

LETTER



Republic of the Philippines  
**COMMISSION ON AUDIT**  
Commonwealth Avenue, Quezon City

January 13, 2014

Honorable **ROGELIO L. SINGSON**  
Secretary  
Department of Public Works and Highways  
Port Area, Manila

Dear Secretary Singson:

Pursuant to Section 2, Article IX-D of the Philippine Constitution of the Philippines and Section 43 of the Government Auditing Code of the Philippines (Presidential Decree No. 1445), the Audit Team created under Commission on Audit (COA) Office Order No. 2012-1009 dated November 20, 2012 conducted a performance audit of the Kalookan-Malabon-Navotas-Valenzuela (KAMANAVA) Flood Control Project of the Department of Public Works and Highways (DPWH) for the period April to July, 2013.

For the said undertaking, we adopted the Citizens' Participatory Audit (CPA) technique in line with the COA's response to the call of the President of the Philippines for increased transparency and citizen participation in governance; and invoking COA's authority granted by the 1987 Constitution "to define the scope of its audit and examination" and "establish the techniques and methods required thereof".

The audit observations and recommendations were discussed with the DPWH KAMANAVA –Project Management Office (PMO) in an exit conference conducted on November 5, 2013. Their responses were incorporated in the report where appropriate. The details of the audit are embodied in our Audit Report.

## 1.0 BACKGROUND

The Kalookan, Malabon, Navotas and Valenzuela (KAMANAVA) area, approximately 18.48 square kilometers of low-lying flat terrain and ground elevation ranging from -0.5 to 1.5 meter above mean sea level of Manila Bay, is located in the estuary of the Malabon- Tullahan River where flooding has been brought about by daily phenomenon. Most of the areas developed for industrial, residential and commercial purposes were originally fish ponds. Floods used to bring no substantial damages to residents living in some flood-free areas taking measures of stilt and/or earth fill to elevate houses with boat as means of transportation. However, rapid urbanization with modernized life-style has changed the susceptibility to damage by permanent floods as indicated by the rising cost of damage due to severe floods which have occurred since the 1970s. The KAMANAVA area is particularly vulnerable to flood due to continued land subsidence and rapid urbanization.

Thus, the Government of the Philippines (GOP) has commenced the preparatory works for implementation of Flood Control and Drainage System Improvement Project for the KAMANAVA in Metro Manila to alleviate the progressive deterioration of flood condition in the area.

After the flood summit held on July 10, 1997, as an initial step of implementation, an approval of the Technical Board of Investment Coordination Committee (ICC) was secured on January 15, 1998, and simultaneously the removal of squatters who are affected by the project implementation has commenced in Malabon area. In addition, the Environment Compliance Certificate (ECC) was also granted by the Department of Environment and Natural Resources (DENR) on July 14, 1998.

The implementing schedule including detailed engineering design, tendering and construction of the project was estimated to be approximately five years from 1999 to 2003. The construction was proposed in two area-wise implementation: South Area of the Malabon River in Stage I and the North Area of the Malabon River in Stage II.

The Executing Agency for the project was the Project Management Office-Foreign Assisted Projects (PMO – FAPs) which is under the cluster of PMO-Major Flood Control Projects of the DPWH.

On April 7, 2000, Loan Agreement No. PH-212 was entered into by and between Japan Bank for International Cooperation (JBIC) and the GOP for the KAMANAVA Drainage System Improvement Project in the amount of Japanese

## 1.0 BACKGROUND

Yen ¥8,929,000,000 and has become effective on September 4, 2000.

The Approved Budget for the Contract (ABC) is ₱3,097,704,294.55. Public bidding was conducted on August 16, 2002 with the following contractors and their corresponding bid proposals as tabulated below

<u>Contractor</u>	<u>Amount of Bid</u>
Taisei Corporation	₱4,012,429,939.44
Toyo Construction	3,907,459,368.93
Sumitomo Construction	3,594,679,861.13
Shimizu Corporation	3,586,346,732.32
Hazama Corporation	3,563,073,564.11
Nishimatsu Construction	3,493,224,966.87

The contract was awarded to Nishimatsu Corporation Co. Ltd. (NCCL) in the amount of ₱3,479,584,407.13 with reduction of ₱13,640,559.74 from its original proposal. The proposal is 12.33 percent above the ABC as stated under the Bids and Awards Committee (BAC) Resolution No. KMV 003 issued in November 2002. The award was concurred by JBIC on January 22, 2003 with the issuance of Notice of Award on January 23, 2003 to NCCL at contract price of ₱3.060 billion. The contract was approved on May 23, 2003.

Presented below is the project's scope of work:

### A. Southern Area of Malabon River

1. Raising of River Wall on the Left Bank of Malabon-Tullahan River (Length = 4.3 km)
2. Raising of River Wall on the Right Bank of the Malabon-Tullahan River (Length = 4.4 km)
3. Raising of River Wall on the Banks of the Navotas-Tullahan River (Length = 4.4 km)

## 1.0 BACKGROUND

### 4. Construction of Flood Control Gates:

Maypajo	- 2 x 6.0 m x 3.8 m (Ancillary to Pumping Station (PS))
Spine	- 1 x 5.0 m x 4.9 m (Ancillary to PS)
Bangkulasi	- 2 x 4.0 m x 4.4 m (Ancillary to PS)
Catmon	- 2 x 4.0 m x 5.0 m (Ancillary to PS)
Longos	- 2 x 4.0 m x 4.2 m (existing flood gate)

### 5. Construction of Pumping Stations and supply and installation of pumps at:

Maypajo	- 2 x 2.3 m <sup>3</sup> /sec. Horizontal Shaft Axial Flow
Spine	- 4 x 3.25 m <sup>3</sup> /sec. Horizontal Shaft Axial Flow
Bangkulasi	- 2 x 2.22 m <sup>3</sup> /sec. Horizontal Shaft Axial Flow
Catmon	- 4 x 2.62 m <sup>3</sup> /sec. Submersible Motor Axial Flow

### 6. Improvement of Existing Drainage Channels (Length = 6 km)

### 7. Construction of Polder Dike (Width = 3 m, Length = 8.6 km)

### 8. Construction of New Regulation Ponds (Area = 6.0 ha.)

## B. Northern Area of Malabon River (North Navotas Pumping Stations)

### 1. Construction of Polder Dike (Width = 3 m, Length = 8.6 km)

### 2. Construction of Submersible Type Navigation Gate (Width = 25 m, Height = 8.9 m)

### 3. Construction of Flood Control Gates:

Navotas	- 2 x 12.0m x 4.4 m
Muzon	- 2 x 4.0m x 4.0m
South Pinagkabalian	- 2 x 4.0m x 4.0m
Kailugan	- 2 x 12.0m x 4.4m
Pinagkabalian	- 2 x 4.0m x 5.4m

### 4. Construction of Pumping Stations and supply and installation of pumps:

Navotas North – 3 x 3.3 m<sup>3</sup>/s Horizontal Shaft Axial Flow (Ancillary to Navigation Gate)

## 1.0 BACKGROUND

The implementation Schedule is presented below:

Pre-construction Activities (Tendering – Issuance of NTP)	- January to May 2003
Construction Works	- June 2003 to January 2012
Operation and Maintenance	- September 2007 to present (PMO-KAMANAVA-DPWH)

The implementation of the project was not completed within the original schedule due primarily to the right-of-way problem thus, in consideration of the project expiration of the loan agreement, the contract with NCCL was terminated with 88 percent accomplishment as of 2007. The contract price was downsized from ₱3.479 billion to ₱3.060 billion. The remaining works of the project was then contracted to the local contractors as follows:

### BMW AD Joint Venture

Contract No. 1	-	₱498.0 M
Contract No. 2	-	300.0 M

JD Legaspi Construction	-	230.0 M
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The objectives of the project are to create a favorable environment and to promote socio-economic activities in the KAMANAVA area by means of achieving the following:

- Mitigation of flood damages by flood control and drainage improvement works, and
- Reduction of water pollution of rivers/waterways by channel dredging.

## 2.0 AUDIT FOCUS

The focus of the CPA was the KAMANAVA Flood Control Project implemented by the DPWH in the Cities of Kalookan, Malabon and Navotas.

For audits which adopts the “citizens’ participatory audit” approach, COA selects projects/services of the government that are close to the hearts of the people, since the audit is conducted with direct involvement of the citizens. The KAMANAVA Flood Control Project of DPWH, is one such service.

The KAMANAVA was selected among the flood control projects of DPWH which is one of the three priority areas identified in the Master Plan and Feasibility Study on Flood Control and Drainage Project in Metro Manila completed in 1990 with the assistance of the Japan International Cooperation Agency (JICA).

Shown below are among the completed structures of the Flood Control and Drainage Project:



Bangkulasi Pumping Station and Floodgate  
R-10, Navotas City



Kallugan Floodgate  
Dampalit, Malabon City  
(2 x 12.0 m x 4.4 m)



NAVIGATION GATE  
Tanza, Navotas City  
(W=25 m, H = 8.9 m)



Polder Dike  
Malabon City

### 3.0 AUDIT OBJECTIVES

The CPA was conducted to determine whether the project has attained its objective of mitigating flood damages by flood control and drainage improvement works in the KAMANAVA and thereby improve the living conditions and promote economic activities in the said areas.

To attain its audit objective, the audit team, through inspection, focus group discussion (FGD) and surveys, shall determine and validate the efficiency and effectiveness of the following structures in mitigating flood:

- a. Polder Dike
- b. Raised River Wall (Right Bank of Malabon River)
- c. Navigation (Tide) Gate Submersible Radial Type
- d. Flood Gates
- e. Control Gates
- f. Pumping Station with Flood Gates
- g. Pumping Station without Flood Gates
- h. Raised River Wall (left bank of Malabon River)
- i. Raised River Wall (Navotas and Maral River)
- j. Improved Existing Drainage Channels

## 4.0 AUDIT CRITERIA

The standards/benchmarks used as bases for the validation/ determination were:

1. Section 3.1.1 (1) and (2), Chapter 3 of the Flood Control and Drainage System Improvement Plan of the Main Design Report provided the Planning Criteria and Methodology for the KAMANAVA Flood Control and Drainage System Improvement Plan.

2. Project Purpose

The objective of the Project is to mitigate flood damages by flood control and drainage improvement works, and thereby improve the living conditions and promote/enhance activities in the KAMANAVA area.

3. Project Completion Report (January 2013) – Utilization of the Project’s Facilities (page 38)

Item	Original Plan
Five Pumping Stations - Bangkulasi - Maypajo - Spine - Catmon - North Navotas	Discharge the storm water
Five Independent Floodgates (except Navigation Gate)	Control the channel flow and prevent tide flood
Malabon River Improvement	Malabon River is upgraded to have a flow capacity of 450m <sup>3</sup> /s
Drainage Channel Improvement - Maypajo Creek - Spine Channel - Longos-Catmon Drainage Channel - Northern Catmon Drainage Channel	Maypajo Creek, Spine Channel and Longos – Catmon Drainage Channel was improved and newly excavated to convey the storm water to Maypajo, Spine and Catmon pumping Stations, respectively
Polder Dike	Protect Dampalit area from tide flood



## 4.0 AUDIT CRITERIA

4. Memoranda of Agreement (MOA) entered into in calendar years 1998 and 2000 by and between the Cities of Kalookan, Malabon, and Navotas and DPWH which provides that DPWH shall:
  - a. endeavor to continuously seek for viable ultimate solution to mitigate the flooding problem in KAMANAVA area caused by high tide and strong rains; and
  - b. sustain the maintenance and rehabilitation of existing flood control structures/facilities.
  
5. Comprehensive Resettlement Program (CRP), the objectives of which are to:
  - a. compensate the affected population for lost assets and livelihood and income;
  - b. provide suitable relocation including the provision of relocation sites with appropriate facilities and services; and
  - c. assist in rehabilitating the families for them to achieve at least the same level of well-being with the Project as without it.

## 5.0 AUDIT METHODOLOGY

The methods applied and the activities performed by the audit team with the assistance/participation of the representatives of three civil societies namely: International Alert, Concerned Citizens of Abra for Good Government and Diaspora for Good Government were the following:

1. Understanding and verification of the following documents:
  - a. Feasibility Study
  - b. Project Completion Report
  - c. Final Report
  - d. MOA with LGUs and other concerned agencies
  - e. Operation and maintenance manual/guidelines
  - f. Contract documents
  - g. List of Relocatees
  - h. Schedule of High/Low Tide
2. Prepared and administered survey questionnaires for the following groups:
  - a. Concerned LGUs
  - b. Implementing Office/DPWH-PMO
  - c. Pumping Stations and Flood Gates Operators
  - d. Relocatees
  - e. Barangay officials and concerned citizens affected
3. Conducted interviews with the following officials:
  - a. Former and current Project Director of the KAMANAVA PMO
  - b. City Engineer of the three LGUs
4. Conducted FGD and citizen surveys in the following barangays:
  - a. Kalookan – Barangays 34, 35, 14 and 28
  - b. Malabon - Dampalit, Tonsuya, Niyugan, Tinajeros and Letre
  - c. Navotas – North Bay Boulevard South, Tangos, Tanza, Sipac and San Jose
  - d. Relocatees residing at Pabahay 2000 and Towerville in San Jose Del Monte, Bulacan

## 5.0 AUDIT METHODOLOGY

5. Inspected the following structures of KAMANAVA project to determine the existence, status of the project and understand the operation of its structures:
  - a. Floodgates with Pumping Stations
  - b. Independent Flood Gates
  - c. Navigational Gate
  - d. Drainage Channel Improvement
  - e. Polder Dike

## 6.0 AUDIT PERIOD

The CPA audit planning and fieldwork were conducted from April to July 2013. Data processing and analysis, including report writing were conducted from August to October 2013.



Audit Planning



Community Inter-action



Ocular Inspection of Facilities



Ocular Inspection of Facilities



Ocular Inspection of Facilities



Ocular Inspection of Facilities

## 7.0 AUDIT RESULTS

- 7.1 *The constructed structures for the flood control project in Kaloookan, Malabon and Navotas (KAMANA) of the DPWH had not completely mitigated the flooding cause by high tide and heavy rains due to: (a) deficiencies in the structures and design, and (b) existence of informal settlers and large volume of garbage in the project sites, thus, the objective of reducing the flood level in project area from 1 meter to below 0.5 meter was not fully attained. Moreover, the effectiveness of the flood control project may not be fully attained due to inadequate personnel and communication facilities necessary for the efficient operation of the flood control facilities.*

A. Deficiencies in Structures/Design

- 7.1.1 The top elevation of structures constructed for the KAMANAVA Flood Control Project designed on the basis of land use was reached, if not overtopped, during the August 7, 2012 flood due to heavy rainfall brought by “habagat” and the 12.8 meter high tide, the highest level ever recorded, that resulted to severe flood in all sub-drainage areas of the project.*

Chapter 3 of the Flood Control and Drainage System Improvement Plan of the Main Design Report provided the Planning Criteria and Methodology for the KAMANAVA Flood Control and Drainage System Improvement Plan Section 3.1.1. (1) and (2) thereof stipulate:

*“3.1.1. Design Floods*

*(1) Target Year*

*The Target is the year 2020 so that the completion year of the Project which is 2005, is 15 years before the target. Therefore, the conditions of the project area, especially the flood runoff conditions and expected flood damages are estimated on the basis of land use in 2020.*

*(2) Project Scale – Design Return Period*

## 7.0 AUDIT RESULTS

*With the proposed step-wise implementation of Dampalit and South Pinagkabalian area, the 10 year return period for drainage improvements can be adopted.*

*In summary, the following return periods are employed for design:*

<i>Plan</i>	<i>Component</i>	<i>Return Period</i>
<i>Flood Control Plan</i>	<i>Design Water Levels</i>	<i>30 - Year</i>
<i>Drainage Control Plan</i>	<i>Gravity Drainage</i>	<i>10 - Year</i>
	<i>Pump Capacity</i>	<i>10 - year</i>

Results of interview with Project Manager Macariola S. Bartolo, former Project Director of the KAMANAVA Project, revealed that for drainage improvement, Design Guidelines, Criteria and Standards of the DPWH and the policy targets in flood control and drainage prepared by the MMDA in 1993 stipulate to apply a design scale of 10-year return period.

Further, she clarified that the design levels/elevations (top) of the various flood and drainage control structures are as follows:

<b><u>Structure</u></b>	<b><u>Original Design Top Elevation Level (TEL)</u></b>
Polder dike	12.60 m
Bank protection works along waterways	12.60 – 12.80 m
Floodgates	12.80 m

The actual completion date of the Project was in January 26, 2012, eight years prior to the target year of 2020. The last batches of the completed structures were operational the following day, January 27, 2012.

On August 7, 2012, the KAMANAVA area experienced severe flood caused by heavy rainfall brought by Habagat (as induced by Typhoon Gener) and the 12.80 meter tide, the highest tide level ever recorded as per NAMRIA Tide Prediction Table. Due to these intense rains and highest tide level that occurred, most of the completed structures were reached, if not overtopped, by flood level, such as some sections of the polder dike as well as the completed revetment/embankment/walls of rivers/esteros as shown in the next page:

## 7.0 AUDIT RESULTS



Affected area of the Polder Dike at Barangay Dampalit, Malabon City



Overtopped earth embankment at Kailugan River at Barangay Dampalit, Malabon City



Overtopped Polder Dike



Scoured portion of Polder Dike at Pinagkabalian River side at Brgy. Dampalit (Tide level at 2.2 m – July 5, 2012)

## 7.0 AUDIT RESULTS



*(Source: Flood Report – August 13, 2012 – Advisory Council City of Malabon on Flood Control)*

As shown below, the overtopped sections of the polder dike were not yet repaired as of date of inspection on April 23, 2013 as bags of undetermined materials were used to hold the dike.



Portion of the Polder Dike near South Pinagkabalian FG



Portion of the damaged polder dike



## 7.0 AUDIT RESULTS

According to Project Manager Bartolo, all sub-drainage areas of the Project had experienced severe flood due to heavy rain which is estimated to be 30-year to 50-year return period (at Port Area Rainfall Gauging Station).

As gleaned from the foregoing, the flood and drainage controls of the Project, although designed on the flood runoff conditions and expected flood damages estimated on the basis of land use in 2020 of the project area, were not effective during the August 7, 2012 flood which is seven years earlier than the design target year.

Moreover, Project Manager Bartolo reported that the return periods used in the design are apparently not enough as the severe flood due to heavy rains is estimated to be 30-year to 50-year return period (at Port Area Rainfall Gauging Station).

The Audit Team's observation was confirmed by the participants of the FGD conducted in Navotas on May 28, 2013 as presented in their comments below:

- The project will control only 12.5 meters water elevation. The sea level is 10.5 meter so there is a 2 to 2.5 meter difference. During that time, the water elevation is at 13 meters and the Japanese contractor did not anticipate such.
- Navotas experienced the worst flood during typhoon Pedring. All the structures along sea shore were washed out. The tide during that time is at 1.8 meters high plus the presence of storm surge. All the houses were destroyed and some of the pumping stations broke down due to continuous pumping.

## 7.0 AUDIT RESULTS

***7.1.2 The constructed Polder Dike in Malabon is not fully effective in protecting the northernmost part of the Project Area (largely Dampalit) against the high tide levels due to the retention/installation of concrete pipes (tosangs) compounded by the DPWH's non-monitoring and control of the opening and closing of the said pipe gates. This demonstrates DPWH's weak control, unclear authority and responsibility setup in the polder dike's overall operation and maintenance. The existence of concrete pipes/tosangs allow the continuous flow of water to the fishponds and residential area causing flooding in Malabon especially in Barangay Dampalit during high tide and heavy rainfall.***

The polder dike is constructed of earth with a 3 meter wide Operation & Maintenance (O & M) road on top of the dike and approximate total length of 8.6 km. The polder dike crest was designed with Elevation Level (EL) + 12.90 meter in consideration of the effect of extra high tide and wave height during rainy season. There are 29 small gates and sluice or tosangs identified along the alignment of polder dike for the fishponds.



Constructed Tosang within the polder dike



Existing Tosang along the polder dike

## 7.0 AUDIT RESULTS

The audit team conducted ocular inspections on some of the structures constructed. Results of our ocular inspections showed, among others, that the constructed polder dike is approximately 8.6 km. However, we observed that the polder dike, constructed between fishponds, is mostly several hundreds of meters from the residential area. We also noted the existence of small gates and sluice along the polder dike.

The audit team inquired from the former KAMANAVA Project Director why the polder dike was constructed within the fishpond area which could cause flooding in the residential area during high tide. She explained that the cost of right-of-way was primarily considered as farm lots are cheaper than residential lots and it is foreseen that in the long run the fishpond area will be converted to residential area.

During the FGD undertaken on May 22, 2013, the residents and fishpond owners of Barangay Dampalit confirmed the existence of concrete pipes or “tosang” embedded/constructed along the length of the polder dike. They said that the tosangs are used to maintain the quality (salinity) and required elevation of water of the fishponds by releasing or obtaining water from the River Side (Manila Bay). The fishpond owners admitted that some of the “tosangs” have no cover that can regulate the flow of water during high tide and heavy rainfall and prevent water to overflow and cause flooding in the nearby residential areas.

Further, the Barangay Chairman of Dampalit and the City Engineer of Malabon said that they cannot control the use of “tosang” since they cannot pinpoint who among the fishpond owners/operators opens or closes the tosangs.

According to the concerned residents, the polder dike does not mitigate flooding in their area. The existence of fishponds between the dike and residential area affects the dike’s effectiveness because fishpond operators are the ones regulating the flow of water to protect their interests to the detriment of the residential area. They said that due to the unregulated use of tosangs, high tide water overflowed to their area and became stagnant. The residents also

## 7.0 AUDIT RESULTS

claimed that damaged fish pond also causes flooding in their residential area.

### *Results of Survey*

A survey at Barangay Dampalit, Malabon City with 41 respondents was also conducted.

Results of the survey revealed that of the total 41 respondents, ten did not provide data on high tide level before and after the project; six respondents did not provide data on the flood level due to high tide after the project although answered that there was flooding due to high tide before the project which ranged from below .5 meter to 1 meter; five respondents said that flooding due to high tide changed from .5 meter to 1 meter to below .5 meter after the project; and 20 respondents said that there was no change in the level of flooding due to high tide which remains at the following level:

<b><u>Level of high tide before and after the project (in meter)</u></b>	<b><u>No of respondents</u></b>
Below .5	17
.5 - 1	1
Above 1	2
<b>Total</b>	<b>20</b>

It could be gleaned from the above data that the polder dike did not prevent flooding due to high tide. This is apparently attributed to the retention/installation of tosangs compounded by its unregulated/unmonitored opening and closing which demonstrates DPWH's weak control, unclear authority and responsibility setup in the polder dike's overall operation and maintenance.

### *Management Comments*

Management commented that the "fishpond industry in Malabon and Navotas areas is a very profitable business since time immemorial and the fish business in the area economically helps both the City Governments in terms of revenue and employment generations.

## 7.0 AUDIT RESULTS

Consequently, no national government project must be initiated defeating the long living benefits these fishponds have produced to both City Governments.”

They also commented that the installation of tosangs were allowed across the length of the polder dike in order to sustain the fishpond operators’ access to the saline water which is very vital in the life of fishes they raise. These tosangs are made of interconnected concrete pipes installed across the polder dike that guides the flow of water from the other side of the dike to the perimeter of the ponds. It is therefore a necessity to avoid leak of water along the path of the pipes for better water accumulation within the ponds. Fishpond is a closed perimeter area designed to confine water and fish habitat within while they grow. The owners of these fishponds, definitely would not allow the overflow of water from these ponds. otherwise the fishes inside would likewise go out of its confine to the detriment of their business”

Management further justified that these tosangs were provided with regulating gates in order to control the flow of water when necessary and it is admissible in their part that they have hardly monitored the proper operations of these gates very lately.

Further, during the exit conference, they justified that the issue about the unregulated operation of private tosangs and prinzas was already brought to the attention of the concerned LGU. Since the maintenance of the whole stretch of the Polder Dike will be eventually turned-over to the LGU, the DPWH has already advised Malabon City to pass an ordinance regarding the “tosang/prinza” operation and regulatory ordinance, just like City Ordinance No. 01-2010: “Fishpond Maintenance Regulatory Ordinance”. The fishpond owners and operators should only be allowed to open their prinzas at a certain water elevation (up to elevation 11.00 m only) which will not cause flooding in the area and at the same time can access to the saline water for fishpond use.

Project Manager Bartolo contends during the exit conference that the Final Variation Orders and as-built plans for Contract Nos. 1 and 2 showed that the stoplogs/ prinzas/tosangs were deleted.

## 7.0 AUDIT RESULTS

The audit team requested during the exit conference that the approved construction plans pertaining thereof should be submitted instead of the as-built drawings.

In response thereof, she agreed to submit copies of the approved final variation orders, construction plans and as-built drawings.

### *Team's Rejoinder*

The audit team opined that if only DPWH had constructed the polder dike adjacent to the residential area, there will be no issue or problems on the monitoring, control and maintenance of tosangs.

Contrary to the claim of Project Manager Bartolo during the exit conference that the tosang were deleted during the implementation phase, the submitted Change Order No. 2 and Variation Order No. 1 (Final) issued relative to Contract Nos. 1 and 2, respectively, of BMW AD Joint Venture did not show that the items to be used in the construction of tosangs (small gates) were deleted. This therefore indicates that the small gates were installed along the Polder Dike. Further, the approved construction plan to support the deletion of the construction of tosangs was not submitted.

In addition, DPWH should also be a member of the committee that will formulate the ordinance on the regulation of tosangs since the polder dike is part of the project implemented and currently maintained by DPWH so that issues and problems encountered in mitigating flood can be incorporated thereof.

## 7.0 AUDIT RESULTS

**7.1.3** *The Navigation Gate was not in operation during the period February 24, 2011 to March 2012 and March 16, 2013 to July 17, 2013 due to damaged link rods caused by faulty design and absence of desilting works (removal of accumulated silt and debris). The damaged link rods caused the navigation gate to remain in open position allowing the water level to rise in the protected area during high tide and eventually cause flooding in North Navotas Sub-Drainage area covering 475 hectares which is approximately 26 percent of the whole project area.*

The main function of the navigation gate is to provide flood protection from high tide and contribute in the mitigation of flood due to rainfall. The gate must be closed to protect the inland area against flooding from high tides; and to mitigate flooding due to heavy rainfall by preventing flood water discharged by the pumping station to the Manila Bay from returning to the Navotas River.

The navigation gate was constructed near the mouth of the North Navotas River to maintain the continuity of the tide protection barrier across the northern end of North Navotas River and to provide special facilities for the navigation of large ships and barges using North Navotas River up to Estrella Bridge as their only route to get to the shipyards on the banks of the North Navotas River.



## 7.0 AUDIT RESULTS

The project undertaken through design and built concept, with CTI Engineering Co., Ltd. (CTIE) as Consultant /Designer, Kurimoto Ltd. (KL) as fabricator and NCCL, as the Contractor, was constructed/located across the Navotas River near the outlet fronting the Manila bay. The navigation gate was completed on January 11, 2008 with a cost of ₱546,290,318.39 and started operation on January 12, 2008. The gate, however, was accepted only in February 26, 2010.

On February 24, 2011, the operator recommended the temporary shutdown of operation of the said gate on the same day, in an open position wherein the gate leaf is submerged in water due to the following defects noted during the conduct of the regular maintenance:

1. a crack/tear on the bottom flange of both link rods was visible; and
2. both link rods were also slightly twisted particularly near the connection with the gate leaf.

In view thereof, the DPWH organized an Inspectorate Team to thoroughly assess, investigate and determine the cause/s and extent of damage of the link rods. In its memorandum dated June 12, 2012, the Inspectorate Team concluded that the failure of the link rods was due to faulty design citing that the same were twisted symmetrically towards the same direction which suggest buckling occurred due to compression, wherein no investigation/analysis was made, as shown in the design computations submitted/presented by CTIE. The said computations showed that the link rods were designed only on its tension capacity. Moreover, they stressed that debris had accumulated in the gate pit and immediate vicinity, as the periodic maintenance dredging per prior agreement with the shipyard owners' association did not materialized and the flushing devise is not adequate to remove the type of debris usually present in the pit and in the surrounding area.



## 7.0 AUDIT RESULTS

The DPWH Inspectorate Team recommended among others: 1) invoke the post construction liability/responsibility of the Contractor as the failure is due to inadequately designed link rods, done by sub-contractor; and 2) the Consultant should also be held equally liable for their failure to check/correct the design plans during their design review.

On March 20, 2013, the DPWH, NCCL, KL and CTIE entered into an Agreement for the cost sharing of the ₱32 million price of the repair of the damaged link rods. Parties agreed that 90 percent of the repair cost shall be shared by and among NCCL, KL and CTIE, namely NCCL to share 30 percent, KL to share 30 percent and CTIE to share 30 percent, while the remaining 10 percent shall be shared by DPWH.

In view of the results of DPWH Inspectorate Team's assessment that the damaged to the link rod was due to inadequately/faulty designed link rods and the subsequent Agreement entered into by DPWH, NCCL, KL and CTIE wherein NCCL, KL and CTIE shall shoulder 90% of the cost of repair works, it could be surmised that the design analysis against compression stress was not made, thus, a sound structural section was not established that would sufficiently resist the compressive stress that acted on link rods. In addition, the DPWH failure to enforce compliance by the shipyard owners' Association and the concerned LGU to conduct periodic maintenance dredging was due to absence of a written agreement among the DPWH, shipyard owners' association and the City Government of Navotas. In a Sworn Statement, Project Manager Bartolo contends that DPWH was informed that the Shipyard Owners' Association had been regularly desilting the same area for their smooth operation/navigation, even prior to the implementation of the project.

The repair works was negotiated with MSB Vitug Construction Co. (MVCC) which included the replacement of link rods using of SM490 steel and the desilting of the gate itself and its immediate vicinity. However, to make the gate operational by end of March 2012, DPWH decided the use of A36 for the temporary link rods, since SM490 steel is not available locally and it will take three

## 7.0 AUDIT RESULTS

months to import said material. MVCC, at its own risk, started the repair works in the second week of December 2011. The operation of the navigation gate was then resumed on the first week of April 2012 after the installation of the temporary link rods.



The navigation gate again temporarily ceased to operate on March 16, 2013 to give way for the installation of the permanent link rods originally scheduled from April 9 - 13, 2013 and the conduct of the necessary test thereon. However, said installation schedule was deferred pending arrival of some incidental imported materials and was reset to last week of May 2013.

On May 15, 2013, the audit team observed that the Navigation Gate was not operational and in an open position, thus, allowing the ships and barges to continuously navigate.

On July 12, 2013, the audit team conducted a follow-up inspection relative to the repair works of the Navigation Gate. It was observed that both permanent link rods had been installed by temporary weld connection. In compliance with our verbal request, a trial/test operation was done moving the said gate from maintenance to close position; from close to half-way open position; and from half-way open to maintenance position. This test however will not prove that the Navigation Gate has been fully repaired at the time of audit.

## 7.0 AUDIT RESULTS

According to the Project Manager Bartolo, the Navigation Gate resumed normal operation on July 17, 2013.

### *Results of Citizen Survey*

The mostly affected area during the non-operation of the navigation gate was the Navotas Area. Comparison of the flood level during hightide, typhoon and rainy season based on the responses of the 23 respondents follows:

#### *During Hightide*

Responses	No. of respondents	Level of flood (in meter)	
		before	after
No answer	3		
Answered that there is flooding before the project but did not provide the flood level after the project	4		
With changes	7		
	4	.5-1	below .5
	1	above 1	.5-1
	2	above 1	below .5
Without change	9		
	7	below .5	
	1	above 1	
	1	.5-1	
<b>total</b>	<b>23</b>		

#### *During typhoon*

Responses	No. of respondents	Level of flood (in meter)	
		before	after
No answer	3		
Answered that there is flooding before the project but did not provide the flood level after the project	5		
With changes	8		
	4	above 1	.5 - 1
	4	above 1	below .5
Without change	7		
	5	below .5	
	2	above 1	
<b>Total</b>	<b>23</b>		

## 7.0 AUDIT RESULTS

### *During rainy seasons*

Responses	No. of respondents	Level of Flood (in meter)	
		before	after
No answer	4		
Answered that there is flooding before the project but did not provide the flood level after the project	6		
With changes	5		
	1	.5	below .5
	3	above 1	below .5
	1	above 1	.5-1
Without change	8		
	4	below .5	
	2	.5-1	
	2	above 1	
<b>total</b>	<b>23</b>		

It could be derived from the above tabulation that seven respondents said that flood level during high tide changed from above one meter to below .5 meter. However, nine responded that the flood water still remains at above 1 meter to .5 meter.

During typhoon, eight respondents said that changes were noted after the project, notably flood levels went down to below .5 meter from above 1 meter. Seven respondents, however, said that there was no change in flood level which remained at below .5 meter to one meter.

Likewise, five of the 13 respondents who gave responses on the level of flood water during rainy season said that flood water went down from above one meter to about below .5. However, eight responded that there was no change in flood level which remains at about below .5 meter to above one meter.

### ***Results of FGD***

During the FGD, the participants complained that their areas easily got flooded especially during high tide because the Navigation Gate

## 7.0 AUDIT RESULTS

is still open which should have controlled the passage of water from Manila Bay during high tide.

Specifically, participants from Navotas said that the siltation project has been long initiated. It is a multi-sectoral project among DENR, shipyard owners, Barangay, Philippine Ports Authority (PPA) and other related waterway stakeholders. However, it did not pushed through because of the presence of informal settlers and the boats parked along the river ways. The dredger of the DPWH and MMDA could not enter.

### B. Existence of Informal Settlers and Large Volume of Uncollected Garbage

#### ***7.1.4 The responsibilities of the City Governments of Kalookan, Malabon and Navotas as embodied in the Memorandum of Agreement (MOA) entered into in 1998 and 2000 with the DPWH were not duly carried out resulting to existence of informal settlers and accumulation of garbage.***

The MOA entered into by and between DPWH and the City Governments of Kalookan, Malabon and Navotas (KAMANA) in 1998 and 2000, covers the following responsibilities:

- Implement an efficient Waste Management System
- Ensure that the vacated areas freed from squatters shall remain free and secured from future interlopers.
- Enhance its environment and ecological protection program thru Zero Waste Management to ensure that the esteros/waterways and vicinity areas remain garbage free;
- Mobilize and continue its advocacy efforts to educate the people the need for unrelenting support to maintain cleanliness as a measure of flood control.

The audit team conducted ocular inspection of the different components of the project and observed that all structures shown in the approved plan were completed except for the cancelled Maysilo Independent Floodgate and deferred two pumping stations in South

## 7.0 AUDIT RESULTS

Pingkabalian and Dampalit which were deleted in the scope of works of the project. The KAMANAVA PMO assumption is that the construction of Polder dike and rehabilitation of existing Tide Control Gate are sufficient to protect the affected area from high tide.

The team witnessed that all pumps and floodgates are operational. However, it was observed that the maximum suctioning capacity of the pump was not attained due to the presence of voluminous garbage that obstructs the flow of water especially at the trash rake section.

The accumulation of garbage is attributed to the presence of large number of informal settlers outside the perimeter area of the PS and FG especially in Maypajo. As observed by the team, informal settlers had also encroached the riverbank and the service roads of PS and FG and apparently have been dumping/disposing their residues or garbage to the river/creek thereon.



Garbage floating at Maypajo Pumping Station (PS)



Existence of informal settlers along Maypajo PS

The audit also revealed that some of the informal settlers who were relocated before the start of the project were not anymore residing in the resettlement area. Some of them sold their rights and have returned to KAMANAVA area since the relocation sites lack the basic amenities of a socialized housing such as electricity. On the other hand, water is only accessed through artesian wells which are located far from the resettlement area. Livelihood programs and

## 7.0 AUDIT RESULTS

trainings provided by NGO for the KAMANAVA relocatees at the relocation sites were unsuccessful.

### ***Results of FGD***

During FGD at the Kalookan City Hall, the participants said that the garbage are not being collected because the garbage trucks cannot reach their area as the route is blocked by informal settlers which is aggravated by no concrete service road. They also said that they have not felt the benefits from the KAMANAVA Flood Control Project as they still experience flooding in their area. Further, the participants lamented that there was no consultation in the Barangay level regarding the Project's operation.

### C. Inadequate Personnel and Communication Facilities

***7.1.4 The personnel of the PSs and FGs were inadequate and working beyond the standard working hours because there were no clear written policies/guidelines on the appropriate working hours and the required number of personnel to be deployed in each PS and FG. Moreover, there were no communication equipment for coordination and monitoring of activities exposing to risks the operations of the facilities.***

To maximize efficiency and effectiveness of both project/facility and personnel, an operations and maintenance manual should have been prepared and made available for reference and guidance. The manual should at least indicate how each facility should be maintained and operated at such time and period as may be necessary to obtain the maximum benefits. The manual should also include the responsibilities and actions to be taken by each personnel in charge of maintaining and operating the facilities. It is also important that a logbook be maintained at each facility, to record, on a daily basis, the date and type of testing conducted, the maintenance performed, and the number of hours each facility or machinery/equipment was utilized.

## 7.0 AUDIT RESULTS

The team observed, however, that there was no operational plan or manual that sets station performance objectives, the required number of personnel for each facility and personnel's duties and responsibilities. The only basis is the security guard's logbook and the Daily Operational Report (DOR). The DOR indicates the utilization data of the pump (main engine and generators) that include period of operation and fuel consumption; the garbage accumulation, the rain intensity; the water elevation; and names of personnel on duty.

Moreover, the overall-in-charge of the operation and maintenance of the KAMANAVA Project explained that the working schedule should be eight hour shift with three shifts in a day schedule while the number of personnel depends on the number of pumps existing in the stations. It was observed, however, during site inspection at the different PSs and FGs in KAMANAVA area, the non-observance of said regular deployment schedule of personnel.

Further, the PSs and FGs have no communication devices to systematically coordinate and monitor the activities or operation of all stations especially during crucial times such as calamities or high water/flood level. Interviews revealed that the basis of operation in the facilities is based on the NAMRIA tide reports and that the personnel in charge have to go to the other stations to inform or inquire of the activities being done.

Results of our interview with the officer and personnel at the pumping stations and floodgates revealed the following practices:

- There were internal agreements between operators of a 48-hour straight duty particularly in Catmon PS;
- Five day working shift in Kailugan approved by the over-all supervising engineer;
- Daily two shifts (12 hours) in all the Independent FG; and



## 7.0 AUDIT RESULTS

- The lack of manpower to cover all the facilities as shown below:

Location	Number of Operators (Per Interview)		Number of Laborer (Per Interview)		Variance (Standard – Actual)
	Required	Actual	Required	Actual	
Spine Pumping PS & FG	3	3	12	6	6
Bangkulasi PS & FG	3	3	6	4	2
Maypajo PS & FG	3	3	6	2	4
Catmon PS & FG	3	3	12	3	9
Navotas PS & NG	3	2	9	4	6
Navotas FG	3	2	-	-	1
Muzon FG	3	2	-	-	1
South Pinagkabalihan FG	3	2	-	-	1
North Pinagkabalihan FG	3	2	-	-	1
Kailugan FG	3	2	-	-	1
Longos FG	3	2	-	-	1
<b>Total</b>	<b>33</b>	<b>26</b>	<b>45</b>	<b>19</b>	<b>33</b>

It is also noted that the over-all supervising engineer allows personnel to extend beyond their regular eight-working hours which may have an adverse effect on the personnel's performance.

### *Results of FGD*

During the FGD conducted on May 30, 2013 at the City Hall of Kalookan, the participants composed of Barangay Chairmen of Barangays 14, 28, 34 and 35 and officials of the City said that the operators of the Maypajo Pumping Station are not always available and sometimes drunk during official hours.

### *Management's Comments*

Management explained that the PMO had requested for authority to hire more than the minimum required number of personnel needed for a 24/7 operation. However, the actual number of personnel enumerated above was approved by the Department of Budget and Management (DBM). Since the number of personnel that was approved is inadequate, the personnel assigned in the PSs and FGs are working beyond the standard working hours especially during

## 7.0 AUDIT RESULTS

rainy season in order for the facilities to be operational 24/7. The PMO has no choice but to maximize the utilization of the manpower available, hence, 2-3 days straight duty was allowed in some of the facilities.

Management also commented that they may agree that there have been some indications of restricted understanding on the operation of the completed pumping stations and floodgates facilities. This situation including the lack of effective communication and manpower was due to insufficient funds. They said that the yearly O & M funds released to the PMO is not even sufficient to cover the priority requirements such as fuel and lubricant, salary of the personnel, security services, etc. Communication, coordination, and monitoring are being done thru cellular phones, weekly coordination meeting and daily inspection/visit at sites.

Management justified that considering that the operation and maintenance of the KAMANAVA flood control facilities and structures is only interim or temporary, since the same will be turned over to MMDA, the KAMANAVA-PMO did not give much emphasis on a permanent operational management system. In fact, as early as year 2008, upon completion of the Spine Pumping station, and while the construction of other structures of the project are on-going, MMDA had been insisting that we already turnover not only the completed Spine Pumping station but also the rest of the on-going (incomplete) structures. However, such request was not realized due to the project loan's restrictions.

## 8.0 AUDIT CONCLUSION

The constructed structures for the flood control project in Kalookan, Malabon and Navotas (KAMANAVA) had not completely mitigated the flooding caused by high tide and heavy rains due to a) deficiencies in the structures, and b) existence of informal settlers and large volume of garbage in the project sites, thus, the objective of reducing the flood level in project area from one meter to below 0.5 meter was not fully attained. Moreover, the effectiveness of the flood control project may not be fully attained due to inadequate personnel and communication facilities necessary for the efficient operation of the flood control facilities.

### a. Deficiencies in the structures

- The top elevation of structures constructed for the KAMANAVA Flood Control Project designed on the basis of land use in 2020 was already either reached or overtopped during the August 7, 2012 flood which is 7 years earlier than the design target year. Moreover, the return periods used in the design are apparently not enough as the severe flood due to heavy rain is estimated to be 30-year to 50-year return period.
- The constructed polder dike in Malabon City is not fully effective in protecting the northern most part of the Project Area against the high tide levels due to the retention/installation of concrete pipes (tosangs), compounded by the DPWH's non-monitoring/control of the opening and closing of the pipe gates, which allows the continuous flow of water to the fishponds and residents causing flooding in Malabon especially in Barangay Dampalit during high tide and heavy rainfall.
- The Navigation Gate was not in operation during the period February 24, 2011 to March 2012 and March 16, 2013 to date of inspection on July 16, 2013 due to damaged link rods caused by faulty design and absence of desilting works. The damaged link rods caused the navigation gate to remain in open position allowing the water level to rise in the protected area during high tide and eventually cause flooding in Navotas and Malabon areas.

## 8.0 AUDIT CONCLUSION

- b. Existence of informal settlers and large volume of uncollected garbage.
- The responsibilities of the concerned LGUs (Cities of Kalookan, Malabon and Navotas) as embodied in the MOA entered into with the DPWH were not duly carried out resulting to existence of informal settlers and accumulation of garbage making the operation of the pumping stations and flood gates ineffective.
- c. Inadequate personnel and communication facilities
- The personnel of the PS and FGs were inadequate and working beyond the standard working hours because there were no clear written policies/guidelines on the appropriate working hours and the required number of personnel to be deployed in each PS and FG, thus, the efficiency and effectiveness of the personnel cannot be measured. Moreover, there were no communication equipment for coordination and monitoring of activities exposing to risks the operation of the facilities.

## 9.0 RECOMMENDATIONS FOR EXECUTIVE ACTION

On the observations noted, we recommended that management:

1. Institute remedial measures to upgrade the completed structures to avoid the overtopping of the same which will result to severe flooding of protected areas;
2. Review the flood and drainage control design of the Project done by CTI Engineering Co., Ltd. (CTIE) to determine if there are flaws made thereon;
3. Enhance the design criteria and methodology of flood and drainage control plans so that target year, as programmed, can be actually achieved;
4. Ensure that appropriate review of the revised design have been undertaken by CTIE and Bureau of Designs - DPWH and compliance thereon during the implementation of repair works to assure that the link rods are structurally sound;
5. Conduct dialogue among DPWH, City Government of Navotas and Shipyard Owners' Association (SOA) to discuss and implement the periodic maintenance dredging to prevent the accumulation of debris in the gate pit and immediate vicinity. Explore the possibility of forging and agreement among them defining/detailing each responsibilities/roles in the regular maintenance of the facility;
6. Replace the flushing device with the one that can adequately remove the type of debris usually present in the pit and in the surrounding area;
7. Since the Navigation Gate is already operational, DPWH should request, provide or allocate funds for the preventive maintenance and desilting of the navigation gate to avoid damages on the parts of the navigation gate that would stop its operation and cause flooding in the affected areas;
8. Revisit and execute/renew the MOA with the LGUs every time there is a change of officials/leadership in the LGU so that the new management will be aware and committed to implement their responsibilities in maintaining and protecting the project. The attention of concerned LGUs should be notified whenever the operation of the project is at risk as a result of its' failure to implement their duties and responsibilities;

## 9.0 RECOMMENDATIONS FOR EXECUTIVE ACTION

9. Make representation to the LGUs for the prohibition of the use of plastic so as to minimize if not totally eradicate clogging of waterways and encourage the concerned LGU officials to implement their responsibilities enumerated in MOA particularly garbage collection and maintaining/keeping cleared areas from encroachment of informal settlers;
10. Collaborate with the Barangay Officials for the continuous conduct of Information Education Campaign (IEC) regarding proper waste disposal;
11. Initiate the creation of an Inter-agency Committee that would ensure relocation sites meet the basic amenities for a suitable living condition as provided by law; and
12. Enhance its system for recording of actual operations at the FG similar to what is being done at the PS. A separate logbook should be maintained on site where all operations are recorded to serve as basis for verification and possible reference of future decision making especially on maintenance issues. Also, DPWH to discuss the needed personnel and equipment to MMDA officials before its actual turn-over, if ever, in order to operate the stations effectively.

## 10.0 AUDITEE'S COMMENTS ON THE TEAM'S RECOMENDATION

During the exit conference conducted on November 5, 2013, the former and current officers of DPWH- KAMANAVA commented that:

- The DPWH is already implementing the raising of river walls and floodgates along Malabon-Tullahan River, Catmon Creek and Longos Creek. The top elevation of these structures are being raised from 12.6 m to 13.5 m.
- There is now an on-going review/assessment on the design, effectiveness and sustainability of the KAMANAVA Flood Control Project. The review/assessment is being conducted by Oriental Consultants, a Japanese consulting firm hired by JICA under the Special Assistance for Project Sustainability (SAPS) for KAMANAVA Flood Control and Drainage System Improvement Project.
- The enhancement of the design criteria and methodology for Flood Control Project is included in the review/assessment being conducted by Oriental consultants.
- Appropriate review of the design was already undertaken by CTIE and approved by the Bureau of Design. Strict compliance with approved plans and specifications were observed during the implementation of the repair works.
- The DPWH Secretary has already approved the request of the KAMANAVA-PMO to assign permanent dredger/excavator that will undertake the regular dredging/excavation in the Navigation Gate area. The Amphibious Excavator will be mobilized at site by the end of this month.
- Adequate flushing device was already installed and already operational.
- Management agreed to the recommendations on the issue of existence of informal settlers, but commented that regardless of the MOA, it is the responsibility and function of the LGUs to protect and secure all facilities and infrastructures, be they private or public, within their jurisdiction from illegal interlopers and from damaging actions that maybe brought upon them. Likewise, it is their responsibility and function to implement an

## 10.0 AUDITEE'S COMMENTS ON THE TEAM'S RECOMENDATION

efficient waste management system to complement the effectiveness and efficiency of the already in-place flood control facilities and appurtenant structures, being the direct beneficiaries of the same.

- To improve the records and documentation pertaining to the operation and maintenance of the facilities, the O & M forms/templates were devised and used effective July 2013. Technical trainings of personnel were also conducted last June to enhance the technical capability of personnel assigned in the operation and maintenance of the facilities. The trainings covered both electrical and mechanical components of the PS and FG.
- The DPWH Secretary has also approved the request of the PMO to purchase Hand-held Communication Radios with two base stations for use in the daily operation of the KAMANAVA Flood Control Facilities.



## 10.0 AUDIT TEAM'S EVALUATION AND REJOINDER

The Audit Team had recognized the efforts and actions taken by the DPWH KAMANAVA - PMO on raising the top elevation of the overtopped structures. The results of the on-going review/assessment on the design, effectiveness and sustainability of KAMANAVA Flood Control should be implemented immediately to maintain the sustainability of the structures in mitigating flood.

On the issue of informal settlers and solid waste management, the team agrees with management that the LGU, being the direct beneficiaries of the flood control project, is responsible to protect and secure all facilities within their jurisdiction and implement an efficient waste management system to complement the effectiveness and efficiency of the already in-place flood control facilities and appurtenant structures. However, we still believe that since maintenance and operation of the project is still under the DPWH, the KAMANAVA PMO should have informed and reminded the LGU concerned of their duties and responsibilities as provided in the MOA whenever the project's operation is put at risk.

## LETTER

We will appreciate receiving feedback on the status of implementation of our audit recommendations within 30 days from receipt hereof.

We thank Engr. Macariola S. Bartolo, Project Manager and the Officials and Staff of the DPWH KAMANAVA – Project Management Office (PMO), for the support and cooperation extended to the audit team.

Our report will be made available at the COA Web site at <http://www.coa.gov.ph> and CPA Web site at <http://i-kwenta.com>.

Very truly yours,

**CECILIA B. CAMON**  
Director IV



## **APPENDICES**

## APPENDIX I: SCOPE AND METHODOLOGY

### A. Audit Design Meeting (ADM)

Agreements on:

1. Audit Focus
2. Audit Questions
3. Methodology
4. Milestone and
5. Tasking

### B. Initial Conference with the former Project Director – KAMANAVA PMO

1. Attended by Audit Team, CPA Project Management Team, COA Cluster 7 Director and CSO Intermediary ANSA-EAP
2. Briefing of the KAMANAVA Flood Control Project

### C. Developing the Survey Questionnaire

1. COA and the CSO Partners (CCAG, DIASPORA, International Alert)
2. Identification of Categories
  - a. LGUs
  - b. Implementing Agency
  - c. Beneficiaries
  - d. Relocates
3. Areas of Inquiry
  - a. LGUs
    - Authorized Official
    - Memorandum of Agreement (MOA)
    - Implementation of the MOA
    - LGUs Support to the Project
    - LGUs Flood Control Projects

- b. Implementing Agency
  - Authorized Official
  - Present Conditions
  - Implementation
  - Operations
  - Personnel
  - Facilities
  
- c. Beneficiaries
  - Affected Resident
  - Length of Stay
  - Depth of Flood Before and After the Project
  - Number of Days of Flooding Before and After the Project
  - Causes of Flooding (High Tide, Typhoon and Rainy Season)
  - Benefits of the Project
  - Recommendations
  
- d. Relocates
  - Relocated Informal Settlers
  - Occupation Before and After the Relocation
  - Amenities of the Relocation Sites
  - Effects of Relocation
  - Living Conditions

The Survey Questionnaire is in Appendix 3.

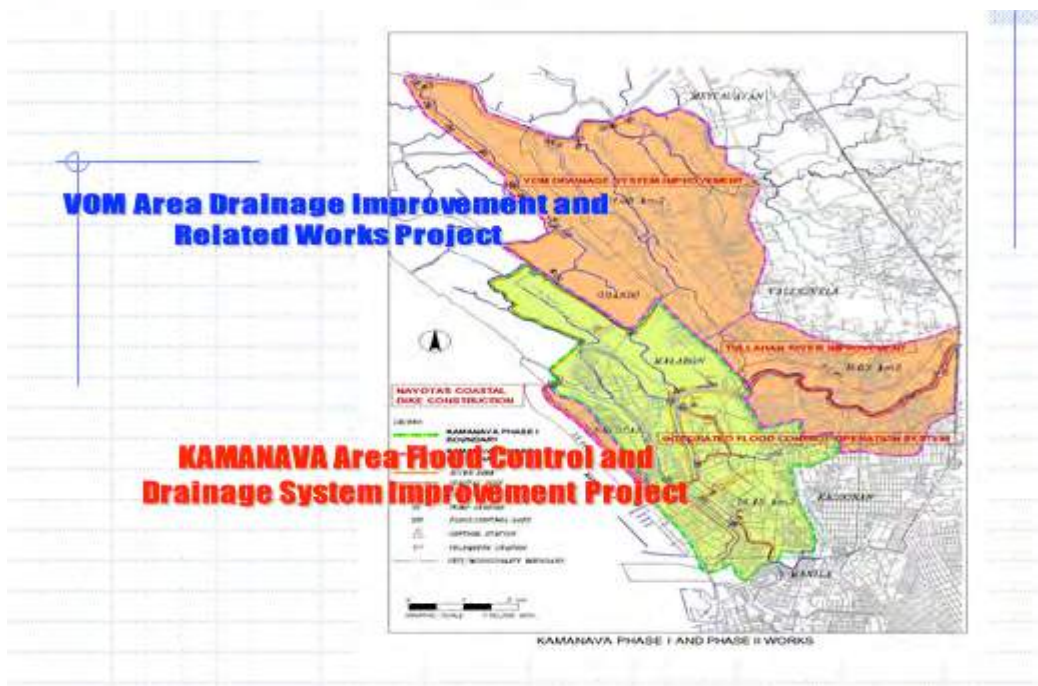
### D. Conduct of FGD

- 1. Criteria for Selection of Barangay
  - a. Mostly Affected
  - b. Within the service area of the KAMANAVA Flood Control Project

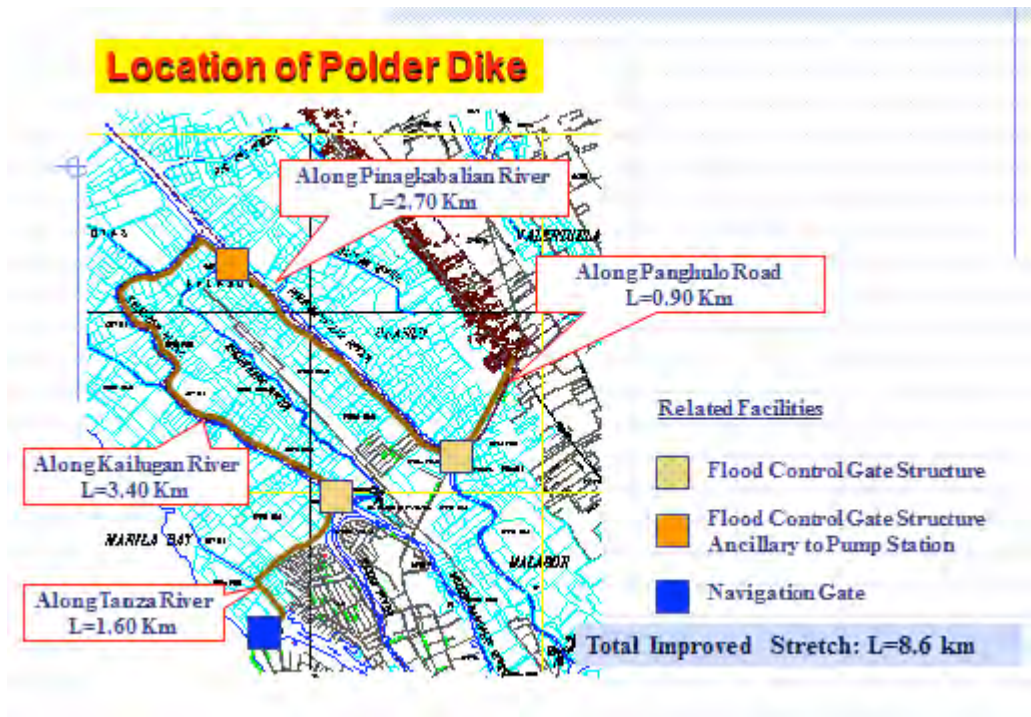
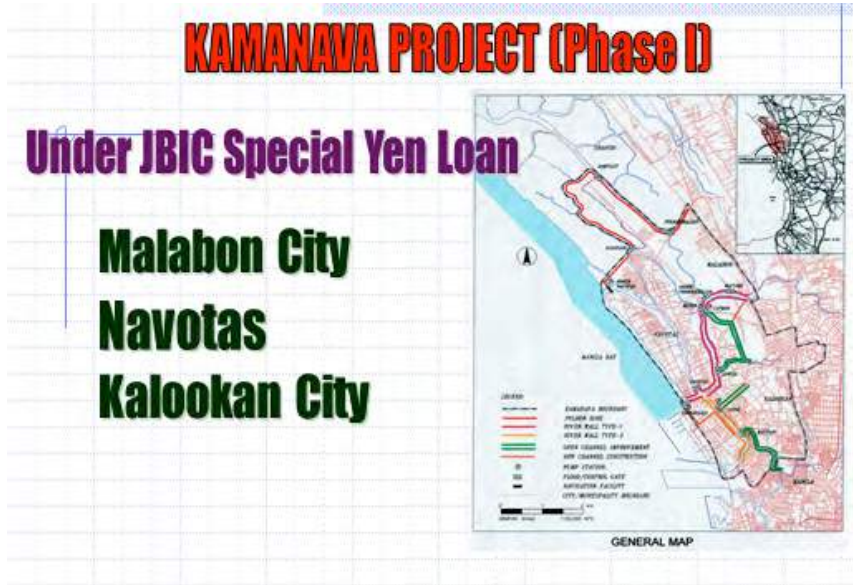
## APPENDIX I: SCOPE AND METHODOLOGY

2. Criteria of Participants (four participants per Barangay selected)
  - a. Officials/Representative of Home Owners Association
  - b. Barangay Officials
  - c. Others:
    - City Engineer
    - Representatives from the Disaster Risk Control Management
    - Planning Officer

APPENDIX II: KAMANAVA FLOOD CONTROL PROJECT MAP

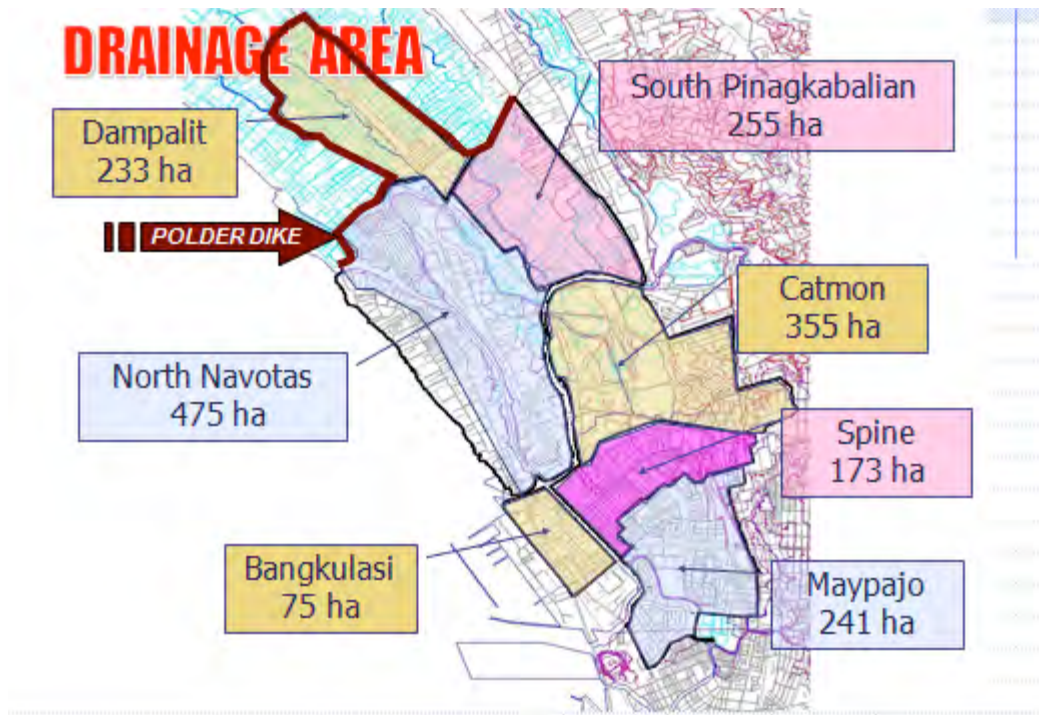


APPENDIX II: KAMANAVA FLOOD CONTROL PROJECT MAP





APPENDIX II: KAMANAVA FLOOD CONTROL PROJECT MAP



APPENDIX III: KAMANAVA FACILITIES & STRUCTURES



**Bangkulasi Pumping Station and Floodgate  
R-10, Navotas City**



**Maypajo Pumping Station and Floodgate  
Maypajo, Kalookan City**

## APPENDIX III: KAMANAVA FACILITIES & STRUCTURES



**Spine Pumping Station and Floodgate**  
Lapu-Lapu Ave., Navotas City



**Catmon Pumping Station and Floodgate**  
Gov. Pascual Ave., Malabon City

APPENDIX III: KAMANAVA FACILITIES & STRUCTURES



**North Navotas PS and Navigation Gate**  
Tanza, Navotas City



**NORTH NAVOTAS PUMPING STATION**  
Tanza, Navotas City

APPENDIX III: KAMANAVA FACILITIES & STRUCTURES



**NAVIGATION GATE**  
Tanza, Navotas City  
(W=25 m, H = 8.9 m)



**Kailugan Floodgate**  
Dampalit, Malabon City  
(2 x 12.0 m x 4.4 m)

APPENDIX III: KAMANAVA FACILITIES & STRUCTURES



**Longos Floodgate**  
Longos, Malabon City  
(2 x 4.0 m x 4.2 m)



**Navotas Floodgate**  
R-10, Navotas City  
(2 x 12.0 m x 4.4 m)

APPENDIX III: KAMANAVA FACILITIES & STRUCTURES



**Pinagkabalian Floodgate**  
Dampalit, Malabon City  
(2 x 4.0 m x 5.4 m)



**SOUTH PINAGKABALIAN FLOODGATE**  
Malabon City  
(2 x 4.0 m x 4.0 m)

APPENDIX III: KAMANAVA FACILITIES & STRUCTURES



**Muzon Floodgate**  
Muzon, Malabon City  
(2 x 4.0 m x 4.0 m)



**Catmon Creek**  
Malabon City



APPENDIX III: KAMANAVA FACILITIES & STRUCTURES



**Longos Creek  
Malabon City**



**Polder Dike  
Malabon City**

APPENDIX IV: SURVEY QUESTIONNAIRES

**SURVEY QUESTIONNAIRES  
ON KAMANAVA FLOOD CONTROL PROJECT**

**Local Government Units**

Name of Local Government Unit: \_\_\_\_\_

Interviewee/Position: \_\_\_\_\_

Date of Interview: \_\_\_\_\_

Questions	Yes	No	Remarks
1. Are you aware of the Memorandum of Agreement (MOA) with DPWH (KAMANAVA Flood Control Project)?			
2. What are the projects implemented in compliance with the MOA <ul style="list-style-type: none"> <li>• Implementation of the tributary local drainage system</li> <li>• Maintain existing local drainage system</li> <li>• Coordination with barangays and other local and national agencies to ensure the smooth operation of all existing drainage system</li> <li>• Formulate and implement a long-range Municipal Sewerage and Drainage Plan</li> <li>• Assist in the removal and relocation of illegal settlers</li> <li>• Secure areas cleared of illegal settlers</li> <li>• Financial Assistance/Food Assistance</li> <li>• Enhancement of environment and ecological protection program thru Zero Waste Management to ensure that the esteros/waterways and vicinity areas remain garbage free</li> <li>• Information Dissemination (Educate its people to support and maintain cleanliness as measure of flood control)</li> <li>• Others</li> </ul> _____ _____			

## APPENDIX IV: SURVEY QUESTIONNAIRES

<p>3. What is the implementation status of these projects? Can we have copies of the status reports?</p>			
<p>4. Did you encounter problems/issues in the implementation of these projects?</p> <ul style="list-style-type: none"> <li>• Funding</li> <li>• Zero waste management</li> <li>• Assisting DPWH in the tagging and relocation of Informal Settlers</li> <li>• Roles and Responsibilities of LGU and DPWH are not clear</li> <li>• Continuity across LGU administrations</li> <li>• Others (please specify):</li> </ul>			
<p>5. Were the LGU and its constituents affected by the Flood-Control Project?</p> <p>Any benefits/disadvantages? (Note: Interviewer to ask for data sources on bullet points below)</p> <ul style="list-style-type: none"> <li>• Less frequent flooding</li> <li>• Decreased flood level (Bumaba ang baha)</li> <li>• Decreased flood area</li> <li>• Increase in economic activity</li> </ul>			
<p>6. Are there other factors that affect the effectiveness of the Flood-Control Project?</p> <p>Please specify.</p>			

Interviewed by:

\_\_\_\_\_

(Signature over Printed Name)

Date \_\_\_\_\_

Position \_\_\_\_\_

Interviewee:

\_\_\_\_\_

(Signature over Printed Name)

Date \_\_\_\_\_

Position \_\_\_\_\_

## APPENDIX IV: SURVEY QUESTIONNAIRES

### BENEFICIARIES

Name: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Date: \_\_\_\_\_  
 Sex: \_\_\_\_\_ Age: \_\_\_\_\_  
 Status: \_\_\_ Head of family \_\_\_ Spouse \_\_\_ Child  
 Occupation: \_\_\_\_\_

Questions	Yes	No	Remarks
7. Ilang taon na kayo nakatira dito sa lugar na ito? (How many years have you been residing in this place) <i>(Pls. indicate specific years in the remarks column)</i> <ul style="list-style-type: none"> <li>• 1 taon pero di lalagpas ng tatlo</li> <li>• Tatlo pataas</li> </ul>			
8. Naka experience na ba kayo ng pagbaha dito? (Have you experience flooding in your area) <ul style="list-style-type: none"> <li>• Before start of the project - 2003 and below</li> <li>• Before completion of the project - 2007 and below - 2008- 2012</li> </ul>			
9. Kung Oo ang iyong sagot sa itaas, ano ang dahilan ng pagbaha at gaano kadalas? (If yes, what are the reason/s and how often flooding occurs?) <ul style="list-style-type: none"> <li>• Palagi Pag May High Tide</li> <li>• Palagi Pag may bagyo</li> <li>• Tuwing Tag-ulan</li> </ul>			

## APPENDIX IV: SURVEY QUESTIONNAIRES

<p>10. Gaano kataas ang baha sa mga sumusunod na panahon? (What is the height of the flooding during the following season?)</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 25%;">Panahon</th> <th style="width: 25%;">Below 0.5 Meter</th> <th style="width: 25%;">0.5-1 Meter</th> <th style="width: 25%;">Above 1 Meter</th> </tr> </thead> <tbody> <tr> <td>High Tide</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Bagyo</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Kapag Tag-ulan</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Panahon	Below 0.5 Meter	0.5-1 Meter	Above 1 Meter	High Tide				Bagyo				Kapag Tag-ulan						
Panahon	Below 0.5 Meter	0.5-1 Meter	Above 1 Meter																
High Tide																			
Bagyo																			
Kapag Tag-ulan																			
<p>11. Alam ninyo na ba may proyekto ang DPWH para makontrol ang pagbabaha dito sa inyong lugar? <sup>1</sup> (Are you familiar with the DPWH Flood Control Project in your area?)</p>																			
<p>12. Ngayong nagawa na at gumagana ang proyekto, may pagbabago ba sa taas ng tubig sa mga sumusunod na panahon? (After the completion of the project, are there any changes in flooding during the following season?)</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 25%;">Panahon</th> <th style="width: 25%;">Below 0.5 Meter</th> <th style="width: 25%;">0.5-1 Meter</th> <th style="width: 25%;">Above 1 Meter</th> </tr> </thead> <tbody> <tr> <td>High Tide</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Bagyo</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Kapag Tag-ulan</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Panahon	Below 0.5 Meter	0.5-1 Meter	Above 1 Meter	High Tide				Bagyo				Kapag Tag-ulan						
Panahon	Below 0.5 Meter	0.5-1 Meter	Above 1 Meter																
High Tide																			
Bagyo																			
Kapag Tag-ulan																			

<sup>1</sup> Kung bago ang respondent, tapusin ang interview. Kung matagal na at hindi alam ang project proceed to question 3-5 lamang

<sup>2</sup> Kung ang sagot sa tanong ay hindi, ang sunod na tanong ay ang Question No. 8.

APPENDIX IV: SURVEY QUESTIONNAIRES

<p>13. Ano sa inyong palagay ang dahilan kung bakit hindi nabawasan ang baha sa lugar ninyo kahit na may nagawa na ang proyekto ng DPWH? (In your own opinion, what are the reason/s why flooding were not mitigated even with the DPWH flood control project?)</p> <ul style="list-style-type: none"> <li>• Barado ang mga kanal</li> <li>• Tuloy pa rin ang pagtapon ng basura ng mga mamayan</li> <li>• Pagsulpot/pagbabalik ng mga informal settlers sa mga tabi ng kanal</li> <li>• Iba pang dahilan (Paki paliwanag)</li> </ul>			
<p>14. Nakatulong ba sa iyong pamumuhay ang proyekto? Kung mayron, sa paanong paraan? (Did the Flood Control project have affected your standard of living, in what ways?)</p> <ul style="list-style-type: none"> <li>• Naging mabilis ang biyahe</li> <li>• Mas maginhawa ang pagpasok sa trabaho/eskwela</li> <li>• Others</li> </ul>			
<p>15. Ano ang maitutulong ninyo bilang mamayan para humupa at mabawasan ang pagbaha? (As part of the community, what can you contribute to the government to mitigate flooding in your area)</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>			

APPENDIX IV: SURVEY QUESTIONNAIRES

16. May mga mungkahi o suhestiyon ba kayo para mas masolusyonan ang problema ng pagbaha ? (Do you have any suggestion(s)/solution(s)) _____ _____ _____ _____ _____			
--	--	--	--

**Interviewed by:**

\_\_\_\_\_  
**(Signature over Printed Name)**  
**DATE**\_\_\_\_\_

**Interviewee:**

\_\_\_\_\_  
**(Signature over Printed Name)**

\_\_\_\_\_  
**Position**

**Date** \_\_\_\_\_

## APPENDIX IV: SURVEY QUESTIONNAIRES

### RELOCATEES

Relocation Site	
Date of Relocation	
Name/Age/Sex	
No. Household Members	
Place of Origin (Barangay /City )	

Questions	Yes	No	Remarks
<p>1. Do you have any means of livelihood?</p> <ul style="list-style-type: none"> <li>• Prior to Relocation</li> <li>• After Relocation</li> </ul>			
<p>2. What is your current means of livelihood?</p> <ul style="list-style-type: none"> <li>• Self-employed                             <ul style="list-style-type: none"> <li>➤ Sari-sari store</li> <li>➤ Manufacturing (soap making, slippers, bags etc.)</li> <li>➤ Others (Specify)</li> </ul> </li> <li>• Employed                             <ul style="list-style-type: none"> <li>➤ Government                                     <ul style="list-style-type: none"> <li>- Permanent</li> <li>- Casual</li> </ul> </li> <li>➤ Private                                     <ul style="list-style-type: none"> <li>- Permanent</li> <li>- Casual</li> </ul> </li> </ul> </li> </ul>			
<p>3. Are you satisfied with the relocation site/ your current resident?</p>			



APPENDIX IV: SURVEY QUESTIONNAIRES

<p>4. If No, please check what is/are lacking in the relocation site;</p> <p>___ public schools</p> <p>___ health centers</p> <p>___ public market</p> <p>___ means of transportation</p> <p>___ potable water facilities</p> <p>___ electrical facilities</p> <p>___ means of livelihood</p>			
<p>5. Was there any assistance in the process of relocation?</p>			
<p>6. What forms of assistance were extended in the process of resettlement or relocation? From whom?</p> <ul style="list-style-type: none"> <li>• Monetary (Specify amount)</li> <li>• Food</li> </ul>			
<p>7. Do you pay monthly amortization for the housing (relocation)</p> <ul style="list-style-type: none"> <li>• If yes, please state amount?</li> <li>• Is the monthly amortization affordable?</li> </ul>			
<p>8. Other Comments (Flood Free)</p>			

**Interviewed by:**

\_\_\_\_\_  
**(Signature over Printed Name)**  
**DATE**\_\_\_\_\_

**Interviewee:**

\_\_\_\_\_  
**(Signature over Printed Name)**

\_\_\_\_\_  
**Position**

**Date** \_\_\_\_\_

## APPENDIX V: SURVEY RESULTS

### Summary of Survey Results - Beneficiaries

City	Status			Q1		Q2					
	Head of family	Spouse	Child/ Single	1 year-3 years	more than 3 years	Before the start of the project		After completion of the project			
								2007 & below		2008 - 2012	
						Yes	No	Yes	No	Yes	No
<b>Kalookan</b>	13	1	0	0	13	11	0	8	0	8	0
<b>Navotas</b>	11	9	3	0	22	19	0	16	0	13	0
<b>Malabon</b>	30	38	1	2	67	60	4	59	0	35	1
<b>Total</b>	<b>54</b>	<b>48</b>	<b>4</b>	<b>2</b>	<b>102</b>	<b>90</b>	<b>4</b>	<b>83</b>	<b>0</b>	<b>56</b>	<b>1</b>

City	Q3			Q4a								
	Palagi pag may high tide	Palagi pag may bagyo	Tuwing tag-ulan	High Tide			Bagyo			Kapag Tag-ulan		
				Below .5 meter	.5 - 1 meter	above 1 meter	Below .5 meter	.5 - 1 meter	above 1 meter	Below .5 meter	.5 - 1 meter	above 1 meter
<b>Kalookan</b>	11	10	10	6	5	1	2	7	4	1	6	5
<b>Navotas</b>	17	21	18	9	7	4	8	1	11	7	4	8
<b>Malabon</b>	9	2	4	34	5	15	27	17	2	7	27	23
<b>Total</b>	<b>37</b>	<b>33</b>	<b>32</b>	<b>49</b>	<b>17</b>	<b>20</b>	<b>37</b>	<b>25</b>	<b>17</b>	<b>15</b>	<b>37</b>	<b>36</b>

## APPENDIX V: SURVEY RESULTS

City	Q 4				Q5	
	Less than a day	1-3 days	4-7 days	more than 7 days	Yes	No
<b>Kalookan</b>		2	0	0	9	2
<b>Navotas</b>		3	1	0	20	1
<b>Malabon</b>	23	17	10	30	56	4
<b>Total</b>	<b>23</b>	<b>22</b>	<b>11</b>	<b>30</b>	<b>85</b>	<b>7</b>

City	Q6a											
	High Tide				Bagyo				Kapag Tag-ulan			
	Yes			No	Yes			No	Yes			No
	Below .5 meter	.5 - 1 meter	above 1 meter		Below .5 meter	.5 - 1 meter	above 1 meter		Below .5 meter	.5 - 1 meter	above 1 meter	
<b>Kalookan</b>	5	3	0	3	7	2	2	2	6	1	2	2
<b>Navotas</b>	13	1	1	1	8	5	0	2	8	3	0	2
<b>Malabon</b>	31	2	4	8	23	13	6	7	26	7	3	10
<b>Total</b>	<b>49</b>	<b>6</b>	<b>5</b>	<b>12</b>	<b>38</b>	<b>20</b>	<b>8</b>	<b>11</b>	<b>40</b>	<b>11</b>	<b>5</b>	<b>14</b>

## APPENDIX V: SURVEY RESULTS

City	Q6b			
	less than a day	1-3 days	4-7 days	more than 7 days
Kalookan	2	0	0	0
Navotas	1	0	0	0
Malabon	14	9	2	6
<b>Total</b>	<b>17</b>	<b>9</b>	<b>2</b>	<b>6</b>

City	Q7			
	walang kanal/ kulang ang kanal	barado ang kanal	tuloy pa rin ang pagtapon ng basura ng mga mamama-yan	pagsul-pot/ pagba-lik ng informal settlers
Kalookan	0	12	10	8
Navotas	1	18	17	8
Malabon	7	43	39	19
<b>Total</b>	<b>8</b>	<b>73</b>	<b>66</b>	<b>35</b>

## APPENDIX V: SURVEY RESULTS

Legend:

Q1	Ilang taon na kayo nakatira dito sa lugar na ito? (how many years have you been residing in this place) (Pls. indicate specific years in the remarks column)
Q2	Naka-experience na ba kayo ng pagbaha dito? (Have you experience flooding in your area)
Q3	Kung OO ang iyong sagot sa itaas, ano ang dahilan ng pagbaha at gaano kadalas? (If yes, what are the reason/s and how often flooding occurs?)
Q4	Gaano kataas ang baha sa mga sumusunod na panahon? (What is the height of the flooding during the following season?)
Q5	Alam ninyo na ba may proyekto ang DPWH para makontrol ang pagbabaha dito sa inyong lugar? (Are you familiar with the DPWH Flood Control Project in your area?)
Q6	Ngayong nagawa na at gumagana ang proyekto, may pagbabago ba sa taas ng tubig sa mga sumusunod na panahon? (After the completion of the project, are there any changes in flooding during the following season?)
Q7	Ano sa inyong palagay ang dahilan kung bakit hindi nabawasan ang baha sa lugar ninyo kahit na may nagawa na ang proyekto ng DPWH? (In your own opinion, what are the reason/s why flooding were not mitigated even with the DPWH flood control project?)

### Summary of Survey Results – Relocatees

Q1	Do you have means of livelihood?			
	Prior		After	
	yes	No	Yes	No
Towerville	21	3	23	1
Pabahay 2000	21	2	22	1
Q2	What is your current means of livelihood			
	Self- Employed		Employed	
	9		11	
Towerville	9		11	
Pabahay 2000	15		10	
Q3	Are you satisfied with your relocation site/current residence?			
	Yes		No	
	18		6	
Towerville	18		6	
Pabahay 2000	20		3	

## APPENDIX V: SURVEY RESULTS

Q4	If no, what is lacking in your relocation Site?				
	Before			After	
		Yes	No	Yes	No
Towerville	Public School	19	5	24	0
Pabahay 2000		0	23	23	0
Towerville	Health Center	2	24	24	0
Pabahay 2000		0	23	23	0
Towerville	Public Market	1	23	24	0
Pabahay 2000		0	23	22	1
Towerville	Transportation	20	4	24	0
Pabahay 2000		0	23	22	1
Towerville	Water Facility	7	17	24	0
Pabahay 2000		0	23	18	5
Towerville	Electricity	9	15	24	0
Pabahay 2000		0	23	19	4
Towerville	Livelihood	2	22	24	0
Pabahay 2000		0	23	10	13
Q5 & Q6	Was there any assistance in the process of relocation? If any, what form of assistance were extended?				
Towerville	Yes	No		Kind of assistance	
	8	11		Free transportation	
	7	3		Food	
Towerville	1	23		Cash Assistance of P1,500	
Pabahay 2000	8			P1,000 & P5,000	
Q7	Do you pay monthly amortization for the housing?				
Towerville	Yes	No		No reply	
	15	6		3	
	Pabahay 2000	21	2		

## APPENDIX VI: AUDIT TEAM COMPOSITION

Per COA Office Order No. 2012-1009 dated November 20, 2012

### Civil Society Organizations (CSOs)

**ANTHONY S. SEPTIMO**  
Diaspora for Good Governance

**YOLANDA C. VICENTE**  
Diaspora for Good Governance

**ELAINE G. MERCADO**  
Concerned Citizens of Abra for  
Good Government

**RENATO P. BRASUELA**  
Concerned Citizens of Abra for Good  
Government

**DELFIN A. BORRERO**  
International Alert

### Commission on Audit

**SANDY S. SIMON**  
Team Member

**MORRIS C. IRIGIAN**  
Team Member

**LUISA B. SANTIAGO**  
Team Member

**JULIANA F. LAZO**  
Team Leader

**FRANCISCO C. VALENTINO, JR**  
Co – Team Leader

**NORMITA N. NARVAEZ**  
Team Supervisor

**CECILIA B. CAMON**  
Director-in-Charge