Appendix-8
Flood Disaster Preparedness Manual

The Study on Comprehensive Flood Mitigation
for Cavite Lowland Area
in the Republic of the Philippines

Flood Disaster Preparedness Manual

December 2008

Province of Cavite
Department of Public Works and Highways (DPWH)
Japan International Cooperation Agency (JICA)
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Flood Prevention Preparedness Manual

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1. Introduction

1.1 Background

The Study on Comprehensive Flood Mitigation for Cavite Lowland Area was carried out by the JICA[1] Study Team from March 2007 to February 2009. The projects proposed in the Study include structural measures for the physical increment of flood mitigation capacity, and non-structural measures which are oriented to control the excessive land development in the river basin and other necessary approaches for sustainable flood management. These comprehensive flood mitigation approaches are necessary to cope with the complex factors of river overflow-flood and inland inundation.

Non-structural measure activities conducted in the Study include the creation of a flood hazard map prototype in cooperation with the PDCC[2], MDCC[3], Barangay officials and local residents, the demonstration of community-based disaster prevention activities such as evacuation drills, and preparation of this Manual.

1.2 Objective of this Manual

Since flood is a natural phenomenon, no structure for flood mitigation could easily stamp out flood damage. Moreover, the large-scale infrastructures such as river channel improvement, off-site flood retention pond and off-site flood retarding basin would require a long construction period during which floods might occur. Hence, flood warning and evacuation has been highlighted as one of the appropriate non-structural measures against floods that exceed the design capacity of the flood mitigation structure.

However, there is no consistent flood warning and evacuation system in Cavite. This manual is therefore prepared, describing the objectives, procedure and execution of flood warning and evacuation as well as the required activities. It is strongly recommended that this manual should be revised regularly every year in response to changes in the surrounding land-use, the evacuation system, and data that should be accumulated.

1.3 Flood History of Cavite

The three major river basins, Imus, San Juan and Canas, are particularly vulnerable to floods, because of the extremely low ground elevation in their lower reaches and the insufficient flow capacity of the rivers/drainage channels. In spite of this vulnerability, intensive industrialization is

[1] Japan International Cooperation Agency
[2] Provincial Disaster Coordinating Council
[3] Municipal Disaster Coordinating Council

being made without adequate consideration for floods. The recent flood damages in these river basins are believed to have exceeded the tolerable level due to the following reasons:

(1) The flood retarding effect in the lower reaches had decreased because some fish ponds and waterways have been reclaimed and a considerable area of the ground surface had been covered with impermeable pavement, decreasing the flood retention capacity of the river basins and increasing the peak flood runoff discharge.

(2) Residential areas have expanded into the habitual flood inundation areas due to the rapid growth of population, leading to the significant increase of flood damageable assets.

(3) The areas along the river and drainage channels are densely packed with houses that overhang the drainage channels and, because of inadequate waste collection services, the dwellers dump a large volume of solid wastes into the river/drainage channels, seriously reducing the channel flow capacity and deteriorating the river environment.

The flood overflow from Imus, San Juan and Canas rivers have caused the death of many people and damage to several houses. Some hundred thousand residents in low-lying areas of the river basins also suffer from prolonged inundation by storm rainfall and/or high tide every year. Such chronic inundation has affected not only the living condition of residents but also the economic development in the province.

There were four major typhoons in the 2000s which caused severe flood damage in Cavite: Typhoon Reming in October 2000, Typhoon Gloria in July 2002, Typhoon Inday in July 2002 and Typhoon Milenyo in September 2006. The inundation caused by Typhoon Milenyo in 2006 is presumed to have inflicted the most severe damage among them. (Refer to Table 1.1)

Table 1.1 Recent Major Flood Damage

Date	Name of Typhoon	Affected Area	Remarks
Oct. '00	Reming	Lowland Area (Bacoor, Noveleta, Rosario, Imus, Kawit, etc.)	Death: 10 people Affected Population: 380,616
Jul. '02	Gloria	Lowland Area (Bacoor, Noveleta, Rosario, Imus, Kawit, etc.)	Affected Population: 173,075
Jul. '02	Inday	Lowland Area (Bacoor, Noveleta, Rosario, Imus, Kawit, etc.)	Death: 1 person Affected Population: 168,025
Sep. '06	Milenyo	Lowland Area (Bacoor, Noveleta, Rosario, Imus, Kawit, etc.) and General Trias	Death: 28, Missing: 18, Injured: 61, Evacuated: 28,322, Affected: 196,904

1.4 Hydro-Meteorological Conditions in Cavite

The Study Area has two pronounced seasons, the dry season from November to April and the wet season during the rest of the year, since the meteorological characteristics are governed mainly by seasonal dominant monsoons, trade winds, tropical cyclones, and their combinations. Annual mean rainfall in and around the Study Area is estimated at approximately 2,000 mm, while total rainfall in the wet season accounts for more than 80% of the annual rainfall. On the other hand, the annual maximum rainfall recorded at Tagaytay and Ambulong stations is about 2,500 mm to 2,600 mm near the Tagaytay ridge.

Monthly mean temperature ranges from 26.4°C in January to 29.9°C in April. The maximum monthly mean relative humidity of 82% takes place in August and the minimum of 71% in April.

Monthly mean rainfall and temperature at Sangley Point Station (Average of 1974 to 2006) are as shown below:

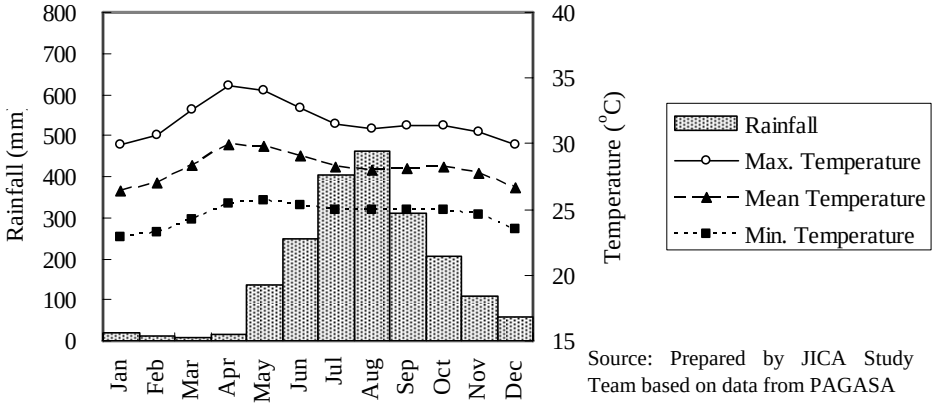


Fig. 1.1 Rainfall and Temperature at Sangley Point Station (Average of 1974 to 2006)

Tropical cyclones usually occur from June to October, and about 20 typhoons enter the Philippine area of responsibility (PAR). Of the typhoons, about 16% pass through the middle part of Luzon Island where Cavite is located. Those tropical cyclones cause strong wind and storm rainfall that bring severe damage to lives and properties.

2. Disaster Preparedness in Cavite

An accident happened during Typhoon Milenyo in 2006 where a dozen of residents watching the overflow on the dam crest at the riverbank died due to the collapse of the footing of the riverbank. Such a tragic accident could have been avoided if the residents were well guided by a flood warning and evacuation system.

2.1 Related Laws and Regulations

Presidential Decree No. 1566, dated June 11, 1978, which is known as the decree for Strengthening the Philippines Disaster Control, Capability and Establishing the National Program on Community Disaster Preparedness, aims to strengthen the disaster management capabilities of the government (disaster preparedness and response) from the national down to the barangay level.

The establishment of the Disaster Coordinating Council (DCC) at each level became effective upon the implementation of this law. The DCCs may legislate and promulgate regulatory policies on disaster preparedness, mitigation and response as stipulated in the National Disaster Preparedness Plan.

The same decree provides the guidelines for multi-sector, multi-agency and multi-level approaches to disaster prevention through the DCCs. At the local government level, as in the case of Cavite, the Provincial, City/Municipal and Barangay DCCs (PDCC, CDCC/MDCC, and BDCC) constitute the core of disaster prevention. It is at this level that disaster prevention, protection, emergency and rehabilitation operations are carried out.

The roles of the DCCs and the leadership at each level as defined in PD 1566 are strengthened by Republic Act No. 7160, which is otherwise known as the Local Government Code of 1991. RA 7160 provides the authority and responsibilities of the local government units (LGUs) to develop disaster prevention and management programs.

Presidential Decree No. 477, which is known as the decree on local fiscal administration, prescribes the budgetary requirement that two percent of the estimated revenue from regular sources shall be set up to cover unforeseen expenditures arising from natural calamities, etc.

The Provincial Government of Cavite ordered the activation and reorganization of the Provincial Disaster Coordinating Council in 2007 through Executive Order No. 97.

2.2 Flood Risk Areas

The extent and depth of floods in potential flood risk areas in Imus, San Juan and Canas river basins were simulated by the JICA Study Team in 2007. As the result, it was confirmed that the extent of a flood risk area largely changes depending on the magnitude of flood.

The Typhoon Milenyo in 2006 caused the flood area of about 60 km^2, which covers a substantial part of the low-lying area. The recurrence probability of the flood caused by the typhoon is almost equivalent to a 100-year return period. In fact, even the provable flood of 2-year return period could submerge an area of about 30 km^2. It was further clarified that a part of the flood risk area would have the flood depth of more than 50 cm, which could cause damage to household assets and/or injury to residents.

Based on the above confirmation, the flood risk areas were preliminarily assumed as those which may be submerged to a depth of more than 50 cm by a probable flood of 100-year return period. In accordance with this assumption, the flood risk area of 1,283 hectares was delineated, as shown in Fig. 2.1. This area was further subdivided according to the administrative boundaries of the city or municipality as listed in Table 2.1, and the CDCC/MDCC and BDCC are required to undertake the necessary activities of flood warning and evacuation for each of the flood risk areas located within their respective jurisdictions.

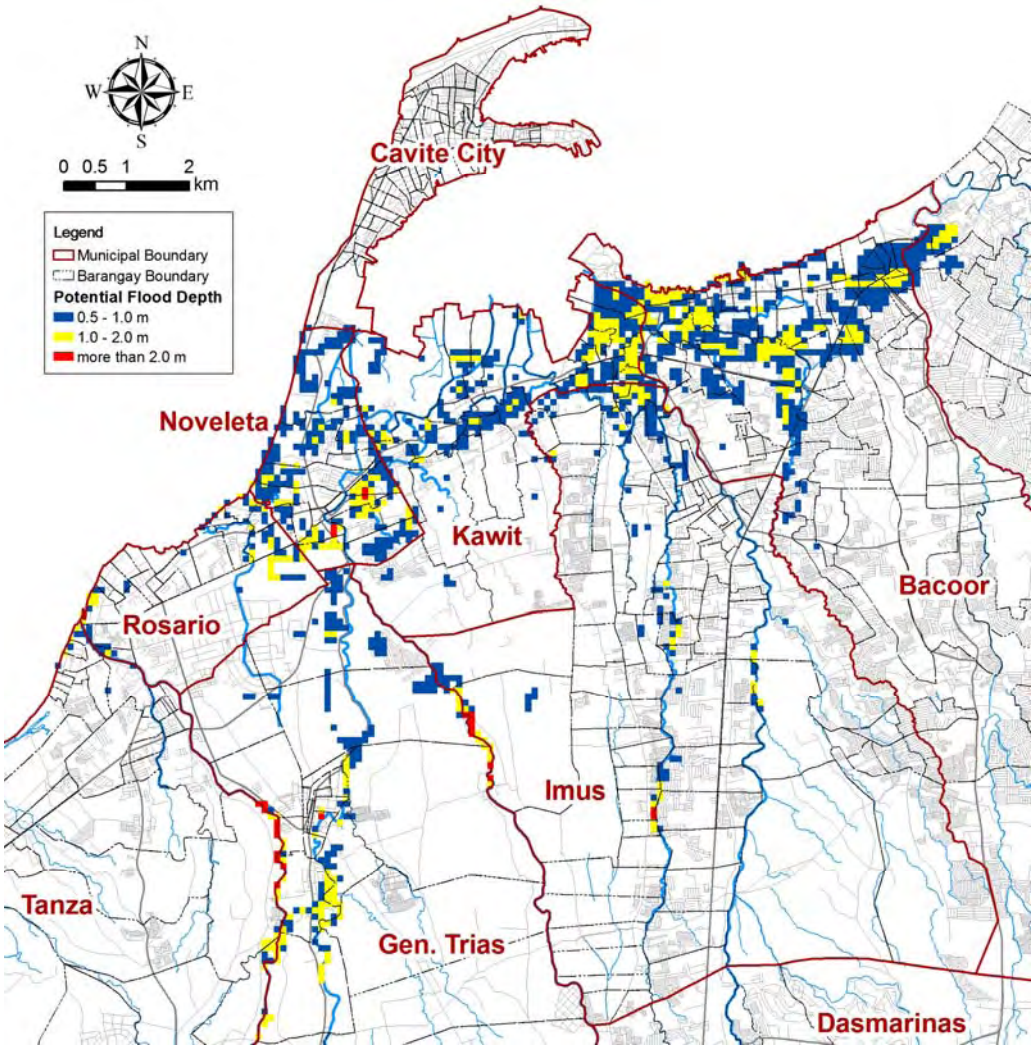


Fig. 2.1 Flood Risk Areas in Cavite

Table 2.1 Barangays Located in Flood Risk Areas

Muni-cipality	River	Barangay				
Bacoor	Imus	Tabing Dagat	Sineguelasan	Salinas I	Alima	Banalo
		Campo Santo	Daang Bukid	Digman	Dulong Bayan	Habay I
		Habay II	Kaingin (Pob.)	Mabolo I	Mabolo II	Mabolo III
		Maliksi I	Maliksi II	Mambog I	Mambog II	Mambog III
		Mambog V	Niog I	Niog II	Niog III	Panapaan I
		Panapaan II	Panapaan III	Panapaan IV	Panapaan VI	Panapaan VII
		Real II	Tabing Dagat	Sineguelasan	Maliksi III	Maliksi II
		Maliksi I	Kaingin (Pob.)	Digman	Campo Santo	Banalo
		Alima				
General Trias	Canas	Pinagtipunan	San Juan I	San Juan II	Tapia	
	San Juan	Navarro	Bacao I	Vibora Pob.	Tapia	Santa Clara
		San Gabriel Pob.	Prinza Pob.	Pinagtipunan	Pasong Camachile	Navarro
		Dulong Bayan Pob.	Bacao II	Bacao I	Arnaldo Pob.	Tejero
		Bacao II	Bacao I			
Imus	Imus	Toclong II-B	Toclong II-A	Toclong I-C	Toclong I-B	Toclong I-A
		Tanzang Luma VI	Palico IV	Medicion II-D	Medicion II-C	Medicion II-B
		Medicion II-A	Medicion I-D	Medicion I-C	Medicion I-A	Malagasang I-E
		Malagasang I-D	Malagasang I-C	Malagasang I-B	Carsadang Bago	Bucandala I
		Bayan Luma VI	Bayan Luma V	Bayan Luma IX	Bayan Luma III	Anabu II-C
		Anabu II-A	Anabu I-G	Anabu I-D	Anabu I-C	Anabu I-B
		Anabu I-A				
	San Juan	Alapan II-B	Alapan II-A	Alapan II-B	Alapan II-A	Toclong II-B
		Pag-Asa III	Pag-Asa II	Medicion II-F	Medicion II-E	Medicion II-D
		Medicion II-C	Medicion II-B	Medicion II-A	Carsadang Bago	
Kawit	Imus	Samala-Marquez	Pulvorista	Manggahan-Lawin	Congbalay-Legas	Balsahan-Bisita
	San Juan	Wakas II	Wakas I	Santa Isabel	San Sebastian	Poblacion
		Panamitan	Magdalo (Putol)	Kaingen	Batong Dalig	Wakas II
		Wakas I	Tramo-Bantayan	Toclong	Tabon III	Tabon II
		Tabon I	Santa Isabel	Samala-Marquez	Pulvorista	Poblacion
		Panamitan	Marulas	Manggahan-Lawin	Kaingen	Gahak
		Congbalay-Legas	Binakayan-Kanluran	Binakayan-Aplaya	Batong Dalig	Balsahan-Bisita
Noveleta	San Juan	Santa Rosa II	Santa Rosa I	San Rafael IV	San Rafael III	San Rafael II
		San Juan II	San Juan I	San Jose II	San Jose I	San Antonio II
		San Antonio I	Santa Rosa II	Santa Rosa I	San Rafael IV	San Rafael III
		San Rafael II	San Rafael I	Salcedo II	Salcedo I	Poblacion
Rosario	Canas	Tejeros Convent	Wawa I	Wawa II	Wawa III	
	San Juan	Wawa II	Tejeros Convent	Silangan I	Sapa III	Sapa II
		Sapa I	Poblacion	Ligtong IV	Ligtong III	Ligtong II
		Ligtong I	Kanluran	Bagbag I		
Tanza	Santol	Santol	Julugan II	Julugan I	Bunga	Biwas

2.3 Procedure of Flood Warning and Evacuation

The information on flood warning and evacuation should be compiled, and based on the evaluation of weather and hydrological conditions such as river water level and rainfall intensity, the stepwise flood warning and evacuation has to be proposed. The basic concept of stepwise flood warning and evacuation is as summarized in four steps below:

(1) Step 1 (Standby Stage): The members of PDCC, CDCC/MDCC and BDCC are convened for the execution of their respective assignments when PAGASA issues Public Storm Warning Signal No. 1, for the whole province of Cavite.

(2) Step 2 (Alert Stage): The available human resources, equipment and materials for flood warning and evacuation are checked, and the necessary river patrols are started.

(3) Step 3 (Warning Stage): Flood warning is issued for the residents to prepare for flood evacuation.

(4) Step-4 (Evacuation Stage): The order for flood evacuation is issued to the residents.

Further detailed activities required and proposed for each of the above steps are as shown below.

Table 2.2 Actions Required for Each Step of Flood Warning and Evacuation

Step	Actions Required
Step-1 (Standby)	• The head of PDCC convenes all members of PDCC, MDCCs and BDCCs to enter the standby status. • The PDCC orders the MDCCs in charge to start measurement of river water level and rainfall intensity in the Study Area and report the findings to PDCC. • The PDCC starts to communicate with PAGASA Synoptic Station at Sangley Point to collect information on weather conditions over Cavite Province.
Step-2 (Alert Stage)	• All members of DCCs start to check available human resources, equipment and materials for flood evacuation. • BDCC in collaboration with the communities starts river patrol in accordance with the order from MDCC.
Step-3 (Warning Stage)	• The head of PDCC issues warning to the heads of MDCCs whose jurisdiction is to be in danger of river overflow. • BDCC in collaboration with the communities starts dissemination of flood warning in accordance with the order from MDCC. • The PDCC, MDCC and BDCC position the necessary equipment, materials and personnel for flood evacuation.
Step-4 (Evacuation Stage)	• The head of PDCC issues the order of flood evacuation to the heads of MDCCs whose jurisdiction is to be in danger of river overflow. • The head of MDCC directs the BDCC to disseminate the order of evacuation among the residents and undertake the necessary guides/supports for residents to evacuate.

2.4 Flood Warning Code

2.4.1 Hydro-Meteorological Conditions

A certain extent of spare time to predict flood risk could be availed through the public storm warning information given by PAGASA and the observation of incremental rate of river water level and/or the rainfall intensity in the river basin, as described below.

(1) Step 1 (Standby Stage)

Step 1 or the standby for flood warning and evacuation shall be put into effect once PAGASA releases "Public Storm Warning Signal No. 1." This signal indicates that a tropical cyclone with the wide velocity of 30 to 60 km/hr would prevail over the Study Area within 36 hours.

(2) Step 2 (Alert Stage)

Step 2 or the alert stage shall be put into effect when the weather condition and/or river condition reaches any of the following critical levels:

- PAGASA releases "Public Storm Warning Signal No. 2," which indicates that a tropical cyclone with the wide velocity of 60 to 100 km/hr would prevail over the Study Area within 24 hours.
- The accumulated rainfall for 5 minutes gauged in the Study Area reaches the probable rainfall intensity of 2-year return period.

This Step 2 (the Alert Stage) will start based on the accumulated rainfall for 5 minutes, while the next Step 3 (the Warning Stage) is based on the accumulated rainfall for 30 minutes. Accordingly, the minimum time duration allowed for this Warning Stage is 25 minutes, which is ruled by such accumulated rainfall. The detailed clarifications on the accumulated rainfall are as described in Subsection 2.4.2.

(3) Step 3 (Warning Stage)

Step 3 or the warning stage shall be put into effect when the weather condition and/or river condition reaches any of the following critical levels:

- PAGASA releases "Public Storm Warning Signal No. 3," which indicates that a tropical cyclone with the wide velocity of 100 to 185 km/hr would prevail over the Study Area within 18 hours.
- The river water level at the designated locations reaches the predetermined critical level, which indicates that the river channel would take the bank-full discharge within one hour.

- The accumulated rainfall within 30 minutes gauged in the Study Area reaches the probable rainfall intensity of 2-year return period.
- The water level at the monitoring point exceeds the Warning level.

The minimum time duration allowed for this Warning Stage is 30 minutes, which is ruled by the difference in gauging time for the accumulated rainfalls and river water levels in this stage and the next stage. The detailed clarifications on the accumulated rainfall and river water levels are as described in Subsection 2.4.2.

(4) Step 4 (Evacuation Stage)

Step 4 or the evacuation stage shall be put into effect when the weather condition and/or river condition reaches any of the following critical levels:

- PAGASA releases "Public Storm Warning Signal No. 4," which indicates that a tropical cyclone with the wide velocity of more than 185km/hr would prevail over the Study Area within 12 hours.
- The river water level at the designated locations reaches the predetermined critical level, which indicates that the river channel would take the bank-full discharge within 30 minutes.
- The accumulated rainfall within 60 minutes gauged in the Study Area reaches the probable rainfall intensity of 2-year return period.
- The water level at the monitoring point exceeds the Evacuation level.

The minimum time duration allowed for this Evacuation Stage is estimated at 30 minutes, taking into account the aforesaid flood travel time. The details of the above river water levels and accumulated rainfall are as described in Subsection 2.4.2

2.4.2 Technical Specifications

(1) River Water Level

The river water level would be the most definite and simple indicator to judge the possibility of river overflow. Should the lower river water level be set as the boundary to initiate the actions for each step of flood warning and evacuation, earlier actions could be made. However, the lower river water level would cause more frequent failures in the prediction of river overflow. In order to compromise such a dilemma, the following assumptions are made:

- The actions to be taken in Step 3 (the Warning Stage) and Step 4 (the Evacuation Stage) would require 30 minutes at least to spare. Based on this concept, the river water level, which would emerge one hour before the river channel reaches the bank-full state, is assumed as the critically necessary indicator to initiate Step 3 (the Warning Stage). The river water level that would emerge 30 minutes before the bank-full state is likewise assumed as the indicator for Step 4.
- The point where the flow capacity is the smallest is a point where the river overflow might occur earliest. These critical water levels are set in each monitoring point in consideration of the water level of the point where the flow capacity is the lowest in each section.
- The river overflow could initially occur in the event of the probable flood of 2-year return period in the Study Area. Taking into account the river channel flow capacity, the above river water levels are set based on the design hydrograph of 2-year return period.

The monitoring points for river water level shall be located in the target areas for flood warning and evacuation and, at the same time, they should have easy accessibility during flood. From this point of view, several bridge sections were selected as monitoring points, and their critical water levels to initiate Steps 3 and 4 were estimated based on the aforesaid assumptions. As the result, the following locations and their critical river water levels are proposed for the objective flood warning and evacuation.

Table 2.3 Critical Water Levels

Location			Critical Water Level*	
River	Name of Bridge & Sta. No.	Barangay/Municipality	Step 3 (Warning)	Step 4 (Evacuation)
Imus	Binakayan (Sta. 1+950)	Balsahan-Bisita, Kawit	3.5	3.4
	Isabel II (St. 4+940)	Palico I, Imus	2.2	0.8
	Imus (Sta. 6+000)	Imus	1.0	0.7
San Juan	San Juan (Sta. 2+350)	San Juan I, Noveleta	4.0	3.2
	Noveleta (Sta. 3+280)	Poblacion, Noveleta	3.7**	2.9**
	Ylang-Ylang (Sta. 4+480)	San Jose I, Noveleta	4.4**	3.3**
Canas	Tejero (Sta. 2+700)	Tejero, General Trias	8.8	8.3

* Height below bridge road surface

** Height below the top of dike

(2) Short-Term Rainfall Intensity

As described above, rainfall intensities (i.e., the cumulative rainfall of short time duration of 5 to 60 minutes) are proposed in order to secure the time duration of 25 to 30 minutes to take the necessary actions for Steps 2 to 4 for flood warning and evacuation. The recurrence probability of the objective rainfall intensities is assumed at 2-year return period, which almost corresponds to the minimum river channel flow capacity of the existing river channel. Taking into account this recurrence probability and the aforesaid durations of cumulative rainfall for each Step of flood warning and evacuation, the critical level of the rainfall intensities were estimated, as listed below.

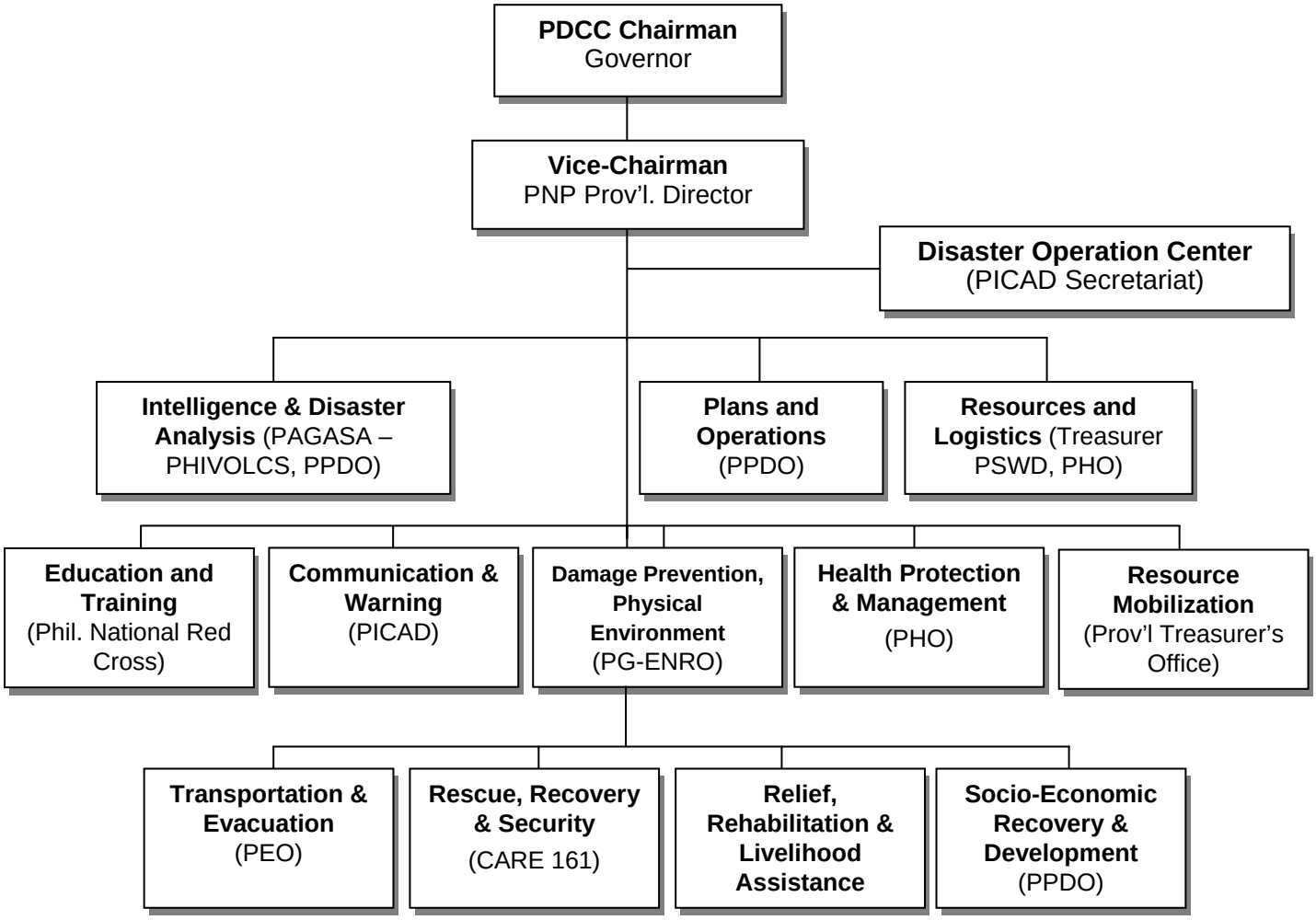
Table 2.4 Critical Cumulative Rainfall

Step	Objectives of Rainfall Gauge	Critical Level to Initiate the Step
Step 2 (Alert Stage)	Cumulative Rainfall in 5 min.	12.3 mm
Step 3 (Warning Stage)	Cumulative Rainfall in 30 min.	38.8 mm
Step 4 (Evacuation Stage)	Cumulative Rainfall in 60 min.	54.3 mm

2.5 Communication Network

2.5.1 PDCC

In accordance with PD 1566, the PDCC was organized under Executive Order No. 97, Series of 2007. Fig. 2.2 shows the organizational structure, while the specific functions of each member is as described in Annex-1 which is Section 4 of EO 97.



PAGASA : Philippines Atmospheric, Geophysical and Astronomical Services Administration

PHIVOLCS : Philippine Institute of Volcanology and Seismology

PPDO : Provincial Planning and Development Office

PICAD : Provincial Information and Community Affairs and Development Office

PSWD : Provincial Social Welfare and Development Services

PHO : Provincial Health Office

PG-ENRO : Provincial Government-Environmental and Natural Resources Office

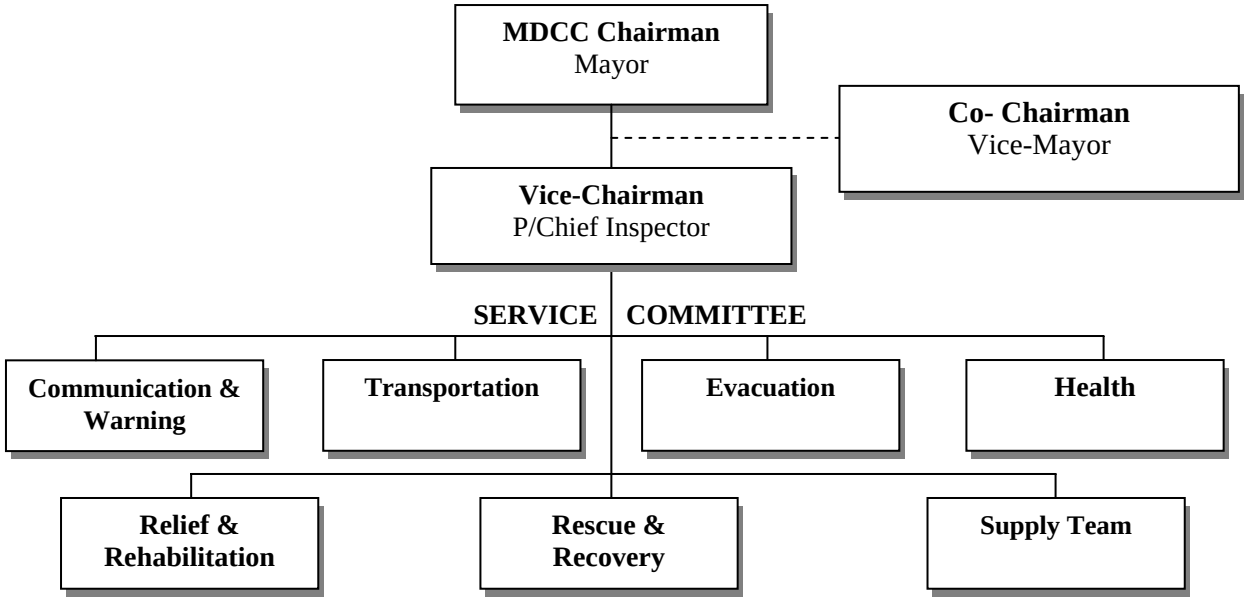
PEO : Provincial Engineering Office

CARE 161 : Cavite Rescue 161

Fig. 2.2 Organizational Structure of PDCC

2.5.2 MDCC

Almost all cities/municipalities in Cavite have already organized their CDCC/MDCC except for Indang and Dasmariñas. The organizational structure of the MDCC of Kawit is as follows:



Committees	Designation	Name in 2008
MDCC Chairman	Mayor	Reynaldo B. Aguinaldo
Co-Chairman	Vice-Mayor	Emilio Aguinaldo IV
Vice-Chairman	Municipal Police Chief Inspector	Hersan H. Mojica
Communication and Warning	Phython Group	Antonio Morga III
Transportation	Municipal Engineer	Engr. Jonathan Jarin
Evacuation	Association of Barangay Captain (ABC President)	Reynaldo Macario
Health	Municipal Health Office (MHO)	Vicky Agco – OIC MHO
Relief and Rehabilitation	Municipal Social Welfare Development Office (MSWDO)	Yolanda Labo
Rescue and Recovery	Bureau of Fire Protection (BFP)	Marcial Lopez
Supply Team	General Services Office (GSO)	GSO – Mayor's Office

Fig. 2.3 Organizational Structure of Kawit MDCC

2.5.3 BDCC

In line with the community-based disaster prevention activities, no BDCC was organized in the pilot barangays. In the event of flood, members of the barangay council (kagawad) and the vigilance committee (tanod), as shown in Table 2.5, carry out the required activities.

Table 2.5 Barangay Assembly Members Engaged in Disaster Prevention

Barangay	Councilman (Kagawad)	Vigilance Committee (Tanod)
Potol-Magdalo	12	10
Gahak	11	13
Manggahan-Lawin	11	20

2.5.4 Communication Network among DCCs

The appropriate communication route relevant to flood warning and evacuation among the government and non-government organizations as well as the residents is as shown in Fig. 2.4, taking into account the present disaster communication system including the necessary flow of information to achieve the aforesaid stepwise flood warning and evacuation. The principal points on the communication flow are as described below.

(1) Communication for DCC Operation Centers

The PDCC, MDCC and Barangay operation centers shall take the following communication activities:

- The PDCC Operation Center shall receive all necessary hydro-meteorological information including weather information from PAGASA, as well as river water level and accumulated rainfall observed in the target area.
- The above hydro-meteorological information is step-wisely transmitted from PDCC to MDCC and from MDCC to BDCC.
- The river conditions in each jurisdiction area of BDCC are step-wisely transmitted from BDCC to MDCC and from MDCC to PDCC.
- Every operation centers shall advise their respective DCC chairpersons to issue the order necessary for flood warning and evacuation actions.

(2) Communication for Chairman of DCC

The Chairmen of PDCC, MDCC and BDCC shall take the following communication activities:

- The Chairman of PDCC shall determine the province-wide actions necessary for flood warning and evacuation and transmit them to the chairman of MDCC. The Chairman of MDCC shall likewise determine the municipality-wide actions necessary for flood warning and evacuation and transmit them to the Barangay Captain. The Barangay Captain shall determine the necessary actions within his jurisdiction based on the information from the MDCC.
- The Chairmen of PDCC, MDCC and BDCC shall order their respective operation groups to execute the necessary actions for flood warning and evacuation.
- The Chairman of PDCC may communicate with the Chairman of the National Disaster Coordinating Council (NDCC) and/or the Regional Disaster Coordinating Council (RDCC) to take the nationwide and/or the region-wide disaster management as required.

(3) Communication for Operations Group of DCC

The Operations Group of PDCC, MDCC and BDCC shall take the following communication activities:

- The respective operation groups shall take the necessary actions for the residents including the dissemination of flood warning/orders of flood evacuation, guidance to residents to the evacuation centers, and all other necessary relief activities.
- The operation groups shall communicate with each other on the utmost utilization of human resources, equipment and materials necessary for flood warning and evacuation.

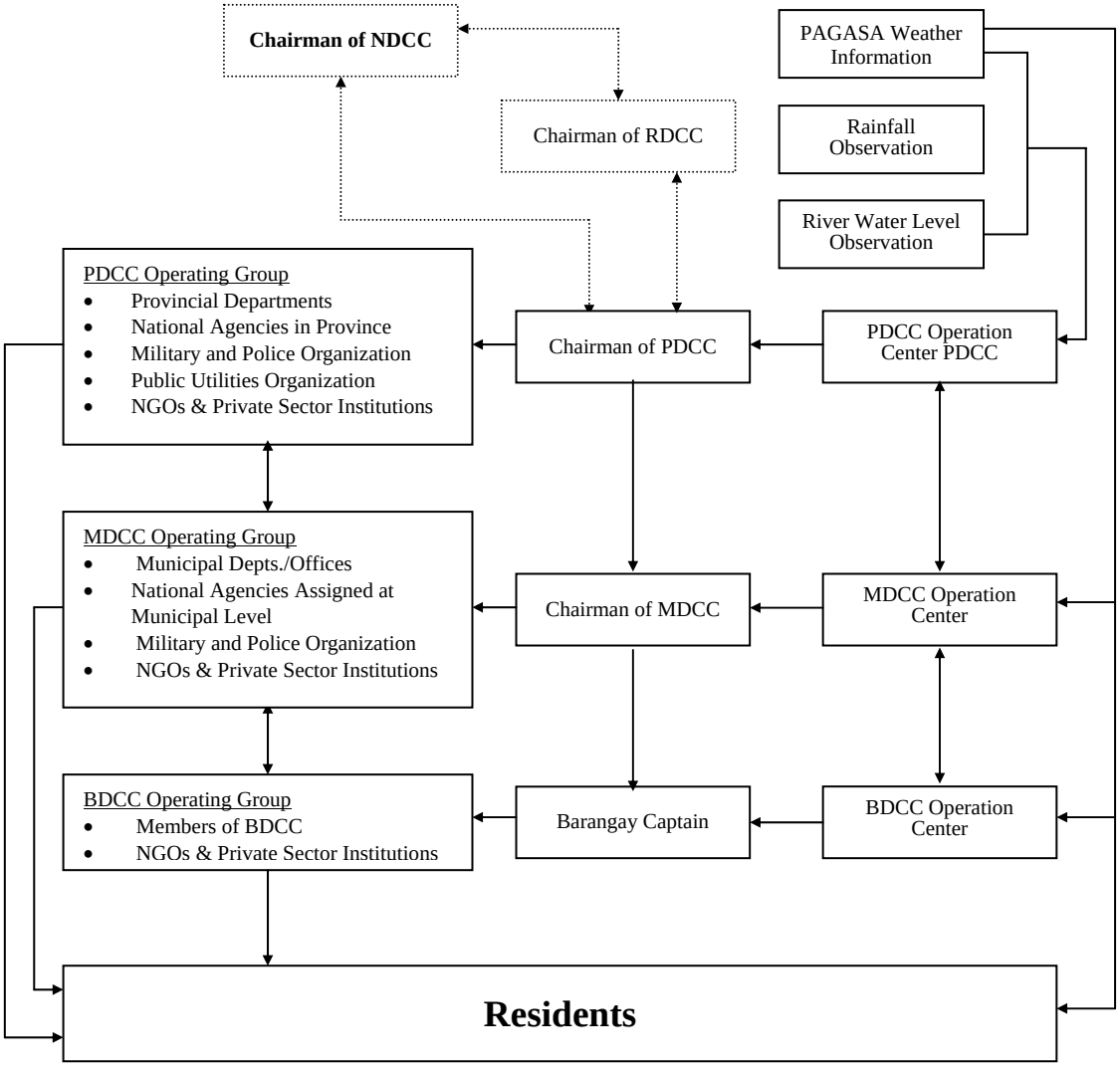


Fig. 2.4 Communication Flow of the Flood Warning and Evacuation System

3. Community-Based Flood Warning and Evacuation

3.1 Barangay

Of the local government units from the provincial level to the barangay level, the barangay has the following particular characteristics:

- All members of the Barangay Assembly, which governs the barangay, are composed of barangay residents.
- The Barangay Captain, who is the head of the barangay, has to be a resident who had resided in the same barangay continuously before his election for more than six months.
- All members of the BDCC are composed of barangay residents, and no government agency is involved in the BDCC.

The Barangay is defined as the smallest government administrative unit in the Philippines as mandated in Republic Act No. 7160 of 1991, and it is also regarded as the residents' self-governing body because of the above particular characteristics. Therefore, the strengthening of BDCCs could lead to the promotion of community-based flood warning and evacuation.

The ultimate purpose of the flood warning and evacuation system is to support the voluntary evacuation of residents from the risk of floods. However, this could hardly be achieved unless the BDCC, in particular, could function based on its definite disaster preparedness plan. From this point of view, the actions described in the succeeding sections are preliminarily required.

3.2 Organizational Setup and Tasks of BDCC

The organizational structure of BDCCs shall be set with reference to the mandate in PD 1566 and in due consideration of the available human resources in each barangay. The major points on the organizational setup are as described below:

- The Barangay Captain shall be the chairman of BDCC. A vice-chairman may be selected to assist the Barangay Captain or to be the acting chairman in his/her absence. The existing Executive Officer of the Barangay Vigilance Committee (called "Barangay Tanod") may preferably be appointed as the vice-chairman, because of the roles of the Staff Team and the Operation Teams mentioned below.
- The Staff Teams and the Operation Teams need to be organized as the executing bodies of BDCCs on disaster management. The Operation Teams shall undertake the actual field works of dissemination of flood warning and support of residents' evacuation, while the Staff Teams shall undertake the necessary logistical support for the smooth execution of the Operation Teams. The existing organizations of the barangay such as the aforesaid Barangay Tanod or the Mediation Committee (called "Lupong Tagapamayapa") could take

the roles of the said Staff and Operation teams. The details of roles required of the Staff Teams and the Operation Teams and are as listed in Table 3.1.

- If the Barangay is too large having the plural “puroks” (the communal unit of barangay), an Operation Team may be organized for each of the “puroks.”
- The Disaster Operation Center (DOC) shall be established to provide the necessary information to all members of the BDCC. Members of the above Staff Teams shall operate the DOC.

3.3 Required Activities to Heighten Public Awareness

It is important to heighten the awareness of residents on the necessity and procedure of the proposed flood warning and evacuation system. In order to do this, each BDCC shall take the following activities:

- Determine the eligibility of evacuation centers among those specified by the PDCC/MDCC or to set up alternative evacuation centers exclusively for each barangay, if all evacuation centers specified by PDCC or MDCC are not applicable;
- Select the available evacuation routes to approach the centers, as well as the pick-up points for physically handicapped persons;
- Clarify the extent of potential flood area in the jurisdiction of the BDCC based on the flood risk map developed in the JICA Study;
- Develop the flood risk map, which presents the extent of probable flood inundation area mentioned above, the flood evacuation center, the flood evacuation routes and other relevant information such as location of hospitals and list of telephone numbers of government offices relevant to the rescue of evacuees;
- Regularly open briefing sessions, consultation meetings and/or workshops to disseminate to the residents the information in the flood risk map and the procedure of flood warning and evacuation and/or to obtain requests and/or comments from the residents; and,
- Repeat the training drills on flood warning and evacuation by the BDCC in collaboration with the residents so as to make the members of BDCC and residents proficient.
-

Table 3.1 Members of Barangay Disaster Coordinating Council and Tasks

Members of BDCC	Tasks
BDCC Chairman/ Vice-Chairman	• Convenes the BDCC and activates the Disaster Operation Center. • Identifies and designates the Barangay Disaster Operation Center. • Maintains liaison with the Municipal Disaster Coordinating Council Chairman. • Initiates and conducts training courses for disaster management activities. • Coordinates arrangement for and directs all drills and exercises. • Exercises the activities programmed in the Barangay Disaster Preparedness Plan. • Arranges for and supervises the storage and disposition of required supplies and equipment.
Staff Team (1) for Security	• Organizes and activates the security functions of the BDCC so as to augment the force of the PNP. • Secures evacuees and properties in the areas of operation. • Checks unauthorized persons in the cordoned areas. • Checks suspicious activities and reports them to higher authorities concerned. • Performs escort duties in the transport of persons, supplies, and equipment.
Staff Team (2) for Supply	• Arranges and supervises the storage and disposition of required supplies and equipment. • Identifies the sources of supplies as may be needed.
Staff Team (3) for Transportation	• Inventories available vehicles for use in flood warning and evacuation. • Prepositions vehicles at pick-up points for physically handicapped persons. • Supports the transportation needs of flood warning and evacuation.
Staff Team (4) for Communications	• Keep contact with MDCC communication teams to update the relevant information. • Keeps records of all warning and communication messages.
Operation Team (1) for Warning	• Monitors the river conditions. • Reports the river conditions to the BDCC Chairman for transmittal to higher DCCs. • Advises the BDCC Chairman on the necessity of emergency evacuation of residents. • Disseminates information on warning and evacuation among the residents.
Operation Team (2) for Rescue	• Organizes and trains rescue service teams. • Coordinates with the higher DCCs for training support. • Requests budget appropriation to support training requirements. • Conducts search, rescue and recovery operation in case of mass casualty incident. • Coordinates for emergency vehicles assistance, as required.
Operation Team (3) for Evacuation	• Develops and reviews the evacuation plan. • Prepares the evacuation centers in coordination with the Department of Education and other relevant agencies. • Determines the safe evacuation route in coordination with the Staff Team (3) for Transportation. • Provides manpower support to the MDCC evacuation committee.
Operations Team (4) for Relief	• Coordinates with Municipal Social Welfare & Development Office for relief assistance. • Prepares and distributes relief goods. • Receives required relief donations. • Prepares relief status and reports them to MDCC.
Operation Team (5) for Medical Services	• Prepares medical kits/resources for health of evacuees. • Provides manpower support to the MDCC medical committee. • Directs the first aid and medical self-help operations • Maintains adequate sanitation, hygienic standards, and other matters related to emergency health, hygiene and medical activities within the barangay during evacuation. • Ensures safety of the storage, handling of food and available drinking water in evacuation areas.
Operation Team (6) for Damage Control	• Develops damage control plans. • Deploys personnel after a flood disaster to rehabilitate the utilities damaged by the flood and report the conditions that require assistance. • Conducts road clearing after every calamity. • Conducts clearing of canals and waterways with accumulated trash or garbage. • Installs warning signs on open manholes and dangerous structures/facilities.

4. Evacuation

4.1 In Normal Time

In the event of flood, probable dangerous points such as creeks, roadside drainage, manholes and potholes of road may not be visible during evacuation. These should be checked in advance or in normal time because inland flood is a typical occurrence in the Cavite lowland areas.

4.2 In the Event of Flood

The term evacuation as used herein is the temporary relocation of people from identified danger zones to the designated safe evacuation centers in order to protect their lives. It can be carried out as a response to a timely warning.

For evacuation work, there must be:

- a timely and accurate warning system;
- clear identification of evacuation routes;
- an estimated and identified population to move;
- identified safe evacuation centers; and
- organized volunteers or evacuation teams to assist.

4.2.1 Evacuation Order

The evacuation order is issued by the head of the PDCC and disseminated to MDCC, and then to BDCC. After making the decision to evacuate, the BDCC chairperson will give the order to evacuate.

The evacuation order has to be issued taking into consideration the evacuation movement as described in the next subsection.

4.2.2 Evacuation Movement

The evacuation movement should prioritize the disabled, sick, pregnant women, babies and children. Evacuation vehicles should provide assistance. Evacuation routes from the dangerous areas to the evacuation centers should be pre-identified. These routes should be free from all hazards, and should allow safe and fast transport of people to the evacuation centers.

The criteria necessary for successful evacuation are water depth of less that 50cm and flow velocity of less than 50cm/sec for adult males. Evacuation speed in water is 1.6 km/hour with below-knee deep and 1.1 km/hour with knee to waist deep.

4.2.3 Evacuation Centers

Evacuation centers should be identified by BDCC or MDCC. The suitable criteria for evacuation centers include the following:

- Must be located in an area not affected by the flood (in other words, located outside the dangerous areas);
- Have sufficient sanitation facilities;
- Accessible; and
- Have electricity and water supply.

The inventory of evacuation centers identified by the Municipality of Kawit is as given in Annex-2.

4.2.4 Role of the DCCs in Evacuation

(1) PDCC

The evacuation team at the provincial level will form part of the augmentation requirement should lower DCCs request for assistance. They will be on standby and on-call if not occupied in some other priority emergency functions.

(2) MDCC

At the municipal level, the evacuation team will be the receiving team at the designated safe evacuation centers. They will automatically prepare the master list of evacuees at the evacuation center.

(3) BDCC

The evacuation team executes the evacuation plan, ensuring that the plan is still executable. It determines the safe evacuation route should the planned route be in danger as well.

5. Flood Hazard Map

5.1 Importance

As mentioned before, floods might occur while the project is being conducted because the completion of structural measures takes a long time and requires a huge investment.

The main reason for the loss of human life during a disaster is that no appropriate evacuation directive is given to the residents. The lack of directives would result in the following consequences:

- Wrong evacuation / No safe evacuation / People do not know what to do
- Wrong perception of safety behind structural measures
- Poor knowledge regarding the present danger and hazard / No technical capability
- No warning / Warning ignored

The Flood Hazard Map is an effective flood prevention measure to lessen the damage.

5.2 Objective

Flood hazard maps are prepared aiming at the prevention of loss of human life during floods by providing flood and evacuation information to the residents. However, it should be noted that these maps do not prevent floods.

5.3 Contents

The flood hazard map contains information about risks of floods. It shows the extent and degree at which an area is prone to a particular hazard. The hazard map also shows areas that are generally safe or unsafe from flash floods, the various river systems and areas that are likely to be affected by floods, and the descriptions of evacuation information.

The JICA Study Team had proposed draft flood hazard maps for Kawit and some pilot barangays. These maps show the simulated inundation area and depth of a 5-year flood and information about evacuation centers, which is attached as Annex-3.

6. Public Awareness

6.1 Objective

The public awareness program aims to create and foster consciousness of disasters, and leads the residents to think and learn appropriate responses to cope with the hazards. It is a communication tool between the government and the residents.

Specifically, the objectives of public awareness program are:

- To provide a good opportunity for residents to consider a disaster and their family's safety by themselves.
- To provide systematic understanding of floods by giving information on the characteristics and causes of floods.
- To provide information on appropriate actions in hazardous situations.
- To motivate residents' preparedness activities to prevent disasters by themselves.

The final objective is to achieve the desired behavioral change of residents, creating a community that responds appropriately to threats and warnings without external prodding.

6.2 Map Exercise

Map exercise is one of the risk communication methods through a community workshop by participatory approach. This is a training wherein the area or situation from which danger is supposed to occur is indicated on the map under the scenario or assumption of a calamity. Such an exercise was conducted in the Municipality of Kawit by the JICA Study Team.

6.2.1 Objectives

The community/residents have to be the main players so that the government can obtain detailed flood information for developing the flood relief plan and the flood hazard map. These are then compared with the image/simulation results and the actual flooding conditions.

In the map exercises, residents can share/integrate flood information/experiences with each other. It may be difficult at first for many residents to understand the map, but through this activity they will be able to recognize the place where they live on the map.

6.2.2 Procedure

The procedure of map exercise is as follows:

- Grouping: Create groups consisting of 7 to 10 members each. Select a leader for each group.

- Task 1: Draw lines to represent rivers and roads. For the landmarks, use the stickers to indicate their location.
- Task 2: Draw the evacuation route.
- Task 3: Discussions and explanations.

The detailed program and materials required are as shown in Annex-4.

6.3 Seminar and Evacuation Drill

After the Map Exercise, the JICA Study Team conducted the Flood Hazard Map Seminar and Evacuation Drill as the disaster awareness program in the pilot barangays. The program and the utilized materials are as shown in Annex-5.

In the seminar, the JICA Study Team and representatives of the Cavite Provincial Government explained the mechanism of floods in Cavite and in each pilot barangay, the definition/contents of the Flood Hazard Map, and how to use the Flood Hazard Map. In addition, the Barangay Captain summarized the results of the Map Exercise Activity.

In the evacuation drill, the residents actually proceeded to an evacuation center. Along the evacuation route, dangerous points were also checked as explained in Section 4.1.

6.4 Others

There are a number of public awareness tools that can be used to achieve the above objectives. These include:

- Manuals
- Pamphlets
- Exhibits and displays
- Posters
- Billboards and board notices
- Website (Establishment of Home Page)
- Special events, like simulation exercises and drills

Annex-1

Specific Function of PDCC Members

Section 4. Specific Functions of Officers and Resource / Member Organizations. To establish clear delineation of respective roles and functions and forge fast complementation of efforts, specific functions of officers and resource/member organizations are hereby laid-down, as applicable, and along the line of their regular respective agency/office mandates and missions:

A. The PDCC Chairman

a) Ensures clear policy direction from government
b) Responsible to minister for all disaster-related matters;
c) Directs activities of the PDCC in operational comprehensiveness and coherency

B. The Philippine National Police Provincial Director (PNP)

a) Acts as Vice Chairman
b) Responsible, as in normal role, for maintenance of law and order and protection of life and property; reinforces critical areas as necessary in times of disaster
c) Utilizes police mobile force as necessary
d) Undertakes and co-ordinates survey and assessment duties, as required by the Chairman of PDCC
e) Develops disaster-related training within Police force
f) Takes standard police action to deal with dead persons

C. Deputized Civil Defense Coordinator

a) Acts as action/executive officer of PDCC as designated by the Chairman
b) Initiates and coordinates programs, projects and activities on civil protection and disaster management through an integrated multi-sectoral approach as provided for in EO 137

D. Information / Communications Organizations (PICAD, CCC, NSO, BAS)

a) Broadcasts warning and public information
b) Maintains broadcast capability on 24-hour basis during disaster periods
c) Advises on broadcast format of disaster-related warnings and public information
d) Advises on broadcast segment of public awareness programs
e) Assists, where possible, in promotion of public awareness as advised by Chairman of PDCC
f) Advises PDCC on media liaison and all information aspects
g) Drafts approved information (press releases, articles for publication, warning ads) in from suitable for issue
h) Collects, collates and issues disaster-related data and analyses

E. Geological and Meteorological Organizations (PAG-ASA, PhiVolcs)

a.) Provides weather-related information of potential disaster and monitors progress as required
b.) Provides information for public awareness programs
c.) Liaises with broadcasting service on broadcast of warning and other weather-related public information

d.) Provides advice to PDCC on all geological and meteorological matters
e.) Provides information and advice concerning possibility of earthquakes and volcanic eruptions

F. Telecommunications (DOTC, PLDT & Mobile Telecom Cos., Phil Postal Corp.,)

a) Ensures rapid repairs of damaged telecommunications
b) Provides emergency communications

G. Water Districts

a) Ensure potable water supply
b) Ensures rapid repairs of damaged water supply facilities
c) Provides emergency assistance for water supply as may be requested by PDCC

H. MERALCO

a) Provides stable power supply
b) Ensures rapid repairs of damaged power supply facilities
c) Provides emergency assistance for power supply as may be requested by PDCC

I. Agriculture (OPA, OPV, NIA, DAR, BFAR, NFA, PCA)

a) Advises on procedures to safeguard crops, livestock and equipment from effects of disaster
b) Undertakes survey and assessment of damage to crops, fisheries, etc.
c) Renders advice and assistance to disaster victims on agriculture sectors whose crops and equipment may have been damaged or destroyed
d) Assists m provision of replacement seeds and livestock
e) Operates a food shortage early warning scheme by monitoring crop failures and food prices, to give maximum warning of any forthcoming shortages
f) Monitors crop programming aimed at minimizing possible damage and destruction during maximum risk seasons
g) Assists in assessment of loss or damage to fishing vessels, facilities, etc.
h) Assists with provision of boats, where possible.
i) Ensures food security and stabilization of grains, and livestock supply and prices
j) Recommends measures for the protection and enhancement of the fishery industries
k) Provides land tenure improvement and provide integrated development services to landless fanners, farm workers and small-land owners-cultivators

J. Environment, Land and Real Property (PG-ENRO, DENR, PENRO, CENRO, Prov'l Assessor)

a) Advices PDCC on environmental and land use issues which may affect disaster management
b) Undertakes survey and assessment of damage to forest, other land resources and properties
c) Renders advice and assistance on forestry matters such as disposal and utilization of trees damaged by disaster

d) Provides maps and mapping information
e) Provides field teams / members in operations requiring special field knowledge and skills
f) Identifies areas suitable for resettlement of disaster victims.

K. Health (PHO, CARE 161, Center for Mental Health, DOH Extension Office)

a) Undertakes first-aid training
b) Deploys resources to the maximum effect
c) Provides emergency medical treatment of disaster victims and subsequent hospitalization, if necessary
d) Provides medicines and medical supplies
e) Institutes preventive and curative measures to check and control occurrence and spread of disease
f) Exercises supervision of public health
g) Maintains sanitary conditions in disaster-affected areas
h) Checks potability of water supplies
i) Co-ordinates utilization of medical teams, medical supplies, equipment provided through overseas disaster assistance
j) Provides medical certification for dead persons

L. Finance / Fiscal Office (PBO, *PAO, PTO, Provincial Auditor's Office)

a) Authorizes release of funds to meet immediate disaster needs
b) Reviews financial requirements for longer term relief and recovery, including distribution of Monies
c) Finances stock holdings of disaster-related stores
d) * Audits disaster-related accounting
e) Ensures proper disbursements of funds

M. Legal / Legislative Office (PLO)

a) Advises on all disaster-related legislative matters
b) Formulates and adopts policies necessary to effectively and efficiently implement PDCC plans ad Programs

N. Department of Education

a) Takes appropriate action to ensure safety of school children
b) Makes available, if required, school buildings nearest to disaster affected areas as temporary welfare and evacuation centers as arranged with the PDCC
c) Provides staff as administrative managers of buildings being used as welfare and evacuation centers
d) Coordinates with other agencies in informing people of impending disaster especially in remote areas
e) Assists, where possible, in assessment of damage and reports information to Police
f) Includes disaster awareness aspects in school programs

O. Civil Service / Employment / LGU Manpower (DILG, DOLE, CSC)

a) Advises PDCC on industrial safety and associated matters

b) Assists in provision of extra personnel during emergency period, as requested by PDCC

P. Military Organizations (Philippine Air Force, Navy, Coast Guard, Marines, Army / Arescom)

a) Conducts public information and training programs on disaster preparedness and management
b) Organizes and mobilize manpower to assist in rescue
c) Provides well-trained and equipped engineers, communication units to provide emergency radio and telephone links and make departmental communication facilities available for disaster purposes, as far as possible
d) Conducts reconnaissance in the disaster zone and of the routes within and leading towards it
e) Provides logistics support to handle, store and transport goods and people over all types of roads and routes
f) Provides emergency medical support to the civilian services
g) Conducts air, land, and sea survey and assessment, specially to ascertain levels of casualties and damage
h) Provides, as may be possible, helicopters and aircraft for reconnaissance and transport duties
i) Maintains plans and takes action to deal with aircraft accidents and incidents
j) Assists, where possible, with availability of aircraft for disaster operations
k) Provides support for sea movement of disaster-related personnel, supplies and equipment
l) Takes action to deal with maritime accidents
m) Liaises with local shipping agents for support from foreign and local vessels
n) Provision by naval forces of transport support when in harbour; also electrical power, mechanical engineering, water purification, long distance radio communication, cooking, and banking facilities

Q. Social Welfare & Development (PSWD)

a) Has primary responsibility, in which it collaborates with NGOs, for relief programs such as emergency feeding, emergency clothing and household supplies, provision of temporary shelter assistance, provision and management of government buildings as evacuation and welfare centers, and provision of such other technical supports to the victims of emergency situations and disaster events as may be deemed necessary

R. Socio-Economic Planning , & Technology Development (PPDO, DOST)

a) Plans and implements, where possible, measures likely to assist in 1ong-term disaster prevention, mitigation and preparedness
b) Takes action to ensure that recovery programs are compatible with national and regional development policies
c) Recommends necessary developments on technology to support efforts on disaster preparedness, response, control and recovery

S. Infrastructure Support & Development (DPWH, PEO, PICE, Contractors' Associations)

a) Assists with survey and assessment of damage
b) Undertakes clearance of roads, airfields and port areas
c) Restores inoperative or damaged public installations and facilities

d) Undertakes special tasks as requested by PDCC
e) Develops and implements technical measures such as physical planning, zoning and building codes, for mitigating effects of disasters
f) Maintains availability of transport for use in counter-disaster operations
g) Co-ordinates use transport, as required by PDCC

T. NGOs (PNRC, Religious Org'n, Volunteer Org'n)

a) Holds disaster relief stocks and equipment
b) Provides relief items and assistance to disaster victims
c) Undertakes tracing of missing persons
d) Carries out first-aid training and welfare education programs
e) Liaises with other NGOs and private sectors in co-ordinating relief work

U. Livelihood, Employment and Business Development (PCLEDO, DTI, CCCI, DOLE, TESDA)

a) Creates livelihood and business opportunities for displaced individuals and families
b) Conducts and supports skills training programs for victims of disasters to help them recover from the negative effects of disaster events
c) Creates business-friendly environment conducive to the growth of enterprises and supportive of fair and robust trade in goods and services

V. Housing Development (UDHB, NHA)

a) Formulates and enforces general and specific policies for housing development and resettlement
b) Prescribes guidelines and standards for the reservation, conservation, and utilization of public lands identified for housing and resettlement
c) Provides resettlement assistance, whether temporary of permanent

Annex-2

Evacuation Centers in Kawit

Barangay	Evacuation Centers	
Balsahan-Bisita	1	Balsahan-Bisita Barangay Hall
	2	Philippine Independent Church
Batong Dalig	3	Batong Dalig Barangay Hall
	4	Batong Dalig Chapel
	5	Batong Dalig Day Care Center
	6	Batong Dalig Elementary School
	7	Kawit Municipal Hall
Binakayan-Aplaya	8	Binakayan-Aplaya Barangay Hall
	9	Binakayan-Aplaya Day Care Center
Binakayan-Kanluran	10	Binakayan-Kanluran Barangay Hall
Congbalay-Legaspi	11	Binakayan Elementary School
	12	Congbalay-Legaspi Barangay Hall
Gahak	13	Emiliano Tria Tirona Memorial National High School
	14	Gahak Barangay Hall
	15	Gahak Chapel
	16	Gahak-Marulas Elementary School
Kaingen	17	Kaingen Barangay Hall & Day Care Center
	18	Kaingen Basketball Court
Magdalo (Putol)	19	Borja Hall / Putol Day Care Center
	20	Magdalo (Putol) Barangay Hall
	21	Potol-Sta. Isabel Elementary School
Manggahan-Lawin	22	Lanai Day Care Center
	23	Manggahan-Lawin Barangay Hall / Day Care Center
Marulas	24	Marulas Barangay Hall
Panamitan	25	Panamitan Day Care Center
	26	Panamitan Elementary School
Poblacion	27	Kaingen-Poblacion Elementary School
	28	Poblacion Barangay Hall
	29	St. Mary Magdalene Church
Pulvorista	30	Binakayan National High School
	31	F. Ilano Memorial School
	32	Pulvorista Barangay Hall
Samala-Marquez	33	Samala-Marquez Barangay Hall
	34	Samala-Marquez Day Care Center
San Sebastian	35	San Sebastian Barangay Hall
	36	San Sebastian Day Care Center
Sta. Isabel	37	Dr. Timoteo V. Encarnacio Memorial Basketball Court
	38	Sta. Isabel Barangay Hall
Tabon I	39	Tabon I Barangay Hall
	40	Tabon I Day Care Center
Tabon II	41	Tabon Ii Barangay Hall
Tabon III	42	Tabon Iii Barangay Hall
	43	Tabon Iii Day Care Center
Toclong	44	Toclong Barangay Hall
	45	Toclong Elementary School
	46	Toclong Elementary School & Toclong Day Care Center
Tramo Bantayan	47	Tramo Bantayan Barangay Hall & Day Care Center
Wakas I	48	Wakas I Barangay Hall & Day Care Center
Wakas II	49	Wakas Ii Day Care Center

Annex-3

Flood Hazard Map

Draft Flood Hazard Map (Kawit)

Hazard Map: Ang *flood hazard map* ay ginawa para sa ligtas at mabilisang paglikas. Ipinapakita nito ang maaaring maging lawak at lalim ng isang *5-year flood*, gayundin ang mga impormasyon ukol sa mga *evacuation centers*. Ito'y inyong gamitin sa paghahanda laban sa baha at sa mga gawaing paglikas tulad ng pagsiguro sa kalagayan sa paligid ng inyong bahay, *evacuation centers* at sa maaaring daanan ng inyong pamilya.
5-year flood: bahang maaaring maganap ng isang beses sa loob ng limang taon

Mga dapat gawin sa oras ng pagbaha:
Subaybayan ang ulat panahon sa radyo o telebisyon
Mag-imbak ng pagkain, tubig inumin, baterya at mga gamit para sa agarang lunas.
Patayin ang *main switch* ng kuryente kung mayroon nang baha.
Maagang ilikas ang mga bata, matanda at ang mga maysakit.

Emergency Goods

Legend

- Evacuation Centers
- Evacuation route

Landmark

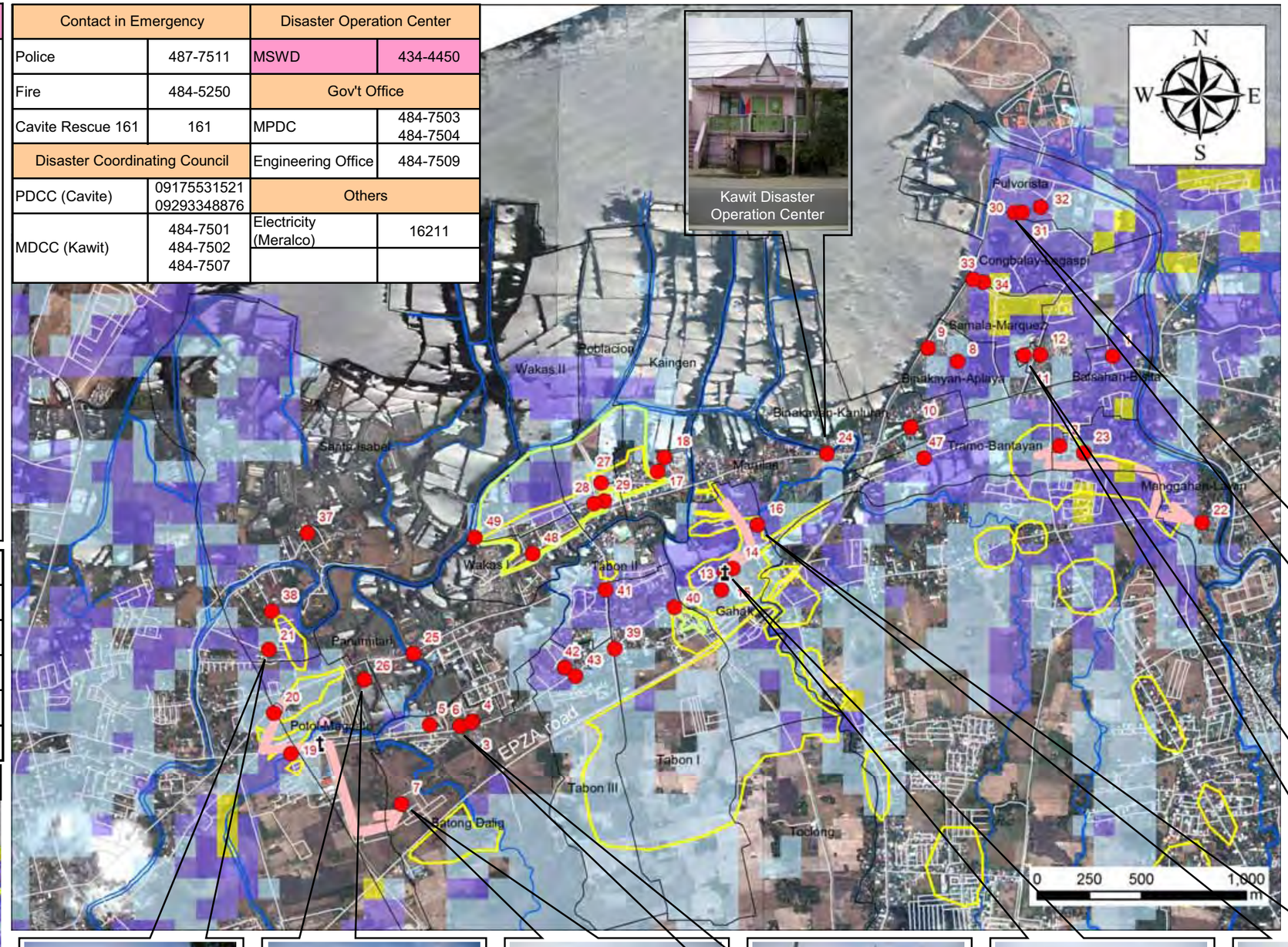
- Church
- School
- Road
- Rivers
- Flood prone area
- High tide flood
- Brgy. bnd

Inundation Depth

- No Flood
- 0.01 – 0.25m
- 0.25 – 0.5m
- 0.5 – 1.0m
- 1.0 – 2.0m
- More than 2.0m

Your Barangay Chairperson
Your Evacuation Center

Contact in Emergency		Disaster Operation Center	
Police	487-7511	MSWD	434-4450
Fire	484-5250	Gov't Office	
Cavite Rescue 161	161	MPDC	484-7503 484-7504
Disaster Coordinating Council		Engineering Office	484-7509
PDCC (Cavite)	09175531521 09293348876	Others	
MDCC (Kawit)	484-7501 484-7502 484-7507	Electricity (Meralco)	16211



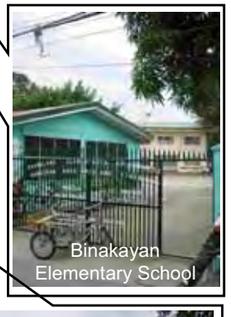
Floods


Clogged Bridge

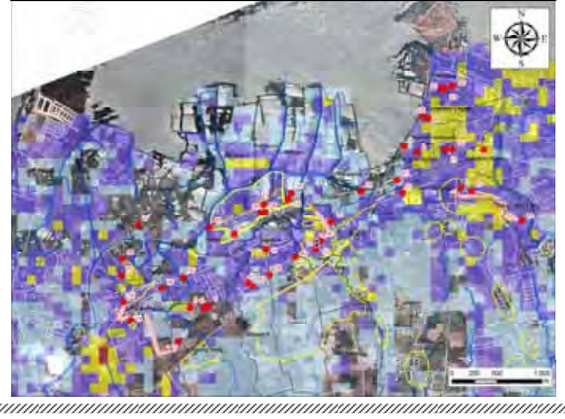

High Tide Flood


Inland Flood


Binakayan National High School


Binakayan Elementary School

In case of 100-year flood




Potol-Sta. Isabel Elementary School


Panamitan Elementary School


Kawit Municipal Hall


Batong Dalig Elementary School


Emiliano Tri Tirona Memorial National High School


Gahak-Marulas Elementary School

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Wakas II	49	Wakas Ii Day Care Center

Memos

Paki-bahagi po lamang sa inyong pamilya ang mga napag-usapan.
Hal. saan dapat lumikas, paano lumikas, paano makipag-ugnayan sa isa't isa, atbp.

Flood Hazard Map (Brgy. Potol-Magdalo, Kawit)

Hazard Map: Ang *flood hazard map* ay ginawa para sa ligtas at mabilisang paglikas. Ipinapakita nito ang maaaring maging lawak at lalim ng isang *5-year flood*, gayundin ang mga impormasyon ukol sa mga *evacuation centers*. Ito'y inyong gamitin sa paghahanda laban sa baha at sa mga gawaing paglikas tulad ng pagsiguro sa kalagayan sa paligid ng inyong bahay, *evacuation centers* at sa maaaring daanan ng inyong pamilya.
5-year flood: bahang maaaring maganap ng isang beses sa loob ng limang taon

Mga dapat gawin sa oras ng pagbaha:
Subaybayan ang ulat panahon sa radyo o telebisyon
Mag-imbak ng pagkain, tubig inumin, baterya at mga gamit para sa agarang lunas.
Patayin ang *main switch* ng kuryente kung mayroon nang baha.
Maagang ilikas ang mga bata, matanda at ang mga maysakit.

Emergency Goods

Legend

- Evacuation Centers
- Evacuation route

Landmark

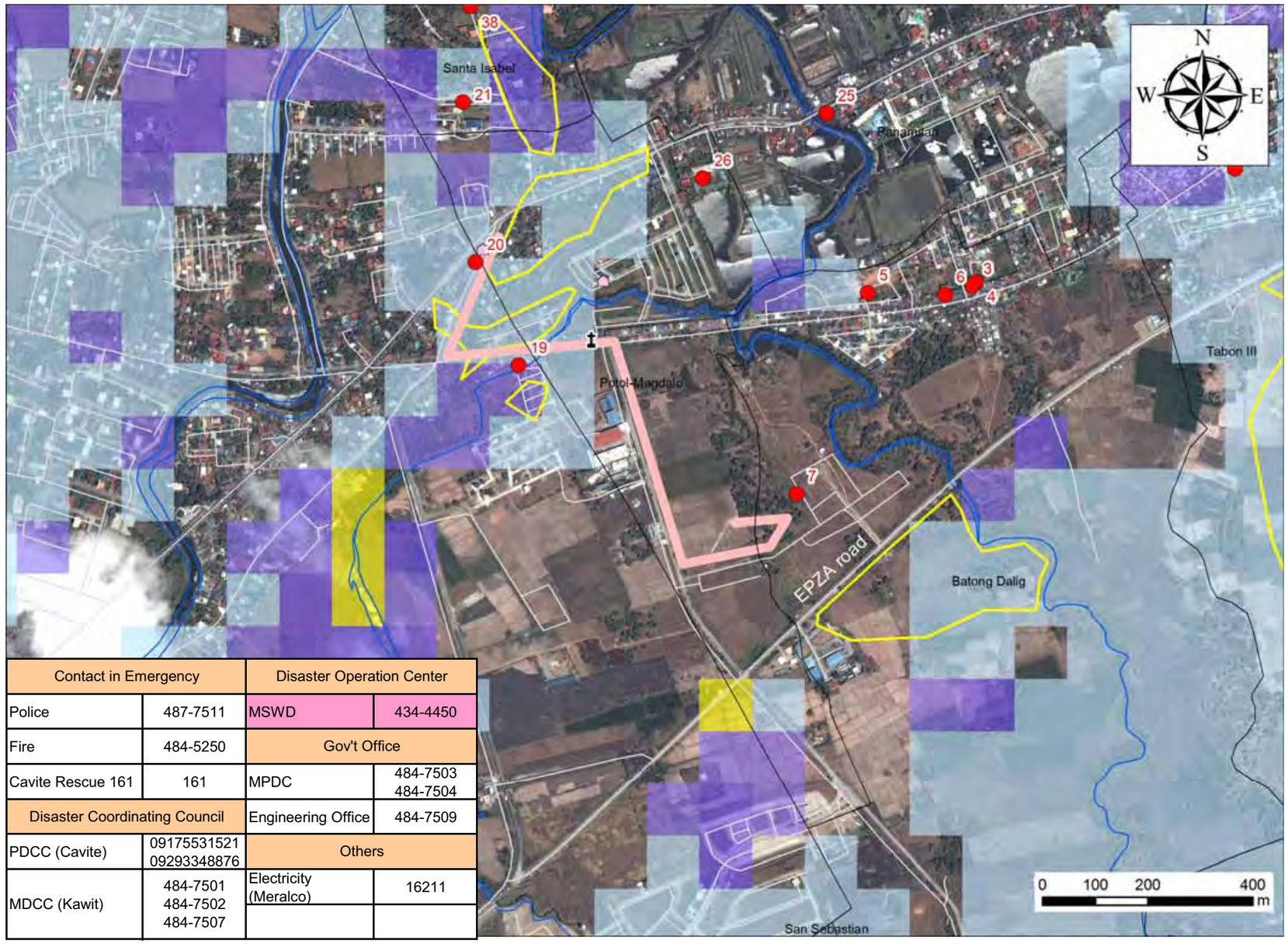
- Church
- School
- Road
- Rivers
- Flood prone area
- High tide flood
- Brgy. bnd

Inundation Depth

- No Flood
- 0.01 – 0.25m
- 0.25 – 0.5m
- 0.5 – 1.0m
- 1.0 – 2.0m
- More than 2.0m

Your Barangay Chairperson
Your Evacuation Center

5-year flood (Kawit)



Contact in Emergency		Disaster Operation Center	
Police	487-7511	MSWD	434-4450
Fire	484-5250	Gov't Office	
Cavite Rescue 161	161	MPDC	484-7503 484-7504
Disaster Coordinating Council		Engineering Office	484-7509
PDCC (Cavite)	09175531521 09293348876	Others	
MDCC (Kawit)	484-7501 484-7502 484-7507	Electricity (Meralco)	16211

Floods


Clogged Bridge


High Tide Flood


Inland Flood


6 Batong Dalig Elementary School


5 Batong Dalig Day Care Center


19 Borja Hall / Potol-Magdalo Day Care Center


20 Potol-Magdalo Brgy. Hall


21 Potol-Sta. Isabel Elementary School


7 Kawit Municipal Hall


25 Panamitan Day Care Center


26 Panamitan Elementary School

Evacuation Centers (Kawit)

Barangay		Evacuation Centers
Balsahan-Bisita	1	Balsahan-Bisita Barangay Hall
	2	Philippine Independent Church
Batong Dalig	3	Batong Dalig Barangay Hall
	4	Batong Dalig Chapel
	5	Batong Dalig Day Care Center
	6	Batong Dalig Elementary School
	7	Kawit Municipal Hall
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	9	Binakayan-Aplaya Day Care Center
Binakayan-Kanluran	10	Binakayan-Kanluran Barangay Hall
Congbalay-Legaspi	11	Binakayan Elementary School
	12	Congbalay-Legaspi Barangay Hall
Gahak	13	Emiliano Tria Tirona Memorial National High School
	14	Gahak Barangay Hall
	15	Gahak Chapel
	16	Gahak-Marulas Elementary School
Kaingen	17	Kaingen Barangay Hall & Day Care Center
	18	Kaingen Basketball Court
Magdalo (Putol)	19	Borja Hall / Putol Day Care Center
	20	Magdalo (Putol) Barangay Hall
	21	Potol-Sta. Isabel Elementary School
Manggahan-Lawin	22	Lanai Day Care Center
	23	Manggahan-Lawin Barangay Hall / Day Care Center
Marulas	24	Marulas Barangay Hall
Panamitan	25	Panamitan Day Care Center
	26	Panamitan Elementary School
Poblacion	27	Kaingen-Poblacion Elementary School
	28	Poblacion Barangay Hall
	29	St. Mary Magdalene Church
Pulvorista	30	Binakayan National High School
	31	F. Ilano Memorial School
	32	Pulvorista Barangay Hall
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	34	Samala-Marquez Day Care Center
San Sebastian	35	San Sebastian Barangay Hall
	36	San Sebastian Day Care Center
Sta. Isabel	37	Dr. Timoteo V. Encarnacio Memorial Basketball Court
	38	Sta. Isabel Barangay Hall
Tabon I	39	Tabon I Barangay Hall
	40	Tabon I Day Care Center
Tabon II	41	Tabon Ii Barangay Hall
Tabon III	42	Tabon Iii Barangay Hall
	43	Tabon Iii Day Care Center
Toclong	44	Toclong Barangay Hall
	45	Toclong Elementary School
	46	Toclong Elementary School & Toclong Day Care Center
Tramo Bantayan	47	Tramo Bantayan Barangay Hall & Day Care Center
Wakas I	48	Wakas I Barangay Hall & Day Care Center
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Memos

Paki-bahagi po lamang sa inyong pamilya ang mga napag-usapan.
Hal. saan dapat lumikas, paano lumikas, paano makipag-ugnayan sa isa't isa, atbp.

Flood Hazard Map (Brgy. Gahak, Kawit)

Hazard Map: Ang *flood hazard map* ay ginawa para sa ligtas at mabilisang paglikas. Ipinapakita nito ang maaaring maging lawak at lalim ng isang *5-year flood*, gayundin ang mga impormasyon ukol sa mga *evacuation centers*. Ito'y inyong gamitin sa paghahanda laban sa baha at sa mga gawaing paglikas tulad ng pagsiguro sa kalagayan sa paligid ng inyong bahay, *evacuation centers* at sa maaaring daanan ng inyong pamilya.
5-year flood: bahang maaaring maganap ng isang beses sa loob ng limang taon

Mga dapat gawin sa oras ng pagbaha:
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Maagang ilikas ang mga bata, matanda at ang mga maysakit.

Emergency Goods

Legend

- Evacuation Centers
- Evacuation route

Landmark

- Church
- School
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Your Barangay Chairperson
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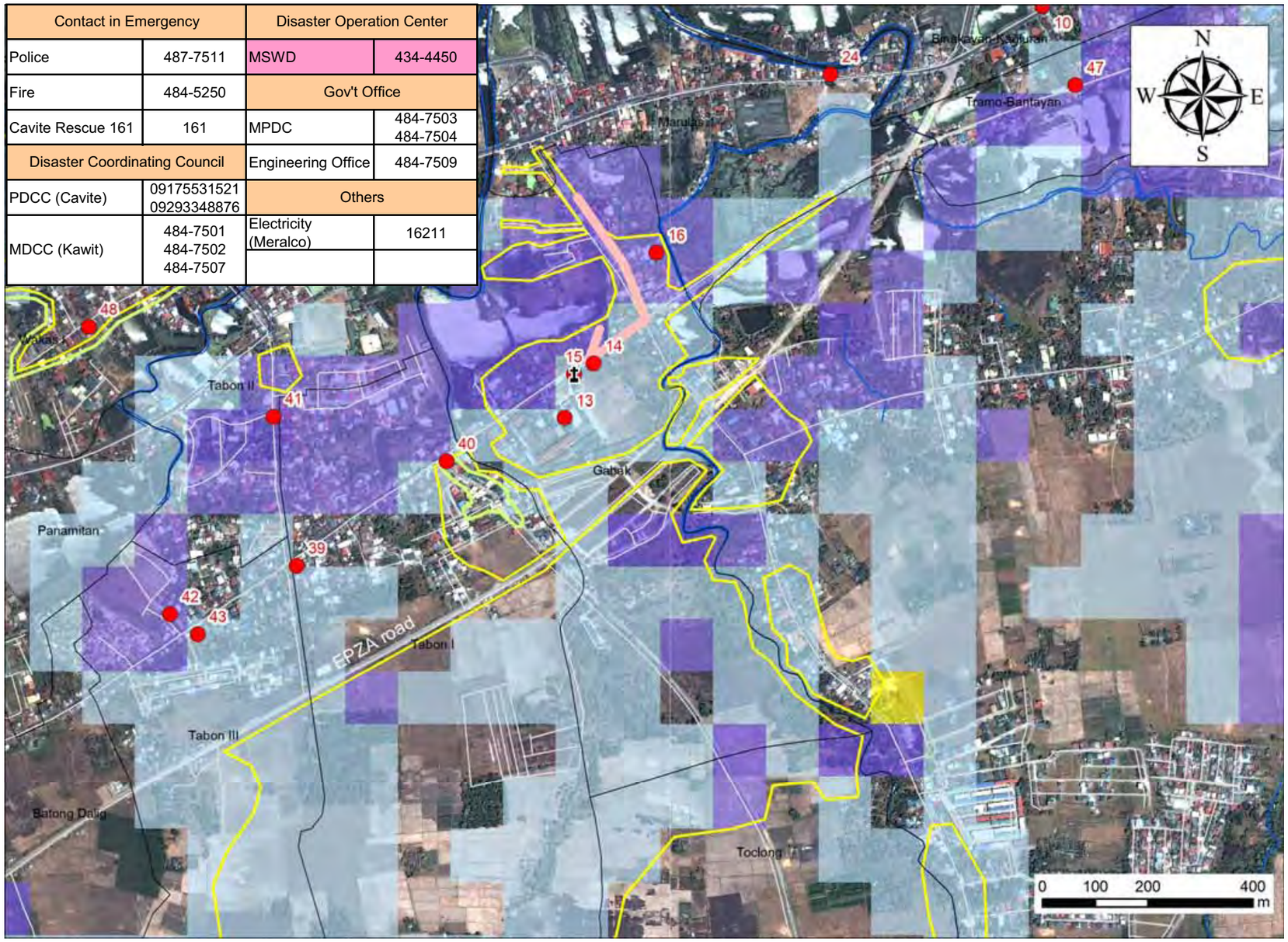

5-year flood (Kawit)

Floods


Clogged Bridge


High Tide Flood


Inland Flood


24 Kawit Disaster Operation Center


16 Gahak-Marulas Elementary School


43 Tabon III Day Care Center


39 Tabon I Brgy. Hall


40 Tabon I Day Care Center


13 Emiliano Tria Tirona Memorial National High School


14 Gahak Brgy. Hall


15 Gahak Chapel

Evacuation Centers (Kawit)

Barangay		Evacuation Centers
Balsahan-Bisita	1	Balsahan-Bisita Barangay Hall
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	16	Gahak-Marulas Elementary School
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	18	Kaingen Basketball Court
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	20	Magdalo (Putol) Barangay Hall
	21	Potol-Sta. Isabel Elementary School
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Flood Hazard Map (Brgy. Manggahan-Lawin, Kawit)

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Emergency Goods

Legend

- Evacuation Centers
- Evacuation route

Landmark

- Church
- School
- Road
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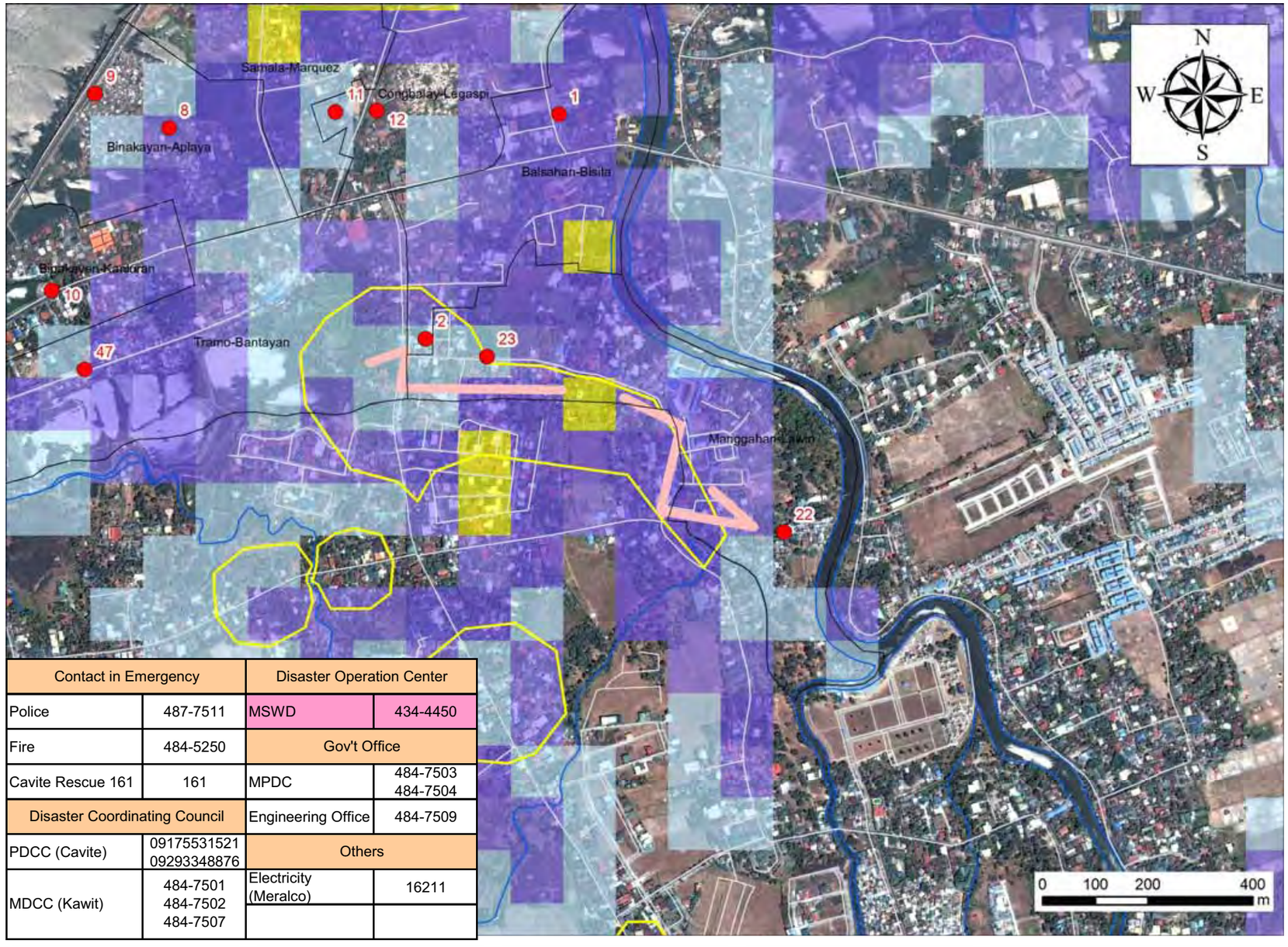
Your Evacuation Center



Floods


Clogged Bridge


High Tide Flood


Inland Flood

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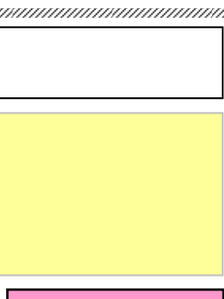
1 Balsahan Bisita Brgy. Hall

22 Lanai Day Care Center

5-year flood (Kawit)


10 Binakayan-Kanluran Brgy. Hall


8 Binakayan-Aplaya Brgy. Hall


11 Binakayan Elementary School


12 Congbalay-Legaspi Brgy. Hall


2 Phil. Independent Church


23 Manggahan-Lawin Brgy. Hall / Day Care Center

Evacuation Centers (Kawit)

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Memos

Paki-bahagi po lamang sa inyong pamilya ang mga napag-usapan.
Hal. saan dapat lumikas, paano lumikas, paano makipag-ugnayan sa isa't isa, atbp.

Annex-4

Map Exercise

THE STUDY
ON
COMPREHENSIVE FLOOD MITIGATION FOR
CAVITE LOWLAND AREA
IN THE REPUBLIC OF THE PHILIPPINES

MAP EXERCISE

for Flood Hazard Map and Evacuation Drill

September 2008
Makoto Mitsukura
JICA Study Team

What's a Map Exercise?

Making such a map together with you!!

Community is a main role.
You play the lead in Map Exercise!!

Sample video

Target Community

Target Community

Schedule

Map Exercise

Barangay	Date	Time	Venue
Potol-Magdalo	Sep. 10	9:00-12:00	Borja Hall/Day Care Center
Gahak	Sep. 9	9:00-12:00	Gahak Barangay Hall
Manggahan-Lawin	Sep. 10	14:00-17:00	Manggahan Day Care Center

Seminar & Evaciation Drill

Barangay	Date	Time	Seminar
Potol-Magdalo	Sep. 17	9:00-12:00	Borja Hall/Day Care Center
Gahak	Sep. 20	9:00-12:00	Gahak Barangay Hall
Manggahan-Lawin	Sep. 17	14:00-17:00	Manggahan Day Care Center

Why do we do this activity?

For developing Flood relief plan and Flood Hazard Map

Although these jobs should be conducted by the government, there is a limit by the approach only of government and researcher as well as JICA Study Team.

Because the one who knows the characteristics of the area the best is the resident.

To get information such as

Where is the safe area?
Where is the dangerous area?
Where are they living and who are they?
Where is it? What is it? (Layout of something)

To make you flood risk awareness

You are the persons concerned! (**Ownership**!)
We can share fragmentary and individual information each other.

Why do we do this activity?

- Reduce the Flood damage and victims

➢Structure Measure
- Improvement of River Channel
- Construction of Flood Retarding Basin

➢Non-Structure Measure
- On-site flood regulation pond
- Control of Land Development
- Flood Forecasting and Early Warning
- Activity for Flood Risk Management
- Maintenance of river channel

Already proposed In our Master Plan

Need to start

Purpose of Map Exercise

For us (PDCC, MDCC and BDCC)

✓To obtain detail flood information
✓To confirm our image/simulation result and actual condition
✓To identify/recognize urgent transportation root
✓To lead the enlightenment activities

For the residents

✓To understand where they live and where the evacuation center is
✓To identify where flood prone area are and where dangerous of flood are
✓To make you easy to understand of Flood Hazard Map
✓To have a sense of flood crisis/risk awareness

Map Exercise

Let's start!!

Map Exercise

Grouping

Please make 3 groups so that the member may become 7 to 10 people.

Please select the leader in each group.

Map Exercise

Please share the works so that all participants can join the exercise.

Task 1 (Drawing lines and putting marks)

Main river, tributaries and creeks	Blue Line
Main roads	Purple Line
Bridges	Pink ■
Fire, Police, Government office	Yellow ■
Hospital	Blue ■
Church/Chapel	Red and White □
Schools, Parks, Open spaces	Green ●

Map Exercise

Please share the works so that all participants can join the exercise.

Task 1 (Drawing lines and putting marks)

Evacuation center	Orange ●
Participant's house	White □
Flood prone area	Yellow Line
Inundation area (Milenyo in 2006)	Orange Line

Map Exercise

Please share the works so that all participants can join the exercise.

Task 2 (Evacuation route)

Please draw the route to the evacuation center from your house.

White Line

Map Exercise

Please share the works so that all participants can join the exercise.

Task 3 (Discussion)

Please discuss the questions in each group

- 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?

The leader should collect their opinions and explains the results of discussion later.