



Coastal Municipalities Water Utility



Annual Report 2017



January 2018

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ACKNOWLEDGEMENT

This annual report has been prepared by the Coastal Municipalities Water Utility (CMWU), the report is mainly composed of all relevant activities progress schemes implemented from January to December 2017.

Special thanks are to PWA leadership for their input as a supportive regulator for the sector and to the Board of Directors of the Coastal Municipalities Water Utility for their valuable support in order to pass through the hard times and achieve CMWU's goals through implementing different activities and projects.

Thanks also continue to all CMWU's partners & donors to their continuous support in financing water and waste water projects such as ICRC, UNICEF, KFW, EU, OCHA, the Islamic Development Bank (IsDB), WB, USAID, AFD, Islamic Help, NRC, Oxfam, GVC, ACF, ANERA, UNDP, QRC, Muslim Hands, Islamic Relief, Save the Children, Qatar Charity, JICA, AECID, SIF, IAC and Welfare Association. High appreciation especially for ICRC and UNICEF for their interventions to bridge the gap in O&M activities to keep running the water and wastewater services. Without their supports it would have been difficult to overcome many of the humanitarian problems, also their assistance to implement some of emergency projects, upgrading activities, and operation supports to avoid environmental disasters and further deterioration of the water sector as their interventions are the reason behind keeping the provision of the adequate level of water supply and wastewater collection in Gaza Strip.

EXECUTIVE SUMMARY

Throughout this year, the CMWU teams manage and carry out all normal operations and maintenance tasks with all monitoring programs set as per several utility performance indicators. The overall hydraulic efficiency of the existing water distribution networks is **68.3%** with **31.7%** of Non-Revenue Water (NRW) for Middle, Khanyounis and Rafah governorates. Water Wells functionality efficiency is **98%**, water disinfection efficiency is over **99.2%**. Also, manage weekly quality monitoring program for all wastewater treatment plants through utilizing CMWU central lab and sampling program based on environment management plan procedures. Despite of catastrophic deterioration electric power supply connected to various wastewater treatment plants all over Gaza strip and having most of the plants hydraulically and biologically overloaded, the records showed satisfactorily progressive achievement for the task of **75%** average removal efficiency as per the target for the year 2017.

The CMWU carries out more than **392** predictive, preventive and corrective maintenance job orders at various areas for the existing **396** back up electric power supply generators that heavily and severely affected by long daily hours of operations which create lots of repair and maintenance needs and parts. Also, **3.03** million liters of Diesel fuel supplies have been distributed towards back up electric Diesel generating sets located at various water and wastewater pumping and treatment facilities spread all over Gaza strip governorates, to overcome and minimize harmful effect of long hours of daily electricity cut off approaching more than 16 hours a day.

The CMWU carries out on time reactions with all programmed inspections and preventive maintenance requirements for all water and wastewater facilities, more than **1040** repair job orders were carried out during 2017 for all municipalities.

Moreover, and due to the deteriorated economic situations that the Gaza strip faces under political division, alleged reconciliation procedures (salaries deduction percentages, Early retirement, etc..), and siege continuity, the collection ratios in the Southern Governorates declined from 48% in the first quarter of 2017 to **36%** as an average by the end of December 2017.

On the other hand, other activities are on-going:

1. The construction of STLV seawater desalination plant 6,000 m³/day; which is funded by EU and implemented by UNICEF in cooperation with PWA and CMWU is operated while the second phase agreement between PWA, CMWU, UNICEF and EU to reach 20,000m³/day is signed and the project is under design stage.

2. As a complementary program to desalination plants, the CMWU in cooperation with PWA is constructing a two water tanks, carrier water lines and pumping stations in El Amal and El Satar areas through EU fund.
3. The construction of the of Gaza sea water desalination plant (10,000 m³/day) as part of the STLV funded by IsDB is in progress
4. The implementation of some strategic storm water projects through Gaza Strip governorates were accomplished like; Al Amal storm water collection and infiltration pond, the Western Rafah storm water project, and Al Qarara Storm water pond to mitigate the targeted areas from frequent floods in winter season, and infiltrate the storm water to the aquifer.
5. WISSIP projects which is financed by the WB and multi-donors have been accomplished and the program is closed by December 2017
6. USAID in cooperation with PWA and CMWU have completed the construction of four reservoirs where; construction of another four water reservoirs is ongoing in Maghazi, burij, Dair El Balah and Rafah. Also, the work is ongoing in the expansion of middle area desalination plant to increase the capacity from 2600 m³/day to reach 6000 m³/day as part of the STLV.
7. The CMWU in cooperation with UNICEF are implementing through USAID fund a Storm water detention basin of 140,000-m³ capacity and a pumping station of 1500 m³ /hr to collect the Storm water from Nujili and Abeda depression zones in Rafah.

INTRODUCTION

Throughout 2017 year, all efforts and activities have been directed towards implementing the essential required water and wastewater projects and managing a set of operational and maintenance tasks which are playing a great role to improve the level of services for the people in the Gaza strip. Hence to achieve the following;

- a) Keep managing and monitoring the performance indicators since they are very important to keep the functionality of the utility.
- b) Coordinate among CMWU different departments of head quarter and the Regional offices to improve the performance indicators; especially the collection system and treatment efficiencies.
- c) Plan for projects in coherence with the CMWU and national strategic plans.

During the past year, CMWU teams through several funding agencies such as ICRC, UNICEF, KFW, WB EU and ISDB continue upgrade, rehabilitate, and resize the water and wastewater facilities and infrastructures to improve the water and wastewater services.

However, the implementation of different interventions has been facing a number of obstacles and restrictions to get the needed materials and equipment across the commercial gates except for minimum requirements of living and some selective materials because of the complicated enforced system called the Gaza Reconstruction and Materials Mechanism System (GRAMMS). As an example ; the Gaza sea water desalination plant project was loaded two years ago on the GRAMMS with serial No. 1769 but until today there is no approval for its technical dual use items .

These restrictions and control over materials and equipment deliveries through the borders gates have continued to cause several development strategies and plans to be in a noticeable delay and have affected on PWA and CMWU efforts to keep the service running without any main or major breakdown.

The continuity of the electricity problem and unreliable sources is still the reason behind the negative impacts on the operational schemes of most of the water and wastewater facilities including water wells, pumping facilities besides the treatment plants. This fluctuated electrical current creates a lot of damages and loss of services at various sites.

Several financing and humanitarian agencies e.g. ICRC, UNICEF, ISDB, UNRWA, WB, OCHA (HRF), KFW.... etc. have continued to play their great roles to assist and facilitate the delivery of fuel and materials but with limited capabilities and interventions. Therefore, it has become relatively so difficult to fulfil, complete, and operate other strategic projects in the due time.

Meanwhile, the difficulties are everywhere in the service area; so the challenges are the motivated forces to CMWU staff to run the services and even sometimes attract the donors to implement some of the developmental projects.

Therefore, CMWU teamwork continues to manage and implement various repair, refurbishment and overhauling works related to more than **284** water wells, **38** water Storage tanks, **46** small scale brackish water desalination plants, **2** Sea water desalination plants, **22** water Booster stations, **55** wastewater pumping stations, **5** waste water treatment plants, water networks, storm water networks, sewage collection networks and basins with all associated equipment and systems upgrading and monitoring requirements. Purpose has been kept with high level of response towards several events of preventive and corrective repair and maintenance activities to minimize the risk of breakdown and operation time loss. Therefore, the CMWU has launched many services contracts during this period of the project, with local contractors for specialized upgrading, maintenance and repair needs e.g. generators, deep well water pumping sets...etc.

1- TECHNICAL PROGRESS ACTIVITIES

This report describes the progress achieved during the period from January to December 2017 in order to achieve the CMWU's targeted indicators. The running activities are being classified into different categories such as water wells activities; water desalination plants, water networks and metering management and disinfection activities, water storage tanks, wastewater pumping stations, networks and treatment plants activities with all associated follow up mechanical and electrical upgrading, refurbishment and repair activities.

IMPROVING QUALITY & QUANTITY OF WATER

A. Improve the Water Quantities

A.1 Overall Water Distribution System Efficiency

Throughout 2017, CMWU continue managing, implementing and monitoring various programs and provide all relevant resources in order to improve the overall efficiency of the existing water distribution networking systems and reduce the quantities of Non-Revenue Water (NRW) down to 31.7% in the Southern Governorates. The annual records and monitoring data base showed that the hydraulic system efficiency is 68.3% so the target for the year is reached. CMWU believes that through the initiatives and procedures currently in place will allow the system efficiency to be monitored and improved with similar focus in the future.

The improved management of data introduced by CMWU continues to be a valuable tool to monitor and report the overall system efficiency each month. Meter readings continue to be collected by the Municipalities and CMWU regional areas' staff. Although new data collection and verification procedures were introduced, some difficulties were experienced in the municipal reports; this required CMWU to perform additional verification crosschecking and refinement of the submitted figures.

The overall annual system efficiencies recorded are as follows:

Table 1. Overall Annual Water Networks System Efficiencies -Year 2017 /Middle and Southern Governorates

Monthly Water Distribution Efficiency Report for 2017				
Monthly Average Values- South-Middle Areas				
No.	Month	Water production m ³	Water billed m ³	System Efficiency %
1	Jan-17	2,798,903	2,014,792	72.0%
2	Feb-17	2,746,427	1,929,912	70.3%
3	Mar-17	3,081,306	1,928,419	62.6%
4	Apr-17	3,006,905	2,102,504	69.9%
5	May-17	3,069,774	2,082,340	67.8%
6	Jun-17	3,255,866	2,107,362	64.7%
7	Jul-17	3,433,877	2,236,932	65.1%
8	Aug-17	3,555,936	2,285,176	64.3%
9	Sep-17	3,460,931	2,432,475	70.3%
10	Oct-17	3,300,134	2,332,425	70.7%
11	Nov-17	3,104,609	2,231,392	71.9%
12	Dec-17	2,832,314	2,033,370	71.8%
Total		37,646,982	25,717,099	68.3%

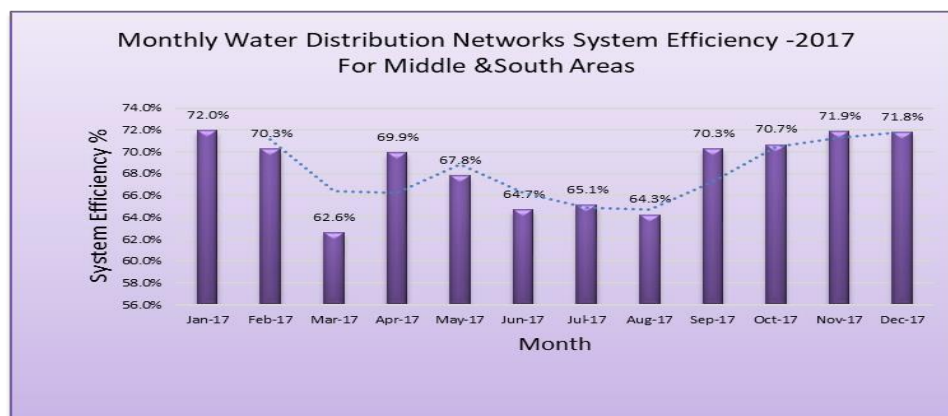


Figure 1: Overall Annual Water Networks System Efficiencies -Year 2017 /Middle and Southern Governorates

The normal trends of behavior and increase or decrease for system efficiency of water distribution networks in the case of Gaza strip are subject to the seasonal water demand

requirements and temperature conditions. Therefore, system efficiency increases during winter months and starts to decrease when it becomes hotter where illegal connections especially used for irrigation which form about 17% of Non-Revenue Water (NRW) consumes a lot of water during hot weather and negatively affects the whole system efficiency.

The efforts and initiatives to improve the system efficiency have continued during year 2017; with great efforts towards legalization of illegal connections, and reduce the leakage and other losses, these are outlined below:

- Network Rehabilitation:

The water mains rehabilitation and repair program all over the Gaza Strip have continued to be applied by CMWU repair and maintenance team through the KFW, ICRC, UNICEF & ACF, and other interventions; in addition to the works done by CMWU mobile workshop specialized for such purposes. All the sites have been successfully handed over and operated again. The work for the construction and rehabilitation programs of water distribution networks were carried out based on criteria that was oriented towards reducing the unaccounted for water of both commercial and technical characteristics including disconnection of illegal connections. A comprehensive network repair and maintenance program was introduced to the targeted areas during the year 2017. Several works of water networks repairs were directly initiated and applied for all emergency repairs to assure water supply system continuity at various areas of Gaza strip municipalities.

This program has been implemented in co-operation with the municipalities and regional offices network repair staff. CMWU procures the repair materials and issues them to the teams in a well-controlled procedure. The Municipal crews carry out the repairs under the supervision and support of the CMWU's staff. Repair materials including repair clamps, MDPE fittings and joints and couplings continue to be issued to the municipalities from CMWU central warehouse.

A summary of **1087 repair jobs** performed during the period from January to end of December 2017 are listed in the following table provided here below:

Table 2. Networks Repair Jobs January – December 2017

Annual Water Networks Repair Monitoring Records - Number of repairs-YEAR 2017													
No.	Municipality	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	AlZahra	0	2	3	0	4	2	0	5	3	1	1	3
2	Wadi Gaza	1	3	1	0	5	0	1	4	2	1	5	4
3	Musader	1	1	2	0	1	4		0	1	2	1	3
4	WadiAl salqa	2	1	0	1	2	1	2	0	1	2	1	1
5	Moghrakah	2	1	1	3	1	1	3	2	0	2	5	4
6	Buraij	3	3	4	2	3	1	4	3	4	2	3	3
7	Maghazi	2	3	1	3	3	3	4	1	2	3	2	4
8	Deir Balah	2	4	8	4	14	11	8	7	8	6	7	9
9	Zuwaida	2	1	3	5	3	8	3	2	3	2	3	4
10	Nusirat	3	5	5	11	7	9	12	5	8	6	8	5
11	Khan Younis	16	14	21	13	16	19	19	21	23	18	19	18
12	Khoza'a	3	1	1	4	4	2	3	3	2	1	2	2
13	Qarrara	2	2	4	2	4	5	2	2	4	2	1	2
14	Abassan Kabira	2	2	1	3	2	2	11	4	3	3	2	2
15	Bani Suhaila	1	5	3	4	1	3	6	1	1	4	1	3
16	Abassan Jadidah	1	2	1	2	3	2	2	3	4	1	2	1
17	AlFukhari	2	1	3	4	1	2	1	2	1	2	2	2
18	AlNaser	3	3	2	1	3	1	3	2	1	1	1	2
19	Alshokah	2	1	4	3	1	2	1	3	2	1	3	3
20	Rafah	22	19	26	27	19	25	27	20	19	25	15	17
Total		72	74	94	92	97	103	112	90	92	85	84	92
Total Networks Repairs		1087											

This program of water distribution networks' repairs has contributed significantly to the reduction of the unaccounted for water. CMWU anticipates that through the efforts put into this task and the procedures developed; the network repair and maintenance program will continue with a similar focus in the future.

- Meter Installation:

The meter installation program has been initiated and continued during the period of this report. It is anticipated that the effect of the installation of new accurate meters, particularly replacing blocked meters, will continue to improve the overall efficiency of the system. During the period of 12 months of year 2017, a total of **629** meters were issued and installed throughout different areas to replace blocked meters and to provide for new connections as well.

The meter installation program has continued to cover non-metered buildings including Hospitals, Schools, Mosques, Universities, Parks, etc. which are consuming water that is unaccounted for either financially in terms of revenues, or technically in terms of cubic meters of water consumed. The meter readings for these buildings are considered. Usually there are reconciliations among the municipalities, the CMWU and Ministry of Finance with regard to water bills for public buildings in lieu of health insurance for employees.

The tables below illustrate the production and consumption for each municipality on a monthly basis during the past year including the received quantities from MEKEROT.

Table 3. Total Annual Production 2017:

No.	Municipality	Monthly Water Wells Production (m ³) - Year 2017												Total Annual Production m ³
		January	February	March	April	May	June	July	August	September	October	November	December	
		m ³	m ³	m ³	m ³	m ³	m ³	m ³	m ³	m ³	m ³	m ³	m ³	
1	Um Al Nasser	17,330	17,270	17,330	20,500	22,920	25,000	28,000	28,890	30,400	28,000	31,702	19,701	287,043
2	Beit Hanoun	231,450	217,110	319,660	324,430	310,800	309,610	310,740	313,450	319,580	322,610	287,640	237,240	3,504,320
3	Beit Lahia	426,890	397,088	382,949	442,135	401,649	313,374	426,429	368,215	388,436	471,869	542,018	433,052	4,994,104
4	Jabalia	974,076	860,042	1,081,519	948,250	1,053,561	924,089	944,805	1,014,608	1,071,337	936,165	1,021,971	957,548	11,787,971
5	Gaza	1,987,822	1,903,343	2,183,453	2,080,371	1,807,637	2,281,451	1,900,581	1,969,455	2,407,098	2,205,666	2,244,654	1,696,895	24,668,426
6	Wady Gaza	10,126	9,566	9,999	13,548	13,111	15,680	14,469	12,360	10,111	9,220	8,818	8,149	135,157
7	Al Moghraka	65,510	58,010	56,840	47,760	50,550	55,600	59,820	60,310	86,780	63,790	56,830	40,000	701,800
8	Al Zahra	18,977	12,029	29,582	25,505	24,765	34,947	33,919	34,868	36,146	34,956	39,988	29,958	355,640
9	Al Nusseirate	230,280	224,770	278,970	258,764	249,820	308,004	332,616	292,450	364,930	278,700	261,340	244,520	3,325,164
10	Al Burij	111,888	87,771	118,997	124,239	124,720	130,327	136,188	149,025	157,070	155,530	146,044	120,379	1,562,178
11	Al Maghazy	53,310	67,992	66,871	69,065	78,685	78,865	93,240	103,161	101,180	90,505	85,455	68,927	957,256
12	Al Zawaida	95,288	61,383	84,909	85,079	80,490	98,426	108,405	112,784	90,480	86,681	80,186	70,797	1,054,908
13	Al Mussader	15,508	10,468	13,792	14,389	20,990	17,456	17,708	21,771	13,607	21,858	19,273	11,201	198,021
14	Deir Al Balah	306,611	364,681	380,579	335,951	332,772	322,346	368,578	377,795	389,529	386,677	328,756	332,391	4,226,666
15	Wady Al Salqa	12,890	11,210	21,300	17,180	20,860	27,270	28,530	31,120	21,370	16,990	18,020	14,270	241,010
16	Al Qrara	96,860	98,370	97,750	103,840	104,160	103,130	131,801	145,696	137,665	115,716	120,986	99,782	1,355,756
17	Khanyounis	651,312	651,382	711,861	692,169	722,529	720,529	751,349	794,892	769,571	752,194	719,751	712,588	8,650,127
18	Bani Suhila	33,657	43,766	74,387	89,360	117,346	138,687	134,028	165,658	103,231	71,791	49,744	30,271	1,051,926
19	Abssan Al Kabera	15,183	20,211	24,296	29,777	26,622	41,814	44,231	52,925	44,794	27,704	21,592	6,325	355,476
20	Abssan Al Jadedda**	4,712	6,272	7,540	9,241	8,262	12,977	10,623	13,322	10,798	5,774	4,771	1,963	96,255
21	Khezaa**	7,853	10,454	12,567	15,402	13,770	21,628	18,706	23,203	19,837	13,553	14,441	5,272	176,685
22	Al Fokhary	24,490	22,575	25,620	24,855	23,915	23,310	22,645	25,625	24,275	23,975	23,700	21,055	286,040
23	Al Nasser	35,020	34,410	40,610	36,840	35,770	37,310	33,140	38,100	31,030	31,530	25,960	29,150	408,870
24	Al Shuka	34,030	31,920	38,260	29,920	32,930	34,160	37,100	37,400	36,170	32,350	35,890	33,720	413,850
25	Rafah	624,803	592,630	687,830	648,124	652,475	715,976	730,037	741,881	694,647	701,886	632,334	572,524	7,995,147
Total Monthly Production (m ³)		6,085,877	5,814,724	6,767,471	6,486,694	6,331,109	6,791,966	6,717,688	6,928,964	7,360,072	6,885,689	6,821,864	5,797,678	78,789,796

Table 4. Total annual MEKEROT Water supply (Israel Line), (m³): January-December 2017

Municipality		Monthly Mekerot Water Supply (m³) - Year 2017												Total Annual Mekerot Supply
		January	February	March	April	May	June	July	August	September	October	November	December	
		m³	m³	m³	m³	m³	m³	m³	m³	m³	m³	m³	m³	
Al Nussierat	خط ميفروت	79,400	68,500	78,500	79,000	75,000	73,800	81,400	71,800	81,300	105,700	99,800	85,000	979,200
ALBurij	خط ميفروت	30,670	37,320	24,710	24,350	13,800	13,228	14,700	12,280	9,326	3,370	7,220	4,370	195,344
Al Maghazi	ميفروت - المدرسة الحادية	1,114	917	1,789	1,754	63	63	59	290	108	78	6,676	112	13,023
	ميفروت - عيادة الولادة	5,089	4,395	513	717	2,165	2,165	3,743	3,156	2,230	14,326	9,977	6,050	54,526
	ميفروت - رعاية نطق	3,481	3,642	5,155	4,746	1,827	1,827	2,597	1,820	2,490	3,520	3,653	2,118	36,876
	ميفروت - الرعاية الصحية	25,847	23,932	24,281	23,630	24,077	24,077	25,907	25,155	25,069	11,501	15,504	33,122	282,102
Bani Suhaila	ميفروت	84,403	71,444	61,203	66,830	71,514	80,393	69,502	81,812	71,169	91,269	105,086	101,519	956,144
Abssan Al Kabera	ميفروت	62,017	65,689	53,804	84,623	85,378	58,786	76,369	72,075	85,206	88,396	90,728	84,995	908,064
Abssan Al Jadeda	ميفروت	25,218	23,818	19,520	22,759	29,968	23,693	25,397	26,858	25,272	27,676	26,209	24,317	300,705
Khezaa	ميفروت	34,683	23,379	24,373	35,483	37,155	39,392	40,474	41,653	33,480	45,158	45,877	37,469	438,577
GAZA		421,900	620,666	506,734	521,200	645,700	644,200	511,600	444,100	467,683	557,700	528,100	532,100	6,401,683
Total Mekerot Water m³		773,822	943,702	800,582	865,092	986,647	961,624	851,748	780,999	803,333	948,694	938,830	911,172	10,566,244

Table 5. Total Annual Water Supply - From January to December 2017

Water Supply Categories	Monthly Water Supply (m³) - Year 2017												Total Annual Water Supply
	January	February	March	April	May	June	July	August	September	October	November	December	
	m³	m³	m³	m³	m³	m³	m³	m³	m³	m³	m³	m³	
Total Production m³- Water Wells	6,085,876	5,814,723	6,767,471	6,486,694	6,331,109	6,791,966	6,717,688	6,928,964	7,360,072	6,885,690	6,821,864	5,797,678	78,789,796
Total Mekerot Water m³	773,822	943,702	800,582	865,092	986,647	961,624	851,748	780,999	803,333	948,694	938,830	911,172	10,566,244
Total Monthly water supply (m³) -Year 2017	6,859,698	6,758,425	7,568,053	7,351,786	7,317,756	7,753,590	7,569,436	7,709,963	8,163,405	7,834,384	7,760,694	6,708,850	89,356,040

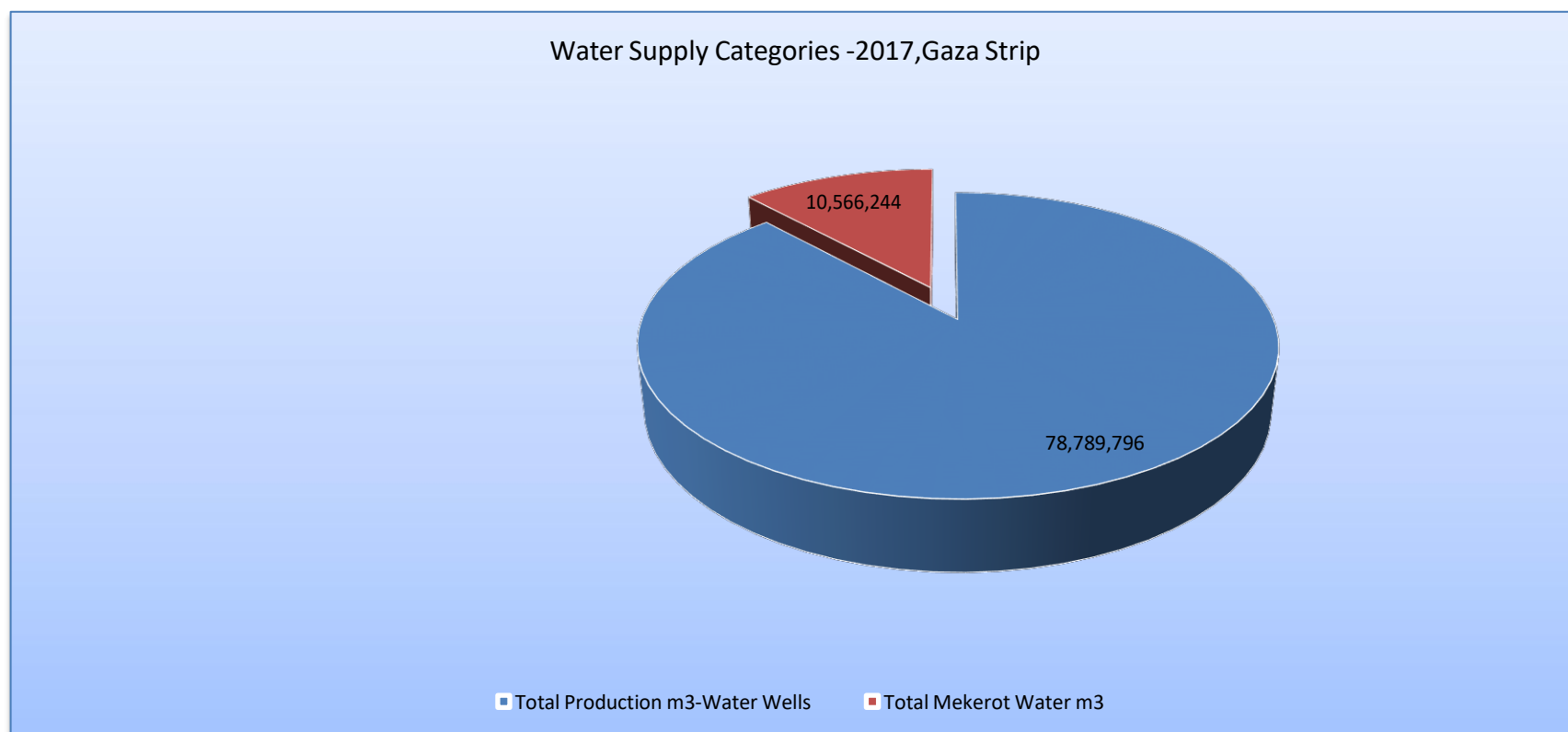


Figure 2: Total annual water supply (m³) January-December 2017

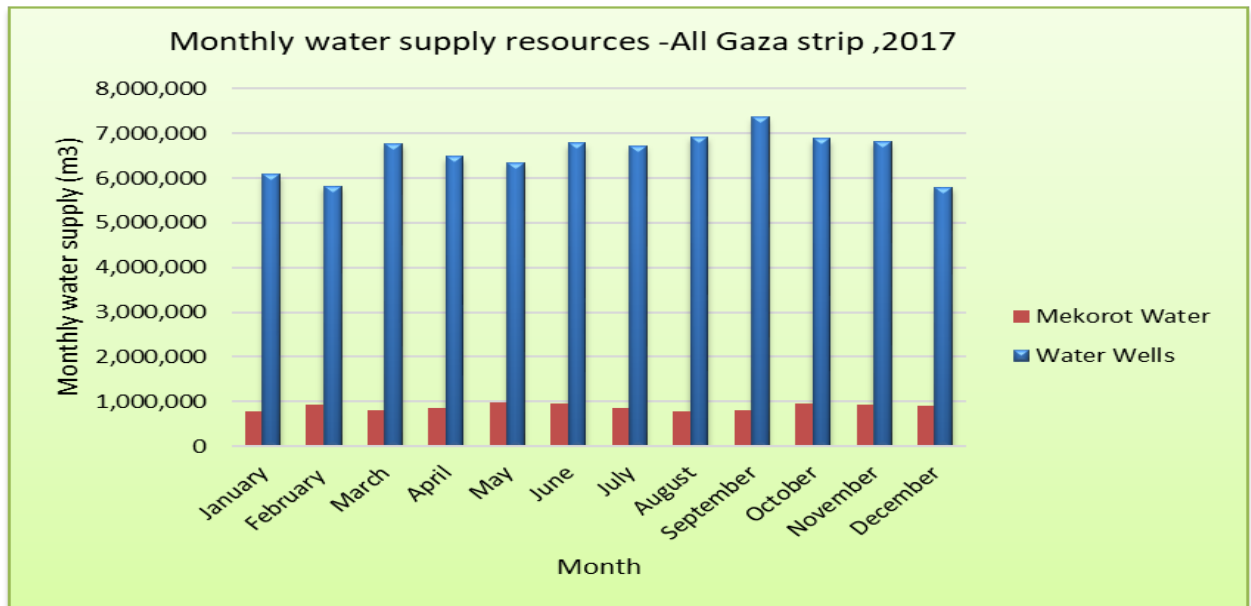


Figure 3: Total annual Production (m³) January-December 2017

Table 6. Water Quota L/C/D-Consumption side: January-December 2017

No.	Municipality	Annual Water Production	Annual Water supplied	Total Annual Water supplied from different	served Population	Non Revenue Water -NRW	Total Annual Water	Daily Water Consumption Rate (Quota)
		m³	m³	m³	Capita	%	m³	liter/c/day
1	Um Al Nasser	287043	0	287043	4127	27%	209828	139
2	Beit Hanoun	3504320	0	3504320	55859	43%	1997462	98
3	Beit Lahia	4994104	0	4994104	94634	44%	2796698	81
4	Jabalia	11787971	0	11787971	242148	43%	6719143	76
5	Gaza	24668426	6401683	31070109	672739	35%	20195571	82
6	Wady Gaza	135157	0	135157	4060	33%	90015	61
7	Al Moghraka	701800	0	701800	9089	47%	369849	111
8	Al Zahra	355640	0	355640	4290	30%	248592	159
9	Al Nusseirate	3325164	979200	4304364	91644	36%	2759097	82
10	Al Burij	1562178	195344	1757522	47910	32%	1195115	68
11	Al Maghazy	957256	386527	1343783	32000	39%	814332	70
12	Al Zawaida	1054908	0	1054908	23972	32%	720502	82
13	Al Mussader	198021	0	198021	2650	41%	117228	121
14	Deir Al Balah	4226666	0	4226666	86150	37%	2650120	84
15	Wady Al Salq	241010	0	241010	6538	34%	158826	67
16	Al Qrara	1355756	0	1355756	27469	33%	907001	90
17	Khanyounis	8650127	0	8650127	250590	28%	6202141	68
18	Bani Suhila	1051926	956144	2008070	44052	32%	1363480	85
19	Abssan Al Ka	355476	908064	1263540	25586	18%	1041157	111
20	Abssan Al jad	96255	300705	396960	8429	20%	318759	104
21	Khezaa	176685	438577	615262	12710	26%	455294	98
22	Al Fokhary	286040	0	286040	7696	28%	206521	74
23	Al Nasser	408870	0	408870	9012	21%	324234	99
24	Al Shuka	413850	0	413850	15334	17%	343496	61
25	Rafah	7995147	0	7995147	223354	32%	5444695	67
Total (m³)		78,789,796	10,566,244	89,356,040	2,002,042		57,649,156	79

**: The water quota supplied to the people was drastically affected in some areas by continual prevailing conditions of electricity cut off and the lack of enough fuel for standby power supply generators required to pump and operate the water production wells and pumping facilities.

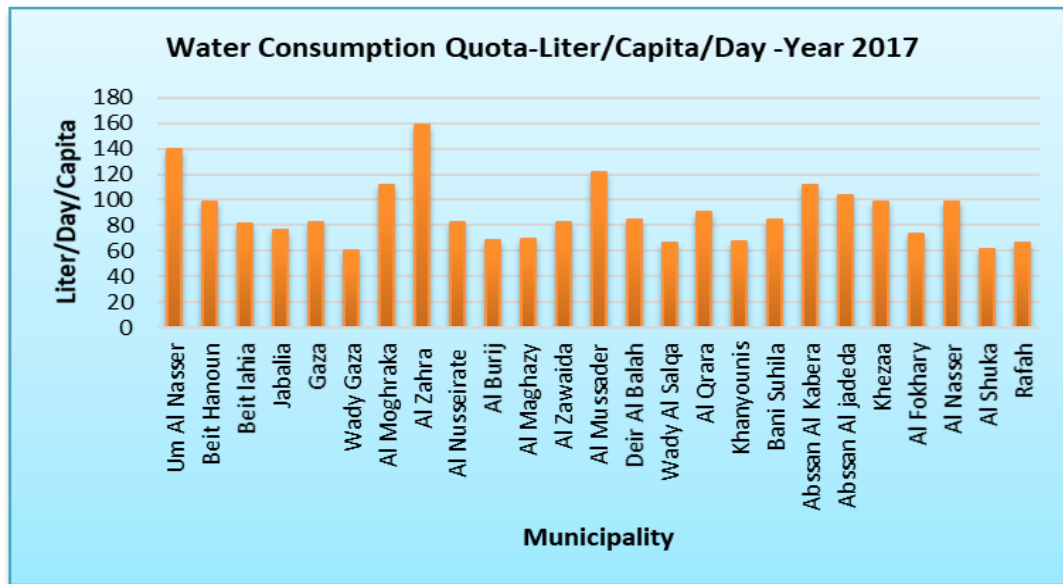


Figure 4 : Water Quota L/C/D-Consumption side: January-December 2017

A.2 Improve Water Facilities

1- Construction New Water Wells

In coherence with the PWA national plan to reallocate, resizing, and closing some designated water wells through the Gaza Strip in order to decrease water abstraction from the aquifer and improve the water quality as well; therefore, there is no new water well-constructed during the past year 2017, however there is an on-going project to construct Al Mosader water well through Muslim Hands fund started 2016 and still waiting materials entry to be completed.



Figure 5: Al Mosadar water well

2- Electrical Refurbishment, Upgrading and Repairs Installations

CMWU has continued to carry out and manage all electromechanical works and installations required to improve the functionality of the water wells and other associated systems providing for optimum operating and maintenance conditions. This will secure and safeguard the water productivity level over different seasonal periods of demand and throughout regional areas.

CMWU have continued its strategy towards the electrification of all newly constructed water wells and other water facilities e.g water tanks with booster stations, desalination plants and some of existing wells by connecting them to the public electricity gridlines, all in coordination with Gaza Electricity Distribution Co. (GEDCO). The electrification activities include the followings:

- The installation of both high and low tension electrical grid lines with all associated transformers for some water facilities have been already initiated while there are still other facilities waiting the materials entry to Gaza Strip in order to complete connecting all the facilities with electricity.
- The quality of the available power supply was very bad as the voltage drop reached 30% in certain areas like Rafah, Al Shoka and Khanyounis. Therefore, additional step up transformers had been installed to secure electrical services for water facilities e.g. water wells and protect it against harmful voltage drop.
- Supply and install some standby power supply generating sets at various water wells and pumping sites to overcome the problems of electricity cut-offs which occur daily in Gaza strip.

Due to unavailability of spare parts resulting from continual security control by Israel authorities over the materials supplied across the borders and dual use classification, severe shortages of essentially required spare parts have been encountered. Due to this process CMWU still facing problems in transferring materials to Gaza especially the electrical materials like all types of power and control cables, soft starters, variable speed drivers, electrical and electronic instruments.... etc. Fortunately, some of the required material were available in CMWU main warehouse, and have been used for electrical repairs and maintenance works in several water and waste water facilities during the past year. Therefore, more than 220 job orders have been issued either for rectifying or repairing some damages or to apply the routine and corrective maintenance in the water facilities.

- 1- More than 350 standby generators located throughout water and wastewater facilities of rated power ranges from 50KVA to 900KVA are continued to be well maintained, repaired

and serviced by CMWU team works and specialized repair and service contracts arranged with local generators dealers.

- 2- Continue to carry out and manage remote monitoring system for water wells, whereas additional 10 sites have been added to the existing system of four pilot water wells sites. The system was initially designed to register for faults notification and some data acquisition.
- 3- In addition to some different repairs occurred and repaired during the past year at the water facilities sites such as:
 - Power supply connections and cabling between the grid and the electrical control switch board.
 - Repair and upgrading of PLC controllers
 - Replacement of control instrumentation e.g. pressure switches...etc
 - Repair and maintenance of electrical faults related to pumps electrical drive motors and associated systems.
 - Electrical upgrading and repair of control switchboards.

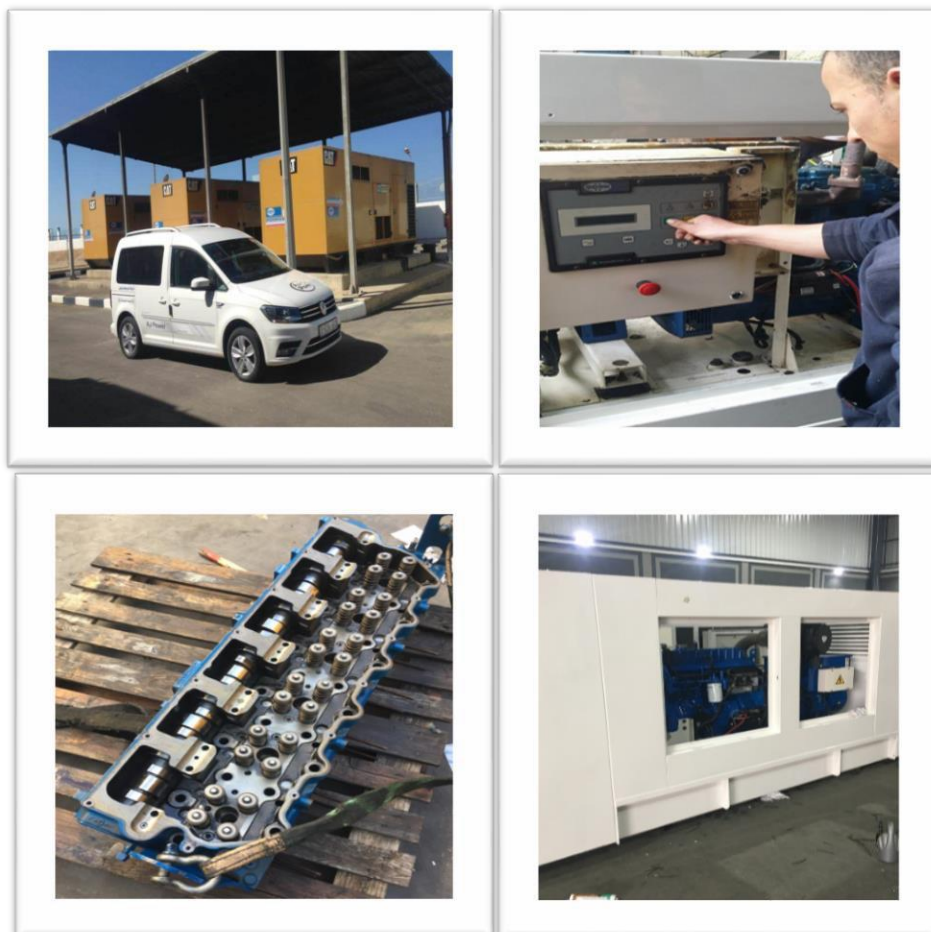


Figure 6: Part of Electrical works

3- Mechanical Refurbishment, Upgrading and Repairs Installations

During the period of this report from January to December 2017, several mechanical refurbishment repairs, upgrading works and repair installations have been continued to be managed and carried out at various operating water facilities. Purpose has been applied to keep the existing and the new water installations functioning well to cover service demands and improve the level of reactivity towards some operational constraints such as unreliable power supply and shortages of spare parts and fuel supplies. Besides carrying out and on time reactions with all programmed inspections and preventive maintenance requirements for all water sites with all associated minor repairs and adjustment works; the regular continuous repairs and maintenance works besides major upgrading works have been provided and completed for several water wells, water tanks and pumping water sites listed here below:

- supply and install complete, vertical turbine water pumping unit 180 m³/hr at a total head of (30) m, manifold, hollow shaft electric motor, and screen for Al Bassa D.P – Deair Al Balah.
- Dismantle and Reassembles vertical discharge pipes connecting and all associated fittings deep well submersible water pumping set out of the borehole for several water wells with different depth in the sites listed here below:
 - EV1-Bani Suhila Municipality
 - Al Aqsa- Al Nusirat Municipality
 - AL Amal- Khanuonis Municipality
 - Al Nada- Bit Hanoun Municipality
 - Al Montaza- Bit lahya Municipality
 - Al Safa- Gaza Municipality
- Supply, install and test 8" & 4" membranes and cartridge filter house for main desalination plant different sites listed here below:
 - Al Nada D.P- Bit Lahya Municipality
 - Al Omary D.P, Al Khazan D.P, Yafa D.P, Al Shanti D.P – Jabalia
 - Abu Naser- Dair Al Balah
 - Al Satar D.P, Al madina Al Riadya D.P, Al Amal Obic D.P- Khanuonis
- Supply and install 6 caps for the house membranes and steel plate for fix the new cartridge filter For El Madyna'a El Reyadia DP-Khanyounis
- Quantity of membranes is 46, the works include supply and install 6 stainless steel 316l cartridge filter house.
- Supply and install 5.5 Hp , pump for El Najjar Desalination Plant in Bani Suhaila'a with all fittings to complete the installation.
- Supply and install brackish desalination plant with full capacity 100 m³/day for Dair Al Balah municipality at Al Montaza Water well-funded by UNICEF.

- Refurbishment and repair of the whole 8", 6" and 4" steel manifolds and including sand blast, welding, painting works for the whole manifold. The works include all required nuts, washers, bolts, open flanges, reducers, dressers, stainless steel Grade 316L chlorine nozzle and any related fittings for 2 main reservoirs and 5 water wells.
- Refurbishment and repair of water wells' exit pumping manifolds.
- Replacement of deteriorated sand removal hydro cyclones.
- Supply and install complete cooling system with all associated electrical and mechanical connections to cool down rubber inserts of pump bronze bearings for 3 water wells.
- Supply and install pressure switch up to 12 bar with all associated electrical and mechanical connections to safe the pump from high-pressure case, for six water wells located throughout various sites from Rafah to Bait Hanoon.
- Supply and install pressure gage up to 15 bar with all associated connections to safe the pump from high-pressure case, for 22 water wells located throughout various sites from Rafah to Bait Hanoon.
- Supply and install PN16, 6" steel manifold with associated materials like valves, hydro cyclone, non-return valve, air release valves and water meter for Al Montaza water well in Bait Lahya municipality.
- Supply and install PN16, 4" cement lined steel manifold and materials like valves, hydro cyclone, non-return valves, air release valves and water meter for Al Sahel4, K20, water wells at Dair al Balah municipality and al Kawthar reservoir at Al Moghraqa municipality.
- Mechanical repair of deep well vertical turbine water pumping sets and submersible pumps of water wells, whereas 44 main jobs for vertical turbine pumps replacement were accomplished
- Repair and refurbishment for 11 brackish water desalination plants BWDP:
 1. Al Montaza D.P, Al Nada D.P- Bit Lahya Municipality
 2. Al Omary D.P, Al Khazan D.P, Yafa D.P, Al Shanti D.P – Jabalia
 3. Abu Naser- Dair Al Balah
 4. Al Satar D.P, Al madina Al Riadya D.P, Al Amal Obic D.P- Khanuonis
- Rewinding of (40-150) HP hollow shaft electric vertical motor for 15 water wells and boosters located throughout various sites from Rafah to Bait Hanoon.
- Change upper and lower bearings of (40 to 150) HP hollow shaft electric vertical motor for 33 water wells and Boosters located throughout various sites from Rafah to Bait Hanoon.

- Electromechanical rehabilitation, upgrading and repair works and installations of various water facilities including wells and reservoirs located at various sites throughout Gaza strip governorates and municipalities
- Refurbishment and repair of water wells' exit pumping manifolds.
- Replacement of deteriorated sand removal hydro cyclones.
- Carry out 67 jobs of repairs, replacement, new installations and M&E works for chlorine dosing systems which are essentially required for water disinfection systems throughout all water production facilities.
- Manage and carry out complete mechanical overhauling and refurbishment of pumping manifolds for water wells where 22 sites in Khanyounis and Rafah and the middle area have been covered during the year 2017.

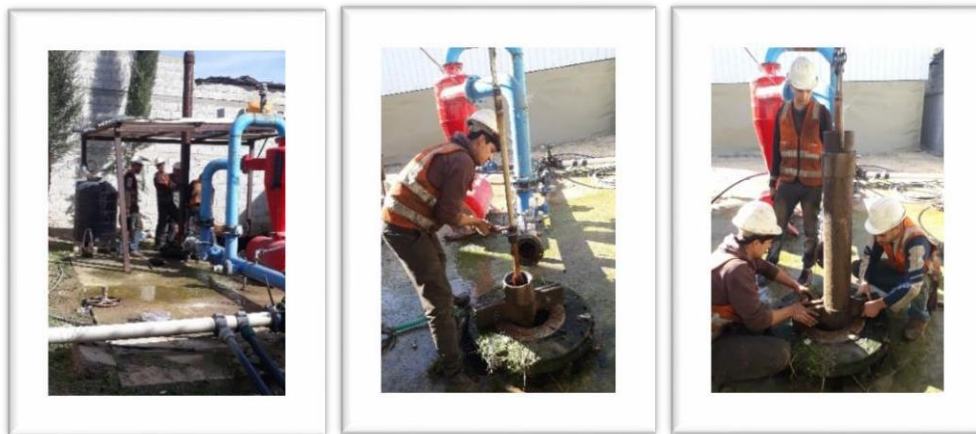


Figure 7: Water facilities Repair, Refurbishment and Rehabilitation Works

The repair records showed that more than **389** predictive, preventive and corrective maintenance job orders were carried out and applied at various areas. While, the registry of major mechanical & electrical repairs, and maintenance job orders reached 285 of various repairs.

In addition to all the above mentioned activities the **Mobile mechanical maintenance and repair workshop** also implemented list of activities to assure the services continuity such as:

- The mobile mechanical service maintenance unit established by CMWU continues to provide all metal works repairs for various municipal water wells and other facilities including specialized pipelines connections which used to be repaired in the past by private services contractor.
- Mechanical repairs and refurbishment of 11 water pumping manifolds for both water and wastewater pumping stations.

- Repair and adjustment of 22 water meters for water wells exits
- Mechanical repair of water distribution valves on the network throughout all operating areas of Gaza strip.
- Carry out several water and wastewater networks repairs, replacement and reconnection works at various CMWU operational areas along Gaza strip.
- The team was involved in different emergency repairs carried out at various water and wastewater sites in Gaza strip.



Figure 8: Water facilities Repair, Refurbishment and Rehabilitation Works

4- Fuel Distribution

CMWU Continues to manage and monitor the supply and distribution of programmed Diesel fuel supplies to various standby power supply generators located at water wells, desalination and pumping facilities funded by WB, GCC/IDB, UNICEF, OCHA (HRF). This task has become one of the life supporting systems in Gaza strip which is essentially required to support water sector during harsh conditions of severe shortages and unreliable electricity supplies in Gaza strip from grid lines. Therefore, it has crucially become needed to operate standby generators and to safe guard satisfactory water supplies to the people in Gaza strip. The chart shows that during the year 2017 the distribution and supply of a **total 3,032,400 liters** of fuel have been managed by CMWU towards

various water and wastewater facilities all over Gaza strip governorates. This illustrates the crucial situation of unreliable grid electric supply in Gaza which suffer from daily cutoffs periods of more than 18 hours.

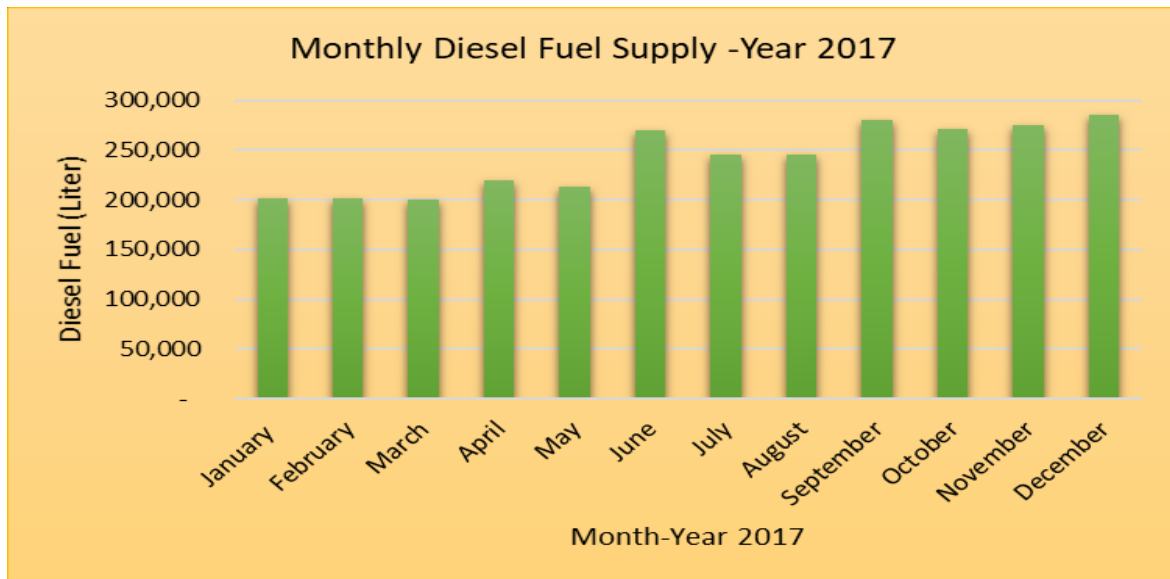


Figure 9: Monthly Diesel Fuel Supply Distribution Scheme -2017

All the mentioned rehabilitation and upgrading electrical and mechanical works ; besides the distributed quantities of fuel to operate the Standby generators have contributed to achieve the CMWU's indicators related to the water wells functionality, and energy consumption. This is despite the continual and endless prevailing conditions of unreliable electricity power supply and shortages that heavily and severely affected the generators and created lots of repair and maintenance needs and parts. Hereunder the achieved targets details.

A.1 Improve Water Wells Functionality

The functionality of Water Wells indicator aims to make sure that all breakdowns of water wells in Rafah Area, Khan younis Area and Middle Area will be rectified in a very short time to achieve the satisfaction of the water customers in those areas. The functionality and readiness of the water production wells will be measured on monthly basis by measuring the efficiency of the water well functionality in each area:

$$\frac{\sum Q_w}{\sum Q_w + D_m}$$

Water Well functionality Efficiency =

Where:

Qw: flow rate of each well.

Dw: No. of working days of each well in the month

Dm: No of days of the month

Water wells operating hours have been managed and recorded as per operational registry database representing the tool of measurement for the actual level of service ability and functionality. The records of each water well pumping facility against breakdown and repair down time hours have been traced and calculated for the targeted period from which the annual target of functionality efficiency for year 2017 has reached an excellent achievement of 98 % which express the high level of operational readiness for water wells.

It is worth to note that the availability of wells is measured and expressed in functionality efficiency, which is subject to the time, consumed (operating hours) to carry maintenance and repair activities for the whole targeted sites under normal conditions.

Despite the continuation of several operational constraints and difficulties by having unreliable electricity power supply from grid lines and shortages of spare parts and fuel supplies, CMWU team work with high level of determination has relatively succeeded to manage on time repairs and maintenance requirements. This reduces the negative impact of faults and breakdown events and safeguards the level of functionality for water wells which represent the major source of water in Gaza strip. Also, it is worth to mention that the collaborative efforts exerted by O&M team work to reach this level of cooperation with the abnormal situation are remarkable and unique.

The operational availability time for each well has kept secured and ready for operation as per the water demand at various regions. The repair records show that there are no more than two sites of water production wells at the same time out of service waiting for repair or refurbishment.

The monthly monitoring program of water wells functionality measured throughout the services targeted Southern and Middle areas for the year 2017 has been illustrated here below. Despite of catastrophic electricity deficit, which continued to occur during this year and its negative impact on the sequential occurrence of faults and number of repairs, the functionality efficiency and the overall annual target of 98% is achieved.

Table 7. The monthly water wells functionality efficiency -Middle and South Governorates -YEAR 2017

Month	Regional Area	Total No of working hours of all Wells hour	Monthly Water Production m ³	Sum of flow rates of all wells (QW) m ³ /hr	total No. of working days of all wells (Dw)	w e ighted value Qw * Dw	Wells Functionality Efficiency %	Monthly Functionality Efficiency %
January	Khan Youins Area	10966	799652	3104	1287	86911	93.34%	97.46%
	Middle Area	14406	921644	3926	1887	117615	99.85%	
	Rafah area	7590	624803	1697	626	50626	99.46%	
February	Khan Youins Area	11686	824482	2761	1314	82463	99.55%	98.63%
	Middle Area	12794	918360	4117	1855	120894	97.89%	
	Rafah area	338	28322	1566	626	46483	98.94%	
March	Khan Youins Area	13352	910791	3067	1300	90541	98.40%	98.92%
	Middle Area	15611	1060869	7434	1857	220956	99.08%	
	Rafah area	8167	687830	1767	626	52548	99.15%	
April	Khan Youins Area	12893	918379	2988	1270	84742	94.54%	96.86%
	Middle Area	15446	1005646	4087	1824	120138	97.97%	
	Rafah area	7651	648124	1732	615	51049	98.25%	
May	Khan Youins Area	13597	1005633	3049	1297	88875	97.17%	98.11%
	Middle Area	14626	973303	4053	1857	119733	98.47%	
	Rafah area	7745	650650	1708	623	50681	98.94%	
June	Khan Youins Area	13537	989807	2945	1319	88316	99.95%	99.23%
	Middle Area	14997	1070031	7105	1856	211036	99.01%	
	Rafah area	8489	719280	1719	622	51026	98.95%	
July	Khan Youins Area	14488	1047105	3026	1321	87735	96.65%	97.60%
	Middle Area	17475	1144677	12796	1860	375499	97.82%	
	Rafah area	8724	725874	1726	615	50567	97.68%	
August	Khan Youins Area	15114	1146575	3169	1315	94294	99.18%	99.36%
	Middle Area	17925	1168824	4424	1876	131903	99.39%	
	Rafah area	8668	734337	1740	627	51998	99.63%	
September	Khan Youins Area	13360	1012980	3117	1283	93117	99.58%	98.89%
	Middle Area	18124	1233574	4014	1855	118264	98.21%	
	Rafah area	8337	689544	1694	623	50416	99.23%	
October	Khan Youins Area	13311	995385	2987	1286	87773	97.94%	98.05%
	Middle Area	15482	1078054	4208	1850	123818	98.08%	
	Rafah area	8227	694913	1712	614	50429	98.16%	
November	Khan Youins Area	12954	957649	3020	1294	88806	98.03%	97.76%
	Middle Area	18833	1034520	4049	1856	119478	98.36%	
	Rafah area	7253	638451	1806	607	51974	95.96%	
December	Khan Youins Area	11384	875148	3061	1311	90993	99.08%	98.87%
	Middle Area	12830	925522	4387	1806	129975	98.76%	
	Rafah area	6505	568852	1722	593	51054	98.80%	
Average water Wells Functionality Efficiency % in Jan-December 2017								98.31%

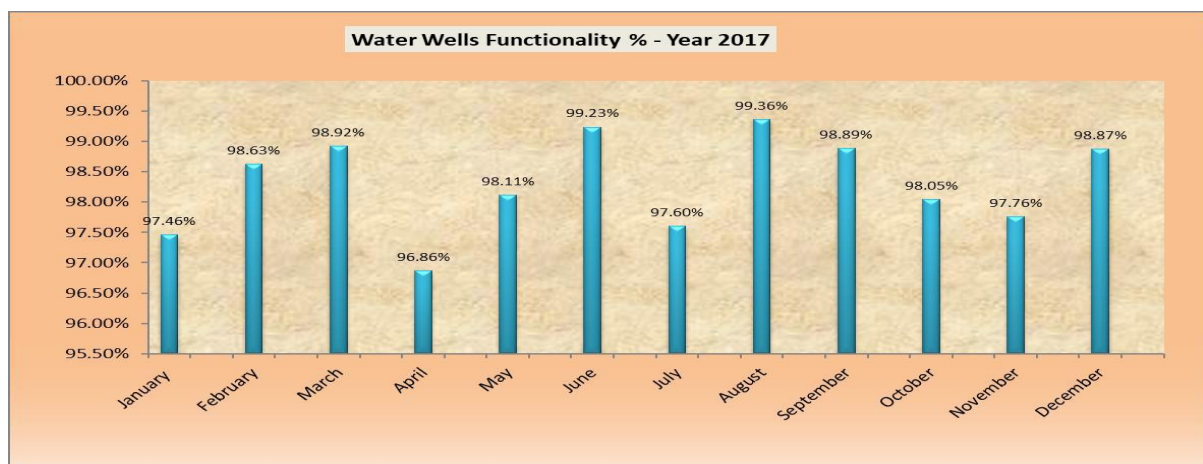


Figure 10: Monthly Functionality Percentage for served Areas-Year 2017

A.2 Improve Energy Consumption

The objective of this indicator is to manage the energy consumption in the water wells, by continued measuring the Specific Energy Consumption for all water wells in the three targeted regional areas and calculated as follows:

$$\text{Specific Energy Consumption (KWh/m}^3\text{)} = \frac{\text{Energy consumed (KWh)}}{\text{water produced in m}^3}$$

During the year 2017, the prevailing conditions of electricity cut off occurred and scheduled on daily basis has become part of the operating inputs and conditions for the systems in the Gaza Strip, and the annual targeted value of specific power consumption of water production wells within the targeted areas have been progressively improved to reach **0.39 KWh/m³** of water produced from wells where the base line value was **0.55KWh/m³** mid of 2014.

CMWU have continued to manage the efficiency of the pumping equipment utilized in the water wells, where more than 6 water wells pumps turbines throughout several services areas have been replaced and changed by new more efficient turbines. This intervention improves the pumping efficiency and reduces the specific power consumption for each cubic meter of water produced under the same hydraulic conditions. The management program set for monitoring of energy consumed by water production wells shows that during the year 2017 of project period, the overall specific Energy consumption in the three targeted regional Areas is **0.39 KWh/m³**.

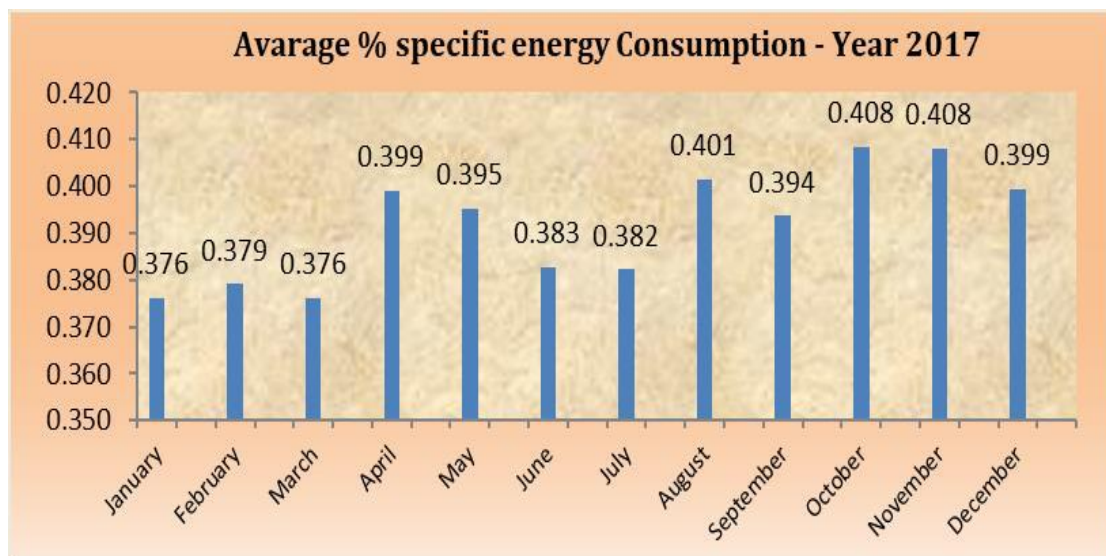


Figure 11 : Monthly Specific Energy Consumption 2017

Table 8. The monthly water wells specific power consumption -Middle and South Governorates -YEAR 2017

Month	Area	Production	Energy	% Specific	Avarage % per month
		m3	KW	KWh/m 3	KWh/m 3
January	Khan Younis	802492	334318	0.417	0.376
	Middle	851392	285016	0.335	
	Rafah	624803	237753	0.381	
February	Khan Younis	801232	370688	0.463	0.379
	Middle	940260	288286	0.307	
	Rafah	592630	225875	0.381	
March	Khan Younis	884341	394999	0.447	0.376
	Middle	1009895	305823	0.303	
	Rafah	687830	270649	0.393	
April	Khan Younis	742198	320518	0.432	0.399
	Middle	824134	302036	0.366	
	Rafah	504744	203687	0.404	
May	Khan Younis	822898	338327	0.411	0.395
	Middle	691020	252294	0.365	
	Rafah	442958	182789	0.413	
June	Khan Younis	815609	319013	0.391	0.383
	Middle	748199	266420	0.356	
	Rafah	541950	220209	0.406	
July	Khan Younis	859063	347551	0.405	0.382
	Middle	893245	295749	0.331	
	Rafah	464971	204096	0.439	
August	Khan Younis	959610	388750	0.405	0.401
	Middle	827533	325240	0.393	
	Rafah	463250	189475	0.409	
September	Khan Younis	848570	362487	0.427	0.394
	Middle	947402	328684	0.347	
	Rafah	532484	225381	0.423	
October	Khan Younis	856548	395716	0.462	0.408
	Middle	990417	332160	0.335	
	Rafah	514515	236766	0.460	
November	Khan Younis	856499	378298	0.442	0.408
	Middle	852936	304073	0.357	
	Rafah	626171	270914	0.433	
December	Khan Younis	813096	357313	0.439	0.399
	Middle	797523	280619	0.352	
	Rafah	394844	162840	0.412	
Yearly Avarage % specific energy in January-December 2017					0.392

B. Improve Water Quality

B.1 Disinfection Efficiency

The maximum recorded disinfection efficiency for the period from January to December 2017 approaches around **99.2%** by the end of December 2017. Over the report period, the disinfection efficiency has progressively increased successfully maintaining a high level of Chlorination throughout the water distribution networks in all Gaza strip governorates. As indicated through the chlorine monitoring program, CMWU is confident that 100% of the networks can be disinfected using the chlorination systems installed. Managing and sustaining this maximum efficiency through the effective maintenance and repair program has resulted in an excellent performance and conclusion to this task.

Monthly disinfection efficiencies recorded as part of the Residual Chlorine Monitoring Program are illustrated in the graph below:

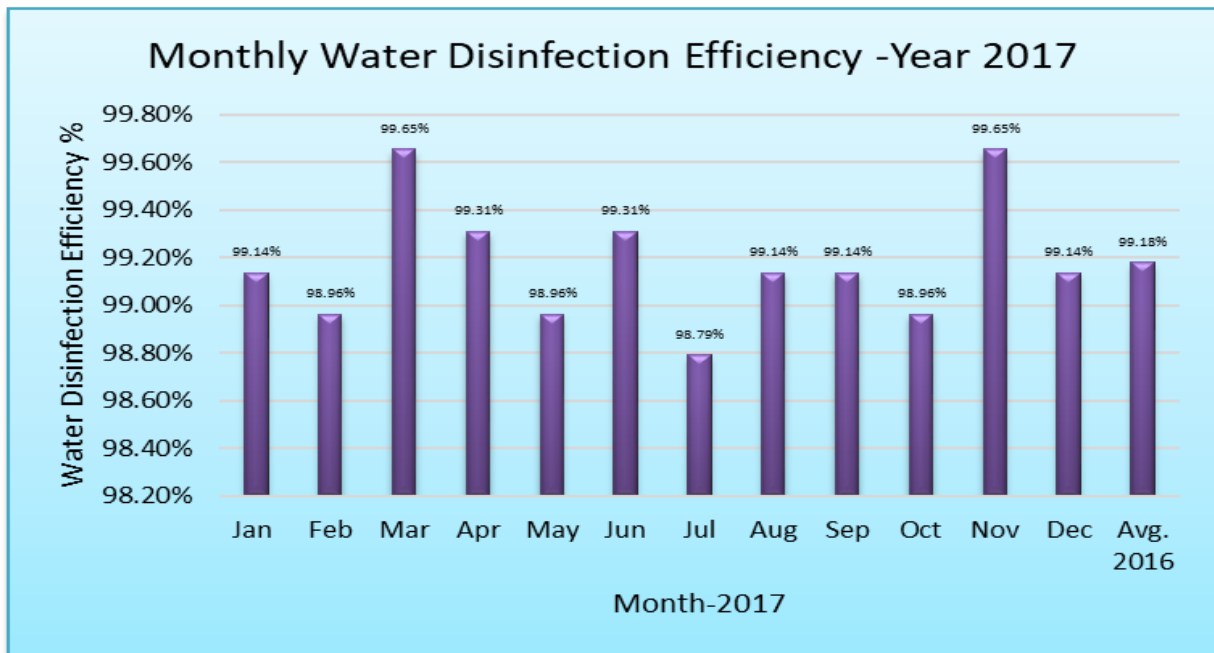


Figure14: Monthly Water Disinfection Percentage 2017

B.2 Residual Chlorine Monitoring Program

The monitoring program continues to be performed in all the municipalities and regional areas on a regular basis using the Photometer test kit, which was made available to the health department of each municipality. Consumables required to run the program were provided as planned in the standard disinfection procedure.

Tests are being carried out for free and total chlorine on a fixed number of sampling points of 580 locations (sampling points) carefully selected to give a true representation of the whole distribution network. The results of the program continue to be saved in the database designed to establish a historical reference, where detailed Monthly disinfection reports are monthly produced and issued. It is clearly shown that by the end of December 2017 there is a significant achievement in which the disinfection efficiency target of the network has been progressively approached and reached the task targeted value.

The test results show a maintained residual chlorine level that is consistent within each municipality. During the year 2017 CMWU have continued to monitor the reports of high chlorine levels through the customer complaints whereas the strength of the chlorine solution has been reduced by dilution before it is injected into the network or in some cases dosing pumps have been replaced to match the dosing requirements.

The results of the monitoring program are tabulated and illustrated here below:

Table 9. Monthly Water Disinfection Monitoring Program from Jan-June 2017

No.	Municipality	No. of Samples	01-Jan		01-Feb		01-Mar		01-Apr		01-May		01-Jun	
			Negative -No. Samples	Positive -No. Samples	Negative -No. Samples	Positive -No. Samples	Negative -No. Samples	Positive -No. Samples	Negative -No. Samples	Positive -No. Samples	Negative -No. Samples	Positive -No. Samples	Negative -No. Samples	Positive -No. Samples
1	Um Al Nasser	12	1	12	0	12	0	12	1	12	0	12	0	12
2	BeitHanoun	19	0	19	2	19	0	19	0	19	1	19	1	19
3	Beitlahia	26	0	26	0	26	0	26	0	26	0	26	0	26
4	Jabalia	42	0	42	0	42	0	42	0	42	0	42	0	42
5	Gaza	86	1	86	2	86	0	86	0	86	0	86	1	86
6	WadyGaza	12	0	12	0	12	0	12	0	12	0	12	0	12
7	Al Moghraka	12	0	12	0	12	0	12	0	12	0	12	0	12
8	Al Zahra	12	0	12	0	12	0	12	1	12	0	12	0	12
9	Al Nusseirate	24	0	24	0	24	0	24	0	24	0	24	0	24
10	Al Burij	20	0	20	0	20	0	20	0	20	1	20	0	20
11	Al Maghazy	24	0	24	0	24	0	24	0	24	0	24	0	24
12	Al Zawaida	24	0	24	0	24	0	24	0	24	0	24	0	24
13	Al Mussader	12	0	12	0	12	0	12	0	12	0	12	0	12
14	Deir Al Balah	30	0	30	1	30	0	30	0	30	0	30	0	30
15	Wady Al Salq	12	0	12	0	12	0	12	0	12	0	12	0	12
16	Al Qrara	16	0	16	0	16	0	16	0	16	1	16	0	16
17	Khanyounis	44	2	44	0	44	1	44	0	44	0	44	1	44
18	Bani Suhila	20	0	20	0	20	0	20	0	20	1	20	0	20
19	Abssan Al Ka	18	0	18	0	18	0	18	0	18	0	18	0	18
20	Abssan Al jad	16	1	16	1	16	0	16	0	16	0	16	0	16
21	Khezaa	16	0	16	0	16	0	16	0	16	0	16	1	16
22	Al Fokhary	12	0	12	0	12	0	12	0	12	0	12	0	12
23	Al Nasser	12	0	12	0	12	0	12	0	12	0	12	0	12
24	Al Shuka	12	0	12	0	12	1	12	0	12	2	12	0	12
25	Rafah	46	0	46	0	46	0	46	2	46	0	46	0	46
Total		579	5	579	6	579	2	579	4	579	6	579	4	579
Monthly Disinfection Efficiency			99.14%		98.96%		99.65%		99.31%		98.96%		99.31%	

Table 9. Monthly Water Disinfection Monitoring Program from July -December 2017

No.	Municipality	No. of Samples	01-Jul		01-Aug		01-Sep		01-Oct		01-Nov		01-Dec	
			Negative —No. Samples	Positive —No. Samples	Negative —No. Samples	Positive —No. Samples	Negative —No. Samples	Positive —No. Samples	Negative —No. Samples	Positive —No. Samples	Negative —No. Samples	Positive —No. Samples	Negative —No. Samples	Positive —No. Samples
1	Um Al Nasser	12	0	12	0	12	0	12	0	12	0	12	2	12
2	BeitHanoun	19	1	19	0	19	0	19	0	19	0	19	0	19
3	Beitlahia	26	0	26	0	26	2	26	0	26	0	26	0	26
4	Jabalia	42	0	42	1	42	0	42	0	42	0	42	0	42
5	Gaza	86	0	86	0	86	2	86	0	86	0	86	2	86
6	Wady Gaza	12	0	12	0	12	0	12	0	12	0	12	0	12
7	Al Moghraka	12	0	12	0	12	0	12	0	12	0	12	0	12
8	Al Zahra	12	0	12	0	12	0	12	0	12	0	12	0	12
9	Al Nusseirate	24	2	24	0	24	0	24	1	24	0	24	0	24
10	Al Burij	20	0	20	0	20	0	20	0	20	0	20	0	20
11	Al Maghazy	24	0	24	0	24	0	24	0	24	0	24	0	24
12	Al Zawaida	24	0	24	0	24	0	24	0	24	0	24	0	24
13	Al Mussader	12	1	12	0	12	0	12	0	12	0	12	0	12
14	Deir Al Balah	30	0	30	0	30	0	30	0	30	0	30	1	30
15	Wady Al Salq	12	1	12	2	12	0	12	0	12	0	12	0	12
16	Al Qrara	16	0	16	0	16	0	16	0	16	0	16	0	16
17	Khanyounis	44	2	44	0	44	0	44	2	44	0	44	0	44
18	BaniSuhila	20	0	20	0	20	0	20	0	20	0	20	0	20
19	Abssan Al Ka	18	0	18	0	18	0	18	0	18	0	18	0	18
20	Abssan Al jad	16	0	16	0	16	0	16	0	16	0	16	0	16
21	Khezaa	16	0	16	1	16	0	16	1	16	0	16	0	16
22	Al Fokhary	12	0	12	0	12	0	12	0	12	1	12	0	12
23	Al Nasser	12	0	12	0	12	1	12	0	12	0	12	0	12
24	Al Shuka	12	0	12	0	12	0	12	0	12	0	12	0	12
25	Rafah	46	0	46	1	46	0	46	2	46	1	46	0	46
Total		579	7	579	5	579	5	579	6	579	2	579	5	579
Monthly Disinfection Efficiency			98.79%		99.14%		99.14%		98.96%		99.65%		99.14%	

**All positive points should have detected positive residual chlorine as per photometric field testing program.

Monthly water disinfection efficiency records -Year 2017												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg. 2017
99.14%	98.96%	99.65%	99.31%	98.96%	99.31%	98.79%	99.14%	99.14%	98.96%	99.65%	99.14%	99.18%

B.3 Chlorine Dosing Units

CMWU have continued to manage the repair and replacement of faulty dosing units. A number of new chlorine dosing units were installed to replace defective units. Technical specifications for installation were issued to the Municipalities and regional offices.

The following table summarizes the number and location where new dosing units are installed and where repairs have taken place during the period from 1st January to the end of December 2017.

Table 10. Repair Works for dosing pumps

No.	Municipality	Number of repairs for dosing pumps	Number of new dosing units installed as per each municipality
1	Beit Hanoon	9	2
2	Beit Lahia	13	3
3	Jabalia	18	2
4	Al Zahra	2	0
5	Al Moghrakah	3	0
6	Nussirate	15	3
7	Al Bureij	7	0
8	Al Maghazi	5	0
9	Al Zawaida	7	0
10	Deir Al Balah	14	3
11	Wadi Al Salqa	2	0
12	Bani Suhaila	3	0
13	AL Qarara	5	1
14	Khanyounis	19	3
15	Abasan Kabira	1	0
16	Rafah	21	4
17	Shokah	5	0
		149	21

Since the chlorine dosing pumps are the critical units in each dosing system, CMWU and its crew in charge have continued to take great care to maintain the essential stock of spares and consumables in stores. The delivery and repair procedures have continued to be carried out through the regional offices and the Municipal chlorination technicians.

During the year 2017 CMWU has continued to provide support through a new On-Call Service Procedure allowing Municipal chlorination technicians to contact CMWU at any time to log faulty systems, CMWU then ensures the repair is carried out within 48 hours. This procedure has improved the availability of operational dosing pumps, ensuring all water entering the distribution network is securely well disinfected.

B.4 Chlorine Supply and Chemicals Delivery for Desalination Plants:

Since the start of year 2017, a total quantity of 896 m³ of Sodium Hypochlorite NaOCl (10%-12% active chlorine) has been managed, supplied and distributed to the water production and treatment installations throughout all Gaza Strip governorates. The scope of chlorine delivery and supply contract managed by CMWU has included in addition to Chlorine, other water treatment chemicals necessary for the operation of both 46 small and medium scale RO brackish and two sea water desalination plants in the Gaza strip. This includes Hydrochloric Acid, citric acid, Sodium Met-bisulfite, Caustic Soda and Anti-scalant and ferric chloride.

The provision of these chemicals is essential to the operation of the desalination plants, and contributes significantly to the improvement of water quality in the areas supplied.

C. New Water Resource

As the underground coastal aquifer is the main source for water supply to the population of approximately 2 million living in the Gaza Strip, and Based on various relevant studies, the groundwater deterioration has continued in both quality and quantity in the Gaza Strip due to over abstraction of the aquifer compared to the recharge quantities which led to seawater intrusion and lowering the groundwater table. It has now become crucially important to safeguard available fresh water supplies and provide new additional potable water supplies to protect the lives and public health of the people in Gaza. The provision of a Short-Term Low Volume (STLV) seawater desalination plant is one of the mitigation measures integrated in the Comparative Study of options for additional supply of water for the Gaza Strip.

C.1 Sea Water Desalination Plants

CMWU in cooperation with PWA throughout different donations has started the implementation of the three short term low volume desalination plants which are:

1- Extension of Existing Deir al Balah Sea Water Desalination Plant –Middle area

The construction of 2000 m³/Day sea water RO desalination modules funded by IsDB through the parallel finance WSSSIP project was completed before the last offensive and the plant was operated to treat the sea water and turning it into drinkable water. Also, it is linked and connected to the existing 600m³/Day module, producing in total 2600 m³/day to serve 30,000 inhabitants of the Middle area residence (Deir Al Balah & Al Zawaida cities) through 4000 m³ capacity water blending tank (Al Aqsa).

During Nov.2016 the site was handed over to the contractor to start the activities of “expansion of this plant capacity to reach 6000 m³/day, by adding new containerized desalination modules of total production capacity 3400 m³/day; the project is funded by USAID and the work at the plant’s site is ongoing.



Figure 13: Deir Al Balah Sea Water Desalination Plant

2- Construction of 6000 m³/Day Sea Water Ro Desalination Plant

A new 6000m³/day sea water RO desalination plant completed to serve around 75,000 inhabitants of both Khanyounis and Rafah Western parts. The project was funded by EU and constructed by UNICEF in co-operation with PWA & CMWU. The CMWU has recently started the plant's operation by standby generators as the plant is not connected yet with electricity network, that encouraged all the concerned parties to operate the plant using solar system (PV panels). The tender for providing the plant with solar system 0.5 Megawatt was launched through EU/UNICEF fund December 2017 and the work will start early 2018, that will assure operating one train of the plant to produce 2000 m³/day as the plant consisted of three sea water RO desalination trains each of 2000m³/Day production capacity. In the meantime, an agreement is in the negotiation phase to cover the electricity consumption fees by the Palestinian Authority for the coming two years. Another extension agreement to expand the desalination plant by another 14,000 m³/day is accomplished between Unicef and EU. The project is in the design stage.



Figure 14: Sea Water Desalination Plant – Southern Governorates

3- Construction of 10000 m³/day Sea Water Ro Desalination Plant in Gaza City:

CMWU and IsDB had signed an agreement to implement sea water desalination plant in Gaza city with a total amount 15 M\$. This plant is an important component of the STLV program that will improve the potable water supply system with a production capacity 10,000 m³/day of desalinated water to blend it with selected municipal water wells with acceptable chloride concentration levels; in order to serve 250,000 inhabitants in the Western part of Gaza city.

The CMWU in cooperation with PWA has selected a consultant to carry out the detail design and prepare the bidding documents of all downstream facilities of the plant. The facilities were divided into four packages as follow:

- 1st package: Blending tank with 5000 m³ capacity with completion of 80%, the civil works were completed whereas the electromechanical works are ongoing.



Figure 15: Blending Tank (Al Sheikh Radwan Water Tank)

- 2nd Package: Transmission line 500 mm diameter, of 6 Km length from the desalination plant to the blending tank, the project is completed
- 3rd package: Design-build sea water desalination plant contract was awarded July 2016 and the work has started at the site on October 2016, the following activities have been completed during 2017:
 - Treated water tank 2500 m³.
 - Intermediate water tank 700 m³.
 - 50% of the Pre-treatment area.
 - 30% of the RO building over 1200 m² area
 - 90% of the administrative building over 130m³ and Electrical room.
 - Boundary block wall all around the Desalination plant
 - 95% of the Electromechanical submittals have been approved; where part of them under manufacturing but still the coordination for the electromechanical materials is not approved.



Figure 16: Gaza STLV Desalination plant

- 4th package: Electrical connection the design has been prepared in cooperation with GEDCO, and will be tendered whenever the installation of the RO takes place.

The Overall progress of Gaza desalination plant project is 30%

C.2 Brackish Desalination Plants:

Besides that, CMWU have continued to manage, upgrade, rehabilitate and monitor the 46 existing brackish desalination plants of total capacity 12,000 m³/day, which were installed from different donations in several areas whereas the groundwater quality is not acceptable for distribution aiming at providing adequate water service for specified areas that are used to be deprived of water supply system. The small capacity plants supply the surrounding population by fountains outside the plant; while the other plants with 600 m³/day or more are used to feed the network in certain areas

In addition, there are two new brackish desalination plants under construction:

- One through the Oxfam fund, At Al shoka area in Rafah of total capacity 200 m³/day, and this plant will serve 10,000 inhabitants with drinkable water.
- Construction of Water Desalination Plant and Drinking Water Filling Points in Al Maghazi Refugees Camp of capacity 12 m³/hr Containerized Well Head Brackish Water RO will be installed on S-80 Well in Al Maghazi- Middle Area Governorate to serve the inhabitant (30,000) with good quality water through Mercy corps. The Work include the following:
 1. Supply and installation of a complete RO- Brackish Water Desalination Plant
 2. Relevant Civil Works.
 3. Permeate water network connections and piping to connect the new DP to the new filling points
 4. Electrical power system supply and installation.
 5. Construction of a gravity line for brine discharge from the RO-BWOP
 6. Supply and install filling points complete with elevated permeate water tanks.

Moreover, a proposal to Human Appeal was submitted to construct 200 m³/hr (5000 m³/day), Modular Skid Mounted RO Brackish water desalination plant to serve the Eastern part of Rafah city.

C.3 Water Networks

This section handles water network plans, upgrading, reconfiguration, resizing. CMWU has succeeded during the year 2017 to implement lots of water networks project varies between upgrading, reconfiguration, and construction new carrier lines and distribution systems at different areas of the Gaza Strip as follows:

1. Complete, Upgrading and expansion of water networks at Al Nussirat, the project is financed by ISDB and Emmar Gaza

2. Complete, Upgrading and expansion of water networks at Dair El Balah, the project is financed by ISDB and Emmar Gaza
3. Complete, Upgrading and expansion of water networks at Jabalia, the project funded by ISDB and Emmar Gaza
4. Reconfiguration of water networks at Rafah and Khan Younis through the EU fund, the work is completed
5. Construction of main carrier pipeline 1.6 KM of 10" diameter at Absan Al Kabera, the project is funded by JICA and the work is completed
6. Construction of the carrier line 1 Km length, 10" diameter from Al shoka wells to the existing line which feed Al Naser water Tank-Rafah. The project is funded by JICA and the work is completed
7. Upgrade of distribution water networks in (Al Salam, Tabit Zarea, Al Shabora, Al Mosabeh, Tal Al Sultan and Al Saymat areas) –Rafah, the project funded by JICA and the work is completed
8. Construction and Upgrading of Water Networks at Different areas in Biet Lahia, Gaza Strip, the project funded by ANERA is completed
9. Construction of water carrier lines and distribution water networks at Abasan Al Kabera in Khan Younis through WB project. The project is completed
10. Launch a tender for Upgrading water networks at Rafah and Khanyounis. The project is funded by DFID through UNICEF.



Figure 17: Water networks at different Areas-Gaza Strip

OVERALL WATER NETWORKS IMPLEMENTED DURING YEAR 2017 IS **60 KM**

C.4 Water Tanks

This section lists the main activities held during the period of this report for the new water tanks and water booster pumping stations:

Construction of two water reservoirs at Al Amal and Al Sattar areas each of 5000m³ capacity, the project is financed by EU, the work is ongoing; the overall progress is 25%

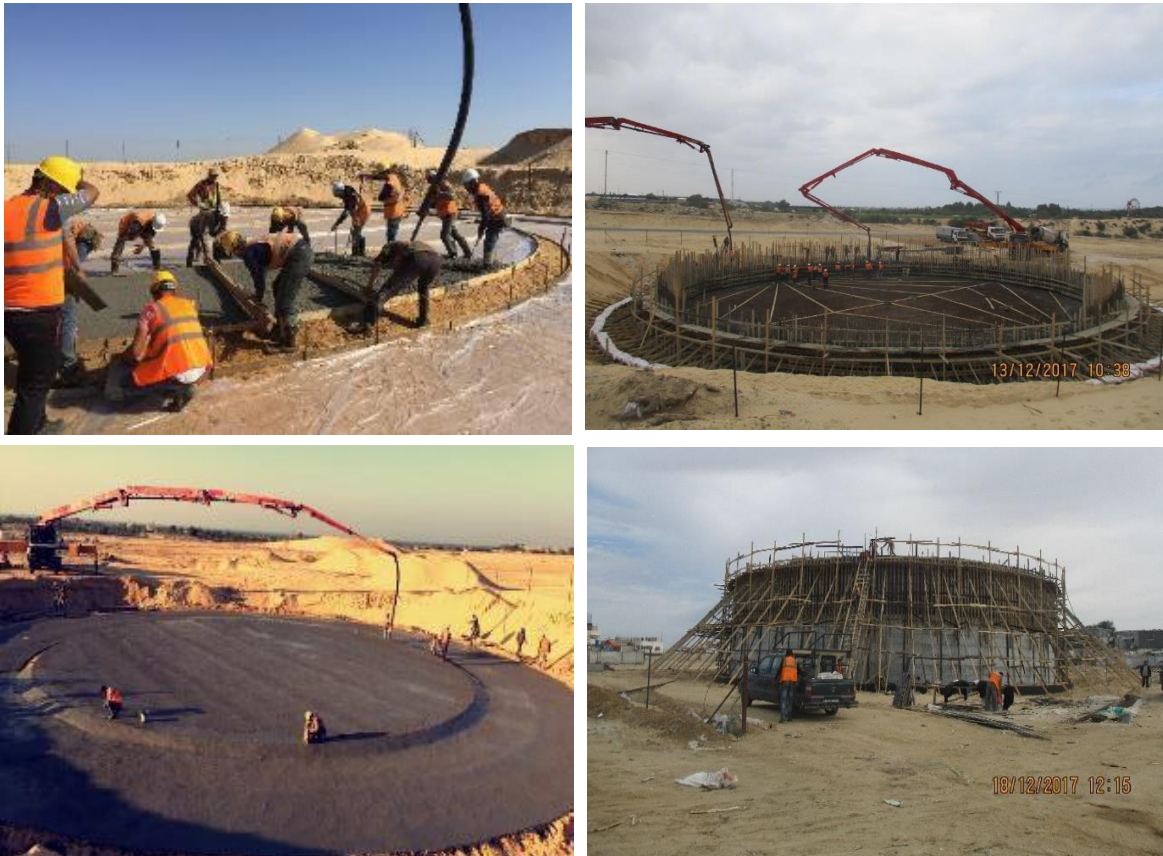


Figure 18: Al Amal and Al Sattar Water Tanks- Khan Younis

- Construction of new four water tanks 5000 m³ capacity each at (Beit lahia, Al Nusirat, Deir El Balah and Khan Younis), the project is funded by USAID in cooperation with PWA and CMWU, and the work is completed; whereas those water tanks are operational since November 2017



Figure 19: Maan water tank- Khan Younis

- Abassan Al Kabira ground water tank of 1800 m³ capacity funded by WB have been completed. This project consists of construction the tank, installation the Booster station of 360 m³/hour capacity, with

all electromechanical works required to operate the system, in addition to 3Km of water trunk and distribution lines with all associated works in order to serve Abasan al Kabera Village- at Khanyounis Governorate.



Figure 20: Abasan Water tank

- Construction of Al Shoka water tank 2000m³ capacity, the work is ongoing in the civil works. The implementing agency is ANERA in cooperation with CMWU and the project is financed by USAID.
- Construction of Al Fokhary water tank 2000m³ capacity, the work is ongoing in the civil works. The implementing agency is ANERA in cooperation with CMWU and the project is financed by USAID.
- Construction of four Ground Water Tanks is ongoing in **Rafah-El Shabora 3000 m³**, **Al Burij water tank 4000 m³**, **Maghazi water tank 3000 m³** and **Deir El Balah water tank 4000 m³**, this project is financed by USAID in cooperation with PWA and CMWU, the work is ongoing and the overall progress is 20%
- Completed the construction of Civil Defense Water tank, the project is financed by KFW and the work.

D. Waste Water Treatment Plants:

There are five operational waste water treatment plants in the Gaza strip, three of them considered intermediate plants located in Beit Lahia, Gaza and Rafah areas as well as two temporary treatment plants in Khan Younis (Mawasi area) WWTP and Wadi Gaza WWTP. CMWU has continued its operational and management roles to manage and carry out comprehensive monitoring program related to the wastewater treatment plants located throughout Gaza strip Governorates and provide for all mitigation measures and improvement programs. Although all relevant events occurred during the last year particularly unreliable electricity power supply system and shortages of special spare parts, and fuel supply, the average achieved 75% efficiency of treatment process.

This section describes the main activities implemented in the treatment plants to improve their treatment efficiencies and to keep the targeted BOD removal values and efficiencies in accordance with the design with regard to effluent quality.

✓ Khanyounis Temporary T P

CMWU through ICRC fund is implementing different upgrading activities for KHWWTTP to be capable to receive and treat around 16,000 m³/day, these upgrading works are currently implemented to serve Khan Younis city until operating the central WWTP in year 2020, the activities are summarized in the following:

- 1- Construction 3 KM of sewage pressure line 500mm diameter form the central pumping station (Al Wafiya) to KHWWTTP to convey the sewage flow to the plant since the old pipeline is old and undersize.
- 2- Construction of 2.6 KM of effluent gravity pipeline from KHWWTTP to the sea as the old pipeline is undersize.
- 3- Upgrading work inside the treatment plant which includes “enlarging the size of internal pipes, cleaning the anaerobic lagoon and maintenance works for mechanical equipment.



Figure 21: Effluent pipeline to the sea

In Parallel with following up the operation schemes and monitor the treatment efficiencies of the mentioned plants; CMWU is following up the construction of the two central treatment plants Eastern Al Buraij (KFW) and Eastern Khanyounis (IsDB and UNDP& JIKA) besides discussing the operational needs for the NGEST with the PWA and WB.

The following are the main implemented activities in the three Central Treatment Plants:

D.1 Gaza Central WWTP Project

KFW has allocated 86.5 million Euros for the construction of Gaza Central Wastewater treatment plant. After completion of the Emergency sewage works in Gaza City and upgrading wastewater treatment plant Sheikh Ejleen; KFW has approved addendum 4.

The addendum agreed to re-plan and update the central WWTP project to take into account changes that have occurred since the original project documents were prepared; the project will include the following:

- Buriej Central Wastewater Treatment Plant and Wadi Gaza Central PS
- Pressure Pipelines from Wadi Gaza PS to Buriej WWTP
- Gravity Collector from Shiekh Ajleen WWTP (Gaza City) to Wadi Gaza PS, including connections to the Central Communities wastewater system.
- Solar Energy source.
- Sheikh Ejleen Measures

Contract 1 was awarded on 24th July 2016 and the contract signed on 6th October 2016. Foundation stone has been laid on 1st of December 2016.



Figure 22: Contract signing and foundation stone ceremony

Contract 1: Buriej Central Wastewater Treatment Plant and Central Pump station at Wadi Gaza

contractor has accomplished the design activities then the approval was given to him to allow construction works. Through the year 2017 contractor has completed 70 % of civil works as following:



figure 23: Central WWTP and Central PS Wadi Gaza

Activity	Percentage completed %
Final Clarifiers	90
Bioreactor	100
Blower Station	90
Primary Clarifier	95
Supernatant Pumping Station	100
4 No. Sludge Thickener Tanks	100
Thickened Sludge Pumping Station	100
Scum Pumping Station	100
1 No. Thickened Sludge Tank	100
Digester Tanks	85
Digester Building	35
Administration Building	65
Gas Holder	5
Workshop Building	40
Sludge Dewatering Building	35
Water Tank	100
Grit and Grease Chamber	20
Return and Excess Sludge Pumping Station	30
Service Water Pumping Station	85
Flow Meter Chamber	90
Primary Clarifier Distribution Chamber	40
Bioreactor Distribution Chamber	20
Scum Pumping Station to Final Clarifiers	10
Grease Holding Tank	10
Electrical Room	10
Variation Order No. 1 – Retaining and Boundary Walls	100
Wadi Gaza Central Pumping Station Activates	80



Contract 2: Pressure Pipeline

The project includes the complete pressure pipeline, 22kV cables and fibre-optic cables between the Wadi Gaza CPS and Buriej WWTP as detailed below:

- Procure, manufacture, ship and deliver to store all equipment and special materials to be imported for the project.
- Transport all equipment and materials into Gaza and deliver to the site.
- Hand over all spare parts not included to be installed.
- Provide erection, installation and site testing details for all other items.
- Include civil and building construction, testing and commissioning of the facilities, including installation, erection and site testing of the equipment.

Prequalification for contractors was completed and they received tender documents to submit their technical and financial proposal.

Contract 3: Gravity Pipeline

The project includes the complete gravity pipelines, and fibre-optic cables between the Interception Chamber at Sheikh Ajleen WWTP and Wadi Gaza CPS, with also connection of the Central Communities Collector to Wadi Gaza CPS as detailed below:

- Construction of Gaza Gravity Collector (DN 1500), 5,700 m long from Sheikh Ajleen WWTP to Wadi Gaza CPS including all ancillary facilities;
- Construction of Central Communities Gravity Collector (DN 1000), 220 m long from Salah Deen Road to Wadi Gaza CPS including all ancillary facilities;
- Manholes;
- Construction of diversion chamber at EWWTP, including dealing with existing flows
- Connection to the inlet manhole at the Wadi Gaza CPS;
- Fibre Optic Cable (SCADA) between the Diversion Chamber at Sheikh Ajleen to Wadi Gaza CPS (5,700 m).
- Reinstatement works.
- Prequalification for contractors was completed and they received tender documents to submit their technical and financial proposal.

Contract 4: PV – Solar Energy Source

The project includes the complete solar PV system to be installed within the boundary of the Buriej WWTP as detailed below:

- Design, procure, manufacture, ship and deliver to store all equipment and special materials to be imported for the project.
- Provide erection, installation and site testing details for all other items.
- Include civil and building construction, testing and commissioning

Contractors prequalification has been completed and short list has been prepared and approved. Tender documents are still under preparation

Contract 6: Sheikh Ejleen Measures

The contract includes rehabilitation of GWWTP and repair electromechanical equipment to allow the plant continue operation through the first phase of the central wastewater treatment plant at east Buriej. The works will include cleaning of ponds, rehabilitation of electrical panels, rehabilitation and replacement of mechanical equipment.

Prequalification of contractors has been completed and short list has been approved. Tender documents prepared and contractors will submit their technical and financial proposals beginning of January 2018.

Gaza Reconstruction project

In Parallel, KFW has signed agreement on the 6th of November 2014 with amount of 9 M Euros for reconstruction assistance for water and wastewater in Gaza City. The following are the status of these activities until the end of Dec 2017:

- Intermediate operational support for the Gaza Strip (Bridge the gap in chlorine and other consumables) - Completed
- Supply and store materials at CMWU warehouse (pipes, Mechanical spare parts, valves, electrical parts, filters, etc)- Completed
- Supply administration equipment to support utility management -Completed
- Intermediate operations support of PS1, PS2, PS3, and GWWTP – On Going
- Service contract for repair of networks – Completed
- Reconstruction of Al Muntar Water tank – Completed
- Reconstruction of Civil Defence Water tank- Completed
- Reconstruction and Rehabilitation of water wells in Gaza City & Central Communities (Muntar well and Saraya Well – Completed) and the other three new wells are on going
- Rehabilitation of Sheikh Ajleen WWTP- On Going



Figure 24: KFW Reconstruction Activities

D.2 KhanYounis Wastewater Treatment Plant (KhWWTP)

The permanent KHWWTTP will be Implemented through two phases with capacity 26,656 m³/day for phase I and 44,948 m³/day for phase II, the tenders of the first phase has been launched by end of 2016 where the implementation started on ground early 2017, the project components were included in three separate tenders as follow:

1- Construction of Khan Younis Waste Water Treatment Plant and Buildings

The following process and technology is used for KY WWTP in order to achieve waste water treatment objectives,

- Pre-treatment including screening and de-greasing/de-gritting.
- Secondary treatment including nitrogen removal.
- Tertiary treatment.

The main activities of this package are:

- Effluent treatment:
- Pre-treatment including fine screening as well as grit and grease removal;
- Aeration tanks and clarification tanks;
- Tertiary treatment including sand filtration and UV disinfection;
- Treated effluent outlet pumping station.
- Sludge treatment:
- Gravity thickening;
- Sludge drying on open drying beds;
- Sludge composting.



Figure 25: Khanyounis Central TP

2- Construction of Main Pressure Lines to the Sea and to the Infiltration Basins

The effluent main pressure pipeline will be constructed and used to pump the treated effluent from the effluent pumping station located at the KY WWTP site to the infiltration basins at Al Fukhari area and to the sea in emergency cases with a total length of around 18.6 kilometres.

The first 5.6 km of this effluent pipeline will be used to convey the treated wastewater to Al Fukhari infiltration basins. An emergency pressure pipeline of 13 Km length will be constructed to complement the effluent pipeline to discharge partially treated or treated effluent into the sea.

The following activities were implemented during 2017:

- The assigned contractor has proposed to supply the ductile iron pipes from one of three factories in china, based on that the CMWU and PWA representatives visited those factories beside the consultant to verify that the factories and their products fulfil all the contract requirements regarding getting the ISO and other international certificates in addition to the quality of factories products.
- All concerned parties have jointly selected one of those factories which met all the requirements,
- Donation number for the project is issued where the approval to deliver the pipes is not obtained yet.



Figure 26: During a visit to the Ductile Iron Factory in China

3- Construction of the Infiltration Basins in AL Fukhari

The site for the infiltration basins is located at Al Fukhari municipal area at the south eastern part of Khan Younis governorate. The site is located in agricultural land over an area of around 100,000 square meters with a trapezoidal shape. Infiltration basins are permeable earthen basins, designed and operated to treat and disperse municipal treated waste water. The works will include excavation, shaping and backfilling with appropriate media for infiltration basins, supplying and installing pipelines with diameters ranging between 305-900 mm, gates, valves, fittings and accessories, manholes, constructing the administrative and service building, constructing the electrical and lighting system, landscaping, paving the access roads and constructing infiltration and monitoring wells.

Implemented works during 2017:

- The overall progress by the end of 2017 is 54%.
- 74% of earthling works (excavation and backfilling) which is the main item of project are completed and the work still ongoing.



Figure 27: Infiltration Basin at Al Fokhari

D.3 The Permanent Northern Treatment Plant (NGEST)

The contractor MACC and international firm have signed a contract to resume the work at the site and they will complete the 5% remaining works. The contractor will operate the plant for a couple of years and there are on-going negotiations between PWA, CMWU, Northern Municipalities and MOLG to hand over the NGEST operation to CMWU.

E. Storm Water Activities

This section describes the main activities implemented during the year 2017 to improve the storm water infrastructure as follows:

Al Amal Storm Water Project:

The project of Al Amal Storm water project has been completed. The project is financed by Emar Gaza and IsDB, it includes upgrading works for Al Amal storm water pond over 100 donums area to infiltrate around

2Mm³ of storm water to the aquifer/ Year. Also the CMWU through IsDB fund has implemented Al Amal storm water pumping station 2700 m³/hr in order to be used in emergency cases in addition to the pressure carrier line 1.6 Km from Al Amal PS to another infiltration pond near KHWWTW over 30 downms which has been constructed recently through UNDP/JICA fund. Besides a storm water carrier line 1000 mm diameter, 400 m length to the inlet structure of Al Amal infiltration pond. Besides separation between wastewater connections and storm water pipelines in Khan Younis.



Figure 28: Al Amal Storm Water Project

Construction block boundary wall for Al Junina Storm Water pond:

Through Paltel fund, the CMWU has recently constructed a block boundary wall 1300 m² around Al Juninah Storm water pond in Rafah to secure the location since it is located near residential area and schools



Figure 29: Boundary wall of Al Junina Storm water Pond

Construction of storm water detention basin, collection BOX Culvert from Al Nujili and overflow conveyance system,

The work includes excavation and shaping the storm water detention pond at Rafah (Near the Egyptian boarder) over 20,000 m² area to collect the 140,000 m³ flow from Tal Al Sultan and Al Nujili areas through the box culvert to eliminate storm water floods in those areas. The project is financed by USAID and

implemented through UNICEF in cooperation with the CMWU and the following activities have been completed during 2017.

- 1- Completing Excavation and shaping the storm water pond over 20 dounms area with the inlet and sand trap structure.
- 2- Completing construction of 3 KM pressure line 630mm diameter from the pumping station to the sea to be used in emergency cases.
- 3- Casting of 865 LM of storm water box culvert (2.2*3 m)
- 4- The civil works of the pumping station are completed, whereas the electromechanical works are still not completed “awaiting coordination to enter Gaza”

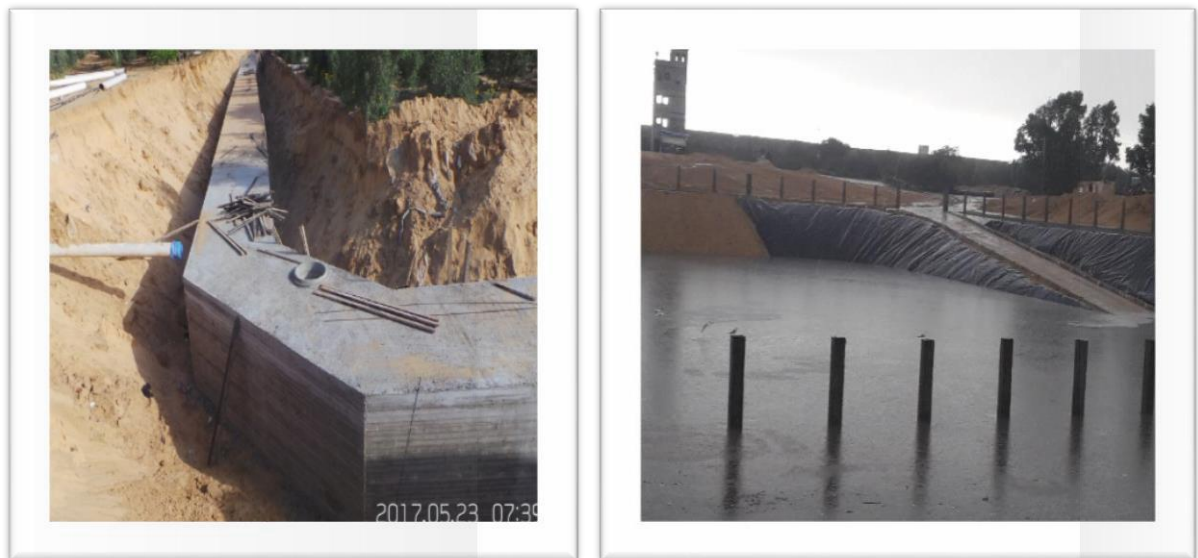


Figure 30: Detention Basin near Egyptian Border

F. Waste Water Activities

F.1 WW Networks

This section summarized the wastewater networks activities include the extension, repair and maintenance through different donations as follows;

1. Completed, Construction of 26 KM waste water networks in Jabalia and Beit Lahia” Lot (1). the project is financed by KFW
2. Completed, Construction of 21 KM Wastewater Networks at Dair El Balah Lot (2), through KFW financing
3. Completed, Construction of 3 KM of wastewater networks at Rafah phase I, the project is financed by SIF
4. Construction of Wastewater Networks in Rafah area and Upgrading of Water Carrier Line in Rafah (Tal El Sultan), the project is financed by JICA through UNDP and the work is completed
5. Construction of Sewage pressure line from Sawarha PS - Zawida to Salah El Deen street, in addition to maintenance works in Al Sawarha PS, the project is financed by JICA through UNDP and the work is completed
6. Complete, Construction of 1.6 KM of wastewater pipelines at Khan Younis, the project funded by USAID through UNICEF.

7. Developing the Master plan for Wadi Al Salqa wastewater system.
8. Launching a tender for Upgrading Wastewater networks at Rafah and Khanyounis. The project is funded by DFID through UNICEF. The work will start early 2018



Figure 31: Wastewater networks

The OVERALL WASTEWATER NETWORKS IMPLEMENTED DURING YEAR 2016 IS 70 KM

F.2 WW Pumping Stations

This section summarize the wastewater new pumping stations activities as follows;

- ✓ The Construction of Sewage Pumping station of capacity 700 m³/day at Abu Mohadi area funded by ICRC is still ongoing, where the complementary 4 KM wastewater networks and 250 household connections were implemented during 2017.

- ✓ Construction of Al Zahra sewage pumping station 850 m³/day and 3 Km wastewater networks, the project is funded by UNICEF/USAID. the work has started in November 2016 and still in progress due to materials entry delay.



Figure 32: Al Zahra sewage pumping station

F.3 Electromechanical Services for Waste Water & Storm Pumping and Treatment Facilities

During the period of this report from January to December 2017, several electromechanical maintenance and repair services and activities summarized here below have been carried out to safe guard the systems and reduce the possibilities of breakdown events and eliminate the risks of environmental contamination by wastewater flooding.

Meanwhile, most of wastewater and storm-water services and pumping facilities were continued to be severely overused and overloaded during the last storms events hit Gaza strip in the last year and create several emergency needs for repairs during flooding times. Therefore, CMWU has taken all possible initiatives to reduce the negative impacts of storm.

Several activities have been summarized here below and carried out to maintain, repair and improve wastewater and storm water systems

- 1 Manage and carry out comprehensive electromechanical maintenance and repair program for sewage pumps of wastewater pumping stations, the work includes rewinding electrical motors, changing the bearing sets (upper & Lower bearings), changing mechanical seals sets (Water & oil mechanical seals sets), changing wear rings, rubber rings, rubber repair kits, changing impellers, rotors, etc., and carry out all work shop requirement i.e. changing bolts, impeller balancing, sand blasting, painting, etc. Maintenance task orders exceeded 50 pumps per year of 2017.



- 2 Manage and carry out comprehensive electromechanical maintenance and repair program for pressure manifolds of wastewater pumping stations, the work includes maintenance of gate valves, non return valves, changing flanged coupling, pipes sand blasting, painting, etc. Maintenance task orders were more than 20 tasks per year of 2017.



- 3 Manage and carry out comprehensive electromechanical maintenance, replacement, repair program for auto mechanical bar screens of wastewater pumping stations i.e. Jumizat Al Sabeel P.S, Hasina P.S, Al Nussirat Terminal P.S, Industrial P.S, Main P.S, Al Bassa P.S, Al Mashroua P.S.
- 4 Comprehensive Maintenance, rehabilitation and Upgrading of Al Sultan Abd El Hameed Sewage P.S, the work include installation electrical transformer, automatic changeover, pumps maintenance, non-return valves replacement, Auto mechanical Bar Screen, main control panel, Bar screen Control Panel.
- 5 Manage and carry out comprehensive cleaning process for sewage pumping stations, cleaning process includes pump wet pit, bar screen chamber, inlet chamber, grit removal, pumping station yard. Cleaning process takes two times for each pumping stations, but for central pumping station may be per week, this is for huge sand quantities comes by influent wastewater coming to the sewage pumping stations, as well as this process may be after each storm. Cleaning process task orders were more than 50 sewage pumping station for year 2017.
- 6 Installation of second transformer and automatic changeover for main sewage pumping stations.
- 7 Installation third submersible pump at Bani Suhaila Sewage Pumping Station, the work includes complete manifold, discharge pipe line and control panel.
- 8 Locally Fabricating Auto mechanical bar screen for Bani Suhaila Sewage Pumping station and Tal Al Sultan Sewage P.S.



- 9 Comprehensive manifold maintenance of Al Sawarha Sewage Pumping station, the work includes raising up the manifold, damaged riser pipes replacement, valves maintenance.
- 10 Manage the maintenance and operational preparedness of mobile self-priming storm water trash pumping sets driven by Diesel engines and distribute it throughout various stations spread all over Gaza strip governorates with all associated pressure and intake hoses requirements and fuel needs.

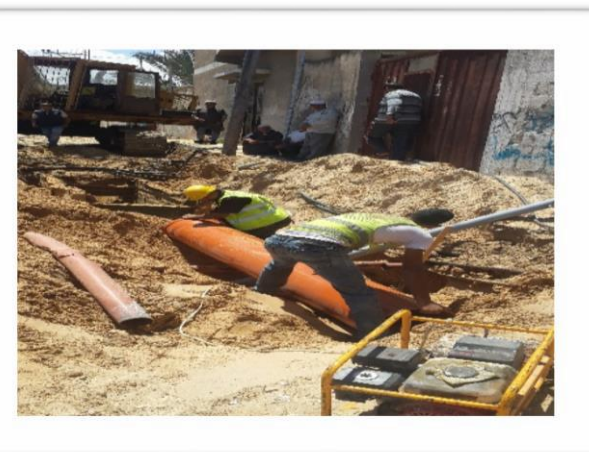
- 11 Replacement of sewage pumping access doors and covers for Al Sawarha P.S, Hesbit Al Samak P.S, Tal Al Sultan P.S, Al Moghraga Sewage pumping station.



- 12 Winterization intervention for Al Salam Area – Khanyounis, the work includes constructing pump chamber, Flygt pump 22kw, pressure line, manifold, storm gullies, manholes, pump control panel.



- 13 Winterization intervention for Abu Elreesh Area – Khanyounis, the work includes constructing pump chamber, Flygt pump 22kw, pressure line, manifold, storm gullies, manholes, pump control panel.



- 14 Winterization intervention for Gezan Al Najjar Area – Khanyounis, the work includes supply and install storm gullies, manholes, etc.

- 14 Winterization intervention for Murag Area – Al Nassir, the work includes construction storm water collection lagoon, supply and install storm gullies, manholes, etc.



15 Manage and carry out winterization programs throughout various areas of Gaza strip which are frequently subject to flooding events. Several activities of construction, cleaning, upgrading of water flows channels to cope, reduce and eliminate the risks of flooding such as construction of additional storm water gullies and pipes, cleaning infiltration basins and storm water lagoons collection systems and rehabilitation of storm water pumping stations.

- Murag Street (works were; construction new storm water collection lagoon, adding storm gullies, adding UPVC pipes SN 8 400mm), Al Nassir area
- Al Qasila Street (works were; adding storm gullies, adding UPVC pipes SN 8 400mm & 500mm pipes), Khanyounis.
- Garage Rafah (works were; adding storm gullies, adding UPVC pipes SN 8 400mm & 500mm pipes), Khanyounis.
- Al Dananeer Street (works were; adding storm gullies, adding UPVC pipes SN 8 500mm pipes), Khanyounis .
- Al Kabeer Mosque Street (works were; adding storm gullies, adding UPVC pipes SN 8 500mm pipes), Khanyounis.
- Al Wadi Al Gharbi (Works were, new storm water drainage system includes UPVC pipes 800mm diameter length around 1 km, concrete manholes, storm gullies, new sewage system, sedimentation chambers,etc.) Bani Suhaila.
- Maghazi Main Street (works were; adding storm gullies, adding UPVC pipes SN 8 355mm), Al Maghazi .
- Al Moghraga Main Street (Installation of Sluice Gate).
- Temraz Street (works were; adding storm gullies, adding UPVC pipes SN 8 500mm pipes, concrete manhole), Jabalia .
- Ahmed Yasin Street (works were; adding storm gullies, adding UPVC pipes SN 8 355mm pipes, concret manhole), Jabalia .
- NWWTP (works were, cleaning infiltration lagoons, Balsam two lagoons, north lagoon) North Governorate.
- Totah Street (works were; adding storm gullies, adding UPVC pipes SN 8 355mm pipes, adding concrete manholes, around 200 m length), Gaza.

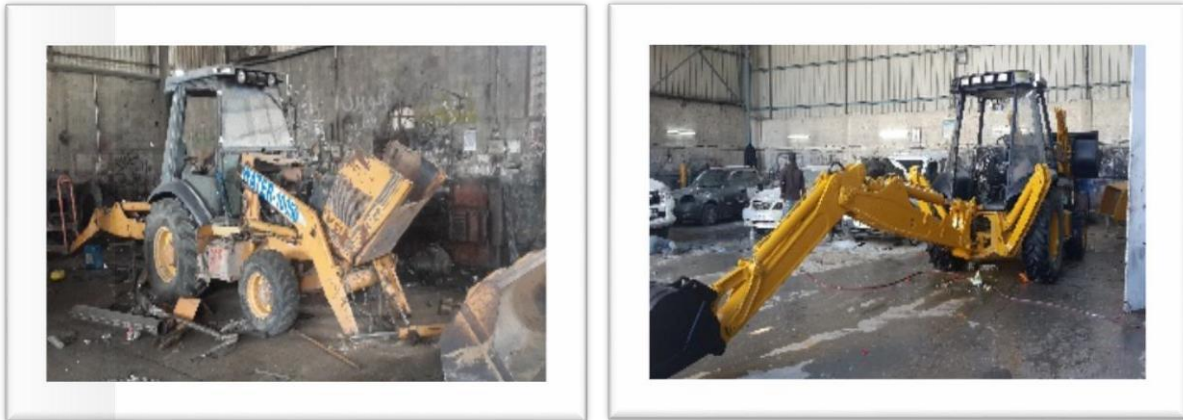
- Mostafa Hafiz Street (works were; adding storm gullies, adding UPVC pipes SN 8 400mm pipes) Gaza.
- NWWTP (works were, making sand dunes for preventing damaging the ww collection lagoons) North Governorate.
- Rafah Storm Water Lagoons (works were, cleaning Al Junina storm water collection lagoon, Al Nijily Storm water collection Lagoon, Abida Storm Water Collection Lagoon) Rafah.
- Rafah Storm Water Drainage Network (works were, cleaning Abida storm water gravitational pipeline 1.25m diameter 800 m length, cleaning all Rafah storm water gullies, cleaning all Rafah storm and ww critical manholes, all sedimentation chamber) Rafah.
- Al Junina Storm water collection lagoon (works were, adding fencing and supports for old fence) Rafah.
- Al Junina Storm water collection lagoon (works were, adding new main gate and concrete slap,,,etc) Rafah.
- Al Nijily Storm water collection lagoon (works were, adding mobile pump 650 m³/hr, three submersible pumps each 500m³/hr, inlet pipes UPVC and Ductile pipe, and gullies) Rafah.



- 16 Supply all required safety and protective tools, clothes and equipment for technicians and labours working under the storm and flooding conditions. Winterization clothes distributed for over 500 labours throughout municipalities of Gaza strip.



- 17 Manage and carry out heavy machineries maintenance, the work includes engines overhauling, fabrication new sewage tanks, suction pumps maintenance, tires replacement, filters & oil replacement, body repairs, gear box, transmission system, drive shafts, disc clutches, engines, pins, buckets, lights, absorption dampers, steering joints, joints for all municipalities of the Gaza strip funded by ICRC.



2- PROGRAM ACTIVITIES PROGRESS

2.1 Geographic Information System (GIS)

Through UNICEF-EU donation and ICRC, the GIS department at the CMWU has established a comprehensive data base survey for all different water and waste water facilities in the southern part of the Gaza Strip. All the collected data has been unified into one geo-database. Currently the GIS department is carrying a survey for customer locations to be linked later with the other collected data for better services. In Sep. 2016, the GIS department has launched its online GIS through web application as (<http://gis.cmwu.info>), as well as a GIS online mobile application under the Android operating system, whereas in the year 2017; new parameters have been added to the online GIS web application, integrated with developing the IOS system.

2.2 Environmental Management Plan (EMP)

The CMWU follows the different projects, coordinates, monitors and measures the performance indicators during the report period. The Environmental Management Plan (EMP) has been designated to ensure effective implementation of the projects in an acceptable environmental level.

The CMWU has analyzed the water quality in the domestic water wells in different governorates based on EMP procedures, added to that wastewater collection and sampling were carried out on a weekly basis based on EMP procedures.

From the ongoing monitoring of the different projects activities running in the field, the environmental aspects are being observed and achieved.

2.3 Customer Services

In this period, many activities have been achieved to enhance the customer services program as follows;

1. Start applying the CMWU manual in the daily customer services operations
2. Follow up the operation and maintenance of comprehensive customer information and Service system CCISS at 14 different municipalities in Gaza Strip.
3. CMWU continues issuing the water bill in a monthly basis for 14 municipalities in Gaza Strip region. The number of customers served by the 3 regional offices (Rafah, Khanyuins and Deir El Balah) is **66,799** customers.
4. CMWU starts its pilot project of erecting a prepaid water meter for selected 20 customers. The test period will last for 3 months and based upon the results collected, CMWU will decide to expand the experiment and use the prepaid water meter in a wider scale.

The following steps are being followed in order to enhance the collection efficiency in Rafah City:

- a. Coordinate and cooperate with legal institute to follow up the uncommitted customers and issue payment order or inform the bank to deduct the bill from their salaries.
- b. Continue follow up to the illegal connections through CMWU inspection unit, in order to raise the collection and enhance system efficiency.
- c. Encourage the committed customers through lunching reward campaign.
- d. Signing agreements with local banks for automatic payment for CMWU bills starting with Bank of Palestine, EL Quds Bank and in process signing agreement with Palestine Islamic Bank.
- e. Finishing the registration of all the customers in the new housing project in Rafah (Suadi project 1&2 , & UNDP project), in cooperation with Rafah Municipalities and Gaza Electricity company.
- f. Launch the cut off-service campaign to the customers who are not committed of paying the monthly water bill while they are capable of doing so.
- g. Cooperation with municipality of Rafah to update customer data base (Unit served by the subscription, HH status, employment status for the customer, contact informationetc.), and compare the results with CCISS data for customers.

3. OTHER ACTIVITIES

Other activities have been running to enhance the performance of CMWU as well as strengthen the relationship between CMWU and PWA through enhancing the management relationship between each other, as well as other activities between the CMWU and funding agencies through close follow up and transparent financial procedures.

The following activities illustrate the CMWU other activities;

3.1 1 Enhance the identity of the CMWU as fully functional service provider:

- CMWU Board of Directors has agreed on a decision that all municipalities who receive O&M services from the CMWU should pay 10 % of the O&M cost to the CMWU account. This step was applied for all the municipalities whereas some municipalities paid their dues on a monthly basis.
- Restructuring CMWU head quarter and regional offices for better performance.
- Expand the CMWU work activities to include all Gaza Strip municipalities.
- Enhance the interface management between CMWU and PWA by regular meeting and close coordination.
- Forming a coordination committee with Municipality of Gaza in order to implement the Gaza sewerage Emergency Project financed by KFW , and to agree how to operate the GWWTP.
- Move on to achieve the CMWU strategic plan (5 years plan), and prepare the TOR for a CMWU business plan for the next five years.

3.2 Donor's visits to the CMWU sites:

During the period of this report, many donors' agencies have visited CMWU and field visits to some of the on-going projects, part of those visits are as follow:

- On February 2017, a Finland delegation visited the Seawater Desalination Plant in the southern Gaza, and Al-Aqsa water tank, CMWU central lab and HQ building in Al-Zahraa City.
- On March 2017, Mr. Peter Pervert – Head of German Agency in Palestine visited Al-Montar Reservoir in Eastern Gaza in.
- On April 2017, OCHA & UNDP Delegation visited the Seawater Desalination Plant in the southern Gaza.
- On May 2017 UNICEF, delegation visited the headquarters of CMWU & the Seawater Desalination Plant in the southern Gaza.
- On August 2017, Excellency minister Eng. Mazin Ghonaim visited Public infrastructure development program- sanitation and wastewater in Deir Al Balah, Beit Lahya, and Jabalia municipalities.
- On October 2017 The International Committee of the Red Cross (ICRC), represented by its Director of Operations in the Gaza Strip, Joseline Deforn, conducted a field trip to some facilities and projects of CMWU, the tour visited Khan Yunis temporary treatment station, and Al-Amal storm water basin in Khan Younis Governorate in the south of the Gaza strip.
- On November 2017 from the United Nations Relief and Works Agency for Palestine Refugees (UNRWA), delegation chaired by Mr. Mathias Shamali visited the headquarters of CMWU.

- On November 2017 World Bank delegation visited the headquarters of CMWU.



Figure 33: sites visits

3.3 Coordinate with other entities:

As known since the establishment of CMWU, all the projects for either development or for emergency are funded from different donors until CMWU could stand alone for its facilities operation and maintenance as well as developmental projects. The following are the on-going activities in cooperation with other donors' agencies as;

IsDB: is financing sea water desalination plant in Gaza city 10,000 m³/day. This plant is an important component of the STLV program that will improve the water supply quality for around 250,000 inhabitants in Gaza City

UNICEF: Many agreements have been signed during 2017 for rehabilitation and upgrading of water & wastewater networks, supply chemicals for water facilities, construction the STLV boundary wall, Providing STLV with PV panels 0.5 Mega, in addition to construction of storm water basin over 20,000 m² area, box culvert and overflow system through USAID fund.

ICRC: has financed different projects which aim to improve the operational schemes and assure continuity of water and wastewater services. The last projects supported by ICRC are Upgrading works for KHWWT and Al Wafiya central sewage PS in Khan Younis

KFW: has financed two wastewater projects at Anan area- Jabalia and Al Berka area- Deir Al Balah. Totalling of 3 M.Euro

EU: is financing two packages of Gaza Water supply Improvement project which include construction of two water reservoirs 5000m³ capacity for each, and upgrading /re-configuration of water networks at Rafah and Khan Younis). In addition, EU is committed to finance the expansion of seawater desalination plant STLV at the southern governorate to reach 20,000 m³/day by adding additional 14,000m³/day desalination units.

Islamic help: has financed installation of RO seawater desalination plant 500 m³/day at Al Shifa Hospital in order to improve its water quality.

Muslim Hands: has financed construction Al Mosadar water well

ANERA: in cooperation with CMWU are currently constructing two water tanks at Al Fokhari and Al Shoka besides water networks at Beit Lahia.

SIF: has financed a construction of wastewater networks at Al Mosabeh area-Rafah-phase I and the design of phase II is under preparation.

USAID: in cooperation with PWA; CMWU is following up the implementation of 8 water tanks all over the Gaza Strip, besides following the works to expand the existing Sea water desalination plant at Deir Al Balah.

Other Ngo's: CMWU has been keeping the communication with all NGO's that are working in the water sector in order to work within master plans and its defined projects and targets.

3.4 Public awareness campaigns:

Public Awareness campaigns implemented during the last year relied on the methodology of raising the public awareness of water and desalination plants in the Gaza Strip and concentrated on the following issues:

- Importance of Seawater Desalination Plant
- Saving water
- Paying Water Bills
- Cleaning tanks
- Water situation
- Needed behaviour to safely deal with sewer network inside and outside HHs

Parts of the implemented activities are mentioned here below:

1. Workshops: Media & awareness unit implemented 10 workshops in all the Gaza governorates.
2. Media & awareness unit implemented awareness session & competitions in 10 schools of Rafah governorate (10000 student)
3. Awareness raising workshop for 120 Children in Rafah governorate.
4. Home visits: Media & awareness unit implemented 158 home visits in Rafah governorate.
5. Media Materials including, TV ads, 2stickers, Public Service Announcements on TV, 4TV episode.
6. Ceremonies: 5 ceremonies.
7. Organizing trip of **100** students of south governorates to the desalination plant in the south of Gaza Strip.
8. Publishing CMWU news on social media and newspaper.
9. Organizing 4 discussion meetings with local committees.
10. World Water Day.

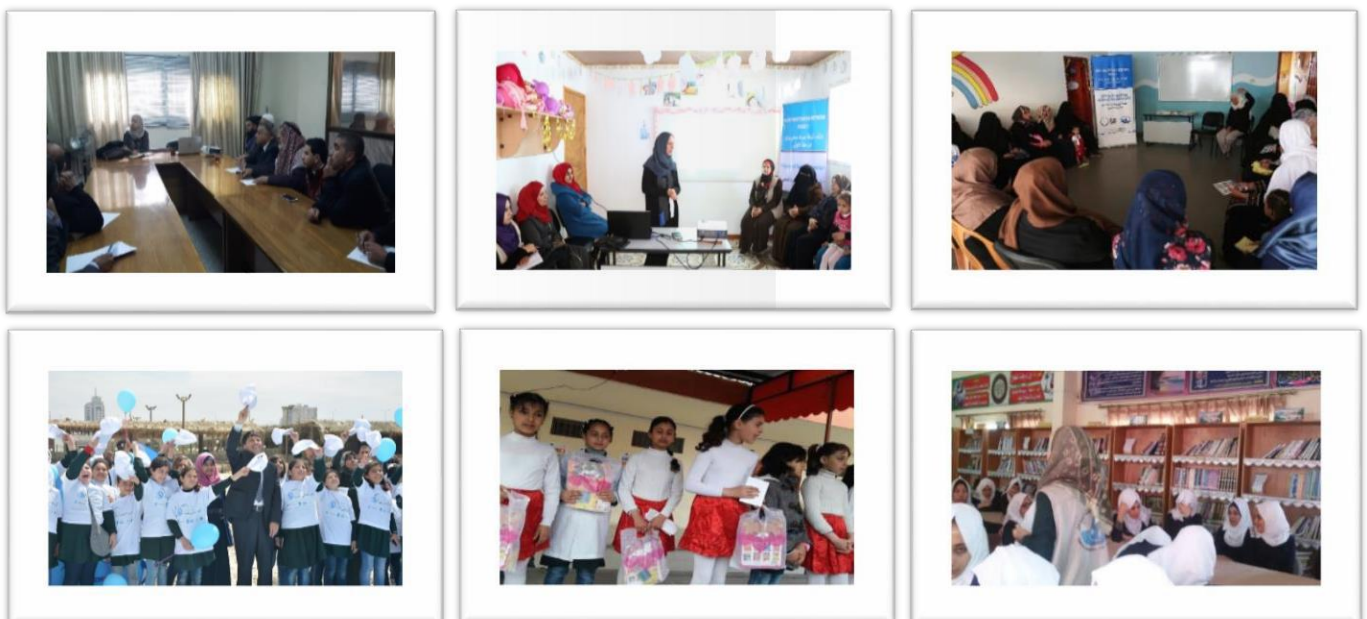


Figure 34: CMWU Public Awareness Activities

MAIN OBSTACLES

One of the main and major obstacles towards accomplishing on-going contracts is the siege forced on the Gaza commercial borders towards importing the necessary goods to finish the works and the new complicated enforced system called the Gaza Reconstruction and Materials Mechanism System (GRAMMS). Added to that; the cost of materials which becomes higher than its regular price due to difficulties in obtaining those materials to implement the projects. Some of the contractors have succeeded to import their materials with higher prices in which affect the engineering estimation for the projects' supply materials.

During the period of this report, Gaza strip was suffering from catastrophic shortages and unreliability of electricity power supply that has severely and adversely affected the whole pumping and treatment systems of water and wastewater services. Also, standby electricity Diesel generators located at various sites were heavily and in somehow harmfully affected with long term operating schemes to keep and protect the services provided to the people of Gaza.

The operational electrical demand for the water and wastewater facilities is 40 MW, which will rise to around 90 MW in the coming years once the desalination plants and WWTP are constructed.

Fuel, abuse of the generators, besides the fluctuated electrical current are the reasons behind the high operation and maintenance costs.

Depreciation of the economic situation affects negatively the collection efficiency during the year, besides the inherited tariff, which is low in comparison to the actual services costs.

SUCCESS STORY

(Retention and Infiltration Basin in Al-Amal Area at Khan Younis Governorate)

Al Amal pond is located in the Western part of Khan Younis city, it was used for storm water collection for many years, but due to illegal wastewater connections since Khanyounis lacks sewerage system, Al Amal pond became for both sewage and storm water collections which caused environmental and health problems for Al Amal neighborhood' inhabitants.,

The CMWU in cooperation with Khan Younis municipality and multi-donors worked hardly during the last three years to separate the two systems through implementing wastewater networks in order to protect the aquifer from wastewater pollution. Moreover, in parallel the CMWU raised a proposal for upgrading Al Amal pond over 100 donums area to be only for Storm water and using part of this area as a recreational area during summer season.

Recently, CMWU in cooperation with IDB & Emmar Gaza has completed and operated the project of "Upgrading Al Amal pond" 4 Million Dollars investment; the project includes the following activities:

- 1- Complete separation the illegal sewage connections from the Storm water pipelines.
- 2- Excavation the western part of the pond to be as infiltration basin over 16 donums area to collect 0.25 MCM (volume) of Storm water, where the expected infiltration rate for this pond is 2 MCM / year
- 3- Storm water pumping station 2700m³/hr capacity to pump the extra water to another infiltration basin west of Khan Younis.
- 4- Inlet, sand trap and other elements.
- 5- A recreational area with landscaping over 50 donums area that includes grassed playground, Kids entertainment, cafeteria, service building, parking, gates, entrances, side supports, grown trees, walkway, seats ... etc

In winter of year 2017, the lagoon is operated and the Storm water recharges in the area; where in the summer of this year; the people of Al Amal enjoyed with their children in the recreational area. The two following photos show the lagoon before and after the CMWU intervention.



Al Amal Lagoon (Before the intervention)



Al Amal Lagoon (After the intervention)

CONCLUSION

In order to fulfil the National Water Plan in the reuse of wastewater, construction of desalination plants, management of the aquifer water, and increasing the efficiency of the distribution networks. PWA developed a strategy that is called CSO-G (Comparative Study of Options for Gaza). The aim of this strategy is to identify a rolling program of interventions that will represent a Palestinian consensus for addressing the current problems in the water sector in Gaza through list of interventions where the main are:

1. Short-term low-volume [STLV] desalination.
2. Improving the domestic water distribution network.
3. A Water and Health Monitoring Project.
4. Increased water imports from Israel.
5. Regional [high-volume] desalination.
6. Pilot wastewater treatment and reuse projects.
7. Large-scale wastewater and reuse programmes, after the treatment plants are completed.

In the meantime, to provide a new fresh water resources to the system, PWA in cooperation with CMWU has been looking for financing large projects especially large scale seawater desalination plants and waste water treatment plants even the current political situation is not stable in order to:

1. Bridge the gap between the water supply demand and the available quantities.
2. Improve the quality of the supplied water which will lead to mitigate the health hazards, especially for the poor people.
3. Relief the stress on the coastal aquifer of Gaza Strip and upgrade its reserve of water for the next generations.

CMWU shall keep looking for self-dependency specially to cover the operation cost for such chemical, biological lab creation and vehicles workshop.

CMWU shall expand and improve water bill issuance and collection efficiency in order to be able to recover most of its operational expenses.

CMWU shall issue and follow up a clear business plan and a strategic plan to reach the sustainability within the coming 5 years.

END