



Coastal Municipalities Water Utility



Annual Report 2016



January 2017

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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 2016.

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EXECUTIVE SUMMARY

Throughout this year the CMWU manage and carry out all normal operations and maintenance tasks with all monitoring programs set as per several utility performance indicators. The overall efficiency of the existing water distribution systems is **64.7%** with **35.3%** UFW for Middle, Khanyounis and Rafah governorates. Water Wells functionality efficiency is **97.5%**, water disinfection efficiency is over **99.4%**. Also, manage weekly quality monitoring program for all wastewater treatment plants through utilizing CMWU central lab and sampling program based on EMP procedures. The records show satisfactorily progressive achievement for the task of **78.2%** average removal efficiency as per the target for the year 2016 despite the treatment plants are overloaded.

The CMWU carries out more than **275** predictive, preventive and corrective maintenance job orders at various areas for the existing **250** generators that heavily and severely affected by long daily hours of operations which create lots of repair and maintenance needs and parts. Also, more than **2.2** million liters of Diesel fuel supplies have been distributed towards various water and wastewater pumping and treatment facilities spread all over Gaza strip governorates.

The CMWU carries out and on time reactions with all programmed inspections and preventive maintenance requirements for all water and wastewater facilities, more than **900** repair job orders in water supply and distribution networks were carried out during 2016 for all municipalities.

Moreover, and despite the bad economic situations that the Gaza strip faces after the conflict, the collection ratios were improved to an average of **45%** by the end of November 2016 towards **55%** the final targeted percentage end of 2017.

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

1. The implementation of STLV sea water desalination plant 6,000 m³/day; which is funded by EU and implemented by UNICEF in cooperation with PWA and CMWU is almost finished; it is in the testing and commissioning phase while the preparation of the second phase agreement between PWA, CMWU, UNICEF and EU to reach 12,000m³/day is under negotiation.
2. 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
3. The implementation of the strategic storm water projects through Gaza Strip governorates are on-going like; Al Amal storm water collection and infiltration pond, the Western Rafah storm water project, and Al Qarara Storm water pond to mitigate the targeted areas from frequent floods in winter season, and infiltrate the storm water to the aquifer.

4. All the WISSIP procurement plan projects were accomplished, and most of the AF projects are on-going, and some of the projects are under the tendering and evaluation phases. The final list of remaining projects for the year 2017 has been identified.
5. USAID in cooperation with PWA and CMWU have started the construction of four reservoirs and finished the design of other four to be constructed during the year 2017. Also, the USAID has contributed to extend the middle area desalination plant from 2600 m³/day to reach 6000 m³/day as part of the STLV

INTRODUCTION

Throughout 2016 year, all efforts and activities have been directed in parallel with other contributions towards implementing the essential required water and wastewater projects and managing set of operational and maintenance tasks which are playing great role to improve the level of services for the people in the Gaza strip. Hence to achieve the following;

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

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

However, the implementation of different interventions has been facing a number of obstacles and restrictions to get the needed materials and equipment across the commercial gates except for minimum requirements of living and some selective materials because of the complicated enforced system early 2015 called the Gaza Reconstruction and Materials Mechanism System (GRAMMS).

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. World Bank, ISDB, UNRWA, UNDP, UNICEF, 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, **34** water Storage tanks, **45** small scale brackish water desalination plants, **22** water Booster stations, **55** wastewater pumping stations, **5** waste water treatment plants, water networks, storm water networks, sewage collection networks and basins with all associated equipment and systems upgrading and monitoring requirements. Purpose has been kept with high level of response towards several events of preventive and corrective repair and maintenance activities to minimize the risk of breakdown and operation time loss. Therefore, the CMWU has launched many services contracts during this period of the project, with local contractors for specialized upgrading, maintenance and repair needs e.g. generators, deep well water pumping sets...etc.

1- TECHNICAL PROGRESS ACTIVITIES

This report describes the progress achieved during the period from January to December 2016 in order to achieve the targeted indicators listed in the performance indicator table (Annex 1). The running activities are being classified into different categories such as water wells activities; water desalination plants, water networks and metering management and disinfection activities, water storage tanks, wastewater pumping stations, networks and treatment plants activities with all associated follow up mechanical and electrical upgrading, refurbishment and repair activities.

IMPROVING QUALITY & QUANTITY OF WATER

A. Improve the Water Quantities

A.1 Overall Water Distribution System Efficiency

Throughout 2016, CMWU continue managing, implementing and monitoring various programs and provide all relevant resources in order to improve the overall efficiency of the existing water distribution networking systems and reduce the quantities of unaccounted for water (UFW) . The annual records and monitoring data base showed that the system efficiency is 64.7% so the target for the year is reached. CMWU believes that through the initiatives and procedures currently in place will allow the system efficiency to be monitored and improved with similar focus in the future.

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

The overall annual system efficiencies recorded are as follows:

Table 1. Overall Annual Water Networks System Efficiencies -Year 2016 /Middle and Southern Governorates

Monthly Water Distribution Efficiency Report for 2016				
Monthly Average Values- South-Middle Areas				
No.	Month	Water production m3	Water billed m3	System Efficiency %
1	Jan-16	2524480	1772226	70.2%
2	Feb-16	2567526	1731627	67.4%
3	Mar-16	2946426	1811717	61.5%
4	Apr-16	2914865	1950284	66.9%
5	May-16	3380023	2061000	61.0%
6	Jun-16	3467243	2099358	60.5%
7	Jul-16	3601375	2409740	66.9%
8	Aug-16	3702209	2282370	61.6%
9	Sep-16	3639746	2484450	68.3%
10	Oct-16	3487713	2216266	63.5%
11	Nov-16	3289799	2152766	65.4%
12	Dec-16	3229218	2088345	64.7%
Total		38,750,623	25,060,149	64.7%

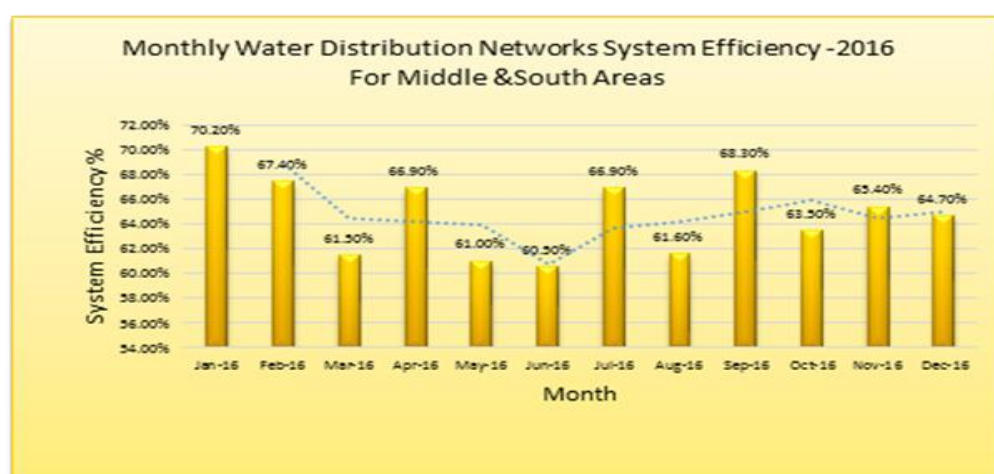


Figure 1: Overall Annual Water Networks System Efficiencies -Year 2016 /Middle and Southern Governorates

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

requirements and temperature conditions. Therefore, system efficiency increases during winter months and starts to decrease when it comes hotter where illegal connections especially used for irrigation which form about 15% of unaccounted for water (UFW) 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 2016 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 WSSSIP & AF, 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 program of water distribution networks was carried out based on criteria that was oriented towards reducing the unaccounted for water of both commercial and technical characteristics including disconnection of illegal connections. A comprehensive network repair and maintenance program was introduced to the targeted areas during the year 2016. Several works of water networks repairs were directly initiated and applied for all emergency repairs to assure water supply system continuity at various areas of Gaza strip municipalities.

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

A summary of **the 916 repair jobs** performed during the period from January to end of December 2016 are listed in the following table provided here below:

Table 2. Networks Repair Jobs January – December 2016:

Annual Water Networks Repair Monitoring Records - Number of repairs-YEAR 2016													
No.	Municipality	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	Al Zahra	2	1	1	2		3	1	4	1	2		2
2	Wadi Gaza		2	2		3	1	2	3	1		2	4
3	Musader	2			1		1		1	2	1		2
4	Wadi Al salqa			1		1	1	1	2	1	3		3
5	Moghrakah	3			2		2	3				5	
6	Buraij	2	4	2	2	4	2	2		6	1	2	2
7	Maghazi	1	4		1	2	2	5	1	2	2		3
8	Deir Balah	3	3	7	6	11	7	6	9	10	4	8	7
9	Zuwaida	1	2	2		4	4	4	3	2	1	2	
10	Nusirat	3	3	4	3	2	5	5	7	6	5	7	4
11	Khan Younis	19	16	19	13	14	17	21	18	20	17	17	16
12	Khoza'a	3			2	3	1	2	2	1		1	1
13	Qarrara	1	2	2	3	3		1	1	2			
14	Abassan Kabira	2	1		2	3	1	8	2	2		1	1
15	Bani Suhaila	3	3		3	3	4	5	2		2		
16	Abassan Jadidah	1	1	2	3	1	3	1	4	3	2	3	2
17	Al Fukhari				2	2		2		1	1	1	
18	Al Naser	2	2	1			2	2	1		2		1
19	Al shokah	2		2	2	1	1	1	3	1		4	
20	Rafah	27	23	25	22	23	22	30	21	23	28	17	15
Total		77	67	70	69	80	79	102	84	84	71	70	63
Total Networks Repairs		916											

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.



Figure2: Water networks Repairs and installations

- Meter Installation:

The meter installation program has been initiated and continued during the period of this report from January to December 2016. It is anticipated that the effect of the installation of new accurate meters, particularly replacing blocked meters, will continue to improve the overall efficiency of the system. During the period of 12 months of year 2016, a total of **929** meters were issued and installed throughout different areas to replace blocked meters and to provide for new connections as well.

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

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

Table 3. Total annual Production /WELLS (m³) -Form January-December 2016:

No.	Municipality	Monthly Water Wells Production (m ³) - Year 2016												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	17750	17500	17200	19370	19270	21850	23860	23500	23000	22,360	21840	20682	248,182
2	Beit Hanoun	201570	217399	300340	290840	336630	383905	305550	365340	336130	280300	290190	300745	3,608,939
3	Beit Iahia	383760	400536	380246	383760	413249	417600	418421	417947	425226	445980	448300	412275	4,947,300
4	Jabalia	854063	991812	988109	1100898	1159127	1245258	1151409	1179311	1158438	1082078	1191213	1100156	13,201,872
5	Gaza	1689814	1757156	2328967	1895809	2251937	2072153	1937802	2337737	2386926	2175597	2350476	2107670	25,292,044
6	Wady Gaza	8667	7742	9999	9277	12096	12264	12595	12888	12418	12987	11371	11119	133,423
7	Al Moghraka	47790	38950	56100	53300	49030	64460	63940	61970	73500	59221	59619	57080	684,960
8	Al Zahra	24120	25258	31489	33290	42356	40874	42804	42859	42951	40884	35423	36573	438,881
9	Al Nusseirate	183066	221037	254820	241000	303640	330530	329220	365320	349500	331320	271636	289190	3,470,279
10	Al Buriij	124610	109833	134280	144853	145592	169944	183566	168886	174162	159404	126351	149226	1,790,707
11	Al Maghazy	53928	57679	69914	52539	83007	83944	89405	97950	91613	80017	81075	76461	917,532
12	Al Zawaida	71424	63003	85441	71584	110675	119690	117697	113223	110849	104568	92708	96442	1,157,304
13	Al Mussader	7800	14070	9773	12426	10387	12021	22259	16931	17832	15932	14144	13961	167,536
14	Deir Al Balah	293112	258263	339185	318414	324296	378128	419858	405105	404280	383765	390100	355864	4,270,370
15	Wady Al Salqa	8890	10950	13700	17400	24630	27270	34560	31320	29190	23330	19420	21878	262,538
16	Al Qrara	96470	84850	92630	88050	109410	113940	138280	109550	110540	122530	141020	109752	1,317,022
17	Khanyounis	612265	596963	677705	674764	794496	809018	809803	853081	787327	826194	784087	747791	8,973,494
18	Bani Suhila	108770	106850	129710	120360	158790	173420	176790	189100	180450	172510	143490	150931	1,811,171
19	Abssan Al Khabaz	31813	29319	34771	24472	35266	40505	40816	44800	39209	28067	30761	34527	414,326
20	Abssan Al Khabaz	9873	9099	10791	7594	10944	12570	12667	13903	12168	8710	9546	10715	128,580
21	Khezaa**	16455	15165	17985	12658	18241	20951	21111	23172	20280	14517	15910	17859	214,304
22	Al Fokhary	18170	18635	22105	22455	30625	27290	26395	27815	27120	28260	25500	24943	299,313
23	Al Nasser	35790	24320	36980	36860	38390	44050	51820	46650	38900	43240	41220	39838	478,058
24	Al Shuka	24730	36550	45020	43860	38240	52970	32480	41910	39680	44180	40920	40049	480,589
25	Rafah	531010	612604	640089	641058	752956	662392	712348	740483	790083	694044	654346	675583	8,106,996
Total Monthly Production (m ³)		5,455,710	5,725,543	6,727,349	6,316,891	7,273,280	7,336,997	7,175,456	7,730,751	7,681,772	7,199,995	7,290,666	6,901,310	82,815,720

Table 4. Total annual MEKEROT Water supply (Israel Line), (m³): January-December 2016

No.	Municipality	Monthly Mekerot Water Supply (m³) - Year 2016												Total Annual Mekerot Supply
		January	February	March	April	May	June	July	August	September	October	November	December	
		m³	m³	m³	m³	m³	m³	m³	m³	m³	m³	m³	m³	
Al Nussierat	خط ميكروت	56202	70000	83100	86000	86600	87500	84100	75300	81100	85200	80300	79582	954,984
AL Burij	خط ميكروت	0	15530	13700	9490	4070	1650	11830	15850	25570	33480	29520	14608	175,298
Al Maghazy	المدرسة الاعدادية - ميكروت	26231	3859	4019	3254	1402	2861	1029	111	467	467	1138	4076	48,914
	عيادة الوكالة - ميكروت	0	23126	19160	16330	17296	8826	5820	3487	4453	8892	28430	12347	148,167
	منطقة السعايدة - ميكروت	2708	2753	2679	3738	4177	4314	3748	8752	6127	5248	4966	4474	53,684
	الصحة العامة - ميكروت	27178	16806	37624	45929	36961	39119	23360	34490	26357	13154	16561	28867	346,406
Bani Suhaila	مكروت	54611	55583	40527	50157	45204	28673	35579	44882	44354	115450	61575	52418	629,013
Abssan Al Kabera	مكروت	60487	59181	42329	69727	73933	68794	69783	75199	81090	83332	69038	68445	821,338
Abssan Al Jadedda	مكروت	18817	18571	16709	25035	25745	27629	31122	29646	26511	29189	32393	25579	306,946
Khezaa	مكروت	24286	16560	14619	31187	34732	30318	33470	52458	36019	35070	38806	31593	379,118
Total Mekerot Water m³		270,520	281,969	274,466	340,847	330,120	299,684	299,841	340,175	332,048	409,482	362,727	321,989	3,863,868

Table 5. Total Annual Water Supply - From January to December 2016

Water Supply Categories	Monthly Water Supply (m³) - Year 2016												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	5,455,710	5,725,543	6,727,349	6,316,891	7,273,280	7,336,997	7,175,456	7730,751	7,681,772	7,199,995	7,290,666	6,901,310	82,815,720
Total Mekerot Water m³	270,520	281,969	274,466	340,847	330,120	299,684	299,841	340,175	332,048	409,482	362,727	321,989	3,863,868
Total Monthly water supply (m³) -Year 2016	5,726,230	6,007,512	7,001,815	6,657,738	7,603,400	7,636,681	7,475,297	8,070,926	8,013,820	7,609,477	7,653,393	7,223,299	86,679,588

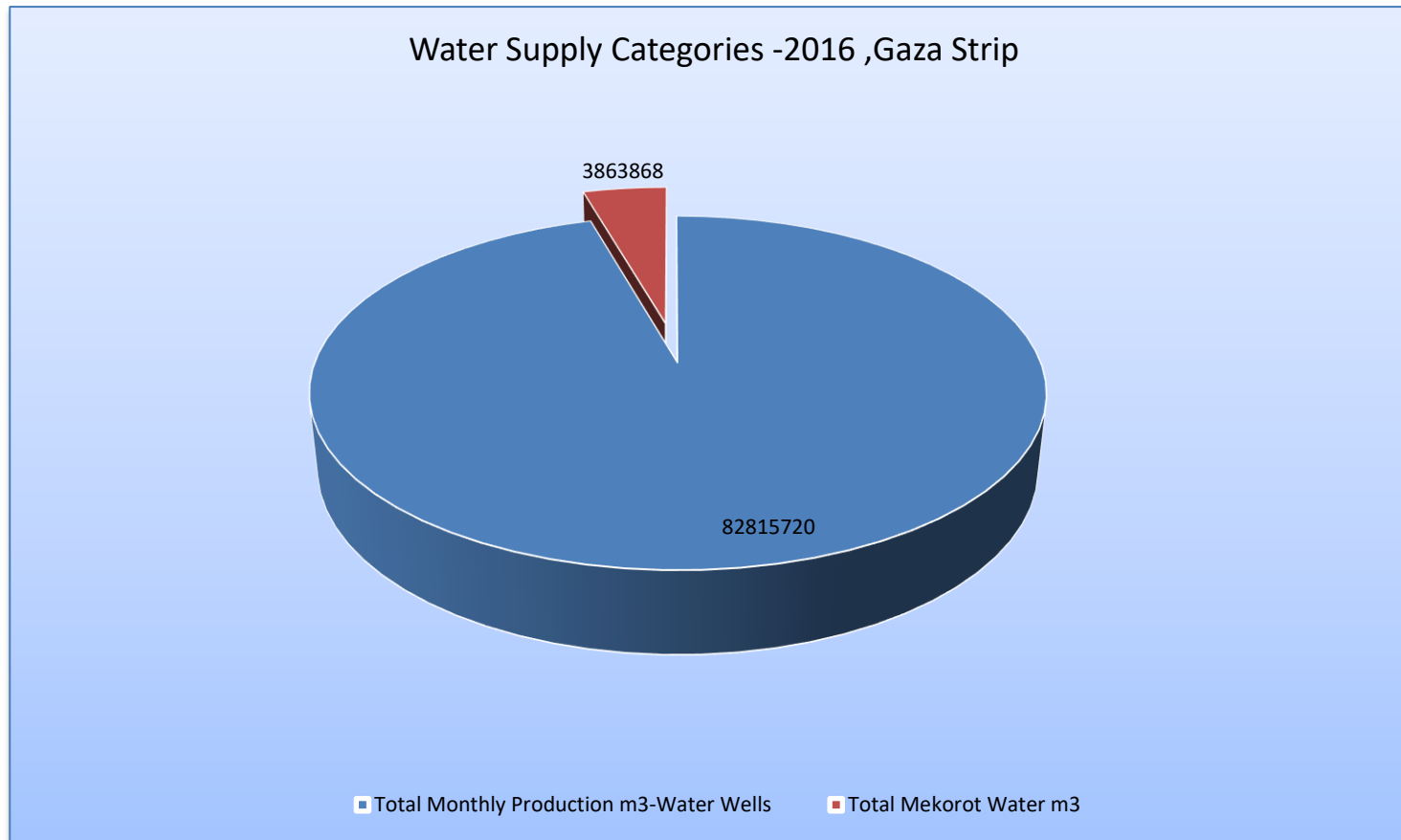


Figure 3: Total annual water supply (m³) January-December 2016

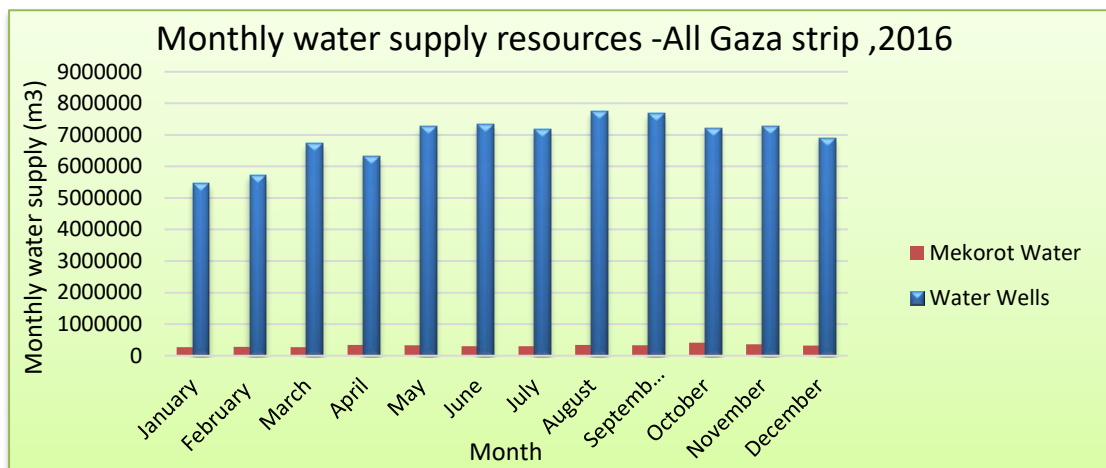


Figure 4: Total annual Production (m³) January-December 2016

Table 6. Water Quota L/C/D-Consumption side: January-December 2016

No.	Municipality	Annual Water Production from water wells	Annual Water supplied from Mekerot (Israel Co.)	Total Annual Water supplied from different resources	served Population	UFW	Total Annual Water Consumption	Daily Water Consumption Rate (Quota)
		m³	m³	m³	Capita	%	m³	liter/c/day
1	Um Al Nasser	248182	0	248182	3654	35%	161318	121
2	Beit Hanoun	3608939	0	3608939	49467	35%	2345810	130
3	Beit lahia	4947300	0	4947300	83803	35%	3215745	105
4	Jabalia	13201872	0	13201872	214433	35%	8581217	110
5	Gaza	25292044	0	25292044	628661	35%	16439829	72
6	Wady Gaza	133423	0	133423	3716	35%	86725	64
7	Al Moghraka	684960	0	684960	8320	35%	445224	147
8	Al Zahra	438881	0	438881	6708	35%	285273	117
9	Al Nusseirate	3470279	954984	4425263	82996	35%	2876421	95
10	Al Buriy	1790707	175298	1966005	43389	35%	1277903	81
11	Al Maghazy	917532	597171	1514703	28980	35%	984557	93
12	Al Zawaida	1157304	0	1157304	21709	35%	752248	95
13	Al Mussader	167536	0	167536	2401	35%	108898	124
14	Deir Al Balah	4270370	0	4270370	78020	35%	2775741	97
15	Wady Al Salqa	262538	0	262538	5921	35%	170650	79
16	Al Qrara	1317022	0	1317022	25156	35%	856064	93
17	Khanyounis	8973494	0	8973494	229483	35%	5832771	70
18	Bani Suhila	1811171	629013	2440184	40342	35%	1586120	108
19	Abssan Al Kabera	414326	821338	1235664	23430	35%	803182	94
20	Abssan Al jaded	128580	306946	435526	7719	35%	283092	100
21	Khezaa	214304	379118	593422	11639	35%	385724	91
22	Al Fokhary	299313	0	299313	7048	35%	194553	76
23	Al Nasser	478058	0	478058	8114	35%	310738	105
24	Al Shuka	480589	0	480589	13805	35%	312383	62
25	Rafah	8106996	0	8106996	201102	35%	5269547	72
Total (m³)		82,815,720	3,863,868	86,679,588	1,830,016	35%	56,341,732	84

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

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; CMWU in full coordination with the PWA and through several donations succeeded to carry out and initiate the following activities listed here below:

1. Construct three water wells at (Dair El Balah, Maghazi and Khan Younis), the project is funded by USAID through UNICEF



Figure 5: Dair Al Balah, Al Maghazi , and Khan Younis water wells

2. Construction of Al Mosadar water well through Muslim Hands fund, the work is still in progress.



Figure 6: Al Mosadar water well

3. Construction new water well at Al Zahra city, the work is still in progress.
4. Construction new water wells at different areas through Gaza Strip in order to reallocate some of bad quality water wells or reduce the production of high pumping wells , funded by IsDB & Emmar Gaza, whereas the following separated tenders have been launched lately 2016, and the work will start at sites early 2017
 - Construction of three wells at Jabalia and reducing the production of other existing three wells.

- Construction of three wells at Beit lahia and reducing the production of other existing three wells.
- Construction of two wells at Al Nussirat and closing two existing wells in addition to rehabilitation and maintenance works for two wells at Al Zahra.
- Construction of two water wells at Rafah and reducing the production of other two existing wells
- Construction three wells at Dair Al Balah and closing other three wells.

2 Electrical Refurbishment, Upgrading and Repairs Installations

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

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

- The installation of both high and low tension electrical grid lines with all associated transformers for some water facilities have been already initiated while there are still other facilities waiting the materials entry to Gaza Strip in order to complete connecting all the facilities with electricity.
- The quality of the available power supply was very bad as the voltage drop reached 30% in certain areas like Rafah, Al Shoka and Khanyounis. Therefore, more than 13 step up transformers had been installed to secure electrical services for water facilities e.g. water wells and protect it against harmful voltage drop.
- Supply and install some standby power supply generating sets at various water wells and pumping sites to overcome the problems of electricity cut-offs which occur daily in Gaza strip.

Due to unavailability of spare parts resulting from continual security control by Israel authorities over the materials supplied across the borders and dual use classification, severe shortages of essentially required spare parts have been encountered. Due to this process CMWU still facing problems in transferring materials to Gaza especially the electrical materials like all types of power and control cables, soft starters, variable speed drivers, electrical and electronic instruments.... etc. Fortunately, some of the required material were available in CMWU main warehouse, and have

been used for electrical repairs and maintenance works in several water and waste water facilities during the past year. Therefore, more than one hundred 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 2016 are summarized here below:

- 1- Installation of local step up transformers used as stabilizer in 12 water wells in Rafah and two water wells in Al Shoka the supply voltage was raised from 300V to 400V .
- 2- Installation of one step up transformer 400/1000 V, 50 Hz, 80 KVA and one step down 1000/400KVA of same rating in RO desalination plant in Dair al balah- Bassa in order to operate the beach wells.
- 3- Supply and installation of overhead cables to provide a second power supply network to three wells in Rafah (Abu zuhri, PWA well and Al Eskin Well) from adjacent municipal sites to obtain a continuous power supply for these wells.
- 4- Installation of underground high tension network in coordination with GEDCO to provide electricity to Saudi Booster in Rafah from a continuous power supply source.
- 5- Replace the main 630 automatic changeovers in Sa'ada Booster in Khan Younis together with the main fuses and the circuit breakers.
- 6- Replace the main 630 automatic changeovers in Ma'an Booster in Khan Younis together with the main fuses and the circuit breakers.
- 7- Replace the old damaged traditional panel by new 100A control panel at Abu Zuhri well in Rafah.
- 8- Replace six old damaged traditional panels by new five panels of 63 A control panel in Dair Al Balah area in wells Trarazi, Shaki, K20, K21 and Al Aqsa and one 200 Amp in S72 well.
- 9- Replace five old damaged traditional panels by new 63 A control panel in Nussairat well G49.
- 10- In Al Aqusa Booster in Dair Al Balah; replacement of 72 Amp soft starter, replacement of control board and repair and connection of the power factor panel.
- 11- Installation of automatic change over switches in 8 water wells in Dair Al Balah, Nussairat Zawida, Buriij and Khan Younis to provide automatic operation of the water wells after the repetitive power supply cut.
- 12- Replace the under voltage protection in more than 30 water wells in all areas. These damages were caused by the bad quality of the main electricity supply.
- 13- Replace the damaged control boards of soft starters in more than 10 water wells in all areas. These damages were due to bad quality of main electricity supply.

- 14- Addition of times relays in more than 30 wells in all areas to provide more protection against damages due to repetitive power supply cut and to provide safe automatic operation of the water wells.
- 15- Installation of ultra-sonic level meters and emergency traditional floats at the main water reservoir in Rafah.
- 16- Replacement of external lighting fixtures in 15 water wells in Nussairat and Dair Al Balah.
- 17- Carry out several upgrading and refurbishment of electrical installations of lighting system and chlorination pumps at different water wells and pumping facilities all over the Gaza Strip.
- 18- Dismantle, transfer and overhauling for 88 KVA standby generator at TRC2 well in Rafah area.
- 19- Dismantle 250 KVA standby generator at El Mashroa water well in Bait Lahia and replace it with a new 320 KVA from CMWU stores.
- 20- Repair and maintenance electrical alternator of 110 KVA standby generator for Khaled ben El Waleed water well in Zawaydah municipality.
- 21- Install electrical control panel with metering panel 63A to driving hollow shaft motor and install 88 KVA standby Diesel generator with daily tank, 2000-liter bulk fuel tank with steel shed for Al Shaymaa water well- Beit Lahia.
- 22- Supply and install two electrical control panels for two water wells in Khuza'a municipality.
- 23- More than 250 standby generators located throughout water and wastewater facilities of rated power ranges from 50KVA to 900KVA are continued to be well maintained, repaired and serviced by CMWU team works and specialized repair and service contracts arranged with local generators dealers.
- 24- Continue to carry out and manage remote monitoring system for water wells, whereas additional 10 sites have been added to the existing system of four pilot water wells sites. The system was initially designed to register for faults notification and some data acquisition.
- 25- In addition to some different repairs occurred and repaired during the past year at the water facilities sites such as:
 - Power supply connections and cabling between the grid and the electrical control switch board.
 - Repair and upgrading of PLC controllers
 - Replacement of control instrumentation e.g. pressure switches...etc

- Repair and maintenance of electrical faults related to pumps electrical drive motors and associated systems.
- Electrical upgrading and repair of control switchboards.



Figure 7: Part of Electrical works

3 Mechanical Refurbishment, Upgrading and Repairs Installations

During the period of this report from January to December 2016, 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:

- Complete electromechanical upgrading, rehabilitation of AL Shimaa water well in Bait Lahia with production capacity 50m³/hour at total head 80 meter funded by ICRC, the works include varies items among these:
 - Construct building, walls and fence with plastering and painting works, Galvanized steel gate, doors and louvers.
 - Supply and install pumping unit include vertical turbine pump with all equipment, 4" steel pipes with bronze bearings and shaft columns, discharge head, 40 HP electrical hollow shaft motor and cooling system with by bass solenoid valve.
 - Supply and install PN16, 4" steel manifold with all steel pipes cement lined and materials like varies type of valves, hydro cyclone, non-return valve, air release valves and water meter.
 - Supply and install chlorine dosing unit with 500-liter p.p. tank and 2.1 l/h dosing pump.
 - Supply and install 4" PVC pipe to connect the outlet of manifold with municipal network.
- Change submersible water wells to Vertical type in the sites listed here below:
 - Ain Jaloot, El Entesar and El Farouq water wells – Nusirate municipality.
 - S-80 water well – El Maghazi municipality.
 - J-6 water well – Dair El Balah municipality.
- Supply, install and test 8" membranes for main desalination plant in Bani Suhaila, the quantity of membranes is 48, the works include supply and install two stainless steel 316l cartridge filter house.
- Supply and install stainless steel duplex cartridge filter house for sea water desalination plant in Dair El Balah with capacity 600 m3/day.
- Supply and install 2 X 50 m3/day brackish water desalination plants for El Fukhary and El Shouka municipalities funded by UNICEF institute.
- Cleaning the borehole of Abu Samhadana and El Matar water wells in El Shouka municipality, the works include dismantle the old pumps of each wells and reassemble one of them in El Matar well.
- Cleaning the borehole of Al Amal Opic well in Khanyoun area, the works include dismantle the old pump for maintenance and repair then re assemble again in the borehole.
- Supply and install 1" diameter cooling water solenoid valve with all associated electrical and mechanical connections to cool down rubber inserts of pump bronze bearings for 7 water wells located throughout various sites from Rafah to Bait Hanoon municipalities.
- Supply and install pressure switch up to 12 bar with all associated electrical and mechanical connections to safe the pump from high pressure case, for 11 water wells located throughout various sites from Rafah to Bait Hanoon.

- Supply and install 5 mm thickness sedimentation tank of 8", 6" and 4" hydro cyclone. The works include fabricate 2" diameter of drain with 2" ball valve.
- Supply and install PVC pipes 1600 mm, PN 10 with all required fittings to connect between two raw water tanks at El Bassa SWDP as an emergency case.
- Refurbishment and repair of the whole 8", 6" and 4" steel manifolds and including sand blast, welding, painting works for the whole manifold. The works include all required nuts, washers, bolts, open flanges, reducers, dressers, stainless steel Grade 316L chlorine nozzle and any related fittings for 3 main reservoirs and 30 water wells.
- Dismantle, Repair and reassemble submersible sea water pump at SWDP well in Dair El Balah.
- Supply and install brackish desalination plant with full capacity 50m³ / day for western water well in Wadi El Salqa municipality.
- Construct walls around El Salam water well in khanyounis municipality, the works include 2x4 m² steel galvanized gate.
- Supply and install two centrifugal feed pumps, duplex material 67 m³/h for SWDP at El Bassa, the plant capacity is 600m³/day.
- Supply and install 30HP, Grundfos type variable frequency drive for second phase of El Bassa SWDP.
- Supply and install PN16, 6" steel manifold with all steel pipes cement lined and materials like varies type of valves, hydro cyclone, non-return valve, air release valves and water meter for S-82 water well in El Maghazi municipality.
- Supply and install PN16, 4" steel manifold with all steel pipes cement lined and materials like varies type of valves, hydro cyclone, non-return valve, air release valves and water meter for Al Aqsa water well in Al Nusirate municipality.
- Transfer from CMWU stores and install one high pressure pump instead of three pumps at S-72 desalination plant in Al Burij municipality.
- Mechanical repair of deep well vertical turbine water pumping sets and submersible pumps of water wells, where 38 main jobs of vertical turbine pumps replacement were completed this year.
- Refurbishment and repair of water wells' exit pumping manifolds.
- Replacement of deteriorated sand removal hydro cyclones.
- Carry out 52 jobs of repairs, replacement, new installations and M&E works for chlorine dosing systems which are essentially required for water disinfection systems throughout all water production facilities.

- Manage and carry out complete mechanical overhauling and refurbishment of pumping manifolds of water wells where 18 sites in Khanyounis and Rafah and the middle area have been covered during the period of this report.
- Repair and refurbishment for many brackish water desalination plants BWDP:
 - Aya BWDP – Khanyounis.
 - Estad Reyadi BWDP - Khanyounis.
 - Ma'an BWDP – Khanyounis.
 - Al Amal BWDP – Khanyounis.
 - Al Amal Opic BWDP – Khanyounis.
 - S.72 BWDP – Al Burij.
 - Main DP, Interpal and Abu Zhaq BWDP – Bani Suhaila.
 - El Sekkah and El Rahma BWDP- Rafah.

The repair records showed that more than **295** 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 257 job orders 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 13 water pumping manifolds for both water and wastewater pumping stations.
- Repair and adjustment of 14 water meters for water wells exits
- Mechanical repair of water distribution valves on the network throughout all operating areas of Gaza strip.
- Carry out several water and wastewater networks repairs, replacement and reconnection works at various CMWU operational areas along Gaza strip.
- The team was involved in different emergency repairs carried out at various water and wastewater sites in Gaza strip.



Figure 8: Water facilities Repair, Refurbishment and Rehabilitation Works

4 Fuel Distribution

CMWU Continues to manage and monitor the supply and distribution of programmed Diesel fuel supplies to various standby power supply generators located at water wells, desalination and pumping facilities funded by WB, GCC/IDB, UNRWA, TIKA, UNICEF, OCHA (HRF). This task has become one of the life supporting systems in Gaza strip which is essentially required to support water sector during harsh conditions of severe shortages and unreliable electricity supplies in Gaza strip from grid lines. Therefore, it has crucially become needed to operate standby generators and to safe guard satisfactory water supplies to the people in Gaza strip. The chart shows that during year 2016 the distribution and supply of **total 2,258,511 liters** of Diesel fuel were managed by CMWU towards various water and wastewater facilities all over Gaza strip governorates. This illustrates the crucial situation of unreliable grid electric supply in Gaza which suffer from daily cutoffs periods of more than 12 hours.

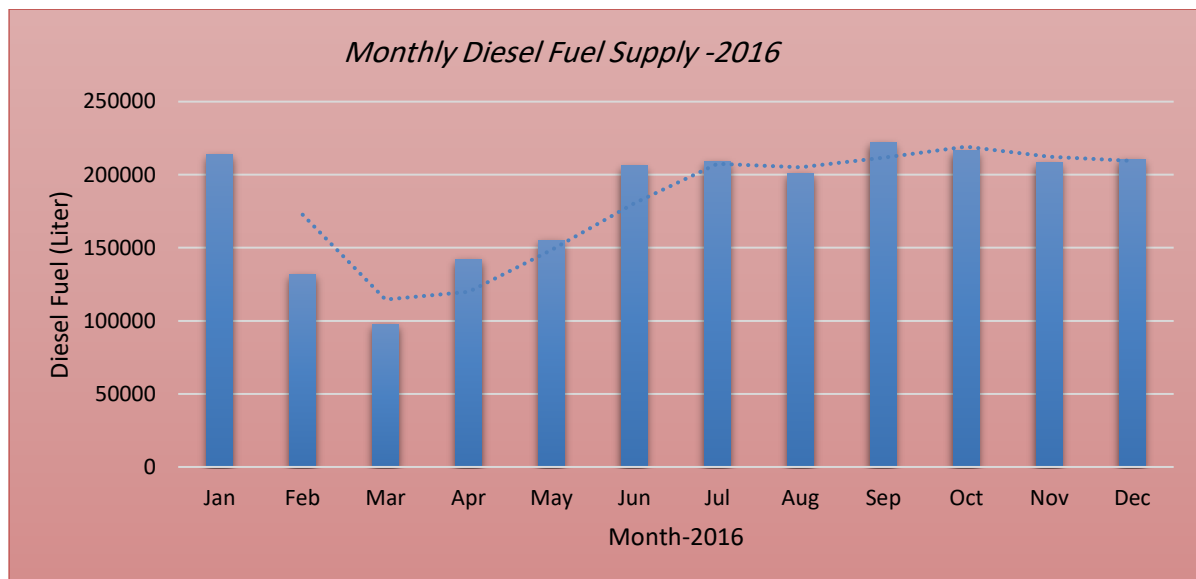


Figure 9: Monthly Diesel Fuel Supply Distribution Scheme

All the mentioned rehabilitation and upgrading electrical and mechanical works executed during 2016 besides the distributed quantities of Diesel to operate the Standby generators contributed to achieve the project's indicators related to the water wells functionality and energy consumption despite the continual and endless prevailing conditions of unreliable grid electricity power supply and shortages that heavily and severely affected the generators and created lots of repair and maintenance needs and parts, hereunder the achieved targets details.

A.3 Improve Water Wells Functionality

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

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

Where:

Q_w : flow rate of each well.

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

D_m : No of days of the month

Water wells operating hours have been continued to be managed and recorded as per operational registry data-base representing the tool of measurement for the actual level of service ability and functionality. The records of each water well pumping facility against breakdown and repair down time hours has been traced and calculated for the targeted period from which the annual target of functionality efficiency for year 2016 has reached an excellent achievement of 97 % 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 subject to the time consumed (operating hours) to carry maintenance and repair activities for the whole targeted sites under normal conditions.

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

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

The monthly monitoring program of water wells functionality measured throughout the services targeted Southern and Middle areas for the year 2016 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 97% was achieved.

Table 7. The monthly water wells functionality efficiency -Middle and South Governorates -YEAR 2016

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	11054	806505	2632	1132	76884	97.39%	97.16%
	Middle Area	11774	821672	3482	1533	100904	96.59%	
	Rafah area	5796	516940	1458	527	42927	98.13%	
February	Khan Youins Area	10367	781544	2923	1106	82000	96.73%	97.16%
	Middle Area	12309	796591	3494	1490	98350	97.07%	
	Rafah area	6740	594024	1505	510	42875	98.21%	
March	Khan Youins Area	12722	931947	2711	1122	79105	97.26%	97.07%

	Middle Area	14407	982643	3580	1574	104503	97.29%	
	Rafah area	7195	614079	1469	512	42365	96.14%	
April	Khan Youins Area	11830	888774	2811	1147	80987	96.03%	97.15%
	Middle Area	14475	937683	3100	1510	90522	97.34%	
	Rafah area	6718	604088	1528	532	45293	98.82%	
May	Khan Youins Area	15134	1100936	2818	1142	80493	95.23%	96.93%
	Middle Area	13500	1133254	3269	1654	96493	98.40%	
	Rafah area	7813	604088	1328	522	38611	96.93%	
June	Khan Youins Area	15574	1143063	2881	1173	82634	95.60%	96.59%
	Middle Area	16090	1216587	3669	1602	106542	96.80%	
	Rafah area	7977	638912	1366	528	40201	98.12%	
July	Khan Youins Area	15478	1138108	2865	1189	83250	96.87%	97.40%
	Middle Area	18090	1259021	3768	1664	110253	97.54%	
	Rafah area	7977	638912	1366	528	40201	98.12%	
August	Khan Youins Area	15226	1158971	2998	1189	87235	96.98%	96.92%
	Middle Area	19769	1297843	3980	1766	115163	96.46%	
	Rafah area	8589	683357	1417	528	41683	98.09%	
September	Khan Youins Area	14884	1117892	3021	1215	87723	96.80%	97.70%
	Middle Area	19274	1292143	3994	1758	117375	97.97%	
	Rafah area	9012	728843	1417	532	42016	98.87%	
October	Khan Youins Area	16049	1168749	2933	1220	85620	97.29%	98.13%
	Middle Area	18253	1215108	3936	1768	116263	98.47%	
	Rafah area	7838	638524	1421	532	42166	98.92%	
November	Khan Youins Area	13894	1020187	2887	1210	84364	97.40%	97.53%
	Middle Area	16146	1081243	3850	1752	112548	97.43%	
	Rafah area	7409	606146	1458	526	42890	98.06%	
Average Annual water Wells Functionality Efficiency %								97.25%

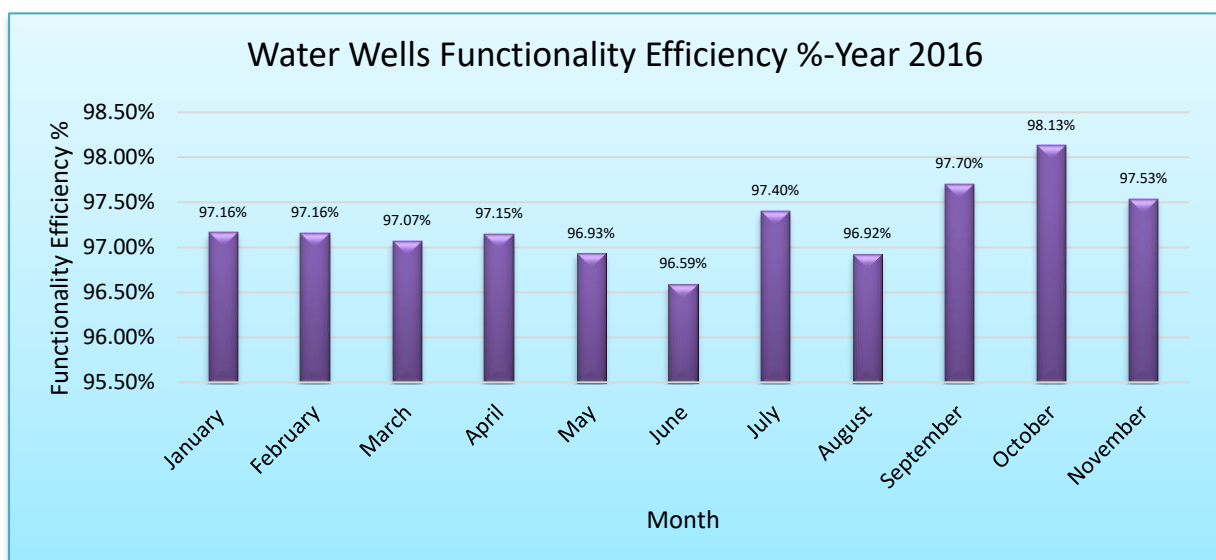


Figure 10: Monthly Functionality Percentage for served Areas-Year 2016

A.4 Improve Energy Consumption

The objective of this task 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 2016, 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 **0.378 KWh/m³** of water produced from wells where the base line value was **0.55KWh/m³**.

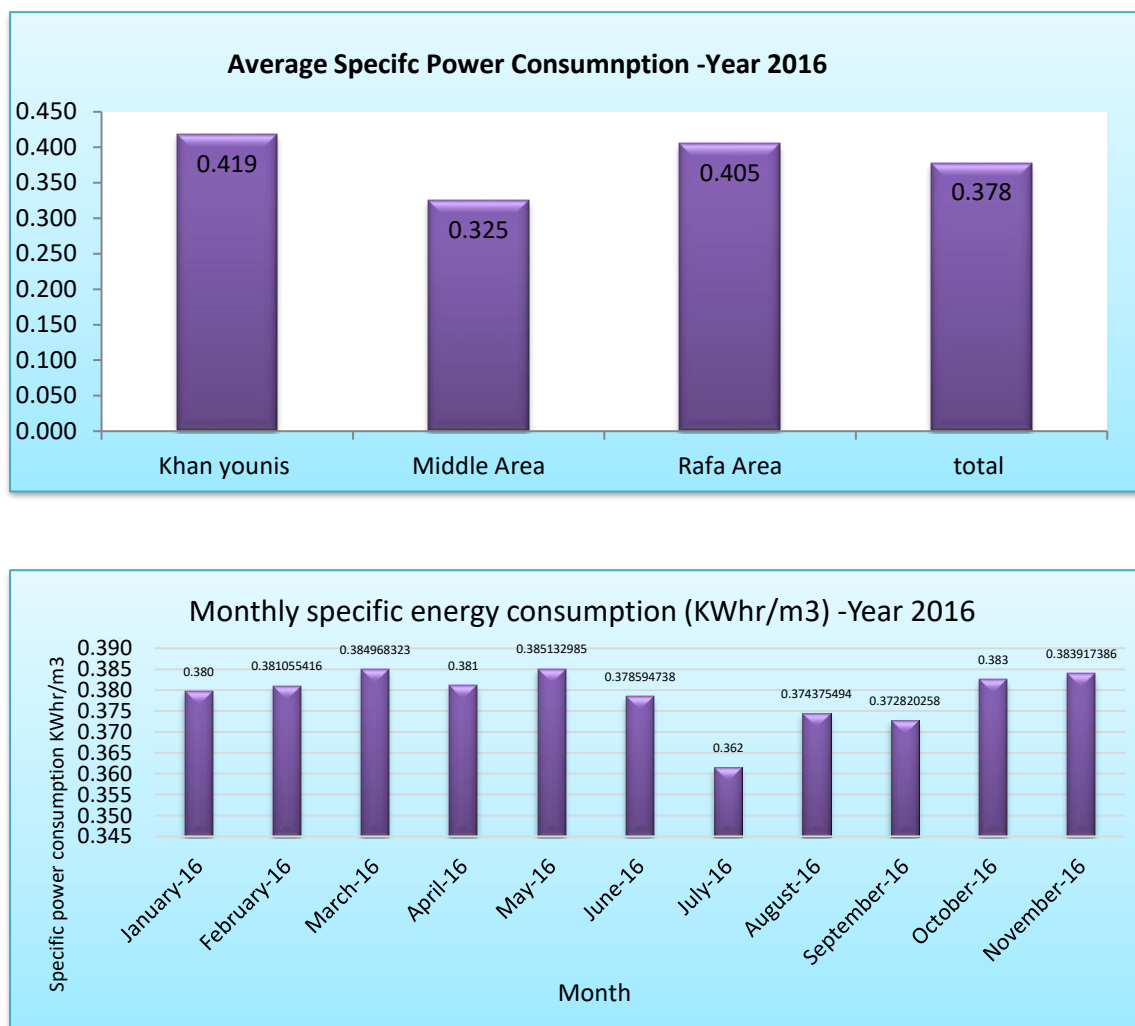


Figure 11 : Monthly Specific Energy Consumption 2016

CMWU have continued to manage the efficiency of the pumping equipment utilized in the water wells, where more than 12 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 2016 of project period, the overall specific Energy consumption in the three targeted regional Areas is **0.378 KWh/m³**.



Figure 12: Well head Electric Stabilizer-Voltage Step up Transformer connections

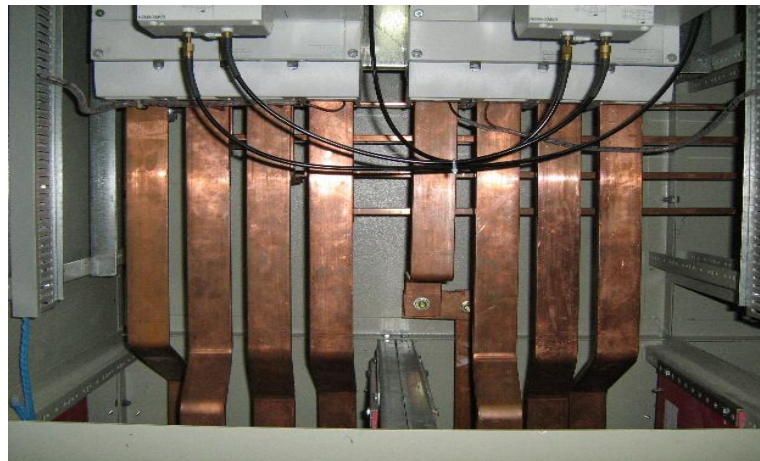


Figure 13 : Electrical change- over copper bus bar

Table 8. The monthly water wells specific power consumption -Middle and South Governorates -YEAR 2016

Month	Area	Energy	Production	% Specific	Avarage % per month
		KWh	m3	KWh/m3	KWh/m3
January-16	Khan Younis	341184	806505	0.423	0.380
	Middle	266301	821672	0.324	
	Rafah	207315	516940	0.401	
February-16	Khan Younis	331636	781544	0.424	0.381
	Middle	256706	796591	0.322	
	Rafah	239371	594024	0.403	
March-16	Khan Younis	405385	931947	0.435	0.385
	Middle	315337	982643	0.321	
	Rafah	252736	614079	0.412	
April-16	Khan Younis	380873	888774	0.429	0.381
	Middle	298157	937683	0.318	
	Rafah	247697	604088	0.410	
May-16	Khan Younis	473560	1100936	0.430	0.385
	Middle	363874	1133254	0.321	
	Rafah	292009	698416	0.418	
June-16	Khan Younis	478591	1142984	0.419	0.379
	Middle	384673	1216587	0.316	
	Rafah	271946	638912	0.426	
July-16	Khan Younis	465201	1146353	0.406	0.362
	Middle	401745	1281108	0.314	
	Rafah	241722	638912	0.378	
August-16	Khan Younis	481788	1158971	0.416	0.374
	Middle	429397	1297843	0.331	
	Rafah	264418	683357	0.387	
September-16	Khan Younis	439428	1076837	0.408	0.373
	Middle	417502	1292143	0.323	
	Rafah	298001	728843	0.409	
October-16	Khan Younis	451378	1082894	0.417	0.383
	Middle	417438	1215108	0.344	
	Rafah	254493	638524	0.399	
November-16	Khan Younis	416146	1020187	0.408	0.384
	Middle	370802	1081243	0.343	
	Rafah	252538	606146	0.417	
Average annual specific energy consumption for water wells - 2016					0.378

B. Improve Water Quality

B.1 Disinfection Efficiency

The maximum recorded disinfection efficiency for the period from January to December 2016 approaches around **99.4%** by the end of December 2016. Over the report period, the disinfection

efficiency has progressively increased successfully maintaining a high level of Chlorination throughout the water distribution networks in all Gaza strip governorates. As indicated through the chlorine monitoring program, CMWU is confident that 100% of the networks can be disinfected using the chlorination systems installed. Managing and sustaining this maximum efficiency through the effective maintenance and repair program has resulted in an excellent performance and conclusion to this task.

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

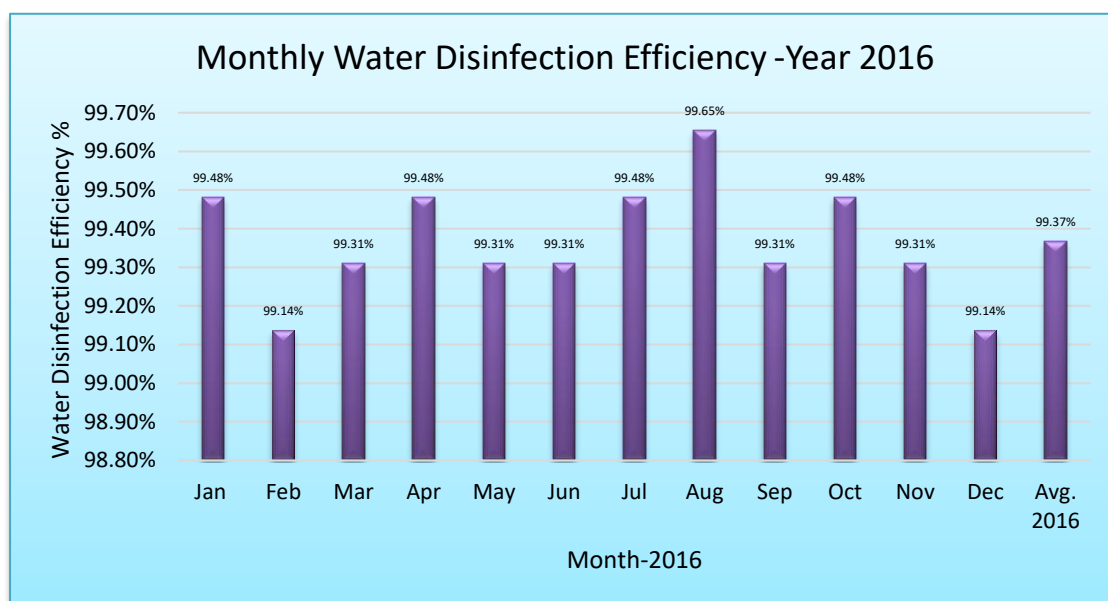


Figure14: Monthly Water Disinfection Percentage 2016

B.2 Residual Chlorine Monitoring Program

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

Tests are being carried out for free and total chlorine on a fixed number of sampling points of 580 locations (sampling points) carefully selected to give a true representation of the whole distribution network. The results of the program continue to be saved in the database designed to establish a historical reference, where detailed Monthly disinfection reports are monthly produced and issued. It is clearly shown that by the end of December 2016 there is a significant achievement in which the disinfection efficiency target of the network has been progressively approached and reached the task targeted value.

The test results show a maintained residual chlorine level that is consistent within each municipality. During the year 2016 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-Jun 2016

No.	Municipality	No. of Samples	01-Jan		01-Feb		01-Mar		01-Apr		01-May		01-Jun	
			Negative – No.	Positive – No.	Negative – No.	Positive – No.	Negative – No.	Positive – No.	Negative – No.	Positive – No.	Negative – No.	Positive – No.	Negative – No. Samples	Positive – No.
1	Um Al Nasser	12	0	12	0	12	1	12	0	12	0	12	0	12
2	Beit Hanoun	19	1	19	0	19	0	19	0	19	0	19	1	19
3	Beit lahia	26	0	26	0	26	0	26	1	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	0	86	0	86	1	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	2	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	0	20	0	20
11	Al Maghazy	24	0	24	0	24	0	24	1	24	0	24	0	24
12	Al Zawaida	24	0	24	1	24	0	24	0	24	0	24	0	24
13	Al Mussader	12	0	12	0	12	2	12	0	12	0	12	0	12
14	Deir Al Balah	30	1	30	1	30	0	30	0	30	0	30	0	30
15	Wady Al Salqa	12	0	12	0	12	0	12	0	12	0	12	0	12
16	Al Qrara	16	0	16	0	16	0	16	0	16	0	16	0	16
17	Khanyounis	44	0	44	1	44	0	44	0	44	0	44	0	44
18	BaniSuhila	20	0	20	0	20	0	20	0	20	0	20	0	20
19	Abssan Al Kabera	18	0	18	0	18	0	18	0	18	0	18	1	18
20	Abssan Al jadedda	16	1	16	0	16	0	16	0	16	0	16	0	16
21	Khezaa	16	0	16	0	16	0	16	0	16	1	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	0	12
24	Al Shuka	12	0	12	0	12	0	12	1	12	1	12	0	12
25	Rafah	46	0	46	1	46	0	46	0	46	0	46	1	46
Total		579	3	579	5	579	4	579	3	579	4	579	4	579
Monthly Disinfection Efficiency			99.48%		99.14%		99.31%		99.48%		99.31%		99.31%	

Table 9. Monthly Water Disinfection Monitoring Program from July -December 2016

No.	Municipality	No. of Samples	01-Jul		01-Aug		01-Sep		01-Oct		01-Nov		01-Dec	
			Neg.#	Pos. #	Neg.#	Pos. #	Neg.#	Pos. #	Neg.#	Pos. #	Neg.#	Pos. #	Neg.#	Pos. #
1	Um Al Nasser	12	0	12	0	12	1	12	0	12	0	12	0	12
2	BeitHanoun	19	0	19	0	19	0	19	0	19	0	19	0	19
3	Beitlahia	26	0	26	1	26	0	26	0	26	0	26	1	26
4	Jabalia	42	0	42	0	42	0	42	0	42	0	42	1	42
5	Gaza	86	0	86	0	86	0	86	2	86	0	86	1	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	1	12	0	12	0	12	0	12
9	Al Nusseirate	24	1	24	0	24	0	24	0	24	0	24	1	24
10	Al Burij	20	0	20	1	20	0	20	0	20	0	20	0	20
11	Al Maghazy	24	0	24	0	24	0	24	0	24	0	24	0	24
12	Al Zawaida	24	1	24	0	24	0	24	0	24	0	24	0	24
13	Al Mussader	12	0	12	0	12	0	12	0	12	2	12	0	12
14	Deir Al Balah	30	0	30	0	30	0	30	0	30	0	30	0	30
15	Wady Al Salqa	12	0	12	0	12	2	12	0	12	0	12	0	12
16	Al Qrara	16	0	16	0	16	0	16	0	16	0	16	0	16
17	Khanyounis	44	0	44	0	44	0	44	1	44	0	44	0	44
18	BaniSuhila	20	0	20	0	20	0	20	0	20	0	20	0	20
19	Abssan Al Kabera	18	1	18	0	18	0	18	0	18	0	18	1	18
20	Abssan Al jadedda	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	1	12	0	12
23	Al Nasser	12	0	12	0	12	0	12	0	12	0	12	0	12
24	Al Shuka	12	0	12	0	12	0	12	0	12	0	12	0	12
25	Rafah	46	0	46	0	46	0	46	0	46	1	46	0	46
Total		579	3	579	2	579	4	579	3	579	4	579	5	579
Monthly Disinfection Efficiency			99.48%		99.65%		99.31%		99.48%		99.31%		99.14%	

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

Monthly water disinfection efficiency records -Year 2016												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg. 2016
99.48%	99.14%	99.31%	99.48%	99.31%	99.31%	99.48%	99.65%	99.31%	99.48%	99.31%	99.14%	99.37%

B.3 Chlorine Dosing Units

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

The following table summarizes the number and location where new dosing units are installed and where repairs have taken place during the period from 1st January to the end of December 2016.

Table 10. Repair Works for dosing pumps

No.	Municipality	Number of repairs for dosing pumps	Number of new dosing units installed as per each municipality
1	Beit Hanoon	8	1
2	Beit Lahia	11	2
3	Jabalia	15	3
4	Al Zahra	1	1
5	Al Moghrakah	2	0
6	Nussirate	8	2
7	Al Bureij	5	0
8	Al Maghazi	6	1
9	Al Zawaida	4	1
10	Deir Al Balah	9	2
11	Wadi Al Salqa	3	0
12	Bani Suhaila	5	1
13	AL Qarara	3	0
14	Khanyounis	17	4
15	Abasan Kabira	2	1
16	Rafah	15	3
17	Shokah	4	1
		118	23

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

During the year 2016 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 2016, a total quantity of 951 m³ (951,000 liters) 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 40 small and medium scale RO brackish and one sea water desalination plants in the Gaza strip. This includes Hydrochloric Acid, citric acid, Sodium Met-bisulfite, Caustic Soda and Anti-scalant and ferric chloride.

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

The supply and delivery follow almost the same procedures introduced as per WB procurement guidelines for the supply and delivery of Chlorine. The table below shows the quantities of chemicals supplied to the desalination plants during 2016.

Table 11. Supplied Chemicals January-December 2016

Chemicals Supplied From 1 st Jan 2016 to End December 2016(Ton)		
Municipality/Facility	Chemical	Quantity (ton)
Khan Younis (Desalination Plants L43/L87)	Hydrochloric acid	3
	Caustic Soda	1
	Sodium Metabisulfite	
	Antiscalant	9
Rafah (Desalination Plants Salam/Sheoot)	Hydrochloric acid	4
	Caustic Soda	2
	Sodium Metabisulfite	
	Antiscalant	4.5
BaniSuhaila (Desalination)	Antiscalant	2
Deir Al Balah Al Aqsa Brackish water	Antiscalant	2
Deir Al Balah Sea Water Desalination Plant	Caustic Soda	2
	Sodium Metabisulfite	0.5
	Antiscalant	4.5
	Hydrochloric Acid	9.5
Al Nussirate Ro Desalination Plants –Taj Al Waqar&Al Forqan	Caustic Soda	1
	Sodium Metabisulfite	0.5
	Anti-scalant	2

C. New Water Resource

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

C.1 Sea Water Desalination Plants

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

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

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

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



Figure 15: Deir Al Balah Sea Water Desalination Plant

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

A new 6000m³/day sea water RO desalination plant almost completed and still under testing and commissioning phase, it serves around 75,000 inhabitants of both Khanyounis and Rafah Western parts. The project is funded by EU and constructed by UNICEF in co-operation with PWA & CMWU. The CMWU has recently started the plant's operation. The construction of phase 1 included the following items:

- Four sea water beach wells each of 200m³/hour capacity
- Three sea water RO desalination trains each of 2000m³/Day production capacity
- Electrical sub-station and three standby generators (3x0.66MW) with all associated electrical works and installations.
- Permeate water storage tank and Booster station
- Plant truss building and site landscaping
- Administration building and ancillary facilities
- Rehabilitation and upgrading of existing water carrier line connecting between the plant and the two existing water blending tanks located in both Rafah and Khanyounis governorates.



Figure 16: Sea Water Desalination Plant – Southern Governorates

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

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

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

- 1st package: Blending tank with 5000 m³ capacity with completion of 45%, the civil works were completed whereas the electromechanical works are ongoing.



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 implementation is still in progress.

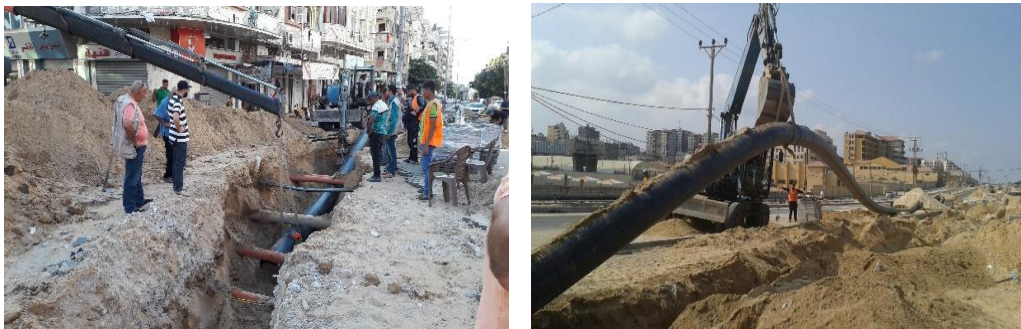


Figure 18: Gaza Sea Water Desalination Plant Carrier line

- 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 concrete foundations of the steel shed and the treated tank have been casted and the work still in progress.



Figure 19: Gaza STLV Desalination plant

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

C.2 Brackish Desalination Plants:

Besides that, CMWU have continued to manage, upgrade, rehabilitate and monitor the 45 existing brackish desalination plants listed in the table below, 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

Table 12. List of the Brackish Desalination Plants

SN	GOVERNORAT	MUNICIPALI	CAPACITY m ³ /D	Name
1	Khan Younis	Abassan Kabira	50	Teamat
2	Khan Younis	Abassan Kabira	50	Municipality plant.
3	Khan Younis	Bani Suhaila	1000	Bani Suhila Area Desalination Plant
4	Khan Younis	Bani Suhaila	600	Interpal Desalination Plant
5	Khan Younis	Bani Suhaila	100	El Najjar well
6	Khan Younis	Bani Suhaila	50	Abu Zehaq
7	Khan Younis	Bani Suhaila	50	Abu Shahla - Abasan Kabira
8	Khan Younis	Bani Suhaila	25	Shajaret El Dor
9	Khan Younis	Bani Suhaila	50	El Zannah - Zannah well.
10	Khan Younis	Bani Suhaila	50	Eastern reservoir
11	Khan Younis	Bani Suhaila	25	Soqiah
12	Middle Area	Deir Al-Balah	50	Aqsa well Desalination Plant
13	Middle Area	Deir Al-Balah	50	Abo Naser well Desalination Plant
14	Middle Area	Deir Al-Balah	1080	El Balad BWDP, J-32 well.
15	Khan Younis	Khan Younis	40	Aiih Well Desalination Plant
16	Khan Younis	Khan Younis	50	Al Amal 1 Well Desalination Plant
17	Khan Younis	Khan Younis	50	Al Amal 2 Well Desalination Plant
18	Khan Younis	Khan Younis	1000	Mahata Eastern Well Desalination Plant
19	Khan Younis	Khan Younis	50	Mahata Eastern Well Desalination Plant
20	Khan Younis	Khan Younis	1000	EL-Sa'ada Desalination Plant
21	Khan Younis	Khan Younis	50	EL-Sa'ada Desalination Plant
22	Khan Younis	Khan Younis	50	Madina Riyadia well Desalination Plant
23	Khan Younis	Khan Younis	50	Satar Well Desalination Plant
24	Khan Younis	Khan Younis	50	Al Hoda
25	Middle Area	Burij	1440	El Karaj DP, S-72
26	Middle Area	Burij	50	El Montazah
27	Middle Area	Maghazi	50	S-80 well Desalination Plant
28	Middle Area	Musaddar	50	Al Musader well Desalination Plant
29	Middle Area	Nussairat	1000	Forqan well Desalination Plant
30	Middle	Nussirat	600	Tag Al-Waqar Well Desalination Plant
31	Middle	Nussirat	24	Kalabosh well.
32	Rafah	Rafah	1000	El Shouot Desalination Plant
33	Rafah	Rafah	1000	El Salam Desalination Plant

34	Rafah	Rafah	50	Rafah Tal Sultan - P124 well
35	Rafah	Rafah	50	El Sekkah , Sekkah well
36	Rafah	Rafah	50	Safa well Desalination Plant
37	Rafah	Rafah	50	Round Reservoir
38	Rafah	Rafah	50	El Rahma
39	Middle Area	Wadi Gaza	50	Wadi Gaza well Desalination Plant
40	Rafah	El Fukhari	50	El Kukhari DP, Municipality
41	Rafah	El Fukhari	24	El Oropi DP.
42	Rafah	El Shouka	50	El Batool DP
43	Khan Younis	Khuza'a	100	Eastern reservoir
44	Khan Younis	Khuza'a	100	Municipality plant.
45	Middle Area	Wadi Salqa	50	Eastern well.
Total Capacity m³/day			11,508	

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

- One through the Welfare Association fund, At Wadi Gaza village of total capacity 70 m³/day, and this plant will serve 3000 inhabitants with drinkable water.
- Construction of 500 m³/day RO desalination plant - Al Sheifa hospital in Gaza City through Islamic Help fund, this plant improves the quality of water supply system with 500 m³/day of desalinated water. The work also included rehabilitation and maintenance works for the existing wells and tank as shown in the figures.



Figure 20: Containerized 500m³/day desalination plant

C.3 Water Networks

This section handles water network plans, upgrading, reconfiguration, resizing, and activities as CMWU succeeds during the period of this report to implement lots of water networks project varies between upgrading, reconfiguration, and construction new carrier lines and distribution systems in different areas of the Gaza Strip as follows:

1. Complete, Upgrade and expansion of water networks at Block D in Al Nusirat and Abu Amra area in Rafah, the project is funded by USAID through UNICEF.

2. Complete, Upgrade and expansion of water networks at the Eastern villages-Khan Younis , the project funded by USAID through UNICEF.
3. Upgrade and expansion of water network at the Northern governorate.
4. Upgrade and expansion of water networks at Al Nussirat, the project is financed by ISDB and Emar Gaza
5. Upgrade and expansion of water networks at Dair El Balah, the project is financed by ISDB and Emar Gaza.
6. Upgrade and expansion of water networks at Jabalia, the project funded by ISDB and Emmar Gaza.
7. Reconfiguration of water networks at Rafah and Khan Younis through the EU fund, the work is still in progress
8. Construction of main carrier pipeline 1.6 KM of 10" diameter at Absan Al Kabera, the project is funded by JICA and the work will start early 2017
9. Construction of the carrier line 1 Km length, 10" diameter from Al shoka wells to the existing line which feed Al Naser water Tank-Rafah. The project is funded by JICA and the work will start early 2017
10. Upgrade of distribution water networks in (Al Salam, Tabit Zarea, Al Shabora, Al Mosabeh, Tal Al Sultan and Al Saymat areas) –Rafah, the project funded by JICA and the work will start early 2017
11. Construction and Upgrading of Water Networks at Different areas in Biet Lahia, Gaza Strip, the project funded by ANERA.
12. Construction of water carrier lines and distribution water networks at Abasan Al Kabera in KhanYounis. The project is funded by WB and the progress is 85%.



Figure 21: Water networks at different Areas-Gaza Strip

OVERALL WATER NETWORKS IMPLEMENTED DURING YEAR is **125 KM**

C.4 Water Tanks

This section lists the main activities held during the period of this report for the new water tanks and water booster pump stations and the rehabilitation works for the existing water tanks and Booster stations:

- Completed the re-Construction of Khuza'a water tank 1800 m³ capacity, the project is funded by WB-AF, this Water tank was constructed instead of the damaged one during the last Israeli's offensive and it is planned to fill the water tank with blended water received from Bani Suhila water tank in addition to the water well in Khoza'a to feed 10,000 inhabitants in Khoza'a city using a Booster station 500 m³/hour. The new tank has been operated since November 2016.



Figure 22: Khuzaa Re-constructed Water Tank

- Construction of two water reservoirs at Al Boraq and Al Satar area each of 5000m³ capacity, the project financed by EU, the work is expected to start at the site during the first quarter of 2017.
- Construction of new four water tanks 5000 m³ capacity each at (Beit lahia, Al Nusirat, Deir El Balah and Khan Younis), the project is funded by USAID in cooperation with PWA and CMWU, and the work had started at the sites on November 2015 and still in progress.



Figure 23: Beit lahia water tank

- The Construction of Abassan Al Kabira ground water tank of 1800 m³ capacity has started recently on site through the WSSSIP-AF. This project consists of construction the tank, install the Booster station of 360 m³/hour capacity, with all electromechanical works required to operate the system, in addition to 3Km of water trunk and distribution lines with all associated works in order to serve Abasan al Kabera Village- in Khanyounis Governorate. The work is still in progress.



Figure 24: Abasan Water tank

- Construction of Al Shoka water tank 2000m³ capacity, the design was prepared by the consultant assigned by ANERA in cooperation with the CMWU and the tender procedures is ongoing, the project is financed by USAID.
- Construction of Al Fokhary water tank 2000m³ capacity the design was prepared by the consultant assigned by ANERA in cooperation with the CMWU and the tender procedures is ongoing, the project is financed by USAID.
- Construction of Four Ground Water Tanks in **Rafah-El Shabora 3000 m³, Al Burij water tank 4000 m³, Maghazi water tank 3000 m³ and Deir El Balah water tank 4000 m³**, this project is financed by USAID in cooperation with PWA and CMWU, the locations of the tanks were handed over on December 2016 to start the work on site early 2017.
- Completed the reconstruction of Al Muntar Water tank 5000m³ in Gaza City, the project is financed by KFW as part of the reconstruction program fund for the CMWU.
- Reconstruction of Civil Defense Water tank, the project is financed by KFW and the work is still in progress.

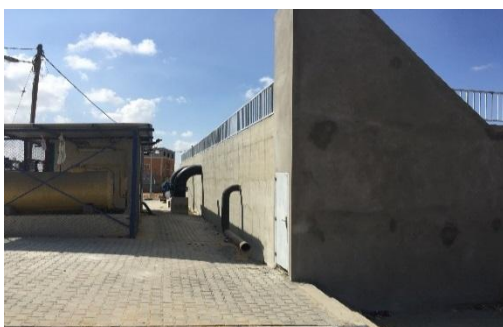


Figure 25: Al Montar Water tank



Figure 26: Civil Defense Water Tank

- The contract for the second phase of repairing water tanks through the WSSIP-AF awarded on May 2016, the work is still in progress whereas lack of the materials especially the electromechanical equipment affects negatively the progress of the project; the rehabilitation works will take place at the following sites:
 - ✓ Abasan Al Kabera existing Water Tank 1800 m³ capacity at Khanyounis: will include repairing the tank body and carrying out the leakage test.
 - ✓ Al Rahma Water Tank 5000 m³ capacity at Khanyounis: will include replacement of six horizontal pumps with vertical turbine pumps and the required electrical modifications for Maan and Saada boosters.
 - ✓ Tal El Sultan Water Tank 3000 m³ capacity at Rafah: will include replacement of three horizontal pumps with vertical turbine pumps and the required electrical modifications, boundary walls and landscape.

D. Waste Water Treatment Plants:

There are five 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 the newly constructed Wadi Gaza WWTP. This section will describe the main activities implemented in all the treatment plants to improve their treatment efficiencies and to keep the targeted BOD removal values and efficiencies in accordance with the design with regard to effluent quality. CMWU has continued its operational and management rules to manage and carry out comprehensive monitoring program related to the wastewater treatment plants located throughout Gaza strip Governorates and provide for all mitigation measures and improvement programs . Although all relevant events occurred during the last year particularly unreliable electricity power supply system and shortages of special spare parts ,the average achieved **78.23%** efficiency of treatment process and BOD removal have been tabulated and shown here below as per all five treatment plants in operation.

Table 13. Annual wastewater quality monitoring program –Year 2016

Wastewater Treatment Plants Monitoring Program -2016										BOD &TSS Removal efficiency %	BOD Removal ton/Year
Plant	Treatment Process Type	Average Weekly Flow m ³ /month	Total Annual Flow m ³ /Year	Influent			Effluent				
				BOD(mg /l)	COD(mg /l)	TSS(mg/l)	BOD(mg /l)	COD(mg /l)	TSS(mg/l)		
BLWWTP	Aerated Lagoons	1,007,760	12,093,120	422	942	455	86	206	87	80.28%	3250
GWWTP	BioTowers /Lagoons	1,776,155	21,313,860	436	910	447	96	299	94	78.54%	5442
WGWWTP	Aerated Lagoons	366,060	4,392,720	480	1,062	512	133	312	130	73.45%	1219
KhWWTP	Aerated Lagoons	411,085	4,933,020	499	1,117	532	131	291	118	75.78%	1451
RWWTP	Bio Towers	406,289	4,875,468	578	1,298	616	129	306	119	79.18%	1753
Total &Weighted Avg. Values		3,967,349	47,608,188	458	994	481	104	276	100	78.23%	13115
Annual Removal Efficiency % - Weighted Value										78.23%	
Annual BOD removal in Ton /Year										13115	

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

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

D.1 Gaza Central WWTP Project

KFW has allocated 70 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 approve addendum 4.

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

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

The Final revision of re-planning report submitted on June 2014, and starting of detail design was completed by end of August 2014. But All the works in the re-planning stopped because of the war occurrence. On June 2015 the consultant Dorsch submitted the Conceptual Project Re-planning; the report has been approved by the steering committee, CMWU and KFW agreed to start the detailed design. In parallel documents for pre-qualifications for international jointly with Local contractors has been prepared and published on May 2015. A contractor's "Information Workshop" was held on 6th July 2015. The purpose of the workshop was to give potential international contractors to find out about the situation and risks of undertaking projects in Gaza. Contractors have submitted the documents on August 2015 and evaluation report got no objection from KFW on September 2015.

Tender Documents have been prepared by the consultant; Invitation to tender proposed on 27th October 2015, Pretender meeting on 30th November 2015 and the submission date was on 25th February 2016. Contractors requested extension and agreed to submit on 8th March 2016. Four Contractors' submitted proposals and evaluation has been completed and financial proposal was opened on 11th April 2016.

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



Figure 27: Contract signing and foundation stone ceremony

During 2014(after war); KFW allocated 2.0 M Euro from the Emergency project for reconstruction of damaged infrastructure facilities within Gaza City. Following are the immediate measures and the status of each activity:

- 1- Supply and store materials at CMWU store (pipes, fittings, mechanical spare parts, valves, electrical parts, filters) - Completed
- 2- Supply replacement equipment & spares (pumps, lifting cranes, fuel tanks, Electrical panels, vehicles, etc) –Completed

Parallel to this addendum 4, KFW has signed agreement on the 6th of November 2014 with amount of 9 M Euros for reconstruction assistance for water and wastewater in Gaza City. The following are the agreed activities and the status of these activities to the end of Dec, 2016:

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



Figure 28: KFW Projects Activities

D.2 KhanYounis Wastewater Treatment Plant (KhWWTP)

KhanYounis Governorate is located in the southern part of the Gaza Strip of the State of Palestine by the Mediterranean Sea, and it is currently inhabited by more than 340,000 residents. Khan Younis City is considered as the second largest city of Gaza Strip and it is currently inhabited by more than 220,000 residents. Part of KhanYounis' population is served by the new established public sewer collection system. According to information gathered from Khan Younis Municipality, 83% of the population of Khan Younis city and 63% of the population in the surrounding area is expected to be served by piped sewage system in 2025. The remaining unconnected population disposes effluents to cesspits, which are emptied regularly by tanker vacuum trucks. Collected septage is then discharged to the system.

The current waste water discharge system is considered as temporary emergency system and the construction of Khan Younis waste water treatment plant is very urgent and vital need. The waste water strategic development plan aims at constructing an extendable and phased waste water treatment plant for Khan Younis. The detailed design of KY WWTP with a flow capacity of 26,656 m³/day for phase 1 and 44,948 m³/day for phase 2 was provided and the tender documents for the construction of KYWWTP, phase 1, are available. The main Project Components are:

I. Construction of Khan Younis Waste Water Treatment Plant and Buildings

In order to achieve waste water treatment objectives, the following steps are necessary for KY WWTP:

- Pre-treatment including screening and degeasing/degritting.
- Secondary treatment including nitrogen removal.
- Tertiary treatment.

According to the detailed design, the secondary treatment by activated sludge process technology is chosen. Sand filtration followed by UV disinfection is proposed for tertiary treatment. The WWTP includes the following treatment steps:

- 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 following activities were implemented during 2016:

- Complete the evaluation session for the pre-qualification request PQ 2014-001 for the provision of pre-contract and construction supervision services for the construction of KY WWTP.
- Final revision and endorsement of the final documents of (ITB) 2016-158: Construction of Khan Younis Waste Water Treatment Plant and Buildings.
- Precipitate in tendering process of (ITB) 2016-158: Construction of Khan Younis Waste Water Treatment Plant and Buildings lunched on 29th June 2016.
- Participate with other stakeholder in the Kick of meeting after awarding the contract to the most responsive bidder, Metito Overseas Ltd.

II. Construction of Main Pressure Lines to the Sea and to the Infiltration Basins

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

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

The following activities were implemented during 2016:

- Completed the evaluation session for the pre-qualification request PQ 2015-002 for the provision of pre-contract and construction supervision services for the construction of Main Pressure Lines to the Sea and to the Infiltration Basins.
- Participate in a design review work shop held on 7th and 8th February 2016, to present the activities of the project by the consultant.
- Final revision and endorsement of the final documents of (ITB) 2016-159(CMWU): construction of Main Pressure Lines to the Sea and to the Infiltration Basins.
- Completed the tendering process of (ITB) 2016-159 (CMWU): construction of Main Pressure Lines to the Sea and to the Infiltration Basins 13 Km length. CMWU launched the tender on 5th September 2016. The evaluation is completed and the contract will be signed at the beginning of 2017 .

III. Construction of the Infiltration Basins in AL Fukhari

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

The following activities were implemented during 2016:

- Completed the evaluation session for the pre-qualification request PQ 2015-003 for the provision of pre-contract and construction supervision services for the construction of the Infiltration Basins in AL Fukhari.
- Participating in a design review work shop held on 7th and 8th February 2016, to present the activities of the project by the consultant.
- Final revising and endorsing the final documents of (ITB) 2016-220(CMWU): construction of the Infiltration Basins in AL Fukhari.
- Completed the tendering process of (ITB) 2016-220(CMWU): construction of the Infiltration Basins in AL Fukhari. The evaluation is completed and the contract will be signed at the beginning of 2017.

D.3 The Permanent Northern Treatment Plant (NGEST)

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

E. Storm Water Activities

This section describes the main activities implemented during the year 2016 to improve the storm water infrastructure as follows:

1. Al Amal Storm Water Project:

The tender of implementation phase for Al Amal Storm water project has been launched on September 2015, financed by Emar Gaza and IsDB, the project includes upgrading works for Al Amal storm water pond over 100 dounms area to infiltrate around 2 M m³ of storm water to the aquifer, the progress of work is 60 %.

Also the CMWU through IsDB fund has implemented Al Amal storm water pumping station 2700 m³/hr in order to be used in emergency cases in addition to the pressure carrier line 1.6 Km from Al Amal PS to another infiltration pond near KHWWTTP over 30 dounms which has been constructed recently through UNDP/JICA fund.

Also the CMWU has implemented through IsDB fund a storm water carrier line 1000 mm diameter, 400 m length to the inlet structure of Al Amal infiltration pond. Besides separation between wastewater connections and storm water pipelines in Khan Younis.



Figure 29: Al Amal Storm Water Project

2. Al Junina Storm Water Project:

The construction of the storm water network, and the storm water pond at Rafah Municipal Area (Phase II) was completed mid of 2015, This project was financed by PALTEL Group Foundation and the main activities of this project were:

- Implementation of storm water pipelines of diameter 40 cm up to 100 cm with all associated manholes, gullies.
- Implementation of storm water pond, infiltration boreholes.
- Pressure pipeline from Al Junina pumping station to the nearest existing network.



Figure 30 : Storm water networks

During December 2016 the CMWU has launched the tender for construction block fence around Al Janina storm water pond; through Paltel Fund.

3. Abeda Storm Water Project

Completed the construction of storm water carrier line from Abeda storm water pond in Rafah to the detention basin near the Egyptian boarder; which will be constructed and shaped through USAID Fund.



Figure 31:Construction Storm water Carrier line-Rafah

4. Al Qarara storm water pond:

The CMWU has implemented during 2016 the first phase of Al Qarara infiltration Basin over 15,000 m² area, pipe lines from the downstream to the lagoon in addition to the curb inlets. This project is funded by IsDB.

While the 2nd phase has been committed by IsDB and EMAR will include the infiltration boreholes.



Al Qarar Figure 32: Al Qarara Storm Water Project

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

The work includes excavation and shaping the storm water detention pond at Rafah (Near the Egyptian boarder) over 20,000 m² area. The tender has been launched during December 2016, the project is financed by USAID through UNICEF, and the implementation will start on March 2017.

The proposed storm water Box culvert will collect the flow from Tal Al Sultan and Al Nujili areas around 70,000 inhabitants to eliminate storm water floods in those areas.



Figure 33: Detention Basin near Egyptian Boarder

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. Construction of 15 KM waste water networks in Jabalia and Beit Lahia” Lot (1), the work is ongoing.
2. Construction of 17 KM Wastewater Networks at Dair El balah Lot (2), the work is ongoing.
3. Completed the construction of phase II of Wastewater Networks and sewage pumping station at Wadi Gaza valley, the project is financed by Welfare Association.
4. Complete the construction of wastewater networks at Boba’a area-Dair El Balah, the project is funded by GVC.
5. Completed the remaining repairing damages of infrastructures at Beit Hanoun resulted from the Israeli offensive on Gaza”, this project is financed by ICRC
6. To eliminate sewage floods in Jomizet Al Sabeel pumping station, the CMWU has completed “construction of 1.6KM HDPE pipeline from this PS to WWTP at Rafah”, this line is used to enhance the PS ability since the old line is deteriorated and under size; the project is funded by UNICEF, the project also includes supply and install sand removal system.



Figure 34: Extension of Waste Water Networks



Figure 35: HDPE pipeline from Jomizit Al Sabeel PS to WWTP at Rafah

7. Completed the construction of 4 KM Sewage network at Rafah and Khan Younis, the project is funded by UNICEF. This Project will eliminate the illegal sewage connections to the storm lines.



Figure 36: Wastewater Networks at Rafah & Khanyounis

8. Completed the construction of 4.3 KM sewage network at Beit lahia, Beit Hanoun, Om Al Naser and Rafah, the project is funded by WB- AF.
9. Completed the construction of 10 KM wastewater networks at Rafah, Khan Younis and Al Zawida, the project is funded by USAID through UNICEF.
10. Completed the construction of 0.7 KM Wastewater networks at Al Salam Neighbourhood-Rafah, the project funded by PHG.
11. Constructing 1.8 KM pressure Pipeline from Manshia Pumping Station to Beit Lahia Wastewater Treatment Plant” the project is still in progress and it is financed by Qatar Charity.
12. Construction of Sewage Pumping station 700 M3/day, 4 KM wastewater networks and 250 household connections at Abu Mohadi area- Al Nussirat, the project is funded by ICRC, on-going.



Figure 37: Abu Mohadi Sewage PS and networks

13. Construction of Al Zahra sewage pumping station 850 m³/day and 3 Km wastewater networks, the project is funded by Unicef/USAID. the work has started on November 2016 and still in progress.
14. Completed the construction 2.5 Km of wastewater networks at Bani Amer-Rafah, the project is funded by UNICEF.
15. Completed Phase II of wastewater networks at Batin Al Sameen Neighbourhood- Khan Younis which includes 3 Km UPVC Pipes and 150 household connections the project funded by AECID.
16. The CMWU has launched consultancy service to design 30 Km wastewater network in Rafah and to produce a master plan for Wadi Al Salqa wastewater system.

17. Construction of Wastewater Networks in Rafah area and Upgrading of Water Carrier Line in Rafah (Tal El Sultan), the project is financed by JICA through UNDP and the work is still in progress
18. Construction of Sewage pressure line from Sawarha PS - Zawida to Salah El Deen street, in addition to maintenance works in Al Sawarha PS, the project is financed by JICA through UNDP and the work is still in progress.
19. Complete, Construction of 1.6 KM of wastewater pipelines at Khan Younis, the project funded by USAID through UNICEF.
20. Construction of Wastewater network at Al Zaytoon area in Beit Hanoun, the project funded by WB, the tender has been launched and the work will start early 2017



Figure 38: Construction Wastewater Networks

The OVERALL WASTEWATER NETWORKS IMPLEMENTED DURING YEAR 2016 IS 80 KM

F.2 Electromechanical Services for Waste Water & Storm Pumping and Treatment Facilities

During the period of this report from January to December 2016, 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 60 pumps per year, as well as this number of orders may increase due to old age of the pumps and harsh wastewater environment.





Figure 39: ElectroMechanical Maintenance for Wastewater Pumps

- 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, none return valves, changing flanged coupling, pipes sand blasting, painting, etc. Maintenance task orders were more than 30 tasks per year.



Figure 40: Maintenance of Pump's Manifolds

- 3 Manage and carry out comprehensive emergency maintenance and repair for pressure pipeline and wastewater networks of wastewater pumping stations, the work includes changing the collapsed pipes, fittings etc.



Figure 41: Emergency Repairs for Wastewater Pressure Lines

- 4 Manage and carry out comprehensive electromechanical maintenance, replacement, repair program for auto mechanical bar screens of wastewater pumping stations.



Figure 42 : Bar screen Maintenance

- 5 Manage and carry out comprehensive cleaning process for sewage pumping station, 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 station, as well as this process may be after each storm. Cleaning process task orders were more than 85 one per year.



Figure 43 : Cleaning Pumping Station Yard

- 6 Installation of local step up transformers used as stabilizer in Waste Water Treatment plant in Rafah for the effluent and bio tower panels the supply voltage was raised from 300V to 400V.
- 7 Replace the main 630 automatic changeovers in Jemez et al Sabeel in Rafah together with the main fuses and the circuit breakers.
- 8 Replace two power factor panels by new automatic ones of 630 A each in Jemez et al sabeel and Junaina Pump stations in Rafah.
- 9 Installation of Ultra-sonic level meters and together with 24 V power supply, 40 AH backup battery and battery charger in 10 main and small pump stations in Khan Younis, bani suhila, bait lahia and bait Hanoun to provide automatic operation of the generator according the level of waste water in the wet bit. This was done to save fuel.
- 10 Complete repair and up grading of the bar screen panel in Jemez et al Sabeel in rafah, hassaina in, Industrial PS and Al sultan PS in Bait hanoun
- 11 Replace the under voltage protection in more than 10 pump station in all areas. These damages were caused by the bad quality of the main electricity supply
- 12 Replace the damaged control boards of soft starters in in more than 6 pump stations in all areas. These damages were due to bad quality of main electricity supply.
- 13 Rehabilitation of all Internal and External lightings including replacement of all damaged overhead projectors in more than 10 pump stations in All areas.
- 14 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.



Figure 44: Mobile Pumps Maintenance

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



Figure 45: Winterization activities

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



Figure 46 : Safety Cloths Distribution

- 17 Additional storm water pumping facilities (three submersible pumps each of 500m³/hour capacity and one 500m³/hour Diesel driven pump) have been completed and installed at Al Najeeli storm water lagoon in Rafah. The upgraded system has been operated and tested this year and improved the pumping capacity and reduce the risk of flooding of Rafah neck bottle called Jemazzit Al Sabeel area.
- 18 Repair and maintenance for 625 KVA standby generator for Enjaily sewage pump station in Rafah area, the works include repair defect end of alternator coils and all required fittings, Also the works include dismantle and transfer the generator to contractor workshop to repair, then transfer to the well site and reassemble.



Figure 47: Repair Enjaily Strom Water P S Generator

2- PROGRAM ACTIVITIES PROGRESS

2.1 Geographic Information System (GIS)

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

2.2 Environmental Management Plan (EMP)

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

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

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

2.3 Customer Services

In this period, lots of activities were achieved to enhance the customer services program as follows;

1. Finalize the preparation of CMWU Customer services manual in cooperation with the external consultant as part of the assignment of preparing CMWU administration and financial manual.
2. Follow up the operation and maintenance of comprehensive customer information and Service system CCISS at 14 different municipalities in Gaza Strip.
3. CMWU continues issuing the water bill in a monthly basis for 14 municipalities in Gaza Strip region. The number of customers served by the 3 regional offices (Rafah, Khanyuns and Deir El Balah) is 60,560 customers.
4. The following steps are being followed in order to enhance the collection efficiency in Rafah City:
 - a. Coordination and cooperation with legal institute to follow up the uncommitted customers and issue payment order of or inform the bank to deduct the bill from their salaries.
 - b. Continues follow up to the legal connection through CMWU inspection unit, in order to raise the collection and enhance system efficiency.
 - c. Encouragement for committed customers through lunching reward campaign.
 - d. Signing agreements with local banks for automatic payment for CMWU bills m 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.
5. The following steps are in process in order to enhance collection efficiency in the regions managed by CMWU.
 - a. CMWU in process of introducing a pre-paid water meter to be used as a trial in Rafah , then the other areas based on the outcome results.
 - b. Enhance the operations of water inspection units.
6. Cooperation with municipality of Rafah to update customer data base (Unit served by the subscription, HH status, employment status for the customer, contact informationetc.), and compare the results with CCISS data for customers.
7. Regarding public awareness CMWU customer service department in cooperation with CMWU media unit finalize the followings;
 - a. Public awareness campaign in the area of Jabalyia , Nuseirat and Dar El-Balah in topics related to Non-revenue water and water conservation , financed by ISDPs.
 - b. Public Awareness campaign in the area of Khanyunis and Rafah , dealing with desalinated water , water conservation and water bill payment. Financed by EU.
8. Follow up the progress of the bill improvement collection campaigns which reaches to 45% even the drop was noticed after the offensive on Summer 2014 to 25%. Extra efforts are needed to reach the target 55% by the end of the year 2017.

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 include all Gaza Strip municipalities.
- Enhance the interface management between CMWU and PWA by regular meeting and close coordination.
- Forming a coordination committee with Municipality of Gaza in order to implement the Gaza sewerage Emergency Project financed by KFW , and to agreed how to operate the GWWTP.
- Move on to achieve the CMWU strategic plan (5 years plan), and prepare the TOR for a CMWU business plan for the next five years.
- PWA and CMWU are working jointly with the WB and ISDB in order to fulfil the new project 's targets and continue monitoring and seek to improve the overall efficiency of the existing water and wastewater services through the WSSSIP and its additional fund AF.
- The CMWU has upgraded the building of the Water & WW central lab in Al Zahra city to be central lab and CMWU headquarter, the construction of the building was financed through IsDB where the upgrading works implemented through WSSSIP- AF fund.



IsDB Construction Works



WB Upgrading and Furnishing Works

Figure 48:CMWU HQ and Central Laboratory

3.2 Donor's visits to the CMWU sites:

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

- On January 2016 the World Bank team accompanied with Mr. Stef Skinbirgur the executive director for middle east programs visited some sites that are funded by the World Bank's projects such as CMWU Central Lab, Bani Suhaila water tank, Al Montaza Water Well and terminal sewage pumping station at Nuseirat.
- On January 2016 the Head of KFW visited the Montar site eastern of Gaza city accompanied with the KFW project director and the consultant Dorch.
- On February 2016 a Finland delegation visited Deir Al Balah Sea Water Desalination Plant, and Al Aqsa Tank, and different sites implemented through the WB-MDF.
- On March 2016 OCHA delegation accompanied with CMWU general Director Visited the destroyed area at Al Shejaaya area and Al Montar Reservoir.
- On May 2016 UNOPs director Mr. Aiden and Mr. Amjad Mohanaa visited the CMWU warehouse at Khanyounis to approve storing any material entered through GRM at the CMWU central Warehouse.
- On June 2016 the EU delegator Mr. Youhanis Han visited the Southern Sea Water Desalination Plan accompanied with Mr. Maged Abu Ramadan; The CMWU Board of Director and the Minister of the Public works Mr. Hasayna.
- On December 2016 CMWU participated in laying the foundation stone for the central sewage treatment plant in East Al Burraiij (KFW).



Figure 49: Sites Visits

3.3 Coordinate with other entities:

As known since the establishment of CMWU, all the projects for either development or for emergency are funded from different donors until CMWU could stand alone for its facilities operation and maintenance as well as developmental projects. This is expected to take more than 5 years at least. The following are the on-going activities in cooperation with other donors' agencies as;

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

UNICEF: new agreement signed between UNICEF and CMWU to construct the boundary wall for STLV , in addition to another agreement to implement and manage construction of storm water basin over 20,000 m² area, box culvert and overflow system through USAID fund.

ICRC: has financed different projects which aim to improve the operational schemes and assure continuity of water and wastewater services.

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

EU: is committed to finance the expansion of sea water desalination plant STLV at the southern governorate to reach 12,000 m³/day by adding additional 6000m³/day desalination units.

JICA: new agreement signed between JICA and CMWU to rehabilitate water networks at different areas in the southern governorate,

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

Muslim Hands: new agreement has been signed between MH and CMWU for electromechanical maintenance for two water wells in Al Nussirat, in addition to two agreements signed last year to construct two water wells one in Khan Younis and the other in Al Mousadar.

ANERA: Anera in cooperation with CMWU has prepared the design of two water tanks at Al Fokhari and Al Shoka besides water networks at Beit Lahia.

SIF: new agreement has been signed between SIF and CMWU to implement wastewater networks at Al Mosabeh area-Rafah

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

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

3.4 Public awareness campaigns:

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

- Importance of Seawater Desalination Plant
- Saving water
- Paying Water Bills
- Cleaning tanks
- Water situation

Parts of the implemented activities are mentioned here below:

1. Training courses: Media & awareness unit implemented training course, which targeted 70 social workers from Khan Younis and Rafah governorates to implement awareness activities and home visits.
2. Workshops: Media & awareness unit implemented 40 workshops in all the Gaza governorates.
3. Media & awareness unit implemented 60 awareness sessions in some schools of the Gaza governorates.
4. Home visits: Media & awareness unit implemented 50,000 home visits in Khan Younis and Rafah governorates.
5. Media Materials including; posters, billboards, radio ads, TV ads, brochures, and 2 cartoon films.
6. Ceremonies: 7 ceremonies.
7. Organizing trip of 50 persons of local communities from Rafah and Khanyounis governorates to the desalination plant in the south of Gaza Strip.
8. Implementing the biggest Mural on Water in Palestine.
9. Organizing 3 press conferences
10. Publishing CMWU news on social media and newspaper.
11. Design and print a new directory for CMWU.
12. Media and Public Awareness unit organized the first exhibition on water in Palestine. (مياھنا حياتنا- Water is Our Life)
13. Organizing 10 discussion meetings with local committees.



Figure 50: CMWU Public Awareness Activities

3.5 Emergency Preparedness Plan - EPP:

In co-operation with ICRC, CMWU has finalized the Emergency Preparedness Plan in order to maintain during a conflict and war events the minimum level of services required by the population, to carry out repairs in infrastructures, to allow the service providers to keep the water & wastewater infrastructures in a working conditions, it is important to note that this plan mainly tackles interventions for which a movement coordination is required.

As part of implementing EPP plan, CMWU in cooperation with the ICRC implemented the following activities during the past year:

1- Emergency Stores

The works included equipping seven main stores throughout The Gaza Strip, with the materials and fittings needed for water and wastewater infrastructures such as UPVC pipes, cement lined steel pipes and fittings (Bends, Flanges, Flanged Couplings, etc.). the stores constructed in seven locations as follow:

1. Beit Hanoun Emergency store.
2. Beit Lahia Emergency store.
3. Jabalia Emergency store.
4. Gaza Emergency store.
5. Middle Area Emergency store.
6. Khanyounis Emergency store.
7. Rafah Emergency store.



Figure 51: Emergency Stores

2- Vehicles Visibility

EPP included also vehicles Visibility, labelling and signage for all water and wastewater vehicles more than 390 vehicles throughout Gaza Strip.



Figure 52: Vehicles Visibility

3- Vehicles Repairs

EPP included vehicles repair, maintenance and refurbishment for some of water and wastewater vehicles around 90 vehicles throughout Gaza Strip. The works included engine overhauling, engine replacement, changing deteriorated parts i.e. disc clutch, tires, gears, drive shafts, body repaired.

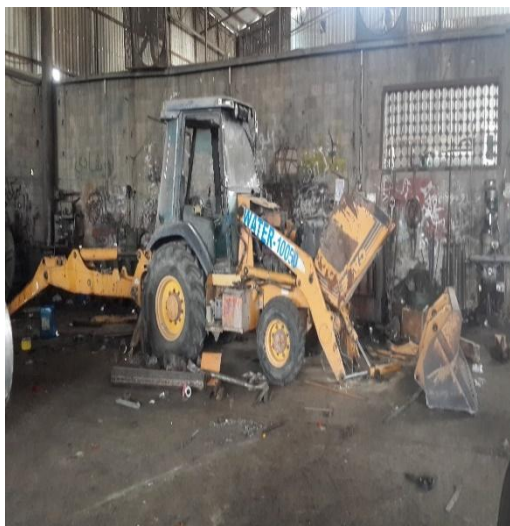


Figure 53: Vehicles Repairs

MAIN OBSTACLES

One of the main and major obstacles towards accomplishing on-going contracts is the siege forced on the Gaza commercial borders towards importing the necessary goods to finish the works and the new complicated enforced system called the Gaza Reconstruction and Materials Mechanism System (GRAMMS). Added to that; the cost of materials which become 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.

Due to Gaza Strip situation, some of the developmental projects are not financed and some of the water and waste water projects become humanitarian projects.

During the period of this report, Gaza strip was suffering from catastrophic shortages and unreliability of electricity power supply which 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 35 MW which will rise to around 90 MW in the coming years once the desalination plants and WWTP are constructed.

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

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

SUCCESS STORY (Al-Shifa Desalination Water Plant – 500m³/day)

Al Sheifa hospital is considered the biggest governmental hospital in Gaza strip, it is located in the western part of Gaza city close to the Mediterranean coastal line of Gaza strip territory where the aquifer is salinized due to the sea water intrusion. The hospital depends on two water wells (50m³/hr. capacity each) as a water source with high salinity rates TDS reach 17,000 ppm, that adversely affects most of the medical equipment used at the hospital especially in the kidney unit ; however, the CMWU succeeded two years ago to find a solution to the kidney section in the hospital by supplying and installing special RO unit with a capacity 100m³/day, but due to other growing needs in the hospital beside the quality deterioration ; CMWU succeeded to integrate a solution to cover the whole hospital needs by adding 500m³/day whereas part of its production will be used for the second pass desalination through the already existing RO for the kidney section.

Eng. Rashad Esi – Maintenance Unit Director- said “The hospital board's chairman asked Coastal Municipalities Water Utility to find practical solutions for the hard water, in it's part, CMWU suggested to dig a new well in the southeast area of the hospital, the water of the new well was acceptable for only a year and a half, then the TDS raised again”

We all know that water is essential for all departments in the hospital as it is used in cleaning and sterilizing tools such as dialysis and any other machines, but due to the hard water, dust and lime started to ruin the dialysis, water networks and the other equipment at the hospital which forced the management to close some facilities in the hospital as they are not useful anymore.

However, the central air in which the Central Surgeries Building depend on was also affected by the hard water, as some of its equipment were broken due to the lime and dust which led to change the central air in the building.

After raising the issue and its serious implications, CMWU agreed to provide the hospital with a Desalination Water Plant (Capacity 100 m³/ a day) as temporary solution.

A serious problem and challenges raised up to affect not only the equipment but also to affect doctors, patients, visitors, and the whole working crew in the hospital, people could not even use the water to perform ablution due to the hard saltwater especially in Summer where water usage reaches 700 m³ / day.

Finally, in an attempt to put an end to the hard water problem, CMWU established a new Central Desalination Water Plant in Al-Shifa Hospital with 500 m³ capacity per a day to lay off buying a huge amount of desalinated water. The desalination plant right now is being used for sterilizers, washing machines, and dialysis, in addition to providing desalinated water to allow every single person in the hospital to drink from the tap.



Figure 54: Al Shifa Desalination Plant Opening Ceremony

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 to reach the sustainability within the coming 5 years.

PWA and CMWU are working jointly with the WB and Multi donors in order to fulfil the new project's targets and continue monitoring and seek to improve the overall efficiency of the existing water and wastewater services through the WSSSIP & AF.

END