

PMU- Palestinian Water authority
In Cooperation with
Coastal Municipalities Water Utility



Gaza Water Supply and Sewage Systems Improvement Program

Annual Progress Report 2015



TABLE OF CONTENTS

ACKNOWLEDGEMENT.....	3
EXECUTIVE SUMMARY.....	4
INTRODUCTION.....	6
1. IMPROVING QUALITY & QUANTITY OF WATER.....	7
1.1 Overall Water Distribution System Efficiency.....	7
1.2 Wells Construction Progress:	11
1.2.1 Electromechanical Progress	14
1.2.2 Water Wells Functionality Progress	19
1.2.3 Water Wells Energy Consumption	22
1.2.4 Water Quality Monitoring Progress.....	25
1.2.5 Mechanical Refurbishment ,Upgrading and Repairs Installations	36
1.2.6 Electrical Works Progress.....	41
1.2.7 Fuel Distribution.....	42
1.3 New Water Resource	43
1.4 Water Networks (Resizing & Reconfiguration & Expansion)	47
1.5 Water Tanks	48
1.5.1 New Water Tanks and Booster stations:	48
1.5.2 Repairing the Water Tanks:	50
1.6 Waste Water Treatment Plants.....	54
1.6.1 Beit Lahia WWTP:	55
1.6.2 Gaza Central WWTP	56
1.6.3 Rafah Wastewater Treatment Plant (RWWTP).....	58
1.6.4 Khanyounis Wastewater treatment plant (KhTWWTP)	58
1.6.5 Wastewater Activities in Middle Area Governorate (WGWWTP)	60
1.7 Storm Water Activities	60
1.8 Waste Water Pump stations and networks	63
1.9 Electromechanical Services for Waste Water Pumping and Treatment Facilities	66
2 PROGRAM ACTIVITIES PROGRESS.....	68
2.1 Geographic Information System (GIS).....	68
2.2 Environmental Management Plan (EMP)	68
2.3 Customer Services	68
3 OTHER ACTIVITIES.....	71
3.1 Enhance the identity of the CMWU as fully functional service provider:.....	71
3.2 Donor's visits to the CMWU sites:.....	72
3.3 Coordinate with other entities:	74
3.4 Public awareness campaigns:	75
3.5 EMERGENCY PREPAREDNESS PLAN - EPP:.....	77
4 MAIN OBSTACLES	78
5 SUCCESS STORY (Construction of Musabeh Brackish Desalination Plant - Rafah)	79
6 CONCLUSION	80

List of Tables

Table 1	Overall Annual System Efficiencies
Table 2	Repair Jobs January – December 2015
Table 3	Monthly Water Well Functionality
Table 4	The monthly water wells specific power consumption -Middle and South Governorates -YEAR 2015
Table 5	Supplied Chemicals January-December 2015
Table 6	Water Disinfection Monitoring Program
Table 7	Total Annual Production (m ³) January-December 2015
Table 8	Total Annual Water Supply (MEKOROT)
Table 9	Total Annual Water Supply
Table 10	Water Qouta L/C/D: January-December 2015
Table 11	Repair Works for dosing pumps
Table 12	List of Brackish Desalination Plants
Table 13	Annual Wastewater Quality Monitoring

List of Figures

Figure 1	Overall Annual Water Networks System Efficiencies -Year 2014 /Middle and Southern Governorates
Figure 2	Water networks Repairs and installations
Figure 3	Al Fayroz Water Well –Deir Al Balah
Figure 4	Al Nazla Water Well - Jabalia
Figure 5	Wadi Al Salqa Water Well
Figure 6	Al Naim Water Well - Khanyounis
Figure 7	Installation of Vertical Turbine Pumps
Figure 8	Standby Generators Activities
Figure 9	Monthly Functionality Percentage for served Areas
Figure 10	Annual Specific Energy Consumption
Figure 11	Monthly Water Disinfection Percentage
Figure 12	Total annual water supply (m ³) January-December 2015
Figure 13	Total annual Production (m ³) January-December 2015
Figure 14	Chlorine Distribution
Figure 15	Water facilities Repair, Refurbishment and Rehabilitation Works
Figure 16	Maintenance activities for water wells
Figure 17	Electrical Control Switch board for Bani Suhail Water Tank Booster Station
Figure 18	Annual Fuel Supply and Distributed Quantities
Figure 19	Filling the generator daily fuel tank with Diesel
Figure 20	Maintenance work at Deir Al Balah Sea Water Desalination Plant
Figure 21	Sea Water Desalination Plant –Southern Governorates
Figure 22	Al Sheikh Radwan Blending Tank
Figure 23	Al Moghraqa Water Tank
Figure 24	Bani Suhaila Water Tank
Figure 25	Al Aqsa Water Tank
Figure 26	Khuzaa Water Tank
Figure 27-33	Water Tanks Repairs – Phase I
Figure 34	Water Tanks to be repaired in phase II
Figure 35	Beit Lahia Wastewater Treatment Plant
Figure 36	KFW Projects Activities
Figure 37	Cleaning Lagoon No. 1 in Khanyounis Temporary WWTP
Figure 38	Wadi Gaza Wastewater Treatment Plant
Figure 39	Al Amal Storm Water Project
Figure 40	Storm water networks at Rafah
Figure 41	Abeda Strom Water Project
Figure 42	Excavation Rafah Storm water pond
Figure 43	Al Nussirate Wastewater Pumping Station
Figure 44	Wastewater Networks at Deir Al Balah
Figure 45	Baten El Sameen sewage pump station in Khanyounis
Figure 46	Sites visits
Figure 47	CMWU Public Awareness Activities
Figure 48	Vehicles Visibility During Emergency Times /EPP
Figure 49	Mrs. Youssra Al Assar during here work with CMWU as a public awareness educator

List of Annexes

Annex 1	Performance Indicators
Annex 2	EMP Site Visits Reports
Annex 3	Water Facilities Sampling Results
Annex 4	Financial report
Annex 5	Emergency Plan

ACKNOWLEDGEMENT

This annual report has been prepared by the WSSSIP project management unit (PMU) in-cooperation with Coastal Municipalities Water Utility (CMWU) - operational team. The report is mainly composed of all relevant activities progress schemes implemented from January to December 2015.

Special thanks are to PWA leadership for their input as a supportive regulator for the sector and to the Board of Directors of the Coastal Municipalities Water Utility for their continuous support in order to push this project and all other projects towards success.

Thanks also continue to the World Bank and Multi donors fund (Representative office of the Kingdom of the Netherlands , AFD , Finland ,....) as a main funding agency for O&M activities and to the Islamic development Bank (IsDB) for the parallel finance program “Gaza Water Supply and Sewage System Improvement”.

PMU and CMWU operational team would like to thank all other donors to their continuous support in financing water and waste water projects such as ICRC, UNICEF, KFW, OCHA(HRF), QRC, AFD, Islamic Help, NRC ,Paltel, Oxfam, GVC, ACF, ANERA, UNDP, Muslim Hands, Islamic Relief, Save the children, Qatar Charity, Td hand JICA, AECID and Welfare Association. Without their supports it would have been difficult to overcome many of the humanitarian problems, also their assistance to implement some of emergency measures in order to avoid environmental disasters and further deterioration of the water sector especially after the last offensive war in July 2014 , in which their quick response to finance the emergency repairs is the reason behind keeping the provision of the minimum level of water supply and wastewater collection in Gaza Strip.

EXECUTIVE SUMMARY

Throughout this year of WSSSIP and AF1 project, the PMU in full cooperation with the CMWU manage and carry out all normal operations and maintenance tasks with all monitoring programs set as per several tasks performance indicators shown as per WSSSIP & AF1 project documents. The overall efficiency of the existing water distribution systems is **65.5%** with 34.5% UFW for Middle , Khanyounis and Rafah governorates. Water Wells functionality efficiency is 97.5%, water disinfection efficiency is over 99.5% . Also, manage weekly quality monitoring program for all wastewater treatment plants through utilizing CMWU central lab and sampling program. The records show satisfactorily progressive achievement for the task of 78.5% average removal efficiency.

Manage and carry out emergency recovery and repair plans for all water and wastewater facilities and succeed to have a commitment for more than **75%** of the damaged Water and wastewater infrastructure resulted from the offensive war on Gaza .

The CMWU carries out more than **245** predictive, preventive and corrective maintenance job orders at various areas for the existing **235** generators that heavily and severely affected by long daily hours of operations which create lots of repair and maintenance needs and parts. Also, 13 new generating sets have been newly supplied and installed by CMWU at various water and wastewater facilities to replace deteriorated sets and to provide other facilities having no standby electrical power supply generators.

The CMWU carries out and on time reactions with all programmed inspections and preventive maintenance requirements for all water and wastewater facilities, more than **721** repair job orders in water supply and distribution networks were carried out during 2015 for all municipalities and more than **85%** of spot damages have been completed and brought back to service mode again, where WSSSIP funded on going service contracts were implemented and employed.

Communicates with many donors to support CMWU in the winter season with extra operational needs for fuel, safety tools, heavy machinery and mobile generators and pumps. Also, continues to manage and monitors the supply fuel and distribution for all water and wastewater facilities funded by WB, GCC/IDB, UNRWA, TIKA, UNICEF, OCHA (HRF) .

The PMU field survey continues to enable monitoring the current activities of different projects in the field. Also, the PMU continues monitoring the water quality in all domestic wells in the governorates based on EMP procedures, added to that wastewater collection and sampling , all tests were carried out based on EMP procedures.

The collection ratios were improved to an average of **46.5%** by the end of November 2015 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 funded by EU is in progress and there is on-going negotiations among PWA, CMWU, EU to expand the second phase of the STLV sea water desalination plant to reach 12,000m³/day.
2. The tender for supervision consultant for the implementation of the central treatment plant in Khanyounis is under evaluation and the work started mid-2015.
3. The implementation of the first phase of Gaza sea water desalination plant (10,000 m³/day) funded by IDB is in progress and there is on-going negotiation among PWA,CMWU and IDB to complete the second phase of Gaza STLV sea water desalination plant to reach 15,000 m³/day
4. The implementation of the strategic storm water projects through Gaza Strip governorates has started 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 area from frequent floods in winter season, and recharge part of the storm water.
5. Storm water Management and Disaster Risk Reduction Study for the Middle and southern Governorates has been prepared through Spain fund.
6. PWA and CMWU are working jointly with the WB and IDB 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 AF1.
7. All the WISSIP procurement plant were accomplished, and most of the AF1 projects are on-going, and some of the projects are under the tendering and evaluation phases.

INTRODUCTION

Throughout this year of WSSSIIP & AF1 project, all efforts and activities have been directed in parallel 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 project year , PWA/CMWU team and through the WB-AF1 with assistance of several funding agencies such as ICRC, KFW and UNICEF continue repairing the damages resulted from the war to improve the water and wastewater services.

However and after more than one year from the last offensive on July 2014, major infrastructural damages, projects for the development of the water and wastewater sector, and smaller-scale emergency preparedness interventions have been facing a number of obstacles and restrictions to get the needed materials and equipment across the commercial gates except for minimum requirements of living and some selective materials because of the complicated enforced system called the Gaza Reconstruction and Materials Mechanism System (GRAMMS).

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. This has tighten the PWA and the CMWU from developing and implementing their plans by enhancing the services through delivering accepted water for drinking and other usage as well as construction of waste water treatment plants.

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, IDB, GCC, QRC,NRC, ICRC, UNRWA, UNDP, UNICEF, GVC, OCHA (HRF),IH,MH, ACF, KFW,QC and others 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 and complete other planned projects implementation programs in the due time.

Meanwhile the difficulties are everywhere in the service area; so the challenges are the motivated forces to PMU & 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 257 water wells, 26 water Storage tanks, 26 water desalination plants, 16 water booster stations, 42 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 lost. Therefore, many services contracts launched 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.

TECHNICAL PROGRESS ACTIVITIES

This report describes the progress achieved during the period from January to December 2015 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.

1. IMPROVING QUALITY & QUANTITY OF WATER

1.1 Overall Water Distribution System Efficiency

Throughout implementing the 3rd year of WSSIP project, PMU and CMWU continue managing ,implementing and monitoring various programs and provide for 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 has been progressively improved and annual **65.5%** system efficiency has been targeted and reached .

Efforts to improve the overall system efficiency have continued through the 3rd year of WSSSIP. PMU and 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 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 to date are as follows:

Table 1. Overall Annual Water Networks System Efficiencies -Year 2015 /Middle and Southern Governorates

Monthly Water Distribution Efficiency Report for 2015				
Monthly Average Values- South-Middle Areas				
No.	Month	Water production m3	Water billed m3	System Efficiency %
1	Jan-15	2,706,752	1,849,995	68.3%
2	Feb-15	2,699,275	1,806,701	66.9%
3	Mar-15	2,687,121	1,811,291	67.4%
4	Apr-15	3,042,475	1,911,290	62.8%
5	May-15	3,258,633	2,052,472	63.0%
6	Jun-15	3,432,389	2,124,942	61.9%
7	Jul-15	3,331,700	2,202,425	66.1%
8	Aug-15	3,313,466	2,224,190	67.1%
9	Sep-15	3,249,773	2,089,668	64.3%
10	Oct-15	3,293,666	2,174,363	66.0%
11	Nov-15	2,983,279	1,989,411	66.7%
12	Dec-15	3,042,945	2,029,199	66.7%
Total		37,041,474	24,265,947	65.5%

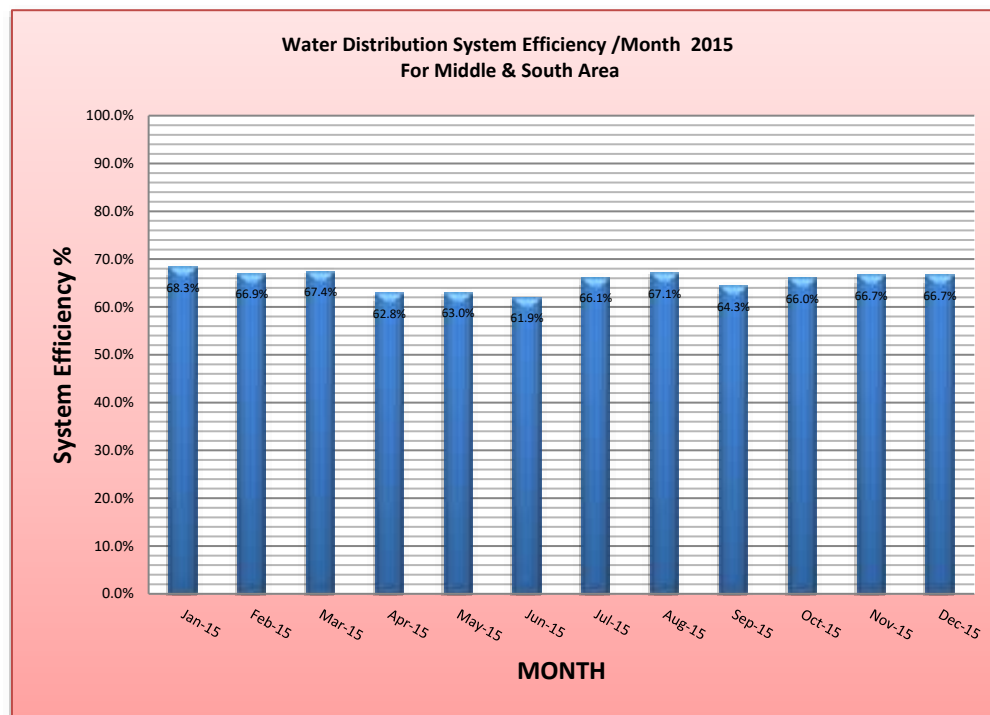


Figure 1: Overall Annual Water Networks System Efficiencies -Year 2015 /Middle and Southern Governorates

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 20% 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 the 3rd year of WSSSIP project 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 in the 23 targeted municipal areas have continued to be applied by CMWU repair and maintenance team through the WISSIP & AF1, works including 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 connection. A comprehensive network repair and maintenance program was introduced to the targeted areas during the 3rd year of WSSSIP

Project . Several works of water networks repairs were directly initiated and applied to provide for all emergency damages repairs which will enable the reactivation of water supply system 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 721 repair jobs** performed during the period from January to end of December 2015 are listed in the following table provided here below:

Table 2. Networks Repair Jobs January – December 2015:

Annual Water Networks Repair Monitoring Records - Number of repairs-YEAR 2015													
No.	Municipality	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	Al Zahra	2		3		3			2	3			1
2	Wadi Gaza		1		2		1	2	2			1	
3	Musader	2		3	3	3			6		2		2
4	Wadi Al salqa	2		2				3			4		
5	Moghrakah	3	4		3		2		3	2	3		2
6	Buraij	3		4	3	1	2			2		4	1
7	Maghazi	3	1	3	3	1	1	4		4		2	
8	Deir Balah	9	7	11	8	11	9	5	10	9	11	9	7
9	Zuwaida		4	4	2			1	2				1
10	Nusirat	5	2	8	4	4	2	7	9	4	6	4	5
11	Khan Younis	9	6	8	14	10	13	9	7	11	10	11	8
12	Khoza'a	1		2	3			3	4	3		4	
13	Qarrara	4	1			4		4	2			4	2
14	Abassan Kabira	7		4	4	1		4					2
15	Bani Suhaila			5	4	4	2		4	4		3	3
16	Abassan Jadidah	2	2				2		2		1		2
17	Al Fukhari		3			2	1	1					1
18	Al Naser	1	2	3					2	1	1	2	
19	Al shokah		2		1		1		2	4			2
20	Rafah	11	9	14	16	14	17	12	12	22	20	11	13
Total		64	44	74	70	58	53	55	69	69	58	55	52
Total Networks Repairs		721											

This program of water distribution networks' repairs have contributed significantly to the reduction of the unaccounted for water. PMU 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 2015. 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 project 3rd year 2015 , a total of 3640 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 and Ministry of finance with regard to water bills for public buildings in lieu of health insurance for employees .

1.2 Wells Construction Progress:

Due to the post reconstruction programs of several water wells destroyed during the last war occurred in year 2014 and having regards to the increasing demand for water and the quality

improvement requirements by wells relocating programs activated in various areas (Deir El Balah, Khan Younis, Rafah and Gaza cities); several water wells are either in progress of construction to be ready for water production or have been completed and brought into operation mode. PMU and CMWU have succeeded to carry out and initiate the following activities listed here below:

1. Complete ,drilling, construction , equipping and operating of new water well called here **Al Fayrouz** well in Deir Al Balah of rated water production capacity 50-60 m³/hr to serve 8000 inhabitants of Deir Al Balah people in the middle area Governorate, where the whole project is funded by WSSSIP-AF1 project . The water well was purposely drilled and constructed to replace one of totally destroyed wells by Israeli military operations during the last war eastern of Deir Al Balah called here Abu Marwan water well . All works have been completed, tested ,commissioned and brought into operational mode .
2. Complete ,drilling, construction , equipping and operating of new water well called here **Al Montazah** well in Deir Al Balah of rated water production capacity 50-60 m³/hr to serve 10000 inhabitants of Deir Al Balah people in the middle area Governorate, where the whole project is funded by WSSSIP-AF1 project . The water well was purposely drilled and constructed to replace one of totally destroyed wells by Israeli military operations during the last war eastern of Deir Al Balah called here Old Abu Hammam water well . All works have been completed, tested ,commissioned and brought into operational mode .
3. Complete drilling ,construction and equipping new water well borehole in Aya water tank area of Khanyounis city .The works includes for drilling ,and installation of complete vertical turbine water pumping set of production capacity 80m³/hr to serve 12000 inhabitants complete with all associated electromechanical installations. The new well have been tested ,commissioned and brought into operational mode .



Figure 3 : Drilling and construction of Al Fayrouz new water well in Deir Al Balah

4. Complete the construction of Al Shifa water well in Jabalia with production rate 60m³/hr, funded by Qatar Charity,
5. Complete the construction of a new water well and Ro desalination plant at Wadi Gaza municipal area, funded by welfare association.
6. Complete the construction of two water wells in Al Qarara area one through Muslim hands fund and the other were funded by IDB.
7. Complete the construction of new Water well in Jabalia - Nazla area with production rate 60 m³/hr, funded by Muslim hands.



Figure 4: Al Nazla Water Well

8. Complete the construction of new water well in Besan area at Beit Lahia, the project funded by Qatar Fund, All works and installations have been successfully completed, tested and the water well is in operational mode.
9. Rehabilitation of two water wells in Jabalia and BeitHanoun, those wells were affected by the last war on July 2014, and were repaired through Save the children fund.
10. Complete the construction of new water well in Wadi Al Salqa municipal area with production rate 60 m³/hr, the project funded by Islamic Help.



Figure 5: Wadi Al Salqa Water well

11. Complete the construction of Al Naim water well in Khanyounis city through the Muslim Hands fund.



Figure 6: Al Naim Water Well

12. Construction of three water wells at (Dair El Balah, Maghazi and Khan Younis) instead of the damaged wells, the project funded by USAID through UNICEF, the work is still in progress.

1.2.1 Electromechanical Progress

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.

PMU and 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).

During the period of this report the works include installation of both high and low tension electrical grid lines with all associated transformers for different water wells have been already initiated as it will be detailed here-below. There are still other facilities waiting the materials entry to Gaza Strip in order to complete connecting all the facilities with electricity.

Supply and installation of several 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.

Moreover, PMU and CMWU have succeeded to continue the implementation of the following works in water wells at different areas;

- 1- **Sikka Water well in Rafah:** installation of a new automatic change over
- 2- **The ground main tank in Rafah:** Repair of the main 630 ATS and replacement of one electronic Cards for the Existing soft starters RVSDN 145A
- 3- **Furkan Well in Nussairat:** Repair all control connections
- 4- **Hassyna booster in Nussairat** installation of Electrical water sensor and associated power supply with all required control relays and timers.
- 5- **Tal al zohoor well and municipal well in Zawaida:** complete rehabilitation of the control panels including replacement of power and control components and installation of Automatic transfer switches -ATS



Figure 7: Al Sikka Water Well

- 6- **Mughraga Well:** rehabilitation of Power GEDCO network including installation of 250 KVA 22kv/400 V . In addition the panel was rehabilitated including repair of power and control wiring
- 7- **Sawarha Well in Nussairat:** Installation of new 100 Amp ATS
- 8- **Farouk well in Nussairat:** Installation of panel surge protection
- 9- **5 Water wells in Dair Al Balah :** Replacements of the damaged ampere meters, voltmeters and hour meters
- 10- **khuza'a water well ,** installation of 10 meter cable and a 160 A automatic changeover
- 11- **RO. Plant in B. Suhila :** Repair of the control panel and installation of electrical blower and flow switch
- 12- **RO Plant in Burij:** Repair the power and control circuit including replacement of CB and relay
- 13- **Brackish Water RO Plant in Dair al Balah:** Installation of 40 A changeover and installation of external lighting system



Figure 8: Electrical works

- 14- **Sea Water RO Plant in Dair al Balah:** Repair of the power factor correction panel, repair the New ATS controller of the new RO unit, repair of the PLC unit of the power saver unit and repair of the Main VFD cooling fans. In addition a new 10KVA UPS was installed in the

- lab building. In the fuel pumping area , a new operating panel was installed with all required
- 15- **Al Naser 3 well in Rafah:** Rehabilitation of both the power factor correction panels and the metering panel
 - 16- **S71 in Burij:** Replacement of the motor cable 4X25 mm2 In S72 in Burij
 - 17- **Hawwa Well in Beit Lahia:** Installation of a Manual transfer Switch Socomec 4X160A and Replacement of the soft starter RVSDN-145 with all required control components and circuits including installation solenoid valve and 220/24 control transformer
 - 18- **Mashrrou Well in Beit Lahia,** installation of an soft starter card and repair the motor cable connection
 - 19- **S.Zaid Well in Beit Lahia ,** installation of an soft starter card and repair the motor cable connection
 - 20- **Sa'adaand Ma'an Boosters in Kanyounis:** Installation of a complete automatic power factor correction panel power
 - 21- **Rahma Booster in Kanyounis :** Replacement of the soft starter of Pump No.4 with a new one
 - 22- **Kuwait Well ,** installation of soft starter of 85 Amp RVSDN-85
 - 23- **Sa'ada booster** the main 400 A changeover was repaired
 - 24- **Nussairat booster** replacement of contactor 40 A and repair all damaged wires
 - 25- **Fukhari Well** installation of a new cable for the new generator
 - 26- **Malizi well in Rafah** repair of control circuit including replacement of relays and timers
 - 27- 10 water wells in **Rafah** installation of step up voltage stabilizer 60-90 KVA to correct the incoming voltage from GEDCO
 - 28- **P15 water well in Rafah;** Installation of New soft starter RVSDN-145A
 - 29- **P124 water well in Rafah** installation of Manual Transfer Switch 4X160 A with all required modifications in the MCC panel with all required wiring
 - 30- **Both sport and stadium Wells in Khan Younis:** installation of 160 A ATS
 - 31- **CMWU main building ,** complete rehabilitation of the main switch board including repair of power factor correction and replacement of its control unit and capacitors and also replacement of the multi meter and correction of the main changeover.
 - 32- **CMWU main store in Khan Younis,** installation of a complete lightning system and repair of the communication system.
 - 33- **Middle area regional office,** complete rehabilitation of the main switch board .

- 34- Manage and carry out usual inspection of electrical panels and generators at all water wells facilities.
- 35- 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.
- 36- Design; Follow up, supervision, revision and taking over of all new control panels installed at different water wells and booster stations all over the Gaza Strip.
- 37- Supervise and implement the optimum selection of vertical turbine water pumps with high efficiency to achieve energy savings as per cubic meter of water produced.



Figure 7: Installation of vertical turbine pump

- 38- Manage the installation of dosing pumps and chlorination equipment at the wells' exits to safeguard the water supplied against any risk of contamination ensuring that the water supplied to the customers is well disinfected with positive residual chlorine levels detected.
- 39- Manage and supervise implementation of specialized service contract.
- 40- Manage and arrange for procurement of all essentially required spare parts and equipment for CMWU warehouse stock recovery program.

A) Standby power supply facilities:

More than **235** 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.

During the period of this report and as a result of continual and endless prevailing conditions of unreliable grid electricity power supply and shortages, the generators have continued to be heavily and severely affected by long daily hours of operations which create lots of repair and

maintenance needs and parts. The repair records showed that more than **245** predictive, preventive and corrective maintenance job orders were carried out and applied at various areas. Also, 13 new electric power supply Diesel generating sets have been newly supplied and installed by PMU/CMWU at various water and wastewater facilities to replace deteriorated sets and to provide other facilities having no standby electrical power supply generators. For instant:

- Water well No.1 - Wadi Salqa - 110KVA & fuel tank 1000 Liter.
- Al Yemen Al Saeed water well – Al Burij - 88 KVA & fuel tank 1000 Liter.
- Al Hassaina Pump Station – Al Nusirate - 275 KVA with steel shed and fence.
- Al Aqsa water tank - Deir El Balah - 250 KVA.
- Brackish water desalination plant 2.4m3/h production from Italia for Wadi Salqa water well No.2.
- 88 KVA standby diesel generator for Abdullah Abu median water well – Al Burij.
- 65 KVA standby diesel generator for Tarazi water well – Deir El Balah.
- 110 KVA standby diesel generator for Al Douha water well – Al Maghazi.
- Supply and install five generators 110KVA for the list sites:
 - Al Moghraqa waste water pump station- Moghraqa
 - Bani Suhaila waste water pump station- Bani Suhaila
 - El Sawarha waste water pump station- Zawaidah
 - Al Safa water well – Rafah.
 - Al Sekka water well and BWDP - Rafah.



Figure 8 : Standby Generators Activities

B) Mobile mechanical maintenance and repair workshop

- The mobile mechanical service maintenance unit established by CMWU continues to repair many of the municipal water wells faults which used to be repaired in the past by private services contractor.
- Mechanical repairs and refurbishment of 15 water pumping manifolds for both water and wastewater pumping stations.
- Repair and adjustment of 25 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 required at various water and wastewater sites in Gaza strip.

1.2.2 Water Wells Functionality Progress

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 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 serviceability 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 2015 has reached an excellent achievement of 97.5% which express the high level of operational readiness for water wells .

It is worth to note that the availability of wells are 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 safeguard the level of functionality for water wells which represent the major source of water in Gaza strip. Also, it is worthy 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 3rd year 2015 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 90% was achieved.

Table 3.The monthly water wells functionality efficiency -Middle and South Governorates -YEAR 2015

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	11347	859874	2508	951	71309	94.78%	96.63%
	Middle Area	11138	712506	2273	1101	66408	97.37%	
	Rafah area	8439	645281	1364	532	40422	98.78%	
February	Khan Youins Area	12405	918336	2642	1054	77090	97.28%	96.93%
	Middle Area	12052	735234	2268	1067	66170	97.23%	
	Rafah area	6756	511752	1354	512	38903	95.75%	
March	Khan Youins Area	11946	899738	2579	1048	74681	96.52%	97.16%
	Middle Area	11460	749032	2751	1202	80322	97.33%	
	Rafah area	7758	579079	1376	528	40478	98.03%	
April	Khan Youins Area	13341	1004326	2572	1062	76393	99.00%	98.14%
	Middle Area	10261	943486	2759	1236	81080	97.97%	
	Rafah area	7372	579079	1406	522	40859	96.88%	
May	Khan Youins Area	14711	1073970	2502	1061	74188	98.82%	98.40%
	Middle Area	17159	1118521	2837	1296	83686	98.33%	
	Rafah area	9157	687937	1358	528	39837	97.76%	

June	Khan Youins Area	14595	1079557	2558	1054	75515	98.39%	98.29%
	Middle Area	15250	982764	2350	1100	69195	98.15%	
	Rafah area	9330	722213	1463	560	43152	98.34%	
July	Khan Youins Area	14257	1044243	2571	1051	73521	95.33%	95.58%
	Middle Area	17124	1120738	3095	1343	88341	95.14%	
	Rafah area	9235	711764	1441	550	41913	96.97%	
August	Khan Youins Area	13487	1010237	2634	1076	77091	97.57%	97.46%
	Middle Area	16890	1144127	3160	1362	92039	97.07%	
	Rafah area	8241	648087	1457	556	42889	98.11%	
September	Khan Youins Area	13905	1037045	2616	1080	76739	97.77%	98.01%
	Middle Area	17000	1117481	3190	1440	93853	98.06%	
	Rafah area	7902	613367	1371	528	40457	98.36%	
October	Khan Youins Area	13531	1051523	2701	1084	79675	98.31%	98.15%
	Middle Area	16334	1111718	3415	1467	100411	98.00%	
	Rafah area	8777	644387	1331	528	39230	98.22%	
November	Khan Youins Area	11587	891769	2675	1092	78675	98.02%	98.29%
	Middle Area	15399	980408	3219	1527	94845	98.22%	
	Rafah area	7832	580431	1326	534	39379	99.00%	
Average Annual water Wells Functionality Efficiency %								97.55%

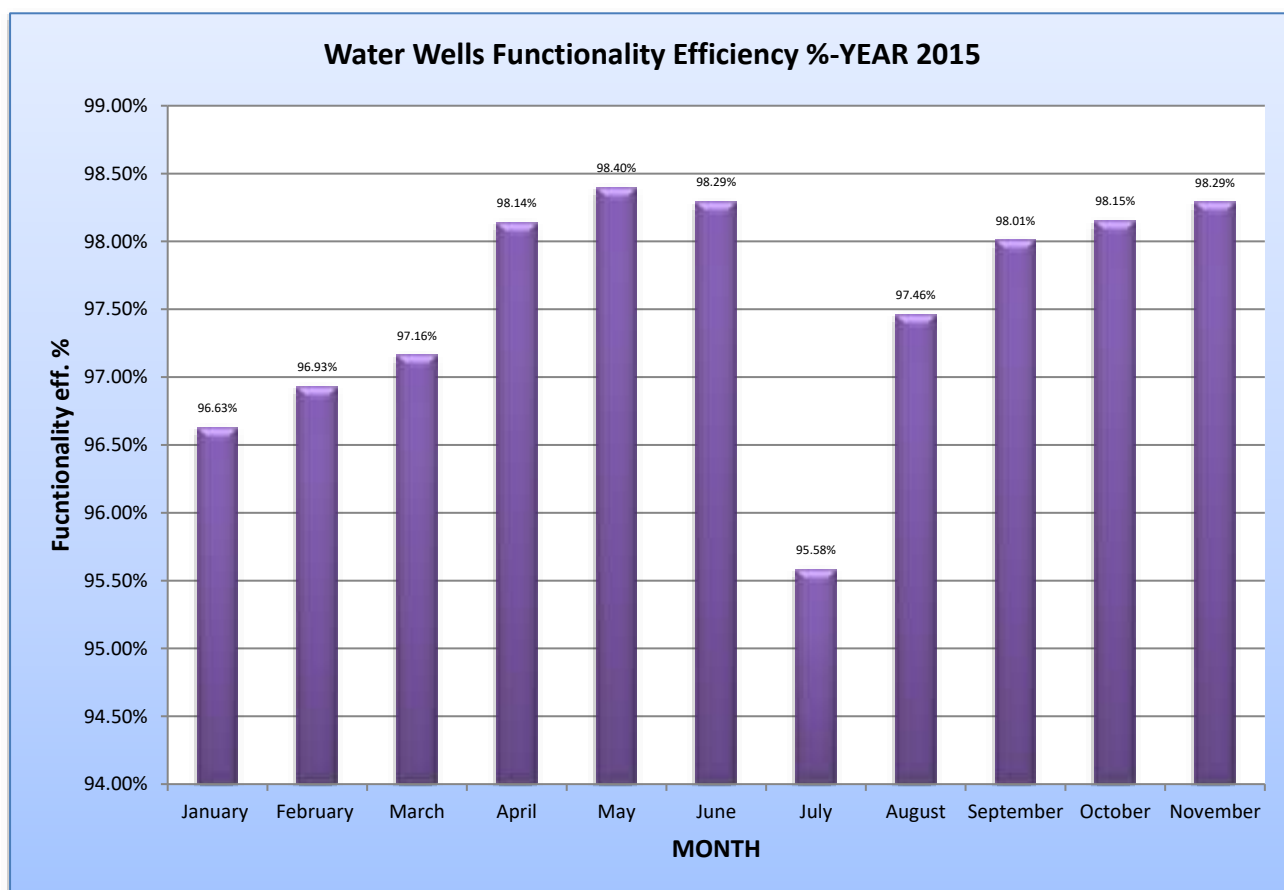


Figure 9: Monthly Functionality Percentage for served Areas-Year 2015

The registry of major mechanical and electrical repairs and maintenance job orders show that during this period 316 job orders of various mechanical and electrical repair upgrading were carried out and technically categorized as follows:

- Follow up the repair and maintenance of electrical faults related to pumps electrical drive motors and associated systems.
- Electrical upgrading and repair of control switchboards
- 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
- Continue to carry out and manage remote monitoring system for water wells, where 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.
- Mechanical repair of deep well vertical turbine water pumping sets and submersible pumps of water wells, where 35 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 63 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 28 sites in Khanyounis and Rafah and the middle area have been covered during the period of this report.

1.2.3 Water Wells 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 3rd year of WSSSIP project of 2015, 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 Gaza strip, and the annual targeted value of specific power consumption of water production wells within the targeted areas as defined lately by WSSSIP-AF1 project have been progressively improved to reach 0.397 KWh/m³ of water produced from wells where the base line value was 0.55KWh/m³.

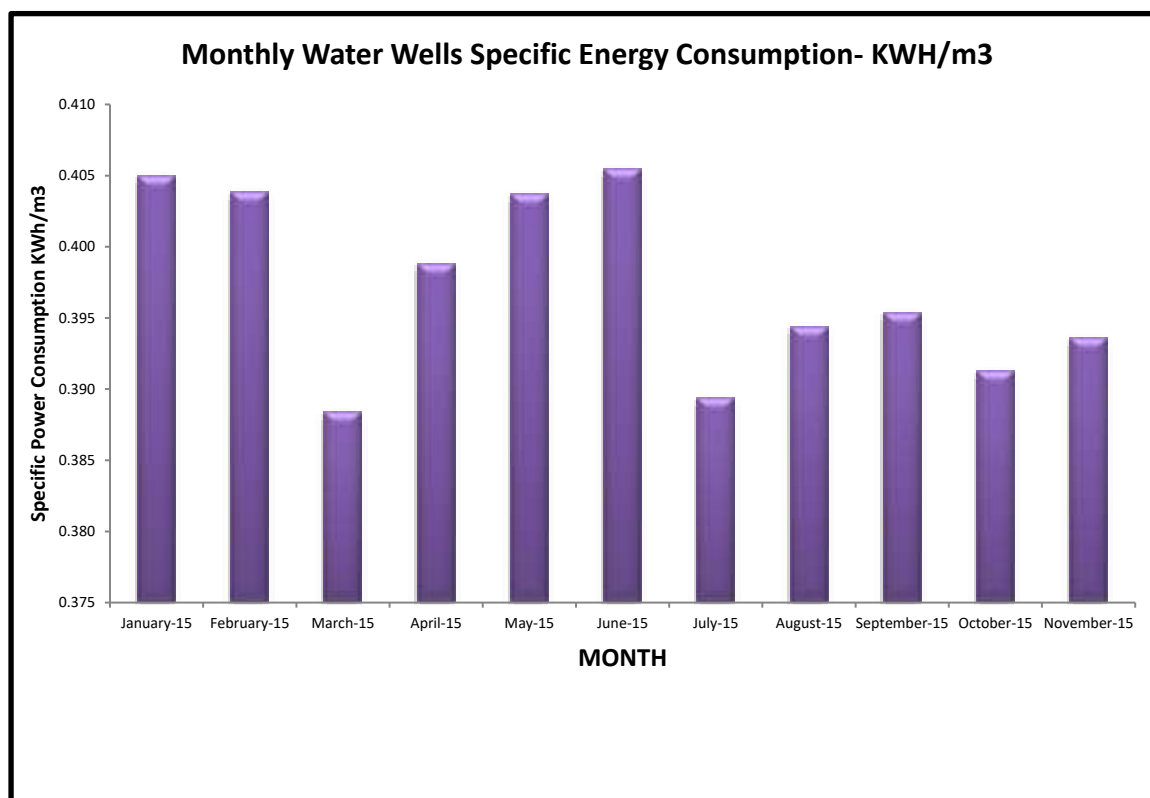


Figure 10 : Monthly Specific Energy Consumption 2015

PMU and CMWU have continued to manage the efficiency of the pumping equipment utilized in the water wells, where more than 18 water wells pumps turbines throughout several services areas have been replaced and changed by new more efficient turbines by IsDB parallel fund. This intervention improves the pumping efficiency and reduces the specific power consumption for each cubic meters 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 3rd year 2015 of project period , the overall specific Energy consumption in the three targeted regional Areas is 0.397 KWh/m³.

Table 4.The monthly water wells specific power consumption -Middle and South Governorates -YEAR 2015

Month	Area	Production	Energy	% Specific	Average % per month
		m ³	KWh	KWh/m ³	KWh/m ³
January-15	Khan Younis	821978	357917	0.435	0.405
	Middle	778153	283770	0.365	
	Rafah	645281	267700	0.415	
February-15	Khan Younis	918336	404943	0.441	0.404
	Middle	789498	284154	0.360	
	Rafah	511752	207242	0.405	
March-15	Khan Younis	899738	375129	0.417	0.388
	Middle	777755	278315	0.358	
	Rafah	579079	222938	0.385	
April-15	Khan Younis	1004326	444753	0.443	0.399
	Middle	980511	351790	0.359	
	Rafah	578359	225721	0.390	
May-15	Khan Younis	1073970	468757	0.436	0.404
	Middle	1181365	435015	0.368	
	Rafah	712440	294266	0.413	
June-15	Khan Younis	1112327	488361	0.439	0.405
	Middle	1223615	447989	0.366	
	Rafah	722213	303625	0.420	
July-15	Khan Younis	1044243	446851	0.428	0.389
	Middle	1120738	404129	0.361	
	Rafah	711764	269094	0.378	
August-15	Khan Younis	1010237	428333	0.424	0.394
	Middle	1144127	422611	0.369	
	Rafah	648087	254291	0.392	
September-15	Khan Younis	1037045	442023	0.426	0.395
	Middle	1086371	393946	0.363	
	Rafah	613367	246068	0.401	
October-15	Khan Younis	1051523	444981	0.423	0.391
	Middle	1076925	370351	0.344	
	Rafah	644387	269570	0.418	
November-15	Khan Younis	891769	386545	0.433	0.394
	Middle	950422	317491	0.334	
	Rafah	580431	249451	0.430	
Yearly Average % specific energy consumption in year 2015					0.397

1.2.4 Water Quality Monitoring Progress

Improve Water Disinfection

The project 3rd year target as well as 1st year target of 99.0 % coverage has been very challenging, the maximum recorded disinfection efficiency for the period from January to December 2015 approaches around **99.5%** by the end of December 2015. Over the period of the 3rd year, the disinfection efficiency has progressively increased successfully maintaining a high level of Chlorination throughout the water distribution network in all Gaza strip governorates. As indicated through the chlorine monitoring program, PMU and 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.

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

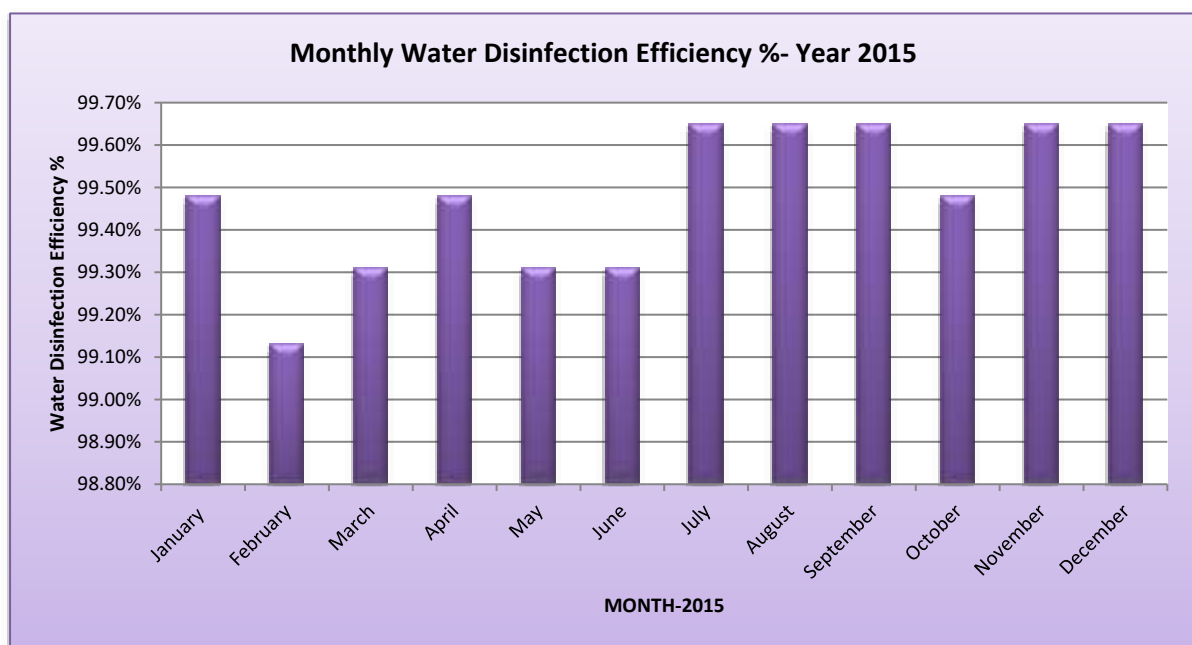


Figure 11: Monthly Water Disinfection Percentage 2015

a) Chlorine Supply and Chemicals Delivery

Since the start of 3rd year 2015 of WSSSIP Project, a total quantity of 1046 m³ (1,046,000 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 PMU and CMWU has included in addition to Chlorine, other water treatment chemicals necessary for the operation.

of both 10 brackish and one sea water desalination plants in 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 2015.

Table 5. Supplied Chemicals January-December 2015

Chemicals Supplied From 1 st Jan 2015 to End December 2015 (Ton)		
Municipality/Facility	Chemical	Quantity (ton)
Khan Younis (Desalination Plants L43/L87)	Hydrochloric acid	5.5
	Caustic Soda	4
	Sodium Metabisulfite	
	Antiscalant	4
Rafah (Desalination Plants Salam/Sheoot)	Hydrochloric acid	
	Caustic Soda	2
	Sodium Metabisulfite	
	Antiscalant	2
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	
	Antiscalant	1
	Hydrochloric Acid	4
Al Nussirate Ro Desalination Plants –Taj Al Waqar&Al Forqan	Caustic Soda	1
	Sodium Metabisulfite	1
	Antiscalant	1

b) 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 576 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 2015 there is a significant achievement in which the disinfection efficiency targets of the network has been progressively approached and reached the task targeted values.

The test results show a maintained residual chlorine level that is consistent within each municipality. During the project 3rd year 2015 PMU &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 6. Monthly Water Disinfection Monitoring Program from Jan-June 2015

No.	Municipality	No. of Samples	1-Jan		1-Feb		1-Mar		1-Apr		1-May		1-Jun	
			Negative – No. Samples	Positive – No. Samples	Negative – No. Samples	Positive – No. Samples	Negative – No. Samples	Positive – No. Samples	Negative – No. Samples	Positive – No. Samples	Negative – No. Samples	Positive – No. Samples	Negative – No. Samples	Positive – No. Samples
1	Um Al Nasser	9	0	9	0	9	0	9	0	9	0	9	0	9
2	BeitHanoun	19	1	18	0	19	0	19	0	19	0	19	1	18
3	Beitlahia	26	0	26	0	26	0	26	0	26	1	25	0	26
4	Jabalia	42	0	42	0	42	0	42	0	42	0	42	0	42
5	Gaza	86	0	86	1	85	0	86	0	86	0	86	0	86
6	Wady Gaza	12	0	12	0	12	0	12	0	12	0	12	0	12
7	Al Moghraka	12	0	12	0	12	0	12	0	12	0	12	0	12
8	Al Zahra	12	0	12	0	12	0	11	1	11	0	12	0	12
9	Al Nusseirate	24	0	24	0	24	2	22	0	24	1	23	0	24
10	Al Buriij	20	0	20	0	20	0	20	0	20	0	20	0	20
11	Al Maghazy	24	0	24	0	24	0	24	0	24	0	24	0	24
12	Al Zawaida	24	0	24	1	23	1	24	0	24	1	23	0	24
13	Al Mussader	12	0	12	0	12	0	12	0	12	0	12	1	11
14	Deir Al Balah	30	1	29	1	29	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	43	1	43	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	1	17	1	17
20	Abssan Al jadedda	16	1	15	0	16	0	16	1	15	0	16	0	16
21	Khezaa	16	0	16	0	16	0	16	0	16	0	16	0	16
22	Al Fokhary	12	0	12	0	12	0	12	0	12	0	12	0	12
23	Al Nasser	12	0	12	0	12	0	12	0	12	0	12	0	12
24	Al Shuka	12	0	12	0	12	0	12	0	12	0	12	0	12
25	Rafah	46	0	46	1	45	0	46	1	45	0	46	1	45
Total		576	3	573	5	571	4	572	3	573	4	572	4	572
Monthly Disinfection Efficiency			99.48%		99.13%		99.31%		99.48%		99.31%		99.31%	

No.	Municipality	No. of Samples	1-Jul		1-Aug		1-Sep		1-Oct		1-Nov		1-Dec	
			Negative – No. Samples	Positive – No. Samples	Negative – No. Samples	Positive – No. Samples	Negative – No. Samples	Positive – No. Samples	Negative – No. Samples	Positive – No. Samples	Negative – No. Samples	Positive – No. Samples	Negative – No. Samples	Positive – No. Samples
1	Um Al Nasser	9	0	9	0	9	0	9	0	9	0	9	0	9
2	BeitHanoun	19	0	19	0	19	0	19	0	19	0	19	0	19
3	Beitlahia	26	0	26	0	26	0	26	0	26	0	26	1	25
4	Jabalia	42	0	42	0	42	0	42	0	42	0	42	0	42
5	Gaza	86	0	86	0	86	0	86	1	85	0	86	0	86
6	Wady Gaza	12	0	12	0	12	0	12	0	12	0	12	0	12
7	Al Moghraka	12	0	12	0	12	0	12	0	12	0	12	0	12
8	Al Zahra	12	0	12	0	12	0	12	0	12	0	12	0	12
9	Al Nusseirate	24	0	24	0	24	0	24	0	24	0	24	0	24
10	Al Buriij	20	0	20	0	20	0	20	0	20	0	20	0	20
11	Al Maghazy	24	0	24	0	24	0	24	1	23	0	24	0	24
12	Al Zawaida	24	0	24	0	24	1	24	0	24	1	23	0	24
13	Al Mussader	12	0	12	2	10	0	12	0	12	0	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	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	0	44	0	44	1	43	0	44	0	44
18	BaniSuhila	20	0	20	0	20	1	20	0	20	1	19	0	20
19	Abssan Al Kabera	18	0	18	0	18	0	18	0	18	0	18	1	17
20	Abssan Al jadedda	16	2	14	0	16	0	16	0	16	0	16	0	16
21	Khezaa	16	0	16	0	16	0	16	0	16	0	16	0	16
22	Al Fokhary	12	0	12	0	12	0	12	0	12	0	12	0	12
23	Al Nasser	12	0	12	0	12	0	12	0	12	0	12	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	0	46	0	46
Total		576	2	574	2	574	2	576	3	573	2	574	2	574
Monthly Disinfection Efficiency			99.65%		99.65%		99.65%		99.48%		99.65%		99.65%	

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

Table 7. Total annual Production /WELLS (m³) -Form January-December 2015:

No.	Municipality	Monthly Water Wells Production (m³) - Year 2015												Total Annual Production
		January	February	March	April	May	June	July	August	September	October	November	December	
		m³	m³	m³	m³	m³	m³	m³	m³	m³	m³	m³	m³	
1	Um Al Nasser	13080	15280	15420	19050	21740	23730	24190	29700	24530	21890	18883	18600	246093
2	Beit Hanoun	204490	177560	248580	290890	328200	284490	269350	302430	264720	293440	233490	230455	3128095
3	Beit Iahia	440520	465836	482800	506612	572703	559690	576648	569030	531011	509145	498272	492293	6204560
4	Jabalia	725426	855375	789489	937181	1058938	1028426	958705	1087818	1178496	1107214	1104943	1092789	11924800
5	Gaza	2123351	2093705	2075224	2094515	2458108	2342175	2202679	2398939	2594249	2432813	1937184	1910063	26663005
6	Wady Gaza	6120	5870	6920	8160	9760	9270	8780	10340	7830	10683	8906	8790	101429
7	Al Moghraka	41340	40580	41330	62060	51710	80050	54200	59350	67300	64900	65310	64526	692656
8	Al Zahra	30456	25033	28477	35619	50954	39105	38723	37025	62844	47313	30570	30096	456215
9	Al Nusseirate	192430	170270	206390	257260	323850	319150	297260	343120	284710	282670	270730	266723	3214563
10	Al Burij	103286	128108	116522	164012	158310	139015	173155	168359	148394	147120	120520	118857	1685658
11	Al Maghazy	54998	78745	61593	78639	101034	97355	92482	94891	94115	70081	63996	63113	951042
12	Al Zawaida	68098	78448	72352	89822	99440	86270	93710	95500	81634	93395	77743	76670	1013082
13	Al Mussader	9410	7290	11010	11290	12990	14261	20219	20010	15320	16440	9080	8955	156275
14	Deir Al Balah	313784	265190	296940	332953	371687	426870	374003	383085	385764	412146	334845	330507	4227774
15	Wady Al Salqa	6760	6330	10900	12100	15920	22610	25990	29030	28160	15090	11540	11367	195797
16	Al Qrara	94130	74620	89850	101970	117260	124440	134510	90170	125400	94630	89580	88362	1224922
17	Khanyounis	638296	659806	660468	721896	800410	786487	726813	729777	729777	798227	681259	671994	8605210
18	Bani Suhila	49695	39385	76969	89219	91689	110979	109774	114026	94478	106947	88949	87739	1059849
19	Abssan Al Kabera	25665	16385	20213	25723	33553	46023	57978	56702	61424	32219	34713	34241	444839
20	Abssan Al jadedaa**	7965	5085	6273	7983	10413	14283	13338	12942	15066	9999	10773	10622	124742
21	Khezaa**	13275	8475	10455	13305	17355	23805	22230	21570	25110	16665	17955	17722	207922
22	Al Fokhary	15865	16850	17200	19856	22360	19815	25460	29260	27465	26205	18790	18548	257674
23	Al Nasser	30750	31260	32790	42500	26860	44400	35970	38910	49230	30760	33200	32740	429370
24	Al Shuka	49700	31770	36370	60350	45990	36630	41600	43000	33890	51770	35130	34650	500850
25	Rafah	658551	529502	600889	608139	722097	759353	748584	682657	664337	699427	613151	606664	7893351
Total Monthly Production (m³)		5917441	5826758	6015424	6591104	7523331	7438682	7126351	7447641	7595254	7391189	6409512	6327085	81609772

Table 8 Total annual MEKOROT Water supply (Israel Line) , (m³): January-December 2015

No.	Municipality	Monthly Mekorot Water Supply (m3) - Year 2015												Total Annual Mekorot 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	بلوك H مكروت	27790	25500	25050	13250	22610	30720	32790	37140	34090	30560	29310	29079	337888.74
	بلوك G مكروت	9800	7040	7950	8150	8630	6010	7260	5420	5420	9750	9970	9871	95271.397
	بلوك F مكروت	16370	23400	24350	16740	18510	15850	15200	17120	14690	16250	15220	15100	208799.91
	بلوك D مكروت	12470	5460	8960	6490	11090	13180	25310	27980	21390	10400	6690	6637	156057.22
AL Burij	خط ميكوروت	2400	0	17000	15000	1262	1500	25890	26980	20400	15620	590	582	127224.18
Al Maghazy	المدرسة الإعدادية - ميكروت	23745	21700	15655	17584	11306	12768	1740	9057	8077	14603	24770	24575	185579.56
	عيادة الوكالة - ميكروت	0	0	0	0	0	0	0	0	0	0	0	0	0
	منطقة السعايدة - ميكروت	3987	2604	2716	3250	1364	0	3685	4640	4425	3985	2485	2454	35595.31
	الصحة العامة - ميكروت	26606	24319	23911	23166	21306	25930	28966	25052	25650	22381	22391	22192	291869.72
Bani Suhaila	مكروت	61945	71865	45171	57651	50661	25031	21986	26414	34522	40413	61801	61313	558773.39
Abssan Al Kabera	مكروت	52595	62435	59757	78787	71567	64637	56112	62898	48546	74081	49587	49196	730197.76
Abssan Al Jadeda	مكروت	22375	25765	19807	24857	20787	21927	21762	25398	22114	22221	27297	27036	281346.04
Khezaa	مكروت	32805	28306	33810	36705	20068	20068	22941	25754	22126	27505	26428	26137	322653.29
Total Mekorot Water m3		292888	298394	284137	301630	259161	237621	263642	293853	261450	287769	276539	274173	3331256.5

Table 9. Total Annual Water Supply - From January to December 2015

Water Supply Categories	Monthly Water Supply (m3) - Year 2015												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 Monthly Production m3- Water Wells	5917441	5826758	6015424	6591104	7523331	7438682	7126351	7447641	7595254	7391189	6409512	6327085	81609772
Total Mekorot Water m3	292888	298394	284137	301630	259161	237621	263642	293853	261450	287769	276539	274173	3331257
Toatl Monthly water supply (m3) -Year 2015	6210329	6125152	6299561	6892734	7782492	7676303	7389993	7741494	7856704	7678958	6686051	6601257	84941028

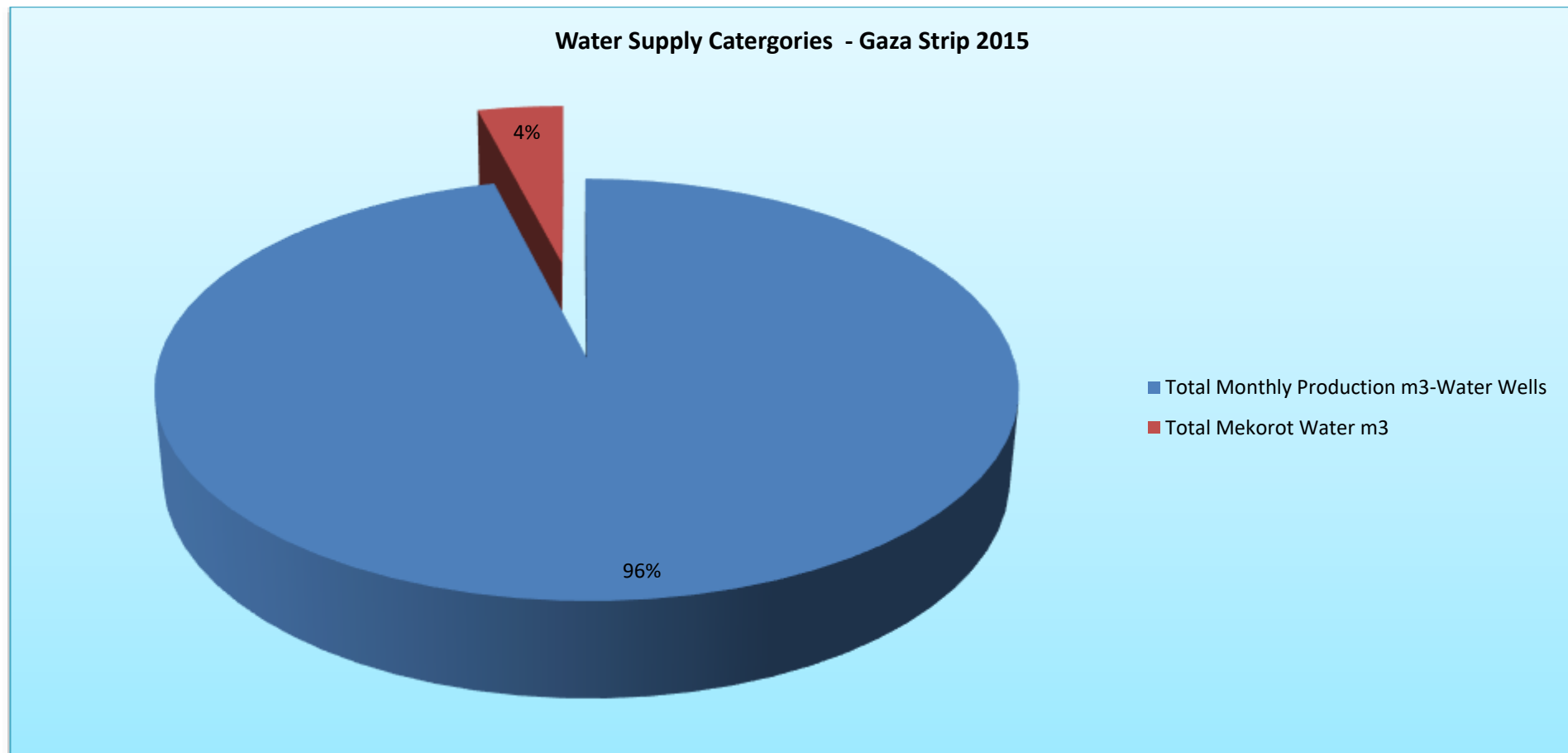


Figure 12: Total annual water supply (m³) January-December 2015

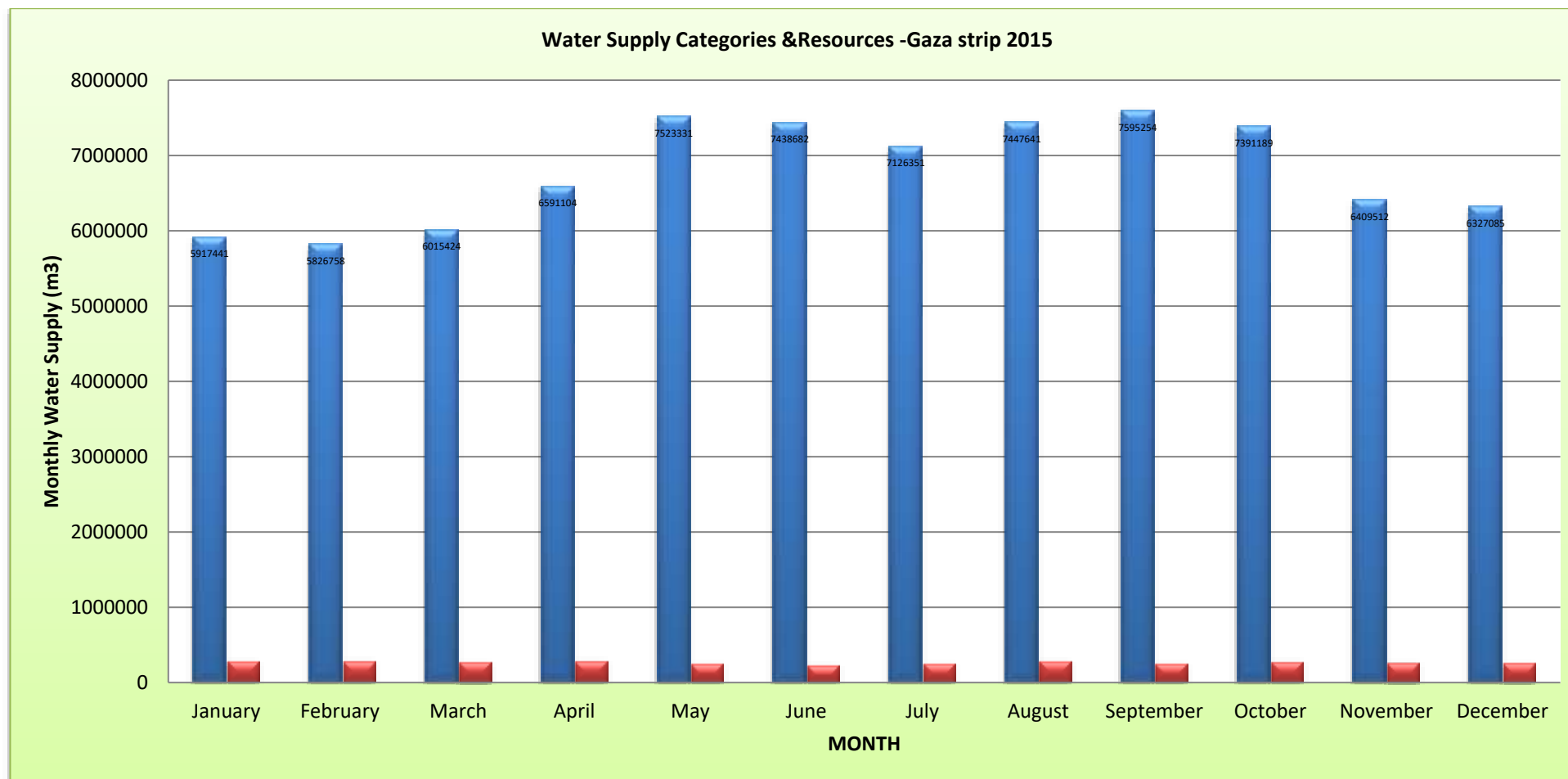


Figure 13: Total annual Production (m³) January-December 2015

Table 10 : Water Qouta L/C/D: January-December 2015

No.	Municipality	Annual Water Production from water wells	Annual Water supplied from Mekorot (Israel Co.)	Total Annual Water supplied from different resources	served Population	UFW	Total Annual Water Consumption	Daily Water Consumption Rate (Quota)
		m ³	m ³	m ³	Capita	%	m ³	liter/c/day
1	Um Al Nasser	246093	0	246093	3548	34.50%	161191	124
2	Beit Hanoun	3128095	0	3128095	48026	34.50%	2048902	117
3	Beit lahia	6204560	0	6204560	81362	34.50%	4063987	137
4	Jabaliala	11924800	0	11924800	208187	34.50%	7810744	103
5	Gaza	26663005	0	26663005	613418	34.50%	17464268	78
6	Wady Gaza	101429	0	101429	3608	34.50%	66436	50
7	Al Moghraka	692656	0	692656	8078	34.50%	453690	154
8	Al Zahra	456215	0	456215	6513	34.50%	298821	126
9	Al Nusseirate	3214563	798017.267	4012580.267	80579	34.50%	2628240	89
10	Al Burij	1685658	127224.18	1812882.18	42125	34.50%	1187438	77
11	Al Maghazy	951042	513044.59	1464086.59	28136	34.50%	958977	93
12	Al Zawaida	1013082	0	1013082	21077	34.50%	663569	86
13	Al Mussader	156275	0	156275	2331	34.50%	102360	120
14	Deir Al Balah	4227774	0	4227774	75748	34.50%	2769192	100
15	Wady Al Salqa	195797	0	195797	5749	34.50%	128247	61
16	Al Qrara	1224922	0	1224922	24423	34.50%	802324	90
17	Khanyounis	8605210	0	8605210	222799	34.50%	5636413	69
18	Bani Suhila	1059849	558773.39	1618622.39	39167	34.50%	1060198	74
19	Abssan Al Kabera	444839	730197.76	1175036.76	22748	34.50%	769649	93
20	Abssan Al jadedda	124742	281346.04	406088.04	7494	34.50%	265988	97
21	Khezaa	207922	322653.29	530575.29	11300	34.50%	347527	84
22	Al Fokhary	257674	0	257674	6843	34.50%	168776	68
23	Al Nasser	429370	0	429370	7878	34.50%	281237	98
24	Al Shuka	500850	0	500850	13403	34.50%	328057	67
25	Rafah	7893351	0	7893351	195245	34.50%	5170145	73
Total (m ³)		81609772	3331257	84941030	1779785		55636374	

** : 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.

c) Chlorine Dosing Units

PMU and 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 2015.

Table 11. Repair Works for dosing pumps

No.	Municipality	Number of repairs for dosing pumps	Number of new dosing units installed as per each municipality
1	Khanyounis	26	3
2	Jabalia	15	2
3	Nusairat	8	1
4	Al Bureij	7	2
5	AL Zahra	4	1
6	Wadi Salqa	3	1
7	Al Moghrakah	2	0
8	Deir El Balah	24	0
9	BeitLahia	9	3
10	BeitHanoon	7	2
11	Qararah	4	2
12	Bani-Suhaila	2	0
13	AbasanKabirah	4	1
14	Rafah	22	3
Total		137	21

Since the chlorine dosing pumps are the critical units in each dosing system, PMU /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 project 3rd year 2015 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.



Figure 14: Chlorine Distribution

1.2.5 Mechanical Refurbishment ,Upgrading and Repairs Installations

During the period of this report from January to December 2015, several mechanical refurbishment repairs, upgrading works and repair installations have been continued to be managed and carried out at various operating water sites .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 :

- A- Dismantle vertical or submersible pumping unit and transfer it to workshop for inspections.
- B- Repair or replace all materials and parts depend on its case and as the contract items.
 - Complete electromechanical repair and rehabilitation of Al Salam brackish water desalination plant of 50m³/hour production capacity in Rafah area which had partially damaged after last war in Gaza, the works include varies items among these:
 - Supply and install high pressure pipes in AISI 316 Taylor made manufactured.
 - Multicar ridges filter in AISI 316L for positioning of nr. 22 cartridges of 40"with all fittings.
 - Set of PVC fittings for revamping and adjustment of flushing and pressurization pump, permeate and concentrate lines, media filter.
 - Supply and install complete motorized butterfly valve for media filter system and cooling system of water well.
 - Supply and install stainless steel tank 3000 Liter grade 316 for potable water.
 - Supply and install steel shed for generator.
 - Supply and install FINI type V-shape portable electrical compressor 100 Liter Volume.
 - Supply and install PN16, 4" dim., stainless steel grade 316, booster pumping manifold with all associated fittings.
 - Supply, Install and reconstruct a new vertical booster pumps in Canada water tank – Rafah **and** the system including supply and install:
 - Tow vertical turbine pumps with total production 320m³/h at total head 88 meter.
 - Tow electrical hollow shaft motor.
 - New manifold 10".
 - Connect; test and commission the manifold with network carrier line 14" and another carrier line 12".
 - Supply, install and test BBA self-priming, non-clogging, 4 wheels trailer mounted, mobile waste water trash centrifugal pump, complete with water cooled diesel engine drive with all associated fittings, the material include for supply geotextile collapsible and reinforced rubber 8" hoses in Jemeset El Sabile Pump station – Rafah area which funded by ICRC.

- Supply and install vertical turbine pump 500 m³/h at total head 40 meter for Al Shiakh Redwan storm water lagoon – Gaza municipality.
- Repair of borehole, and pumping set of Al Shawwa water well in Bait Lahia which including:
 - Vertical turbine water pump with production 60m³/h at total head 140 meter.
 - Steel pipes schedule 40, 6 inch
 - Stainless steel shaft with coupling.
 - Bronze bearing 6".
 - Discharge head 6".
 - Electrical hollow shaft motor 60 horse power.
 - manufacture and fabricate stainless steel filter 10"
 - Supply and install new 6" manifold with all equipment.
- Change pumping unit of well No.2 in Khuza'a municipality from submersible to vertical type which include supply and install all equipment listed her below:
 - Vertical turbine water pumps with production 50m³/h at total head 90 meter.
 - Steel pipes schedule 40, 4 inch
 - Stainless steel shaft with coupling.
 - Bronze bearing 4".
 - Discharge head 4".
 - Electrical hollow shaft motor 40 horse power.
 - Supply and install new 4" manifold with all equipment.
- Supply, fabricate, and install 18" steel pipe with all fittings and construction works required for replace damaged old borehole of Al Shouka booster pump station, the works also include supply install a new vertical turbine pump instead of another damaged.
- Supply and install new water pumping set for new Abu Hamam water well in Deir Al Balah and the works include supply and install:
 - Vertical turbine water pumps with production 50m³/h at total head 80 meter.
 - Steel pipes schedule 40, 6 inch
 - Stainless steel shaft with coupling.
 - Bronze bearing 6".
 - Discharge head 6".
 - Electrical hollow shaft motor 40 horse power.
 - Supply and install 6" manifold with all materials and equipment.
- Supply and install four chlorine systems for Al Burij wells.
 - Supply and install complete submersible water pumps 50m³/h at total head of 80 meter.
- Repair and refurbishment for many brackish water desalination plants BWDP:
 - Aia BWDP – Khanyounis.
 - Al Satar BWDP - Khanyounis.
 - Ma'an BWDP – Khanyounis.
 - Al Amal BWDP – Khanyounis.
 - Al Amal Opic BWDP – Khanyounis.
 - S.72 BWDP – Al Burij.

- Manufacture, Fabricate and install locally factory made sound attenuator for 110KVA for WWTP in Rafah municipality.
- 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 18 water wells located throughout various sites from Rafah to Bait Hanoon municipalities.
- Supply and install two electrical switch boards 3X100A for two water well No.1 & 2 in Khuza'a municipality.
- Supply and install 3X250 A an electrical panel for Al Salateen water well – Bait Lahia ,reassemble pumping unit after stage of repair then running the system.



Figure 15 : Water facilities Repair, Refurbishment and Rehabilitation Works

LIST OF WATER SITES WHICH WERE SUBJECT TO CMWU REPAIR ,REFURBISHMENT AND UPGRADING INETRVENTIONS FOR THE YEAR 2015

Rafah Area

- W1,W2,W3 water wells.
- TRC 1,2,3 water wells.
- Al Rahma RO Plant.
- Canada water well.
- Al Hashash water well.
- Shoaoat water well.
- Al Suadi booster pumps.
- Miraj Water tank.
- P15 , P148, P124, P164water wells.
- El Sikkah water well.
- Al Saffa water well.
- Booster station – Al Shouka municipality.
- Malizi water well - Al Shouka municipality.
- Mattar water well - Al Shouka municipality.
- Al Nasser No.3 – Al Nasser municipality.



Deir El Balah

- J-4, J-5 ,J-6 ,J-32 water wells - Deir El Balah.
- Tarazi water well - Deir El Balah.
- Seawater Desalination Plant
- Abu Nasser , and Abu Hamam new water well
- S-69 water well
- Al Mo'atared water well

Al Maghazi

- S-80, and S-82 water well.

Al Buraij

- S-72 water well.
- Al Montazah water well.
- Al Jazaer water well.
- Maqbula water well.
- Al Farouq water well.
- Al Yemen Al Saeed water well.

Al Mosadder

- Al Mosaddar water well

Al Nusirate

- G-49 ,G-56, F208 water well
- Al Fourqan water well.
- Heteen water well.
- Al Hasaina booster station
- Al Mofty water well

Zawaida

- Aesha water well.
- Khaled Ben Elwaleed water well.
- Tal El Zohoor water well.

Al Zahra

- G-50 water well.
- Al Montazah water well.

Al Moghraqa

- F203, and F-192 water well.
- Al Abrar water well.

Wadi Gaza

- Water well No.1.
- Booster Pump at water well No.1.

Khan younis Area

- Al Saada water well.
- Al Rahma water well.
- Al Sattar water well.



- Al Wakalah water well.
- Al Thaqafi water well.
- Al Mawasy water well.
- Al Madinal Al Reiadia water well.
- Ayya water well.
- L225 , L189 Al Tahadi water well.
- Ma'an water well.
- Al Amal water well.
- Breaka water well.

Bani Suhaila

- EV1, EV4 ,EV2water well – Bani Suhaila.
- B154, M11 water well – Bani Suhaila.
- Abu Zehaq RO plant and well – Bani Suhaila.
- Ground water tank RO plant – Bani Suhaila.
- Water well No.1 , No.2 – Khuza'a
- N22 water well – Abasan Al Kabira.

Bait Lahia

- El Mashroa'a water well.
- Fadaous water well.
- Al Montazah water well.
- Al Salateen water well.
- Al Shawwa water well.
- Al Sheakh Zaied water well.
- Ghaben A-180 water well.
- Bisan water well.
- Seiafa water well.
- Al Shieakh Zayied water well.

Bait Hanoon

- Khadijah water well.
- C-128 water well.
- Al Salah water well.
- Al Ezba water well.
- Al Nada water well.
- Aida water well.
- Abu Gazala water well.
- Al Awqaf water well.
- Al Shawwa water well.

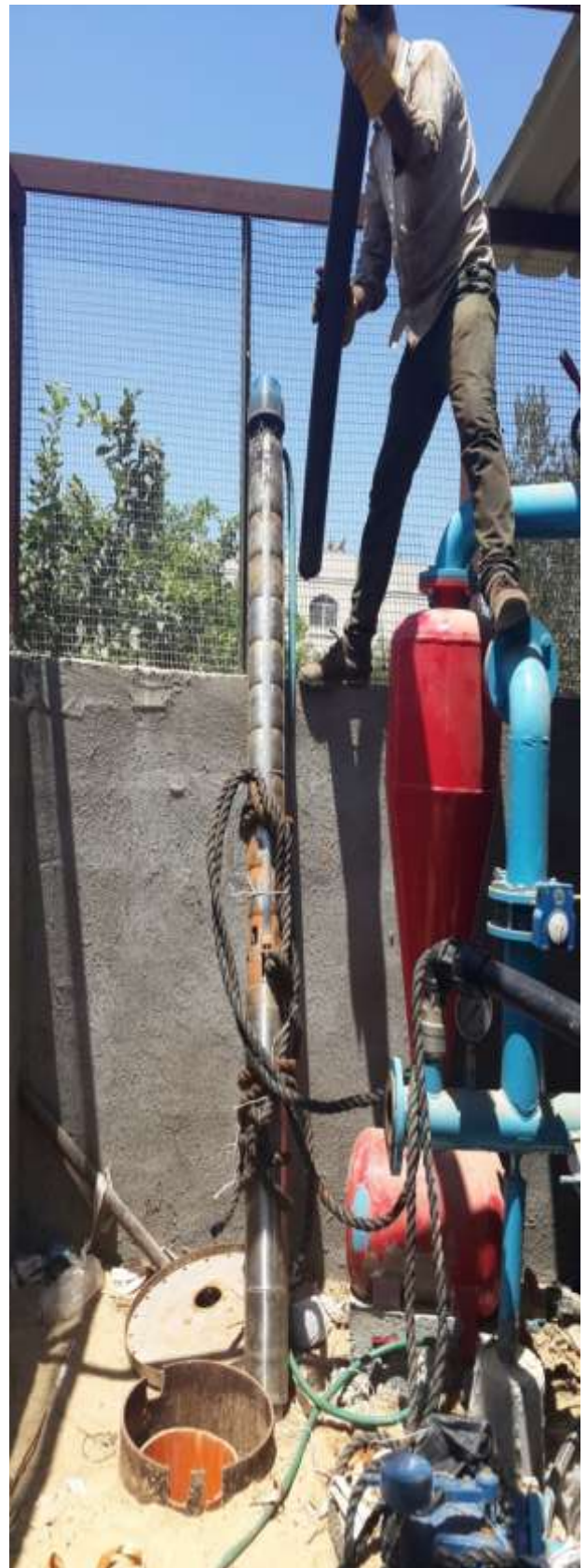


Figure 16: Maintenance activities for water wells

1.2.6 Electrical Works Progress

During the period of this report several electrical repairs and upgrading activities were applied and carried out as follows:

1. Manage, supervise and carry out all procurement required for specialized electrical service contracts including the procurement of essentially required stock of spare parts, equipment and relevant specialized service contracts.
2. Continue to manage and follow up remote monitoring program initiated for specific water wells in Rafah and Khanyounis. The system will enhance and improve the operation and maintenance activities for different water and wastewater facilities and eliminate the human intervention. Also, all operational data and faults records shall be remotely provided by the system down to the designated control room at CMWU regional and HQ offices.
3. Continue to carry out technical review and provide electrical design for new projects whether it is implemented now or proposed to be carried out in the future e.g. booster stations, water tanks, wells lifting stations.
4. Continue to review electrical shop drawings and review as built drawings for electrical installations of all new projects managed and carried out by CMWU along with all Gaza strip governorates.
5. Supervise and manage the electrical repairs and refurbishment of 67 various job orders for different water treatment ,wells and pumping sites including replacement and repair of soft starters ,panel boards ,breakers ,contactors ,cables ..etc



Figure 17: Electrical Control Switch board for Bani Suhail Water Tank Booster Station

1.2.7 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) ,ICRC . 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 2015 the distribution and supply of **total 1,420,288 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 .

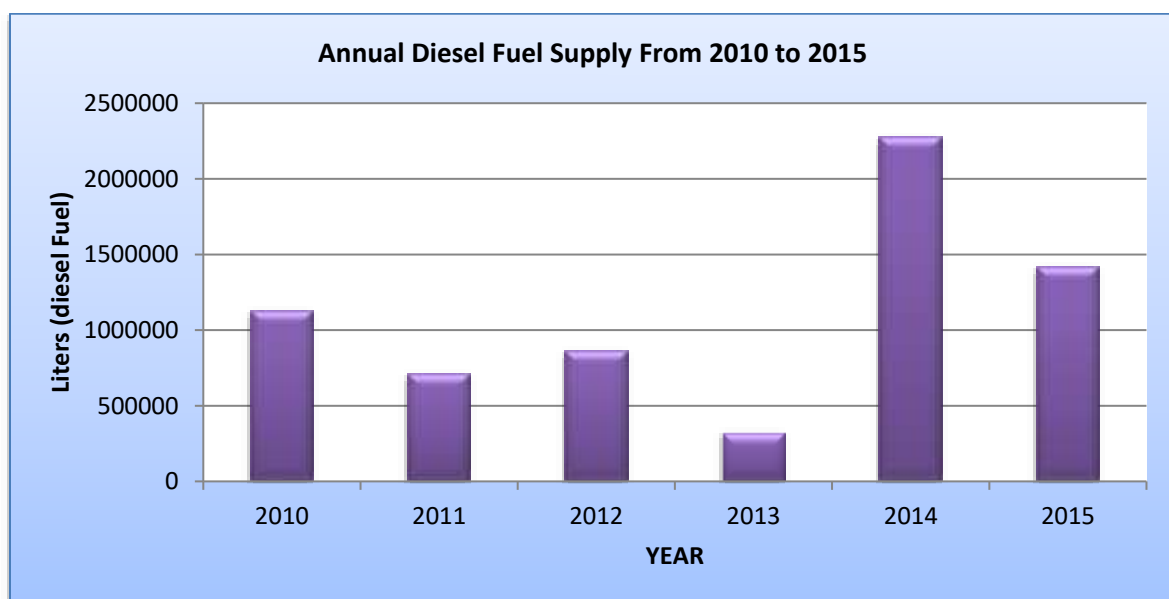


Figure 18: Annual Fuel Supply and Distributed Quantities



Figure 19: Filling the generator daily fuel tank with Diesel

1.3 New Water Resource

As the underground coastal aquifer is the main source for water supply to the population of approximately 1.8 million living in Gaza, 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. The lack of adequate supply of safe drinking water is therefore exposing the lives of the people in Gaza to high levels of health risks. 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 options for additional supply of water for the Gaza Strip.

Henceforth, 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.

However, this plant had been partially damaged in the last offensive 2014, as well as the blending tank (Al Aqsa) and both were rehabilitated through the WB additional fund during 2015.

The STLV solution proposed expansion of this plant capacity to reach 6000m³/day, therefore , CMWU raised a proposal to the USAID to add new containerized desalination modules of total production capacity 3400m³/day , and recently the design phase has started.



Figure 20: Maintenance work at 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 is now under construction to serve 75,000 inhabitants of both Khanyounis and Rafah western parts .The project is funded by EU and implemented by UNICEF in co-operation with PWA &CMWU . The construction contracts have been launched for all contractors to carry out the works for all plant components and packages. The plant shall mainly comprise of the following items:

- Four sea water beach wells each of 200m³/hour capacity (Ongoing)
- Three sea water RO desalination trains each of 2000m³/Day production capacity (Ongoing)
- Electrical sub-station and three standby generators (3x0.66MW) with all associated electrical works and installations.(completed)
- Permeate water storage tank and Booster station; the construction of the water tank is completed where the booster station is waiting the electromechanical equipment to be entered.
- Plant truss building and site landscaping (Ongoing)
- Administration building and ancillary facilities (Completed)
- 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. (completed)



Figure 21: 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 STLTV 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 the western part of Gaza city. The targeted areas include the refugee Beach Camp, Western Nasr and Sheikh Radwan areas besides Western part of Tal Alhawa.

The CMWU in cooperation with PWA has assigned 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 is ongoing with completion of 20%



Figure 22: Al Sheikh Radwan Blending Tank

- 2nd Package : Transmission line of 6 Km length from the desalination plant to the blending tank and the tender documents are now under evaluation, and the implementation phase should take place early 2016.
- 3rd package: Design-build sea water desalination plant contract, the tender documents are now under evaluation, and the implementation phase should take place early 2016.
- 4th package: Electrical connection the design has been prepared in cooperation with GEDCO, and will be tendered whenever the installation work of the RO take place.

Besides that, PMU/CMWU have continued to manage, upgrade, rehabilitate and monitor the 26 existing brackish desalination plants listed in the table below, which were installed from different donations in several areas where the groundwater quality is not acceptable for distribution aiming at providing adequate water service for areas that are used to be deprived of water supply system.

Table 12. List of the Brackish Desalination Plants

Plant Name	Governorate	X	Y	Capacity (m ³ /hr)
El Shouot Desalination Plant	Rafah	78545.14	77776.17	1000
El Salam Desalination Plant	Rafah	78972.53	75713.36	1000
Deir El-Balah Desalination Plant	Middle Area	88288.35	91765.54	600
Mahata Eastern Well Desalination Plant	Khan Younis	84346.73	83148.99	1000
EL-Sa'ada Desalination Plant	Khan Younis	83056.69	84199.03	1000
Omari well Desalination Plant	Nourth Area	101539.85	104180.55	50
Maghazi-2 well Desalination Plant	Middle Area	93113.86	91921.69	50
Aqsa well Desalination Plant	Middle Area	88550.00	91887.87	50
Abo Naser well Desalination Plant	Middle Area	91199.81	90460.94	50
Rafah Tal Sultan Area Desalination Plant	Rafah	77559.39	80169.33	50
Bani Suhila Area Desalination Plant	Khan Younis	85889.85	82848.92	1000
Hejazi well Desalination Plant	Rafah	77916.14	78911.14	50
Abu Shahla - Nwari Well Desalination Plant	Khan Younis	85100.02	83358.07	50
Madina Riyadia well Desalination Plant	Khan Younis	83496.77	81790.17	50
Wadi Gaza well Desalination Plant	Middle Area	97083.01	96337.18	50
Al Musader well Desalination Plant	Middle Area	91874.43	90945.88	50
Safa well Desalination Plant	Rafah	80039.81	78474.25	50
Forqan well Desalination Plant	Middle Area	92007.59	95934.55	1000
Ayah Well Desalination Plant	Khan Younis	83063.19	83461.45	40
Al Amal 1 Well Desalination Plant	Khan Younis	82679.50	85080.42	50
Al Amal 2 Well Desalination Plant	Khan Younis	83109.96	85436.84	50
Satar Well Desalination Plant	Khan Younis	84364.42	86334.72	50
Tag Al-Waqar Well Desalination Plant	Khan Younis	92452.53	95407.58	600

In addition, there are two new Brackish desalination plant under construction:

- One through the Welfare Association fund, At Wadi Gaza village of total capacity 70 m³/day, this plant will serve 3000 inhabitants with drinkable water.
- The second is 500 m³/day RO desalination plant - Al Sheifa hospital in Gaza City as CMWU and Islamic Help have signed an agreement to improve the quality of water supply system with a production capacity 500 m³/day of desalinated water to be blended with the water produced from two existing wells in the hospital.

1.4 Water Networks (Resizing & Reconfiguration & Expansion)

This section handles water network plans, upgrading, reconfiguration, resizing, 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 the construction of carrier lines and connections for Al Moghraqa and Deir El Balah Water tanks, funded by WB.
2. Complete the upgrading of water networks at Al Moghraqa and Wadi El Salqa, funded by Oxfam/PHG
3. Complete the construction of water networks at Beit Hanoun Municipal area, funded by JICA
4. The construction of water carrier line in Deir Al Balah city is ongoing, the project is funded by ISDB.
5. Upgrade and expansion of water networks in the Middle area (Al zawaida, Dair El Balah and Al Musader
6. Upgrade and expansion of water networks in the southern governorate (Rafah and Khan Younis)
7. Upgrade and expansion works for water networks in Al Zana neighborhood at Bani Suhaila, Khan Younis- the project is implemented through ANERA.
8. Upgrade and expansion of water networks in Junina, Mashr'o, Brazil, and El Salam Areas- Rafah City- the project is implemented through ANERA.
9. 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.
10. Upgrade and expansion of water networks at the Eastern villages-Khan Younis , the project is funded by USAID through UNICEF.
11. Upgrade and expansion of water network at the Northern governorate.
12. Upgrade and expansion of water networks at Al Nussirat, the tender documents is prepared and the project will be financed by ISDB and Emar Gaza
13. Upgrade and expansion of water networks at Dair El Balah, the tender has been launched and the project is financed by ISDB and Emar Gaza.
14. Reconfiguration of water networks at Rafah and Khan Younis, through the EU fund ,the tender documents were prepared by the consultant and the tender will be launched on January 2016.
15. Construction of main carrier pipeline 1.6 KM of 10" diameter at Absan Al Kabera, the tender documents was prepared and the project will start early 2016 through JICA fund.
16. 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 tender documents was prepared and the work will start early 2016

OVERALL WATER NETWORKS IMPLEMENTED DURING YEAR 2015 IS **60 KM**

1.5 Water Tanks

This section lists the main activities held during the period of this report from January 2015 to December 2015 for the new water tanks and water booster pump stations and the rehabilitation works for the existing water tanks and Booster stations:

1.5.1 New Water Tanks and Booster stations:

- Complete the rehabilitation and electrical works for “Al Moghraga water tank 3000 m³ and Booster pumping station.



Figure 23: Al Moghraga Water Tank

- Bani Suhila water tank 4000 m³ capacity: This tank comprise of construction of the water tank 4000 m³ capacity receives water from Asada 3 water wells, Tika 3 water wells and blend them with Mekorot source to feed the Eastern villages in Khanyounis Governorate through two Booster stations. One of them feeds Bani Suhila and the other feeds Abasan and Khoza'a. This facility has been operated since the first of November 2015 and the construction included:
 - Construction of Water Tank 4000 m³ capacity and the boundary walls. This phase was financed by IsDB parallel finance.
 - Construction service Building and Installation of electromechanical Equipments for Bani Suhila Booster 600 m³/hour. This phase was financed by WB parallel finance.
 - Construction of Piping , Mechanical Works and Eastern Villages Booster 500 m³/hour. This phase was financed by ICRC.



Figure 24: Bani Suhila Water Tank

- Deir Al Balah (Al aqsa) water tank 4000 m³ capacity: This Water tank planned and designed to receive water from Deir Al Balah sea water desalination plant and blend the desalinated water with the brackish water from some wells in Deir Al Balah to feed the Northern area of Deir Al Balah city and part of Al Zawida city. This facility has been operated since the first of May 2015 after being rehabilitated through the AF1-WB project.



Figure 25: Al Aqsa Water Tank

- Construction of Beit Hanoun water tank 3000 m³ capacity through UNDP fund.
- Construction of Om Al Nasser water tank 4000 m³ capacity through UNDP fund.
- Re-Construction of Khuza'a water tank 1800 m³ capacity is ongoing, the project funded by WB-AF1 , this Water tank is 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. This water tank is under construction of overall progress 90%. It is planned to be operated by the end of February 2016.



Figure 26: Khuzaa Re-constructed Water Tank

- Completing the design documents for Al Boraq and Al Satar water tanks 5000m³ for each, financed by EU, the tender launched on the mid of December 2015.
- Construction of new four water tanks 4000 m³ capacity each at (Beit lahia, Al Nusirat, Deir El Balah and Khan Younis), the project is funded by USAID, the work started on sites on November 2015.
- The Construction of Abassan Al Kabira ground water tank of 1800 m³ capacity has started recently on site through the WSSIP-AF1. This project consists of construction the tank, install

the Booster station 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 design for a new water tank of 5000 m³ capacity at Al Salam area in the eastern part of Rafah is ongoing and the project will be financed by JICA.
- Construction of Al Shoka water tank 2000m³ capacity, the consultant will be assigned by ANERA to prepare the design.
- Construction of Al Fokhary water tank 2000m³ capacity, the consultant will be assigned by ANERA to prepare the design.

1.5.2 Repairing the Water Tanks:

As a result of the Israeli's offensive July-August 2014, 13 of water tanks through the Gaza Strip have been damaged (partially/completely). The CMWU team started the evaluation of the damaged water tanks directly after the ceasefire and divided the repairing and rehabilitation of those tanks, into two phases through WB- AF1 as follows:

- **First phase:** was started on site early 2015, this phase includes repairing of seven water tanks which are: Al Moghraqa, Al Aqsa, Musadar Wadi Al Salqa, Deir El Balah, El Qarara and Bani Suhila . This project is ongoing and the overall achievement is 90%.



Figure 27: Bani Suhila Water Tank



Figure 28: Dair El Balah Water Tank



Figure 29: Al Moghraga Water Tank



Figure 30: Al Musadar Water Tank



Figure 31: Al Qarara Water Tank



Figure 32: Wadi Al Salqa Water Tank



Figure 33: Al Aqsa Water Tank

Second phase: This Phase focus on the electromechanical repairs for the water tanks which includes:

- Abasan Al Kabera 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.
- El-Shoot Elevated Water Tank 300 m³ capacity at Rafah: will include insulation works and repair the piping.

The CMWU team is preparing the tender documents which will be launched during January 2016.



Figure 34: Water Tanks to be repaired in phase II

1.6 Waste Water Treatment Plants

There are five main waste water treatment plants in Gaza strip ,three of them located in Beit Lahia, Gaza and Rafah areas as well as two intermediate and 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 with regard to effluent quality .

PMU /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 ,the average achieved **78%** efficiency of treatment process and BOD removal have been tabulated and shown here below as per all four treatment plants in operation.

Table 13. Annual wastewater quality monitoring program

Wastewater Treatment Plants Monitoring Program -2015										BOD & TSS Removal efficiency	BOD Removal
Plant	Treatment Process Type	Average Weekly Flow m ³ /Week	Total Annual Flow m ³ /Year	Influent			Effluent			%	ton/Year
				BOD(mg/l)	COD(mg/l)	TSS(mg/l)	BOD(mg/l)	COD(mg/l)	TSS(mg/l)		
BLWWTP	Aerated Lagoons	186,960	9,615,083	477	1054	510	120	320	118	75.65%	3431
GWWT	BioTowers /Lagoons	428,750	22,356,250	512	1098	589	105	305	114	79.95%	9099
KhWWTP	Aerated Lagoons	98,352	5,058,110	527	1157	558	119	268	129	77.21%	2062
RWWTP	Bio Towers	99,062	5,094,641	518	1147	553	115	319	113	78.56%	2055
Total m ³		813,125	42,124,084								
Removal Efficiency % - Weighted Value										78.47%	
BOD removal in Ton /Year										16647	

This section will describe the main activities implemented during the last year 2015 in all the treatment plants to improve their treatment efficiency as follows:

1.6.1 Beit Lahia WWTP:

- Remarkable improvement has been noticed in the function at the plant after finishing the rehabilitation project funded by the ICRC , reflected in the reduction of the biological load that the plants deals with.
- An Ultra-sonic open channel flow meter has been installed at right place to measure the incoming flow to the treatment.
- Tiling the entrance of the plant to prevent the storm water laden clay from going into the anaerobic lagoon.
- Small donation being solicited to prepare the improvised lagoon to receive any unexpected quantity of storm water.



Figure 35: Beit Lahia Wastewater Treatment Plant

1.6.2 Gaza Central WWTP

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 occurred. 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 will be on 25th February 2016.

Following the war on July 2014, 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) - On Going
- 2- Supply replacement equipment & spares (pumps, lifting cranes, fuel tanks, Electrical panels, vehicles, etc) – On Going

- 3- Service contract(s) for repair of networks. –Completed
- 4- Immediate repair PS 1 and Sheikh Ajleen WWTP –Completed
- 5- Supply fuel as operations support of PS1, PS 2, PS 3 & Sheikh Ajleen WWTP – completed by the end of December 2015

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, 2015:

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



Water Networks



Muntar Water Tank



Internal Roads at CWWTW



Muntar Well

Figure 36: KFW Projects Activities

1.6.3 Rafah Wastewater Treatment Plant (RWWTP)

- Replacement the PLC components in the main panel and installation of new cable for the generator
- Regular maintenance to the standby generating set for Rafah WWTP comprising of two generators 400KVA and 110 KVA respectively to assure appropriate power supply management during electricity cut off hours .
- Maintenance of two 45 kw ABS effluent P S, and three 18kw bio towers pumps.
- Through the WB-AF1 fund, CMWU intends to construct a fence wall surrounding the plant from the south and west sides to secure the plant.

1.6.4 Khanyounis Wastewater treatment plant (KhTWWTP)

1. Through Word Bank allocated fund the temporary treatment plant west of Khanyounis has under gone some upgrading process , which are still on-going , first anaerobic lagoon (17,700 m² area) has been cleaned , awaiting the Israeli side to allow cement into construction block wall fence around the Plant for safety precautions, also the electrical network including addition of enough lighting and installation of a new change over in the electrical panel.



Figure 37: Cleaning Lagoon No. 1 in Khanyounis Temporary WWTP

While , the work is in progress for the preparation of the prequalification tender documents for the three main activities to implement Khan Younis Central WWTP which are:

1- Construction the central treatment plant

The following activities were implemented during 2015:

- 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.

- Technical and financial evaluation process of the consultants' submitted proposals for the RFP 2014-287 for the provision of design review, pre- contract and construction supervision services for the construction of KY WWTP.
- Review the inception report, and the prequalification documents submitted by the contracted consultant (Artelia &UG).
- A design review work shop was held to present the activities of the project by the consultant.
- Review the prequalification documents for the international contractors for the construction of the WWTP and the tenders were launched on November 2015 and are under evaluation stage.

2- Construction infiltration basins:

The infiltration basins will be established in agricultural land of around 97 dunums; located in Al Fukhari area in the South Eastern part of Khan Younis Governorate in order to infiltrate the treated wastewater to aquifer and use it for different purposes. CMWU participated in finalizing the acquisition of the land designated for the infiltration basins in full cooperation with UNDP, the land authority, PWA, MoLG, Khan Younis Municipality.

CMWU reviewed the prequalification documents submitted by the consultant for the local contractors to construct the infiltration basins and the tenders will be launched early 2016.

3- Effluent and emergency pressure pipeline

In order to ensure proper and environmentally sound disposal of treated wastewater, an effluent and emergency steel pressure pipeline will be constructed with dual use to pump the treated effluent from the effluent pump station at KYWWTP site to Al Fukhari infiltration basins or to the sea in emergency cases; with a total length of around 18.6 km.

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.

CMWU Finalized approving the access roads for the plant's site and the outlet route for the effluent pressure pipeline with the central planning committee (MoLG) in full coordination with Khan Younis and Al Fukhari Municipalities, Joint service council for solid waste, PWA, and UNDP.

1.6.5 Wastewater Activities in Middle Area Governorate (WGWWTP)

The following activities took place in the Middle area:

Implementation phase of Wadi Gaza Intermediate Wastewater treatment plant is completed, this project includes three components (Wadi Gaza IWWTP, the pressure line from Nusirat pumping station to the plant with 2700 meter length) and rehabilitation of Nusirat Pumping station ; the project is financed by ICRC.

All of these works have been completed by Dec.2014 while the only activity which were implemented during 2015 is the cover of the anaerobic pond , this cover aims to eliminate the odours/gases resulted from wastewater treatment, and the plant now is under testing and commissioning phase.



Figure 38:Wadi Gaza Wastewater Treatment Plant

1.7 Storm Water Activities

This section describes the main activities implemented during the year 2015 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 CMWU still waiting the awarding from Emar Gaza to start the implementation phase of AL Amal pond . Also the CMWU through IsDB fund is implementing the pressure carrier line from Al Amal PS to the proposed infiltration pond near KHWWTTP of total length 1.6

Km in addition to construct pumping station of total capacity 2700 m³/hr to be used in emergency cases.



Figure 39: 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.

The CMWU has prepared the tender documents to complete the storm water system in Al Junina basin. This tender will include the infiltration boreholes, lighting works and block fence around the pond. The tender will be launched during January 2016 through Paltel Fund.



Figure 40: Storm water networks at Rafah

3. Abeda Storm Water Project

The construction of the carrier line from Abeda storm water pond in Rafah to the infiltration basin near the Egyptian border is completed and the design of the infiltration basin is on-going and the implementation will start spring 2016 through IsDB fund.



Figure 41: Abeda Storm water pipeline

4. Al Qarara storm water pond :

The CMWU has launched 1st phase of construction of Al Qarara which consists of the excavation work of the pond over 15,000 m² area, pipe lines from the downstream to the lagoon in addition to the curb inlets. This project funded by IsDB. The tender is under evaluation.

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

5. Construction of storm water pipeline at Rafah:

This project aims to eliminate floods in Abeda area in addition to separate the sewage connection from the storm water system, the project is funded by USAID through UNICEF.

6. Construction of storm water collection BOX Culvert from Al Nujili pond to the infiltration pond at Rafah,

The work includes excavation and shaping the storm water infiltration pond at Rafah (Near the Egyptian boarder) over 20,000 m² area, the preliminary design of the project has been prepared by the consultant, the tender will be launched once the final design completed. The project is funded by USAID through UNICEF



Figure 42: Excavation Rafah Storm water pond

In Addition CMWU has prepared consultancy service to get a professional consultant in order to prepare detailed design for Aslan Storm water collection and infiltration pond in Beit Lahia over 9,000 m² area to serve two square kilometres catchment area. This project was proposed to UNICEF to be implemented next year and to be operational before the coming winter season.

And completed, the Storm water Management and Disaster Risk Reduction study for the Middle and southern Governorates has been prepared through Spain fund through ACF. The main output of this study is to identify the flood zones, location of the proposed collection and infiltration lagoons and the needed area for each of them. This enabled the CMWU in cooperation with the concerned municipalities to proceed for land acquisition from the land authority.

1.8 Waste Water Pump stations and networks

This section summarized the wastewater networks activities includes; 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 tender is under evaluation funded by KFW.
2. Construction of 17 KM Wastewater Networks at Dair El balah Lot (2), the tender is under evaluation funded by KFW.
3. Re-construction of Al Nussirat Sewage Pumping Station which will collect the sewage from the whole middle area, then it will be pumped to Wadi Gaza WWTP which is currently under construction; the project is financed by ICRC.



Figure 43: Al Nussirat Sewage Pumping Station

4. Complete the construction of WW networks at Rafah, through PHG fund.
5. Complete the supply and install electromechanical equipment and spare parts for Pump Station 7B and 5 at Gaza city, this project is funded by ICRC
6. Complete the rehabilitation of wastewater networks at El Salam neighbourhood in Rafah, this project is funded by PHG.
7. Complete the rehabilitation of wastewater networks at the southern and middle Governorates, this project is financed by UNICEF
8. Complete the rehabilitation of wastewater networks at Baghdad neighbourhood - Rafah .
9. Complete the construction of phase I of Wastewater Networks at Wadi Gaza Municipal area, this project aims to provide wastewater system for the people instead of septic tanks that cause aquifer pollution. The project is financed by Welfare Association.
10. The construction of phase II of Wastewater Networks and sewage pumping station at Wadi Gaza valley is in progress, the project is financed by Welfare Association.
11. Complete the construction of wastewater networks at Boba'a area-Dair El Balah, the project is funded by GVC.
12. Complete the remaining repairing damages of infrastructures at Beit Hanoun resulted from the Israeli offensive on Gaza", this project is financed by ICRC



Figure 44: Wastewater Networks at Deir Al Balah

13. Complete the rehabilitation of sewage pumping stations at Beit Hanoun which was destroyed during the offensive 2014, the project is financed by ICRC.
14. To eliminate sewage floods in Jomizet Al Sabeel pumping station, the CMWU started the construction of 1.6KM HDPE pipeline from this PS to WWTP at Rafah, this line will be used to enhance the PS ability since the old line is deteriorated and under size the project is funded by Japan through UNICEF, on-going.
15. Construction of 4 KM Sewage network at Rafah and Khan Yunis, the project is funded by UNICEF. This Project will eliminate the illegal sewage connections, it is on-going.
16. Construction of 4.3 KM sewage network at Beit lahia, Beit Hanoun, Om Al Naser and Rafah, the project funded by WB- AF1, on-going.

17. Construction of 10 KM wastewater networks at Rafah, Khan Younis and Al Zawida, the project funded by USAID through UNICEF, on-going.
18. Construction of 0.7 KM Wastewater networks at Al Salam Neighbourhood-Rafah, the project funded by PHG, on-going.
19. Launching the tender documents for constructing 1.8 KM pressure Pipeline from Manshia Pumping Station to Beit Lahia Wastewater Treatment Plant” the project is under evaluation and will be financed by Qatar Charity.
20. Construction of Sewage Pumping station 700 M3/day, 4 KM wastewater networks and 250 household connection at Abu Mohadi area- Al Nussirat, the project is funded by ICRC, on-going.
21. Construction of Al Zahra sewage pumping station 850 m³/day and 3 Km wastewater networks, the design of the project is completed and the tender will be launched on January 2016, the project is funded by USAID.
22. Construction 2.5 Km of wastewater networks at Bani Amer-Rafah, the project is funded by UNICEF , on-going.
23. Construction of conveyance pressure line 900 mm diameter in Khanyounis to be part of Khanyounis WWTP in the east of Fokhari is completed.
24. Construction of 5 Km sewage network, sewage pumping station of capacity 450 m³/day, 350 household connection and 0.7KM Pressure pile line were completed and operated during year 2015 at Baten Al Sameen Neighbourhood in Khanyouns.
25. Phase II of wastewater networks at Batin Al Sameen Neighbourhood- Khan Younis which includes 3 Km UPVC Pipes and 150 household connections, the tender has been launched recently through AECID fund.
26. The CMWU has prepared consultancy service to get detailed design for 30 Km wastewater network in Rafah and produce a master plan for Wadi Al Salqa wastewater system.



Figure 45: Baten El Sameen sewage pump station in Khanyounis

The OVERALL WASTEWATER NETWORKS IMPLEMENTED DURING YEAR 2015 IS 30 KM

1.9 Electromechanical Services for Waste Water Pumping and Treatment Facilities

During the period of this report from January to December 2015 ,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 during the last year and create several emergency needs for repairs during flooding times. Therefore PMU/CMWU has taken all possible initiatives to reduce the negative impacts of storm.

Several activities have been summarized here below and carried out during year 2015 to maintain ,repair and improve wastewater and storm water systems

- 1 Manage and carry out comprehensive winterization programs throughout various areas of Gaza strip which are normally subject to flooding events ,where several activities of construction ,cleaning , upgrading of water flows channels to cope reduce and eliminate the risks of flooding .. eg (Construction of additional storm water gullies and pipes, cleaning infiltration basins and storm water lagoons collection systems and rehabilitation of storm water pumping stations ..etc)
- 2 Manage the maintenance and operational preparedness of 13 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.
- 3 Supply all required safety and protective tools, clothes and equipment for technicians and labours working under the storm and flooding conditions.
- 4 Mechanical repair and refurbishment of 5 mobile pumps in Khanyounis ,Al Al Amal storm water collection lagoon.
- 5 Carry out on site and on time repair and maintenance campaigns through services contractors for several pumps, generators and electrical damages occurred as a result of war events operational faults at various pumping stations and facilities, where more than **323** mechanical job orders have been completed.
- 6 Carry out detailed mechanical and electrical rehabilitation and repair works of four mechanical bar screens in sewage pumping stations .
- 7 Manage and carry out complete mechanical overhauling and repair of KSB submersible sewage pumping set at Jemazit Al Sabeel pumping station in Rafah including the replacement of impeller ,mechanical seal and set of bearings .Also, valves systems and no return check valves have been also repaired and maintained .
- 8 Additional storm water pumping facilities(two submersible pumps each of 500m³/hour capacity and one 350m³/hour diesel driven pump) have been completed and installed at Al Najeeli storm water lagoon in Rafah. The upgraded system have been operated and tested this year and improve the pumping capacity and reduce the risk of flooding of Rafah neck bottle called here Jemazzit Al Sabeel area .

- 9 Additional floating submersible pump have been installed and operated at Al Amal storm water collection system in Kahnyounis with all associated fittings and accessories.
- 10 Comprehensive replacement and repair of impellers for wastewater pumping facilities Al Juniena pumping station in Rafah .
- 11 Supply and install two new submersible pumping units at Jemazit Al Sabeel wastewater pumping station with all associated electrical and mechanical installations.
- 12 Carry out all mechanical and electrical repairs and maintenances of wastewater treatment mechanical and electrical systems e.g. surface aerators ,pumps ,screens ..etc
- 13 Repair the automatic change over in Aslan P.S in Bait lahia
- 14 Replacement of Two Electronic Cards for the Existing soft starters RVSDN -145A and installation of control circuit for automatic operation of the generator according to the water level in Al Manshia PS in BeitLahia.
- 15 Replacement of control panel including all power and control components in Block 7 PS in Al Burij
- 16 Replacement of float switches in Block 12 PS in Burij
- 17 Installation of back up batteries of 20 Amps for the ultrasonic level detector and connection of the generators with float switched for automatic operation system in Wafiya and Hesba PS in Kanyounis,
- 18 Connection of an additional pump and rehabilitation of the panel to include the pump in the existing automatic system in Hesba PS in Khan younis
- 19 Upgrading the control Panel of the bar screen panel including replacement of relays and timers in Jemez al Sabeel in Rafah
- 20 Upgrading the control Panel of the bar screen panel including replacement of relays and timers in PS 2 in Bait Hanoun
- 21 Replacement of the air conditioning units and installation of 4 new soft starters of 58 A for the new 4 aerators. The work includes also the complete repair of underground cables and the disconnect switches in the main North P.S.
- 22 Replacement of one soft starter of 58 Amps in Om Al Naser PS.
- 23 Repair of cable connection inside the disconnect switch of pump No. 3 in Al Hassayna P S in Nussairat.
- 24 Repair Soft Starter RVSDN-58A. and the control panel including replacement of relays and timers and contactor DILM 12 in Mughraga P.S.
- 25 Complete replacement of the control panel of the bar screen including all power and control components and installation of new air conditioning system inside the MDB & MCC Room . the main changeover was also repaired and main fuses were also replaced in Al Bassa P.S. in Deir Al Balah
- 26 Connect the new 54 kw pump including installation of new control panel with soft starter 145 A, by pass contactor DILM150 A , MCCB of 160 Amp and all control components . In addition , a new disconnect switch , cables and lighting systems were also installed in Al Nujili PS in Rafah
- 27 Connection of the generator with an additional float switch for automatic operation system in Sawarha PS in Zawaida,
- 28 Replacement of soft starter, repair control connection and replacement of float switches manual changeover, two float switches in Bani Suhila P.S.

2 PROGRAM ACTIVITIES PROGRESS

2.1 Geographic Information System (GIS)

Through UNICEF-EU donation and (ICRC), the GIS department has establish 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. By next year 2016 the GIS department will launch its online GIS through web application for all internet users including water and wastewater facilities and networks.

2.2 Environmental Management Plan (EMP)

The PMU 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.

PMU / CMWU have established a field survey to monitor the current activities of different projects in the field. Those forms are being filled as shown in **Annex no. 2**

Also, the PMU has analyzed the water quality in the domestic water wells in different governorates based on EMP procedures (refer to **Annex 3** for details), 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.

Moreover, and through WSSSIP-AF1, an environmental consultancy service shall be carried out, in which it started on Dec., 2015. This service will provide water quality sampling analysis for 60 location for heavy metals traces added to another 20 soil samples. The expected field activities will start in mid of January 2016.

2.3 Customer Services

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

1. Follow up the operation and maintenance of comprehensive customer information and Service system CCISS at 14 different municipalities in Gaza Strip in total coordination with CMWU IT section.
2. 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 Der El Balah) is 60,376 customers.

3. 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.
 - b. Activation of illegal connection campaigns through CMWU inspection unit, in order to raise the collection and enhance system efficiency.
 - c. Rewards Campaign for the committed customers.
 - d. Signing agreements with local banks for automatic payment for CMWU bills.
 - e. Follow up the new housing projects in Rafah (Suadi project 1&2 , & UNDP project), with CMWU partners in order to legalize the water subscription for the beneficiaries.
 - f. Follow up the governmental employees in Rafah with the ministry of finance in Ramallah in order to come up with a process for water bill payment.
4. 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. Negotiate with the MOLG to make pressure to set new laws to encourage the customers to pay their due amounts to the water utility.
 - c. Enhance the operations of water inspection units.
 - d. 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.
 - e. Negotiate the final steps with MOLG to apply the new tariff structure in Rafah City, in order to overcome the financial problem raised from using the old tariff; the expected application date of the new Tariff is the first of February 2016.
5. Update customer data base (Unit served by the subscription, HH status, employment status for the customer, contact information etc.), through activations of water meter readers unit.
6. Finalize the customer satisfaction survey regarding the quality of service provided by the Water utility and the municipalities, prepare the final report which indicate and

highlight the possible intervention plan for more based on survey results. The project financed by ICRC and the results will guide the future plans for customers services department.

7. In process;
 - 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 IDPs.
 - 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. Prepare several fund raising proposal for different donors to support customers services activities. (ACF, QRC, ICRC, UNICEF)
9. Cooperate with GIS & MIS department for customer data to be uploaded in CMWU GIS system.
10. Follow up the progress of the bill improvement collection campaigns firstly issued in April 2009 in Rafah area. The collection figures were encouraging and meet the campaign expectation. The collection ratio has risen from 25% in 2008, to 44% in 2009, 48% in 2010, 58.50% in 2011, 46.0% in 2012 , 52.0% in 2013 & 40% in 2014 , the decrease in 2014 due, to the extremely deteriorated economic situation (close the borders from Israeli & Egyptian Side) and the 51 days war on Gaza (July & August/ 2014), while in 2015 the collection ratio began to heal reaching 45%.
11. The collection ratios in 2015 summarized in the following table:

Area	Collection Ratio	No. of Customers
Khan Younis	55%	17132
Rafah	45%	18766
Deir El Balah	30%	7230
Total		43,128

* The records up to Nov. 2015

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. (More details are found in Annex 4“Financial Report”).

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 will strengthen the CMWU future sustainability.
- 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 other re-construction projects after the war.
- Move on to achieve the CMWU strategic plan (5 years plan), and present it to all CMWU partners, stockholders, etc.
- On-going negotiations between PWA, CMWU, Northern Municipalities and MOLG to hand over the NGEST operation to CMWU.
- The implementation of STLV (phase 1) funded by EU is in progress and there is on-going negotiations between PWA, CMWU and UNICEF to complete the second phase of the STLV sea water desalination plant to reach 20,000 m³/day.
- PWA and CMWU are working jointly with the WB and IDB 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 AF1.

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:

1. On 03/02/2015 CMWU participated in a workshop organized by the World Bank in the presence of representatives of the funding agencies ,the World Bank and national authorities and partner institutions . Workshop aimed to offer emergency projects funded by the World Bank for the rehabilitation and development of water and sanitation, energy and municipal services.
2. On 10/02/2015 CMWU participated in laying the foundation stone for the central sewage treatment plant in Khan Yunis .
3. On 1/4/2015 CMWU participated in a workshop organized by the ICRC to develop a contingency plan to work during any aggression or emergency and provide the potential to secure a minimum of water and sanitation services to citizens of the Gaza Strip through the repair of damage to infrastructure and carry out operation of water and sewage systems.
4. On 01/07/2015 a field meeting was held at Deir Al Balah sea water desalination plant in the central region with Mr. Robert Bieber's-OCHA.
5. On 16/08/2015 CMWU participated in a workshop in Bethlehem discussed the institutional development in the water services sector and its relationship to diversity and integration of women in the labor market in the water sector.
6. On 25/08/2015 the World Bank staff , accompanied with representatives of some donors and a delegation from the PWA visited some sites that are funded by those donor institutions through the World Bank's projects such as the desalination plant, Al Moghraqa tank , and UNRWA sewage pumping station.
7. On 9/12/2015 A delegation from the Dutch Representative Office visited Rafah wastewater treatment plant.

8. On 25/11/2015 A delegation from the House of the German Foundation for Development Cooperation GIZ included Dr. Thomas REICHL Director of the Water Program in Palestine, and Mr. Tobias Mohan ,Adviser Water Programme in Palestine in order to see the water and sanitation situation and discuss the possibility of cooperation through the implementation of joint programs between the CMWU and the GIZ .



Figure 46: Site 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: The CMWU and IsDB have agreed to expand the sea water desalination plant in Gaza city to reach 15000 m³/day. This plant is an important component of the STLV program that will improve the water supply quality for around 250,000 inhabitant in Gaza City , in addition during 2015 an agreement has been signed to reduce the leakage of water networks totalling of 1 M\$.

UNICEF: new agreements signed between UNICEF and CMWU to rehabilitate water & wastewater networks at different locations in the southern and Middle areas. In addition, to another agreement to implement and manage six projects aims to improve water, wastewater and storm water services through USAID fund.

ICRC: has financed different projects which aim to improve especially the wastewater sector at different areas of Gaza strip . In addition to that ICRC has financed many emergency projects during and after the last offensive war on Gaza.

QC: has financed different projects for rehabilitation of wastewater pumping stations in addition to Al Manshiya pressure line at Beit Lahia.

KFW: is committed to finance two wastewater projects of total amount 3.3 M Euro in cooperation with PWA and CMWU which for construction wastewater networks in Anan area- Jabalia and Al Berka area- Deir Al Balah.

EU: an agreement has been signed with PWA, CMWU and EU; it includes different water projects which aim to rehabilitate and improve the water sector at the southern governorates, and the total budget is 4.7 Million Euro, the projects includes construction water tanks at Khanyounis city (Al Amal, and Al Satar) besides partial re-configuration for water distribution systems to accommodate with the desalinated quantity.

JICA: During year 2015 an agreement has been signed between the CMWU and JICA in order to implement two pilot projects in Beit Hanoun. One for rehabilitation of Water Network and the other for rehabilitation Wastewater Networks. Those two projects have been completed successfully and new package will be implemented during year 2016 included Water Tank at Rafah and two water main carrier in Abasan and Al Nasser.

Gaza EMAR: An agreement has been signed among the CMWU ,IsDB and Gaza Emar in order to implement Al Amal storm water basin, Al Qarara infiltration boreholes, water networks and resizing the water wells through Gaza Strip.

Islamic help: An agreement has been signed with CMWU and Islamic Help to install RO sea water desalination plant 500 m³/day at Al Shifa Hospital in order to improve its water quality.

Muslim Hands: During 2015 two agreement have been signed with MH to construct two water wells one in Khan Younis and the other in Al Mousadar.

ANERA: During 2015, Anera implemented water networks at the southern governorates (Al Zana, Bani Suhaila, Rafah) and prepare the design for three water tanks at Al Fokhari, Al Qarara, Al Fokhari besides water networks at Beit Lahia.

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.

CMWU played an important role in the signature of a long term "water Operations partnership Agreement" between Dutch water Utilities (Vitens and Water Net) and Palestinian Water Utilities (CMWU, JWU and Bethlehem Joint Water Services) sponsored by PWA. This agreement is expected to strengthen the institutional framework, improve the water and wastewater operational capacity and performance and improve the assets management for both parties; especially the Palestinian institutions.

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 sanitation in the Gaza Strip and concentrated on the following issues:

- Saving water
- Storm-water Use
- Cleaning tanks
- Water situation

Parts of the implemented activities are mentioned here below:

1. Training courses: Media & awareness unit implemented
 - Training course, which targeted 5 mobilizers from Khan Younis city to implement awareness activities.
 - Training course which targeted 10 women from Khan Younis city to implement 400 home visits.
2. Workshops: Media & awareness unit implemented 26 workshops in all the 5 Gaza governorates.

3. Media & awareness unit implemented 30 Awareness sessions in all the 5 Gaza governorates.
4. Home visits: Media & awareness unit implemented 400 home visit in Khan Younis city.
5. Media Materials including; posters, billboards ,radio ads.
6. Ceremonies: 4 ceremonies.
7. Organizing 25 student trips
8. Organizing water competitions for school female and male students
9. Organizing painting days about water
10. Organizing 3 press conferences
11. Publishing CMWU newspaper
12. Organizing 10 discussion meetings with local committees



Figure 47 :CMWU Public Awareness Activities

3.5 EMERGENCY PREPAREDNESS PLAN - EPP:

In co-operation with ICRC ,CMWU finalize 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 , several training sessions have been applied for all involved parties and members of EPP schemes with drills to teach 80 trainees from various water and wastewater operational areas of Gaza strip about their duties and how to behave during the emergency times ,where the training session covered the following subjects :

- International Humanitarian Law
- Co-ordination Mechanism
- Maps Reading for identification of affected localities or targeted area for repair an emergency intervention.



- Vehicles Visibility and signage

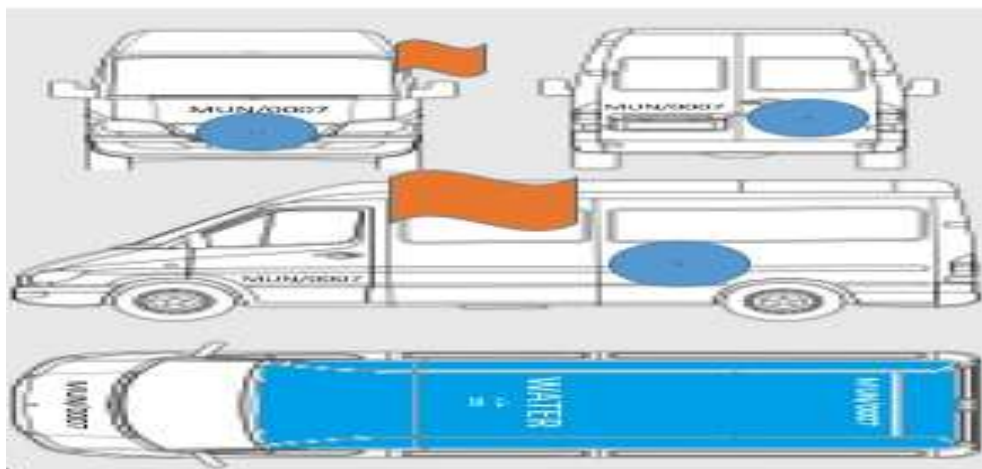


Figure 48 : Vehicles Visibility During Emergency Times /EPP

For more details please refer to Annex no.(5)

4 MAIN OBSTACLES

One of the main and major obstacles towards accomplishing on-going contracts is the Israeli 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.

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.

5 SUCCESS STORY (Construction of Musabeh Brackish Desalination Plant - Rafah)

After two years of implementing Musabeh brackish desalination plant of 50m³/day in year 2013, to serve the people of Al Musabeh area in Rafah with safe , healthy , and drinkable water. CMWU conducted a home visits to measure the positive effects of the project on the targeted people.

Mrs. Yousra Al Assar, 40 years, an employee, and a mother for 6 children, were got a the training for trainer with CMWU before, and were been worked as a public awareness educator for a few months at her district with CMWU to convince the people to drink from the desalinated water instead of continue buying the desalinated water from the private vendors during the implementation period.

She said that working within the project gave me the opportunity to have salary for many months to bridge the gap of irregular salary of my husband'. 'and encourage me to challenge my society by visiting houses talking about water issues' She continued, " the public awareness work added to my personality that I can depend on myself now and I can influence my community" And improve my qualifications and enrich my experience that will help me find jobs in the future .



Figure 49: Mrs. Youssra Al Assar during here work with CMWU as a public awareness educator

On the other hands, implementing such a desalination plant decrease the financial burden on the people as illustrated by Mr. Yousef Abed Abu Zaid

"I am the one who is responsible of securing desalinated water for my house, my family consists of 10 people, and we daily need 2 gallons of desalinated water; 16 liter per gallon for cooking and drinking. We used to have desalinated water from the water cars." This was reported by the young man, Yousef Abed Abu Zaid, a resident of Musbah area.

He continued, "The cost of our monthly need of desalinated water was 60-70 NIS. I don't work and our income is very limited, therefore, that amount was a financial burden. Now we got water only from the desalination plant that was established by the CMWU near my house beside the water distribution water tank of the CMWU."

However, Mr. Younis Mohammed Duhair, who works in agriculture fields, and his income is very poor, has reported that the presence of a desalination plant at his area is very important. The residents of this area now get free desalinated water from the plant, which saved the additional costs and the water bill, especially in light of the deteriorated economic situation.

He also added that he daily needs 2-3 desalinated water galloons for his family that consists of 12 members, which saves 80 NIS monthly.

6 CONCLUSION

In order to fulfil the National 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 especially 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.

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 & AF1.

END