VISION

The most innovative and efficient water district in the provision of safe, potable water and sewerage system.

MISSION

To develop, preserve an ecological and sustainable, safe and potable water resources. To uphold healthy practices. To protect and stabilize mother Earth and the health of the city residents. Insure continuous improvement in Public Services in providing safe potable water and sewerage system at par with international standards.

FOREWORD

Quality water supply as well as water quality service concessionaries is the main goal to achieve by the City of Ilagan Water District (CIWD) Operations and Technical Division. They may find it necessary to measure effectiveness, efficiency, quality, impact and productivity.

To ensure efficiency of operations in providing safe and potable water, closer supervision in the analysis of water quality production, its water resources and proper maintenance of the transmission and distribution pipelines, service connection, pumping equipment and facilities shall be provided to the public.

In order to facilitate and maximize as many residential, industrial and commercial coverage in the improvement and the expansion of water supply system, it is imperative 0to focus on many types of measurements and strategies to adhere and mitigate the perennial problems in the water system.

The Operations and Technical Division shall adopt the various steps of management to wit:

- Planning for the acquisition of needed equipment, facilities supplies or services to carry out unit mission;
- Identifying specific ways for improving unit procedures, processes, structure and cost effectiveness;
- Developing strategies toward achieving unit long-term goals by continuous system refinement and improvements;
- Utilizing individual number input for improving productivity and excellence.

Such strategies may include setting national drinking water quality standards and implementing monitoring programs to detect the occurrence of specific chemicals in the water supply.

It is hoped that tis manual can served as reference not only for the readers, but also for future water service oriented entities to understand more about the significant programs and activities of the City of Ilagan Water District (CIWD) Operations & Technical Division.

SERVICE AREA

The City of Ilagan Water District (CIWD) has an existing water system that serves 24 barangays, to wit;

1. Bagumbayan	13. Alibagu
2. Baculod	14. Bliss
3. Sta. Barbara	15. San Felipe
4. Centro Poblacion	16. Alinguigan 2nd
5. San Vicente	17. Alinguigan 3rd
6. Camunatan	18. Sipay
7. Sto. Tomas	19. Marana 1st
8. Guinatan	20. Marana 2nd
9. Osmeña	21. Marana 3rd
10. Calamagui 1st	22. San Andres
11. Calamagui 2nd	23. San Isidro
12. Baligatan	24. Tangcul

The City of Ilagan District (CIWD) in City of Ilagan, Isabela was established by virtue of Section 4 of Presidential Decree (PD) No.768 and 479 known and referred to as “Local Water District Law” and Provincial Water Utilities Act of 1973”, respectively. The Local Water Utilities Administration (LWUA) has awarded the Certificate of Conformance No.090 to the District on August 30, 1979. It operates with the primary objective of giving the best service possible to its concessionaires by providing them with reliable and economically viable and sound water supply. It is one of the leading water service providers in the province. Though the entire province is rich with rivers and springs, the CIWD water sources are reliant to ground water. The CIWD is headed by the General Manager who is in charge of the day-to-day operations of the CIWD. Based on its 2016 Monthly Data Sheet (MDSL), CIWD employs a total of Thirty-seven (37) regular employees and serves 6,774 connections. The CIWD water system facilities include: twenty one (21)

operational deep well pumping stations, network of pipelines, elevated water tanks, ground reservoirs and on-line filtration. With the current deep well facilities of CIWD, it serves twenty four (24) barangays out of ninety one (91) barangays, representing 26% water service coverage.

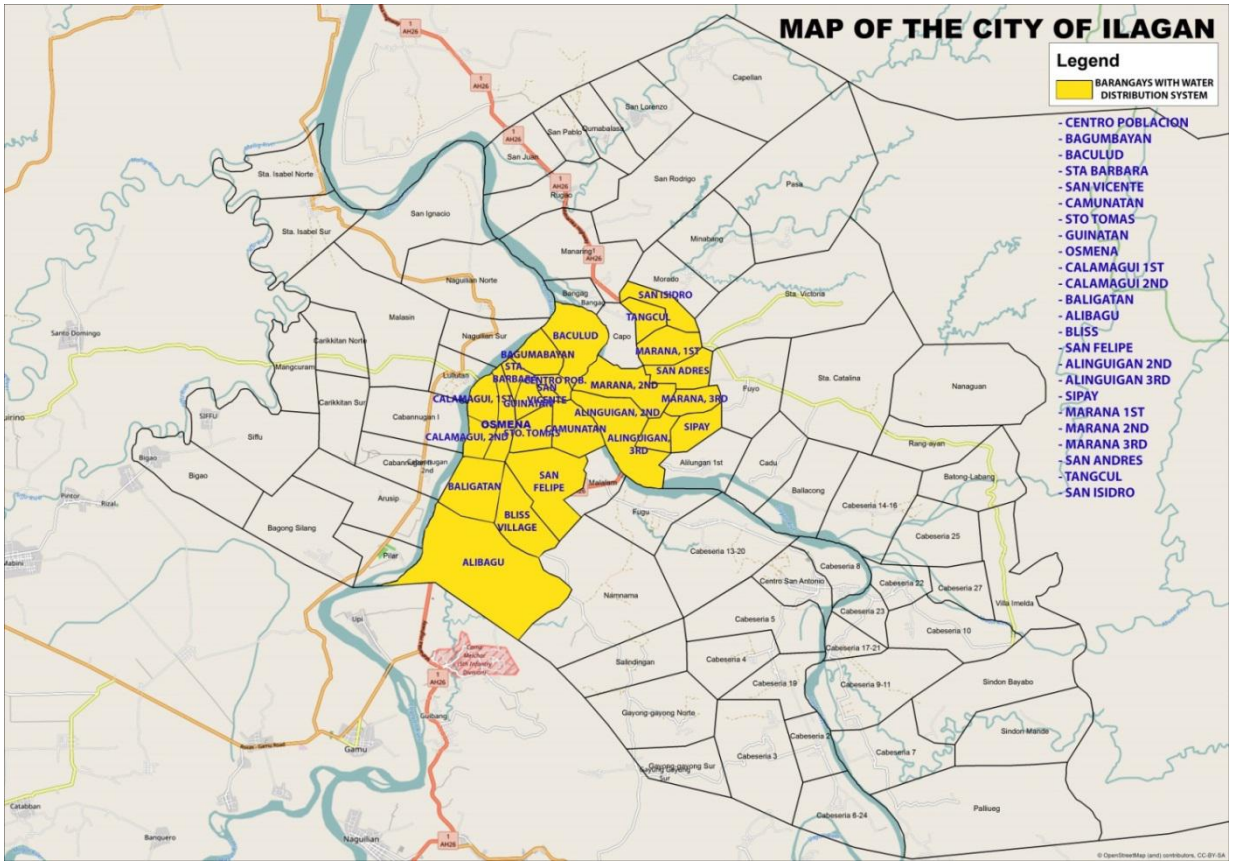
Presently, the twenty one (21) operational deep well pumping stations of CIWD are: 1) Alibagu Elementary School PS, 2) Isabela Sports Complex PS, 3) California Homes Subdivision PS, 4) Ilagan Central Terminal PS, 5) Baligatan Elementary School PS, 6) Baligatan Market PS, 7) Bliss PS, 8) NHA-1, 9) NHA-2, 10) Upper Osmeña PS, 11) Osmeña (PMS) PS, 12) Calamagui 1st Riverside PS,13) South Central School PS, 14) Sto. Tomas Pumping Station-1, 15) Sto. Tomas Pumping Station-2, 16) Ilagan East Central School PS, 17) Ilagan West Elementary School (Pilot) PS, 18) Bagumbayan PS, 19) Alinguigan 3rd PS, 20) DPWH PS and 21) Marana 1st PS. Majority of the deep well facilities complemented each other thru interconnected network of pipelines and augment water pressure in the high portion and far end of the pipelines within the service area. All of these deep wells are guided with the following standard operation procedures:

- Pumping stations operates in accordance with approved daily operating hours
- Comply with the pre-scheduled preventive maintenance to all deep well pumping stations
- Minor/Major repair and maintenance works to all electro-mechanical equipment, mechanical equipment and electrical machineries used by every pumping stations

- Daily monitoring and recording of operating conditions of all pumping stations
- Cleanliness and orderliness of all pumping station surroundings and equipment rooms
- Recommends improvement plan, rehabilitation and upgrading of pumping station

There are three (3) divisions in the City of Ilagan Water District (CIWD): 1) Operations & Technical Division - Wholly responsible in the operations of the Engineering/Construction for the operation and maintenance of the distribution network, and also responsible on production requirements and develops resulting schedules, attend to all matters necessary to ensure 24 hours a week or 24/7 service to all consumers of safe, potable water assuring satisfactory delivery of quality water under established minimum pressure, maintains accurate records as to daily production, equipment operation, machinery history levels and pressures, established detailed preventive maintenance to all production equipment and establishing priorities for economical and safe operation of mechanical equipment, 2) Administrative and General Services Division - Responsible in the implementation of vital personnel policies, rules & services and also requires extensive knowledge and understanding of management methods and principles to effectively achieve management goals and objectives, 3) Finance and Commercial Division - Responsible for the operation of determining customer records, enforces utility rules and regulations as to billing, payment delinquencies and assistance and pursues delinquent accounts. It also deals with customer relations, addressing complaints and various client concerns.

The agency's current water requirement for its client is still sustainable. But, with its projected expansion projects, increasing demand of water due to growing population and higher volume abstraction from its existing wells, CIWD is currently studying proposals from different water utility companies, tapping Cagayan River and Pinacanauan River as water sources.



SOURCE FACILITIES

	PUMPING STATION	PUMP	MOTOR (HP)	POWER SUPPLY	WELL DEPTH (M)	DATE CONST'D	CASING (MM)
1	BAGUMBAYAN PS	SP 8A-12	7.5	1Ø	60	Nov. 2012	200
2	ILAGAN EAST C/S PS	SP 17-6	7.5	3Ø	80	Oct. 2012	200
3	SAN VICENTE (PILOT) PS	SP 8A-15	5	1Ø	80	May-04	200
4	SERGIO PS	UG 8-9	5	1Ø	45	Jan. 1986	200
5	STO. TOMAS 1 PS	SP 17-6	5	1Ø	45	Jan. 1986	200
6	STO. TOMAS 2 PS	SP 30-7	25	3Ø	60	Dec. 2010	200
7	PMS PS (Pres'l Mgt. Staff)	SP 8A-15	5	1Ø	80	Jan. 1986	250
8	CALAMAGUI 1ST PS	SP 17-8	10	3Ø	50	Mar. 2004	200
9	UPPER OSMEÑA PS	SP 8A-15	5	1Ø	90	Jun. 1999	150
10	BALIGATAN MARKET PS	SP70008	5	1Ø	40	Feb. 2005	250
11	BALIGATAN E/S PS	SP 8A-15	5	1Ø	50	Jun. 2004	200
12	ISABELA SPORTS COMPLEX PS	SP 17-8	15	3Ø	60	Mar. 2011	250
13	ALIBAGU E/S PS	SP 30-7	25	3Ø	100	Jun. 2004	250
14	BLISS PS	SP 17-8	10	1Ø	120	Jul. 2012	200
15	NHA I PS (Nat. Housing Authority	SP 17-10	15	3Ø	128	Apr. 2001	200
16	NHA II PS	SP 8A-15	5	1Ø	140	Apr. 2012	200
17	ALINGUIGAN 3RD PS	SP 17-8	15	3Ø	24	Sept. 2012	200
18	MARANA 1ST PS	SP 5A-15	3	1Ø	80	Apr. 2010	150
19	MARANA 3RD PS	SP 17-10	7.5	3Ø	77	May. 2012	200

CURRENT WATER SOURCES

	WATER PUMPING STATION	RATING/CAPACITY				WELL DEPTH (M)	DATE INSTALLED	PUMP SETTING (M)	STATIC WATER LEVEL (M)	PUMPING WATER LEVEL (M)	DISCHARGE CAPACITY (LPS)
		PUMP TYPE/BRAND	MOTOR (HP)	POWER SUPPLY							
				PHASE	VOLTAGE						
1	BAGUMBAYAN	SP 9-12	5	3 Ø	200V	60	2012	45	10.2	27.3	3
2	ILAGAN EAST CENTRAL SCHOOL	SP 30-7	15	3 Ø	220V	80	2012	63	28	57	5.6
3	SAN VICENTE (PILOT)	SP 8A-15	5	1 Ø	200V	80	2004	60	27.3	44.2	1.7
4	STO TOMAS - I	SP 8A-15	5	1 Ø	220V	45	1986	30	10.2	21.2	2
5	STO TOMAS - II	SP 46-5	15	3 Ø	200V	60	2000	33	8.2	20	9
6	PMS	SP 8A-15	5	1 Ø	220V	80	1986	66	36	56	2
7	SOUTH CENTRAL SCHOOL	DP 17-8	7.5	3 Ø	200V	50	2004	44	12.7	31.5	3.1
8	UPPER OSMEÑA	SP 8A-15	5	1 Ø	220V	90	1999	66	46.6	62	2
9	BALIGATAN MARKET	SP 8A-15	5	1 Ø	200V	40	2005	30	10.5	22.6	2
10	BALIGATAN ELEMTARY SCHOOL	SP 8A-15	5	1 Ø	220V	50	2004	38	10.5	37.2	1.7
11	ISABELA SPORTS COMPLEX	SP 17-6	7.5	3 Ø	200V	60	2011	54	23	37.7	3.4
12	ALIBAGU ELEMENTARY SCHOOL	SP 46-7	25	3 Ø	220V	100	2004	66	18.5	53.5	7
13	BLISS	SP 17-8	10	1 Ø	200V	120	2012	81	54	63.2	2.8
14	NHA - I	SP 30-7	15	3 Ø	220V	128	2001	60	38	47.3	5.3
15	NHA - II	SP 8A-15	5	1 Ø	200V	140	2012	60	46.5	53	1.7
16	ALINGUIGAN 3RD	SP 30-8	15	3 Ø	220V	36	2012	24	9.2	12.6	5.6
17	CALIFORNIA HOMES	25 GS 30	3	1 Ø	200V	41.3		30	20.8	26.5	1.8
18	CALAMAGUI 1ST	VP 60A/06	20	3 Ø	220V	60	2014	42	9	31.9	11
19	DPWH	VP 8A/15	5.5	1 Ø	200V	103		72	58.3	62.1	2
20	ILAGAN CENTRAL	SP 30-7	15	3 Ø	220V	75	2015	45	9.2	19	8

WATER TREATMENT FACILITIES

STO. TOMAS PUMPING STATION & TREATMENT PLANT

STO. TOMAS WATER TREATMENT PLANT

UPPER CHAMBER FILTER MEDIA

FILTER CLOTH

TREATMENT PLANT CONTROL ROOM

BAGUMBAYAN PUMPING STATION ON LINE SAND FILTER

2 UNITS - COAGULATION TANK

5 STAGES – SAND FILTER MEDIA

UPPER OSMEÑA PUMPING STATION ON LINE SAND FILTER

SINGLE STAGE ONLINE SAND FILTER MEDIA

TREATED WATER STORAGE TANK

OSMEÑA (PMS) PUMPING STATION ON LINE SAND FILTER

SINGLE STAGE ON LINE SAND FILTER MEDIA

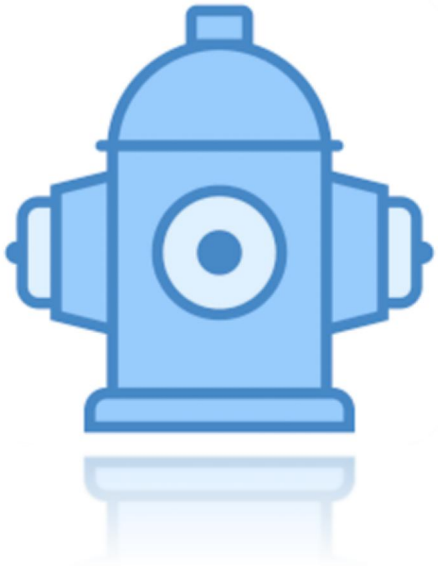
TREATMENT PLANT – SAND FILTER MEDIA
WITH FILTER CLOTH


09/07/2017 14:53


CITY OF ILAGAN WATER DISTRICT
WATER PUMPING STATION
DPWK Brgy. Osmeña
City of Ilagan, Isabela
09/07/2017 14:56


09/07/2017 14:54

FIRE FIGHTING FACILITIES



Fire-fighting facilities are constructed in strategic locations within the whole area of coverage of the CIWD water distribution system. The CIWD has installed two-way (150mmØ) fire hydrants, one way (75mmØ) angle hydrants and (50mmØ) flushing points with corresponding size of gate valve already to use as the need arises.

HYDRANT/TYPE	NUMBER/ LOCATIONS	STATUS
FIRE HYDRANT2-WAY 150MMØ	5	Operational
ANGLE HYDRANT 1-WAY 100MMØ	26	Operational
ANGLE HYDRANT 1-WAY 50MMØ	8	Operational
FLUSHING POINT 50MMØ	80	Operational
TOTAL	119 locations	

FIRE HYDRANT

(150 mmØ), 2 way

ANGLE FIRE HYDRANT

(4"Ø GI STAND PIPE

SCHEDULE 40)

FLUSHING POINT

(50 MM Ø)

OPERATIONS & MAINTENANCE

The City of Ilagan Water District's (CIWD) primary concern is the operation and maintenance of the pump equipment, repair of pipe service connections, leakages, defective meters, installation of service connections and the maintenance of water sources and storage tanks.

The pump motors are mostly operating 24 hours while some are normally for eighteen (18) hours. The water is pumped directly into the water distribution system except those pumping stations with fill and draw method water tank system. The CIWD technical personnel conducts cleaning operations of the distribution and transmission lines, as well as the flushing of water through the hydrants, blow-off valves and flushing points to remove undesirable elements that are accumulated during low pressure and power interruption.

MOTORPOOL AND FABRICATION SHOP

The City of Ilagan Water District has an existing motorpool and fabrication shop located at Brgy. Sto. Tomas. the motorpool has different kinds of maintenance equipment, to wit;

- Hand Tools
- Welding Machine – 1 unit
- Acetylene and Oxygen Cutter – 1 unit
- Precision Drilling Machine ½ Hp, 220V – 1 unit
- Bench Grinder 1 HP – 1 unit
- Bench Clamp – 1 unit
- Air Compressor ¼ Hp – 1 unit
- Portable Grinder – 1 unit
- Battery Charger – 1 unit
- Water Pump 2"Ø – 1 unit
- Concrete Cutter (Gasoline & Diesel Engine) – 2 units
- Cut-off Machine – 1 unit
- Hydraulic Pressure – 1 unit
- Jackhammer with Air Compressor (Isuzu Diesel Engine 4-Cyl.) – 1 unit

The agency acquired different units of equipment generator sets and service vehicles that are used for the operation of the district, to wit;

- Isuzu pick-up 2 x 4
- Isuzu Elf
- Kia "Bongo"
- Perkins – 6 Cylinder Diesel Engine (125 KVA)
- Perkins – 4 Cylinder Diesel Engine (50 KVA)
- Perkins – 4 Cylinder Diesel Engine (35KVA)
- Mitsubishi 4DR5 4 – Cylinder Diesel Engine (25 KVA)
- Isuzu C190 4 - Cylinder Diesel Engine (25 KVA)
- Isuzu 4FB1 4 - Cylinder Diesel Engine (25 KVA)
- Isuzu 4BC1 4 - Cylinder Diesel Engine (40 KVA)
- Portable Generator Set – 2 units
- Concrete Mixer (1-Bagger) – 1 unit
- Concrete Vibrator
- Submersible Motors and Pumps

PICTS

PRODUCTION AND WATER QUALITY

A. WELLS, SPRINGS AND SURFACE WATER

The City of Ilagan Water District (CIWD) existing production wells water source id underground aquifer of different elevations. Considering the time element, these production wells are decreasing in volume of water drawn as a result of low static water level and slow recovery of pumping water level due to aquifer recharging, clogged screens and the distant point of other production wells within the area.

With the existing topography, the City of Ilagan is surrounded by the Pinacanauan an Cagayan Rivers. Thes rivers are abundant source of water supply for the Poblacion and western barangays of the city. The CIWD is planning to construct a filtration gallery at Calamagui 1st, benefitting from the Cagayan River as the water source.

B. PUMP/MOTOR EQUIPMENT AND INSTRUMENTATION

The existing production wells of City of Ilagan Water District (CIWD), envelops different rating and capacity of submersible motors and pumps respectively. It ranges from 3Hp to 25Hp coupled with appropriate pump with different hydraulic head.

The installed submersible motors are Franklin type while the submersible pumps are Grundfos type, both made from Italy and Germany. These motors are power supplied either three phases or single phase by ISELCO II and being controlled by Radius Voltage Auto-Transformer (RVAT) and Variable Frequency Drive (VFD). During brown-outs, some of these motors are operated by standby diesel generator set.

C. DOSING AND CHEMICAL FEED PUMPS

Production wells are provided with dosing pump to supply chlorine dioxide in the discharge pipe with approximate pressure to penetrate the running water. Dosing pump strokes vary for each pumping station considering the number of consumers. These pumps

are adjusted in different strokes per minute to attain the right chlorine content of water for the service area as per requirement of the Philippine National Standard for Drinking Water (PNSDW).

D. DISINFECTION AND COAGULATION

The CIWD is currently using chlorine dioxide to disinfect the raw water from production wells. This compound is an effective coagulant as well as a descaling agent for the distribution lines. The present concentration of chlorine dioxide powder (Oxycide) mix with 100 liters of water for dosing pumps. This serve as a preventive measure for contamination as well as neutralizer.

E. WATER ANALYSIS (BACTERIOLOGICAL, PHYSICAL AND CHEMICAL)

One of the standards established by Local Water Utilities Administration (LWUA) for compliance by local water districts, pursuant to Section 62 of PD 198, as amended, is the regular monitoring of the water quality in terms of bacteriological, chemical and physical parameters including uniform testing procedures and submission of water analysis result.

It is the primary responsibility of the City of Ilagan Water District to supply water that meets the requirement of the Philippine National Standard for Drinking Water (PNSDW).

The CIWD management is doing its best to perform the regular monitoring to maintain water quality conforming to standards. Bacteriological analysis of water samples from various water sources is examined in the laboratory facilities of Metro Tuguegarao Water District (MTWD) due to lack of consumables and is accredited by the LWUA. The Physical and Chemical Analysis is administered annually by the Platinum Laboratory (Cubao, Quezon City). Although water samples shows presence of manganese, iron and problems in color, odor and turbidity, it is still within the permissible limits by the PNSDW

BACTERIOLOGICAL TEST REPORT for 2016

DESCRIPTION	JANUARY	FEBRUAR	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1. Population actually served by utility	32,635	32,695	32,820	32,955	33,135	33,370	33,660	33,870	34,035	34,225	34,370	34,495
a. Number of total service connections	6,527	6,539	6,564	6,591	6,627	6,674	6,732	6,774	6,807	6,845	6,874	6,899
b.Average no.of persons/service connection	5	5	5	5	5	5	5	5	5	5	5	5
2. Required Minimum no.of Samples Per Month												
(1 sample for every 5,000 population)	7	7	7	7	7	7	7	7	7	7	7	7
3. Sample Requirement												
a. Number of Samples Examined	7	7	7	7	7	7	7	7	7	7	7	7
b.Percent to minimum required(3a/2x100)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
4.1 Multiple Tube Fermentation Technique												
a.No.of samples showing presence of coliforn	0	0	0	0	0	0	0	0	0	0	0	0
b.Percent(%)to samples examined	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4.2 Fecal Coliform Test (FCT)												
a.Number of samples showing presence of fe	0	0	0	0	0	0	0	0	0	0	0	0
organisms with mpn/100ml.value of 1.10 more												
b. Meets Standard	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
4.3 Heterotrophic Plate Count (HPC)												
a. Number of HPC tests conducted	7	7	7	7	7	7	7	7	7	7	7	7
b.No.of samples w/HPC value of <500CFU/ml.	7	7	7	7	7	7	7	7	7	7	7	7
c. Meets Standard(if c is 100%or more,)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

CHLORINE RESIDUAL REPORT FOR 2016

Monthly Averages for Chlorine Residuals

January	February	March	April	May	June	July	August	September	October	November	December	Annual Average
0.305mg/L	0.311mg/L	0.317mg/L	0.308mg/L	0.301mg/L	0.320mg/L	0.321mg/L	0.31mg/L	0.306mg/L	0.322mg/L	0.312mg/L	0.320mg/L	0.313mg./Liter

Limits:

Minimum: 0.3mg./Liter(Detected at the farthest point of the distribution system)

Maximum: 1.5mg./Liter(Detected at any point of the distribution system)

Notes:

Chlorine Dioxide and Calcium Hypochlorite(Chlorine Granules) are presently used as water disinfectants in all pump stations.

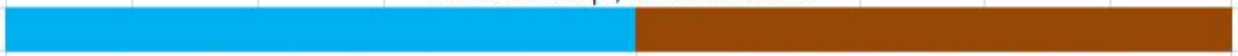
Color Codes: Chlorine Residuals

Good:	0.1mg/L -0.2mg/L
Better:	0.2mg/L-0.3mg/L
Best:	0.3mg/L-1.5mg/L

FOR TOTAL and FECAL COLIFORMS

(Bacteriological Test)

<<less than 1.1mpn/100ml.more than>>



0 mpn/100 Liter-1.1mpn/100Liter (Negative)

1.1mpn/100Liter and above (Positive)

Limits:

Less than 1.1mpn/100ml.(negative)

More than 1.1mpn/100ml.(positive)

Note:

mpn----(most probable number)

Remarks:

91 out of 93 samples tested for year 2015 registered <1.1mpn/100ml.for total and fecal coliforms(negative).

PHYSICAL AND CHEMICAL ANALYSIS 2016														
LOCATION	Color	Turbidity	ph	Nitrate	Sulfate	Chloride	TDS	IRON	Mn	Arsenic	Lead	Cadmium	Benzene	
Bagumbayan Pump Station	5	1.18	7.81	nil	13	72	373	0.04	0.83	nil	nil	nil	nil	
Brgy.Bagumbayan,Ilagan City	Color U.	NTU			mg./liter	mg./lter	mg./liter	mg./liter	mg./liter					
Ilagan East Central Pump Stn.	10	0.93	7.1	nil	0.04	194	642	0.22	1.13	nil	nil	nil	nil	
Centro,Ilagan City	Color U.	NTU			mg./liter	mg./lter	mg./liter	mg./liter	mg./liter					
Sto.Tomas 2 Pump Station	20	2.22	7.28	nil	5	24	196	0.13	0.05	nil	nil	nil	nil	Notes:
Brgy.Sto.Tomas,Ilagan City	Color U.	NTU			mg./liter	mg./lter	mg./liter	mg./liter	mg./liter					PNSDW-
Upper Osmeña Pump Station	120	0.93	7.75	nil	3	97	353	0.19	0.05	nil	nil	nil	nil	(Philippine National
Brgy.Osmeña,Ilagan City	Color U.	NTU			mg./liter	mg./lter	mg./liter	mg./liter	mg./liter					Standards for
Calamagui Riverside P.S.	10	1.21	7.18	nil	7	15	243	0.22	0.92	nil	nil	nil	nil	Drinking Water)
Brgy.Calamagui 1st,Ilagan C.	Color U.	NTU			mg./liter	mg./lter	mg./liter	mg./liter	mg./liter					NTU-
CIWD/DPWH Pump Station	10	1.12	6.86	nil	134	87	411	0.03	0.04	nil	nil	nil	nil	(Nephelometric
Brgy.Osmeña,Ilagan City	Color U.	NTU			mg./liter	mg./lter	mg./liter	mg./liter	mg./liter					Turbidity Units)
Baligatan School Pump Stn.	10	3.09	7.52	nil	4	14	211	0.17	0.34	nil	nil	nil	nil	TDS-
Brgy.Baligatan,Ilagan City	Color U.	NTU			mg./liter	mg./lter	mg./liter	mg./liter	mg./liter					(Total Dissolved
BLISS Pump Station	16	4.31	7.42	nil	3	5	181	0.44	0.15	nil	nil	nil	nil	Solids)
Brgy.BLISS,Ilagan City	Color U.	NTU			mg./liter	mg./lter	mg./liter	mg./liter	mg./liter					
NHA 1 Pump Station	6	1.82	7.71	nil	3	5	177	0.16	0.11	nil	nil	nil	nil	
Brgy.San Felipe,Ilagan City	Color U.	NTU			mg./liter	mg./lter	mg./liter	mg./liter	mg./liter					
California Homes Pump Stn.	10	0.91	7.65	nil	5	5	254	0.14	0.17	nil	nil	nil	nil	
Brgy.Alibagu,Ilagan City	Color U.	NTU			mg./liter	mg./lter	mg./liter	mg./liter	mg./liter					Remarks:
Alibagu Terminal Pump Stn.	25	3.66	7.39	nil	2	5	232	0.97	0.3	nil	nil	nil	nil	Results in red did
Brgy.Alibagu,Ilagan City	Color U.	NTU			mg./liter	mg./lter	mg./liter	mg./liter	mg./liter					not comply with the
Alinguigan 3rd Pump Station	5	1.2	7.26	nil	15	10	179	0.09	0.45	nil	nil	nil	nil	Standards set by the
Brgy.Alinguigan 3rd,Ilagan C.	Color U.	NTU			mg./liter	mg./lter	mg./liter	mg./liter	mg./liter					PNSDW.
PNSDW Limit	10	5	6.5-8.5	50	15	10	500	1	0.4	0.01	0.01	0.003	0.01	

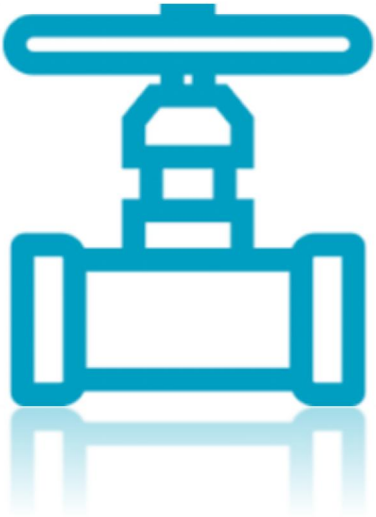
TRANSMISSION/ DISTRIBUTION PIPE LINES

The distribution system has about 38.30 kms. of piping with pipe diameters ranging 32 mm to 300 mm. The pipe materials are uPVC pipe Class 100 and HDPE SDR 11 Black Pipe.

PIPE DIA. (mm)	PIPE MATERIAL	LENGTH (kms)
300	HDPE	300
250	HDPE	150
200	HDPE	3,620
150	HDPE	10,145
100	HDPE/uPVC	4,849
75	HDPE/uPVC	8,198
50	HDPE/uPVC	9,839
25	HDPE	1,200
TOTAL LENGTH		**38,301**

- HDPE – High Density Poly Ethylene
- uPVC – Unplastic Poly Vinyl Chloride

VALVES, FITTINGS AND OTHER APPURTENANCES



TYPE	SIZES (Ø) (MM)	NUMBER	S T A T U S
VALVES	300	4	Operational
	250	1	Operational
	200	9	Operational
	150	29	Operational
	100	9	Operational
	75	38	Operational
	50	30	Operational
FITTINGS		170	
Pressure Sustaining Reducing Valve (PSRV)	150	2	Operational
	75	1	Operational
	50	1	Operational
AIR RELEASE VALVE	50	6	Operational

SERVICE CONNECTION

SERVICE CONNECTION
As of December 2016

CLASSIFICATION	SERVICE CONNECTION
RESIDENTIAL	4,176
GOVERNMENT	80
COMMERCIAL / INDUSTRIAL	490

STORAGE FACILITIES

The City of Ilagan Water District (CIWD) has eight (8) existing storage facilities made of reinforced concrete and structural steel. There are three storage facilities that are constructed on ground elevation, the Presidential management Staff (PMS) cylindrical reservoir with a capacity of 300 cu.m., the Department of Public Works and Highways (DPWH) cylindrical reservoir with a capacity of 550 cu.m., Brgy. Osmeña and Sto. Tomas treatment plant rectangular water tank with a capacity of 216 cu.m. The two (2) elevated reinforced concrete tank are the Upper Osmeña PS with a capacity of 8 cu.m., and Bliss PS with a capacity of 20 cu.m. The remaining existing elevated cylindrical steel water thanks are located at National Housing Authority (NHA) Pumping Station 1 & 2, San Felipe Pumping Station, both with a capacity of 227 cu.m. and Baligatan Market PS with capacity of 50 cu.m. The Storage facilities od CIWD is a contributing factor to ease the high demand of water supply especially during peak hours.

STORAGE FACILITIES						
	LOCATION	TYPE	MATERIAL	DIMENSION	VOLUME (CU.M)	ELEVATION (MASL)
1	PMS PS	Ground Reservoir	Concrete	12m Ø x 6.19m ht.	700	72
2	STO TOMAS PS	Ground Reservoir	Concrete	9m x 6m x 4m	216	40
3	DPWH PS	Ground Reservoir	Concrete	13.68m Ø x 3.75m ht.	550	89
4	UPPER OSMEÑA PS	Elevated Reservoir	Concrete	2m x 2m x 2m	8	78
5	BALIGATAN MARKET	Elevated Reservoir	Steel	3.5m Ø 5.2m ht.	50	44
6	BLISS PS	Elevated Reservoir	Concrete	3.2m x 3.2m x 2m	20	97
7	NHA - I	Elevated Reservoir	Steel	6m Ø x 8m ht.	227	77
8	NHA - II	Elevated Reservoir	Steel	5m Ø x 5.76 ht.	113	93
9	CALIFORNIA HOMES	Elevated Reservoir	Concrete	5m x 5m x 5m	75	67

PHILIPPINE NATIONAL STANDARD FOR DRINKING WATER

PHYSICAL STANDARDS	CHEMICAL STANDARDS
Odor - Unobjectable	pH - 6.5 - 8.5
Taste - Unobjectable	Hardness - 300mg./L
Turbidity - 5 FTU	Total Dissolved Solids - mg./L -
Apparent Color - 10 Color Units	Chloride - 250mg.L Iron - 1 mg./L Manganese - 0.40mg./L

SEWERAGE SYSTEM AND WASTE WATER DISPOSAL

Due to the topography of the City of Ilagan, flooding is not a problem except for the relatively flat portion of the Poblacion. This area has concrete lined open canals and ditches that drain the storm water by gravity toward the Cagayan and Panacanauan rivers. In the market site, these canals are also used in disposing wastewater.

The City of Ilagan has no existing public sewerage facilities for domestic wastewater disposal. Domestic wastewater is discharged either in private septic tanks, street canals or directly into the creeks and waterways.

There are garbage trucks serving the urban core of City of Ilagan, collecting garbage daily. The city owns a waste disposal site located at Brgy. Namnama, a rural barangay 11 km from the city proper. In addition, majority of the households living in the area dispose their garbage through burning, burying and/or composting.

DRINKING WATER FOUNTAINS

NO.	DRINKING FOUNTAIN	LOCATION
1	**Rizal Park**	Rizal Park St., Bagumbayan City of Ilagan, Isabela
2	**Ilagan West Central School (Pilot)**	San Vicente, City of Ilagan, Isabela
3	**Bonifacio Park**	
4	**Baligatan Court**	Baligatan, City of Ilagan, Isabela
5		
6		
7		

MANAGEMENT PROCEDURES

Management procedures are documented manuals of actions to be taken when the system is operating under normal conditions and incident situations. Operational procedures are usually step-by-step actions to be applied as standard operating procedures in any circumstances or events. It is also a routine good practices aimed to improve present set-ups in order to achieve a more reliable, efficient and economy-wise solutions to persistent problems in the water system.

STANDARD OPERATION PROCEDURES OF WATER PUMPING STATION

1. The Pump Operator-In-Charge must be familiar with the Locations, Functionalities, and Operations of Electrical Devices (Circuit Breakers, Relays, Switches, and Pressure Transmitter), Mechanical Devices (Discharge Valve, Blow-Off Valve, Check Valve Flow Meter, and Pressure Gauge), Motor Control Equipment (VFD, RVAT, IVFD).

2. Before starting the Pump/Motor, Check the physical conditions of all electrical components and wires for the signs of overheating, loosed or detached wires and burnt components that can cause further damage to the motor control system.

3. Always refer to the recent data in the Operator's Logbook. Early warning or notice can be helpful.

4. Make sure that the selector switch is in "OFF" position before turning on the Main Circuit Breaker.

5. Be aware of the specified operating voltage and current of the submersible motor (single-phase or three-phase).

6. Check the Line Voltage. Never attempt to start the motor with a single-phase power supply if the motor is a three-phase (it may cause damage to the motor).

7. Fully Close the Discharge Valve and open the Blow-Off Valve before starting the motor.

8. Start the Pump/Motor by setting the selector switch to Manual Mode, and then press the START Button.

9. After starting the Pump/Motor, immediately checks the Line Current of the Motor, it should not exceed the Rated Current.

10. If the Operator encounters problem, press the STOP Button and shut off the Main Circuit Breaker and fix it.

11. Divert the pump discharge to the Distribution Line by gradually opening the Distribution Valve and fully closing the Blow-Off Valve (Blow-Off Flushing is already done).

12. Turn ON the dosing pump and make sure that it is working properly.

13. Round-the-Clock monitoring and inspection of Voltmeter, Ammeter, Water Discharge Pressure, and Flow Meter to determine if the pump is functioning normally.

14. Frequent and accurate recording of Line Voltage, Line Current, KWHR Reading, Discharge Capacity, Pressure and Flow Meter Reading. Always examine and analyze if these values are in accordance with normal operation.

15. Record in the Logbook all the important information and events relevant to the smooth and efficient operation to be endorse to the next operator.

16. Operators are duty-bound to maintain cleanliness and orderliness inside and outside water pumping station premises.

17. Stop the Pump Operation as per required pump schedule.

18. Press the STOP Button to Stop the Pump/Motor.

19. Fully Close the Discharge Valve right after the Pump/Motor stops.

20. Record all the important Data, Time, KWHR Reading, Flow Meter Reading, Motor Running Hour, Engine Hour and Pressure Reading when the Pump/Motor stops.

21. Turn OFF the Main Circuit Breaker at the Main Control Panel.

22. On-Time Submission of Reports (Weekly Production Report, Monthly Production Report and Flushing Report).

STANDARD OPERATING PROCEDURES FOR STANBY GENERATOR SETS

Standby generator sets are used specifically during power outages and interruptions, therefore proper handling and maintenance are required in every operator to ensure that generator sets are always in running condition as follows:

1) Before starting the generator set, be sure to check the following:
   a) Engine oil level
   b) Radiator fluid (Coolant/Water)
   c) Fuel level
   d) Battery condition
   e) Air cleaner

2) Upon starting the generator set, observe the sound that produce by the generator set during “No-load” condition, immediately report to the authorized mechanic if you hear unusual sound, like “cranking” sound.

3) Before shifting the power to generator set, measure or read the following:
   a) Line voltage output (Line 1, Line 2, Line 3 = 220v – 240v)
   b) Frequency (60Hz)

4) Regular warm-up (5 minutes) for at least twice a week is also necessary to prevent clogging to the fuel line and also re-charge the battery.

5) Record the latest change-oil date which serve as reference to the next one (Every 500 running-hours for brand new Genset and 300 running –hours for others).

6) Always maintain minimum of fifty percent (50%) fuel levels of all fuel tanks.

OPERATION AND MAINTENANCE OF GROUND AND ELEVATED WATER RESERVOIR

1) Ensure security of all utility entry point and opening of reservoir

2) Secure all gates with heavy duty padlocks

3) Daily checking of water level of the reservoir

4) Maintain all fences in good condition

5) Weekly collection of raw and treated water samples for presence/absence of coliforms and chlorine residual analysis.

6) Observe for crack/leaks and implement repair the soonest

7) Strictly implement periodic cleaning and maintenance of Reservoir inner chamber as per schedule. (Monthly cleaning is recommended)

8) Ensure normal operation of all Electro-Mechanical devices and equipment including the “Floater Switch”

9) Always maintain cleanliness and orderliness of the surroundings and pump house respectively.

10) Never store un-chlorinated water in reservoir for more than seventy two (72) hours.

11) Keep reservoir roof ladders and walkways free of dirt, debris or grease to prevent slipping and contamination.

12) Never enter a closed reservoir alone without someone standing by to help you get in trouble.

13) Complete cleaning and disinfection are recommended every quarter of its year.

OPERATION AND MAINTENANCE OF DISTRIBUTION SYSTEM (FIRE HYDRANT, BLOW-OFF ASSEMBLY, PIPE LINES AND VALVES)

1) Only designated Personnel (Pump Operators) and BFP (Bureau of Fire Protection) are authorized for the usage of fire hydrants and blow-off points during flushing activities and fire events, respectively.

2) Limit or suspend all flushing activities during low water pressure situations, especially during power outages and interruptions.

3) Conduct flushing activities right after the commercial power resumes eliminating or minimizing effects or varying water pressure.

4) Strictly follow all regular flushing intervals and schedules (Daily, Twice a week, Weekly and Monthly) for every areas (Calamagui 1st, Calamagui 2nd, Centro, etc.)

5) All flushing activities should be accomplished only during night time and lean water demand except for emergency purposes.

6) Do not leave valve fully open or fully close, but back of 1½ turns.

7) Clean valve box and clear hydrant surrounding twice a year.

8) Inspect operability of air release valves, special valves (PSRV).

9) All exposed pipes and mechanical fittings should be inspected for deterioration due to corrosion or rusting.

10) Replace all malfunction/leaking valves and repaint all exposed pipes and fittings to weather once a year to avoid rusting.

OPERATION AND MAINTENANCE OF SERVICE CONNECTIONS AND METERS

1) Follow established installation procedure for new connection (Clustered and usage connection)

2) All service connection pipes should be embedded to prevent potential damage due to exposure.

3) Repair of all service connection leaks should be accomplished immediately to minimized NRW (Non-Revenue Water) and increase Water System Pressure.

4) Maintain accuracy of all water meters by regular maintenance and periodic cleaning.

5) Water meter with high consumption is required to re-calibrate for accuracy and if found out to be not accurate and unserviceable, replace it with new one.

6) Replacement of water meters should be done every five (5) years.

SECURITY MEASURES OF PUMPING STATION FACILITIES

1. Secure all gates and equipment rooms with heavy-duty padlocks and Overhead barbwires to all perimeter fences

2. Ensure all perimeter lights “On” during night time.

3. Daily checking and inventory of all pumping station facilities and equipment.

4. Secure all well opening with threaded caps to prevent contamination from all sorts (Physical, Chemical and Biological).

5. Every site, visit, inspection and educational trips should be properly documented and coordinated with concerned personnel.

6. Secure all maintenance tools, materials and machine use during and after preventive maintenance activities.

7. Only authorized personnel are allowed to enter Water Pumping Station rooms and premises.

8. Always wear protective gear (hard hat, gloves, mask, goggles, aprons, safety shoes, etc.) during and after preventive maintenance activities and during preparation of chlorine solution and during disinfection.

OSMEÑA (PMS) SINGLE ON LINE SAND FILTER MEDIA TREATMENT PROCEDURES

1) Operator in-charge must be familiar with the process flow of the treatment facilities upon assumption of duty.

2) PMS Pump Station is built with an online (9ft.long and 8in.diameter) cylindrical metal tube rapid sand filter. Filter media is composed of sand and activated carbon for turbidity and odor reduction.

3) Backwashing is done thru a reverse flow built alongside the cylinder by operational valves done manually, based upon pressure gauge installed before the cylinder when signs of constriction or saturation of filter media caused by trapped suspended solids from the raw water.

4) Post chlorination is done by mixing 0.75kg. of calcium hypochlorite vigorously in a 10liter of clean water letting it settle for an hour before transferring and filling up a fifty (50) liters container with clean water leaving behind the white sediments for proper disposal.

5) Final adjustments on chlorinator concentrations and dosing pump strokes is to be made based on field on-site monitoring of chlorine residuals particularly at endpoints.

6) Filtered water is then stored at the elevated PMS Reservoir with a capacity of 700cu.meters and to be distributed by gravity.

STO.TOMAS 2 CHAMBERS SAND FILTER TREATMENT PLANT PROCEDURES

1) Operator –in-charge must be familiar with the process flow of the treatment facilities upon assumption of duty.

2) Sto. Tomas II Pumping Station is built with a two (2) gravity sand filter bed with a volume of 72 cu. meters /filter bed and a surface loading rate of 0.632 liters/sec./sq. meter.

3) Each filter bed is equipped with a 500 cm. depth stone pebbles and a thin layer (2 cm.) of sand with a topmost layout of Geotextile (F20) designed for turbidity, color and iron/manganese for, suspended solids reduction.

4) Effectively of this filter bed was based on color and turbidity comparison between raw water before entering the filter media and the filtered water which is from 6 NTU to 2 NTU respectively and also with a color reduction from 60 to 10 color units.

5) Filtered water then proceed to the 216 cu. meter storage chamber to be pumped by two booster pumps (10hp and 15hp) for the distribution line (fill and draw method).

6) 1.5 kg. of calcium hypochlorite is to be mixed in a 10 liters clean water and to be decanted in an hour before transferring the solution to a 100 liters container and to be filled up with clean water for dosing, leaving behind the white sediments for proper disposal. Adjustments on dosing pump stroke and chlorinator concentration will be done based on field water sampling and on-site monitoring of chlorine residuals particularly at endpoints.

7) Frequent monitoring and measurement of the water level of the storage chamber is required for updating and necessary adjustments of the booster operating set-up.

8) Always maintain a minimum system pressure of 38 psi.

9) Always refer to recent update in logbook before operating the whole system.

BAGUMBAYAN PS 5 STAGES ON LINE SAND FILTER MEDIA WITH COAGULATIONS TANKS PROCEDURES

1) Operator –in charge must be familiar with the process flow of the treatment facilities upon assumption of duty.

2) Pour 1(one kg.) of instant oxides powder in a 100 liters of clean water and mix thoroughly. This would serve as oxidant as well as disinfectant to be injected to the raw water before entering the two (6.7 cu. meter/tank) pressurized cylindrical tanks.

3) Contact time between the oxidant and raw water is being met inside these two tanks before entering the five pressurized five-filter chamber with electronically-equipped automatic backwash.

4) Regular monitoring, checking and cleaning of the filter chambers should be done as soon as filtered water turbidity and color parameters are about to fail PNSDW limits.

5) Post chlorination for boosting chlorine residual is to be done depending on the chlorine residual which would be taken from a water sample before entering the distribution line.

CHLORINATING PROCEDURES FOR CITY OF ILAGAN WATER DISTRICT PRODUCTION WELLS WITH RAW WATER PASSING PNSDW LIMITS

A. CHLORINE DIOXIDE DISINFECTANT

1) 500 grams (1 pack) of Chlorine Dioxide is dissolved in a fifty (50) liters container of clean water.

2) Prepared solution must stir thoroughly until particulates are dissolved.

3) Dosing pump foot-valve must have to be suspended a few inches from the bottom of the container.

4) Dosing pump stokes and adjustments varies on each particular well based on chlorine residual measurements taken from starting point, midpoints and endpoints of distribution lines.

B. CALCIUM HYPOCHLORITE

1) 750 grams of Calcium Hypochlorite is poured in 10 liter pail of clean water and stirred vigorously and letting particulates settled at the bottom.

2) The cleared aqueous solution is to be transferred to a 50 liter container and filled for until partly full.

3) Dosing pump foot-valve must have to be suspended a few inches from the bottom of the container.

4) Dosing pump stokes and adjustments varies on each particular well based on chlorine residual measurements taken from starting point, midpoints and endpoints of distribution lines.

5) Decanted calcium hypochlorite undissolved particulates are to be dispose properly.

TRANSMISSION and DISTRIBUTION MAINLINE LEAK REAPAIR

1) Verify and inspect the service request received from the commercial division its truthfulness and its condition.

2) Assemble the plumbers to do the job and prepare the necessary tools or equipment needed to address the repair.

3) If the site condition is a concrete road/sidewalk, prepare the concrete saw for square holing, jackhammer with compressor for concrete breaking and dewatering pump for water draining; if it is an ordinary soil use common excavation tools.

4) Inform the public before closing the gate valves of the affected area. Provide necessary early warning device to avoid accident.

Proceed to repair work. Always deliver water supply in the affected area.

5) In the excavation process, it needs extra care to avoid damage in the pipeline and continuous dewatering to avoid intrusion of contaminants inside the pipeline.

6) The affected portion will be clean very well and the hole is always dry before repair works proceed by installing appropriate repair materials.

7) After repair works is done, open gate valves and proceed to flushing activity to the nearest flushing point until the water clears.

8) Upon build- up of pressure in the system, observe the repaired portion of the pipeline if there is leak. If none, restore the affected area to its original condition. In backfilling, use other backfill materials if necessary and always compact layer by layer about 20 cm. thick.

9) Fix the warning devices before leaving the area while waiting the curing period when concrete restoration is done, if not clear the area and open for traffic.

REPAIR & MAINTENANCE OF DOSING PUMP

1) The Pump Tender will verify & check the brand, date of purchased (CIWD property Sticker) and operation condition of the dosing pump.

2) Check everyday if the whole system is working from the current source to the dosing pump to the injection point.

3) Monitor the design strokes of the dosing pump.

4) Check if there is leak and clogging in the system (pump, hose and injector.

5) Referring to previous records of cleaning of pumps, injector valve, and replacement of delivery tube must be adopted in that pumping station depending of what kind of disinfectant being used.

6) Always provide a stock of spare dosing pump, repair kit and delivery tube to avoid any stoppage of operation.

REPAIR & MAINTENANCE OF PUMP HOUSE AND SECURITY FENCE

1) Inspect all structure in the pumping station and record all defects to be address.

2) Repair all deteriorating parts of the structure to ensure its soundness and beauty.

3) Repaint the structure if necessary.

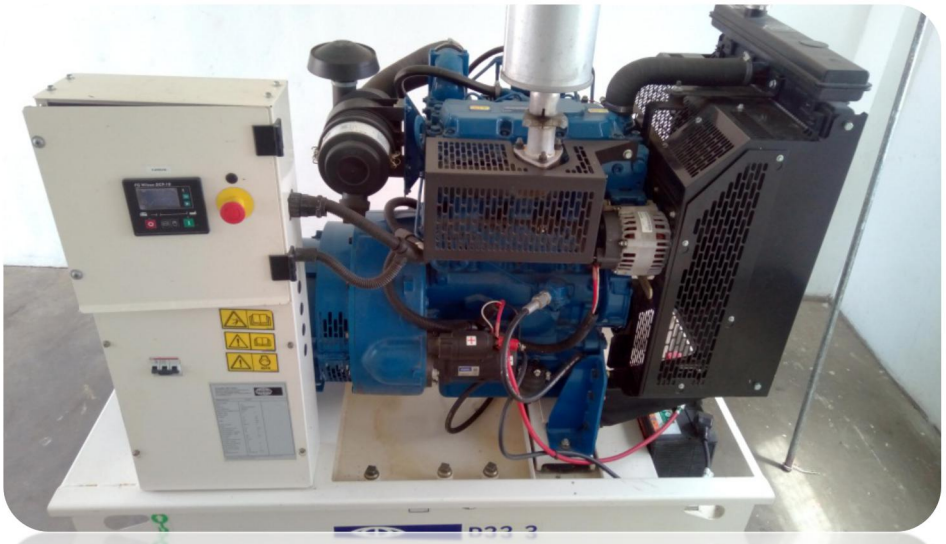
4) Restore immediately of any damages after calamities.

5) Maintain cleanliness of surroundings and beautify the area.

GENERATOR SETS

	DESCRIPTION	POWER SUPPLY	RATING (KVA)	LOCATION	REMARKS
1	"DENYO"	3 ϕ	45 KVA	Brgy. Centro, City of Ilagan Isabela	SURPLUS
2	"DENYO"		105 KVA		
3		3 ϕ	25 KVA	Brgy. San Vicente, City of Ilagan, Isabela	SURPLUS
4		1 ϕ	25 KVA	Brgy. Osmeña, City of Ilagan, Isabela	ASSEMBLED
5	"DENYO"	1 ϕ	25 KVA	Brgy. Baligatan, City of Ilagan Isabela	ASSEMBLED
6		3 ϕ	25 KVA	Brgy. Alibagu, City of Ilagan Isabela	SURPLUS
7		3 ϕ	50 KVA	Brgy. Alibagu, City of Ilagan Isabela	ASSEMBLED
8	"DENYO"	1 ϕ	25 KVA	Brgy. Bliss, City of Ilagan, Isabela	SURPLUS
9		3 ϕ	40 KVA	Brgy. San Felipe, City of Ilagan, Isabela	ASSEMBLED
10		3 ϕ	25 KVA	Brgy. Alinguigan 3rd, City of Ilagan, Isabela	ASSEMBLED
11		3 ϕ	37.5 KVA	Brgy. Calamagui 1st, City of Ilagan, Isabela	BRAND NEW
12		3 ϕ	37.5 KVA	Brgy. Alibagu, City of Ilagan Isabela	BRAND NEW
13		3 ϕ	37.5 KVA	Brgy. Osmeña, City of Ilagan, Isabela	

CALAMAGUI 1ST , RIVERSIDE PUMPING STATION GENERATOR SET



CITY OF ILAGAN CENTRAL TERMINAL PUMPING STATIONGENERATOR SET

BLISS PUMPING STATION GENERATOR SET

ILAGAN EAST CENTRAL SCHOOL
PUMPING STATIONGENERATOR SET

ISABELA SPORTS COMPLEX PUMPING STATION
GENERATOR SET

SOUTH CENTRAL PUMPING STATION
GENERATOR SET

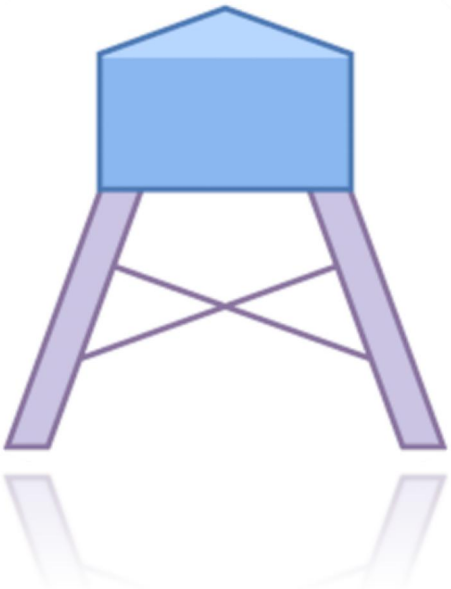
ALIBAGU ELEMENTARY SCHOOL PUMPING STATION GENERATOR SET

ADMINISTRATIVE BUILDING GENERATOR SET

ALINGUIGAN 3RD GENERATOR SET

MARANA 1ST GENERATOR SET

WATER PUMPING STATIONS



BAGUMBAYAN PUMPING STATION

ILAGAN EAST CENTRAL SCHOOL PUMPING STATION

ILAGAN WEST CENTRAL SCHOOL (PILOT) PUMPING STATION

STO. TOMAS PUMPING STATION I

STO. TOMAS PUMPING STATION II

FILTER MEDIA

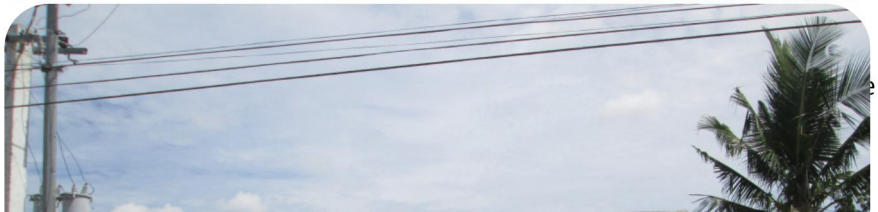
STO. TOMAS TREATMENT PLANT

OSMEÑA PUMPING STATION(PMS)

PUMP HOUSE

SINGLE STAGE ON LINE SAND FILTER MEDIA

ILAGAN SOUTH CENTRAL SCHOOL PUMPING STATION



CALAMAGUI 1ST (RIVERSIDE) PUMPING STATION

PUMP HOUSE

UPPER OSMEÑA PUMPING STATION

FILTER MEDIA

SINGLE STAGE ONLINE SAND FILTER MEDIA

TREATED WATER STORAGE TANK

BALIGATAN PUBLIC MARKET PUMPING STATION

BALIGATAN ELEMENTARY SCHOOL PUMPING STATION

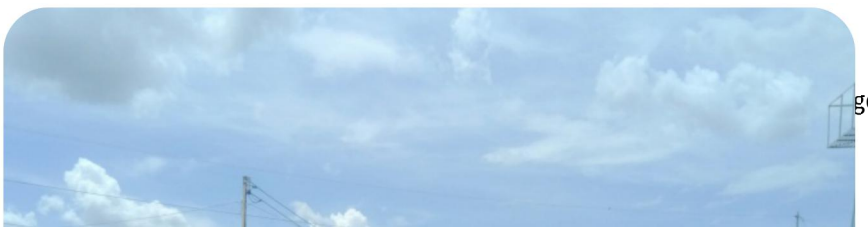
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
PUMPING STATION

ISABELA SPORTS COMPLEX PUMPING STATION

CALIFORNIA HOMES PUMPING STATION

ALIBAGU ELEMENTARY SCHOOL PUMPING STATION

CITY OF ILAGAN CENTRAL TERMINAL PUMPING STATION



NATIONAL HOUSING AUTHORITY I (NHA-I) PUMPING STATION

PUMP HOUSE

NATIONAL HOUSING AUTHORITY II (NHA-II) PUMPING STATION

BLISS PUMPING STATION

ALINGUIGAN 3RD PUMPING STATION

MARANA 1ST PUMPING STATION

MARANA 3rd PUMPING STATION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REPORT FORMS