



Catbalogan Water District  
**Water Safety Plan (WSP)**

**Revision No 0.0 Dated 01 Sep 2016**

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## Document History

This page records the changes made to the document since its inception. Every time a revision is made to the document,

<b>Revision Number and Date</b>	<b>Which sections of the document were revised</b>
Rev 0.0 Date 01 Sep, 2016	Issue of first revision – all sections new

# 1. Introduction

## 1.1 Background

Guided by its vision which is “to be an excellent water utility providing potable and sustainable water with efficient and economically viable services and ensuring the preservation of our natural resources”, Catbalogan Water District (CWD) develop this Water Safety Plan (WSP) to ensure that the quality of drinking water supplied by CWD can meet the health based standards even in emergency situations.

Water Safety Plan is a comprehensive approach that encompasses all steps from source to consumers by identifying the hazards that may cause hazardous events. The conceptual framework of the plan describes in details the water sources, the treatment process down to the distribution networks and up to the consumer's tap. This is a proactive approach in addressing issues that affects water quantity and quality. The WSP will act as a guide in the continuous improvement projects to ensure health and safety of the consumer of the water district.

The plan was modelled after the World Health Organization (WHO) which recommends identifying residual risks to water safety, determining the existing and proposed control measures, and develop improvement plan based on the significant risks identified. Correct details in operational monitoring of the WSP are also indicated to ensure that the water supply system components and control measures continue to work effectively. Verification process will also confirm that the drinking water quality standards are being met, and consumers are satisfied. The said process will also validate that the WSP is complete and is working effectively.

## 1.2 Mission, Vision and Core Values

- 1.2.1 Mission: We are committed to be a customer service-oriented utility that is concerned with the preservation of our natural resources
- 1.2.2 Vision: To be an excellent water utility providing potable and sustainable water with efficient and economically viable service and ensuring the preservation of our natural resources
- 1.2.3 Core Values: Commitment, Teamwork, & Environmental Stewardship

## 2. WSP Team

### 2.1 WSP Team Composition

CWD board of directors and top management showed their support for the development of WSP and its implementation activities through a signed Board Resolution no. 70 dated July 18, 2016 (See attached Annex A).

The WSP team was formed to lead the development and implementation of the identified approach that is connected to the safety of the water supply.

The core team that was assembled have knowledge and experience in all aspects of the water supply system and sufficient decision-making authority to develop and implement the WSP.

**Table 2-1. Skills needed to complete a WSP team**

1	Technical expertise on operation and maintenance of	
	a	Source
	b	Storage
	c	Treatment
2	Provide operational support for the WSP in terms of	
	a	Administrative
	b	Financing
3	Capable of communicating the WSP objectives and outcomes	
	a	Inside the WD
	b	Outside the WD
4	Understand water quality targets to be met	
5	Understand the impact of proposed water quality controls on the environment	
6	Knows the regulation	
7	Familiar with training and awareness programmes	
8	With authority	
9	Other team members	
	a	Resource persons
	b	Coordinator
	c	Secretariat
	d	Documentation committee/staff

### 2.2 WSP Team Members

Using table 2-1, the team members' expertise were identified and was plotted in table 2-2. As much as the required skills needed to complete a WSP team, table 2-2 shows that the district has people that could meet the needed skills.

Table 2-2 shows the list of members, its job title, contact information, role in the water safety plan team, and its expertise.

**Table 2-2. WSP Team Members**

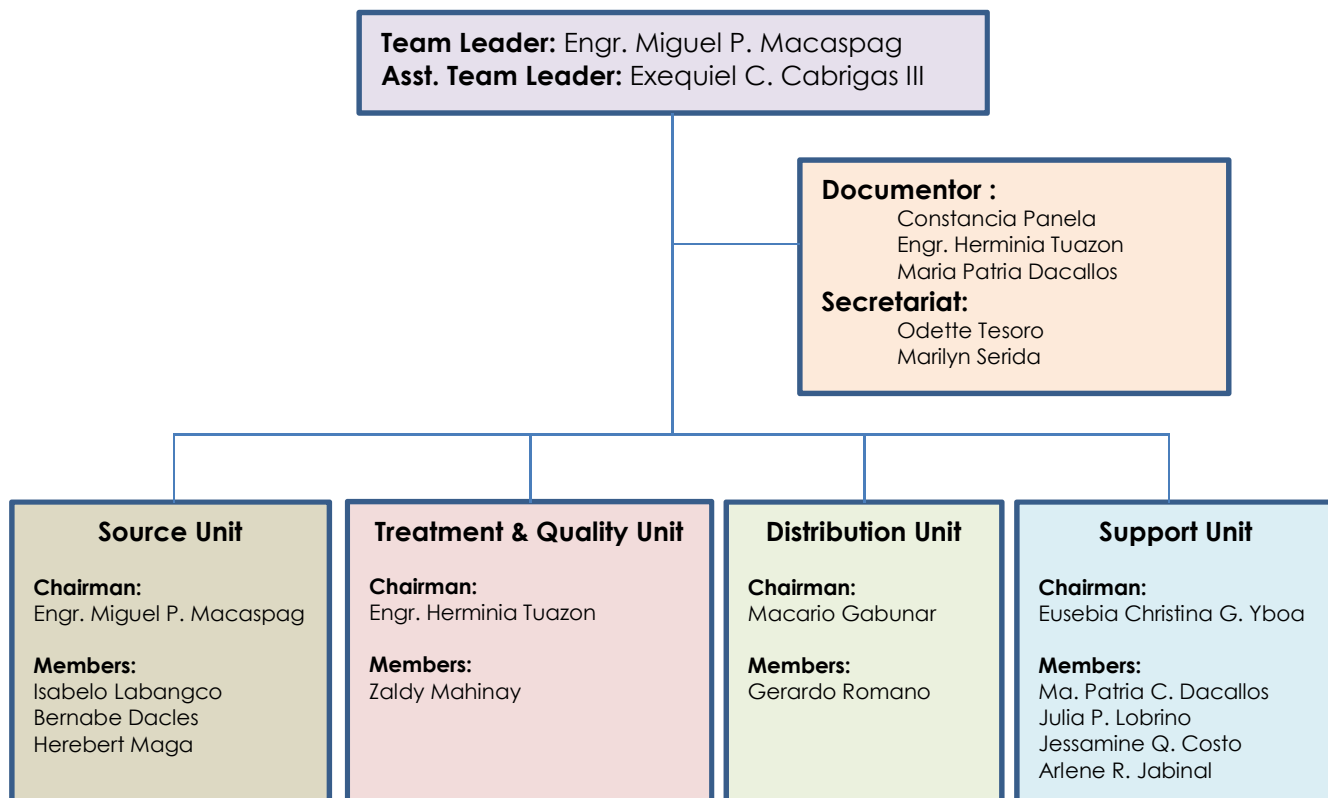
Name	Role in the WSP Team	Expertise																	
		1				2			3		4	5	6	7	8	9			
		a	b	c	d	a	b	c	a	b						a	b	c	d
<b>Engr. Miguel P. Macaspag</b> OIC – Engineering Division Cell #: 09177072643	1. Team Leader 2. Chairman: Source Unit																		
<b>Exequiel C. Cabrigas III</b> Sr. Mgt. System Analyst Cell #: 09091480830	1. Assistant Team Leader 2. Coordinator																		
<b>Isabelo R. Labangco Jr.</b> WSM Man B Cell #:	1. Member Source Unit																		
<b>Bernabe S. Dacles</b> WSM Man B Cell #:	1. Member Source Unit																		
<b>Herbert R. Maga</b> WRF Operator A Cell #: 09075486563	1. Member Source Unit																		
<b>Engr. Herminia S. Tuazon</b> Engineer B Cell #: 09173086315	1. Chairman Treatment & Quality Unit 2. Documentor																		
<b>Zaldy A. Mahinay</b> Sr. Mgt. System Analyst Cell #: 09774410054	1. Member Treatment & Quality Unit																		
<b>Macario M. Gabunar</b> Sr. Mgt. System Analyst Cell #:	1. Chairman Treatment & Quality Unit																		
<b>Gerardo L. Romano</b> Sr. Mgt. System Analyst Cell #: 09495727209	1. Member Treatment & Quality Unit																		
<b>Eusebia Christina G. Yboa</b> Sr. Mgt. System Analyst Cell #: 09196081957	1. Chairman Support Unit																		
<b>Maria Patria C. Dacallos</b> Sr. Mgt. System Analyst Cell #: 09208034524	1. Member Support Unit – Human Resource 2. Documentor																		
<b>Julia P. Lobriño</b> Sr. Mgt. System Analyst Cell #: 09177074035	1. Member Support Unit – Financial																		
<b>Jessamine Q. Costo</b> Sr. Mgt. System Analyst Cell #: 09285596338	1. Member Support Unit – Financial																		
<b>Arlene R. Jabinal</b> Sr. Mgt. System Analyst Cell #: 09228045815	1. Member Support Unit – Financial																		
<b>Constancia V. Panela</b> Sr. Mgt. System Analyst Cell #:	1. Documentor																		
<b>Odetta L. Tesoro</b> Sr. Mgt. System Analyst Cell #: 09106551908	1. Secretariat																		
<b>Marilyn A. Serida</b> Sr. Mgt. System Analyst Cell #: 09485989127	1. Secretariat																		

1. Technical expertise on the operation and maintenance of
  - a. Source
  - b. Storage
  - c. Treatment
  - d. Distribution
2. Provide operational support for the WSP in terms of
  - a. Administrative
  - b. Financing
  - c. Technical
3. Capable of communicating the WSP objectives and outcomes
  - a. Inside the WD
  - b. Outside the WD
4. Understand Water Quality Targets to be met ( Specific knowledge on product water)
5. Understand the impact of proposed quality controls on the environment
6. Knows the regulation
7. Familiar with training and awareness programmes
8. With Authority
9. Other Members
  - a. Consultants
  - b. Coordinator
  - c. Secretariat
  - d. Documentation Committee

## **2.3 Duties and Responsibilities**

- 2.3.1 The team leader should drive the project and ensure focus.
- 2.3.2 The team leader must use his interpersonal skills to ensure project implementation and must explore for external support, that includes benchmarking or partnering with other organizations and sources of aid and information.
- 2.3.3 The team will discuss, determine, and define the water supply system, its stakeholders, the hazards of each part of water supply system, the control measures both existing and proposed, the improvement plan to minimize if not eliminate hazardous events.
- 2.3.4 The team is responsible in the monitoring of the effectiveness of the WSP and ensure that corrective actions are fully implemented.
- 2.3.5 The team is responsible of the verification process by conducting several verification activities to ensure that the WSP is effectively implemented to deal with water quality issues.
- 2.3.6 Ensure an open communication with the management and its stakeholders on activities that will affect quality of water.

**Figure 1.0 WSP Organogram**



## 2.4 Stakeholders

Stakeholders play a vital role in bringing quality water to our customers. This part will describe the stakeholders' roles and responsibilities, what component of the water supply the stakeholder is engaged, and the interaction mechanism with the water district.

**Table 2-3 WSP Stakeholder identification and Interaction**

Stakeholders				Interaction Mechanism	Record of Interaction
Name	Relationship to Drinking Water Supply Issues	Point of Contact with WD/WSP Team	Issues with Drinking Water Supply		
<b>SOURCE</b>					
Department of Environment and Natural Resources (DENR)	B F	P: WD - Team Leader(Source), DENR - PENRO/CENRO	1. Strict implementation of forest protection; 2. Enforcement of police power (Timber poaching, kaingin, charcoal making activities)	P: Semestral Meeting	Minutes of the meeting, attendance



Stakeholders				Interaction Mechanism	Record of Interaction
Name	Relationship to Drinking Water Supply Issues	Point of Contact with WD/WSP Team	Issues with Drinking Water Supply		
Catbalogan City - LGU	B E	P: WD - Team Leader(Source), LGU -Mayor	Strict Implementation of existing ordinance on environment protection	P1: Semestral Meeting	1: Minutes of the meeting, attendance
				P2: Periodic follow up of implementation of ordinances	2: Letter Request or logbook
Department of Agriculture (DA)	B	P: WD - Team Leader(Source), DA: Head of office	Strict Implementation of existing regulation on the use of pesticide	P: Annual Meeting	Minutes of the meeting, attendance
Barangay	A	P: WD - Team Leader(Source), UB - Brgay Captain	Waste runoff during rainy days	P: Quarterly meeting	Minutes of the meeting, attendance
Farmers	A	P: WD - Team Leader(Source), Farmers - Brgy Captain	Pesticide and human waste runoff to river during onset of rainy season;	P: Quarterly meeting	Minutes of the meeting, attendance
AFP	F	P: WD - Team Leader(Source), AFP: Commanding General	Close coordination with DENR for the apprehension of timber poachers, kaingeros and charcoal makers	P: Semestral Meeting	Minutes of the meeting, attendance
PNP	F	P: WD - Team Leader(Source), PNP: Chief of Police	Close coordination with DENR for the apprehension of timber poachers, kaingeros and charcoal makers	P: Semestral Meeting	Minutes of the meeting, attendance
Samelco	D	P: WD - Team Leader(Source), Samelco: GM	Proper coordination of preventive maintenance; advance notification of power interruption for continuity of water treatment process	E: Communication thru Text and social media P: Monthly meeting	E: Screenshots of Notices P: Minutes of Meetings and Attendance
BFP	G	P: WD - Team Leader(Source), BFP: Fire Chief	Immediate response during grass fire to prevent possible water contamination	P: Semestral Meeting	Minutes of the meeting, attendance

Stakeholders				Interaction Mechanism	Record of Interaction
Name	Relationship to Drinking Water Supply Issues	Point of Contact with WD/WSP Team	Issues with Drinking Water Supply		
CHO	B	P: WD - Team Leader(Source), CHO: City Health Officer	Strict monitoring of proper design of septic tanks; implementation of sanitary code	P: Monthly Meeting	Minutes of the meeting, attendance
Suppliers/Contractors	D	P: WD - Team Leader(Source), S/C: Proprietor	Supply materials that adhere to the standard specifications	E: PhilGeps Posting, Bidding	PR, RFQ/Invitation to bid
NGO (PBSP)	G	P: WD - Team Leader(Source), NGO: Chairman/President	Organic fertilizer; livelihood trainings; training on proper planting of trees	P: Quarterly Meeting	Training proposal; attendance
<b>DISTRIBUTION</b>					
City Health Unit (CHU)	B, C	P: WD - Lab. Tech./CHU - Sanitary	Compliance with PNSDW	P: Assist in gathering & conduct the laboratory test of water samples, if necessary	Laboratory Test Results
			Compliance with Sanitary Code of the Phils.	P: Strict implementation of the law, particularly in the Design/Const. of Septic Tanks	Copy of Permits and/or Certification
City Engineering Office (CEO)	B, C, A	P: WD - Eng'g. Division/CEO - Bldg. Officials & City Engineer	Compliance with Sanitary and Building Code of the Phils.	P: Strict implementation of sanitary and building code/laws	Copy of Permits and/or Certification
			Provide necessary permits to CWD for speedy repair/restoration/rehabilitation works of leakages	P: Coordination before projects/repair / rehabilitation works	Letter Request/Permits
			Provide advance information regarding implementation of projects that may caused damage to water pipelines	Confer with authorized personnel, if necessary	Copy of Plans

Stakeholders				Interaction Mechanism	Record of Interaction
Name	Relationship to Drinking Water Supply Issues	Point of Contact with WD/WSP Team	Issues with Drinking Water Supply		
DPWH-2SED	B, A	P: WD - Eng'g. Division/DPWH-SED District Engineer	Provide advance information regarding implementation of projects that may caused damage to water pipelines	Confer with authorized personnel, if necessary	Copy of Plans
			Provide necessary permits to CWD for speedy repair/restoration/rehabilitation works of leakages	P: Coordination before projects/repair/rehabilitation works	Letter Request/Permits
Provincial Engineering Office (PEO)	B, A	P: WD - Eng'g. Division/PEO - Prov'l. Engineer	Provide advance information regarding implementation of projects that may caused damage to water pipelines	Confer with authorized personnel, if necessary	Copy of Plans
			Provide necessary permits to CWD for speedy repair/restoration/rehabilitation works of leakages	P: Coordination before projects/repair/rehabilitation works	Letter Request/Permits
Barangay LGU	B, A	P: WD - Eng'g. Division/LGU-Brgy. Chairman	Provide advance information regarding implementation of projects that may caused damage to water pipelines	Confer with authorized personnel, if necessary	Copy of Plans
			Provide necessary permits to CWD for speedy repair/restoration/rehabilitation works of leakages	P: Coordination before projects/repair/rehabilitation works	Letter Request/Permits

Stakeholders				Interaction Mechanism	Record of Interaction
Name	Relationship to Drinking Water Supply Issues	Point of Contact with WD/WSP Team	Issues with Drinking Water Supply		
Accredited Laboratory Testing Centers	D	E: WD: Lab. Tech./Lab. Center - Lab. Technician; RMT	Compliance with PNSDW - Provide speedy laboratory test results of water samples submitted for various parameters (Physical-Chemical) & absence or presence of E.Coli (Bacteriological) for sound & efficient management decision	E: Proper handling of water samples for accurate & truthful laboratory results	Laboratory Test Results
<b>TREATMENT</b>					
City Health Unit (CHU)	B, C	P: WD - Lab. Tech./CHU - Sanitary Inspector	Compliance with PNSDW	P: Assist in gathering & conduct the laboratory tests of water samples, especially during emergencies	Laboratory Test Results
Accredited Laboratory Testing Centers	D	E: WD: Lab. Tech./Lab. Center - Lab. Technician; RMT	Compliance with PNSDW - Provide speedy laboratory test results of water samples submitted for various parameters (Physical-Chemical) & absence or presence of E.Coli (Bacteriological) for sound & efficient management decision	E: Proper handling of water samples for accurate & truthful laboratory results	Laboratory Test Results
Barangay LGU	B, A	P: WD - Eng'g. Division/LGU-Brgy. Chairman	Proper coordination with CWD prior to issuance of permits/certification, especially structures built near CWD treatment facilities	P: Letter Request (Approval/Disapproval)	Copy of the Letter with CWD concurrence

Stakeholders				Interaction Mechanism	Record of Interaction
Name	Relationship to Drinking Water Supply Issues	Point of Contact with WD/WSP Team	Issues with Drinking Water Supply		
Technically, Financially Capable Suppliers & PhilGEPS Registered	D	E: WD: BAC Chairman/Supplier Sales Manager	Provide materials/supplies that met the standard specifications & delivered within the specified period to avoid interruption in the operation of treatment plant, especially during rainy season and calamities	E: Invitation to Bid and/or Request for Quotation; and Bid Notice Abstract (PhilGEPS)	Copy of Purchase Request/RFQ,/Bid Notice Abstract/ITB

## 3. System Description

### 3.1 General information on the supplier

The water supply of the City of Catbalogan is handled and managed by the Catbalogan Water District (CWD), which was initially constructed in 1925 under the management of the local government. It was transferred to the National Waterworks and Sewerage Authority (NAWASA) upon its creation in 1995. In 1969, NAWASA was abolished and the Catbalogan municipal government took over the CWD management.

A Sanguniang Bayan resolution No. 66 was approved in July 5, 1978 creating the Catbalogan Water District (CWD) based on the national policy, the P.D. 198 known as Provincial Water Utilities Act of 1973 favoring local operation and control of water systems; authorizing the formation of local water districts and providing for the government and administration of such districts; chartering a national administration for facilitate improvement of local water utilities; granting said administration such powers as are necessary to optimize public service from water utility operations, and for other purposes. On December 7, 1979 the Local Water Utilities Administration awarded Conditional Certificate of Conformance No. 107 to the CWD.

Currently, Catbalogan Water District is the only water service provider in the city of Catbalogan. Catbalogan Water District is a none-profit oriented and receives no subsidy from the national and local government. The revenue raised is solely from the concessionaires' monthly payments of water bills and other installation costs. Local Water District was declared a Government Owned Controlled Corporation by Supreme Court as of 1992.

The district is currently managed by its General Manager, Engr. Ralph S. Uy. It has three divisions namely: Administrative Division headed by Eusebia Christina Yboa, Commercial Division headed by Julia P. Lobriño, and Engineering Division headed by Engr. Miguel P. Macaspag.

The policy making body is composed of five directors each representing different sectors. The Chairman is Mr. Victoriano C. Navarrete, CPA (Education Sector), Vice Chairman is Mr. Don A. Mabulay Jr. (Civic Sector), Secretary/Treasurer is Mrs. Myra Gay M. Tambor (Women Sector), Rolando T. Ko (Business Sector), representative for the Professional Sector is currently vacant.

#### 3.1.1 Area of Coverage

Catbalogan is composed of 57 barangays with 22 barangays classified as upland or island barangays, the remaining 35 barangays are along the carline.

The current service area of CWD is only 62% of the total number of the carline and poblacion barangays or 22 out of 35 barangays, mostly within the town proper. These barangays are Poblacion 1 to 13, San Andres, Barangay Canlapwas, Barangay San Pablo, Barangay Muñoz, Barangay Mercedes, Barangay Maulong, Barangay Guindapunan, Barangay Guinsorongan, Barangay Bunu-anan. Installation of Distribution line to the two Island barangays, Darahuway Guti and Darahuway Dako is on-going.

Possible expansions of the service coverage are the carline barangays along the highway, namely, San Vicente, Mahayag, Iguid, Pupua, Payao, upper portion of Maulong, Lagundi, and Socorro.

### 3.1.2 Household Coverage

For the last five years, there was a 31.7% increase in the number of active service connection from 6,853 of Dec 2010 to 9,028 of Dec 2015.

CWD is currently serving 57% of the total Number of households in the service area and is projected to increase by 13% by the end of year 2020.

### 3.1.3 Transmission and Distribution Pipelines

There are four transmission pipelines originating from the three water sources namely, one from Kulador, two from Masacpasac Spring and another one from Caramayon Spring. However, only two 200mm transmission pipelines that is in place from San Andres to the poblacion proper.

The existing transmission lines have a carrying capacity of about 90-120 lps. This was based on the hydraulic analysis of the two 200mm transmission pipelines and actual recorded production.

Length of the following Transmission and Distribution Lines.

300 mm	PVC	0.289 Km
250 mm	PVC	5.584 Km
200 mm	PVC, GI, CI	9.322 Km
150 mm	CI, PVC	4.470 Km
100 mm	PVC	4.713 Km
75 mm	PVC	6.205 Km
63 mm	PVC	0.170 Km
50 mm	PVC, PE	2.908 Km
38 mm	PE, PVC	1.680 Km
25 mm	PE	0.140 Km
<b>TOTAL LENGTH</b>		<b>33.961 KM</b>

### 3.1.4 Transmission and Distribution Pipelines

Customers of CWD are classified into five types, namely, residential, government commercial, commercial a, commercial b, and commercial c.

Below is the current water rate of Catbalogan Water District.

Type	Min. Charge	11-20 cu.m	21-30 cu.m	31-40 cu.m	over4 cu.m
Residential/Govt	175	19.45	21.35	24.80	28.50
Commercial	350	38.90	42.70	49.60	57.00
Commercial A	306.25	34.00	37.35	43.40	49.85
Commercial B	262.50	29.15	32.00	37.20	42.75
Commercial C	218.75	24.30	26.65	31.00	35.60

### 3.2 Source of water: Catchment and extraction from source

The District currently has three main water sources, namely Kulador, Caramayon, and Masacpasac spring. It has also two supplemental sources namely: Piczonville Pumping Station and Tumalistis Pumping Station. Incoming water source is Caramayon 2 spring.

#### 3.2.1 Kulador Treatment Facility

The plant is located 2.7 kilometers from Barangay San Andres of Catbalogan, Samar, or 110 48' 44.4" N and 240 54' 10.3" E.

The treatment plant receives water from the Antiao River through an Intake Box 3m x 3m wide and 2.5m depth. The water was conveyed through a telescopic Transmission Line of 250mm and 200mm diameter PVC pipes and goes into a 4,000cum/day clarifier system for water treatment. Later this year the clarifier is to expand its capacity to 6,000cum/day.

#### 3.2.2 The Caramayon Pumping Station

The project started on February 22, 2002. Fund by 32M ADB – Loan under LWUA's Small Towns Water Supply System Project (STWSSP). Component of the project are the ff:

- Construction of impounding Dam and Sump Tank
- Pumping facilities 1-100hp, 2-500hp, 440v, 3 diameter
- Generator, 300hp
- Laying of 5.1km 10" diameter Transmission Lines, 500lm riser pipe, 200mm diameter
- Installation of 3-phase Electric Power Line, 13.2 KV primary lines

The Project site is not accessible to any mode of transportation. The spring is located in a highland Barangay of Lobo, Sitio Caramayon, it is approximately 9.1 kms. from the nearest lowland Barangay San Andres



and about 11 kms. from the center of the Poblacion. Caramayon spring could be reached only by foot passing through mountains, the highest elevation of which is 197 meters above mean sea level and traversing the same river about twenty (20) times. The said spring source is below and between mountain ranges with an elevation of 84.7 meters.

Except for the pumps which were airlifted (courtesy of the 8ID, Camp Lucban & PAF) all of the materials and equipment were handled/ carried manually.

Caramayon spring source capacity is 140 lps. A Mini impounding Dam was built from where water flows to the sump Tank by gravity. Three high head submersible pumps, 1-100hp, 2-50 hp was installed to pump the water to the break pressure chamber and from there water flows by gravity to the Kulador Treatment Plant via a 10-inch pipeline through a 4.65-km distance.

A 3-phase power line 13.2 KV Primary Line with a distance of 11.9 kms was constructed as a primary prime mover of the pumping equipment. A generator was installed as standby power.

5.1 kms pipelines 10 inch and 8 inch diameter were installed. On February 22, 2005, test run was conducted on the pumping equipment and three days after it was put to operation

With the three (3) pumps capable of delivering a combined capacity of 91 lps, it can supply 9000 households.

### **3.2.3 Masacpasac Spring**

The Masacpasac spring is located at 11 4j8' 58.8000" N, 124 55' 10.8000" E and approximately 5 kms from Brgy San Andres.

The water source contributes an average of 64% of the total water production with two transmission lines, CI 6" and CI 10" with a total rated capacity of 55 lps.

The source is not passable by any vehicle and can only be reached by hiking.

### **3.2.4 Piczonville Pumping Station**

Its operation is from 5:00 in the morning to 1:00 o'clock in the afternoon, then from 4:00 in the afternoon to 6:00 in the evening daily.

As observed, this pumping schedule is operational during rainy season but during dry season/summertime, it is on a standby due to high salinity level recorded in the underground source.

Source: Deep Well, Rated Capacity: 6.5 lps, 10hp submersible pump

### **3.2.5 Tumalistis Pumping Station**

This is a deep well water source providing water in the southside part of Catbalogan. This has a total rated capacity of 4.5 lps utilizing a 10hp submersible pump.

Two hours operation is intended for the Executive heights subdivision. The remaining hours supplements the supply for the poblacion.

### **3.2.6 V&G Booster Pump**

V & G, 5hp booster pump - was donated by the developer to CWD, to cater the needs of V & G subdivision.

### **3.2.7 Canlapwas in-line Booster Pump**

This station is equipped with 25hp, 220v, 3 phase, Floor mounted high pressure pump. It boosts water pressure to increase the water supply in Canlapwas, San Andres, Salug, Casantolan, Brgy. Mercedes, Brgy. Mabini.

### **3.2.8 Mabini in-line Booster Pump**

Mabini in-line Booster pump – 40 hp, 220v, 3 phase, high head, submersible pump, boosting of water pressure to increase the area coverage supplied due to existing limited size of Distribution Line, serving Canlapwas, San Andres, Salug, Casantolan, Brgy. Mercedes, Brgy. Mabini.

### **3.2.9 440 Cu.m. Concrete Reservoir**

This Reservoir was constructed by the Americans way back 1935. It was rehabilitated and re commissioned last 2005. It is located in an elevated part of Brgy. 13, with an elevation of 35m above sea level. It is used to augment the high demand during morning (peak hour) of the poblacion. The remaining 100cu.m. of water was reserved for fire fighting purposes.

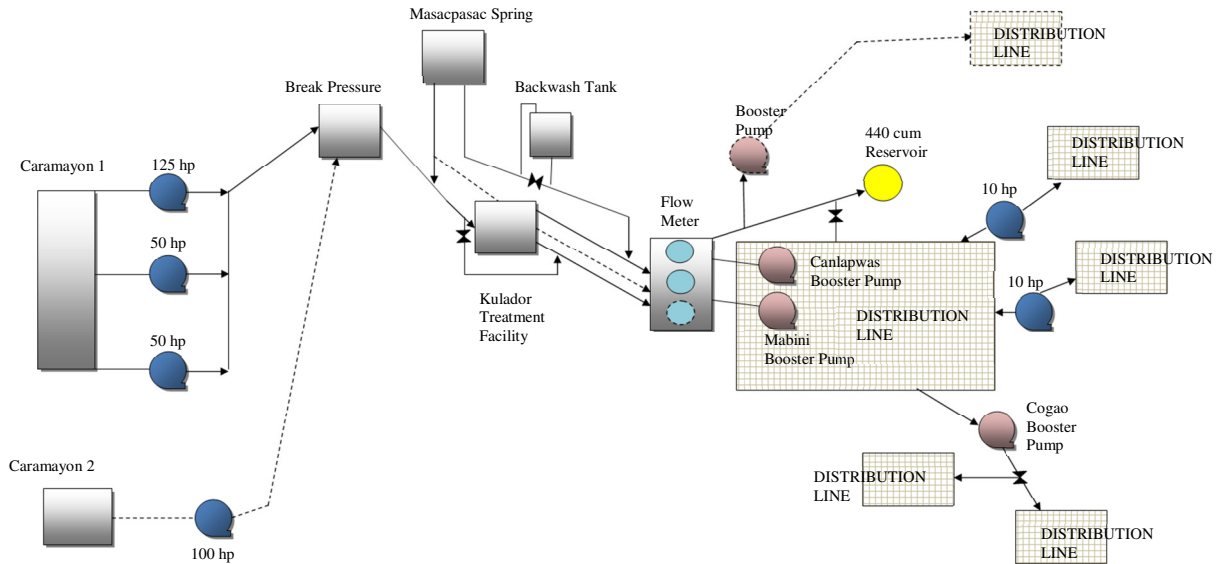
### **3.2.10 Cogao Booster Pump**

This Station was constructed last 2015 to provide water supply to two (2) island Barangays namely Darahuway Dako and Darahuway Guti. Transmission line is a 2" diameter x 1.7km underwater, it is equipped with a floor mounted high pressure, 75m TDH, 5lps, 200v, 3 diameter pump.

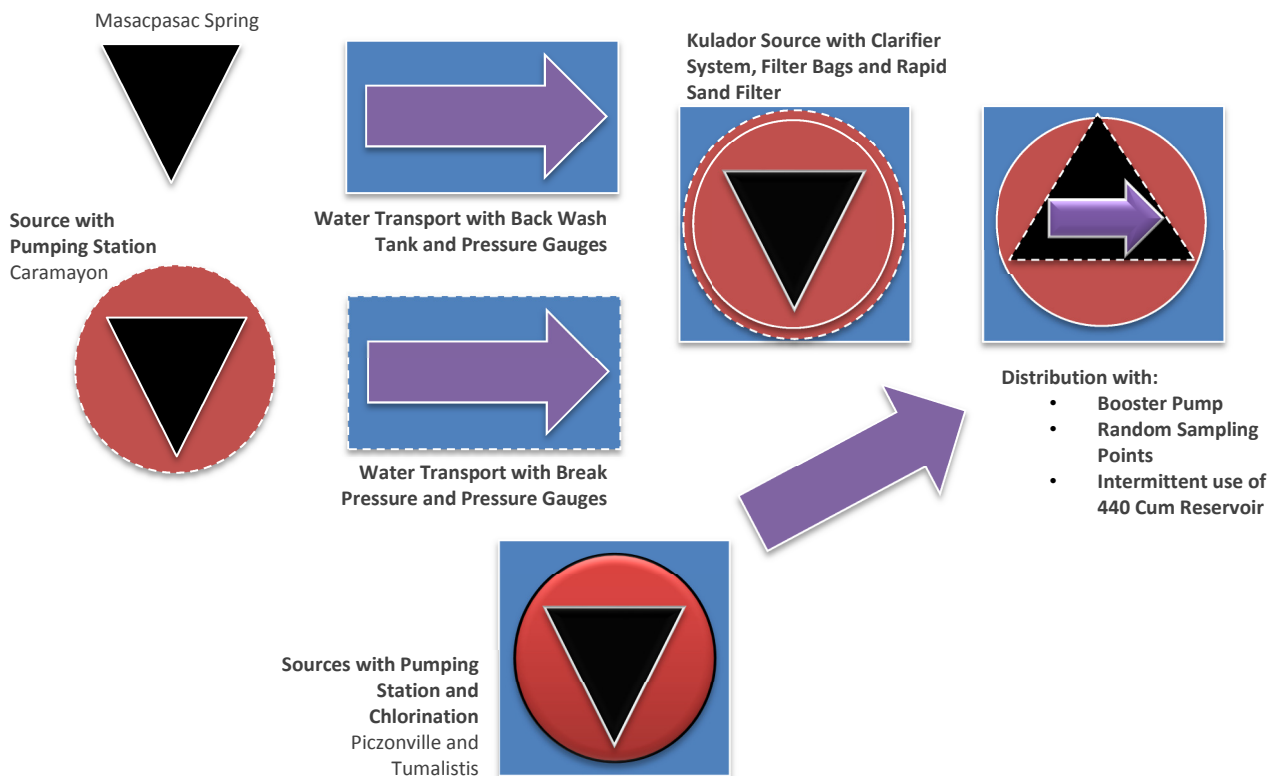
### 3.3 Flow diagram

To accurately define the hazards in the water supply system, it is best to describe first the components of the system in detail. The diagram shows the flow of water from the source, to the treatment, and to distribution. In between are operational and inspection processes to ensure the quality of water

**Figure 1.0: System Schematic Diagram**

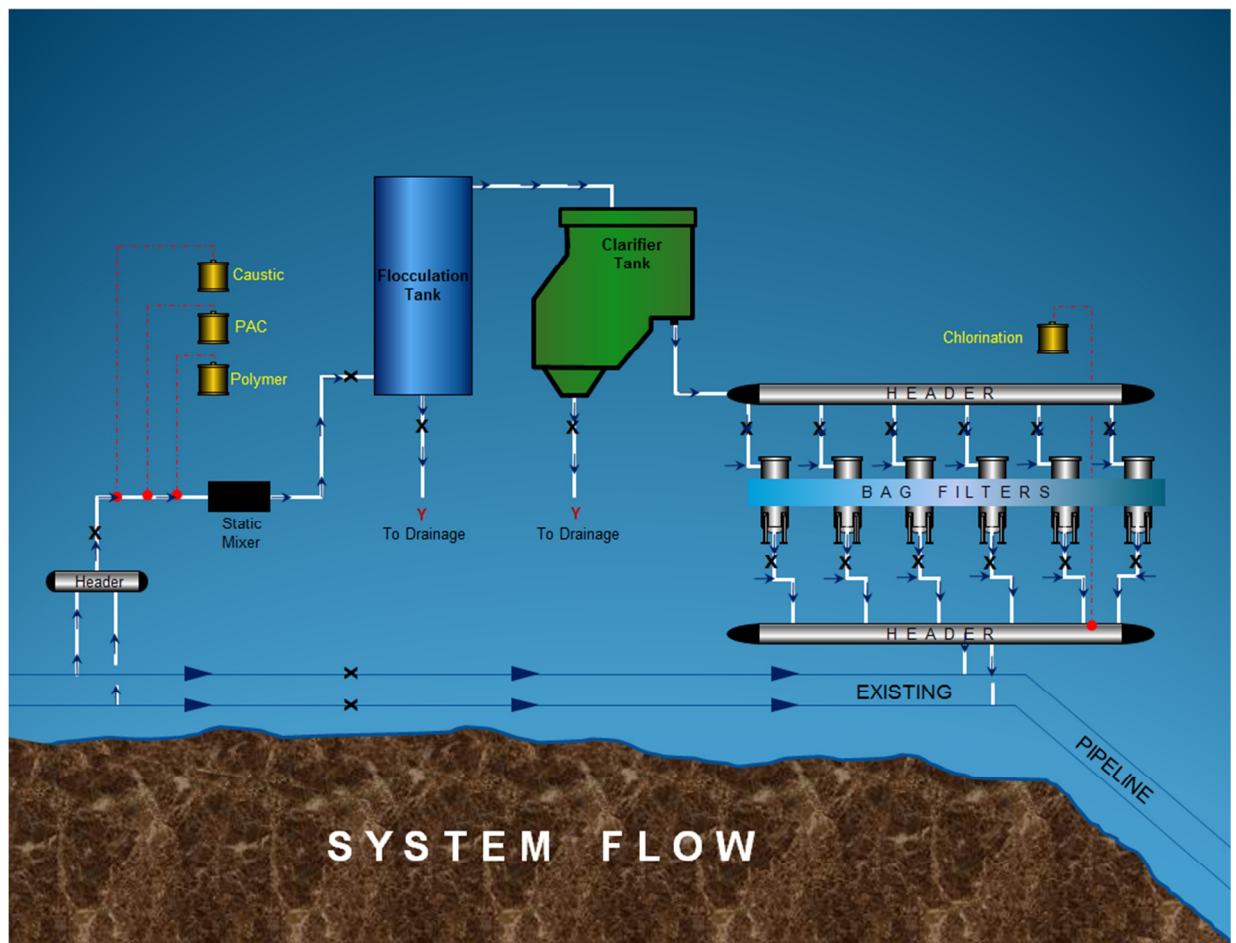


**Figure 2.0: Process Flow Diagram**



### 3.4 Treatment processes

Figure 4.0 Clarifier system flow



The treatment facility is located in Kulador, approximately 2.7 kms from the poblacion as discussed in item 3.2.1.

The facility is equipped with a clarifier system which can process 4,000 CMD of turbid water. Turbid water that enters the system is injected with PAC and Polymer to capture sediments, it will then go to a fluctuation tank and clarifier to let the sediments settle down. Finish product will pass through bag filters for final process of filtration before chlorine is injected for disinfection.

### 3.5 Distribution system

Figure 3.0 Distribution Line

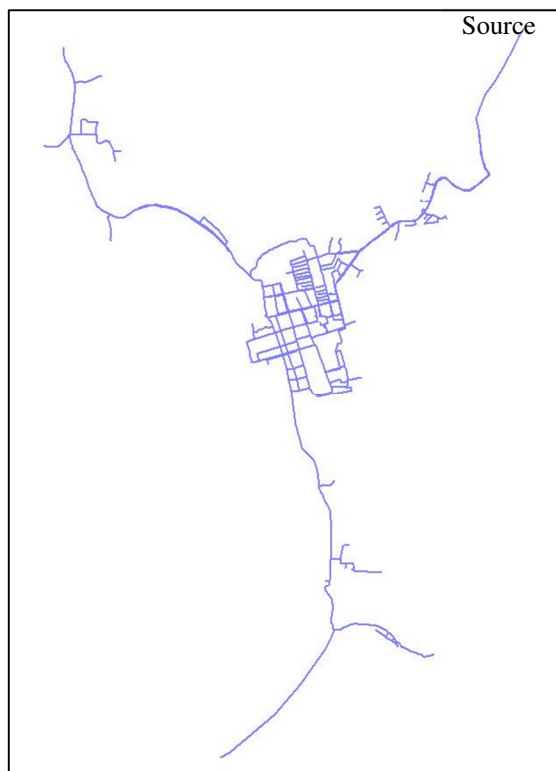
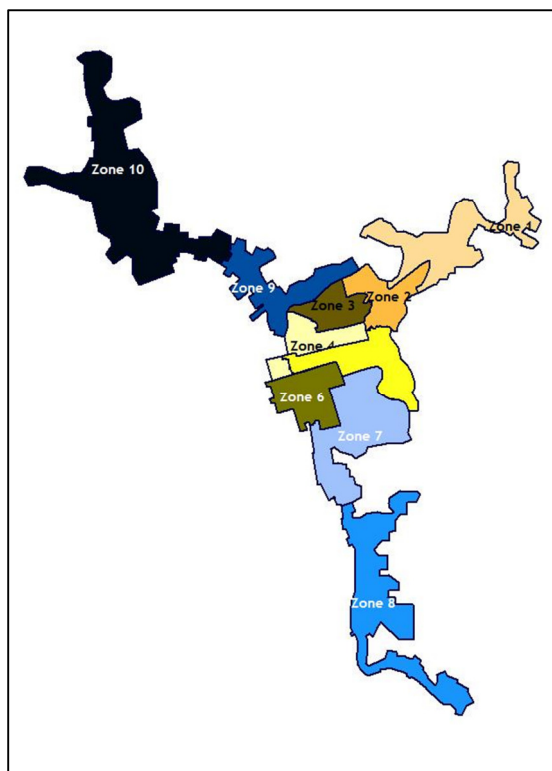


Figure 4.0 Zoning



The current distribution line is serving 22 barangays subdivided into 10 zones. Two (2) booster pumps are in placed within the poblacion to boost water pressure to far distant barangays. Another booster pump was place in Cogao to boost water pressure to the two island barangays of Darahuway Dako and Darahuway Guti which is not yet operational due to the El Niño phenomenon.

As shown in figures 3 and 4, northern tip of zone 10 and southern tip of zone 8 covers the barangays that are farthest from the source. These are also the barangays that experience low to negative water pressure every day.

The district distribution lines and facilities information are databased in the existing Geographic Information System of the office.

In the later part of this plan, control measures and improvement plans will be discussed to answer the different hazards that the current distribution lines is having.

### 3.6 Water quality required

The district follows the standards set by the Administrative Order No 2007- Philippine National Standards for Drinking Water of 2007.

To ensure safe drinking water, the laboratory technician conducts the following:

#### 1. Bacteriological Test

##### a. PHC Bottle

Tests are conducted every Monday and Wednesday using PHC bottle. Daily results are saved in a database where reports are generated and submitted to the City Health Office.

b. Microbiological Test

The test is conducted by a DOH accredited testing center in the region. In our Region we have two testing center, EVRMC and LMWD. Water sample is brought to the testing center every 3<sup>rd</sup> week of the month.

Test Results are submitted to LWUA every month.

**2. Laboratory Test**

Water sampling is conducted daily in random household points within the service area. The office is equipped with laboratory equipment to measure the following standards:

- a. Chlorine Residual - 1.0 ppm
- b. Salinity - 500 ppm s
- c. Conductivity - No Limit
- d. Ph - 6.5 - 8.5 mg/l
- e. Total Dissolved Solid - 500 mg/l
- f. Turbidity - 5.0 NTU

Laboratory test results are encoded to a database where reports are generated for submission to the City Health office.

**3. Physico-Chemical Test**

This test is conducted once a year by a DOH accredited testing center. The test measures, Aesthetic, Physical, and Chemical components of the water supplied. The table below shows the parameters being measured by the test.

PARAMETER	METOD OF ANALYSIS	PERMISSIBLE LIMITS
<b>AESTHETIC</b>		
Color	Colometric	≤ 5 TCU
Turbidity	Nephelometric	≤ 5 NTU
<b>PHYSICAL</b>		
pH	Direct Measurement	≤ 6.5 – 8.5
Conductivity	Direct Measurement	
Resistivity	Direct Measurement	
Salinity	Direct Measurement	
Total Dissolved Solids	Direct Measurement	≤ 500 mg/L
Water Temperature	Direct Measurement	24.9 ° C
<b>CHEMICAL</b>		
Inorganic		
Alkalinity	Titration	≤ 150 mg/L @ pH=4.8
Ammonia	Distillation	Not greater than 250 mg/L
Boron	Carmine	≤ 0.30 mg/L
Chloride	Argentometric	≤ 250 mg/L
Iron	Phenanthroline	≤ 1 mg/L
Manganese	Persulfate	≤ 0.50 mg/L
Nitrate	Distillation	≤ 50 mg/L
Nitrite	Spectrophotometric	≤ 3 mg/L

### **3.7 Delivery Point, Intended users of water and intended uses of the water**

Catbalogan Water District is currently serving 9,500 customers within the City of Catbalogan. The farthest delivery point to the North is barangay Maulong, this is about 3 kms from the Poblacion. Farthest southern delivery point is barangay Bunuanan, this is about 2 kms away from the Poblacion.

Intended users of water are the population of the City of Catbalogan. Currently 22 barangays were only served, but is planned to expand to other carline barangays.

### **3.8 Current delivered-water quality**

The current delivered water generally passed the National Standards for Drinking water, in fact all regular laboratory test results are within the permissible limits in all parameters of the tests.

### **3.9 Persistent Problems**

The water produced from the sources has different quality issues that were addressed during the treatment process. Here are some of the major problems with some of the sources:

- High Turbidity issues are common in our two sources, Caramayon and Kulador sources during heavy rains,
- High Salinity issue is a problem in Piczonville Pumping Station.
- High iron Content is a problem in Tumulistis Pumping Station.
- The major problem is not on the quality but on the quantity of water delivered. Although lack of supply doesn't directly affects quality of water, its after effects caused hazard to the supply system, like:
  - o contaminants tends to enter in leak pipes in areas with low/negative pressure
  - o Back flow from customer tanks in areas with low/negative pressure
  - o Areas with no water supply tend to use alternative water sources which are untreated causing water born deceases.

The current issues/problems will be discussed in the later part of this plan. These were identified as hazards and were addressed through control measures.

## 4. Risk Assessments, Hazard Table and Existing Control Measures

### 4.1 Risk assessment methodology

The team uses the hazard / risk table methodology. With this method, the team identified the different hazards from water sources, to treatment plants, to pumping stations, distribution lines and other facilities where the quality of water may be affected.

In this Methodology, the hazard table was clustered into groups for easy categorization. These grouping are Source, Treatment, Distribution, and Customer premises.

The table allocates a column for Raw Risk, Existing Control Measure being applied to minimize the event, and the residual risks which determine if there are still risks that remains after the existing control measure.

### 4.2 Hazard / Risk table and existing controls

The Hazard / Risk table is subdivided into different areas of focus like, Water Source, Treatment, Distribution, and customer taps.

Risk Ref	Priority	Hazard	Hazardous event (source of hazard)	Raw Risk			Existing Control Measure	Effectiveness of existing control measure	Residual Risk	
				Likelihood	Severity	Score			Likelihood	Score
<b>WATER SOURCES</b>										
<b>S1 - CARAMAYON SPRING</b>										
S1.1	L	M	Seepage of animal and human wastes in existing sink holes near the source	5	5	25	Uncontrollable in the catchment but Measures are in the treatment facility	Bacteriological Test Results shows that the water produced passed the parameters	1	5
S1.2	H	C	Entry of wildlife and unauthorized persons inside the pumping stations which could lead to contamination, sabotage (poisoning) and vandalism of pumping station equipments	5	4	20	24/7 Watchman is on Duty in the Pumping Station	Watchman cannot fully monitor the entry of wildlife and cannot prevent unauthorized entry of persons	5	20
S1.3	M	P	Soil erosion due to kaingin, charcoal making, and timber poaching activities leading to change in the physical quality (High Turbidity) of water	4	3	12	- Tree planting activities is conducted every Environment Day and Anniversary  - Coordination with City LGU on the implementation of Ordinances regarding Watershed protections	Problem on turbidity still existent	4	12



Risk Ref	Priority	Hazard	Hazardous event (source of hazard)	Raw Risk			Existing Control Measure	Effectiveness of existing control measure	Residual Risk	
				Likelihood	Severity	Score			Likelihood	Score
S1.4	H	C	Fish poisoning activities near the source resulting to water contamination	4	4	16			4	16
S1.5	L	P	Presence of algae formation in sump tank leading to change in the quality of water	5	3	15	Monthly Cleaning of Sump Tank	Reduce of Algae formation	1	5
S1.6	L	P	Well casing damage due to wear and tear	5	3	15	Regular Monitoring by the Watchman	Well casing properly maintained	1	5
<b>S2 - MASACPASAC SOURCE / SPRING</b>										
S2.1	L	M	Seepage of animal and human wastes in existing sink holes near the source	5	5	25	Uncontrollable in the catchment but Measures are in the treatment facility	Bacteriological Test Results shows that the water produced passed the parameters	1	5
S2.2	H	C	Entry of wildlife and unauthorized persons inside the pumping stations which could lead to contamination, sabotage (poisoning) and vandalism of catchment	5	4	20			5	20
S2.3	M	P	Soil erosion due to kaingin, charcoal making, and timber poaching activities leading to change in the physical quality (High Turbidity) of water	4	3	12	- Tree planting activities is conducted every Environment Day and Anniversary - Coordination with City LGU on the implementation of Ordinances regarding Watershed protections	Problem on turbidity still existent	4	12
S2.4	L	P	Presence of algae formation in the intake box leading to change in the quality of water	5	3	15	Monthly Cleaning of Sump Tank	Reduce of Algae formation	1	5
S2.5	L	M	Entry of small animals and insects in the uncovered intake box	5	5	25	Installation of Aluminum insect Screen	Installed screen is small enough for debris, birds, carwling animals and insects to enter the intake box	1	5
<b>S3 - KULADOR SOURCE / SURFACE WATER</b>										
S3.1	L	M	Seepage of animal and human wastes in existing sink holes near the source	5	5	25	Uncontrollable in the catchment but Measures are in the treatment facility	Bacteriological Test Results shows that the water produced passed the parameters	1	5

Risk Ref	Priority	Hazard	Hazardous event (source of hazard)	Raw Risk			Existing Control Measure	Effectiveness of existing control measure	Residual Risk	
				Likelihood	Severity	Score			Likelihood	Score
S3.2	H	C	Entry of wildlife and unauthorized persons inside the pumping stations which could lead to contamination, sabotage (poisoning) and vandalism of catchment	5	4	20	24/7 Watchman is on Duty in the Pumping Station	Watchman cannot fully monitor the entry of wildlife and cannot prevent unauthorized entry of persons	5	20
S3.3	M	P	Soil erosion due to kaingin, charcoal making, and timber poaching activities leading to change in the physical quality (High Turbidity) of water	4	3	12	- Tree planting activities is conducted every Environment Day and Anniversary	Problem on turbidity still existent  Clarifier system can only process 6000 cmd	2	6
							- Coordination with City LGU on the implementation of Ordinances regarding Watershed protections			
							- Installation of Clarifier System in treatment			
<b>S4 - PICZONVILLE SOURCE / DEEP WELL</b>										
S4.1	H	C	Entry of wildlife and unauthorized persons inside the pumping stations which could lead to contamination, sabotage (poisoning) and vandalism of catchment	5	4	20	24/7 Watchman is on Duty in the Pumping Station	Watchman cannot fully monitor the entry of wildlife and cannot prevent unauthorized entry of persons	5	20
S4.2	H	M	Existence of septic tanks within the 25 meter radius from the well leading to water contamination	5	5	25			5	25
S4.3	H	M	Presence of household garbage and human waste 10 to 15 meters away from the well	5	5	25			5	25
S4.4	H	P	Sea water intrusion leading to high water salinity	5	3	15	Reduce pumping hours from 6 hrs to 3 hrs	There are still complaints in salty water	5	15
S4.5	H	M	Flood water intrusion in the well casing affecting the quality of water	5	5	25			5	25

Risk Ref	Priority	Hazard	Hazardous event (source of hazard)	Raw Risk			Existing Control Measure	Effectiveness of existing control measure	Residual Risk	
				Likelihood	Severity	Score			Likelihood	Score
<b>S5 - TUMALISTIS SOURCE / DEEP WELL</b>										
S5.1	H	C	Entry of animals and unauthorized persons inside the pumping stations which could lead to contamination, sabotage (poisoning) and vandalism of pumping station equipments	5	4	20	24/7 Watchman is on Duty in the Pumping Station	Watchman cannot fully monitor the entry of wildlife and cannot prevent unauthorized entry of persons	5	20
S5.2	H	M	Existence of septic tanks within the 25 meter radius from the well leading to water contamination	5	5	25			5	25
S5.3	L	P	Presence of naturally occurring iron bacteria affecting water quality	5	3	15	- Periodic maintenance of riser pipe - Post chlorination	No complaints received regarding the quality of water	1	3
<b>T1 - WATER TREATMENT</b>										
<b>T1.1 Maintenance of Clarifier System</b>										
T1.1.1	L	P	High turbidity due to insufficient filtration capacity, processing only 50% of the total production	4	3	12	Installation of additional filter bags	Processing capacity from 4000 cmd to 6000 cmd	4	3
T1.1.2	L	P	Damage of clarifier system due to wear and tear	2	3	6	Preventive Maintenance of parts	Increase life span of clarifier system	2	3
<b>T1.2 Application of Poly-Aluminun Chloride (PAC)</b>										
T1.2.1	L	P	Slow settling process due to under dosing of Poly-Aluminun Chloride (PAC)	2	3	6	Training of employee in-charge		1	3
T1.2.2	L	C	Concentration of PAC above acceptable level due to over dosing	2	4	8	Training of employee in-charge		1	4
<b>T1.3 Disinfection of the finished product</b>										
T1.3.1	M	M	Survival of pathogens caused by under dosing of chlorine due to clogged / defective chlorinator	3	5	15	Training of employee in-charge Daily Monitoring	Daily Chlorine Residual within permissible limit	2	10
T1.3.2	L	C	Residual chlorine > 1.5ppm due to over dosing	2	4	8	Training of employee in-charge Daily Monitoring	Daily Chlorine Residual within permissible limit	1	4
T1.3.3	L	M	Failure of chlorination due to power interruption	3	5	15	Existing Stand by drip type chlorinator	Daily Chlorine Residual within permissible limit	1	5

Risk Ref	Priority	Hazard	Hazardous event (source of hazard)	Raw Risk			Existing Control Measure	Effectiveness of existing control measure	Residual Risk	
				Likelihood	Severity	Score			Likelihood	Score
T1.3.4	L	M	Failure of chlorination due to unavailability of chlorine products due to fortuitous event	2	5	10	Proper monitoring of stock reorder level	Chlorine stock always above the reorder level	1	5
T1.3.5	L	M	Failure of final filtration due to clogged filter bags	3	5	15	Regular schedule of cleaning and monitoring	There are filter bags as spare	1	5
<b>T1.4 Quality control of treatment chemicals</b>										
T1.4.1	L	M	Poor quality of treatment chemicals due to lack of quality check during delivery	2	5	10	Follow Standard Operational Procedure in accepting delivered inventories	All delivered inventories undergoes quality checks	1	5
T1.4.2	H	M	poor quality of treatment chemicals due to lack of proper storage leading to exposure (rain, humidity, etc)	5	5	25			5	25
<b>D1 - DISTRIBUTION</b>										
<b>D1.1 Burst and Leaks</b>										
	H	M	Ingress of contamination during leak repair near drainage canals	5	5	25	Relocation of existing pipelines along drainage canal	40% of pipelines along drainage canals transferred	5	25
	H	M	Poor workmanship and unhygienic practices in leak repairs	5	5	25	Skills Training	Employees not in proper attire during conduct of work	4	20
	H	M	Entry of contaminants due to leaks caused by vandalism or construction works of other government agencies (DPWH, LGU) and other private entities	3	5	15			3	15
	H	M	Entry of contaminants due to leaks caused by old dilapidated pipes	5	5	25	Rehabilitation or replacement of dilapidated pipes	Only identified dilapidated pipes were replaced, ageing of pipes not yet determined as basis for evaluation	5	15
<b>D1.2 Water Distribution Pressure</b>										
	H	M	Back siphonage of contaminants in the distribution lines caused by intermittent, low, negative pressure	5	5	25			5	25
	H	M	- In Maulong (zero to negative pressure - 5am to 11pm)	5	5	25			5	25

Risk Ref	Priority	Hazard	Hazardous event (source of hazard)	Raw Risk			Existing Control Measure	Effectiveness of existing control measure	Residual Risk	
				Likelihood	Severity	Score			Likelihood	Score
	H	M	- Parts of Mercedes (zero to negative pressure - 5am to 11pm)	5	5	25			5	25
	H	M	- Rotation of distribution by phase in Executive Heights	5	5	25			5	25
	H	M	- Scheduled Pumping in Piczonville Subdivision	5	5	25			5	25
	H	M	- Elevated Area in Brgy 13	5	5	25			5	25
	H	M	- In Bunuanan (zero to negative pressure 20hrs/day)	5	5	25			5	25
	H	M	- In Calapog (zero to negative pressure 20hrs/day)	5	5	25			5	25
	L	M	Back flow from customer uncleaned elevated tanks during negative pressure	3	5	15	Installation of non-return valve in	__% of water service connections to be installed	3	5
	H	M	Back flow from customer's alternative untreated water source	5	5	25	Installation of non-return valve in	__% of water service connections to be installed	5	25
	H	M	Use of alternative untreated water source due to low water supply	5	5	15			5	25
<b>D1.3 Quality Control of materials for leak repair and installation</b>										
	H	M	Entry of small animals and insects in pipes stored at the stockyard	5	3	15			5	15
	H	C	Use of non-food grade materials during installation, repair and rehabilitation	4	4	16			4	16
	L	M	Poor quality of material used due to insufficient inspection during delivery	4	5	20	Follow Standard Operational Procedure in accepting delivered inventories	All delivered inventories undergoes quality checks	1	5
<b>D1..4 Maintenance of Distribution and appurtenances</b>										
	L	M	Accumulation of suspended sediments in dead-ends	5	5	25	Periodic Flushing		1	5
	H	M	Entry of garbage / contaminants in open hydrants	5	5	25			5	25
	H	M	Cross connection with dilapidated and abandoned water pipes	5	5	25			5	25

Risk Ref	Priority	Hazard	Hazardous event (source of hazard)	Raw Risk			Existing Control Measure	Effectiveness of existing control measure	Residual Risk	
				Likelihood	Severity	Score			Likelihood	Score
	H	M	Pipes and meter stands submerged or traverse drainage canals	5	5	25	Relocation of pipes	Not yet completed	5	25
<b>D1.5 Disinfection of service line</b>										
	L	M	Drop of Chlorine residual less than 0.3 to 1.0 ppm not detected	5	5	25	Daily monitoring of Chlorine Residual	Daily results shows Chlorine residual within distribution lines are within permissible limits	1	5

### 4.3 Proposed Control Measures

Risk Ref	Priority	Hazard	Hazardous event (source of hazard)	Residual Risk		Proposed Control Measure	Validation
				Likelihood	Score		
<b>WATER SOURCES</b>							
<b>S1 - CARAMAYON SOURCE / DEEP WELL</b>							
S1.1	L	M	Seepage of animal and human wastes in existing sink holes near the source	1	5	Soil Erosion Management	Instituting soil erosion management will lessen entry of contaminants in sink holes
S1.2	H	C	Entry of wildlife and unauthorized persons inside the pumping stations which could lead to contamination, sabotage (poisoning) and vandalism of pumping station equipments	5	20	Fencing	Fencing of the pumping station will limit the entry of wildlife animals and unauthorized persons passing by the area
S1.3	M	P	Soil erosion due to kaingin, charcoal making, and timber poaching activities leading to change in the physical quality (High Turbidity) of water	4	12	Strict implementation of Ordinances regarding watershed preservation	The strict implementation of ordinances will reduce the illegal activities in the watershed area that causes degradation of forest cover
S1.4	H	C	Fish poisoning activities near the source resulting to water contamination	4	16		
S1.6	L	P	Well casing damage due to wear and tear	1	5	Spare Unit	Providing a spare unit of well casing will reduce the occurrence of interruption in water supply
<b>S2 - MASACPASAC SOURCE / SPRING</b>							
S2.1	L	M	Seepage of animal and human wastes in existing sink holes near the source	1	5	Soil Erosion Management	Instituting soil erosion management will lessen entry of contaminants in sink holes
S2.2	H	C	Entry of wildlife and unauthorized persons inside the pumping stations which could lead to contamination, sabotage (poisoning) and vandalism of catchment	5	20	Fencing	Fencing of the pumping station will limit the entry of wildlife animals and unauthorized persons passing by the area

Risk Ref	Priority	Hazard	Hazardous event (source of hazard)	Residual Risk		Proposed Control Measure	Validation
				Likelihood	Score		
S2.3	M	P	Soil erosion due to kaingin, charcoal making, and timber poaching activities leading to change in the physical quality (High Turbidity) of water	4	12	Strict implementation of Ordinances regarding watershed preservation	The strict implementation of ordinances will reduce the illegal activities in the watershed area that causes degradation of forest cover
<b>S3 - KULADOR SOURCE / SURFACE WATER</b>							
S3.1	L	M	Seepage of animal and human wastes in existing sink holes near the source	1	5	Soil Erosion Management	Instituting soil erosion management will lessen entry of contaminants in sink holes
S3.2	H	C	Entry of wildlife and unauthorized persons inside the pumping stations which could lead to contamination, sabotage (poisoning) and vandalism of catchment	5	20	Fencing	Fencing of the pumping station will limit the entry of wildlife animals and unauthorized persons passing by the area
S3.3	M	P	Soil erosion due to kaingin, charcoal making, and timber poaching activities leading to change in the physical quality (High Turbidity) of water	2	6	Strict implementation of Ordinances regarding watershed preservation	The strict implementation of ordinances will reduce the illegal activities in the watershed area that causes degradation of forest cover
<b>S4 - PICZONVILLE SOURCE / DEEP WELL</b>							
S4.1	H	C	Entry of wildlife and unauthorized persons inside the pumping stations which could lead to contamination, sabotage (poisoning) and vandalism of catchment	5	20	Fencing	Fencing of the pumping station will limit the entry of wildlife animals and unauthorized persons passing by the area
S4.2	H	M	Existence of septic tanks within the 25 meter radius from the well leading to water contamination	5	25	Strict implementation of the ordinance regarding use of standard septic tanks	Septic tanks specifically those near the water sources must follow standards to prevent possible contamination of water source
S4.3	H	M	Presence of household garbage and human waste 10 to 15 meters away from the well	5	25	Strict implementation of ordinance on proper disposal of garbage and use of toilets	Prohibition the disposal of Garbage and human waste will prevent possible contamination of water source
S4.4	H	P	Sea water intrusion leading to high water salinity	5	15	Reduce pumping hours	Reduction of pumping hours will allow fresh water to replenish
S4.5	H	M	Flood water intrusion in the well casing affecting the quality of water	5	25	Elevate well casing/pump base	
<b>S5 - TUMALISTIS SOURCE / DEEP WELL</b>							
S5.1	H	C	Entry of animals and unauthorized persons inside the pumping stations which could lead to contamination, sabotage (poisoning) and vandalism of pumping station equipments	5	20	Fencing	Fencing of the pumping station will limit the entry of wildlife animals and unauthorized persons passing by the area
S5.2	H	M	Existence of septic tanks within the 25 meter radius from the well leading to water contamination	5	25	Strict implementation of the ordinance regarding use of standard septic tanks	Septic tanks specifically those near the water sources must follow standards to prevent possible contamination of water source

Risk Ref	Priority	Hazard	Hazardous event (source of hazard)	Residual Risk		Proposed Control Measure	Validation
				Likelihood	Score		
S5.3	L	P	Presence of naturally occurring iron bacteria affecting water quality	1	3		
<b>T1 - WATER TREATMENT</b>							
<b>T1.1 Maintenance of Clarifier System</b>							
T1.1.1	L	P	High turbidity due to insufficient filtration capacity, processing only 50% of the total production	4	3	Provide New Treatment Facility	The new facility will process the remaining 50% of production during high turbidity
<b>T1.4 Quality control of treatment chemicals</b>							
T1.4.2	H	M	Poor quality of treatment chemicals due to lack of proper storage leading to exposure (rain, humidity, etc)	5	25	Construction of Storage Facility	The storage facility of chemicals will maintain the quality of treatment chemicals for long span of time
<b>D1 - DISTRIBUTION</b>							
<b>D1.1 Burst and Leaks</b>							
	H	M	Ingress of contamination during leak repair near drainage canals	5	25	Relocation of all existing pipelines along drainage canals	No pipelines along the drainage canals will minimize possible contamination during leak repair
	H	M	Poor workmanship and unhygienic practices in leak repairs	4	20	Skills training	Continuous training and refresher course is needed to improve workmanship and hygienic practices
	H	M	Entry of contaminants due to leaks caused by vandalism or construction works of other government agencies (DPWH, LGU) and other private entities	3	15	Enter into an agreement between government agencies that can be considered as effluent to the water system	Government agencies must coordinate with the office to minimize the possibilities of damage in the water supply system during their road repairs
	H	M	Entry of contaminants due to leaks caused by old dilapidated pipes	5	15	Pipe age and status must be determined  Continuous rehabilitation or replacement of dilapidated pipes	Determining the Pipe age and its status will give an ease in the decision making of pipe rehabilitation  Continuous rehabilitation will minimize leaks that causes entry of contaminants
<b>D1.2 Water Distribution Pressure</b>							
	H	M	Back siphonage of contaminants in the distribution lines caused by intermittent , low, negative pressure	5	25	Development of new source and transmission line	
	H	M	Use of alternative untreated water source due to low water supply	5	25		
	H	M	- In Maulong (zero to negative pressure - 5am to 11pm)	5	25	Improvement of water supply system for Mercedes – Maulong	
	H	M	- Parts of Mercedes (zero to negative pressure - 5am to 11pm)	5	25		
	H	M	- Rotation of distribution by phase in Executive Heights	5	25	24/7 supply for executive heights subdivision	
	H	M	- Scheduled Pumping in Piczonville Subdivision	5	25	24/7 supply for executive heights subdivision	



Risk Ref	Priority	Hazard	Hazardous event (source of hazard)	Residual Risk		Proposed Control Measure	Validation
				Likelihood	Score		
	H	M	- Elevated Areas like in Brgy 13, Brgy Guindapunan, etc.	5	25	Improvement of water supply system for elevated areas	
	H	M	- In Bunuanan (zero to negative pressure 20hrs/day)	5	25	Improvement of water supply system for Bunuanan – Calapog	
	H	M	- In Calapog (zero to negative pressure 20hrs/day)	5	25		
	L	M	Back flow from customer uncleaned elevated tanks during negative pressure	3	5	Installation of non-return valve	100% of all water meters installed with non-return valve
	H	M	Back flow from customer 's alternative untreated water source	5	25	Installation of non-return valve	100% of all water meters installed with non-return valve
<b>D1.3 Quality Control of materials for leak repair and installation</b>							
	H	M	Entry of small animals and insects in pipes stored at the stockyard	5	15	Proper storage of pipes	Maintain the quality of materials
	H	C	Use of non-food grade materials during installation, repair and rehabilitation	4	16	Non-use of lead materials in installation, repair and rehabilitation	Use of food grade materials will prevent contamination
<b>D1..4 Maintenance of Distribution and appurtenances</b>							
	H	M	Entry of garbage / contaminants in open hydrants	5	25	Installation of hydrant covers	Hydrant cover will limit entry of contaminants
	H	M	Cross connection with dilapidated and abandoned water pipes	5	25	Abandoned water pipes must be determined  Continuous rehabilitation or replacement of dilapidated pipes	Determining the Pipe age and its status will give an ease in the decision making of pipe rehabilitation  Continuous rehabilitation will minimize leaks that causes entry of contaminants
	H	M	Pipes and meter stands submerged or traverse drainage canals	5	25	Continuous transfer or replacement of meter stands submerged or traverse drainage canals	Continuous transfer of meter stands will lessen the risk of entry of contaminants

## 5. Improvement Plans

Risk Ref	Priority	Hazard	Hazardous event (source of hazard)	Action to be Taken (Name of Project)	Funding Source	Responsible Party - Target Due/Completion Date
					- Cost	
<b>WATER SOURCES</b>						
<b>S1 - CARAMAYON SOURCE / DEEP WELL</b>						
S1.1	L	M	Seepage of animal and human wastes in existing sink holes near the source	Site identification and classification of sink holes	ICGF - 40,000.00	Eng'g Division Oscar, Raphaelito - 1. December 2016
S1.2	H	C	Entry of wildlife and unauthorized persons inside the pumping stations which could lead to contamination, sabotage (poisoning) and vandalism of pumping station equipments	Installation of Fence along the Perimeter of Caramayon source	ICGF - 500,000.00	Eng'g Division - 1. July 2017
S1.3	M	P	Soil erosion due to kaingin, charcoal making, and timber poaching activities leading to change in the physical quality (High Turbidity) of water	Periodic consultative meeting with DENR and LGU on the implementation of ordinances	ICGF - 50,000.00	WSP Team - Semi-annual
S1.4	H	C	Fish poisoning activities near the source resulting to water contamination			Eng'g Division
<b>S2 - MASACPASAC SOURCE / SPRING</b>						
S2.1	L	M	Seepage of animal and human wastes in existing sink holes near the source	Site identification and classification of sink holes	ICGF - 40,000.00	Eng'g Division - 1. December 2016
S2.2	H	C	Entry of wildlife and unauthorized persons inside the pumping stations which could lead to contamination, sabotage (poisoning) and vandalism of catchment	Installation of Fence along the Perimeter of Mascapasac source	ICGF - 50,000.00	Eng'g Division - July 2017
S2.3	M	P	Soil erosion due to kaingin, charcoal making, and timber poaching activities leading to change in the physical quality (High Turbidity) of water	Periodic consultative meeting with DENR and LGU on the implementation of ordinances	ICGF - 50,000.00	WSP Team - Semi-annual
<b>S3 - KULADOR SOURCE / SURFACE WATER</b>						
S3.2	H	C	Entry of wildlife and unauthorized persons inside the pumping stations which could lead to contamination, sabotage (poisoning) and vandalism of catchment	Installation of Fence along the Perimeter of Kulador source	ICGF - 200,000.00	Eng'g Division - July 2017
S3.3	M	P	Soil erosion due to kaingin, charcoal making, and timber poaching activities leading to change in the physical quality (High Turbidity) of water	Periodic consultative meeting with DENR and LGU on the implementation of ordinances	ICGF - 50,000.00	WSP Team - Semi-annual

Risk Ref	Priority	Hazard	Hazardous event (source of hazard)	Action to be Taken (Name of Project)	Funding Source - Cost	Responsible Party - Target Due/Completion Date
<b>S4 - PICZONVILLE SOURCE / DEEP WELL</b>						
S4 .1	H	C	Entry of wildlife and unauthorized persons inside the pumping stations which could lead to contamination, sabotage (poisoning) and vandalism of catchment	Installation of Fence along the Perimeter of Piczonville Substation	ICGF - 100,000.00	Eng'g Division - July 2017
S4 .2	H	M	Existence of septic tanks within the 25 meter radius from the well leading to water contamination	Periodic consultative meeting with DENR and LGU on the implementation of ordinances	ICGF - 50,000.00	WSP Team - Semi-annual
S4 .3	H	M	Presence of household garbage and human waste 10 to 15 meters away from the well	Periodic consultative meeting with DENR and LGU on the implementation of ordinances	ICGF - 50,000.00	WSP Team - Semi-annual
S4 .4	H	P	Sea water intrusion leading to high water salinity	Sealing using clay 6 meters depth	ICGF - 30,000.00	Eng'g Division - March 2017
S4 .5	H	M	Flood water intrusion in the well casing affecting the quality of water	Elevate well casing/pump base	ICGF - 100,000.00	Eng'g Division - January 2017
<b>S5 - TUMALISTIS SOURCE / DEEP WELL</b>						
S5 .1	H	C	Entry of animals and unauthorized persons inside the pumping stations which could lead to contamination, sabotage (poisoning) and vandalism of pumping station equipments	Installation of Fence along the Perimeter of Tumulistis pumping station	ICGF - 100,000.00	Eng'g Division - July 2017
S5 .2	H	M	Existence of septic tanks within the 25 meter radius from the well leading to water contamination	Periodic consultative meeting with DENR and LGU on the implementation of ordinances	ICGF - 50,000.00	WSP Team - Semi-annual
<b>T1 - WATER TREATMENT</b>						
<b>T1.1 Maintenance of Clarifier System</b>						
T1 .1. 1	L	P	High turbidity due to insufficient filtration capacity, processing only 50% of the total production	Provide Additional Treatment Facility  Purchase of dosing pump for PAC and polymer	ICGF - 10,000,000.00 200,000.00	Eng'g Division - 2019

Risk Ref	Priority	Hazard	Hazardous event (source of hazard)	Action to be Taken (Name of Project)	Funding Source - Cost	Responsible Party - Target Due/Completion Date
<b>T1.3 Disinfection of the finished product</b>						
T1.3.1	M	M	Proliferation of pathogens caused by under dosing of chlorine due to clogged / defective chlorinator	Purchase of spare five (5) units chlorinator	ICGF - 250,000.00	Eng'g Division - March 2017
<b>T1.4 Quality control of treatment chemicals</b>						
T1.4.2	H	M	Poor quality of treatment chemicals due to lack of proper storage leading to exposure (rain, humidity, etc)	Construction of Storage facility in Kulador Treatment plant	ICGF - 150,000.00	Eng'g Division - May 2017
<b>D1 - DISTRIBUTION</b>						
<b>D1.1 Burst and Leaks</b>						
	H	M	Ingress of contamination during leak repair near drainage canals	Continuous relocation of pipes near drainage canal  Installation of control valves along the distribution lines	ICGF - 1,000,000.00  500,000.00	Eng'g Division - December 2017  December 2017
	H	M	Poor workmanship and unhygienic practices in leak repairs	Competency trainings	ICGF - 100,000.00	Eng'g Division - 2017
	H	M	Entry of contaminants due to leaks caused by vandalism or construction works of other government agencies (DPWH, LGU) and other private entities	Information Campaign	ICGF - 50,000.00	Commercial Division - 2017
	H	M	Entry of contaminants due to leaks caused by old dilapidated pipes	Replacement of old Dilapidated pipes and fittings	ICGF -1,000,000.00	Eng'g Division - 2017
	H	M	Cross connection with dilapidated and abandoned water pipes			
<b>D1.2 Water Distribution Pressure</b>						
	H	M	Back siphonage of contaminants in the distribution lines caused by intermittent , low, negative pressure	Installation of non-return valve/check valves in service connections	ICGF - 100,000.00	Eng'g Division - 2017
	H	M	Back flow from customer 's alternative untreated water source			
	H	M	Use of alternative untreated water source due to low water supply	See annex B for Project Details	See annex B for Project Details	See annex B for Project Details
	H	M	- In Maulong (zero to negative pressure - 5am to 11pm)			
	H	M	- Parts of Mercedes (zero to negative pressure - 5am to 11pm)			
	H	M	- Rotation of distribution by phase in Executive Heights			
	H	M	- Scheduled Pumping in Piczonville Subdivision			
	H	M	- Elevated Areas like in Brgy 13, Brgy Guindapunan, etc.			

Risk Ref	Priority	Hazard	Hazardous event (source of hazard)	Action to be Taken (Name of Project)	Funding Source - Cost	Responsible Party - Target Due/Completion Date
	H	M	- In Bunuanan (zero to negative pressure 20hrs/day)	See annex B for Project Details	See annex B for Project Details	See annex B for Project Details
	H	M	- In Calapog (zero to negative pressure 20hrs/day)			
<b>D1..4 Maintenance of Distribution and appurtenances</b>						
	H	M	Entry of garbage / contaminants in open hydrants	Installation hydrant cap	ICGF  -  0.00	Eng'g Division  -  January 2017
	H	M	Pipes and meter stands submerged or traverse drainage canals	See annex B for Project Details	See annex B for Project Details	See annex B for Project Details

## 6. Operational Monitoring and Corrective Actions of Control Measures

	<b>Parameters and Critical Limits</b>	<b>Monitoring Locations - Monitoring Frequency</b>	<b>Responsible Party - Monitoring Procedures</b>	<b>Corrective action</b>
<b>Water Source / Catchment</b>	High turbidity level (Permissible limit: 5 ntu)	Caramayon - Daily Monitoring	Source Operator - 1. Water sampling using portable turbidimeter with fast tracker	Greater than 5 ntu – Shut off operation
	Power Interruption	Caramayon - Daily Monitoring	Source Operator - 1. Record date and time of Power outage	Inform production head for proper coordination with electric cooperative to restore power  Use the standby Generator Set
	Preventive Maintenance of pumping station Equipment and other electrical appurtenances	Caramayon - Daily Monitoring	Source Operator - Recording of operating hour	Ensure enough fuel  Ensure GenSet in good running condition  Ensure availability of spare pumps and motors
	High salinity level (Permissible limit: 500ppm)	Piczonville - Daily Monitoring	Laboratory Technician - 1. Water sampling using HACH Tester 2. include in daily laboratory report	Above permissible limit: reduce pumping hours
	Physical Chemical Tests (13 +1 parameters)	All water sources - Twice in a year	Laboratory Technician - 1. Water Sampling 2. Send samples to DOH accredited laboratory centers 3. forward results to LWUA	Per recommendation from LWUA
<b>Water Treatment</b>	High turbidity level (Permissible limit: 5 ntu)	Kulador - Daily Monitoring	Source Operator - 1. Water sampling using portable turbidimeter with fast tracker	Dosing of PAC and Polymer depending on the level of turbidity  Conduct pre and post chlorination procedure  Replacement and cleaning of filter bags using pressure washer
	Clogging of chlorinator nozzle	Kulador - Daily Monitoring	Source Operator - 1. conduct regular check-up and cleaning	Pull out chlorinator for cleaning and use stand by chlorinator for continuous water disinfection
<b>Water Distribution</b>	Chlorine Residual (Permissible limit: 0.3 to 1.5 PPM)	17 Sampling points - Daily Monitoring	Laboratory Technician - 1. Water sampling using HACH Tester 2. include in daily laboratory report	Below permissible limit: Inform pump operator to increase chlorine dosage  Above permissible limit: Inform pump operator to decrease chlorine dosage

	<b>Parameters and Critical Limits</b>	<b>Monitoring Locations</b> - <b>Monitoring Frequency</b>	<b>Responsible Party</b> - <b>Monitoring Procedures</b>	<b>Corrective action</b>
	Microbiological Test	12 sampling points - Daily Monitoring	Laboratory Technician - 1. Water Sampling 2. Send samples to DOH accredited laboratory centers 3. forward results to LWUA	For positive result: 1. Conduct investigation 2. Conduct resampling
<b>Consumer</b>	1. abang 2. inside plumbing 3. alternative source, tanks,	<b>NWSC</b> - <b>Application of NWSC</b>	Plumber - 1. Conduct resurvey before installation of New SC	Advise applicant to proper pipe laying after the meter

## 7. Verification Procedures

### 7.1 Compliance monitoring plan consistent with water quality targets

<b>Activity</b>	<b>Description</b>	<b>Frequency of Monitoring</b>	<b>Responsible Party</b>	<b>Records</b>
Physical Chemical Test	Check water (13) parameters if still within permissible limits (PNSDW 2007)	Twice a year in all water sources	DOH accredited testing centers	Test Results submitted to LWUA
Bacteriological Test using PHC bottle	<i>E. coli</i> is monitored in product water samples	Twice a week in 8 sampling points	In house testing	Test Results submitted to CHO
Bacteriological Test - Laboratory	<i>E. coli</i> is monitored in product water samples	Once a month one sample for every one thousand connections	DOH accredited testing centers	Test Results submitted to LWUA
Water quality monitoring	Check water (6) parameters if still within permissible limits (PNSDW 2007)	Daily in 17 sampling points	In house testing	For Management monitoring
Physical Chemical Test for new possible sources	Check viability of water parameters (PNSDW 2007)	As needed	DOH accredited testing centers	Basis for decision making

### 7.2 Verification Monitoring Program

<b>Verification Activity</b>	<b>Location of Activity</b>	<b>Type of Activity</b>	<b>Frequency of activity</b>	<b>Analyst</b>	<b>Recipient of Analysis Result*</b>	<b>Action on unusual/ failing result</b>	<b>3rd-Party Recipient of Results</b>
<b>Water Quality</b>							
Physical Chemical Test	All water sources	Sampling	Twice a year	DOH accredited lab	Engineering Division Chief	Protocol for water Parameter permissible limits	Production Manager, LWUA
Bacteriological Test using PHC bottle	Consumer's taps randomly selected per designed sampling plan	Sampling	Twice a week	Water Quality Technician	Engineering Division Chief	Protocol for positive results	CHO

Verification Activity	Location of Activity	Type of Activity	Frequency of activity	Analyst	Recipient of Analysis Result*	Action on unusual/failing result	3rd-Party Recipient of Results
Bacteriological Test - Laboratory	Consumer's taps randomly selected per designed sampling plan	Sampling	Monthly	DOH accredited lab	Engineering Division Chief	Protocol for positive results	Production Manager, LWUA
Water quality monitoring	Consumer's taps randomly selected per designed sampling plan	Sampling	Daily	Water Quality Technician	Engineering Division Chief	Protocol for positive results	General Manager
Physical Chemical Test for new possible sources	Drilling site	Sampling	As needed	DOH accredited lab	Engineering Division Chief	Protocol for water Parameter permissible limits	General Manager

### 7.3 External Audit Plans

Activity	Description	Frequency	Responsible party
Physical – Chemical test by external		Twice a year	City Health Office/LWUA



## 8. Management Procedures

Standard Operating Procedures	Description	Document Reference Operations Manual (OM)
Water Source Operation	<p>Caramayon Spring Source (Pumping Station)</p> <ol style="list-style-type: none"> <li>1. Operating Procedure</li> <li>2. Electrical Failure</li> <li>3. Equipment Preventive Maintenance</li> <li>4. Production Monitoring</li> <li>5. Water Supply</li> </ol> <p>Masacpasac Spring</p> <ol style="list-style-type: none"> <li>1. Operating a valve (shutting down/recharging a main)</li> <li>2. Maintenance of impounding structure</li> <li>3. Maintenance of Intake box</li> <li>4. Water Sampling Procedure</li> </ol> <p>Kulador Surface Water</p> <ol style="list-style-type: none"> <li>1. Operating a valve (shutting down/recharging a main)</li> <li>2. Maintenance of impounding structure</li> <li>3. Production monitoring and recording</li> <li>4. Maintenance of Intake box</li> <li>5. Maintenance of facility</li> <li>6. Water Sampling Procedure</li> </ol> <p>Piczonville</p> <ol style="list-style-type: none"> <li>1. Pumping Operation</li> <li>2. Valving</li> <li>3. Monitoring and reporting of static water level and drawdown</li> <li>4. Maintenance of facility</li> <li>5. Water Sampling Procedure</li> </ol> <p>Tumalistic</p> <ol style="list-style-type: none"> <li>6. Pumping Operation</li> <li>7. Valving</li> <li>8. Monitoring and reporting of static water level and drawdown</li> <li>9. Maintenance of facility</li> <li>10. Water Sampling Procedure</li> </ol>	Operations Manual (OM) Annex C
Production House	<ol style="list-style-type: none"> <li>1. Data logging and reporting</li> <li>2. Maintenance of facility</li> </ol>	

Standard Operating Procedures	Description	Document Reference
Treatment Operation	Kulador Treatment Facility <ol style="list-style-type: none"> <li>1. Clarifier System operation</li> <li>2. Pre and post Chlorination</li> </ol> Piczonville <ol style="list-style-type: none"> <li>1. Post Chlorination</li> </ol> Tumalistas <ol style="list-style-type: none"> <li>2. Pre and Post Chlorination</li> </ol>	
Transmission Main Line	<ol style="list-style-type: none"> <li>1. Operating a valve (shutting down/recharging a main)</li> <li>2. Water main repair procedure</li> <li>3. Repair Burst/Leaking Water Mains</li> <li>4. Notification of Burst Water Main</li> </ol>	
Booster pump operation	<b>V&amp;G</b> <ol style="list-style-type: none"> <li>1. Pump Operation</li> <li>2. Maintenance of facility and equipment</li> </ol> Canlapwas <ol style="list-style-type: none"> <li>3. Monitoring and Data logging</li> <li>4. Maintenance of electro mechanical equipment</li> </ol> Mabini <ol style="list-style-type: none"> <li>5. Monitoring and Data logging</li> <li>6. Maintenance of electro mechanical equipment</li> <li>7. Dewatering of pump housing structure</li> </ol> Cogao <ol style="list-style-type: none"> <li>8. Monitoring and Data logging</li> <li>9. Maintenance of electro mechanical equipment</li> </ol>	
Distribution Line	<ol style="list-style-type: none"> <li>1. Repair Burst/Leaking</li> <li>2. Repair of a Damaged / Burst Hydrant</li> <li>3. Notification of Burst distribution line repair</li> <li>4. Tapping of Service connection</li> </ol>	
Extension Line	<ol style="list-style-type: none"> <li>1. Relocation of extension line</li> <li>2. Repair Burst/Leaking</li> <li>3. Water Sampling Procedure</li> <li>4. Notification of Burst extension line repair</li> <li>5. Tapping of Service connection</li> </ol>	
Leak Detection	<ol style="list-style-type: none"> <li>6. Leak Detection and Reporting</li> <li>7. Flushing</li> <li>8. Valving</li> <li>9. Pressure Monitoring and Reporting</li> </ol>	

Standard Operating Procedures	Description	Document Reference
Service Connection	<ol style="list-style-type: none"> <li>1. New water service connection</li> <li>2. Reconnection</li> <li>3. Disconnection</li> <li>4. Meter Stand Repair</li> <li>5. Relocation of Service</li> <li>6. Abrupt increase / decrease of consumption</li> </ol>	
Water Meter Maintenance	<ol style="list-style-type: none"> <li>1. Recalibration of New Water Meters</li> <li>2. Replacement of Water Meter 5 yr old</li> <li>3. Removal of reported faulty or defective water meters</li> <li>4. Relocation of Water Meters</li> <li>5. Clustering of Water Meters</li> </ol>	

## 9. Supporting Programs

### 9.1 Plan for supporting programmes

Program	Activity	Purpose	Target Date
Hygiene, Sanitation and safety Gear	Strict Implementation of Proper uniform and wearing of safety gear	Proper Safety of field workers and hygiene purposes	On going
Research	Geographic Information System	Efficiency in the operations	On going
	Computerized Database		On going
Organizational Culture	Team Building	Enhancing team cooperation and camaraderie within employee and management	Once every 2 years
	Family Day		Yearly
Training & continuing education	Program on Employee's Skills Training	Enhancing Employee's skills	On going
	Program on Seminar-orientation of New Water Service Connection applicants	Proper Information for customers in the operations of the water district	MWF
	Skills Competition	Enhancing Employee's skills	Once every year during anniversary
	Competency requirements	Enhancing Employee's skills	On going
Equipment upgrade, calibration & Maintenance	Program on Change of 5 yr old meter	Lowering NRW	On going
	Recalibration	Lowering NRW	On going

	Night shift leak detection	Lowering NRW	On going
	Regular Flushing	Reduction of sediments	Once every month or as needed

## 10. WSP Review Procedures

Purpose of Review	Schedule	Responsible Unit
Changes in the Catchment, Treatment and Distribution	Any changes in the water system	WSP Team
Revised Procedures	Any changes made in the office procedures	WSP Team
Staff Changes	Any changes in the workforce	WSP Team, HR
Stakeholder Contact Changes	Any changes in the Contact Nos of WSP team Member	WSP Team Secretariat

## 11. Incident Response Plans

Purpose of Review	Schedule	Responsible Unit
Incident	After fortuitous event (e.g. Typhoon, Earthquake, Landslide)	WSP Team
Near Miss	After fortuitous event (e.g. Typhoon, Earthquake, Landslide)	WSP Team

# **Annex A**

## **Resolution Supporting WSP Development**



**CATBALOGAN WATER DISTRICT**  
Catbalogan, Samar

**OFFICE OF THE BOARD OF DIRECTORS**

**Board Resolution No. 70**  
**Series of 2016**

SUBJECT:

**APPROVING THE SUPPORT IN THE PREPARATION AND DEVELOPMENT  
OF THE WATER SAFETY PLAN (WSP) FOR CATBALOGAN WATER  
DISTRICT (CWD) AND ITS IMPLEMENTING ACTIVITIES**

WHEREAS, Management hereby recommends for board approval supporting the preparation and development of the Water Safety Plan (WSP) for Catbalogan Water District (CWD) and its implementing activities,

WHEREAS, said policy is authorized under Department of Health Administrative Order No. 2014-0027 dated September 04, 2014 entitled “ National Policy on Water Safety Plan (WSP) for All Drinking-Water Service Providers”,

WHEREAS, this is further authorized under Local Water Utilities Administration (LWUA) MC No. 010-14 entitled: “ Development and Implementation of Water Safety Plan.”

WHEREAS, Water Safety Plan is a management tool that can be applied in all types of water systems to ensure the safe quality of supplied water. The WSP uses a comprehensive risk assessment and risk management approach encompassing all steps in water supply from water source (catchment) to consumer. The traditional approach of monitoring water quality at the tap is found to be ineffective because notification comes too late whenever there is contamination. Consumers have already ingested the water before an action could be made,

WHEREAS, WSP can address this gap by ensuring that notification will come on time while addressing the risks by appropriate control measures,

WHEREAS, WSPs objectives are to prevent or minimize contamination of water source, remove contamination thru treatment and prevent re-contamination during storage, distribution and handling of drinking water,

WHEREAS, WSPs are increasingly recognized as a cost-effective, management-oriented, preventive approach to drinking-water safety.

WHEREAS, the Department of Health declared the development and implementation of Water Safety Plan by all drinking-water service providers as a national policy for drinking-water quality management,

NOW THEREFORE, as unanimously moved and seconded by the members of the Board present,

RESOLVED, as it is hereby resolved, approving the support in the preparation and development of the Water Safety Plan (WSP) for Catbalogan Water District (CWD) and its implementing activities .

Adopted this 18<sup>th</sup> day of July 2016.



**VICTORIANO C. NAVARRETE**  
Chairman



**JOSE A. MABULAY, JR.**  
Vice Chairman



**MYRA GAY M. TAMBOR**  
Secretary/Treasurer



**ROLANDO T. KO**  
Director

# **Annex B Improvement Plan**



## Engineering Division

189-01 : Survey, Exploration, Drilling

**Lagundi** 300,000.00 (ICGF)

203-04 : Wells

**Construction of Dugwell with 35 hp Submersible Pump & Pressure Filter 1,390,000.00 (ICGF)  
Villa Paula (2016)**

203-08 : Source Exploration & Development

**Caramayon II New Source** 2,829,926.40 (ICGF)

**Tumalistis II Well Development** 952,000.00 (ICGF)

203-09 : Transmission and Distribution Main

**1. Installation of 1,200 LM 10" Transmission Pipeline from Nasarang to 2,181,634.00 (ICGF)  
Culador**

**2. Installation of 630 LM 8" PVC Transmission Pipeline Mabini after 1,333,107.00 (ICGF)  
Mabini Pumping Station to Del Rosario St.**

**3. Installation of Transmission Pipeline to Diversion Road** 4,969,503.00 (ICGF)

**4. Installation Distribution Line to Darahuway Island Dako & Guti** 1,615,599.00 (ICGF)

**5. Procurement of Combination Air Release valve** 300,000.00 (ICGF)

**6. Procurement of Electromagnetic Flow Meter 8" - Location: Kulador** 200,000.00 (ICGF)

# **Annex C**

## **Operation's Manual**



# **O**PERATIONS **M**ANUAL

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**CATBALOGAN WATER DISTRICT**

*August 2016*

## Revision Sheet

<b>Release No.</b>	<b>Date</b>	<b>Revision Description</b>
Rev. 00	12/18/2015	Operations Manual produced
Rev. 01	08/30/2016	Operations Manual revised



## Operations Manual Authorization Memorandum

I have carefully assessed the Operations Manual for Catbalogan Water District. .

MANAGEMENT CERTIFICATION - Please check the appropriate statement.


\_\_\_\_\_ The document is accepted.

\_\_\_\_\_ The document is accepted pending the changes noted.


\_\_\_\_\_ The document is not accepted.

---

We fully accept the changes as needed improvements and authorize initiation of work to proceed. Based on our authority and judgment, the continued operation of this system is authorized.

  
\_\_\_\_\_  
**EXEQUIEL C. CABRIGAS III**  
Sr. Planning & Development officer


08/30/2016  
DATE

  
\_\_\_\_\_  
**EUSEBIA G. YBOA**  
Administrative Division Manager

08/30/2016  
DATE

  
\_\_\_\_\_  
**JULIA P. LOBRINO**  
Commercial Division Manager

08/30/2016  
DATE

  
\_\_\_\_\_  
**ENGR. MIGUEL P. MACASPAG**  
Engineering Division Manager

08/30/2016  
DATE

  
\_\_\_\_\_  
**ENGR. RALPH S. UY**  
General Manager

08/30/2016  
DATE

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# OPERATIONS MANUAL

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      - 2.3.3.1.5 Request for Personal Data Sheet (PDS), Service Records, and Leave Cards/COC
      - 2.3.3.1.6 Report Generation
      - 2.3.3.1.7 Rating of Performance Targets: Division Performance Commitment Review and Individual Performance Commitment Review
    - 2.3.3.2 Stock and Supplies Inventory
      - 2.3.3.2.1 Purchasing and stocking of supplies and equipment
      - 2.3.3.2.2 Issuance of stock and supply
      - 2.3.3.2.3 Generation of Inventory Reports
      - 2.3.3.2.4 Updating Meter History Card
    - 2.3.3.3 Control of Records and documents
  - 2.3.4 Finance
    - 2.3.4.1 Financial Report Preparation
      - 2.3.4.1.1 Preparation of Billing Journal
      - 2.3.4.1.2 Preparation of Cash Receipt Journal
      - 2.3.4.1.3 Preparation of Disbursement Voucher
      - 2.3.4.1.4 Preparation of Journal Vouchers
      - 2.3.4.1.5 Preparation of Financial Statements
      - 2.3.4.1.6 Balancing of A/R in accounting and commercial
      - 2.3.4.1.7 Preparation of Monthly Data Sheet
  - 2.3.5 Performance Targets
  - 2.3.6 Business Planning
  - 2.3.7 Budget Preparation

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## **1.0 GENERAL INFORMATION**

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## **1.0 GENERAL INFORMATION**

### **1.1 Introduction on the Manual**

Welcome to the Operations manual of Catbalogan Water District. The purpose of this manual is to provide all employees and stakeholders of Catbalogan Water District with a reference manual containing policies and procedures established by the Board of Directors, General Manager, and Division Heads. In the interest of brevity, an attempt has been made to include only that information which will be used under normal operating circumstances within the district. For special situations, it is recommended that the appropriate division be contacted.

This manual defines the different role and responsibilities within the organization, the operational control and supervision, and the different operating procedures of the major activities of the district.

The Catbalogan Water District Operations Manual is available on the district's official website at: [www.catbaloganwd.gov.ph](http://www.catbaloganwd.gov.ph). Copies of the printed version are maintained at the frontdesk of CWD office located in Pier II, Allen Avenue Extension, Brgy 4, Catbalogan City.

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## 1.2 Definition of Terms and Abbreviations

CWD	-	Catbalogan Water District
BOD	-	Board of Directors
GM	-	General Manager
NWSC	-	New Water Service Connections
NRW	-	Non Revenue Water
OR	-	Official Receipts
JO	-	Job Order
RIS	-	Requisition Issuance Slip
SSIS	-	Stock and Supplies Inventory System

## 1.3 General Information about the Agency and the Selected Area of Operations

Catbalogan Water District (CWD) is the sole water provider of the city of Catbalogan. It was initially constructed in 1925 under the management of the local government. It was transferred to the National Waterworks and Sewerage Authority (NAWASA) upon its creation in 1955. In 1969, NAWASA was abolished and the Catbalogan municipal government took over the CWD management.

A Sanguniang Bayan resolution No. 66 was approved in July 5, 1978 creating the Catbalogan Water District (CWD) based on the national policy, the P.D. 198 known as Provincial Water Utilities Act of 1973 favoring local operation and control of water systems; authorizing the formation of local water districts and providing for the government and administration of such districts; chartering a national administration for facilitate improvement of local water utilities; granting said administration such powers as are necessary to optimize public service from water utility operations, and for other purposes. On December 7, 1979 the Local Water Utilities Administration awarded Conditional Certificate of Conformance No. 107 to the CWD.

The Catbalogan water supply is supplied from five waters sources, namely: a) Masacpasac sub-surface channel; b) Caramayon spring water; c) surface water at Kulador; d) deep well at Tumalistis; and e) deep well at Piczonville Subdivision. These five sources currently serve twenty two (22) barangays, mostly from the poblacion area.

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## **1. SYSTEM DESCRIPTION**

### **1.1 General information on the Supplier**

The water supply of the City of Catbalogan is handled and managed by the Catbalogan Water District (CWD), which was initially constructed in 1925 under the management of the local government. It was transferred to the National Waterworks and Sewerage Authority (NAWASA) upon its creation in 1995. In 1969, NAWASA was abolished and the Catbalogan municipal government took over the CWD management.

A Sanguniang Bayan resolution No. 66 was approved in July 5, 1978 creating the Catbalogan Water District (CWD) based on the national policy, the P.D. 198 known as Provincial Water Utilities Act of 1973 favoring local operation and control of water systems; authorizing the formation of local water districts and providing for the government and administration of such districts; chartering a national administration for facilitate improvement of local water utilities; granting said administration such powers as are necessary to optimize public service from water utility operations, and for other purposes. On December 7, 1979 the Local Water Utilities Administration awarded Conditional Certificate of Conformance No. 107 to the CWD.

Currently, Catbalogan Water District is the only water service provider in the city of Catbalogan. Catbalogan Water District is a none-profit oriented and receives no subsidy from the national and local government. The revenue raised is solely from the concessionaires' monthly payments of water bills and other installation costs. Local Water District was declared a Government Owned Controlled Corporation by Supreme Court as of 1992.

The district is currently managed by its General Manager, Engr. Ralph S. Uy. It has three divisions namely: Administrative Division headed by Eusebia Christina Yboa, Commercial Division headed by Julia P. Lobriño, and Engineering Division headed by Engr. Miguel P. Macaspag.

The policy making body is composed of five directors each representing different sectors. The Chairman is Mr. Victoriano C. Navarrete, CPA (Education Sector), Vice Chairman is Mr. Don A. Mabulay Jr. (Civic Sector), Secretary/Treasurer is Mrs. Myra Gay M. Tambor (Women Sector), Rolando T. Ko (Business Sector), representative for the Professional Sector is currently vacant.

#### **1.1.1 Area of Coverage**

Catbalogan is composed of 57 barangays with 22 barangays classified as upland or island barangays, the remaining 35 barangays are along the carline.

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The current service area of CWD is only 62% of the total number of the carline and poblacion barangays or 22 out of 35 barangays, mostly within the town proper. These barangays are Poblacion 1 to 13, San Andres, Barangay Canlapwas, Barangay San Pablo, Barangay Muñoz, Barangay Mercedes, Barangay Maulong, Barangay Guindapunan, Barangay Guinsorongan, Barangay Bunu-anan. Installation of Distribution line to the two Island barangays, Darahuway Guti and Darahuway Dako is on-going.

Possible expansions of the service coverage are the carline barangays along the highway, namely, San Vicente, Mahayag, Iguid, Pupua, Payao, upper portion of Maulong, Lagundi, and Socorro.

### 1.1.2 Household Coverage

For the last five years, there was a 31.7% increase in the number of active service connection from 6,853 of Dec 2010 to 9,028 of Dec 2015.

CWD is currently serving 57% of the total Number of households in the service area and is projected to increase by 13% by the end of year 2020.

### 1.1.3 Transmission and Distribution Pipelines

There are four transmission pipelines originating from the three water sources namely, one from Kulador, two from Masacpasac Spring and another one from Caramayon Spring. However, only two 200mm transmission pipelines that is in place from San Andres to the poblacion proper.

The existing transmission lines have a carrying capacity of about 90-120 lps. This was based on the hydraulic analysis of the two 200mm transmission pipelines and actual recorded production.

Length of the following Transmission and Distribution Lines.

300 mm	PVC	0.289 Km
250 mm	PVC	5.584 Km
200 mm	PVC, GI, CI	9.322 Km
150 mm	CI, PVC	4.470 Km
100 mm	PVC	4.713 Km
75 mm	PVC	6.205 Km
63 mm	PVC	0.170 Km
50 mm	PVC, PE	2.908 Km
38 mm	PE, PVC	1.680 Km
25 mm	PE	0.140 Km
<b>TOTAL LENGTH</b>		<b>33.961 KM</b>

### 1.1.4 Transmission and Distribution Pipelines

Customers of CWD are classified into five types, namely, residential, government commercial, commercial a, commercial b, and commercial c.

Below is the current water rate of Catbalogan Water District.

Type	Min. Charge	11-20 cu.m	21-30 cu.m	31-40 cu.m	over40 cu.m
Residential/Govt	175	19.45	21.35	24.80	28.50
Commercial	350	38.90	42.70	49.60	57.00
Commercial A	306.25	34.00	37.35	43.40	49.85
Commercial B	262.50	29.15	32.00	37.20	42.75
Commercial C	218.75	24.30	26.65	31.00	35.60

## 1.2 Source of water: Catchment and extraction from source

The District currently has three main water sources, namely Kulador, Caramayon, and Masacpasac spring. It has also two supplemental sources namely: Piczonville Pumping Station and Tumalistis Pumping Station. Incoming water source Is Caramayon 2 spring.

### 1.2.1 Kulador Treatment Facility

The plant is located 2.7 kilometers from Barangay San Andres of Catbalogan, Samar, or 110 48' 44.4" N and 240 54' 10.3" E.

The treatment plant receives water from the Antiao River through an Intake Box 3m x 3m wide and 2.5m depth. The water was conveyed through a telescopic Transmission Line of 250mm and 200mm diameter PVC pipes and goes into a 4,000cum/day clarifier system for water treatment. Later this year the clarifier is to expand its capacity to 6,000cum/day.

### 1.2.2 The Caramayon Pumping Station

The project started on February 22, 2002. Fund by 32M ADB – Loan under LWUA's Small Towns Water Supply System Project (STWSSP). Component of the project are the ff:

- Construction of impounding Dam and Sump Tank
- Pumping facilities 1-100hp, 2-500hp, 440v, 3 diameter
- Generator, 300hp
- Laying of 5.1km 10" diameter Transmission Lines, 500lm riser pipe, 200mm diameter
- Installation of 3-phase Electric Power Line, 13.2 KV primary lines

The Project site is not accessible to any mode of transportation. The spring is located in a highland Barangay of Lobo, Sitio Caramayon, it is approximately 9.1 kms. from the nearest lowland Barangay San Andres and about 11 kms. from the center of the Poblacion. Caramayon spring could be reached only by foot passing through mountains, the highest elevation of which is 197 meters above mean sea level and traversing the same river about twenty (20) times. The said spring source is below and between mountain ranges with an elevation of 84.7 meters.

Except for the pumps which were airlifted (courtesy of the 8ID, Camp Lucban & PAF) all of the materials and equipment were handled/ carried manually.

Caramayon spring source capacity is 140 lps. A Mini impounding Dam was built from where water flows to the sump Tank by gravity. Three high head submersible pumps, 1-100hp, 2-50 hp was installed to pump the water to the break pressure chamber and from there water flows by gravity to the Kulador Treatment Plant via a 10-inch pipeline through a 4.65-km distance.

A 3-phase power line 13.2 KV Primary Line with a distance of 11.9 kms was constructed as a primary prime mover of the pumping equipment. A generator was installed as standby power.

5.1 kms pipelines 10 inch and 8 inch diameter were installed. On February 22, 2005, test run was conducted on the pumping equipment and three days after it was put to operation

With the three (3) pumps capable of delivering a combined capacity of 91 lps, it can supply 9000 households.

### **1.2.3 Masacpasac Spring**

The Masacpasac spring is located at 11 48' 58.8000" N, 124 55' 10.8000" E and approximately 5 kms from Brgy San Andres.

The water source contributes an average of 64% of the total water production with two transmission lines, CI 6" and CI 10" with a total rated capacity of 55 lps.

The source is not passable by any vehicle and can only be reached by hiking.

### **1.2.4 Piczonville Pumping Station**

Its operation is from 5:00 in the morning to 1:00 o'clock in the afternoon, then from 4:00 in the afternoon to 6:00 in the evening daily.

As observed, this pumping schedule is operational during rainy season but during dry season/summertime, it is on a standby due to high salinity level recorded in the underground source.

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Source: Deep Well, Rated Capacity: 6.5 lps, 10hp submersible pump

### **1.2.5 Tumalistis Pumping Station**

This is a deep well water source providing water in the southside part of Catbalogan. This has a total rated capacity of 4.5 lps utilizing a 10hp submersible pump.

Two hours operation is intended for the Executive heights subdivision. The remaining hours supplements the supply for the poblacion.

### **1.2.6 V&G Booster Pump**

V & G, 5hp booster pump - was donated by the developer to CWD, to cater the needs of V & G subdivision.

### **1.2.7 Canlapwas in-line Booster Pump**

This station is equipped with 25hp, 220v, 3 phase, Floor mounted high pressure pump. It boosts water pressure to increase the water supply in Canlapwas, San Andres, Salug, Casantolan, Brgy. Mercedes, Brgy. Mabini.

### **1.2.8 Mabini in-line Booster Pump**

Mabini in-line Booster pump – 40 hp, 220v, 3 phase, high head, submersible pump, boosting of water pressure to increase the area coverage supplied due to existing limited size of Distribution Line, serving Canlapwas, San Andres, Salug, Casantolan, Brgy. Mercedes, Brgy. Mabini.

### **1.2.9 440 Cu.m. Concrete Reservoir**

This Reservoir was constructed by the Americans way back 1935. It was rehabilitated and re commissioned last 2005. It is located in an elevated part of Brgy. 13, with an elevation of 35m above sea level. It is used to augment the high demand during morning (peak hour) of the poblacion. The remaining 100cu.m. of water was reserved for fire fighting purposes.

### **1.2.10 Cogao Booster Pump**

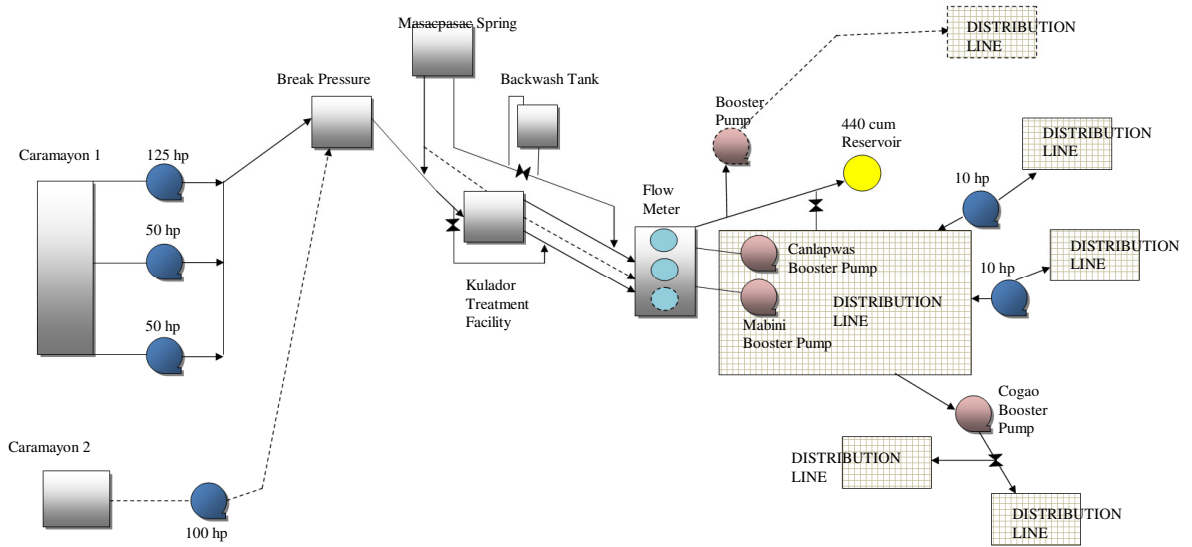
This Station was constructed last 2015 to provide water supply to two (2) island Barangays namely Darahuway Dako and Darahuway Guti. Transmission line is a 2" diameter x 1.7km underwater, it is equipped with a floor mounted high pressure, 75m TDH, 5lps, 200v, 3 diameter pump.

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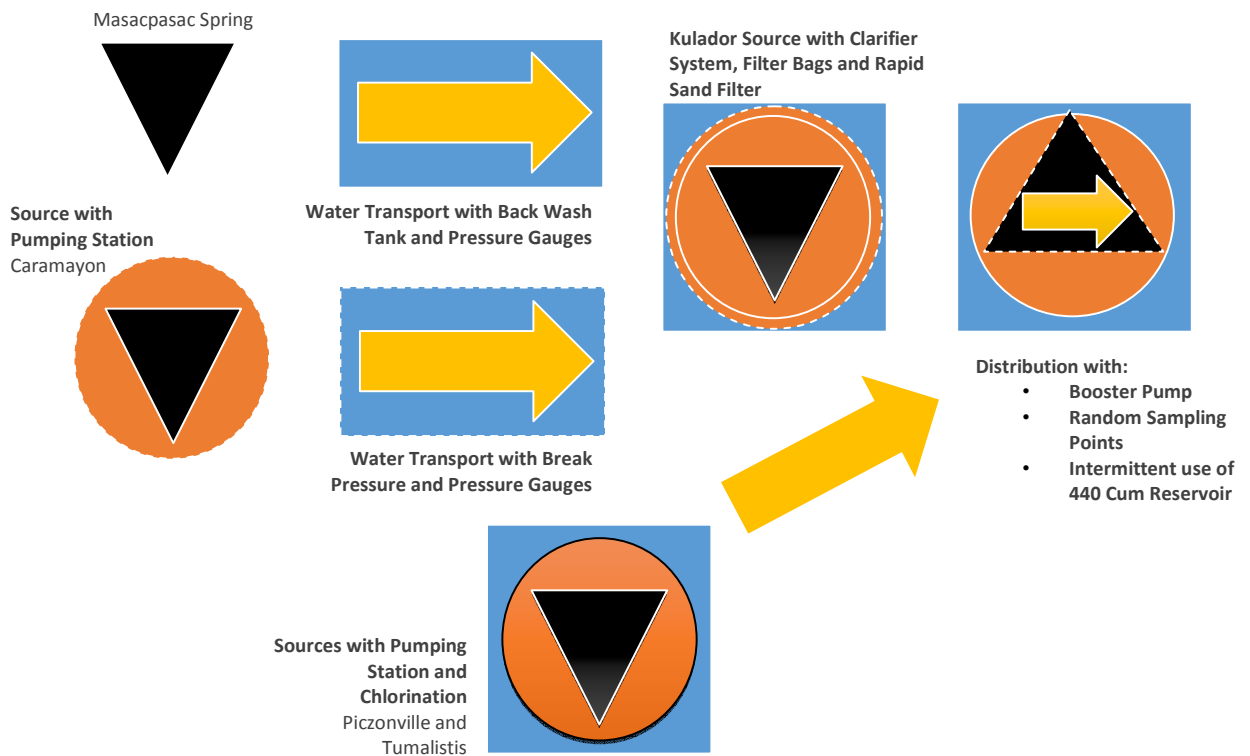
### 1.3 Flow diagram

To accurately define the hazards in the water supply system, it is best to describe first the components of the system in detail. The diagram shows the flow of water from the source, to the treatment, and to distribution. In between are operational and inspection processes to ensure the quality of water

**Figure 1.0: System Schematic Diagram**



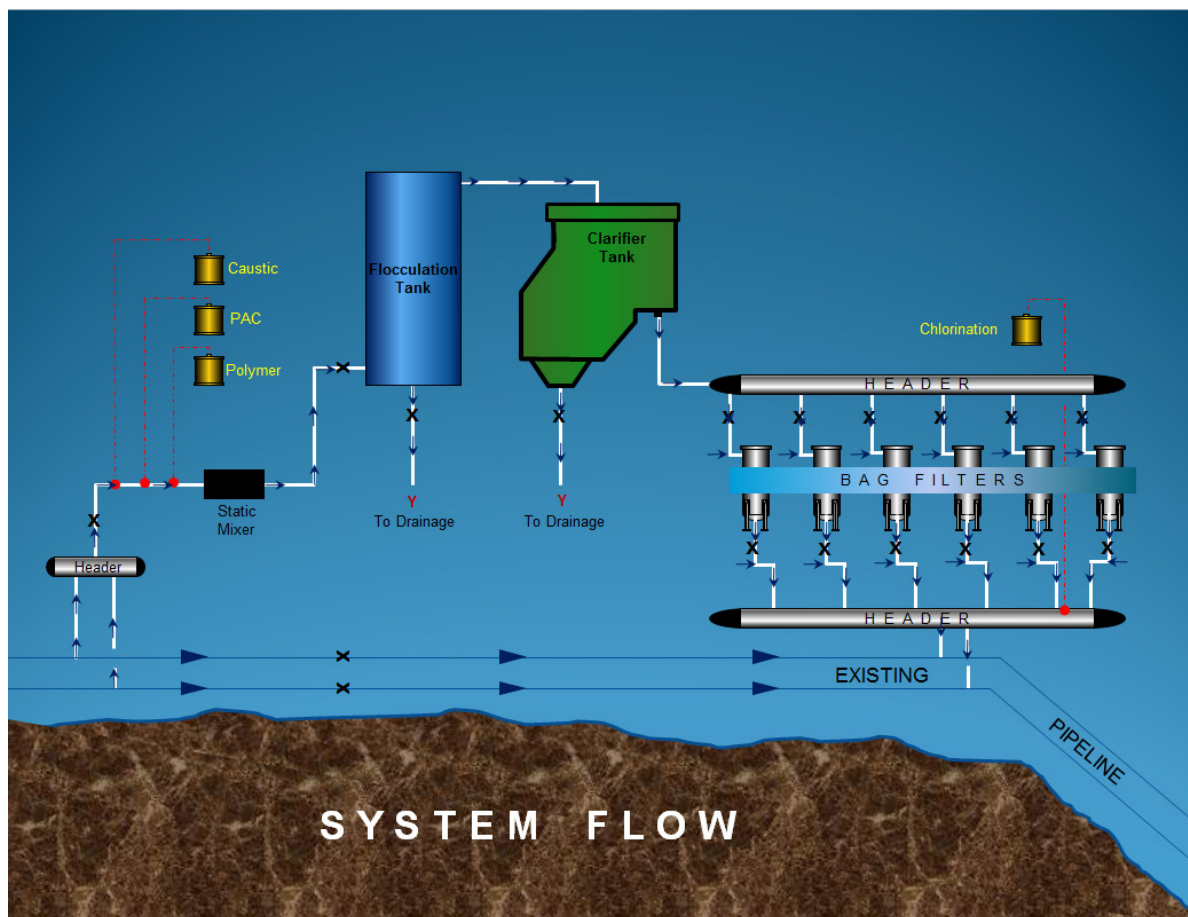
**Figure 2.0: Process Flow Diagram**





## 1.4 Treatment processes

Figure 3.0 Clarifier system flow



The treatment facility is located in Kulador, approximately 2.7 kms from the poblacion as discussed in item 3.2.1.

The facility is equipped with a clarifier system which can process 4,000 CMD of turbid water. Turbid water that enters the system is injected with PAC and Polymer to capture sediments, it will then go to a fluctuation tank and clarifier to let the sediments settle down. Finish product will pass through bag filters for final process of filtration before chlorine is injected for disinfection.

## 1.5 Distribution system

Figure 4.0 Distribution Line

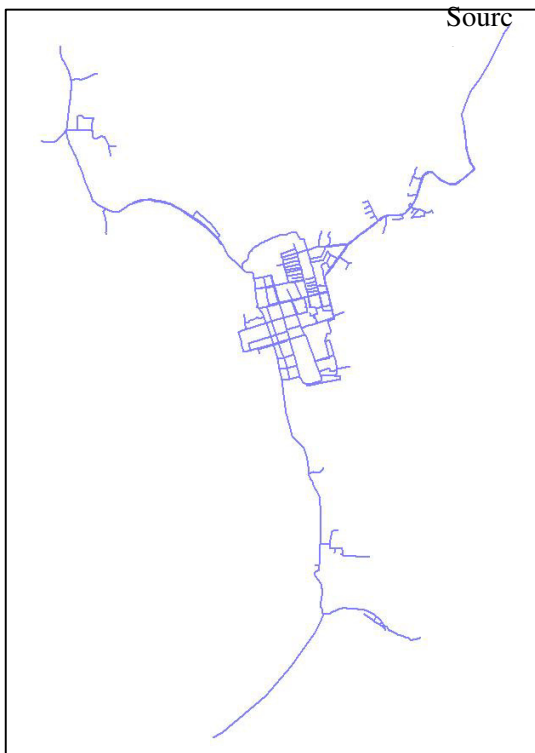
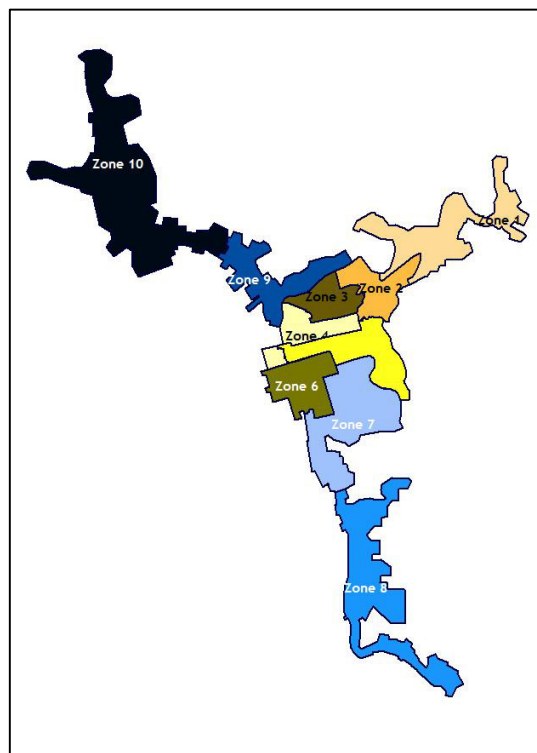


Figure 5.0 Zoning



The current distribution line is serving 22 barangays subdivided into 10 zones. Two (2) booster pumps are in placed within the poblacion to boost water pressure to far distant barangays. Another booster pump was place in Cogao to boost water pressure to the two island barangays of Darahuway Dako and Darahuway Guti which is not yet operational due to the El Niño phenomenon.

As shown in figures 3 and 4, northern tip of zone 10 and southern tip of zone 8 covers the barangays that are farthest from the source. These are also the barangays that experience low to negative water pressure every day.

The district distribution lines and facilities information are databased in the exsiting Geographic Information System of the office.

In the later part of this plan, control measures and improvement plans will be discussed to answer the different hazards that the current distribution lines is having.

## 1.6 Water quality required

The district follows the standards set by the Administrative Order No 2007- Philippine National Standards for Drinking Water of 2007.

To ensure safe drinking water, the laboratory technician conducts the following:

### **1.6.1 Bacteriological Test**

#### **a. PHC Bottle**

Tests are conducted every Monday and Wednesday using PHC bottle. Daily results are saved in a database where reports are generated and submitted to the City Health Office.

#### **b. Microbiological Test**

The test is conducted by a DOH accredited testing center in the region. In our Region we have two testing center, EVRMC and LMWD. Water sample is brought to the testing center every 3<sup>rd</sup> week of the month.

Test Results are submitted to LWUA every month.

### **1.6.2 Laboratory Test**

Water sampling is conducted daily in random household points within the service area. The office is equipped with laboratory equipment to measure the following standards:

c. Chlorine Residual	-	1.0 ppm
d. Salinity	-	500 ppm s
e. Conductivity	-	No Limit
f. Ph	-	6.5 - 8.5 mg/l
g. Total Dissolved Solid	-	500 mg/l
h. Turbidity	-	5.0 NTU

Laboratory test results are encoded to a database where reports are generated for submission to the City Health office.

### **1.6.3 Physico-Chemical Test**

This test is conducted once a year by a DOH accredited testing center. The test measures, Aesthetic, Physical, and Chemical components of the water supplied. The table below shows the parameters being measured by the test.

## **1.7 Delivery Point, Intended users of water and intended uses of the water**

Catbalogan Water District is currently serving 9,500 customers within the City of Catbalogan. The farthest delivery point to the North is barangay Maulong, this is about 3 kms from the Poblacion. Farthest southern delivery point is barangay Bunuanan, this is about 2 kms away from the Poblacion.

Intended users of water are the population of the City of Catbalogan. Currently 22 barangays were only served, but is planned to expand to other carline barangays. The users are classified into Residential, Government, Commercial, Commercial A, Commercial B, and Commercial C.

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PARAMETER	METHOD OF ANALYSIS	PERMISSIBLE LIMITS
<b>AESTHETIC</b>		
Color	Colometric	≤ 5 TCU
Turbidity	Nephelometric	≤ 5 NTU
<b>PHYSICAL</b>		
pH	Direct Measurement	≤ 6.5 – 8.5
Conductivity	Direct Measurement	
Resistivity	Direct Measurement	
Salinity	Direct Measurement	
Total Dissolved Solids	Direct Measurement	≤ 500 mg/L
Water Temperature	Direct Measurement	24.9 ° C
<b>CHEMICAL</b>		
Inorganic		
Alkalinity	Titration	≤ 150 mg/L @ pH=4.8
Ammonia	Distillation	Not greater than 250 mg/L
Boron	Carmine	≤ 0.30 mg/L
Chloride	Argentometric	≤ 250 mg/L
Iron	Phenanthroline	≤ 1 mg/L
Manganese	Persulfate	≤ 0.50 mg/L
Nitrate	Distillation	≤ 50 mg/L
Nitrite	Spectrophotometric	≤ 3 mg/L

## **2.0 SYSTEM OPERATIONS OVERVIEW**

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## 2.0 SYSTEM OPERATIONS OVERVIEW

### 2.1 Organization and Responsibilities

The water district is currently operating under the supervision of Local Water Utilities Authority (LWUA). It has a policy making body representing different sectors of the community. The organizational chart of the district is attached as Appendices 1.0

#### 2.1.1 Board of Directors

The Board of Directors of a district is composed of five citizens of the Philippines who are of voting age and residents within the district. One member is a representative of civic-oriented service clubs, one member a representative of professional associations, one member a representative of business, commercial, or financial organizations, one member a representative of educational institutions, one member a representative of women's organizations. The district does not have any representative from the administration as sixth member.

Education Institutions	- Dir. Victoriano Navarette Chairman
Civic-oriented service clubs	- Dir. Jose Mabulay Vice-Chairman
Professional Associations	- Vacant
Business Sector	- Dir. Rolando Ko
Women Organizations	- Dir. Myra Gay Mabangue-Tambor

#### 2.1.2 General Manager

The duties of the General Manager and other officers shall be determined and specified from time to time by the Board. The current General Manager of the district is Engr. Ralph S. Uy. He has full supervision and control of the maintenance and operation of water district facilities, with power and authority to appoint all personnel of the district. Provided, that the appointment of personnel in the supervisory level shall be subject to approval by the Board.

#### 2.1.3 Division Manager

There are three divisions supporting the office of the General Manager, namely: Administrative Division, Commercial Division, and Engineering Division.

The Administrative Division is managed by Ms. Eusebia Christina Yboa. She directs and supervises basic efforts of the division like general services, human resource management office, property section, information management, and planning and development.

The Commercial Division is managed by Mrs. Julia P. Lobriño supervises the utility activities specifically on application for new water service connections,

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meter readings, billings and collections, marketing, investigations, disconnection, reconnections, maintaining customers records, and other related activities.

The Engineering Division being managed by Engr. Miguel Macaspag directs and supervises the engineering, production and construction activities of the district. He coordinates efforts with other divisions and evaluates performance of the supervisors and employees under his division.

The Senior Project/Development Planning officer position is currently vacant but currently handles as OIC by Mr. Exequiel C. Cabrigas III. He carries out and coordinates all divisions in the preparation of long-term Business planning/development management activities, including delivery of Water District plan and policies. Undertake site inspections and consultations as necessary in accordance with agreed targets, timescales and priorities. He also conducts consultations with local authorities, statutory consultees, community groups and members of the public.

## **2.2 Operational Control and Supervision**

### **2.2.1 Administrative Division**

The Administrative division has five (5) sections namely: Human Resource Management Section, Property Management Section, General Services Section, Information Management Section, and Planning and Development Section.

The human resource management section generally falls into nine broad activities, namely: Organization Tasks, Resources for the organization, Performance management, Employee development, Reward Management, and Employee relations.

Property management section is the overall in charge in the acquisition of new properties and equipment, its utilization and the disposition of unserviceable or no longer needed equipment of the district.

The Information Management section develops implements and maintains Information Systems, Databases and Applications that support the processes of the district. The section also provides access to ICT resources; supports and maintains district's ICT facilities.

The current Planning Section has primary responsibility for the implementation of the Comprehensive Plan through the development review process. The Section coordinates the activities of the Engineering and Commercial Division, which provides recommendations on planning matters.

The General Services Management section is under the supervision of the division head maintains inventory of linen clothing and supplies; accepts delivery of and transports supplies; provides various services to the different division of the district.

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### **2.2.2 Commercial Division**

The division currently has two sections, the billing and collection section and the finance section.

The billing and collection section focuses on three major activities, meter reading and billing, Collection, preparation of job/maintenance orders, Disconnection of service connection, maintenance of customer records, investigation, and answering customer's complaints and queries.

The district currently has four (4) meter readers who conducts meter reading for the first ten days of the month. There are two (2) customers assistants. They handle the preparation of job/maintenance orders and answering customer complaints and queries. Three (3) customer's assistants are assigned in the maintenance of customer records and preparation of Billing. Two investigators are assigned to conduct surveys on the classification of new applicants and validating questionable consumption and connections. The division has one supervisor that directly supervises the billing and collection activities.

The Finance Section is an essential component to business operations. It cover a wide range from basic bookkeeping to providing information to assisting managers and board of directors in making strategic decisions.

Finance Section is responsible for all the day to day transaction for the business. This includes the following:

1. **Accounts Payable (Disbursement)** – It is responsible for management of the cash flow and ensuring there are enough funds available to meet the day to day payments. It also ensures that suppliers are paid on time.
  2. **Cash collections:** All cash received and receivables from sales and from all other sources is identified and recorded.
  3. **Payroll** – the accounting department ensures that the company pays its employees accurately and timely, including bonuses, commissions and benefits. In addition, proper tax and other employees remittances to pertinent government agencies is assessed and payments are on time.
  4. **Properties and Inventories** - The accounting department keeps records of all purchases and issuances and making sure the inventories balances are accurate.
  5. **Reporting and Financial Statements** – Aside from compliance with the government agencies such as COA and BIR, Financial Statements are prepared to help interested parties, both internal and external, to make business decisions.
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### **2.2.3 Engineering Division**

This division has two sections engineering and construction section and the production section.

The engineering and construction focuses on five different activities namely, maintenance of pipe networks, monitoring and construction of district facilities, conducting survey and preparation of work and estimates for all construction projects, non-revenue management, installation and maintenance of service connections, and accomplishing job orders prepared by the commercial division.

The production section has three functions namely, monitoring and ensuring the water production from the different water sources, ensuring the potability and safety of the water produced by conducting scheduled water bacteriological/laboratory tests, and conducting source explorations to ensure the sustainability of the water supply.

The division also assists in the different watershed management activities like tree planting activities and watershed monitoring.

## **2.3 Operating Procedures**

### **2.3.1 Production**

#### **2.3.1.1 Water Source and Treatment Process**

##### **2.3.1.1.1 Caramayon Spring Source (Pumping Station)**

###### **2.3.1.1.1.1 Operating Procedure**

- a. Inspect the Sump Tank if full of water.
- b. Record the Flow meter Reading Water and KWHR Reading of SAMELCO Meter.
- c. Inspect the Line Voltage if Complete (3 Lines 440V)
- d. Close the Discharge Valve and Open the Backwash Pipe in order to Feed the Line Gradually and Discharge the Air.
- e. Switch On Main Breaker.
- f. Start the Soft Starter.
- g. As the Pump Start, Gradually close the backwash pipe valve at the same time open the discharge valve so the water flow to the system, until that Backwash Pipe Valve close and full open the discharge valve.

###### **2.3.1.1.1.2 Electrical Failure**

During Operation some electrical failure occurs:

- a. Line Low Voltage – cause by line fault of Electrical Cooperative, Operator call the attention of electric cooperative.
- b. Soft Starter Failure – call the technician for immediate repair.

###### **2.3.1.1.1.3 Equipment Preventive Maintenance**

- a. Clearing Weekly the soft starter and facility other electrical appurtenances.
  - b. Clearing the Sump tank weekly
-

- c. Clearing of surrounding and check up valves weekly.

#### **2.3.1.1.1.4 Production Monitoring**

- a. After 24 hour operation, Operator record the Flow meter reading and KWHR reading. They subtract the reading to get the production KWHR for one day operation.

#### **2.3.1.1.1.5 Water Supply**

- a. Record the turbidity reading if it conforms with the PNSDW which is 5 ntu. When it is turbid or above 5 ntu pump operation will be stopped.

### **2.3.1.2 Bacteriological and Laboratory Testing**

To ensure and properly monitor the safety of the water supply, bacteriological and laboratory test are conducted regularly.

The bacteriological test covers sample source address, date and time of collection, result of analysis, and remarks. The test is conducted and analyzed by Leyte Metropolitan Water District having a qualified laboratory.

The laboratory test is done twice a week with seventeen sample points. These covers the location where sample is taken, time taken, chlorine residual, salinity, conductivity, total dissolve solids, turbidity, and name of registered customer where sample is taken.

#### **2.3.1.2.1 BACTERIOLOGICAL TEST (Monthly – LWUA compliance)**

##### **2.3.1.2.1.1 Water Sampling/Testing & Reporting**

- a. Sampling from a tap or household faucet at random (ensure that areas covered shall be well represented)
  - b. Clean the tap or faucet (wipe the outlet with a clean cloth to remove dirt)
  - c. Turn on the tap at maximum flow rate and let the water flow for 1-2 minutes
  - d. Sterilize the tap for 1-minute with the flame from an ignited cotton-wool swab soaked in alcohol (denatured and/or 70% Isopropyl)
  - e. Carefully turn on the tap and allow 1-2 minutes at a medium flow rate prior to sampling
  - f. Open a sterilized bottle and immediately hold the bottle under the water jet and fill the bottle at least 100ml of water sample. A small air space should be left to facilitate shaking at the time of inoculation prior to analysis
  - g. Capped the bottle and shall be labeled properly
    - g.1) Date & Time of sampling
    - g.2) Source/Point of sampling
-

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- h. Deliver water samples to nearest DOH accredited laboratory center (EVRMC or LMWD)
  - i. Using of ice cooler during transport to the laboratory center is recommended
  - j. Water Sample Collector shall also take into consideration the following important reminders:
    - j.1) That water analysis shall be done 6-hours from the time of collection
    - j.2) That the time of lapsing between collection and processing should in no case exceed 24-hours
  - k. Upon availability of the laboratory result/s, prepare the Summary Report on Microbiological Test (Pre-Format), filling-up all the necessary data and information and send to LWUA-Management Advisor for compliance/reference (attached the laboratory results)

**2.3.1.2.2 BACTERIOLOGICAL TEST** (Monday & Wednesday – For Water Quality Monitoring/Detection of Coliform Organisms)

**2.3.1.2.2.1 Water Sampling/Testing & Reporting**

- a. Sampling from a tap or household faucet at random (ensure that areas covered shall be well represented)
  - b. Clean the tap or faucet (wipe the outlet with a clean cloth to remove dirt)
  - c. Turn on the tap at maximum flow rate and let the water flow for 1-2 minutes
  - d. Sterilize the tap for 1-minute with the flame from an ignited cotton-wool swab soaked in alcohol (denatured and/or 70% Isopropyl)
  - e. Carefully turn on the tap and allow 1-2 minutes at a medium flow rate prior to sampling
  - f. Fill the prepared PHC Bottle leaving small air space
  - g. Capped the bottle and shall be labeled properly
    - g.1) Date & Time of sampling
    - g.2) Source/Point of sampling
  - h. Place the water samples (PH Bottle) at room temperature for about 24-hours
    - h.1) Water samples turn blackish – indicates the presence of coliform organisms. Investigate possible reason/s or possible source/s of contamination to make the necessary precautionary reparation, and shall water sampling & testing shall be done from the identical spot from which the first sample was taken for comparison and confirmation of result
    - h.2) No changes in appearance/color indicate absence of any coliform organisms
-

- i. Encode results and prepare the Summary Report on Bacteriological Test Result (Format), filling-up all the necessary data and information and send to the City Health Office (City Sanitation Inspector) for conformity and reference.

#### **2.3.1.2.2 Preparation of PHC Bottle (50 bottles every 2-months)**

##### **A. Cleaning of PHC Bottles**

- a.) Dilute 1-2 drops of Muriatic Acid, and soak PHC Bottles
- b.) Wash every single PHC bottle thoroughly with running water at maximum flow rate, then let it dry

##### **B. Preparation of PHC Media**

- a.) Prepare the medium; combine the following
  - 1.5 grams - Dipotassium Hydrogen Phosphate
  - 0.75 gram – Ferric Ammonium Citrate
  - 1.5 grams – Sodium Thiosulfate
  - 20.0 grams Peptone
  - 1.0 gram Teepol
  - 50.0 grams Distilled Water

- C. Fold several times half of a sheet of tissue (toilet paper) paper and placed at the bottom of the PHC Bottle

- D. Dropped 1-ml of Medium (PHC Media) into the tissue paper

- F. Sterilized the bottles using Pressure Cooker for about 10-minutes at medium heat, and then allowed to stand at room temperature with UV Lamp (Black/Violent Light) for 24-48 hours, and the PHC Bottles is ready for utilization or usage

#### **2.3.1.2.3 LABORATORY TEST (Monday to Friday) (17-sampling points)**

##### **2.3.1.2.3.1 Water Sampling/Testing: Parameters/Permissible Limit)**

##### **a.) Chlorine Residual (Free) (1.0 ppm) (ProHayward Tester)**

- a.1) Sampling from a tap or household faucet at random (ensure that areas covered shall be well represented)
  - a.2) Clean thoroughly the tap or faucet (wipe the outlet with a clean cloth to remove dirt)
  - a.3) Turn on the tap at maximum flow rate and let the water flow for 1-2 minutes
  - a.4) Remove the cap from the tube CL and rinse
  - a.5) Fill CL tube with water sample until the level with line just under CL marking on tube
-

- a.6) Remove cap from OTO solution, and place nozzle of OTO bottle vertically over opening in CL tube and squeeze 5-drops of solution into CL tube
- a.7) Place cap on CL tube and invert the tube several times to mix OTO with water sample, and within 10-seconds, compare the tube color with the adjacent color markings to determine the numerical reading, and record the result for the preparation of report for management file and reference

**b.) Salinity (500 ppm S); Conductivity (no limit); Total Dissolved Solid (500 mg/L) (Ultra Pen PT1)**

- b.1) Sampling from a tap or household faucet at random (ensure that areas covered shall be well represented)
- b.2) Clean thoroughly the tap or faucet (wipe the outlet with a clean cloth to remove dirt)
- b.3) Turn on the tap at maximum flow rate and let the water flow for 1- minute, then fill bottle (350-ml) with water sample
- b.4) Using the PT1 Tester, press and release push button to turn the PEN ON
- b.5) While the LED flashes rapidly; dip the pen in water sample so that the cell is completely submerged
- b.6) While the LED flashes slowly, swirl PEN around to remove bubbles, keeping cell submerged.
- b.7) When LED turns on solid, remove PEN from water sample, display will alternate between measurement (Salinity, Conductivity, TDS & Temperature) readings
- b.8) Rinse the cell and electrodes with clean water after each use, and before the next water sample measurements & readings
- b.9) record the result for the preparation of report for management file and reference

**c.) Turbidity (5.0 NTU) (Hach DR/820 Colorimeter)**

- c.1) With the remaining water sample/s above (350-ml water sample taken), press the button to turn the Tester (Colorimeter) ON
  - c.2) Set the Tester at Program 95
  - c.3) For calibration purposes, fill cell with 10-ml Distilled or Deionized Water
  - c.4) Wipe the surface of the cell with a soft cloth, and place in cell holder
  - c.5) Cover and press ZERO, then take out from the cell folder
  - c.6) Fill a separate cell with 10-ml water sample for analysis
  - c.7) Mix the sample well before transferring to the sample cell. Wipe the surface of the cell with a soft cloth
-

- 
- c.8) Place in cell holder, cover and READ
  - c.9) Rinse the cell with clean water after each use, and before the next water sample measurements & readings
  - c.10) record the result for the preparation of report for management file and reference

**d.) pH (6.5-8.5 mg/L) (Hach Pocket Pro Tester)**

- d.1) With the remaining water sample/s above (350-ml water sample taken), press the button to turn the Tester (Pocket Pro) ON
- d.2) Fill the sensor cap with water sample up the indicated line
- d.3) Place in the sensor cap to the pocket pro ensuring that it is well submerged, then read and record the result for the preparation of report for management file and reference

**2.3.1.2.4 PHYSICAL-CHEMICAL TEST (Twice a Year – LWUA compliance)**

- a. Physical Quality Parameters – Color & Turbidity
- b. Chemical Quality Parameter – pH, Chloride, Nitrate, Sulfate, Total Dissolved Solid, Benzene, Iron, Manganese, Arsenic, Cadmium & Lead)
- c. Other Physical & Chemical parameters based on specific source conditions

**2.3.1.2.4.1 Caramayon Spring Source (Pumping Station)**

**Water Sampling/Testing & Reporting:**

- a. Before water sample is collected from the tap (faucet), sufficiently flush to ensure that the sample is representative of the supply.
- b. Clean the tap or faucet (wipe the outlet with a clean cloth to remove dirt
- c. Open the bottle (1.5 liters) , then capped the bottle and labeled properly
  - c-1) Date & Time of sampling
  - c-2) Source/Point of sampling
- d. Deliver water samples to any DOH accredited laboratory center (government & private) for analysis
- e. Upon availability of the test result/s, send Physico-Chemical Test Results for Water to LWUA-Management Advisor for compliance/reference

**Water Quality Monitoring (Turbidity) (Portable Turbidimeter with Fast Tracker HI 98703):**

- a. Turn the instrument on by pressing ON/OFF. When dashes are displayed on the LCD, the instrument is ready.
  - b. Fill a clean, dry cuvette with 10-ml of sample up to the mark, taking care to handle the cuvette by the top
-

- c. Replace the cap
- d. Wipe the cuvette thoroughly with a lint-free cloth to remove any fingerprints, dirt or water spots
- e. Apply silicone oil on the cuvette and wipe with a lint-free cloth to obtain an even film over the entire surface of the cuvette. Silicone oil hides the glass imperfections that can influence the reading
- f. Place the cuvette into the instrument. Align the mark from the cuvette with the sign on the instrument case and close the lid
- g. Press READ to start the measurement. The display will show blinking dashes and the icons for cuvette, detectors and lamp will appear during measurement
- h. At the end of the measurement, the instrument directly displays turbidity in NTU
- i. Record the result, including the date, time and weather & power condition for reference

#### **2.3.1.2.4.2 Masacpasac Spring**

##### **Water Sampling/Testing & Reporting:**

- a. Before water sample is collected from the tap (faucet), sufficiently flush to ensure that the sample is representative of the supply.
- b. Clean the tap or faucet (wipe the outlet with a clean cloth to remove dirt
- c. Open the bottles for collection of water sample (1.5 liters bottle), then capped the bottle and labeled properly
  - c.1) Date & Time of sampling
  - c.2) Source/Point of sampling
- f. Deliver water samples to any DOH accredited laboratory center (government & private) for analysis
- g. Upon availability of the test result/s, send Physico-Chemical Test Results for Water to LWUA-Management Advisor for compliance/reference

#### **2.3.1.2.4.3 Kulador Surface Water (Pesticides as additional Parameter)**

##### **Water Sampling/Testing & Reporting:**

- a. Before water sample is collected from the tap (faucet), sufficiently flush to ensure that the sample is representative of the supply.
  - b. Clean the tap or faucet (wipe the outlet with a clean cloth to remove dirt
  - c. Open the bottles (1 of 1.5 liters bottle for other Parameters and 2-liters Amber Bottle for Pesticides) Capped the bottle and labeled properly
    - c-1) Date & Time of sampling
-

- c-2) Source/Point of sampling
- d. Deliver water samples to any DOH accredited laboratory center (government & private) for analysis
- e. Upon availability of the test result/s, send Physico-Chemical Test Results for Water to LWUA-Management Advisor for compliance/reference

**Water Quality Monitoring (Turbidity) (Portable Turbidimeter with Fast Tracker HI 98703):**

- a. Turn the instrument on by pressing ON/OFF. When dashes are displayed on the LCD, the instrument is ready.
- b. Fill a clean, dry cuvette with 10-ml of sample up to the mark, taking care to handle the cuvette by the top
- c. Replace the cap
- d. Wipe the cuvette thoroughly with a lint-free cloth to remove any fingerprints, dirt or water spots
- e. Apply silicone oil on the cuvette and wipe with a lint-free cloth to obtain an even film over the entire surface of the cuvette. Silicone oil hides the glass imperfections that can influence the reading
- f. Place the cuvette into the instrument. Align the mark from the cuvette with the sign on the instrument case and close the lid
- g. Press READ to start the measurement. The display will show blinking dashes and the icons for cuvette, detectors and lamp will appear during measurement
- h. At the end of the measurement, the instrument directly displays turbidity in NTU
- i. Record the result, including the date, time and weather condition for reference

**2.3.1.2.4.4 Clarifier System:**

- A. Dosing of Chemicals
    - a. Mix 12.5-kgs. of PolyAluminum Chloride (PAC) to 100-liters of Water at 90 Stroke/80 Speed
    - b. Mix 100-grams of Polymer to 100-liters of Water at full stroke (100-stroke)
    - c. Mix 5.5-kgs. of Granular Chlorine (70%) to 100-liters of Water at full stroke (100 stroke) for Pre-Chlorination
    - d. Inject chemicals (PAC, Polymer & Chlorine) to the 8" Pipeline to the Flocculation Tank
  - B. Flocculation Tank
    - a. Monitor water quality using the Portable Turbidimeter with Fast Tracker HI 98703 tester
-



- b. Turn the instrument on by pressing ON/OFF. When dashes are displayed on the LCD, the instrument is ready.
  - c. Fill a clean, dry cuvette with 10-ml of sample up to the mark, taking care to handle the cuvette by the top
  - d. Replace the cap
  - e. Wipe the cuvette thoroughly with a lint-free cloth to remove any fingerprints, dirt or water spots
  - f. Apply silicone oil on the cuvette and wipe with a lint-free cloth to obtain an even film over the entire surface of the cuvette. Silicone oil hides the glass imperfections that can influence the reading
  - g. Place the cuvette into the instrument. Align the mark from the cuvette with the sign on the instrument case and close the lid
  - h. Press READ to start the measurement. The display will show blinking dashes and the icons for cuvette, detectors and lamp will appear during measurement
  - i. At the end of the measurement, the instrument directly displays turbidity in NTU
  - j. Record the result, including the date, time and weather & power condition for reference
  - k. Monitor/Check the tank for sediments (floc) accumulation to determine the need to open the drain valve
- C. Clarifier System
- a. Monitor water quality using the Portable Turbidimeter with Fast Tracker HI 98703 tester (same process/procedure stated above)
  - b. Monitor/Check the tank for sediments (floc) accumulation to determine the need to clean using pressure washer and drain.
- D. Bag Filters (12-units)
- a. Monitor water quality using the Portable Turbidimeter with Fast Tracker HI 98703 tester (same process/procedure stated above)
  - b. Check filter bags to determine the need for replacement/change to avoid clogging and backflow
  - c. Clean/Wash the clogged filter bags, and let it dry for impending usage. Ensure that sufficient filter bags are readily available for emergency cases (Heavy rains/Typhoon) at the treatment plant.
- E. Post-Chlorination
- a. Mix 5.5-kgs. of Granular Chlorine (70%) to 100-liters of Water at full stroke (100 stroke) for Post-Chlorination
  - b. Monitor/Test the Chlorine Residual (Total) using the ProHayward Tester.
  - c. Fill CL tube with water sample until the level with line just under CL marking on tube
-

- d. Remove cap from OTO solution, and place nozzle of OTO bottle vertically over opening in CL tube and squeeze 5-drops of solution into CL tube
- e. Place cap on CL tube and invert the tube several times to mix OTO with water sample, and within 10-seconds, compare the tube color with the adjacent color markings to determine the numerical reading (1-1.5ppm), adjust the Chlorinator settings (Pulse & Stroke/Speed) if the results is below 1-ppm and record the result for file and reference
- f. Using the Chlorinator Equipment, supply the disinfected (Chlorinated) water

#### **2.3.1.2.4.5 Piczonville (Pumping Station)**

##### **Water Sampling/Testing & Reporting:**

- a. Before water sample is collected from the tap (faucet), sufficiently flush to ensure that the sample is representative of the supply.
- b. Clean the tap or faucet (wipe the outlet with a clean cloth to remove dirt)
- c. Open the bottle (1.5 liters) , then capped the bottle and labeled properly
  - c-1) Date & Time of sampling
  - c-2) Source/Point of sampling
- d. Deliver water samples to any DOH accredited laboratory center (government & private) for analysis
- e. Upon availability of the test result/s, send Physico-Chemical Test Results for Water to LWUA-Management Advisor for compliance/reference

##### **Water Quality Monitoring (Chlorine Residual) (Chlorinator):**

- a. Mix & Stir thoroughly  $\frac{3}{4}$  kls. (750 grams) of Granular Chlorine (70%) to 100-liters of water in a container (200 liters) (good for 1-week operation)
  - b. Test the Chlorine Residual (Total) using the ProHayward Tester.
  - c. Fill CL tube with water sample until the level with line just under CL marking on tube
  - d. Remove cap from OTO solution, and place nozzle of OTO bottle vertically over opening in CL tube and squeeze 5-drops of solution into CL tube
  - e. Place cap on CL tube and invert the tube several times to mix OTO with water sample, and within 10-seconds, compare the tube color with the adjacent color markings to determine the numerical reading (1-1.5ppm), adjust the Chlorinator settings (Pulse & Stroke/Speed) if
-

the results is below 1-ppm and record the result for file and reference

- f. Using the Chlorinator Equipment, supply the disinfected (Chlorinated) water. Pumping Hours (6:00 a.m. to 8:00 a.m. and 6:00 p.m. to 7:00 p.m. daily)
- g. Occasionally stirring the mixture (about every 1-hour)
- h. Test the residual of chlorine before every pumping hours/operation
- i. Clean the chlorine injector & sensor at least every 3-days
- j. Check-up the Chlorinator Equipment every operation to prevent failure and clogging
- k. Record the result, including the date, time and power & weather condition for file and reference

#### **2.3.1.2.4.5 Tumulistis (Pumping Station)**

##### **Water Sampling/Testing & Reporting:**

- a. Before water sample is collected from the tap (faucet), sufficiently flush to ensure that the sample is representative of the supply.
- b. Clean the tap or faucet (wipe the outlet with a clean cloth to remove dirt)
- c. Open the bottle (1.5 liters) , then capped the bottle and labeled properly
  - c-1) Date & Time of sampling
  - c-2) Source/Point of sampling
- d. Deliver water samples to any DOH accredited laboratory center (government & private) for analysis
- e. Upon availability of the test result/s, send Physico-Chemical Test Results for Water to LWUA-Management Advisor for compliance/reference

##### **Water Quality Monitoring (Chlorine Residual) (Chlorinator):**

- a. Mix & Stir thoroughly  $\frac{3}{4}$  kls. (750 grams) of Granular Chlorine (70%) to 100-liters of water in a container (200 liters) (good for 1-day operation)
  - b. Test the Chlorine Residual (Total) using the ProHayward Tester.
  - c. Fill CL tube with water sample until the level with line just under CL marking on tube
  - d. Remove cap from OTO solution, and place nozzle of OTO bottle vertically over opening in CL tube and squeeze 5-drops of solution into CL tube
  - e. Place cap on CL tube and invert the tube several times to mix OTO with water sample, and within 10-seconds, compare the tube color with the adjacent color markings to determine the numerical reading
-

(1-1.5ppm), adjust the Chlorinator settings (Pulse & Stroke/Speed) if the results is below 1-ppm and record the result for file and reference

- f. Using the Chlorinator Equipment, supply the disinfected (Chlorinated) water. Pumping Hours/Schedule (6:00 a.m. to 1:00 p.m.; 4:00 p.m. to 8:00 p.m. and 10:00 p.m. to 3:00 a.m. daily)
- g. Occasionally stirring the mixture (about every 1-hour)
- h. Test the residual of chlorine before every pumping hours/operation
- i. Frequently clean the chlorine injector & sensor
- j. Check-up the Chlorinator Equipment every operation to prevent failure and clogging
- k. Record the result, including the date, time and other power interruption/failure (if any) for file and reference

### **2.3.1.3 NRW reduction**

#### **2.3.1.3.01 Leak Detection**

#### **2.3.1.3.02 District Metering Zone**

#### **2.3.1.3.03 Database and Geo-tagging in GIS Maps of leaks**

##### **A. MICROSOFT EXCEL**

1. Open the Microsoft Excel of Repair leakages.
2. Type the Job Order No. , Address, Plumbers, Water Loss, Date and what kinds of leakages it is in Microsoft Excel.
3. Putting the Needed Details from “Service Request Paper” to Microsoft Excel.
4. Complete the Details that needed under the Microsoft Excel so that we can continue in GIS Maps.

##### **B. GIS MAPS**

1. Click the Icon of GIS Map.
  2. Open the “Open Your Own Data Files”.
  3. Select the Latest GIS Map. Like “GISMap November2015”.
  4. Click the Icon named “Open Control Center”, so that it can easily see what you needed most and minimize it.
  5. Click the Icon named “Create Point/Text Feature” or look-like has 1 pencil and 4 stars.
  6. Click the “Digitizer Tools” or look-like a pen then Double Click the Point that you made or Right Click the Point then choose Edit.
  7. To Create New File of Leaks. Inside the Icon of “Create Point/ Text Feature” or “Modify Feature Info” answer the following:
-

- 
- i) **Name** – Just keep it Blank for a while. It has Leak Number from the Microsoft Excel
  - ii) **Feature Type** – Unknown Point Feature
  - iii) **Feature Layer** – Repair Leaks
  - iv) **Specify Style to use when rendering feature** – Point Symbol is Big Red X
  - v) **Symbol Size** – Scale Factor is 1.5
  - vi) **Name Font** – Font is Times New Roman, Font Style is Regular, Size is 12 and Select Color is Red.
  - vii) Click “Add” and put only the Attribute Name that has bold letters:
    - a. **Concessionaire** – The Person that has leaks in his/her pipeline. Ex. Danilo Cabrigas
    - b. **Address** – The Address where the leaks are. Ex. P-1 Canlapwas
    - c. **Account No.** – The Account No. of the person. Ex. 014-12-082
    - d. **Leak\_ID** – If it has Leak ID.
    - e. **PipeID** – If it has PipeID.
    - f. **Date** – The day were the Plumber accomplished the Job Order.
    - g. **Plumber** – In charge of fixing the Leaks.
    - h. **Remarks** – What kind of leaks it is, Before the Meter, Main Line, Meter Stand, Water Meter and After the Meter.
    - i. **Water Meter No.** – The water meter of the concessionaire that has leaks. Ex. 00554C
    - j. **Water Loss** – How much water that lost while they’re the leaks.
    - k. **Job Order No.** – What it’s Job Order No. from Service Request Paper.
  - viii) Check the “Automatically apply these settings to new features of same type” and Click OK if already done.
- 8. If you done typing inside the “Modify Feature Info”. Get one “Service Request Paper” that has complaint of Leaks.
  - 9. Click the “Search the Attribute/Name/Description” or look-like telescope. Inside the Telescope choose the “Attribute/Item” or “Feature Name” either it is a Name, Barangay or Account No. and Type the “Compare Value” for Example:
    - i.) Scenario 1:
      - Attribute/Item: Account No
      - Compare Value: 014\*082
    - ii.) Scenario 2:
      - Attribute/Item: Name
      - Compare Value: Cabrigas\*
    - iii.) Scenario 3:
      - Attribute/Item: Barangay
      - Compare Value: Canlapwas\*
-

Just use asterisk (\*) for the Minus Sign (-) if you using the Account No. while in Name or Barangay just put the asterisk (\*) to last letter. If you find the Name or the Account No. just double click it and it will show you the way.

10. Click again the Icon of “Create Point/ Text Feature” and start marking if you already see the Place.
11. Click the “Digitizer Tools” then Double Click the Big Red X that you made or Right Click the Big Red X choose edit.
12. Inside the Icon of “Create Point/ Text Feature” or “Modify Feature Info” you will answer the Attribute Value based on the “Service Request Paper”.  
For Example:

Name – 1351

Feature Type – Unknown Point Feature

Feature Layer – Repair Leaks

Specify Style to use when rendering feature – Point Symbol is Big Red X

Symbol Size – Scale Factor is 1.5

Name Font – Font is Times New Roman, Font Style is Regular, Size is 12  
and Select Color is Red.

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- 
13. If you already did click “OK” then get “Service Request Paper” again and follow the procedure from No. 8 to No. 13. Don’t Forget to Ctrl+Save.
  14. Other Icon Like:
    - i.) “i” – used for knowing the details of the House or just click the icon “Feature Info Tools”
    - ii.) Magnifier – used for zooms in and zooms out.
    - iii.) Hands – used for Grab and Drag or Pan.
    - iv.) Ruler – used for measure the length and area.
  15. To know all about GIS Mapper Click the “Help” and “Help F1”.

## **2.3.2 COMMERCIAL**

### **2.3.2.1 Service Connection Application**

#### **2.3.2.1.1 Application process**

- Submit duly filled up application form together with:
  - ✓ Brgy. Certification, Tax Declaration/ Land Title (Proof of Ownership)
  - ✓ Community Tax Certificate (Cedula)
  - ✓ Photo of valid ID
  - ✓ Permit of concrete cutting/ excavation as required
  - ✓ Upon receiving the accomplished application, applicant will attend orientation seminar  
(Scheduled: Mon & Wed – 4:00 PM, Friday - 9:00 AM) Provide certificate of appearance

#### **2.3.2.1.2 Investigation for proper classification**

- Prepare letter informing customer his proper classification

#### **2.3.2.1.3 Survey for proper costing and pipe size identification**

- Prepare 2 job orders for investigation and survey
- After approval of investigations and survey for estimates of materials needed and investigations for what classifications it may belong

#### **2.3.2.1.4 Recording New Customer Information in Database and GIS**

- Informing the applicant for payment of installation fee through texting
- Upon payments NWSC’s application will be forwarded to Manager Commercial Division and then to Engineering Division Manager for schedule of installation.
- After accomplishment of NWSC will be back to front liner and recording New Customer Information in Database and GIS

### **2.3.2.2 Customer Complaints and request**

#### **2.3.2.2.1 Filing complaints and requests**

- Filing complaints and Request to all registered consumers and it depends what complaints and Request
-

#### **2.3.2.2.2 Job/Maintenance order preparation and monitoring**

- Report request details/assess request and prepare job order for maintenance (if not need of survey and investigation)
- If request needs survey and investigation, prepare job order for investigation and survey and for investigation and approval and job order for survey forwarded to Engineering Division.

#### **2.3.2.2.3 Monthly generation of complaints summary report**

#### **2.3.2.3 Billing and Collection**

The current billing cycle of the district is only covering 25 working days. This includes meter reading up to the last day of penalty date. The district currently utilizes the read and bill technology which makes the activity efficient.

A database is maintained to keep all the records of customers which give ease in the billing process and answering customer complaints and inquiries. The said system is installed in all of the computers of the commercial section and is connected to a local area network.

Currently the district has two (2) tellers conducting regular collection activities. During due dates, another teller is assigned to help in the collection. This is due to the bulk of customers during due dates. Field collection is also conducted by meter readers using handheld computers to enhance the collection efficiency of the district.

#### **2.3.2.3.1 Meter Reading and Billing**

- Create Billing Schedule of Reading
- Create Pahibaro to DYMS for the Billing Schedule
- Check all CWM, Reopen, Cut-off, Re-sequence, Transfer of Tapping, Transfer of Zone (Rezoning) were encoded in the system
- Create Readers' Reading Schedule for the month (This is a rotation schedule of meter readers in four books per zone and its projected number of billed concessionaires)
- Upload Data for Reading – uploading data of accounts from billing system to reading Device
- Meter Reading – meter reader input the current WM reading to the reading device and automatic prints an Statement of Account that will be given to the concessionaires
- Download data from reading device - after reading, data from reading device will be uploaded to the system.

#### **2.3.2.3.2 Billing Report Generation**

- Zero, High & Low Consumption
  - Prooflist
  - Negative Reading
  - Unread Accounts
  - Creating Billing Adjustment Memo
  - Creating Debit/Credit Memo
  - Billing List
-



- Transaction Report
- Penalty List
- Disconnection Notice and Summary
- Ageing Summary
- Uncollected Bills Report

#### **2.3.2.3.3 Customer Payment of Bills**

- Give Customer Priority Number
- Posting of payment and printing of water bill
- Prepare Daily Tellers Report for at least 25 water bills collection
- Prepare Daily Summary Collection Report
- Prepare Deposit Slip for the amount collected for the day and turn over to the cashier for deposit

#### **2.3.2.3.4 Penalty and Disconnection Orders**

- Water bills not paid on due date plus one day allowance are subject of the 10% penalty
- Customers with unpaid accounts of 2 months are subject for Disconnection after giving 48hrs notice

#### **2.3.2.4 Job Order Preparation and Accomplishment**

The job/maintenance order is prepared by the customer assistants to answer the different requests of the customers. This is generated and monitored from the billing database of the district.

The job/maintenance order is a pre-numbered document which can be monitored every day. There are different type of maintenance order, Survey, Investigations, disconnection, Repair and maintenance, water calibration and testing.

Process and flowcharts which would describe the flow of the said activity is attached as appendices.

Appendices 3.11 Job Order Preparation

Appendices 3.12 Job Order Accomplishment and Monitoring

#### **2.3.2.5 Dealing with Delinquent Accounts**

- Prepare Collection Letter informing customer to settle accounts within 15 days
- Send Demand Letter signed by Legal Counsel through post office
- Filing of Small Claims at MTC

#### **2.3.2.6 Cashiering**

The cashier utilizes a computerized system that aids in the preparation of the different reports and monitoring of daily cash on hand and cash in bank.

##### **2.3.2.6.1 Check Preparation**

- Received Check Disbursement Voucher from the Accounting Division with corresponding amount stated and supporting document attached
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- In checking preparation, checks to be made by the cashier with the date of Check, Name of payee, Amount of Check, Amount in words, lastly the name of signatories signed by the authorized signatories of the agency
- After check prepared and signed, disbursement of check issue

#### **2.3.2.6.2 Cash Security**

- Cash and Checks collection from tellers and cashier received and deposit to the bank daily and the cash on hand for the day kept in safety vault for safekeeping and deposit it to the following day.

#### **2.3.2.6.3 Cash Position Report Preparation**

- The Cash Position Report is prepared daily by the Cashier which shows the ending balances for the day with Cash On Hand and balances from different banks
- The Cash Position Report is consist of the following:
  - a. Daily Collection Report submitted by the Tellers with corresponding Cash and bills paid by the concessionaires.
  - b. Daily Disbursement Report made by the Cashier for the issuance of checks to the payee.
  - c. Daily Cash Position Report made by the Cashier showing the Collection for the day and Disbursement for the day and ending balances.

#### **2.3.2.7 Other Services offered**

##### **2.3.2.7.1 Reconnection**

- Those disconnected customers that have already paid their arrears and reconnection fee
- After payment we prepare job order for reconnection and if it is more than 2 months from the time of orientation seminar and job order for reconnection will be forwarded to Engineering Division for reconnection

##### **2.3.2.7.2 Disconnection**

- Those customers who have delinquent accounts (we have a month policy after the reading of the second month that is the schedule for cut-off).
- Before disconnection we set a disconnection letter stated the date when their service connection will be disconnected by our cut-off team.

##### **2.3.2.7.3 Change Meter**

- Inform customer the life span of water meter is only five years from the time it was installed
- Defective water meter

##### **2.3.2.7.4 Recalibration**

- After the investigation of high and low consumption and zero consumption the investigator recommend for calibration of water meter, sometimes the consumer itself requested for calibration and they paid Php 50.00.

##### **2.3.2.7.5 Change Registration**

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- Requested by the consumer to change the registration of their WSC , the requirements are as follows:
  - ✓ Xerox copy of 1 valid ID
  - ✓ Cedula
  - ✓ Any: Deed of Sale / Death Certificate / waiver of the previous owner
  - ✓ Orientation seminar
  - ✓ Change Registration Fee Php 50.00
  - ✓ Notarial of service contract Php 50.00

#### **2.3.2.7.6 Service Request**

- If the service requests for investigation the job order will be forwarded to Commercial Division. If the service request for maintenance the job order will be forwarded to Engineering Division

#### **2.3.2.7.7 Customer Report Generation**

- Detailed Report of Complaints
- Summary Report of Complaints
- List of NWSC Report
- List of ReOpen/NWSC
- List of Reconnection
- List of Disconnected
- Daily Accomplishment Report
- List of Change Classification
- List of Change Meter
- List of Transfer Tapping
- List of Change Registration
- List of Meter Recalibrated
- List of Accounts Aailed the Promo
- List of Senior Citizen
- Master List

### **2.3.3 ADMINISTRATIVE**

#### **2.3.3.1 Human Resource**

The Human Resource Management Information System was installed to effectively implement the processes and functions in the Human Resource Section.

##### **2.3.3.1.1 TIME AND ATTENDANCE**

###### **Reporting to Office**

Step 1. - Employee before entering the office in the morning shall time in the biometrics, press F1 for IN and sign in the Employees Logbook.

Step 2. - Then at noon time employee will press F2 for BREAK time and sign in the employees Logbook before going out the office.

Step 3. - In the afternoon, before entering the office employee will time in the biometrics , press F3 for (RESUME), sign in the Employees LOGboook.

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Step 4. - In the afternoon before going out will press F4 for OUT and sign in the Employees Logbook.

**Employees when going out of the office are required to use the Pass Slips.**

Step 1. Employees will get Pass Slip form at the HR Section , fill-up up the form.

Step 2. After filling-up, employees will proceed to their respective Division Heads, submit the Pass Slip for approval may it be official or personal.

Step 3. Employees with approve Pass slips can now leave the office, gave the Pass Slips to the guard on duty for recording the time of departure and arrival in the office.

Step. 4 – At the end of the day, all Pass slips in the custody of the guard on duty shall be turn-over to the HR Section for recording purposes.

**2.3.3.1.2 LEAVE CARD UPDATING AND MONITORING**

**Leave Card updating and monitoring involves the following process:**

Step 1. – Open the Biometrics system, upload the attendance and save the excel file.

Step 2. - Post the attendance of the employees, if they are present, absent, on leave, CTO, on travel, on training/seminar or on official business, and with overtime works.

Step 3 - After posting , all employees with application for leave will be automatically be recorded and deducted in their respective leave cards.

Step 4 – Every last working day of the month, leave credit earning is posted and automatically recorded in the leave cards.

**2.3.3.1.3 FILING OF LEAVES AND COMPENSATORY TIME-OFF (CTO)**

**FILING OF LEAVE:**

Step 1 – Employee will ask from the HR Section the form on Application for Leave, then fill-up the upper portion of the form (Detail of Applciation).

Step 2 – After filling-up the form, it will be submitted to the HR Section to fill-up the portion of the form (Details of Action on Application)

Step 3 – HR Section will received the Application for Leave for processing, then print-out the Leave Card as attachment for validation of the available leave credits balances.

Step 4 – After filling-up the form, HR Section will forward the Application for Leave to the Head, Administrative Division for Certification and forward to the Division Head of the employee applying for leave for signature as recommending official whether approved or disapproved.

Step 5 - After the Division Head , signed, it will be forwarded to the Head of Office for final action of the Application for Leave, whether APPROVE OR DISAPPROVE.

**FILING OF COMPENSATORY TIME-OFF (CTO)**

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- Step 1 – Employee will ask from the HR Section the form on CTO, then fill-up the the form.
- Step 2 – After filling-up the form, it will be submitted to the HR Section to fill-up the form of COC Earned and balances at the end
- Step 3 – HR Section will received the Application for CTO for processing, then print-out the COC Card as attachment for validation of the available COC balances.
- Step 4 – After filling-up the form, HR Section will forward the Application for CTO to the Head, Administrative Division for Certification and forward to the Division Head of the employee applying for CTO for signature as recommending official whether approved or disapproved.
- Step 5 - After the Division Head , signed, it will be forwarded to the Head of Office for final action of the Application for CTO, whether APPROVE OR DISAPPROVE.

#### **2.3.3.1.4 201 FILING AND E-FILING**

All employees of Catbalogan Water District has its 201 File under the custody of the Human Resource Section. The 201 File is maintain by the HR Section. Each 201 File contain the following:

- a. Appointment (CSC Form 33)
- b. Assumption of Duty
- c. Personal Data Sheet (CSC Form 212)
- d. Position Description Form
- e. Oath of Office
- f. Certificate of Eligibilities
- g. Copies of Medical Certificate
- h. NBI Clearance
- i. Copies of Diplomas, Transcript of Records (TOR)/Commendations/Awards
- j. Copies of Marriage Certificate
- k. Copies of Disciplinary Action
- l. Designations
- m. Notice of Salary Adjustments/Step Increments
- n. Certificate of Leave Balances (if Transferees)
- o. Clearance from Property and Money Accountabilities (if Transferees)
- p. Certificate from Training/Seminar

201 File of Leave Cards has a separate folder. Also employees copies of their SALN, IPCR, DPCR, Withholding Certificate form has separate folder.

Employees who attended training/seminars shall furnished the HR Section photocopy of their certificate. Employees who have changes/update in their status, additional dependents and beneficiaries and continuous studies shall furnish the HR Section photocopy of document, for the purpose of updating their 201 File.

201 File is keep safe in the steel cabinet .

#### **E- FILING**

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E filing is done thru scanning process of all the documents found in the 201 File of employees and kept in the USB which serves as a back-up file.

#### **2.3.3.1.5 REQUESTS FOR PERSONAL DATA SHEET (PDS), SERVICE RECORDS, and LEAVE CARDS/COC**

In requesting the above documents, employees may approach the HR Section and request copies of their Personal Data Sheet, Service Records and Leave Cards whenever they are in need.

HR Section will attend their request by printing their PDS, Service Records and Leave Cards/COC and forward the requested documents to the Head of Office for signature, the service record shall be countersigned by the Head of Administrative Division before the signature of the Head of Office.

#### **2.3.3.1.6 REPORT GENERATION**

The reports generated every end of the month are the following:

- a. Daily Time Records
- b. Leave Cards
- c. Compensatory Overtime Credits (COC)
- d. Balances of Leave Credit
- e. Leave Monitoring

#### **2.3.3.1.7 RATING OF PERFORMANCE TARGETS: DIVISION PERFORMANCE COMMITMENT REVIEW INDIVIDUAL PERFORMANCE COMMITMENT REVIEW**

Step 1. Division Heads prepares their DPCR for the semester January – June and July – December of every year for two rating period.

Step 2. Division Heads distribute task to their employees and agrees and prepares their IPCR.

Step 3. Planning Office consolidate, review, validate and evaluate performance assessments submitted by the Division Heads after six months.

Step 4. PMT calibrate results of assessment by Planning Officer and submit to the General Manager.

Step. 5 General Manager rates and approval the final rating of the Division Heads.

Step. 6 – Planning Officer prepares summary list of and provides the Division Heads of their final rating as approved by the General Manager.

Step. 7 – After the Division Units had been rated, the Division Heads will assess and discuss the submitted employees IPCR with accomplishments and rates their staff.

Step 8. – Division Heads submits the IPCR to the HRMO

Step 9. – The HRMO will consolidates all the IPCR and submits to the General Manager for approval.

#### **2.3.3.2 Stock and Supplies Inventory**

The stock and supplies inventory of the district currently have a computerized system in maintaining, updating the stock / supplies records. Purchases and issuances of stocks, and including the monitoring of properties are the different process in this activity.

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**2.3.3.2.1 Purchasing and Stocking of Supplies and Equipment**

- a. Every Division prepare Purchase Requisition 3 copies and Request for Quotation 3 copies. Submit the Purchase Requisition to the General Manager for approval.
- b. Approved Purchase Requisition and Request for Quotation will be forwarded to the Property Officer . Give the Request for Quotation to the Utility Man to canvass items in three (3) Store or Suppliers .
- c. Upon Receipt of the Request for Quotation the Property Officer will now prepare the Abstract of Bids and submit to the Bidding Committee for approval.
- d. Received approved Abstract of Bids and prepare Purchase Order in three (3) copies with BIR Certificate. Serve the Purchase Order to the Supplier for them to sign and conformed and deliver the items to Catbalogan Water District.
- e. Upon receipt items in the Purchase Order it will be inspected and preparation of Inspection and Acceptance Report will now be done and automatically posted in the stock card.

**2.3.3.2.2 Issuance of Stocks and Supplies**

- a. Each Division will prepare Requisition and Issued Slip using the CWD RIS Form. Approved RIS will be given to the Property Officer for release of their request materials or supplies.

**2.3.3.2.3 Generation of Inventory Reports**

- a. The Schedule for the Physical Inventory of Office Equipment and other equipment in the Pumping Station is always done every month of December ( once a year) while the stocks of materials and supplies is always check or counted every end of the month for us to reorder whatever is locking in our stocks.

**2.3.3.2.4 Updating Meter History Card**

- a. Once the RIS for the new water service connection and change of water meter is prepare the water meter is automatically recorded in the meter History Card.

**2.3.4 FINANCE****2.3.4.1 Financial Reports Preparation****2.3.4.1.1 Preparation of Billing Journal**

- a. Receive Daily Billing Summary from the Commercial Division
- b. Post the Data in Accounting System and Prepares the Journal Entry
- c. Check the Correctness of the Billing Journal

**2.3.4.1.2 Preparation of Cash Receipt Journal**

- a. Prepare the Daily Cash Position Report (DCPR)
  - b. Check the DCPR
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- c. Post the DCPR to the Accounting System daily and make the Journal Entry at the end of each month
- d. Check the correctness of the Cash Receipt Journal

#### **2.3.4.1.3 Preparation of Disbursement Voucher**

- a. Submit necessary documents to Accounting section
- b. Check the completeness of the document and prepare Budget Utilization Slip (BUS).
- c. Certifies the availability of budget funds
- d. Prepares the Disbursement Vouchers
- e. Certifies the completeness of the documents and if the DV is Proper

#### **2.3.4.1.4 Preparation of Journal Vouchers**

#### **2.3.4.1.5 Preparation of Financial Statements**

#### **2.3.4.1.6 Balancing of A/R in accounting and commercial**

#### **2.3.4.1.7 Preparation of Monthly Data Sheet**

- a. Ask necessary data from Engineering, Commercial and Administrative Division
  - b. Input Data to the MDS form
  - c. Print Report
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