedule and contents of the seminar were discussed. The number of invitation was discussed with budgetary constraints.	Conference Room, NAMRIA
December 20, 2012	Geo-Portal	Mr. Kamimura, in charge of map utilization, interviewed Deputy Director Linda Papa on the Philippine Geo-Portal. It was confirmed that the final output of the Project would be uploaded to the geo-portal site to update the existing data.	Office of Deputy Director, NAMRIA
December 21, 2012	A Map Distribution Plan	The Team Leader, Mr. Kokufu and Mr. Bele, Director of Mapping and Geodesy Department, NAMRIA discussed how the topographic maps will be distributed. Director Belen commented that NAMRIA would prioritize printing of maps in the Project areas, and that the printed maps would be available through the map sales offices.	MGD Multi-purpose room, NAMRIA
December 27, 2012	Map Data Distribution	Mr. Raymond Tejano, Information Officer, MinDA, Mr. Kokkufu, Team Leader, and Mr. Kamimura, Map Utilization discussed the map data distribution schedule and data security. It was confirmed that MinDA woud distribute the GIS data to all TCC members and that MinDA followed an administrative procedure of NAMRIA in distributing the data. Data processing capacity of MidDA was a ocncern expressed during the meeting.	Library, MinDA

1.9 Safety-Management

The Project Team manages safety issues, which may arise during the Project period for the Project Team members, and the contractors based on the safety standards and safety management measures of the Embassy of Japan in the Philippines and JICA Philippine Office in cooperation with and support from NAMRIA and MinDA.

<Project Team >

The safety measures for the Project Team follow the Guideline of Travel to Mindanao prepared by the JICA Philippine Office.

(1) The Project Team shall inform schedule of a trip to Mindanao (major cities in Davao, General Santo, Cagayan de Oro, Butuan, and Surigao) two weeks in advance to the JICA Philippine Office.
(2) The Project Team shall notify the Embassy of Japan through JICA, when a team member travels to conflict affected areas.
(3) A Project team member must accompany security guards when he travels to conflict affected areas to assure security during his stay.
(4) The Project team members shall carry two or more mobile phones of different companies to secure telecommunication connection in Mindanao.
(5) A Project team member shall accompany a member from the counterpart agencies while conducting field work.
(7) After 4:00 pm, the Project Team members shall not go outside of the premise of an accommodation establishment in principle in conflict areas in Mindanao.
(8) The Project Team members shall stay in an accommodation establishment specified in the Guidelines of Travel to Mindanao.

The Project Team shall not accept use of vehicles as a means of land transport.

<Contractors>

The Project Team subcontracts the work in accordance with the safety guideline of JICA. The Project Team, therefore, strictly follows the procedure of the Guideline of Travel to Mindanao (Philippine Consultant) in conducting the work to manage safety of the contractors.

(1) The contractor shall report and receive permission and advice when travelling to the southwestern part of Minidanao.
(2) The contractor shall prepare an operation schedule including locations of work (names of barangays), names of members who enter the area, mobile phone numbers of the members to the Project Team two week in advance by email. The Project Team shall report the operation schedule to J-CCCH and receive permission before commencement of the work of the contractor.
(3) The work hours of the contractor shall be from dawn to dusk.
(4) The contractor shall communicate closely not only with J-CCCH, but the police, national army, offices of LGUs and the offices of the counterparts to collect information of the areas.
(5) The contractor shall collect information of the areas from J-CCCH and other related parties and inform to the Project Team. When safety is not confirmed, the contractor shall not enter the areas.
(6) The contractor shall confirm safety of an accommodation with J-CCCH. The contractor shall stay in an accommodation where safety has been confirmed.
(7) Public facilities, except for airplane or ship shall not be used.

(8) The contractor shall not leave premises of an accommodation at night.

(9) The members of the contractor shall carry mobile phone at all times in principle.

The Project Team, NAMRIA, MinDA and JICA hold a technical meeting regularly and invite the contractor to confirm the progress of work and resolve issues of the field work to support contractors' safety management during the Project period. When an operational problem, such as identification of insecure areas, is found, the Project Team, NAMRIA, MinDA, JICA, and the contractor would hold a coordination meeting and discuss the solution to the problem to support smooth operation of the contractor.

The following chart shows the safety and security and emergency communication structure:

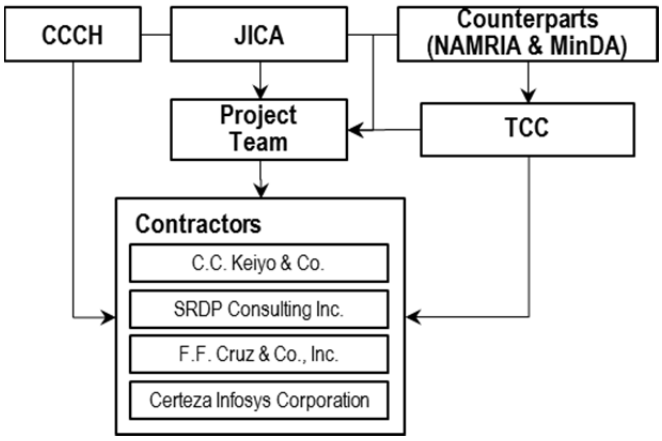


Figure 1.4 Safety and Security Management and Emergency Communications Structure

1.10 Outputs

JICA shall prepare and submit the following reports and final products of to the counterpart.

1. Inception Report

   Ten (10) copies in English at the commencement of the Project

2. Interim Report

   Ten (10) copies in English within twenty-first (21) months after the beginning of the Project

3. Draft Final Report

   Ten (10) copies in English within Thirty-five (35) month after the beginning of the Project

4. Final Report

   Twenty (20) copies in English within two (2) months after the receipt of the

comments on the Draft Final Report

5. Final products (Deliverable)

5-1 One (1) set of Satellite Images

5-2 One (1) set of Ortho-Image Maps

5-3 One (1) set of ground control point coordinates

5-4 One (1) set of 1:50,000 scale digital topographic maps data for printing which includes 58,000 sq.km of nautical chart area

5-5 One (1) set of 1:50,000 scale digital topographic maps data for GIS applications which includes 58,000 sq.km of nautical chart area

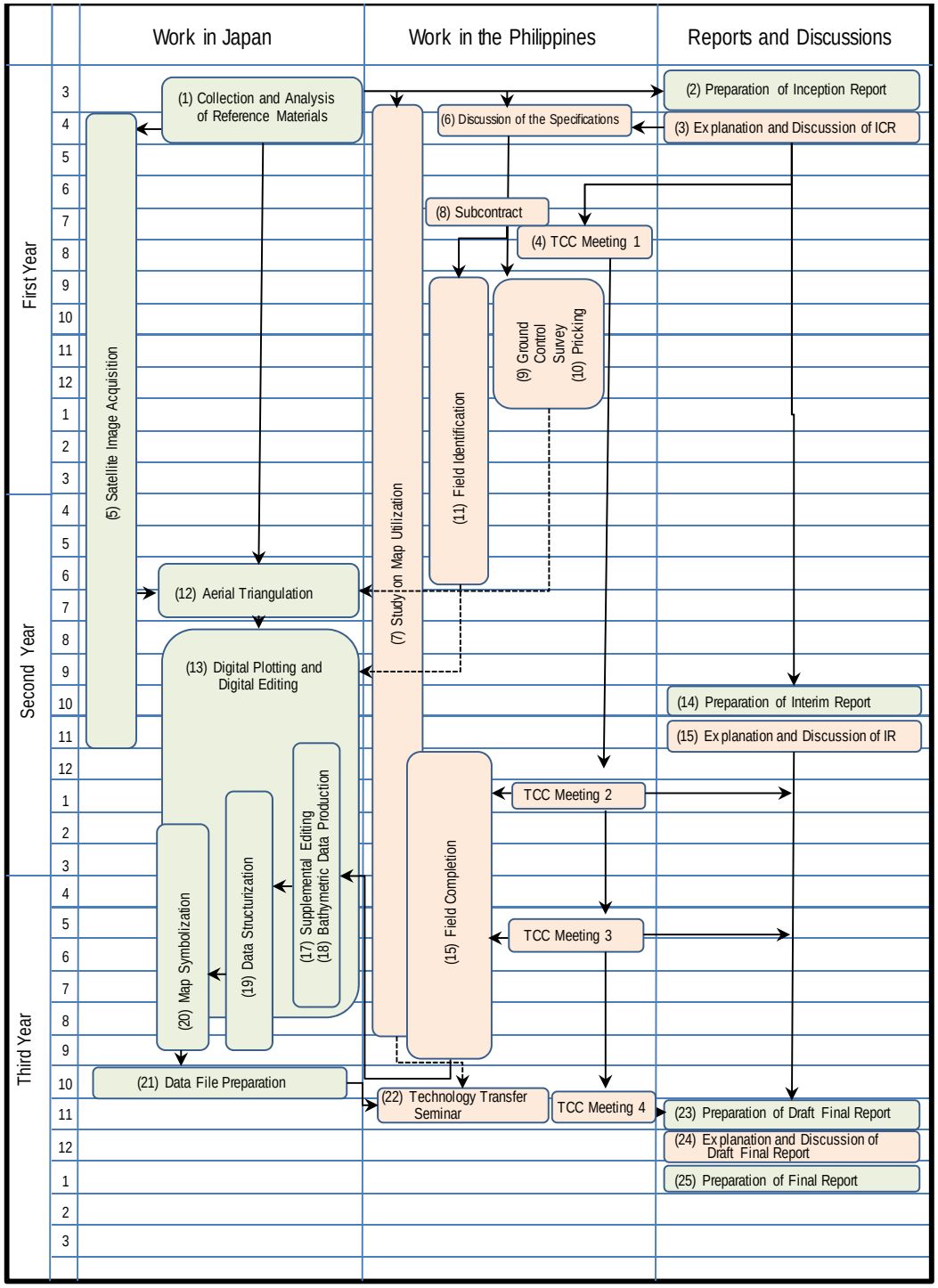


Figure 1.5 Project Work Flow

2. Project Work Items Completed

[1] Collection and Analysis of Reference Materials (Work in Japan)

The Project Team collected, organized and analyzed data and information related to the Project. Examples of reference materials collected and to be collected are: the existing topographical maps; land use maps; satellite imagery; aerial photographs; control points from organizations such as DPWH, DENR, MinDA, the Peace Building Committee of the President, and private corporations.

The Project Team has identified the following materials useful and collected:

(1) The thematic maps of MAP ATLAS prepared during the Study for Socio-Economic Reconstruction and Development of Conflict-Affected Areas in Mindanao in 2008 conducted by JICA
(2) 1:10,000 digital topographic maps prepared during in the Project for Flood Disaster Mitigation in Camiguin Island in 2004 conducted by JICA
(3) The Work of Aerial Photography and Photo Mosaic for Panaon Island and West Coast of Surigao, Philippines, 2004 JICA/FF CRUZ Inc.
(4) SPOT Images acquired in 2006 by NAMRIA as source materials for field identification
(5) Control points and benchmarks covering the entire area of Mindanao owned by NAMRIA
(6) 1:10,000 topographic maps covering ten districts surveyed and mapped by NAMRIA
(7) Digital-ortho maps and other data covering the Iligan west coast district prepared by FF CRUZ in 2009

[2] Preparation of Inception Report (Work in Japan)

The Project Team prepared the Inception Report by examining TOR, Preliminary Study Report and other materials to formulate policies, methods, schedule, manning, technology transfer plan and others. The Project Team submitted it to JICA, and JICA approved the contents.

[3] Explanation and Discussion of Inception Report (Work in the Philippines)

The Project Team presented and explained the Inception Report to the counterparts on April 8, 2010. The discussion on the Inception Report was held with NAMRIA on April 12, 2010, and on April 19, 2010, the Project Team discussed the contents with MinDA. On April 23, 2010, both sides of the Project Team and the counterparts agreed on the contents and signed the Minutes of Discussions on the Inceptions Report.

In the Minutes, the counterparts strongly requested the following:

(1) The area of digital topographic mapping shall be the entire area of Mindanao with an area of about 100,500 km^2 including the Basilan Island and the southeastern islands.
(2) To access the needs and capacity of TCC members, the capacity and needs assessment shall be conducted.

MinDA

NAMRIA

Photo 2.1 Discussions on Inception Report

[4] Holding a TCC Meeting (Work in the Philippines)

<The First TCC Meeting>

The Project Launching was held on July 27, 2010 in the Marco Polo Hotel in Davao City inviting LGUs in the entire area of Mindanao. TCC was formed to support preparation of the digital topographic data. The expected supporting activities were: validation on data regarding annotation, public facilities, road, river and other; and operational support. The Project Team explained the Project to the members of TCC, and requested a support to the questionnaire survey on utilization of spatial information, and operational support during the field identification. To those that could not attend the Project Launching, additional TCC meetings were held: General Santos City on September 7, 2010; Zamboanga City on September 8, 2010; and Cagayan de Oro City on September 9, 2010.

Further, on September 15, 2010, the TCC meeting was held for the ARMM government, and the Project Team requested cooperation on the questionnaire study on map utilization and support during the field survey. On September 16, the Project Team had a meeting with MILF and BDA for the purpose of assuring security of the contractors during the field surveys to explain the contents of the Project and asked cooperation during the field surveys and the questionnaire on map utilization with permission from the Embassy of Japan and JICA.

<The Second TCC Meeting>

The second TCC meetings were held on: January 24, 2012 (Davao City); January 25, 2012 (General Santos City); January 27, 2012 (Zamboanga City); January 27, 2012(Cagayan De Oro City); January 30, 2012 (Cotabato City); and January 31, 2012 (Cotabato City). The Project Team reported progress of the work. To the provincial members, the draft topographic data (.pdf) and printed maps were distributed for validation. To other member, only .pdf files were provided. The Project Team, NAMRIA and MinDA distributed the capacity assessment questionnaires as the contents of the questionnaires were explained.

<The Third TCC Meeting>

The third TCC meetings were held on: May 10, 2012 (Davao City); May 11, 2012 (Koronadal City); May 13, 2012 (Cotabato City); May 14, 2012 (Cotabato City); May 15, 2012 (Butuan City); May 16, 2012 (Pagadian City); and May 16, 2012 (Cagayan De Oro City).

The Project Team reported progress of the work. The validated maps and the questionnaire sheets distributed during the second TCC meetings were collected.

<The Final TCC Meeting>

Following the Technology Transfer Seminar, the final TCC meetings were held on November 07, 2012 (Davao City) and November 09, 2012 (Cagayan De Oro City). The Project Team, NAMRIA and MinDA thanked TCC members for cooperating to the Project. The Project Team, NAMRIA and MinDA distributed the final topographic maps (.jpg) to be validated for comments to the TCC members. NAMRIA explained that duration of comments to be accepted would be only one month. NAMRIA announced that if they were not heard from the TCC members, the maps distributed would be the final topographic maps.

Photo 2.2 TCC Meetings

The following table summarizes the TCC meeting held during the three-year-project period.

Table 2.1 Technical Coordinating Committee

TCC	Date	Venue
1	July 27, 2010 August 9, 2010 September 7, 2010 September 9, 2010 September 9, 2010 September 15, 2010 September 16, 2010	Marco Polo Hotel, Davao City ARMM Office, Cotabato City Tierra Montana Hotel, General santos City Pasonanca, Zamboanga City Dynasty Hotel, Cagayan de Oro City ARMM Office, Cotabato City MILF Office, Cotabato City
2	January 24, 2012 January 25, 2012 January 27, 2012 January 27, 2012 January 30, 2012 January 31, 2012	Microtel Inns and Suites, Davao City Tierra Montana Hotel, General Santos City Grand Astoria Hotel, Zamboanga City Dynasty Court Hotel, Cagayan De Oro City MILF Office, Cotabato City El Manuel Hotel, Cotabato City
3	May 10, 2012 May 11, 2012 May 13, 2012 May 14, 2012 May 15, 2012 May 16, 2012 May 16, 2012	Grand Men Seng Hotel, Davao City Del Rio Splash Hotel, Koronadal City ARMM Office, Cotabato City Estosan Hotel, Cotabato City Almont Hotel, Butuan City Pagadian Bay Plaza Hotel, Pagadian City Dynasty Court Hotel, Cagayan De Oro City
4	November 07, 2012 November 09, 2012	The Ritz Hotel at Garden Oases, Davao City N Hotel, Cagayan De Oro City

[5] Satellite Imagery Acquisition (Work in Japan)

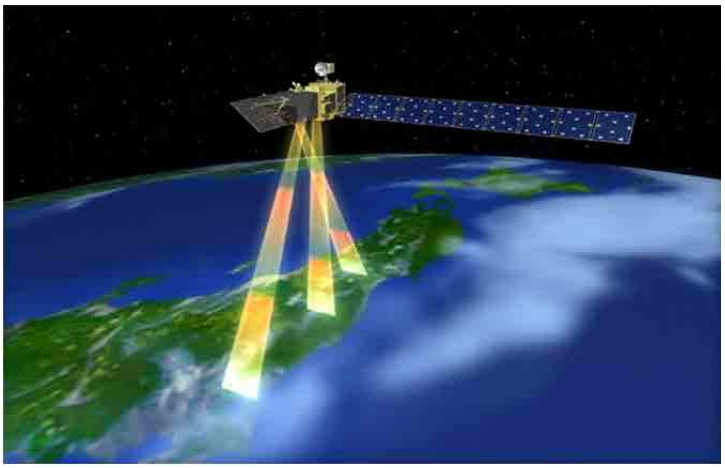
The Project Team acquired following satellite images:

Type of Image:	Stereo Pair Panchromatic (2.5 meter resolution) of Advanced Land Observing Satellite (ALOS)
Area:	The entire area of Mindanao, Philippines (about 100,500 km^2)
Specifications of the Images:	the PRISM image of forward viewing, nadir viewing and backward viewing (three directional vision) in principle.

Other Information: the specifications of the satellite images or high resolution images for single image plotting shall be equivalent to ALOS/PRISM images or images with higher (2.5 meters) resolution.

The Project Team has been acquiring the new observation data (stereo pair) of ALOS imagery from the beginning of the Project; however, because of malfunction of the ALOS satellite, new observation became impossible, after May 12, 2011. The images acquired during 2010 had covered the entire area, but about 20% of the area was covered with clouds. The reason was that even though the images had 20% cloud cover, the contract of purchase required the purchase of the newly acquired images.

For this reason, the Project Team discussed the matter with JICA and researched the SPOT images, which had the same resolution (2.5 meters) and ALOS archives for the past five years. The satellite images from ALOS and SPOT are listed in the following table.



(Source: JAXXA)

Figure 2.1 ALOS Image Acquistion

Table 2.2 Acquired ALOS Imagery Information

PRISM Image	Date of Acquisition		No. of Scenes
PRISM OB1 Image	2011	2/24/2011	8 scenes
		2/12/2011	10 scenes
PRISM OB1 Image	2010	12/28/2010	4 scenes
		12/16/2010	8 scenes
		11/12/2010	14 scenes
		10/4/2010	6 scenes
		9/22/2010	2 scenes
		8/12/2010	4 scenes
		7/14/2010	2 scenes
		7/9/2010	2 scenes
		7/4/2010	6 scenes
		6/15/2010	2 scenes
		5/24/2010	2 scenes
		5/2/2010	8 scenes
		4/25/2010	12 scenes
		4/13/2010	10 scenes
		4/3/2010	2 scenes
		4/1/2010	2 scenes
		3/27/2010	2 scenes
		3/22/2010	10 scenes
		3/15/2010	6 scenes
		3/10/2010	6 scenes
		3/5/2010	12 scenes
		3/3/2010	10 scenes
		2/28/2010	26 scenes
		2/26/2010	4 scenes
		2/16/2010	26 scenes
		1/18/2010	10 scenes
		1/13/2010	2 scenes
		1/6/2010	6 scenes
		1/1/2010	6 scenes
PRISM OB1 Image	2009	12/30/2009	6 scenes
		12/15/2009	4 scenes
		12/3/2009	8 scenes
		11/28/2009	14 scenes
		11/9/2009	4 scenes

PRISM Image	Date of Acquisition		No. of Scenes
		10/30/2009	4 scenes
		10/18/2009	10 scenes
		10/11/2009	2 scenes
		9/14/2009	22 scenes
		9/12/2009	10 scenes
		9/7/2009	2 scenes
		8/26/2009	2 scenes
		8/21/2009	4 scenes
		8/14/2009	7 scenes
		8/9/2009	14 scenes
		6/19/2009	8 scenes
		6/14/2009	2 scenes
		6/12/2009	2 scenes
		6/5/2009	2 scenes
		6/2/2009	4 scenes
		5/31/2009	2 scenes
		5/9/2009	4 scenes
		5/4/2009	4 scenes
		4/29/2009	2 scenes
		4/5/2009	12 scenes
		1/25/2009	2 scenes
PRISM OB1 Image	2008	12/29/2008	4 scenes
		12/22/2008	4 scenes
		12/12/2008	4 scenes
		12/10/2008	4 scenes
		11/30/2008	2 scenes
		11/28/2008	10 scenes
		11/18/2008	2 scenes
		11/6/2008	4 scenes
		10/27/2008	2 scenes
		7/10/2008	4 scenes
		7/8/2008	8 scenes
		6/2/2008	3 scenes
		3/23/2008	21 scenes
		2/6/2008	3 scenes
		2/4/2008	2 scenes
		1/25/2008	3 scenes
		1/6/2008	6 scenes
PRISM OB1 Image	2007	12/20/2007	3 scenes
		11/11/2007	9 scenes
		10/25/2007	25 scenes
		8/11/2007	15 scenes
		7/18/2007	6 scenes
		7/8/2007	7 scenes
		6/24/2007	18 scenes
		6/19/2007	3 scenes
		5/26/2007	3 scenes
		5/21/2007	5 scenes
		5/9/2007	2 scenes
		5/4/2007	5 scenes
		4/24/2007	5 scenes
		3/26/2007	8 scenes
		3/9/2007	3 scenes
		2/23/2007	3 scenes
		2/13/2007	6 scenes
		2/8/2007	5 scenes
		2/1/2007	3 scenes
PRISM OB1 Image	2006	12/22/2006	12 scenes

PRISM Image	Date of Acquisition		No. of Scenes
		12/12/2006 11/25/2006 11/8/2006 9/11/2006 8/20/2006 7/3/2006	6 scenes 8 scenes 5 scenes 3 scenes 3 scenes 3 scenes
TOTAL	647 scenes		

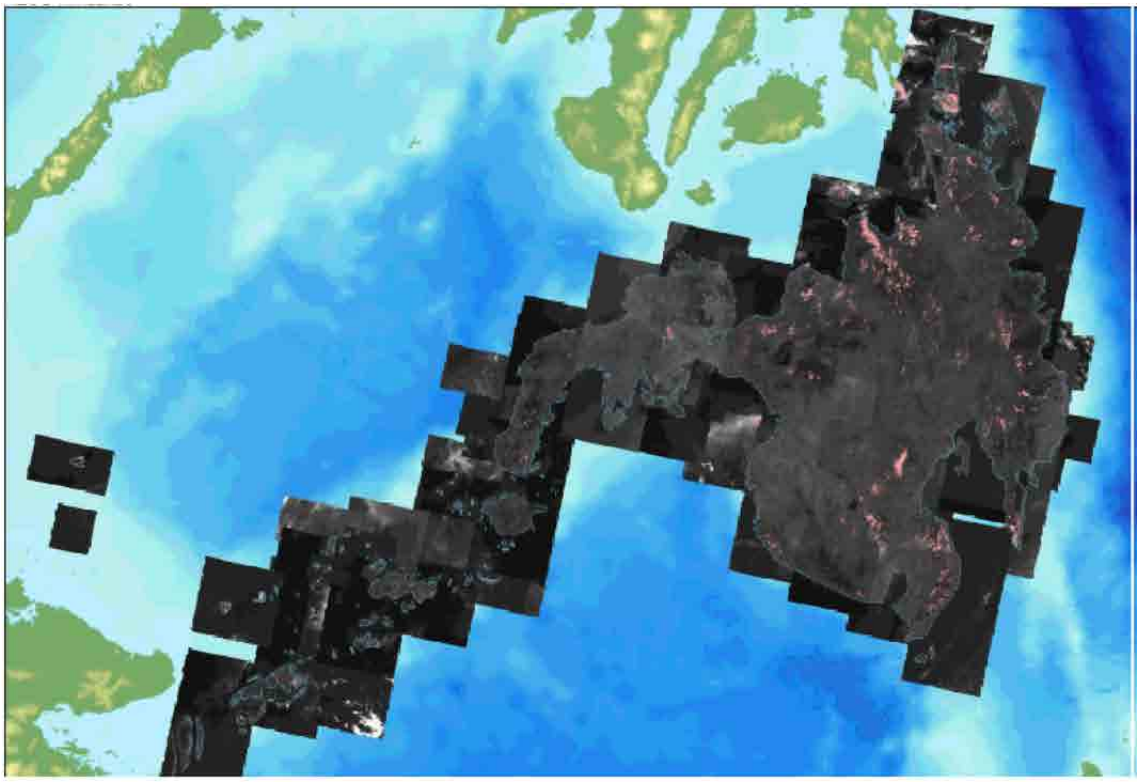


Figure 2.2 ALOS Images Index Map

Table 2.3 Acquired SPOT Imagery Information

SPOT Image	Date of Acquisition		No. of Scenes
SPOT 5	2010	2010/12/24	2 scenes
		2010/10/22	1 scene
		2010/9/25	1 scene
		2010/7/15	1 scene
		2010/6/3	1 scene
		2010/3/22	1 scene
		2010/2/13	1 scene
	2009	2009/12/28	1 scene
		2009/12/9	1 scene
		2009/12/8	1 scene
		2009/12/7	1 scene
		2009/12/3	1 scene
		2009/8/5	2 scenes
		2009/7/27	1 scene
		2009/3/19	4 scenes
	2008	2008/3/24	2 scenes
	2006	2006/11/17	1 scene
TOTAL	23 scenes		

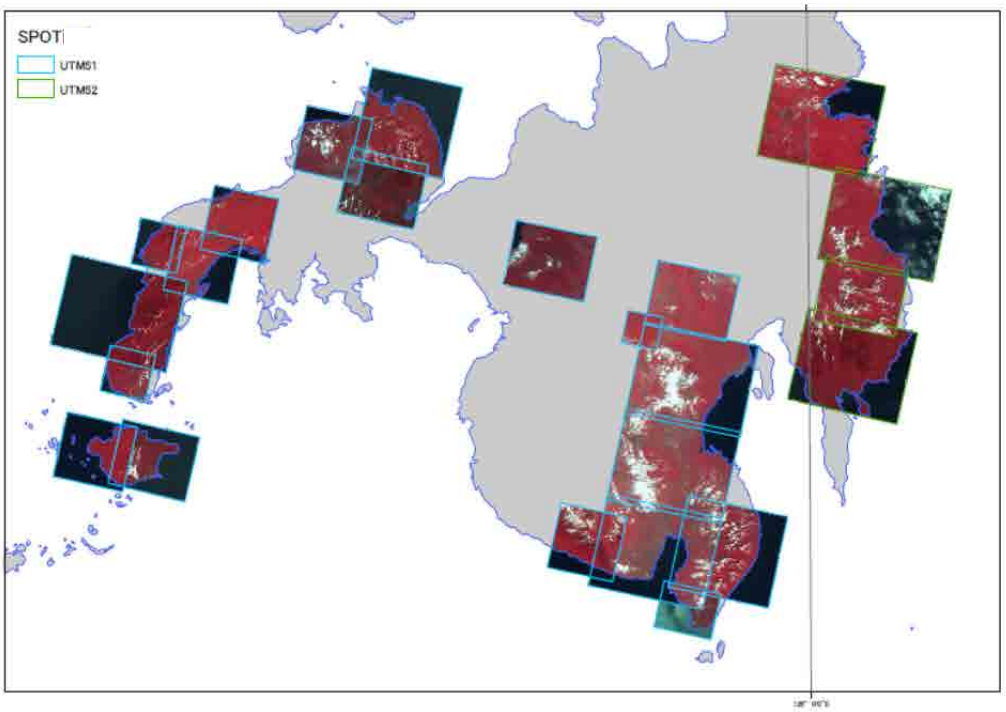


Figure 2.3 SPOT Images Index Map

[6] Discussion on the Specifications (Work in the Philippines)

The Project Team and NAMRIA discussed on the specifications (standards of map expressions such as map symbols and annotations), on April 26, 2010. Both sides agreed to used the specifications--Specifications 2008: (1) The Specifications for 1:50,000 Topographic Maps; (2) the Specifications for Map Symbolization; and (3) The Manual for Ortho-Photo Preparation. The specifications were prepared during the "Study for Mapping Policy and Topographic Mapping for Integrated National Development Plan in the Republic of the Philippines" with a JICA funding from 2006 to 2008. The specifications on digital topographic maps and ortho-photo preparation are in accordance with the Overseas Survey and Mapping (Basic Maps) of 2006 specified by JICA on image data acquisition, control point survey, pricking, field identification, aerial triangulation, digital plotting, digital editing, field completion and supplemental digital editing, digital data structuring, map symbolization on topographic maps, and data file preparation.

The survey standards shall be as follows:

Table 2.4 Survey Standards

Reference System	PRS92 (Philippine Reference System 1992);
Standard of height	The existing benchmark is followed;
Projection:	UTM (ZONE 50, 51, 52)
Contour interval:	A contour interval shall be 20.0 m.
Map Information	The following sentences will be added to the data files: *This digital map was prepared jointly by Japan International Cooperation Agency (JICA) under the Japanese Government Technical Cooperation Program and the Government of Philippines.*

Bathymetric Data

As for the specifcaitons on the bathymetric data, the specifications (methods of bathymetric data preparation and specifications on bathymetric data) in the Minutes of Meeting on Amendment of Schedule.

The survey standards for bathymetric data shall be as follows:

Table 2.5 Survey Standards for Bathymetric Data

Horizontal Datum	Philippine Reference System 1992(PRS92)
Hydrographic Datum	Depths in Fathoms at Mean Lower Low Water
Map Projection	Universal Transverse Mercator Projection (UTM)
Map Symbols	PMS50K(Philippine Map Symbols for 50k, 2008)

The workflow of producing digital topographic maps from satellite images and bathymetric data is as follows:

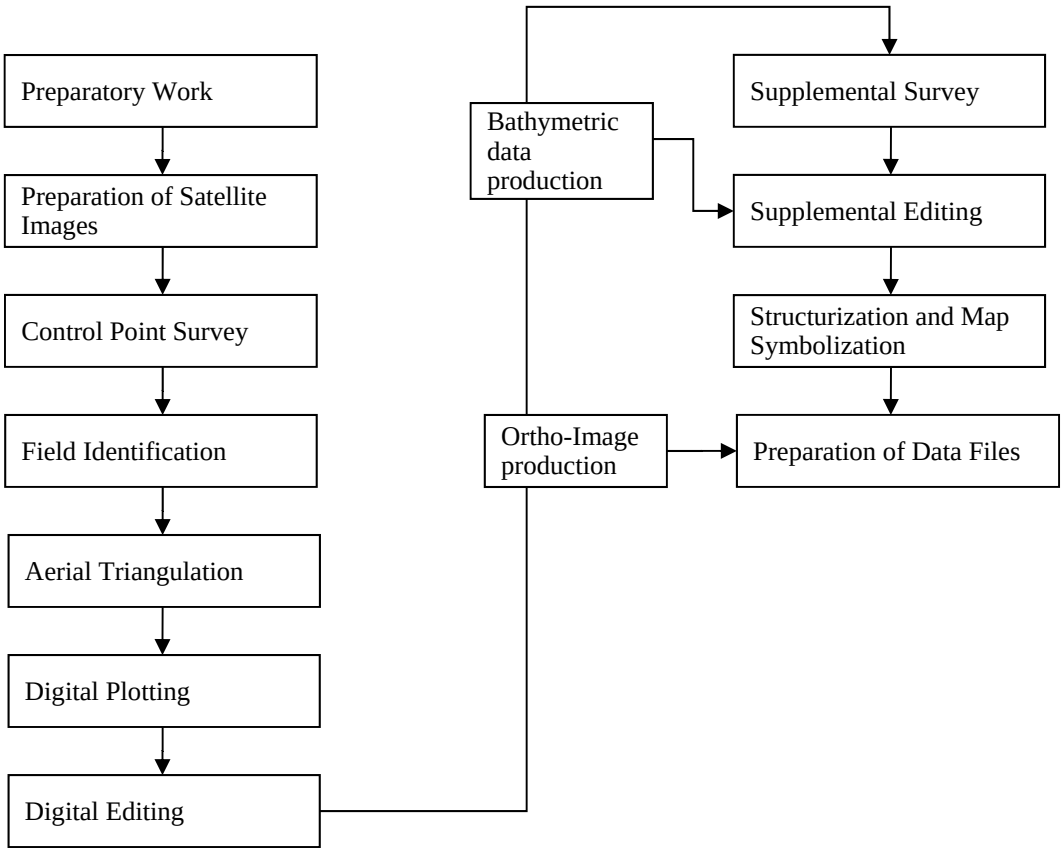


Figure 2.4 Digital Topographic Mapping Work Flow

[7] Study on Map Utilization (Work in the Philippines)

1) Study

(a) Introduction

The Project Team conducted interview survey and questionnaire survey. The interview survey was conducted informally to selected TCC members in the course of project in the absence of the data application expert in charge of capacity assessment.

The questionnaire survey was conducted also. The Project Team had explained the contents of the questionnaire survey, distributed the questionnaire survey sheets on map utilization, and requested cooperation to the study to the TCC members on the Project Launching on July 27, 2010. However, as of May 25, 2011, only nine LGUs had submitted the responses. The Project Team, NAMRIA and MinDA had a discussion over

the matter on August 26, 2011 and agreed to conduct the survey again. The questionnaire survey was implemented in the following manner.

(1) NAMRIA and MinDA reviewed the questionnaire sheets and rearrange the question sheets into two types for LGUs and government offices.
(2) MinDA prepared the two types of questionnaire sheets, and NAMRIA divided actual sheets into two by the end of August, 2011.
(3) The Project Team, NAMRIA and MinDA explained the contents, distribute the questionnaire sheets to LGUs and government offices of TCC members, and requested cooperation of submission during the TCC meeting scheduled in January 2011.
(4) The questionnaire sheets were to be collected during the TCC meetings in May, 2012.

(b) Method

(i) Interview Survey

A unstructured interview research of capacity assessment was conducted to MinDA, General Santos City, Butuan City, Cagayan De Oro City, ARMM, MILF and DPWH Region IX.

(ii) Questionnaire Survey

A set of questionnaire is designed to identify current capacity of data application (digital topographic mapping information) and the needs of thematic data preparation and its training. The target organizations have two tiers: the regional offices of the national government agencies and Local Government Units (provinces and major cities). Form 1-A-L and Form 1-B-L are targeted to LGUs; Form 1-A-R and Form 1-B-R are targeted to the regional offices. Other forms are common forms to be answered by both LGUs and the regional offices. MinDA which has a multi-sector functions at the regional level shall answer all the form except for the form number 2.

Table 2.6 Questionnaire Forms

No	Form Code	Form Name	Target	Excel Sheet Name 1/
1	Form 1-A-L	Thematic Mapping Situations in LGUs	LGU, MinDA	MapCapLGU
2	Form 1-A-R	Thematic Mapping Situations in Regional Offices	Regional Office	MapCapRegion
3	Form 1-B-L	Thematic Mapping Needs Assessment for LGUs	LGU, MinDA	MapNeedsLGU
4	Form 1-B-R	System Development Needs Assessment for Regional Offices	Regional Office, MinDA	SysDevNeedsRegion
5	Form 2-A	Current Situation - Equipment	Common	Equipment
6	Form 2-B	Current Situation - Software	Common	Software
7	Form 2-C	Current Situation – Human Resources	Common	HumanResources
8	Form 3-A	Individual Skill Assessment	Common	Skills
9	Form 3-B	Individual Training Needs Assessment	Common	TrainingNeeds
10	Form 4	SERD-CAAM Output Usage	Common	SERD-CAAM

1/ The forms were provided in Excel sheet format.

Form 1-A-L and Form 1-B-L have two pages – Form 1-A-L (1), Form 1-A-L (2), Form 1-B-L (1), and Form 1-B-L (2). Other forms have only one page – if data require additional sheets, a respondent needs to photocopy the form to list additional data.

Major targets were local governments and MinDA. Cooperation from regional offices of the national government agencies were encouraged, but data from the regional offices were less emphasized than those from the local governments and MinDA.

Form 1-A-L Thematic Mapping Situations in LGUs

In an organization, there are thematic maps for planning and management. The form is to identify what thematic maps have been or are being prepared. The mapping data are digital or analogue. Digital mapping data are either raster or vector. Raster data are generally scanned data from a paper map. Vector data are digitized using digitizer or other input devices.

Form 1-A-R Thematic Mapping Situations in Regional Offices

Types of thematic maps available in the regional offices may be limited to the sector the offices are dealing with. Current operation and management may be conducted using paper maps or blue prints.

In this form, one needs to list maps used in the organization-both digital and analogue (paper). A type of geographic information may not be completed within a region. Even if the coverage is sufficient, the information may be stored in a paper medium.

The data file format is, generally, either cad-based file or GIS-based file. The respondents answer the file format based on the file extension.

Form 1-B-L Thematic Mapping Needs Assessment for LGUs

The items are identical to the Form 1-A-L. For those unavailable, some thematic maps need to be prepared for planning and development. Some maps may have higher priority than others. The respondents assessed the needs at five different levels: very high; high; fair; low; and very low.

Form 1-B-R System Development Needs Assessment for Regional Offices

The regional offices may want to develop a geographic information system using the digital topographic maps at a scale of 1:50,000. The form is designed to identify what type of system would be developed using the digital topographic data. An information system can be either CAD based or GIS based system depending on the needs and available resources.

Form 2-A Current Situation – Equipment

To promote uses of digital maps, appropriate equipment will be required. This form is to identify current situation of equipment available in an organization. Please list office automation equipment such as PC, server, workstation, printer, plotter, and other IT equipment. Photocopies of the original are used to list equipment if one sheet is not sufficient.

Form 2-B Current Situation – Software

Not only the equipment, but software is essential to utilize the digital topographic maps. Socio-economic data from NSO need to be processed and stored using a spreadsheet or database application. To prepare a report, a word processing application is necessary. Graphic software such as Adobe products create presentation graphics. GIS software, such as ArcGIS, integrates data and graphics. The respondents list all the software used in their organizational units.

Form 2-C Current Situation – Human Resources

Human resources are the most important element in promoting use of digital topographic data. A manager of an organizational unit needs to fill out the form. The information is only used for the purpose of the project. If individual privacy becomes an issue, the manager may use pseudo names or even a code instead of real names.

Form 3-A Individual Skill Assessment

A manager of an organizational unit needs to distribute the form to potential users of digital topographic maps. The categories of IT skills are: Basic IT; Graphics; GIS; Database; Statistics; and Other IT Skills. For graphics and other IT skills categories, there are additional spaces provided in case there are other software or IT skills. The software names are identified and listed.

Form 3-B Individual Training Needs Assessment

The individual training needs assessment is to find out what categories IT skill are needed to promote uses of digital topographic maps. The categories are parallel to Form 3-A Individual Skill Assessment.

"Training system will be necessary" means that a full-fledged-long-term-training system with an appropriate budgeting will be necessary. "Ad-hoc seminar will would help" means that once in three months or six months may be needed to retain and augment the skill levels of employees. "Can manage within a section" means that there are some IT leaders available in your section, so that the IT leaders can support others. "Self-help" means that one can learn using manuals or searching web sites to find answers to possible questions and troubles. "Not necessary or not relevant" means that the skill level is sufficient to perform current duties or the individual is not assigned to use the type of software.

Form 4 SERD-CAAM Output Usage

The Study for Socio-Economic Reconstruction and Development of Conflict-Affected Areas in Mindanao has produced ATLAS MAPS and GIS Application. The situation of uses and updating socio-economic data and base maps might be called for. The questionnaire is to set to find out how the results of the study, the map atlas and GIS application have been used.

(c) Results

(i) Interview Survey

The interview survey was conducted to MinDA and TCC members in the following major cities. The Project Team had summarized the results of the interviews.

Table 2.7 Summery of the Interview Survey (Capacity and Needs Assessment)

Name of Organization	Geographic Data used in the Office	Geographic Data Required	No. of PC	Required No. of PC	GIS or CAD Software (No. of License)	Required No. of Software License (GIS/CAD)	Availability of IT Room	Necessity of IT Room	No. of IT Engineer	Required No. of IT Engineer	Necessity of Training for IT Engineers
MinDA	VTM1/	Topo. Maps for the Entire Mindanao, AM, LUM2/, Thematic Maps for Regional Development Planning	5	8	2	GIS/ CAD, 8 sets	Yes	-	5	8	Yes
General Santos City	VTM1/	Detailed Topo. Maps for the City, AM, LUM2/	2	4	0	GIS, 4sets	No	Yes	2	4	No
Butuan City	VTM1/	Detailed Topo. Maps for the City, AM, LUM2/	2	4	0	GIS, 4sets	No	Yes	2	4	No
Cagayan De Oro City	VTM1/	Detailed Topo. Maps for the City, AM, LUM2/	2	4	1	GIS, 4sets	Yes	-	2	4	No
ARMM	VTM1/	Detailed Topo. Maps for the Entire ARMM, AM, LUM2/	1	2	1	GIS, 2set	Yes	-	1	2	No
MILF	VTM1/	Topo. Maps for the Entire Mindanao, AM, LUM2/	1	2	0	GIS, 2sets	No	Yes	1	2	No
DPWH Region IX	VTM1/	Topo. Maps for the Entire Mindanao, AM, LUM2/, Thematic Maps for Regional Development Planning	3	5	2	GIS/ CAD, 5sets	Yes	-	3	5	Yes

1/ VTM: Various Thematic Maps, Maps of NAMRIA

2/ Administrative maps, land use maps

(ii) Questionnaire Survey

Responses

All the forms that were submitted to MinDA were transferred to the JICA Project Team by the end of July 7, 2012. The data were encoded and processed.

Three cities, five provinces, and ten regional offices of the national government agencies have submitted the questionnaire. The expected number of submission was from nine cities, 26 provinces, the regional offices, MinDA and BDA. The percentage of submission of the LGUs was 20%. The regional offices of DENR, DPWH, NEDA and others submitted the data and information.

Table 2.8 Rates of Submission

	No.	Submitted	Percentage
City (Independent or major)	9	2	22.2%
Province	26	5	19.2%
Local Government Total	35	7	20.0%

Table 2.9 List of Organizations Submitted (Independent or Major Cities)

No.	Region	Name	Submitted?	Independent City	1st Class
1	X	Cagayan de Oro City		Yes	Yes
2	X	Malaybalay			Yes
3	XI	Davao City	Yes		Yes
4	IX	Tagum			Yes
5	XII	General Santos City	Yes	Yes	Yes
6	XIII	Butuan		Yes	Yes
7	X	Lligan		Yes	Yes
8	IX	Zamboanga City		Yes	Yes
9	XII	Cotabato City		Yes	

Table 2.10 List of Organizations Submitted (Province)

No.	Region	Province	Submitted?
1	IX	Zamboanga Del Norte	
2	IX	Zamboanga Del Sur	
3	IX	Zamboanga Sibugay	
4	X	Bukidnon	
5	X	Camiguin	
6	X	Lanao Del Norte	
7	X	Misamis Occidental	
8	XI	Misamis Oriental	
9	XI	Davao Del Norte	
10	XI	Davao Del Sur	
11	XI	Davao Oriental	
12	XI	Compostela Valley	Yes
13	XII	North Cotabato	
14	XII	South Cotabato	
15	XII	Sultan Kudarat	Yes
16	XII	Sarangani	Yes
17	XIII	Agusan Del Norte	
18	XIII	Agusan Del Sur	
19	XIII	Surigao Del Norte	
20	XIII	Surigao Del Sur	Yes
21	XIII	Dinagat Islands	
22	ARMM	Basilan	
23	ARMM	Lanao Del Sur	
24	ARMM	Maguindanao	
25	ARMM	Sulu	
26	ARMM	Tawi-Tawi	Yes

(d) Analyses

(i) Thematic Mapping Situations in LGUs: Form 1-A-L LGU, MinDA

All the cities and provinces have most of the thematic maps probably for their mandatory planning purposes--Comprehensive Land Use Plan and Provincial Physical Framework Plan. Except for the Tawi Tawi province, all the data were in a digital format.

(ii) Thematic Mapping Situations in Regional Offices: Form 1-A-R Regional Offices

Ownership of thematic maps in the regional offices of the national government agencies were limited. Only three offices reported their possession of thematic maps: NIA Region 12, DENR Region 9, and DENR MGB Region 12. NIA has the irrigation maps; DENR has slope, land classification maps; DENR MGB has flood, landslide and mining related thematic maps. Other regional offices should have thematic maps of similar kind, but they did not report.

(iii) Thematic Mapping Needs Assessment for LGUs: Form 1-B-L LGU, MinDA

All of them expressed the needs of thematic map preparation in all the fields.

(iv) System Development Needs Assessment for Regional Offices: Form 1-B-R Regional Field Office, MinDA

Hazard mapping, land use sustainability assessment, and slope analysis were expressed by the DENR offices.

(v) Current Situation - Equipment and Software

PCs and general office software are available in most administrative units. Only a few provinces reported that they have GIS software. A CAD based system users were not identified. A couple of LGUs still use ArcView 3.2. Sarangani and General Santos have ArcGIS. Only DENR Region 9 and Davao City have the AutoCAD system.

Table 2.11 Usage of GIS and Graphics Software

City, Province, Region	Province	Software	Version
City	Davao City	ESRI ArcMap	9.2
		Autodesk AutoCAD	13
		Autodesk Map	2002
		ESRI ArcMap	8
	General Santos City	Manifold	8
		Quantum GIS (open source)	1.7
		ArcInfo	8.3
		ArcView	3.1, 3.2
Province	Compostela Valley	ArcGIS (DIPP Grant)	9.2
	Tawi Tawi	ArcView	2008
Region	DA Region 11	Arc GIS	9.2
	DPWH Region 10	Autocad 2000	2000

(vi) Current Situation – Human Resources: Form 2-C

Only two persons among 67 persons listed have positions as GIS operators. Nine persons, 13.4% of the total, were map users mainly for policy purposes. About half was reported that they prepared thematic maps. Others were engaged in general administration with less emphasis on map usage.

Table 2.12 Human Resource - Purpose of Map Usage.

	Count	Percentage
For Policy	9	13.4%
Thematic Map Preparation	30	44.8%
No map user (General Administration)	12	17.9%

Note: The count includes one multiple selection.

(vii) Individual Skill Assessment: Form 3-A

The Office software is used by most of the respondents. Experiences of graphic software are limited. Only a few reported that they have knowledge of GIS operation. The scale is one to five; five is the most knowledgeable about the listed software.

Table 2.13 Average Score of Skills

Category	Software	Average Score
Office	Word	3.6
	Excel	3.6
	Power Point	3.5
CAD	AutoCAD	2.4
	AutoCAD_Map	1.8
Graphic	Illustrator	1.8
	Freehand	2.0
GIS	ArcGIS	2.5
	MapInfo	2.2
Database	Access	2.1
	SQL_Server	2.1
	Oracle	1.6
Statistics	SPSS	1.3
	SAS	1.4

(viii) Individual Training Needs Assessment: Form 3-B

Training needs in all the areas except for the general office software are high. Especially, CAD, graphics and GIS training needs are high. The scores nearly five mean that they would like have some sort of long-term training systems. No organization units have expressed training needs for analogue technology.

Table 2.14 Training Needs Assessment - Summary

Category	Software	Average Score
Office	Word	2.9
	Excel	2.9
	Power Point	2.9
CAD	AutoCAD	4.7
	AutoCAD_Map	4.8
Graphic	Illustrator	4.7
	Freehand	4.8
GIS	ArcGIS	4.8
	MapInfo	4.8
Database	Access	4.3
	SQL_Server	4.4
	Oracle	4.6
Statistics	SPSS	4.6
	SAS	4.6

(e) Conclusion

(i) Capacity Development of Local Government Units

Most of the provincial officers interviewed do not have capacity to even view or edit digital data even though their needs of data are very high. The Project Team, therefore, decided to include the following subjects in the program of the technology transfer seminar.

(1) Digital Topographic Map Information
(2) Viewing Data using Free GIS Software
(3) Basic Operations: CAD based system and GIS based system

To facilitate usage of the digital topographic data, user guide for the digital topographic maps shall be prepared.

(ii) Basic Understanding in Thematic Maps

The provinces and cities are mandated to prepare spatial plans. They must be aware types of thematic maps to be prepared for their community. The responses, however, did not clearly indicate or prioritize what thematic maps to be prepared. Even though they may know what thematic maps to be available and prepared, possible uses of the new digital topographic maps may not be known. Along with the basic operation, preparation of basic thematic maps using the new digital topographic maps shall be shown to the TCC members. For more advanced LGUs, how their thematic maps can be updated using the new topographic maps shall be shown.

(iii) Continuous Thematic Map Monitoring and Management

The questionnaire was intended to capture types and contents of thematic maps prepared and managed in the regional offices and local governments. The questionnaire survey failed to capture overall picture of thematic map production and management in Mindanao. Continuous monitoring will be necessary for MinDA to monitor planning and development activities by the national government agencies and local governments to resolve possible interregional and intergovernmental conflicts in planning and development management.

(iv) Coordination Capacity Development of MinDA

MinDA as coordinating entity for the regional offices of national government agencies does not function as much as it should for it does not have an authority over the regional offices to officially request data--including the capacity assessment survey. If MinDA was to function as coordinating body in planning and development, some institutional arrangement will be necessary to collect thematic maps from all the regional offices in Mindanao.

(v) Institutionalization of Capacity Development

Many marked "5 Systematic Training Necessary" for CAD, GIS and graphic software. Overall spatial data management system will be needed to make the institutionalization of training for supporting planning and management activities in the context of local government administration.

2) Recommendations

(a) Basic Understandings

(i) Basic maps and thematic maps

A map is used to identify locations and attributes of planimetric features. Generally speaking, a map is used to find where things are and what they are. The level of details is limited to the specifications of 1:50,000 topographic maps. The topographic maps are the basic maps that are the fundamental source of spatial information in the project areas. The base maps are designed for general uses; they are not designed to be used in one particular use; the use is not limited to specific sector. Maps that have specific purpose or expression are called thematic maps.

Table 2.15 Basic vs. Thematic Maps

General Category of Maps	Purpose of use	User	Contents (level of details)
Topographic maps (Basic maps)	General	Not identified	1:50,000 topographic map specifications
Thematic maps	Specific	Identified	Designed for specific uses

Depending on the needs of users with the limitation of the legends and level details, a user may use the 1:50,000 topographic maps. An individual may use them for hiking or travel planning; school teachers may use them in their classroom situation.

(ii) Scale

The scale, 1:50,000 is not the scale suited for detailed planning and facility management in urbanized areas. If one needs to identify a building or house, he or she needs to have a larger scale map. The maps do not include barangay roads; therefore, if barangay roads become an issue in city or municipal planning, the data needs to be acquired by respective agencies or respective jurisdiction. As shown in the example, buildings and cluster of buildings are symbolically represented. Generally, a city or municipality requires more detailed data for zoning.

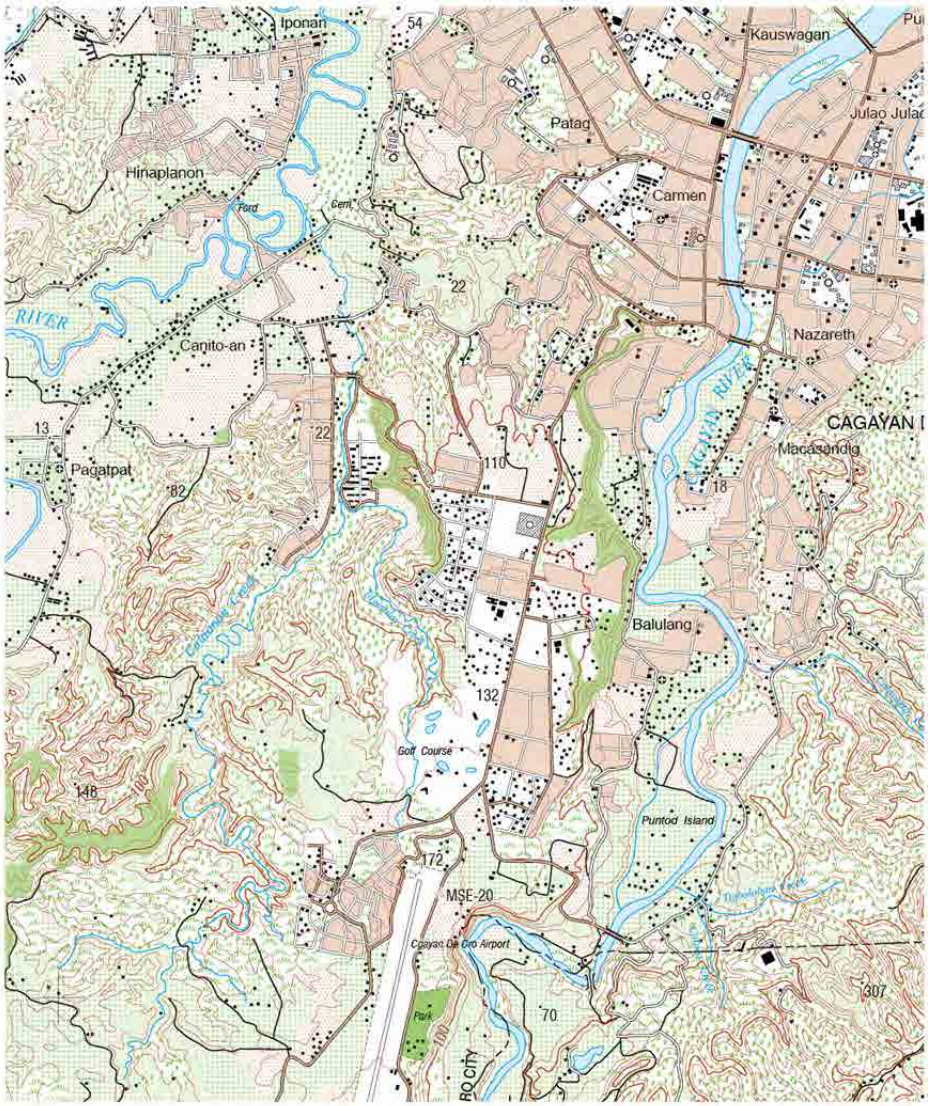


Figure 2.5 1:50,000 Topographic Map (A Part of Cagayan De Oro)

The following figure shows the legend. As it is shown, the roads are not classified by administration; they are classified by surface type. If one needs to produce a road network map with roads classified by administration, one needs to produce a road network map using the topographic map.

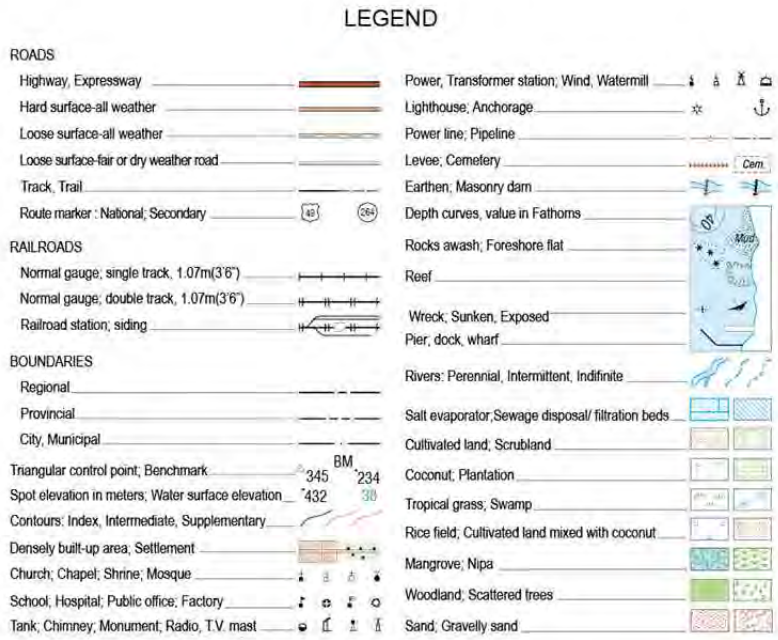


Figure 2.6 Legend

(iii) GIS

GIS is a system that has both maps and database. Both map part and database part can be updated depending on one's needs. The left side of the figure shows the table associated with the points, lines or polygons. If one needs to prepare a road inventory with associated maps. The road inventory data need to be encoded, linked or imported.

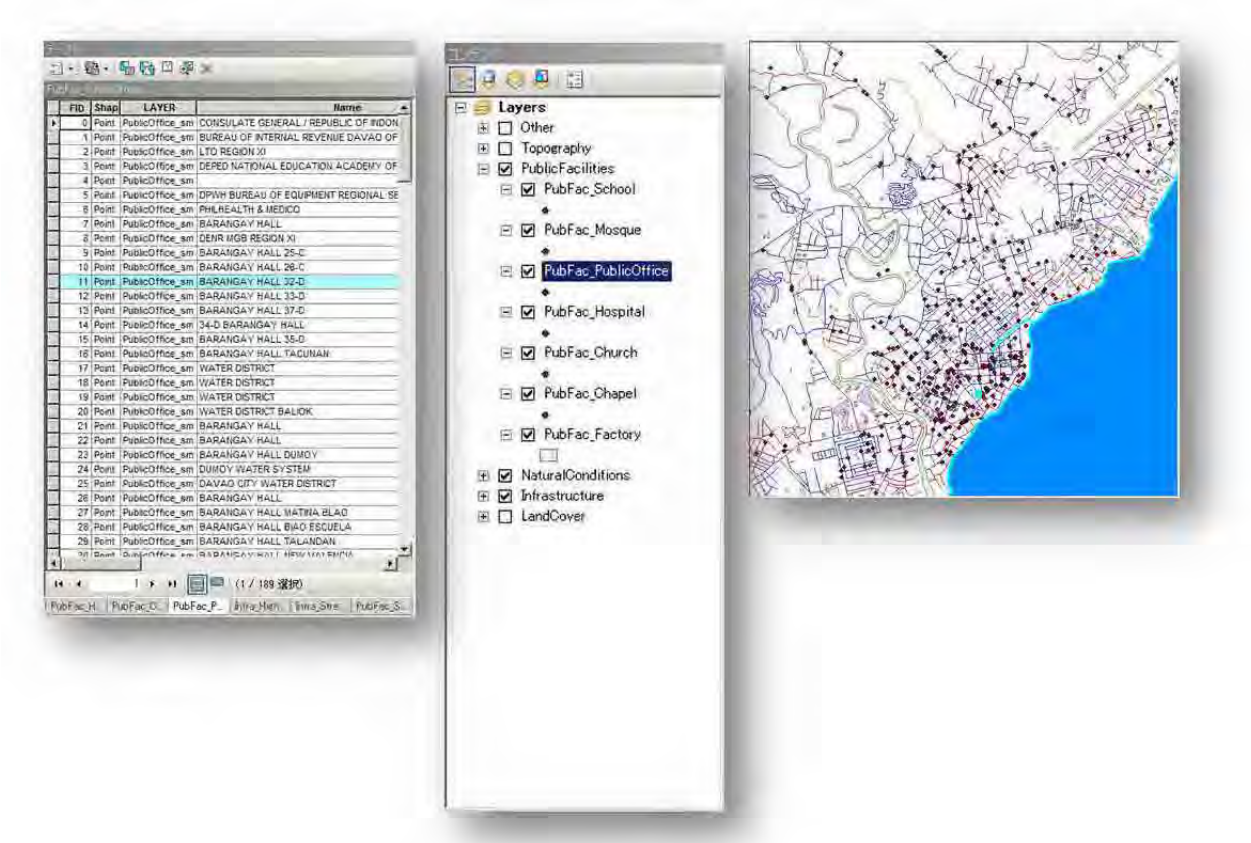


Figure 2.7 Table, Layer and Map

(iv) GIS Analysis

Using the data one can conduct various analyses to support spatial policy formulation. The types are classified into two: primary analysis and secondary analysis.

Primary Analysis

The primary analysis is to produce thematic maps directly from the existing layers of the GIS data. The major layers are: Topography; Land cover; Public Facilities; Infrastructure; and Natural Conditions. Multiple layers (generally with administrative boundaries) with any combination can be expressed without additional data.

Secondary Analysis

The secondary analyses require additional data. The data could be spatial, numerical or text. If the GIS data are to be used in the public sector, population and economic census data are the very first data to be incorporated to the system.

(b) Basic Directions on Map Utilization in Mindanao

(i) Peace and Development and Topographic Maps

The topographic maps are to be used for peace and development. Peace and development are not a parallel concept; the general logic is that with equitable economic development in the conflict areas, peace will be achieved. The uses of topographic maps, therefore, are targeted to the conflict areas or area with less development.

Before getting into uses, one needs to understand a general development process. A simplified rational model of development follows: study, planning, implementation, and monitoring/evaluation.

- Study (Situational Analysis)

Before planning, current conditions need to be identified. The topographic maps contribute in this process of development cycle. The land cover and infrastructure data are the most important elements in this process. During the study phase, socio-economic activities with population characteristics become significant. Specific thematic maps are prepared to study social and economic infrastructure with level of economic activities and population distribution.

- Planning and Consensus Building

Any plan with public nature needs to be consulted with the public or stakeholders, and GIS is a tool to facilitate democratic consensus building processes. There is an administrative procedure in the Philippines in plan making and there are on-going plans and programs; therefore, any new plan needs to incorporate existing plans and programs. GIS is a good tool to understand on-going plans and programs, and to resolve possible conflicts in planning. Graphics or thematic maps produced using the GIS data shall be the tool for consensus building.

- Implementation

During the process of implementation, topographic maps may be referred to identify locations of near-by facilities. Generally larger-scale maps are used to prepared site plans and detailed plans.

- Monitoring/Evaluation

Locations of projects and programs can be plotted onto the topographic maps. Those projects and programs that do not require polygon or line data can be monitored using the GIS base data.

(ii) Institutional Setting

Any plan, without an institutional arrangement, will not be followed or updated by a government; therefore it is important that all the planning procedures are followed. Among many administrative procedures, following two are significant in planning and development.

Table 2.16 EO No. 72 and RA No. 7170

EO No. 72 (1993)	E.O. No. 72 provides for the preparation and implementation of the CLUPs of LGUs. The plan formulation/updating is described below. The City or Municipal Development Council (CDC/MDC) in consonance with the approved provincial CLUPs, shall initiate the formulation or updating of their CLUPs, in consultation with the concerned sectors in the community. The CLUPs prepared by CDC/MDC shall be submitted to Sanggunian concerned for enactment into Zoning Ordinance in accordance with Articles 107 and 108 of the Implementing Rules and Regulations of the LGC. The Provincial Development Council (PDC) shall initiate the formulation or updating of its land use plan, in consultation with the concerned sectors in its component unit. The CLUP prepared by the PDC shall be submitted to the Sangguniang Panlalawigan for enactment into an ordinance.
RA No. 7160 - LOCAL GOVERNMENT CODE (1992)	Sec. 20 of the Local Government Code empowers cities and municipalities to reclassify agricultural lands to non-agricultural uses. The LGUs shall determine whether a piece of agricultural land has greater economic value for residential, commercial or industrial uses than for agricultural uses. Reclassification of agricultural lands by LGU shall be through an ordinance passed by the Sanggunian after public hearing subject to percentage limitations. Likewise, use of land resource of LGUs shall be in conformity with zoning standards and guidelines prescribed by the Housing and Land Use Regulatory Board. Sec. 114 provides for the integration of LGUs plans into regional plans. The policies, programs and projects proposed by local development councils shall be submitted to the Sanggunian concerned for approval. Approved local development plans shall be integrated with the development plans of the provinces, highly urbanized cities and independent component cities. Likewise, approved LGUs plans shall be submitted to the Regional Development Council for integration into the Regional Development Plans.

Source: Comprehensive Flood Mitigation for Cavite Lowland Area (internal document)

The multi-sector master planning is through framework planning or comprehensive planning at local levels set development directions of communities. Without a cross acceptance process of consensus building among different levels of public administration, smooth implementation of a project or program may not be realized.

(iii) Supporting Spatial Planning and Development in Mindanao

As the interview and questionnaire surveys revealed, capacity of provinces in map utilization is quite low. The first thing to be done is to raise capacities of individuals and organizations in map usage and GIS. This does not mean that all LGUs shall be equipped with GIS, since cost effectiveness depends on capacity and needs of an LGU. It still needs assessment, but from general observation that receptive capacity at the municipal level is expected to be low. At the regional and provincial levels, GIS shall be promoted.

Table 2.17 Receptive Capacity and Targets

	Regional Line Agencies	Provinces	Cities and Municipalities
Planning Tool	GIS	GIS/CAD	Tracing Paper Outputs or Printed Topographic Maps
Plans	Regional Physical Framework Plan and other sector plans	Regional Physical and Development Framework Plan	Comprehensive Land Use Plan
Software/Hardware	GIS and PC	GIS or CAD/PC	-
Note	A Regional Physical Framework Plan is prepared by NEDA. Other line agencies are to prepare their sector plans in accordance with the Regional Physical Framework Plan.	A plotter to support output needs of cities and municipalities may be required.	For those without larger scale maps. Independent cities or Class 1 cities may require a GIS.
	An existing plan shall be updated with the new data.		

NEDA Region IV has prepared a Regional Physical Framework Plan. The following table shows thematic maps and their legends. The thematic maps will have to be update with the new data. Thematic mapping of NEDA Region IV in the framework plan shall have a potential to become a model for other regions and even for provinces.

Table 2.18 Thematic Maps included in Regional Physical Framework Plan 2003-2030 (Davao Region) and Legend

Name	Legend
Location Map	Chartered City
	Component City
Administration Boundary Map	City Proper
	Town Proper
	Provincial/City Boundary
	Municipality
	Compostella Valley
	Davao City
	Davao del Norte
	Davao del Sur
	Davao Oriental
	Municipalities of other Regions
Elevation Map	City Proper
	Town Proper
	Provincial/City Boundary
	Municipality
	0 -200 m
	200 -500 m
	500 - 1,000 m
	1,000 - 1,500 m
	1,500 - 2,000 m
	Municipalities of other regions
Geologic Map	City Proper
	Town Proper
	Provincial/City Boundary
	Municipality
	R, Recent, Alluvium
	N3 + Q1, Pilio Pleistocene, Sand and Gravel
	N3 + Q1LS, Pilio Pleistocene, Coral Limestone
	N2, Tertiary, Sandstone
	N1, Tertiary, Andesitic Conglomerate
	N1LS, Tertiary, Limestone
	Pg1, Tertiary, Marine Conglomerate
	Kpg, Mesozoic Tertiary, Graywake and Metamorphosed shale
	K, Mesozoic Tertiary, Metamorphosed Graywake, quartzite, shale,etc.
	UC, Mesozoic Tertiary, Mafic Rocks
	QV, Quarternary, Andesite, Dacite, etc.
	QVP, Quarternary, Pyroclastics, tuffs
	UV, Cretaeous-Paleogene, Basalt, Andesite lava flow
	Municipalities of other Regions
Slope Map	City Proper
	Town Proper
	Provincial/City Boundary
	Municipality
	0 - 3%
	3 - 8%
	8 - 18%

Name	Legend
	18 - 30%
	30 - 50%
	> 50%
	Municipalities of other Regions
Soil Taxonomy Map	City Proper
	Town Proper
	Provincial/City Boundary
	Municipality
	Aeric Tropaquepts
	Aquic Eutropepts
	Aquic Hapludalfs
	Escarpments
	Eutropepts - Hapludalfs Association
	Eutropepts - Troporthents Association
	Fluventic Eutropepts
	Hapludults - Rhodudults - Dystropepts Association
	Hapludults - Dystropepts - Eutropepts Association
	Lithic Troporthens
	Rendolls - Euthropepts Association
	Riverwash
	Troporthens- Euthropepts- Hapludalfs Association
	Typic Euthropepts
	Typic Hapludalfs
	Typic Hyraquents
	Typic Paledults
	Typic Psommaquents
	Typic Tropofibrists
	Typic Tropopsamments
	Unknown
	Municipalities of other Regions
Surface Water Utilization Ratio Map	City Proper
	Town Proper
	Provincial/City Boundary
	Municipality
	0 -10%
	10 - 30%
	30 - 50%
	50 - 70%
	> 70%
	No available data
	Municipalities of other Regions
Ground Water Utilization Ratio Map	City Proper
	Town Proper
	Provincial/City Boundary
	Municipality
	0 - 10%
	10 - 50%
	50 - 100%
	100 - 500%
	> 500%
	Municipalities of other Regions
Major River Basin Map	City Proper
	Town Proper
	Provincial/City Boundary
	Municipality
	Agusan River Basin
	Baganga River Basin

Name	Legend
	Balutakay River Basin
	Carga River Basin
	Casauman River Basin
	Cateel River Basin
	Culaman River Basin
	Davao River Basin
	Digos River Basin
	Hagonoy River Basin
	Hijo River Basin
	Lasang River Basin
	Lipadas River Basin
	Malita River Basin
	Manurigao River Basin
	Mayo River Basin
	Quinonoan River Basin
	Sibulan River Basin
	Sumlog River Basin
	Tagum River Basin
	Talomo River Basin
	Tuganay River Basin
	Cities/ Municipalities of Davao Region
	Municipalities of other Regions
Land Classification Map	City Proper
	Town Proper
	Provincial/City Boundary
	Municipality
	CADC
	Alienable and Disposable Land
	Forestland
	No Available Data
	Municipalities of other Regions
Existing Land Use Map	City Proper
	Town Proper
	Mining Areas
	Industrial Development Areas
	Trunk Road Network
	Provincial/City Boundary
	Municipal Boundary
	Settlement/ Built-up
	NIPAS
	Coconut
	Cropland
	Forest
	Miscellaneous
	Mixed Grassland
	Paddy Rice
	Shrub Land
	No available data
	Municipalities of other Regions
Ecozone Map	City Proper
	Town Proper
	Industrial Development Areas
	Provincial/City Boundary
	Municipal Boundary
Tourist Destination Map	City Proper
	Town Proper
	Provincial/City Boundary

Name	Legend
	Municipal Boundary
	Compostella Valley
	Davao City
	Davao del Norte
	Davao del Sur
	Davao Oriental
	Municipalities of other Regions
Commodity Trade Routes Map	City Proper
	Town Proper
	Aerial Road Network
	Secodary Road Network
	Provincial/City Boundary
	Municipal Boundary
	Compostella Valley
	Davao City
	Davao del Norte
	Davao del Sur
	Davao Oriental
	Municipalities of other Regions
Primary Growth Forest Area Map	City Proper
	Town Proper
	Provincial/City Boundary
	Municipal Boundary
	2nd growth above 50% slope and below 1000 MSL
	2nd growth above 1000 MSL
	City/Municipalities of Davao Region
	Municipalities of other Regions
Network of Protected Areas for Agriculture and Agro-Industrial Development (NPAAAD) Map	City Proper
	Town Proper
	Provincial/City Boundary
	Municipal Boundary
	Irrigated Areas
	Irrigated land already covered by irrigation projects with firm funding commitment
	Alluvial plains highly suitable for agriculture, whether irrigated or not
	Agro industrial croplands or land presently planted to industrial crops that support the viability of existing agricultural infrastructure and agro based enterprises
	Highlands or areas located at an elevation of five hundred (500) meters or above and have the potential for growing semi-temperature and high-value crops
	Agricultural lands that are ecologically fragile, the conversion of which will result in serious environmental degradation, and mangrove areas and fish sanctuaries
	Fishery areas as defined in Fisheries Code of 1998
Strategic Agriculture and Fishery Development Zone (SAFDZ) Map	City Proper
	Town Proper
	Provincial/City Boundary
	Municipal Boundary
	Strategic Crop Sub-Development Zone
	Strategic Livestock Sub-Development Zone
	Strategic Fishery Sub-Developemt Zone
	Integrated Strategic Crop/Livestock Sub-Development Zone
	Integrated Strategic Crop/Fisheries Sub-Development Zone
	Remaining NPAAD (Future Expansion fpr SAFDZ)
	Agro- Forestry
	Forest Watershed Areas
	Built-up areas
	No Available Data
	Municipalities of other Regions
Agrarian Reform	City Proper

Name	Legend
Communities Map	Town Proper
	Agrarian reform communities
	Provincial/City Boundary
	Municipal Boundary
	Compostella Valley
	Davao City
	Davao del Norte
	Davao del Sur
	Davao Oriental
	Municipalities of other Regions
Environmentally Critical Areas Map	City Proper
	Town Proper
	Earthquake Epicenter and Intensity
	I to IV = Hardly Perceptible to Peeble Stock
	V to VI = Moderate to fairly Strong Shock
	Provincial/City Boundary
	Municipal Boundary
	Trunk Road Network
	Observed Faults
	Salt Water Intrusion Area
	Flood Prone Areas
	Cities/ Municipalities of Davao Region
	Municipalities of other Regions
Flood Prone Areas Map	City Proper
	Town Proper
	Provincial/City Boundary
	Municipal Boundary
	Flood Prone Areas
	Cities/ Municipalities of Davao Region
	Municipalities of other Regions
Erosion Map	City Proper
	Town Proper
	Provincial/City Boundary
	Municipal Boundary
	No Apparent Erosion
	Slight Erosion
	Moderate Erosion
	Severe Erosion
	Unclassified Erosion
	Municipalities of other Regions
Saltwater Intruded Areas Map	City Proper
	Town Proper
	Provincial/City Boundary
	Municipal Boundary
	Salt Water Intruded Area
	Cities/ Municipalities of Davao Region
	Municipalities of other Regions
Active Fault Lines Areas Map	City Proper
	Town Proper
	Provincial/City Boundary
	Municipal Boundary
	Anticlinal Axis with Plunge
	Inferred Faults
	Observed Faults
	Strike Slip Fault with Sense of Displacement
	Synclinal Axis
	Thrust /Reverse Faults

Name	Legend
	Cities/ Municipalities of Davao Region
	Municipalities of other Regions
Agricultural Sustainability Map	City Proper
	Town Proper
	Provincial/City Boundary
	Municipal Boundary
	Sustainability for Upland Crops
	Sustainable
	Overused
	Sustainability for Orchard
	Sustainable
	Overused
	Underused (Grassland)
	Cities/ Municipalities of Davao Region
	Municipalities of other Regions
Land Use Opportunities Map	City Proper
	Town Proper
	Provincial/City Boundary
	Municipal Boundary
	Agricultural Areas
	Expansion Areas
	Rehabilitation Areas
	Preservation Areas
	Wetland Areas
	Miscellaneous
	No Available Data
	Municipalities of other Regions
Existing Port Facilities Map	City Proper
	Town Proper
	Provincial/City Boundary
	Municipal Boundary
	Port Facilities
	Military Port
	Municipal Port
	PPA Port
	Private Port
	PFDA - Manged Fish Port
	Compostella Valley
	Davao City
	Davao del Norte
	Davao el Sur
	Davao Oriental
	Municipalities of other Regions
Location of Telegraph Facilities and Government Public Calling Offices Map	City Proper
	Town Proper
	8 Telegraph Facilities in Davao del Sur
	3 Telegraph Facilites in Davao Ctiy
	Telegraph Facilites in Davao del Norte
	7 Telegraph Facilities in Compostella Valley
	11 Telegraph Facilites in Davao Oriental
	11 Government PCOs in Davao Oriental
	Provincial/City Boundary
	Municipal Boundary
	Compostella Valley
	Davao City
	Davao del Norte
	Davao del Sur

Name	Legend
	Davao Oriental
	Municipalities of other Regions
Location of Post Offices Map	City Proper
	Town Proper
	14 Post Offices within Davao del Sur
	14 Post Offices within Davao City
	10 Post Offices within Davao del Norte
	11 Post Offices within Compostella Valley
	11 Post Offices within Davao Oriental
	Provincial/City Boundary
	Municipal Boundary
	Compostella Valley
	Davao City
	Davao del Norte
	Davao del Sur
	Davao Oriental
	Municipalities of other Regions
Power/Energy Facilities Map	Existing S/S
	Cooperative S/S
	Hydro Plant
	Power Barge
	Boundary Point
	Transmission Lines
	DLPC -owed Line
	Existing 138 kV Line single Ckt
	Existing 69 kV Line
	City Proper
	Town Proper
	Provincial/City Boundary
	Compostella Valley
	Davao City
	Davao del Norte
	Davao del Sur
	Davao Oriental
	Municipalities of other Regions
2000 Population Density Map	City Proper
	Town Proper
	Provincial/City Boundary
	Municipal Boundary
	Level of Density (number of persons/square kilometer)
	1 - 100
	101 - 200
	201 - 300
	301 - 400
	401 - 500
	501 - 599
	600 - 699
	700 - 799
	800 - 899
	900 - 999
	Municipalities of other Regions
2000 Level of Urbanization Map	City Proper
	Town Proper
	Provincial/City Boundary
	Municipal Boundary
	Urbanization Rate (in percent)
	0 - 10

Name	Legend
	10 - 20
	20 - 30
	30 - 40
	40 - 50
	50 - 60
	60 -70
	Municipalities of other Regions
Existing Settlement Pattern Map	City Proper
	Town Proper
	Provincial/City Boundary
	Municipal Boundary
	Regional Center
	Provincial Urban Center
	Major Urban Growth Center
	Rural Service Center
	Municipalities of other Regions
Proposed Land Use Map	City Proper
	Town Proper
	Mining Areas
	Industrial Development Areas
	Provincial/City Boundary
	Municipal Boundary
	Settlement/ Built-up
	Crop Land
	Expansion (Agro-Forest)
	Rehabilitation (Forest Plantation)
	Fishpond
	Pasture
	Non - NIPAS (>1000 Elevation; >50% Slope)
	NIPAS
	No Available Data
	Municipalities of other Regions
Regional Spatial Strategy Map (Long-Term Planning Strategy)	City Proper
	Town Proper
	Linear Urban Corridor
	Market/Trading Centers
	Provincial/City Boundary
	Municipal Boundary
	Interaction/Linkages
	Compostella Valley
	Davao City
	Davao del Norte
	Davao del Sur
	Davao Oriental
	Municipalities of other Regions
Regional Spatial Strategy Map (Medium to Long-Term Planning Strategy)	City Proper
	Town Proper
	Linear Urban Corridor
	Agri-industrial Centers
	Sub-Provincial Growth Centers
	Interaction/Linkages
	Compostella Valley
	Davao City
	Davao del Norte
	Davao del Sur
	Davao Oriental
	Municipalities of other Regions

Name	Legend
Industry Clustering Map	City Proper
	Town Proper
	Provincial/City Boundary
	Municipal Boundary
	Compostella Valley
	Davao City
	Davao del Norte
	Davao del Sur
	Davao Oriental
	Municipalities of other Regions
Overall Regional Spatial Strategy Map (Linear Urban Growth Corridor and Nodal Growth Center and Economic Zone (2003-2030))	City Proper
	Town Proper
	Linear Urban Corridor, PHASE 1 - Industrial Growth Corridor and Development of Market/Trading Centers
	Agri-industrial Centers, PHASE II - Development of Agri-industrial Centers and Sub-Provincial Market/Trade Centers
	Sub-Provincial Growth Centers, PHASE III - Clustering of Production Areas into Economic Zones
	Clustering of Production Areas into Economic Zones
	Provincial/City Boundary
	City/Municipality of Davao Region
	Municipalities of other Regions
Settlements Plan Map	City Proper
	Town Proper
	Linear Urban Corridor
	Agri-industrial Centers
	Sub-Provincial Growth Centers
	Provincial/City Boundary
	Compostella Valley
	Davao City
	Davao del Norte
	Davao del Sur
	Davao Oriental
	Municipalities of other Regions
	Core Center
	Seat of Government
	Nodal growth centers
	Tourist Destination
	Commercial and Trading Center
	Industrial Estate
	Agro-Industry
	Integrated Davao Development Area
Transportation Map	City Proper
	Town Proper
	Linear Urban Corridor, PHASE I
	Agri-industrial Centers, PHASE II
	Sub-Provincial Growth Centers, PHASE III
	Provincial/City Boundary
	Municipal/District Boundary
	Compostella Valley
	Davao City
	Davao del Norte
	Davao del Sur
	Davao Oriental
	Municipalities of other Regions
	Modernization of Port of Davao City
	Port of Sarangani
	Ferry/Roll-On Roll-Off Facilities
Power/Energy Map	City Proper

Name	Legend
(Major Programs and Projects)	Town Proper
	Linear Urban Corridor
	Agri-industrial Centers
	Sub-Provincial Growth Centers
	Provincial/City Boundary
	Municipal Bounday
	Municipalities of other Regions
	PHASE I Bunawan Switching Station
	PHASE I Maco Substation
	PHASE I Malita Substation
	PHASE I Tarragona 138 KV Substation
	69 KV Transmission Line
	138 KV Transmission Line
	230 KV Transmission Line
	69 KV Transmission Line
	Sub marine Cable
	PHASE III Energization of all households
Water Supply Map (Major Programs and Projects)	City Proper
	Town Proper
	Linear Urban Corridor
	Agri-industrial Centers
	Sub Provincial Centers
	Provincial/City Boundary
	Municipal Boundary
	Compostella Valley
	Davao City
	Davao del Norte
	Davao del Sur
	Davao Oriental
	Municipalities of other Regions
	Expansion of Davao City Water District (Phase I)
	Davao del Norte Integrated Water Resource Development Project ((Phase I)
	Expansion of other Existing Water District (Phase I)
	Establishment of other Water Districts in Sub-provincial Growth Areas (Phase II)
	Establishment of Water Districts/ Level III Water Systems in Production Areas (Phase III)
Irrigation Systems Map (Major Programs and Projects)	City Proper
	Town Proper
	Linear Urban Corridor
	Agri-industrial Centers
	Sub Provincial Growth Centers
	Irrigation Systems (Phase I and II)
	Provincial/City Boundary
	Municipal Boundary
	Compotella Valley
	Davao City
	Davao del Norte
	Davao del Sur
	Davao Oriental
	Municipalities of other Regions
Flood Control and Drainage Facilities Map (Major Programs and Projects)	City Proper
	Town Proper
	Linear Urban Corridor
	Agri-industrial Centers
	Sub Provincial Growth Centers
	Phase I
	Phase II
	Provincial/City Boundary

Name	Legend
	Municipal Boundary
	Compostella Valley
	Davao City
	Davao del Norte
	Davao del Sur
	Davao Oriental
	Municipalities of other Regions
Health Facilities Map (Major Programs and Projects)	City Proper
	Town Proper
	Linear Urban Corridor
	Agri-industrial Centers
	Sub-Provincial Growth Centers
	Provincial/City Boundary
	Municipal/District Boundary
	Compostella Valley
	Davao City
	Davao del Norte
	Davao del Sur
	Davao Oriental
	Municipalities of other Regions
	Davao Medical Center (Phase I)
	Davao Regional Hospital (Phase I)
	Provincial Hospital (Phase I)
	District hospital (Phase I)
	Municipal/Community Hospital (Phase III)
Market Support Infrastructure Facilities Map (Major Programs and Projects)	City Proper
	Town Proper
	Linear Urban Corridor
	Agri-industrial Centers
	Sub-Provincial Growth Centers
	Provincial/City Boundary
	Municipal/District Boundary
	Compostella Valley
	Davao City
	Davao del Norte
	Davao del Sur
	Davao Oriental
	Municipalities of other Regions
	PHASE I - Establishment of Modern Transport Terminal, Public Market, Slaughterhouses, Storage 7 other facilities at the Provincial Market/Trading Centers
	PHASE II - Establishment of Modern Transpirt Terminal, Public Market, Slaughterhouses, Storage & other facilities at the Sub-provincial Market/Trading Centers
Community Facilities Map (Major Programs and Projects)	City Proper
	Town Proper
	Linear Urban Corridor
	Agri-industrial Centers
	Sub-Provincial Growth Centers
	Provincial/City Boundary
	Municipal/District Boundary
	Compostella Valley
	Davao City
	Davao del Norte
	Davao Oriental
	Municipalities of other Regions
	Expansion/establishment of telephone systems and modernization of telecommunication facilities (Phase I)
	Modernization of telecommunication facilities (Phase II)
	Development/establishment of telephone systems (Phase III)

At the city or municipal level, various thematic maps are required. The framework of Comprehensive Land Use Plan has been prepared by HLURB, but implementation of planning has not been realistically conducted, since current information has not been available until the Project was completed. All the cities and municipalities in Mindanao will have to organize their thematic maps required in the HLURB standards.

Table 2.19 Base Map and Thematic Maps to be Prepared in Cities and Municipalities

MAPS		LEGEND		
		Layers	Classes	Description
General Maps				
1	Base Map	Administrative Boundaries	Provincial Boundaries	
			Municipal Boundaries	
		Special Study Area Boundary		
		Major Roads		
		Bodies of Water	Streams	
			Rivers and Lakes	
2	Vicinity Map	Provincial/Regional Boundary		
		Special Study Area Boundary		
Thematic Maps				
3	Topographic Map	Contours		
		Road Surface		
		Vegetation		
		Structures		
4	Climate Map	Climate Types	First Type	Wet & Dry Seasons
			Second Type	No Dry Season
			Third Type	No Pronounced Season; Relatively wet May-October, dry for the rest of the year.
			Fourth Type	Rainfall evenly distributed throughout the year.
5	Hydrogeological Map	Water Level Contour		
		Piezometric Level		
		Permeability		
		Bedrock Quality Type	Fault/Shear Zones, Alluvium	
			Nearly Limestone and poorly consolidated sediments	
			pyroclastic, shale and sandstone	
			sediments, crystalline rocks, basic lava flows	
6	Slope Map	Slope	0-3%	Board to level to nearly level land
			3-5%	Gently sloping areas with land sloping areas in one general direction
			5-8%	Gently undulating and rolling land sloping in more than one direction
			8-15%	Moderately undulating and gently rolling land sloping in more than one direction
			15-18%	Steeply undulating and rolling land sloping in many directions
			18% and up	Very steeply sloping and rolling land in many directions
7	Soil Map	Soil Series		
		Soil Type		
		Soil Phase		
		Soil Complex		
		Undifferentiated Soils		
8	Land Classification Map	Land Class	Forest Reserve	
			Parks and Wildlife Sanctuaries	
			Commercial Forest	
			Mossy Forest	
			Logged Over Areas	
			Alienable and Disposable Land	
			Swamp Lands/Water Bodies	
9	Infrastructure Map	Transportation	Roads	
			Bridges	

MAPS		LEGEND		
		Layers	Classes	Description
			Airports	
			Railways	
			Ports	
			Harbor	
		Utilities/Facilities	Power Supply	
			Water Works	
			Telecommunications	
			Drainage/Sewerage	
			Schools/Public Libraries	
			Hospitals/Clinics/Centers	
			Fire/Police Stations/Facilities	
		Irrigation	National Irrigation System	
			Communal Irrigation System	
			Private Irrigation System	
		Special Projects / Planned Facilities		Planned Facilities
10	Cadastral Map	Land Boundaries		
11	Land Values Map	Potential Land Use	Natural Resources	Land Values Based on Land Use
			Agricultural	
			Residential	
			Commercial	
			Industrial	
12	Land Use Map	General Land Use	Forest	
			Agricultural	
			Open Grass Land	
			Built-up	
			Industrial	
			Parks/Open Spaces	
			Rivers and Swamps	
		General Land Use Plan		Planned Land Use Distribution for entire Municipality
		Urban Land Use	Residential	
			Commercial	
			Industrial	
			Parks/Open Spaces	
			Agricultural	
			Institutional	
			Rivers/Swamps	
			Special Projects/Uses	
		Urban Land Use Plan		Planned Land Use Distribution for urban areas
		Land Use Zones		
13	Population Density Map	Population Density		
14	Erosion Potential	Erosion Potential Category	Not Susceptible to Erosion	
			Slightly Susceptible	
			Moderately Susceptible	
			Highly Susceptible	
			Very Highly Susceptible	
15	Flooding Hazard Map	Flooding Hazard Category	No flooding Hazard	(1)well drained, any slope (2)moderately drained, 5% up slope (3)poorly drained 8% up slope
			Slight Flooding Hazard	(1)very poorly drained, 15% up slope (2)moderately drained, 3-5% slope (3)poorly drained 5-8% slope
			Moderate Flooding Hazard	(1)very poorly drained, 8-15% slope (2)moderately drained, 0-3% slope (3)poorly drained, 3-5% slope (4)very poorly drained, 5-8% slope
			Severe Flooding Hazard	(1)poorly drained, 0-3% slope (2)very poorly drained, 3-5% slope
			Very Severe Flooding Hazard	well drained, 0-3% slope
16	Land Capability Classification Map	Land Capability Class	Class A	Very good land; can be cultivated safely, requiring only simple but good farm management practices.
			Class B	Good land; can be cultivated safely, requiring easily applicable conservation practices.
			Class C	Moderately good land; must be cultivated with caution; requires careful management and complex cultivation practices.
			Class D	Fairly good land; must be cultivated with extra caution; require careful management and complex conservation practices for safe cultivation; more suitable for pasture or forest.

MAPS		LEGEND		
		Layers	Classes	Description
			Class L	Level to nearly level; too stony or very wet for cultivation; limited to pasture or forest with careful soil management.
			Class M	Steep land; very severely eroded; shallow; not for cultivation; limited to pasture or forest with careful management
			Class X	Level land; wet most of the time and cannot be economically drained; suited for fishpond or recreation
			Class Y	Very hilly and mountainous, barren and rugged; should be reserved for recreation and wildlife for reforestation.
17	Soil Suitability Map	Soil Suitability Class	Class I (Good)	Areas which have properties favorable for the rated use with none to slight limitations which can be easily overcome.
			Class II (Fair)	Areas with moderate limitations due to soil erosion, moderate drainage problems caused by run-off and slow permeability.
			Class III (Poor)	Areas with soil having one or more properties unfavorable for the rated use. The limitations are difficult and costly to modify/overcome, requiring major soil reclamation, special design or intensive maintenance.
			Class IV (Very Poor)	Soil under this classification have very severe limitations for urban requirements which are very difficult and costly to overcome. Complete replacement or modifications or existing soil conditions may be needed.
18	Development Constraints Map	Development Constraints		
Other Maps				
19	Land Management Unit Map			
20	Land Suitability Map			
21	Area Ecological Profile Maps	Ground Water Use Restrictions		
		Hazards		
		Air Quality		
		Suitability for Agriculture		

Source: CLUP Guidebook, HLURB

(iv) Coordinating Capacity Development of MinDA

The needs of updating existing thematic maps and new thematic maps in the regional line agencies, provinces, cities, and municipalities have been discussed. How to coordinate all the planning efforts into one-Mindanao-wide plan depends on coordinating capacity of MinDA.

It would become political, but technically, what MinDA can do to raise coordination capacity is to update its GIS. MinDA's GIS is based on Manifold which is a file based GIS established in 2007. GIS Operation Manual was prepared. The file based GIS is link to database: INfra.MDB; INVESTMENT.MDB; DEVSTAT.MDB; ODA_MDF, ODA.LDF; and SOCIAL.MDB. The spatial files of Manifold maps files are classified into corresponding tables in database. The business process or work process has been itemized to produce reports. This system needs to be update with the new data, and possibility with more sophisticated GIS software. Reorganizing the database itself requires expertise which MinDA does not have. It was informed that ArcGIS has been donated, but the operators in MinDA have not been trained to use ArcGIS. As coordinating with regional councils, MinDA will have to coordinate with international organizations as it provides spatial policy information as well as status of on-going projects and programs.

(v) Spatial Information Management for Bansamoro Development

Since the Project object is for peace and development, ARMM shall become the priority target area for map utilization. As well as MinDA, Bansamoro Development Agency will become a critical agency in developing ARMM. Spatial data and information shall be reorganized and updated with the new data as soon as possible. The planning efforts shall follow after the spatial data and information will be organized. Following table summarizes thematic maps or spatial policy information to be updated.

Table 2.20 Thematic Maps to be Prepared (draft)

Current, Monitoring, Planning	Category	Map Name	Sub-title
Current Condition	Administration	Location Map	
	Basic Land Information	Elevation Map	
		Existing Land Use Map	
		Geologic Map	
		Land Classification Map	
		Slope Map	
		Soil Taxonomy Map	
	Economic Development	Commodity Trade Routes Map	
		Industry Clustering Map	
		Tourist Destination Map	
	Environmental Evaluation	Flood Prone Areas Map	
		Major River Basin Map	
		Primary Growth Forest Area Map	
	Facility Location	Existing Port Facilities Map	
		Location of Post Offices Map	
		Location of Telegraph Facilities and Government Public Calling Offices Map	
		Power/Energy Facilities Map	
		Transportation Map	
	Hazard	Active Falt Lines Areas Map	
		Erosion Map	
		Saltwater Intruded Areas Map	
	Land Use Policy and Regulation	Agricultural Sustainability Map	
		Ecozone Map	
		Environmentally Critical Areas Map	
		Network of Protected Areas for Agriculture and Agro-Industrial Development (NPAAAD) Map	
		Strategic Agriculture and Fishery Development Zone (SAFDZ) Map	
	Settlement	2000 Level of Urbanization Map	
		2000 Population Density Map	
		Agrarian Reform Communities Map	
		Existing Settlement Pattern Map	
	Socio-Economic	Administration Boundary Map	
	Water Use	Ground Water Utilization Ratio Map	
		Surface Water Utilization Ratio Map	
Monitoring	Economic Development	Irrigation Systems Map	Major Programs and Projects
	Facility Location	Community Facilities Map	Major Programs and Projects
		Health Facilities Map	Major Programs and Projects
		Market Support Infrastructure Facilities Map	Major Programs and Projects
	Hazard	Flood Control and Drainage Facilities Map	Major Programs and Projects
	Utility	Power/Energy Map	Major Programs and Projects
		Water Supply Map	Major Programs and Projects
Policy Planning	Land Use Policy and Regulation	Land Use Opportunities Map	
		Overall Regional Spatial Strategy Map	Linear Urban Growth Corridor and Nodal Growth Center and Economic Zone (2003-2030)
		Proposed Land Use Map	
		Regional Spatial Strategy Map	Long-Term Planning Strategy
		Regional Spatial Strategy Map	Medium to Long-Term Planning Strategy
		Settlements Plan Map	

The thematic maps will become sources of a framework plan which will show development directions agreed with stakeholders and decision makers.

(vi) Geo-portal and Spatial Information Management

The Philippine GeoPortal is a web based spatial data infrastructure used for data sharing and is accessible by the public (c.f. http://www.geoportal.gov.ph/).[1] It is a three years project with the current status on beta testing the first phase of the system.

NAMRIA provides the base map for the geoportal. Spatial data were gathered from different government agencies such as Department of Agriculture (DA), Department of Environment and National Resources (DENR) among others. Data are in geodatabase format with corresponding metadata. NAMRIA is currently using ESRI Services for their database schema. Spatial data from NAMRIA were already uploaded, including 1:50,000 topographic maps for the whole country, 1:5,000 topographic map of Metro Manila Area from 2011 LIDAR data and 2011 orthophoto images.

Currently, GeoPortal is for viewing purposes only. The project has three phases: first phase is the beta testing of the portal; second phase is putting the system in mobile applications and the third phase is cloud sharing of the system. NAMRIA has five (5) portals with two (2) accessible by the public. There are plans to publish the geoportal services to Open GeoSpatial Consortium (OGC) to open the system to every software type (including open source GIS software) and data format. The GeoPortal system is running on 45mbps but they are soon planning to move to 90 mbps. NAMRIA is continuously enhancing the system for better service and usability.

The Philippine GeoPortal and local geo-spatial information management need work hand-in-hand to make spatial policy planning consistent among all levels of public administration.

[8] Arrangement of Subcontracting Work

In order to execute the topographic mapping at scale of 1:50,000, the following survey works were carried out to determine horizontal and vertical control data to be used for aerial triangulation of digital topographic mapping at scale of 1:50,000 and to obtain planimetric details data to be used for digital topographic mapping at scale of 1:50,000 in the Project. The survey works involved the following four (4) items.

1) Ground Control Survey consists of GPS Survey (220 ground control points in total) and Leveling and Pricking (220 spot height points in total)

2) Field Survey 1 including Field Identification, Field Completion and Digitizing of Annotations on existing topographic maps at scale of 1:50,000 covering the Central Mindanao: Sarangani; South Cotabato; Sultan Kudarat; Maguindanao; Lanao Del Sur; parts of Davao Del Sur; North Cotabato; Bukidnon; Misamis Oriental; Lanao Del Norte; and the surrounding areas (coverage area: approximately 30,000 km^2).

3) Field Survey 2 including Field Identification, Field Completion and Digitizing of Annotations on existing topographic maps at scale of 1:50,000 covering the North

[1] As of January 2013.

East and Central Mindanao: Surigao Del Norte; Agusan Del Norte; Surigao Del Sur; and parts of Agusan Del Sur; North Cotabato; Bukidnon; Misamis Oriental; and the surrounding areas (coverage area: approximately 28,000 km^2)

4) Field Survey 3 including Field Identification, Field Completion and Digitizing of Annotations on existing topographic maps at scale of 1:50,000 covering the South East and Westl Mindanao: Davao; Davao Oriental; Misamis Occidental; Zamboangan Del Sur; Zamboanga Del Norte; Basilan; Sulu; Tawi Tawi; Cagayan de Tawi Tawi Islands; Turtle Islands; Mambahenauhan Island and parts of Agusan Del Sur; North Cotabato; Bukidnon; Davao Del Sur; Lanao Del Norte; and the surrounding areas (coverage area: approximately 42,500 k m^2)

All the above survey works are subcontracted and carried out by the following four (4) separate contractors.

Table 2.21 Information of Contract Works

Contract Works	Contractor	Contract Date/Completion Date
Ground Control Survey	C.C. KEIYO AND COMPANY in Association with SOLAR SURVEYING CORPORATION and GEOTECH MERCANTILE CORPORATION	July 20, 2010/December 25, 2010
Field Survey 1	F.F. CRUZ & CO., INC.	July 22, 2010/August 31, 2012
Field Survey 2	CERTEZA INFOSYS CORPORATION	July 22, 2010/ August 31, 2012
Field Survey 3	SRDP CONSULTING INC. in Association with C.C. KEIYO AND COMPANY	July 30, 2010/ August 31, 2012

Selection of the contractors for the bid was discussed with NAMRIA on June 28, 2010 as the field work was discussed. Based on experiences of the Project Team on subcontracting work of survey and mapping in the Philippines, human resources of the companies; equipment; experiences of similar projects, and others were considered in short-listing the candidate subcontractors. The opening of the bid was held with presence of the Project Team, NAMRIA and officers from the JICA Philippine Office.

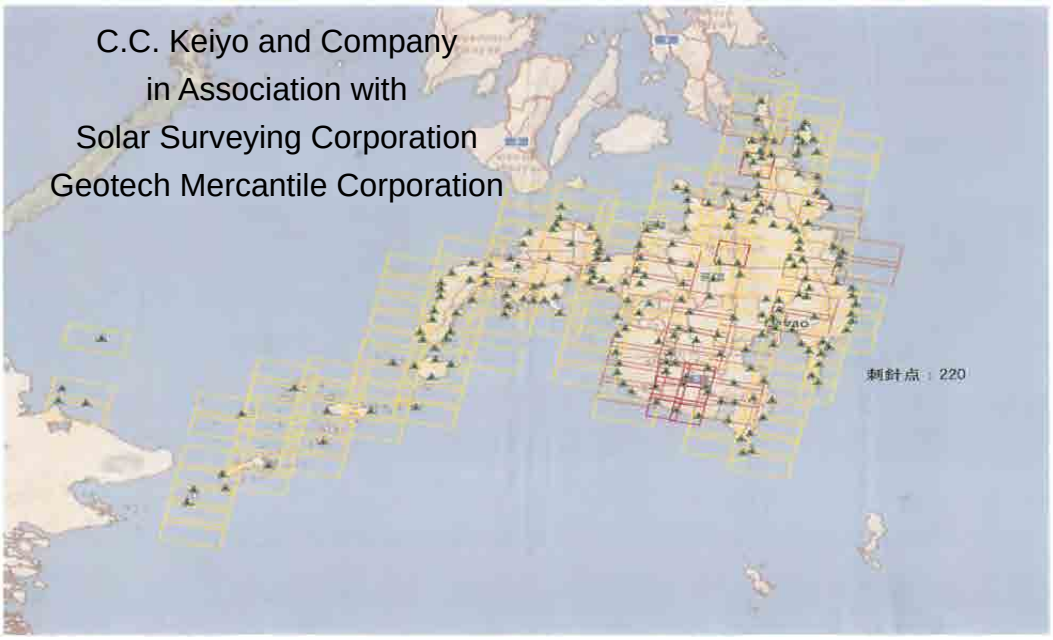


Figure 2.8 Plan of Ground Control Survey

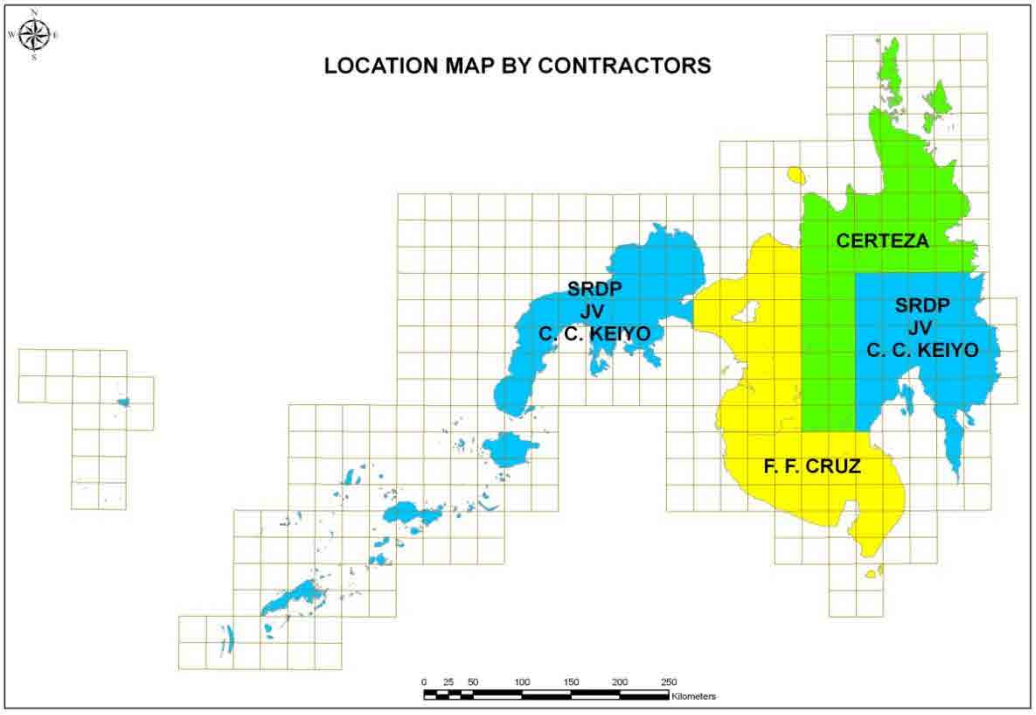


Figure 2.9 Location Map of Field Survey

Because of security reasons, all the subcontracting work was commenced on September 13, 2010. All the work was completed by August 31, 2012.

[9] Control-Point Survey (Work in the Philippines: Subcontract)

The control point survey was conducted to acquire 220 GCPs with vertical and horizontal values for aerial triangulation using satellite images. The contractors conducted the survey work based on the service contract, common specifications and technical specifications as scheduled in the contract. The specifications and precision, the survey data submitted by the contractors, locations of GCPs, and the results of examinations were as follows:

(1) GPS Observation and Measurement

(a) More than three (3) units of survey receivers with dual frequency having following distance measurement accuracy shall be used for measuring.

- Horizontal accuracy : ±5ppm x Distance between GCPs (5 cm per 10 km)
- Vertical accuracy : ±5ppm x Distance between GCPs (5 cm per 10 km)

(b) Elevation mask shall be 15 degrees.

(d) Signals from more than four (4) satellites shall be received at each GCPs simultaneously.

(2) Expected accuracy of control points

(a) Mis-closure of GPS traverse shall be less than 5 ppm×measured distance.
(b)Expected horizontal accuracy (Standard deviation) of control point shall be within 2.5m.

Photo 2.3 GPS Observation

The results of the control points

All the control points used in the control point survey were the ones of NAMRIA. The result of the control point survey was as follows:

Table 2.22 Ground Control Survey

Type of GCP	Quantity (No.)
Existing NAMRIA GCP（Eccentric measurement pints）	201
Reference points	114
Total (Quantity of the Contract)	315 (220)

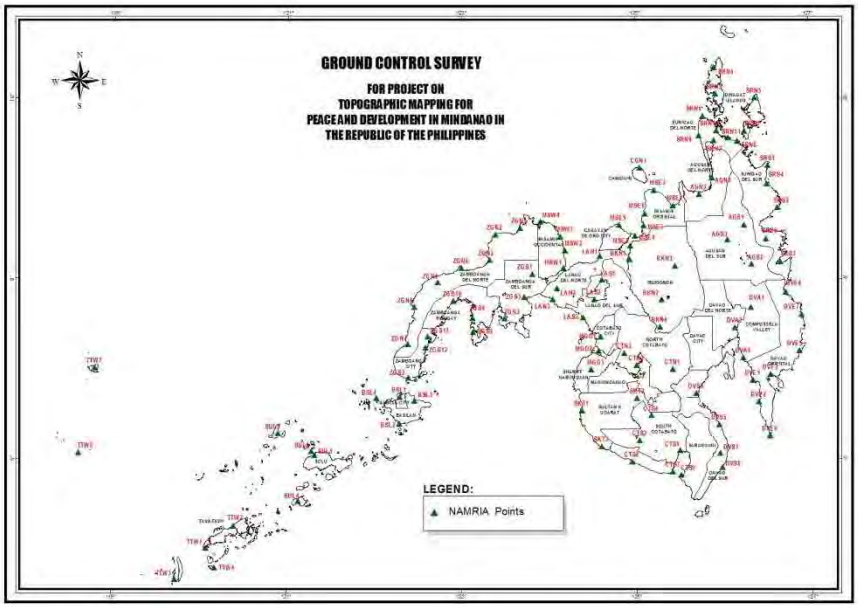


Figure 2.10 Locations of Control Points

Figure 2.11 Description of Control Point

The control point survey was conducted using RTK and GPS Path Finder and other GPS receivers onto the control points of NAMRIA where DGPS observation was possible. In addition, the pricking work was conducted onto the photo-images using the satellite image data and a personal computer. The images were submitted with the description of stations on all the points.

The Project Team and NAMRIA examined the results as progressed in accordance with Specifications 2008 (1. The Specifications for 1:50,000 Topographic Maps, 2. The Specifications for Map Symbolization, 3. The Manual for Ortho-Photo Preparation). The survey was completed on December 25, 2010.

Field Inspection of Accuracy of GCPs

The Project Team and NAMRIA had inspected the accuracy of selected GCPs in the surrounding areas of Davao City submitted from the contractors. The result of the inspection is as follows:

Table 2.23 Comparison of Point Inspection

Station	Coordinates by the Project Team and NAMRIA		Coordinates Surveyed by the Project Team and NAMRIA		Mis-closure Values		
NAMRIA GCP (Eccentric point)	Northing (m)	Easting (m)	Northing (m)	Easting (m)	⊿N (m)	⊿E (m)	MRS
GCP068	840513.24	825000.37	840513.80	825000.95	0.56	0.58	0.81
GCP073	819185.43	748632.25	819185.65	748631.79	0.22	0.46	0.51
GCP078	797998.00	764276.13	797998.43	764276.28	0.43	0.15	0.46
GCP081	789108.15	789111.15	789108.63	791511.95	0.52	0.80	0.95
GCP084	780212.20	780608.64	780211.62	780608.03	0.58	0.61	0.84
GCP091	754794.94	741070.47	754795.03	741070.52	0.09	0.05	0.10

The coordinates of six GCPs (eccentric points) satisfied the "expected horizontal accuracy of control points" which was less than 2.5 meters. The Project Team confirmed sufficient accuracy.

[10] Pricking (Leveling) (Work in the Philippines: Subcontract)

The pricking work (leveling) was conducted onto 220 points that were required for aerial triangulation using satellite images. The contractor conducted the survey work in accordance with the service contract, common specifications, technical specifications and contract schedule. The expected specifications and precision, survey data submitted by the contractor, locations map of leveling, and the result of inspection are as follows:

Specifications/Precision

The leveling shall start from the existing NAMRIA benchmark and closed to another one. The leveling route shall be formed by closed loop and leveled twice. The leveling shall be carried out in accordance with the following manners:

(1) Automatic or digital level for height measuring shall be used.

(2) Mis-closure of leveling between existing benchmarks and spot height points shall not exceed $\pm$ 24 mm$\sqrt{}$D(D: measured distance in kilometer).

The all the pricking work was conducted onto the benchmarks of NAMRIA.

Photo 2.4 Observation

Pricking

The pricking work of the benchmarks for control points was conducted as examining along the existing leveling routes of NAMRIA on site by the same method of pricking for control points necessary for plotting.

Leveling

When interpretation on the images was difficult, direct leveling or GPS leveling was conducted to the points where pricking was possible. A Handly GPS was used to acquire the coordinates of pricking points.

Pricking

The result of leveling included the ledger of pricking point description with photos of the sites.

Figure 2.12 Description of Bench Marks (Pricking)

The Project Team and NAMRIA examined the results of pricking (leveling) as progressed in accordance with Specifications 2008 (1. The Specifications for 1:50,000 Topographic Maps, 2. The Specifications for Map Symbolization, 3. The Manual for Ortho-Photo Preparation). All the results were received, and the work was completed in December 2010.

[11] Field Identification (Work in the Philippines: Subcontract)

The field identification work was conducted by dividing the areas into three sections as work load and schedule were considered using the SPOT images owned by NAMRIA and the existing 1:50,000 topographic maps. The field identification work was conducted by the contractor in accordance with the service contract, common specification, technical specification and contract schedule as in the following procedure.

Reference Collection

The Contractor collected reference materials on road, village, river, canal, names of railways, names of region and district, road classification, and administrative boundary from departments of public works, engineering, planning or river in offices of provinces, cities and municipalities.

Photo 2.5 Reference Collection

Preliminary Interpretation

As referring the existing topographic maps, the satellite images were interpreted before the field identification work. The items interpreted were the basic planimetric features: road, village, river, canal, railway, and vegetation.

Photo 2.6 Preliminary Interpretation

Field Identification

Annotation information, road classification, unidentified structures, vegetation that had not been identifiable by image interpretation was identified on site. A Handy GPS is used to acquire coordinates of schools, churches, and cemeteries.

Photo 2.7 Field Identification

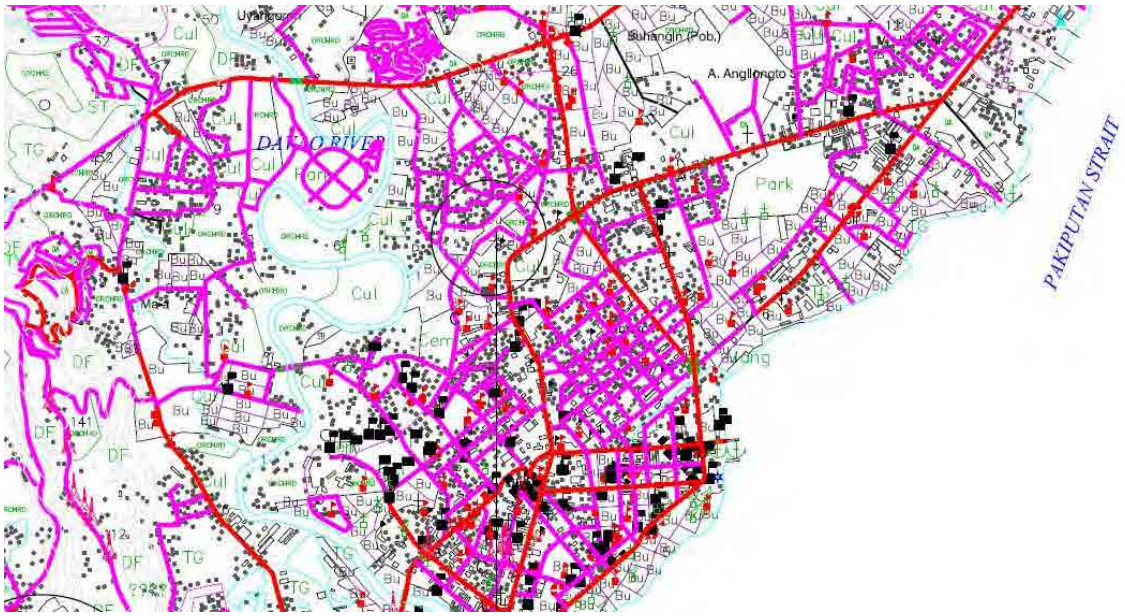


Figure 2.13 Field Identification Data

Table 2.24 The Total Areas of Field Identification

CONTRACTOR (Division)	FF CRUZ （Field Survey 1）	CERTEZA （Field Survey 2）	SRDP （Field Survey 3）
Area	about 30,000 km^2	about 28,000 km^2	about 42,500 km^2

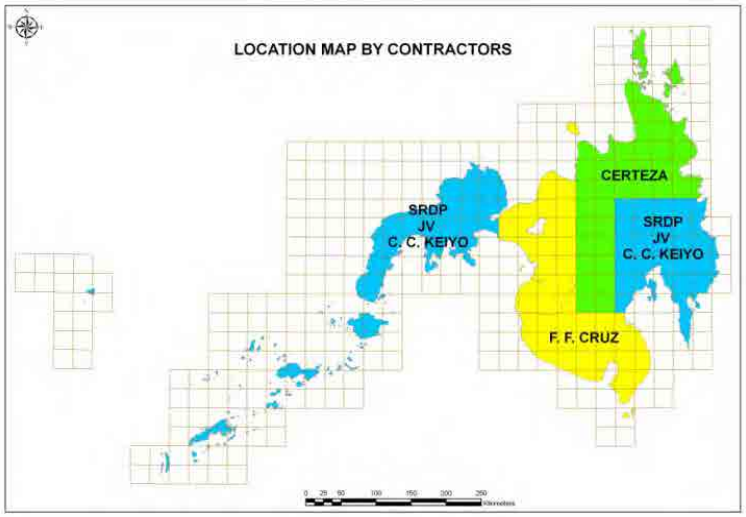


Figure 2.14 Division of Areas

The Project Team and NAMRIA examined the results of field identification as progressed in accordance with Specifications 2008 (1. The Specifications for 1:50,000 Topographic Maps, 2. The Specifications for Map Symbolization, 3. The Manual for Ortho-Photo Preparation). The work was completed in May 2011 except for some barangays (critical areas--about 2% of the total area) where a permission of entry was not secured. The areas were studied and confirmed during the field completion.

Photo 2.8 Inspection of Field Identification Data

[12] Aerial Triangulation (Work in Japan)

The Project Team conducted the aerial triangulation work in accordance with the following specifications and manuals: Specification 2008 (1) The Specifications for 1:50,000 Topographic Maps and prepared during the "Study for Mapping Policy and Topographic Mapping for Integrated National Development Plan in the Republic of the Philippines" with a JICA funding from 2006 to 2008; Overseas Survey and Mapping (Basic Maps); and Operation Manual (December 2007, JICA).

The adjustment calculation of aerial triangulation was performed by block set in multiple sections to coordinate with the progress of acquisition of satellite images and implementation schedule of digital plotting. All the mapping areas were combined as one block and the adjustment calculation was performed.

In order to build stereo models required for the successive work of digital-plotting, ALOS (PRISM) satellite images and RPC (Rational Polynomial Coefficient) files incidental to the ALOS were taken to the digital photogrammetry system. The ground control points and tie points were observed to perform adjustment calculation by the bundle method.

Since the PRISM images were observed with three directions (forward, nadir and backward views), the adjustment calculation used all images from three views.

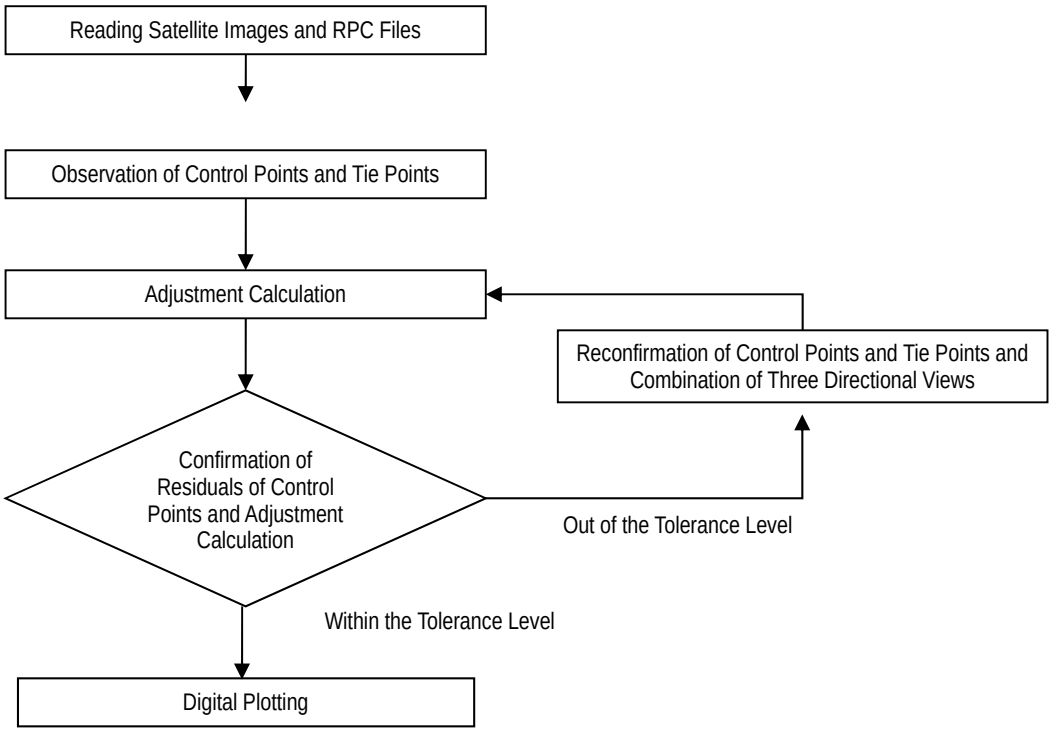


Figure 2.15 Workflow of Aerial Triangulation

Figure 2.16 Areas of Aerial Triangulation

Table 2.25 Residuals of Aerial Triangulation (Main Island of Mindanao)

Residuals on GCP

GCP（129points）	⊿ X Direction（m）	⊿Y Direction（m）	⊿Z Direction（m）
Average error	0.02	0.02	-0.16
Root mean square error	0.56	0.58	0.61
Standard deviation	0.56	0.59	0.59
Maximum error	-1.87	-1.70	-2.02

Residuals on BMs

BM(141 pints)	⊿Z（m）
Average error	-0.06
Root mean square error	0.47
Standard deviation	0.69
Maximum error	4.65

Table 2.26 Residuals on Image

Tie point(12,606 points)	⊿X(pixel)	⊿Y(pixel)
Average error	-0.01	0.01
Standard deviation	0.35	0.24
Maximum error	1.57	1.77

The maximum errors at control points were within 2.5 meters for the X and Y directions. The maximum error of the Z direction, vertical, was within 5 meters for GCPs and BM. The maximum errors of residuals on images were within two pixels. The results satisfied

the following standards: Specification 2008 (1) The Specifications for 1:50,000 Topographic Maps and prepared during the "Study for Mapping Policy and Topographic Mapping for Integrated National Development Plan in the Republic of the Philippines" with a JICA funding from 2006 to 2008; Overseas Survey and Mapping (Basic Maps); and Operation Manual (December 2007, JICA); and the Operation Manual of Digital Topographic Basic Map (Geographic Information) using Satellite Images, prepared by the Geographic Survey Institute, which stated that the tolerance of the residuals of images as 2 pixels (standard deviation: 1 pixel), the maximum horizontal error as 10 meters (standard deviation: 2.5 meters), the maximum vertical errors of control points as 13.5 meters (standard deviation: 3.3 meters). The aerial triangulation work was commenced in the early June, 2011, and completed by the end of July, 2011.

[13] Digital Plotting and Digital Editing (Work in Japan)

The Project Team completed the digital plotting work in accordance with the following specifications and manuals:

Specification 2008 (1) The Specifications for 1:50,000 Topographic Maps and prepared during the "Study for Mapping Policy and Topographic Mapping for Integrated National Development Plan in the Republic of the Philippines" with a JICA funding from 2006 to 2008; Overseas Survey and Mapping (Basic Maps); and Operation Manual (December 2007, JICA); the Operation Manual of Photogrammetry Using Satellite Images (Basic Maps) (December 2007, JICA). Unclear features of interpretation were clarified in the process of field completion.

In accordance with the standards of data extraction and field identification, the data were inspected on items such as: joining of line objects; completion of polygons; and cleaning of unnecessary objects. To the cleaned data, administrative boundaries and annotation were added to complete the topographic data. In the process, joining of map sheets was inspected as well. The plotting work was completed by the end of 2011.

Photo 2.9 Plotting and Editing

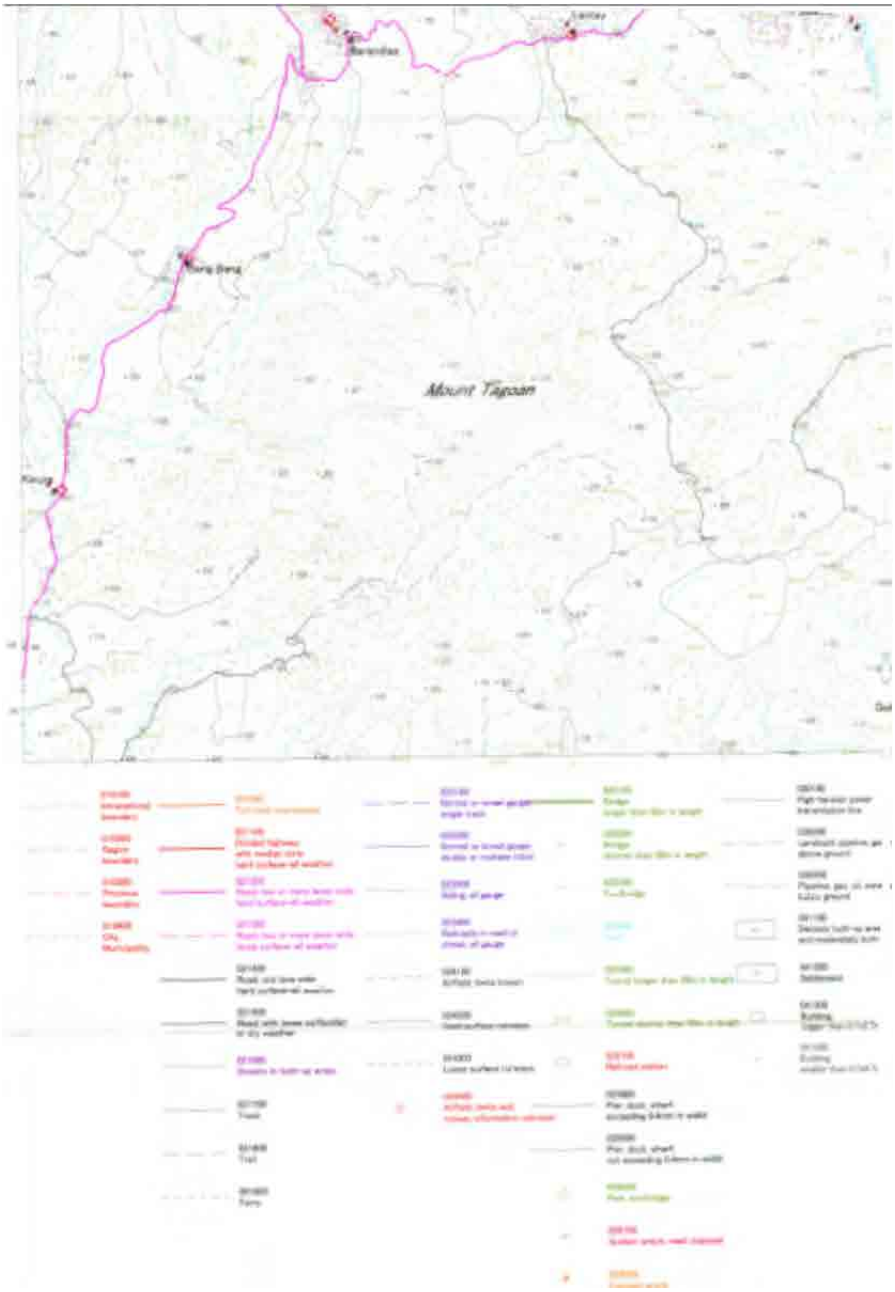


Figure 2.17 Draft Plotting Sheet

[14] Preparation of Interim Report (IT/R) (Work in Japan)

The results of the Project, posterior to the Inception Report, was summarized as the Interim Report.

[15] Explanation and Discussion of Interim Report (IT/R) (Work in the Philippines)

The Project Team has submitted the Interim Report completed on December 2, 2011 to the counterpart. The contents of the report were discussed on December 8, 2011, and the report was accepted by the counterpart.

Photo 2.10 Discussion on the Interim Report

During the Interim Report discussion, the Project Team explained that the Project Team and JICA had discussion and concluded that the digital map data at a scale of 1:50,000 prepared for the entire Mindanao were to be prepared with the collected data--ALOS images, SPOT images, Ortho-images mapping data owned by NAMRIA and other private companies, ground survey data, other related survey and mapping data. The counterpart agreed to the explanation.

[16] Field Completion (Work in the Philippines: Subcontract)

Matters in question such as expressions of topographic and planimetric features or administrative boundaries and annotations were examined during field completion.

In order to investigate the points in question during plotting and editing, the edited originals were brought to the field. The method employed a Handy GPS for smooth operation of the work.

Photo 2.11 Field Completion

Photo 2.12 Inspection of Field Completion Data

During the field completion work, Barangays where the entry permits were not secured were studied. Still the entry permits were not secured in some of Barangays--about 2% of the total Project area. MinDA, NAMRIA and the Project Team had a discussion over the issue and concluded to follow a suggestion of NAMRIA that secondary data and interview survey data were to be used for the barangays where the entry permits were not secured.

[17] Bathymetric Data Production

The bathymetric data were produced using the depth curve and depth point data of the ocean part of the existing 1:50,000 topographic maps. The maps were digitized to convert to the coordinate data, and the data were edited and structurized to be parts of the digital topographic data with the same specifications of the 1:50,000 digital topographic maps.

The specifications were itemized in the record of specification discussion. The workflow of the bathymetric data production is as follow:

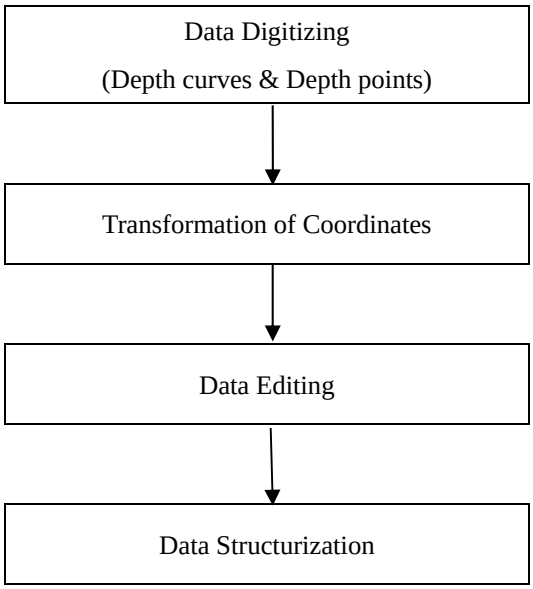


Figure 2.18 Bathymetric Data Production Workflow

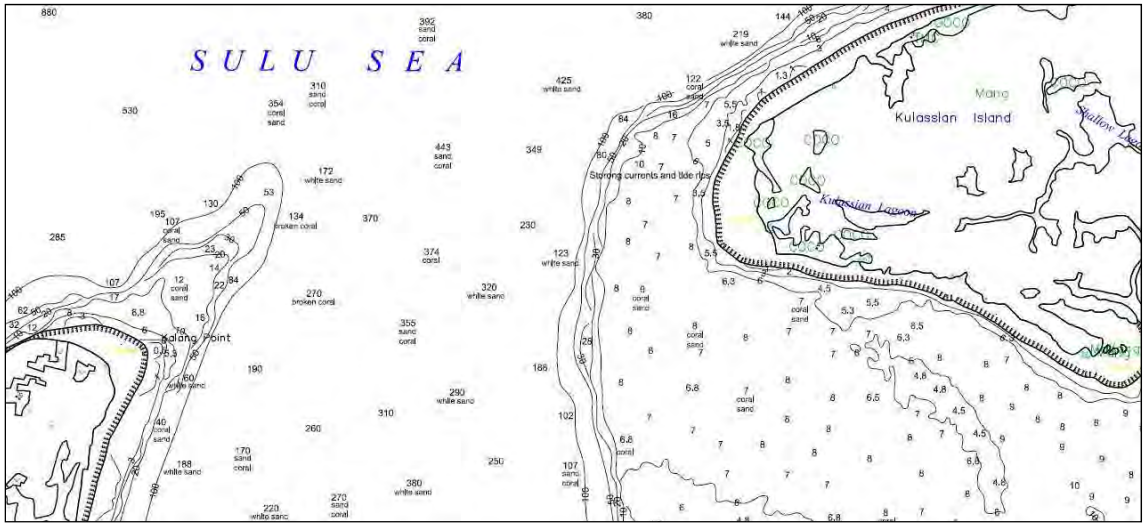
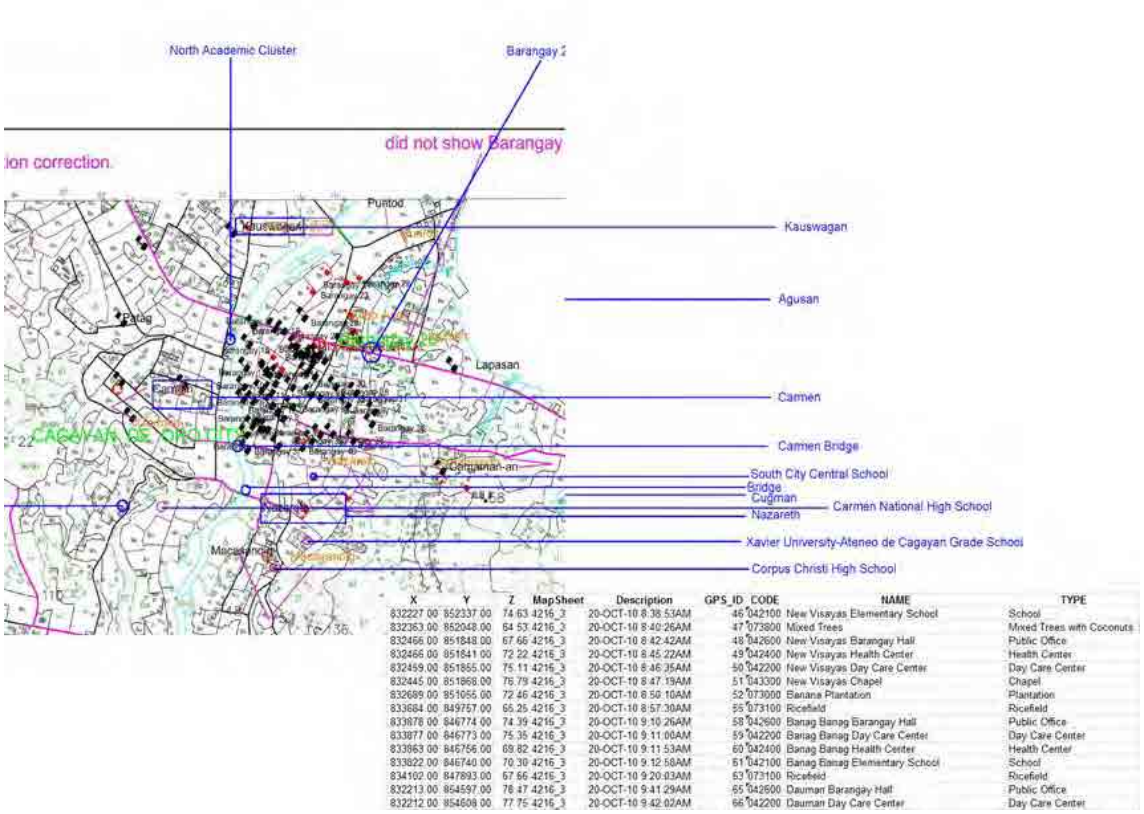


Figure 2.19 Bathymetric Data

[18] Supplemental Editing (Work in Japan)

The results of field completion were used to re-edit the data. Joining of adjacent maps sheets were edited and confirmed.

Photo 2.13 Supplemental Editing



X	Y	Z	MapSheet	Description	GPS_ID	CODE	NAME	TYPE
832227.00	852337.00	74.63	4216_3	20-OCT-10 8:38:53AM	46	042100	New Visayas Elementary School	School
832363.00	852048.00	64.53	4216_3	20-OCT-10 8:40:26AM	47	073800	Mixed Trees	Mixed Trees with Coconuts
832466.00	851848.00	67.66	4216_3	20-OCT-10 8:42:42AM	48	042600	New Visayas Barangay Hall	Public Office
832466.00	851641.00	72.22	4216_3	20-OCT-10 8:45:22AM	49	042400	New Visayas Health Center	Health Center
832459.00	851865.00	75.11	4216_3	20-OCT-10 8:46:35AM	50	042200	New Visayas Day Care Center	Day Care Center
832445.00	851868.00	76.79	4216_3	20-OCT-10 8:47:19AM	51	043300	New Visayas Chapel	Chapel
832689.00	851055.00	72.46	4216_3	20-OCT-10 8:50:10AM	52	073000	Banana Plantation	Plantation
833684.00	849757.00	65.25	4216_3	20-OCT-10 8:57:30AM	55	073100	Ricefield	Ricefield
833878.00	846774.00	74.39	4216_3	20-OCT-10 9:10:26AM	58	042600	Barag Barag Barangay Hall	Public Office
833877.00	846773.00	75.35	4216_3	20-OCT-10 9:11:00AM	59	042200	Barag Barag Day Care Center	Day Care Center
833863.00	846756.00	69.82	4216_3	20-OCT-10 9:11:53AM	60	042400	Barag Barag Health Center	Health Center
833822.00	846740.00	70.30	4216_3	20-OCT-10 9:12:58AM	61	042100	Barag Barag Elementary School	School
834102.00	847893.00	67.56	4216_3	20-OCT-10 9:20:03AM	63	073100	Ricefield	Ricefield
832213.00	854597.00	76.47	4216_3	20-OCT-10 9:41:29AM	65	042600	Daumon Barangay Hall	Public Office
832212.00	854608.00	77.75	4216_3	20-OCT-10 9:42:02AM	66	042200	Daumon Day Care Center	Day Care Center

Figure 2.20 Supplemental Editing

[19] Data Structurization (Work in Japan)

The digital data after supplemental editing were structured to be used for GIS in accordance with the specifications of the draft survey and mapping standards. To be used in a GIS, layer structures and topology were added to develop a GIS topographic database.

Not all the data acquired were used for the topographic data for GIS. The features were selected so that the system would be practical and user friendly. The attributes of GIS were determined as future application development was being considered.

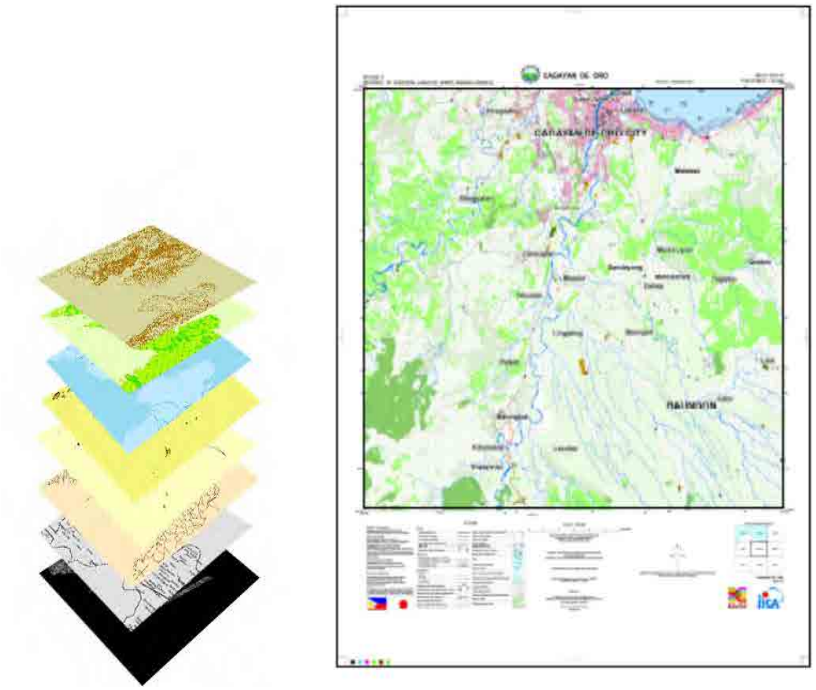


Figure 2.21 Data Structurization

[20] Map Symbolization (Work in Japan)

Based on the Survey Operation Manual (Draft), the topographic data were symbolized and data for print maps were prepared based on the draft survey and mapping standards.

To the print map data, the following note was added:

> *This digital map was prepared jointly by Japan International Cooperation Agency (JICA) under the Japanese Government Technical Cooperation Program and the Government of Philippines.*

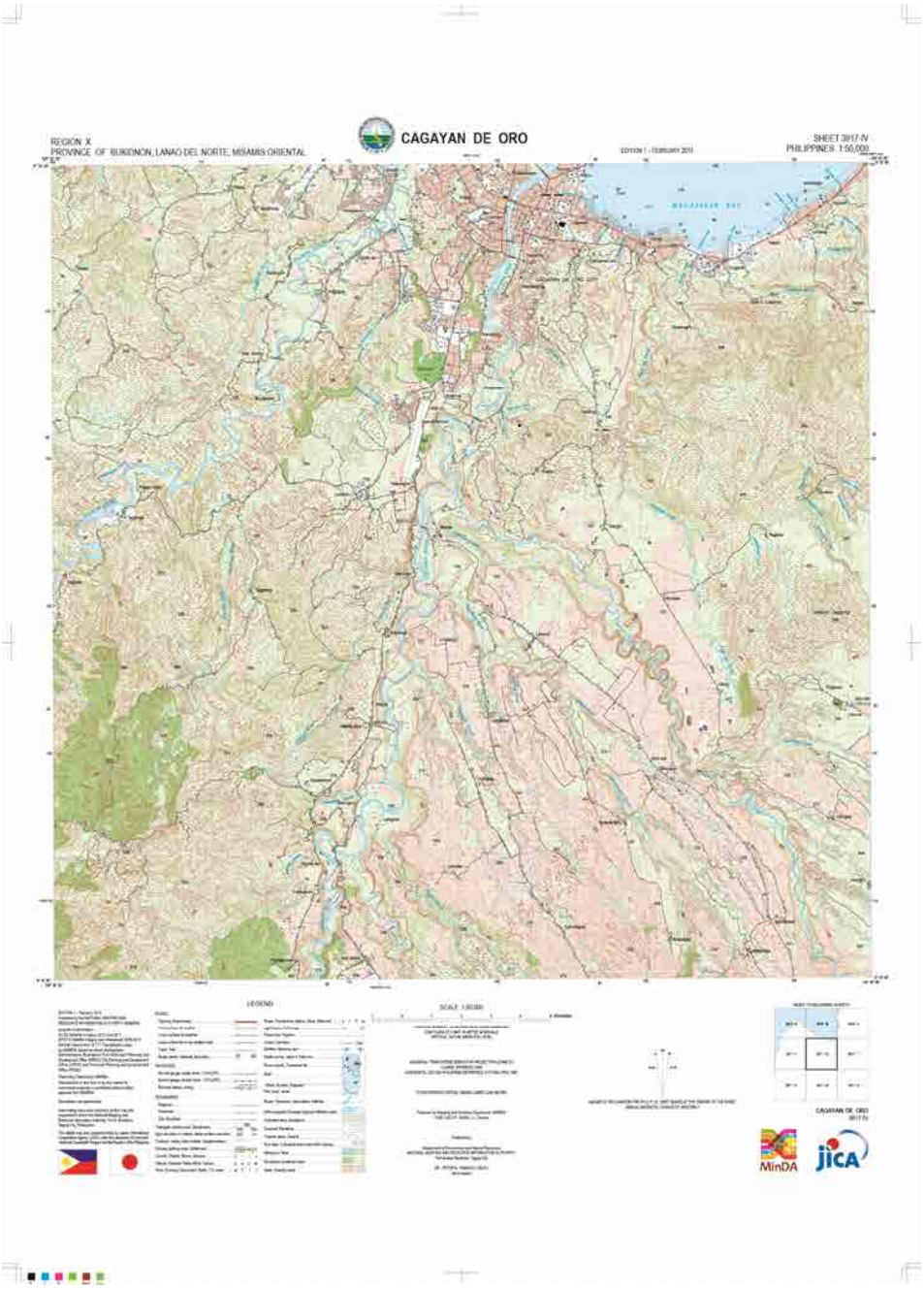
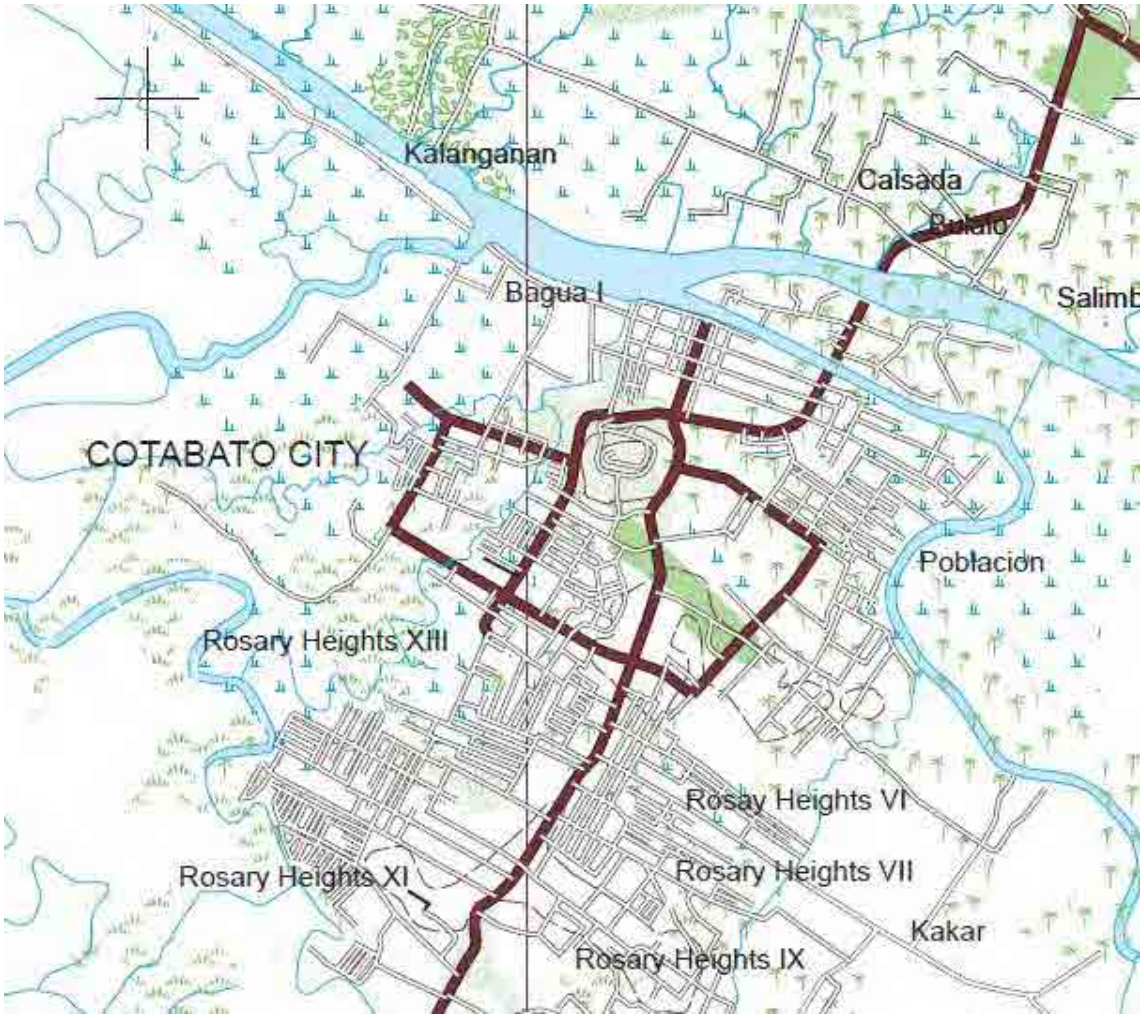


Figure 2.22 Digital Topographic Map Data for Printing



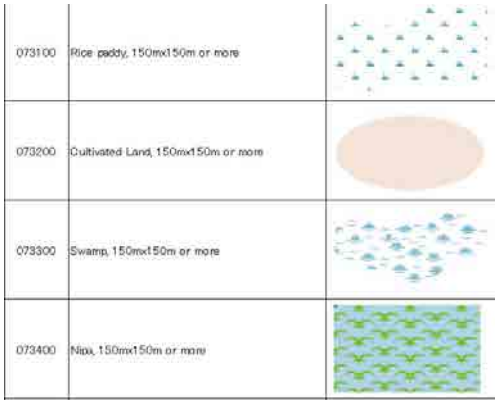


Figure 2.23 Digital Topographic Map Data for Printing (Close-up)

[21] Data File Preparation (Work in Japan)

To the data prepared, metadata were prepared in accordance with the draft survey and mapping standards. The metadata included information such as contents of the data,

quality and characteristics. The data of ortho-photos at a scale of 1:50,000 were prepared at the same time.

The GIS topographic database, metadata and data for printing and ortho-photo maps were stored in DVD as final outputs.

Figure 2.24 Data File Preparation

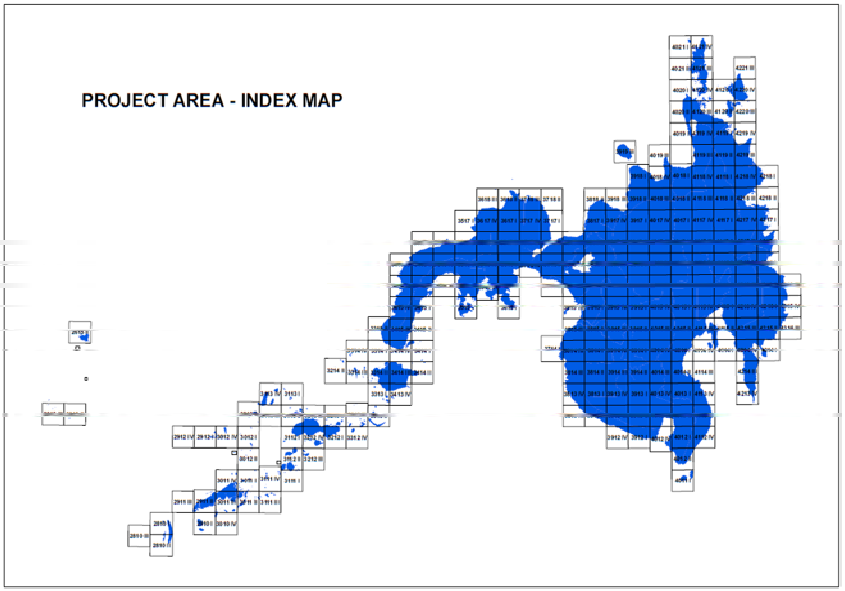


Figure 2.25 Project Area - Index Map

[22] Holding a Technology Transfer Seminar (Work in the Philippines)

The technology transfer seminar was held twice in Davao on November 9, 2012, and Cagayan De Oro on the 9th of November, 2012. The program of the technology transfer seminar was targeted to the counterparts, TCC members and LGUs to support map utilization. During the seminar, the major contents of the seminar were: results of capacity assessment; GIS and CAD basic operations; and examples of map utilization.

Photo 2.14 Technology Transfer Seminar

Table 2.27 Technology Transfer Seminar and Technical Coordinating Committee Meeting Program

	From	To	Item	Facilitator/Presenter
Technology Transfer Seminar				
Opening	8:30 AM	8:45 AM	Registration	NAMRIA/MinDA
	8:45 AM	8:55 AM	Invocation and National Anthem	MinDA
	8:55 AM	9:00 AM	Seminar Announcement	Ms. Hennesey Roque, NAMRIA
	9:01 AM	9:05 AM	Overview of the Project	Video
	9:05 AM	9:15 AM	Introduction and Project Information	Mr. Yutaka Kokufu, JICA Project Team
Technology Transfer Sessions	9:16 AM	9:34 AM	Introduction: Results of the Capacity Assessment Survey	Mr. Kazunobu Kamimura, JICA Project Team
	9:35 AM	9:46 AM	Digital Topographic Map Information (AutoCAD and ArcGIS)	Video
	9:47 AM	10:14 AM	Basic Operation (AutoCAD and ArcGIS)	Video
	10:15 AM	10:40 AM	Basic Operation (AutoCAD and ArcGIS) Demonstration	Mr. Jose Villanueva/Ms. Sheila Eugenio, NAMRIA
	10:41 AM	10:54 AM	Basic Operation of ArcGIS Explorer	Video
	10:55 AM	11:15 AM	Introduction to Map Utilization	Mr. Kazunobu Kamimura, JICA Project Team
	11:16 AM	12:00 PM	Open Forum	
Lunch	12:00 PM	12:55 PM		LUNCH BREAK
Technical Coordinating Committee Meeting				
Technical Coordinating Committee Meeting	1:00 PM	1:05 PM	Message	Sec. Luwalhati R. Antonino, Chairperson, MinDA
	1:05 PM	1:10 PM	Message	Dr. Peter N. Tiangco, Administrator, NAMRIA
	1:10 PM	1:15 PM	Message	Mr. Shinichi Matsuda, Senior Representative, JICA
	1:15 PM	1:45 PM	Hand-over of Draft Topographic Maps for Validation to TCC Members	NAMRIA/MinDA
	1:45 PM	1:55 PM	Open Forum	
Closing			Closing	Director Ruel DM. Belen, NAMRIA

[23] Preparation of Draft Final Report (Work in Japan)

The Draft Final Report was prepared as compiling all the results of the Project.

[24] Discussion of Draft Final Report (Work in the Philippines)

The Project Team submitted the Draft Final Report to the counterparts, and the contents were explained and discussed. This result of the discussion was recorded in the minutes of meeting.

[25] Preparation of Final Report (Work in Japan)

As reflecting the comments from the counterpart, the Draft Final Report was finalized as the Final Report.

Appendix 1. **Implementation Arrangement for Project on Topographic Mapping for Peace and Development in Mindanao Agreed upon Between National Mapping Resource Information Authority and Japan International Cooperation Agency on January 11, 2010.**

IMPLEMENTATION ARRANGEMENT

FOR

THE PROJECT

ON

TOPOGRAPHIC MAPPING FOR PEACE AND DEVELOPMENT IN MINDANAO

AGREED UPON BETWEEN

NATIONAL MAPPING AND RESOURCE INFORMATION AUTHORITY

AND

JAPAN INTERNATIONAL COOPERATION AGENCY

Manila, 11 January 2010

USEC DIONY A. VENTURA, MNSA
Administrator
National Mapping & Resource Information Authority

Mr. MASAFUMI NAGAISHI
Leader
Detailed Planning Study Team
Japan International Cooperation Agency

Witnessed by

VIRGILIO L. LEYRETANA, SR.
Undersecretary and Chairman
Mindanao Economic Development Council

I INTRODUCTION

In response to the request of the Government of the Republic of the Philippines (hereinafter referred to as "the GOP"), the Government of Japan (hereinafter referred to as "the GOJ") decided to conduct the project entitled "TOPOGRAPHIC MAPPING FOR PEACE AND DEVELOPMENT IN MINDANAO" (hereinafter referred to as "the Project"), in accordance with the relevant laws and regulations enforced in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of technical cooperation programs such as the Grand Aid Project and Yen Loan Project, will undertake the Project in close cooperation with the authorities concerned in the GOP.

On the part of GOP, NATIONAL MAPPING AND RESOURCE INFORMATION AUTHORITY, (hereinafter referred to as "NAMRIA") and MINDANAO ECONOMIC DEVELOPMENT COUNCIL (hereinafter referred to as "MEDCo") shall act as the representatives of counterpart agencies to the Japanese Project Team (hereinafter referred to as "the Project Team") and shall be the coordinating body to facilitate assistance with other concerned government and non-governmental organizations for the effective implementation of the Project.

II OBJECTIVES OF THE PROJECT

The objectives of the Project are:

1) The preparation of the digital topographic maps covering as shown in Attachment 1 at the scale of 1:50,000.

2) The Implementation of the necessary support on wide and effective use of the digital topographic maps and GIS

III SCOPE OF THE PROJECT

In order to achieve the objectives mentioned above, the Project shall cover following items.

1. Review of Existing Conditions
   Existing conditions relevant to the Project including organization set-up, mapping system, facilities management and control points shall be reviewed.

2. Satellite Imagery
   Satellite Imagery at the appropriate scale covering as shown in Attachment 1 shall be acquired.

3. Map Production for covering the area as shown in Attachment 1.
   Map production shall be undertaken using digital mapping technology in accordance with Survey Operation Manual of JICA (for National Base Map) (2006).

4. Dissemination of the Final Products
   Recommendations for the wide and effective use of the topographic data produced under the Project shall be prepared.

IV STUDY SCHEDULE

The Project will be implemented in accordance with the tentative study schedule shown in Attachment 2. The

schedule, including the submission of reports stated in the next clause (V), is tentative and still subject to modification as may be necessary and agreed upon by both parties in the course of the Project.

V REPORTS AND FINAL PRODUCTS

JICA shall prepare and submit the following reports and final products to the GOP:

1. Inception Report
   Ten (10) copies, in English, at the commencement of the Project
2. Interim Report
   Ten (10) copies, in English, within twelve (12) months after the beginning of the Project
3. Draft Final Report
   Ten (10) copies, in English, within twenty-two (22) months after the beginning of the Project
4. Final Report
   Twenty (20) copies, in English, within twenty-four (24) months after the receipt of the comments on the Draft Final Report
5. Final Products (Deliverables)
   - 5-1. One (1) set of Satellite Images
   - 5-2. One (1) set of Ortho-Image Maps
   - 5-3. One (1) set of ground control point coordinates
   - 5-4. One (1) set of 1:50,000 scale digital topographic maps data for printing
   - 5-5. One (1) set of 1:50,000 scale digital topographic data for GIS applications

VI UNDERTAKING OF THE GOP

In the smooth implementation of the Project, the GOP will undertake the followings;

1. To facilitate the smooth conduct of the Project, the GOP shall take the following necessary measures:
   - 1-1. Secure the safety of the Project Team;
   - 1-2. Permit the members of the Project Team to enter, leave and sojourn in the Republic of the Philippines for the duration of their assignments therein, and exempt them from foreign registration requirements and consular fees;
   - 1-3. Assume all taxes, duties and other fiscal levies which may be imposed on equipment, machinery and other material brought into the Republic of the Philippines which will be needed in the implementation of the Project;
   - 1-4. Assume all taxes, duties and other fiscal levies which may be imposed on or in connection with any emoluments or allowances paid to the members of the Project Team for their services in the implementation of the Project;
   - 1-5. Provide the necessary facilities to the Project Team for the remittance as well as utilization of the funds introduced into the Republic of the Philippines from Japan in connection with the implementation of the Project;
   - 1-6. Secure necessary permission in the use of aircraft for aerial photography in connection with the implementation of the Project;
   - 1-7. Facilitate the legal entry of the Project Team into private properties and restricted areas in connection with the implementation of the Project; and
   - 1-8. Secure permission for the Project Team to carry topographic maps and other data (including,

negative films, contact prints or digital photo data of aerial photographs) related to the Project out of the Republic of the Philippines.

2. The GOP, through its implementing agency, shall bear claims, if any arises, against the members of the Project Team, resulting from or occurring in the course of the performance of their duties, except when, after consultation between the implementing agency mentioned above and JICA, it is established that such claims arise from gross negligence or willful misconducts on the part of the members of the Project Team.

3. NAMRIA and MEDCo shall act as the counterpart agencies of the Project Team and also the coordinating body to facilitate the involvement of other governmental and non-governmental organizations from all sectors.

4. The GOP, through NAMRIA and MEDCo shall, at its own expense, provide the Project Team with the following in cooperation with other organizations concerned:
   - 4.1 Available data and information related to the Project;
   - 4.2 Security-related information on as well as measures to ensure the safety of the Project Team;
   - 4.3 Information on as well as support in obtaining medical service;
   - 4.4 Counterpart personnel;
   - 4.5 Suitable office space with necessary furniture and utilities including telephone and internet access; and
   - 4.6 Office Identification Cards.

   Note: NAMRIA and MEDCo shall coordinate with other concerned organizations for items 4.1, 4.2 and 4.3.

VII UNDERTAKING OF JICA

In the implementation of the Project, JICA shall take the following measures:

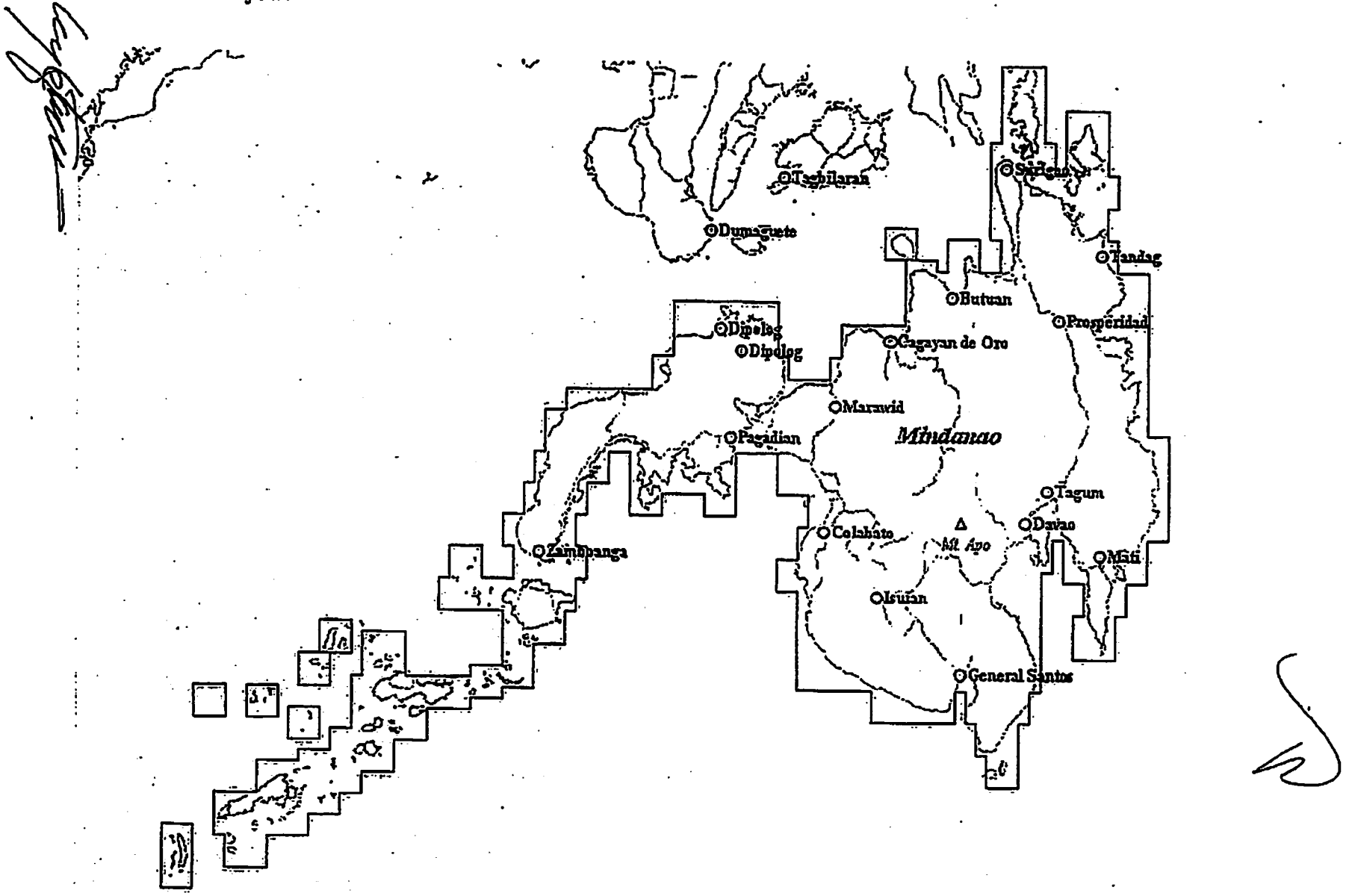
1. To dispatch, at its own expense, the Project Team to the Republic of the Philippines; and
2. To pursue technology transfer to the Republic of the Philippines counterpart personnel in the course of the Project.

VIII OTHERS

JICA, NAMRIA and MEDCo shall consult with each other regarding any matter that may arise from or in connection with the Project.

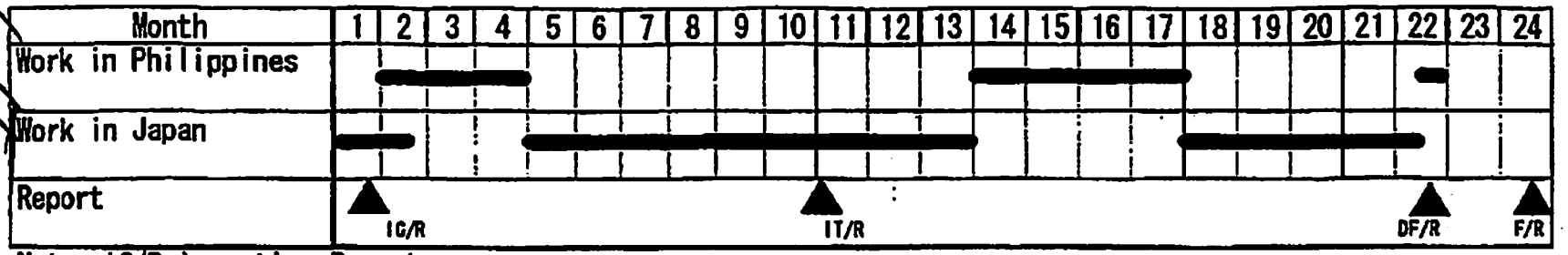
Attachment 1 : Study Area
Attachment 2 : Tentative Project Schedule

Attachment1: Study Area



Note: Study Area is whole Mindanao Region as shown above, but some area will be excluded by technical reason through consultation between consultant team and NAMRIA.

Attachment2: Tentative Study Schedule



Note IC/R: Inception Report
IT/R: Interim Report
DF/R: Draft Final Report
F/R: Final Report

Appendix 2. **Minutes of Meeting on Implementation Arrangement for Project on Topographic Mapping for Peace and Development in Mindanao Agreed upon Between National Mapping Resource Information Authority and Japan International Cooperation Agency on January, 11, 2010**

MINUTES OF MEETING

ON

IMPLEMENTATION ARRANGEMENT

FOR

THE PROJECT

ON

TOPOGRAPHIC MAPPING FOR PEACE AND DEVELOPMENT IN MINDANAO

AGREED UPON BETWEEN

NATIONAL MAPPING AND RESOURCE INFORMATION AUTHORITY

AND

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

Manila, 11 January 2010

USEC DIONY A. VENTURA, MNSA
Administrator
National Mapping and Resource Information Authority

Mr. MASAFUMI NAGAISHI
Leader
Detailed Planning Study Team
Japan International Cooperation Agency

Witnessed by

VIRGILIO L. LEYRETANA, SR.
Undersecretary and Chairman
Mindanao Economic Development Council

The Japan International Cooperation Agency (hereinafter referred to as "JICA") organized the Japanese Detailed Planning Study Team (hereinafter referred to as "the Team") headed by Mr. Masafumi Nagaishi, to discuss the Implementation Arrangement for the project on "TOPOGRAPHIC MAPPING FOR PEACE AND DEVELOPMENT IN MINDANAO" (hereinafter referred to as "the Project").

The Team held a series of meetings with the officials of the National Mapping and Resource Information Authority (hereinafter referred to as "NAMRIA") and other concerned organizations of the Republic of the Philippines.

Based on the discussions, NAMRIA and the Team agreed to sincerely cooperate in achieving the main objectives of the Project in order to contribute toward effective planning, smooth implementation and enhanced development of Japanese ODA Projects in Mindanao including the Yen Loan Project.

Both parties also agreed to the Implementation Arrangement of the Project. The main issues discussed and agreed upon are summarized below.

1. Counterpart Personnel
   NAMRIA shall provide sufficient counterpart personnel in the course of the Project to assist in the creation of digital topographic maps. MEDCo shall provide sufficient counterpart personnel in order to utilize the project output.

2. Study Area
   Study Area is whole Mindanao Region as shown in Attachment 1 of the Implementation Agreement, but some area will be excluded by technical reason through consultation between consultant team and NAMRIA.

3. Securing the Safety
   The Team requested the security of the Japanese Consultant Team as well as their local counterparts, especially during the field surveys.

   NAMRIA and MEDCo shall arrange the required security measures for the Japanese Consultant Team in cooperation with concerned organizations.

   NAMRIA shall organize a technical team to execute a series of required field survey works in some parts of Project Area where Japanese Experts are restricted to enter.

4. Office Space and Equipment
   NAMRIA and MEDCo shall provide an office space in Manila and Davao, respectively, equipped with telephone lines and internet access in which the cost shall be shouldered by the Japanese Consultant Team.

5. Import of Equipment
   NAMRIA or MEDCo shall act as the consignee of equipment that may be acquired for the Project. They shall carry out all the necessary import procedures and pay custom duties if not exempted.

Both parties have agreed that the equipment thus imported shall be used exclusively for the implementation of the Project under the supervision of the Japanese Consultant Team.

6. Creation of the Technical Coordinating Committee (TCC)

The TCC shall be created to serve as the local consultation arm of the Project in order to facilitate the involvement of all sectors in the production of up-to-date topographic maps. The committee shall be headed by NAMRIA and MEDCo and will consists of concerned organizations from all regions in Mindanao.

7. Dissemination of the Final Report and Products

The Team requested NAMRIA that the final reports and outputs of the Project shall be opened to the public immediately after its completion.

The Team requested NAMRIA that all products produced in the course of the Project shall be made available to relevant projects undertaken with other donor agencies.

NAMRIA and MEDCo shall take full responsibility in the data sharing and distribution procedure that may be necessary to make the outputs of the Project accessible to the public and the private sectors.

8. Data Ownership/Copyright

Both sides agreed the followings about the ownership/copyright on Digital Topographic Map Data and Ortho-Image Map Data (hereinafter referred to as "the Product").

8-1 "The Product" produced in the Project belongs to both NAMRIA and JICA.

8-2 Both NAMRIA and JICA keep the master-copy of "the Product".

8-3 JICA agreed to allow NAMRIA to modify, update or convert "the Product". Ownership/copyright on updated, modified or converted "the Product" belongs to NAMRIA.

8-4 JICA agreed to allow NAMRIA to sell "the Product" at reasonable price.

8-5 NAMRIA agreed to allow JICA to provide "the Product" to person or organization in Japan under these conditions:

1) The Product shall be utilized only for purposes approved by JICA;
2) The Product cannot be transferred to any third party without JICA's approval; and
3) The Product cannot be used for any profitable purpose.

Appendix 3. **Minutes of Meeting on Amendment of Schedule of the Project on Topographic Mapping for Peace and Development in Mindanao on October 13, 2011**

MINUTES OF MEETING
ON
AMENDMENT OF SCHEDULE
OF
THE PROJECT
ON
TOPOGRAPHIC MAPPING FOR PEACE AND DEVELOPMENT
IN
MINDANAO

As a result of discussions during project implementation, the concerned authorities of the Government of Philippines (hereinafter referred to as "GOP") and Japan International Cooperation Agency (hereinafter referred to as "JICA") agreed on the matters described in the annexes attached hereto.

Manila, 13th October, 2011

Peter N. Tiangco, Ph. D.
Administrator
National Mapping and Resource Information Authority
Department of Environment and Natural Resources
Republic of the Philippines

Mr. Shinichi Masuda
Senior Representative
Japan International Cooperation Agency
Philippine Office

Witness

Luwalhati Ricasa Antonino
Chairperson
Mindanao Development Authority

1. Schedule amendment

According to the Implementation Agreement signed on 11th January 2010, the control point survey and field identification of "the Project on Topographic Mapping for Peace and development in Mindanao" (hereinafter referred to as "the Project"), was planned to be completed in December 2010. However, due to security reason in some areas which discourage continuous field survey, control point survey and field identification was only completed in May 2011. Therefore, in order for the project to secure sufficient time to complete the mapping process and technology transfer under the Project it would be appropriate to extend the Project period as described in the schedule below.

2. Specification of the map

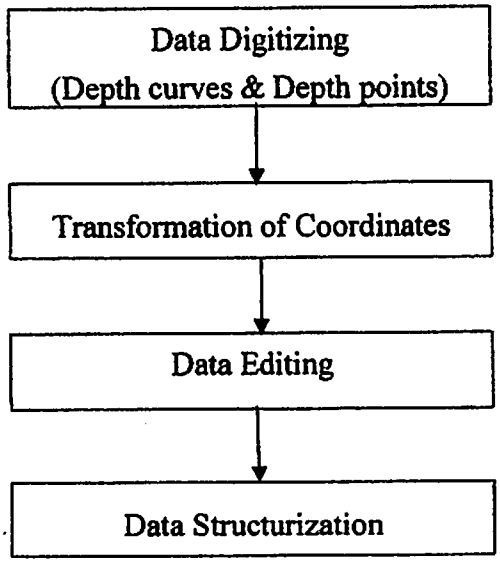
Considering the usage of the final product, comparing existing maps in Philippines, GOP requested JICA to add 58,000sq.km of nautical chart in the digital topographic map as among the final products of the Project. Both parties agreed that the nautical chart shall be developed with the following procedure using existing bathymetric data as well as the areas and survey standards as described below.

(1)Area of Bathymetric Data

The area of bathymetric data is about 58,000sq.km of nautical chart area of existing 1/50,000 scale topographic maps covering the entire area of Mindanao.

(2)Bathymetric Data Production Method

The bathymetric data for 1/50,000 digital topographic maps shall be prepared using a depth curve and depth point data of nautical chart portion of existing 1/50,000 scale topographic maps covering the entire area of Mindanao. The work flow of bathymetric data preparation is as follows:



(3)Survey Standards for Bathymetric Data

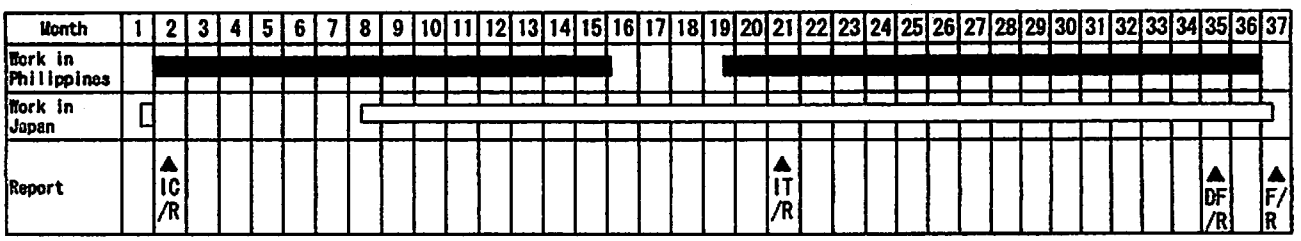
The survey standards for bathymetric data shall be as follows:

- Horizontal Datum : Philippine Reference System 1992(PRS92)
- Hydrographic Datum : Depths in Fathoms at Mean Lower Low Water
- Map Projection : Universal Transverse Mercator Projection (UTM)
- Map Symbols : PMS50K(Philippine Map Symbols for 50k, 2008)

Accordingly, this Minutes of Meeting has been prepared to agree on a new (tentative) schedule and the specification of final products as following the "IV STUDY SCHEDULE" and the "V REPORTS AND FINAL PRODUCTS" in the Implementation Agreement signed on 11th January 2010 between GOP side and Japan International Cooperation Agency.

IV PROJECT SCHEDULE

The Project will be implemented in accordance with the tentative study schedule as shown below. The schedule, including submission of reports stated in the next clause (V), is tentative and still subject to be modified when both parties agree upon and any necessary that arises in the course of the Project.



IC/R : Inception Report, IT/R : Interim Report, DF/R : Draft Final Report, F/R : Final Report

V REPORTS AND FINAL PRODUCTS

JICA shall prepare and submit the following reports and final products of topographic to the GOP.

1. Inception Report

   Ten (10) copies in English at the commencement of the Project

2. Interim Report

   Ten (10) copies in English within twenty-first (21) months after the beginning of the Project

3. Draft Final Report

   Ten (10) copies in English within Thirty-five (35) month after the beginning of the Project

4. Final Report

   Twenty (20) copies in English within two (2) months after the receipt of the comments on the Draft Final Report

5. Final products (Deliverable)

5-1 One (1) set of Satellite Images

5-2 One (1) set of Ortho-Image Maps

5-3 One (1) set of ground control point coordinates

5-4 One (1) set of 1:50,000 scale digital topographic maps data for printing which includes 58,000sq.km of nautical chart area

5-5 One (1) set of 1:50,000 scale digital topographic maps data for GIS applications which includes 58,000sq.km of nautical chart area

Appendix 4. Minutes of Meeting on the Inception Report

MINUTES OF DISCUSSIONS

ON

INCEPTION REPORT

FOR

TOPOGRAPHIC MAPPING FOR PEACE AND DEVELOPMENT

IN MINDANAO

IN

THE REPUBLIC OF THE PHILIPPINES

Fort Bonifacio, Taguig City, 23 April 2010

PETER N. TIANGCO, Ph. D.
Administrator
National Mapping and Resource Information Authority
Department of Environment and Natural Resources
Republic of the Philippines

YUTAKA KOKUFU
JICA Project Team Leader
Japan International Cooperation Agency
Japan

Witnessed by

JESUS G. DUREZA
Secretary and Chairman
Mindanao Development Authority
Republic of the Philippines

I. INTRODUCTION

The JICA Project Team (hereinafter referred to as "the Project Team") for the Project on "Topographic Mapping for Peace and Development in Mindanao", in the Republic of the Philippines (hereinafter referred to as "the Project") dispatched by Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Yutaka KOKUFU commenced the Project in the Republic of the Philippines on April 4, 2010 as one of the Japan-Bangsamoro Initiatives for Reconstruction and Development (J-BIRD).

The Project Team presented and explained the contents of the Inception Report to the officials of National Mapping and Resource Information Authority (hereinafter referred to as "NAMRIA") and Mindanao Development Authority (hereinafter referred to as "MinDA") as the counterpart agencies.

The NAMRIA and MinDA accepted the Inception Report and confirmed the contents of the main outputs of the Project.

II. COMMENTS AND REQUESTS

NAMRIA and MinDA officials reviewed the Inception Report and raised comments and requests on the contents of the Project:

A. On the Objectives of the Study (Item 2.1)

1. The second objective shall include the empowerment of stakeholders that are Regional Offices of National Government Agencies (NGAs), MinDA (formerly MEDCo) and Local Government Units (LGUs) in Mindanao. This will build capability in the utilization of digital topographic data using GIS.

B. On the Technical Coordinating Committee (TCC)

1. NAMRIA and MinDA will discuss the organizational structure, including establishment of a decision making body, roles, functions and membership of TCC to prepare an operation plan for the TCC prior to the TCC meeting in June, 2010.

2. The first TCC meeting to be held in June 2010 shall include workshops which aim to assess the current situation and needs of MinDA and members of the TCC for topographic map utilization.

C. On Technology Transfer

1. The Project Team should conduct capacity and needs assessment among selected members of the TCC.

2. MinDA requested possible financial support for participants to the TCC meetings.

3. The technology transfer, mentioned in the Inception Report is limited to conducting the technology transfer seminar only once. To utilize these mapping data sustainably, it would be necessary to have a training system on GIS and related technologies. Also, it would be necessary to conduct a trainer's training.

4. There shall be a series of technology transfer seminar/workshops in the Project area instead of one as proposed by the Project Team along with capacity development activities.

5. MinDA and members of TCC may not have necessary equipment in utilizing the digital topographic maps. Support of equipment is necessary to those sectors which cannot accommodate digital map utilization.

D. On Topographic Map Data

1. Considering the impact of the project on peace and development in Mindanao, the project area should cover the whole Mindanao including: the ARMM areas of Basilan, Sulu, and Tawi Tawi; and the remote islands of Cagayan de Tawi Tawi, Turtle Islands, and Mambahenauhan Island.
2. NAMRIA technical personnel and some members of the TCC shall join the Project Team in the conduct of quality assurance of subcontracted field activities. NAMRIA requested for necessary financial support during the field survey.
3. Seamless data shall be prepared for smooth utilization of administrative units other than the data by map sheets.
4. NAMRIA requested support materials for map printing since most of the map users still use printed maps.

The Project Team acknowledged the comments and requests, and agreed to convey them to the JICA headquarters.

III. AGREEMENTS

Other than the comments and requests from the NAMRIA and MinDA, both parties agreed on the following matters:

A. The Project offices shall be established in Manila and Mindanao. The Manila office shall be established inside of NAMRIA headquarters and the Mindanao office will be established in Davao after discussing the suitable location with MinDA.

B. Preparation of promotion materials and planning of map utilization shall be conducted in collaboration with NAMRIA and MinDA.

C. Both sides agreed that the field survey in the entire area of Mindanao would be conducted. After confirming the results of the field identification, the succeeding work items shall commence.

IV. Attachments:

A. Inception Report

B. List of Attendants

Topographic Mapping for Peace and Development

in Mindanao

Inception Report

April 2010

PASCO Corporation

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List of Abbreviations and Acronyms

ALOS	Advanced Land Observing Satellite
DA	Department of Agriculture
DEM	Digital Elevation Models
DENR	Department of Environment and Natural Resources
DOTC	Department of Transportation and Communication
DGPS	Differential Global Positioning System
DPWH	Department of Public Works and Highways
GIS	Geographic Information System
GPS	Global Positioning System
IFSAR	Interferometric Synthetic Aperture Radar
JICA	Japan International Cooperation Agency
LGU	Local Government Unit
NAMRIA	National Mapping and Resources Information Authority
MinDA	Mindanao Development Authority
RPC	Rational Polynomial Coefficient
SPOT	Pour l'Observation de la Terre

1. Background

In Mindanao, topographic maps produced in the 1950s are still used as base maps for regional planning and infrastructure development. Updating the geographic data for peace and development has been called for.

In the Philippines, the National Mapping and Resource Information Agency (hereinafter referred to as "NAMRIA") is responsible for producing, updating, and distributing topographic maps. The Agency has the potential of carrying out the tasks; however, because of shortage of funds and human resources, the potential has not realized to update the topographic maps in Mindanao. The delay has been affecting various planning and development activities: road; disaster prevention mitigation; environmental management; social services; and so forth.

In response to the request of the Government of the Republic of Philippines (hereinafter referred to as "GOP"), the Government of Japan (hereinafter referred to as "GOJ") has conducted a preliminary study in December 2009. On January 11, 2010, both parties have signed the Implementation Arrangement to conduct the "Project on Topographic Mapping for Peace and Development in Mindanao (hereinafter referred to as "the Project") as one of the Japan-Bangsamoro Initiatives for Reconstruction and Development (J-BIRD).

The Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for implementation of technical cooperation programs of GOJ, will undertake the Project in accordance with the relevant laws and regulations enforced in Japan.

On the part of GOP, NAMRIA and Mindanao Development Authority (successive body of former Midanao Economic Development Council, hereinafter referred to as "MinDA") shall act as the counterpart agencies to the JICA Project Team (hereinafter referred to as "the Project Team") and also the coordinating body in relation with other governmental and non-governmental organizations concerned for the smooth implementation of the Study.

2. Outline of the Project

2.1 Objectives of the Project

The major objective of the Project is to produce 1:50,000 digital topographical maps used as basic information for development-planning in Mindanao. More specifically the objectives are:

- Preparation of digital topographic maps covering, as shown in Figure 1, at a scale of 1:50,000; and
- Implementation of necessary support on wide and effective uses of the digital topographic maps and GIS.

The Project Team utilizes the existing topographic maps and related information using stereo-satellite imagery to produce the digital topographic maps.

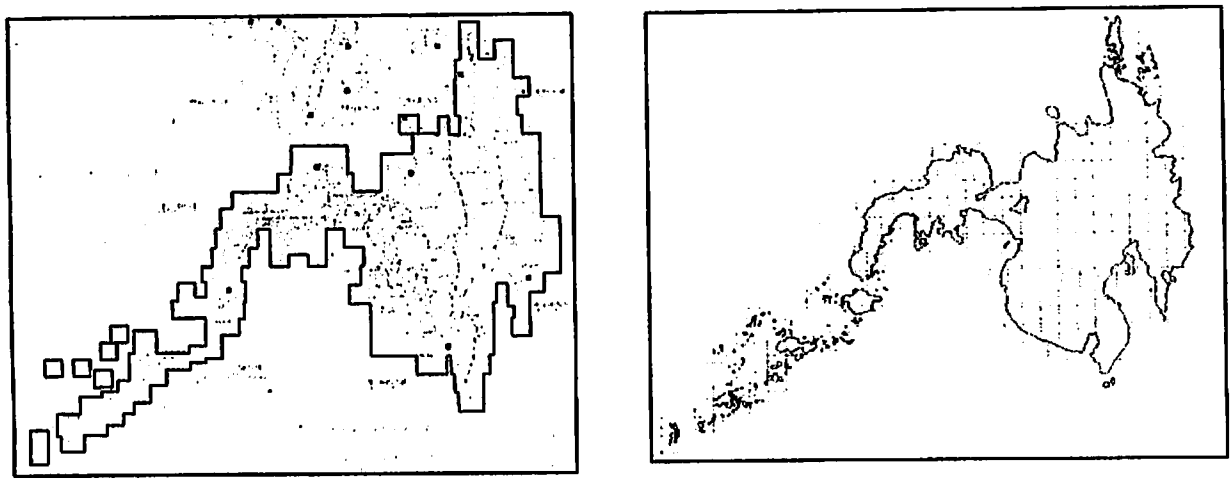
The Project Team will study current use of maps in organizations of the Technical Coordinating Committee members. Based on the result of the study, the Project Team will present an example application at the technology transfer seminar.

2.2 Project Area

1) Target Area

The project area covers the entire area of Mindanao.

Figure 1 Project Area



Note: The squares show the boundaries of map sheets.

2) Target Organizations of Data Application

The members of the Technical Coordinating Committee are the major targets for supporting data application. NAMRIA; MinDA; DENR, NEDA, DOTC, and DA are the major organizations at the central level; Planning and development related departments of the provincial governments are the targets at the local level. To cities and municipalities, that will not be able to participate in the technology transfer seminar, supporting information shall be provided.

2.3 Survey Standards

The survey standards shall be as follows:

Reference System	PRS92 (Philippine Reference System 1992);
Standard of height	The existing benchmark is followed;
Projection:	To be discussed with the counterparts;
Contour interval:	A contour interval shall be 20.0 m.

The following sentences will be added to the data files:

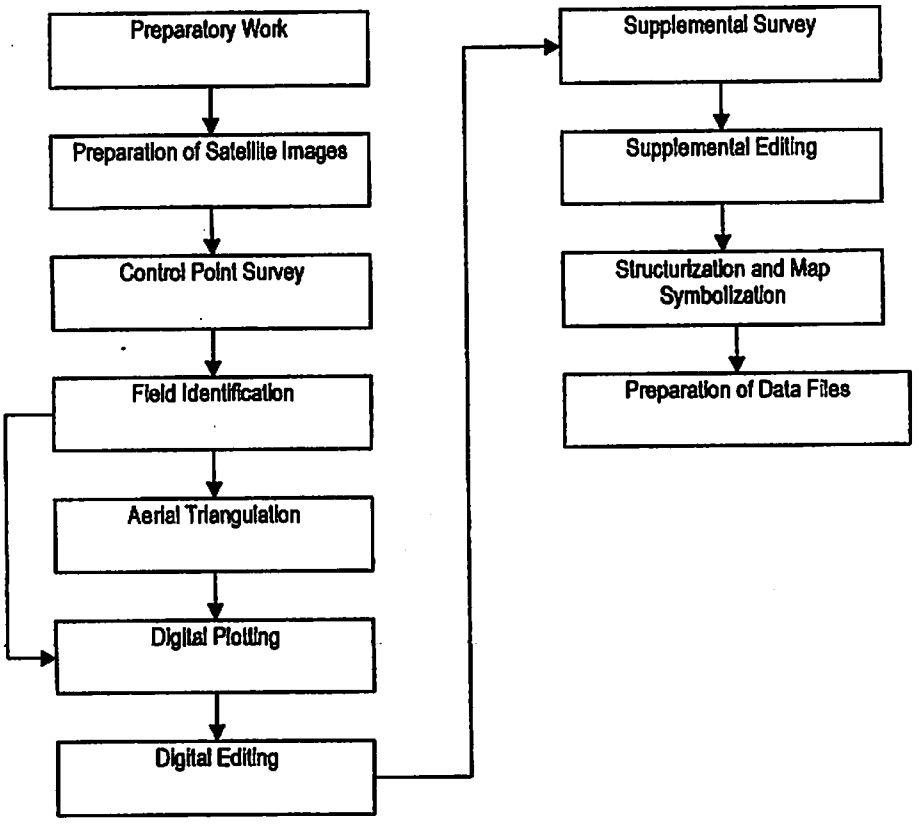
> *This digital map was prepared jointly by Japan International Cooperation Agency (JICA) under the Japanese Government Technical Cooperation Program and the Government of Philippines.*

2.4 Conforming to the Rules and Regulations Established in 2006

The standards and procedures on digital mapping and ortho-photo preparation have been specified in December 2006. The Project shall follow the work procedures: satellite data acquisition; control point survey; field survey; aerial triangulation; digital plotting; digital editing; field completion and digital editing; data structurization; map symbolization; and data file preparation. On the work items that are not specified in the rules and regulations, the Project Team will discuss with the counterparts.

The work flow of producing digital topographic maps from satellite images is as follows:

Figure 2 Digital Topographic Mapping Work Flow



2.5 Satellite imagery acquisition

The Team will acquire following satellite images of the target area:

- Type: Advanced Land Observing Satellite – PRISM (ALOS)
- Target Area: Mindanao

The archives of ALOS images include images of which the ratio of cloud cover exceeds 20 % which does not satisfy the Project standards. For those areas with high cloud coverage, the Project Team will order new ALOS images to be recorded for the Project.

The deadline of ALOS image acquisition shall be the end of July, 2010 when the succeeding work of control point survey will be commenced. Areas where ALOS images will not be acquired because of the time limitation shall be covered using existing SPOT and IFSAR images.

NAMRIA already possesses some of the SPOT images. The Project Team will discuss the coverage of the SPOT images and possible uses during field identification. From IFSAR images, contour lines can be extracted; however, classification of vegetation cannot be determined. When IFSAR data will be used, the Project Team will acquire additional high resolution satellite images.

2.6 Utilization of Existing Topographical Maps

The Project Team will use 1/250,000 topographical maps for work planning. The topographic maps at a scale of 1:50,000 will be used for field identification. The Project Team plans to use the digitized topographic data at a scale of 1:50,000 as reference for annotations and administrative boundaries.

The map atlas data created by JICA in 2008 cover Mindanao. After examining the data, the Project Team will use the data as reference for field identification.

2.7 Organizational Setting

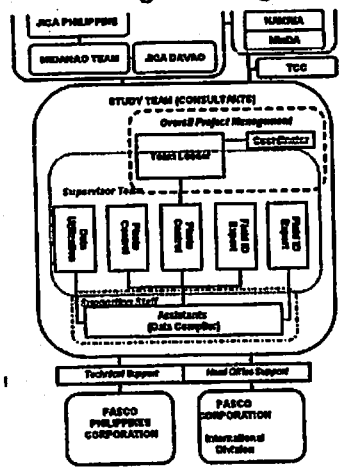
The Project will be implemented with three organizations: JICA; counterpart agencies; and the Project Team.

To ensure proper use and application of the data, and to reflect opinions of map users, the TCC will be formed. The TCC members include: NAMRIA, MinDA, Regional Offices of the Central Government and local governments in Mindanao.

TCC shall function as a supporting body which shares information and exchange opinions regarding the Project. The Project Team expects supports from TCC throughout of the Project especially during field identification.

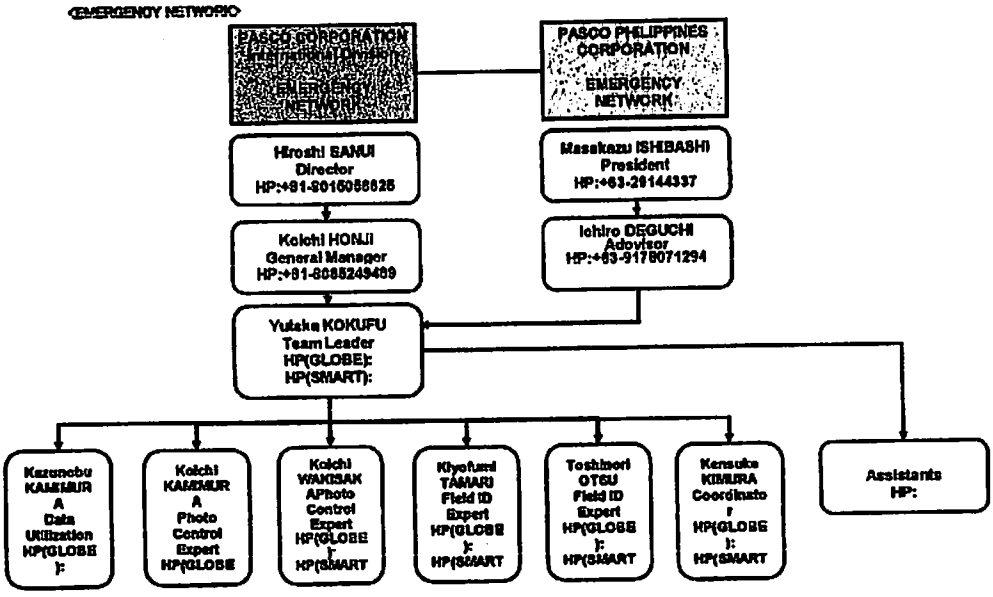
Pasco International Division and the affiliated local company of Pasco will support the Project Team both technically and administratively.

Figure 3 Organization Setting for Project Implementation



The emergency communication structure is shown in the following chart:

Figure 4 Emergency Communication Structure



The Project Team consists of the following eight persons.

(1) Team Leader
(2) Data Application
(3) Control Point Survey/Pricking 1
(4) Control Point Survey/Pricking 2
(5) Field Identification/Field Completion 1
(6) Field Identification/Field Completion 2
(7) Project Advisor
(8) Project Coordinator

Project Advisor is positioned to support Team Leader.

Control point survey/pricking will be subcontracted. The outline is summarized in Table 1; details are discussed in 4. Implementation Plan of the Field Survey.

Table 1 Plan of Operation in the Philippines (Tentative)

	Quantity	Duration	Parties
Control-point survey	200 points	About three months	{Preparation: 10 days + field work: 30 day + observation: 100 days [200 observation points divided by two (one party per day)] + 20 days for calculation } / planned work period: 90 days = about 2 teams
Pricking	200 points	About three months	{Preparation 10: days + field work: 15 days + observation: 50 days [200 point / 4 points on the average (observation workload per day by one party)]+ calculation 10 days}/ planned work period: 90 days = about one group
Field Identification	About 95,000 sq. km.	Five months	95,000 sq km / 18 sq km on the average (one party per day) / planned work period: 150 days = about 35 parties
Field Completion		Four months	95,000 sq km / 24 sq km on the average (one party per day) / planned work period: 120 days = about 33 parties

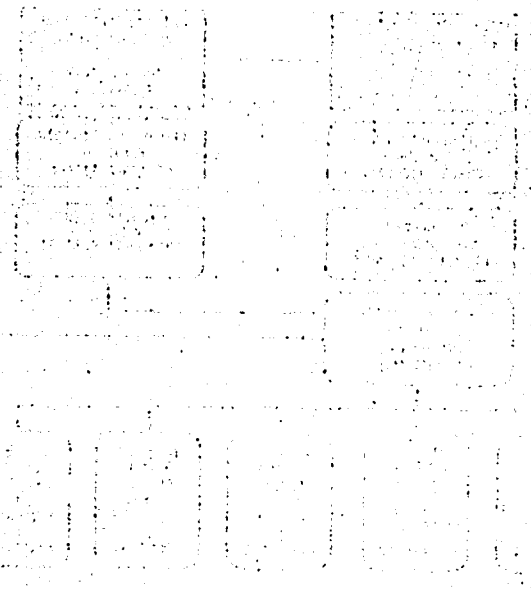
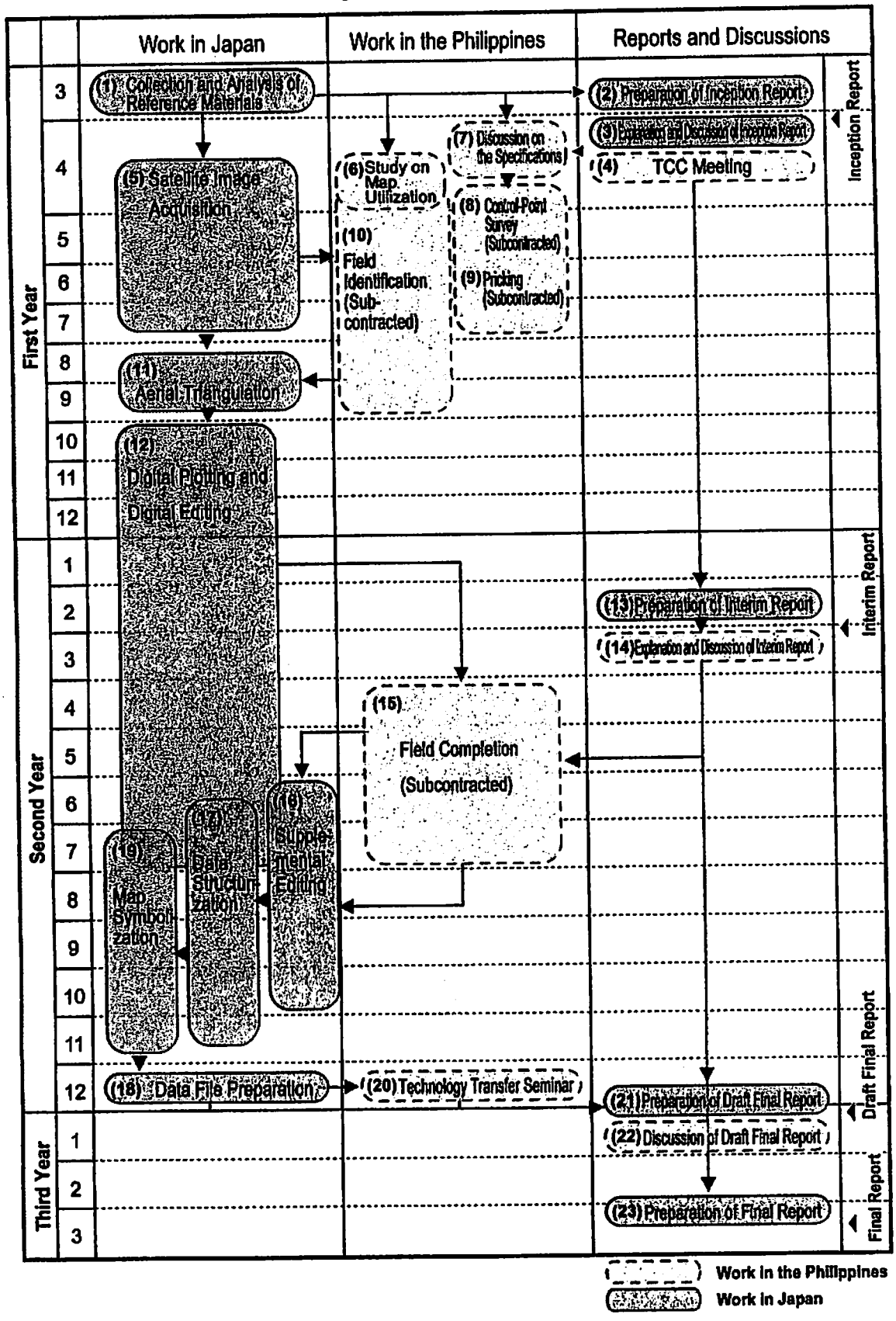


Figure 5 Project Flow Chart



3. Project Implementation Method

Project Period: March, 2010 - February 2012

[1] Collection and Analysis of Reference Materials (Work in Japan)

The Project Team will collect, organize and analyze data and information related to the Project. Examples of reference materials collected and to be collected are: the existing topographical maps; land use maps; satellite imagery; aerial photographs; control points from organizations such as DPWH, DENR, MinDA, and the Peace Building Committee of the President. Reference materials from private corporations will be collected; the internet will be utilized to collect data and information.

[2] Preparation of Inception Report (Work in Japan)

The Project Team prepares an inception report by examining TOR, Preliminary Study Report and other materials to formulate policies, methods, schedule, manning, technology transfer plan and others.

[3] Explanation and Discussion of Inception Report (Work in the Philippines)

The Project Team presents and explains the Inception Report to the counterpart. The contents will be discussed by both parties, and details of the Project will be confirmed. Especially, the mapping area and methods of topographic map data will be confirmed and agreed. The organizational structure of the Project implementation and responsibility of facilitation by the Philippine side will be confirmed.

[4] Holding a TCC Meeting (Work in the Philippines)

A TCC meeting will be held. The Project Team will: explain the outline of the Project and ask for cooperation during the Project. One of the significant topics would be opinions on current uses of the topographic maps and future application of the data to be created. The Project Team will encourage exchange of opinions among members of TCC.

[5] Satellite Imagery Acquisition (Work in Japan)

The Project Team will consider the following points for satellite image acquisition:

- The satellite imagery used for stereo plotting shall cover entire project area;
- The satellite imagery used for planimetric-features extraction shall cover entire project area;
- The general conditions of satellite imagery are as follows:
  (1) It is observed at the time when operation of a satellite is stable;
  (2) There is little influence of clouds, such as haze and fog, and cloud shadow.
  (3) Surface of the earth is not covered with a forest fire, an open-air burning, and volcanic ashes, flooding or other unusual substances.
- The satellite imagery used for stereo plotting is based on the ALOS image of forward viewing, nadir viewing and backward viewing (three directional vision); and
- The overlap between images shall be secured to avoid a blank part for stereo plotting.

The processing requirements of the satellite imagery are as follows:

Table 2 Image Processing Requirement

Type	Selection Item
Processing level	1B1
Orbital data	High precision orbital information
Posture data	High precision posture determination value

The Project Team will check the following items of the satellite images upon reception:

(1) Coverage;

(2) Results of the gradation (color, sensibility, contrast, etc.) and existence of noise; and

(3) Suitability for survey usage.

[6] Discussion on the Specifications (Work in the Philippines)

The specifications (standards of map expressions such as map symbols and annotations) of 1:50,000 topographical map will be discussed and agreed by the Project Team and the counterpart.

The basis of the specifications is Specifications 2008: (1) The Specifications for 1:50,000 Topographic Maps; (2) the Specifications for Map Symbolization; and (3) The Manual For Ortho-Photo Preparation. The specifications were prepared during the "Study for Mapping Policy and Topographic Mapping for Integrated National Development Plan in the Republic of the Philippines" with a JICA funding.

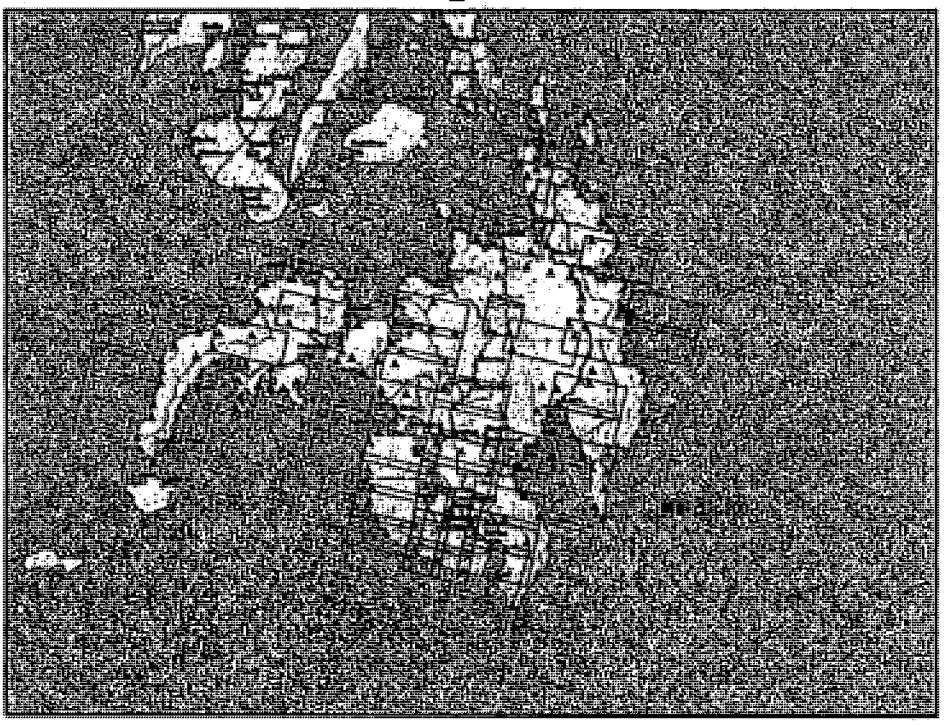
[7] Study on Map Utilization (Work in the Philippines)

For promoting the topographic mapping data, the Project Team will study current uses and future application of digital topographic maps. MinDA will be the major target of the study. For the local governments, an initial assessment will be conducted with the counterpart and interview survey will be conducted to selected local governments. Based on the study, examples of application will be presented at the technology transfer seminar.

[8] Control-Point Survey (Work in the Philippines: Subcontract)

The horizontal and vertical control points, necessary for aerial triangulation, will be determined using GPS.

Figure 6 Control Points



The control points will be distributed in the blocks and surrounding major cities as shown in Figure 6. The number of control points shall satisfy the precision requirement of aerial triangulation; the total number of points will be about 200. The control points of NAMRIA in areas where peace has not been secured, Handy GPS which can observe DGPS will be used to acquire coordinate data in a short period of time.

[9] Pricking (Leveling) (Work in the Philippines: Subcontract)

1) Pricking

The benchmark shall be determined using the existing leveling routes within the Project area. The points shall be pricked as in prinking of the control points. If the benchmarks cannot be determined from the satellite images, the coordinates shall be acquired using Handy GPS.

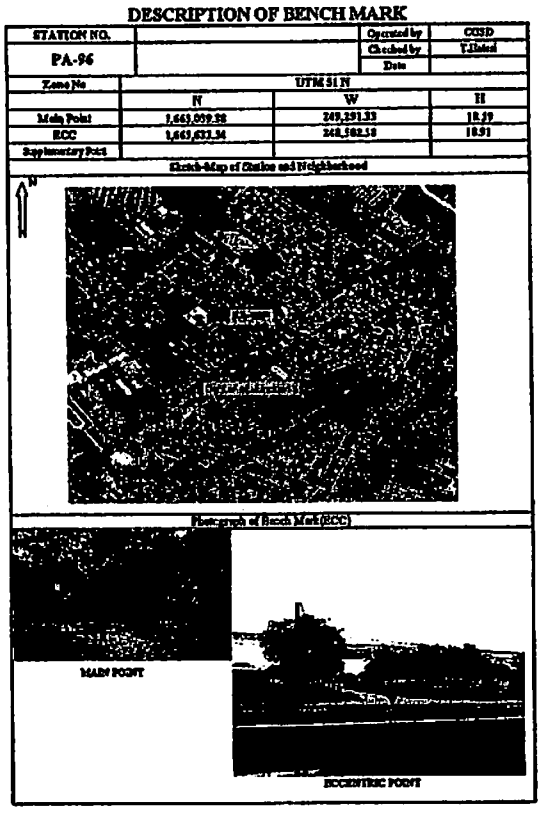
2) Leveling

The vertical control points required for aerial triangulation shall be determined by pricking the existing benchmarks. If necessary, direct leveling and GPS leveling from a benchmark to the points in which pricking is possible will be performed.

The altitude of a GPS control point shall be determined by leveling as much as possible.

The result of (leveling) shall be compiled as ledger of detailed pricking point description with photographs of the sites.

Figure 7 Ledger of Pricking Point Description


DESCRIPTION OF BENCH MARK

STATION NO.		Operated by	CGSD
PA-96		Checked by	T.Ishii
		Date	
Zone No	UTM 51 N		
	N	W	H
Main Point	1,643,099.98	249,291.33	18.59
ECC	1,643,031.34	248,982.18	18.91
Supplementary Point			

Sketch Map of Station and Neighborhood

Photograph of Bench Mark (ECC)

[10] Field Identification (Work in the Philippines: Subcontract)

Field identification will be performed using the acquired satellite images to planimetric features which cannot be confirmed by interpreting the satellite images.

The Project covers large areas. Moreover, the geographic condition makes the work harder; the altitude at the central and western mountainous areas is about 2,000 m.

Generally, one Japanese surveyor performs field identification of 1:50,000 topographical map at an average of 20 sq. m per day. It would be difficult for a local consultant to complete the work with the Project period. Therefore, the Project Team has decided to divide the Project area into three regions to subcontract the work to enhance efficiency to complete the work within the Project period. The three regional groups are: Eastern Region (Region XI & XIII); Central Region (Region X & XII); and Western Region (Region IX & ARMM).

The proposed method requires ten (10) parties in one region. One party consists of one supervisor, one engineer, and two assistants.

Since the work will involve many surveyors, the Project Team will inspect the results of field identification in a timely manner as the work progresses.

1) Reference Collection

The Project Team collects information required for a topographic mapping from departments of public works, city planning, road, river management and other related agencies of the local

governments. The pieces of information to be collected are: road, village, river, canal, names of railways, names of region and district, road classification, and administrative boundary. The method of collecting the information and its schedule will be discussed and determined with the counterparts.

2) Preliminary Interpretation

As referring the existing topographic maps, the satellite images will be interpreted using stereoscopes before the field identification work. The items to be interpreted shall be the basic planimetric features: road, village, river, canal, railway and vegetation. Moreover, school, church cemetery and other items shall be interpreted as much as possible. The interpretation key will be prepared to secure consistency of interpreting subjects that are prone to errors.

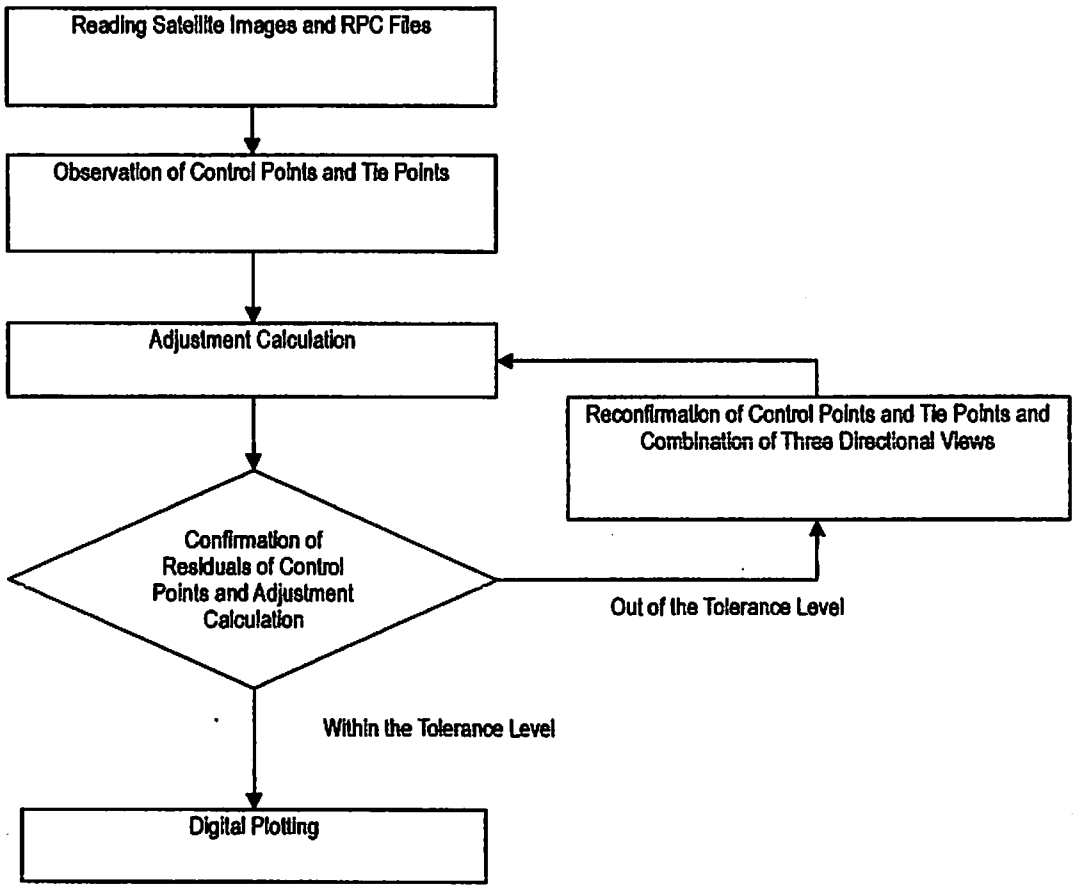
[11] Aerial Triangulation (Work in Japan)

In order to build stereo models required for the successive work of digital-plotting, ALOS images and RPC (Rational Polynomial Coefficient) files incidental to the ALOS are taken to a digital photogrammetry system. The ground control points and tie points are observed to perform adjustment calculation by the bundle method.

Since the ALOS images are observed with three directions (forward, nadir and backward views), the adjustment calculation shall use all images from three views. However, there was a precedent of discrepancies of the results from combinations of images used; there have been discrepancies among four different combinations: 1) all three views; 2) forward and nadir views; 3) backward and nadir views; and 4) forward and backward views. The adjustment calculation shall be performed in consideration with the discrepancies of combination of the views.

The work flow of aerial triangulation is shown in Figure 8.

Figure 8 Work Flow of Aerial Triangulation

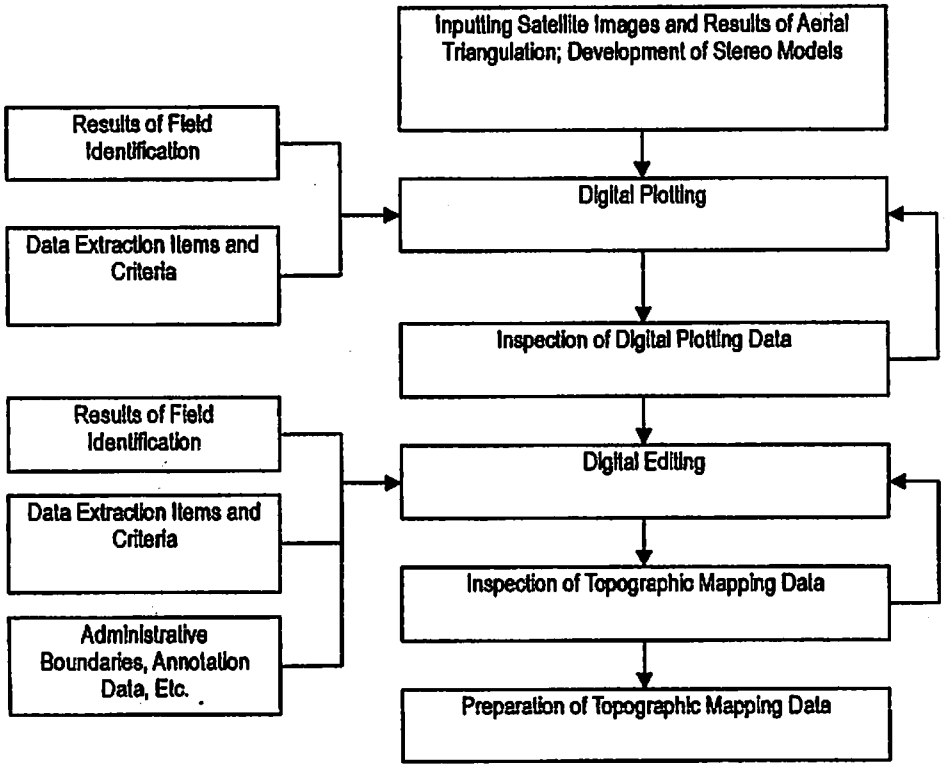


[12] Digital Plotting and Digital Editing (Work in Japan)

The stereo models created from the satellite images and the results of aerial triangulation and the results from field identification are used to conduct digital plotting and digital editing. The data will be extracted in accordance with the agreement of the discussion on the specifications which determines the items and standards of data extraction. Unclear features of interpretation shall be clarified in the process of field completion.

In accordance with the standards of data extraction and field identification, the data will be inspected on items such as: joining of line objects; completion of polygons; and cleaning of unnecessary objects. To the cleaned data, administrative boundaries and annotation will be added to complete the topographic data. In the process, joining of map sheets shall be inspected as well.

Figure 9 Digital Plotting and Editing Work Flow



[13] Preparation of Interim Report (IT/R) (Work in Japan)

The results of the Project, posterior to the Inception Report, will be summarized as the Interim Report (IC/R).

[14] Explanation and Discussion of Interim Report (IT/R) (Work in the Philippines)

The contents of the Interim Report will be explained and discussed. The results of discussion and agreements will be recorded in the minutes of meeting. The meeting is planned to be held in April, 2011.

[15] Field Completion (Work in the Philippines: Subcontract)

Matters in question such as expressions of topographic and planimetric features or administrative boundaries and annotations shall be examined during field completion.

In order to investigate the points in question during plotting and editing, the edited originals will be brought to the field. The method will employ Handy GPS for smooth operation of the work.

[16] Supplemental Editing (Work in Japan)

Using the results of field completion, digital editing will be finalized. The joining between map sheets is certainly checked at the final stage of supplemental digital editing. Then the digital data will be finalized incorporating the results of field completion.

Incidentally, it would be expected that the contour lines created using ALOS and other satellite data may not match the existing contour lines. If this was the case, such matters would be discussed with the counterpart.

[17] Data Structurization (Work in Japan)

The digital data after supplemental editing are structured to be used for GIS. To be used as in a GIS, layer structures and topology will be added to develop a GIS topographic database.

All features compiled will be included in the database. Names of schools, hospitals, churches, cemeteries, villages, rivers, water bodies, railroads, bridges, regions and districts and road classification and vegetation will be encoded as feature attributes.

[18] Map Symbolization (Work in Japan)

The topographic data will be symbolized and data for print maps will be prepared. The features will be selective not all the data will be included to enhance readability.

To the print map data, the following note will be added:

> *This digital map was prepared jointly by Japan International Cooperation Agency (JICA) under the Japanese Government Technical Cooperation Program and the Government of Philippines.*

[19] Data File Preparation (Work in Japan)

To the data prepared, metadata will be prepared. The metadata shall include information such as contents of the data, quality and characteristics. The GIS topographic database, metadata and data for printing shall be stored in CD-ROM or DVD.

[20] Holding a Technology Transfer Seminar (Work in the Philippines)

A technology transfer seminar will be held for the counterpart, the members of TCC and local governments. A sample of GIS application using the data will be presented to promote wide use of the digital topographic data. The seminar is planned to be held once in Davao.

[21] Preparation of Draft Final Report (Work in Japan)

A Draft Final Report is prepared as compiling all the results of the Project.

[22] Discussion of Draft Final Report (Work in the Philippines)

The Project Team submits the Draft Final Report to the Philippines side, and the contents will be explained and discussed. This result of the discussion will be recorded in the minutes of meeting.

[23] Preparation of Final Report (Work in Japan)

As reflecting the comments from the counterpart, the Draft Final Report will be finalized as the Final Report.

4. Implementation Plan of the Field Survey (Draft)

Figure 3 Organization Setting for Project Implementation showed the structure of project implementation. In implementing the field survey, safety management and emergency communication shall be shared among NAMRIA, MinDA and the members of TCC. The subject shall be discussed and agreed in the TCC meeting so that the Project Team will be notified about the local safety and security conditions. The TCC meeting shall include the local contractors to share the rules and consideration on safety and security in the region.

Hereafter, the implementation plan of the field survey has the following components: contents of field survey; subcontract; installation of Project offices; managers of subcontracted work; management and supervision of subcontracted work; and safety-management organization."

1. Contents of Field Survey

In the following work items and quantity will be subcontracted:

(1) Control-point survey: Eastern Region (about 100 points) and Western Region (about 100 points)
(2) Pricking (leveling): the whole region of Mindanao--200 points
(3) Field identification/field completion: Eastern Region (about 37,300 sq. km), Central Region (about 36,000 sq. km); Western Region (about 21,700 sq. km)

2. Subcontract

The Project Team and the counterpart will discuss and decide on the standards of control point survey, pricking (leveling), and field identification/field completion. Moreover, the shortlist of the subcontractors for a bid is also discussed with the counterpart. After selecting the subcontractors the bidding documents will be prepared and distributed in June 2010. The bidding documents to be prepared will be: control-point survey (Eastern Region, Western Region), pricking (leveling), and field identification/field completion (Eastern Region, Central Region, and Western Region).

3. Installation of Project Office

The Project Team will establish the project offices in Davao and Manila.

4. Managers of the Subcontract Work

General Supervisor: Yutaka Kokufu

Control-point Survey/ Pricking (Leveling): Koichi Kamimura, Koichi Wakisaka

Field Identification / Field Completion: Kiyofumi Tamari, Toshinori Otsu

5. Management and Supervision of Subcontractors

The headquarters of management and supervision shall be the Davao office. To manage progress and to control quality, the members of the Project Team will visit Surigao, Butuan, Cagayan de Oro, General Santos, Cotabato, Dipolog, and Zamboanga as shown in Figure 11 A Plan for Progress and Quality Control Management. The subcontractors are required to report progress of the work and entry/exit dates to the Project Team by e-mail every week. The output is to be delivered to the Project office in Davao weekly. The emergency communication network is as shown in Figure 4 Emergency Communication Structure.

Hereafter, methods of management and supervision will be discussed in the Davao Project office and on site.

<Davao Project Office>

(1) The Project Team manages the progress of the subcontracted work using database with maps.
(2) The Project Team inspects horizontal and vertical accuracy of control point survey and pricking (leveling) using software of the Project Team.
(3) The Project Team inspects school, church, cemetery, village, river, canal, railroad and its name, names of regions and districts, road classification, and administrative boundaries recorded on to the existing topographic maps.

<On Site>

(1) The Project Team instructs use of the Pathfinder GPS to the subcontractors for efficient implementation of control point survey and pricking (leveling).
(2) The Project Team or assistants for the Project Team confirms unidentified features using Handy GPS on site to check the results of the subcontractors to avoid omission in data.

6. Safety-Management for Field Work

The Project Team and the subcontractors shall submit a voyage plan two week prior to the date of entry to the sites in accordance with the safety standards of the Embassy of Japan in the Philippines and JICA Philippine Office.

As establishing the Project Office, the Project Team will investigate conditions of the sites to confirm locations of police station and emergency hospital. The phone numbers of police and hospital and other significant telephone numbers will be listed and handed to each member of the Project. Each team member shall have two mobile phones of different telephone company.

<Project Team >

(1) The Project Team shall inform schedules of each member and progress of the Project to the JICA Davao Office every week, and at the same time same information shall be sent to the JICA Philippine Office by e-mail.
(2) The team member shall report his schedule to the team leader; if there is any change of schedule, updated schedule shall be reported to the team leader.
(3) The work hours of the Davao Project Office shall follow the working hour of MinDA.
(4) Field work shall be limited within the city boundary; the team members shall not go out of the city boundary.
(5) The areas of field work shall be discussed with the counterpart. If safety and security are not assured, no person shall enter such an area by any means.
(6) The Project Team members will stay in an accommodation establishment specified by the JICA Philippine Office.
(7) The Project Team members are not allowed to act alone in Mindanao.
(8) The Project Team members will accompany one or more local assistant(s) to the sites.
(9) The Project Team members start outside activities after 9:00 am and return to an accommodation before 4:00 pm. After returning, the team member shall report to the Davao Project Office.
(10) After 4:00 pm, the Project Team members do not go outside of the premise of an accommodation establishment.

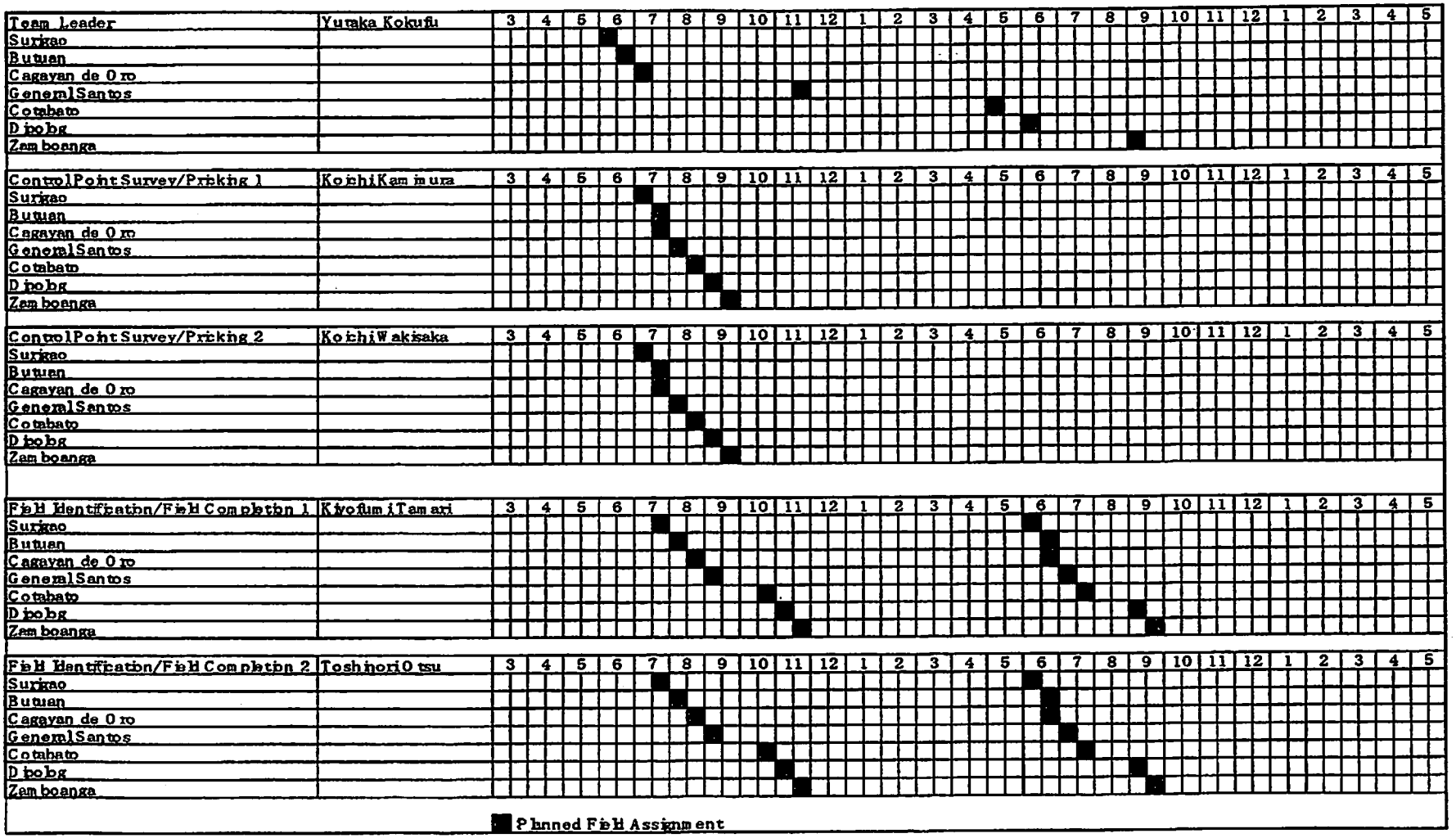
<Subcontractors>

(1) The Subcontractor shall report the schedule and progress of the work to the Project Team every week.
(2) The Subcontractor shall establish an organization structure for safety management and an emergency communication list of workers. The organization and emergency communication list shall be submitted to the Project Team.
(3) The Subcontractor shall not enter an area where safety and security have not been assured. The condition shall be reported to the Project Team.
(4) The outputs shall be delivered to the Davao Project Office or to an accommodation establishment where the Project Team members stay.

Figure 10 Assignments of Team Members

Position	Name	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5
Team Leader	Yutaka Kokufu																											
Data Application	Kazunobu Kamimura																											
ControlPoint Survey/Pricking 1	Koichi Kamimura																											
ControlPoint Survey/Pricking 2	Koichi Wakisaka																											
Field Identification/Field Completion 1	Kiyofumi Tamari																											
Field Identification/Field Completion 2	Toshinori Otsu																											

Figure 11 A Plan for Progress and Quality Control Management (Tentative)



ATTN: Bernadetha Guarez

3241923

Republic of the Philippines

MINDANAO ECONOMIC DEVELOPMENT COUNCIL

Regions IX, X, XI, XII, XIII, CARAGA and ARMM

Date of Meeting : 14 APRIL 2010 @ 10:00 am

Place of Meeting : MinDA Conference Room

Purpose of Meeting : Topographic Mapping Meeting w/ JICA

ATTENDANCE SHEET

NAME	AGENCY	SIGNATURE
Mary Bernadetha P. Guarez	JICA DPO	
Reymond P. Tejo	MinDA	
Jhan Barrera	MinDA	
Ma. Evelia Ausa	MinDA	
Charlie A. Escaro	MinDA	
Amelyn Binancijan		
Shiho Akamatsu	JICA DPO	
Kiyofumi TAMARI	Pasco (DMS)	
Kazunobu Kamimura	Pacet JICA Project Team	
JOOG GALO LEYBA	MAMALA	
Yutaka KOKUBU	PASCO Co.,	
Kensuke KIMURA	Pasco	
NAKAISHI Masafumi	JICA Manila	
Hernan Pineda	JICA Manila	
Gina Ruth Cayetano	MinDA	
[illegible]	[illegible]	
Donna Jane P. Dumania	MinDA	

ATTENDANCE

Meeting re: Project on Topographic Mapping for Peace and Development in Mindanao
NAMRIA-MGD Conference Room
12 April 2010, 2:30 PM

	Name		Signature
1.	Dir Jose Galo P. Isada, Jr	-	
2.	Adir. Audie A. Ventirez	-	
3.	Engr. Ofelia T. Castro	-	
4.	Mr. Joaquin Borja	-	
5.	Ms. Mary Jane Montemor	-	
6.	Yutaka Kokufu	-	
7.	Kiyofumi Tamari	-	
8.	Kensuke Kimura	-	
9.	Kazunobu Kamimura	-	
10.	_____	-	
11.	_____	-	
12.	_____	-	

ATTENDANCE

1st Meeting of Inception Report
The Project on Topographic Mapping for Peace and Development in Mindanao
NAMRIA-MGD Multi-Purpose Room
08 April 2010, ~~1:30~~ PM

	Name		Signature
1.	JOSE GALO ISIDA	-	
2.	Ruel DM Belen	-	
3.	Yutaka KOKUFU	-	
4.	KENSUKE KIMURA	-	
5.		-	
6.	R.C. Catahalan	-	
7.	Joaquin Borja, Jr.	-	
8.	ephie castro	-	
9.	Audie Vantuer	-	
10.	MJ MONTEMOR	-	
11.	~~Kiyofumi~~ TAMARI	-	
12.	BING TOTAÑES	-	JICA
13.	HERNAN PINEDA	-	
14.	Kazunobu Kamimura	-	
15.	NAGAISHI Masafumi		

Appendix 5. Minutes of Meeting on the Interim Report

The Project on Topographic Mapping for Peace and Development in Mindanao In the Republic of the Philippines

Minutes of Meeting

Subject		Interim Report Presentation		
Date		December 08, 2011	Time	10:00 am -12:00 pm
Place		NAMRIA Conference, Taguig City		
Participants	NAMRIA	1. Mr. Jose Galo Isada – Director, Mapping and Geodesy Dapartment (MGD) 2. Mr. Ruel DM. Belen –Asst. Director, Mapping and Geodesy Department (MGD) 3. Mr. Joaquin Borja, Jr.- OIC, Cartography Division, MGD 4. Ms. Ophelia Castro - Division Chief, Photography Division 5. Ms. Mary Jane Montemor – Engineer II, Cartography Division, MGD 6. Mr. Jose Villanueva – Engineer II, Cartography Division, MGD 7. Mr. Yutaka KOKUFU – Project Team Leader, Project Team		
	MinDA	8. Mr. Junee Warren M. Riogeleon – Engineer, MinDA		
	JICA	9. Mr. Shinichi Masuda – Senior Representative, JICA Philippine Office		
		10. Mr. Kazuo Sudo – JICA Senior Advisor to ARMM		
		11. Ms. Shiho Akamatsu – Project Formulation Adviser, JICA Davao		
		12. Mr. Hernan Pineda – Program Asst., JICA Philippine Office		
	Project Team	13. Mr. Yutaka Kokufu – Project Team Leader, Project Team		

AGENDA :

1. Explanation and Discussion of Interim Report
2. Confirmation of the Minutes of Meeting for the coordination meeting on November 29, 2011 in Davao City
3. Preparation of Field Completion Work
   - Supporting Letter for Field Completion Work from MinDA
   - Production of Draft topographic maps by NAMRIA and the Project Team
   - Technical Briefing for Field Completion Work to the Local Contractors by the Project Team and NAMRIA
   - Safety Measures Briefing by JICA and the Project Team
   - Meeting on Security clearance and Safety Measures from J-CCCH
   - Meeting on Safety Measures (ARMM and MILF office)

The Coordination Meeting for the NAMRIA, MinDA, JICA and Projecrt Team for the Project Topographic Mapping for Peace and Development in Mindanao was presided by Dir. Jose Galo P. Isada, Jr. of NAMRIA. He presented the agenda of the meeting prepared by Mr. Kokufu.

The following issues and concerns was discussed and agreed during the meeting:

1) Mr. Kokufu presented and discussed the Interim Report:

1.1. Objective
1.2 Outline of the Study
1.3 Project Area
1.4 Change of Project Period

1.5 Specification of Bathymetric Data
1.6 Current Issues of Preparation of Topographic Mapping
1.7 Organization Setting
1.8 Major Activities of the Project Team
1.9 Safety Management of Project Team and Contractors
1.10 Output of the Project
1.11 Project Work Flow and Progress

Mr. Kokufu explained that the Original Project Area:95,000sq.km excluding the ARMM areas of Basilan, Sulu, and Tawi Tawi; and remote islands of Cagayan de Tawi Tawi, Turtle Islands, and Mambahenauhan Island. However, it was modified into 100,500sq.km covering all the regions in Mindanao.

He also mentioned about the change of the Project Period. The Project period was changed 2 times from March 2010 to August 2012,as agreed by JICA, however, due to safety concerns especially in critical areas JICA agreed to extend until February 2013. Therefore the project period starts from March 2010 and will be completed until February 2013.

Further, he also discussed about the acquisition of Bathymetric Data requested by NAMRIA. The 1:50,000 digital topographic map data includes the bathymetric data in which the area of the bathymetric mapping is 58,000sq km.

Mr. Kokufu also mentioned about the current issues of topographic map preparation, and according to him there are still 4% are considered to be a critical areas of the covered project area and about 20% of the project area are cloudy covered by the satellite image. The JICA and the Project Team agreed to produce a digital topographic maps with all data acquired from the field completion data to be completed on August 2012 wherein the satellite images are already acquired.

Mr. Kokufu also presented and discussed the major activities of the Project Team, Security Management for both the Project Team and the Contractors, and the Project Work Flow and Progress. He explained and gave more emphasis on the Project Work Flow and Progress especially the works done in Japan and Philippines. According to him the works done in Japan include the collection and analysis of reference materials and preparation of Inception Report last March 2010.

He also explained the Satellite Imagery Acquisition for ALOS. The ALOS Images is 515 scenes in total. The 383 was taken in September 2010 and 132 were taken in Jan 2011. The mentioned that the malfunction of the ALOS Satellite prevented the new acquisition of satellite imagery after May 2011. Due to this problem the Project Team decided to research the archives for the past 5 years of all ALOS images and also SPOT Satellite Images. However, the Project Team found out that SPOT Images do not have EDM data. Therefore, the Project Team decided not to include for this project.

Mr. Kokufu also explained that Arial Triangulation result satisfies the Specification of 2008 Standard which is within 2.5m maximum error for control points. He also mentioned that the Project Team already started the Digital Plotting and Editing Works that are based on standards. The target completion of the Plotting work will be on January 2012 and a draft map will be distributed to TCC Members for checking.

According to Mr. Kokufu there are still remaining works in Japan which includes Bathymetric Data, Supplemental Editing, Data Structurization, Map Symbolization and Data File Preparation.

Mr. Kokufu also explained the works done in Philippines. And according to him, the following works has been already finished. 1) Discussion of the Inception Report; 2) Holding a TCC Meeting; and 3) Study on Map Utilization.

The discussion of the Meeting last Nov 29, 2011 are still needing a confirmation from the NAMRIA, MinDA, JICA and Project Team which is part of the agenda of today's meeting.

Mr. Kokufu also mentioned about the preparation of the Field Completion Work. According to Mr. Kokufu the Project Team and Contractors already coordinate with MinDA to prepare a supporting letter for field completion work to 237 LGUs. And Mr. Kokufu also informed to NAMRIA, MinDA and JICA that the Contractors intend to visit the ARMM and MILF Office before they conduct a field completion work for safety measures of the field work.

2) Dir. Isada mentioned what are the alternatives to de done since there are areas that have not yet recovered by ALOS. But Mr. Kokufu already mentioned to Dir. Isada that a research was conducted mentioned during the presentation of the Satellite Imagery Acquisition. And Mr. Kokufu will provide information on this status next meeting.

3) Mr. Belen, mentioned about the capability building of MinDA in using GIS. He requested to JICA to provide at least 20 units of hardware or additional software as part of the capability building for NAMRIA because NAMRIA is now preparing database of maps and anticipating the volume of maps after the project is completed.. And Dir. Isada also explained that when all map data will be transferred to Philippine Government, a volume of data cannot be accommodated by the current no. of hardware of NAMRIA. However, JICA explained to NAMRIA that in the case of MinDA they need support because they do not have enough facility in terms of using GIS although they have technical persons who knows GIS. JICA also mentioned to NAMRIA to provide justification on how the GIS will be utilized efficiently by NAMRIA, MinDA and the LGUs.

4) JICA mentioned that the regional government of the ARMM need to be included in the list of the TCC Members. NAMRIA, MinDA and Project Team agreed on this matter. JICA also mentioned that BDA should be in the TCC members. MinDA said that they will consult for this matter.

And Mr. Kokufu will make revision in the document and the report on the list of TCC Members and will provide a copy to NAMRIA, MinDa and JICA.

5) JICA also advised to the Project Management Team to inform JICA in advance whenever there are scheduled meeting with ARMM so that JICA will also attend the meeting. JICA also mentioned that they can help arrange a meeting with MILF for local consultants regarding security and safety issues.

6) Mr. Kokufu mentioned that the target date of Field Completion will be decided after the MILF and ARMM meeting in January.

7) The venue of the TCC meeting for ARMM will be in Cotabato City which is schedule in January next year.

8) Mr. Sudo questioned JICA's position in the TCC membership. The Project Management Team clarified that JICA will be an observer.

9) Dir. Isada also mentioned that a copy of the Minute of Meeting will be sent through email to the Project Management Team for comment.

10) JICA clarifies the issues about the administrative boundary and asked how NAMRIA would respond to inquiries from LGUs during TCC meetings. According to Dir. Isada, NAMRIA will answer that the administrative or political boundaries are just indicative in the Philippine Topo Map and it is not considered as authoritative. And he also explained that boundary survey is not under NAMRIA responsibility but can only offer technical advises to LGUs. NAMRIA and the project team will collect the necessary and the latest information from DENR, the responsible agency for land management, and will reflect in the map. NAMRIA and the project team will collect and reflect the information from LGUs and consult with them if necessary.

11) JICA asked that on January next year, NAMRIA will provide a draft map with boundary before the conduct of the Field Verification or not. NAMRIA said that they would provide draft map with boundary.

12) NAMRIA suggested the option to put remarks on the map saying "Boundaries are indicative only".

13) JICA also mentioned to include the Regional Government of ARMM as target organizations of data application in the Interim Report.

Meeting Adjourned 12:00 noon

Confirmed by:

Name	Signature	Date
Jose Galo Isada		8 Dec 2011
Ruel DM. Belen		08 Dec 2011
Junee Warren M. Riogeleon		08 DEC 2011
Shinichi Masuda		08. Dec. 2011
Shiho Akamatsu		08. Dec 2011
Yutaka Kokufu		8 Dec 2011

ATTENDANCE SHEET
Presentation of Interim Report: Topographic Mapping for Peace and Development in Mindanao
08 December 2011, MGD Conference Room

Name	Company	Signature
1. JOSE OTLO ISADA	NAMRIA	
2. Ruel DM. Belen	NAMRIA	
3. ENGR. JUNEE WARREN M. RIOGELON	Min DA	
4. JOAQUIN B. BORJA, JR.	NAMRIA	
5. Ofelia Castro	-do-	
6. Hernan Pineda	JICA	
7. Icazuo Suda	JICA	
8. Shiho Akamatsu	JICA	
9. Shinichi MASUDA	JICA	
10. Yutaka KOKUFU	The Project Team	
11. Ruby Borja	Project Team	
12. JOSE VILLANUEVA	NAMRIA	
13. Mary Jane Montemor	NAMRIA	

Appendix 6. Minutes of Meeting on the Draft Final Report

Topographic Mapping for Peace and Development in Mindanao In the Republic of the Philippines

Minutes of Meeting

Subject		Discussion of the Draft Final Report		
Date		December 13, 2012	Time	13:30 – 15:00
Place		MGD Multi-purpose room, NAMRIA		
Participants	JICA Project Team	1. Mr. Yutaka Kokufu –Team Leader 2. Mr. Kazunobu Kamimura – Map Utilization 3. Mr. Kensuke Kimura – Coordinator 4. Ms. Grace Desusa – Secretary 5. Ms. Corina Manansala – Support Staff		
	NAMRIA	6. Mr. Ruel Belen – Director, Mapping & Geodesy Department 7. Ms. Ofelia Castro – Asst. Director, Mapping & Geodesy Department 8. Mr. Joaquin Borja – Division Chief, Cartography Division 9. Mr. Celedonio Pili, Chief, Printing and Reprography Division		
	MinDA	10. Mr. Raymond Tejano – Information Technology Officer		
	JICA	11. Mr. Sinichi Masuda – Senior Representative, JICA Philippine Office 12. Ms. Yoko Ujike – In-House Consultant, JICA Philippine Office 13. Ms. Mary Bernadette Suarez – In-House Consultant, JICA Philippine Office		

AGENDA:

1. Overview of the Results of the Project
2. Final Outputs of the Project
3. Map Utilization Schedule of MinDA and NAMRIA

Mr. Kokufu, the Team Leader of the Project Team presented the Draft Final Report. The contents were discussed among the participants, and MinDA and NAMRIA accepted the Draft Final Report.

The Project Team and the counterparts discussed subjects on final outputs and map utilization by MinDA and NAMRIA.

Final Outputs

Mr. Kokufu reported that the Project Team would submit the outputs by the end of February 2013.

Both sides confirmed the followings:

2) The director's name on the map print data needs to be changed.
3) The index shall show nine boxes. Ocean areas without an index code shall be left blank.
4) Where two zones can be applicable in one map sheet, a zone of an LGU with larger area will be used.
5) NAMRIA will edit the administrative boundaries that are apparently erroneous since the Project Team conducted the work based on the given data from NAMRIA and since the

Project Team does not have an authority to change the administrative boundary data.

6) Administrative boundaries of remote islands are not included in the final outputs.
7) The built-up areas shall be drawn as polygon. Only the map-print data shall be edited; the GIS data will not be edited. The locations of such built-up areas shall be discussed.
8) NAMRIA will conduct editing work and update if such editing work will become necessary after the completion of the Project. Such editing work include: power line data and municipal waters boundaries.

Map Utilization

On map utilization, NAMRIA commented the followings:

1) NAMRIA will purchase a Computer-to-Print (CTP) machine next year (2013) to make production more efficient.
2) NAMRIA will prioritize the Project area for printing.
3) When the printing work of the new topographic maps produced in the Project exceeds the NAMRIA's printing capacity, out-sourcing will be considered.
4) The printed maps will be available at the map sales offices; in every regional office of DENR, there is a map sales office.
5) The Geo-portal system is a spatial data management system in the Philippines. The new Mindanao topographic map data will be uploaded to the system so that all the government agencies will be able to use the new topographic map data.

MinDA commented:

1) There are already requests from government agencies. The data will be distributed to the TCC members, but the distribution shall be based on "controlled release." How the distribution will be controlled will be discussed with NAMRIA.
2) While the maps will be printed, "e-copies" can be distributed. "E-copies" will be the mode of distribution for government agencies especially for the recovery work in those devastated areas from the recently typhoon.

JICA asked the schedule of printing and prices of maps and as it expressed significance of distribution and utilization of the maps as soon as possible.

NAMRIA answered:

1) The capacity of printing in one year is about 150 map sheets with about 300 prints for each map sheet. The capacity could be increased with the new CTP system to be acquired. The budget for the CTP system has been approved; therefore, there is no doubt that the faster system will be installed next year. The next year budget for printing is about seven (7) million pesos.
2) One map sheet is 120 pesos, but there is a plan for the price to be increased; a government agency will not be charged.
3) Plotting onto an ordinary paper is 750 pesos; on a sheet of photo paper, it is 1,500 pesos.

Ceremony

Mr. Masuda asked about the turnover ceremony to MinDA.

MinDA responded that since the Project started with a ceremony with an attendance of President,

the completion of the Project shall have a ceremony with an attendance of President. The tentative schedule is February 4, but the date depends on availability of President in Manila. The exact date would be determined as MinDA coordinates with the Office of the President; however, it is likely that the date will be shifted to late February or early March.

Reconfirmation of Final Outputs

NAMRIA read the list of final outputs in the Draft Final Report, reconfirmed the final outputs and acknowledged.

Printed Project Area Map (1:250,000 Scale Topographic Map to be printed)

Mr. Masuda requested to produce a Mindanao map in one print sheet, if possible.

NAMRIA and the Project Team commented:

1) Such map would be a generalized map without details expressed in 1:50,000 scale topographic maps.
3) Mosaicking satellite images could be done, but joining entire map data may not be realistic.
4) 1:250,000 scale maps could be compiled directly from 1:50,000 topographic maps; 20 sheets would cover entire Mindanao.
5) A topographic map with a scale of 1:1,000,000, which would fit in one sheet, would require major editing work on contour lines and annotation among other editing work; therefore, it would take time to compile a 1:1,000,000 scale topographic map that reflects the new data.

The JICA Project Team recommended that NAMRIA would be the entity to conduct the work and that JICA and NAMRIA would have another meeting regarding the specifications of the project area map to be printed.

Meeting adjourned at 3:00 pm.

Conformed by:

Name	Signature	Date
Sinichi Masuda Senior Representative, JICA Philippine Office		18. Dec. '12
Ruel Belen Director, Mapping & Geodesy Department		18 Dec '12
Raymond Tejano Information Technology Officer, MinDA		12 | 28 | 2012
Yutaka Kokufu Project Leader, JICA Project Team		18 Dec. '12

Appendix 7. Request Letter of NAMRIA

Republic of the Philippines
Department of Environment and Natural Resources
NATIONAL MAPPING AND RESOURCE INFORMATION AUTHORITY
Lawton Ave., Fort Bonifacio, Makati City

23 April 2010

Mr. MASAFUMI NAGAISHI
Senior Representative
JICA Philippine Office

Dear Mr. Nagaishi,

We are very pleased that the project "Topographic Mapping for Peace and Development in Mindanao in the Republic of the Philippines" will finally be implemented with the assistance of the Government of Japan through JICA.

The JICA Project Team and the NAMRIA Technical Team had a very fruitful and serious discussion on the contents of the Inception Report that was presented by Team Leader Mr. Kokufu.

We would like to reiterate the following points of discussion:

- *Considering the impact of the project on peace and development in Mindanao, the project area should cover the whole Mindanao including: the ARMM areas of Basilan, Sulu, and Tawi Tawi; and the remote islands of Cagayan de Tawi Tawi, Turtle Islands, and Mambahenauhan Island.*
- *Capacity development of users, the TCC members, will be necessary to ensure wide use of digital topographic data.*

In order for the smooth conduct of the project, we would like to request:

- *Financial support for the fieldwork and expense to be incurred by the TCC members to participate in the TCC meetings, seminars and workshops, and*
- *Sufficient personnel assignment for the needs and capacity assessment study and capacity development activities.*

We would be glad if you could favorably consider the results of our discussions and request.

Very truly yours,

USEC PETER N TIANGCO, Ph.D.
Administrator

Republic of the Philippines
Department of Environment and Natural Resources
NATIONAL MAPPING AND RESOURCE INFORMATION AUTHORITY
Lawton Avenue, Fort Andres Bonifacio, 1634 Taguig City

25 February 2011

MR. NORIO MATSUDA
Resident Representative
Japan International Cooperation
Agency (JICA) Philippine Office
40th Floor, Yuchengco Tower, RCBC Plaza
6819 Ayala Avenue, Makati City

Dear Mr. Matsuda:

This pertains to the JICA-assisted Topographic Mapping for Peace and Development in Mindanao being implemented by this agency and the Mindanao Development Authority (MinDA).

As a result of our consultations and dialogues with stakeholders during the Technical Coordinating Committee (TCC) meetings, may we respectfully request that the following items, which were not mentioned in the Terms of Reference, be included among the outputs of the project:

- **Orthoimages at 1:50,000** – these are distortion-corrected satellite images showing the actual picture of the ground, which are very useful in identifying vegetation, infrastructures, river drainage systems, agricultural areas, settlements and other features. These maps can be immediately produced ahead of the final topographic base maps and hence, be readily used by the stakeholders for local development planning, particularly in the preparation of Comprehensive Land use Plans (CLUPs). Moreover, orthoimage production is one the regular activities being undertaken by NAMRIA.

- **Seamless Digital Database (for entire Mindanao and for each province)** – this would be utilized by individual provincial government for various GIS applications, and the MinDA for planning the development of the entire Mindanao area.

- **Bathymetric Data** – it is requested that this information, showing depths of water areas, be included in the final map output. These data are normally depicted in the topographic base maps of NAMRIA.

Finally, it is requested that the members of the JICA Project Team be allowed to stay in the project area until the completion of the field work so that they can supervise the activities of the contractors.

Hoping for your favorable action on the matter.

With warm regards.

Very truly yours,

USec PETER NILO TIANGCO, PhD.
Administrator

Republic of the Philippines
Department of Environment and Natural Resources
NATIONAL MAPPING AND RESOURCE INFORMATION AUTHORITY
Lawton Avenue, Fort Andres Bonifacio, 1634 Taguig City

30 June 2011

MR. NORIO MATSUDA
Chief Representative
Japan International Cooperation
Agency (JICA) Philippine Office
40th Floor, Yuchengco Tower, RCBC Tower
6819 Ayala Avenue, Makati City

Dear Mr. Matsuda:

This pertains to our previous letter dated 25 February 2011, wherein we have requested certain items to be included in the final output of the "Topographic Mapping for Peace and Development in Mindanao" Project.

One item refers to bathymetric data showing depths of water areas. May we reiterate that we are referring to depth curves which can be derived from existing hydrographic or bathymetric charts of NAMRIA. In support to our request, we would like to provide you with the following justifications.

Bathymetric/Hydrographic data is included in topographic map standards and specifications in the Philippines. Even before the establishment of NAMRIA, published topographic maps already include hydrographic data (e.g. *depth* curves) in its map information. This is in accordance with the standards and specifications adopted by the Philippines from then Defense Mapping Agency (DMA), presently called National Geospatial-Intelligence Agency (NGA) of the United States.

This specification is likewise applied in the JICA- Pilot Study in Central Luzon entitled "The Study for Mapping Policy and Topographic Mapping for Integrated National Development Plan in the Republic of the Philippines" in 2008. In the final report of the said study, the relevant section is the "Specifications for Map Symbols for Topographic Map at scale 1:50,000", specifically in pages 13 and 14 on "Water Systems" and page 23 on "Topography – Depth Curves".

Presently, the same map standard is being adopted in the production of the Philippine National Topographic Map Series (PNTMS). The hydrographic/bathymetric data are already available in the agency, hence there is no need to conduct additional survey for this.

Hydrographic data in topographic maps is an important information that map users need considering that the Philippines is an archipelagic country with vast coastal areas. If hydrographic/bathymetric information will not be depicted, the map will not be able to depict a complete picture of the topography of the land with respect to the condition of the coastal waters.

NAMRIA topographic maps are being used by both government and private agencies with specific purpose of showing the land features and the immediate surrounding water areas. At present, these maps are required in planning and development of the coastal communities, hazard mapping for low-lying areas and mangrove habitat mapping, among others.

We hope for you kind action on this regard.

With warm regards.

Very truly yours,

USec PETER NILO TIANGCO, PhD
Administrator