

Appendix 5

Minutes of Discussions (Explanation of the Draft Report)

MINUTES OF DISCUSSIONS
ON BASIC DESIGN STUDY
ON "THE PROJECT FOR UPGRADING OF FLOOD FORECASTING
AND WARNING SYSTEM IN THE PAMPANGA AND AGNO RIVER AND BASINS"
IN REPUBLIC OF THE PHILIPPINES
(EXPLANATION OF DRAFT FINAL REPORT)

From November to December 2006, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Basic Design Study Team on the Project for Upgrading of Flood Forecasting and Warning System in the Pampanga and Agno River Basins (hereinafter referred to as "the Project") to Republic of the Philippines (hereinafter referred to as "the Philippines"), and through discussions, field survey, and technical assessment of the results, JICA prepared a draft report on this study.

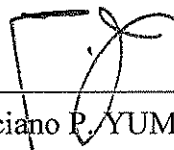
In order to explain and to consult with the Government of the Philippines on the contents of the draft report, JICA dispatched Draft Report Explanation Team (hereinafter referred to as "the Team") to the Philippines, which is headed by Mr. Norihito YONEBAYASHI, Water Resources Development and Environmental Management Team, Grant Aid Management Department, JICA Headquarter, and is scheduled to stay in the country from March 15 to March 20, 2007.

In the course of discussions and field survey, both sides confirmed the main items described in the attached sheets.

Quezon City, March 19, 2007

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Mr. Norihito YONEBAYASHI
Leader
Basic Design Study Team
Japan International Cooperation Agency



Dr. Graciano P. YUMUL, Jr.
Undersecretary
Department of Science and Technology
(DOST)
Republic of the Philippines



Dr. Prisco D. NILO
Deputy Director
Philippine Atmospheric, Geophysical and
Astronomical Services Administration
(PAGASA), DOST
Republic of the Philippines

ATTACHMENT

1. Components of the project

The Philippine side agreed and accepted in principle, the components of the Draft Final Report explained by the Team.

2. Japan's Grant Aid Scheme:

2-1) The Philippine side understood the Japan's Grant Aid Scheme and will take the necessary measures and allocate necessary and sufficient budget for smooth implementation of the Project, as the conditions for the Japanese Grant Aid to be implemented. The Grant Aid Scheme and necessary measures were described in the Annex of the Minutes of Discussions agreed by both sides on 5th of November 2006 (hereinafter referred to as "the Previous M/D").

2-2) Measures for some items and matters which are described in "Other Relevant Issues" in this document, should be undertaken timely and properly since these are indispensable to the whole Project Design. If the measures will not be taken properly by the Philippine side, the Team explained that approval of the Project would be reconsidered including cancellation by the Government of Japan.

3. Schedule of the Study:

JICA will complete the Final Report in accordance with the confirmed items in this Minutes of Discussions and send it to the Government of the Philippines around April 2007 at the earliest.

4. Title of the Project:

Both sides agreed to change the title of the Project tentatively as "THE PROJECT FOR UPGRADING OF FLOOD FORECASTING AND WARNING SYSTEM IN THE PAMPANGA AND AGNO RIVER BASINS", in compliance with the request by the Philippine side.

Final decision for the title will be made when both Governments sign the Exchange of Notes (hereinafter referred to as "E/N") for the Project.

5. Custom Duties, Taxes and Value Added Tax (VAT) :

The Team explained again the background of suspension of the Grant Aid for the Philippines as written in the previous M/D.

The Team explained the scope and estimates of the Project and requested to secure the appropriate and necessary amount of budget to pay the Value Added Tax (hereinafter referred to as "VAT"), custom duties and any other taxes and fiscal levy charges in the Philippines arising from the Project activities and shall be borne by the Philippine side in accordance with the implementation schedule.

The Philippine side promised to take necessary measures for getting the additional and proper amount in time.

The Philippine side had already requested for additional amount approximately twenty-two (22) million Philippine pesos for the same purpose for fiscal year 2008.

The Philippine side also promised to arrange the budget for the Philippine fiscal year 2007 to be carried over for fiscal year 2008 in accordance with the Project cost and schedule in case there were any surplus in the budget for 2007.

The Team will provide the Philippine side with the detailed information of amount of the equipment, construction and schedule of implementation for the Philippine side to arrange the budget properly.

The Philippine side promised that if PAGASA could not secure the budget, DOST will take care of the payment of taxes.

The Philippine side will submit the information on reimbursement procedure for Japanese Consultant and Contractor as soon as E/N is signed.

The Team explained that the Project would be reconsidered including cancellation by the Government of Japan if these tax-related payment issues will not be implemented properly and timely.

6. Implementation of the prerequisite conditions:

Since there are many prerequisite conditions for realization and implementation of the Project, which should be taken care of in time by the Philippine side, the Team strongly requested to the Philippine side to execute these conditions properly. If these conditions are not executed, the implementation of the Project might be postponed or cancelled at the worst. The details of these pre-conditions are written in Item "7. Other Relevant Issues" in this document.

Both sides agreed that some components might be excluded in the course of Japanese Cabinet approval even if the conditions are executed by the Philippine side.

7. Other Relevant Issues:

7-1) Pampanga Sub-Center:

The Team explained that the equipment of Pampanga Sub-Center will be considered as a component of the Project since the function of Pampanga Sub-Center is recognized as important and essential. However, the construction of the Center is excluded from the components.

Hence the Philippine side agreed to construct the Center according to the Project schedule as both sides agreed in the previous M/D.

The Team strongly requested to complete the construction before the Notice of Tender at the latest, which is scheduled in October or November of 2007.

The Team also strongly requested to allocate qualified and adequate number of personnel and maintenance cost exclusively for the Center for its effective and sustainable operation of the system. The deadline of the allocation is by the time of completion.

The Philippine side explained the effort and current progress of the procedure for the construction as follows.

7-1-1) The site for the Center has been identified and there are some alternative sites. The Philippine side will start securing the site from the viewpoint of floodless, no interference of frequency etc.

7-1-2) Scale and design of the Center was already prepared as shown in ANNEX 1.

7-1-3) The Philippine side will provide the official proof of site acquisition before the signing of E/N.

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7-1-4) The budget for construction was already secured and amount is approximately two (2) million Philippine pesos as shown in ANNEX 2.

7-1-5) Six (6) Personnel are assigned to the Center and the Philippine side plans to add two (2) more in 2008. The current actual personnel duties are shown in ANNEX 3.

7-1-6) According to the regulations and laws in the Philippines, selection of the contractor for the Center will be done by bidding. For bidding procedure, it will normally take two (2) months and for physical construction of the Center will be four (4) months. Total period will be at the fastest six (6) months. However the Philippine side will make every effort to shorten the period.

The Philippine side will report the progress of construction to the Team through JICA Philippine Office monthly.

Since the sites are Government property and the budget for construction has already been secured in 2007, the Philippine side expressed confidence and optimism that the Center would be constructed in accordance with the designated time.

Both sides understood that the whole components for Pampanga area would be cancelled if the construction of the Center is not implemented on time since the network system for WHOLE Pampanga area is carefully planned under the condition that the Center is constructed on time.

Both sides understood that the Team holds the right to give advice and modify the design of the Center in order to install the equipment properly.

7-2) Frequencies for Data Transmission:

The Philippine side explained the progress of assignment of the frequencies for the Project and it was already approved to utilize the frequency band of 7.5GHz and 18GHz by National Telecommunications Commission (hereinafter referred to as "NTC") as shown in ANNEX 4. All channels for both bands were also proposed by NTC as shown in ANNEX 5.

PAGASA will complete the interference review and check for these channels by end of March 2007. The Philippine side will inform the result of test to the Team through JICA Philippine Office in the beginning of April 2007.

The Team appreciated the effort of the Philippine side

The Philippine side will secure the channels by middle of April 2007 and inform the Team of the final approval of frequencies assignment.

If they are not secured within the designated time, the Philippine side will submit an official letter endorsed by DOST and NTC, which clearly proves that the approval of the assignment of frequencies is conclusive. In this case, the Team explained that deadline would be before August 2007.

The Philippine side should submit progress starting April 2007. If the frequencies are not secured by August 2007, the whole Project will be cancelled since securing these frequencies are essential and one of the important prerequisite conditions of the Project for achieving the objectives.

7-3) Custom Duties, Taxes and VAT of Equipment for Other Organizations:

Since the equipment for other organizations such as Office of Civil Defense (OCD), National Power Corporation (NPC), National Irrigation Administration (NIA), Department of Public Works and Highways (DPWH) and relevant Dams in the region will be part of the components of the Project, the Team requested the Philippine side to decide who would secure and pay the Tax, VAT and other levies for these equipment.

The Philippine side explained that these taxes will be borne by PAGASA and promised to take necessary measures.

If the Team can not confirm these matters officially by the time of preparation of the Tender documents, these equipment will be excluded from the Project.

7-4) Strengthening of Operation & Maintenance:

According to the result of Basic Design study, the Team requested the Philippine side to take necessary actions which were proposed in the Draft Basic Design Report such as allocation of adequate cost and qualified personnel for proper, effective and sustainable operation and maintenance of equipment and facilities.

The Team strongly requested that the necessary actions should be taken in time for the installation of equipment in the first phase of the Project, since the training for the personnel as Technical Assistance would be implemented in that time.

The Team particularly pointed out the lack of younger engineers for the future operation of the system and the Philippine side agreed that.

The Philippine side explained the effort and current progress of actions for strengthening the Operation & Maintenance as follows.

7-4-1) Proposed running and maintenance cost will be secured regularly and annually.

7-4-2) When the "Rationalization Program" of the Philippine is implemented, the Philippine side will make efforts to increase the number of engineers. "Rationalization" is the policy of the Philippines to streamline the Government body for effective management.

7-4-3) Personnel Allocation for 2008 is planned as ANNEX 6.

7-4-5) Every year, Government body gets approximately 20% increase of previous year's budget.

7-5) Flood Forecasting and Warning Model:

Regarding the software for Inundation Modeling and Mapping, which was requested by the Philippine side, the Team explained that the software will be included on the condition that the data collection and data input for the software is properly and periodically executed by the Philippine side in order to get maximum benefit from the software.

The Philippine side promised to utilize the software and to update the data to get maximum benefit. The Philippine side also promised to submit the Hazard Maps to the Government of Japan, made by utilizing the software, as an output of the Project, before the completion of the Project.

7-6) Technical Assistance:

The Team explained that the contents of the technical assistance would focus on the subjects as follows.

The Philippine side agreed on the following contents:

7-6-1) Training for system operation

7-6-2) Training for the improvement of Runoff model

7-6-3) Training for the software on Inundation Modeling and Mapping

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Fig. 4

7-7) Monitoring Stations in the Region:

Since monitoring stations will be renovated and some will be newly constructed in the region, the Team requested PAGASA to collaborate with responsible Municipalities for the proper and effective operation and maintenance of these monitoring stations.

The Philippine side agreed and also explained that Memorandum of Agreement had been signed for the provision of security and physical maintenance of the existing monitoring stations for the province of Pangasinan as shown in ANNEX 7. The same will be done for other provinces. This Agreement will be applied to the stations of the Project and benefit the Project.

7-8) Memorandums between relevant organizations:

Since equipment for other organizations such as OCD, NPC, NIA, DPWH and relevant Dams in the region will be part of the components of the Project, affirmative support and proper maintenance by these organizations is essential to get maximum benefits from the Project.

For this purpose, the Team requested PAGASA and these organizations to sign the memorandum which shows the responsibility and measures to be taken by each organization during and after the Project period.

The Philippine side agreed to the suggestion and promised to submit supporting documents by the end of April to the Team through JICA Philippine Office.

If the Team will not be able to confirm the support and approval to take the necessary measures by the other organizations, the equipment for the said organizations will be excluded.

7-9) Relevant Permissions for the Project:

The Philippine side explained that in order to get relevant permissions, initial coordination with relevant agencies and local government had been undertaken as follows.

Relevant documents which show the proof of coordination by relevant agencies are shown in ANNEX 8.

7-9-1) To use bridges for construction and installation of monitoring facility and equipment:

In progress. The Philippine side is positive to get approval from DPWH.

7-9-2) To cut trees for access to the proposed site and construction of relevant facilities:

Local Government will facilitate the issuance of permits.

7-9-3) To construct tower:

Except the repeater in San Rafael, there is no problem for the construction of towers. For the tower in San Rafael, NIA and PAGASA started negotiations since the proposed site belongs to NIA and PAGASA has secured verbal approval from NIA.

7-9-4) To acquire Land for monitoring stations:

Except for one site, all sites are secured. One site belongs to private landowner and the right of way has been secured. The approval for the use of the site for monitoring station is in progress. The result will be provided to the Team through JICA Philippine Office.

The Team appreciated the effort made by the Philippine side.

The Team strongly requested the Philippine side to get approval of the permits before the signing of E/N and the Philippine side agreed.

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Fig. 4b

7-10) Environmental Impact Assessment (EIA) or Corresponding Equivalent Document:

The Philippine side has already secured the Certificate of Non-Coverage, which proves that the Project will not cause negative impacts to the environment as shown in ANNEX 9.

7-11) Dissemination of Appropriate Forecasting and Warning Information:

As an improvement to the flood warning information, hazard maps will be incorporated in the flood bulletins. The Philippine side promised to update hazard maps utilizing the software for Inundation Modeling and Mapping.

The Philippine side promised to submit the hazard maps to Japanese Government as written in 7-5) in this document.

7-12) "Mobile Flood Warning Patrol Car":

The Team informed that "Mobile Flood Warning Patrol Car" requested by the Philippine side was excluded from the components.

Since the purpose of the Project is "the provision of necessary, accurate and timely flood warning information" confirmed in the previous M/D, all efforts must be done to achieve this purpose. The Team explained that to strengthen the capacity of information dissemination is one of the conditions for the Project as written in the previous M/D. Without measures for dissemination of flood information, the outcome of the Project can not be achieved than expected.

In this connection, even though the Car was excluded, The Team recognized the importance of such patrol cars in disseminating the flood warning information to people living in remote areas and beyond the range of sirens.

Therefore the Team required the Philippine side to procure these vehicles to strengthen more the flood warning dissemination system in order to maximize the benefits of the Project.

The Philippine side understood the decision of Japanese Government and promised to make effort to procure these items by themselves to maximize the benefits of the Project.

7-13) Progress of the agreed matters in the previous M/D:

The Philippine side explained the plan and progress of the agreed matters in the previous M/D as follows.

7-13-1) The Philippine side explained that PAGASA have classes for the school children to learn the basic knowledge of weather and flood etc. periodically as a measure of public education. The Team witnessed the activity in PAGASA during their stay.

7-13-2) The Philippine side will make all efforts to use all decommissioned equipment in other river basins such as Bicol, Cagayan or for the spare parts for the same type of existing equipment. The Philippine side will officially inform the Team through JICA Philippine Office on the usage which was agreed in the previous M/D.

7-13-3) The Philippine side promised to take necessary actions to expedite other agreed matters in the previous M/D.

7-14) Public Relations of the Project:

The Philippine side promised to do public relations for the Project affirmatively in order for people to understand the Project is assisted by Japanese Official Assistance Development.

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7-15) Fair Implementation of the Project:

The Team explained that some information of the Draft Report should be dealt with carefully until Final Basic Design Report is released, since the information will affect the Tender process. The Philippine side understood and promised to do so.

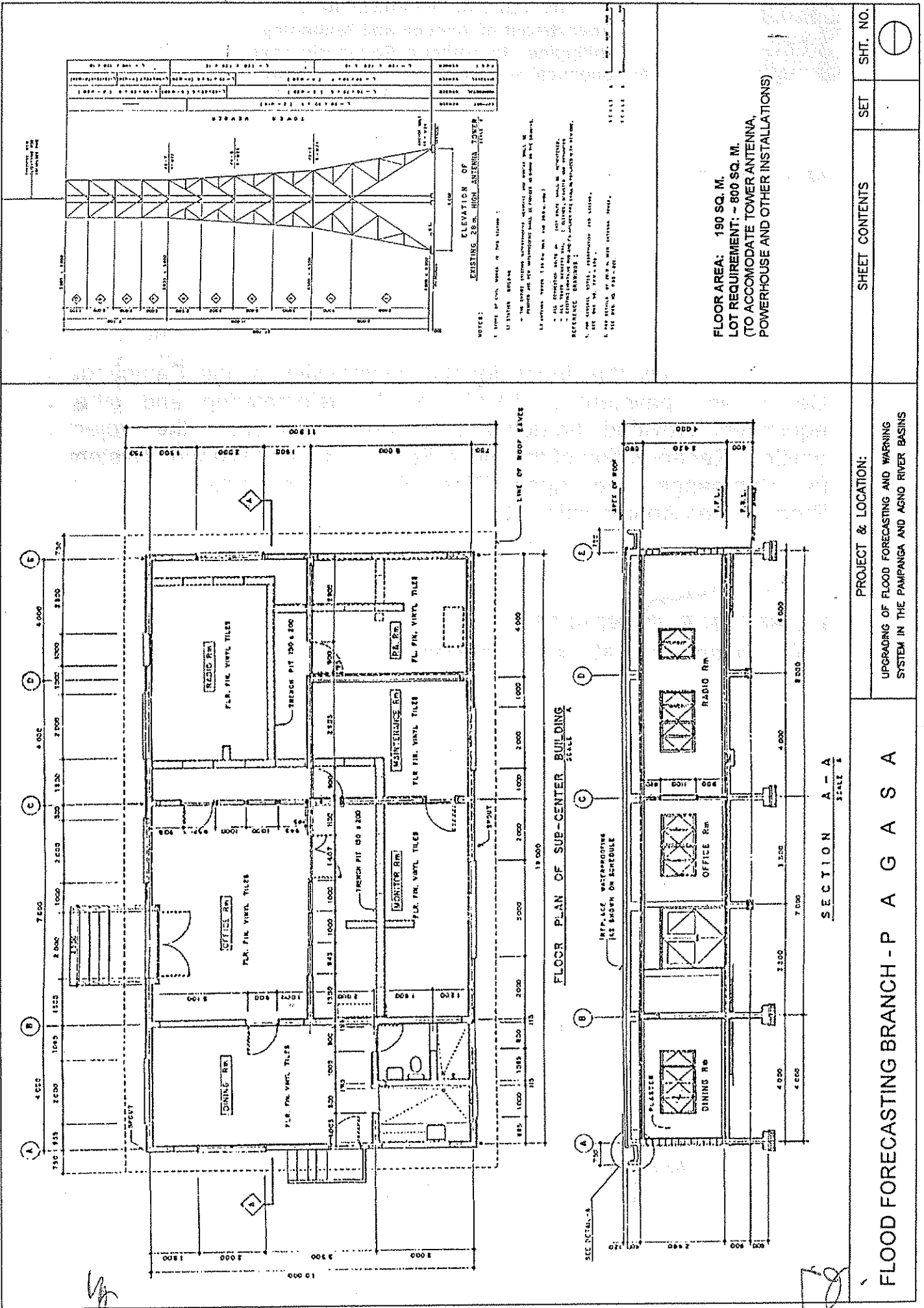
END

ANNEX:

- 1: Scale and Design of Pampanga Sub-Center**
- 2: Budget secured for the Construction of Pampanga Sub-Center**
- 3: Current and Actual Personnel Duties of PRFFWC**
- 4: Approval by NTC for Frequencies 7.5GHz and 18GHz**
- 5: Channels provided by NTC for Frequencies 7.5GHz and 18GHz**
- 6: PAGASA Personnel Allocation Plan for 2008**
- 7: Memorandum of Agreement between PAGASA and Pangasinan Province**
- 8: Examples of Coordination with Relevant Agencies**
- 8-1: Letter of No-Objection by DPWH**
- 8-2: Letter of Land Permission for Gauge Station by NIA**
- 8-3: Letter of Assistance by Municipality of Rosales**
- 8-4: Letter of Assistance by Municipality of San Clemente**
- 9: Certificate of Non-Coverage**

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FLOOR AREA: 190 SQ. M.
 LOT REQUIREMENT: ~ 800 SQ. M.
 (TO ACCOMMODATE TOWER ANTENNA,
 POWERHOUSE AND OTHER INSTALLATIONS)

- NOTES:
1. TYPE OF CIVIL WORKS IN THIS DRAWING:
 2. EXISTING BUILDING:
 3. THE EXISTING BUILDING IS TO BE DEMOLISHED AND A NEW ONE SHALL BE CONSTRUCTED IN THE SAME PLACE AS SHOWN IN THE DRAWING.
 4. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
 5. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE NATIONAL BUILDING CODE AND OTHER APPLICABLE LAWS AND REGULATIONS.
 6. ALL MATERIALS SHALL BE OF THE BEST QUALITY AND SHALL BE SUBJECT TO INSPECTION AND APPROVAL BY THE ENGINEER.
 7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE APPROPRIATE AGENCIES.
 8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING UTILITIES AND STRUCTURES TO REMAIN.
 9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING TREES AND LANDSCAPE.
 10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING ROADS AND PATHS.

PROJECT & LOCATION:
 UPGRADING OF FLOOD FORECASTING AND WARNING
 SYSTEM IN THE PAMPANGA AND AGNO RIVER BASINS

SECTION A - A
 SCALE 1/4"

FLOOD FORECASTING BRANCH - P A G A S A

SHEET NO.	SET	SHEET CONTENTS
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REPUBLIC OF THE PHILIPPINES
Department of Science and Technology
Philippine Atmospheric, Geophysical and
Astronomical Services Administration (PAGASA)
Science Garden, Agham Road, Diliman, Quezon City 1100

March 19, 2007

CERTIFICATION

This is to certify that funds for the construction of the Pampanga Center and payment of EVAT for the telemetering and other equipment provided through a grant from JICA under the project entitled "Rehabilitation of the Flood Forecasting and Warning System for Pampanga and Agno River Basins", is included in the Programmed Appropriations for FY 2007.


LILLIBETH B. GONZALES
Chief, Finance and Management Division

"tracking the sky... helping the country"

Postal Address: P.O. Box 3278 Manila

Tel No. (63-2) 929-4865 (w/Fax) & 434-9040

PERSONNEL COMPLEMENT (Actual) OF PAMPANGA RIVER FLOOD FORECASTING and WARNING CENTER (PRFFWC)

Senior Weather Specialist (Chief Meteorological Officer)

1. Supervises and controls the various tasks of the personnel of the Center.
2. Lead the studies on the following:
 - a. improvements of hydrometeorological/hydrological forecasting/prediction method/techniques through modeling/statistical or frequency analysis
 - b. monitoring and improvement works for meteorological and hydrological conditions within his area of operation
 - c. Design, improvement and expansion of hydromet station network
 - d. Instrument and specification standardization
 - e. Improvement of data acquisition and primary processing/hydrometry work for hydrographic survey/post-flood investigation
 - f. Planning and determination of computerization requirements
3. Acts as Sr. Hydrometeorologist/Flood Forecaster in the hydrological conditions monitoring for the preparation/issuance of Flood Bulletins and other hydro information
4. Acts as Resources Speaker in the Public Information Drive/Education on Flood and its Mitigation
5. Perform other duties as may be required by the Supervisor

Weather Facilities Specialist II

1. Supervises, reviews and evaluates the projects of the unit personnel involving the establishment/operation/maintenance/repair of hydrological facilities and other civil works
2. Acts as Flood Forecasters/Hydrometeorologist in the meteorological and hydrological conditions monitoring operation for the issuance of flood information
3. Undertakes studies for the expansion/improvement of hydromet station network and hydrographic survey, and on instrument specification/standardization
4. Leads the hydrographic survey team and control the data obtained from the survey
5. Conducts post-flood investigation
6. Performs other related duties as may be required by the Supervisor

Weather Observer III

1. Verifies and edits the extracted data/retrieves and files the processed rainfall and water level data in the primary data processing
2. Participates in the following activities:
 - a. Calibration and physical maintenance of rainfall/water level/discharge gauging instrument/equipment such as recorder, staff gauge, current meter, etc.
 - b. Physical maintenance of filed stations and other civil works such as recorder shelter, station housing, etc.
 - c. Hydrographic survey/hydrometry work which involves leveling and river sounding/velocity measurement
3. Acts as Hydrological Aide in the meteorological and hydrological conditions monitoring for the preparation/issuance of flood bulletins and other hydro information
4. Performs other related duties as may be required by the Supervisors, particularly administrative/word processing works.

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Weather Observer II

1. Extracts from strip charts/teleprinters/observation forms rainfall and water level data in the primary data processing
2. Encodes/stores in the computer rainfall and water level data in the primary data processing
3. Participates in the following activities:
 - a. Calibration and physical maintenance of rainfall/water level/discharge gauging instrument/equipment such as recorder, staff gauge, current meter, etc.
 - b. Physical maintenance of filed stations and other civil works such as recorder shelter, station housing, etc.
 - c. Hydrographic survey/hydrometry work which involves leveling and river sounding/velocity measurement
4. Acts as Hydrological Aide in the meteorological and hydrological conditions monitoring for the preparation/issuance of flood bulletins and other hydro information
5. Performs other related duties as may be required by the Supervisors, particularly clerical/word processing works.

Weather Observer I

1. Record and checks the incoming rainfall/water level strip charts and other, and associated observation forms
2. Transcribes at the source the rainfall and water level data not received in the primary data processing
3. Participates in the following activities:
 - a. Calibration and physical maintenance of rainfall/water level/discharge gauging instrument/equipment such as recorder, staff gauge, current meter, etc.
 - b. Physical maintenance of filed stations and other civil works such as recorder shelter, station housing, etc.
 - c. Hydrographic survey/hydrometry work which involves leveling and river sounding/velocity measurement
4. Acts as Hydrological Aide in the meteorological and hydrological conditions monitoring for the preparation/issuance of flood bulletins and other hydro information
5. Performs other related duties as may be required by the Supervisors, particularly clerical/word processing works.

Weather Observer Aide

1. Takes care or does minor physical maintenance of the station housing and gauging instruments in the field
2. Observes/reads rainfall depths from the rain gauge/water level from the staff gauge
3. Transcribes at the source the rainfall and water level data not received in the primary data processing

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REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS
NATIONAL TELECOMMUNICATIONS COMMISSION
BIR Road, East Triangle, Diliman, Quezon City

January 23, 2007

DR. PRISCO D. NILO
Officer-In-Charge
Office of the Director, PAGASA


Dear Dr. Nilo,

In connection with your letter dated November 27, 2006, re: the upgrading project of the Flood Forecasting and Warning System (FFWS) in the Pampanga and Agno River Basins, please be informed that the Commission interposes no objection on your proposed network for the FFWS utilizing the frequency band 7.5GHz and 18GHz. However, it is necessary to coordinate with the Frequency Management Division of this Commission to determine the availability of frequency channels for the said bands.

Please be reminded that such frequency assignment shall be subject to the usual collection of licensing fee and Spectrum Users Fee (SUF).

Thank you very much.

Very truly yours,


ABRAHAM R. ABESAMIS
Commissioner

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LICENSEE: PHIL. ATMOSPHERIC, GEOPHYSICAL & ASTRONOMICAL SERVICES ADMINISTRATION

DATE OF APPROVED BRIEF:

FAS DATE ISSUED :

Station A	Station B	TxA/RxB (MHz)	TxB/RxA (MHz)	Pol.	Power Output	Capacity / BW / Emission
SCIENCE GARDEN E_LONG. 121° 2' 30" N_LAT. 14° 38' 34"	SAN RAFAEL E_LONG. 120° 55' 38" N_LAT. 14° 58' 54"	7442.0000	7603.0000	VERT.	30 dBm	13.6Mbps 14MHz
SAN RAFAEL E_LONG. 120° 55' 38" N_LAT. 14° 58' 54"	GAPAN E_LONG. 120° 56' 45" N_LAT. 15° 18' 24"	7631.0000	7470.0000	VERT.	30 dBm	13.6 Mbps 14 MHz
GAPAN E_LONG. 120° 56' 45" N_LAT. 15° 18' 24"	CABANATUAN E_LONG. 120° 57' 29" N_LAT. 15° 28' 38"	7498.0000	7659.0000	VERT.	30 dBm	13.6 Mbps 14 MHz
CABANATUAN E_LONG. 120° 57' 29" N_LAT. 15° 28' 38"	PANTABANGAN RS E_LONG. 121° 5' 21" N_LAT. 15° 48' 58"	7603.0000	7442.0000	VERT.	30 dBm	13.6 Mbps 14 MHz
CABANATUAN E_LONG. 120° 57' 29" N_LAT. 15° 28' 38"	TARLAC E_LONG. 120° 36' 23" N_LAT. 15° 29' 13"	7631.0000	7470.0000	VERT.	30 dBm	13.6 Mbps 14 MHz
TARLAC E_LONG. 120° 36' 23" N_LAT. 15° 29' 13"	AGNO SUB-CENTER E_LONG. 120° 36' 27" N_LAT. 15° 53' 24"	7442.0000	7603.0000	VERT.	30 dBm	13.6 Mbps 14 MHz
SAN RAFAEL E_LONG. 120° 55' 38" N_LAT. 14° 58' 54"	PAMPANGA SUB-CENTER E_LONG. 120° 38' 13" N_LAT. 15° 4' 49"	7498.0000	7659.0000	VERT.	30 dBm	13.6 Mbps 14 MHz
SCIENCE GARDEN E_LONG. 121° 2' 38" N_LAT. 14° 38' 38"	NIA FFWS E_LONG. 121° 2' 37" N_LAT. 14° 38' 19"	18387.5000	19397.5000	VERT.	20 dBm	13.6 Mbps 14 MHz
NIA FFWS E_LONG. 121° 2' 37" N_LAT. 14° 38' 19"	OCD E_LONG. 121° 3' 54" N_LAT. 14° 36' 37"	18607.5000	19617.5000	VERT.	20 dBm	13.6 Mbps 14 MHz

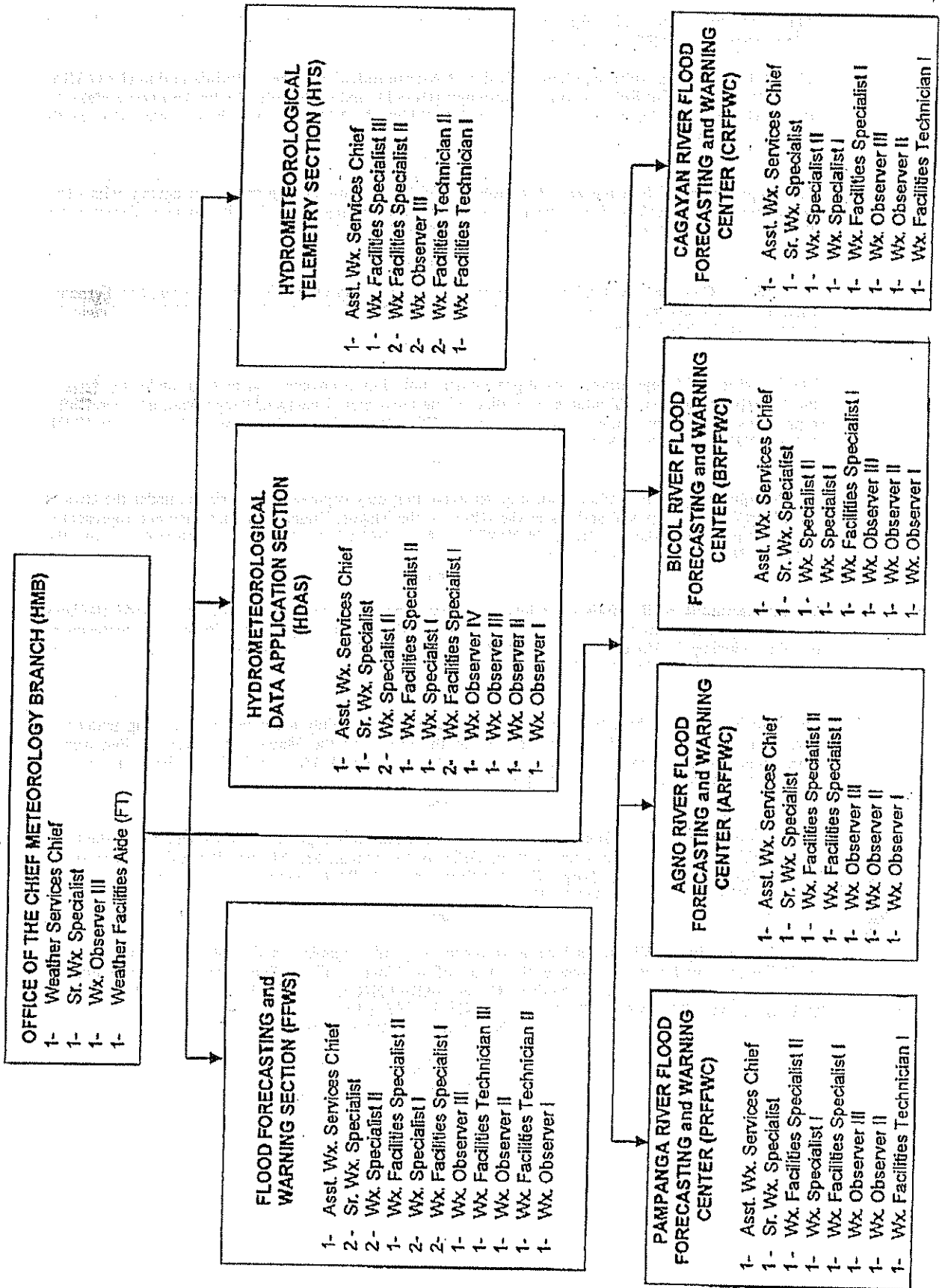
***** NOTHING FOLLOWS *****

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**FIG. 1 PROPOSED MANNING ORGANIZATIONAL CHART
PAGASA RATIONALIZATION 2007
FLOOD FORECASTING BRANCH**



Handwritten mark

Handwritten signature

MEMORANDUM OF AGREEMENT

For the Provision of Security and Physical Maintenance of the Flood Forecasting and Warning System (FFWS) Facilities in the Monitored River Basins

KNOW ALL MEN BY THESE PRESENTS:

This Memorandum of Agreement made and entered into this 21st day of January, 2007 by and among:

The Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), of the Department of Science and Technology (DOST), and represented by the Undersecretary for Research and Development, DOST, Dr. GRACIANO P. YUMUL, JR., herein referred to as the "DOST-PAGASA";

- and -

The Department of Science and Technology (DOST-Region 1), a government agency with office address at DOST-1 Office, San Fernando City, La Union, and represented by its Regional Director, Dr. EDGAR F. PADILLA, herein after referred to as "DOST Region 1";

- and -

The Office of Civil Defense, Region I, with postal address at Camp Oscar Florendo, Parian, San Fernando City, La Union and represented by its Regional Director, Mr. EDGAR NIGEL LONTOC, hereinafter referred to as the "OCD Region I"

- and -

The Province of Pangasinan, a local government unit duly organized and existing under the laws of the Philippines, with postal address at Office of the Governor, Lingayen, Pangasinan, and hereinafter represented by the Provincial Governor, Hon. VICTOR AGBAYANI, herein referred to as "THE PROVINCE OF PANGASINAN";

- and -

The Municipality of Bugallon, a local government unit duly organized and existing under the laws of the Philippines, with postal address at the Office of the Mayor, Bugallon, Pangasinan and represented by its Municipal Mayor, Hon. RODRIGO M. ORDUÑA, hereinafter referred to as the "MUNICIPALITY of BUGALLON";

- and -

The Municipality of Bayambang, a local government unit duly organized and existing under the laws of the Philippines, with postal address at the Office of the Mayor, Bayambang, Pangasinan represented by the Municipal Mayor Hon. LEOCADIO C. DE VERA, hereinafter referred to as the "MUNICIPALITY of BAYAMBANG";

- and -

The Municipality of, Sta. Barbara, a local government unit duly organized and existing under the laws of the Philippines, with postal address at the Office of the Mayor, Sta. Barbara, Pangasinan represented by its Municipal Mayor Hon. JINKY C. ZAPLAN, hereinafter referred to as the "MUNICIPALITY of STA. BARBARA";

- and -

The Municipality of San Manuel, a local government unit duly organized and existing under the laws of the Philippines, with postal address at the Office of the Mayor, San Manuel, Pangasinan represented by its Municipal Mayor, Hon. SALVADOR M. PEREZ, hereinafter referred to as the "MUNICIPALITY of SAN MANUEL";

- and -

The Municipality of Villasis, a local government unit duly organized and existing under the laws of the Philippines, with postal address at the Office of the Mayor, Villasis, Pangasinan and represented by its Municipal Mayor Hon. NONATO S. ABRENICA, hereinafter referred to as the "MUNICIPALITY of VILLASIS";

Jose M. Perez

**CERTIFIED
XEROX/TRUE COPY**

Jose M. Perez

JOSE M. PEREZ
CHIEF RECORDS MANAGEMENT SECTION

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The **Barangay of Bañaga** as the basic political unit duly organized and existing under the laws of the Philippines, with postal address at brgy. Bañaga, Bugallon, Pangasinan and represented herein by its **Punong Barangay Mrs. Susana Sison**, hereinafter referred to as the "**BARANGAY of BAÑAGA**";

- and -

The **Barangay of Wawa** as the basic political unit duly organized and existing under the laws of the Philippines, with postal address at Brgy. Wawa, Bayambang, Pangasinan and represented herein by its **Punong Barangay Mr. Dario Menor** hereinafter referred to as the "**BARANGAY of WAWA**";

- and -

The **Barangay of Poblacion Norte** as the basic political unit duly organized and existing under the laws of the Philippines, with postal address at brgy. Poblacion Norte, Sta. Barbara, Pangasinan the and represented herein by its **Punong Barangay Mr. Fernando Florendo** hereinafter referred to as the "**BARANGAY of POBLACION NORTE**";

- and -

The **Barangay of San Roque** as the basic political unit duly organized and existing under the laws of the Philippines, with postal address at brgy. San Roque, San Manuel, Pangasinan, and represented herein by its **Punong Barangay, Mr. Primo A Lopez** hereinafter referred to as the "**BARANGAY of SAN ROQUE**";

- and -

The **Barangay of Puelay** as the basic political unit duly organized and existing under the laws of the Philippines, with postal address at brgy. Puelay Villasias, Pangasinan, and represented herein by its **Punong Barangay Mr. Carlos A. Mostoles** hereinafter referred to as the "**BARANGAY of PUELAY**";

WITNESSETH:

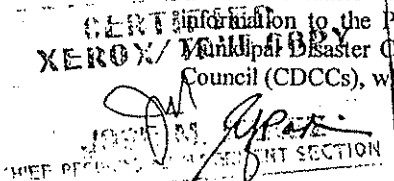
TERMS AND CONDITIONS

Section I: Title and Nature

- 1.1 This agreement is entitled "**Provision of Security and Physical Maintenance of the Flood Forecasting and Warning System (FFWS) Facilities**". This involves a joint undertaking between and among the **DOST-PAGASA**, the Department of Science and Technology (DOST) Region I, the Office of Civil Defense (OCD) Region I, the Province of Pangasinan, the Municipalities of Bugallon, Bayambang, Sta. Barbara, San Manuel and Villasias and the Barangays of Bañaga, Wawa, Poblacion Norte, San Roque, and Puelay to mutually agree on securing the facilities of the FFWS and to coordinate all their efforts in the physical maintenance of the same facilities.

Section II: Roles and Responsibilities

- 2.1 *Specific obligations of the DOST-PAGASA* – Under this Agreement, the PAGASA, thru its Flood Forecasting Branch (FFB), shall perform the following tasks:
- 2.1.1 To take charge in the overall operation and maintenance of the telemetry/telecommunication system networks and electro-mechanical gauging equipment installed at the strategic locations within the Province of Pangasinan, specifically at the municipalities of Bugallon, Bayambang, Sta Barbara, San Manuel and Villasias;
- 2.1.2 To act as trainers for simple trouble-shooting, which will be carried out for the community caretakers, who will be designated by the Municipal Mayor to look after the welfare of the said station, including all the facilities installed therein;
- 2.1.3 Provide Weather and River Flood Bulletins and Advisories and other related information to the Pangasinan Provincial Disaster Coordinating Council (PDCC), the Municipal Disaster Coordinating Council (MDCCs) and the City Disaster Coordinating Council (CDCCs), when the situation warrants;



2.1.4. Conduct post-flood surveys and investigation after every flood event and other related researches and projects in coordination with the PDDC-Pangasinan as well as the Municipalities of Bugallon, Bayambang, Sta. Barbara, San Manuel and Villasis.

2.2 *Specific Obligations of the DOST Provincial Office-Region I.* Under this Agreement, DOST-Region I shall perform the following tasks:

2.2.1 Assist in the dissemination of Weather Bulletins, Dam Discharge Warning, Flood Bulletins and Advisories and other related information to all stakeholders; and

2.2.2 Assist in the monitoring and evaluation of the effectivity of all the information disseminated and to propose improvements of the same, if the situation warrants.

2.3 *Specific Obligations of the OCD-Regional Center I* – Under this Agreement, OCD Regional Center I shall perform the following tasks:

2.3.1 Assist in the dissemination of Weather Bulletins, Dam Discharge Warning, Flood Bulletins and Advisories and other related information to all concerned municipalities and barangays; and

2.3.2 Assist in the monitoring and evaluation studies by providing data on damages, i.e. damages to infrastructure, agriculture, etc.

2.4 *Specific obligations of the Province of Pangasinan* – Under this Agreement, the Province of Pangasinan shall perform the following tasks:

2.4.1 Assist the FFB-PAGASA in whatever endeavors that will be conducted by the Telecommunication Engineers/Technician, i.e. in their quarterly / emergency maintenance works within the Province of Pangasinan;

2.4.2 Organize the trainings for provincial/municipal/barangay personnel for simple troubleshooting, emergency repairs, etc;

2.4.3 Disseminate Weather Bulletins, Dam Discharge Warning, River Flood Bulletins and Advisories and other related information to the Pangasinan Provincial Disaster Coordinating Council (PDCC) and to the Municipal Disaster Coordinating Council (MDCCs) and City Disaster Coordinating Council (CDCCs) when the situation warrants.

2.4.4 Assist in the conduct of post-flood surveys and investigation after every flood event, other related researches and projects in coordination with the FFB-PAGASA.

2.4.5 To assure the maintenance and sustainability of the installed FFWS equipment. They shall guarantee continued support and cooperation in all the activities/endeavors pertaining to the operation and maintenance of the FFWS equipment.

2.4.6 Support every undertaking of the FFB-PAGASA thru proper coordination with any related government and non-government agency within the Province of Pangasinan.

2.5 *Specific obligations of the Municipalities of Bugallon, Bayambang, Sta. Barbara, San Manuel and Villasis* – Under this agreement, the concerned Municipalities shall perform the following tasks:

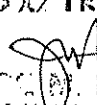
2.5.1 Provide security to the FFB-PAGASA personnel in the conduct of their undertakings, as described herein, within their respective areas of responsibility.

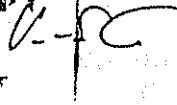
2.5.2 Provide assistance in securing the rainfall and water level gauging station including the facilities installed within their respective municipalities or areas of responsibility.

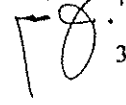
2.5.3 Support every undertaking of the FFB-PAGASA thru proper coordination with any related government and non-government agency within the Province of Pangasinan.

2.5.4 Work out this agreement to be a provincial resolution in order to be a permanent and a continuing undertaking between the parties concerned.

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CHIEF RECORDS SECTION

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- 2.6 *Specific obligations of the Barangays of Baniaga, Wawa, Poblacion Norte, San Roque and Puclay-* Under this agreement, the concerned Barangays shall perform the following tasks:
- 2.6.1 Provide security to the Rainfall and the Water level gauging stations including the facilities that were installed within their respective areas of responsibility;
 - 2.6.2 Assist in the provision of security to the FFB-PAGASA personnel in the conduct of their undertakings, as described herein, when an activity is being done within their respective areas of responsibility;
 - 2.6.3 Support every undertaking of the FFB-PAGASA thru proper coordination with any related government and non-government agency within the Province of Pangasinan.
- 2.7 Under this Agreement, the Parties shall perform the following:
- 2.7.1 That the parties shall continuously coordinate related projects / plans in order to ensure the effectiveness of the facility;
 - 2.7.2 That each concerned party shall regularly report on the implementation of the related projects / plans for this program;
 - 2.7.3 That each party shall continuously exchange necessary information to improve flood disaster preparedness and other related activities;
 - 2.7.4 That a meeting/dialogue be conducted between the parties, organizations and agencies concerned, and representatives of the end users to assess the effectivity of the facility and to make necessary improvements so as to assure the optimum utilization of the facility.
 - 2.7.5 That the parties shall exert all their efforts to replicate the installation of the same facility at other identified areas of concern within the municipality and or the province.


Section III: Effectivity


That this Agreement shall take effect immediately on the date of its signing and approval by the Parties concerned and shall remain in force unless sooner terminated as stipulated in the abovementioned provisions.


Section IV: Termination of Agreement


That the parties concerned reserve the right to terminate this agreement when technical reasons or public policy so demands in which case the party desiring to cause such termination shall notify the other parties in writing at least three (3) months before actual termination of the agreement.

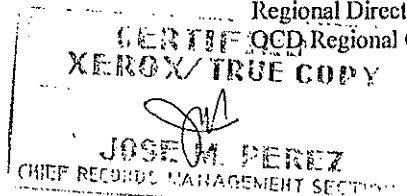
IN WITNESS WHEREOF, the parties have herein unto set their hands on the date and place first above written.


GRACIANO P. YUMUL, JR.
 Undersecretary
 DOST-PAGASA



VICTOR E. AGBAYANI
 Governor
 Province of Pangasinan

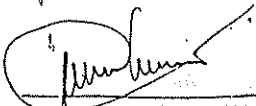

EDGAR F. PADILLA
 Regional Director
 DOST Region I

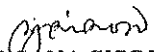

EDGAR NIGEL B. LONTOC
 Regional Director
 OCD Regional Center I




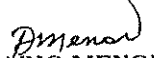
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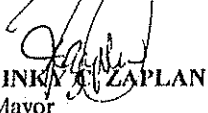




RODRIGO M. ORDUÑA
Mayor
Municipality of Bugallon


SUSANA SISON
Punong Barangay
Brgy. Bañaga, Bugallon


LEOCADIO C. DE VERA
Mayor
Municipality of Bayambang


DARIO MENOR
Punong Barangay
Brgy. Wawa, Bayambang

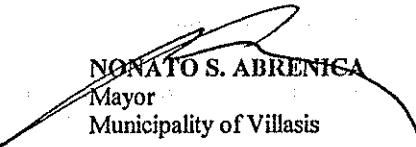

JINKY A. ZAPLAN
Mayor
Municipality of Sta. Barbara

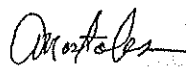

FERNANDO FLORENDO
Punong Barangay
Brgy. Poblacion Norte, Sta. Barbara

LGU participation in the provision of security and physical maintenance of the FFWS facilities installed at Brgy. San Roque, San Manuel is no longer necessary since the said facilities are within the compound of the San Roque Power Corporation (SRPC), where the security is already assured. Likewise, a Part-time caretaker of PAGASA has been designated for the physical maintenance of the said station.

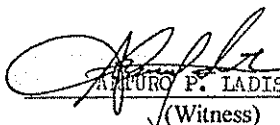
SALVADOR M. PEREZ
Mayor
Municipality of San Manuel

PRIMO A. LOPEZ
Punong Barangay
Brgy. San Roque, San Manuel




NONATO S. ABRENICA
Mayor
Municipality of Villasis


CARLOS A. MOSTOLES
Punong Barangay
Brgy. Puelay, Villasis

Signed in the presence of:

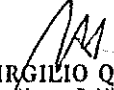

ARTURO P. LADISLAO - PAGASA
(Witness)

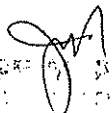
(Witness)



NORMA A. UNTALAN - FPDC Pangasinan
(Witness)

QUIRINO M. AQUINO - PDO IV, Pangasinan
(Witness)

SUBSCRIBED AND SWORN to before me this 31st day of January 2007, affiant exhibiting to me his / her Residence Certificate as indicated above.

Doc. No. 112
Page No. 23
Book No. 6
Series of 2007


ATTY. VIRGILIO Q. SOLIS JR.
Notary Public
Until January 3, 2009
Roll No. 22626 / IBP Lifetime No. 02801
PTR No. 25 ~~Notary~~ Notary ~~12007~~
Bollao, Pangasinan

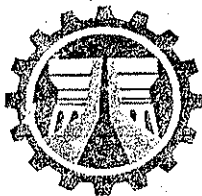
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JOSE M. MERIT
OFFICE RECORDED
INVESTIGATION SECTION

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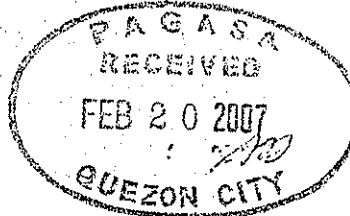






Republic of the Philippines
Department of Public Works and Highways
Region III
OFFICE OF THE REGIONAL DIRECTOR
City of San Fernando, Pampanga

PRAD 07-0220153



February 13, 2007

Mr. PRISCO D. NILO
Officer-In-Charge
PAG-ASA, DOST
Agham Road, Diliman, Quezon City

Sir:

This has reference to his letter dated January 22, 2007 requesting permission to install the new water level gauges at the pier of concrete bridges along the rivers of Pampanga. Please be informed that this Office interposes **NO OBJECTION** on the within request subject to the review of the construction and installation scheme. Henceforth, we would suggest that the scheme and drawing of these improvement works be furnished this Office, for our guidance, reference and file.

Warm Regards.

Very truly yours,


ALFREDO G. TOLENTINO, CESO III
Regional Director

Copy furnished:

Dir. Danilo C. Manalang
Bureau of Design
DPWh-Central Office

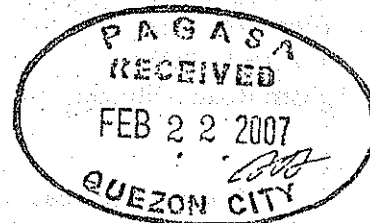
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Republic of the Philippines
NATIONAL IRRIGATION ADMINISTRATION
Region III
OFFICE OF THE REGIONAL IRRIGATION MANAGER
Tambubong, San Rafael, Bulacan

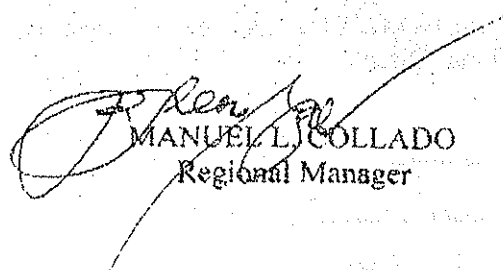
PRAD 07 - 0222189

1st Indorsement
February 21, 2007



Respectfully forwarded to the Office of the Project Manager, Balog-balog Multi Purpose Project, Matatalaib, Tarlac City, for his information and appropriate action the herein letter of Prisco D. Nilo, Officer-In-Charge, Department of Science and Technology, Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) Diliman, Quezon City requesting for a small portion of lot within the NIA office in Tarlac intended for the construction of the housing of rain gauge station to augment the existing monitoring station in Tibag, Tarlac.

It is informed that based on the survey done by PAGASA and JICA, the NIA Office near the Balog-balog dam would be the ideal site for the said station.


MANUEL L. COLLADO
Regional Manager

Cc. The Officer-In-Charge
PAGASA
Diliman, Q. C.

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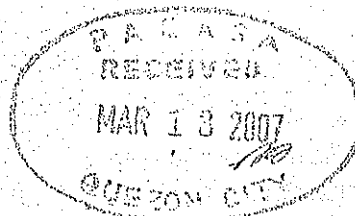
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Republic of the Philippines
PROVINCE OF TARLAC
MUNICIPALITY OF SAN CLEMENTE
OFFICE OF THE MAYOR

PRAD 07-0313104

March 12, 2007



DR. PRISCO D. NILO
Deputy Director for Operations and Services
PAGASA

Sir,

Anest your letter regarding the Construction of a Rainfall Station on Barangay Masain in this Municipality, the Honorable Mayor Vicente G. Pacada, Jr. gives his commitment of support for the realization of the said project. This administration is very much willing to assist and help on the securing permits (issued by this LGU) and, if necessary, dialogues with prospective lot owners where the said structure would be possibly erected.

Please feel free to contact this office through this number: telefax 045-9341244.

Thank you very much and **MORE POWER!**

By authority of the Mayor:


ALLAN FRANCIS G. ESPIRITU
Executive Assistant

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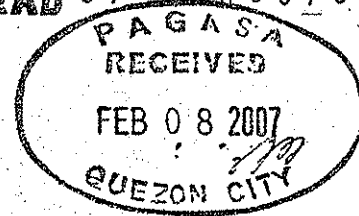


Republic of the Philippines
Department of Environment and Natural Resources
ENVIRONMENTAL MANAGEMENT BUREAU

Regional Office No. 1
2nd Floor Lee Bldg., Lingsat, City of San Fernando, La Union

February 1, 2007

PRAD 07-0208079



MR. PRISCO D. NILO
Office of the Director
PAGASA Science Garden
Agham Road, Diliman
Quezon City, 1100

Dear Mr. Nilo:

We are pleased to inform you of the approval of your application for a Certificate of Non - Coverage (CNC) for upgrading your Flood Forecasting and Warning System Project located at San Felipe Bridge, Binalonan, Balaleng Bridge, Mapandan and Sta. Maria Bridge, Sta. Maria, all province of Pangasinan.

You may now claim said certificate upon payment of One Hundred Pesos (P100.00) representing Processing Fee. Moreover, please be advised to inform this Office of any plans for expansion or modification for further assessment or evaluation of the same.

For your guidance and compliance.

Very truly yours,


JOEL G. SALVADOR
Regional Director

CNC

820-107

Protect the environment... Protect life...

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ENVIRONMENTAL
MANAGEMENT BUREAU

Department of Environment and Natural Resources
Environmental Management Bureau
Region 1

CERTIFICATE OF NON-COVERAGE

No.: 010702-01 0024-0999

This Certificate of Non - Coverage (CNC) is hereby issued to *PHILIPPINE ATMOSPHERIC, GEOPHYSICAL AND ASTRONOMICAL SERVICES ADMINISTRATION (PAGASA)* for upgrading the *Flood Forecasting and Warning System Project* located at *San Felipe Bridge, Binalonan, Balaleng Bridge, Mapandan and Sta. Maria Bridge, Sta. Maria, all province of Pangasinan* pursuant to DAO No. 2003 - 30, the Implementing Rules and Regulations of the Philippine Environmental Impact Statement System (PD 1586), subject to the following condition:

1. All the proposed impact mitigating measures contained in the Environmental Management Plan (EMP) shall be strictly implemented.

Issued this *01st* day of *February* 2007.

Attested by:

NICANOR C. ESTEBAN
OIC, Environmental Impact Assessment
and Monitoring Division

JOEL G. SALVADOR
Regional Director

Filing Fee : ₱ 100.00 O.R. No.: 8732557 Date: 03-08-2007

E-mail address: emb1@emb.gov.ph

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Republic of the Philippines
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
ENVIRONMENTAL MANAGEMENT BUREAU
Regional Office No. III, 4/F Mel-Vi Bldg., Olongapo-Gapan Rd.,
Dolores, City of San Fernando, Pampanga
Telephone Nos. (045) 860-2875 & (045) 861-2361
Telefax No. (045) 961-5203 & (045) 961-5206

CNC-03PA 0703 07-061

CERTIFICATE OF NON-COVERAGE

The DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES through the ENVIRONMENTAL MANAGEMENT BUREAU (EMB) REGIONAL OFFICE NO. III hereby grants this Certificate of Non-Coverage to PHILIPPINE ATMOSPHERIC GEOPHYSICAL AND ASTRONOMICAL SERVICES ADMINISTRATION (PAGASA), after it has complied with the criteria for projects which are not covered by the Philippine Environmental Impact Statement (EIS) System (PD 1586).

The proponent is reminded of the following:

1. This Certificate covers only the proposed Upgrading of the Flood Forecasting and Warning System (FFWS) for Pampanga and Agno River Basins in Region 3.
2. Any significant expansion, cessation, or modification of the approved project shall be subjected to EIA requirements.
3. Transfer of ownership of this Certificate shall carry the same conditions for which written notification shall be made by herein grantee to this Office within fifteen (15) days from such transfer.
4. The proponent shall implement waste minimization, segregation, re-use and other ecological waste management practices pursuant to Ecological Solid Waste Management Act (RA 9003).
5. Planting of trees shall be undertaken either within the project site and/or in other areas as part of the proponent's social and environmental program; and
6. On the spot inspection or monitoring may be conducted by this Office anytime in coordination with concerned groups.

Given this _____

Recommending Approval:


MARILOU P. AVENIDO

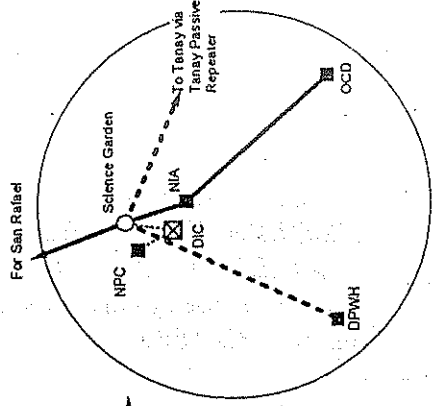
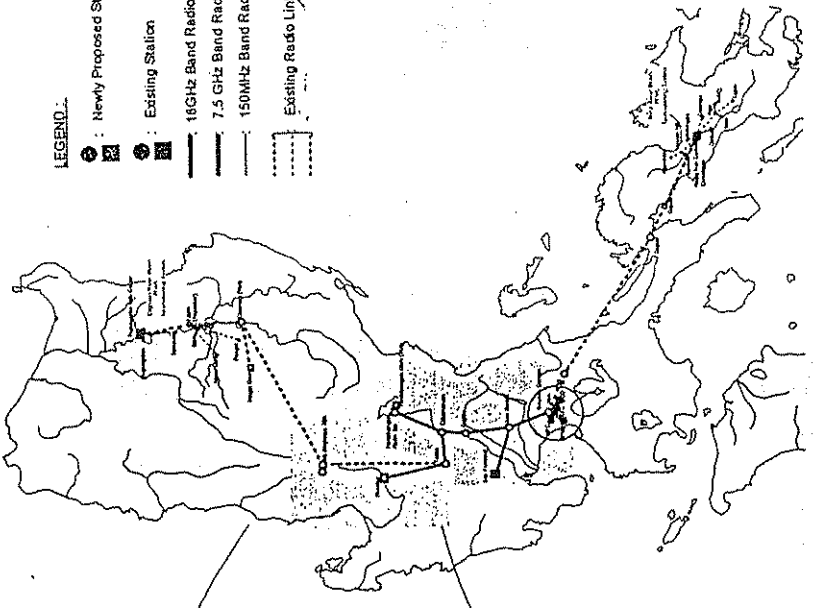
Officer-in-Charge, Environmental
Impact Assessment and Management Division

Laid under O.R. No. 7291501
in the amount of 100.00 dated
March 13, 2007

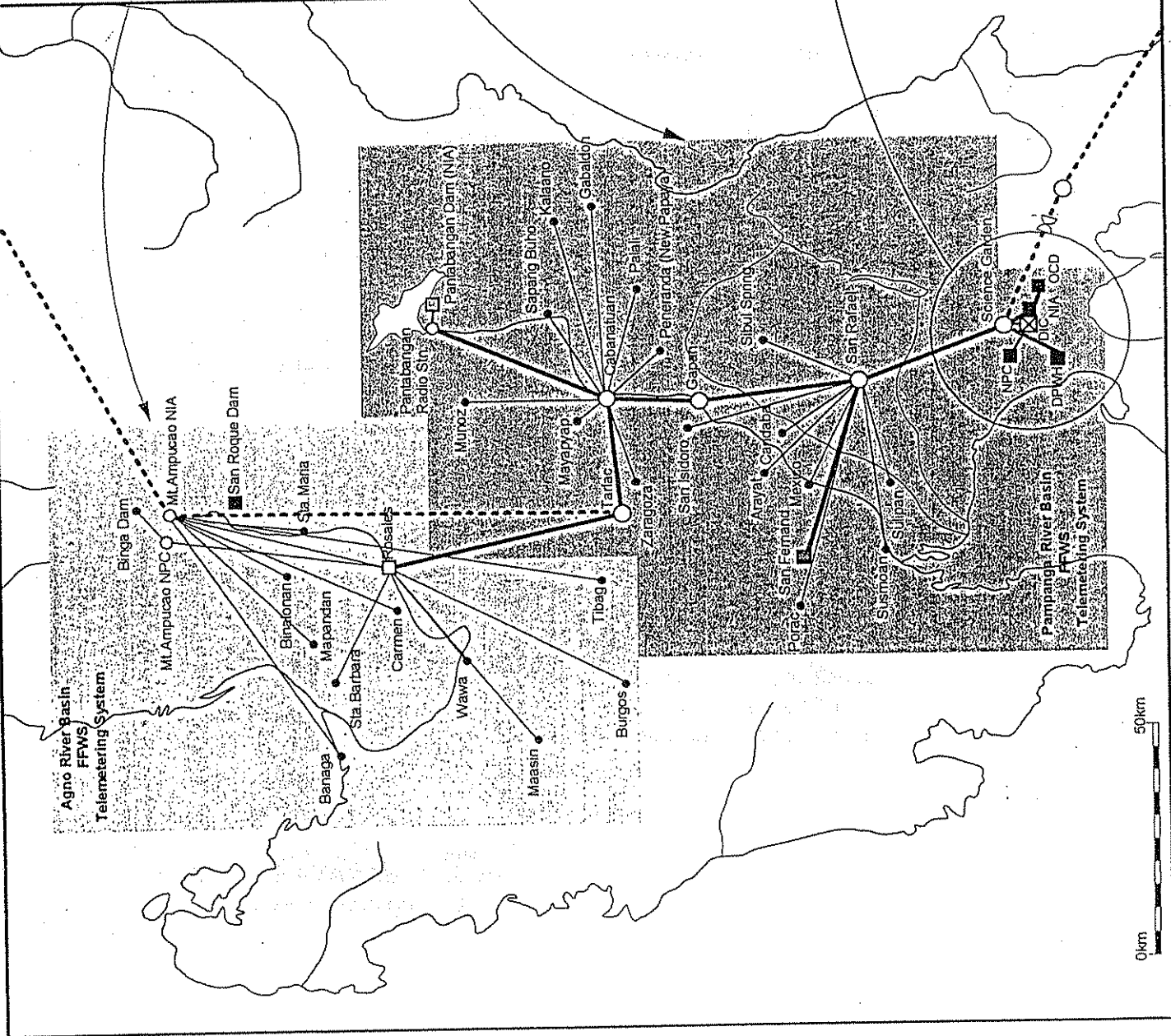
Approved:


OSCAR C. CABANAYAN, CESO VI
OIC, Regional Director

- LEGEND:**
- Newly Proposed Station
 - Existing Station
 - 18GHz Band Radio Link
 - 7.5 GHz Band Radio Link
 - 150MHz Band Radio Link
 - Existing Radio Link



Location Map



Upgrading of Flood Forecasting and Warning System in the Pampanga and Agno River and Basins: Scope of Work under the project

1. Upgrading of the telemetry system, Station Nos : 28 (Pampanga : 17, Agno : 11)

Type	River basin	Station Nos	Name of the station to be upgrading
Rainfall gauging station	Pampanga	6	Munoz, Gabaldon, Sibul Spring, Kalaano, Palali, Porac
	Agno	2	Maasin, Burgos
Rainfall/Water level gauging station	Pampanga	10	Sapang Buhô, Mayayap, Zaragoza, Penaranda, San Isidro, Candaba, Arayat, Sasman, Sulipan, Mexico
	Agno	8	Santa Maria, Santa Barbara, Banaga, Carmen, Wawa, Tibag, Mapandan, Binalonan
Repeater station/Water level gauging station	Pampanga	1	San Rafael
	Agno	1	Mt. Ampacao

2. Upgrading of monitoring system : Station nos. 3

Type	River basin	Name of the station to be upgrading	New/Modification
Central monitoring center		DIC (Data Information Center)	Modification
Sub-center for the basin	Pampanga	San Fernando sub-center	New
	Agno	Rosales sub-center	Modification

3. Upgrading of microwave multiplex system, New : 7. 5GHz x 7 links, 18GHz x 2 links (Underlined is new station)

- 7.5GHz (Science Garden - San Rafael - Gapan - Cabanatuan - Tarlac - Rosales, San Rafael - San Fernando, Cabanatuan - Pantabangan FFWS)
- 18GHz (Science Garden - NIA - OCD)

4. Upgrading of the relevant organizations

- OCD (Office of Civil Defense): Modification
- DPWH (Department of Public Works and Highways): Modification
- NPC (National Power Corporation): Modification
- NIA (National Irrigation Administration): Modification
- Pantabangan DAM: Modification
- Sanroque DAM: New
- Binga DAM: Modification

5. Other civil works and

- River bank protection work: 4 stations (Pampanga: 2, Agno: 2)
- Gauging house work: 15 stations (Pampanga: 9, Agno: 6)
- Water level gauge support work: 12 stations (Pampanga: 7, Agno: 5)

Type	River basin	Station Nos	Name of station
River bank protection work	Pampanga	2	Sapang Buhô, Sulipan
	Agno	2	Santa Barbara, Binalonan
Gauging house work	Pampanga	9	Zaragoza, Penaranda, San Isidro, Candaba, Arayat, Mexico, Kalaano, Palali, Porac
	Agno	6	Santa Maria, Wawa, Mapandan, Binalonan, Maasin, Burgos
Water level gauge support work	Pampanga	7	Zaragoza, Penaranda, San Isidro, Candaba, Arayat, Sasman, Mexico
	Agno	5	Santa Maria, Carmen, Wawa, Tibag, Mapandan

6. Upgrading of telecommunication tower

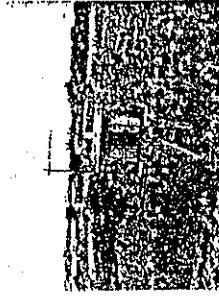
Station	Existing design	Design for the upgrading
Science Garden	5.4m self-standing	Structural reinforcement for the existing design
San Rafael	76m guyed tower	New (76mself-standing)
Gapan	31m self-standing	Structural reinforcement for the existing design
Cabanatuan	31m guyed tower	New (30mself-standing)
Tarlac	35m self-standing	Increase 10mup: Structural reinforcement for the existing design
Rosales	28m self-standing	Increase 25mup: new 53mself-standing
Pantabangan	55m guyed tower	Structural reinforcement for the existing design
San Fernando	-	New (30mself-standing)

7. Main equipment for monitoring stations (DIC and Sub-Centers)

Equipment name	Function	DIC	Sub-Center
Data memory reader	Reading of the measuring data saved at the gauging stations as a backup	1	2
FFWS server	Processing and storing of the data observed	1	2
Web server	Convert the processed data to Web data for visual display	1	Operated at server
Flood forecasting server	Analysis for flood forecasting and run off modes	1	2 (Run off model only)
Data management server	Storing of river data and processed data	1	-
Monitoring PC	Monitoring of process and analysis data	3	1
Large display panel	Display the processed data on large display	5	1

8. Examples of gauging stations

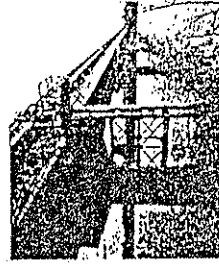
1) Rainfall/Water level gauging: Existing Banaga station



Overview of gauging house



Inside view of the gauging house

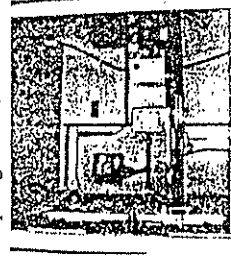


Pressure type water level sen.

2) Rainfall gauging station: Existing Sibul spring station



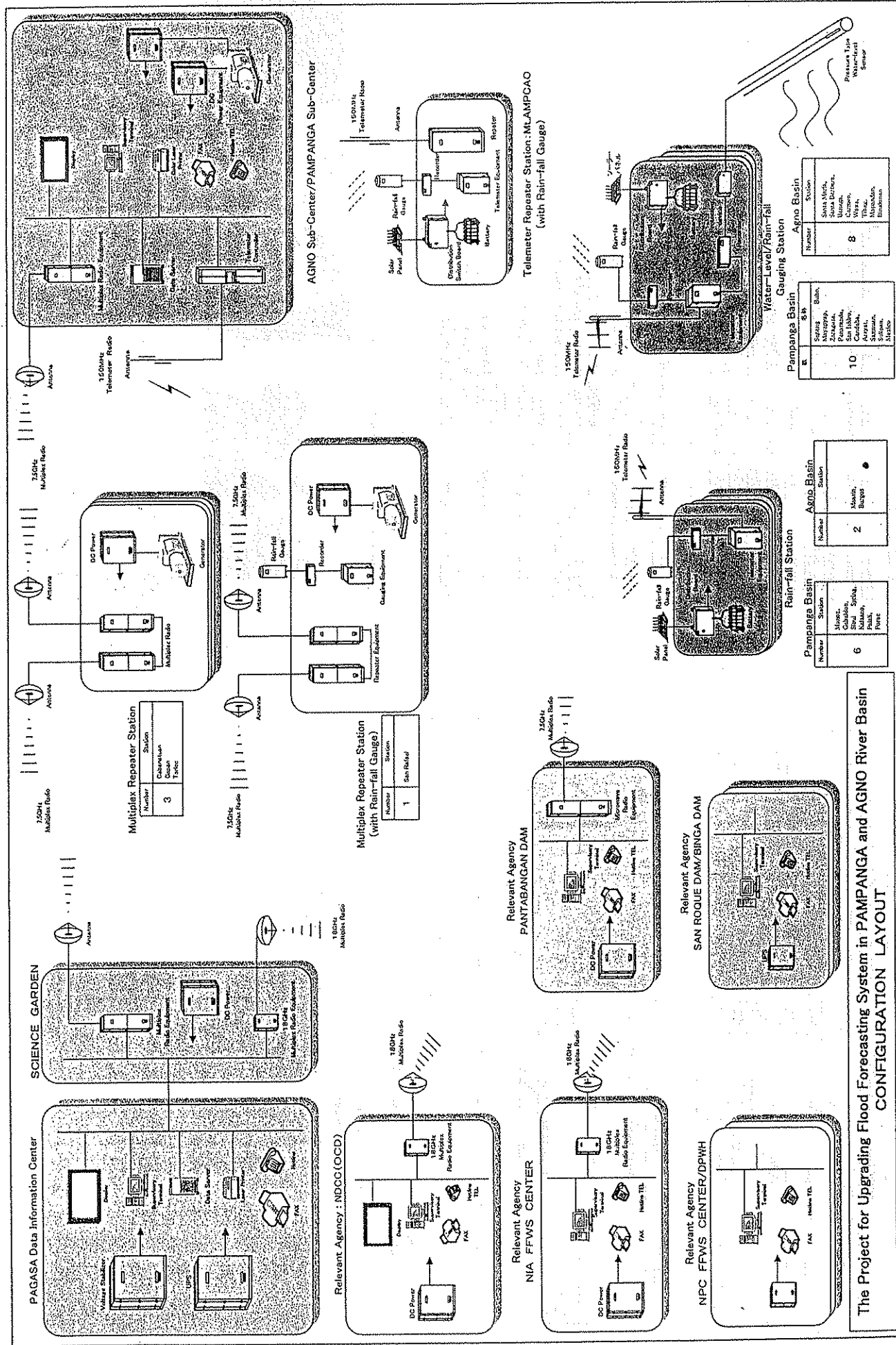
Overview of gauging house



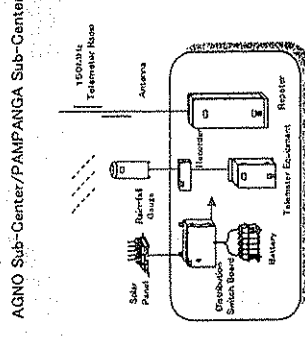
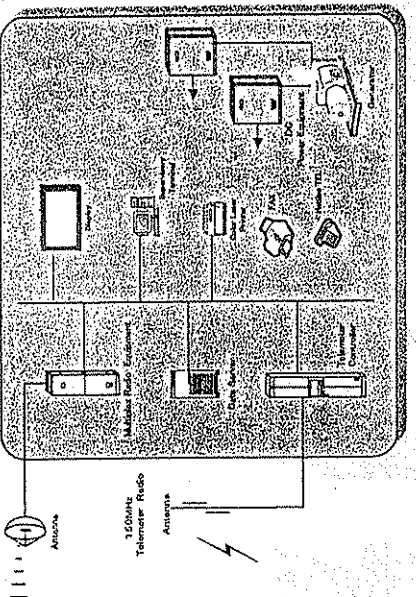
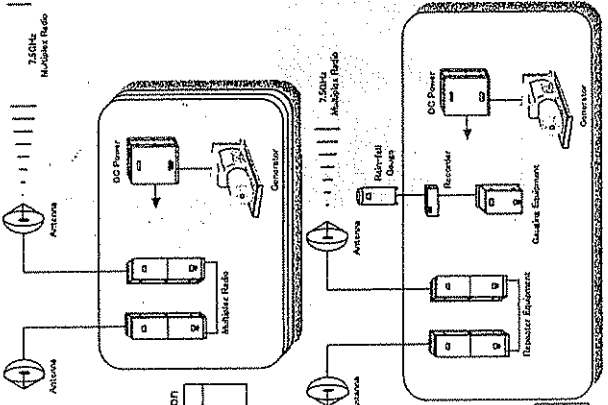
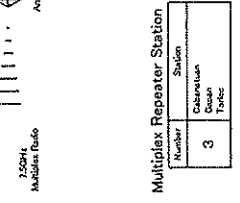
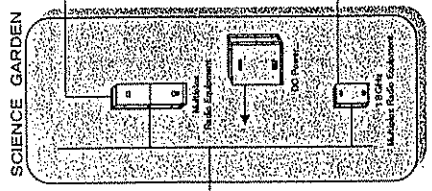
Inside view of the gauging house



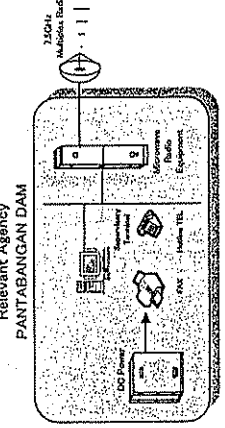
Roof of the gauging station



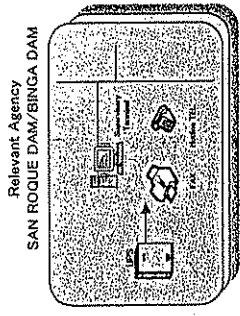
PAGASA Data Information Center



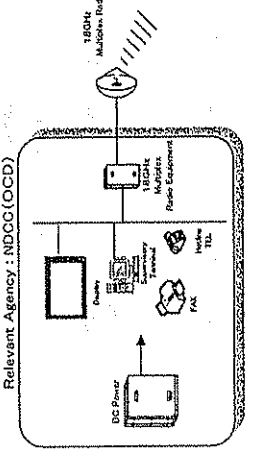
Telemeter Repeater Station: MLAMPCAO
(with Rain-fall Gauge)



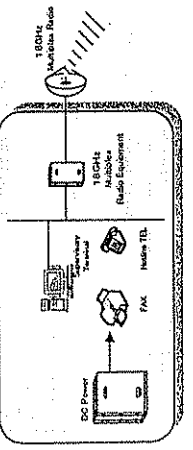
Relevant Agency
PANTABANGAN DAM



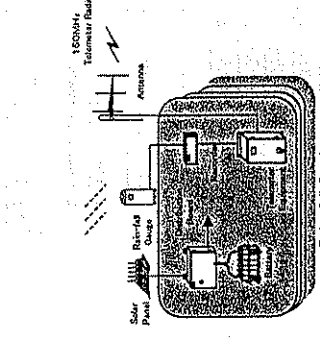
Relevant Agency
SAN ROQUE DAM/BINGA DAM



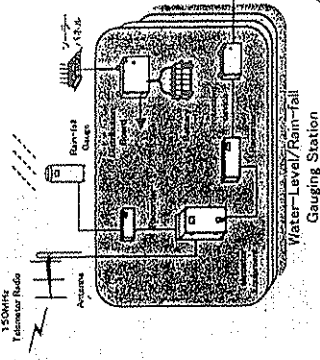
Relevant Agency
NIA FFWS CENTER



Relevant Agency
NPC FFWS CENTER/DPWH



Pampanga Basin
Rain-fall Station



Pampanga Basin
Water-Level/Rain-fall Gauging Station

Basin	Station
Spring	Suber
San Roque	San Roque
Pantabangan	Pantabangan
San Roque	San Roque
Agno	Agno
San Roque	San Roque
San Roque	San Roque
San Roque	San Roque
San Roque	San Roque
San Roque	San Roque

Basin	Station
Spring	Suber
San Roque	San Roque
Pantabangan	Pantabangan
San Roque	San Roque
Agno	Agno
San Roque	San Roque
San Roque	San Roque
San Roque	San Roque
San Roque	San Roque
San Roque	San Roque

Basin	Station
Spring	Suber
San Roque	San Roque
Pantabangan	Pantabangan
San Roque	San Roque
Agno	Agno
San Roque	San Roque
San Roque	San Roque
San Roque	San Roque
San Roque	San Roque
San Roque	San Roque

Basin	Station
Spring	Suber
San Roque	San Roque
Pantabangan	Pantabangan
San Roque	San Roque
Agno	Agno
San Roque	San Roque
San Roque	San Roque
San Roque	San Roque
San Roque	San Roque
San Roque	San Roque

The Project for Upgrading Flood Forecasting System in PAMPANGA and AGNO River Basin
CONFIGURATION LAYOUT

「パンパンガ・アグノ河洪水予警報システム改善計画」基本設計調査概要説明調査日程

2007年3月19日Ver4

日	曜	時	JICA	コンサルタント	
			団長/総括 兼 計画管理 Leader of the Mission	①業務主任/洪水予警報システム Chief Consultant / Flood Forecasting and Warning System Planner	②電気通信/無線計画 Telecommunication / Wireless Radio System Planner
			米林 徳人 Mr. Norihito YONEBAYASHI	奥田 真人 (日本工営) Mr. Masato OKUDA	東 靖 (日本工営) Mr. Yasushi AZUMA
3月11日	日	AM	09:40 成田⇒フィリピン 13:05 (JL 741) 09:40 Tokyo⇒Phillipine13:05 (JL 741)	出発日は調整中	
		PM	—メトロマニラ排水改善計画B/D調査— Metro Manila B/D study		
3月13日	火	AM	—メトロマニラ排水改善計画B/D調査— Metro Manila B/D study	09:40 成田⇒フィリピン 13:05 (JL 741) 09:40 Tokyo⇒Phillipine13:05 (JL 741)	
		PM	—メトロマニラ排水改善計画B/D調査— Metro Manila B/D study	16:00 科学技術省大臣 気象天文庁表敬・協議 16:00 Courtesy Call to DOST	
3月14日	水	AM	—メトロマニラ排水改善計画B/D調査— Metro Manila B/D study	10:00 気象天文庁協議 10:00 Discussion with PAGASA	
		PM	19:00 団内打合せ 19:00 Internal Meeting	14:00 気象天文庁協議 14:00 Discussion with PAGASA 16:00 団内打合せ 16:00 Internal Meeting	
3月15日	木	AM	09:00 JICA事務所表敬・打合せ 09:00 Courtesy Call & Discussion with JICA Office 11:00 在フィ日本大使館表敬・打合せ 11:00 Courtesy Call & Discussion with EOJ in Philippine	同JICA団員 Ditto as JICA Member	
		PM	16:00 国家通信管理局 (NTC) 協議 16:00 Discussion with NTC 17:00 科学技術省大臣および次官 表敬 17:00 Courtesy Call to Secretary and USEC of DOST	同JICA団員 Ditto as JICA Member	
3月16日	金	AM	10:00 気象天文庁 (PAGASA) 表敬・協議 10:00 Courtesy Call & Discussion with PAGASA New Acting Director attend 11:00 移動⇒パンパンガ 11:00 Move to Pampanga area	同JICA団員 Ditto as JICA Member	
		PM	13:00 パンパンガ関係機関との協議 13:00 Discussion with Local Authority & MDCC or BDCC 15:00 パンパンガ流域サブ・センター建設候補地視察 15:00 Site Survey for proposed construction site for Pampanga Sub-Center 17:00 移動⇒マニラ 17:00 Move to Manila	同JICA団員 Ditto as JICA Member	
3月17日	土	AM	11:00 科学技術省 気象天文庁ミニッツ協議 11:00 Discussion on M/D with PAGASA	同JICA団員 Ditto as JICA Member	
		PM	14:00 科学技術省 気象天文庁ミニッツ協議 14:00 Discussion on M/D with PAGASA	同JICA団員 Ditto as JICA Member	
3月18日	日	AM	10:00 科学技術省 気象天文庁ミニッツ協議 10:00 Discussion on M/D with PAGASA	同JICA団員 Ditto as JICA Member	
		PM	14:00 科学技術省 気象天文庁ミニッツ協議 14:00 Discussion on M/D with PAGASA	同JICA団員 Ditto as JICA Member	
3月19日	月	AM	10:00 合同運営維持管理委員会+砂防センター協議 10:00 Discussion with Joint Operation & Management Committee (JOMC) including FCSEC	同JICA団員 Ditto as JICA Member	
		PM	14:00 科学技術省大臣気象天文庁協議 14:00 Discussion with PAGASA 18:00 科学技術省長官協議・報告 18:00 Discussion with Secretary of DOST 19:00 ミニッツ署名 19:00 Sign of M/H	同JICA団員 Ditto as JICA Member	
3月20日	火	AM	10:00 科学技術省 気象天文庁 負担事項確認協議 10:00 Discussion with PAGASA	同JICA団員 Ditto as JICA Member	
		PM	14:00 在フィ日本大使館報告 14:00 Report to EOJ in Philippine 16:00 JBIC事務所報告 渡辺氏 16:00 Report to JBIC Office Mr. Watanabe 18:00 JICA事務所報告 18:00 Report to JICA Office	同JICA団員 Ditto as JICA Member	
3月21日	水	AM	09:30 経済開発庁表敬 (先方都合によるキャンセル) 09:30 Courtesy Call to NEDA 10:00 科学技術省 気象天文庁 最終打合せ 10:00 Discussion with PAGASA		
		PM	14:25 フィリピン⇒成田 19:45 (JAL 742) 14:25 Phillipine⇒Tokyo 19:45 (JAL 742)		

Appendix 6

Soft Component Plan

Soft Component Plan

on

**Improvement Project for Flood Forecasting and Warning Systems on
Pampanga and Agno Rivers**

March 2007

1. Background

(1) Project background

The Republic of the Philippines is located in the subtropical monsoon zone and suffers damage from rainstorms caused by the monsoons and typhoons every year. In particular, Luzon Island, the largest island of the Philippines, where most of the population and economic activities are concentrated, faces serious damage from such storms.

Because of this, the Philippines has been developing flood forecasting and warning systems for the basins of major rivers on Luzon Island, including the Pampanga, Agno, Cagayan and Bicol, as part of measures to reduce the damage from floods with grant and loan aid provided by the government of Japan. Such flood forecasting and warning systems have contributed to the mitigation of flood damage in these basins.

The systems in the Pampanga and Agno River basins for which the assistance is currently requested, however, are 10 to 30 years old and severely deteriorated. These systems were damaged also by natural disasters such as the volcanic mudflows from the eruption of Mount Pinatubo and Baguio earthquake in the 1990s, and are unable to function as they originally did.

Under such circumstances, the Philippines has requested that Japan provide it with grant aid for the equipment maintenance needed to rehabilitate the flood forecasting and warning systems for the Pampanga and Agno River basins.

The Philippines originally requested assistance for the rehabilitation of the existing systems. The Japanese side, however, was concerned that the rehabilitation alone would be inadequate for the flood forecasting and warning systems to function properly, and changed the positioning of this study for a general grant aid project.

The Philippine side subsequently notified of the requested equipment, including a categorized list, at the time of the field study for the basic design research on the assumption of a general grant aid project.

This project is to reinforce the existing flood forecasting and warning systems, aiming to ensure proper functioning of the flood forecasting and warning systems in the Pampanga and Agno River basins and facilitate efficient and effective disaster prevention activities.

(2) Background of soft component

The flood forecasting and warning systems to be improved in this project will distinctively differ from the existing system in the following respect.

Monitoring of flood-related information at the agencies involved in flood prevention measures

The amount of information obtainable at the following relevant agencies through the existing flood forecasting and warning systems has been extremely limited. The information has been delivered by telephone or facsimile, which lacked speed and accuracy. This project plans to newly install surveillance monitors for the flood forecasting and warning systems at the following agencies involved in flood prevention activities so as to allow the information collected, analyzed and forecasted by Philippine Atmospheric, Geophysical and Astronomical Service Administration (PAGASA) to be directly monitored. This requires a soft component for the operation and management of the new flood forecasting and warning systems with the surveillance monitors.

Table 1. Roles involved in flood control

Agency	Role
National Disaster Coordinating Council (NDCC)	Supreme body in charge of disaster measures, providing information and instructions for disaster control.
National Power Corporation (NPC)	Oversees the operation and management of hydroelectric dams.
National Irrigation Administration (NIA)	Oversees the operation and management of irrigation dams.
Department of Public Works and Highways (DPWH)	Maintains rivers and roads.
San Roque Dam	Located on the mid-Agno River, discharging the reservoir water into the Agno River.
Binga Dam	Located on the upper Agno River, discharging the reservoir water into the Agno River.
Pantabangan Dam	Located on the upper Pampanga River, discharging the reservoir water into the Pampanga River.

The existing outflow forecasting software will be updated to serve the increased gauging stations.

The outflow forecasting software helps forecast the streamflow and water levels in the lower basin several hours in advance based on the rainfall and water levels observed upstream, which has already been in use at PAGASA. Because of the new rainfall and water level gauging stations added in this project, however, the relationship between the observation data for the outflow forecasting software and streamflow and water levels to be forecasted must be reorganized. Consequently, technical instruction through soft component is required for the rearrangement of the existing outflow forecasting software and its continuous renewal.

New overflow analysis software will be installed to improve the means of providing information.

The overflow analysis software is used to clearly illustrate the state of river overflow

based on the downstream flow rates and water levels forecasted by the outflow forecasting software and geographical data. This is to be newly installed in this project. Soft component is again required so that the new overflow analysis software can be used effectively and continuously for flood control activities.

(3) Positioning of soft component

Appropriate and effective use of the flood forecasting and warning systems to be improved in this project requires in-depth understanding of the operation management that takes the above aspects into consideration. Further, the activities (a) through (i) below must be implemented to enhance the effectiveness of the systems and achieve the project goals.

- 1) Basic operation and maintenance of the flood forecasting and warning systems
- 2) Comprehensive and efficient operation and management of the flood forecasting and warning systems
- 3) Organization and improvement of the criteria for issuing flood forecasts and warnings
- 4) Update of the existing run-off analysis software
- 5) Management to maintain accuracy
- 6) Improvement of the methods of providing information using the run-off analysis software
- 7) Formulation of evacuation plans (hazard maps) and flood emergency management
- 8) Continuous efforts to promote more active and efficient disaster prevention activities conducted by relevant agencies using the flood forecasting and warning systems
- 9) Educational campaign for the residents to learn the measures to reduce flood damage using the flood forecasting and warning systems

Of these activities;

Item (a) will be undertaken by a construction company as part of facility construction and equipment procurement.

Items (b) through (f) will be needed to efficiently initiate the operation of the flood forecasting and warning systems and ensure the minimally required sustainability. The technical support through this soft component of grant aid is thus considered necessary

(the underlined activities above).

Items (g) through (i) are not the requirements for operating the systems, but are necessary for the improvement of the effectiveness of the flood forecasting and warning systems. These, therefore, should be performed solely by the local agencies or through technical assistance other than the assistance provided by the soft component of this project.

The overall operation and management of the flood forecasting and warning systems involving relevant agencies in the activity (b), in particular, requires those agencies other than Flood Forecasting Branch (FFB) of PAGASA, the organizing agency, that engage in flood control activities such as, National Disaster Coordinating Council (NDCC), National Power Corporation (NPC), National Irrigation Administration (NIA), Department of Public Works and Highways (DPWH) and relevant dam operators, to learn how to operate and maintain the flood forecasting and warning systems.

2. Aim of soft component

The technical assistance provided through the soft component of the grant aid aims to develop human resources that can appropriately operate, manage and maintain the equipment for the flood forecasting and warning systems.

The following are the specific types of personnel to be developed.

Table 2. Specific aims of soft component

Subject	Aim
Engineers who operate and maintain the flood forecasting and warning systems	Learn how to operate and maintain the monitors and other devices to facilitate effective disaster control.
Engineers who operate and maintain the outflow forecasting software	Learn how to operate and maintain the outflow forecasting software for accurate forecasting from water level data and continuous updates.
Engineers who operate and maintain the overflow analysis software	Learn how to operate and maintain the overflow analysis software for accurate overflow analysis and continuous updates.

3. Expected outcomes of soft component

The following describes the operational and technical outcomes expected from the technical assistance for the efficient operation and maintenance of the flood forecasting and warning systems.

(1) Outcomes of operation and maintenance technology

- 1) The roles and activities of each organization in disaster prevention and methods of information delivery and cooperation required for effective disaster control will be defined, which will allow effective system operation and faster decision-making.
- 2) The system operation and maintenance manuals will be revised and technical skills and judgment needed for basic operation and maintenance will be developed.
- 3) Management and use of information effective for flood control will be feasible.
- 4) Technology to set the criteria for issuing flood forecasts and warnings will be developed, and appropriate criteria will allow effective delivery of information such as water levels.
- 5) Disaster simulation and field exercises will provide the experience of emergency operation, which will also reveal any issues in the system operation to allow measures to be taken.

(2) Outcomes of technology to update the runoff forecasting software

- 1) The understanding of the mechanism, capabilities and issues of the existing outflow forecasting software will be gained and technology for continuous software updates will be developed through designing, outsourcing and verification of software updates.
- 2) The operation and maintenance manuals for the outflow forecasting software will be revised, and comprehensible information on water level forecasts will become available through the operation of the updated outflow forecasting software to forecast water levels.
- 3) Operation and maintenance technology to maintain the accuracy of the outflow forecasting software output will be developed.

(3) Outcomes of technology for the runoff analysis software

- 1) The understanding of the mechanism, capabilities and issues of the overflow analysis software will be gained and technology for continuous software updates will be developed through designing, customizing and verification of software installation.
- 2) The operation and maintenance manual will be prepared and operation and maintenance skills will be acquired, which will allow the analysis of flood

forecasts and overflow levels.

- 3) Operation and maintenance technology to maintain the accuracy of the overflow analysis software output will be developed.
- 4) The overflow analysis software will allow the criteria for issuing warnings to be verified.
- 5) The overflow analysis software will help improve the methods of information delivery and promote the use of hazard maps.

4. How to confirm the level of goal achievement

The level of goal achievement must be assessed regularly over the period of the technical assistance. As a quantitative measure, the technical assistance staff will enter the expected outcomes in a check sheet, and the assessment table will be used to confirm and summarize the results. Table 3 below is an example of assessment table for the level of goal achievement.

Table 3. Example of assessment table for the level of goal achievement.

Assessment criteria	Grade
<p>Operation and maintenance technology</p> <ol style="list-style-type: none"> 1. Organizations and systems <ul style="list-style-type: none"> • Understands the roles and activities of each relevant organization • Methods of information delivery and cooperation required are clearly defined. 2. Organizing and analyzing observation data <ul style="list-style-type: none"> • Understands the types and accuracy of information and timing of collection required for flood control. • Understands how to manage and use information. • Understands the importance of short-term rainfall data. • Understands rainfall characteristics such as hourly rainfall and rainfall before flooding. • Able to summarize the rainfall per hour, three hours and day and understands its importance. • Able to summarize hourly and daily water level data and understands its importance. 3. Method of flood forecasting and warning <ul style="list-style-type: none"> • Has the technical skills and judgment needed for basic operation and maintenance. • Understands the water levels and other criteria for issuing flood forecasts and warnings. • Understands the relationship between the criteria for issuing flood forecasts and warnings and disaster prevention activities. • Understands how to improve the means to provide information. 4. Other <ul style="list-style-type: none"> • Has the knowledge of the future flood and disaster prevention measures and flood forecasting and warning systems. • Clearly defined the issues through operational training and proposed measures. 	

<p>Assessment of technology to update the existing outflow forecasting software</p> <ol style="list-style-type: none"> 1. Flood forecasting software <ul style="list-style-type: none"> • Understands the software structure. • Able to grasp the relationship between rainfall and low. • Able to changes rainfall patterns and calculate the flow. • Able to make rainfall-flow waveforms from the results of flow calculation. • Understands the limits of software application. • Understands the current software issues. 2. Understanding of flood forecasting procedures <ul style="list-style-type: none"> • Understands the hydrologic data required for flood forecasting. • Understands the hydrologic data currently maintained. • Understands the current issues in flood forecasting. • Understands the flood forecasting procedures. • Understands the relationship between forecast lead time and accuracy. 3. Updating existing software <ul style="list-style-type: none"> • Understands new software and how to redesign software. • Understands how to apply software. • Understands the appropriateness of forecast lead time and accuracy. • Understands how to verify software. • Understands how to effectively provide forecast information. 4. Improving software accuracy <ul style="list-style-type: none"> • Understands the techniques to improve software accuracy. 	
<p>Assessment of technology for overflow analysis software</p> <ol style="list-style-type: none"> 1. Overflow analysis software <ul style="list-style-type: none"> • Understands the software structure. • Able to grasp the relationship between the results of flow calculation and overflow. • Understands the limits of software application. • Understands software issues. 2. Understanding of procedure for examining overflow analysis <ul style="list-style-type: none"> • Understands the geographical data required for overflow analysis. • Understands the geographical data currently maintained. • Understands the current issues in overflow analysis. • Understands the overflow analysis procedures. 3. Software customization <ul style="list-style-type: none"> • Understands how to customize software. • Understands how to apply software. • Understands how to verify software. 4. Improving software accuracy <ul style="list-style-type: none"> • Understands the techniques to improve software accuracy. 5. Other <ul style="list-style-type: none"> • Understands how to verify the criteria for issuing flood forecasts and warnings. • Understands how to improve the means to provide information. • Understands how to apply the software to hazard maps. 	

5. Activities and introduction plan

(1) Trainees by specialty

Table 4 indicates the minimum number of trainees by specialty considered necessary in each area of technical assistance.

Table 4. The number of trainees by specialty and the groups subject to technical assistance

Agency	Operation	# of personnel		Training group
		Manager	Members	
PAGASA & FFB	Operation	1 person	6 persons	A
	Outflow forecasting	1	6	B
	Overflow analysis	1	4	C
NDCC	Operation	1	2	D
NPC	Operation	1	2	D
NIA	Operation	1	2	D
DPWH	Operation	1	2	D
San Roque Dam	Operation	1	2	D
Binga Dam	Operation	1	2	D
Pantabangan Dam	Operation	1	2	D

(2) **Technical assistance activities**

Table 5 lists the activities in the technical assistance for the operation and maintenance of the flood forecasting and warning systems by dividing them into operation and maintenance technology, existing outflow forecasting technology and overflow analysis technology. Training group classification is shown in Table 4.

The orientation and instruction on the monitor operation concerning the operation and maintenance technology and existing outflow forecasting technology can be given simultaneously on several terminals. The instruction and operation concerning the overflow analysis technology can only use one terminal due to limited license for the overflow analysis software; thus, the instruction and operation will be conducted alternately for one or two trainees at a time.

Table 5. Technical assistance activities Operation and maintenance technology: 1.375 months (first period: 0.875 months (3.5 weeks), second period: 0.5 month (2 weeks))

Activities	Training group	Period required (# of weeks)	Period required (# of weeks)
<p>1. Confirm the organizational systems and explain how to cooperate.</p> <p>Determine the sections and roles managed by each agency in disaster prevention, define the responsibility system for the agencies and staff and present how to provide information and cooperation needed for effective disaster prevention.</p> <ul style="list-style-type: none"> • Describe and confirm the roles of each agency. • Explain and confirm the methods of cooperating with the agencies and disaster prevention activities. • Describe and confirm the information to be exchanged with the agencies and timing of information exchange. 	A & D	0.5	-
<p>2. Revise the system operation and maintenance manuals.</p> <p>Determine the system operation criteria for flood season and</p>	A & D	1.0	-

<p>non-flood season.</p> <p>Revise the system operation and maintenance manuals to facilitate effective disaster prevention and develop the technical skills and judgment to carry out basic operation and maintenance.</p> <ul style="list-style-type: none"> • Explain how to operate and maintain the system (0.25 weeks) • Revise the existing operation and maintenance manuals (0.75 weeks). 			
<p>3. Explain and instruct how to manage information</p> <ul style="list-style-type: none"> • List the types and accuracy of information and timing of collection required for flood control and define how to manage and use the information. • Explain how to manage and use information. • Describe the database development and create such database. 	A	0.5	-
<p>4. Describe the criteria and procedures for issuing flood forecasts and warnings.</p> <p>Confirm the criteria for issuing flood forecasts and warnings and organize the information at each site to determine appropriate criteria. Instruct how to effectively provide water level and other information.</p> <ul style="list-style-type: none"> • Explain the purpose of the issuance criteria and how to determine and use such criteria (first period: 0.5 week). • Determine the criteria for issuing forecasts and warnings (first period: Pampanga basin: 0.5 week, second period: Agno basin: 0.5 week). 	A	1.0	0.5
<p>5. Describe the future flood and disaster prevention measures and flood forecasting and warning systems.</p> <p>Assuming that the dam management system will be renewed and the various types of observation and information delivery will become possible in the future, describe the forthcoming flood and disaster prevention measures and flood forecasting and warning systems.</p> <ul style="list-style-type: none"> • Describe the future flood and disaster prevention measures and flood forecasting and warning systems. 	A & D	0.5	-
<p>6. Operational training</p> <p>Conduct disaster simulation and field exercises, define the issues in system operation and propose measures.</p> <p>Prepare the training sessions (0.25 week)</p> <p>Disaster simulation exercise (0.25 week)</p> <p>Field exercise (two times: 0.5 week)</p>	A & D	-	1.0
<p>7. Assessment</p> <p>Assess the technical assistance.</p> <p>Examine using documents</p> <p>Examine based on system operation</p>	A & D	-	0.5

Existing outflow forecasting technology: 2.375 months (first period: 1.375 months (5.5 weeks), second period: one month (4 weeks))

Activities	Training group	Period required (# of weeks)	Period required (# of weeks)
<p>1. Describe the existing flood forecasting software.</p> <p>Describe the configuration and content of the existing flood forecasting software, let the trainees operate the software and</p>	B	0.5	-

<p>ensure that they are able to perform flow calculation.</p> <ul style="list-style-type: none"> • Describe the existing flood forecasting software. • Operate the existing flood forecasting software. 			
<p>2. Explain the flood forecasting procedures.</p> <p>Instruct the flood forecasting procedures and describe the hydrologic data required for flood forecasting, current issues, etc.</p> <ul style="list-style-type: none"> • Explain the flood forecasting procedures. • Describe the data required for flow forecasting. • Describe the issues such as the accuracy of data collected. 	B	0.5	-
<p>3. Organize and analyze observation data</p> <p>Explain and instruct how to organize and analyze observation data.</p> <ul style="list-style-type: none"> • Explain the purposes and methods of organizing and analyzing observation data (0.5 week). • Organize rainfall and water level data from observation (1.0 week) • Analyze the correlations between rainfall and water level data (0.5 week) 	B	2.0	-
<p>4. Describe and instruct the redesigning of the existing flood forecasting software.</p> <p>Explain how to improve and design the flow forecasting software for updates and accuracy improvement and design such software.</p> <ul style="list-style-type: none"> • Explain how to design software and improve the accuracy (0.5 week). • Determine the coefficients of the basins' characteristics, taking into account the geological and geographical features, river structures, overflow condition, etc (1.0 week). • Divide the basins into sections based on the river confluences, dams and basin characteristics, etc., determine Thiessen coefficients (coefficients for calculating the average rainfall in the basin) and develop a flow calculation model (1.0 week). 	B	2.5	-
<p>5. Describe and instruct the verification of updates of the existing flood forecasting software.</p> <ul style="list-style-type: none"> • Explain how to verify the existing outflow forecasting software (0.25 week). • Prepare verification data and check sheets (0.25 week). • Verify updated software (0.5 week). 	B	-	1.0
<p>6. Instruct the existing outflow calculation.</p> <p>Revise the existing operation manual and check the software operation. Explain how to improve the accuracy and work on the improvement.</p> <ul style="list-style-type: none"> • Revise the existing operation manual and check the software operation (0.5 week). • Explain how to improve the accuracy and operate the system (0.5 week). • Compare forecast data and actual measurement data, and adjust the coefficients of basin characteristics to improve the accuracy (1.0 week). 	B	-	2.0
<p>7. Explain and instruct how to provide information for flood forecasting and warning.</p> <p>Explain how to provide information for flood forecasting and warning, describe the issues and instruct the improvement.</p> <ul style="list-style-type: none"> • Describe the issues in the methods of providing information for flood forecasting and warning and explain how to improve the 	B	-	0.5

methods.			
8. Assessment Assess the technical assistance. <ul style="list-style-type: none"> Examine using documents. Examine based on system operation. 	B	-	0.5

Overflow analysis technology: 1.875 months (first period: 0.875 month (3.5 weeks), second period: one month (4 weeks))

Activities	Training group	Period required (# of weeks)	
		(1st period)	(2nd period)
1. Describe the overflow analysis software. Describe the configuration and content of the overflow analysis software and let the trainees operate the software using other cases to acquire the basic knowledge of the software operation. <ul style="list-style-type: none"> Describe the overflow analysis software. Operate the overflow analysis software using example cases. 	C	0.5	-
2. Explain the overflow analysis procedure. Instruct the overflow analysis procedure and describe the geographical data required for overflow analysis, current issues, etc. <ul style="list-style-type: none"> Explain the overflow analysis procedure. Describe the data required for overflow analysis. Describe the issues such as the accuracy of data collected. 	C	0.5	-
3. Organize and analyze geographical data. Explain and instruct how to organize and analyze the geographical data from the basin. <ul style="list-style-type: none"> Explain how to collect and organize data (0.5 week). Organize data such as collection and format conversion (1.0 week). 	C	1.5	-
4. Customize the overflow analysis software. Explain how to customize the overflow analysis software and perform the customization. <ul style="list-style-type: none"> Customize the overflow analysis software (1.0 week). 	C	1.0	-
5. Describe and instruct the verification of the overflow analysis software. <ul style="list-style-type: none"> Explain how to verify the software (0.25 week). Organize the data for verification (0.25 week). Verify the software (0.5 week). 	C	-	1.0
6. Instruct how to analyze overflow. Prepare an operation manual, operate the overflow analysis software and check all software functions from outflow forecasting to analysis. Explain how to improve the accuracy. <ul style="list-style-type: none"> Prepare an operation manual (0.75 week). Check the functions of the overflow analysis software, including outflow forecasting (1.0 week). Explain how to improve the accuracy and operate the software (0.25 week). 	C	-	2.0
7. Explain and instruct how to use the overflow analysis software. Explain how to use the overflow analysis software such as	C	-	0.5

<p>the methods of providing information for flood forecasting and warning and application to hazard maps, and describe the issues and instruct the improvement.</p> <ul style="list-style-type: none"> • Explain and demonstrate how to verify the criteria for issuing forecasts and warnings. • Explain and demonstrate how to provide information for flood forecasting and warning. • Explain and demonstrate how to display analytical results and how to apply them to hazard maps. 			
<p>8. Assessment</p> <p>Assess the technical assistance.</p> <ul style="list-style-type: none"> • Examine using documents. • Examine based on system operation. 	C	-	0.5

* This operational instruction will be provided alternately to one or two trainees at a time.

(3) Input from Japan

The input from Japan required for the technical assistance will consist of one engineer (for 1.375 months) who will instruct the overall system operation and maintenance and one hydraulic/hydrological engineer (4.25 months) with expertise in the existing outflow forecasting software and overflow analysis software.

6. How to procure implementation resources

This soft component will be implemented most effectively through direct assistance of Japanese consultants for the following reasons:

- 1) The flood forecasting and warning systems encompassing the Pampanga and Agno River basins were introduced through grant and load aid provided by Japan, which were built based on the technical knowledge and standards of Japan. The system operation thus requires technology transfer from Japan.
- 2) The existing outflow forecasting software has been developed and operated through financial and technical assistance provided by Japan and Japanese engineers have in-depth understanding of the software configuration and other aspects. The new overflow analysis software to be installed must be developed and operated based on the functions of the existing outflow forecasting software, which requires technical instruction by Japanese engineers who have through knowledge of the existing software.

The engineers who will be assigned to the technical assistance in this project are as follows:

- 3) Assistance in the operation and maintenance technology
The ideal engineer will have experience in the operation of overseas flood forecasting and warning systems, who is well-informed about flooding in the Pampanga and Agno basins.

4) Assistance in outflow forecasting and overflow analysis technology

The ideal person will be a hydraulic/hydrological engineer who is familiar with the existing flow software configuration and new overflow analysis software.

It is important that the instruction on how to operate the existing outflow forecasting software and overflow analysis software aiming at effective flood control based on the current conditions is given after the instruction on the basic software configuration and operation has been completed. This requires consultants to provide effective instruction on the operation, rather than technical instruction given by contractors.

7. Implementation process

The soft component education will comprise three types – operation and maintenance technology, outflow forecasting technology and overflow analysis technology –, which will be provided primarily to PAGASA engineers who will operate the flood forecasting and warning systems. Part of the training for the operation and maintenance technology will also include engineers from other relevant agencies. The training will take place before the end of each period (two times) to avoid the rainy seasons when the staff becomes occupied with their work.

- 1) December 2008 – March 2009: when the first-phase construction is completed (At the completion of the system installation at DIC, relevant agencies and Pampanga River basin)
- 2) January – March 2010: when the second-phase construction is completed (At the completion of the installation of all systems to be renewed, including the Agno River basin system)

Table 6. Soft component implementation process

Activities	1st phase				2nd phase			Total (month)		
	2008	2009			2010			1st	2nd	
	Dec	Jan	Feb	Mar	Jan	Feb	Mar			
1. Operation of FFWS								0.875	0.500	
(1) Confirmation of the organization and mutual communication			■					0.125		
(2) Revision of O & M manuals			■					0.250		
(3) Explanation/Guidance on the data management			■					0.125		
(4) Explanation/Guidance on the guide line of the flood warning							■	0.250	0.125	
(5) Explanation on future organization and FFWS			■					0.125		
(6) Training on the operation							■		0.250	
(7) Evaluation							■		0.125	
2. Upgrading of the existing run-off model analysis								1.375	1.000	
(1) Explanation on procedures for the flood forecasting	■							0.125		
(2) Explanation on procedures for the flood forecasting	■							0.125		
(3) Arrangement and analysis on the existing run-off model analysis	■							0.500		
(4) Explanation/Guidance on existing run-off model analysis		■						0.625		
(5) Explanation/Guidance on verification of the existing run-off model analysis					■				0.250	
(6) Guidance on the formula of the existing run-off model analysis					■				0.500	
(7) Explanation/Guidance on offering of the flood warning									0.125	
(8) Evaluation									0.125	
3. Operation of Flood Analysis software								0.875	1.000	
(1) Explanation on procedure for the flood analysis software		■						0.125		
(2) Explanation on procedure for the flood analysis software		■						0.125		
(3) Arrangement and analysis on the topographic data			■					0.375		
(4) Customization on the flood analysis software			■					0.250		
(5) Explanation/Guidance on verification of the existing flood analysis software						■			0.250	
(6) Guidance on procedure of the flood analysis software						■			0.500	
(7) Explanation/Guidance on utilization of the flood analysis software							■		0.125	
(8) Evaluation							■		0.125	
								Grand total	3.125	2.500

8. Resulting products

The following will result from the soft component operation.

- 1) Final report to be submitted to the government of the Philippines
- 2) Final report to be submitted to JICA
- 3) Manuals to be prepared in this technical assistance project

9. Estimated cost of project

The overall estimated cost of this soft component is expected to be 12,837,000 yen (first period: 7,126,000 yen, second period: 5,711,000 yen). No cost of local re-commissioning will arise.

10. Responsibilities of the recipient country

Achieving the goals of the soft component requires continuous activities such as operation and maintenance by the participating agencies and local residents in addition to the results of the soft component. The following describes the continuous activities that will be the responsibilities of the agencies and residents of the aid recipient country.

(1) Formulation of evacuation plans (hazard maps) and local disaster prevention plans using the flood forecasting and warning systems

- 1) The local administrative agencies will promote the formulation of local disaster prevention plans, including evacuation plans using hazard maps and other resources, based on the results of the overflow analysis from the flood forecasting and warning systems.
- 2) The organizing agency (PAGASA) will provide the results of the overflow analysis from the flood forecasting and warning systems and technical instruction to promote the development of hazard maps.

(2) Continuous efforts to promote more active and efficient disaster prevention activities conducted by relevant agencies using the flood forecasting and warning systems

- 1) Those agencies involved in flood control will hold periodical and continuous consultations to discuss the ways to effectively use the flood forecasting and warning systems and promote active and efficient disaster prevention activities.
- 2) The organizing agency (PAGASA) will improve the methods of providing information for the flood forecasting and warning systems based on the outcomes of consultations with relevant agencies.

(3) Educational campaign for the residents to learn the measures to reduce flood damage using the flood forecasting and warning systems

- 1) The local administrative agencies will inform all residents of the evacuation plans such as by using hazard maps and promote the educational campaign to raise their awareness of disaster prevention.
- 2) The organizing agency (PAGASA) will cooperate in the promotion of the measures to reduce flood damage conducted by the local administrative agencies.

Cooperation and continuous efforts of not only PAGASA but the local administrative agencies and other related organizations will be essential for achieving the goals of this project and soft component. While PAGASA will continuously provide instruction for the local administrative agencies to continue the operation and maintenance activities, these

are basically different organizations and the activities may possibly be interrupted by the differences among them.

For PAGASA, local administrative agencies and other relevant organizations to continue the operation and maintenance after the completion of the soft component, therefore, Japan's regular and comprehensive technical cooperation focusing on the local disaster prevention activities is likely to become beneficial.

Appendix 7

Other Relevant Data (Annex Figures and Tables)

Annex - 1 Gauging Station Placement Plan

Gauging Station	Observation	Condition and Issues in Current Placement	New Placement Plan
Agno River Basin			
A1. Binga Dam (discontinued)	RR, WL	Rainfall observation is conducted at Binga Dam near this station and upstream Ambuklao Dam (both under National Power Corporation (NPC)) and the rainfall data is sent to PAGASA. Therefore, there is little need for this station to conduct rainfall observation. Currently, San Roque Dam reservoir is operated downstream of Binga dam where the gauging station is located, and flooding from the upstream region is moderated at San Roque Dam. Therefore, there is little need for water-level observation at this station for flood forecasting for the downstream region.	For the reasons stated on the left, there is little need for rainfall and water-level observation, and this gauging station will thus be removed so as to avoid redundant placement of gauging stations. Since rainfall observation is conducted at Binga Dam and upstream Ambuklao Dam under NPC, the closure of this gauging station (under PAGASA) will not prevent the rainfall data sent by NPC from being used for flood forecasting for the downstream region.
A2. Mt. Ampucao (continued)	RR	This station (repeater station) is added with a rainfall gauge. Located approx. 10 -15 km downstream from Binga Dam, the position is appropriate for a rainfall gauge (covers area on the right bank of the main Agno River). Also encompassed in the San Roque Dam basin, this station facilitates the dam operation.	For the reasons stated on the left, the rainfall gauge will continue to be used.
A3. San Roque (discontinued)	RR, WL	For the following reasons, there is little need for water-level observation at this station for flood forecasting for the downstream region. San Roque Dam is located immediately upstream and flooding from the upstream region is moderated at the dam reservoir. - Discharge data is sent to PAGASA. Rainfall observation is conducted also at San Roque Dam (under NPC) near this station and the rainfall data is sent to PAGASA. Therefore, there is little need for this station to conduct rainfall observation.	For the reasons stated on the left, there is little need for rainfall and water-level observation, and this gauging station will thus be removed so as to avoid redundant placement of gauging stations. Since rainfall observation is conducted at San Roque Dam under NPC, the closure of this gauging station (under PAGASA) will not prevent the rainfall data sent by NPC from being used for flood forecasting for the downstream region.
A4. Sta. Maria (new)	RR, WL	There is no existing gauging station. Relocating the rainfall and water-level gauges at San Roque gauging station (to be discontinued) to this location is reasonable for the improvement of lead time and flood forecasting of the existing systems.	For the following reasons, new rainfall and water-level gauges will be placed. The new gauging station will be placed downstream of a confluence of two right-bank tributaries, and thus the water-level observation will benefit the flood warning for the downstream region. The location of the rainfall gauge will be appropriate for flood forecasting for the downstream region.
A5. Carmen (continued)	RR, WL	Located downstream of a confluence of right-bank tributaries, the position is appropriate as a rainfall and rainfall observation point.	For the reason stated on the left, the rainfall and water-level gauges will continue to be used.
A6. Tibag (continued)	RR, WL	Located on the Tarlac River, the largest tributary of the Agno River, in the vicinity of Tarlac City (population approx. 260,000). Water-level observation is important for monitoring flood warning levels for Tarlac City. Rainfall observation also contributes to flood forecasting for the downstream region.	For the reasons stated on the left, the rainfall and water-level gauges will continue to be used.
A7. Wawa (continued)	RR, WL	Located on the Agno River downstream of the confluence with the Tarlac River, the largest tributary, the water-level observation benefits the flood forecasting for the downstream region. Rainfall observation also contributes to flood forecasting for the downstream region.	For the reasons stated on the left, the rainfall and water-level gauges will continue to be used.

A8. Bañaga (continued; new rainfall gauge placed)	WL	Located 5 km from the mouth of Agno River, the water-level observation benefits the flood forecasting for the upstream region.	For the reason stated on the left, the water-level gauge will continue to be used. For the following reason, a new rainfall gauge will be placed. The rainfall gauge will be placed for rainfall observation of the tributary basin on the left bank of the Agno River to improve the accuracy of flood warning for nearby Dagupan City and the downstream region.
A9. Sta. Barbara (continued)	RR, WL	Located approx. 10 km from the mouth of the Sinocalan River, upstream of Dagupan City (population approx. 130,000). Water-level observation is important for monitoring flood warning levels for Dagupan City. Rainfall observation also contributes to flood forecasting for Dagupan City.	For the reasons stated on the left, the rainfall and water-level gauges will continue to be used.
Gauging Station	Observation	Condition and Issues in Current Placement	New Placement Plan
A10. Mapandan (new)	RR, WL	There is no existing gauging station. A gauging station must be placed to improve the accuracy of flood forecasting and warning so as to reduce the flood damage in the downstream region in which population and economic infrastructure are concentrated (beneficial effect).	For the following reasons, new rainfall and water-level gauges will be placed. Located approx. 15 km from the mouth of Cayanga-Patalan Rivers, upstream of Mangaldan town (population approx. 80,000) and San Fabian town (population approx. 70,000). Water-level observation is important for monitoring flood warning levels for the downstream urban areas. Rainfall observation is expected to contribute to flood forecasting for this downstream region, including Dagupan City.
A11. Binalonan (new)	RR, WL	There is no existing gauging station. Rainfall and water-level gauges must be added to improve the lead time and flood forecasting of the existing systems.	For the following reason, new rainfall and water-level gauges will be placed. Located approx. 35 km upstream (Binalonan town on the Sinocalan River) from the existing Sta. Barbara gauging station. The gauging station will be placed to improve the accuracy of flood forecasting (lead time) for downstream Dagupan City (population approx. 130,000).
A12. Maasin (new)	RR	There is no existing gauging station. A rainfall gauge must be added to improve the lead time and flood forecasting of the existing systems.	For the following reason, a new rainfall gauge will be placed. The gauging station will be placed for rainfall observation of the tributary basin on the left bank of the lower Agno River to improve the accuracy of flood forecasting for the downstream region.
A13. Burgos (new)	RR	There is no existing gauging station. A rainfall gauge must be added to improve the lead time and flood forecasting of the existing systems.	For the following reason, a new rainfall gauge will be placed. The gauging station will be placed for rainfall observation of the tributary basin on the left bank of the lower Agno River to improve the accuracy of flood forecasting for the downstream region.
Pampanga River Basin			
P1. Sapang Buho (continued)	RR, WL	The most upstream gauging station on the main Pampanga River located at the confluence with the tributary Coronel River on the left bank. The position is appropriate for water-level and rainfall gauges used for flood forecasting for the Pampanga River basin.	For the reason stated on the left, the rainfall and water-level gauges will continue to be used.
P2. Gabaldon (continued)	RR	The easternmost station in the basin which is an appropriate location for a rainfall gauge for forecasting flood levels from typhoon rainfall at an early stage to improve the lead time of flood forecasting and warning for the entire basin.	For the reason stated on the left, the rainfall gauge will continue to be used.
P3. Kalaanon (new)	RR	There is no existing gauging station. A rainfall gauge must be added in the upper east Pampanga River	For the following reason, a new rainfall gauge will be placed. The gauging station will be placed for rainfall observation of the tributary

		basin to improve the accuracy of flood forecasting and warning for the entire basin and to forecast flood levels from rainfall at an early stage.	basin on the left bank of the upper Pampanga River to improve the accuracy of flood forecasting for the downstream region.
P4. Mayapyap (continued)	RR, WL	Located approx. 20 km downstream from Sapang Buho gauging station in the vicinity of Cabanatuan City (population approx. 220,000) on the main Pampanga River.. The position is appropriate for water-level and rainfall gauges used for flood forecasting for the Pampanga River basin.	For the reason stated on the left, the rainfall and water-level gauges will continue to be used.
P5. Papaya (discontinued)	RR	Observation of rainfall in the tributary basin on the left bank of the Pampanga River is conducted to contribute to flood forecasting for the downstream region.	New rainfall and water-level gauges will be placed at nearby Penaranda Bridge. The current rainfall gauging station will thus be removed so as to avoid redundant placement of gauging stations.
P6. Penaranda (new)	RR, WL	There is no existing gauging station. Rainfall and water-level gauges must be added to improve the lead time and flood forecasting of the existing systems. The rainfall gauge will be relocated from Papaya gauging station which is to be discontinued.	For the following reason, new water-level and rainfall gauges will be placed. The new gauging station will be placed for rainfall and water-level observation of the tributary basin on the left bank of the mid Pampanga River to improve the accuracy of flood forecasting for the downstream region.
P7. San Isidro (continued)	RR, WL	Located approx. 30 km downstream from Mayapyap gauging station on the main Pampanga River downstream of the confluence with the tributary Penaranda River on the left bank. The position is appropriate for water-level and rainfall gauges used for flood forecasting for the Pampanga River basin.	For the reason stated on the left, the rainfall and water-level gauges will continue to be used.
P8. Munoz (continued)	RR	Located upstream of the largest tributary (the Rio Chico River basin) on the right bank of the Pampanga River. Rainfall observation contributes to flood forecasting for the downstream region.	For the reason stated on the left, the rainfall gauge will continue to be used.
Gauging Station	Observation	Condition and Issues in Current Placement	New Placement Plan
P9. Zaragoza (continued)	RR, WL	Located midstream of the largest tributary (the Rio Chico River basin) on the right bank of the Pampanga River. The location of water-level observation is appropriate for confirming the water-level correlation with the upstream rainfall (Munoz gauging station). The location of rainfall observation is appropriate for confirming the water-level correlation with the flood forecasts for the downstream region and Arayat gauging station.	For the reasons stated on the left, the rainfall and water-level gauges will continue to be used.
P10. Palali (new)	RR	There is no existing gauging station. A rainfall gauge must be added in the upper east Pampanga River basin to improve the accuracy of flood forecasting and warning for the entire basin and to forecast flood levels from rainfall at an early stage.	For the following reason, a new rainfall gauge will be placed. The gauging station will be placed for rainfall observation of the tributary basin on the left bank of the upper Pampanga River to improve the accuracy of flood forecasting for the downstream region.
P11. Arayat (continued)	RR, WL	Located approx. 25 km downstream from San Isidro gauging station on the main Pampanga River downstream of the confluence with the tributary Penaranda River on the left bank. The position is appropriate for water-level and rainfall gauges used for flood forecasting for the Pampanga River basin.	For the reason stated on the left, the rainfall and water-level gauges will continue to be used.
P12. Subul Spring (continued)	RR	Observation of rainfall in the tributary basin on the left bank of the Pampanga River is conducted to contribute to flood forecasting for the downstream region.	For the reason stated on the left, the rainfall gauge will continue to be used.

P13. Candaba (continued)	RR, WL	Located approx. 15 km downstream from Arayat gauging station in the flood-prone area on the left bank of the main Pampanga River. Observation of rainfall and water-level in the flood-prone area is essential for flood forecasting for the Pampanga River basin.	For the reason stated on the left, the rainfall and water-level gauges will continue to be used.
P14. Ipo Dam (discontinued)	RR	The location of the rainfall gauge is considered beneficial for the observation of rainfall in the tributary basin on the left bank of the Pampanga River and flood forecasting for the downstream region. Currently, however, the rainfall gauge frequently breaks down, causing chronic data loss.	There is little need for rainfall observation at this station due to Angat Dam rainfall gauging station (under NPC) located in the vicinity. This gauging station under PAGASA will thus be removed so as to avoid redundant placement of gauging stations. Since rainfall observation is conducted at Angat Dam under NPC, the closure of this gauging station (under PAGASA) will not prevent the rainfall data sent by NPC from being used for flood forecasting for the downstream region.
P15. San Rafael (continued)	RR	Observation of rainfall in the tributary basin on the left bank of the Pampanga River is conducted to contribute to flood forecasting for the downstream region.	For the reason stated on the left, the rainfall gauge will continue to be used.
P16. Sulipan (continued)	RR, WL	Located approx. 20 km from the mouth of the Pampanga River, the rainfall and water-level observation benefits the flood forecasting for the upstream region or nearby urban areas (San Fernando City, Apalit town and Calumpit town) in which population and economic infrastructure are concentrated.	For the reason stated on the left, the rainfall and water-level gauges will continue to be used.
P17. Sasmuan (continued)	RR, WL	Located approx. 15 km from the mouth of the Porac-Gumain River, the rainfall and water-level observation benefits the flood forecasting for the upstream region or nearby urban areas (Sasmuan town, Lubao town and Guagua town) in which population and economic infrastructure are concentrated.	For the reason stated on the left, the rainfall and water-level gauges will continue to be used.
P18. Mexico (new)	RR, WL	There is no existing gauging station. A gauging station must be placed to improve the accuracy of flood forecasting and warning so as to reduce the flood damage in the downstream region (e.g., San Fernando City) in which population and economic infrastructure are concentrated (beneficial effect).	For the following reason, new rainfall and water-level gauges will be placed. Located upstream of San Fernando City (population approx. 220,000), the gauging station will be placed to monitor flood warning levels for the downstream region and forecast flood levels at an early stage through rainfall observation.
P19. Porac (new)	RR	There is no existing gauging station. A gauging station must be placed to improve the accuracy of flood forecasting and warning so as to reduce the flood damage in the downstream region (San Fernando City and towns of Sasmuan, Lubao, Guagua, etc.) in which population and economic infrastructure are concentrated (beneficial effect).	For the following reason, a new rainfall gauge will be placed. The gauging station will be placed for rainfall observation of the upper Porac-Gumain River to improve the accuracy of flood forecasting for the downstream region.

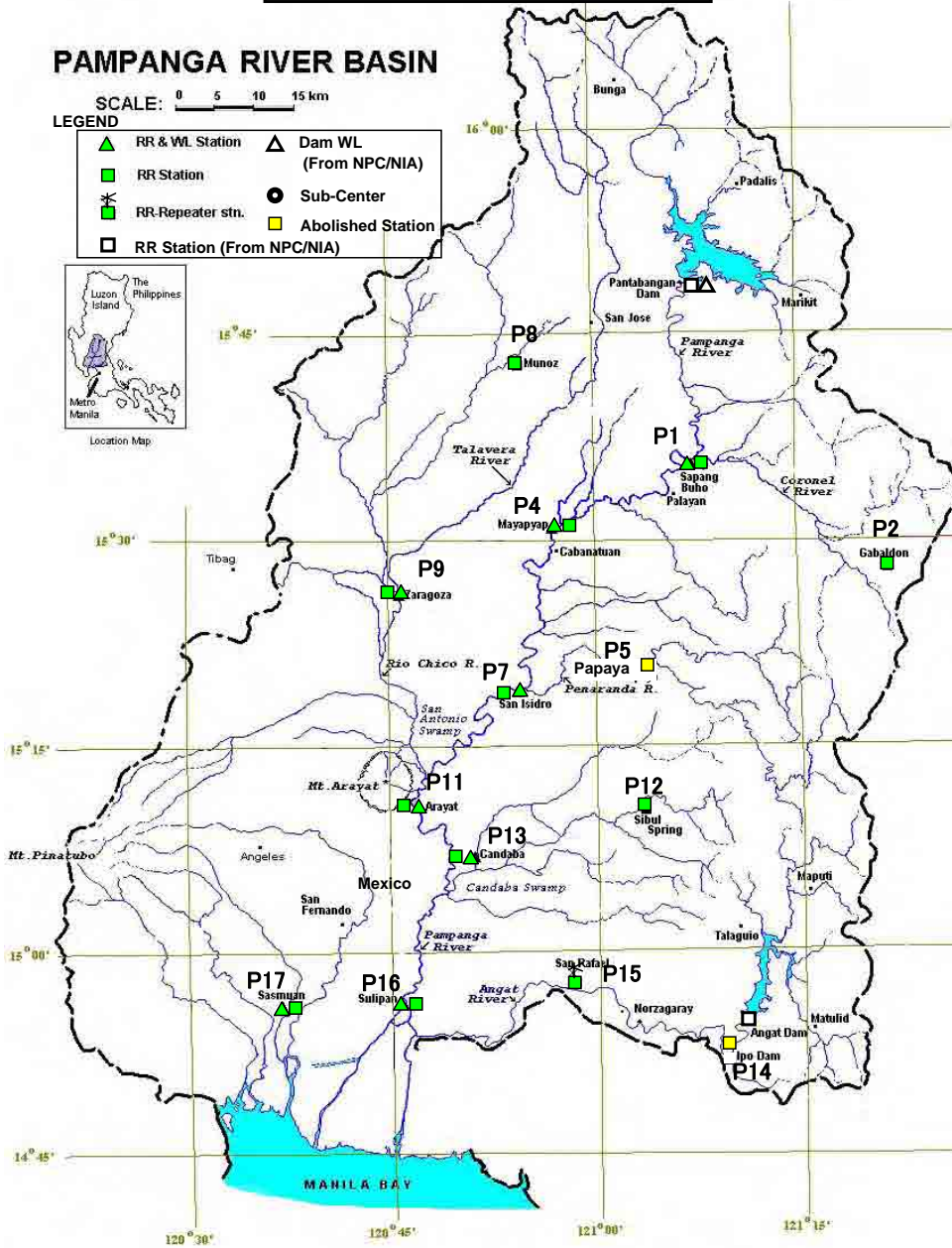
Existing Location

PAMPANGA RIVER BASIN

SCALE: 0 5 10 15 km

LEGEND

- ▲ RR & WL Station
- RR Station
- * RR-Repeater stn.
- RR Station (From NPC/NIA)
- ▲ Dam WL (From NPC/NIA)
- Sub-Center
- Abolished Station



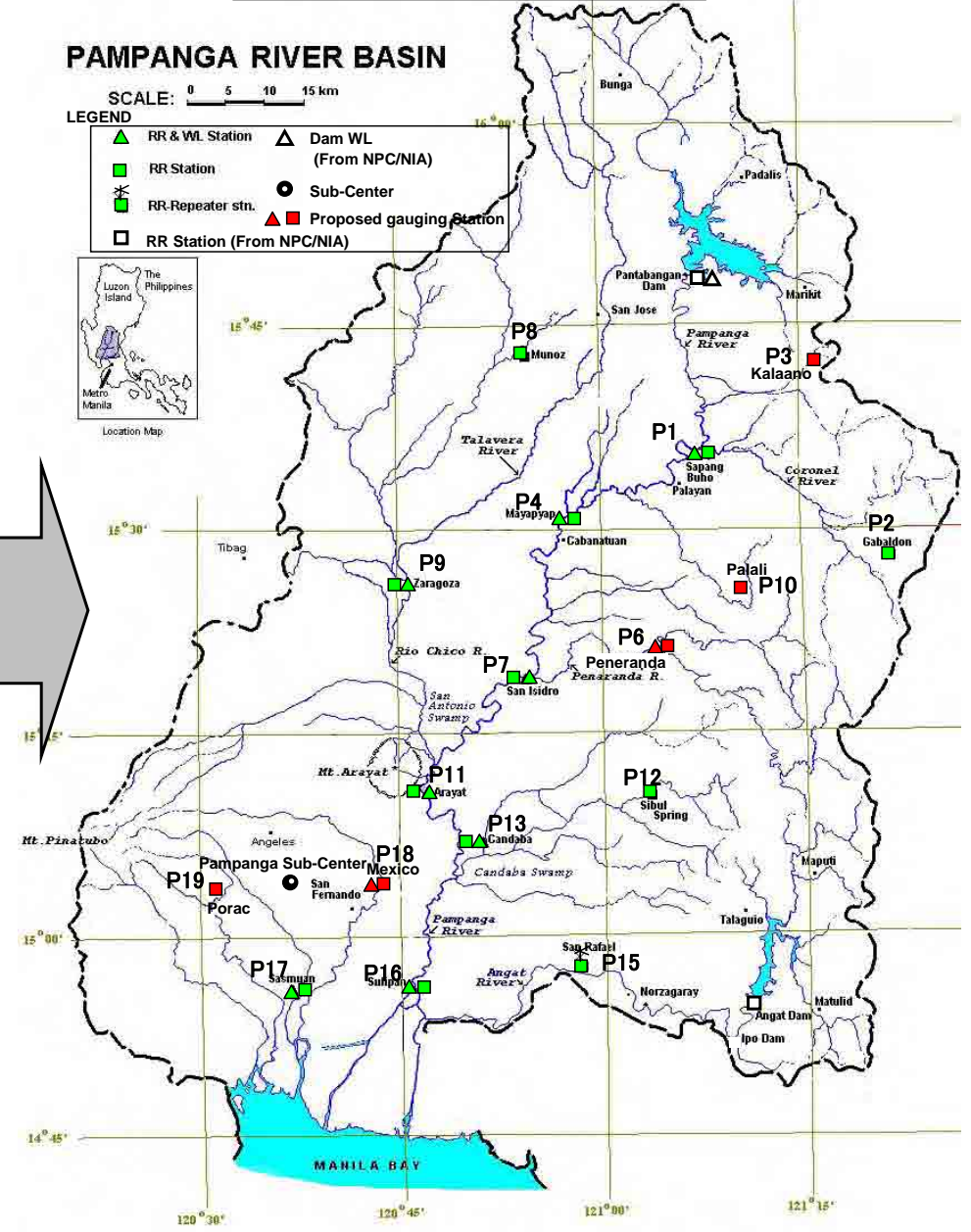
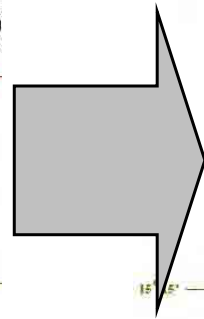
New Location Plan

PAMPANGA RIVER BASIN

SCALE: 0 5 10 15 km

LEGEND

- ▲ RR & WL Station
- RR Station
- * RR-Repeater stn.
- RR Station (From NPC/NIA)
- ▲ Dam WL (From NPC/NIA)
- Sub-Center
- ▲ Proposed gauging Station



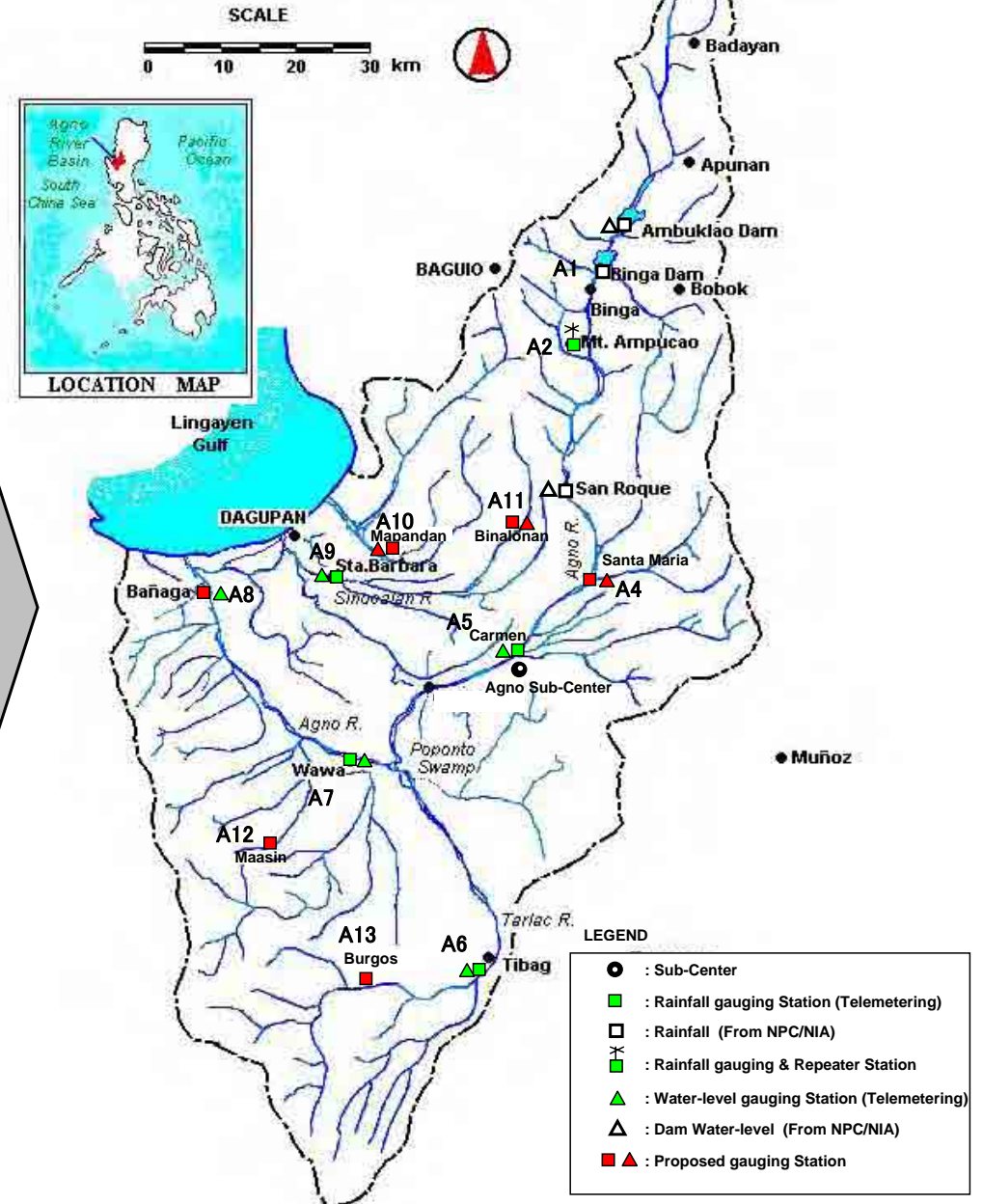
Existing Location

AGNO RIVER BASIN

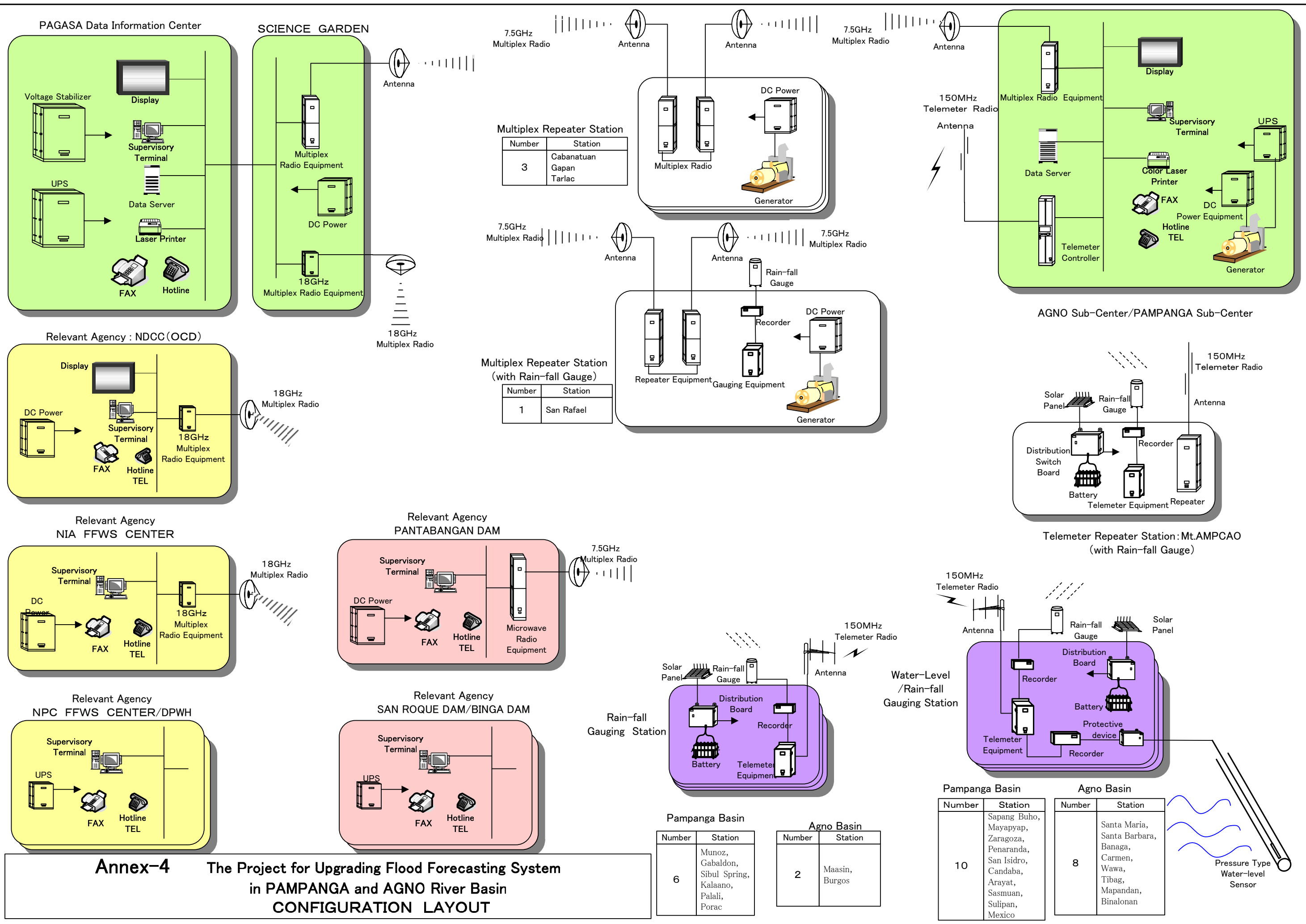


New Location Plan

AGNO RIVER BASIN



Annex - 3 Proposed Location Plan (Agno River Basin)



Multiplex Repeater Station

Number	Station
3	Cabanatuan Gapan Tarlac

Multiplex Repeater Station (with Rain-fall Gauge)

Number	Station
1	San Rafael

Pampanga Basin

Number	Station
6	Munoz, Gabaldon, Sibul Spring, Kalaano, Palali, Porac

Agno Basin

Number	Station
2	Maasin, Burgos

Pampanga Basin

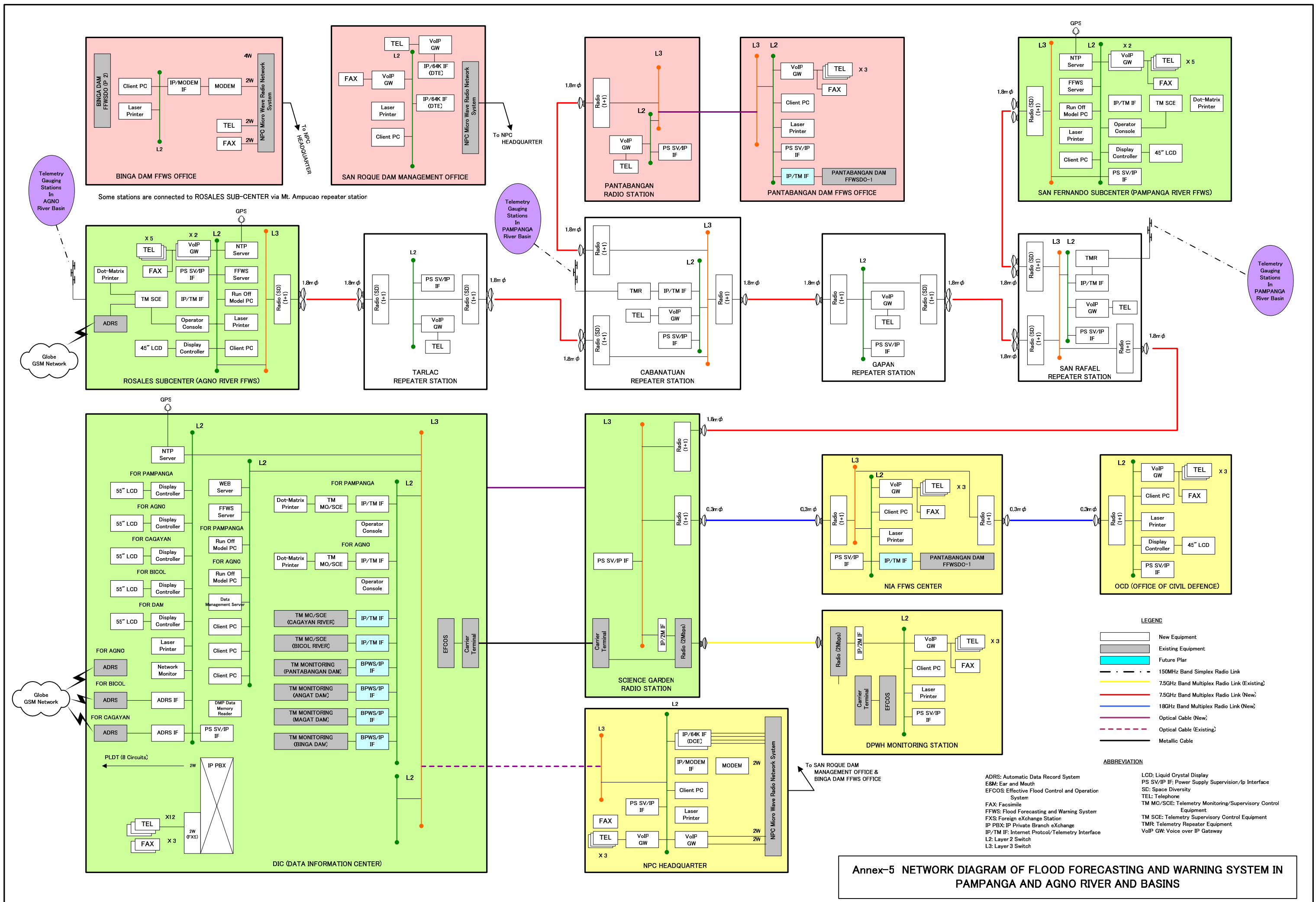
Number	Station
10	Sapang Buho, Mayapyap, Zaragoza, Penaranda, San Isidro, Candaba, Arayat, Sasmuan, Sulipan, Mexico

Agno Basin

Number	Station
8	Santa Maria, Santa Barbara, Banaga, Carmen, Wawa, Tibag, Mapandan, Binalonan

Annex-4 The Project for Upgrading Flood Forecasting System in PAMPANGA and AGNO River Basin CONFIGURATION LAYOUT

Pressure Type Water-level Sensor



Annex-5 NETWORK DIAGRAM OF FLOOD FORECASTING AND WARNING SYSTEM IN PAMPANGA AND AGNO RIVER AND BASINS