Chapter 4. Plan for Land Use Control

4.1 Introduction (or Contents of the Study)

In order to reflect the land use plan (Growth Boundary Plan), proposed in the Master Plan Study to the land use planning system in the Cavite Province, the JICA Study Team made discussions with C/MPDC and PPDC, and confirmed the following issues:

(1) The urban growth area (built-up or expansion) area as planned by cities/municipalities in their comprehensive land use plans (CLUP) shall be divided into the "Urbanization Promotion Zone" (UPZ) and the "Urbanization Control Zone" (UCZ) for the sake of the proper management of urban growth.

(2) The urban development shall be positively promoted in UPZ for 10 years from now on in accordance with the current development permission control system.

(3) The priority must be given to the land use for agriculture and fishery production, conservation of natural resources and natural hazard, and the urban development should not be promoted for about 10 years in UCZ.

(4) In order to realize the above rules, the JICA Study Team pushes forward discussions with the persons concerned, and supports for preparation such as the guidelines for a review of the current land use plan and necessary ordinances to implement growth management plan.

(5) The draft ordinance on the on-site flood regulation pond was prepared and the supportive activities for enforcement of the ordinance were undertaken in the Study.

On the basis of the above, the JICA Study Team performed the following investigations/ activities at the Feasibility Study Stage.

(1) Discussions with the persons concerned in PPDC and C/MPDC (Cavite Province, the city/ municipalities of Dasmariñas, Trece Martires, Bacoor and Imus, where the rapid urbanization is currently in progress)

(2) Discussions with persons concerned in HLURB, Region IV-A and Central office on Growth Boundary Planning and draft ordinances

(3) Discussion with PLUC members on draft ordinance of Growth Management

(4) Presentation at Provincial Assembly and discussions with Land Use Committee representatives on the draft ordinances

(5) Presentation and discussions with the Mayors and their staffs (Trece Martires and Bacoor)

(6) Preparation of draft ordinances on on-site flood regulation pond and growth management and supporting for enforcement of them

(7) Preparation of guidelines for review of land use plan (Workbook for the delineation of growth boundary) and reference for designing an on-site flood regulation pond.

(8) Supporting on consensus building, technology transfer and advice on land use planning and forming recommendations about human resources and organization development.

4.2 Proposed and Recommended Growth Management Concept

The JICA Study Team evaluated that the current land use plan (CLUP) prepared by the cities/municipalities is deemed to possess an apprehension, which may cause not only flood problem, but also various types of urbanization problems in the future. From this point of view, a growth management concept in the land use planning is proposed in this subsection.

Fig. R 4.1 shows the differences in the policy between the current CLUP and JICA Proposal. The current CLUP designates a quite large urban growth area as mix use of residential and commercial area receiving high demand of development of the private sector. This scattered-type of urban development tends to cause excessive land development, and deteriorates the accumulative effect of urban function and efficiency of public investment leading to aggravation of the city landscape and traffic congestion. In addition, the productivity of the agriculture falls due to loss of massive agricultural lands by an encroachment of land development.

In due consideration of the above unfavorable effects of the mix land use, the JICA Study Team proposed the urban development within a designate zone, which could contribute to the formation of urbanization area with the accumulation effect and effective public works investments. Moreover, the proposal could maintain the existing massive farmland keeping the agricultural productivities.

The JICA Study Team also clarified that there is a room to improve the way of formulation or criteria for the spatial planning and that there is a discrepancy between the Land Use Plans in the Provincial Physical Framework Plan (PPFP) and in the CLUP of each city and municipality. Based on these examinations, the JICA Study Team provided the proposed urban growth area plan aiming the target year of 2020, and deepened the understanding of the persons in the organizations concerned.

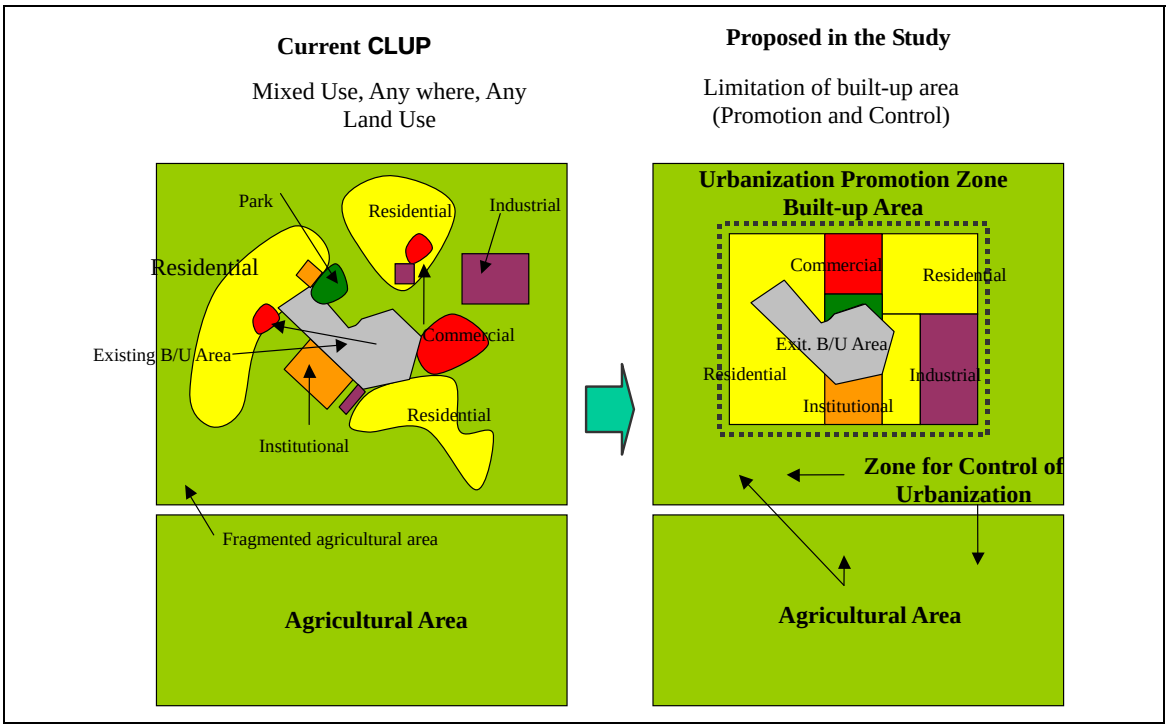


Fig. R 4.1 Differences in the Policy between the current CLUP and JICA Proposal

Fig. 4.1 is the map overlaid with the future urban growth (built-up or expansion) area of CLUP and the environmental critical areas, such as NIA irrigated area, CARP area, SAFDZ (Strategic Agricultural & Fisheries Planning Zones) area, steep slope area, and flood hazard area, which are account for the areas prohibited or not suitable for urban growth. As shown in the map, nearly half of the urban growth area planned by CLUP is overlapped on the environmentally critical area. The JICA Study Team pointed out that the current land use plans of the CLUPs must be reviewed in this aspect.

Fig. 4.2 is the map overlaid with land use plan of PPFP, which performs as indicator of land use framework plan for the current land use plan of CLUP. It can be pointed out that there is a big discrepancy in the acreage and the locations of the future urban growth areas planned by two

levels of organizations i.e. provincial government and city/ municipal governments. Normally, they should have a consistency between indicative provincial plan and land use plan prepared by city/ municipality. The JICA Study Team pointed out that such adjustment/conformity should be performed between province and city/ municipality.

(1) Utilization of items for map legend, which are defined in the guideline of HLURB.

(2) Avoid using map legend of Mix Use Area or Built-up Area in the land use plan and zoning plan, and define the most suitable land use item, like residential, commercial, industrial, etc. as much as possible.

(3) Re-zoning is preferable for an area already developed, for instance residential subdivision project was made in someplace, and prefer to keep there as residential environment, as “residential land use”, even the area was designated as Mix Use Area in the land use plan in the past.

(4) Utilization of GIS method for land use planning and aerial photo and/or satellite image data of CALA and Google internet data.

(5) Integration of spatial information of Present land use condition, Land use plan, Official zoning map and Cadastre map for the land use information management.

(6) Carry out review (a review of the growth area) of the land use plan for the whole province of PPFP in reference to guideline of NEDA and Workbook of JICA involving the growth management component, which was proposed by the JICA Study Team. According to the revised PPFP, a review of each CLUP (a review of the growth area, then review of land use plan and zoning ordinance) shall be made by each LGU.

(7) Because an aspect of the desirable urban formation covering the whole province, as well as an aspect of the flood mitigation measure, is important for the formulation of land use plan, it strengthens a role and authority of Provincial Land Use Committee (PLUC) in approval process of the land use plan of the province (PPFP) and the land use plans of CLUP, and, in addition, it is necessary to step in a process of the examination by PLUC for development permission application in the urbanization control zone.

(8) In this regard, as for PPDO, a capacity of the organization/human resource should be empowered so that it is possible for collection / processing / management of the accurate and updated spatial information of the updated present situation / plan information, necessary for those approval precisely in particular, and it is necessary to improve it to be able to function.

The future urbanized area for the Study Area in the year of 2020 was delineated in the Master Plan Study based on: (1) the review on the current land use plans of PPFP and CLUPs, (2) review on population projection, (3) estimation of required built-up area and receptive capacity of the Study Area for the future incremental population, (4) examination of spatial distribution of the environmental critical areas (refer to Section 4.3 and 4.4 in Chapter 4, and Fig. 4.2 in Vol. 1 Master Plan Study). This future urbanized area delineated in the Study takes about 42.7% of the entire Study Area, which is far smaller than the urbanized ratio of 62.7% as projected in the CLUPs.

Fig. 4.3 is the overlaid map of the urban growth area, proposed by the JICA Study Team and the planned urban growth areas of the CLUP. At the same time, this map is recommended as the Growth Boundary Plan, whereby the Study Area is divided into the following three zones: (a) Zone A designated as the “Urbanization Promotion Zone (UPZ)”, (b) Zone B as the “Urbanization Control Zone (UCZ)”, and (c) Zone C as the “Production and Protection Zone (PPZ)”.

The Zone-A (UPZ) is the area including existing built-up area (24.6%of the entire Study Area) and the future urban growth area proposed by the JICA Study Team covering 42.7% of the entire Study Area. The Zone-B (UCZ) is also defined as the area planned by the current CLUP minus Zone-A having the extent of 22.5% of the entire Study Area, and the rest of the area is

Zone-C (PPZ), which is the open space including farmland and grassland. The urban expansion for Zone C is not is not planned for urban expansion by both of the current CLUP and JICA Study Team.

The above zoning plan aims at delineating Zone A as the urban growth boundary for next 10 years and controlling the excessive expansion of the urban area into the Zone B and C. This graph shows the basis of proposed and recommended concept of growth management, which shall be adopt in the land use planning in Cavite Province. The growth management policies and development control measures for each of Zone A, Zone B and Zone C are as shown in Table R 4.1.

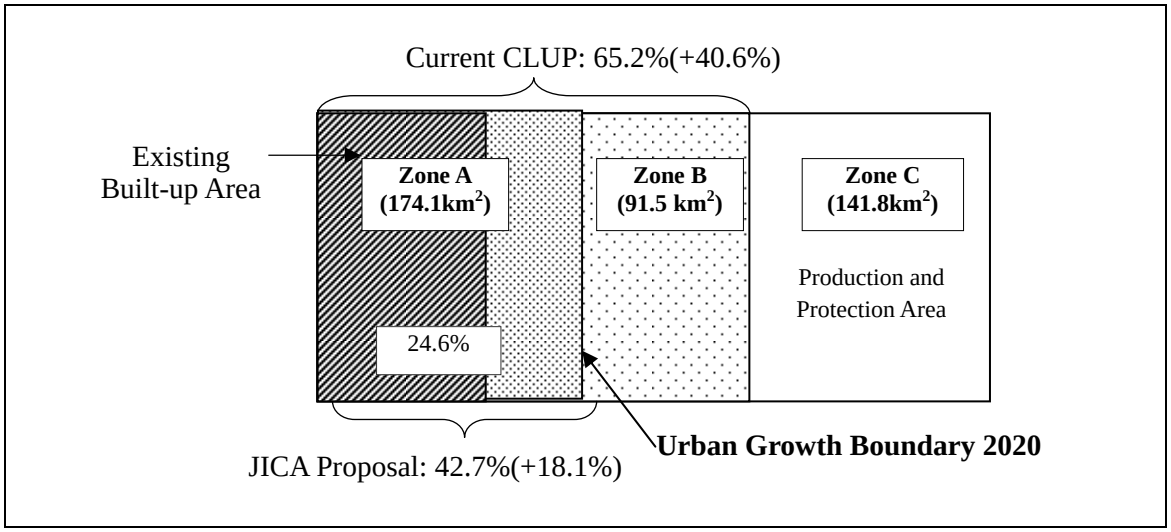


Fig. R 4.2 Urban Growth Management System

Table R 4.1 Growth Management Policy and Measures

Zone	Zone name	Growth Management Policy	Development Control Measures
Zone A	Urbanization Promotion Zone (UPZ)	Existing urbanized area and urbanization should be positively implemented within 10 years or so.	Under current development permission system With new requirement of on-site flood regulation pond (＞5ha)
Zone B	Urbanization Control Zone (UCZ)	The following use of land is given priority and urbanization should not be promoted. Agriculture and fishery Conservation of natural hazard areas Conservation of natural resources However, a development which satisfy the requirements, mentioned in the right row is allowed	Required conditions; More than 10ha (on-site f.r. pond, EIA) Public Works Small structure belong to agricultural production Restriction of building on flood hazard area (Zone B-2 on the plan)
Zone C	Production and Protection Zone (PPZ)	Agricultural and fishery production and conservation of natural resources are promoted and no urbanization is allowed.	

In Zone B, a flood hazard area in particular is designated the flood management area as Zone B2. Fig. R 4.3 shows the locations of the designated flood management areas. Those areas are located in Kawit, Bacoor and Imus municipalities and the total area is 109 ha. The lowest floor of any new or substantially improved residential houses/buildings in Zone B2 shall be elevated at least 50cm above the present ground level or equipped with the flood-proofing devises.

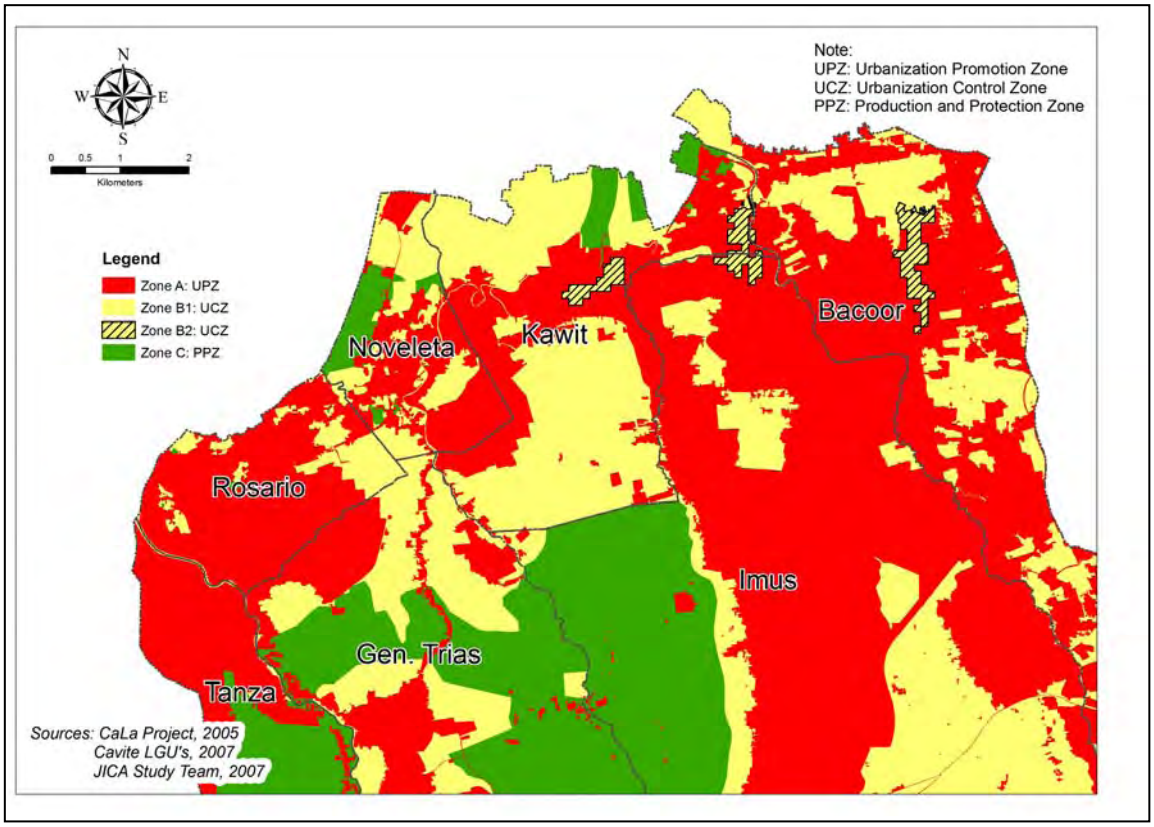


Fig. R 4.3 Flood Management Area

4.3 Proposed Ordinances

The JICA Study Team has proposed and presented the two ordinances: "On-Site Flood Regulation Pond Requirement on New Development"; and "Urban Growth Management Ordinance" (refer to Vol.4 Appendix, Appendix-3.1 and 3.2). The details of the ordinances are as described hereinafter.

4.3.1 Ordinance for On-Site Flood Regulation Pond

An ordinance "On-Site Flood Regulation Pond Requirement in a Development Project" was proposed, in the Study, for the sake of reducing the peak flood run-off discharges from the new subdivisions. The developer of the subdivision is required through the ordinance, to construct an on-site flood regulation pond at the downstream end of the subdivision, when the extent of the subdivision is more than five hectares. The construction cost of the pond to be borne by the developers is, however, different as shown in Table R 4.2 depending on the subdivisions for the medium/high cost housing under PD 957 and for the low cost housing under BP 220*.

As for development of subdivision of less than five hectares, construction of the on-site flood regulation pond is not required, but one million pesos per one hectare of development area is imposed to the developer as "the Flood Impact Fee", if development of subdivision is for the medium/high cost housing. However, if the development is for the low cost housing project, the Fee is exempted.

The cities and/or the municipalities would collect the above Flood Impact Fee in the process of development permit application, and pool it. The Provincial Government would manage the accumulated Fee as the fund for the subsidy for construction of the on-site flood regulation pond in the subdivision for the low cost housing under BP220. A developer who applies for a

* Both of the PD 957 and BP220 are the "Subdivision and Condominium Buyers Protective Decree". The PD 957 is for the medium/high cost housing project with selling price of more than 9,615 US dollars/lot, while the BP220 for low cost housing project with selling price of more than 9,615 US dollers/lot

BP220 project may be entitled to acquire the subsidy of one million pesos per hectare for construction of the flood regulation pond..

Table R 4.2 Cost Requirement for Construction of On-site Flood Regulation Pond

Extent of Land Development Area	Development of Subdivision for Medium/ High Cost Housing under PD957/Others	Development of Subdivision for Low Cost Housing under BP220
≥5 ha	The construction cost of the on-site regulation pond is required on the premises that the whole cost is borne by the developer of subdivision.	The Provincial Gov. would subsidies one million pesos/hectare of subdivision for construction of the on-site flood regulation pond. The remaining construction cost of the pond is born by the developer.
< 5 ha	The construction cost of the on-site regulation pond is not required. However, one million pesos/hectare of subdivision is collected from the developer as the Flood Impact Fee.	Both of construction cost of the on-site regulation pond and the Flood Impact Fee is exempted.

The area to be allocated to the pond is three percent of the total project area. The area allocated to the pond can be included into the 30% open-space requirement in the Implementation Rules and Regulations of PD957 and BP220 as long as the on-site flood regulation ponds do not aggravate the functions of required public facilities. The developer can set aside the three percent as the excluded area in the salable area calculation. When the areas for on-site regulation ponds are not included as a part of non-salable 30%, the excluded area calculation works as an advantage to the developers.

4.3.2 Ordinance for Urban Growth Management

(1) Growth Boundaries

The Ordinance for Urban Growth Management is proposed to control and promote development in an orderly manner in a provincial context. The Ordinance requires the Provincial Planning and Development Officer (PPDO) to designate the "Built-up Expansion Areas (Urban Growth Areas)" and then divide it by the growth boundaries into the aforesaid Urbanization Control Zone (UCZ) and Urbanization Promotion Zone (UPZ). The PPDO is further required to update the Provincial Physical Planning Framework Plan (PPFP) to include the growth management scheme, and express UCZ and UPZ in the PPFP with consideration of existing CLUPs prepared by the cities/municipalities.

The growth management is a concept that can be applied to both the provincial and city/municipal levels of governments. The land use components of PPFP and CLUPs need to be consistent. To keep consistency, the PPDO needs to prepare the Land Use Cross Identification Maps. The maps are to be prepared at a scale of 1:50,000 as land use components of PPFP and CLUPs are overlaid. When there is an inconsistency, the PLUC recommends revision of CLUPs to cities and municipalities. If necessary, a negotiation meeting is held to resolve discrepancies between PPDC and C/MPDCs. After resolving land use conflicts between PPFP and CLUPs, PPFP or CLUPs will have to be revise. If CLUPs were revised, the zoning ordinances would have to be revised.

In UPZ, the current procedure of development application for permit shall be applied. In UCZ, the minimum area of development shall be set as ten (10) hectares with consideration of conformity to PPFP, development impacts, and availability of infrastructure.

The members of Provincial Land Use Committee (PLUC) need to review the application, and when they are deemed valid, PLUC recommend issuance of certificate to the Provincial Assembly (Sangguniang Panlalawigan). The Assembly then issues a certificate. The cities and municipalities may include the certificate as a condition of issuing a development permit.

(2) Flood Management Areas

In the growth management scheme, the flood area management scheme was introduced within the UCZ in the lowland areas. It is a new responsibility of the PPDO to delineate the flood prone areas based on the result of simulation of flood inundation area, 2-year return.

The inundation area of more than 25 centimeters deep with 2-year return period are designated as the flood management areas. The Flood Management Areas are to be adapted to the CLUPs in the lowland areas; the zoning ordinances will have to be update accordingly. The requirement is the height of the lowest floor elevation. The height of the elevated floor needs to be 30 centimeters higher than the 100-year-flood level. The process of application is the same as in the building permit process in the cities and municipalities.

4.4 Consensus Building

4.4.1 Introduction

The consensus building has two parts: on-site flood regulation pond requirement and the Growth Management scheme. Activities for consensus building are mainly explanatory meetings with government officials and councilors. A series of meetings had been held, during the Study period, in order to promote the understandings and consensus on the aforesaid proposed two ordinances. The attendances of the meetings include the officials of the CPDCs/MPDCs, Mayors, HLURB as the representative agency of the central government, the members of the Cavite Provincial Assembly, the members of Committee on Land Use, Zoning, Urban and Rural Development (Provincial Assembly (CLZURD) and PLUC, the administrators of the LGUs for land use planning and development and other government officials concerned.

In accordance with the comments and suggestions made in the meeting, the contents of the proposed ordinances were step-wisely revised, and finally agreed, in general, with PDCC and CPDCs/MPDCs at the Dialog (Public hearing) on August 20, 2008. The series of meetings held for consensus buildings on the proposed ordinances are as listed in Table R. 4.3.

Table R 4.3 Meetings Held for Consensus Buildings on the Proposed Ordnances

Date	Purpose of Meeting	Target Participants to the Meeting
Sep. 12 to 28, 2007 Oct. 02 to 22, 2007	Consultation meeting on the present issues of the excessive land use control in Cavite Province	• HLURB • NEDA • CPDCs/MPDCs
Mar. 04, 2008	Explanatory meeting on the proposed on-site flood regulation pond	• Provincial Governor • Members of the Provincial Assembly
Feb. 10 to 27, 2008 Jul. 07 to 18, 2008	Consultation meeting on the concept of the proposed ordinances for “On-site Flood Regulation Pond” and “Urban Growth Management.	• HLURB • CPDCs/MPDCs • Mayors
Jul. 16, 2008	Explanatory meeting on the concept of the proposed ordinances for “On-site Flood Regulation Pond” and “Urban Growth Management.	• Members of PLUC (Provincial Government)
Jul. 21, 2008	Explanatory meeting on the Draft of the above two ordinances	• Members of the Provincial Assembly
Jul. 24, 2008	Explanatory meeting on the Draft of the above two ordinances	• Members of CLZURD
Aug. 20, 2008	Dialog (Public hearing) on the Draft of the above two ordinances, convened by the chairman of LZURD	• PPDC • CPDCs/MPDCs

The public hearing was scheduled to promote understandings and consensus of the developers for subdivisions on the proposed ordinances about a few weeks after the above Dialog (Public hearing) on August 20, 2008. Nevertheless, the public hearing has not been held yet for some reasons of the organizers of the meeting. Moreover, the final dialog with the all stakeholders

including the officials of the relevant central/local government agencies and the land developers has to be held before resolution of the proposed ordinances by the Provincial Assemble. (See Table R. 4.4)

Under the above conditions, it is expected that the proposed ordinances will be enacted by March 2009 and enforced by July 2009.

Table R 4.4 Meetings Required in the Future for Resolution of the Proposed Ordinances

Purpose of Meeting	Target Participants to the Meeting
Public hearing (Open Forum) on the Draft of the above two ordinances (scheduled in January)	• HLURB • Developers of subdivisions
Dialog (Open Forum) on the Draft of the above two ordinances	• HLURB • Developers of subdivisions • CPDCs/MPDCs • City/Municipal Engineers
Resolution on the above two ordinances	• Members of the Provincial Assembly •

4.4.2 Discussions with Stakeholders

The stakeholders are government officials, developers and residents. The on-site flood regulation pond requirement is a burden to developers; the cost incurred for on-site flood regulation ponds would be added to units when they are sold. The low-land communities are the direct beneficiary of the policies of on-site flood regulation pond requirement and Growth Management measures. The major stakeholder's opinions over proposed two draft ordinances are summarized as below:.

Table R 4.5 Stakeholder's Opinions on the Proposed Ordinances

Organization	On-site flood regulation pond	Growth Management
CPDCs/MPDCs	• Local autonomy has fully responsibility in land use planning and development permit process. • The developer's understanding and cooperation is important	• The Growth Management scheme is acceptable and shall be reflected to CLUPs.
Mayors	• The multipurpose use of the flood mitigation structure is expected including irrigation, park, recreation purposes. • The ordinance shall be implemented as soon as possible.	• Although there is some difficulty with landowner on limitation of land use, the Growth Management scheme shall be supported fully.
PLUC	• Permission of On-site Regulation Pond is not duty of PLUC, however, the proposal is acceptable	• The provincial government does not have to compensate for restrictions imposed in the ordinance. • The province would be able to involve the application process by issuing a provincial certificate on development.
Provincial Government (Assembly)	• Since implementing bodies are cities and municipalities; their inputs to the ordinances are important. • Coordination with national agencies is also necessary.	• Since implementing bodies are cities and municipalities, their inputs to the ordinances are important. • Coordination with national agencies is also necessary.
HLURB	• The proposal is not contradictory with existing rules and regulations of HLURB and acceptable. • The developer's understanding and cooperation is important	• The Growth Management scheme is the matter of the LGUs (provincial, city, municipal).

The followings are the detail descriptions about the opinions of stakeholders at the explanatory meeting on consensus building of Draft ordinances.

(1) Explanatory Meetings

(a) CPDCs/MPDCs

The explanatory meetings were conducted with the CPDCs/MPDCs. The fundamental position of CPDCs/MPDCs is "autonomy" of planning and permitting development within their jurisdiction. They do understand needs of on-site flood regulation pond and Growth Management schemes, but reluctant to adopt—developers' oppositions and housing cost increase because of the requirement were the major concerns. If the PPFP was amended according to the policy, they would agree to amend the CLUP according to the PPFP. The developers concerns will be cost increase factor by the construction of On-site Regulation Pond or payment of Flood Impact Fee and also newly required fee for the development permission. The JICA Study Team made a rough assumption that the increased cost will be only around 1% of the total sale of the subdivision project, and it is marginal expense even this expense will be paid by the buyers.

(b) Mayors

The JICA Study Team held consultative meeting with Mayor Melencio L. De Sagun, Jr., Trece Martires City and Mayor Strike Bautista Revilla, Municipality of Bacoor. Mayor Sagun Jr. has a strong policy to have multi-purpose dam construction. He expects that the proposed on-site and off-site regulation ponds will have function of irrigation, park, recreation, etc. The use of regulation pond to irrigation is possible, but it faces the problems of sanitation (dengue fever, unhygienic) and season-ability (water requires in dry season). As for the Growth Management scheme, the city have acknowledged the compact urban form after a series of discussions with the JICA Study Team since the beginning of the Study and formulated a policy of consolidating development activities along the major arterials to minimize the public services costs. The policy of the compact urban form emphasized by the JICA Study Team would be realized in the revised CLUP.

CPDC, Trece Martires City, has a plan to convert non-agricultural zones to agricultural zones, based on the argument that: 1. No development has been taking place in the on-agricultural zones; 2. Land owners have failed pay real estate tax for non-agricultural uses; therefore, the re-conversion of zone to agricultural lands is not depriving properties.

Mayor Revilla, Municipality of Bacoor, fully supported both the on-site flood regulation pond and Growth Management schemes. The questions raised were technical matters—requirements on-site flood regulation pond. Mayor Revilla is willing to include the Growth Management scheme even before the adoption at the provincial level.

(c) Provincial Land Use Committee (PLUC)

The Growth Management scheme was supported during the consultative meeting with the Provincial Land Use Committee.

The first discussion was on the additional role of PLUC in the development application procedure. The development application, in general, is processed by cities and municipalities (CPDCs/MPDCs). The Growth Management scheme with UCZ makes it a condition for a developer to receive certificate from the provincial government. PLUC members agreed with the proposal, and started to prepare a draft procedure of the provincial government issuing a development certificate for a development application submitted for an area within UCZ.

The second discussion was on CLUP revision. The draft ordinance specifies accuracy of base map used in PPFP so that PLUC would be able to review the spatial components of CLUP more objectively. The members acknowledge the

necessity of the spatial plan review.

(d) Committee on Land Use, Zoning, Urban and Rural Development (CLZURD), Provincial Assembly

In the regular session of SP, the JICA Study Team presented the principle policy of the ordinances. A meeting for the Committee on Land Use, Zoning, Urban & Rural Development (CLZURD), SP was held with attendance of three SP members: Hon. Virgilio T. Ambion; Hon. Alex L. Advincula; and Hon. Raymundo A. Del Rosario. The JICA Study Team presented the overall scheme of flood mitigation and Growth Management as emphasizing the importance of implementing the on-site flood regulation pond in new development.

Hon. Rosario responded that the implementing bodies were cities and municipalities. In his opinion, HLURB's agreement was significant for it was the agency to make standards for development projects. Hon. Rosario and other SP members agreed to have meetings with representatives from cities and municipalities. The meeting on the proposed ordinances was scheduled on August 20, 2008.

(e) HLURB

An explanatory meeting was held with Ms. Lilia Lumbera, the Administrative Officer, HLURB Region IV-A. She commented that the controlling development application at the provincial level might be difficult at present under the current status, function and ability of PLUC and that the development applications were processed cities and municipalities under the current procedure. However, the improvement of the current status, function and ability of PLUC is important for better management of land use. The allocation of the proposed On-site Regulation Pond in the subdivision project is not contradictory with the existing Rules and Regulations of PD 957 and BP 220 and acceptable.

The following interpretation on the allocation of On-site Regulation Pond under the Rules and Regulations of subdivision project (PD 957 and BP 220) is acceptable.

- The required 3% of a total area for the allocation of pond may be inclusive of the required minimum open space of 30% of a total project area. When a part or all functions of the community facilities do not satisfy the standards because of the allocation of the On-site Regulation Pond, the developer shall provide an additional area in addition to the 30% open space requirement within the project area.
- The developer may exclude the 3% obligation for the On-site Regulation Pond and treat as the Excluded Area.

Another meeting was held with Nora L. Diaz, En. P., Head Field operations Support Group, HLURB. She recommended making the ordinance formal as soon as the Draft has been prepared. Even thought the ordinance is to make development control stricter, a developer could challenge the validity of the ordinance based on the absence of a provision in the existing Implementing Rules and Regulations. As for land use planning scheme of Growth Management, she commented that the land use matters were not matters of development standards for the nation; therefore, the Cavite Province shall have the authority to use the PPFP as a tool for land use development as long as the plan following the guideline of NEDA.

(f) Dialog (Public hearing) on Draft Ordinances, 20th August 2008

An open forum was held, convened by Mr. Alex Advincula, Committee Chairman on Land Use, Zoning, Urban & Rural Development (CLZURD), Cavite

Provincial Assembly and chaired by Mr. Joe de Castro, Provincial Board Secretary. The major dialogs in the meetings are;

- Ms. Eden Austria, head of PPDO, agreed to the contents of the draft ordinances and wished to promote an approval process by the SP. She expected that the land use planning and urban growth management will be improved by the enforcement of these ordinances. These ordinances are not contradictory to the existing national and local rules and regulations, and inevitable for flood mitigation. The allocation for space for On-site Regulation Pond in the subdivision project site is not hard and the expense of construction of the pond is affordable for developers and also buyers.
- Mr. Ararao, head of CPDC of Trece Martires City, expected that the on-site and off-site regulation ponds will have multi-functions not only flood mitigation purpose, but also irrigation purpose, although there are technical problems including season-ability and sanitation problems. Ms. Austria also expected the effects of regulation pond for park/landscape/ recreation and agricultural activity in dry season. The possibility of those by-products needs further examinations and discussions.
- The chairman of Mr. Castro concluded the meeting that all the suggestions and comments are welcomed and need more discussions by the stakeholders including HLURB and developers. After a series of public hearings, the chairman will bring this to the plenary sessions to refine the legislation.

(2) Promotional Materials

The following materials were distributed as the materials for the consensus building:

(a) Presentation Material

The JICA Study Team developed presentation materials on: Land Use Planning; GIS, Growth Management, and On-site Flood Regulation Pond. The presentation materials were used at explanatory meetings with the government officials in the province, cities and municipalities.

(a) Brochures

Brochures for promoting the on-site regulation ponds and the growth management scheme were prepared with assistance from PPDO. The contents are in line with the draft ordinance (refer to Vol.4 Appendix 3.3).

(b) Workbook

The JICA Study Team also prepared the “Workbook for the Delineation of Growth Boundary” as a text material for technology transfer (refer to Vol.3 Appendix 3.4).

4.5 Organizational and Human Resource Development

4.5.1 Organizational Development

(1) Provincial Land Use Committee

The PLUC, as a special committee, has been limited for its technical capacity. The JICA Study Team proposes the following capacity development actions by functional requirement from the proposed ordinances. The major functions of PLUC to be strengthened are: (1) Review and approval of PPFP; (2) Review and approval of CLUPs; and 3) Review of a Development Application in UCZ. The major actions to satisfy the capacity development areas are summarized in the following table.

Table R 4.6 PLUC's Functions and Actions

Capacity Development Area	Ordinance Review Requirements	Actions
Review and approval of PPFP	• Scale of Land Use Plan (1/50,000) • Validity of the Growth Boundary Plan (UCZ/UPZ) • Validity of the Flood Management Area	• Preparation of PPFP Appraisal Report
Review and approval of CLUP	• Validity of the Growth Boundary Plan (UCZ, UPZ) • Validity of the Flood Management Area • Consistency between PPFP and CLUP	• Assignment of Land Use/Zoning Evaluator from PPDO • Preparation of CLUP Appraisal Report
Review of Development Application in UCZ	• Conformity to PPFP • Development impact review • Availability of infrastructure and public services	• Review and confirmation by each sector (PLUC-TWG)

The above actions to satisfy the capacity development are further elaborated as below:

(a) Preparation of PPFP Appraisal Report

The PPFP needs to satisfy the requirement set by the NEDA standards. The new ordinances require a land use plan with higher accuracy (1/50,000); inclusion of the growth boundary plan; and designation of flood management areas. The chairperson of PLUC shall compile the result as the PPFP Appraisal Report to be submitted to SP.

(b) Assigning a Land Use/Zoning Evaluator from PPDO

PLUC needs to assign a Land Use/Zoning Evaluator in PLUC-TWG from PPDO to strengthen the capacity of PLUC-TWG.

(c) Preparation of CLUP Appraisal Report

The chairperson of PLUC shall prepare CLUP Appraisal Report. The major contents to be included are:

(i) Results of Cross Identification Analysis

(ii) Results of Socio-Economic Data Validation

(iii) Consistency Examination of Land Use Categories and Zoning Categories

(d) Review of Development Application in UCZ

Review and confirmation on an application in UCZ shall be conducted by each PLUC-TWG members. The three major review categories are: conformity to PPFP; review on development impacts; and availability of infrastructure and public services. The following table shows responsibility of PLUG-TWG members for reviewing a development application in UCZ.

Table R 4.7 Roles Development Application Review in UCZ

Review Items	PLUC-TWG Member
Conformity to PPFP	PPDO
Development Impact Review	PENRO, DAR, DA, DPWH
Availability of Infrastructure and Public Services	PPDO, DILG, DPWH, DOT

If a development application in UCZ is satisfactory, PLUC recommends Provincial Assembly (Sangguniang Panlalawigan) to issue a certificate.

(2) Provincial Planning and Development Office

To implement the proposed ordinances, PPDO needs to conduct following activities:

(a) Revising PPFP with Higher Spatial Accuracy

The tool of development control at the provincial level is the PPFP. The current land use plan needs to be refined to have accuracy equivalent to 1/50,000 topographic maps. The spatial planning work with higher accuracy shall be conducted by the proposed GIS Unit in a digital format.

When topographic maps are not available or outdated, satellite images shall be used to supplement the spatial planning work. The internet based satellite images shall also be used without violating the licensing required by the provider of satellite images and software.

(b) Preparation of Growth Boundary Plan

The first step is to draw the Built-up Expansion Area (Urban Growth Area). Using the topographic maps at a scale of 1:50,000, the proposed GIS engineer or mapping operator in the proposed GIS Unit traces the boundaries. After the Built-up Expansion Area (Urban Growth Area) is delineated, the growth boundaries are drawn to divide the areas into UCZ and UPZ. The JICA Study Team has prepared a workbook for the Growth Boundary Planning (refer to Vol.4 Appendix, Appendix-3.4).

(c) Designation of Flood Management Area

The flood management areas, proposed in the growth management ordinance, will have to be designated. PPDO shall utilize the results of the flood simulation conducted by the JICA Study Team. The Flood Management Area map, preferably, shall have a scale of 1/5,000 or larger with contour lines. When such maps are not available, cadastral maps shall be used. Leveling work shall be conducted if necessary.

(d) Monitoring Development Activities

Development activities take place in cities and municipalities; the activities are not spatially monitored by PPDO. PPDO shall acquire copies of development plans from C/MPDC to update status of development activities in the province.

The proposed GIS Unit shall prepare the development activity monitoring map using the proposed GIS system. The attributes such as names of developers and application type (BP220, PD957, other) shall be linked to the development activity monitoring map. The map shall be updated quarterly.

(e) Supporting PLUC-TWG Activities

In order to identify discrepancies between PPFP and CLUP, the Cross Identification Maps shall be prepared. The map shall be prepared in the following procedure.

- Preparation of raster CLUP land use maps
- Preparation of vector CLUP land use maps
- Preparation of raster PPFP land use map
- Preparation of vector PPFP land use map
- Extraction of PPFP Built-up Expansion Areas
- Extraction of CLUP Built-up Expansion Areas
- Extraction of difference between the PPFP and CLUP Built-up Expansion Areas.

As PLUG assign one Land Use/Zoning Evaluator from PPDO, the Evaluator shall

prepare following thematic maps to be presented to PLUC.

- PPFP/CLUP Land Use Overlay Map (1:50,000 or larger)
- Land Use Conflict Identification Map (1:50,000 or larger)
- Flood Management Area Map (1/5,000 or larger)

Also, consistency between CLUP land use plans and zoning ordinances shall be reviewed and confirmed by the Land Use/Zoning Evaluator to be reported to PLUC.

The PLUC member and PLUC-TWG member from HLURB shall be in charge of technology transfer and training to the Land Use/Zoning Evaluator assigned in PPDO.

(f) Creation of GIS Unit under the IT Division

The GIS Unit is proposed to support thematic mapping and spatial analyses in PPDO to satisfy mapping requirement for the ordinances. The IT Division in PPDO already owns a plotter and PC. Until some funds will be available, the existing equipment shall be used as much as possible. A new flat-bet scanner and large format scanner (A1) shall be installed within the IT Division of PPDO to convert maps submitted by CPDO/MPDO to an appropriate format to enable overlaying onto the provincial land use plan which shall have an accuracy level of 1:50,000 scale or larger.

For monitoring and evaluation of the spatial component of the CLUP, the following software shall be installed. The Input/Out put system shall have the after-scanning processing function—rubber sheeting—and digital map editing. The GIS system shall have ArcGIS for analysis and database (MS Access or equivalent).

Table R 4.8 Software Requirement

System	Software Name	Major function
Input Output	AutoCad Map	Rubber sheeting Tracing and Editing
GIS	ArcGIS	Overlay analysis
Database	MS Access	Data organization

To operate the systems for preparation of PPFP and analysis results to PLUC, the following human resources shall be allocated to the GIS Unit.

Table R 4.9 New Positions in the Proposed GIS Unit

Position	Roles and Responsibilities
GIS Engineer	Organization and preparation of attribute data; Organization of spatial data from the Mapping Operator; Creation of thematic maps; Preparation of the cross identification map.
Mapping Operator	Importing and exporting data from other agencies; Tracing and editing existing spatial data;

(3) City/Municipal Planning and Development Offices

The new items of planning in relation to the proposed ordinances are:

(a) Revision of CLUP

The revision of CLUP requires conformity to the revised PPFP with the growth boundary plan. C/MPDO needs to revise its CLUP to include the growth boundary plan.

(b) Confirmation of Certificate by Provincial Assembly (Sangguniang

Panlalawigan)

If a city or municipality adopts the provincial development review requirement in UCZ, the city or municipality needs to amend its development permit requirement to make it a condition that a developer acquires the provincial development certificate.

(c) Designation of Flood Management Areas

If a city or municipality is situated in the lowland area, the city or municipality shall designate the flood management area using the results of simulation conducted by the JICA Study Team. The area designation shall be included in CLUP.

(d) On-site Flood Regulation Administration

The ordinance of the on-site flood regulation pond requirement will require additional administration for C/MPDO and City/Municipal Engineering Offices.

C/MPDO shall prepare a guideline on maintenance for on-site flood regulation ponds to landowners or homeowners association based on the annex of the ordinance on the on-site flood regulation pond. The staff in charge in Engineering Office or C/MPDO shall conduct periodical inspection to ensure proper function of the on-site flood regulation ponds.

4.5.2 Human Resource Development

(1) Technology Transfer

The technology transfer/consensus building sessions were conducted thirty-nine (39) times. The list of technology transfer/consensus building sessions is as shown in Table 4.1.

The technology transfer was planned in three stages as listed in following table: recognizing the situation (excessive urban growth and flood in the lowland areas); understanding policy measures; and formulating ordinances and working toward implementation.

Table R 4.10 Overall Structure of Technology Transfer

Activity Period	Themes	Major Topic	Text Materials
September 2007 ~ October 2007	Recognizing current situation (excessive development and flooding in lowland areas)	Development Control	Presentation materials
February 2008	Understanding policy measures (on-site flood regulation pond and growth management)	Growth Management / On-site Flood Regulation Pond	Workbook for the Delineation of Growth Boundary (Vol.4 Appendix, Appendix-3.4)
July 2008	Formulating ordinances and working toward implementation	Promoting Ordinances/Consensus Building	Draft Ordinances (On-site Flood Regulation Pond Requirement, Growth Management) (Vol.4 Appendix, Appendix-3.1 and 3.2)

The JICA Study Team has received positive feedback from the over all schemes. In some city and municipality such as Trece Martires City and Bacoor, the growth management component will be included in the next version of CLUP. As for implementation of on-site flood regulation ponds, all the participants do understand the necessity and mechanism of on-site flood regulation pond; however, adoption of ordinances and their implementation are time consuming in a democratic decision system of the Philippines.

(2) Future Human Resource Development

(a) Seminar/Lecture

As conducted by HLURB Region 4-A, seminar/lecture series shall be conducted regularly. Concerned government agencies, consultants and academics shall play a role in seminars and lectures.

The seminar/workshop shall be conducted regularly to the cities/municipalities in the Province of Cavite as it was conducted in the Province of Laguna. The GIS component which was included as a volume of the new CLUP guideline shall be included in the seminar/workshop for Trece Martirez City, Silang, General Trias and Imus (partially) that have initiated digital mapping for their land management. An Officer in Charge HLURB, IT/GIS shall be the lecturer/coordinator for the seminar/workshop component.

(b) Self Learning

Most of the CLUP guidelines are available online. PPDC, C/MPDC who has access to the internet shall be able to utilize the leaning material among other planning information on the internet.

(c) Provincial Development and Physical Framework Plan

The new guideline, Guidelines on Provincial/Local Planning and Expenditure Management, was prepared by NEDA. The five comprehensive volumes shall be used as much as possible to raise the capacity of PPDO in PPFP preparation. The guideline does not address thematic mapping methods; the GIS Cook Book prepared for CLUP shall be referred as tutorial, and the Mapping Guideline for CLUP shall be referred as a text material. Unlike the guidance from HLUPR, the seminar/workshop has not been formalized for PDPFS; since it was NEDA that has prepared the guideline for PPFP, PPDO shall request a seminar/workshop to NEDA for assistance. When a consultant is to be used for its preparation, it is important that PPDO receives all the digital files including CAD/GIS files that were created in process of preparation.

4.6 Administration for On-site Flood Regulation Pond

The principal administrative works for the on-site flood regulation ponds are as described below:

(1) Adoption of On-site Flood Regulation Pond

After the adoption of the On-site Flood Regulation Pond, the cities and municipalities will have to revise the development permit form.

(2) Approval Procedure and Criteria

The design and other criteria for the On-Site Regulation Pond shall be approved in the process of development application approval procedure. The following items shall be examined by a licensed engineer in the Planning or Engineering Department depending on the procedural requirement of the city/municipal governments: (a)Area, (b) Slope, (c) Structure, (d) Use and (e) Safety

(3) Operation/Maintenance

The operation and maintenance of the On-Site Regulation Ponds shall be conducted by the homeowners' association or landowners. The cost for operation and maintenance shall be paid by a homeowners' association or land owners. The operation of the On-Site Regulation Pond shall be as a following manner.

Table R 4.11 Maintenance Work of Homeowners' Association

Activity	Schedule
Note erosion of pond banks or bottom	Semi-Annual Inspection
Inspect for damage to the embankment	Monthly
Monitor for sediment accumulation	Monthly
Examine to ensure that inlet and outlet devices are free of debris and operational	Annual
Repair undercut or eroded areas	When necessary
Mow side slopes	Semi-annual
Pesticide/ Nutrient management	When necessary
Litter/ Debris Removal	Monthly
Seed or sod to restore dead or damaged ground cover.	Annual

4.7 Required Activities by Provincial Government for Enforcement of the Proposed Ordinances

As described in subsection 4.3, the following two ordinances are proposed as a part of the priority project components: (1) "On-Site Flood Regulation Pond Requirement on New Development"; and (2) "Urban Growth Management Ordinance"

The ordinance entitled the "On-site Flood Regulation Pond" aims at obligating the land developers of the new subdivisions to construct a on-site flood regulation pond at the most downstream point of the subdivision. On the other hand, the ordinance entitled "Urban Growth Management" requires the City and/or Municipal Office as the competent authority for the land use plan to delineate the "Urban Promotion Zone", "Urbanization Control Zone", and "Zone for Preservation of Farmland".

Both of the ordinances are indispensable to properly control the excessive land development in the river basin so as to minimize the increment of the basin peak flood runoff discharge. The ordinances had been drafted in the Study, and the LGUs, the Provincial Government of Cavite in particular are required to prepare the "Implementation Rules and Regulations (IRR)" for enforcement of the ordinances in the earliest opportunity. The items to be clarified in the IRR are as enumerated below:

(1) The existing Philippine laws, rules and regulations related to the two (2) ordinances proposed in the Study,

(2) The institutional setup for enforcement of the ordinances with referring to the present relevant laws/regulations and the existing relevant organization setup,

(3) The planning and design standards for construction of the on-site flood regulation pond and delineation of the zones proposed in the Study,

(4) All necessary documents and drawings together with the legal forms required to application to the ordnances,

(5) All necessary procedures for application to the ordinance, evaluation/approval of the applications and registration/licensing of the applicants to the ordinances and

(6) All requirements other than the above items (1) to (5).

There are many precedents of IRRs and their actual operations for the ordinances in Japan, which are similar to those proposed in the Study. On the other hand, the ordnances proposed in the Study are the first attempts in the Philippines, and difficulties are foreseeable in preparing and actually operating the IRRs for the ordinances. From these points of view, the further technical assistance of JICA would be preferably recommended for establishment and actual operation of the above IRR. The Terms of the Reference for the technical assistance are drafted as shown in Vol. 4 Appendix_10.

Chapter 5. Development of Database for River Area Management

5.1 Purpose of Development and Updating of Database for Management of River Area

As described in Vol.1 for the Master Plan Study, management of the river area is required to refrain the intensive encroachment into the river area and keep the appropriate river flow conditions, the river structures (such as river dike and revetment), the river morphologies and all other river environments. In order to facilitate the management of the river area, development of the database for the river area is proposed as the base for management of the river area.

5.2 Establishment of Boundaries of River Area

5.2.1 Cross-sectional Boundaries

The Presidential Decree No.1067 prescribes that the river area covers the water body of the river channel and a certain width of the river corridor along the channel. The Decree further defines the width of the river corridor to be 3m in the urban area, 20m in the agricultural area and 40m in the forest area from the boundary of the water body. However, the width of the water body largely changes depending on the magnitude of the river flow discharge, which leads to uncertainties of the boundary of the river area. From this point of views, the water body was provisionally assumed as the flow area of the flood discharge of 2-year return period in the Master Plan Study (refer to Vol. 1 subsection 9.3.1).

The above definition of the water body was re-clarified in the Feasibility Study. As the results, it is concluded that difficulties are still foreseeable in defining the flow area of the flood discharge of 2-year return period for every river cross sections, and the river area is reclassified as blow (refer to Fig, R 5.1):

- The river dikes are constructed along a part of downstream stretch of the rivers. The river section confined by these river dikes and the inland with a width of 3m from the fool of the dike are defined as the river area.

- In case of difficulties in recognizing clear river dike, the water body should be assumed as the width of the water flow section, which is measured during a dry season, and the river corridor, which should be included as the river area, is assumed to have the widths of 3m in the urban area in accordance with Presidential Decree No. 1067.

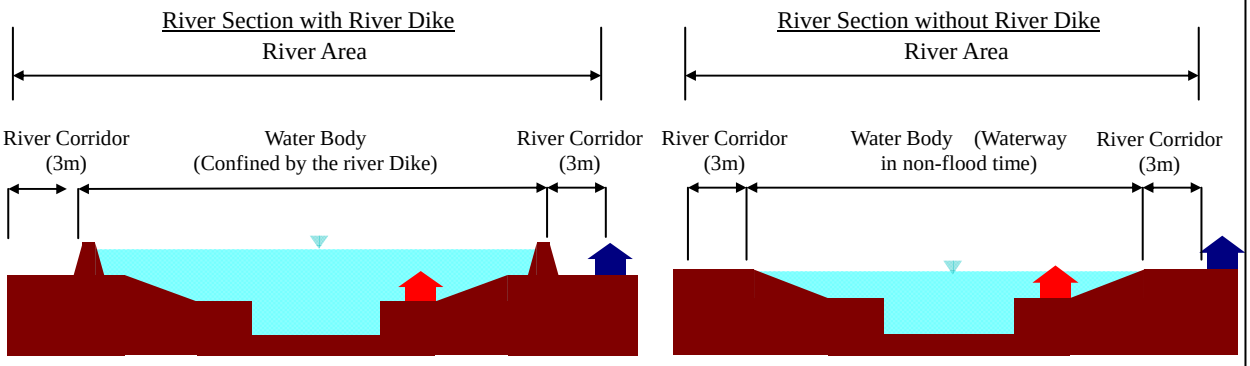


Fig. R 5.1 Cross Sectional Boundary of River Area

5.2.2 Longitudinal Boundaries

The intensive encroachment into the river area is made along the downstream of Imus, San Juan and Canas River, with a length of about 29km in total, and the approximate upstream ends of such the intensive encroachment area are as shown in Table R 5.1 and Fig. 5.2. These river stretches area are proposed as the initial target for development of the database for management of the river area.

Table R 5.1 Target River Stretches for Management of River Area

Name of River	Upstream End of Objective River Stretch			
	Name of Bridge	Length	Name of Barangay	Name of Municipality
Imus	Tomas Mas Cardo	6,000 m /1	Tanzang Luma I/Palico III	Imus
Bacoor	Aguinaldo Highway	4,920 m /2	Panapaan VI	Bacoor
Julian	Julian	4,840 m /2	Bayan Luma IX	Imus
San Juan	Ilang-Ilang Bridge I	4,480 m /1	San Antonio II	Noveleta
Canas	NIA Maintenance	9,150 m /1	Bunga	Tanza
Total		29,390 m		

Note: /1: Length from the river mouth
/2: Length from the confluence with Imus River

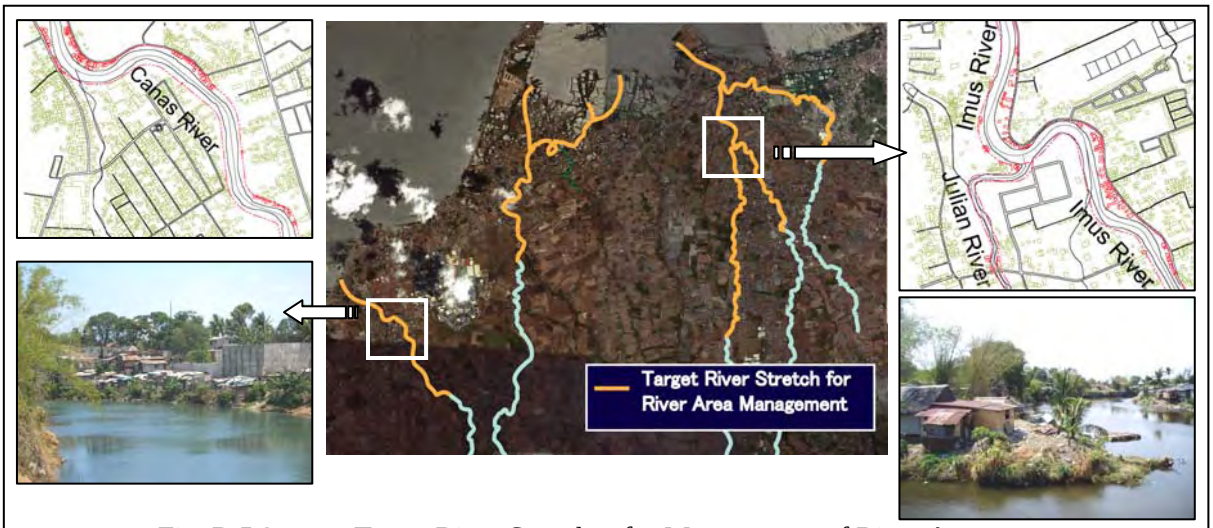


Fig. R 5.2 Target River Stretches for Management of River Area

5.2.3 Establishment of Boundary Markers of River Area

In accordance with the definitions of the river area as described in the above subsections 5.2.1 and 5.2.2, the outward boundary markers of the river area should be established. The boundary marker would be preferably made of the concrete peg and placed with an interval of about 100m along the river channel. The signboard, which notifies the residents of the boundary of the river area, should be also placed with an interval of about 1,000 m.

5.3 Items to be recorded in the Database

The items to be recorded in the database were selected as described hereinafter in due consideration of the necessary information for the proper management of river area.

5.3.1 Division of River Area

The river area has the longitudinal length of several kilometers and it is virtually difficult to recognize the location of issues/problems detected in management of river area. In order to cope

with this issue, the river area is longitudinally divided, by the "cross-sectional boundary lines", into numerous small blocks with an interval of about 100m, and the issues/problems at each of the block are to be recorded into the database.

(1) Identity Code of Cross-sectional Boundary Line

Each of the aforesaid cross-sectional boundary lines should have the Identity Code, which has the number with three decimal places and presents the distances in kilometers either from the river mouth or from the confluence with the mainstream (ex. 1.234 means the distance of 1.234km). The Identity Codes for the mainstreams (Imus, San Juan and Canas River) present the distances from the river mouth, while those for the tributaries (Bacoor and Julian River) present the distances from the confluence from the mainstream.

(2) Location of Cross-sectional Boundary Line

The boundary markers as described in the above subsection 5.2.3 should be placed at left and right bank edge of the aforesaid cross-sectional boundary lines, and their locations should be recorded in the forms of the latitudes and longitudes. The name of Barangay and Municipality, where the boundary points are placed, should be also recorded.

(3) Width of River Area

The following widths along the cross-sectional boundary lines should be recorded.

- The approximate width of the minimum water body measured during a dry season,
- The width of river corridor at the left and right bank; the width could be assumed at 3m in case of no definite river dike. However, when there is the definite river dike, it should be from the edge of the minimum width of water body up to the inland point at 3m from the foot of the river dike.
- The entire width of the cross-sectional boundary line as the total of the above two items (i.e., the entire cross-sectional width of the river area)

5.3.2 Land Use of River Corridor

The informal land use of the river corridor would be the great hindrance against the safety flow of flood discharge, and at the same time, they are exposed to the high risk of flood damage. In order to control the informal land use, the following land uses status of the river corridor at left and right bank in each block of river area should be confirmed through the river patrol and recorded into the database:

(1) Extent of River Corridor

The river area covers a certain part of the river corridor as described in the foregoing subsection 5.2.1, and the average cross-sectional width and the extent in square meters of river corridor should be recorded. The record should be separately made for each of the left and right bank.

(2) Number of Houses

The number of the houses in the above river corridor should be confirmed and recorded into the database.

(3) Type of Land Use

The type of land use in the river corridor should be represented by some of the following four types: (a) residential area, (b) commercial area, (c) vacant land and (d) others. If others are included in the type of land use, further detailed clarification should be made.

(4) Obstruction of River Flow

Evaluation on whether or not the subject land use hampers the safe flow of the flood discharge and/or other river environment should be made, and the results of evaluation by the terms of “Serious” and “Not Serious” should be recorded into the database. The evaluation is based on the ground elevation and land use of the river corridor. That is, when the river corridor of the block has the ground elevation of less than 1m higher than the river water level observed in the dry season and at the same time, a substantial part of the river corridor is used as the residential/commercial area, the block is evaluated to hamper the safe flow of the flood discharge.

5.3.3 River Structures

There exist a variety of river structures, and the inventory of them together with the structural conditions for each of blocks of river area divided by the above cross-sectional boundary lines should be recorded in the database. The structures to be recoded are as described below:

(1) River Dike

Existence of river dike should be recorded together with the types (such as earth dike and parapet wall) and structural conditions (conditions/degree of damages) of the dike.

(2) River Protection Works

Existence of river protection works should be recorded together with the types (such as concrete revetment and stone masonry) and structural conditions (conditions/degree of damages) of the river protection works.

(3) Bridge

Existence of the river bridge should be recorded together with the name, the structural type (such as concrete guilder and steel truss) and the structural conditions of the bridge.

(4) Weir/Dam

Existence of weir/dam should be recorded together with the structural type (such as concrete dam/weir, and earth-fill) and structural conditions (conditions/degree of damages) of the weir/dam.

(5) Others

When there exist the particular river structures other than those described in the above items (1) to (4), the structural type of them and other particular features should be recorded.

5.3.4 Particularities of River Area

The particular conditions of riverbank and land use in river corridor and hinterland at each block of river area should be recorded covering the following information:

(1) The particular conditions of river dike, such as existence of river dike, confluence of tributaries, and structural types of river dike if the dike exists.

(2) Classification of dominant land uses of river corridor and its hinterland such as mangrove forest, reclaimed area, fishing pond, vacant land, residential area and commercial area.

5.4 Development of Database for Imus River

The database for management of Imus River is provisionally developed in order to work out the concrete example during the study period. The details of the database are as described hereinafter:

(1) Division of River Area

Encroachment into the river area of Imus River is intensive especially along the river stretch of about 6km in length from the river mouth up to the intersection of the G. E. Aguinaldo Highway. The vertical river dike runs along (a) the left bank stretch of 0.0 to 1.6km from the river mouth and (b) the right bank stretch of 2.5 to 6.0km from the river mouth (refer to Fig. 5.1). The river corridor sandwiched between the river dike and the edge of the river water body is assumed as a part of the river area. As for the river stretch, which has no definite river dike, the river corridor, which should be included as the river area, is assumed to have the widths of 3m from the outward bound of the above water body.

Based on the above concept, the river area of Imus River is delineated and, its cross-sectional boundary lines with an interval of about 100m are setup as shown in Fig. 5.2, where the river area is divided into 58 blocks by the cross-sectional boundary lines. The Database (Sheet-A) is further developed to record the detailed information on the cross-sectional boundary line as specified in the foregoing subsection 5.3.1 (refer to Table 5.1).

As listed in Table 5.1, the river area lies over eight Barangays in Bacoor Municipality and ten Barangays in Imus Municipality. The average width of the cross-sectional boundary line (i.e., the width of river area) is about 72 m, which is divided into 46m of water body, 9m of the river corridor at the left bank and 16m of the river corridor at the left bank. The width of cross-sectional boundary line changes from 26m at minimum to 249m at maximum.

(2) Database on Land Use in River Area

The Database (Sheet B) on the present land use in the river area of Imus River is developed as shown in Table 5.2. The Database contains the following information as proposed in the foregoing subsection 5.3.2:(a) extent of the river corridor in each block of the river area, (b) number of houses in each block, (c) land use classification, (c) evaluation on whether or not the encroachment in each block of the river area causes the negative impacts to the river flow and/or lead to the serious flood damage.

As shown in Table 5.2, the river corridor as defined as a part of the river area has an extent of about 5.4ha (53,756m^2) in total, and a considerable part of it is used as the residential area. That is, of the total 58 blocks of the river area, 11 blocks are encroached by the houses at the right bank and 32 blocks at the left bank.

The number of house located in the river area is 323 units in total, which is divided into 37 units at the left bank and 286 units at the right bank. The house encroachment to the river corridor is intensive especially along the right bank river stretch of 3.4 to 5.7km upstream from the river mouth, where 234 houses exist and, of them, 110 houses are evaluated to causes the significant affect of the river flow discharge and/ to be exposed by the serious damage of flood discharge.

(3) Database on Structures of Imus River

The Database (Sheet-C) on the existing principal river structures placed in the river area of Imus River is developed as shown in Table 5.3 containing the information as proposed in the foregoing subsection 5.3.3. As shown in Table 5.3, the principal river structures are such as the earth dike, the parapet wall, the revetment of stone masonry and/or concrete, and the four bridges (the concrete T Girder Bridge), namely (a) Island Cove Bridge, (b) the bridge under construction, which has not been named yet, (c) Bina Kayan Bridge and (d) Palico, Imus Bridge.

(4) Database on Particularities of River Area

The entity in charge of the management of the river area would be required to regularly undertake the patrol of the river area. The results of the patrol would be accumulated and, those for a certain time length need to be summarized into the database so to overview the updated states of the river area. From this point of view, Table 5.4 is proposed as the format for the said database together with the relevant information for Imus River such as the updated structural conditions of river dike, the status of land use/encroachment of houses in the river corridor and the land use status of the hinterland.

5.5 Entities in Charge of and Activities Required for Development of Database

5.5.1 Entities in Charge of Development of Database

The sustainable development and updating of the database for management of the river area has to be achieved by a definite entity, and the District Engineering Office of DPWH (DEO-DPWH in Trece Martires City) under the umbrella of the Flood Mitigation Committee (FMC) is deemed to be the most appropriate implementing body for the said development and updating works from the following points of view.

- The DEO-DPWH has the knowledge on the river engineering, such as those for river structures, river morphology and river hydrology. Moreover, the Office is now in charge of inspection and maintenance of river channel as well as river structures such as the river dike and the protections of riverbank. These knowledge of the Office on the river maintenance works could be useful for collection of the relevant information and development of the database.

- The DEO-DPWH is the core member of the Flood Mitigation Committee (FMC) and could collect the information on the registrations of houses in the river area and/or informal dwellers through the members of FMC such as the Provincial Planning and Development Office (PPDO) and the Provincial Housing and Urban Development Office (PHUDO). At the same time, the FMC would have the function to control, regulate, rationalize and harmonize all flood mitigation programs proposed in the Study, and therefore, the database developed for management of the river area would be effectively utilized through the channel of FMC.

5.5.2 Activities Required for Development of Database

The DEO-DPWH would be required to undertake the following activities:

(1) Expansion of Database

The format of database together with the data input for Imus River has been made during the study period. The DEO-DPWH should review the format and make the necessary revisions for it immediately after completion of the Study. The Office is further requested to expand data collection for Bacoor, Julian, San Juan and Canas Rivers and compile them into the database in the manners as described in the foregoing subsections 5.2 to 5.4.

(2) Updating of Database

The database needs to be updated once a year, and the time of updating works would be preferably after the flood seasons so as to clarify the updated flood damage potentials, which could be used as the basic information on the necessary river maintenance works for the forthcoming floods. The items of information to be updated are as below:

- Confirm whether the outward boundary markers of the river area are still available or missing (refer to subsection 5.3.1 and Table 5.1),
- Replenish the above boundary makers at the place where the previous maker is missing or not useable,
- Confirm necessity of changes of outward boundary makers (check whether or not the location of maker needs to be changed due to change of river conditions such as construction of new river dike, widening of river channel, etc.)
- Change the location of the above boundary makes in accordance with the changes of river conditions such as construction of new river dike and. widening of river channel.
- Update the number of houses and type of land use in the river area (refer to subsection (refer to subsection 5.3.2 and Table 5.2),
- Evaluate whether or not the houses newly constructed and/or the land use newly changed in the river area would cause the obstruction of the river flood flow or hamper the river environment (refer to subsection 5.3.2 and Table 5.2), and
- Update the inventory and structural conditions of the river structures (refer to subsection 5.3.3 and Table 5.3)

(3) Use of Database for Management of River Area

The Flood Mitigation Committee (FMC) would be required to undertake the following activities for management of the river area based on the information updated in the database:

- To confirm the informal land uses in the river area, which may cause the significant negative impact to the flood flow and execute the necessary actions to stop and/or correct such land uses.

- To confirm the informal construction and/or renovation of houses and/or any other structures in the river area and execute the necessary actions to stop and/or correct such construction and renovation works,

- To evaluate the damages of river structures, and prepare the rehabilitation program for them,

- To evaluate the updated status of the garbage damping into the river area, and prepare and implement the expansion program for the on-going cleanup drive of waterways (Oplan LINIS).

Chapter 6. Capacity Development

6.1 Overview

A major part for the capacity development has been made for the counterpart personnel, who are assigned from two counterpart agencies of the Study, namely DPWH and Provincial Government of Cavite. The member list of the key counterpart personnel is as listed in Table 6.1.

The capacity development for the counterpart personnel aims at transferring of knowledge on analysis, designing and plan formulation related to the structural and nonstructural flood mitigation schemes. In order to perform the objectives of the capacity development, a variety of activities have been undertaken in the Study including: (a) the day to day on-the-job training, (b) the oversea training in Japan, (c) the study tour to the site of the completed flood mitigation project in Philippines, (d) the workshops, (e) the technical transfer seminar, and (f) the technical working and steering committee meetings

The capacity development was further extended to the residents and other stakeholders to diffuse the knowledge on the proposed flood mitigation projects. In order to achieve the capacity development for the stakeholders, undertaken are (a) the public consultation meeting, (b) the stakeholder meetings and (c) the pilot projects for clean-up drive of waterways and flood waning and evacuation.

6.2 Capacity Development for Counterpart Personnel

The principal activities for capacity development, which takes the counterpart personnel as the main target, are as described hereinafter:

(1) Day to Day On-The-Job Training

The counterpart personnel have participated in the most opportunities of the data collection, the field reconnaissance, the indoor analysis, the plan formulation and other activities for the Study. The OJT for the hydrological/hydraulic analysis in particular was intensively made for two counterpart personnel from the Planning Service of DPWH and FCSEC twice a week during the first and second field survey period from April to October 2007. The principal subjects of the OJT for the hydrological/hydraulic analysis are as enumerated below:

(a) Methodologies for estimation of the basin average probable rainfall intensities,

(b) Flood runoff simulation by the “Quasi-Linear Storage Type Model, and

(c) Simulation on Flood Inundation by the models of “MIKE FLOOD”, which is composed of “MIKE 11” and “MIKE 21”.

(2) Overseas Training in Japan

The overseas training aims at deepening the understandings on the comprehensive flood mitigation project through observation of and lecture about the relevant practices made in Japan. The training was made for two-week period from 13 July to 26 July 2008.

The detailed training program are as shown in Table 6.2, and the member lists of the trainees as well as the purpose/results of the training are as listed in Table R 6.1 and R 6.2, respectively.

Table R 6.1 Trainees for Oversea Training in Japan

Name	Office	Designation
Mr. Ness S. Villanueva	District Office of DPWH	District Engineer
Mr. Elmo F. Atillano	Planning Service Div., DPWH	Engineer III
Ms. Eden V. Austria, MPA	PPDO, Provincial. Gov.	PPDC
Ms. Anabelle L. Cayabyab	PG-ENRO, Provincial Government	Sr. Environmental Management Specialist

Table R 6.2 Purpose and Results of Training

Item	Contents
Purpose	The Study emphasized the necessity of strengthening of the basin flood detention capacity in order to cope with the increment of peak flood runoff discharge inflicted by the rapid urbanization in the basin. The basin flood detention capacity could be strengthened by the measures such as (a) multi-purpose flood retarding basin, (b) on-site flood regulation pond at each of new subdivision and (c) control of excessive urban development. These measures have been widely applied in Japan The Study Area and other many urban centers in the Philippines are also suffered from increment of flood peak discharge because of the rapid urbanization. In spite of such flood problem, the river channel improvement has been solely applied as the conventional flood mitigation measure and the measure for strengthening of the basin flood detention capacity as mentioned above has been seldom practiced in Philippines. From the above points of view, the principal subjects of training are addressed to observation of and lecture about strengthening of the basin flood detention capacity practiced in Japan. The trainees are expected to well understand the importance of and/or the issues in the comprehensive flood mitigation project and the necessary works to achieve the project.
Results	All of the trainees dispatched from DPWH and the Provincial Gov. of Cavite are the core planner and/or engineer for the flood mitigation project and/or the urban development project. At the same time, they are the chief counterparts for the Study. According to the results of questionnaire survey, all of the trainees are deeply impressed by the successful flood mitigation effects practiced in Japan. At the same time, they are well aware of the importance of the basin flood detention capacity and the issues to achieve it. These experience and knowledge of the trainees would be useful to promote the execution of the comprehensive flood mitigation project in Philippines.

(3) Study Tour in Philippines

The Ormoc Flood Control Project had been launched out due to the unprecedented flood damage in 1990 and implemented through the Japanese Grant Aid for a period from 1997 to 2000. The project facilities are now well operated, maintained and managed by the Flood Mitigation Committee (FMC), which is jointly organized by Ormoc City and DPWH.

In order to learn the points of success and issues/problems encountered in the Project, the study tour to the site of Project was made on September 26 and 27, 2007. The counterparts, who attended the study tour, are as listed in Table R 6.3 below, and the study program in the tour are as listed in Table 6.3.

Table R 6.3 Participants to the Study Tour

Name	Designation	Office
1. Ms. Dolores M. Hipolito	PM II	DPWH-PMO-FCSEC
2. Mr. Harold Uyat	Engineer II	DPWH-PMO-FCSEC
3. Mr. Willy Galang	Engineer III	ESSO
4. Mr. Romeo Belardo	Engineer II	DPWH-Cavite
5. Mr. Nolasco Madlangbayan	Engineer II	DPWH-Cavite
6. Mr. Rodelio D. Cruz	Project Dev't. Office IV	PPDO Cavite
7. Ms. Anabelle L. Cayabyab	Sr. Environmental Mgt. Specialist	PG-ENRO Cavite
8. Mr. Ruperto T. Arca	Sr. Environmental Mgt. Specialist II	PG-ENRO Cavite
9. Mr. Rodel Pelaez	MPDC	LGU-Imus
10. Mr. Redentor Dones	MPDC	LGU-KAWIT

The study tour aimed at acquiring the understandings on the following items through the field observation and discussions with the members of FMC:

- Present condition of the flood mitigation facilities,
- Activities of FMC and the present issues on them,
- Effective operation and maintenance of the flood mitigation facilities,
- Awareness on the river management and participation to the community-based disaster prevention by the residents and NGOs, and
- Present conditions of the resettlement area.

(4) Workshop for Technical Transfer to Counterpart Personnel

The workshops were periodically held to achieve the transfer of knowledge related to the proposed schemes in the Study. The principal topics in the workshop are such as (a) the technical skills for a variety of analysis and planning (such as hydrological analysis, planning for river improvement and planning for land zoning), and (b) the basic policies/concepts on the proposed flood mitigation plans. The topics of the above item (a) are given to the counterpart personnel, while those of the item (b) are not only for the counterpart personnel but also for other stakeholders including the residents, the NGOs and the academies. The workshops held during the study period are as listed below:

Table R 6.4 Workshop for Technical Transfer to Counterpart Personnel

	Name of Meeting	Date	Topics
1	Meeting with Counterpart Personnel	19 Mar. 2007	To explain and discuss the Inception Report
2	2nd Meeting with Counterpart Personnel	07 Jun. 2007	To explain and discuss the results of the First Field Survey and the study programs of the Second Field Survey
3	1st Joint Counterpart Training	29 Aug. 2007	To conduct a lecture on the formulation of river improvement plan.
4	2nd Joint Counterpart Training	14 Sep. 2007	To conduct a lecture on hydrological analysis.
5	3rd Joint Counterpart Training	26-27 Sep. 2007	To conduct a study tour to the Project for Flood Mitigation in Ormoc City
6	4th Joint Counterpart Training	19 Oct. 2007	To conduct a lecture on the methods to formulate a land zoning plan.
7	6th Joint Counterpart Training	26 Jan. 2008	To explain the context of the seminar and discuss the contents of presentation
8	Lecture to MPDCs on the Proposed Ordinance for Land Use	20-27 Feb. 2008	To explain and discuss the concept of urban growth management.
9	Executive Meeting with the Members of Provincial Assembly	01 Mar. 2008	To explain and discuss the proposed ordinance for on-site flood regulation pond
10	7th Joint Counter Part Training	03 Mar. 2008	To explain the proposed members and roles of Flood Mitigation Committee (FMC)
11	8th Joint Counter Part Training	27 May 2008	To explain and discuss the contents of Interim Report
12	Lecture to MPDCs on the boundary of urban growth area	07 - 10 Jul. 2008	To explain and discuss the proposed zoning plan for urban area and on-site flood regulation pond in new subdivision
13	Lecture to Members of the Provincial Land Use Committee (PLUC)	15 - 16 Jul. 2008	To explain and discuss the capacity development for PLUC
14	Lecture to Members of Provincial Assembly	21 Jul. 2008	To explain the current flood problems and necessary flood mitigation works in the Cavite Low Land Area.
15	Meeting with the Provincial Land Use Committee	24 Jul. 2008	To explain and discuss the proposed ordinance for land use control

(5) Technical Transfer Seminar

Many of the river basins in Philippines have the similar flood problems inflicted by the intensive urbanization in the river basin as experienced in the Study Area. The officials, scholars as well as residents are aware of the principal issues and ideas for solution of the flood problems. Japan has also ever straggled the flood problems aggravated by the rapid urbanization in the river basin and accumulated a variety of knowledge to cope with the problems.

The Technical Transfer Seminar aims at sharing experience and knowledge in regard to the comprehensive flood mitigation practiced in the Study and other references in Philippines as well as Japan. The Seminar has been held two times, and another third Seminar is further scheduled at the end of the Study in January 2009. The detailed programs of the Seminar are as described hereinafter:

(a) First Technical Transfer Seminar

The Fist Seminar was held at Taal Vista Hotel, Tagaytay City in Cavite Province on February 05, 2008. The attendances of the Seminar are the counterpart personnel/other government officials, the statesman/administrators and the private citizens including 68 personnel in total.

The main theme of this Seminar was addressed to the “On-going Comprehensive Flood Mitigation Practices in Philippines and Japan”, and the following topics were presented and discussed:

- Comprehensive Flood Control by Mr. Shunta Dozono, River Bureau, Ministry of Land, Infrastructure, Transport and Tourism, GOJ
- Socio Economic Development and Land Use Plan in Cavite Province Ms. Eden V. Austria, MPA, Provincial Government of Cavite, GOP
- Flood Mitigation in the Philippines: Trends & Challenges, by Ms. Dolores M. Hipolito Msc, Project Manager II, FCSEC, DPWH, GOP
- The Study on Comprehensive Flood Mitigation for Cavite Lowland Area in the Republic of the Philippines by Mr. Makihiko Otogawa, JICA Study Team

(b) Second Seminar

The Second Seminar was held at Taal Vista Hotel, Tagaytay City in Cavite Province on August 08, 2008. The attendances of the Seminar involve 51 personnel, who are the counterpart personnel/other government officials, the statesman/administrators and the private citizen

The main theme of this Seminar was addressed to the “Community-based Practices for Flood Mitigation”, and the following topics were presented and discussed:

- Points of Discussion on Flood Mitigation Scheme by Mr. Minoru Kamoto, JICA River Management Advisor, DPWH
- Community-based Disaster Mitigation Measures in the Philippines, by Ms. Dolores M. Hipolito Msc, Project Manager II, FCSEC, DPWH, GOP
- Community-based Flood Warning System by Ms. Susan R. Espinueva, Senior Weather Specialist, PAGASA, GOP

- Results of IEC Experiences and Lessons Learned by Ms. Anabelle Cayabyab, PG-ENRO, Provincial Gov. Cavite
- Results of Master Plan Study for Comprehensive Flood Mitigation for Cavite Low Land Area by Mr. Makihiko Otogawa, JICA Study Team

(c) Third Seminar

The Third Seminar was held at Taal Vista Hotel, Tagaytay City in Cavite Province on January 23, 2009. The attendance of the Seminar involves 54 personnel, who are the counterpart personnel/other government officials and the statesman /administrators.

The theme of the Seminar was set at "Perspective for Future Approach to Flood Mitigation", whereby the results of the entire Study and their related topics. The following individual topics were presented and discussed:

- River Administration and management in Japan and Philippines by Mr. Minoru Kamoto, JICA River Management Advisor, DPWH
- Trends and Approaches On Flood Management by Ms. Dolores M. Hipolito Msc, Project Manager II, FCSEC, DPWH, GOP
- Introduction of the river management which the Prefectural government Carries Out in Japan by Mr. Shunta Dozono, Member of JICA Advisory Committee, Director of River Division, Gifu Prefectural Government
- Activity Report on Flood Hazard Map, Map Exercise, Awareness Program and Evacuation Drill in the Study by Ms. Anabelle Cayabyab, PG-ENRO, Provincial Government of Cavite
- Socio Economic Development and Land Use Plan in Cavite Province Ms. Eden V. Austria, MPA, Provincial Government of Cavite
- Results of Feasibility Study on Comprehensive Flood Mitigation for Cavite Lowland Area in the Republic of the Philippines by Mr. Makihiko Otogawa, JICA Study Team

(6) The Meetings with Steering Committee (SC) and Technical Working Group (TWG)

The meetings among the members of SC, TWG and the JICA Study Team were held to explain and discuss (a) the Inception Report, (b) the interim results of the Master Plan Study and (c) the final results of the Master Plan Study as compiled in the Progress Report. Moreover, the final SC and TWG meetings are scheduled at the end of the study period in January 2008 to explain and discuss the contents of the Draft Final Report, which compiles the whole study results including those of the Master Plan and Feasibility Study. The list of the meetings are as shown in Table R 6.5.

Table R 6.5 Meeting with Counterpart Agencies

Name of Meeting	Date	Purpose	Number of Attendants
1st TWG Meeting	21 Mar. 2007	To explain and discuss the Inception Report.	19
1st SC Meeting	23 Mar. 2007	To explain and discuss the Inception Report.	15
2nd TWG Meeting	01 Oct. 2007	To explain and discuss the interim results of the Master Plan Study.	16
2nd SC Meeting	03 Oct. 2007	To explain and discuss the interim results of the Master Plan Study.	21
3rd TWG Meeting	23 Feb. 2008	To explain and discuss the final results of the Master Plan Study.	18
3rd SC Meeting	25 Feb. 2008	To explain and discuss the final results of the Master Plan Study.	15
Executive Meeting	04 Mar. 2008	To explain and discuss the final results of the Master Plan Study.	15
4th TWG Meeting	28 May. 2008	To explain and discuss the Interim Report and Priority Projects.	22
4th SC Meeting	28 May. 2008	To explain and discuss the Interim Report and Priority Projects.	14
5th Joint SC and TWG Meeting	20 Jan. 2009	To explain and discuss the whole study results.	28

6.3 Capacity Development for Stakeholders

(1) Stakeholder Meetings

The stakeholder meeting was held six times in total in order to explain and discuss the social and environmental impacts caused by the resettlement and the land acquisition for the project implementation.

The objectives of first three meetings were oriented to the entire flood mitigation plan proposed in the Master Plan Study. Of these meetings, the first and second were held in Cavite Province considering that the majority of the participants are from the municipalities in the Province. The second stakeholder meeting was, however, held in Manila City because more than half of the participants were the members of the staring committee, who are from the offices in Metro Manila.

The objectives of the last three meetings are oriented to understandings and consensus on the contents of the priority project components examined in the Feasibility Study. All of these three meetings were held in Imus Municipality, because the proposed sites of the priority project components are located in the Municipality.

The agendas and the places of the meetings are as listed below:

Table R 6.6 Agendas and Places of Stakeholder Meetings

No	Date	Agenda		Place of Meeting
		Principal	Detailed	
1	10 Aug. 2007	Draft of Scoping for IEE-Level Study	• Outline of the Master Plan Study • Draft of scoping for the Master Plan	- Trece, Martires City - Cavite Province
2	03 Oct. 2007	Preliminary Results of IEE-Level Study	• Details of alternative structural flood mitigation measures proposed in the Master Plan • Details of non-structural flood mitigation measures proposed in the Master Plan • Interim report on the social environmental study	- Manila City
3	10 Nov. 2007	Results of IEE-Level Study	• Results of Master Plan Study • Cost and benefit of the proposed plans • Results of the social environmental study	- Municipality of General Trias - Cavite Province
4	12 Jul. 2008	Draft of Scoping for EIA-Level Study	• Outline of the Feasibility Study • Draft of scoping for the priority project selected as the objectives of the Feasibility Study	- Municipality of Imus - Cavite Province
5	30 Sep. 2008	Preliminary Results of EIA-Level Study	• Details of the off-site flood retarding basins selected as the priority project component • Details of non-structural flood mitigation measures examined in the Feasibility Study • Interim report on the social environmental study	- Trece, Martires City - Cavite Province
6	09 Dec. 2008	Results of EIA-Level Study	• Results of Feasibility Study • Cost and benefit of the proposed priority project • Results of the social environmental study	- Municipality of Imus - Cavite Province

All of the above meetings were organized by the Provincial Government of Cavite with support of the JICA Study Team. The number of the attendants of the meetings is 358 in total including the residents and other relevant organizations such as NGOs and government agencies as shown in Table R 6.7. The invitations for these attendants were made through the delivery of letter and/or fax to house to house of the residents and the offices of other stakeholders more than one week before the meetings.

Table R 6.7 Attendants of Stakeholder Meetings

No.	Date	Attendants	Number of Attendants
1	10 Aug. 2007	• Residents in Municipalities of Bacoor, Imus, Kawit, Noveleta, Rosario and Tanza • Representatives of towns and barangays in the above Municipalities • Representatives of central governments (DPWH, DENR, OCD, etc.) • Others (NGOs, communities, etc.).	100
2	03 Oct. 2007	• Representatives of Cavite Province • Representatives of central governments (DPWH, DENR, OCD, etc.) (Members of Steering Committee and other well-informed persons)	21
3	10 Nov. 2007	• Residents in Municipalities of Bacoor, Imus, Kawit, Noveleta, Rosario and Tanza • Representatives of towns and barangays in the above Municipalities • Representatives of central governments (DPWH, DENR, OCD, etc.) • Others (NGOs, communities, etc.)	56
4	12 Jul. 2008	• Residents from four Barangay (“Anabu II”, “Tanzang Luma”, “Alapan” and “Bucandala”) in Municipalities of Imus • Representatives of the above four barangays • Representatives of central governments (DPWH, DENR, OCD, etc.) • Others (NGOs, communities, developers of subdivision, etc.).	62
5	30 Sep. 2008	• Same as No. 4	62
6	09 Dec. 2008	• Same as No. 4	57
Total			358

(2) Public Consultation Meeting

The Public Consultation Meeting was held eight times in order to reflect the request and suggestions of the residents to the flood mitigation plan proposed in the Study. The number of attendants for each of the meetings is 240 in total, including both of the formal and informal settlers.

Table R 6.8 Public Consultation Meeting

Name of Meeting	Data	Agenda	Place of Meeting	Number of Attendants
1st Public Consultation Meeting for Informal Dwellers	21 May 2007	Outline of the Study (Objectives, the study area and scope of the Study)	Municipality Rosario, Cavite	59
1st Public Consultation Meeting for Formal Dwellers	26 May 2007	Same as above	Municipality Rosario, Cavite	13
2nd Public Consultation Meeting for Formal Dwellers	25 Sep. 2007	Preliminary estimation on the extent of ROW and the affected families by the proposed flood mitigation plan	Municipality Rosario, Cavite	36
2nd Public Consultation Meeting for Informal Dwellers	28 Sep. 2007	Same as above	Municipality Rosario, Cavite	20
3rd Public Consultation Meeting for Formal/Informal Dwellers	10 Nov 2007	The results of the Master Plan Study	Municipality Rosario, Cavite	59
4th Public Consultation Meeting	25 Jul. 2008	Outline of the priority project component.	Municipality Imus, Cavite	13
5th Public Consultation Meeting	29 Sep. 2008	Preliminary estimation on the extent of ROW and the affected families by the priority project	Municipality Imus	21
6th Public Consultation Meeting	06 Dec. 2008	The results of the Feasibility Study	Municipality Imus	19
Total				240

(3) Pilot Project

As described in Chapter 3, the promotion of the community based flood mitigation activities were undertaken through the pilot projects in the Study. The pilot projects have the two different themes, namely (a) the clean-up drive of the waterways and (b) the effective flood warning and evacuation. The knowledge on these themes was transferred to the counterpart personnel as well as the communities and the other relevant government officials through the workshops, the field training, the indoor practices and distribution of the campaign materials (refer to subsections 3.1 and 3.2).

Chapter 7. Plan for Activation of Flood Mitigation Committee (FMC)

7.1 Organization Setup of FMC

The primary objective of the FMC is to promote the community-based flood mitigation and other activities relevant to flood mitigation at the local levels. In order to attain the objective, the FMC shall ideally include all stakeholders at the local level such as the members of the provincial and city/municipal government units, the barangays, the NGOs and the communities relevant to the proposed project in the Study Area. However, there are an extremely large number of stakeholders, and it is virtually difficult to integrate all of them as members of FMC. At the same time, a considerable part of the proposed community-based and other relevant non-structural flood mitigation programs have been already executed as the extension and/or part of the ongoing activities by the existing.

Taking the above situations into consideration, the FMC had been provisionally organized at the end of the Master Plan Study as shown in Table R. 7.1 and Fig. R. 7.1. The selected members of the FMC are the leading personnel for the community-based flood mitigation and other related flood mitigation works in the Study Area and all activities required to FMC would be able to be achieved through coordination by them.

7.2 Activities of FMC during the Study Period

The FMC had commenced a part of its activities in collaboration with the local communities and NGOs during the stage of the Feasibility Study. The activities so far undertaken by the FMC include (a) execution of the pilot projects for cleanup drive of the waterway and the flood warning and evacuation, (b) consensus building for the proposed ordinances for “On-site Flood Regulation Pond” and “Urban Growth Management” and (c) opening of the stakeholder meetings for promoting understandings of the flood mitigation project proposed in the Study. The details of these activities are as described hereinafter:

(1) Execution of Pilot Project

As described in Chapter 3, the flood hazard map was developed as a part of the pilot project, and the FMC supported the local communities for the development works. That is, the JICA Study Team had estimated the extent of the flood risk area through hydrological/hydraulic simulation, and, the FMC supported the local communities to delineate the available flood evacuation routes and evacuation centers. Both of the information from the JICA Study Team and the local government/community were integrated into the flood hazard map. Moreover, the FMC supported the local communities to participate to the map exercise and the field drill for trace of the selected flood evacuation route and evacuation centers.

The Cleanup Drive of the Waterway had been also undertaken as a part of the pilot project, and the FMC organized the participatory approach of the five municipalities and the communities in the low land area of Cavite to the actual clean up works of the waterways in the filed.

Through the above participatory approaches taken in the pilot project, the local communities could be well aware of the importance of the self-reliance and their own role for flood mitigation. At the same time, the FMC could accumulate the knowledge for organizing the community-based participatory approaches to the flood mitigation works, which need to be sustainably practiced even after completion of the Study.

Table R 7.1 Proposed Members of FMC

Designation	Personnel and Organization	Principal Role	Relevant Organizations to be Coordinated
Chairperson	Provincial Planning and Development Coordinator (PPDC)	• Coordinate and guide the overall activities of FMC • Guide the necessary control of the excessive land development • Guide the necessary conservation of the agricultural land	• Provincial Land Use Committee • PPDO • CPDO/MPDOs
Secretariat	Provincial Planning and Development Office (PPDO)	• Act as the secretariat of the FMC	•
Vice-chairperson	District Engineer of DPWH in Tress Martires City	• Assist the chairperson for coordination and guidance of the overall activities of FMC • Coordinate and implement land acquisition and construction of the proposed flood mitigation facilities • Coordinate and implement the O&M of the flood mitigation facilities	• DPWH
Member	Provincial Director of Philippine National Police (PNP)	• Coordinate and guide the flood warning and evacuation works • Coordinate and guide the control of encroachment to the river area	• PNP
Member	Head of PG-Environmental and natural Resources Office (PG-ENRO)	• Coordinate and guide the OPLAN LINIS (IEC for cleanup drive of the waterways)	• CENRO/MENROs
Member	Head of Provincial Housing and Urban Development Office	• Coordinate and implement the control of encroachment to the river area	• PHUDO • Task Force for Relocation of Informal Dwellers)
Member	Head of Provincial Engineering Office (POE)	• Coordinate and implement land acquisition and construction of the proposed flood mitigation facilities • Coordinate and implement the O&M of the flood mitigation facilities	• PEO • C/MEOs
Member	Representative from District Office of DENR in Tress Martires City	• Coordinate and guide the OPLAN LINIS (IEC for cleanup drive of the waterways) • Coordinate and guide the watershed management	• DENR
Member	Representative from District Office of NIA in Naic, Cavite	• Guide the necessary conservation of the agricultural land	• NIA
Member	Provincial Action Officer of the Gov. Service Office	• Coordinate and guide the activities relevant to flood warning and evacuation a	• PDCC • CDCC/MDCCs • BDCCs

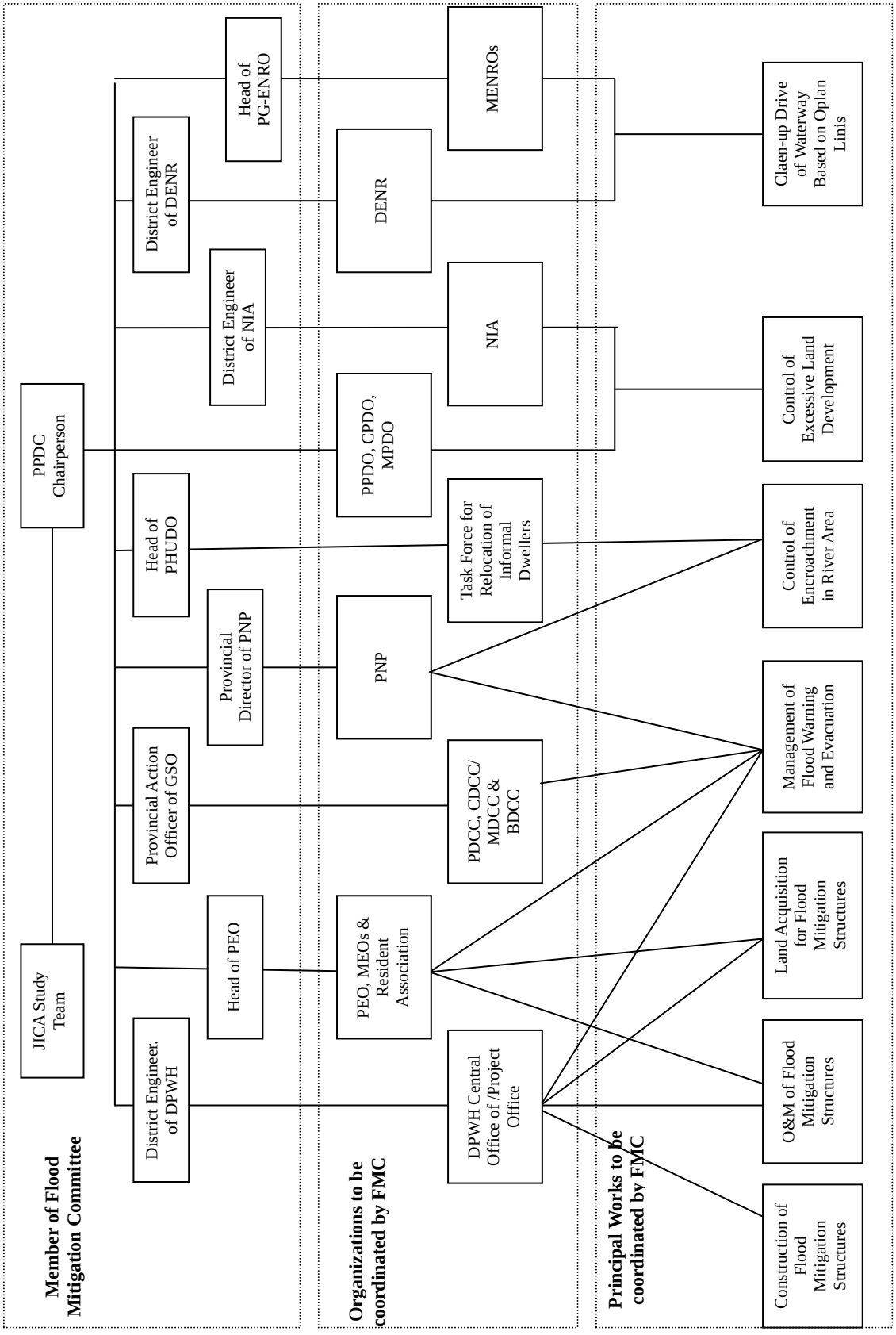


Fig. R 7.1 Proposed Organization-set up of Flood Mitigation Committee

(2) Consensus Building on the Ordinances proposed in the Study

As described in the Chapter 4, the JICA Study Team proposed two ordinances for "On-site Flood Regulation Pond" and "Urban Growth Management in order to cope with the incremental peak flood runoff discharge inflicted by the excessive land development. Enforcement of the ordinance would be achieved, only when the stakeholders such as the land use planner at the city/municipality office, the land developer and the residents could mutually understand the necessity of the ordinance. In this connection, the FMC had played an important role to arrange the dialogs and other relevant meetings, where the stakeholders could independently examine and discuss the contents of the ordinances and lead to the applicable contents of the ordinances.

(3) Opening of Public Consultation Meeting and Stakeholder Meetings

As described in Subsection 6.3, FMC arranged each of the public consultation meeting and stakeholder meeting three times during the Feasibility Study Stage in the period from May to December 2008. The attendances of the meetings are the formal/informal residents, who would be affected by the flood mitigation projects proposed in the Study, and officials of the local government. These attendances of the meetings could possess, through the meetings, the common knowledge on the issues related to the project and discuss the most effective and eligible flood mitigation measures.

7.3 Plan for Activation of FMC

7.3.1 Organization Setup

As described above, the organization setup of the FMC had been provisionally setup under the PPDC as the chairman of the FMC, and the activities of the community-based flood mitigation by FMC had been commenced during the study period.

The organization setup of the FMC is, however, deemed to be based on the initiative of the JICA Study Team and has not been adequately deliberated by the LGUs themselves. Due to such immature states of the FMC, only a few members of FMC had taken place of the activities, and many of the members are still nominal. Moreover, consent of the district office of NIA in Naic Cavite to be the member of the FMC has not been confirmed yet.

In order to improve the immature status of the organization setup, the PPDO as the chairperson as well as other members of the FMC should deliberate the necessary revision of the organization setup. It is also required to confirm the consent of the NIA in Naic, Cavite to be the members of the FMC. Executive Order on establishment of the FMC has to be further made by the Provincial Governor at the earliest opportunity.

7.3.2 Tasks of FMC

The flood mitigation works to be made at the local levels are broadly classified into (a) community-based flood mitigation works, (b) control of the excessive land development, (c) support of the resettlement for the project affected peoples and (d) enhancement of the sustainable maintenance for the flood mitigation structures of the Project.

A considerable part of the above works are actually executed as the extension of the existing entities and/or assumed as a part of the ongoing projects at the local levels as described above. For instance, the community-based cleanup of the waterways could be regarded as a part of the on-going project of the Oplan Linis" which is being implemented under initiatives of the PE-ENRO and CENROs/MENROs. The PAGASA in collaboration with the relevant LGUs also currently undertakes the community-based flood waning and evacuation for the Cavite Province including the Study Area through the financial assistance of the United Nations Development Programme (UNDP).

As for the support of the resettlement for the PAPs, the Inter-agency Resettlement Task Force (IRTF) would be organized independently from FMC, during the project construction stage, to formulate the Resettlement Action Plan (RAP) and implement it. Moreover, the operation and maintenance of the

project structures would be undertaken by the technical agencies such as DPWH and the local engineering offices.

Under the above situations, the principal roles of the FMC would be oriented to inter-agency coordination. However, the FMC may also need to take a role to take direct initiative for the flood mitigation works at the local level including holding of the stakeholder meetings, preparation of the materials for IEC and other relevant works depending on the situation. In order to achieve the roles, the FMC is required to prepare the annual coordination programs for the following items and execute them:

Table R 7.2 Tasks to be Coordinated and Promoted by FMC

Classification of Tasks	Detailed Tasks	Relevant Agencies
Community-Based Flood Mitigation Works	IEC on cleanup of waterways	PG-ENRO, CENROs and MENROs
	Development of the flood hazard map and flood warning and evacuation system in collaboration	PDCC, CDCC/s, MDCCs and BDCCs
	Management against encroachment to the river area	PHDMO, PNP
Control of Excessive Land Development	Consensus building and enactment of the two ordinances proposed in the Study, namely: the "urban development management" and "on-site flood regulation pond to be constructed in the new sub-division".	PPDC, CPDCs and MPDCs
	Revision of the Provincial Physical Framework Plan and the land use plans for each city/municipality in accordance with the concept of the urban growth management proposed in the Study	PLUC, CPDCs and MPDCs
Project Implementation for Flood Mitigation Structures	Consensus buildings of the project affected peoples (PAPs) for resettlement	PHDMO, IRTF, DPWH,
	Census survey and tagging of the PAPs	PHDMO, IRTF, DPWH
	Preparation of the resettlement site	PHDMO
	Support social rehabilitation and income restoration for the PAPs	IRTF
O&M of Project Structures	O&M of off-site flood retarding basins	DPWH
	O&M of on-site flood regulation pond	HLURB
	O&M of the river dikes	DPWH
	O&M of the inland drainage facilities and coastal dike	City and Municipal Offices

7.3.3 Budgetary Arrangement

The budgetary arrangement for the activities of FMC has not been established yet, and it is urgently required.

The necessary expenditures for the activities of the FMC would include those for: (1) open of the coordinating meetings, the public consultation meetings and other relevant meetings, and (2) preparation of the materials for IEC. Aside from these direct expenditures, the personal expenditures might be potentially incurred but it could be substantially covered by the annual budget allocated to the exiting office operating cost.

The necessary amount of the annual expenditure for the activities of the FMC is preliminarily estimated at about 760,000 pesos based on the actual expenditure incurred for implementation of the pilot project as listed in Table R 2.3. The FMC would need to seek for the available financial sources to cover such annual expenditure.

Table R 7.3 Preliminary Estimation on the Annual Expenditure for Activities of FMC

Item	Unit Cost	Volume	Cost
1. Meetings			
(1) Workshop/seminars	20, 000 peso/time	12 times	240,000 pesos
(2) Coordinative meetings	10,000 peso/time	12 times	120,000 pesos
2. Materials foe IEC			
(1) Training manual	100 pesos/volume	1000 volumes	100,000 pesos
(2) Leaflet	20 pesos/set	10,000 sets	200,000 pesos
(3) Others			100,000 pesos
Total			760,000 pesos

7.3.4 Coordinative Activities with the Relevant Agencies

As described above, the FMC would need to coordinate with a variety of agencies as well as the ongoing projects. In order to keep the close contact with those relevant entities, it is required to set up the annual schedule for the regular meetings and to assign the liaisons at the both side of FMC and the relevant entity.

Chapter 8. Evaluation and Recommendations on the Overall Study Results

8.1 Overview

The extensive flood damage by the river overflow has occurred four times in the Study Area causing the serious flood damages with death of the peoples during the recent nine years (2000 – 2008). According to the results of the hydraulic simulation, the latest flood by the Typhoon Milenyo in 2006 brought about the flood inundation area of 54km^2. The number of the houses/buildings inundated by the flood is estimated, based on the satellite image, at about 36,000 units, which is translated to 170,000 residents assuming at the average household size of 4.78 person/household. The death of 28 and missing of 18 in the flood were also confirmed by PDCC.

The Study Area also suffers from the chronic inland flood inundation due to the stagnant of storm rainfall and the tidal flood. This inland flood causes the less inundation area/depth as compared with the above river overflow flood but occurs several times every year aggravating not only the living conditions of the residents but also the regional social and economic growth. The habitual inundation area by the inland flood is estimated at about 7km2, where about 4,900 houses/buildings are located.

As described above, the Study Area is vulnerable to flood, which could be attributed to the extremely low ground elevation and the insufficient flow capacity of the river and drainage channels. In spite of the vulnerabilities to the flood, the intensive urbanization is now in progress, which leads to increment of the basin peak flood runoff discharge and expansion of the damageable assets in the flood hazard area. Moreover, the area along the downstream river stretch is densely packed with the houses, and therefore, the large-scale river channel improvement as the conventional flood mitigation measure in Philippines is hardly executed.

In order to cope with the complex factors of the flood damages, it is important to minimize the scale of the river channel improvement and maximize the basin flood detention facility. From this point of view, the comprehensive flood mitigation project is indispensable including both of the structural and non-structural project components. The implementation of the following three project components in particular is important: (a) the partial river channel improvement, (b) construction of flood retarding basins, and (c) introduction of the urban development plan. The components of items (a) and (b) are the structural measures. These are evaluated to contain the high viability, and urgently required to secure the ROW under the current intensive urbanization in the Study Area.

The component of the above item (c) is the non-structural project component measures and should be put into execution at the earliest opportunity. The LGUs would be required to establish the "Implementation Rules and Regulations" for the component and develop the institutional setup for screening/approval on the application for land development.

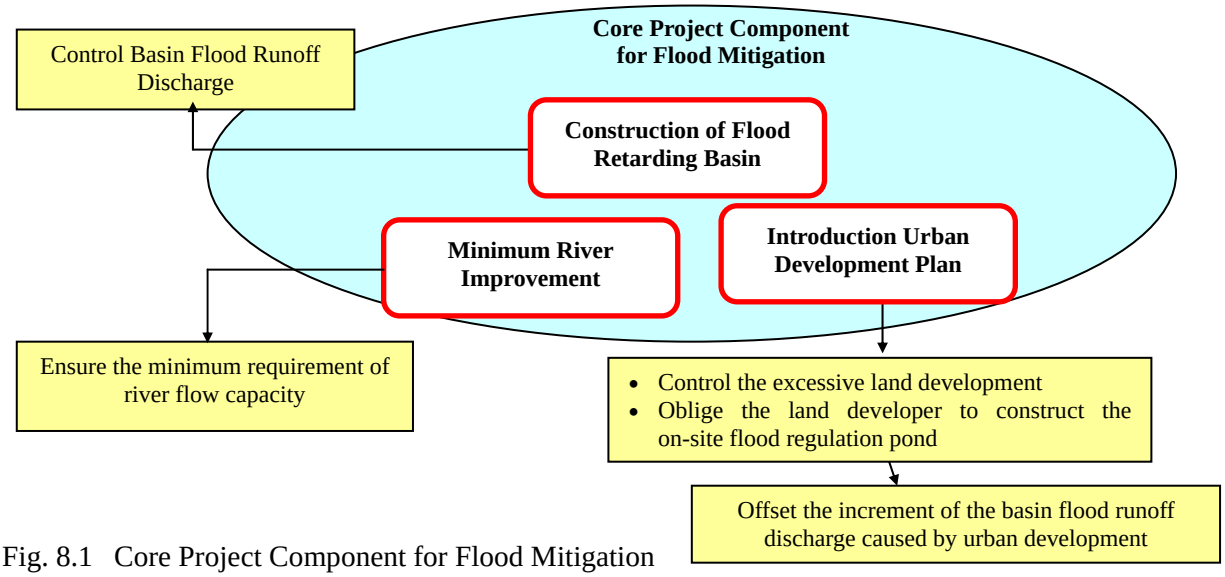


Fig. 8.1 Core Project Component for Flood Mitigation

8.2 Evaluation and Recommendation on the Structural Measures

The proposed structural project component consists of the mitigation measures for the river overflow flood and the inland flood. The proposed mitigation measures for the river overflow flood includes the construction of the off-flood retarding basins, the partial river improvement and the construction of the on-site flood regulation pond, which is to be placed at the every new-subdivision. The priority project is further addressed to construction of three flood retarding1 basins in the middle reaches of Imus river basin.

The structural component as the whole is evaluated to be economically variable, and no fetal negative impact on social and natural environment is evaluated in its implementation. The EIRR, the project construction cost and the target completion year are as summarized as below:

Table R 8.1 Principal Features of the Proposed Structural Flood Mitigation Component

Description	Unit	Entire Project	Priority Project
Project Cost (Initial Investment Cost)/1	Mi. Php.	6,858	1,845
Project Cost (O&M cost)/1	Mi. Pesos/year	37.9	4.7
Target Completion Year	A.D.	2020	2013
Number of House benefited by Flood Mitigation Project	Nos.	24,700/2	12,800/3
Number of House affected by the Project/4	Nos.	470	62
EIRR	%	22.2	26.0

Note: /1: The price contingency is excluded.
/2: The figure includes 17,700 house benefited by the project component for river overflow flood and 7,000 benefited by the component for inland flood in the entire Study Area.
/3 The figure is the number of house benefited solely by the priority project component for the river overflow of Imus River only.
/4 The figure is the number of house that shall be relocated or resettled by the entire/priority project.

8.2.1 Off-site Flood Retarding Basin

The downstream stretch of the major two rivers, namely Imus and San Juan in the Study Area has the extremely small flow capacity, which hardly copes with even the probable flood of 2-year return period. Such small channel flow capacity has been conventionally dealt with by the river channel improvement in Philippines. However, the area along the downstream stretches is densely packed with the houses, and the full-scale river channel improvement without any basin flood detention facility would require the large house relocations of more than 2,000 houses or 10,000 residents.

In order to minimize the number of house relocation and achieve the early effect of flood mitigation, construction of the off-site flood retarding basin is strongly recommended as the basin flood detention facility. The river channel improvement contributes to increment of the river flow capacity. On the other hand, the off-site flood retarding basin functions to decrease the river flow discharge by temporal detention of the flood discharge.

The proposed flood retarding basins are constructed at ten (10) sites, requiring ROW of about 200 ha. This extent for ROW is apparently large. However, the off-site flood retarding basin is not designed for exclusive use of flood mitigation but it could be used for multiple purposes. That is, the impounding area of the flood retarding basin is divided into a few zones, which have the different frequencies of impounding by their different bottom elevations. The zones are used as the flood retarding basin during the flood time, but they could be used as the farmland, the amenity spaces and other multiple uses during a non-flood time. One of the zones in particular would be designed to impound the flood only once for five years, and the more constant land use could be made.

The proposed sites of the flood retarding basin could be placed at the current non-built up area, and the land acquisition is scheduled to start in 2009. However, the present rapid expansion of the built-up area would inroad into the eligible site for the off-site flood retarding basin, and it would be more difficult to acquire the land for the project as the project implementation is delayed. Moreover, the

[1] Four sites of off-site flood retarding were proposed in the Master Plan. However, two of them were integrated into one site due to the latest land development conditions in and around the proposed difficulties in land acquisition, which were newly clarified in the Feasibility Study

off-site flood retarding basin would bring about the early flood mitigation effect within a short construction period of less than three years. Accordingly, the project implementation for the off-site flood retarding basin shall be urgently implemented as per the proposed schedule.

8.2.2 Partial River Channel Improvement

The aforesaid off-site flood retarding basin hardly protects the estuary of Imus and San Juan River against the tidal flood. Moreover, there exits several bottleneck sections along Bacoor and San Juan River, which could not get rid off the river overflow solely by the off-site flood retarding basin. Due to these reasons, the partial river improvement is required for the estuary section of about 5.4km in total and the bottleneck sections, which exist along the middle river stretch of 15.5km in total along Bacoor and Julian River.

The partial river improvement would be made through elevating of the existing dike level and/or the channel widening. These river improvement works could be minimized by construction of the off-site flood retarding basin. Moreover, unless the off-site flood retarding basin functions to reduce the peak flow discharge, the river overflow often occurs along the river improvement section, which leads to destruction of the river dike. From these viewpoints, the off-site flood retarding basin has to be the precondition of the partial river channel improvement.

8.2.3 On-site Flood Regulation Pond

The present urbanized ratio in the Study Area is 26%. As clarified in the Study, however, the future urbanization ratio in the year 2020 would have to increase to 42.7% at least, no matter what the proper land use control is made. As far as the urbanization makes progress in the upper reaches, the basin peak flood runoff discharge continues to increases.

It is virtually difficult to gradually increase the structural size of the off-site flood retarding basin to meet the said continuous increment of the basin peak runoff discharge. At the same time, the over or under-structural size of the off-site flood retarding would be made, when the structure is designed foreseeing the future increment of the peak runoff discharge under assumption of a certain extent of future urbanization ratio.

Due to the above background, construction of the on-site flood regulation pond is proposed. The on-site the regulation pond could be progressively constructed in accordance with expansion of the urbanization and therefore it could properly offset the increment of the peak runoff discharge inflicted by the urbanization.

In order to materialize the construction of the on-site flood regulation ponds, proposed is an ordinance, which imposes the construction works to the developer of the subdivision. The concept of this ordinance is the new approach in Philippines, and the proposed ordinance has not been legislated yet due to difficulties in building the consensus of the stakeholders. Nevertheless, the ordinance on the on-site flood regulation pond has been widely adopted as the local regulations in Japan, and the great effect of the on-site flood regulation pond has been confirmed through enforcement of the ordinance.

The urbanization without countermeasure against the incremental peak flood runoff discharge would certainly cause the dynamic aggravation of the flood conditions in the Study Area, and the early enforcement of the on-site flood regulation pond is strongly recommended.

8.2.4 Inland Drainage Improvement

In addition to the aforesaid three structural measures against the river overflow flood, the inland drainage improvement for the municipalities along the coast is raised as one of the key issues. Municipality of Kawit in particular pressingly wishes to construct the structure to prevent the low-lying area from inundating by the tidal flood.

The inland drainage improvement works have to be made in the existing densely populated area, which lead to the huge project investment cost of more than 6,300 million pesos and large number of house relocations of more than 300 houses. Due to the conditions, the works require the longer project implementation period and show the EIRR of less than 6%.

Taking the above huge project cost, large number of house relocations and low value of EIRR, the design scale for drainage improvement is set at 2-year return period as the minimum requirement, and the proposed improvement works are limited to the following priority/critical items.

(1) Coastal dike together with the tidal gate against the tidal flood for Municipality of Kawit,

(2) Flap gates at the downstream end of the drainage channel to check reverse flow from the sea or rivers for Municipalities of Bacoor, Imus, Kawit, Noveleta, and Rosario,

(3) Improvement of existing drainage channels and construction of new drainage channels for Imus and Kawit Municipalities, and

(4) Construction of new interceptor together with the flood regulation pond for Imus, Kawit Noveleta and Rosario.

8.3 Evaluation and Recommendation on the Non-structural Project Component

The objectives of the proposed non-structural project component include a variety of program such as control of the excessive land use control, IEC for cleanup of waterways, promotion of the community-based flood warning and evacuation, and management of the river area. The major part of objectives is to be undertaken by the LGUs, and the establishment of the Flood Mitigation Committee (FMC) is recommended to take initiatives for execution of the proposed non-structural programs.

The non-structural project component could bring about the early effect of flood mitigation with less cost of implementation as compared with the structural project components, and at the same time, they could contribute to a certain range of flood mitigation effect for every scales of flood. From the points of view, execution of the non-structural project component is recommended and a part of it had been made during the study period.

8.3.1 Control of Excessive Land Development

The plan of land use control possesses two main themes, namely the urban growth management and the adaptation of the on-site flood regulation pond for each of the new subdivision. The urban growth management aims at ensuring the urban growth boundary, which contribute to preventing of the increment of the basin flood runoff discharge and preserving the necessary farming land. In order to achieve the urban growth management, the following items are recommended:

(1) The urbanized area by the year 2020 should be limited to 46% of the entire Study Area,

(2) The urban growth boundary shall be established in order to set the “Urban Promotion Zone”, where the above urbanization is positively made. However, the urbanization shall be strictly controlled in other areas.

(3) The LGUs adopts the zoning for mix land use, whereby the residential area, the commercial area and the industrial area are intermingled in the above UPZ. Instead of such mixed land use, the exclusive land use for each of the residential, commercial and industrial area shall be promoted.

(4) The LGUs shall revise their present land use plan (CLUP) and the provincial physical framework plan (PPFC) in accordance with the above items (1) to (3).

The concept of the on-site flood regulation pond to be constructed at each of the subdivision is also indispensable to cope with the increment of the peak flood runoff discharge from the new subdivision as described above.

The ordinances both for the above urban growth management and the on-site flood regulation pond had been prepared through the Study. However, its legislative works are still in progress, and the consensus buildings with the stakeholders are further required for early enforcement of the ordinances. Moreover, the LGUs are required to prepare the “Implementation Rules and Regulations” for the ordinances and establish the institutional setup for screening/approval on the application for land development. In order to achieve this requirement to LGUs, the further technical assistance from JICA is deemed to be necessary, as proposed by the Provincial Government of Cavite.

8.3.2 Community-based Flood Mitigation

The community based flood mitigation is oriented to two themes, name: (1) Information and Education Campaign (IEC) for cleanup of the waterways and (2) promotion of the community-based flood warning and evacuation.

The IEC for cleanup of the waterway is important to refrain the illegal dumping into the river channel and the drainage channels so as to maintain the required channel flood flow capacity and at the same time to preserve the appropriate river environment. The promotion of the community-based flood warning and evacuation is also indispensable to support the residents for evacuate from the extra-ordinary flood.

The pilot projects for the above two theme had been executed in collaboration with the relevant local government agencies, the NGOs, the residents and the JICA Study Team. The relevant training materials and the guideline together with the prototype of the flood hazard maps were developed as the products of the pilot project and distributed to the residents and the government officials. The workshop and the field trainings were also undertaken through the pilot projects to diffuse the knowledge on the community-based flood mitigation.

The practices examined in the pilot project projects have to be made repeatedly and expanded to the wider range of the residents. From this point of view, the LGUs are recommended to continue the practices even after completion of the Study. The initiative of the FMC in particular would be the key issue to lead to the sustainable practices for the community-based flood mitigation. Moreover, the further technical assistance would be preferable for development of hazard map in particular as proposed by the Provincial Government of Cavite.

8.3.3 Management of River Area

The Presidential Decree No. 1067 prescribes that the water body of the river and a certain width of the river corridor along the water body shall be designated as the river area, and any illegal construction and land use in the designated river area are prohibited. However, the width of the water body is changeable, which lead to uncertainties of the boundary of the river area. As the results, the current management of the river area is deemed to be nominal and the intensive encroachment to the river corridor is in progress.

Under the above conditions, the management of the river area is strongly recommended to refrain the present intensive encroachment to the river area and to keep the appropriate river flow conditions and all other river environment. In order to materialize the management of the river area, it is also recommended to develop the database on the updated land use status of the river area.

The format of the database together with data input for management of Imus River had been provisionally made in the Study. The FMC is required to make initiative to appoint the implementing agency to undertake the further development of the database. The early commence of the river area management shall be also made including establishment of the river area boundary, the river patrol system, control of the illegal activities in the river area and all other works relevant to the management.

8.3.4 Activation of Flood Mitigation Committee

The LGUs have to take the important role for promotion of the community-based flood mitigation, consensus building of the residents on the project implementation and other relevant activities, which shall be undertaken by the LGUs. The FMC had been preliminarily established as the coordinating bodies for the said activities of the LGUs during the study period and a part of the community-based flood mitigation had been commenced by FMC in collaboration with the JICA Study Team. The organization setup of the FMC is, however, based on the recommendations by the Study Team and has not been adequately deliberated by the LGUs themselves. Due to such immature status of the FMC, only a few members of FMC had taken place the activities and other many of members are still nominal.

The LGUs shall review on the existing organization setup of the FMC and attain the Execution Order together with the budgetary arrangement for establishment and sustainable activities of the FMC at the earliest opportunity.

8.4 Recommendation on the Project Execution Body

The works for the structural project components as proposed in the above subsections 8.2 are such as construction of the off-site flood retarding basin, the river channel improvement, and construction of inland drainage facilities together with coastal dike. Development of these infrastructures would require the project cost of several billion pesos, and the eligible project implementation body for them has to be addressed solely to DPWH judging from budgetary affordability for such large-scale infrastructure project.

DPWH would be required to undertake construction for all proposed flood mitigation structures except the on-site flood regulation pond, which is subject to obligation of land developer. Undertakings of DPWH would include, in principal, land acquisition and house relocation required to the construction works.

However, the LGUs shall take the supportive works for land acquisition including identification of the project affected persons (PAPS), consensus building of the PAPs for relocation, preparation of the relocation site, and support of the social rehabilitation/income rehabilitation for the PAPS.

The LGUs are also requested to undertake the aforesaid non-structural flood mitigation works, which include the control of the excessive land development, the IEC for cleanup of waterways, the community-based flood warning and evacuation, and all other community-based flood mitigation works.

8.5 Recommendation on Environmental and Social Consideration

The overall flood mitigation plan proposed in the Master Plan Study would require house relocation of 470 families on the premises of the target project completion year of 2020. In order to achieve such large-scale resettlement, the relocation action plan (RAP) has to be formulated and implemented without delay in accordance with “the Land Acquisition, Resettlement and Indigenous Peoples Policy of the Department of Public Works and Highways (DPWH)”. In execution of the RAP, the operation for “Census survey-cum-structure Tagging (C/T)” shall be performed to identify the PAPs and refrain the illegal settlers encroaching to the project site.

The overall flood mitigation plan also requires cleanup of the existing mangrove forest with an extent of about 4.1 hectors due to river channel improvement round the estuary and construction of the coastal. In order to mitigate the impact to the mangrove forest, it is required to formulate the plan to transplant and/or regenerate the mangrove forest and implement the plan.

Of the project components in the overall flood mitigation plan, construction of the three off-site flood retarding basins is selected as the priority project component and targeted to complete by 2013. The number of families to be relocated by the project is limited to twelve (12) families. LGUs in collaboration with the NGOs shall properly formulate and implement the RAP even for such small number of the families to be relocated. It is herein noted that the priority project would not affect any mangrove forest and other rare fauna/flora.

8.6 Implementation Program

The overall project is divided into the structural project component and the non-structural component. The structural project component is further classified into the priority project (or the short-term project) and the long-term project. The priority project is proposed to complete by the target year of 2013, while the long-term project by 2020.

Several programs are proposed under the above project component, and some of them including execution of the pilot projects and the capacity buildings had been executed during the Study Period. A particular attention is also given to the community based flood warning and evacuation, which is being executed by PAGASA with the financial assistance from UNDP.

In addition to the above project to be implemented by 2020, the adaptations of the structural and non-structural flood mitigation measures for climate changes were conceived in the Study (refer to Vol.3 Adaptations to Climate Changes).

The execution period as well as the necessity of the foreign technical/financial assistance for each of the above project and/or adaptation for the climate changes is proposed taking the project cost required and the validity of the foreign technical assistance into account as shown below:

Table R 8.2 Overall Project Implementation Program

Scheme	Execution Period	Foreign Assistance*	Present States
I. Program for Flood Mitigation before 2020			
1. Structural Project Component			
1.1 Priority Project (Short Term Project)			
(1) Imus Flood Retarding Basin (RB-I1)	2010-2013	Required	Proposed
(2) Bacoor Flood Retarding Basin (RB-B4))	2010-2012	Required	Proposed
(3) Julian Flood Retarding Basin (RB-J1)	2010-2013	Required	Proposed
(4) Compensation	2010-2012	-	Proposed
1.2 Long Term Project			
(1) Partial River Improvement for Imus, Bacoor and Julian	2014-2018	Required	Proposed
(2) Imus Flood Retarding Basins (RB-B1, B2, B3)	2013-2016	Required	Proposed
(3) Partial River Improvement for San Juan and Ylang-Ylang	2015-2019	Required	Proposed
(4) San Juan Flood Retarding Basins (RB-S1, Y1, Y2)	2017-2020	Required	Proposed
(5) Inland Drainage Improvement	2011-2019	Required	Proposed
(6) Compensation	2011-2018	-	Proposed
2. Non-structural Project Component			
2.1 IEC on Cleanup of Waterways			
(1) Pilot Project	2007-2008	Required	Completed
(2) Expansion Program	2009-Onward	-	Projected
2.2 Land Use Control			
(1) Legislation of Ordinances for Urban Growth Management	2007-2009	-	On-going
(2) Legislation of Ordinance for On-site Flood Regulation Pond	2007-2009	-	On-going
(3) Review of CLUP	2007-2010	-	On-going
(4) Review of PPFP	2009-2010	-	Proposed
(6) Organizational and Human Resource Development by Study Team	2007-2008	Required	Completed
(7) Organizational and Human Resource Development by the LGUs	2009-Onward	-	Proposed
2.3 Management of River Area			
(1) Establishment of Boundary for River Area	2008-2009	-	Proposed
(2) Development of Database of River Area	2008-2010	-	Proposed
(3) Formulation and Execution of the Management Plan	2009-Onward	-	Proposed
2.4 Community-based Flood Warning and Evacuation			
(1) Setup of Local Disaster Coordinating Council	2007-2009	-	On-going
(2) Formulation of Calamities and Disaster Preparedness Plan	2007-2009	-	On-going
(3) Establishment of Disaster Operation /Evacuation Centers	2008-2009	-	On-going
(4) Development of Flood Hazard Map	2008-Onward	Required	On-going
(5) Development of Hydrological Gauging Network	2008-2010	Required	On-going
(6) Training for Flood Warning and Evacuation	2007-Onward	Required	On-going
II. Program of Adaptation for Climate Changes after 2020			
1. Structural Measure			
1.1 Expansion of the off-site food retarding basins	Indefinite	Required	Conception
1.2 Expansion of the drainage network for eastern drainage area	Indefinite	Required	Conception
1.3 Construction of drainage pump in Kawit Municipality	Indefinite	Required	Conception
1.4 Noveleta、Rosario、Tanza地区への海岸堤の延長	Indefinite	Required	Conception
2. Non-structural Measure			
2.1 Establishment of a monitoring and execution body for climate changes	2021		Conception
2.2 Revision of the ordinances for Urban Growth Management (Review on the zoning for urban development)	Indefinite	Required	Conception
2.3 Redefinition of the river area boundary and readjustment of the land use in the river area	Indefinite	Required	Conception
2.4 Strengthening of the flood warning and evacuation system	Indefinite	Required	Conception

*: Include the technical and financial assistance

Tables

Table 2.1(1) Simulation Result of Flood Retarding Basin

Imus River

Basin	River	Code of Retarding Basin	Available Area (has)	Overflow Weir Sta. No Length	Surrounding Dike	Chainage of connecting Point in MIKE11	RB Bed Level	Crest Level	2-yr				5-yr			
									Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB	Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB
Imus	Imus	RB-I1 (M/P)	40.0	12+750 L=100m	EL+32.0	150.0	24.50	27.80	28.42	26.69	2.19	0.88	28.67	28.34	3.84	1.54
Imus	Imus	RB-I2_02	35.0	9+450 L=100m	EL+18.0	3450.0	8.68	11.98	12.42	9.40	0.72	0.25	12.79	11.54	2.86	1.00
Imus	Imus	RB-I2_05	35.0	9+450 L=45m	EL+18.0	3450.0	8.68	11.25	12.19	10.04	1.36	0.48	12.70	12.12	3.44	1.20

Basin	River	Code of Retarding Basin	Available Area (has)	Overflow Weir Sta. No Length	Surrounding Dike	Chainage of connecting Point in MIKE11	RB Bed Level	Crest Level	10-yr				20-yr			
									Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB	Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB
Imus	Imus	RB-I1 (M/P)	40.0	12+750 L=100m	EL+32.0	150.0	24.50	27.80	28.84	28.80	4.30	1.72	29.31	29.31	4.81	1.92
Imus	Imus	RB-I2_02	35.0	9+450 L=100m	EL+18.0	3450.0	8.68	11.98	13.02	12.84	4.16	1.46	13.70	13.70	5.02	1.76
Imus	Imus	RB-I2_05	35.0	9+450 L=45m	EL+18.0	3450.0	8.68	11.25	13.02	12.91	4.23	1.48	13.66	13.66	4.98	1.74

Note: under 2020 landuse w/ on-site Regulation Pond

Table 2.1(2) Simulation Result of Flood Retarding Basin

Bacoor River

Basin	River	Code of Retarding Basin	Available Area (has)	Overflow Weir Sta. No Length	Surrounding Dike	Chainage of connecting Point in MIKE11	RB Bed Level	Crest Level	2-yr				5-yr			
									Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB	Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB
Imus	Bacoor	RB-B4 (M/P)	12.0	7+800 L=25m	EL+9.5	-200.0	5.00	7.45	9.00	8.75	3.75	0.45	9.75	9.75	4.75	0.57
Imus	Bacoor	RB-B4_01	7.0	8+150 L=25m	EL+10.4	-550.0	3.00	8.35	9.61	9.36	6.36	0.45	10.67	10.67	7.67	0.54

Basin	River	Code of Retarding Basin	Available Area (has)	Overflow Weir Sta. No Length	Surrounding Dike	Chainage of connecting Point in MIKE11	RB Bed Level	Crest Level	10-yr				20-yr			
									Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB	Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB
Imus	Bacoor	RB-B4 (M/P)	12.0	7+800 L=25m	EL+9.5	-200.0	5.00	7.45	10.23	10.23	5.23	0.63	10.65	10.65	5.65	0.68
Imus	Bacoor	RB-B4_01	7.0	8+150 L=25m	EL+10.4	-550.0	3.00	8.35	11.21	11.21	8.21	0.57	11.73	11.73	8.73	0.61

Note: under 2020 landuse w/ on-site Regulation Pond

Table 2.1(3) Simulation Result of Flood Retarding Basin

Julian River

Basin	River	Code of Retarding Basin	Available Area (has)	Overflow Weir Sta. No Length	Surrounding Dike	Chainage of connecting Point in MIKE11	RB Bed Level	Crest Level	2-yr				5-yr			
									Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB	Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB
Imus	Julian (IT-1)	RB-J2	11.0	5+400 L=50m	EK+16.75	4575.0	12.25	14.25		16.30	4.05	0.45		16.84	4.59	0.50
Imus	Julian (IT-1)	RB-J1R (M/P)	5.3	2+500 L=50m	EL+10.0	7500.0	3.50	5.50	5.83	5.63	2.13	0.11	7.05	7.05	3.55	0.19
Imus	Julian (IT-1)	RB-J1R _02	11.0	2+900 L=50m	EL+10.0	7100.0	3.50	6.60	7.40	5.86	2.36	0.26	7.66	7.48	3.98	0.44

Basin	River	Code of Retarding Basin	Available Area (has)	Overflow Weir Sta. No Length	Surrounding Dike	Chainage of connecting Point in MIKE11	RB Bed Level	Crest Level	10-yr				20-yr			
									Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB	Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB
Imus	Julian (IT-1)	RB-J2	11.0	5+400 L=50m	EK+16.75	4575.0	12.25	14.25								
Imus	Julian (IT-1)	RB-J1R (M/P)	5.3	2+500 L=50m	EL+10.0	7500.0	3.50	5.50	7.65	7.65	4.15	0.22	8.17	8.17	4.67	0.25
Imus	Julian (IT-1)	RB-J1R _02	11.0	2+900 L=50m	EL+10.0	7100.0	3.50	6.60	8.04	8.04	4.54	0.50	8.59	8.59	5.09	0.56

Note: under 2020 landuse w/ on-site Regulation Pond

Table 2.1(4) Simulation Result of Flood Retarding Basin

Left Tributary of Julian River

Basin	River	Code of Retarding Basin	Available Area (has)	Overflow Weir Sta. No Length	Surrounding Dike	Chainage of connecting Point in MIKE11	RB Bed Level	Crest Level	2-yr				5-yr			
									Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB	Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB
Imus	IT-2	RB-J1L (M/P)	8.8	3+000 L=50m		1650 at IT-2up	3.50	4.75	5.03	4.12	0.62	0.05	5.11	4.85	1.35	0.12
Imus	IT-2	RB-J1L _01	4.0	3+400 L=50m	EL+10.0	1250 at IT-2up	3.50	6.00	6.26	4.75	1.25	0.05	6.35	6.15	2.65	0.11
Imus	IT-2	RB-J1L _06	4.0	3+400 L=30m	EL+10.0	1250 at IT-2up	3.50	5.78	6.18	5.27	1.77	0.07	6.29	6.29	2.79	0.11

Basin	River	Code of Retarding Basin	Available Area (has)	Overflow Weir Sta. No Length	Surrounding Dike	Chainage of connecting Point in MIKE11	RB Bed Level	Crest Level	10-yr				20-yr			
									Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB	Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB
Imus	IT-2	RB-J1L (M/P)	8.8	3+000 L=50m	0.00	1650 at IT-2up	3.50	4.75	5.10	5.10	1.60	0.14	5.35	5.35	1.85	0.16
Imus	IT-2	RB-J1L _01	4.0	3+400 L=50m	EL+10.0	1250 at IT-2up	3.50	6.00	6.45	6.45	2.95	0.12	6.74	6.74	3.24	0.13
Imus	IT-2	RB-J1L _06	4.0	3+400 L=30m	EL+10.0	1250 at IT-2up	3.50	5.78	6.56	6.56	3.06	0.12	6.84	6.84	3.34	0.13

Note: under 2020 landuse w/ on-site Regulation Pond

Table 2.2 Comparative Table for Structural Consideration of Overflow Dike

	Asphalt Facing	Concrete Facing	Concrete Block Facing	Gabion Type Facing
Reference Photo				
Concept/General	Overflow Dike of which surface is covered with Asphalt pavement.	Overflow Dike of which surface is covered with Concrete pavement.	Overflow Dike of which surface is covered with Connected Concrete-blocks.	Overflow Dike of which surface is covered with special gabion mattress (wire: 4-8mm dia).
Track Experiences	Many (A)	Many (A)	Many (A)	Many (B)
Control Force for Design	Up-lift Force (B)	Up-lift Force (B)	Grouted(Wet Masonry): Up-lift Dry Masonry : Tractive Force (B)	Tractive Force by Flow on Dike (B)
Acceptance to Irregular Sinking	this type has a certain flexibility. (B)	Due to no flexibility, very vulnerable to irregular sinking (C)	Grouted(Wet Masonry): very vulberable (C) Dry Masonry:ceratain flexibility(A)	Suface can follow change of sub-soil consolidation (A)
Daily Maintenance	It is easy to maintain dikes since volume of garbage and debris are few due to smooth surface (A)	It is easy to maintain dikes since volume of garbage and debris are few due to smooth surface. Required to repair joints. (B)	a certain frequency for cleaning activities are required since debris and garbages are liable to lodge on surface. (B)	frequent cleaning activities are required since debris and garbages are very liable to lodge on surface. (C)
O&M Activity in Emergency	On the occurrence of a crack on the surface, it is required to repair it immediately.	On the occurrence of a crack on the surface, it is required to repair it immediately.	On the occurrence of a irregular settlement, it is required to repair it immediately.	When wires of gabion are damaged, damaged gabions shall be replaced.
Environmental and Sceanery	Artificial black color by asphalt stands out in contrast to scenery.	People receive the impression that white structure is quite artificial by concrete surface.	People receive the impression that white structure is quite artificial by concrete surface.	Spogy and multiphase surface by natural stones interact with surrounding scenery.
Other Remarks	It is necessary to install air release pipes and drain pipes for counter measure against uplift.	It is necessary to install air release pipes and drain pipes for counter measure against uplift.	Wet Stone Masonry Type: It is necessary to install air release pipes and drain pipes for counter measure against uplift.	it is required to secure large amount of cobble stones.
	To secure workability of asphalt work, it is required to construct slope of dike at gentle gradient (less than	Worlability is inferior to other alternatives.	Dry Stone Masonry Type: It is necessary to give consideration to saction of base soil.	It is necessary to pay adequate attention to saction of subsoil.
Economic Aspect	1.0 (as Basic Cost for Comparison)	1.2	1.3 - 1.5	1.2 - 1.5
Evaluaion	As for initial construction cost, Asphalt facing type is the lowest cost alternative for 4 alternatives. In addition, it is easy to maintain the dike since less frequent cleaning acitivity is required. However, Asphalt facing type requires 1): to take the most expensive cost for repair when dike is damaged, 2) the special maintenance activity for air release and drain pipes, and 3): no elasticity for gradinent of cross sectional slope of dike. In this connection, Gabion facing type is selected as the most suitable type of overflow dike for three retarding basin by the following reasons; A): expected maintenance and repair costs can be minimized including easy maintenance items, B): exterior view doesn't give surrounding area some discomfort sense. (A:Superior, B:Fair, C:Inferior)			

Table 2.3 Comparative Table for Structural Alternatives of Stilling Basin

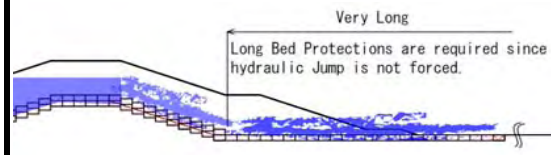
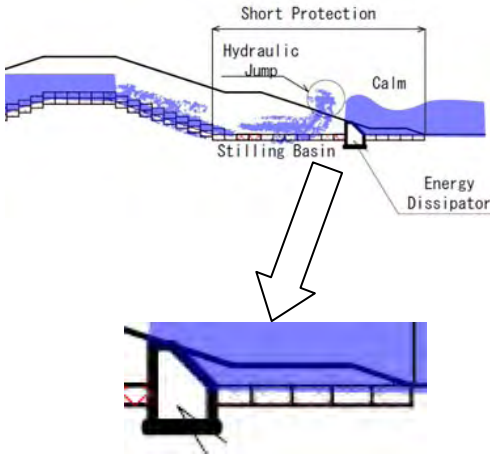
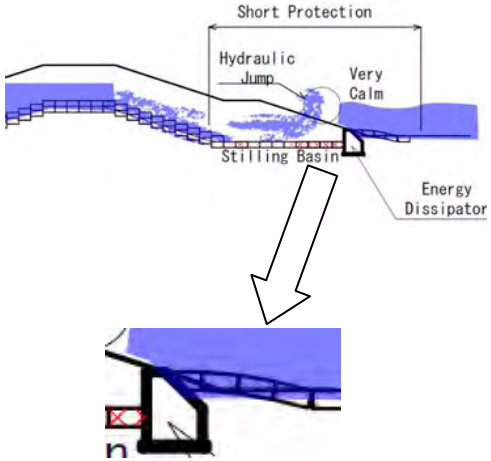
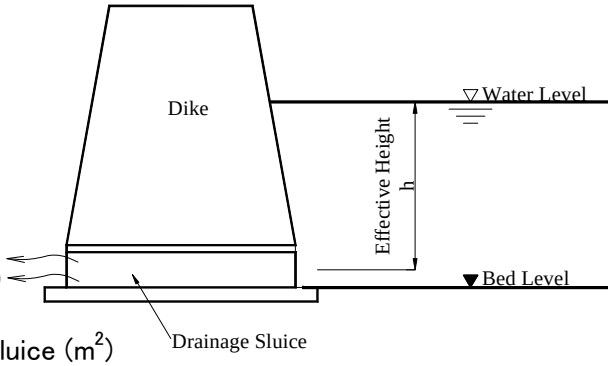
Item	Alternative-A: Bed Protection Independent Structure	Alternative-B: Bed Protection with Projected End Sill	Alternative-C: Bed Protection with Mounded End Sill
Conceptual Cross Section			
Area of Bed Protection	Long : (C)	Short : (A)	Short : (A)
Cost of Bed Protection	High : (C)	Low : (A)	Low : (A)
Flow Condition in Basin	Sharrow and High : (C)	Deep and Calm : (B)	Deep and Calm : (A)
Evaluation	Not Applicable : (C)	Applicable : (B)	Suitable : (A)

Table 2.4 Discharging Calculation of Drainage Sluice in Retarding Basins

Basic Formula for Drainage

$$Q = C \cdot A \cdot \sqrt{2 \cdot g \cdot h}$$

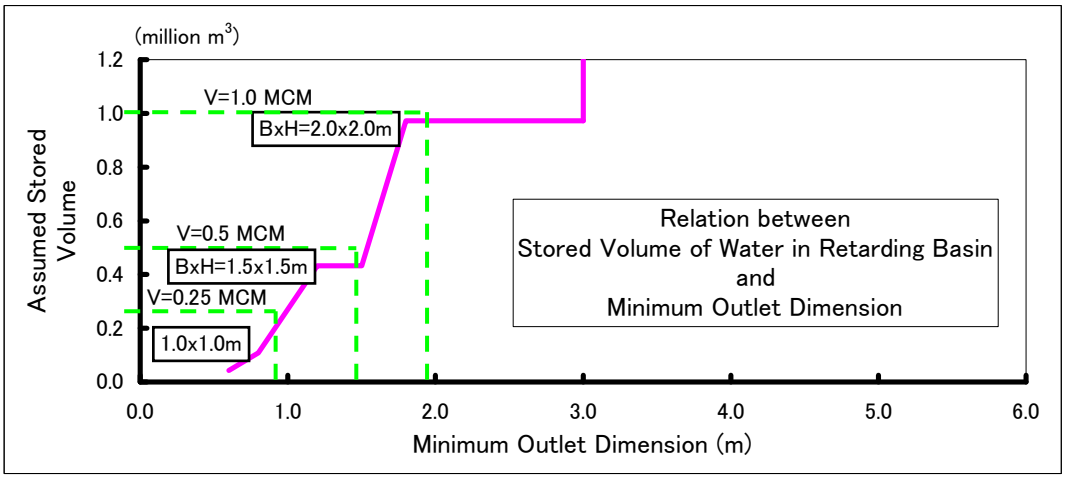


where,

Q : Drainage Discharge (m^3/s)
C : Coefficient of Orifice
A : Cross Sectional Area of Sluice (m^2)
h : Effective Height from Center of Sluice to Water Level (m)

Calculation Sheet

Case	Assumed Effective Height	Assumed Stored Volume	Assumed Suface Area	Outlet Dimension		Max. Outlet Discharge	Discharging Time
	h [m]	[m^3]	[ha]	B [m]	H [m]	Q [m^3/s]	[hour]
1	0.2	43,200	21.60	0.6	0.6	1.13	11.33
2	0.7	108,000	15.43	0.8	0.8	2.28	15.00
3	3.2	432,000	13.50	1.2	1.2	7.75	21.33
4	2.2	432,000	19.64	1.2	1.2	6.73	23.33
5	1.2	432,000	36.00	1.5	1.5	8.35	18.00
6	0.7	432,000	61.71	1.5	1.5	7.20	19.67
7	0.2	432,000	216.00	1.5	1.5	5.83	22.00
8	3.2	972,000	30.38	1.8	1.8	16.78	23.17
9	2.2	972,000	44.18	1.9	1.9	15.90	23.67
10	1.2	972,000	81.00	2.1	2.1	15.05	23.83
11	0.7	972,000	138.86	2.3	2.3	14.40	24.00
12	0.2	972,000	486.00	3.0	2.5	13.36	23.33
13	2.2	1,728,000	78.55	3.0	2.5	31.18	23.50
14	1.2	1,728,000	144.00	3.6	2.5	28.79	23.67
15	0.7	1,728,000	246.86	4.2	2.5	27.19	23.50
16	0.2	1,728,000	864.00	5.0	2.2	22.63	23.50



Required Dimension of Drainage Sluice for Retarding Basins

Retarding Basin	Effective Height	Regulated Volume	Required Area	Outlet Dimension		Max. Outlet Discharge	Discharging Time
	H_E	VR	A_R	B_O	H_O	Q_{OM}	T_D
	m	m^3	ha	m	m	m^3/s	hour
Imus	7.02	1,500,000	21.40	2.0	2.0	26.07	27.00
Bacoor	6.86	450,000	6.60	1.0	1.0	6.70	34.17
Julian(J1_R)	3.81	460,000	12.07	1.2	1.2	6.85	31.00
Julian(J1_L)	2.65	110,000	4.15	1.0	1.0	3.89	12.33

Table 2.5 Project Cost (Including Contingencies)

Objective	Cost (million Philippine Peso)			Remarks	
All Retarding Basins	L/C Portion	F/C Portion	Total		
Construction Cost	326	506	832		
Compensation Cost	644	0	644		
Administration Cost	15	0	15		
Engineering Service Cost	53	80	133		
Physical Contingency	51	29	80		
Price Contingency	234	45	278		
Subtotal	1,323	660	1,982		
Tax and Duties	138	0	138		
Grand Total	1,460	660	2,120		

Table 2.6 Project Cost (Excluding Contingencies)

Objective	Cost (Philippine Peso)			Remarks	
Imus Retarding Basin	L/C Portion	F/C Portion	Total		
Construction Cost (Construction Base Cost)	*141,082,000*	*234,325,000*	*375,407,000*		– (A)
Estimated Direct Cost + OPC	130,633,000	216,969,000	347,602,000		
Mobilization & Demobilization	1,306,000	2,169,000	3,475,000	1.0%	of Estimated Direct Cost
Contractor's Facilities and Activities	2,612,000	4,339,000	6,951,000	2.0%	of Estimated Direct Cost
Temporary Work	6,531,000	10,848,000	17,379,000	5.0%	of Estimated Direct Cost
Compensation Cost (Base Cost)	*313,150,000*	*0*	*313,150,000*		– (B)
House Relocation & Livelihood Support	1,150,000		1,150,000		
Land Acquisition	312,000,000		312,000,000		
Administration Cost (Base Cost)	*6,885,000*		*6,885,000*	1.0%	of (A) + (B)
Engineering Service Cost (Base Cost)	*24,025,000*	*36,038,000*	*60,063,000*		– (C)
Detailed Design Engineering	9,009,000	13,514,000	22,523,000	6.0%	of (A)
Supervision	15,016,000	22,524,000	37,540,000	10.0%	of (A)
Tax and Duties	*52,257,000*		*52,257,000*	12.0%	of (A) + (C)
Total	***537,399,000***	***270,363,000***	***807,762,000***		

Objective	Cost (Philippine Peso)			Remarks	
Bacoor Retarding Basin	L/C Portion	F/C Portion	Total		
Construction Cost (Construction Base Cost)	*67,861,000*	*90,580,000*	*158,441,000*		– (A)
Estimated Direct Cost + OPC	62,836,000	83,872,000	146,708,000		
Mobilization & Demobilization	628,000	838,000	1,466,000	1.0%	of Estimated Direct Cost
Contractor's Facilities and Activities	1,256,000	1,677,000	2,933,000	2.0%	of Estimated Direct Cost
Temporary Work	3,141,000	4,193,000	7,334,000	5.0%	of Estimated Direct Cost
Compensation Cost (Base Cost)	*102,100,000*	*0*	*102,100,000*		– (B)
House Relocation & Livelihood Support	2,100,000		2,100,000		
Land Acquisition	100,000,000		100,000,000		
Administration Cost (Base Cost)	*2,605,000*		*2,605,000*	1.0%	of (A) + (B)
Engineering Service Cost (Base Cost)	*10,139,000*	*15,209,000*	*25,348,000*		– (C)
Detailed Design Engineering	3,802,000	5,703,000	9,505,000	6.0%	of (A)
Supervision	6,337,000	9,506,000	15,843,000	10.0%	of (A)
Tax and Duties	*22,055,000*		*22,055,000*	12.0%	of (A) + (C)
Total	***204,760,000***	***105,789,000***	***310,549,000***		

Objective	Cost (Philippine Peso)			Remarks	
Julian Retarding Basin	L/C Portion	F/C Portion	Total		
Construction Cost (Construction Base Cost)	*117,373,000*	*181,035,000*	*298,408,000*		– (A)
Estimated Direct Cost + OPC	108,680,000	167,626,000	276,306,000		
Mobilization & Demobilization	1,086,000	1,676,000	2,762,000	1.0%	of Estimated Direct Cost
Contractor's Facilities and Activities	2,173,000	3,352,000	5,525,000	2.0%	of Estimated Direct Cost
Temporary Work	5,434,000	8,381,000	13,815,000	5.0%	of Estimated Direct Cost
Compensation Cost (Base Cost)	*228,650,000*	*0*	*228,650,000*		– (B)
House Relocation & Livelihood Support	4,650,000		4,650,000		
Land Acquisition	224,000,000		224,000,000		
Administration Cost (Base Cost)	*5,270,000*		*5,270,000*	1.0%	of (A) + (B)
Engineering Service Cost (Base Cost)	*19,097,000*	*28,646,000*	*47,743,000*		– (C)
Detailed Design Engineering	7,161,000	10,742,000	17,903,000	6.0%	of (A)
Supervision	11,936,000	17,904,000	29,840,000	10.0%	of (A)
Tax and Duties	*41,539,000*		*41,539,000*	12.0%	of (A) + (C)
Total	***411,929,000***	***209,681,000***	***621,610,000***		

Objective	Cost (Philippine Peso)			Remarks	
All Retarding Basins	L/C Portion	F/C Portion	Total		
Construction Cost (Construction Base Cost)	*326,316,000*	*505,940,000*	*832,256,000*		– (A)
Estimated Direct Cost + OPC	302,149,000	468,467,000	770,616,000		
Mobilization & Demobilization	3,020,000	4,683,000	7,703,000	1.0%	of Estimated Direct Cost
Contractor's Facilities and Activities	6,041,000	9,368,000	15,409,000	2.0%	of Estimated Direct Cost
Temporary Work	15,106,000	23,422,000	38,528,000	5.0%	of Estimated Direct Cost
Compensation Cost (Base Cost)	*643,900,000*	*0*	*643,900,000*		– (B)
House Relocation & Livelihood Support	7,900,000		7,900,000		
Land Acquisition	636,000,000		636,000,000		
Administration Cost (Base Cost)	*14,760,000*		*14,760,000*	1.0%	of (A) + (B)
Engineering Service Cost (Base Cost)	*53,261,000*	*79,893,000*	*133,154,000*		– (C)
Detailed Design Engineering	19,972,000	29,959,000	49,931,000	6.0%	of (A)
Supervision	33,289,000	49,934,000	83,223,000	10.0%	of (A)
Tax and Duties	*115,851,000*		*115,851,000*	12.0%	of (A) + (C)
Total	***1,154,088,000***	***585,833,000***	***1,739,921,000***		

Table 2.7 Breakdown of Compensation Cost

Retarding Basin / Item / Description	Quantity	Unit	Unit Cost (Php)	Total Cost (Php)	Remarks
Imus Retarding Basin					
House Relocation					
Informal Dwellers	0	house	100,000	0	inclusive of Livelihood Support
Tenant Farmer-1	1	house	350,000	350,000	Compensation House
Tenant Farmer-2	16	family	50,000	800,000	Livilihood Support
Farmer (Owner)	0	house	400,000	0	Compensation for House excl. of conpensation of land
Land Acquisition	390,000	m^2	800	312,000,000	
Total				313,150,000	
Bacoor Retarding Basin					
House Relocation					
Informal Dwellers	0	house	100,000	0	inclusive of Livelihood Support
Tenant Farmer-1	2	small house	350,000	700,000	Compensation House
Tenant Farmer-2	0	family	50,000	0	Livilihood Support
Owner	4	small house	350,000	1,400,000	Compensation for House excl. of conpensation of land
Land Acquisition	125,000	m^2	800	100,000,000	
Total				102,100,000	
Julian Retarding Basin					
House Relocation					
Informal Dwellers	0	house	100,000	0	inclusive of Livelihood Support
Tenant Farmer-1	3	large house	800,000	2,400,000	Compensation House
Tenant Farmer-2	13	family	50,000	650,000	Livilihood Support
Farmer (Owner)	2	large house	800,000	1,600,000	Compensation for House excl. of conpensation of land
Land Acquisition	280,000	m^2	800	224,000,000	
Total				228,650,000	
Summary					
House Relocation				7,900,000	
Land Acquisition				636,000,000	
Grand Total				643,900,000	

Table 2.8 (1/3) Construction Schedule of Imus Retarding Basin

Working Item	Unit	Q'ty
Mobilization & Preparatory Work	L.S.	1
Earth Work		
Clearing & Grubbing	m^2	400,000
Excavation	m^3	1,600,000
Embankment	m^3	28,051
Disposal of Soil	m^3	1,572,000
Road Work (Access Road B=6m)		
Aggregate Subbase Course (t=200mm)	m^3	3,293
Aggregate Base Course (t=200mm)	m^3	2,904
Plant-mix Surface Course t=50mm	m^2	9,148
Road Work (Main Trunk Road B=10m) PCP		
Aggregate Subbase Course (t=200mm)	m^3	0
Aggregate Base Course (t=200mm)	m^3	0
Concrete Pavement (t=230mm)	m^3	0
Drainage Ditch (BxH=0.3m x 0.3m)		
Concrete (for Small Structure)	m^3	851
Leveling Concrete	m^3	378
Form Work for Concrete	m^2	7,091
Form Work for Leveling Concrete	m^2	945
Drainage Sluice		
Reinforced Concrete, Staging, Supporting	m^3	630
Leveling Concrete	m^3	55
Formwork for Concrete	m^2	1,823
Formwork for Leveling Concrete	m^2	21
Supporting	m^3	817
Flap Gate	pcs	2
SSP	m^2	103
Re-Bar	ton	63
Revetment (1:3.0 – 1:2.0)		
Wet Stone Masonry (t=200mm)	m^2	4,129
Gravel Bedding	m^3	826
Concrete (Small Structure)	m^3	43
FormWork for Concrete	m^2	435
Re-Bar	ton	4
Revetment (1:0.5)		
Rubble Stone Masonry	m^3	0
Gravel Backfill	m^3	0
Concrete for Small Structures	m^3	0
FormWork for Concrete	m^2	0
Overflow Dike		
Kago Mattress	m^3	2,669
Others		
Grass Sodding	m^2	59,768
Other Reinforced Concrete Work	m^3	0
Communal Facility	L.S.	1
Site Clearance / Cleaning	L.S.	1
Demoblization	L.S.	1
Commpletion		

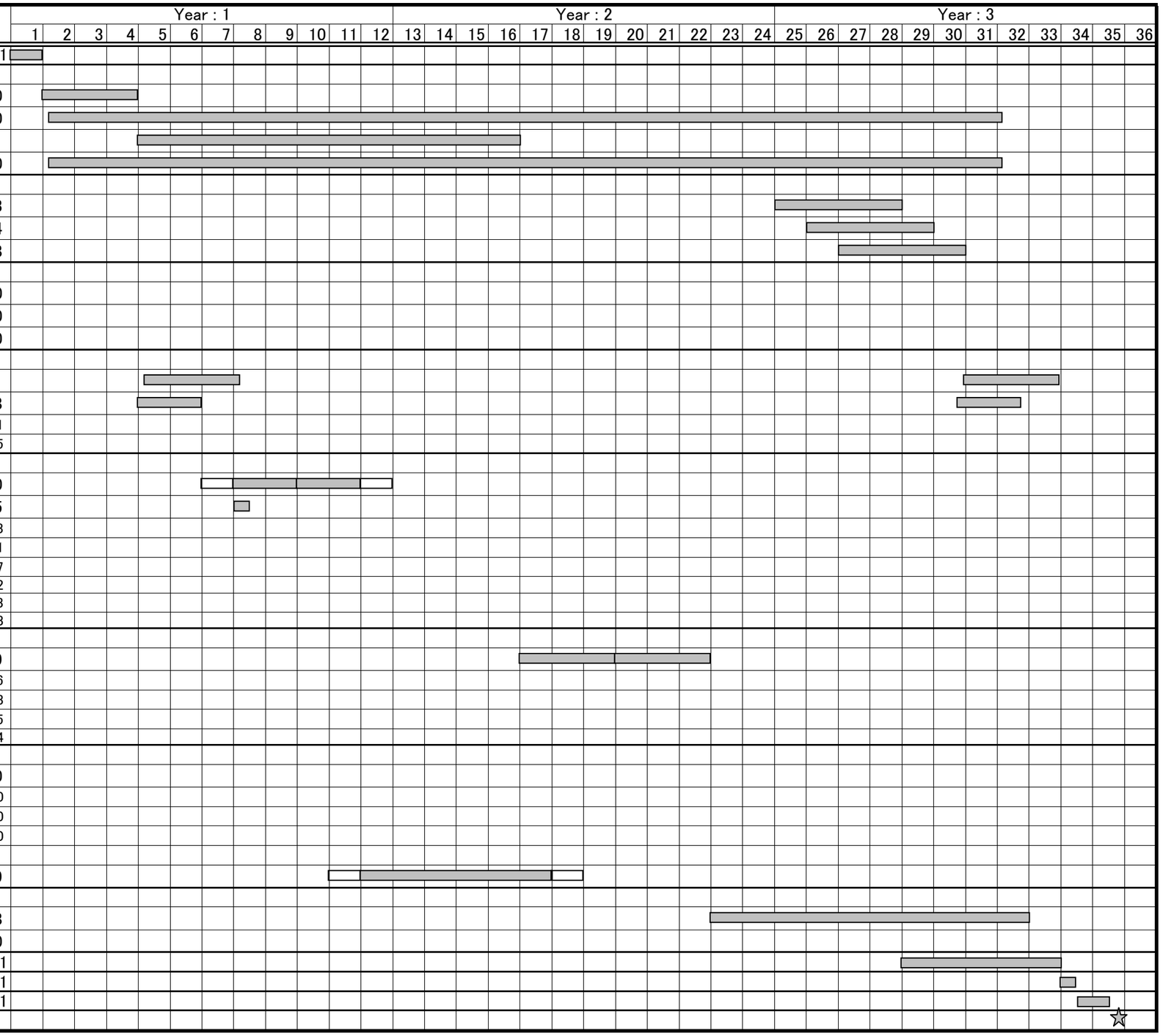


Table 2.8 (2/3) Construction Schedule of Bacoor Retarding Basin

Working Item	Unit	Q'ty
Mobilization & Preparatory Work	L.S.	1
Earth Work		
Clearing & Grubbing	m^2	130,000
Excavation	m^3	450,000
Embankment	m^3	18,810
Disposal of Soil	m^3	431,000
Road Work (Access Road B=6m)		
Aggregate Subbase Course (t=200mm)	m^3	2,399
Aggregate Base Course (t=200mm)	m^3	2,116
Plant-mix Surface Course t=50mm	m^2	6,664
Road Work (Main Trunk Road B=10m) PCP		
Aggregate Subbase Course (t=200mm)	m^3	1,169
Aggregate Base Course (t=200mm)	m^3	616
Concrete Pavement (t=230mm)	m^3	2,280
Drainage Ditch (BxH=0.3m x 0.3m)		
Concrete (for Small Structure)	m^3	934
Leveling Concrete	m^3	415
Form Work for Concrete	m^2	7,784
Form Work for Leveling Concrete	m^2	1,038
Drainage Sluice		
Reinforced Concrete, Staging, Supporting	m^3	233
Leveling Concrete	m^3	17
Formwork for Concrete	m^2	530
Formwork for Leveling Concrete	m^2	12
Supporting	m^3	233
Flap Gate	pcs	1
SSP	m^2	90
Re-Bar	ton	23
Revetment (1:3.0 - 1:2.0)		
Wet Stone Masonry (t=200mm)	m^2	1,362
Gravel Bedding	m^3	272
Concrete (Small Structure)	m^3	14
FormWork for Concrete	m^2	143
Re-Bar	ton	1
Revetment (1:0.5)		
Rubble Stone Masonry	m^3	2,972
Gravel Backfill	m^3	3,474
Concrete for Small Structures	m^3	354
FormWork for Concrete	m^2	3,541
Overflow Dike		
Kago Mattress	m^3	1,172
Others		
Grass Sodding	m^2	21,251
Other Reinforced Concrete Work	m^3	1,006
Communal Facility	L.S.	1
Site Clearance / Cleaning	L.S.	1
Demoblization	L.S.	1
Commpletion		

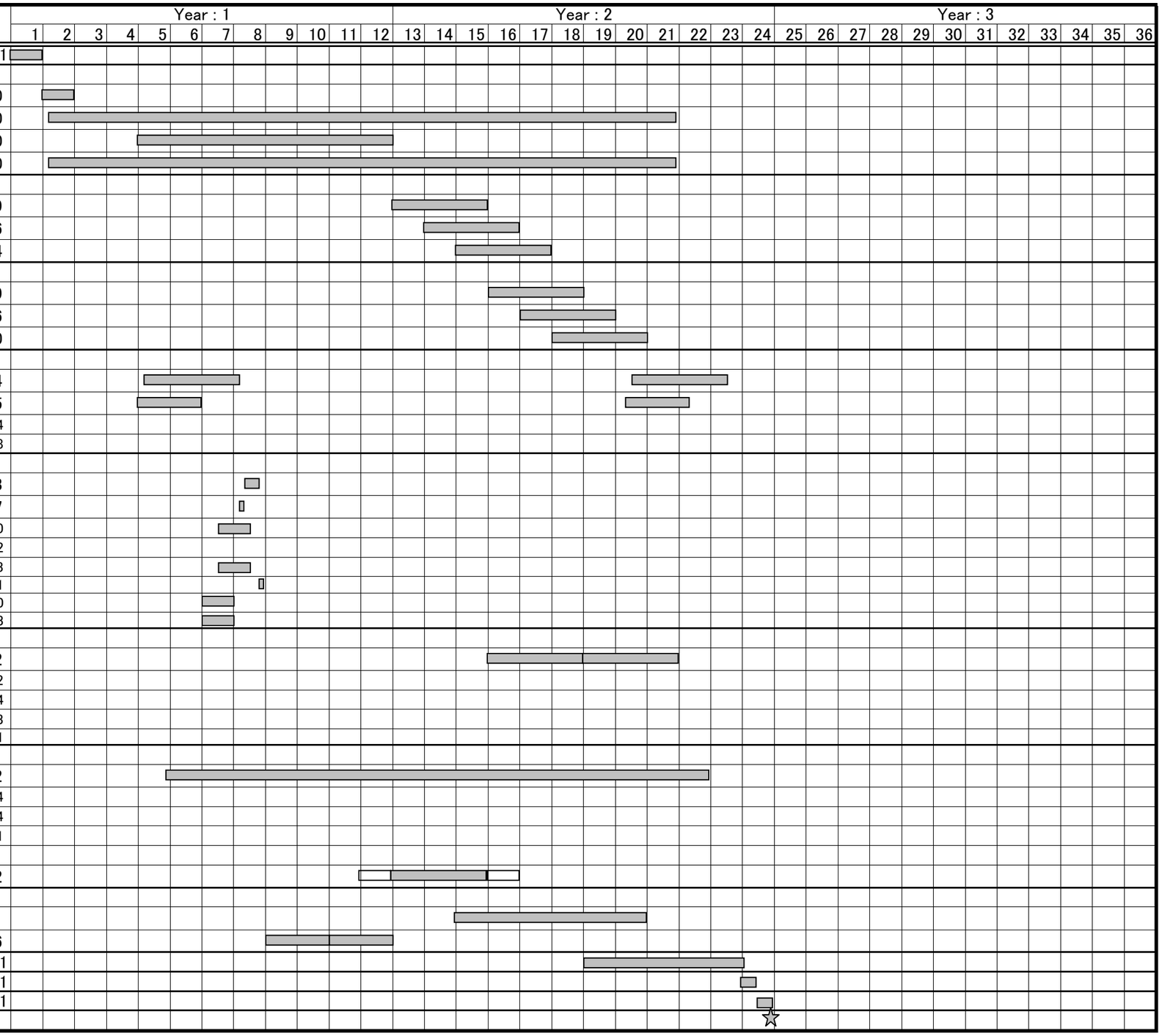


Table 2.8 (3/3) Construction Schedule of Julian Retarding Basin

Working Item	Unit	Q'ty
Mobilization & Preparatory Work	L.S.	1
Earth Work		
Clearing & Grubbing	m^2	280,000
Excavation	m^3	900,000
Embankment	m^3	114,735
Disposal of Soil	m^3	785,000
Road Work (Access Road B=6m)		
Aggregate Subbase Course (t=200mm)	m^3	4,078
Aggregate Base Course (t=200mm)	m^3	3,597
Plant-mix Surface Course t=50mm	m^2	11,328
Road Work (Main Trunk Road B=10m) PCP		
Aggregate Subbase Course (t=200mm)	m^3	0
Aggregate Base Course (t=200mm)	m^3	0
Concrete Pavement (t=230mm)	m^3	0
Drainage Ditch (BxH=0.3m x 0.3m)		
Concrete (for Small Structure)	m^3	1,189
Leveling Concrete	m^3	528
Form Work for Concrete	m^2	9,908
Form Work for Leveling Concrete	m^2	1,321
Drainage Sluice		
Reinforced Concrete, Staging, Supporting	m^3	469
Leveling Concrete	m^3	35
Formwork for Concrete	m^2	1,067
Formwork for Leveling Concrete	m^2	24
Supporting	m^3	470
Flap Gate	pcs	2
SSP	m^2	180
Re-Bar	ton	23
Revetment (1:3.0 - 1:2.0)		
Wet Stone Masonry (t=200mm)	m^2	3,284
Gravel Bedding	m^3	657
Concrete (Small Structure)	m^3	35
FormWork for Concrete	m^2	346
Re-Bar	ton	3
Revetment (1:0.5)		
Rubble Stone Masonry	m^3	2,494
Gravel Backfill	m^3	2,779
Concrete for Small Structures	m^3	206
FormWork for Concrete	m^2	2,060
Overflow Dike		
Kago Mattress	m^3	3,191
Others		
Grass Sodding	m^2	58,819
Other Reinforced Concrete Work	m^3	2,522
Communal Facility	L.S.	1
Site Clearance / Cleaning	L.S.	1
Demoblization	L.S.	1
Commpletion		

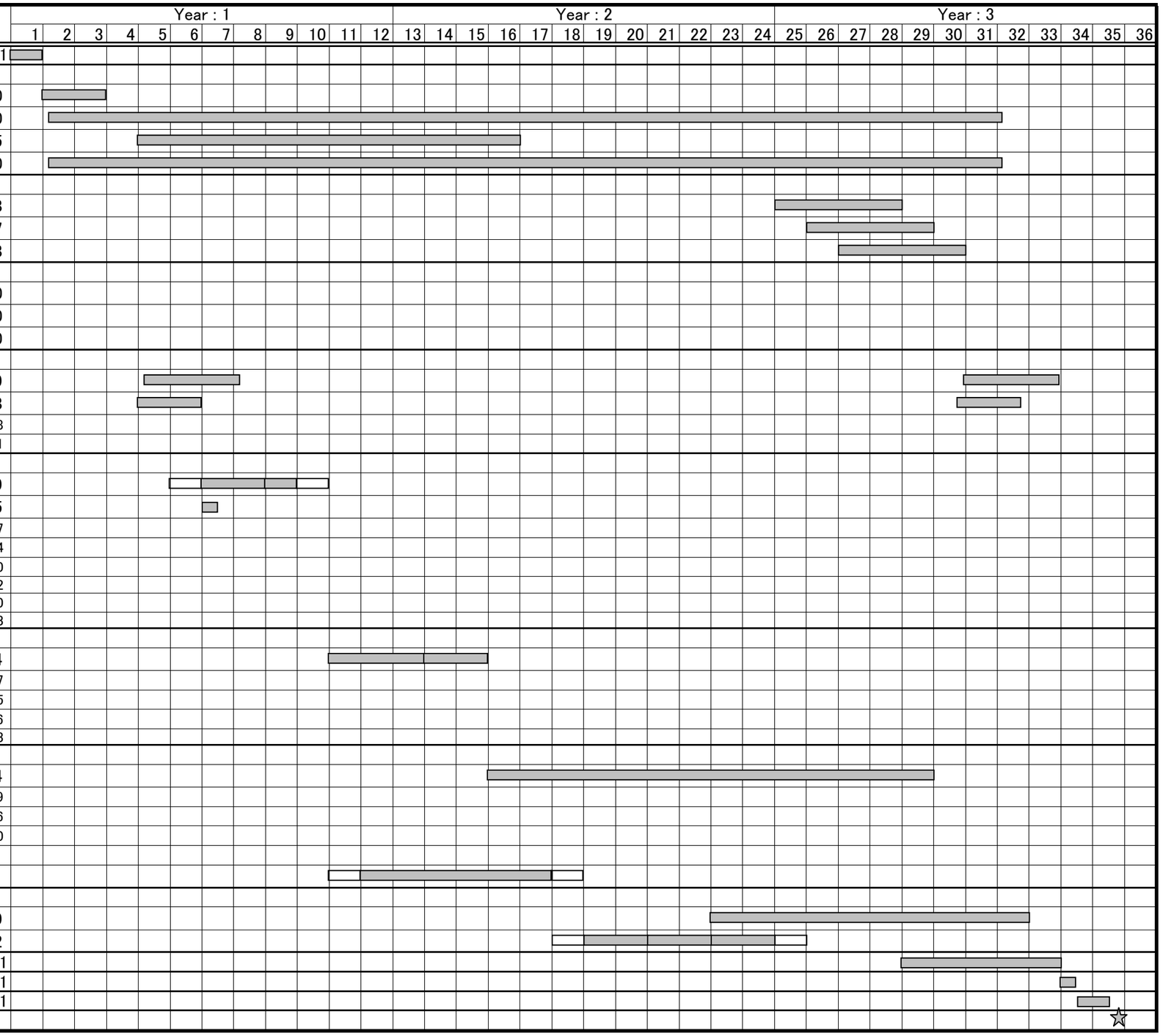


Table 2.9 (1/3) Simulation Result with Priority Project
(Inundation Area)

Imus river basin caused by river overflow

Unit: Km^2

Inundation Depth (m)	Inundation Area (2-year return period)			
	Present		2020 with On-site	
	w/o project	w/ priority project	w/o project	w/ priority project
0.01 - 0.24	5.60	3.96	6.29	4.32
0.25 - 0.49	1.46	0.87	1.50	1.03
0.50 - 0.99	1.25	0.81	1.50	0.97
1.00 - 1.99	0.09	0.02	0.11	0.02
2.00 - 2.99	0.00	0.00	0.00	0.00
>= 3.00	0.00	0.00	0.00	0.00
Total	8.39	5.66	9.40	6.34

Inundation Depth (m)	Inundation Area (5-year return period)			
	Present		2020 with On-site	
	w/o project	w/ priority project	w/o project	w/ priority project
0.01 - 0.24	6.73	5.57	7.02	5.81
0.25 - 0.49	2.53	1.52	2.69	1.87
0.50 - 0.99	2.14	1.66	2.28	1.70
1.00 - 1.99	0.36	0.17	0.48	0.20
2.00 - 2.99	0.00	0.00	0.00	0.00
>= 3.00	0.00	0.00	0.00	0.00
Total	11.75	8.91	12.46	9.59

Inundation Depth (m)	Inundation Area (10-year return period)			
	Present		2020 with On-site	
	w/o project	w/ priority project	w/o project	w/ priority project
0.01 - 0.24	7.24	6.08	7.65	6.16
0.25 - 0.49	3.08	2.37	3.18	2.53
0.50 - 0.99	2.74	2.02	2.79	2.16
1.00 - 1.99	0.71	0.35	0.73	0.43
2.00 - 2.99	0.01	0.00	0.00	0.00
>= 3.00	0.00	0.00	0.00	0.00
Total	13.78	10.82	14.35	11.28

Inundation Depth (m)	Inundation Area (20-year return period)			
	Present		2020 with On-site	
	w/o project	w/ priority project	w/o project	w/ priority project
0.01 - 0.24	7.87	6.02	8.22	6.36
0.25 - 0.49	3.54	3.00	3.67	3.11
0.50 - 0.99	3.17	2.57	3.21	2.71
1.00 - 1.99	1.01	0.71	1.12	0.80
2.00 - 2.99	0.00	0.00	0.00	0.00
>= 3.00	0.00	0.00	0.00	0.00
Total	15.59	12.29	16.22	12.98

Inundation Depth (m)	Inundation Area (30-year return period)			
	Present		2020 with On-site	
	w/o project	w/ priority project	w/o project	w/ priority project
0.01 - 0.24	8.15	6.45	8.70	8.29
0.25 - 0.49	3.70	3.23	4.33	3.84
0.50 - 0.99	3.37	2.75	4.04	3.17
1.00 - 1.99	1.22	0.80	1.36	0.98
2.00 - 2.99	0.00	0.00	0.03	0.03
>= 3.00	0.00	0.00	0.00	0.00
Total	16.43	13.23	18.46	16.31

Inundation Depth (m)	Inundation Area (50-year return period)			
	Present		2020 with On-site	
	w/o project	w/ priority project	w/o project	w/ priority project
0.01 - 0.24	8.50	7.32	9.59	9.56
0.25 - 0.49	3.89	3.50	4.62	4.01
0.50 - 0.99	3.76	3.07	4.31	3.41
1.00 - 1.99	1.28	0.97	1.44	1.14
2.00 - 2.99	0.02	0.02	0.03	0.03
>= 3.00	0.00	0.00	0.00	0.00
Total	17.46	14.87	19.98	18.15

Inundation Depth (m)	Inundation Area (100-year return period)			
	Present		2020 with On-site	
	w/o project	w/ priority project	w/o project	w/ priority project
0.01 - 0.24	9.67	8.83	9.67	10.17
0.25 - 0.49	4.34	3.89	4.94	4.37
0.50 - 0.99	4.13	3.30	4.56	3.82
1.00 - 1.99	1.49	1.12	1.74	1.24
2.00 - 2.99	0.02	0.02	0.03	0.03
>= 3.00	0.00	0.00	0.00	0.00
Total	19.64	17.16	20.93	19.62

Table 2.9 (2/3) Simulation Result with Priority Project
(Inundated Built-up/Non-built-up Area)

Imus river basin caused by river overflow

Unit: Km^2

Inundation Depth (m)	Inundation Area (2-year return period)			
	Present		2020 with On-site	
	Built-up Area	Non-built-up Area	Built-up Area	Non-built-up
0.01 - 0.24	2.33	1.62	3.51	0.81
0.25 - 0.49	0.55	0.33	0.70	0.32
0.50 - 0.99	0.38	0.43	0.53	0.44
1.00 - 1.99	0.02	0.00	0.02	0.00
2.00 - 2.99	0.00	0.00	0.00	0.00
>= 3.00	0.00	0.00	0.00	0.00
Total	3.28	2.38	4.76	1.58

Inundation Depth (m)	Inundation Area (5-year return period)			
	Present		2020 with On-site	
	Built-up Area	Non-built-up Area	Built-up Area	Non-built-up
0.01 - 0.24	3.20	2.37	4.81	1.00
0.25 - 0.49	0.90	0.61	1.38	0.49
0.50 - 0.99	1.06	0.59	1.16	0.55
1.00 - 1.99	0.09	0.08	0.11	0.09
2.00 - 2.99	0.00	0.00	0.00	0.00
>= 3.00	0.00	0.00	0.00	0.00
Total	5.25	3.66	7.46	2.13

Inundation Depth (m)	Inundation Area (10-year return period)			
	Present		2020 with On-site	
	Built-up Area	Non-built-up Area	Built-up Area	Non-built-up
0.01 - 0.24	3.53	2.56	5.30	0.86
0.25 - 0.49	1.55	0.82	1.91	0.61
0.50 - 0.99	1.26	0.76	1.46	0.70
1.00 - 1.99	0.20	0.15	0.28	0.15
2.00 - 2.99	0.00	0.00	0.00	0.00
>= 3.00	0.00	0.00	0.00	0.00
Total	6.53	4.29	8.96	2.32

Inundation Depth (m)	Inundation Area (20-year return period)			
	Present		2020 with On-site	
	Built-up Area	Non-built-up Area	Built-up Area	Non-built-up
0.01 - 0.24	3.56	2.46	5.48	0.89
0.25 - 0.49	1.86	1.14	2.41	0.69
0.50 - 0.99	1.63	0.94	1.86	0.85
1.00 - 1.99	0.41	0.30	0.52	0.28
2.00 - 2.99	0.00	0.00	0.00	0.00
>= 3.00	0.00	0.00	0.00	0.00
Total	7.46	4.83	10.27	2.71

Inundation Depth (m)	Inundation Area (30-year return period)			
	Present		2020 with On-site	
	Built-up Area	Non-built-up Area	Built-up Area	Non-built-up
0.01 - 0.24	3.77	2.69	6.67	1.62
0.25 - 0.49	1.99	1.25	3.05	0.79
0.50 - 0.99	1.71	1.03	2.24	0.93
1.00 - 1.99	0.51	0.29	0.70	0.28
2.00 - 2.99	0.00	0.00	0.03	0.00
>= 3.00	0.00	0.00	0.00	0.00
Total	7.97	5.25	12.69	3.63

Inundation Depth (m)	Inundation Area (50-year return period)			
	Present		2020 with On-site	
	Built-up Area	Non-built-up Area	Built-up Area	Non-built-up
0.01 - 0.24	4.20	3.12	7.43	2.13
0.25 - 0.49	2.08	1.41	3.22	0.79
0.50 - 0.99	1.98	1.09	2.41	1.00
1.00 - 1.99	0.63	0.34	0.84	0.30
2.00 - 2.99	0.01	0.01	0.03	0.00
>= 3.00	0.00	0.00	0.00	0.00
Total	8.90	5.97	13.93	4.23

Inundation Depth (m)	Inundation Area (100-year return period)			
	Present		2020 with On-site	
	Built-up Area	Non-built-up Area	Built-up Area	Non-built-up
0.01 - 0.24	4.60	4.23	7.95	2.23
0.25 - 0.49	2.27	1.62	3.50	0.87
0.50 - 0.99	2.06	1.24	2.71	1.11
1.00 - 1.99	0.74	0.39	0.93	0.31
2.00 - 2.99	0.01	0.01	0.03	0.00
>= 3.00	0.00	0.00	0.00	0.00
Total	9.69	7.48	15.11	4.51

Table 2.9 (3/3) Simulation Result with Priority Project

(Number of Inundated Houses and Buildings)

Imus river basin caused by river overflow

Inundation Depth (m)	No. of Inundated Houses and Buildings (2-year return period)			
	Present		2020 with On-site	
	w/o project	w/ priority project	w/o project	w/ priority project
0.15 - 0.49	4,706	3,935	9,996	8,802
0.50 - 0.99	2,138	1,491	5,503	3,811
1.00 - 1.99	67	53	155	120
2.00 - 2.99	0	0	0	0
>= 3.00	0	0	0	0
Total	6,911	5,479	15,653	12,733

Inundation Depth (m)	No. of Inundated Houses and Buildings (5-year return period)			
	Present		2020 with On-site	
	w/o project	w/ priority project	w/o project	w/ priority project
0.15 - 0.49	6,777	5,945	13,677	13,257
0.50 - 0.99	3,943	4,142	8,291	8,150
1.00 - 1.99	739	214	1,960	520
2.00 - 2.99	0	0	0	0
>= 3.00	0	0	0	0
Total	11,459	10,301	23,928	21,927

Inundation Depth (m)	No. of Inundated Houses and Buildings (10-year return period)			
	Present		2020 with On-site	
	w/o project	w/ priority project	w/o project	w/ priority project
0.15 - 0.49	7,691	7,915	15,681	15,510
0.50 - 0.99	5,151	4,727	9,754	9,083
1.00 - 1.99	1,659	793	3,085	1,806
2.00 - 2.99	33	0	0	0
>= 3.00	0	0	0	0
Total	14,534	13,435	28,520	26,400

Inundation Depth (m)	No. of Inundated Houses and Buildings (20-year return period)			
	Present		2020 with On-site	
	w/o project	w/ priority project	w/o project	w/ priority project
0.15 - 0.49	8,339	8,178	18,073	16,816
0.50 - 0.99	5,777	5,348	10,905	10,584
1.00 - 1.99	2,257	1,669	4,458	3,558
2.00 - 2.99	0	0	0	0
>= 3.00	0	0	0	0
Total	16,373	15,196	33,437	30,958

Inundation Depth (m)	No. of Inundated Houses and Buildings (30-year return period)			
	Present		2020 with On-site	
	w/o project	w/ priority project	w/o project	w/ priority project
0.15 - 0.49	8,573	8,606	19,599	19,672
0.50 - 0.99	5,852	5,580	13,080	12,132
1.00 - 1.99	2,588	1,966	5,174	4,304
2.00 - 2.99	0	0	91	91
>= 3.00	0	0	0	0
Total	17,013	16,151	37,943	36,199

Inundation Depth (m)	No. of Inundated Houses and Buildings (50-year return period)			
	Present		2020 with On-site	
	w/o project	w/ priority project	w/o project	w/ priority project
0.15 - 0.49	8,643	8,719	20,043	20,260
0.50 - 0.99	6,721	6,140	13,738	12,540
1.00 - 1.99	2,621	2,296	5,568	4,840
2.00 - 2.99	22	22	91	91
>= 3.00	0	0	0	0
Total	18,007	17,177	39,439	37,731

Inundation Depth (m)	No. of Inundated Houses and Buildings (100-year return period)			
	Present		2020 with On-site	
	w/o project	w/ priority project	w/o project	w/ priority project
0.15 - 0.49	9,289	9,251	20,673	20,910
0.50 - 0.99	7,137	6,597	14,906	13,533
1.00 - 1.99	3,016	2,565	6,113	5,271
2.00 - 2.99	22	22	91	91
>= 3.00	0	0	0	0
Total	19,464	18,434	41,782	39,804

Table 2.10 (1/4) Hydraulic Figures of Retarding Basin as the Result of Flood Inundation Analysis (Imus Retarding Basin: I1)

Basin	River	Code of Retarding Basin	Available Area (has)	Overflow Weir Sta. No Length	Surrounding Dike	Chainage of connecting Point in MIKE11	RB Bed Level	Crest Level	2-yr				5-yr			
									Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB	Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB
Imus	Imus	RB-I1-b_03	35.0	9+450 L=28m	EL+18.0	3450.0	8.68	10.58	12.03	10.74	2.06	0.72	12.63	12.30	3.62	1.27
Imus	Imus	with Priority	35.0	9+450 L=28m	EL+18.0	3450.0	8.68	10.58	12.03	10.74	2.06	0.72	12.63	12.30	3.62	1.27

Basin	River	Code of Retarding Basin	Available Area (has)	Overflow Weir Sta. No Length	Surrounding Dike	Chainage of connecting Point in MIKE11	RB Bed Level	Crest Level	10-yr				20-yr			
									Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB	Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB
Imus	Imus	RB-I1-b_03	35.0	9+450 L=28m	EL+18.0	3450.0	8.68	10.58	13.10	13.02	4.34	1.52	13.71	13.71	5.03	1.76
Imus	Imus	with Priority	35.0	9+450 L=28m	EL+18.0	3450.0	8.68	10.58	13.10	13.02	4.34	1.52	13.71	13.71	5.03	1.76

Note: under 2020 landuse w/ on-site Regulation Pond

Table 2.10 (2/4) Hydraulic Figures of Retarding Basin as the Result of Flood Inundation Analysis (Bacoor Retarding Basin: B4)

Basin	River	Code of Retarding Basin	Available Area (has)	Overflow Weir Sta. No Length	Surrounding Dike	Chainage of connecting Point in MIKE11	RB Bed Level	Crest Level	2-yr				5-yr			
									Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB	Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB
Imus	Bacoor	RB-B4_01	7.0	8+150 L=25m	EL+10.4	-550.0	3.00	8.35	9.61	9.36	6.36	0.45	10.67	10.67	7.67	0.54
Imus	Bacoor	with Priority	7.0	8+150 L=25m	EL+10.4	-550.0	3.00	8.35	9.61	9.36	6.36	0.45	10.67	10.67	7.67	0.54

Basin	River	Code of Retarding Basin	Available Area (has)	Overflow Weir Sta. No Length	Surrounding Dike	Chainage of connecting Point in MIKE11	RB Bed Level	Crest Level	10-yr				20-yr			
									Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB	Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB
Imus	Bacoor	RB-B4_01	7.0	8+150 L=25m	EL+10.4	-550.0	3.00	8.35	11.21	11.21	8.21	0.57	11.73	11.73	8.73	0.61
Imus	Bacoor	with Priority	7.0	8+150 L=25m	EL+10.4	-550.0	3.00	8.35	11.21	11.21	8.21	0.57	11.73	11.73	8.73	0.61

Note: under 2020 landuse w/ on-site Regulation Pond

Table 2.10 (3/4) Hydraulic Figures of Retarding Basin as the Result of Flood Inundation Analysis (Julian Retarding Basin: J1-R)

Basin	River	Code of Retarding Basin	Available Area (has)	Overflow Weir Sta. No Length	Surrounding Dike	Chainage of connecting Point in MIKE11	RB Bed Level	Crest Level	2-yr				5-yr			
									Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB	Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB
Imus	Julian (IT-1)	RB-J1R_02	11.0	2+900 L=50m	EL+10.0	7100.0	3.50	6.60	7.40	5.86	2.36	0.26	7.66	7.48	3.98	0.44
Imus	Julian (IT-1)	with Priority Project	11.0	2+900 L=50m	EL+10.0	7100.0	3.50	6.60	6.92	4.60	1.10	0.12	7.06	6.57	3.07	0.34

Basin	River	Code of Retarding Basin	Available Area (has)	Overflow Weir Sta. No Length	Surrounding Dike	Chainage of connecting Point in MIKE11	RB Bed Level	Crest Level	10-yr				20-yr			
									Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB	Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB
Imus	Julian (IT-1)	RB-J1R_02	11.0	2+900 L=50m	EL+10.0	7100.0	3.50	6.60	8.04	8.04	4.54	0.50	8.59	8.59	5.09	0.56
Imus	Julian (IT-1)	with Priority Project	11.0	2+900 L=50m	EL+10.0	7100.0	3.50	6.60	7.26	7.26	3.76	0.41	8.01	8.01	4.51	0.50

Note: under 2020 landuse w/ on-site Regulation Pond

Table 2.10 (4/4) Hydraulic Figures of Retarding Basin as the Result of Flood Inundation Analysis (Julian Retarding Basin: J1-L)

Basin	River	Code of Retarding Basin	Available Area (has)	Overflow Weir Sta. No Length	Surrounding Dike	Chainage of connecting Point in MIKE11	RB Bed Level	Crest Level	2-yr				5-yr			
									Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB	Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB
Imus	IT-2	RB-J1L_02	4.0	3+400 L=50m	EL+10.0	1250 at IT-2up	3.50	5.90	6.18	5.04	1.54	0.06	6.27	6.27	2.77	0.11
Imus	IT-2	RB-J1L_02	4.0	3+400 L=50m	EL+10.0	1250 at IT-2up	3.50	5.90	6.18	5.04	1.54	0.06	6.25	6.25	2.75	0.11

Basin	River	Code of Retarding Basin	Available Area (has)	Overflow Weir Sta. No Length	Surrounding Dike	Chainage of connecting Point in MIKE11	RB Bed Level	Crest Level	10-yr				20-yr			
									Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB	Simulated Water Level (m) River	Simulated Water Level (m) RB	Simulated Depth (m) RB	Simulated Volume (MCM) RB
Imus	IT-2	RB-J1L_02	4.0	3+400 L=50m	EL+10.0	1250 at IT-2up	3.50	5.90	6.53	6.53	3.03	0.12	6.82	6.82	3.32	0.13
Imus	IT-2	RB-J1L_02	4.0	3+400 L=50m	EL+10.0	1250 at IT-2up	3.50	5.90	6.46	6.46	2.96	0.12	6.64	6.64	3.14	0.13

Note: under 2020 landuse w/ on-site Regulation Pond

Table 2.11 DPWH Resettlement Policy Compensation Matrix

Type of Loss	Application	Entitled Person	Compensation / Entitlements
LAND (Classified as Agricultural, Residential, Commercial or Institutional)	More than 20% of the total landholding lost or where less than 20% lost but the remaining landholding becomes economically unviable	PAP with TCT or Tax Declaration (Tax Declaration can be legalized to full title)	PAPs will be entitled to: + Cash compensation for loss of land at 100% replacement cost at the informed request of PAPs + If feasible, land for land will provided in terms of a new parcel of equivalent productivity, at a location acceptable to PAPs + Holders of free or homestead patents and CLOAs under CA 141 (Public Land Act) will be compensated for land improvements only. + Holders of Certificate of Land Ownership Award (CLOA) granted under the Comprehensive Agrarian Reform Act shall be compensated for the land at zonal value. + Cash compensation for damaged crops at market value at the time of taking. + Rehabilitation assistance in the form of skills training equivalent to the amount of P15, 0000.00 per family, if the present means of livelihood is no longer viable and the PAP will have to engage in a new income-earning activity.
		PAP without TCT	+ Cash compensation for damaged crops at market value at the time of taking. + Agricultural lessor are entitled to disturbance compensation equvalent to five times the average of the gross harvest for the past 3 years but not less than PhP15, 000.00.
	Less than 20% of the total landholding lost or where less than 20% lost or where the remaning landholding still viable for continued use	PAP with TCT or Tax Declaraation (Tax Declaration can be legalized to full title)	PAP will be entitled to: + Cash compensation for lost of land at 100% replacement cost at the informed request of PAFs + Holders of free or homestead patents and CLOAs under CA 141. (Public Lands Act) shall be compensated on land improvements only. + Holders of Certificate of Land Ownership Award (CLOA) granted under the Comprehensive Agrarian Reform Act shall be compensated for the land at zonal value. + Cash compensation for damaged crops at market value at the time of taking.
		PAP without TCT	+ Cash compensation for damage crops at market value at the time of taking. + Agricultural lessor are entitled to disturbance compensation equvalent to five times the average of the gross harvest for the past 3 years but not less than PhP15, 000.00.
STRUCTURES (Clasiified as Residential, Commercial or Industrial)	More than 20% of the total landholding lost or where less than 20% lost but the remaining structures no longer function as intended or no longer viable for continued use	PAP with TCT or Tax Decalaration (Tax Declaration can be legalized to full title)	PAP will be entitled to: + Cash compensation for entire structure at 100% replacement cost. + Rental subsidy for the time between the submission of complete documents and the release of payment on land.
		PAP without TCT	PAP will be entitled to: + Cash compensation for entire structure at 100% replacement cost + Rental subsidy for the time between the submissionof complete documents and the release of payment on land.
	Less than 20% of the total land holding lost where the remaning structure is still viable for continued use	PAP with TCT or Tax Declaraation (Tax Declaration can be legalized into full title)	+ Compensation for affected portion of the structure.
		PAP without TCT	+ Compensation for affected portion of the structure.
IMPROVE-MENTS	Severely or marginally affected	PAP with or without TCT, tax declaration, etc.	PAP will be entitled to: + Cash compensation for the affected improvements at replacement cost.
CROPS, TREES, PERENNIALS			PAP will be entitled to: + Cash compensation for crops, tress, and perennials at current market value as prescribed by the concerned LGUs and DENR

Table 2.12 (1/2) Standard Indicators in Resettlement Monitoring and Evaluation

Aspect	Contents	Verifiable Indicators	Methodology
Budget and Time Frame	• Social preparation among PAPs and host communities: IEC, consultation, community organization • Social survey, tagging and inventory of affected assets • Land acquisition • Compensation and entitlement • Inter-agency arrangements commitments • Resettlement site development works and facilities • Shelter development • Restoration of social infrastructure and services • Livelihood and income-restoration	• Budget allocation and disbursements • Manning and deployment schedules • Organization and activity of IRTAF • Progress and status of imple-mentation of RAP activities throughout project cycle • Milestones against physical/financial targets and timeline of activities	• Process documentation • Review of progress reports • Key informant interview • Post-site development inspection • Review of MOA stipulations and delivery of agency commitments
Delivery of entitlement to PAPs	• ROW acquisition • Policy guidelines and compensation policy • Eligibility criteria • Appraisal of affected properties and assets • Payment of compensation and entitlement • Resettlement options including self-relocation • Delivery of non-monetary entitlement	• Type and amount of monetary entitlements intended and actual provided • Applicability of criteria in qualifying for entitlements • Applicability of methodology for determining fair market value of properties and assets • Payment made against inventory of assets actually affected • No. of structures demolished or cleared against census tagging (C/T) master list • No. of PAPs transferred to resettlement site • No. of self-relocating PAPs • Delivery of disturbance allowances, transfer assistance, transportation, etc. • Assistance during demolition, hauling, transport and re-establishment of dwellings and other structures • Time allowed for harvesting crops • Observance of humane conduct of demolition activities and movement of PAPs • Condition of resettlement site and facilities according to standards • No. of PAPs inhabiting resettlement site against Master list • Delivery to PAPs of tenurial documents (land tittles or conditional deeds of sale) • Appropriateness of schemes and terms of payment for land and/or shelter development	• Process documentation of ROW acquisition • Process documentation of appraisal of properties and improvements • Review of implementation of LARRIP Policy Guidelines on ROW Acquisition • Review of RAP • Key informant interviews among PAPs due for entitlements • Inspection of cleared areas and resettlement site • Post-relocation survey • Review of project reports on program/activity progress and status • Review of financial and relevant records on amortization, equity and delivery of legal ownership documents

Table 2.12 (2/2) Standard Indicators in Resettlement Monitoring and Evaluation

Benefits to PAPs and host communities	• Benefits derived from compensation and entitlement • Condition and adequacy of resettlement site development • Condition and adequacy of shelter development • Effectiveness and adequacy of livelihood and income restoration program • Effectiveness and adequacy of social rehabilitation and re-integration program • Benefits to extremely vulnerable groups • Benefits accruing to host communities	• Status and progress against • target delivery of livelihood development options • Status and progress against target delivery of social rehabilitation programs • Types and number of PAPs benefited by income restoration programs (training, technical assistance, credit and micro-lending and livelihood generation schemes) • Quality of improvement in housing units • Improvements in occupation and livelihood pattern of PAPs • Improvement in production and resource use pattern of PAPs • Income and expenditure pattern of PAPs • Cost of living and additional cost incurred by PAPs • Adequacy of incomes compared to cost of living • Social and cultural conditions / presence of social safety nets • Improvement in socio-economic condition of extremely vulnerable groups • Community members availing of resettlement site facilities and services • Socio-economic condition of receiving community • Assistance received by host LGU	• Post-relocation asseessment of benefits and impact • Socio-economic survey among PAPs and host community • Key informant interviews • Post-RAP implementation evaluation • Process documentation
Consultation, Grievance and special Issues	• Information dissemination • Reiterative consultation • Institutional mechanism and grievance redress procedures •	• Report on IEC activities • Status report on project Grievance and Arbitration Measures under IRTAF or other avenues • No. of PAPs conforming receipt of entitlements (as timely and adequate) • No. of PAPs benefited by grievance redress measures availed of	• Process documentation • Key informant interview

Table 2.13 (1/2) Environmental Scoping for Priority Projects

No.	Environmental Impact Element	Flood Retarding Basin			Description of Impacts
		I-1	B-4	J-1	
Construction Phase					
Social Environment					
1	Land Acquisition	A	B	A	A wide land area consisting of grass land and farmland shall be acquired for construction of the retarding basins. Further, some grass lands shall be temporarily acquired (rented) for construction of such ancillary works as spoil bank and construction road.
2	Involuntary Resettlement	A	B	A	A certain number of house relocation would be unavoidable due to the land acquisition.
3	Livelihood and Local Economy	B	B	B	Some affected tenant farmers might lose employment due to land acquisition. Some people other than tenant farmers also might lose employment when they are forced to resettle far away from the original place.
4	Land Use Change	-	-	-	
5	Social Institution	-	-	-	
6	Social Service and Infrastructures	B	B	B	Some roads will be intersected by the retarding basins.
7	Poverty/Indigenous People/Ethnic Minority	B	B	B	A certain number of poor people and informal settlers are probably living within the proposed retarding basin area.
8	Uneven Distribution of Losses and Benefits	-	-	-	
9	Historical and Archaeological Site	-	-	-	
10	Regional Conflicts of Interests	-	-	-	
11	Water Use	B	-	B	Some irrigation canals will be intersected by the retarding basins, causing disruption of irrigation water supply to the downstream area.
Natural Environment					
1	Topography and Geology	-	-	-	
2	Groundwater	C	C	C	Excavation of the retarding basin will lower the groundwater table and it might affect the shallow well use in the surrounding area. The existing shallow well use in the surrounding area shall be surveyed.
3	Soil Erosion	-	-	-	
4	River Flow Regime	-	-	-	
5	Seashore	-	-	-	
6	Fauna and Flora	C	C	C	The existing riverbank trees shall be cleared on some locations for construction of the retarding basins. No rare species of flora were identified in the previous master plan study. More detailed survey is necessary.
7	Landscape	-	-	-	
8	Global Warming	-	-	-	

Table 2.13 (2/2) Environmental Scoping for Priority Projects

Public Hazard					
1 2	Air Pollution Water Pollution	B B	B B	B B	Excavation, transportation and dumping works of soils might cause air pollution (dust). River water pollution (turbidity) might be caused by the excavation works of riverbank/riverbed.
3	Soil Pollution	-	-	-	
4	Solid Waste	-	-	-	
5	Noise and Vibration	B	B	B	Operation of the construction equipment for the soil excavation works might cause noise problems on the neighboring residential area.
6	Traffic Disturbance	B	B	B	Transportation of the excavated soils and reconstruction of intersected road would cause traffic congestion on the related existing roads.
7	Ground Subsidence	-	-	-	
8	Odor	-	-	-	
Operation Phase					
Social Environment		Not Anticipated			
Natural Environment		Not Anticipated			
Public Hazard					
1	Solid Waste	C	C	C	People might illegally dump garbage into the retarding basins.
2	Water Pollution	C	C	C	People in the surrounding residential area might discharge wastewater into the retarding basins through illegally connected drainage pipes. The wastewater would emit odor.

Note: Evaluation criteria are as follows.
A: Significant negative impact is expected. B: Moderate negative impact is expected. C: Negative impact is not known in the scoping stage (further study is necessary)
Blank: Negative impact is not expected or negligible.

Table 2.14 Observed Peak Hourly Traffic Volume by Vehicle Type

Station	Traffic Direction	Vehicle Type					Total
		I	II	III	IV	V	
St. A	Anabu I-A road near I-1 retarding basin, 2 lanes road with a total width of 5 m, asphalt/concrete with partially gravel pavement						
	WB: going toward Aguinaldo Highway	57	3	19	14	29	122
	EB: going toward Buhay na Tubig road	65	2	22	10	31	130
St. B	Buhay na Tubig road in Bgy. Buhay na Tubig, 2 lanes road with a total width of 6 m, asphalt/concrete pavement						
	NWB: going toward Aguinaldo Highway	213	85	173	28	55	554
	SEB: going toward Batang Hari road	249	95	175	42	94	655
St. C	Bayan Luma - Bucandala Roard in Bgy. Bucandala I, 2 lanes road with a total width of 6 m, asphalt/concrete pavement						
	WB: going toward the crossing with Dasmarinas road	125	67	334	32	98	656
	EB: going toward Aguinaldo Highway	198	97	349	27	154	825
St. D	NIA road in Bgy. Carsadang Bago II, 2 lanes road with a total width of 6 m, concrete pavement						
	NB: going toward Poblacion of Imus	50	1	92	6	47	196
	SB: going toward Dasmarinas through Malagasang	58	1	111	9	42	221
St. E	Crossing of Aguinaldo Highway and Buhay na Tubig road at Poblacion Imus, Aguinaldo Highway: 4 lanes road with a total width of 12 - 15 m, asphalt/concrete pavement						
	NB: going toward Bacoor	545	254	55	161	145	1,160
	SB: going toward Dasmarinas	591	217	46	209	144	1,207

Note (1) : Vehicle type I: including van, jeep, sedan, ordinary car and taxi
Vehicle type II: including jeepny and multicab
Vehicle type III: including tricycle and pedicab
Vehicle type IV: including big/small truck and public/tourist bus
Vehicle type V: including motorbike

Note (2) : NWB: north west bound, SEB: south east bound, WB: west bound, EB: east bound, NB: north bound, SB: south bound,

Note (3) : Traffic volumes at St. E includes those which join from Buhay na Tubig road

Note (4) : Above peak hourly traffic volume is that during 8:00 am to 5:00 pm

Table 2.15 (1/2) Summary of Environmental Impact and Mitigation Measures

Project Activities	Predicted Environmental Impacts	Impact	Mitigation Measures
Construction Phase			
A. Social Environment			
Land Acquisition, House Relocation	Loss of land (farmland: 30 ha, grassland: 44 ha and housing lot/others: 7 ha) due to right of way acquisition	S, P (-)	● Negotiate with land owners for an acceptable compromise on land price and crop compensation.
	Relocation of 12 households (formal settler: 6, tenant resident: 6)	S, P (-)	● Negotiate with PAFs for an acceptable compromise on house compensation. ● Prepare the resettlement action plan through consultation with PAPs
	Loss of employment of PAPs	M, P (-)	● LGUs to assist them in vocational training, creation/introduction of jobs suitable for them in cooperation with other agencies concerned and NGO. ● Require contractor to employ them for the construction works.
Construction Works including site clearing, soil excavation, soil transportation, soil dumping, structure works	Generation of job opportunity for local people	M, T (+)	● Require contractor to hire local people for the construction works and employ the local materials and services
	Intersection of existing road disrupting traffic: one road with 200 m distance	M, T (-)	● Construction of a temporary detour road
	Damage of existing roads due to soil transportation works and movement of heavy equipment	M, T (-)	● Regular road maintenance ● Restore the road conditions to original after completion of construction works
B. Natural Environment			
Construction Works including site clearing, soil excavation, soil transportation, soil dumping, structure works	Runoff of dumped soils from the reclamation land to surrounding areas at a rainy time	M, T (-)	● Implement the stabilization works of the dumped soils
	Clearance of the trees on the riverbanks of the retarding basin	M, P (-)	● Careful clearance of riverbank trees not to cut endangered/vulnerable species such as Kamagong and Is-is ● Planting of trees on the surrounding banks of the retarding basins to compensate for habitat loss of birds/small animals

Table 2.15 (2/2) Summary of Environmental Impact and Mitigation Measures

C. Public Hazard			
Construction Works including site clearing, soil excavation, soil transportation, soil dumping, structure works	Dust generation by excavation, transportation and dumping works of soils	M, T (-)	● Sprinkle water at the soil excavation and dumping sites on regular basis ● Cover the soils on dump truck by sheet
	River water pollution (turbidity) due to sediment runoff by revetment works of riverbank and excavation works of retarding basin	M, T (-)	● Construct temporary coffer dams enclosing the revetment work sites ● Install adequate temporary sedimentation pits at the outlet of the retarding basin
	Generation of solid waste; cleared grass/bush at the construction site and garbage at the labor camp	M, T (-)	● Contractor to collect the cleared grass/bush to dispose them at the designated site ● Collect and transport the garbage generated from the labor camp to the designated disposal site on regular basis
	Increase of noise by operation of construction equipment	M, T (-)	● Contractor to prepare a proper working time schedule during day-time
	Traffic disturbance due to soil transportation to land reclamation site	M, T (-)	● Traffic control of transportation road (limit of operation time, arrangement of traffic controller) ● Pavement of road shoulder for traffic use of tricycles and motorbikes
Operation Phase			
A. Social Environment		Not Anticipated	
B. Natural Environment		Not Anticipated	
C. Public Hazard			
O/M of the retarding basin	Growth of grass in the retarding basin and people's illegal garbage dumping into the retarding basin	M, P (-)	● O/M responsible organization to clear the grass during dry season as required and collect/transport to the designated site for treatment. ● O/M responsible organization to inspect the site, collect/transport the garbage to the transfer station of the new solid waste disposal system of Cavite Province. ● SIRRP to promote the information and education campaign to maintain the retarding basins clean

Note: (1): S: significant, M: moderate, P: permanent, T: temporary, (-): negative impact, (+): positive impact
(2): SIRRP: Save Imus River Rehabilitation Project

Table 2.16 (1/2) Environmental Monitoring Plan

Project Activities	Monitoring Item	Parameter and Method	Location	Frequency
Construction Phase				
A. Social Environment				
Land Acquisition and Resettlement	Progress of land acquisition	Acquired area	Project site	Quarterly
	Progress of resettlement	Number of removed house by field inspection	Project site	Quarterly
	Infrastructures of new settlement	Interview with PAPs	Resettlement site	Quarterly
	Achievement of income restoration	Interview with PAPs	Resettlement site	Every half year
B. Natural Environment				
	Soil erosion and runoff	Erosion and runoff condition by field inspection	Reclamation area and river bank around project site	Monthly
	Planting of trees	Growth of planted trees by field inspection	Tree planted site	Every half year
C. Public Hazard				
Construction Works	Air quality	TSP by the standard observation method of Philippines	Surrounding residential area of the retarding basin (at least 6 points)	Monthly during active construction period
	Water quality	pH, DO, BOD, TSS, Oil/Grease, Total Coliform by the standard observation method of Philippines	Designated downstream points of the Imus, Bacoor and Julian rivers (at least 3 points)	Quarterly during active construction period
	Solid waste	Presence or absence of dumps, waste bins, collection system	Construction site and labor camp	Monthly
	Noise	Noise by the standard observation method of Philippines	Surrounding residential area of the retarding basin (at least 6points)	Monthly during active construction period
	Traffic disturbance	Traffic disturbance by field inspection	At critical points on the soil transportation route	Monthly during active construction period
Operation Phase				
A. Social Environment		None		
B. Natural Environment				
O/M of retarding basin	Planting of trees	Growth of planted trees by field inspection	Tree planted site	Yearly

Table 2.16 (1/2) Environmental Monitoring Plan

C. Public Hazard				
O/M of retarding basin	People's illegal garbage dumping into the retarding basin	Dumped garbage by field inspection	Within the retarding basin	Every half year
	Growth of grass in the retarding basin	Growth of grass by field inspection	Within the retarding basin	Yearly

Table 3.1 Work Schedule for Pilot Project in Imus

No.	Activities/Projects	Resp.	Schedule	Oct 07	Nov 07	Dec 07	Jan 08	February 2008
								F S S M T W TH F S S M T W TH F S S M T W TH F S S M T W TH F S
								1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 1
A.	**IEC OF 26 Barangays along Riverbanks**							
1	Preparation of Module for Trainers' Training		Oct-07					
	1.2. Progress Monitoring	CCK						
2	Trainors' Training	SCC/SIRP	Nov-Dec 2007					
	2.1. Selection of Trainors	SIRP/SCC	Oct, 2007					
	2.2. Actual Training of Trainors	SCC	Nov-Dec 2007					
	2.3. Progress Monitoring	CCK						
3	Development of training materials per target group	SCC/SIRP	Jan-08					
	e.g. barangay leaders, residents, youth, mothers,							
	business sectors, schools, etc							
	- Progress Monitoring	CCK						
4	Conduct of actual IEC per target group	SCC/SIRP						
	4.1. Anabu 1-A, 1-C,1-E,1-F,1-G		Feb 2. 200					
	4.2. Anabu II-B, II-C, II-D, II-E,II-F		Feb 2. 2008					
	4.3. Palico 1,2,3,4		Feb.9, 2008					
	4.4. Poblacion I-A, I-B, II-A		Feb. 16, 2008					
	4.5. Tanzang Luma I,II,III,IV,V,VI		Feb. 23, 2008					
	4.6. Toclong I-C, II-A,II-B		March 1, 2008					
B	**Riverbank Enhancement**							
1	Establishment of nursery plant co-managed by	SCC/LGU/	Oct. 2007					
	community members	SIRP						
	- Progress Monitoring							
2	Tree Planting (simultaneously with the river clean	SCC/LGU/						
	2.1. Anabu 1-A, 1-C,1-E,1-F,1-G	SIRP	Feb 2. 200					
	2.2. Anabu II-B, II-C, II-D, II-E,II-F		Feb 2. 2008					
	2.3. Palico 1,2,3,4		Feb.9, 2008					
	2.4. Poblacion I-A, I-B, II-A		Feb. 16, 2008					
	2.5. Tanzang Luma I,II,III,IV,V,VI		Feb. 23, 2008					
	2.6. Toclong I-C, II-A,II-B		March 1, 2008					
C.	Monitoring & Evaluation of the Project for its	LGU/	March ,08					
	Effectiveness ans Sustainability	SCC/SIRP						

SIRP Save Imus River Project
SCC Sagip-ilog Cavite Council
CCK C. C. Keiyo
JICA Japan International Cooperation Agency Study Team
LGU Local Government Unit

Table 3.2 Work Schedule for Pilot Project in Kawit

No.	Activities/Projects	Resp.	Schedule	Oct 07	Nov 07	Dec 07	Jan 08	February 2008
								F S S M T W TH F S S M T W TH F S S M T W TH F S S M T W TH F
								1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
1	Preparation of Module for Trainers' Training		Oct-07					
	1.1 Draft Module & Seminar Material Preparation	KSI	1-10 Oct '07					
	1.2 Review of Draft Module & Seminar Material	SICC	11-20 Oct '07					
	1.3 Finalization of Module/Seminar material	KSI	21-31 Oct '07					
	1.4 Progress Monitoring	CCK	Oct-07					
2	Preparation of Comic Reading Materials							
	2.1 Draft Design & Layout preparation	KSI	Nov. 2007					
	2.2 Review of Draft Design/Layout	SICC	Nov. 2007					
	2.3 Sample printing	KSI	Dec. 2007					
	2.4 Review of Sample Prints	SICC	Dec. 2007					
	2.5 Progress Monitoring	CCK	Nov/Dec 07					
3	Printing of Comics Reading materials	KSI/JICA	Jan-08					
	- Progress Monitoring	CCK						
4	Trainor's Training	KSI	Nov-Jan 08					
	- Continuous from Nov 07 to Jan 08							
	- Progress Monitoring	CCK						
5	Printing of Materials for Seminar Workshop	KSI/JICA	Jan-08					
	- Progress Monitoring	CCK						
6	Workshop/Seminar	KSI	Feb-08					
	- Assistance/Monitoring	SICC/CCK						
	February 4 - Marulas		Monday					
	February 7 - Kaingen and Poblacion		Thursday					
	February 11 - Wakas 1 & Wakas 2		Monday					
	February 14 - Sta. Isabel		Thursday					
	February 18 - Panamitan		Monday					
	February 21 - Gahak		Thursday					
	February 25 - Tabon 1,2 & 3		Monday					
	February 28 - Binakayan		Thursday					
7	Distribution of Comics reading Materials	KSI	Feb-08					
	- Distribution Monitoring	CCK						

KSI Kawit Sagip Ilog
SICC Sagip Ilog Cavite Council
CCK C. C. Keiyo
JICA Japan International Cooperation Agency Study Team

Table 3.3 Work Schedule for Second Pilot Project

ACTIVITIES	RESP	REMARKS	Feb	Mar	April	May	June
A. PREPARATION STAGE							
1. Project Formulation							
1.1 Team organized (provincial level), Discussed with PG-ENRO	PG-ENRO	Meeting (Food)					
1.2 Preparation of the Concept	PG-ENRO	Kawit, Imus documents discussed.					
1.3 Clustering of barangay's	LGU						
1.3.1 Discuss with PPDO/MENRO of 5 LGUs	PG-ENRO	Discussed on Feb 20 at Taal Vista					
1.3.2 Prepare/Distribute Municipal Inundation Map	JICA	Distributed during the meeting					
1.3.3 Obtain Representative Barangay Cluster	LGU, PG-ENRO	Receive from LGU by 29 Feb 08					
2. Project Proposal Preparation							
2.1 Work plan and budget developed	PG-ENRO						
2.2 Funding secured from local and provincial government	PG-ENRO, LGU						
2.4 Presentation of Proposal to JICA HQ for approval	JICA						
2.5 Funding secured from JICA, LGU and Prov'l. Government	JICA						
3. Development of IEC Materials and Module							
3.0 Consultative meeting with LGUs on IEC Material/Module	PG-ENRO, LGU						
3.1 Explanation to LGUs on preparation of IEC Material/module by LGUs	PG-ENRO						
3.2 Preparation of IEC Materials	LGUs/PG-ENRO	To be guided by PG-ENRO					
3.2.1 Training Module							
3.2.1a Review of past and present IEC activities on solid waste							
3.2.2b Conduct Training Needs Assessment (TNA)							
3.2.3d Development of training modules							
3.2.4e Logistical preparation							
3.2.2 Development and lay outing of leaflet	PG--ENRO, PIO						
3.2.3 Identification of Resource persons							
B. IMPLEMENTATION STAGE							
1. Briefing of Preparation Status to JICA	PG-ENRO						
2. Workshop/Seminar							
2.1 Training of Trainers on Community Workshop	PG-ENRO/LGU	5 reps per LGU					
2.2 Community Workshop							
2.1.1 Tanza	LGU/Brgy						
2.1.2 Rozario	LGU/Brgy						
2.1.3 Noveleta	LGU/Brgy						
2.1.4 Bacoor	LGU/Brgy						
2.1.5 Gen Trias	LGU/Brgy						
3. Support to Oplan Linis							
3.1 Tanza - Printing of Leaflet							
3.2 Rosario - Simultaneous Barangay clean-up							
3.3 Noveleta - Mangrove Planting							
3.4 Bacoor - Barangay competition using recyclable materials							
3.5 Gen. Trias - Poster making contest (secondary school level)							
C. EVALUATION AND REPORTING							
1. Report submitted to PG-Enro	LGU						
2. Assessment, evaluation and recommendation	PG-ENRO						
3. Submission of Reports to JICA	JICA						

PG-ENRO Provincial Government - Environment and Natural Resources Office
LGU Local Government Units)
JICA Japan International Cooperaiton Agency/Study Team
Brgy Selected Barangay Cluster (Community Representative)

Table 3.4 Discussion Result of Map Exercise

Barangay	Group No.	Questions			
		How did you choose the evacuation route?	**What did you pay attention to during evacuation?**	**What makes your evacuation difficult?**	**What can we do by ourselves for early evacuation?**
Potol-Magdalo	**1**	Easy accessibility	They check if there are enough food, medicine, clothes, drinking water, etc.	The evacuation of the children, the sick, and the elderly	Awareness
	2	It is the route going to the Potol Bridge	They check if the children, sick, and the elders evacuate early	Lack of supplies in the evacuation centers as well as during the evacuation itself (i.e. ropes, small boat, etc.)	Necessary supplies (e.g. food, clothing, candles, drinking water, medicine, etc.) should be stored
	3	The routes are chosed based on the proximity from their place, it is safe, and it is easily accessible to residents of the barangay.	Families are prioritized. They check if there are enough supplies (e.g. flashlight, food, ropes, medicine, drinking water, clothing, etc.) and if the route is safe on the way to the evacuation center.	If the evacuation centers are far and if their necessities are not prepared	Weather news should be monitored on the radio or TV. The residents should not hesitate to leave some of their household things that they can't really save.
Gahak	**1**	Easy accessibility	Priority is given to those who are in flood prone areas (most members of this group are barangay tanods) . They also pay attention to the weather condition and the possibility of having accidents along the way (e.g. stepping into drainage system which are under construction). In the evacuation center, they also check the availability of drinking water, food, clothing, etc.	Areas with high inundation	Any weather disturbance and rising flood water/river should be monitored. They also listen/watch the news. If necessary, they also volunteer to give whatever help can be offered to the community.
	2	Easy accessibility	Families are prioritized. The inundation (as it gets higher) and household things that might get wet are also being monitored.	The river currents are strong (most of the members live near the river).	Coordination with barangay officials
	3	The routes are chosen because of its location. It is the area with the highest elevation and is easily accessible. It also has the lowest level of inundation.	Families are prioritized. Food, clothing and shelter is second. Saving other valuables is the least. Information is gathered from forecasts from TV and radio.	Lack of (1) supply, (2) places to evacuate, and (3) coordination with officials	Storing supplies (food, clothing, etc.) and coordination with the officials
Manggahan-Lawin	**1**	Poximity to their place	The residents should help each other (from the Barangay Captain's point of view)	Heavy/strong currents	Staying in-tune for the weather news on the radio or TV and monitoring announcements from the MDCC and PDCC.
	2	Poximity to their place	The routes should be safe and they should get to the center as soon as possible	Narrow passageways	Announcements using megaphones and/or mobile phones
	3	Easy accessibility and safest route	Familie are prioritized. As barangay tanods, it is also their duty to make sure that all the residents of the barangay are safe.	Lack of supplies (e.g. 2-way radios, medicine, small boats, etc.)	Monitoring of weather news on the radio or TV
Model Answer		Accessibility (higher place, nearest route, etc.)	Dangerous Point such as creeks, road-side drainages, manholes and electric facilities lowgrand level along evacuation route Check if elderly or children evacuate	Late evacuation (strong current, deep water depth) Heavy rain Evacuation on foot Carring your properties Obstacles along evacuation route (vehicles, tricycle, garbage, tec.)	Preparations as usual Checking the things that might be obstacles during flood in advance Early evacuation system of Barangay Understanding and Familiarization of Flood Hazard Map

Table 3.5 Discussion Result of each Municipality

Municipality	Questions			
	How did you choose the evacuation route?	**What do you pay attention to during evacuation?**	**What makes your evacuation difficult?**	**What can we do by ourselves for early evacuation?**
Bacoor	Nearness of the evacuation area and safety of evacuees	Safety of evacuees	Lack of rescue/evacuation equipments (e.g. rubber boats)	Continuous monitoring of weather updates through the radio, television and also from the PDCC
Gen. Trias	Safety of evacuation site	Safety of evacuees and their belongings	(1) properties can't be left behind since it will be prone to thieves, (2) route is also heavily flooded.	If the inundation depth is getting higher, secure your properties and evacuate immediately.
Imus	Easy accessibility and with high elevation	Children, elders and the condition/safety of the evacuation site	Lack of cooperation among the residents and too much baggages.	By being attentive and through the better understanding and learing on how to use the flood hazard map
Noveleta	Evacuation site should be safe and accessible	Safety of evacuees	Transportation, food, and other basic needs of the evacuees	(1) proper information and orientation of the flood hazard map, (2) early warning device
Rosario	Safety of evacuation site	(1) basic needs such as goods, money and food, (2) safety of family members	Transportation, long distance to evacuation center, lack of communication tools	Early warning system
Tanza	Most convenient route	Security of all important belongings	Lack of cooperation among the residents	Early warning system

Table 3.6 Evacuation Centers Designated in Municipality of Kawit

No.	NAME	Barangay	Class	Inundation depth (m)	
				5-yr	100-yr
1	Balsahan-Bisita Barangay Hall	Balsahan-Bisita	Government Facility	0.80	1.25
2	Philippine Independent Church	Balsahan-Bisita	Church	0.16	0.59
3	Batong Dalig Barangay Hall	Batong Dalig	Government Facility	0.00	0.00
4	Batong Dalig Chapel	Batong Dalig	Church	0.00	0.00
5	Batong Dalig Day Care Center	Batong Dalig	Day Care Center	0.00	0.00
6	Batong Dalig Elementary School	Batong Dalig	School	0.00	0.00
7	Kawit Municipal Hall	Batong Dalig	Government Facility	0.00	0.01
8	Binakayan-Aplaya Barangay Hall	Binakayan-Aplaya	Government Facility	0.48	0.96
9	Binakayan-Aplaya Day Care Center	Binakayan-Aplaya	Day Care Center	0.00	0.10
10	Binakayan-Kanluran Barangay Hall	Binakayan-Kanluran	Government Facility	0.00	0.19
11	Binakayan Elementary School	Congbalay-Legaspi	School	0.20	0.68
12	Congbalay-Legaspi Barangay Hall	Congbalay-Legaspi	Government Facility	0.00	0.38
13	Emiliano Tria Tirona Memorial National High School	Gahak	School	0.11	0.26
14	Gahak Barangay Hall	Gahak	Government Facility	0.17	0.53
15	Gahak Chapel	Gahak	Church	0.17	0.53
16	Gahak-Marulas Elementary School	Gahak	School	0.42	0.78
17	Kaingen Barangay Hall & Day Care Center	Kaingen	Government Facility & Day Care Center	0.00	0.00
18	Kaingen Basketball Court	Kaingen	Sports Facility	0.00	0.15
19	Borja Hall / Putol Day Care Center	Magdalo (Putol)	Day Care Center	0.29	0.89
20	Magdalo (Putol) Barangay Hall	Magdalo (Putol)	Government Facility	0.09	0.53
21	Potol-Sta. Isabel Elementary School	Magdalo (Putol)	School	0.00	0.59
22	Lanai Day Care Center	Manggahan-Lawin	Day Care Center	0.00	0.28
23	Manggahan-Lawin Barangay Hall / Day Care Center	Manggahan-Lawin	Government Facility & Day Care Center	0.11	0.38
24	Marulas Barangay Hall	Marulas	Government Facility	0.00	0.00
25	Panamitan Day Care Center	Panamitan	Day Care Center	0.00	0.00
26	Panamitan Elementary School	Panamitan	School	0.00	0.61
27	Kaingen-Poblacion Elementary School	Poblacion	School	0.00	0.18
28	Poblacion Barangay Hall	Poblacion	Government Facility	0.00	0.00
29	St. Mary Magdalene Church	Poblacion	Church	0.00	0.18
30	Binakayan National High School	Pulvorista	School	0.36	0.75
31	F. Ilano Memorial School	Pulvorista	School	0.36	0.75
32	Pulvorista Barangay Hall	Pulvorista	Government Facility	0.27	0.66
33	Samala-Marquez Barangay Hall	Samala-Marquez	Government Facility	0.43	0.89
34	Samala-Marquez Day Care Center	Samala-Marquez	Day Care Center	0.43	0.89
35	San Sebastian Barangay Hall	San Sebastian	Government Facility	0.00	0.00
36	San Sebastian Day Care Center	San Sebastian	Day Care Center	0.00	0.30
37	Dr. Timoteo V. Encarnacio Memorial Basketball Court	Sta. Isabel	Sports Facility	0.00	0.00
38	Sta. Isabel Barangay Hall	Sta. Isabel	Government Facility	0.00	0.36
39	Tabon I Barangay Hall	Tabon I	Government Facility	0.00	0.02
40	Tabon I Day Care Center	Tabon I	Day Care Center	0.33	0.72
41	Tabon II Barangay Hall	Tabon II	Government Facility	0.70	1.11
42	Tabon III Barangay Hall	Tabon III	Government Facility	0.28	0.73
43	Tabon III Day Care Center	Tabon III	Day Care Center	0.02	0.36
44	Toclong Barangay Hall	Toclong	Government Facility	0.00	0.04
45	Toclong Elementary School	Toclong	School	0.00	0.00
46	Toclong Elementary School & Toclong Day Care Center	Toclong	School & Day Care Center	0.00	0.01
47	Tramo Bantayan Barangay Hall & Day Care Center	Tramo Bantayan	Government Facility & Day Care Center	0.14	0.54
48	Wakas I Barangay Hall & Day Care Center	Wakas I	Government Facility & Day Care Center	0.00	0.13
49	Wakas II Day Care Center	Wakas II	Day Care Center	0.08	0.64

Note: The water depth is computed by simulation model that JICA Study Team developed in the Study.
Simulated water depth might be different from actual one because the simulation model doesn't consider the microtopography
5-yr: under probable 5-year flood condition
10-yr: under probable 10-year flood condition

Table 4.1 (1/4) List of Technology Transfer/Consensus Building Sessions

Date	Topic	Sub-topic	Method	Attendees	Location
September 4, 2007	Development Control	Mechanism of flooding	Individual Consultation	Lowland communicates	Kawit, Tanza, Rosario
September 12, 2008	Development Control	Zoning, survey and development procedure/Population projection	Individual Consultation	Bellen Ceniza, Director-HLURB Region IV A	HLURB
September 18, 2007	Development Control	Development application monitoring	Individual Consultation	Mr. Proceso H. Curioso, MPDC	Indang
September 18, 2007	Development Control	Application processing procedure	Individual Consultation	Ms. Jennifer T. Manes, MPDC	Silang
September 18, 2007	Development Control	Illegal occupation of land and growth control	Individual Consultation	Mr. Carlos J. Suniga, CPDC	Tagaytay
September 18, 2007	Development Control	Protecting agricultural land	Individual Consultation	Mr. Alvin B. Colarina, MPDC	Amadeo
September 19, 2007	Development Control	Locating unwanted land use--dumping site	Individual Consultation	Ms. Corazon c. Tahimic, MPDC	Tanza
September 19, 2007	Development Control	Land use and Zoning	Individual Consultation	Mr. Efren P. Criman. MPDC	Noveleta
September 19, 2007	Development Control	MPDC training at UP	Individual Consultation	Mr. Redentor G. Dones, MPDC	Kawit
September 19, 2007	Development Control	Development impact to circulation	Individual Consultation	Ms. Silvia de Castro	Bacoor
September 20, 2007	Development Control	Protecting agricultural land/Using GIS	Individual Consultation	Ms. Jennifer T. Manes, MPDC	Silang
September 20, 2007	Development Control	Development fees and exactions	Individual Consultation	Engr. Moises C. Menguito, MPDC	Dasmarinas
September 20, 2007	Development Control	Using satellite images/digital maps in land use planning	Individual Consultation	Engr. Rodel Pelaez, MPDC	Imus

Table 4.1 (2/4) List of Technology Transfer/Consensus Building Sessions

Date	Topic	Sub-topic	Method	Attendees	Location
September 21, 2007	Development Control	Case Study: Antel Grand, Bacao, General Trias	Individual Consultation	Mr. Jemie Cubillo, MPDC	Gen Trian
September 21, 2007	Development Control	Development fees and exactions	Individual Consultation	Mr. Alberto S. Ararao, CPDC	Trece Martires City
September 21, 2007	Development Control	Land use control in flood prone areas	Individual Consultation	Mr. R. Q. Broas, MPDC	Rosario
September 28, 2007	Development Control		Individual Consultation	Engr. Moises C. Menguito, MPDC	Dasmarinas
September 28, 2007	Development Control	Protected area management	Individual Consultation	Ms. Jennifer T. Manes, MPDC	Silang
October 2, 2007	Development Control	National project (Cavite export zone) and Flood Mitigation	Individual Consultation	Mr. R. Q. Broas, MPDC	Rosario
October 5, 2007	Flood mitigation/Growth management	Current flood situation and necessity of flood mitigation	Seminar/Lecture	P/C/MPDCs	Dasmarinas
October 22, 2007	On-site flood regulation pond, growth management	Using GIS/Issues of development	Stake holder Meeting Seminar/Lecture/workshop	P/C/MPDCs	Dasmarinas
February 10, 2008	Growth Management/On-site Flood Regulation Pond	Protecting agricultural land	Individual Consultation	DA-OIC	Trece Martires City
February 13, 2008	Growth Management/On-site Flood Regulation Pond	Growth management-concept and benefit to flood mitigation	Lecture/Individual Consultation	Engr. Rodel Pelaez, MPDC, Engr. Moises C. Menguito, MPDC	Imus, Dasmarinas
February 14, 2008	Growth Management/On-site Flood Regulation Pond	Growth management-concept and benefit to flood mitigation	Lecture/Individual Consultation	Ms. Eden Austria, PPDC	PPDO

Table 4.1 (3/4) List of Technology Transfer/Consensus Building Sessions

Date	Topic	Sub-topic	Method	Attendees	Location
February 20, 2008	Growth Management/On-site Flood Regulation Pond	Growth management-concept and benefit to flood mitigation	Lecture/Individual Consultation	Mr. R. Q. Broas, MPDC, Mr. Redentor G. Dones, MPDC	Lowland MPDCs
February 21, 2008	Growth Management/On-site Flood Regulation Pond	Growth management-concept and benefit to flood mitigation	Lecture/Individual Consultation	Mr. Alberto S. Ararao, CPDC, Engr. Moises C. Menguito, MPDC	Midland MPDCs
February 26, 2008	Growth Management/On-site Flood Regulation Pond	Growth management-concept and benefit to flood mitigation	Lecture/Individual Consultation	Mr. Jemie Cubillo, Ms. Silvia de Castro, MPDCs	Bacoor, General Trias
February 27, 2008	Growth Management/On-site Flood Regulation Pond	Growth management-concept and benefit to flood mitigation	Lecture/Individual Consultation	Mr. Redentor G. Dones, MPDC, Ms. Corazon c. Tahimic, MPDC, Ms. Jennifer T. Manes, MPDC	Kawit, Tanza, Silang
July 7, 2008	Promoting Ordinances/ Consensus Building	Delineating growth boundaries/On-site flood regulation pond requirement	Lecture/Individual Consultation	Mr. Alberto S. Ararao, CPDC	CPDC Office, Trece Martires City, Cavite
July 8, 2008	Promoting Ordinances/ Consensus Building	Delineating growth boundaries/On-site flood regulation pond requirement	Lecture/Individual Consultation	Engr. Rodel Pelaez, MPDC	CPDC Office, Municipality of Imus, Cavite
July 9, 2008	Promoting Ordinances/ Consensus Building	Delineating growth boundaries/On-site flood regulation pond requirement	Case Study (Kawayan)	Mr. Jemie Cubillo, MPDC	CPDC Office, Municipality of General Trias, Cavite
July 10, 2008	Promoting Ordinances/ Consensus Building	Delineating growth boundaries/On-site flood regulation pond requirement	Individual Consultation	Engr. Moises Menguito, MPDC	CPDC Office, Municipality of Dasmariñas, Cavite

Table 4.1 (4/4) List of Technology Transfer/Consensus Building Sessions

Date	Topic	Sub-topic	Method	Attendees	Location
July 15, 2008	Promoting Ordinances/ Consensus Building	Function of PLUC: measures for capacity development	Individual Consultation	Ms. Lilia Lumbera, the Administrative Officer, HLURB Region IV-A	Office, HLURB Region IV-A, Quezon City
July 15, 2008	Promoting Ordinances/ Consensus Building	National standards and local ordinance	Individual Consultation	Ms. Nora L. Diaz, En.P., Head Field operations Support Group, HLURB	Office, HLURB Central, Quezon City
July 16, 2008	Promoting Ordinances/ Consensus Building	Growth Management Ordinance: Capacity Development of PLUC	Lecture/Workshop-Revising Growth Management Ordinance	Provincial Land Use Committee Members	Meeting Room, PPDO, Capital Building Cavite, Trece Martires City, Cavite
July 18, 2008	Promoting Ordinances/ Consensus Building	Comprehensive approach to flood mitigation	Lecture/discussion	Mayor Melencio L. De Sagun, Jr.,Trece Martires City	Conference Room, Trece Martires City, Cavite
July 18, 2008	Promoting Ordinances/ Consensus Building	Implementing the ordinances	Lecture/discussion	Mayor Strike Bautista Revilla, Municipality of Bacoor.	Conference Room, Municipality of Bacoor
July 21, 2008	Promoting Ordinances/ Consensus Building	Current flood situation and necessity of flood mitigation	Lecture	Members of Sangguniang Panlalawigan	Regular Session, Sangguniang Panlalawigan , Session Hall, Legislative Building, Trece Martires City, Cavite
July 24, 2008	Promoting Ordinances/ Consensus Building	Consensus building among stakeholders	Lecture/discussion	Hon. Virgilio T. Ambion; Hon. Alex L. Advincula; and Hon. Raymundo A. Del Rosario	Committee on Land Use, Zoning, urban ' Rural Development, SP, Conference Room, Legislative Building, Trece Martires City, Cavite

Table 5.1 (1/2) Database for Management of River Area (Sheet-A: Cross-sectional Boundary Line)

Name of River: Imus River

Boundary Marker	Location of Cross-sectional Boundary Line								Width of River Area (m)			
	Left Bank				Right Bank				Width of River Body	Width of River Corridor		Entire Width of River Area
	Lat.	Long.	Barangay	Municipality	Lat.	Long.	Barangay	Municipality		Left Bank	Right Bank	
0.000	14° 27' 42.98" N	120° 55' 00.6" E	Pulvorista	Bacoor	14° 27' 47.44" N	120° 55' 09.01" E	Sineguelasan	Bacoor	166	3	0	169
0.100	14° 27' 42.09" N	120° 55' 09.78" E	Pulvorista	Bacoor	14° 27' 45.33" N	120° 55' 11.58" E	Sineguelasan	Bacoor	92	3	0	95
0.200	14° 27' 40.81" N	120° 55' 11.81" E	Pulvorista	Bacoor	14° 27' 43.37" N	120° 55' 13.92" E	Sineguelasan	Bacoor	101	3	0	104
0.300	14° 27' 38.45" N	120° 55' 14.17" E	Pulvorista	Bacoor	14° 27' 40.48" N	120° 55' 15.95" E	Sineguelasan	Bacoor	82	3	3	88
0.400	14° 27'00. 31" N	120° 55' 15.69" E	Pulvorista	Bacoor	14° 27' 38.45" N	120° 55' 18.72" E	Sineguelasan	Bacoor	108	138	3	249
0.500	14° 27' 32.56" N	120° 55' 20.16" E	Pulvorista	Bacoor	14° 27' 37.03" N	120° 55' 21.96" E	Sineguelasan	Bacoor	93	63	3	159
0.600	14° 27' 31.73" N	120° 55' 23.62" E	Pulvorista	Bacoor	14° 27' 36.25" N	120° 55' 25.12" E	Sineguelasan	Bacoor	90	56	3	149
0.700	14° 27' 30.83" N	120° 55' 27.44" E	Pulvorista	Bacoor	14° 27' 35.42" N	120° 55' 28.96" E	Sineguelasan	Bacoor	131	17	3	152
0.800	14° 27' 29.68" N	120° 55' 30.72" E	Pulvorista	Bacoor	14° 27' 33.18" N	120° 55' 32.06" E	Sineguelasan	Bacoor	104	10	3	118
0.900	14° 27' 28.43" N	120° 55' 33.91" E	Pulvorista	Bacoor	14° 27' 31.34" N	120° 55' 35.16" E	Sineguelasan	Bacoor	86	11	3	100
1.000	14° 27' 27.20" N	120° 55' 37.05" E	Pulvorista	Bacoor	14° 27' 29.82" N	120° 55' 38.52" E	Sineguelasan	Bacoor	85	14	3	102
1.100	14° 27' 25.48" N	120° 55' 39.16" E	Pulvorista	Bacoor	14° 27' 27.44" N	120° 55' 41.12" E	Sineguelasan	Bacoor	71	14	3	87
1.200	14° 27' 23.83" N	120° 55' 40.03" E	Pulvorista	Bacoor	14° 27' 24.39" N	120° 55' 42.62" E	Banalo	Bacoor	61	11	3	75
1.300	14° 27' 21.48" N	120° 55' 40.23" E	Congbalay-Legaspi	Bacoor	14° 27' 21.49" N	120° 55' 42.47" E	Banalo	Bacoor	50	18	3	70
1.400	14° 27' 19.51" N	120° 55' 39.47" E	Congbalay-Legaspi	Bacoor	14° 27' 18.04" N	120° 55' 42.09" E	Banalo	Bacoor	61	25	3	89
1.500	14° 27' 15.89" N	120° 55' 37.06" E	Congbalay-Legaspi	Bacoor	14° 27' 15.33" N	120° 55' 39.89" E	Mabolo I	Bacoor	51	20	3	74
1.600	14° 27' 11.79" N	120° 55' 38.04" E	Balsahan-Bisita	Bacoor	14° 27' 12.38" N	120° 55' 40.29" E	Mabolo I	Bacoor	60	3	3	66
1.700	14° 27' 08.78" N	120° 55' 39.39" E	Balsahan-Bisita	Bacoor	14° 27' 09.03" N	120° 55' 41.03" E	Mabolo I	Bacoor	52	3	3	58
1.800	14° 27' 06.17" N	120° 55' 39.73" E	Balsahan-Bisita	Bacoor	14° 27' 06.01" N	120° 55' 41.51" E	Mabolo I	Bacoor	53	3	3	59
1.900	14° 27' 03.33" N	120° 55' 39.56" E	Balsahan-Bisita	Bacoor	14° 27' 02.95" N	120° 55' 40.99" E	Mabolo I	Bacoor	45	3	3	51
2.000	14° 27' 00.21" N	120° 55' 38.06" E	Balsahan-Bisita	Bacoor	14° 26' 59.79" N	120° 55' 39.82" E	Mabolo III	Bacoor	39	3	3	45
2.100	14° 26' 00.57" N	120° 55' 37.73" E	Balsahan-Bisita	Bacoor	14° 26' 56.09" N	120° 55' 38.63" E	Mabolo III	Bacoor	27	3	3	33
2.200	14° 26' 53.48" N	120° 55' 37.85" E	Manggahan-Lawin	Bacoor	14° 26' 54.03" N	120° 55' 38.94" E	Mabolo III	Bacoor	37	3	3	43
2.300	14° 26' 50.49" N	120° 55' 40.33" E	Manggahan-Lawin	Bacoor	14° 26' 51.63" N	120° 55' 40.87" E	Mabolo III	Bacoor	39	3	3	45
2.400	14° 26' 49.08" N	120° 55' 43.46" E	Manggahan-Lawin	Bacoor	14° 26' 50.19" N	120° 55' 43.88" E	Mabolo III	Bacoor	36	3	3	42
2.500	14° 26' 48.04" N	120° 55' 46.53" E	Manggahan-Lawin	Bacoor	14° 26' 49.31" N	120° 55' 47.12" E	Mabolo III	Bacoor	33	3	0	36
2.600	14° 26' 47.01" N	120° 55' 49.66" E	Manggahan-Lawin	Bacoor	14° 26' 48.15" N	120° 55' 50.21" E	Mabolo III	Bacoor	29	3	0	32
2.700	14° 26' 45.37" N	120° 55' 51.33" E	Manggahan-Lawin	Bacoor	14° 26' 46.12" N	120° 55' 52.76" E	Mabolo III	Bacoor	38	3	0	41
2.800	14° 26' 42.28" N	120° 55' 52.48" E	Toclong II-B	Imus	14° 26' 42.25" N	120° 55' 54.15" E	Salinas I	Bacoor	41	3	0	44
2.900	14° 26' 39.41" N	120° 55' 52.19" E	Toclong II-B	Imus	14° 26' 38.81" N	120° 55' 54.07" E	Salinas I	Bacoor	32	3	28	62
3.000	14° 26' 36.14" N	120° 55' 51.07" E	Toclong II-B	Imus	14° 26' 35.72" N	120° 55' 53.59" E	Salinas I	Bacoor	31	3	46	80
3.100	14° 26' 32.65" N	120° 55' 51.15" E	Toclong II-B	Imus	14° 26' 33.95" N	120° 55' 53.31" E	Salinas I	Bacoor	38	3	38	79
3.200	14° 26' 30.46" N	120° 55' 53.78" E	Toclong II-B	Imus	14° 26' 32.19" N	120° 55' 54.25" E	Salinas I	Bacoor	39	3	16	58

Table 5.1 (2/2) Database for Management of River Area (Sheet-A: Extent of River Area)

Name of River: Imus River

Boundary Marker	Location of Cross-sectional Boundary Line								Width of River Area (m)			
	Left Bank				Right Bank				Width of River Body (m)	Width of River Corridor (m)		Entire Width of River Area (m)
	Lat.	Long.	Barangay	Municipality	Lat.	Long.	Barangay	Municipality		Left Bank	Right Bank	
3.300	14° 26' 32.04" N	120° 55' 57.06" E	Toclong I-C	Imus	14° 26' 33.03" N	120° 55' 56.14" E	Salinas I	Bacoor	34	3	5	42
3.400	14° 26' 33.28" N	120° 55' 58.88" E	Toclong I-C	Imus	14° 26' 34.58" N	120° 55' 59.73" E	Salinas I	Bacoor	38	3	9	51
3.500	14° 26' 30.43" N	120° 56' 00.64" E	Toclong I-C	Imus	14° 26' 30.78" N	120° 56' 02.71" E	Salinas I	Bacoor	34	3	29	66
3.600	14° 26' 27.11" N	120° 56' 01.56" E	Toclong I-C	Imus	14° 26' 28.08" N	120° 56' 03.69" E	Salinas I	Bacoor	28	3	43	74
3.700	14° 26' 24.39" N	120° 56' 03.38" E	Toclong I-C	Imus	14° 26' 26.77" N	120° 56' 04.78" E	Salinas I	Bacoor	37	3	47	87
3.800	14° 26' 23.03" N	120° 56' 06.33" E	Toclong I-C	Imus	14° 26' 24.02" N	120° 56' 07.74" E	Salinas I	Bacoor	33	3	14	51
4.000	14° 26' 17.68" N	120° 56' 09.65" E	Toclong I-C	Imus	14° 26' 18.38" N	120° 56' 10.58" E	Salinas I	Bacoor	23	3	0	26
4.100	14° 26' 14.84" N	120° 56' 09.99" E	Toclong I-C	Imus	14° 26' 14.58" N	120° 56' 12.02" E	Salinas I	Bacoor	17	3	44	64
4.200	14° 26' 11.39" N	120° 56' 09.36" E	Toclong I-C	Imus	14° 26' 12.26" N	120° 56' 11.88" E	Salinas I	Bacoor	24	3	56	83
4.300	14° 26' 08.13" N	120° 56' 10.27" E	Toclong I-C	Imus	14° 26' 10.31" N	120° 56' 12.19" E	Salinas I	Bacoor	29	3	60	91
4.400	14° 26' 06.35" N	120° 56' 12.49" E	Toclong I-C	Imus	14° 26' 07.16" N	120° 56' 14.12" E	Salinas I	Bacoor	26	3	29	58
4.500	14° 26' 03.59" N	120° 56' 14.17" E	Toclong I-C	Imus	14° 26' 04.45" N	120° 56' 15.92" E	Salinas I	Bacoor	23	3	35	62
4.600	14° 26' 00.72" N	120° 56' 16.09" E	Toclong I-C	Imus	14° 26' 01.33" N	120° 56' 1703" E	Salinas I	Bacoor	23	3	18	44
4.700	14° 25' 57.87" N	120° 56' 17.24" E	Poblacion II-A (Pob.)	Imus	14° 25' 58.77" N	120° 56' 18.66" E	Real I	Imus	21	3	30	54
4.800	14° 25' 56.05" N	120° 56' 20.12" E	Poblacion II-A (Pob.)	Imus	14° 25' 56.9" N	120° 56' 20.71" E	Real I	Imus	15	3	16	35
4.900	14° 25' 54.07" N	120° 56' 22.41" E	Poblacion II-A (Pob.)	Imus	14° 25' 54.43" N	120° 56' 24.07" E	Palico I	Imus	17	3	33	54
5.000	14° 25' 50.65" N	120° 56' 22.61" E	Poblacion II-A (Pob.)	Imus	14° 25' 51.98" N	120° 56' 25.03" E	Palico I	Imus	13	3	71	86
5.100	14° 25' 48.47" N	120° 56' 24.86" E	Poblacion I-B	Imus	14° 25' 52.62" N	120° 56' 24.83" E	Palico I	Imus	23	3	70	96
5.200	14° 25' 47.98" N	120° 56' 27.71" E	Poblacion IV-D	Imus	14° 25' 49.09" N	120° 56' 29.45" E	Palico I	Imus	19	3	44	65
5.300	14° 25' 44.08" N	120° 56' 28.83" E	Poblacion IV-D	Imus	14° 25' 45.22" N	120° 56' 30.12" E	Palico III	Imus	20	3	21	44
5.400	14° 25' 41.65" N	120° 56' 29.09" E	Poblacion IV-D	Imus	14° 25' 42.15" N	120° 56' 31.15" E	Palico III	Imus	23	3	18	43
5.500	14° 25' 38.66" N	120° 56' 31.05" E	Poblacion IV-D	Imus	14° 25' 39.36" N	120° 56' 32.05" E	Palico III	Imus	18	3	18	40
5.600	14° 25' 36.08" N	120° 56' 33.04" E	Tanzang Luma I	Imus	14° 25' 36.91" N	120° 56' 34.52" E	Palico III	Imus	24	3	27	54
5.700	14° 25' 33.24" N	120° 56' 33.73" E	Tanzang Luma I	Imus	14° 25' 31.74" N	120° 56' 37.01" E	Palico III	Imus	25	3	3	31
5.800	14° 25' 30.83" N	120° 56' 31.05" E	Tanzang Luma I	Imus	14° 25' 28.42" N	120° 56' 35.53" E	Palico IV	Imus	36	3	3	42
6.000	14° 25' 27.41" N	120° 56' 32.73" E	Tanzang Luma I	Imus	14° 25' 33.01" N	120° 56' 36.56" E	Palico III	Imus	22	3	3	28
Average									46	9	16	72

Table 5.2 (1/4) Database for Management of River Area (Sheet B: Land Use in River Area)

Name of River: Imus River_Left Bank

Boundary Marker			Extent of River Corridor		Number of Houses	Type of Land Use (a) Residential, (b) Commercial, (c) Vacant, (d) Others				Obstruction of River Flow (a): Serious (b) Not Serious		Hampering River Environment (a): Serious (b) Not Serious		Remarks
			Ave. Width (m)	Area (m^2)		(a)	(b)	(c)	(d)	(a)	(b)	(a)	(b)	
0.000	-	0.100	3.0	300.0	0				x		x		x	River Corridor is used as Fishing Pond
0.100	-	0.200	3.0	300.0	0				x		x		x	River Corridor is used as Fishing Pond
0.200	-	0.300	3.0	300.0	0			x			x		x	
0.300	-	0.400	70.4	7,044.7	2			x	x		x		x	Confluence with a creek
0.400	-	0.500	100.3	10,032.4	1		x	x		x			x	Storehouse
0.500	-	0.600	59.6	5,958.8	1		x	x		x			x	Storehouse
0.600	-	0.700	36.9	3,694.1	0			x			x		x	
0.700	-	0.800	14.0	1,397.6	0			x			x		x	
0.800	-	0.900	10.8	1,084.3	0			x			x		x	
0.900	-	1.000	12.3	1,234.9	0			x			x		x	
1.000	-	1.100	13.5	1,350.2	0			x			x		x	
1.100	-	1.200	12.2	1,220.9	0			x			x		x	
1.200	-	1.300	14.2	1,423.7	0			x			x		x	
1.300	-	1.400	21.1	2,107.9	0			x			x		x	
1.400	-	1.500	22.4	2,243.2	0			x			x		x	
1.500	-	1.600	11.6	1,163.1	0			x			x		x	
1.600	-	1.700	3.0	300.0	0			x			x		x	
1.700	-	1.800	3.0	300.0	0			x			x		x	
1.800	-	1.900	3.0	300.0	0			x			x		x	
1.900	-	2.000	3.0	300.0	2	x		x			x		x	
2.000	-	2.100	3.0	300.0	3	x		x			x		x	
2.100	-	2.200	3.0	300.0	1	x		x			x		x	
2.200	-	2.300	3.0	300.0	6	x		x			x		x	
2.300	-	2.400	3.0	300.0	1	x					x		x	
2.400	-	2.500	3.0	300.0	1			x	x		x		x	School
2.500	-	2.600	3.0	300.0	0			x			x		x	
2.600	-	2.700	3.0	300.0	0			x			x		x	
2.700	-	2.800	3.0	300.0	0			x			x		x	
2.800	-	2.900	3.0	300.0	0			x			x		x	
2.900	-	3.000	3.0	300.0	4	x		x			x		x	
3.000	-	3.100	3.0	300.0	0			x			x		x	
3.100	-	3.200	3.0	300.0	0			x			x		x	
3.200	-	3.300	3.0	300.0	2	x		x	x	x			x	Graveyard, Confluence with Jurian River

Table 5.2 (2/4) Database for Management of River Area (Sheet B: Land Use in River Area)

Name of River: Imus River_Left Bank

Boundary Marker			Extent of River Corridor		Number of Houses	Type of Land Use (a) Residential, (b) Commercial, (c) Vacant, (d) Others				Obstruction of River Flow (a): Serious (b) Not Serious		Hampering River Environment (a): Serious (b) Not Serious		Remarks
			Ave. Width (m)	Area (m^2)		(a)	(b)	(c)	(d)	(a)	(b)	(a)	(b)	
3.300	-	3.400	3.0	300.0	0				x		x		x	Graveyard
3.400	-	3.500	3.0	300.0	0				x		x		x	Graveyard
3.500	-	3.600	3.0	300.0	0				x		x		x	Graveyard
3.600	-	3.700	3.0	300.0	0			x			x		x	
3.700	-	3.800	3.0	600.0	0			x			x		x	
3.800	-	4.000	3.0	300.0	4	x		x			x		x	
4.000	-	4.100	3.0	300.0	0			x			x		x	
4.100	-	4.200	3.0	300.0	0			x			x		x	
4.200	-	4.300	3.0	300.0	0			x			x		x	
4.300	-	4.400	3.0	300.0	0			x			x		x	
4.400	-	4.500	3.0	300.0	0			x			x		x	
4.500	-	4.600	3.0	300.0	0			x			x			
4.600	-	4.700	3.0	300.0	2	x		x			x		x	
4.700	-	4.800	3.0	300.0	0			x			x		x	
4.800	-	4.900	3.0	300.0	0			x			x		x	
4.900	-	5.000	3.0	300.0	0			x			x		x	
5.000	-	5.100	3.0	300.0	0			x			x		x	
5.100	-	5.200	3.0	300.0	2	x		x			x		x	
5.200	-	5.300	3.0	300.0	0			x			x		x	
5.300	-	5.400	3.0	300.0	0			x			x		x	
5.400	-	5.500	3.0	300.0	0			x			x		x	
5.500	-	5.600	3.0	300.0	0			x			x		x	
5.600	-	5.700	3.0	300.0	0			x			x		x	
5.700	-	5.800	3.0	300.0	0			x			x		x	
5.800	-	6.000	3.0	300.0	5	x		x		x			x	
Total				**53,756**	**37**									

Table 5.2 (3/4) Database for Management of River Area (Sheet B: Land Use in River Area)

Name of River: Imus River_Right Bank

Boundary Marker			Extent of River Corridor		Number of Houses	Type of Land Use				Obstruction of River Flow		Hampering River Environment		Remarks
			Ave. Width (m)	Area (m^2)		(a) Residential, (b) Commercial, (c) Vacant, (d) Others				(a): Serious (b) Not Serious		(a): Serious (b) Not Serious		
						(a)	(b)	(c)	(d)	(a)	(b)	(a)	(b)	
0.000	-	0.100	0.0	0.0	0						x		x	Earth Dike
0.100	-	0.200	0.0	0.0	0						x		x	Earth Dike
0.200	-	0.300	0.0	0.0	0						x		x	Confluence with Creek
0.300	-	0.400	3.0	300.0	0		x				x		x	Resort Hotel
0.400	-	0.500	3.0	300.0	0		x				x		x	Resort Hotel
0.500	-	0.600	3.0	300.0	0		x		x		x		x	Resort Hotel
0.600	-	0.700	3.0	210	0			x			x		x	Resort Hotel, Confluence with Creek
0.700	-	0.800	3.0	300	0			x			x		x	
0.800	-	0.900	3.0	300	0			x			x		x	Fishing Pond
0.900	-	1.000	3.0	300	4	x		x			x		x	
1.000	-	1.100	3.0	300	2	x		x			x		x	
1.100	-	1.200	3.0	300	0			x			x		x	
1.200	-	1.300	3.0	300	3	x		x			x		x	
1.300	-	1.400	3.0	300	2	x		x			x		x	Confluence with Bacoor River
1.400	-	1.500	3.0	210	0			x			x		x	
1.500	-	1.600	3.0	300	0			x			x		x	
1.600	-	1.700	3.0	300	0			x			x		x	Parapet wall of about 1.5m high
1.700	-	1.800	3.0	300	8	x		x			x		x	
1.800	-	1.900	3.0	300	2	x		x			x		x	
1.900	-	2.000	3.0	300	2	x		x			x		x	
2.000	-	2.100	3.0	300	0			x			x		x	
2.100	-	2.200	3.0	300	1	x		x			x		x	
2.200	-	2.300	3.0	300	0			x			x		x	
2.300	-	2.400	3.0	300.0	0						x		x	
2.400	-	2.500	3.0	300.0	4	x		x			x		x	
2.500	-	2.600	0.0	0.0	0						x		x	Existing Road as the Dike
2.600	-	2.700	0.0	0.0	0						x		x	Existing Road as the Dike
2.700	-	2.800	0.0	0.0	0						x		x	Existing Road as the Dike, Riprap
2.800	-	2.900	13.9	1,387.1	6	x		x		x			x	Riprap
2.900	-	3.000	36.8	3,676.4	0			x			x		x	Riprap
3.000	-	3.100	41.8	4,179.8	0			x		x			x	Riprap
3.100	-	3.200	26.9	2,692.1	5	x		x		x			x	
3.200	-	3.300	10.7	1,067.9	0						x		x	

Table 5.2 (4/4) Database for Management of River Area (Sheet B: Land Use in River Area)

Name of River: Imus River_Right Bank

Boundary Marker			Extent of River Corridor		Number of Houses	Type of Land Use				Obstruction of River Flow		Hampering River Environment		Remarks
			Ave. Width (m)	Area (m^2)		(a) Residential, (b) Commercial, (c) Vacant, (d) Others				(a): Serious (b) Not Serious		(a): Serious (b) Not Serious		
						(a)	(b)	(c)	(d)	(a)	(b)	(a)	(b)	
3.300	-	3.400	7.3	732.5	0						x		x	
3.400	-	3.500	19.1	1,914.1	13	x		x		x		x		
3.500	-	3.600	35.9	3,588.5	19	x		x		x		x		
3.600	-	3.700	45.0	4,501.1	13	x		x		x		x		
3.700	-	3.800	30.8	3,081.4	4	x		x		x			x	
3.800	-	4.000	7.2	1,441.6	6	x		x			x		x	Riprap
4.000	-	4.100	22.0	2,195.9	7	x		x			x		x	
4.100	-	4.200	50.0	5,002.5	12	x		x		x			x	
4.200	-	4.300	57.9	5,791.1	19	x		x		x			x	
4.300	-	4.400	44.3	4,425.8	12	x		x		x			x	
4.400	-	4.500	32.1	3,214.5	19	x		x		x			x	
4.500	-	4.600	26.9	2,688.9	9	x		x			x		x	
4.600	-	4.700	23.9	2,392.6	16	x		x			x		x	Riprap
4.700	-	4.800	22.9	2,288.0	6	x		x		x		x		
4.800	-	4.900	24.9	2,485.8	12						x		x	
4.900	-	5.000	52.0	5,203.1	12	x		x			x		x	
5.000	-	5.100	70.3	7,028.3	7	x		x			x		x	
5.100	-	5.200	56.8	5,675.8	20	x				x		x		
5.200	-	5.300	32.1	3,213.1	5	x		x			x		x	
5.300	-	5.400	19.2	1,917.4	10	x					x		x	
5.400	-	5.500	18.0	1,796.6	7	x					x		x	
5.500	-	5.600	22.8	2,276.7	7	x					x		x	
5.600	-	5.700	15.1	1,510.3	12	x		x			x		x	
5.700	-	5.800	3.0	300.0	0			x			x		x	
5.800	-	6.000	3.0	300.0	0						x		x	
Total				**88,748**	**286**									

Table 5.3 (1/4) Database for Management of River Area (Sheet C: River Structure)

Name of River: Imus River_ Left Bank

Boundary Marker			River Dike			Bank Protection Works			River Bridge				Others		
			Structural Type	Conditions	Remarks	Structural Type	Conditions	Remarks	Name of Bridge	Structural Type	Conditions	Remarks	Structural Type	Conditions	Remarks
0.000	-	0.100	-	-	-	-	-	-	-	-	-	-	-	-	-
0.100	-	0.200	-	-	-	-	-	-	-	-	-	-	-	-	-
0.200	-	0.300	-	-	-	-	-	-	-	-	-	-	-	-	-
0.300	-	0.400	-	-	-	-	-	-	-	-	-	-	-	-	-
0.400	-	0.500	Earth Dike/Road	No notable damage	-	-	-	-	-	-	-	-	-	-	-
0.500	-	0.600	Earth Dike/Road	No notable damage	-	-	-	-	Island Cove	Concrete T Gilder	No notable damage	-	-	-	-
0.600	-	0.700	Earth Dike/Road	No notable damage	-	-	-	-	-	-	-	-	-	-	-
0.700	-	0.800	Earth Dike/Road	No notable damage	-	-	-	-	-	-	-	-	-	-	-
0.800	-	0.900	Earth Dike/Road	No notable damage	-	-	-	-	-	-	-	-	-	-	-
0.900	-	1.000	Earth Dike/Road	No notable damage	-	-	-	-	-	-	-	-	-	-	-
1.000	-	1.100	Earth Dike/Road	No notable damage	-	-	-	-	-	-	-	-	-	-	-
1.100	-	1.200	Earth Dike/Road	No notable damage	-	-	-	-	-	-	-	-	-	-	-
1.200	-	1.300	Earth Dike/Road	No notable damage	-	-	-	-	-	-	-	-	-	-	-
1.300	-	1.400	Earth Dike/Road	No notable damage	-	-	-	-	-	-	-	-	-	-	-
1.400	-	1.500	Earth Dike/Road	No notable damage	-	-	-	-	-	-	-	-	-	-	-
1.500	-	1.600	Earth Dike/Road	No notable damage	-	-	-	-	Under Construction	Concrete T Gilder	No notable damage	-	-	-	-
1.600	-	1.700	-	-	-	-	-	-	-	-	-	-	-	-	-
1.700	-	1.800	-	-	-	-	-	-	-	-	-	-	-	-	-
1.800	-	1.900	-	-	-	-	-	-	-	-	-	-	-	-	-
1.900	-	2.000	-	-	-	-	-	-	Bina Kayan	Concrete T Gilder	No notable damage	-	-	-	-
2.000	-	2.100	-	-	-	Stone Masonry	No notable damage	Under Const.	-	-	-	-	-	-	-
2.100	-	2.200	-	-	-	-	-	-	-	-	-	-	-	-	-
2.200	-	2.300	-	-	-	-	-	-	-	-	-	-	-	-	-
2.300	-	2.400	-	-	-	-	-	-	-	-	-	-	-	-	-
2.400	-	2.500	-	-	-	-	-	-	-	-	-	-	-	-	-
2.500	-	2.600	-	-	-	-	-	-	-	-	-	-	-	-	-
2.600	-	2.700	-	-	-	-	-	-	-	-	-	-	-	-	-
2.700	-	2.800	-	-	-	-	-	-	-	-	-	-	-	-	-
2.800	-	2.900	-	-	-	-	-	-	-	-	-	-	-	-	-
2.900	-	3.000	-	-	-	-	-	-	-	-	-	-	-	-	-
3.000	-	3.100	-	-	-	-	-	-	-	-	-	-	-	-	-
3.100	-	3.200	-	-	-	-	-	-	-	-	-	-	-	-	-
3.200	-	3.300	Parapet Wall	No notable damage	Grave yard	Concrete Revetment	No notable damage	-	-	-	-	-	-	-	-
3.300	-	3.400	Parapet Wall	No notable damage	Grave yard	Concrete Revetment	No notable damage	-	-	-	-	-	-	-	-
3.400	-	3.500	Parapet Wall	No notable damage	Grave yard	Concrete Revetment	No notable damage	-	-	-	-	-	-	-	-
3.500	-	3.600	-	-	-	-	-	-	-	-	-	-	-	-	-
3.600	-	3.700	-	-	-	-	-	-	-	-	-	-	-	-	-
3.700	-	3.800	-	-	-	-	-	-	-	-	-	-	-	-	-
3.800	-	4.000	-	-	-	-	-	-	-	-	-	-	-	-	-
4.000	-	4.100	-	-	-	-	-	-	-	-	-	-	-	-	-
4.100	-	4.200	-	-	-	-	-	-	-	-	-	-	-	-	-
4.200	-	4.300	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 5.3 (2/4) Database for Management of River Area (Sheet C: River Structure)

Name of River: Imus River_ Left Bank

Boundary Marker			River Dike			Bank Protection Works			River Bridge				Others		
			Structural Type	Conditions	Remarks	Structural Type	Conditions	Remarks	Name of Bridge	Structural Type	Conditions	Remarks	Structural Type	Conditions	Remarks
4.300	-	4.400	-	-	-	-	-	-	Palico I, Imus	Concrete T Gilder	No notable damage		-	-	-
4.400	-	4.500	-	-	-	-	-	-	-	-	-	-	-	-	-
4.500	-	4.600	-	-	-	-	-	-	-	-	-	-	-	-	-
4.600	-	4.700	-	-	-	-	-	-	-	-	-	-	-	-	-
4.700	-	4.800	-	-	-	-	-	-	-	-	-	-	-	-	-
4.800	-	4.900	-	-	-	-	-	-	-	-	-	-	-	-	-
4.900	-	5.000	-	-	-	-	-	-	-	-	-	-	-	-	-
5.000	-	5.100	-	-	-	-	-	-	-	-	-	-	-	-	-
5.100	-	5.200	-	-	-	-	-	-	-	-	-	-	-	-	-
5.200	-	5.300	-	-	-	-	-	-	-	-	-	-	-	-	-
5.300	-	5.400	-	-	-	-	-	-	-	-	-	-	-	-	-
5.400	-	5.500	-	-	-	-	-	-	-	-	-	-	-	-	-
5.500	-	5.600	-	-	-	-	-	-	-	-	-	-	-	-	-
5.600	-	5.700	-	-	-	-	-	-	-	-	-	-	-	-	-
5.700	-	5.800	-	-	-	-	-	-	-	-	-	-	-	-	-
5.800	-	6.000	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 5.3 (3/4) Database for Management of River Area (Sheet C: River Structure)

Name of River: Imus River_ Right Bank

Boundary Marker			River Dike			Bank Protection Works			River Bridge				Others		
			Structural Type	Conditions	Remarks	Structural Type	Conditions	Remarks	Name of Bridge	Structural Type	Conditions	Remarks	Structural Type	Conditions	Remarks
0.000	-	0.100	Earth Dike	No notable damage	-	-	-	-	-	-	-	-	-	-	-
0.100	-	0.200	Earth Dike	No notable damage	-	-	-	-	-	-	-	-	-	-	-
0.200	-	0.300	Earth Dike	No notable damage	-	-	-	-	-	-	-	-	-	-	-
0.300	-	0.400	-	-	-	-	-	-	-	-	-	-	-	-	-
0.400	-	0.500	-	-	-	-	-	-	-	-	-	-	-	-	-
0.500	-	0.600	-	-	-	-	-	-	Island Cove	Concrete T Gilder	No notable damage	-	-	-	-
0.600	-	0.700	-	-	-	-	-	-	-	-	-	-	-	-	-
0.700	-	0.800	-	-	-	-	-	-	-	-	-	-	-	-	-
0.800	-	0.900	-	-	-	-	-	-	-	-	-	-	-	-	-
0.900	-	1.000	-	-	-	-	-	-	-	-	-	-	-	-	-
1.000	-	1.100	-	-	-	-	-	-	-	-	-	-	-	-	-
1.100	-	1.200	-	-	-	-	-	-	-	-	-	-	-	-	-
1.200	-	1.300	-	-	-	-	-	-	-	-	-	-	-	-	-
1.300	-	1.400	-	-	-	-	-	-	-	-	-	-	-	-	-
1.400	-	1.500	-	-	-	-	-	-	-	-	-	-	-	-	-
1.500	-	1.600	-	-	-	-	-	-	Under Construction	Concrete T Gilder	No notable damage	-	-	-	-
1.600	-	1.700	-	-	-	-	-	-	-	-	-	-	-	-	-
1.700	-	1.800	-	-	-	-	-	-	-	-	-	-	-	-	-
1.800	-	1.900	-	-	-	-	-	-	-	-	-	-	-	-	-
1.900	-	2.000	-	-	-	-	-	-	Bina Kayan	Concrete T Gilder	No notable damage	-	-	-	-
2.000	-	2.100	-	-	-	-	-	-	-	-	-	-	-	-	-
2.100	-	2.200	-	-	-	-	-	-	-	-	-	-	-	-	-
2.200	-	2.300	-	-	-	-	-	-	-	-	-	-	-	-	-
2.300	-	2.400	-	-	-	-	-	-	-	-	-	-	-	-	-
2.400	-	2.500	-	-	-	-	-	-	-	-	-	-	-	-	-
2.500	-	2.600	Parapet Wall	No notable damage	-	Concrete Revetment	No notable damage	-	-	-	-	-	-	-	-
2.600	-	2.700	Parapet Wall	No notable damage	-	Concrete Revetment	No notable damage	-	-	-	-	-	-	-	-
2.700	-	2.800	Parapet Wall	No notable damage	-	Concrete Revetment	No notable damage	-	-	-	-	-	-	-	-
2.800	-	2.900	Road	No notable damage	-	-	-	-	-	-	-	-	-	-	-
2.900	-	3.000	Road	No notable damage	-	-	-	-	-	-	-	-	-	-	-
3.000	-	3.100	Road	No notable damage	-	-	-	-	-	-	-	-	-	-	-
3.100	-	3.200	Road	No notable damage	-	-	-	-	-	-	-	-	-	-	-
3.200	-	3.300	Parapet Wall	No notable damage	-	Concrete Revetment	No notable damage	-	-	-	-	-	-	-	-
3.300	-	3.400	Parapet Wall	No notable damage	-	Concrete Revetment	No notable damage	-	-	-	-	-	-	-	-
3.400	-	3.500	Road	No notable damage	-	-	-	-	-	-	-	-	-	-	-
3.500	-	3.600	Road	No notable damage	-	-	-	-	-	-	-	-	-	-	-
3.600	-	3.700	Road	No notable damage	-	-	-	-	-	-	-	-	-	-	-
3.700	-	3.800	Parapet Wall	No notable damage	-	Concrete Revetment	No notable damage	-	-	-	-	-	-	-	-
3.800	-	4.000	Road	No notable damage	-	-	-	-	-	-	-	-	-	-	-
4.000	-	4.100	Parapet Wall	No notable damage	-	Concrete Revetment	No notable damage	-	-	-	-	-	-	-	-
4.100	-	4.200	Road	No notable damage	-	-	-	-	-	-	-	-	-	-	-
4.200	-	4.300	Road	No notable damage	-	-	-	-	-	-	-	-	-	-	-

Table 5.3 (4/4) Database for Management of River Area (Sheet C: River Structure)

Name of River: Imus River_ Right Bank

Boundary Marker			River Dike			Bank Protection Works			River Bridge				Others		
			Structural Type	Conditions	Remarks	Structural Type	Conditions	Remarks	Name of Bridge	Structural Type	Conditions	Remarks	Structural Type	Conditions	Remarks
4.300	-	4.400	Road	No notable damage		-	-	-	-	-	-	-	-	-	-
4.400	-	4.500	Road	No notable damage		-	-	-	-	-	-	-	-	-	-
4.500	-	4.600	Road	No notable damage		-	-	-	-	-	-	-	-	-	-
4.600	-	4.700	Road	No notable damage		-	-	-	-	-	-	-	-	-	-
4.700	-	4.800	Road	No notable damage		-	-	-	-	-	-	-	-	-	-
4.800	-	4.900	Road	No notable damage		-	-	-	-	-	-	-	-	-	-
4.900	-	5.000	Road	No notable damage		-	-	-	-	-	-	-	-	-	-
5.000	-	5.100	Road	No notable damage		-	-	-	-	-	-	-	-	-	-
5.100	-	5.200	Road	No notable damage		-	-	-	-	-	-	-	-	-	-
5.200	-	5.300	Road	No notable damage		-	-	-	-	-	-	-	-	-	-
5.300	-	5.400	Road	No notable damage		-	-	-	-	-	-	-	-	-	-
5.400	-	5.500	Road	No notable damage		-	-	-	-	-	-	-	-	-	-
5.500	-	5.600	Road	No notable damage		-	-	-	-	-	-	-	-	-	-
5.600	-	5.700	Road	No notable damage		-	-	-	-	-	-	-	-	-	-
5.700	-	5.800	-	-	-	-	-	-	-	-	-	-	-	-	-
5.800	-	6.000	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 5.4 (1 /5) Database Sheet for Management of River Area (Sheet D: Particularities of River Area)

Name of River: Imus River

Boundary Marker	River Dike		River Corridor		Hinterland	
	Left Bank	Right Bank	Left Bank	Right Bank	Left Bank	Right Bank
0.000 - 0.100	There exist no dike.	The earth dike of EL. 1.2 to 1.4 in height runs.	The area is covered with mangrove forest.	The area other than the dike space is nil.	The area is reclaimed and remains as vacant land.	The area is used as fishing pond and/or mangrove forest.
0.100 - 0.200	- Ditto -	- Ditto -	- Ditto -	- Ditto -	- Ditto -	- Ditto -
0.200 - 0.300	- Ditto -	A creek joins to the mainstream, and there exits no dike.	The area is remained as the vacant land.	- Ditto -	- Ditto -	The area is covered with the flow area of a creek.
0.300 - 0.400	- Ditto -	A creek joins to the mainstream, and there exist no dike.	There are a few house encroachments (shanties) in the area.	The area is used as the premises of a resort hotel named Island Cove.	The downstream area from confluence of the creek is vacant land, while the upstream area is used as residential are, where several shanties exist.	The area is reclaimed and used as the premises of Island Cove.
0.400 - 0.500	The existing road running along the river channel functions as the circle dike.	There exist no dike.	The area is used as residential area and/or the premises of storehouse.	- Ditto -	The area is used as the residential area.	- Ditto -
0.500 - 0.600	- Ditto -	- Ditto -	The area is used as the premises of storehouse.	- Ditto -	- Ditto -	- Ditto -
0.600 - 0.700	- Ditto -	A creek joins to the mainstream, and there exits no dike.	The area is remained as the vacant land.	- Ditto -	The area is used and/or projected as the residential area.	- Ditto -
0.700 - 0.800	The existing road running along the river channel functions as the circle dike.	There exist no dike.	The area other than the dike space is nil.	The area is occupied by the mangrove forest.	The area is remained used as the fishing pond.	The area is remained as the mangrove forest and/or the fishing pond.
0.900 - 1.000	The existing road running along the river channel functions as the circle dike.	There exist no dike.	The area other than the dike space is nil.	The area is densely packed with houses.	The area is remained used as the fishing pond.	The area is covered with the residential areas.
1.000 - 1.100	- Ditto -	- Ditto -	- Ditto -	- Ditto -	The area is remained as the vacant land but projected to be residential area.	- Ditto -
1.100 - 1.200	- Ditto -	- Ditto -	- Ditto -	The area is 3m wide and used as the residential area and/or mangrove forest.	The area is remained as the fishing pond.	The area is covered with the residential areas and vacant land.

Table 5.4 (2 /5) Database Sheet for Management of River Area (Sheet D: Particularities of River Area)

Name of River: Imus River

Boundary Marker	River Dike		River Corridor		Hinterland	
	Left Bank	Right Bank	Left Bank	Right Bank	Left Bank	Right Bank
1.200 - 1.300	- Ditto -	- Ditto -	The area other than the dike space is nil.	The area is densely packed with houses.	- Ditto -	The area is covered with the residential areas.
1.300 - 1.400	- Ditto -	- Ditto -	- Ditto -	- Ditto -	The area is remained as vacant land.	The area is shared by the residential area and the vacant land.
1.400 - 1.500	- Ditto -	Bacoor River joins to the mainstream, and there is no dike.	The area is remained as the vacant land.	The area is remained as the vacant land.	The area is remained as vacant land and/or fishing pond.	The area is remained as the vacant land and/or the flow area of Bacoor River.
1.500 - 1.600	The road, which functions as the circle dike, protects about 80% of the area but another 20% has no dike.	There exist no dike.	- Ditto -	- Ditto -	- Ditto -	The area is remained as the vacant land.
1.600 - 1.700	There exists no dike.	- Ditto -	- Ditto -	- Ditto -	- Ditto -	- Ditto -
1.700 - 1.800	- Ditto -	- Ditto -	- Ditto -	The area is densely packed with houses.	- Ditto -	The area is covered with the residential areas.
1.800 - 1.900	- Ditto -	- Ditto -	- Ditto -	- Ditto -	The area is covered with residential area.	- Ditto -
1.900 - 2.000	There exists no dike.	There exists no dike.	Almost half of the area is covered with the residential area.	A substantial part is covered with the residential area.	A substantial part is covered with the residential area.	A substantial is covered with the residential area.
2.000 - 2.100	- Ditto -	- Ditto -	A substantial part is remained as the vacant land but a few houses exist in the area.	The area is remained as the vacant land.	- Ditto -	- Ditto -
2.100 - 2.200	- Ditto -	- Ditto -	- Ditto -	A substantial part is remained as the vacant land but a few houses exist in the area.	A substantial part is remained as the vacant land.	- Ditto -
2.200 - 2.300	- Ditto -	- Ditto -	The area is encroached Houses encroach to the area.	- Ditto -	A substantial part is covered with the residential area.	- Ditto -

Table 5.4 (3 /5) Database Sheet for Management of River Area (Sheet D: Particularities of River Area)

Name of River: Imus River

Boundary Marker	River Dike		River Corridor		Hinterland	
	Left Bank	Right Bank	Left Bank	Right Bank	Left Bank	Right Bank
2.300 - 2.400	- Ditto -	- Ditto -	A substantial part is remained as the vacant land but a few houses exist in the area.	- Ditto -	- Ditto -	- Ditto -
2.400 - 2.500	- Ditto -	- Ditto -	- Ditto -	- Ditto -	- Ditto -	- Ditto -
2.500 - 2.600	- Ditto -	The existing road running along the river channel functions as the circle dike.	- Ditto -	The area other than the dike space is nil.	The area is shared by the residential area and the vacant land.	- Ditto -
2.600 - 2.700	- Ditto -	- Ditto -	The area is remained as the vacant land.	- Ditto -	A substantial part is remained as the vacant land.	- Ditto -
2.700 - 2.800	- Ditto -	- Ditto -	- Ditto -	- Ditto -	- Ditto -	- Ditto -
2.800 - 2.900	- Ditto -	- Ditto -	- Ditto -	The area of maximum 28m wide is occupied with the residential area.	- Ditto -	- Ditto -
2.900 - 3.000	- Ditto -	- Ditto -	About 80% of the area is encroached by houses (shanties).	The area is remained as the vacant land.	A substantial part is covered with the residential area.	- Ditto -
3.000 - 3.100	- Ditto -	- Ditto -	The area is remained as the vacant land.	The area is occupied by the residential area..	A substantial part is remained as the vacant land.	- Ditto -
3.100 - 3.200	- Ditto -	The existing road running along the river channel functions as the circle dike.	A substantial part is remained as the vacant land but a few houses encroach to the area..	The area other than the dike space is nil.	A substantial part is remained as the vacant land.	A substantial is covered with the residential area.
3.200 - 3.300	Jurian River joins to the mainstream, and the parapet wall runs along the upstream riverbank from the confluence with Jurian River.	- Ditto -	The upstream area from the confluence with Jurian River is nil, while the downstream area is encroached by a few houses, which are in danger of flood.	- Ditto -	The area is used as the graveyard.	- Ditto -
3.300 - 3.400	The parapet wall runs along the riverbank	- Ditto -	The area is nil.	- Ditto -	- Ditto -	- Ditto -

Table 5.4 (4 /5) Database Sheet for Management of River Area (Sheet D: Particularities of River Area)

Name of River: Imus River

Boundary Marker	River Dike		River Corridor		Hinterland	
	Left Bank	Right Bank	Left Bank	Right Bank	Left Bank	Right Bank
3.400 - 3.500	The parapet wall runs along the riverbank	The existing road running along the river channel functions as the circle dike.	The area is nil.	A substantial part of the area is occupied by the houses, which are in danger of flood.	The area is used as the graveyard.	A substantial is covered with the residential area.
3.500 - 3.600	There exits no dike.	- Ditto -	The area is used as the premises for the graveyard.	- Ditto -	- Ditto -	- Ditto -
3.600 - 3.700	- Ditto -	- Ditto -	The area is remained as the vacant land.	A substantial part of the area is occupied by the houses, which are in danger of flood.	A substantial part is remained as the vacant land.	- Ditto -
3.700 - 3.800	- Ditto -	- Ditto -	- Ditto -	- Ditto -	The area is shared by the residential are and vacant land.	- Ditto -
3.800 - 3.900	- Ditto -	- Ditto -	There are a few house encroachments.	About 40% of the area is occupied by the houses.	A substantial part is covered with the residential area.	- Ditto -
3.900 - 4.000	- Ditto -	- Ditto -	- Ditto -	The area fully occupied by houses.	A substantial part is covered with the residential area.	- Ditto -
4.000 - 4.100	- Ditto -	- Ditto -	The area is remained as the vacant land.	A substantial part of the area is occupied by the houses.	A substantial part is remained as the vacant land.	- Ditto -
4.100 - 4.200	- Ditto -	- Ditto -	- Ditto -	- Ditto -	A substantial part is covered with the residential area.	- Ditto -
4.200 - 4.300	- Ditto -	- Ditto -	- Ditto -	- Ditto -	The area is shared by the residential are and vacant land.	- Ditto -
4.300 - 4.400	- Ditto -	- Ditto -	- Ditto -	- Ditto -	- Ditto -	- Ditto -
4.400 - 4.500	- Ditto -	- Ditto -	- Ditto -	The area is fully occupied by the houses.	- Ditto -	- Ditto -
4.500 - 4.600	- Ditto -	- Ditto -	- Ditto -	A substantial part of the area is occupied by the houses.	- Ditto -	- Ditto -
4.600 - 4.700	- Ditto -	- Ditto -	There are a few storehouse encroachments.	The area is fully occupied by the houses.	- Ditto -	- Ditto -

Table 5.4 (5 /5) Database Sheet for Management of River Area (Sheet D: Particularities of River Area)

Name of River: Imus River

Boundary Marker	River Dike		River Corridor		Hinterland	
	Left Bank	Right Bank	Left Bank	Right Bank	Left Bank	Right Bank
4.700 - 4.800	There exits no dike.	The existing road running along the river channel functions as the circle dike.	The area is remained as the vacant land.	The area is fully occupied by the houses.	A substantial is covered with the residential area.	A substantial is covered with the residential area.
4.800 - 4.900	- Ditto -	- Ditto -	- Ditto -	The area is nil.	- Ditto -	- Ditto -
4.900 - 5.000	- Ditto -	- Ditto -	- Ditto -	A substantial part of the area is occupied by the houses.	- Ditto -	- Ditto -
5.000 - 5.100	- Ditto -	- Ditto -	- Ditto -	- Ditto -	- Ditto -	- Ditto -
5.100 - 5.200	- Ditto -	- Ditto -	A substantial part of the area is occupied by the houses.	- Ditto -	- Ditto -	- Ditto -
5.200 - 5.300	- Ditto -	- Ditto -	The area is remained as the vacant land.	- Ditto -	The area is remained as the vacant land.	- Ditto -
5.300 - 5.400	- Ditto -	- Ditto -	- Ditto -	The area is fully occupied by the houses.	A substantial is covered with the residential area.	- Ditto -
5.400 - 5.500	- Ditto -	- Ditto -	The area is remained as the vacant land.	- Ditto -	- Ditto -	- Ditto -
5.500 - 5.600	- Ditto -	- Ditto -	- Ditto -	- Ditto -	- Ditto -	- Ditto -
5.600 - 5.700	- Ditto -	- Ditto -	- Ditto -	A substantial part of the area is occupied by the houses.	- Ditto -	- Ditto -
5.700 - 5.800	The parapet wall runs along the bank.	- Ditto -	The area is nil.	The area is occupied by a Mall.	- Ditto -	- Ditto -
5.800 - 6.000	- Ditto -	- Ditto -	The area is occupied by houses	- Ditto -	- Ditto -	- Ditto -

Table 6.1 List of Counterpart Personnel

Expatriate	Name	Agency	Designation	Tel. No.
Project Manager	Ms. Dolores M. Hipolito	PMO-FCSEC, DPWH	Project Manager II	(0917) 2773960 (02) 640-0160
Development Planning Specialist	Mr. Elmo F. Atillano	DPD, PS, DPWH	Engineer III	(0918) 3338057 (02) 304-3350
Hydrologist/GIS Specialist	Mr. Harold N. Uyap	Research and Development Division, PMO-FCSEC, DPWH	Civil Engineer	(0917) 201-3754
Environmental and Social Development Specialist	Ms. (Belinda I. Fajardo)	ESSO-DPWH	Project Manager IV	(02) 304-3525
Public Works Engineer	Mr. Nolasco Madlangbayan	DEO-DPWH		
Flood Control Engineer	Mr. Romeo Belardo	DEO-DPWH		(0915) 2125452
Development Planning Specialist	Ms. Eden V. Austria, MPA	Provincial Planning & Development Office, Provincial. Gov.	Provincial Planning & Development Coordinator	(917) 5512502 (046) 419-1469
Environmental and Social Development Specialist	Mr. Rolinio Pozas	Environment and Natural Resources Offices, Provincial Government		(0917) 551-1562 (046) 4190916
Flood Control Engineer	Mr. Rodelio D. Cruz	Provincial Planning & Development Office, Provincial. Gov.		(0917) 7414649
Land Use Planning Specialist	Ms. Gloria L. Sarfe	Provincial Planning & Development Office, Provincial. Gov.	Planning Officer IV	(0919) 2676589
Community Participation Specialist	Ms. Anabelle L. Cayabyab	Environment and Natural Resources Offices, Provincial Government	Sr. Environmental Management Specialist	(0922) 8128420 (046) 419-0916

Table 6.2 Itinerary for Counter Part Training in Japan in the Year 2008

Date		Training Program	Trained by	Place to Stay
13-Jul	Sun	Move from Manila to Tokyo		Tokyo
14-Jul	Mon	Courtesy call to and orientation by JICA	JICA	Tokyo
15-Jul	Tue	Guidance and indoor lecture on comprehensive flood mitigation projects and community-based flood prevention activities in Japan	CTII	Tokyo
16-Jul	Wed	Study by observation of community-based flood prevention works and comprehensive flood mitigation projects practiced in Tsurumi River Basin	MLITT-Keihin River Project Office	Tokyo
17-Jul	Thu	Study by observation of the on-site flood regulation pond and nature-oriented river works adapted by Yokohama City	Bureau of Environmental Creation-Yokohama City	Tokyo
18-Jul	Fri	Indoor Lecture on measures against storm surge and river clean-up drive in Japan	CTII	Tokyo
19-Jul	Sat	Move from Tokyo to Osaka	CTII	Osaka
20-Jul	Sun	Study by observation on storage facility of storm rainfall and inland drainage facilities in Fushimi-East No. 5 Area and Kyoto Civic Disaster Prevention Center (Field Trip)	CTII	Osaka
21-Jul	Mon	Move from Kyoto to Yakayama Osaka (National Holiday)	CTII	Takayama
22-Jul	Tue	River Environmental Park, Site of Restoration Project for River Disaster, Site of Of-site Flood Retarding Basin for Econa River	Gifu Prefecture	Gifu
23-Jul	Wed	River Information System at Gifu Prefecture Office, Underground Flood Retention Facility, Site of Off-site Flood Retarding Basin	Gifu Prefecture	Tokyo
24-Jul	Thu	Indoor lecture on results of whole training items	CTII	Tokyo
25-Jul	Fri	Meeting with JICA for reporting and evaluation on the results of training	JICA	Tokyo
26-Jul	Sat	Move from Tokyo to Manila		

Table 6.3 Itinerary of Site Tour To Ormoc Flood Mitigation Project

Date	Activity	Time
Sep. 26, 2007	Move from Manila to Tacloban	AM. 05:35 to AM. 06:40
	Travel from Tacloban to Ormoc	AM. 06:50 to AM. 08:50
	Courtesy Call DPWH-4th LED, District Engineer	AM. 09:20 to AM. 09:00
	Site Inspection of Ormoc Flood Mitigation Project with DPWH - 4th Leyte District Engineering Office (Anilao River Improvement and Anilao, Biliboy Slit Dams)	AM. 09:30 to AM. 11:30
	Courtesy Call to Ormoc City Mayor	Am. 11:30 to AM. 12:00
	Joint Meeting with FMC, Ormoc Session Hall (1) Lecture on Role of FMC Organization, (2) Lecture on Activity of FMC (operation and maintenance), (3) Discussion	PM. 13:30 to PM. 17:00
Sep. 26, 2007	Visit Mass Grave of Ormoc Tragdy in 1991	AM. 08:10 - AM. 08:30
	Relocation Site and Disposal Area of Flood Mitigation Project	AM. 08:30 - AM. 10:30
	Discussion with FMC member in Pongos Hall (Q & A)	AM. 10:30 - AM. 12:00
	Move from Ormoc to Tacloban	PM. 12:20 - PM. 14:40
	Move from Tacloban to Manila	PM. 15:45 - PM. 17:10