



Coastal Municipalities Water Utility



Annual Report 2018



January 2019

TABLE OF CONTENTS

ACKNOWLEDGEMENT	3
EXECUTIVE SUMMARY	4
INTRODUCTION	6
1. TECHNICAL PROGRESS ACTIVITIES	7
A. Improve the Water Quantities	8
A.1 Overall Water Distribution System Efficiency	8
A.2 Improve Water Facilities	17
1- Construction New Water Wells	17
2. Electrical Refurbishment, Upgrading and Repairs Installations	18
4- Fuel Distribution	24
A.3 Improve Water Wells Functionality	25
A.4 Improve Energy Consumption	27
B.Improve Water Quality	29
B.1 Disinfection Efficiency	29
B.2 Residual Chlorine Monitoring Program	29
B.3 Chlorine Dosing Units:	33
B.4 Chlorine Supply and Chemicals Delivery for Desalination Plants:	33
B.5 Training and Capacity Building of Municipal Trainees:	33
C.New Water Resource	34
C.1 Sea Water Desalination Plants	34
C.2 Brackish Desalination Plants:	37
C.3 Water Networks	38
C.4 Water Tanks	39
C.5 Gaza Sustainable Water Supply Program	40
D.Waste Water Treatment Plants:	41
D.1 Gaza Central WWTP Project	42
D.2 Khan Younis Wastewater Treatment Plant (KHWWT)	46
D.3 The Permanent Northern Treatment Plant (NGEST)	49
E. Storm Water Activities	49
F. Waste Water Activities	51
F.1 WW Networks	51
F.2 WW Pumping Stations	51
F.3 Electromechanical Services for Waste Water & Storm Pumping and Treatment Facilities	51
2. PROGRAM ACTIVITIES PROGRESS	57
2.1 Geographic Information System (GIS)	57
2.2 Environmental Management Plan (EMP)	57
2.3 Customer Services	57
3. OTHER ACTIVITIES	58
3.1 Enhance the identity of the CMWU as fully functional service provider:	58
3.2 Coordinate with other entities:	58
3.4 Public awareness campaigns:	60
MAIN OBSTACLES	61
SUCCESS STORY	62
CONCLUSION	63

List of Figures

Figure 1	Overall Annual Water Networks System Efficiencies
Figure 2	Total annual water supply (m ³) January-December 2018
Figure 3	Total annual Production (m ³) January-December 2018
Figure 4	Mekorot water supply as per municipality -December 2018
Figure 5	Municipal Water Supply Quota L/C/D: January-December 2018
Figure 6	Al Mosadar water well
Figure 7	Part of SCADA Works
Figure 8	Electro Dialyses Desalination Unit
Figure 9	Water facilities Repair, Refurbishment and Rehabilitation Works
Figure 10	Part of mobile mechanical maintenance and repair workshop activities
Figure 11	Quarterly Diesel Fuel Supply Distribution Scheme -2018
Figure 12	Monthly Functionality Percentage for served Areas-Year 2018
Figure 13	Monthly Specific Energy Consumption 2018
Figure 14	Monthly Water Disinfection Percentage 2018
Figure 15	Deir Al Balah Sea Water Desalination Plant
Figure 16	Sea Water Desalination Plant –Southern Governorates
Figure 17	Al Sheikh Radwan Blending Tank
Figure 18	Gaza Sea Water Desalination Plant (GSWDP)
Figure19	Al Maghazi filling points
Figure 20	Water networks at different Areas-Gaza Strip
Figure 21	Al Amal and Al Sattar Water Tanks- Khan Younis
Figure 22	Al Rahma Booster station-Khan Younis
Figure 23	KH Temporary Wastewater Treatment Plant
Figure 24	Central WWTP and central PS Wadi Gaza
Figure 25	Central WWTP pressure line
Figure 26	Central WWTP gravity pipeline
Figure 27	Parts of Shiekh Ejleen Measures
Figure 28	KhanYounis Central Treatment Plant
Figure 29	Ductile Iron pipeline
Figure 30	Infiltration Basins at Al Fokhari
Figure 31	Storm water preparedness activities
Figure 32	Wastewater networks and treatment unit at Al Mawasi
Figure 33	Wastewater electromechanical maintenance
Figure 34	Manifold repairs
Figure 35	Sewage PS repairs
Figure 36	Heavy Machinery Repairs
Figure 37	CMWU Public Awareness Activities
Figure 38	Al Atatra Water Reservoir-Beit lahia

List of Tables

Table 1	Overall Annual Water Networks System Efficiencies -Year 2018 /Middle and Southern Governorates
Table 2	Networks Repair Jobs January – December 2018
Table 3	Total Annual water wells Production (m3) January-December 2018
Table4	Total annual MEKEROT Water supply (Israel Line), (m3): Year 2018
Table 5	Total Annual Water Supply from different sources – Year 2018
Table 6	Water Quota L/C/D consumption side: January-December 2018
Table 7	The monthly water wells functionality efficiency -Middle and South Governorates -YEAR 2018
Table 8	The monthly water wells specific power consumption -Middle and South Governorates -YEAR 2018
Table 9	Monthly Water Disinfection Monitoring Program-year 2018
Table 10	List of major rehabilitation and repair works

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 2018.

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, IsDB, USAID, AFD, Islamic Help, NRC, Oxfam, GVC, AAH, ANERA, UNDP, QRC, Muslim Hands, Save the Children, Qatar Charity, JICA, 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 team 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 **66.6%** with **33.4%** of Non-Revenue Water (NRW) for Middle, Khanyounis and Rafah governorates, while it reached 63.34% in average for the Gaza Strip, Water Wells functionality efficiency is **98%**, water disinfection efficiency is over **99%**. Also, manage weekly quality monitoring program for all wastewater treatment plants through utilizing CMWU central lab.

Despite of catastrophic deterioration of 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 of **74%** average removal efficiency for the year 2018.

The CMWU carries out more than **412** predictive, preventive and corrective maintenance job orders at various areas for the existing **396** back up electric power supply generators that are heavily and severely affected by long daily hours of operations which create lots of repair and maintenance needs and parts. Also, **2** 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 **1321** repair job orders were carried out during 2018 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 36% in the first quarter of 2018 to 31% as an average by the end of December 2018.

On the other hand, other strategic 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 design of the second phase to expand the plant to reach 20,000m³/day has been developed and the tender was launched and awarded during 2018, the site activities will start by mid of January 2019.

2. The construction of two water tanks, carrier water lines and pumping stations in El Amal and El Satar areas through EU fund is still ongoing; as a complementary program to the STLV Southern sea water desalination plant.
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. In the past two years USAID in cooperation with PWA and CMWU have completed the construction of Eight reservoirs, four were completed in year 2017 and the rest have been completed recently at Al Maghazi, Al Burij, Dair El Balah and Rafah. Also, the work is finished 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.
5. The construction of Gaza central wastewater treatment plant with capacity 60,000m³/day as phase I; is still ongoing; the project is funded by KFW and implemented by the CMWU , the project also includes upgrading Al Sheikh Ejleen existing WWTP.
6. The construction of Khan Younis central wastewater treatment plant with capacity of 26,000m³/day (phase I) is still ongoing; the project is funded by ISDB and implemented by UNDP in cooperation with CMWU and PWA.
7. The CMWU in cooperation with UNICEF through USAID fund has implemented 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. The project is operational now and its positive impact during 2018/2019 winter season has been touched.

INTRODUCTION

Throughout 2018 year, all efforts and activities have been directed in parallel with other contributions 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 and to mitigate various environmental and health risks. Hence to achieve the following;

- Develop a management, operational and financial system within quality performance criteria in different areas of Gaza Strip, which affects positively the type and level of service provided.
- Offer a comprehensive vision on the water and environmental situation in all areas, consequently, it is easier to prepare plans and find solutions so to avoid the rapid deterioration in water situation in Gaza Strip.
- Achieve the operational performance of all working systems efficiently, which results in lowering the operational costs, using these operational systems wisely without affecting the quality of service provided for people and reaching fairness and non-profiting endeavours.
- Participate in developing and implementing the water strategic plan such as wastewater treatment plants, desalination plants, carrier lines and water tanks. However, focus on the operation and keep maintenance for such strategic projects, as well as decreases the operational costs so the people can benefit from such services on the long run.
- Work together and developing different available resources and capacities (humanitarian, technical, etc.) to manage and have the water and wastewater sector function, especially in times of crises and emergencies.
- Implement various plans, studies, and strategic projects, accredited and approved from parties such as PWA, MOP, EQA and MOLG, in order to elevate the quality of services offered to the citizens in a fair way and without any bias to any specific area.

During the past year, CMWU teams through several funding agencies such as ICRC, UNICEF, KFW, 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.

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, 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, **51** water Storage tanks, **46** small scale brackish water desalination plants, **2** Sea water desalination plants, **26** water Booster stations, **67** 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 2018, 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 2018 in order to achieve the CMWU's targeted performance indicators. The running activities are being classified into different categories such as water wells activities; water desalination plants, water networks, metering management, disinfection activities, water storage tanks, wastewater pumping stations, networks and wastewater treatment plants activities with all associated 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 2018, and despite of various operational, economical constraints and challenge, CMWU continue managing, implementing and monitoring several programs and provide all relevant resources in order to improve the overall hydraulic efficiency of the existing water distribution networking systems and reduce the quantities of Non-Revenue Water (NRW) down to 33.4% in the Middle and Southern Governorates. The annual records and monitoring data figures on monthly basis showed that the hydraulic system efficiency is 66.6 %. 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 figures of overall system efficiency and non-revenue water 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 requires 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 2018 /Middle and Southern Governorates

Monthly Water Distribution Efficiency Report for 2018				
Monthly Average Values- South-Middle Areas				
No.	Month	Water production m ³	Water billed m ³	System Efficiency %
1	Jan-18	3009088	2023732	67.3%
2	Feb-18	2611556	1963374	75.2%
3	Mar-18	3098048	2101157	67.8%
4	Apr-18	3058115	2114369	69.1%
5	May-18	3356527	2132776	63.5%
6	Jun-18	3523397	2289145	65.0%
7	Jul-18	3692313	2391462	64.8%
8	Aug-18	3738437	2391782	64.0%
9	Sep-18	3514114	2446298	69.6%
10	Oct-18	3499822	2260120	64.6%
11	Nov-18	3392830	2198331	64.8%
12	Dec-18	3070622	2029609	66.1%
Total		39564868	26342155	66.6%

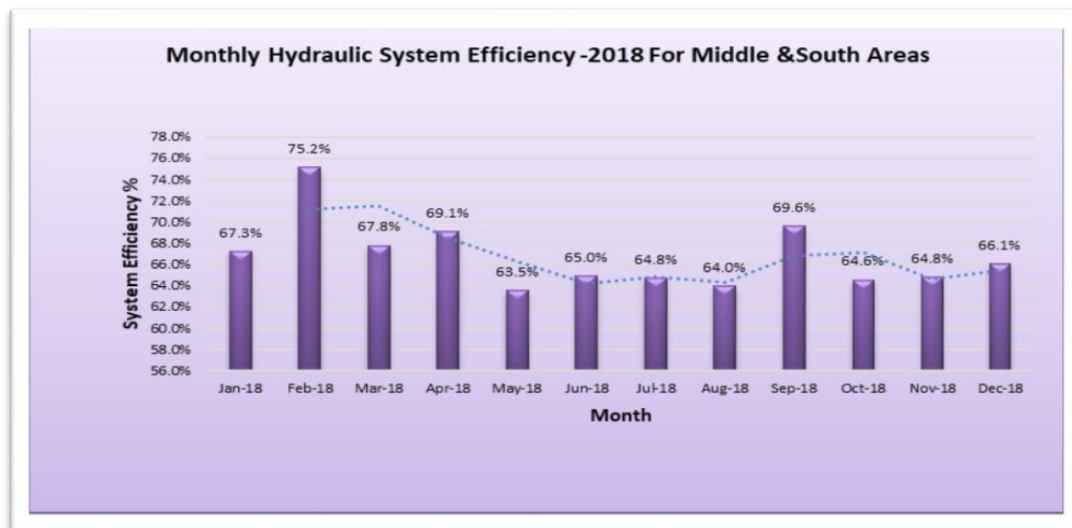


Figure 1: Overall Annual Water Networks System Efficiencies -Year 2018 /Middle and Southern Governorates

The normal trends of behavior and increase or decrease for hydraulic 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 comes hotter where illegal connections especially used for irrigation which form about 18% 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 2018 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 were introduced to the targeted areas during the year 2018. 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 from warehouse 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 **1989 repair jobs** performed during the period from January to end of December 2018 are listed in the following table provided here below:

Table 2. Networks Repair Jobs January – December 2018

Annual Water Networks Repair Monitoring Records - Number of repairs-YEAR 2018/ Diameter> 2 inches													
No.	Municipality	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	Al Zahra	2	3	3	3	5	7	2	6	4	1	2	3
2	Wadi Gaza	1	1	3	2	1	1	2	2	2	1	1	1
3	Musader	1	2	2	1	1	4	5	2	1	1	3	2
4	Wadi Al salqa	2	1	1	2	2	1	3	2	1	2	2	2
5	Moghrakah	2	2	5	1	6	7	4	7	5	6	5	8
6	Buraij	6	3	4	6	6	8	5	10	11	8	7	9
7	Maghazi	5	7	3	5	9	6	5	4	8	6	8	9
8	Deir Balah	10	9	14	16	16	14	24	21	11	13	20	16
9	Zuwaida	3	3	5	6	7	8	6	9	6	4	6	6
10	Nusirat	11	15	20	25	14	16	22	19	15	17	21	15
11	Khan Younis	25	19	25	31	25	29	36	35	28	24	26	24
12	Khoza'a	3	4	4	6	5	3	5	5	4	5	8	4
13	Qarrara	2	3	6	4	4	5	6	2	7	7	4	6
14	Abassan Kabira	4	7	3	6	6	2	5	6	13	18	14	11
15	Bani Suhaila	8	8	14	9	16	13	15	9	5	14	9	10
16	Abassan Jadidah	5	5	4	7	9	8	6	2	8	7	6	4
17	Al Fukhari	2	3	1	1	2	4	1	4	5	3	3	3
18	Al Naser	2	1	3	4	3	6	1	4	2	5	2	1
19	Al shokah	6	4	4	5	1	2	3	5	4	2	1	3
20	Rafah	30	27	24	25	28	33	36	35	40	26	36	24
Total		130	127	148	165	166	177	192	189	180	170	184	161
Total Networks Repairs		1989											

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's 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 for both household level and bulk water level, particularly replacing blocked meters, will continue to improve the overall efficiency of the system and significantly reducing non-revenue water.

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 of 2018 including the received quantities from MEKEROT.

Table 3. Total Annual water wells production 2018:

No.	Municipality	Monthly Water Wells Production (m ³) - Year 2018												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	22349	20659	21494	24443	24996	29571	32312	37824	25029	28,565	22355	21067	310664
2	Beit Hanoun	260430	263790	328870	317260	331720	316780	307840	339480	309320	327000	307680	268840	3679010
3	Beit Iahia	311243	320790	334555	357796	383996	410503	425453	420848	420990	455804	431620	491883	4765481
4	Jabaliala	1018762	1061206	1137346	1092736	1130048	1165388	936407	1017027	1132049	1150498	998149	912821	12752437
5	Gaza	1835929	1491471	1549916	1818117	1806602	2248593	1930895	2110715	2217393	2166259	2212306	1933915	23322111
6	Wady Gaza	8640	8011	10355	10348	12110	11345	13921	14862	13705	13315	12379	11296	140287
7	Al Moghraka	34090	34600	56170	47840	47310	63360	76740	79426	79426	47189	47189	46548	659888
8	Al Zahra	30707	20911	36183	33740	43087	44017	40196	47477	37369	44930	39533	37477	455627
9	Al Nusseirate	218700	194370	241000	250210	266410	309080	290260	313480	325090	335060	312220	247830	3303710
10	Al Burij	120894	91970	118953	102866	133208	152675	174629	147567	161810	145830	157495	145986	1653883
11	Al Maghazy	65097	64548	78394	75519	76854	93955	105330	100750	99139	113217	79467	72509	1024779
12	Al Zawaida	69475	61279	85322	71841	105898	73368	70327	104117.5	92297.5	115975	69972	66966	986838
13	Al Mussader	11271	9229	14735	16709	20531	23233	22023	28021	21119	17589	20410	13592	218462
14	Deir Al Balah	392582	305272	387771	381040	391528	439105	467215	447335	444977	419423	444322	427543	4948113
15	Wady Al Salqa	8410	11730	19040	20200	29840	34040	26670	33510	23900	19770	11200	13190	251500
16	Al Qrara	85656	78612	105233	113698	127274	111924	137252	122385	133309	139999	91153	96661	1343156
17	Khanyounis	730032	662654	745119	678664	773348	796107	874562	844956	772503	767777	748405	655162	9049289
18	Bani Suhila	33788.68	34608.79	39318.43	48891	72173.54	117369	107952	104618.84	80498.14	69081.63	57782.34	42497.97	808581
19	Abssan Al Kabera	10858.76	8020.53	3442.01	5642	27108.78	29845	32890	31365.88	14430.98	14334.41	25410.38	14862.79	218211
20	Abssan Al jadede	3369.96	2489.13	1068.21	1751	4192.38	9277	8536	8571.48	5608.58	5688.61	8305.98	5002.59	63861
21	Khezaa	5714.6	4422.55	2055.35	3348	7600.3	12185	16093	25045.8	16094.3	8676.35	13286.3	7709.65	122231
22	Al Fokhary	23060	19685	24110	25105	23455	25435	27215	25080	23320	25185	24015	23945	289610
23	Al Nasser	27460	26850	30780	26350	27980	43680	33530	27770	31980	39090	30940	27280	373690
24	Al Shuka	40660	29480	29880	44470	51710	29470	29440	32560	29480	34620	34840	44618	431228
25	Rafah	688176	570122	664629	649838	693442	717135	753003	776850	684644	725396	802812	699932	8425979
Total Monthly Production (m ³)		6,057,355	5,396,780	6,065,739	6218422	6,612,422	7307440	6940692	7,241,643	7,195,482	7,230,272	7,003,247	6,329,134	79,598,627

Table 4. Total annual MEKEROT Water supply (Israel Line), (m³): Year 2018

No.	Municipality	Monthly Mekerot Water Supply (m³) - Year 2018												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	
1	AL Nussirate	98400	66800	62050	73750	61500	73100	66700	74900	82000	78800	65400	55500	858900
2	AL Bureij	15660	33860	36770	38310	22390	25400	20920	20380	19030	21780	19740	4990	279230
3	Al Maghazi	45586	37532	35470	30395	28097	24072	28238	21208	26283	14221	33953	51924	376979
4	Bani Suhaila	94921	86351	110772	121047	114006	106621	100098	112831	119212	102468	99718	111712	1279757
5	Abassan Kabira	67681	77519	90758	113172	107966	104271	101738	123581	108824	116715	92790	89137	1194153
6	Abassan Jadidah	19360	24571	26662	20629	40578	32133	31734	32789	33161	29811	23774	23777	338979
7	Khoza'a	58837	46058	42009	20629	46350	41375	35031	36999	34903	28706	30319	32973	454189
8	GAZA	585500	512100	458700	527500	490400	468300	447200	537700	655300	636300	668800	672582	6660382
Total Mekerot Water m³		985946	884792	863190	945432	911287	875272	831658	960388	1078713	1028801	1034493	1042596	11442568

Table 5. Total Annual Water Supply from different sources – Year 2018

Water Supply Categories	Monthly Water Supply (m³) - Year 2018												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	6,057,355	5,396,780	6,065,739	6,218,422	6,612,422	7,307,440	6,940,692	7,241,643	7,195,482	7,230,272	7,003,247	6,329,134	79,598,627
Total Mekerot Water m³	985,946	884,792	863,190	945,432	911,287	875,272	831,658	960,388	1,078,713	1,028,801	1,034,493	1,042,596	11,442,568
Total Monthly water supply (m³) -Year 2017	7,043,301	6,281,572	6,928,929	7,163,854	7,523,709	8,182,712	7,772,350	8,202,031	8,274,195	8,259,073	8,037,740	7,371,730	91,041,195

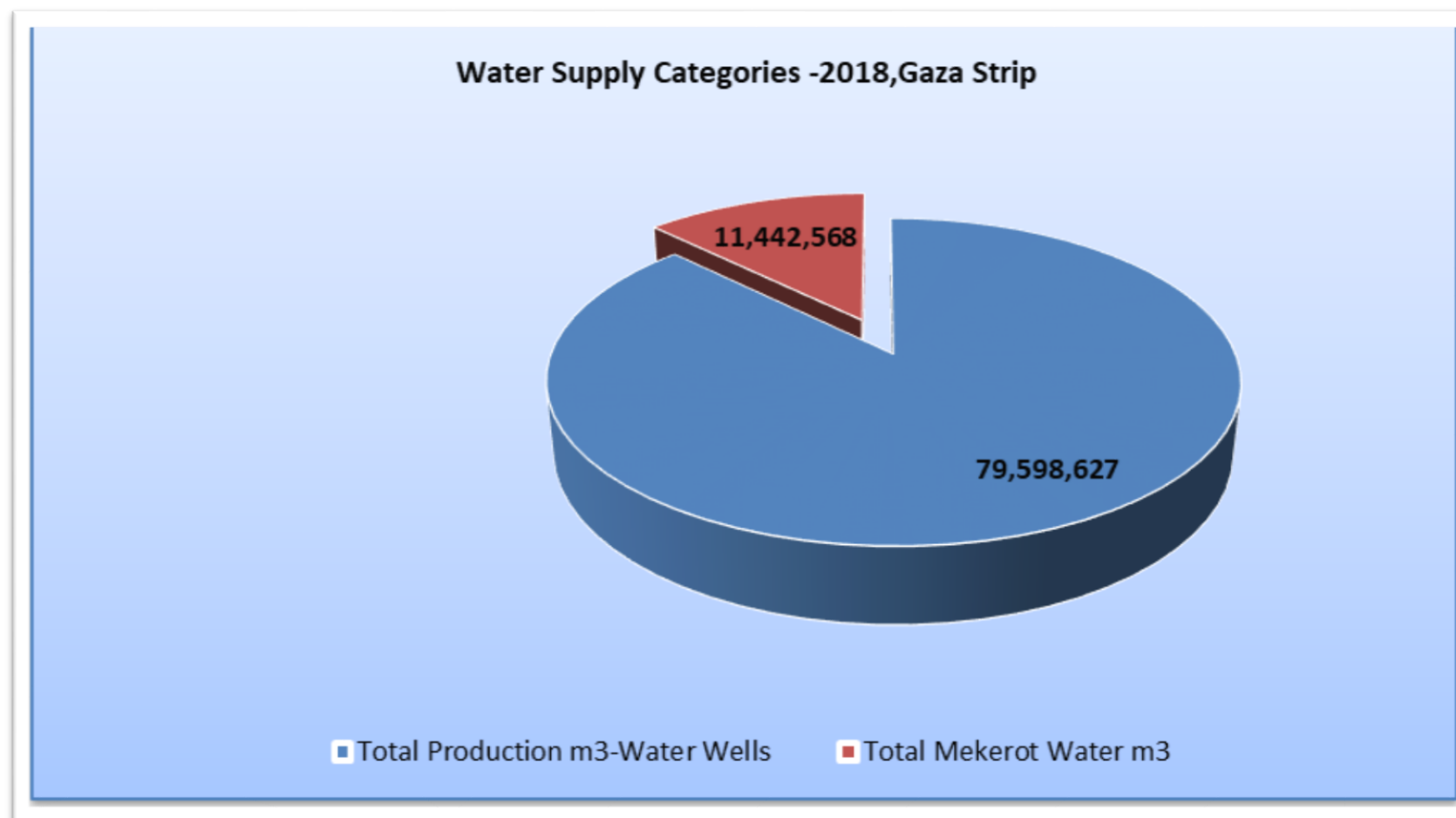


Figure 2: Total annual water supply (m³) January-December 2018

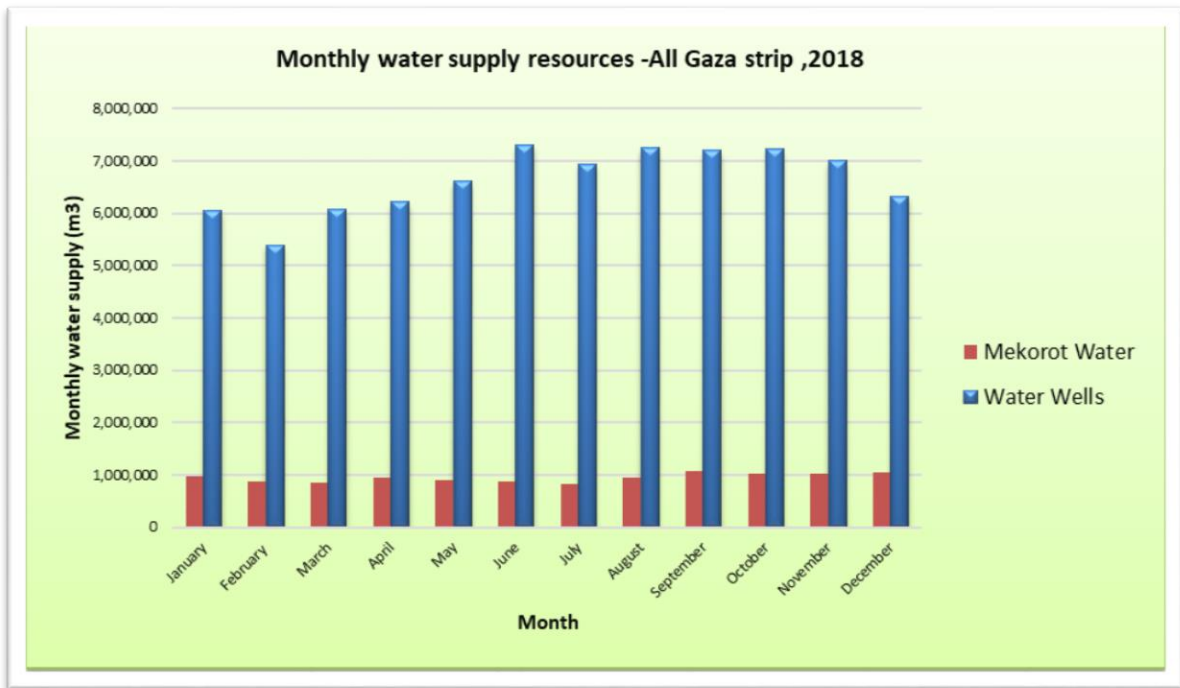


Figure 3: Total annual Production (m³) January-December 2018

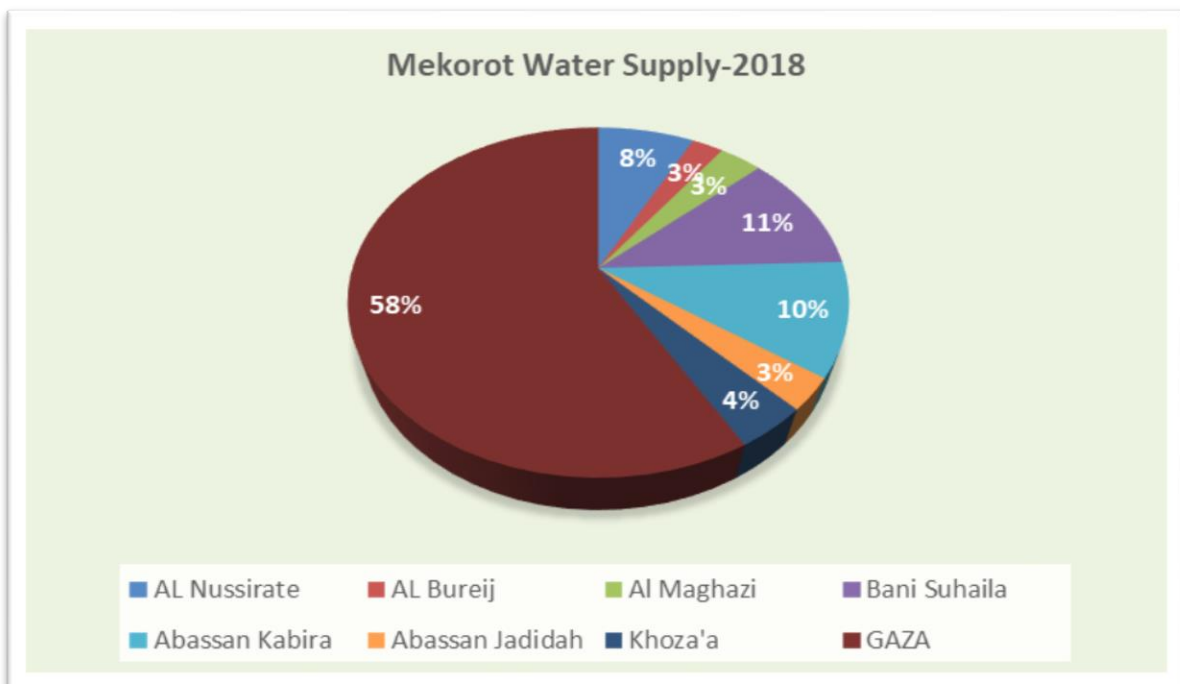


Figure 4 : Mekorot water supply as per municipality -December 2018

Table 6. Water Quota L/C/D-Consumption side: January-December 2018

** : 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 to operate backup generators.

No.	Municipality	Annual Water Production from water wells	Annual Water supplied from Mekerot (Israel Co.)	Total Annual Water supplied from different resources	served Population	Non Revenue Water -NRW	Total Annual Water Consumption	Daily Water Consumption Rate (Quota)	Daily Water Production Rate (Quota)
		m ³	m ³	m ³	Capita	%	m ³	liter/c/day	liter/c/day
1	Um Al Nasser	310664	0	310664	4434	22.06%	242132	150	192
2	Beit Hanoun	3679010	0	3679010	60011	50.41%	1824253	83	168
3	Beit lahia	4765481	0	4765481	97828	41.39%	2792918	78	133
4	Jabalia	12752437	0	12752437	260146	49.22%	6475632	68	134
5	Gaza	23322111	6660382	29982493	722744	33.29%	20000000	76	114
6	Wady Gaza	140287	0	140287	4361	18.20%	114755	72	88
7	Al Moghraka	659888	0	659888	9764	53.05%	309816	87	185
8	Al Zahra	455627	0	455627	6446	33.43%	303323	129	194
9	Al Nusseirate	3303710	858900	4162610	98456	35.04%	2703970	75	116
10	Al Burij	1653883	279230	1933113	51472	36.40%	1229374	65	103
11	Al Maghazy	1024779	376979	1401758	34379	42.63%	804248	64	112
12	Al Zawaida	986838	0	986838	25753	33.80%	653304	70	105
13	Al Mussader	218462	0	218462	2847	43.75%	122891	118	210
14	Deir Al Balah	4948113	0	4948113	92553	46.62%	2641201	78	146
15	Wady Al Salqa	251500	0	251500	7024	29.42%	177515	69	98
16	Al Qrara	1343156	0	1343156	29511	33.25%	896506	83	125
17	Khanyounis	9049289	0	9049289	269216	24.97%	6789458	69	92
18	Bani Suhila	808581	1279757	2088338	47326	29.78%	1466509	85	121
19	Abssan Al Kabera	218211	1194153	1412364	27488	22.94%	1088355	108	141
20	Abssan Al jadedda	63861	338979	402840	9055	20.62%	319763	97	122
21	Khezaa	122231	454189	576420	13655	21.93%	449988	90	116
22	Al Fokhary	289610	0	289610	8268	33.54%	192469	64	96
23	Al Nasser	373690	0	373690	9682	18.03%	306320	87	106
24	Al Shuka	431228	0	431228	16473	21.13%	340106	57	72
25	Rafah	8425979	0	8425979	239956	35.68%	5419590	62	96
		79598627	11442568	91041195	2148852	36.66%	57664395	74	116

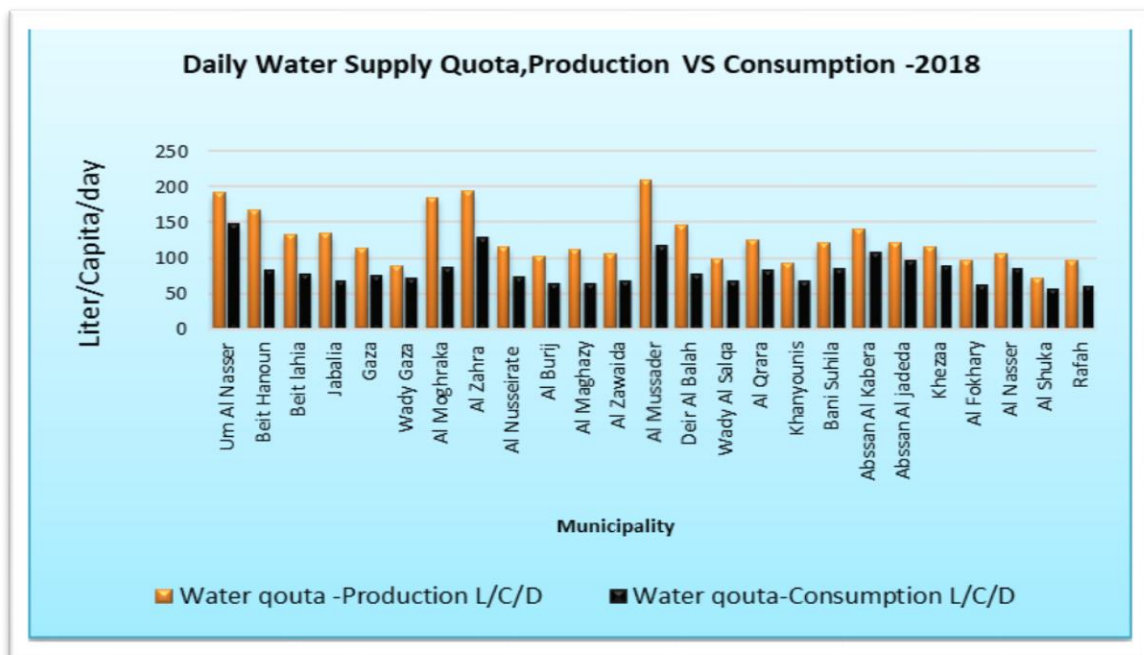


Figure 5: Municipal Water Supply Quota L/C/D: January-December 2018

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; An Agreement was signed in December 2018 between IDB and Emmar in order to drill 3 water wells in Jabalia and close the most saline 3 water wells (Shanti, Amer and Tika) in order to improve the water quality. On the other hand, there is no new water well-constructed during the past year 2018, whereas, Al Mosader water well (funded by Muslim Hands) has been completed, the work in that well started in 2016 and due to materials entry' restrictions the project delayed more than 2 years.



Figure 6: Al Mosader 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) and PWA. 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.
- Supply and install 2nd electricity power lines for critical water and wastewater facilities (Sewage pumping stations, water reservoirs and booster stations), where 16 facilities in total have become electrified by second electricity feeder from GEDCo which will be electrified during emergency and hostilities conditions. This program was funded by ICRC to enhance operational readiness under emergency preparedness plan EPP established for water sector in Gaza strip.
- Provide and install automation and SCADA equipment and connections for 70 sites of water facilities which are located at the remote areas, and this will secure the water services and facilities operation needs during hostilities without human interference.
- 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 110 job orders have been issued either for rectifying

or repairing some damages or to apply the routine and corrective maintenance in the water facilities. The main repair and maintenance works during year 2018 are classified to maintenance, upgrading, rehabilitation up to development works summarized here below:

Upgrading Works:

- 1- Supply and install new electrical control panels for Al Salah well – Bait Hanoon , L-179 and Al Matahen wells – Al Qarara , Al Bahtimy, Al Omary wells – Jabalia, and P-124 and P148 water wells – Rafah.
- 2- Supply and install the defect programmable logic controller (PLC) for Al Wafiia pump station – Khanyounis.
- 3- Supply and install ultrasonic level meter for CANADA reservoir at Rafah, New Reservoir at Bani Suhilah and Al Hassaina pump station at Al Nusirate.
- 4- Supply and install new automatic change over in Al Hassaina P.S., Al Mokhaiiam Al Jadeed P.S., G57 well – Nusirate, Al Sheakh Zayed well – Bait Lahia, Abu Gazala well – Bait Hanoon, and Maqbula well – Al Burij.
- 5- Upgrading electrical system for Abu Rashed, Mahader, Hawaber, Serdah, Tal Al Zaater P.S. and Tika reservoir in Jabalia, the works varies between change soft starter, float switches, electrical disconnect switches with FRB panels, repair bar screens, ampere and voltage measuring panels.
- 6- Upgrading electrical system for Al Nusirate main p.s., The works include:
 - ✓ Enlarge electrical subscription from 400A to 630 A.
 - ✓ Power equipment to be fit with additional pump like main MCCB, Automatic and Manual change over, Busbar, Capacitive bank and correction power factor controller and others.
 - ✓ Adding complete electrical panel to drive a new pump with all required power and control materials.
 - ✓ Extend the existing PLC to meet the right of operation sequence for four pumps.
- 7- Connect electrical panel of P-15 well in Rafah with Al Ethhirate well transformer. The works include ABC cable with length 400 meter, LTL 250 A, wood poles and all required accessories.

Maintenance:

- Change 400A manual change over in Bani Suhaila RO plant.
- Change two remote motor for the existing motorized change over in Ground reservoir.

- Change soft starter control panel and float switches in Al Bassa p.s – Dair El Balah, Al Fukhari well no.1
- Change ammeter and voltmeter panel mounted for more than 15 water and waste water facilities.
- Repair and change indoor and outdoor lighting units at different municipal W&WW facilities.
- Repair and change capacitor to improve power correction factor at WWTP-Rafah, Um El Nasser P.S., Wadi Gaza WWTP, L-179 and Matahen no.2 wells –Al Qarara .
- Change timers, relays, limit switches, float switches and other fittings at different sites.
- Repair the existing motorized change over 2000 A at Abu Rashed P.S. – Jabalia, the works include welding metal inside the circuit breaker in a very sensitive and precise location, the works was conducted successfully by CMWU maintenance staff.

Development Works:

The works to develop the WASH facilities targeted the water facilities by Automation and SCADA operation and provide second electrical power feeder, besides implementing a pilot project to desalinate water by electro dialyses technique.

1- Automation and SCADA

- Automation and SCADA system targeted ten wells as full SCADA and more than sixty wells fully automated. The aim of this work is to avoid operational risks during war and to develop SCADA operation in the future.
- The targeted wells are distributed for nine municipalities and the SCADA is positioned near borders and open area.
- In this stage of installation, the entire SCADA system shall be purposely driven by mobile message to access facility for operation and monitoring until getting modular and sustainable system which will include master control room at CMWU and other branches at municipalities.



Figure 7:Part of SCADA Works

2- Second Electrical Feeder

Another electrical feeder was constructed for each of the four main water and waste water facilities which are: Hawaber P.S. – Jabalia , Aslan no.4 P.S. – Bait Lahia, Al Samer P.S. – Gaza, and Ground Reservoir – Rafah.

3- Electro-dialyses desalination unit

Construct, operate and test desalination unit which is supplied by MIT institute via UNICEF. The idea behind the prototype of brackish water desalination unit is to test and commercialized new water purification system of electro dialyses technique which means separate salt ions in the water by electrical direct current. CMWU electrical engineers have reviewed both installation and O&M manuals and bring it into safe and productive operation mode. The unit capacity is 10m³ daily and was prefabricated inside 20ft container and installed at Al Sadda well head in Khanyounis to get the brackish water supply. The unit was completely self-electrified by solar power modules with battery bank to keep system operating over the night.



Figure 8: Electro Dialyses Desalination Unit

Mechanical Refurbishment, Upgrading and Repairs Installations

During the period of this report from January to December 2018, 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:

- Rewinding of (40-150) HP hollow shaft electric vertical motor for 12 water wells and boosters located throughout various sites from Rafah to Bait Hanoon.
- Change upper and lower bearings of (40 to150) HP hollow shaft electric vertical motor for 24 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 115 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 in Gaza strip.
- Manage and carry out complete mechanical overhauling and refurbishment of pumping manifolds for water wells where 17 sites in Khanyounis and Rafah and the middle area have been covered during the year 2018.



Figure 9: Water facilities Repair, Refurbishment and Rehabilitation Works

The repair records showed that more than **285** 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 234 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 14 water pumping manifolds for both water and wastewater pumping stations.
- Repair and adjustment of 17 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 10: Part of mobile mechanical maintenance and repair workshop activities

4- Fuel Distribution

CMWU under emergency fuel supply program and in full co-operation with wash cluster and OCHA continues to manage and monitor the supply and distribution of programmed Diesel fuel supplies to operate back up electricity supply generators located at essentially categorized facilities e.g. water wells, desalination and pumping facilities. This task has become one of 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 and reduce the risks of wastewater flooding and public health deterioration. The chart shows that during the year 2018 the distribution and supply of a **total 2,061,001 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 cut-offs periods of more than 18 hours.

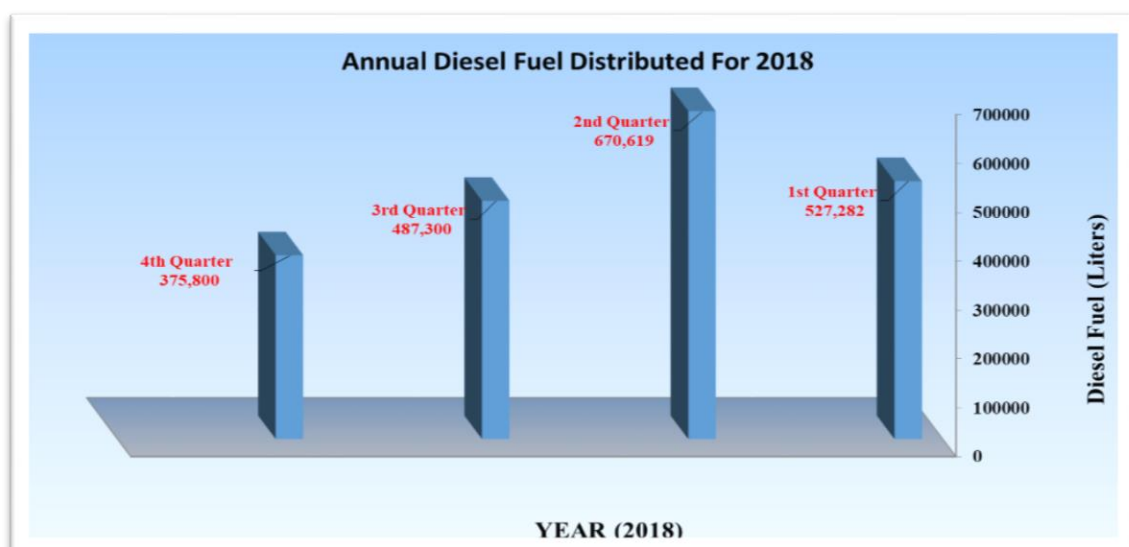


Figure 11: Quarterly Diesel Fuel Supply Distribution Scheme -2018

All activities and programs of rehabilitation and upgrading electrical and mechanical works; besides the distributed quantities of fuel to operate the Standby generators have significantly contributed to safeguard acceptable level of services, and positively impacted the water wells functionality, and energy consumption. Despite, the continual and endless prevailing socioeconomic and politically unstable conditions with unreliable electricity power supply and shortages of spare parts and materials for repair which had heavily and severely affecting back up electricity generators and created lots of repair and maintenance needs and parts, CMWU had continued to manage the services under pressure and protecting environmental and health life aspects. Hereunder the achieved targets details.

A.3 Improve Water Wells Functionality

The functionality of Water Wells indicator aims to make sure that all breakdowns of water production wells in Rafah Area, Khan younis Area and Middle Area to 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:

$$\text{Water Well functionality Efficiency} = \frac{\sum Q_w * D_w}{(\sum Q_w) * D_m}$$

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 serviceability 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 2018 has reached its targeted level 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 was 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 2018 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 2018

Month	Regional Area	Total No of working hours of all Wells	Monthly Water Production	Sum of flow rates of all wells (QW)	total No. of working days of all wells (Dw)	weighted value	Wells Functionality Efficiency	Monthly Functionality Efficiency
		hour	m ³	m ³ /hr		Qw* Dw	%	%
January	Khan Youins Area	11527	863878	2867	1322	84406	98.13%	97.49%
	Middle Area	13470	950766	4104	1794	120601	97.96%	
	Rafah area	7847	5398	1777	588	50864	95.39%	
February	Khan Youins Area	10468	800146	2857	1254	84443	98.54%	96.52%
	Middle Area	11009	801920	4470	1823	128148	95.56%	
	Rafah area	6203	5398	1791	594	51420	95.70%	
March	Khan Youins Area	12452	925982	2766	1216	82071	98.90%	97.96%
	Middle Area	15053	1033361	4075	1846	119718	97.93%	
	Rafah area	7117	5398	1818	601	52688	96.59%	
April	Khan Youins Area	11864	891292	2782	1244	82246	98.55%	98.08%
	Middle Area	17436	1010309	3846	1821	113072	98.00%	
	Rafah area	6922	5398	1807	607	52857	97.53%	
May	Khan Youins Area	2752	186070	650	322	19127	98.11%	97.34%
	Middle Area	15551	1136000	4370	1823	127287	97.09%	
	Rafah area	7707	5398	1798	614	52692	97.67%	
June	Khan Youins Area	13113	958930	2888	1318	85149	98.29%	98.05%
	Middle Area	18360	1243569	4146	1852	122134	98.19%	
	Rafah area	8199	5398	1781	616	52000	97.33%	
July	Khan Youins Area	15609	1153174	3018	1288	88244	97.46%	96.99%
	Middle Area	17442	1301637	4265	1856	125717	98.24%	
	Rafah area	8201	5398	1817	589	50834	93.25%	
August	Khan Youins Area	15771	1135191	2892	1287	84352	97.22%	98.28%
	Middle Area	17494	1268956	4468	1876	133045	99.26%	
	Rafah area	8375	771505	1801	612	52699	97.54%	
September	Khan Youins Area	14985	1076086	2889	1276	83675	96.53%	97.63%
	Middle Area	18080	1276597	4198	1855	123881	98.37%	
	Rafah area	7328	676523	1812	610	53086	97.64%	
October	Khan Youins Area	13731	982952	2582	1202	75291	97.20%	97.89%
	Middle Area	19880	1424086	4368	1850	128206	97.84%	
	Rafah area	7847	682268	1777	621	52805	99.03%	
November	Khan Youins Area	13727	945824	2669	1227	75827	94.70%	97.36%
	Middle Area	19030	1384369	4253	1856	125513	98.38%	
	Rafah area	8693	13591	1839	619	54550	98.89%	
December	Khan Youins Area	11842	800713	2553	1238	75430	98.50%	97.44%
	Middle Area	15558	1135510	4142	1806	120283	96.81%	
	Rafah area	7497	681664	1679	608	49040	97.36%	
Average water Wells Functionality Efficiency % in Jan-December 2018								98.68%

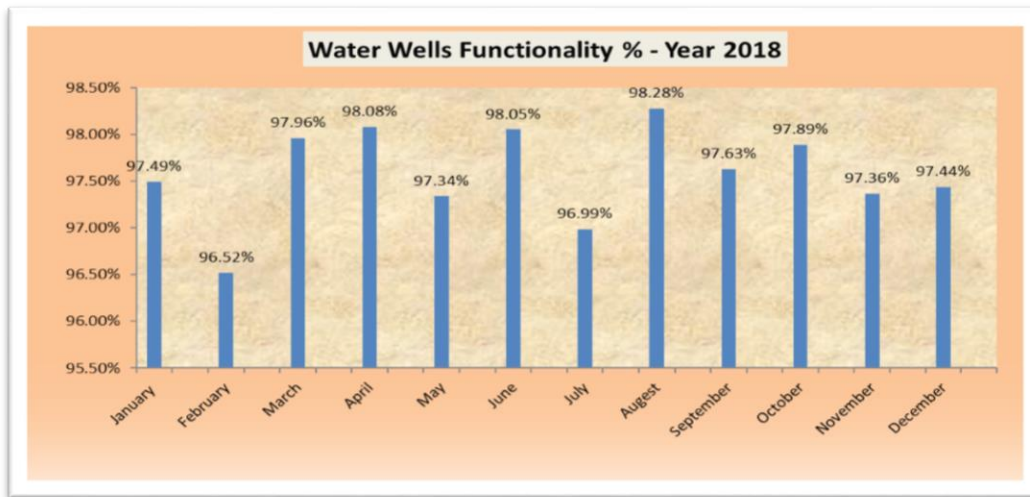


Figure 12: Monthly Functionality Percentage for served Areas-Year 2018

A.4 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:

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

During the year 2018, 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 **0.413 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 2018 of project period, the overall specific Energy consumption in the three targeted regional Areas is **0.413 KWh/m³**.

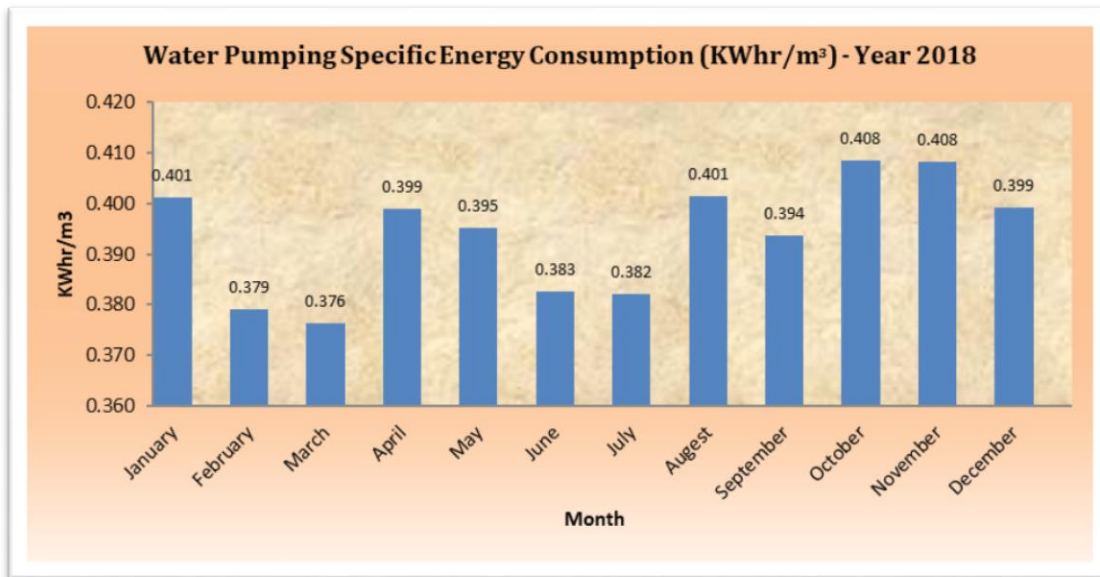


Figure 13: Monthly Specific Energy Consumption 2018

Table 8. The monthly water wells specific power consumption -Middle and South Governorates -YEAR 2018

Month	Area	Energy	Production	Monthly /Governorate	Average Specific Power Consumption -All
		KW	m³	KWh/m³	KWh/m³
January	Khan Younis	355399	827511	0.429	0.401
	Middle	287625	824857	0.349	
	Rafah	259168	596120	0.435	
February	Khan Younis	324440	769280	0.422	0.379
	Middle	240810	672645	0.358	
	Rafah	202902	484718	0.419	
March	Khan Younis	415961	897052	0.464	0.376
	Middle	292584	873009	0.335	
	Rafah	244576	600398	0.407	
April	Khan Younis	362782	829779	0.437	0.399
	Middle	363974	848295	0.429	
	Rafah	226114	539447	0.419	
May	Khan Younis	394820	844939	0.467	0.395
	Middle	308665	894016	0.345	
	Rafah	213316	500632	0.426	
June	Khan Younis	401760	849433	0.473	0.383
	Middle	371410	993116	0.374	
	Rafah	213229	509856	0.418	
July	Khan Younis	513406	1110726	0.462	0.382
	Middle	369325	1101230	0.335	
	Rafah	236398	575276	0.411	
August	Khan Younis	532926	1101094	0.484	0.401
	Middle	374941	1052441	0.356	
	Rafah	241061	607526	0.397	
September	Khan Younis	524056	1049121	0.500	0.394
	Middle	372896	1079795	0.345	
	Rafah	228342	600077	0.381	
October	Khan Younis	498044	1002249	0.497	0.408
	Middle	418946	1209457	0.346	
	Rafah	287527	634825	0.453	
November	Khan Younis	454973	873171	0.521	0.408
	Middle	442068	1281320	0.345	
	Rafah	340193	781594	0.435	
December	Khan Younis	431733	817047	0.528	0.399
	Middle	370898	1066373	0.348	
	Rafah	320063	817047	0.392	
Annual water pumping specific energy consumption (KWhr/m³) -Year 2018					0.413

B. Improve Water Quality

B.1 Disinfection Efficiency

Despite of all prevailing operational conditions, the water disinfection task was of high priority and the maximum recorded disinfection efficiency for the period from January to December 2018 approaches around **99 %** by the end of December 2018. 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 most of the water supply and distribution networks can be disinfected to maximum coverage using the chlorination systems installed, operated and maintained at various water production and pumping facilities.

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

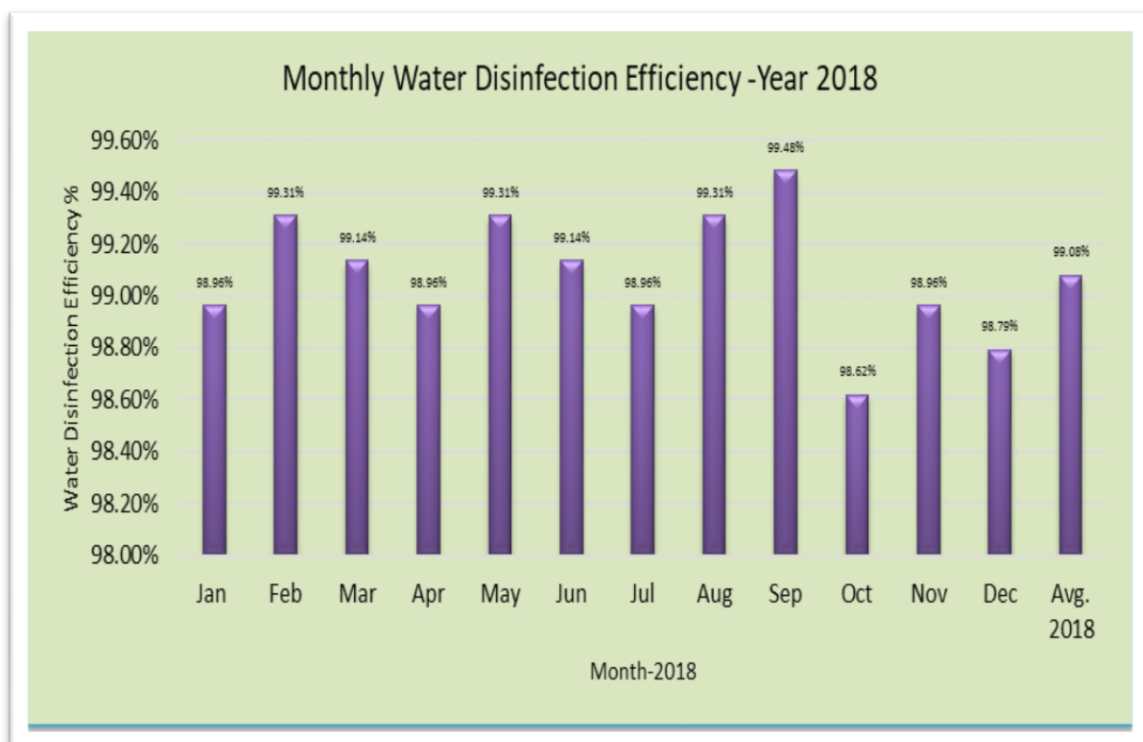


Figure14: Monthly Water Disinfection Percentage 2018

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.

It is clearly shown that by the end of December 2018 there is a significant achievement in which the disinfection efficiency target of the network has been progressively approached and reached the targeted value.

The test results show a maintained residual chlorine level that is consistent within each municipality. During the year 2018 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 2018

No.	Municipality	No. of Samples	01-Jan		01-Feb		01-Mar		01-Apr		01-May		01-Jun	
			Number of negative samples	Total No. of Samples	Number of negative samples	Total No. of Samples	Number of negative samples	Total No. of Samples	Number of negative samples	Total No. of Samples	Number of negative samples	Total No. of Samples	Number of negative samples	Total No. of Samples
1	Um Al Nasser	12	0	12	0	12	1	12	1	12	0	12	0	12
2	Beit Hanoun	19	0	19	0	19	0	19	0	19	0	19	0	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	0	86	1	86	0	86	2	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	1	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	0	24	0	24	0	24	0	24	0	24	0	24
10	Al Burij	20	1	20	0	20	0	20	0	20	2	20	0	20
11	Al Maghazy	24	0	24	1	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	1	30	0	30	0	30	0	30	2	30
15	Wady Al Salq	12	2	12	0	12	0	12	0	12	0	12	0	12
16	Al Qrara	16	0	16	0	16	2	16	0	16	0	16	0	16
17	Khanyounis	44	0	44	0	44	0	44	2	44	0	44	0	44
18	Bani Suhila	20	0	20	0	20	0	20	0	20	0	20	0	20
19	Abssan Al Kaf	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	1	16	0	16
21	Khezaa	16	2	16	0	16	0	16	0	16	0	16	0	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	1	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	1	46	0	46	1	46	1	46
Total		579	6	579	4	579	5	579	6	579	4	579	5	579
Monthly Disinfection Efficiency			98.96%		99.31%		99.14%		98.96%		99.31%		99.14%	

Table 9. Monthly Water Disinfection Monitoring Program from July -December 2018

No.	Municipality	No. of Samples	01-Jul		01-Aug		01-Sep		01-Oct		01-Nov		01-Dec	
			Number of negative samples	Total No. of Samples	Number of negative samples	Total No. of Samples	Number of negative samples	Total No. of Samples	Number of negative samples	Total No. of Samples	Number of negative samples	Total No. of Samples	Number of negative samples	Total No. of Samples
1	Um Al Nasser	12	0	12	0	12	0	12	0	12	0	12	0	12
2	BeitHanoun	19	0	19	0	19	0	19	2	19	1	19	0	19
3	Beitlahia	26	2	26	1	26	0	26	0	26	0	26	0	26
4	Jabaliala	42	1	42	0	42	0	42	0	42	2	42	1	42
5	Gaza	86	0	86	0	86	1	86	1	86	1	86	0	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	0	24	0	24	1	24	0	24	0	24	0	24
10	Al Burij	20	0	20	0	20	0	20	0	20	1	20	1	20
11	Al Maghazy	24	1	24	0	24	0	24	2	24	0	24	1	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	2	30	0	30	0	30
15	Wady Al Salq	12	1	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	1	44	0	44	1	44	0	44	0	44	1	44
18	BaniSuhila	20	0	20	0	20	0	20	0	20	0	20	2	20
19	Abssan Al Kaf	18	0	18	0	18	0	18	0	18	0	18	0	18
20	Abssan Al jac	16	0	16	0	16	0	16	0	16	0	16	0	16
21	Khezaa	16	0	16	0	16	0	16	0	16	0	16	0	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	1	12
24	Al Shuka	12	0	12	0	12	0	12	0	12	0	12	0	12
25	Rafah	46	0	46	2	46	0	46	1	46	0	46	0	46
Total		579	6	579	4	579	3	579	8	579	6	579	7	579
Monthly Disinfection Efficiency			98.96%		99.31%		99.48%		98.62%		98.96%		98.79%	

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

Monthly water disinfection efficiency records -Year 2018												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg. 2018
98.96%	99.31%	99.14%	98.96%	99.31%	99.14%	98.96%	99.31%	99.48%	98.62%	98.96%	98.79%	99.08%

B.3 Chlorine Dosing Units:

CMWU have continued to manage the repair and replacement of faulty dosing units and all associated systems. The records show **that 12 new chlorine dosing units were installed** to replace defective units and **112** repair jobs have been applied for malfunctioning systems at various water wells and pumping facilities.

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 at the stores. The delivery and repair procedures have continued to be carried out through the regional offices and the Municipal chlorination technicians.

During the year 2018 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 2018, a total quantity of 766 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 reverse osmosis desalination plants, and contributes significantly to the improvement of water quality at various served areas of Gaza strip.

B.5 Training and Capacity Building of Municipal Trainees:

Three days training session had been arranged and carried out by CMWU engineer in charge at the ministry of local governorate buildings for 20 municipal technicians who are in charge of operating and maintaining water disinfection systems .It includes for both theoretical presentations and field demonstration for optimum methods of water disinfection including standard operation procedures for chlorine solution injection systems in accordance with relevant occupational health and safety rules .

C. New Water Resource

As the underground coastal aquifer is the main source for water supply to the population of more than 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 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 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 November 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 is finished and will be operated early 2019



Figure 15: Deir Al Balah Sea Water Desalination Plant

2- Construction of 6,000 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 started the plant's operation by standby generators as the plant was not connected 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 the work is still ongoing, that will assure operating one train of the plant to produce 2000 m³/day as the plant consist of three sea water RO desalination trains each of 2000m³/Day production capacity. In the meantime, the design of the second phase to expand the plant by adding 14,000 m³/day, was accomplished and the tender of construction was launched through EU/UNICEF and awarded as well, the work on site will start by mid of January 2019.



Figure 16: Sea Water Desalination Plant – Southern Governorates

3- Construction of 10,000 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 had 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 and booster pumping station is finished.

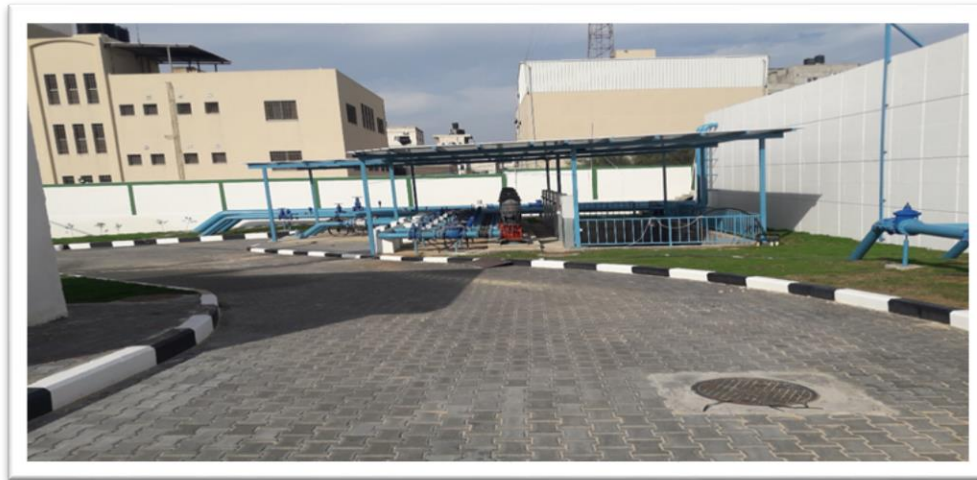


Figure 17: Blending Tank (Al Sheikh Radwan Water Tank)

- 2nd Package: Transmission line 500 mm diameter, of 6 Km length from the desalination plant to the blending tank, the project was 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 2018:
 - Treated water tank 2500 m³.
 - Intermediate water tank 700 m³.
 - Pre-treatment area.
 - RO building over 1200 m² area
 - the administrative building over 130m³ and Electrical room.
 - Brine Tank and line to the sea
 - Electrical room
 - Supply two generators 1825 KVA for each
 - Boundary block wall all around the Desalination plant
 - Supply 3 shipments of electromechanical materials of RO modules.



Figure 18: Gaza STLV Desalination plant

- 4th package: Electrical connection the design has been prepared in cooperation with GEDCO, and will be tendered early 2019

The Overall progress of Gaza desalination plant project is 65%

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.

CMWU in cooperation with ACF and Oxfam has assessed 46 Ro small units through Gaza Strip in order to maintain and rehabilitate those units through different projects to improve their operation efficiency. CMWU and ACF during 2018 have intervened to maintain 14 Ro units at the southern governorates, also another tender for providing 10 Ro units with PV solar system will be launched early 2019.

In addition, there are two new brackish desalination plants constructed during 2018:

- One; through Oxfam fund, at Al shoka area in Rafah of total capacity 200 m³/day, and this plant will serve 10,000 inhabitants with drinking water. To assure a good operation for that plant, CMWU in cooperation with Oxfam/PEF through OCHA fund will provide this plant with PV solar system, the design is being developed and the tender will be launched early 2019.
- 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 was installed on S-80 Well in Al Maghazi-Middle Area Governorate to serve the inhabitant (30,000) with good quality drinking water through Mercy corps.



Figure 19: Al Maghazi filling points

C.3 Water Networks

This section handles water network plans, upgrading, reconfiguration, resizing. CMWU has succeeded during the year 2018 to implement water networks projects varies between upgrading, reconfiguration, and construction new carrier lines and distribution systems at different areas in the Gaza Strip as follows:

1. Upgrading water networks in Rafah and KhanYounis through UNICEF, the project is completed.
2. Rehabilitation water networks at Beit Hanoun through ANERA (USAID fund), the project is ongoing and the overall progress is 15%.
3. Construction water carrier line at Al Shoka through ANERA (USAID fund), the project is completed.
4. The CMWU in cooperation with PWA through EU fund is going to implement NRW program in the southern governorates “Rafah & Khan Younis”, the ToR for consultancy services has been developed in order to enable the MOF to proceed with tendering process.
5. The work is ongoing in Water networks construction at Moghraqa and Nusirat Municipal areas through GVC and the overall progress is 75%.
6. Completed the construction of Water Networks distributed as part of the reservoirs’ tender construction at Rafah, Maghazi, Burij and Dair El Balah Municipal areas.

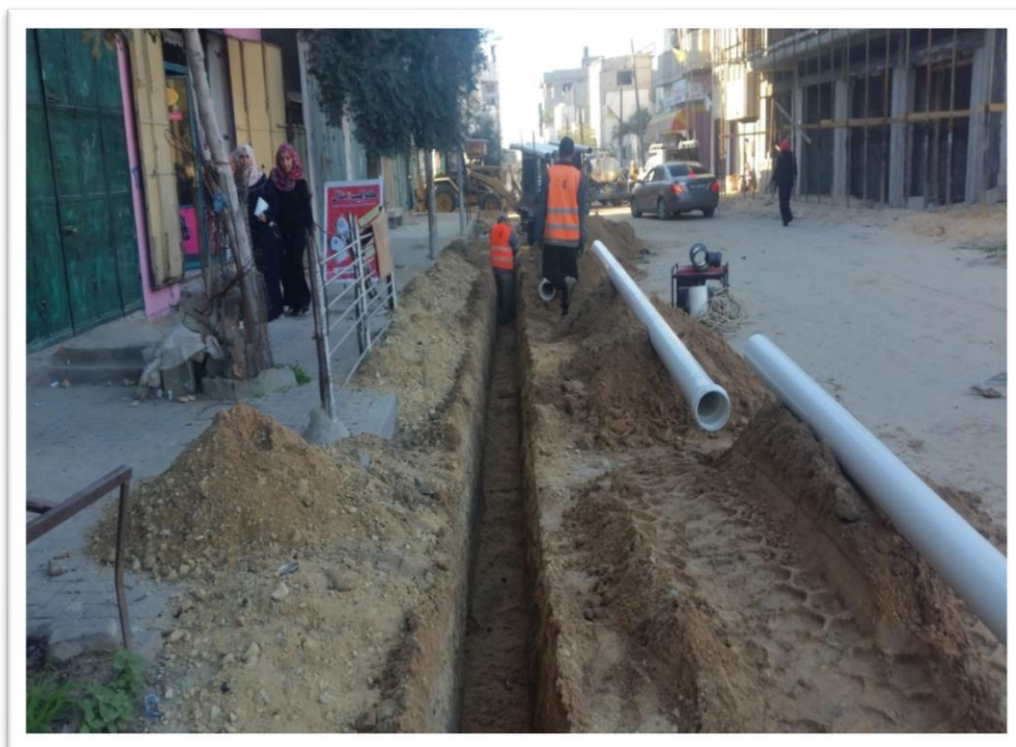


Figure 20 : Water networks at different Areas-Gaza Strip

OVERALL WATER NETWORKS IMPLEMENTED DURING YEAR 2018 IS 65 KM

C.4 Water Tanks

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

- Construction of two water tanks 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 75%

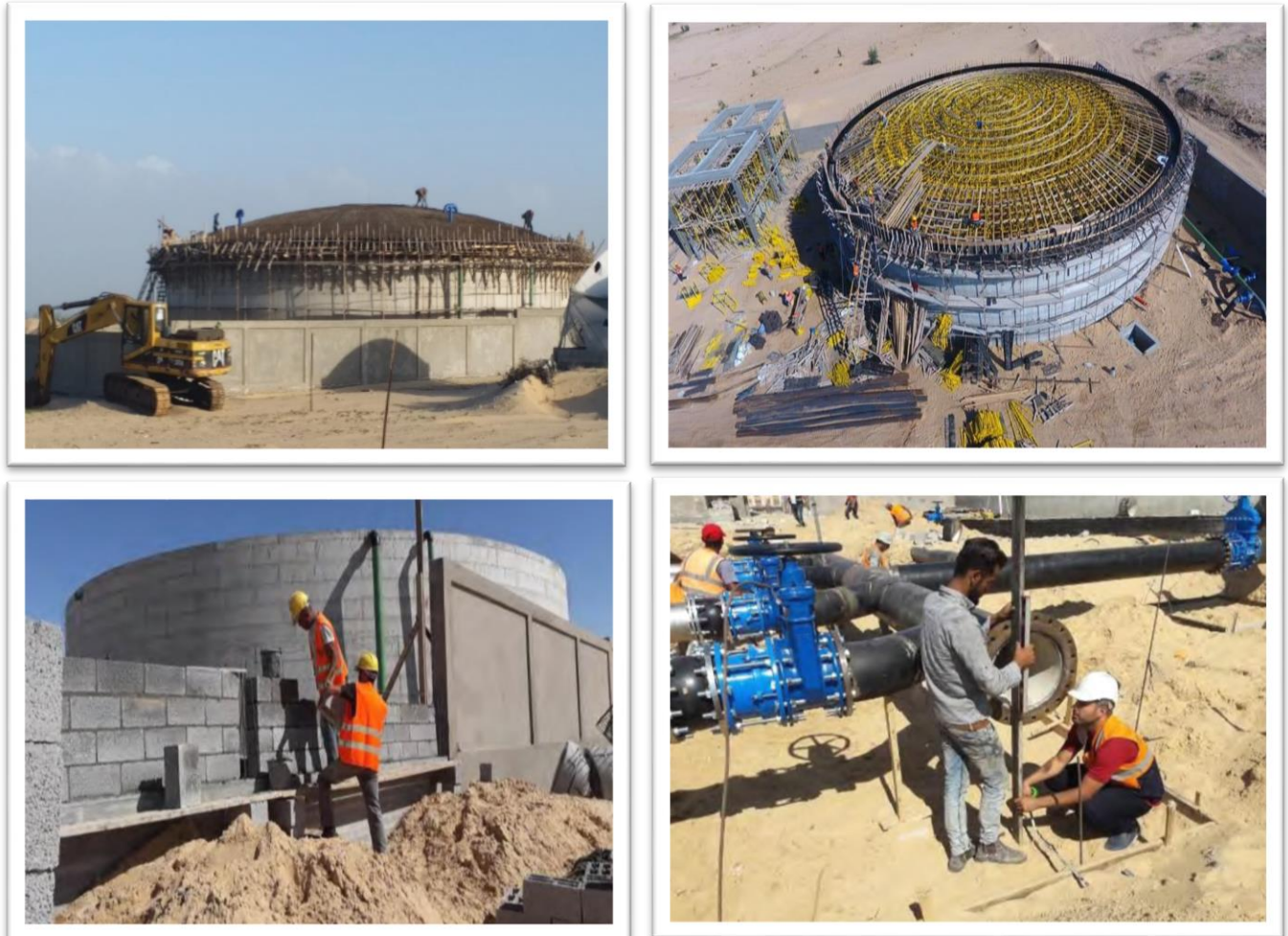


Figure 21: Al Amal and Al Sattar Water Tanks- Khan Younis

- Construction of four water tanks 5000 m³ capacity each at (Beit lahia, Al Nusirat, Deir El Balah and Khan Younis), the project was funded by USAID in cooperation with PWA and CMWU, and the work is completed; whereas those tanks have been in operation since November 2017; in addition, another new four tanks have been constructed during 2018 in (Al Maghazi, Al Buraj, Dair Al Balah and Rafah) and will be in operation mode by January 2019.
- Construction of Al Shoka water tank 2000m³ capacity. The implementing agency is ANERA in cooperation with CMWU and the project is financed by USAID, it has been completed and handed over by December 2018 and will be in operation mode by January 2019.

- Construction of Al Fokhary water tank 2000m3 capacity, the implementing agency is ANERA in cooperation with CMWU and the project is financed by USAID, it has been completed and handed over by December 2018 and will be in operation mode by January 2019.
- Rehabilitation of Al Rahma water tank at Khan Younis, the works include replacement of the existing pumping system by new vertical turbine pumps to improve the tank's operation scheme and to avoid losing part of the tank's capacity, the project is completed on December 2018 and is financed by ICRC.



Figure 22: Al Rahma Booster station

- Upgrading of Tal El Sultan pumping station and Providing Canada booster station with PV solar system, the project funded by ICRC and the work is still in progress.

C.5 Gaza Sustainable Water Supply Program (Associated Works for Gaza Desalination Project)

The consultancy service aimed to prepare the design and tender documents of the associated works for Gaza desalination project. The project was financed by the world Bank and administrated by the PWA.

The CMWU was part of the technical team in addition to PWA who supervised the consultant during the whole assignment implementation.

The consultant (Lotti) has prepared and submitted to PWA and CMWU the following documents and reports as per the TOR:

- Hydraulic Analysis Report
- Asset Inventory Report and Associated Maps for the existing water distribution system
- Non-Revenue-Water Reports and Maps including NRW strategy and NRW management plan.
- Develop an Investment Plan
- Energy Supply and Energy Management Plan Report
- System Operating Cost Report
- Public Awareness Improvement Report
- Note on SCADA Communication System
- Preliminary ESIA Report

Tender Documents and Complete Tendering Process Report including the following packages:

- ✓ 1st. Package: Southern Carrier including the main pumping stations, Carrier pipes and reservoirs.
- ✓ 2nd. package: North Carrier including the main pumping stations, Carrier pipes and reservoirs
- ✓ 3rd. package: Reconfiguration of Water Distribution System – Southern Gaza Governorates.
- ✓ 4th. package: Reconfiguration of Water Distribution System – Northern Gaza Governorates.
- ✓ Mekorot water Improvement Works – Middle and Khan Younis Governorates Contract Package

The last tender (Mekorot improvement works) has been issued for tenderers by PWA and financed by the KDF.

D. Waste Water Treatment Plants:

Wastewater 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.

Due to the insecure and intermittent supply of the electricity from GEDCO Grid, it is operationally unrealistic to have sustainable and stable treatment process, however the improvement of the supply for some time during the year had a little effect in the treatment process, power is needed all the time round for continuous oxygen supply of the aerobic bacteria. Also, the Diesel quantities quota is not enough to bridge the gaps of electricity shortages by backup generators, which negatively impacting the aeration requirements at various treatment plants. Therefore, the pollutants removal efficiency despite all the odds is recording relatively well (around 74 %).

This section describes the main activities implemented in the treatment plants to improve their treatment efficiencies:

- ✓ Beit Lahia TP: CMWU has prepared a tender for rectification and upgrading of TPS, to be financed by the ICRC.
- ✓ Gaza /Sheikh Eileen wastewater treatment plant: CMWU is taking part of the supervisory committee that overlooking the comprehensive maintenance contract (C6) , financed by KFW, the contract is approximately finished (80%).
- ✓ Rafah: Normal operation, 170Kwh of PV system has been added to the operating power of the plant, another 200Kw project is being carried out, and this will improve the functionality of the plant. PECДАР in cooperation with CMWU is supervising a contract that will achieve some improvements of plant's operation like cleaning, bar screen, and old bio tower maintenance, etc.

- ✓ Khan Younis TTP: It is in midst of an upgrading contract that include, cleaning the lagoons (1&2), also enlarging the diameter of internal pipping and some modifications of grit removal.
- ✓ Wadi Gaza/Temporary lagoons: This plant has been sidelined with only partial lagoons sedimentation, because it has become extremely undersized, and all sewage shall be diverted towards eastern Al Bureij new wastewater treatment plant



Figure 23: KH Temporary Wastewater Treatment Plant

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 negotiating the operational needs for the NGEST with the PWA .

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 includes 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
- Wadi Gaza Measures

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

contractor has accomplished the design activities and started the construction works during 2017, the contractor has completed 95 % of civil works and 45% of electro-mechanical works as following:

Activity	Percentage completed %
Final Clarifiers	96
Bioreactor	100
Blower Station	95
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	90
Digester Building	95
Administration Building	100
Gas Holder	95
Workshop Building	95
Sludge Dewatering Building	95
Water Tank	100
Grit and Grease Chamber	100
Return and Excess Sludge Pumping Station	100
Service Water Pumping Station	100
Flow Meter Chamber	90
Primary Clarifier Distribution Chamber	100
Bioreactor Distribution Chamber	100
Scum Pumping Station to Final Clarifiers	95
Grease Holding Tank	95
Electrical Room	95
Variation Order No. 1 – Retaining and Boundary Walls	100
Wadi Gaza Central Pumping Station Activates	80

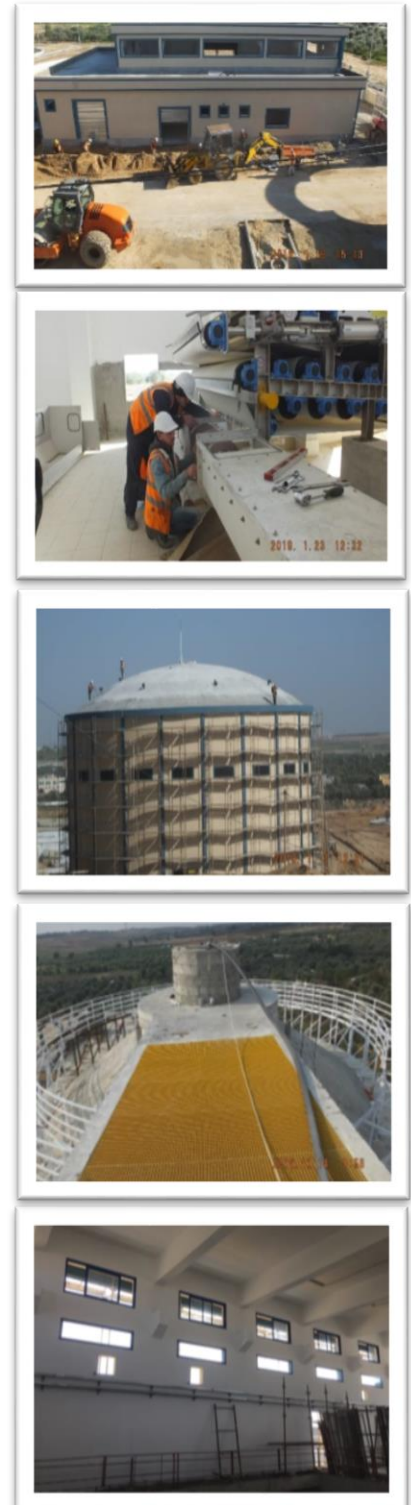


Figure 24: Central WWTP and Central

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.
- ✓ Pipes of 1200 mm DI are installed with total length of 1585m (46% of the total length is completed).
 - ✓ Pipe of 400 mm DI are installed with total length of 1060 m (96% of the total length is completed), the Remaining 20m to connect it with the Nuseirat PS.

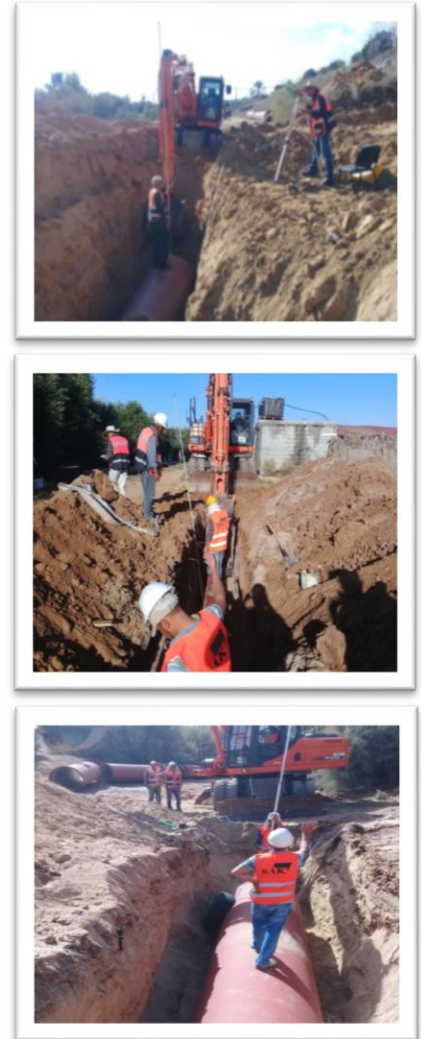


Figure 25: Central WWTP Pressure line

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 Central PS, 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.

Percentage Completion:**Pipes:**

1500mm Concrete Pipes – 2,690m constructed to date = 49% Complete to date.

1000 mm Concrete Pipes – 215m constructed to date = 100% Complete to date.

Manholes:

47% of the Concrete Manholes of 1500mm diameter were installed (# 30)

100% of the Concrete Manholes of 1000mm diameter were installed (# 3)



Figure 26: Central WWTP Gravity Pipeline

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

The contract has been awarded and commencement will be early 2019.

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; 65 % of the activities of the project have been completed.



Figure 27: Parts of Sheikh Ejleen Measures

Gaza Reconstruction project

In Parallel, KFW has signed agreement on the 6th of November 2014 with an amount of 9 M Euros for reconstruction assistance for water and wastewater in Gaza City. The following activities were implemented during the past four years:

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

Whereas the following activities were completed during 2018:

- Reconstruction and Rehabilitation of water wells in Gaza City & Central Communities three new wells
- Rehabilitation of Sheikh Ajleen WWTP

D.2 Khan Younis Wastewater Treatment Plant (KHWWT)

The permanent KHWWT is Implemented through two phases with capacity 26,656 m³/day for phase I and 44,948 m³/day for phase II; the project is financed by ISDB (KDF), JICA and implemented by (UNDP and CMWU in cooperation with PWA) , 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.

The progress in the treatment is about 85%



Figure 28: 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 treated effluent into the sea.

The following activities were implemented during 2018:

The contractor has supplied and installed about 40% of the total pipes.



Figure 29: Ductile Iron Pipeline

3- Construction of the Infiltration Basins in AL Fokhari

The site for the infiltration basins is located at Al Fokhari 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 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. The overall progress by the end of 2018 is 98%.



Figure 30: Infiltration Basin at Al Fokhari

- A separate tender will be launched early 2019 for construction the block boundary walls around the infiltration basin, the project is financed by ISDB (KDF).
- In addition, the CMWU in cooperation with UNDP through ISDB fund will upgrade the central pumping station 8 and extend the main carrier line from PS 8 to KHHWWTP, the designs have been developed and the tenders to be launched on January 2019, this project is planned to be completed in parallel with the WWTP to assure that all the associated facilities of WWTP are operational.

D.3 The Permanent Northern Treatment Plant (NGEST)

Since July 2018, the new wastewater treatment plant of daily capacity 35600m³/day was brought into full operation mode under two years' operation contract signed between PWA and Joint venture contractor (Thermomechanic & MACC), and the records showed that till the end of year 2018 more than 7 million cubic meters of raw sewage were pumped from terminal pumping station at Beit Lahia lagoons site and treated at the new plant

In the construction agreement among PWA and WB (Multi donors fund); it is clearly mentioned that CMWU is the operator. An MOU has been drafted among PWA, CMWU and Northern Municipalities which abide the CMWU to operate the NGEST, it is under revision to be signed and CMWU should take over the operation before the end of operation contract; but CMWU wants some financial guarantees from PWA since the municipalities are not able to cover the whole operation cost.

E. Storm Water Activities

Many storm water collection and pumping facilities constructed and upgraded during the past five years have become operational and brought into service mode. This provide remarkable improvement and relief and reduce the risk of flooding at various areas of Gaza strip and positive impacts have been significantly recorded from various hot spots in the field as detailed here below:

- Since March 2018 ,North Gaza Waste Water Treatment Plant was completed ,commissioned ,operated and fully loaded by June 2018 ,where all wastewater collected from northern governorate of 35000m³/day had directly diverted from central terminal pumping station towards the new treatment plant and existing lagoons and bonds at Beit Lahia have become only receiving storm water for infiltration with safe manner and sustainable hydraulic absorbing capacities .This new scheme of operation has played great role to eliminate totally the risk of lagoons flooding and life threatening events of Beit Lahia residents flagged up during the past years.
- Storm water detention lagoon with box culvert and pumping station and pressure force main to the sea out fall were constructed and commissioned in Rafah under USAID/Unicef financing program and brought into operational mode this winter season. The entire intervention has solved one of chronical flooding case in Rafah which used to divide Rafah city into two halves along Abu Baker street and at Jemmazit Al Sabeel area during rainy seasons in the past years.
- Construction and equipping storm water detention basin at Al Junaina area of Rafah city reduces flooding events at eastern part of the city.
- Al Amal storm water bond with pumping station and force main was constructed and brought into operational mode in Khanyounis to pump storm water towards the western infiltration basin.

- Activation of Sheikh Radwan storm water pumping station with 900mm diameter force main at Shiek Radwan storm water collection bon in Gaza.
- Construction and equipping of Asqola storm water infiltration basin in Gaza
- Construction of Al saftawi storm water infiltration lagoon in Western Jabalia has solved flooding risks at the targeted area behind old municipality building.
- Construction and activation of storm water detention/infiltration basin in Al Qarara.
- Comprehensive cleaning and opening of Wadi Salqa .
- All governorates have been given mobile diesel driven pumps to be utilized during rainy times and to pump out any flooding on streets and lowest points.
- Eight pumping facilities of hot spot level had been electrified by second power line to maintain electricity from two different feeders during emergency cases.
- 35 repair and rehabilitation jobs of sewage and storm water pumping stations were completed to improve facilities preparedness. This include the repairs of pumps and backup generators and other associated systems.
- 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.
- Supply all required safety and protective tools, clothes and equipment for technicians and labors working under the storm and flooding conditions. Winterization clothes distributed for labors throughout municipalities of Gaza strip.
- NRC in cooperation with CMWU will launch the tender of construction storm water pipeline in Al Aqsa street at Dair Al Balah, the design of the project is being developed by the CMWU, and the work will start early 2019.
- An agreement between Emmar and IDB has been signed in order to construct Aslan infiltration basin in Beit Lahia. This basin will collect Storm water from 2 Km2 area and protect the downstream from yearly flood.



Figure 31: Storm water preparedness activities

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. Develop the Master plan for Wadi Al Salqa wastewater system.
2. Ongoing, construction of sewage network, pumping station and Household connection at Al Mawasi Area-Khan Younis, the project is being implemented by ACF in cooperation with the CMWU, the overall progress is 55%.
3. Upgrade Sewage Networks in Al Nusirat and Moghraqa Municipal areas. the project is being implemented by GVC in cooperation with the CMWU, the overall progress is 85%.

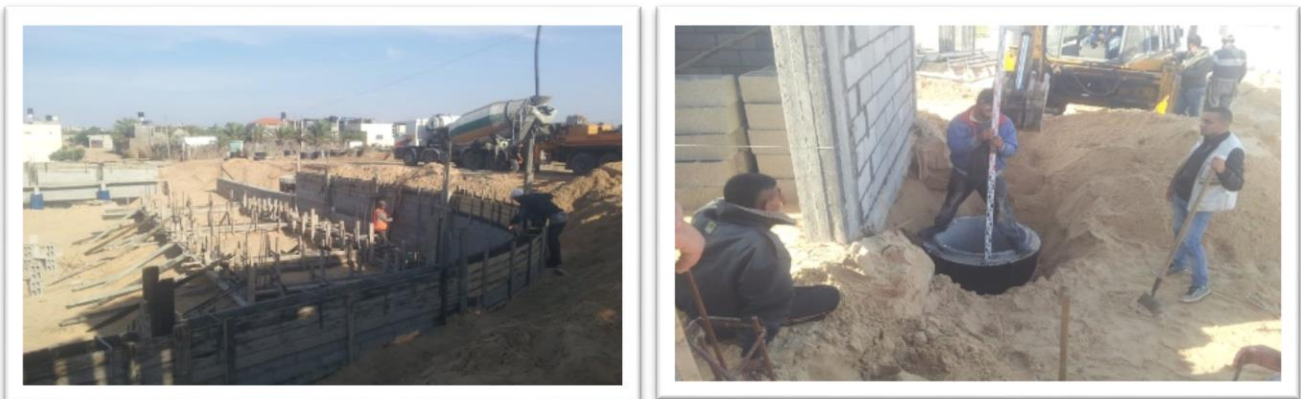


Figure 32: Wastewater networks and treatment unit at Al Mawasi

The OVERALL WASTEWATER NETWORKS IMPLEMENTED DURING YEAR 2018 IS 40 KM

F.2 WW Pumping Stations

- The Construction of Sewage Pumping station of capacity 700 m³/day at Abu Mohadi area funded by ICRC is completed and operated in 2018, whereas 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 is completed and now the PS is operational.
- The CMWU has updated the wastewater master plan for Khan Younis governorate in coherence with the strategic & national plans, the locations of the proposed pumping stations have been determined and all the concerned parties are involved in order to facilitate and intervene towards lands acquisition.

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

During the period of this report from January to December 2018, 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 32 pumps during year 2018.



Figure 33: Wastewater electromechanical maintenance

- 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 15 tasks per year of 2018.



Figure 34: Manifold repairs

- 3 Manage and carry out comprehensive electromechanical maintenance, replacement, repair program for automatic mechanical bar screens of wastewater pumping at 8 sewage pumping stations.

- 4 Comprehensive Maintenance, rehabilitation and Upgrading of Al Nussirate-UNRWA terminal sewage pumping station, the work includes installation of additional pump, electrical control board, increase electrical connecting power rating, supply and install new 500KVA generator, mechanical upgrading of main pumping manifold and pumps risers, repair of bar screen, overflow diverting pipelines ...etc.
- 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 42 sewage pumping station for year 2018.
- 6 Installation of second transformer and automatic changeover for main sewage pumping stations.
- 7 Comprehensive electromechanical repairs of terminal sewage pumping station of north Gaza governorate including bar screen repair, arrange for sand removal trailers, repairs of backup generators installation of VFD drives. etc.
- 8 Supply and install new sewage pumping unit at Hesbit Al Samak sewage pumping station in Khanyounis with all associated works and electromechanical installations.
- 9 Replacement of pumps risers, discharge pipelines and rehabilitation of two sewage pumps out of two at Al Wafiya sewage pumping station in Khanyounis.
- 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 6 sewage pumping stations.



Figure 35: Sewage PS repairs

- 14 Continue to manage and carry out heavy machineries annual maintenance and repair program ,and the works include 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.



Figure 36: Heavy Machinery Repairs

Table 10. List of major rehabilitation and repair works:

Item No.	Municipality	Site/Facility	Work Description
1	Al Nussirat	Nussirat P.S (Wadi Qshash)	mechanical overhauling and repairs of 2 inches air release valve
			mechanical overhauling and repairs of 4 inches air release valve
			General Overhauling, Rehabilitation, electromechanical maintenance and operation of the auto mechanical bar screen
2	Al Nussirat	Nussirat P.S (Wadi Qshash)	Modification the Existing openings for the new pump and ladder
3	Al Nussirat	Nussirat P.S (Wadi Qshash)	Supply and install upper bearings for Flygt 85 KW CP3231.665
			Supply and install lower bearings for Flygt 85 KW CP3231.665
			Supply and install set of mechanical seals for Flygt 85 KW CP3231.665
			Checking and inspection for deteriorated pumps/parts at the site (P.S) and in the workshop for Flygt 85 KW CP3231.665
4	Middle Area	WGWWTP	General Overhauling, Rehabilitation, electromechanical maintenance and operation of the auto mechanical bar screen
5	Middle Area	WGWWTP	General Overhauling, Rehabilitation, electromechanical maintenance and operation of the aerator or mixers
6	Deir Al Balah	Al Bassa P.S	Rewinding the electrical motors for 54KW
			Supply and install upper bearings for 54KW
			Supply and install lower bearings for 54KW
			Supply and install set of mechanical seals for 54KW
			Checking and inspection for deteriorated pumps/parts at the site (P.S) and in the workshop for 54KW
7	Deir Al Balah	Al Bassa P.S	Supply and install upper bearings for 54KW
			Supply and install lower bearings for 54KW
			Supply and install set of mechanical seals for 54KW
			Checking and inspection for deteriorated pumps/parts at the site (P.S) and in the workshop for 54KW
8	Jabalia	Hawaber P.S	Rewinding the electrical motors for KSB Pump of 78KW
			Supply and install upper bearings for KSB Pump of 78KW
			Supply and install lower bearings for KSB Pump of 78KW
			Supply and install set of mechanical seals for KSB Pump of 78KW
			Checking and inspection for deteriorated pumps/parts at the site (P.S) and in the workshop for KSB Pump of 78KW
9	Bait Lahia	Hatabia P.S	Supply and install upper bearings for KSB Pump of 78KW
			Supply and install lower bearings for KSB Pump of 78KW
			Supply and install set of mechanical seals for KSB Pump of 78KW

			Checking and inspection for deteriorated pumps/parts at the site (P.S) and in the workshop for KSB Pump of 78KW
10	Bait Lahia	Al Atatra P.S	Supply and install upper bearings for 54KW
			Supply and install lower bearings for 54KW
			Supply and install set of mechanical seals for 54KW
			Checking and inspection for deteriorated pumps/parts at the site (P.S) and in the workshop for 54KW
11	North Area	BLWWTP	Remove, disassembling, cleaning and re-install the aerator frame, pontoons at the site work
			General Overhauling, Rehabilitation, electromechanical maintenance and operation of the aerator or mixers
12	North Area	BLWWTP	Electromechanical rehabilitation, of various wastewater facilities, include supply S.Steel 316L welding electrode.
13	Bait Lahia	Amer P.S	Checking and inspection for deteriorated pumps/parts at the site (P.S) and in the workshop for KSB Pump of 125KW
14	Khanuonis	Hesbit Al Samak P.S	Rewinding the electrical motors for KSB Pump of 210KW
			Supply and install upper bearings for KSB Pump of 210KW
			Supply and install lower bearings for KSB Pump of 210KW
			Supply and install set of mechanical seals for KSB Pump of 210KW
			Checking and inspection for deteriorated pumps/parts at the site (P.S) and in the workshop for KSB Pump of 210KW
15	Khanuonis	Al Majadla	Cleaning the pumping stations, The work includes removing the garbage for Al Majadla P.S
16	Khanuonis	Hesbit Al Samak P.S	Cleaning the pumping stations, The work includes removing the garbage for Hesbit Al Samak P.S
17	Deir Al Balah	Al Bassa P.S	Cleaning the pumping stations, The work includes removing the garbage for Hesbit Al Bassa P.S
18	Rafah	WWTP-Rafah	Supply and install upper bearings for ABS Pump- 45kw
			Supply and install lower bearings for ABS Pump- 45kw
			Supply and install set of mechanical seals for ABS Pump- 45kw
			Checking and inspection for deteriorated pumps/parts at the site (P.S) and in the workshop for ABS Pump- 45kw
19	Rafah	Al Junina P.S	Supply and install upper bearings for 54KW
			Supply and install lower bearings for 54KW
			Supply and install set of mechanical seals for 54KW
			Checking and inspection for deteriorated pumps/parts at the site (P.S) and in the workshop for 54KW
20	Al Nussirat	Nussirat P.S (Wadi Qshash)	Removing the (existing electrical hoist block, I-Beam Girder that installed in grit removal channels unit and any odor system ducts
			Supply and install steel I beam profiles 30cm (IPN 300/125) and bracing as girder beam
21	North Area	BLWWTP	Cleaning the pumping stations, The work includes removing the garbage for BLWWTP .
22	North Area	BLWWTP	Checking and inspection for deteriorated pumps/parts at the site (P.S) and in the workshop.
23	Rafah	Jumizat Al Sabiel P.S	Cleaning the pumping stations, The work includes removing the garbage from Jumizat Al Sabiel P.S
24	Rafah	Al Junina P.S	Cleaning the pumping stations, The work includes removing the garbage for Al Junina P.S
25	Al Moghraga	Al Moghraga	Cleaning the pumping stations, The work includes removing the garbage for Al Moghraga P.S
26	Rafah	UNDP P.S	Cleaning the pumping stations, The work includes removing the garbage for UNDP P.S
27	Rafah	Tal Al Sultan P.S	Cleaning the pumping stations, The work includes removing the garbage frontal Al Sultan P.S
28	Khanuonis	Al Wafiya'a	Cleaning the pumping stations, The work includes removing the garbage for Tal Al Sultan P.S
29	North Area	BLWWTP	Cleaning the pumping stations, The work includes removing the garbage for BLWWTP .
30	Rafah	Jumizat Al Sabiel P.S	Checking and inspection for deteriorated pumps/parts at the site (P.S) and in the workshop.
31	Wadi Gaza	Wadi Gaza P.S	Checking and inspection for deteriorated pumps/parts at the site (P.S) and in the workshop for 7.5 KW
32	Al Zawida'a	Sawarha P.S	Cleaning the pumping stations, The work includes removing the garbage for Sawarha P.S

33	Rafah	UNDP P.S	Checking and inspection for deteriorated pumps/parts at the site (P.S) and in the workshop for UNDP P.S
34	Deir Al Balah	Al Berka P.S	Electromechanical rehabilitation, of various wastewater facilities, include maintenance of the Air release valve, Gate valve and cleaning the manhole for completing the works.
35	Bait Lahia	Al Mashrou	Cleaning the pumping stations, The work includes removing the garbage for Al Mashrou P.S
36	Rafah	WWTP-Rafah	Supply and install upper bearings for Pump of 18KW
			Supply and install lower bearings for Pump of 18KW
			Supply and install set of mechanical seals for Pump of 18KW
			Checking and inspection for deteriorated pumps/parts at the site (P.S) and in the workshop for Pump of 18KW
37	Rafah	WWTP-Rafah	Sewage multi-manufacturer pumps of (16-45) KW
			Supply and install upper bearings for Pump of 18KW
			Supply and install lower bearings for Pump of 18KW
			Supply and install set of mechanical seals for Pump of 18KW
			Checking and inspection for deteriorated pumps/parts at the site (P.S) and in the workshop for Pump of 18KW
38	Al Nussirat	Hasaina P.S	Supply and install electrically operated hoisting block four direction of motion
39	Um Al Nasser	Um Al Nasser P.S	Cleaning the pumping stations, The work includes removing the garbage for Um Al nasser P.S
40	Deir Al Balah	Al Berka P.S	Cleaning the pumping stations, The work includes removing the garbage for Al Berka P.S
41	Khanuonis	Baten Al Sameen P.S	Cleaning the pumping stations, The work includes removing the garbage for Baten Al Sameen P.S
42	Khanuonis	Hesbit Al Samak P.S	Supply, install, connect and test a complete package of a sewerage submersible pumping unit, Type : KRTK 200-500/2104.UG-S
43	Al Nussirat	Al Nussirat P.S	Supply, install, Operate, connect and test a complete package of a sewerage submersible pumping unit of FLYGT pump type (FLYGT CP 3231.665 HT), power 85 kw at 1450 rpm, 3-ph, 50 Hz and 380 V
44	North Area	BLWWTP	Supply Galvanized steel shed 1.25*2.5, 3mm thickness.
45	Al Nussirat	Al Nussirat P.S	Supply and install Sewer Pipes Upvc, 400mm, SN 8, 30m long as an overflow.
			Supply and install UPVC pipe, 160mm, SN 8, 25m long as a rain water drainage.
			Supply and install drive line Shaft with Coupling, 34mm, S.Steel 304 for two sluice gates.
			Manufacture, supply and install Odor system slice cover (62*62)cm made of stainless steel 316L
			Backfill Kurkar material with all required works.
			Supply and cast reinforced concrete (B250) and 15 cm thick for ground slab.
			Dismantling and raising the manifold of Al Nussirat pump station.
46	Jabaliala	Tal Al Water P.S	General Overhauling, Rehabilitation, electromechanical maintenance and operation of the auto mechanical bar screen
47	Khanuonis	Al Wafiya'a P.S	Carry out electromechanical rehabilitation, repairs and upgrading of any defected parts, including supplying and installing programmable logic controller PLC 128input/128output points.
48	Jabaliala	Abu Rashed	General Overhauling, Rehabilitation, electromechanical maintenance and operation of the auto mechanical bar screen
49	Khanuonis	Al Wafiya'a P.S	Rewinding the electrical motors for KSB Pump of 210KW
			Supply and install upper bearings for KSB Pump of 210KW
			Supply and install lower bearings for KSB Pump of 210KW
			Supply and install set of mechanical seals for KSB Pump of 210KW
			Supply and install Impeller for KSB 210KW (As per manufacturer Specifications Manual)
			Checking and inspection for deteriorated pumps/parts at the site (P.S) and in the workshop for KSB Pump of 210KW
50	Bait Hanoun	Al Seka P.S	General Overhauling, Rehabilitation, electromechanical maintenance and operation of the auto mechanical bar screen
51	Bait Hanoun	Al Sultan Abdul Hamid P.S	General Overhauling, Rehabilitation, electromechanical maintenance and operation of the auto mechanical bar screen

2. PROGRAM ACTIVITIES PROGRESS

2.1 Geographic Information System (GIS)

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.ps](http://gis.cmwu.ps).

New update to the system has been posted after signing a support agreement for further field survey as well as software update's with the ICRC funding.

2.2 Environmental Management Plan (EMP)

CMWU has monitored and analyzed the water quality in the domestic water wells in different governorates, in addition to wastewater collection and sampling for all WWTPs on a weekly basis.

2.3 Customer Services

During 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 on 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 90,346 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 information etc.), 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 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 integrate extra municipalities in the utility system.
- 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.
- Updated the CMWU strategic plan (5 years plan 2018- 2023), and prepare the TOR for a CMWU business plan for the next five years.

3.2 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 PWA and 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: some projects during 2018 are in progress; like rehabilitation and upgrading of water & wastewater networks, supply chemicals for water facilities, construction emergency warehouses, Supply drinking water for schools, providing water & Wastewater facilities with PV solar system, and the second phase of STLV (SGDP) desalination plant.

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, providing PV system for Canada water tank, maintenance works and providing the Second power line for wastewater facilities,

KFW: has financed Gaza central WWTP, recently KFW has allocated 10M USD for water sector.

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. Recently EU is committed to finance the NRW program for Rafah & Khan Younis and already the CMWU in cooperation with EU started the project's preparation. The projects implementation among PWA, CMWU, MOF and EU

Muslim Hands: has financed PV solar system at Al Kawther water well.

ANERA: in cooperation with CMWU has finished recently construction of two water tanks at Al Fokhari and Al Shoka besides water networks at Beit Lahia. In addition to rehabilitation of water networks at Al Shoka, Khan younis and Beit Hanoun

Oxfam: in cooperation with CMWU and through EU fund will rehabilitate and maintain 16 Ro units through Gaza Strip, in addition to providing Al Shoka and maan water tank with PV solar system.

ACF: in cooperation with CMWU has completed the assessment study for storm water flood mitigation where the current projects with ACF are "construction of wastewater networks and treatment unit at Al Mawasi-Khan younis, rehabilitation 14 Ro units at the southern governorate, providing 10 Ro units with PV system,

PHG: in cooperation with CMWU PHG is going to provide 5 wastewater facilities with PV system, the designs are still under preparation and the tender/s will be launched early 2019

NRC: in cooperation with CMWU NRC will finance the construction of storm water pipeline at Al Aqsa street-Dair Al Balah, the design is being developed by the CMWU to be launched early 2019.

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. Mural at the distribution points at Al Saada desalination unit in Khanyounis
2. Media & awareness unit implemented awareness session & competitions in 10 schools and two kindergartens at Khanyounis governorate and others (8000 student)
3. 6 Awareness raising workshop for women in Khanyounis and other governorates.
4. Home visits: Media & awareness unit implemented 588 home visits in Khanyounis governorate.
5. Media Materials including, TV ads, 1 sticker of 5000 copies.
6. Ceremonies: 10 ceremonies.
7. Organizing trips for 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 2 discussion meetings with local committee in Khanyounis and Rafah.
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. 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 first half of the year 2018, 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 45 MW, which will rise to around 75 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

In the Past years, residents in the west of Beit Lahia used to depend on Atatra, Siafa and Salaten water wells in water supply. Those three water wells are not enough to supply water for 40,000 people especially with the contagious power cut-offs.

In order to increase access to clean drinking water to the people in Gaza strip; CMWU and PWA has succeeded to construct eight reservoirs distributed overall Gaza strip through USAID fund.

Beit Lahia reservoir 3800 m3 capacity is one of them, the construction works started on January 2016 and the reservoir has been operated on January 2018, the work included site preparation, excavation, backfilling, yard piping, retaining walls, mechanical equipment (valves, piping, fittings, supports and other appurtenances), electrical and control building, guard house building, disinfection building, booster pumps station, standby diesel generator and laying 11.5 KM main transmission pipelines.

Atatra water well in Beit Lahia 110 m3/hour capacity which is considered the main water supply to the reservoir was targeted and destroyed completely by Israeli airstrike; however, the new reservoir and pipelines facilitate the water access for more than 10,000 people used to be supplied previously by this water well. The pipeline between the two water wells have been constructed as part of Al Atatra reservoir project.

Hani Ibrahim Zaqout, 58 years old, from west of Beit Lahia area, said” the situation was so difficult before the reservoir construction, we don’t find any water shortage after operating the new reservoir and the water service improved dramatically in the whole area. Finally, he thanks Municipality of Beit Lahia, CMWU, PWA and USAID for the reservoir construction”.

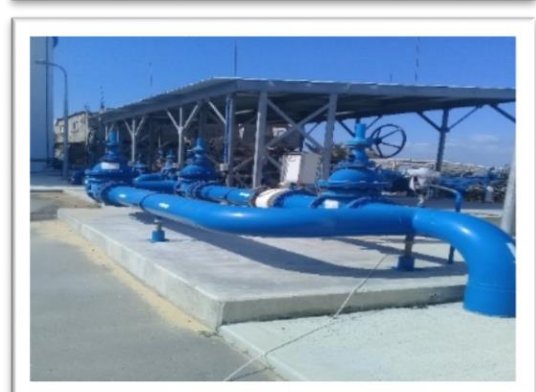


Figure 35: Al Atatra water Reservoir

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 by 2025.

END