



Coastal Municipalities Water Utility

Annual Report 2022



March 2022

TABLE OF CONTENTS

ACKNOWLEDGEMENT.....	5
EXECUTIVE SUMMARY.....	6
INTRODUCTION.....	10
1- TECHNICAL PROGRESS ACTIVITIES	12
<i>A. Improve the Water Quantities</i>	<i>13</i>
A.1 Overall Water Distribution System Efficiency	13
A.2 Improve Water Facilities.....	23
1- Construction New Water Wells.....	23
2. Electrical Refurbishment, Upgrading and Repairs Installations.....	24
3- Mechanical Refurbishment, Upgrading and Repairs Installations	Error! Bookmark not defined.
A.3 Improve Water Wells Functionality	45
A.4 Improve Energy Consumption	48
<i>B. Improve Water Quality.....</i>	<i>50</i>
B.1 Disinfection Efficiency.....	50
B.2 Residual Chlorine Monitoring Program	51
B.3 Chlorine Dosing Units:.....	54
B.4 Chlorine Supply and Chemicals Delivery for Desalination Plants:.....	54
<i>C. New Water Resource</i>	<i>55</i>
C.1 Sea Water Desalination Plants	56
C.2 Brackish Desalination Plants:	58
C.3 Water Networks.....	59
C.4 Water Tanks	62
C.5 Gaza Sustainable Water Supply Program (Associated Works for Gaza Desalination Project).....	62
<i>D. Waste Water Treatment Plants:.....</i>	<i>63</i>
D.1 Gaza Central WWTP Project.....	66
D.2 Khan Younis Wastewater Treatment Plant (KHWWT)	67
D.3 The Permanent Northern Treatment Plant (NGEST).....	68
<i>E. Storm Water Activities.....</i>	<i>68</i>
<i>F. Waste Water Activities</i>	<i>72</i>
F.1 WW Networks.....	72
F.2 Electromechanical Services for Waste Water & Storm Pumping and Treatment Facilities.....	77
2.ACTIVITIES PROGRESS.....	103
2.1 Geographic Information System (GIS)	103
2.2 Environmental Management Plan (EMP).....	103
3. OTHER ACTIVITIES.....	104
3.1 Enhance the identity of the CMWU as fully functional service provider:	104
3.2 Continuity of Services during COVID-19 Outbreaks:	104
3.2 Coordinate with other entities:	106
3.3 Missions to CMWU Facilities:	107
MAIN OBSTACLES.....	111
SUCCESS STORY	112
CONCLUSION	114

List of Figures

Figure	Page #	Figure	Page #
Figure 1 Overall Annual Water Networks System Efficiencies -	13	Figure 30 BLWWTP terminal pumping station Spare parts and maintenance activities	60
Figure 2 Overall Annual Water Networks System Efficiencies -	14	Figure 31 Drying Wadi Gaza WW lagoons	61
Figure 3: Total annual water supply (m3) January-December	21	Figure 32 Cleaning of anaerobic wastewater lagoons – RWWTP	62
Figure 4: Total annual Production (m3) January-December	21	Figure 33 Central WWTP and Central PS Wadi Gaza	63
Figure 5 Mekorot water supply as per municipality - 2020	22	Figure 34 Central WWTP Pressure line	64
Figure 6 Municipal Water Supply Quota L/C/D:	23	Figure 35 Central WWTP Gravity Pipeline	65
Figure7: Construction Water Wells at Rafah	24	Figure 36 Solar Panels installation	66
Figure 8: electrical upgrading works	26	Figure 37 Parts of Shiekh Ejleen Measures	67
Figure 9 Part of upgrading and maintenance works	29	Figure 38 Part of Wadi Gaza measures	67
Figure 10 PV systems installed	32	Figure 39 Khanyounis Central TP	69
Figure 11 PV systems installed	32	Figure 40 Infiltration Basin at Al Fokhari	69
Figure 12 upgrading of Al Mashrooa water well	33	Figure 41: construction of Al Attatra stormwater project	71
Figure13: Rehabilitation of Al Sabra water well-Gaza city	34	Figure 42 Upgrading works in Al Juninah stormwater basin-	71
Figure14: Rehabilitation of Al Matar well-Rafah	34	Figure 43: Aslan stormwater infiltration basin-Beit Lahia	72
Figure15 Beit Hanoun water well	35	Figure 44 Al Saftawi carrier line	72
Figure 16 UNRWA water well-Khan Younis	35	Figure 45 Storm water preparedness activities	72
Figure 17 Part of mobile mechanical maintenance workshop	40	Figure 46 WW networks in Al Nussirat	73
Figure 18 Monthly Functionality Percentage for served Areas-	44	Figure 47 wastewater networks in Jabalia	73
Figure 19 Monthly Specific Energy Consumption 2020	45	Figure 48 Fixing the damages in wastewater network	74
Figure 20 Monthly Water Disinfection Percentage 2020	49	Figure 49 Installing mechanical Bar Screen	75
Figure 21 Chlorine solution supply to water facilities	51	Figure50: mechanical repairs for Al Hawaber PS	76
Figure 22 Sea Water Desalination Plant – Southern Governorates	52	Figure 51: cleaning the pumps room in different sewage pumping stations	76
Figure 23 Expansion of Sea Water Desalination Plant – SG	53	Figure 52: Rehabilitation of Tal Al Zaatat PS	76
Figure 24 Gaza STLV Desalination plant	54	Figure53: Maintenance works for heavy machineries	77
Figure25: rehabilitation of RO plants	54	Figure 54: Supplying Hygiene and safety tools to CMWU	90
Figure 26 Rehabilitation of brackish RO plants and supply spare parts for RO plants	55	Figure55: Ministerial and donors missions	93
Figure 27 providing 6 RO plants with PV solar energy	55	Figure 56 CMWU Public Awareness Activities	94
Figure 28: Maintenance jobs for water & WW networks	56	Figure 57 Providing the Quarantine centers with water & WW	97
Figure 29 Al Amal and Al Sattar Water Tanks- Khan Younis	57		

List of Tables

Table 1. Overall Annual Water Networks System Efficiencies -Year 2020 /Middle and South.....	13
Table 2. Overall Annual Water Networks System Efficiencies -Year 2020 /All Gaza Strip.....	14
Table 3 Networks Repair Jobs January – December 202.....	16
Table 4 Total Annual water supply 2020/All resources:.....	18
Table 5 Total annual MEKEROT Water supply (Israel Line), (m3): Year 2020.....	19
Table 6 Total annual STLVS production (m3): Year 2020.....	19
Table 7 Total Annual Water Supply from different sources – Year 2020.....	20
Table 8: The water quota supplied to the people.....	20
Table 9 summarizes the upgrading works during 2020.....	27
Table 10: list of water well equipped with SCADA.....	30
Table 11 : list of facilities that have two electrical feeders or permanent feeder.....	31
Table 12 List of upgrading works at water facilities	35
Table 13 The monthly water wells functionality efficiency -Middle and South 2020.....	43
Table 14 The monthly water wells specific power consumption -Middle and South-2020.....	45
Table 15 Water Disinfection Monitoring Program -Year 2020.....	48
Table 16 List of major rehabilitation and repair works/Wastewater and storm water facilities.....	77
Table 17: list of major repairs/ Heavy machineries.....	84

Annexes

Annex 1: Average Wastewater Quantities and Treatment Efficiency for the WWTPs during 2020

Annex 2: Report's summary in Arabic

ACKNOWLEDGEMENT

This annual report has been prepared by the Coastal Municipalities Water Utility (CMWU), the report is mainly composed of all relevant activities progress schemes implemented from January to December 2022.

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

Thanks also continue to all CMWU's partners & donors to their continuous support in financing water and waste water projects such as KFW, ICRC, UNICEF, EU, OCHA, IsDB, AFD, ANERA, NRC, Oxfam, GVC, AAH, GIZ, Human Appeal, Save the Children, Qatar Charity and Ma'an

High appreciation especially for ICRC, UNICEF, Oxfam, NRC and AAH for their support during and after the escalation in June 2022, which caused severe damages in WASH facilities and infrastructure also their support was and still essential to bridge the gap in O&M activities to keep running the water and wastewater services during the harsh conditions. Without their supports it would have been difficult to overcome many of the humanitarian problems. Moreover, their assistance to implement some of emergency projects, upgrading activities, and operation supports to avoid environmental disasters and further deterioration of the water sector as their interventions are the reason behind keeping the provision of the adequate level of water supply and wastewater collection in Gaza Strip.

EXECUTIVE SUMMARY

Throughout this year, the CMWU team manage and carry out all normal and emergency operations and maintenance tasks with all monitoring programs set as per several utility performance indicators. CMWU has succeeded in maintaining a minimum level of safe WASH services during the harsh conditions that Gaza Strip suffers from, including Israeli escalations, blockade, economic deterioration.

The challenges over year 2022 were difficult. However, the CMWU in cooperation with its partners succeeded to overcome the difficulties and restore the affected and damaged facilities to operation mode to ensure providing safe WASH services for the densely populated Gaza Strip.

The overall hydraulic efficiency of the existing water distribution networks is **56.9%** with **43.1% of** Non-Revenue Water (NRW) in average for all Gaza Strip, Water Wells functionality efficiency is **98.68%** for Middle, Khan Younis and Rafah governorates, water disinfection efficiency is over **99.24%**. Also, manage weekly quality monitoring program for all wastewater treatment plants through utilizing CMWU central lab.

During 2022 there was a remarkable improvement in wastewater treatment efficiency; since the three newly constructed WWTPs (North Gaza, Burej and Khan Younis) are operational with high efficiency, the two plants that discharge partially treated sewage to the sea are Rafah and Al Sheikh Ejleen WWTPs with average BOD concentration 100 mg/l and *** mg/l respectively , Rafah needs upgrading works to enhance its capacity and treatment efficiency where the second plant will be decommissioned after expansion Gaza WWTP phase II which increases the capacity to 120,000 m3/day to serve both Gaza and middle governorates.

The CMWU has carried out more than **155** predictive, preventive and corrective maintenance job orders at various areas for the existing **back** up electric power supply generators that are heavily and severely affected by long daily hours of operations which create lots of repair and maintenance needs and parts. During the period of this year the grid electricity supply was mostly stable on daily scheme of 8 hours on ,8 hours off, 8 hours on. Over the last years, the CMWU had used to operate the standby generators of WASH facilities during electricity cut offs and the fuel supply was almost secured by several financing and humanitarian agencies.

Unfortunately, this emergency fuel supply was stopped and not supported since year 2019, which negatively affected in somehow various services provisions. However, supporting the fuel supply is limited to emergency cases like preparedness for heavy storms to avoid risks of floods or during escalation to operate WASH facilities and provide the needed services. During 2021 CMWU received 600000-liter Diesel from UNICEF and ICRC. In the meantime, and during this year CMWU through incentive communication channels succeeded to exclude some main facilities of the daily schemes of electricity cut off and connected them with second line power source to avoid the services discontinuity.

The CMWU carries out on time reactions with all programmed inspections and preventive maintenance requirements for all water and wastewater facilities, more than 2451 repair job orders were carried out during 2021 for all municipal areas.

Moreover, and due to the deteriorated economic situations that the Gaza strip faces under political division, frequent escalations, alleged reconciliation procedures (salaries deduction percentages, Early retirement, etc.), , siege continuity, the collection ratios in the Gaza Governorates has declined; it reached around 20% as an average by the end of December 2021.

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

1. The construction of STLV seawater desalination plant 6,000 m³/day; which is funded by EU and implemented by UNICEF in cooperation with PWA and CMWU is accomplished and operated, while the construction of the second phase to expand the plant to reach 20,000m³/day is still ongoing with targeted completion and commissioning end of July 2023.
2. Gaza sea water desalination plant (10,000 m³/day) is operated with its full capacity and pumps the desalinated water to blending tank to serve the western districts of Gaza city around 250,000 inhabitants. Two connections have been implemented from Gaza STLV for Beit Lahia and Jabalia and those connections will be extended to blending water tanks through KFW financed program as the groundwater quality in both areas has deteriorated and there was a need to blend the produced water from wells with the desalinated water to alleviate the salinity. In this regard and to meet the current water demand for Gaza and North governorates, the CMWU and PWA plan to construct another STLV for Gaza city and allocate the existing one for the North governorate. This project shall cover the water needs for the short and intermediate terms. For the time being the existing STLV will be expanded through construction additional 2500m³/day

RO unit, this project is financed by IDB and will be implemented in 2023 by Emar Palestine in cooperation with CMWU

3. Gaza central wastewater treatment plant with capacity 60,000m³/day as phase I; is being operated by the CMWU with partial support of KFW for 5 years of operation the plant receives daily around 25,000 m³/day from Gaza city and 35,000 m³/day from the Middle area
4. The construction of Khan Younis central wastewater treatment plant with capacity of 26,000m³/day (phase I) is completed and the plant is operational but with less incoming flow 15,000 m³/day; the project was funded by KDF-IsDB & Japan and implemented by UNDP in cooperation with CMWU and PWA. Recently the plant has been provided with 1.2 Megawatt of PV solar system through UNDP fund and still equipped with 3.7 Megawatt through IDB financed project, in addition the EU is committed to finance 2.1 Megawatt of PV to have in total 7 Megawatt which covers the needed power of WWTP .
5. In cooperation with PWA and CMWU, UNICEF through Kuwaiti fund has supported two projects, the first is construction storm water system at Khan Younis & Dair Al Balah, to protect 100,000 inhabitants from yearly floods, which was implemented in 2021-2022 and already its positive impact has been touched during winter season, while the second component of the project “providing 6 WASH facilities with solar energy” has completed by the end of 2022.

Through EU fund, KFW will support the CMWU to implement a storm water project at Rafah in addition to providing 3 WASH facilities with PV solar system, KHWWTTP is one of those 3 facilities, the consultant will be assigned by KFW to prepare the designs and tender documents for this project to be launched next year.

6. Through EU fund, GVC in cooperation with PWA, CMWU and municipality of Khan Younis is still implementing “Gaza Innovation and water efficiency program” which aims to improve the water supply in Khan Younis through reducing NRW, the projects outputs include installation of DMAs for two piloting areas, setting the needed interventions to reduce NRW in all Khan Younis city, supporting NRW unit with all needed logistics and human resources. during 2023 the consultant has developed the model for Khan Younis water network which includes 37 DMAs with all needed upgrading and rehabilitation interventions to improve the existing system. Next year the two pilot DAMs will be implemented and equipped with smart devices for high control and monitoring.

7. As a part of KHWWT, the CMWU through KDF-IsDB fund is currently implementing new pressure pipeline 60cm diameter and 3.7 KM length instead of the existing deteriorated and overloaded pipeline, it extends from Al Wafiya PS in Khan Yonis to the existing wastewater network which discharges the flow to PS 8 then to KHWWT.
8. In cooperation with CMWU, PWA has launched a consultancy service during 2022 to update the sewage master plan for Khan Yonis governorate. The assignment was completed in November 2022 and the deliverables including "the updated master plan, designs for part of networks and pumping stations in addition to the final report".
9. As a part of KHWWT and based on the recent developed sewage master plan, the CMWU in cooperation with PWA and Emar Palestine Organization through KDF-IsDB fund, is currently implementing the central sewage pumping station no.04 for the benefit of Eastern villages alongside with the main sewage collector and part of sewage network. Through this project Absan, Bani Suhila and Khuzaa will be connected with sewage system besides closing large number of cesspits, in addition the WWTP will be operated efficiently as more than 5000 m³/day will be pumped to WWTP, that contributes to increase the flow of WWTP which is still operated under its designed capacity.

Construction of Eastern brackish RO plant at Rafah with 50m³/hr capacity, the project is financed by Human Appeal, it is divided into two packages, the first included drilling a new water well to feed the RO plant and already was completed during 2022, where the second package related to construction the RO plant is still ongoing

Launch the consultancy services tender under energy saving program which is financed by KFW, the tender has been awarded in August 2021, the program aims to reduce the energy consumption in water and wastewater facilities, it includes several interventions like (PV installations, pumps' replacement, VFDs installations, ...etc). in December 2021, the consultant submitted the inception report for review, then he will proceed in assessment to prepare the designs and tender documents.

10. The CMWU through PHG fund has completed the project of "Rehabilitation of water and wastewater networks at Rafah", this project contributed to provide safe and adequate water and sanitation access for more than 9000 inhabitants
11. The CMWU through UNICEF fund has completed the project of "construction wastewater networks at Al Forqan neighbourhood- Rafah", this project contributed to provide safe sanitation access for more than 3000 inhabitants.

12. Through Oxfam fund the public WASH facilities maintenance and operational plan has been developed and the WASH needs over the coming five years are recognized for interventions. In addition, OXFAM in cooperation with CMWU and through a consultancy firm is currently Establishing the early warning unified system for emergency
13. The CMWU through ANERA/USAID fund has been implementing packages of rehabilitation water networks at Khan Younis, Rafah, Dair Al balah and Beit Hanoun
14. The CMWU through ANERA fund has been implementing package of WASH projects throughout Gaza Strip, it includes storm water pipelines , wastewater networks and water networks
15. The CMWU through ANERA fund has been implementing stormwater networks at Al Fokhari and Al Mansora street in Gaza city to prevent frequent floods in those areas, the project will be completed early 2023
16. The CMWU through ANERA fund has completed construction of wastewater networks at Al kateba and Al Salam neighbourhoods at Khan Younis.
17. The CMWU through Human Appeal fund has been implmenting wastewater networks at Qlebo area in Beit lahia, the works will be completed early 2023.
18. The CMWU through AAH has completed construction of stormwater and wastewater networks at Jabalia and Beit lahia and still financing the project of construction wastewater network at Jort Al loot in Khan Younis
19. The CMWU in cooperation with ICRC, UNICEF, Anera and WASH cluster partners has fixed and rectified most of WASH damages resulted from the last escalation in June 2022,

INTRODUCTION

Throughout **2022** year, all efforts and activities have been directed in parallel with some contributions towards implementing the essential required water, wastewater and storm water projects, fixing the damages of WASH facilities resulted from the last escalation in ***** 2022 besides managing a set of operational and maintenance tasks, especially after operating the newly constructed facilities (STLVs and WWTPs), such projects are playing a great role to improve the level of services for people in the Gaza strip and to mitigate various environmental and health risks. Hence to achieve the following:

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

During the year, CMWU teams through several funding agencies such as ICRC, UNICEF, AAH, OXFAM, KFW, EU, Save the Children, ANERA, HA, Maan and GVC continue upgrading, rehabilitation, and resizing the water and wastewater facilities and networks to improve the water and wastewater services.

However, the implementation of different interventions has been facing a number of obstacles and restrictions, related to Israeli frequent escalations on Gaza Strip, Israeli restrictions on materials entry, lack of funds for WASH needs and the harsh socioeconomic conditions, all these restrictions and obstacles 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. Therefore, it has become relatively so difficult to fulfil, complete, and operate other strategic projects in the due time.

The continuity of the electricity problem and unreliable sources is still the reason behind the negative impacts on the operational schemes despite of providing many of water and wastewater facilities with solar energy systems to improve the operational situations of the targeted water wells, pumping facilities besides the treatment plants.

In Addition, Several financing and humanitarian agencies e.g., ICRC, UNICEF, ISDB, OCHA (HRF), KFW.... etc. have continued to play their great roles to assist and support part of O&M needs but with limited resources and interventions, hence covering O&M cost is one of main challenges especially it is affected by the collection ratio which is deteriorated for more than 10 years due to harsh economic situations in Gaza Strip.

Meanwhile the difficulties are everywhere in the service area; so, the challenges are the motivated forces to CMWU staff to run the services and even sometimes in cooperation with PWA 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 **295** water wells, **55** water Storage tanks, **109** small scale brackish water desalination plants, **3** Sea water desalination plants, **53** water Booster stations, **68** wastewater pumping stations, **5** waste water treatment plants, water networks, storm water networks, sewage collection networks and basins with all associated equipment and systems upgrading and monitoring requirements. Purpose has been kept with high level of response towards several events of preventive and corrective repair and maintenance activities to minimize the risk of breakdown and operation time loss. Therefore, the CMWU has launched many services contracts during 2021, with local contractors for specialized upgrading, maintenance and repair needs e.g., generators, deep well water pumping sets...etc.

1- TECHNICAL PROGRESS ACTIVITIES

This report describes the progress achieved during the period from January to December 2022 in order to achieve the CMWU's targeted performance indicators. The running activities are being classified into different categories such as water wells activities; water desalination plants, water networks, metering management, disinfection activities, water storage tanks, wastewater pumping stations, networks and wastewater treatment plants activities with all associated mechanical and electrical upgrading, refurbishment and repair activities.

IMPROVING QUALITY & QUANTITY OF WATER

A. Improve the Water Quantities

A.1 Overall Water Distribution System Efficiency

Throughout 2021, and despite of various operational, economical constraints, escalations effects and other challenges, CMWU continues managing, implementing and monitoring several programs and provide all relevant resources in order to improve the overall hydraulic efficiency of the existing water distribution networking systems and reduce the quantities of Non-Revenue Water (NRW) down to 37 % in the Middle and Southern Governorates, and 43% in all Gaza Strip governorates including Gaza and Northern governorates which needs extra efforts for improvement.

The annual records and monitoring data figures on monthly basis showed that the hydraulic system efficiency is **63 % for Middle and Southern governorates where it reached 57 % for all Gaza Strip**. 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 especially in Gaza City since it was late in joining the CMWU. The improved management of data introduced by CMWU continues to be a valuable tool to monitor and report the figures of overall system efficiency and non-revenue water each month. Meter readings continue to be collected by the Municipalities and CMWU regional areas' staff. Although new data collection and verification procedures were introduced, some difficulties were experienced in the municipal reports; this requires CMWU to perform additional verification crosschecking and refinement of the submitted figures. The overall annual system efficiencies recorded are as follows:

Table 1 Overall Annual Water Networks System Efficiencies -Year 2021

Monthly Water Distribution Efficiency Report for -2021				
Municipalities:		ALL GAZA STRIP		
No.	Municipality name	water production m ³	water billed m ³	dec-2021 System efficiency %
1	Wadi Salqa	300528	216118	71.9%
2	Wadi Gaza	201219	138062	68.6%
3	Al Moghrakah	825340	264479	32.0%
4	Al Zahra	899150	655053	72.9%
5	Al Nussirate	5278461	2826738	53.6%
6	Al Buriej	2288098	1285630	56.2%
7	Al Maghazi	1585677	865857	54.6%
8	Al Zawiada	1024744	718422	70.1%
9	Al Musader	247554	131842	53.3%
10	Deir Al Balah	5640638	3037750	53.9%
11	Al Qarara	1443629	983899	68.2%
12	KhanYounis	9706197	7031298	72.4%
13	Bani Suhaila	2223338	1597831	71.9%
14	Abassan Kabira	1667960	1281092	76.8%
15	Abassan Jadidah	521899	373157	71.5%
16	Kheza'a	688258	592726	86.1%
17	Al Fukhari	359159	238098	66.3%
18	Al Nasser	519266	416843	80.3%
19	Al Shokah	781420	405991	52.0%
20	Rafah	10098949	6054724	60.0%
21	Um al nasser	312160	239255	76.6%
22	Jabaliala	14583905	9285739	63.7%
23	Beit lahia	7043375	2966860	42.1%
24	Beit hanoon	4503640	2473773	54.9%
25	Gaza	37798436	18780456	49.7%
Total	Total	110543000	62861693	56.9%

The normal trends of behavior and increase or decrease for hydraulic system efficiency of water distribution networks in the case of Gaza strip are subject to the seasonal water demand requirements and temperature conditions. Therefore, system efficiency increases during winter months and starts to decrease when it comes hotter where illegal connections especially used for irrigation which form about 20% of Non-Revenue Water

(NRW) consume a lot of water during hot weather and negatively affects the whole system efficiency. Moreover, the frequent escalations on Gaza caused many damages in water networks, the seen damages have been fixed where there are still unseen damages in the water distribution networks which resulted in a leakage and lowering the system efficiency.

The efforts and initiatives to improve the system efficiency have continued during year 2021, the priority was for fixing the damages of water network through replacing the damaged pipes with new and greater diameter in some cases to restore the water services to better level than before and to improve the system efficiency as well, since part of the affected pipelines were deteriorated and under size and it needs this replacement. In the meanwhile, the efforts have been exerted to push the progress of EU financed project with totaling budget 1 Million Euro for NRW program which takes place at Khan Younis areas. The program includes developing a plan for reducing NRW in Khan Younis city, where the physical works include networks' rehabilitation, domestic and district meters' installation, leaks detection activities in addition to public awareness campaigns, all those activities and interventions aim towards legalization of illegal connections and reduce the leakage and other losses towards improving the overall system efficiency.

The following describes the main interventions implemented during 2022:

- Network Rehabilitation:

The water mains rehabilitation and repair program all over the Gaza Strip have continued to be applied by CMWU through the support of ICRC, ANERA, UNICEF, AAH and PHG where PWA is still working on the associated and reconfiguration works at the middle and southern governorates.

In addition to that the CMWU mobile workshop has continued to fix and repair the urgent breakdowns in the networks to restore the water access for people. All the sites have been successfully handed over and operated again. The work for the construction and rehabilitation programs of water distribution networks were carried out based on criteria that was oriented towards reducing the unaccounted-for water of both commercial and technical characteristics including disconnection of illegal connections. A comprehensive network repair and maintenance program were introduced to the targeted areas during the year 2022. Several works of water networks repairs were directly initiated and applied for all emergency repairs to assure water supply system continuity at various areas of Gaza strip. This program has been implemented in co-operation with the municipalities and

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

A summary of 2451 repair jobs performed during the period from January to end of December 2021 are listed in the following table provided here below:

Table 3 Networks Repair Jobs January – December 2021

Annual Water Networks Repair Monitoring Records - Number of repairs-YEAR 2021														
No.	Municipality	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1	Um Al Nasser	4	2	6	4	2	2	4	5	3	2	2	3	39
2	Beit Hanoun	7	6	7	7	9	10	14	10	6	5	8	9	98
3	Beit Iahia	6	8	7	8	12	14	15	11	8	8	9	7	113
4	Jabalila	8	8	15	13	18	16	20	15	14	12	8	6	153
5	Gaza	15	25	29	35	36	40	32	24	35	22	17	15	325
6	Al Zahra	3	2	2	5	3	3	8	4	4	4	4	3	45
7	Wadi Gaza	2	2	4	6	3	2	2	3	3	3	3	4	37
8	Musader	3	2	3	3	2	2	4	5	3	4	4	4	39
9	Wadi Al salqa	2	2	3	2	3	2	2	3	4	3	2	3	31
10	Moghrakah	5	4	6	8	6	5	5	4	5	4	5	2	59
11	Buraij	7	6	5	6	4	4	2	9	6	5	4	7	65
12	Maghazi	5	6	3	3	4	5	5	8	5	2	4	4	54
13	Deir Balah	7	6	9	14	15	22	24	17	19	8	9	10	160
14	Zuwaia	6	4	4	4	4	4	6	6	5	4	4	4	55
15	Nusirat	9	8	7	11	13	14	18	22	18	17	7	9	153
16	Khan Younis	19	16	19	13	16	22	25	24	20	20	19	16	229
17	Khoza'a	4	2	2	2	3	2	2	4	4	3	4	3	35
18	Qarrara	5	3	2	3	3	6	7	5	4	2	2	3	45
19	Abassan Kabira	6	3	4	5	5	4	10	11	8	7	2	4	69
20	Bani Suhaila	5	3	7	3	4	4	7	10	6	3	2	3	57
21	Abassan Jadidah	4	4	2	3	7	9	5	7	5	4	3	2	55
22	Al Fukhari	3	2	6	2	2	6	7	6	3	3	4	3	47
23	Al Naser	3	2	3	4	4	2	2	4	7	3	6	4	44
24	Al shokah	4	3	2	4	4	3	5	4	6	4	4	4	47
25	Rafah	31	35	32	28	31	25	48	42	36	35	28	26	397
Total		173	164	189	196	213	228	279	263	237	187	164	158	2451

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

The tables below illustrate the production and consumption for each municipality on a monthly basis during the year of 2021 including the received quantities from MEKEROT.

The records show that, during 2021 there was a notably increase in the total annual production and consumption, that refers to the effects of COVID-19 pandemic which has led to intensify the hygiene practices to avoid infection and pandemic outbreak. Thus, the consumed water in all areas is more than the usual annual consumption as indicated in the tables below:

Table 4 Total Annual water supply 2021/All resources:

Municipality	Production (Water meter)	Production (Water meter)	Production (Water meter)	Production (Water meter)	Production (Water meter)	Production (Water meter)	Production (Water meter)	Production (Water meter)	Production (Water meter)	Production (Water meter)	Production (Water meter)	Production (Water meter)	Total Production (Water meter)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2021
	m ³	m ³	m ³	m ³	m ³	m ³	m ³	m ³	m ³	m ³	m ³	m ³	m ³
Um AL Nasser	20,997	20,663	23,091	23,751	23,513	28,101	33,301	32,132	29,527	29,504	25,786	21,794	312,160
Beit Hanoun	341,562	250,310	318,081	369,365	410,069	385,763	485,787	412,577	488,728	378,234	369,261	293,903	4,503,640
Beit Lahia	518,336	465,779	521,274	573,809	598,552	604,112	682,580	725,985	732,584	578,169	579,711	462,484	7,043,375
Jabalia	1,206,772	978,196	1,258,169	1,369,021	1,274,686	1,200,979	1,262,338	1,384,033	1,298,342	1,180,376	1,133,403	1,037,590	14,583,905
Gaza	2,785,722	2,906,808	2,918,099	3,303,867	3,102,277	3,176,646	3,118,599	3,430,288	3,342,867	3,372,775	3,412,396	2,928,092	37,798,436
wady Gaza	9,651	9,231	13,249	14,588	17,932	20,072	16,687	24,127	22,494	18,116	20,265	14,807	201,219
wady Salqa	15,120	13,825	21,786	24,313	29,918	35,245	31,233	35,287	25,930	26,083	17,810	23,978	300,528
Al Moghraka	42,520	47,220	59,340	59,340	93,390	84,770	93,230	87,260	78,150	57,450	69,180	53,490	825,340
Al Zahra	63,785	60,374	64,755	72,173	87,434	88,701	87,929	82,418	79,599	80,266	71,266	60,450	899,150
Al Nussierat	296,090	262,802	371,710	435,530	421,170	530,500	557,350	581,259	486,150	525,990	430,600	379,310	5,278,461
AL Burij	136,602	182,014	177,419	208,705	171,650	228,780	218,562	232,626	194,911	211,002	173,455	152,372	2,288,098
Al Maghazy	138,143	103,901	131,564	145,683	136,201	143,155	162,217	178,829	156,418	114,062	91,827	83,677	1,585,677
AL Zawaida	95,269	73,134	95,301	119,712	74,163	67,181	88,371	97,325	93,670	71,077	71,263	78,278	1,024,744
AL Mossader	13,089	16,615	14,056	18,738	18,738	26,813	26,519	26,889	29,545	20,237	19,219	17,096	247,554
Dair Al Balah	305,114	289,913	411,349	461,755	441,277	531,439	615,098	615,853	508,488	438,095	540,207	482,050	5,640,638
AL Qrara	100,905	98,511	107,422	120,133	119,425	132,960	139,498	138,314	137,387	138,274	104,036	106,764	1,443,629
Khanyounis	747,583	660,600	779,563	813,704	739,756	871,728	901,744	923,152	903,401	866,368	760,847	737,751	9,706,197
Bani Suhila	136,320	150,718	138,390	165,922	187,930	217,888	211,708	225,547	245,201	198,206	200,829	144,679	2,223,338

Abssan Al Kabera	107,500	122,700	121,900	131,250	137,100	163,604	152,186	163,214	171,600	143,700	153,256	108,000	1,676,010
Abssan Al Jadeda	34,060	36,835	33,280	41,042	43,574	49,975	46,435	56,197	53,627	48,188	45,451	33,235	521,899
Khezaa	42,778	47,150	43,811	51,098	68,820	70,352	64,645	67,960	63,255	61,662	63,445	43,282	688,258
Al Fukhary	26,404	21,161	28,663	30,262	28,582	33,185	35,349	34,497	33,156	32,582	28,431	26,887	359,159
AL Nasser	47,561	33,458	37,910	35,158	68,508	35,859	36,360	43,278	38,673	64,490	37,498	40,513	519,266
AL Shuka	59,230	59,030	53,960	53,880	53,880	76,720	64,300	85,930	88,240	63,710	72,010	50,530	781,420
Rafah	758,255	709,376	808,468	828,422	785,258	852,222	967,925	929,431	921,749	916,027	841,474	780,342	10,098,949
Total Distributed Water in 2021 / Month	8,049,368	7,620,324	8,552,610	9,471,221	9,133,803	9,656,750	10,099,951	10,614,408	10,223,692	9,634,643	9,332,926	8,161,354	<u>110,551,050</u>
Water wells	6,736,413	6,329,682	7,266,848	8,000,977	7,800,307	8,255,267	8,795,750	9,143,426	8,679,975	7,936,234	7,496,762	6,331,444	92,895,537
Sea Water Desalination Plant	177,275	211,932	190,272	295,944	187,696	263,783	212,577	237,584	234,332	411,480	470,060	467,396	3,360,331
Mekerot	1,135,680	1,078,710	1,095,490	1,174,300	1,145,800	1,137,700	1,091,624	1,233,398	1,309,385	1,286,929	1,366,104	1,362,514	14,295,182

Table 5 Total annual MEKEROT Water supply (Israel Line), (m3): Year 2021

Municipality	Jan m³	Feb m³	Mar m³	Apr m³	May m³	Jun m³	Jul m³	Aug m³	Sep m³	Oct m³	Nov m³	Dec m³	2021 m³
Gaza	692500	664800	684200	697500	708600	700400	654200	756800	711200	708700	687800	645300	8312000
Al Nussierat	30700	31900	60000	94600	86200	67190	67410	95400	80100	92800	131880	218040	1056220
AL Burij	47220	64130	34740	37940	4800	4880	22670	23260	27210	45470	67252	139512	519084
Maghazy	47080	37170	70160	41660	13700	24230	24120	17740	30890	9530	29631	46216	392127
Bani Suhila	106841	90372	82890	115261	125781	130411	134198	137127	205074	183813	190749	135964	1638480
Abssan Al Kabera	99381	98249	92215	112388	113594	118370	108136	113864	154115	141063	153256	105979	1410611
Abssan Al Jadeda	30200	25327	20938	30608	32137	34093	30485	38687	43391	40670	42091	30538	399164
Khezaa	38578	34503	28457	41342	57988	55126	46905	46520	53384	60282	63445	40966	567496
Total Per Month	1179580	1113620	1163760	1212960	1156500	1158930	1112244	1247138	1336254	1291858	1395735	1408730	14295182

Table 6 Total annual STLVs production (m3): Year 2021

Desalination Plant	Production (Water meter)	Production (Water meter)	Production (Water meter)	Production (Water meter)	Production (Water meter)	Production (Water meter)	Production (Water meter)	Production (Water meter)	Production (Water meter)	Production (Water meter)	Production (Water meter)	Production (Water meter)	Total Production (Water meter)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2,021
	m3	m3	m3	m3	m3	m3	m3	m3	m3	m3	m3	m3	m3
Deir Al Balah SWDP	-	-	6,925	42,687	19,828	22,531	19,015	24,143	22,750	39,701	34,747	25,393	257,720
Gaza SWDP	149,042	151,343	114,439	164,261	110,793	161,837	129,219	140,667	137,903	256,272	283,807	274,946	2,074,529
Southern Area SWDP	28,233	60,589	68,908	88,996	57,075	79,415	64,343	72,774	73,679	115,507	151,506	167,057	1,028,082
Total Amounted Produced Water in 2021 / Per Month	177,275	211,932	190,272	295,944	187,696	263,783	212,577	237,584	234,332	411,480	470,060	467,396	3,360,331

Table 7 Total Annual Water Supply from different sources – Year 2021

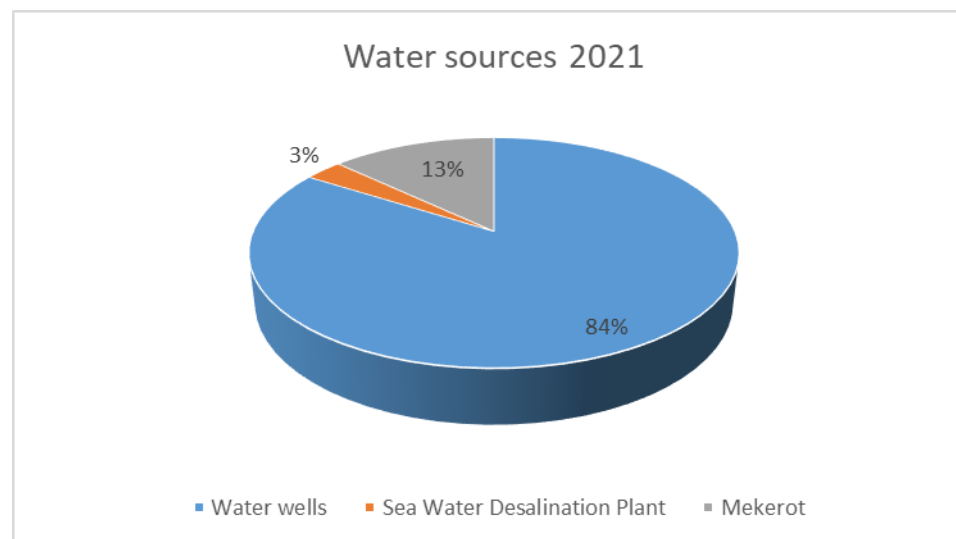


Figure 3: Total annual water supply (m3) January-December 2020

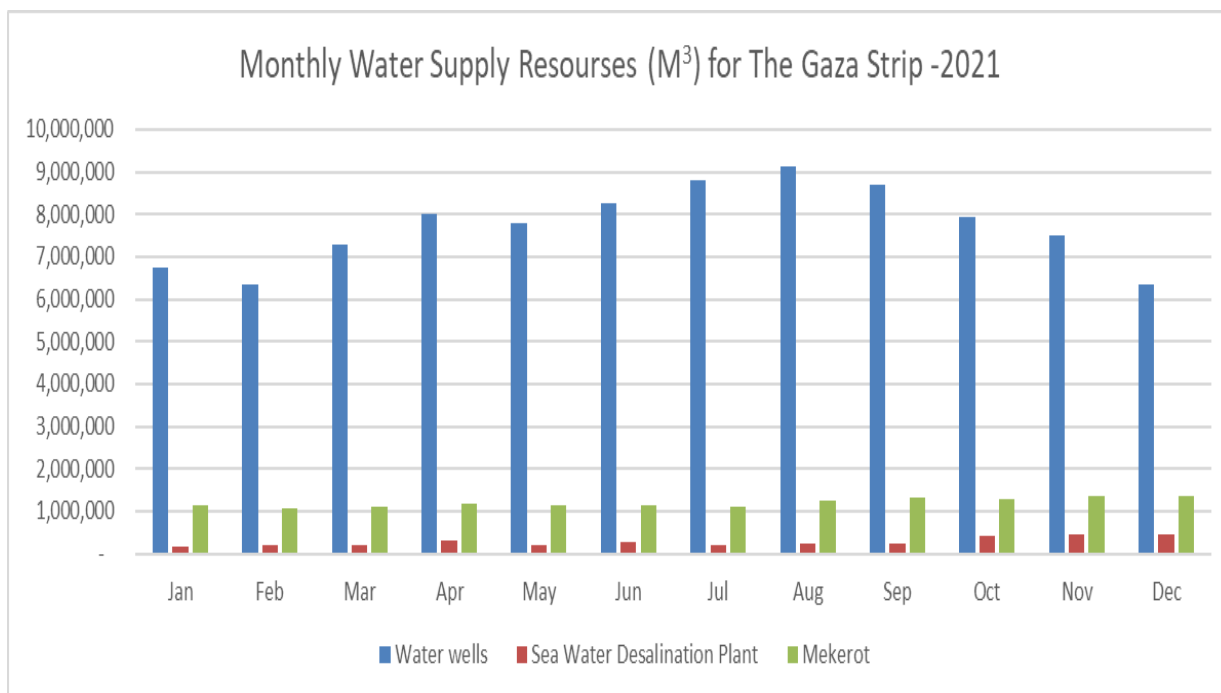


Figure 4: Total annual Production (m3) January-December 2021

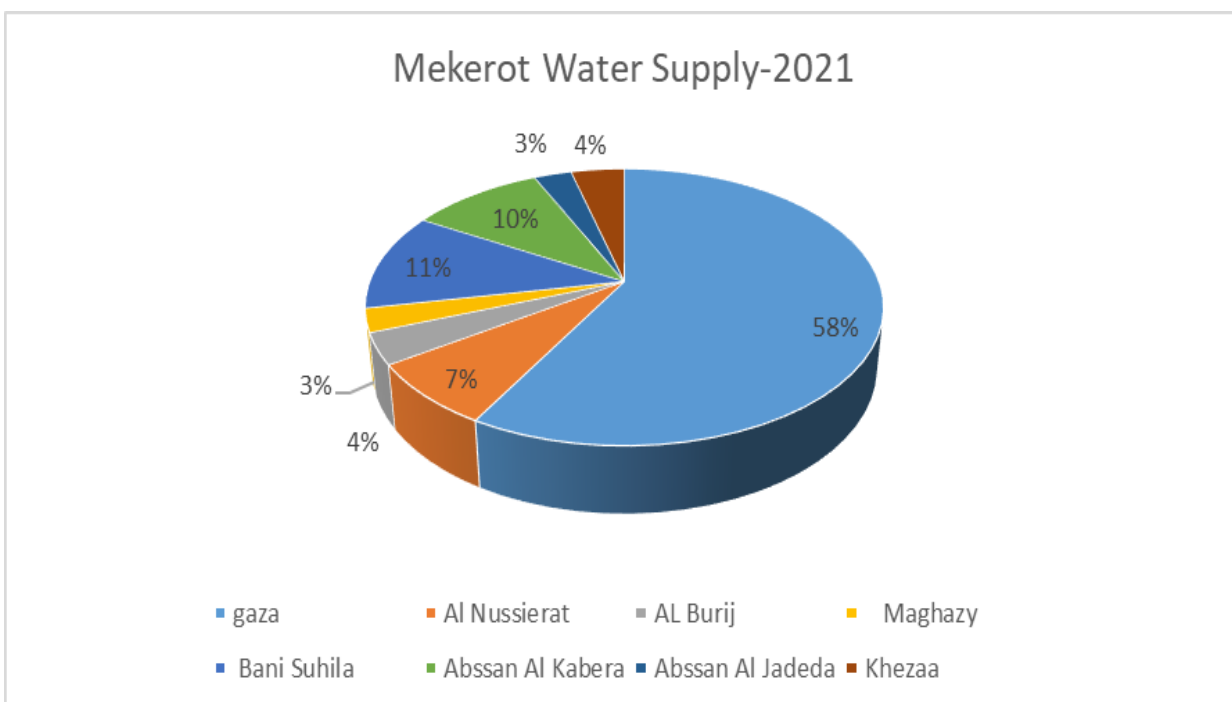


Figure 5 Mekerot water supply as per municipality – 2021

Table 8: Water Quota L/C/D-: January-December 2021

No.	Municipality	Annual Water Production from water wells	STLV	Annual Water supplied from Mekerot (Israel Co.)	Total Annual Water supplied from different resources	Served Population	UFW	Total Annual Water Consumption	Daily Water Consumption Rate (Quota)
		m ³	m ³	m ³	m ³	Capita	%	m ³	liter/c/day
1	Um al nasser	312160			312160	5540	23%	239255	118
2	Beit Hanoon	4503640			4503640	60255	45%	2473773	112
3	Beit lahia	7043375			7043375	101500	58%	2966860	80
4	Jabaliala	14583905			14583905	264000	36%	9285739	96
5	Gaza	27411907	2074529	8312000	37798436	702540	56%	16647985	65
6	Wadi Salqa	300528			300528	9500	28%	216118	62
7	Wadi Gaza	201219			201219	6000	31%	138062	63
8	Al Moghrakah	825340			825340	12800	68%	264479	57
9	Al Zahra	899150			899150	8250	27%	655053	218
10	Al Nussirate	4222241		1056220	5278461	97250	46%	2826738	80
11	Al Buriej	1769014		519084	2288098	53245	44%	1285630	66
12	Al Maghazi	1193550		392127	1585677	32550	45%	865857	73
13	Al Zawiada	1024744			1024744	28100	30%	718422	70
14	Al Musader	247554			247554	3870	47%	131842	93
15	Deir Al Balah	5212808	427830		5640638	87100	46%	3037750	96
16	Al Qarara	1443629			1443629	35000	32%	983899	77
17	KhanYounis	9276807	429390		9706197	271555	28%	7031298	71
18	Bani Suhaila	584858		1638480	2223338	44165	28%	1597831	99
19	Abassan Kabira	265399		1410611	1676010	32240	23%	1281092	109
20	Abassan Jadida	122734		399164	521898	11220	29%	373157	91
21	Kheza'a	120763		567496	688259	13125	14%	592726	124
22	Al Fukhari	359159			359159	8500	34%	238098	77
23	Al Nasser	519266			519266	12750	20%	416843	90
24	Al Shokah	781420			781420	18150	48%	405991	61
25	Rafah	9670367	428582		10098949	247250	40%	6054724	67
Total (m ³)		92,895,537		14,295,182	110,551,050	2,166,455		60,729,222	77

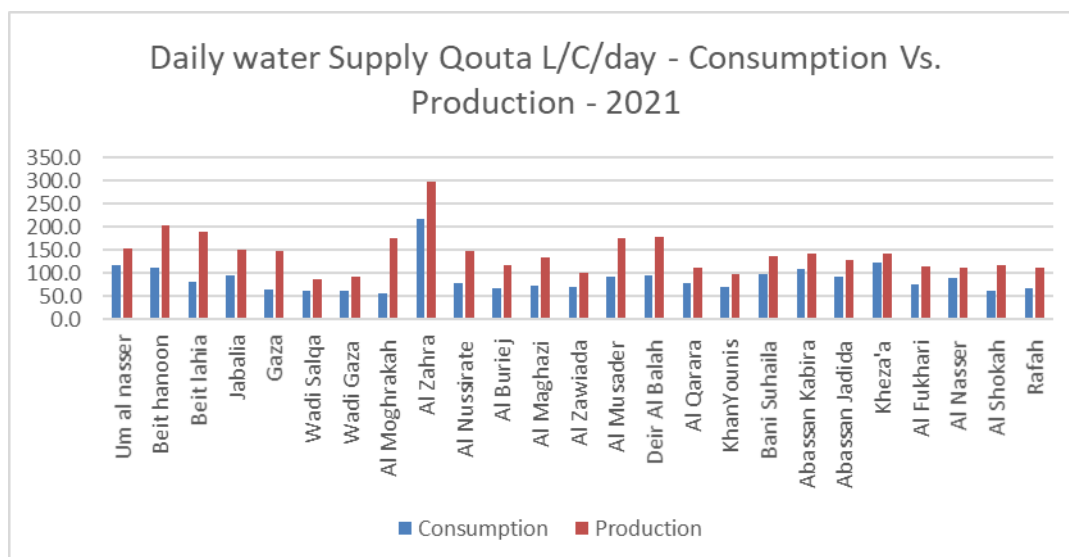


Figure 6 Municipal Water Supply Quota L/C/D: January-December 2021

A.2 Improve Water Facilities

1- Construction New Water Wells

In coherence with the PWA national plan to reallocate, resizing, and closing some designated water wells throughout the Gaza Strip in order to decrease water abstraction from the aquifer and improve the water quality as well; CMWU during the past three years stopped proposing any new construction for water wells and all interventions are limited to maintain and rehabilitate the existing wells or reallocate some damaged or malfunctioned ones, besides completion the construction of some low production water wells to replace the closed wells with high production rates

- Through Qatar Charity; two water wells at Rafah and Khan Younis have been constructed and operated during 2022,
- Reallocation works for Al Nasser water well no.3 have been completed during 2022 and the well is operational now and feeds more than 5000 inhabitants with their water needs, the project was financed by Anera.
- Construction of water well to feed Ben Taymiya desalination plant 50m³/hr (phase I), the work in water well is still suspended due to the delay of materials entry from Israeli, the efforts are exerted to obtain the approval for entering the needed materials (steel pipes, pump, electrical motor) this project is financed by Human Appeal.
- Construction of 3 wells at different areas in Rafah with low production rate 45 m³/hr in order to decrease the abstraction from other wells , the project is completed, it was financed by Kuwaiti Palestinian Association.

- Relocation of Al Moghraka water well F208, the project is completed and it was financed by Anera.
- through AAH fund, Al Atatra water well at Beit Lahia has been upgraded and operated after it was attacked during the Israeli escalations on Gaza Strip



Figure7: Construction Water Wells at Rafah

2. Electrical Refurbishment, Upgrading and Repairs Installations

CMWU has continued to implement and manage all electromechanical works and installations required to improve the functionality of water wells and other associated systems to provide optimal operating and maintenance conditions. This will secure and protect the level of water productivity over different seasonal demand periods and throughout the regions.

CMWU continued its strategy of electrifying all newly constructed water wells and other water facilities, for example. Water tanks with booster stations, desalination plants, water wells and sewage pump stations by connecting them to the public electricity grid lines, all in coordination with the Gaza Electricity Distribution Company (GEDCO Co.) and the Palestinian Water Authority (PWA). The electricity activities include but not limited with:

- Installing high and low voltage electrical network lines with all transformers connected to some water facilities, while there are other facilities waiting approval from donors to involve with this intervention.

- Installing a second power line or permanent power lines for vital water and wastewater facilities (sewage pumping stations, water tanks and booster stations), where 29 facilities were provided with live lines to be activated during wars with remote control technology, and new facilities were provided with electricity by a feeder A second electrician from GEDCO Co. in addition to the previous facilities that will be electrified during emergency and hostile conditions. The ICRC funded this program to enhance operational preparedness within the framework of the Emergency Preparedness Plan (EPP) for the water sector in the Gaza Strip.

- Complete the SCADA works for the previous 100 water well sites located in remote areas, this will secure water services and utility operation needs during war situations without human intervention, 58 water wells out of 100 sites had been prepared with SCADA systems using SMS media to complete Controlling the facility automatically remotely.

- Starting with SCADA system for 7 wastewater facilities in Jabalia area by using VPN communication lines and central control room in municipality, ICRC adopted the program to achieve optimal operation with reliability and sustainability for wastewater system.

Due to the unavailability of spare parts resulting from continual security control by Israeli authorities over the materials supplied across the borders and dual-use classification, severe shortages of essentially required spare parts have been encountered. Due to this process CMWU still facing problems in transferring materials to Gaza especially the electrical materials like all types of power and control cables, soft starters, variable speed drivers, electrical and electronic instruments.... etc. Fortunately, some required materials were available in CMWU main warehouse, and have been used for electrical repairs and maintenance works in some water and wastewater facilities during the past year. The main repair and maintenance works during the year 2021 are classified to upgrading, maintenance, rehabilitation up to development works summarized here below:

Upgrading Works:

Table no Summary of upgrading works.

Municipality	Facility Name	Facility Type	Intervention
Wadi Gaza	Wadi Gaza Water well	Water Well	Electrical Panel 160A
Bait Lahia	Fatma Al Ali water well	Water Well	Electrical Panel 63A
Al Shouka	Malyzi water well	Water Well	Complete ATS, 200A
Rafah	Al Shoath DP	Desalination Plant	Ultrasonic level meter

Overall Gaza strip	Several sites	W&WW facilities	Wall and pole type lighting units
Khan Younis	Al Tanfedia P.S	Pump Station	Electrical Panel 63A
Bait Lahia	Aslan 5	Water Well	Electrical Panel 63A
Rafah	Jemmezet El Sabeel	Pump Station	Ultrasonic level meter
Khan Younis	Hamad P.S	Pump Station	Sensor for Ultrasonic level meter

Maintenance:

Table no. summary of maintenance works.

No.	Municipality	Facility Name	Work description
1	Wadi Gaza	Wadi Gaza west well	under voltage and phase sequence protection relay with time delay Entes type or equivalent.
2	Dair el balah	Al Bassa SWDP	under voltage and phase sequence protection relay with time delay Entes type or equivalent. three phase power Contactor up to 15KW, 30 Amps, 3poles , 400V, 50Hz with 2NO/NC contacts of Moeller type DILM model or equivalent with all needed auxiliaries according to site requirements
3	Al Buriij	Al Montazah Well – Buriij	Repair and maintenance of soft starter power and control circuits, the works include replace all defected parts like IGBT's, control boards and others.
4	Al Maghazi	Al Doha Well	Repair and maintenance of soft starter power and control circuits, the works include replace all defected parts like IGBT's, control boards and others.
5	Al Nasser	Al Nasser No.1 well	Supply and install high pressure switch, Danfoss type or equivalent, RT116
6	Al Zawaidah	Al Rawda well - Zawaidah	Supply and install high pressure switch, Danfos type or equivalent, RT116

7	Bait lahia	Amer P.S.	Supply and install power factor correction controller as specifications mentioned here below: Number of steps output contacts: 9 or more. Rated supply voltage: 90....550 VAC. IP degree of protection - Rear face: IP20 - Front face: IP54 Operating mode: Manual or Automatic. Device connection communication protocol: Modbus interface RS485. Backlit LCD
8	Rafah Khan Younis Bait Lahia	Jninah, Tal Al Sultan P.S. Hesbet, El Samak P.S. Amer P.S	Supply and install power factor correction controller as specifications mentioned here below: Number of steps output contacts: 9 or more. Rated supply voltage: 90....550 VAC. IP degree of protection - Rear face: IP20 - Front face: IP54 Operating mode: Manual or Automatic. Device connection communication protocol: Modbus interface RS485. Backlit LCD
9	Khan Younis	Hesbet, El Samak P.S.	Supply and install shielded cable 3X0.5 mm2 for existing ultrasonic transducer sensor.
10	Al Burij	S.72	Supply and install capacitor contactor with capacity 25 KVAR
11	Al Nusirate	F 208 Water well	Three phase power Contactor up to 15KW, 30 Amps, 3poles , 400V, 50Hz with 2NO/NC contacts of Moeller type DILM model or equivalent with all needed auxiliaries according to site requirements
12	Wadi Salqa	West Well	Three phase power Contactor 50 KW
13	Rafah	Jemmezet El Sabeel	Supply and install shielded cable 3X0.5 mm2 for existing ultrasonic transducer sensor.
14	Rafah Khan Younis	Jeninah, UNDP Jemmizet El Sabeel Tal Al Sultan Hesbets Al Samak Al Wafiia P.S.	Supply and install shielded cable 3X0.5 mm2 for existing ultrasonic transducer sensor.

15	Rafah Khan Younis Bait Lahia	Tal Al Sultan P.S. Hesbet El Samak P.S. Amer P.S.	Supply and install power factor correction controller.
16	Al Mughraqa	Al Kawther Reservoir	under voltage and phase sequence protection relay with time delay Entes type or equivalent.
17		Tika Reservoir	Supply and install shielded cable 3X0.5 mm ² for existing ultrasonic transducer sensor.
18	Wadi Gaza	Water well Eastern	Supply and install 3x160A complete electrical control switchboard with all associated power and control circuit.
19	Bait lahia	Fatmah Al Ali Well	Supply and install 3x63 A complete electrical control switchboard with all associated power and control circuit.
20	Rafah	Tal Al Sultan P.S.	Micro switch or limit switch of metal for Non return valve. Supply and install power contactor 15KW.
21	Rafah	WWTP	Mercery Float Switch. Panel Mounted Digital Ammeter or voltmeter , 96X96 mm. Supply and install street light. pressure switch, 0 up to 16 bar, water proof
22	Rafah	Block O	Three phase power Contactor up to 15KW, 30 Amps, 3poles , 400V, 50Hz with 2NO/NC contacts of Moeller type DILM model or equivalent with all needed auxiliaries according to site requirements
23	Khan Younis	UNICEF Seawater Desalination Plant	Supply and install street light.
24	Rafah	Jemmezet El Sabeel	Supply and install street light.
25	Rafah	WWTP	Panel Mounted Digital Ammeter or voltmeter , 96X96 mm
26	Al Shouka	Jameiia Well	Panel Mounted Digital Ammeter or voltmeter , 96X96 mm. under voltage and phase sequence protection relay with time delay Entes type or equivalent.
27	Al Shouka	Malaysian Well	Supply and install complete and as unit of automatic change over, contactor type, 4 pole, 100 KW
28	Rafah	TRC 1	Three phase power Contactor up to 50KW.

29	Khan Younis	Several P.S.	Mercury Float Switch. Panel Mounted Digital Ammeter or voltmeter , 96X96 mm. Supply and install street light. pressure switch, 0 up to 16 bar, water proof
30		Hatabiiah P.S. Dawwas P.S. AL Tanfediiia P.S.	Supplying and erecting Ultrasonic level detector of PULSAR.
31	Overall Gaza Strip	Several water and wastewater Facilities.	Supply and install street light.
32	Rafah	WWTP	Contactora 30 KVAR
33	Rafah	Miraj Reservoir	Contactora 25 KVAR
34	Rafah	Hashash Well	Contactora 25 KVAR
35	Rafah	Shooth DP	Contactora 15 KVAR
36	Rafah	Jemmezeta El Sabeel	Contactora 25 KVAR
37	Nusirate	Taj Al Waqar Well	Panel Mounted Digital Ammeter or voltmeter , 96X96 mm. current transformer of suitable input ratings and output 5 A . Contactora 100 KVAR
39	Zawaidah	Al Ansar	under voltage and phase sequence protection relay with time delay Entes type or equivalent.
40	Zawaidah	Al Ansar	Panel Mounted Digital Ammeter or voltmeter , 96X96 mm
41	Khan Younis	Al Maqaber P.S.	Supply and install 3x63 A complete electrical control switchboard with all associated power and control circuit .
42	Bait lahia	Dawwas P.S.	Supplying and erecting Ultrasonic level detector of PULSAR, 3 relays, Siemens type
43	Bait lahia	Hatabiiah P.S.	Supplying and erecting Ultrasonic level detector of PULSAR, 3 relays, Siemens type
44	Khan Younis	Wafeiia P.S	Supplying and erecting Ultrasonic level detector of PULSAR, 3 relays, Siemens type
45	Rafah	Jemmezeta El Sabeel P.S.	Supplying and erecting Ultrasonic level detector of PULSAR, 5 relays, Siemens, Ultra equivalent type with touch keypad of analogue 4-20 mA input and output signal with five electronic output relay. the instrument shall be supplied with

			waterproof ultrasonic transducer of IP- 65 and of 10-meter depth detector, range to be install above water level
46	Bait lahia	Al Manshiiah	Supplying and erecting Ultrasonic level detector of PULSAR, 5 relays, Siemens, Ultra equivalent type with touch keypad of analogue 4-20 mA input and output signal with five electronic output relay. the instrument shall be supplied with waterproof ultrasonic transducer of IP- 65 and of 10-meter depth detector, range to be install above water level
47	Jabalia	Hawaber P.S.	Supply and install 630A main circuit breaker.
48	Bait lahia	Dawwas P.S.	The work includes supply and install FRP electrical panel 40X30 cm with MCB's for 3 pumps and all connections, terminals, control and power cables from main panel to the wet pit panel.
49	Rafah	P148	Supply and install shielded cable 3X0.5 mm2 for existing ultrasonic transducer sensor.
50	Bait lahia	WWTP	Supply and install three phase pump type, heat monitoring device, thermistor overload relay, Without manual reset, mains and fault LED display, test button, rated control voltage (24 - 240 V, 50 - 400 Hz ,24 - 240 V DC).



Development Works:

The works to develop the WASH facilities targeted the water facilities by automation and SCADA operation and provide second electrical power feeder.

Automation and SCADA

CMWU has intervention with ICRC to establish on time SCADA system for wastewater facilities, the first area in this program is Jabalia Municipality. The project includes supply, install, test and commission all required hardware and software for 7 facilities which are Tal Al Zaater pumping station, Abu Rashed P.S, pumping station, Abu Rashed storm water, Hawaber pumping station, Al Saftawi, Al Alamy pumping station, Mahader pumping station. The system involves main components such as:

Control room in municipality building:

The room prepared to include server, firewall, screen, operator PC and furniture.

Pump stations:

There are 7 pump stations linked with control room, there were prepared with PLC, transducers, routers, VPN communication lines with firewalls and other related equipment.

The system is facing difficulties to finished due to frequent rejection from Israeli side to enter server and firewalls, ICRC try to endorse issue by reserve the service of server from local service provider like

as Palestinian communication company PALTEL, this solution will give us flexibility in future to establish all SCADA system in all municipalities without facing the same problems.

Automation and SCADA system targeted 8 wells as full SCADA and more than Fifty wells fully automated. The aim of this work is to avoid operational risks during war and to develop SCADA operation in the future.

The targeted wells are distributed for seven municipalities and the SCADA is positioned near borders and open area.

In this stage of installation, the entire SCADA system shall be purposely driven by mobile message to access facility for operation and monitoring until getting modular and sustainable system which will include master control room at CMWU and other branches at municipalities.

Table no. of SCADA system for water wells which were implemented during 2020 - 2021

No.	Municipality	Location
1	Bait Hanoun	Sultan Abdel Hameed well
2	Beit Lahia	Shyma borewell
3	Buraij	Al-Zajar (S-79) borewell
4	Maghazi	S-71
5	Musader	Musader well
6	Wadi Salqa	Wadi Salqa Western
7	Qararh	Matahen- Al jadead
8	Rafah	Seka water well
9	Rafah	Hashash borewell
10	Rafah	Abu Zohri borewell
11	Rafah	Safa borewell
12	Rafah	Malaysian borewell
13	Maghazi	S.82
14	Khan Younis	Hamad well No. 3
15	Khan Younis	Hamad well No. 2
16	Khan Younis	Hamad well No. 1
17	Maghazi	Wakala well S-65
18	Fukhari	Fukhari well no. 2
19	Beit Lahia	ATATRA well
20	Beit Lahia	BESAN well
21	JABALIA	Asalya well
22	JABALIA	EL FATEH
23	WADI GAZA	WELL NO.2 - Desalination F205
24	NUSIRATE	G.56 - Nusirate Well 1
25	Zahra	F208

26	Maghazi	S-80 well (Husni)
27	BANI SUHAILA	TIKA 1
28	Rafah	TRC3 borewell
29	Khan Younis	Kuwaiti - L214 well
30	Deir Al Balah	Montaz well
31	Bait Hanoun	New Jenin well
32	Deir Al Balah	Tarazi well
33	Deir Al Balah	Sahel No.5
34	Deir Al Balah	Sahel No.6
35	Deir Al Balah	Al Laham
36	Deir Al Balah	Al Balad j-32
37	Deir Al Balah	Al Berka K-20
38	Qararh	Aylaboon
39	Khan Younis	Al Barakah
40	Rafah	UNDP
41	Rafah	P/148



3- Mechanical Refurbishment, Upgrading and Repairs Installations

During the period of this report from January to December 2021, several mechanical refurbishment repairs, upgrading works and repair installations have been continued to be managed and carried out at various operating water facilities .Purpose has been applied to keep the existing and the new water installations functioning well to cover service demands especially during COVID-19 outbreak in addition to improving 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:



Figure1: Rehabilitation of destroyed f203 well – Al moghraqa



Figure2: Rehabilitation of Omari well - Jabalia



Figure3: Upgrading of Al naser 3 well – Al naser



Figure4: Replacement of K-19 well's manifold – Al Qarara

table 12 List of upgrading works at water facilities

Item	Project	Municipality	Facility	Description	Donor
1	emergency Repair of essential wash Facilities in Gaza strip	Beit Hanoon	Abu ghazala Well	Supply & install new complete vertical pump with new 6" manifold	MAAN-OCHA
2	emergency Repair of essential wash Facilities in Gaza strip	Beit Hanoon	Al Ezba Well	Supply & install new complete 6" manifold + chlorine dosing pump	MAAN-OCHA
3	emergency Repair of essential wash Facilities in Gaza strip	Beit Lahia	AL Mashroo Well	Supply & install new complete 10" manifold + chlorine dosing pump+ electromechanical maintenance for the existing vertical pump	MAAN-OCHA
4	Rehabilitation of Public desalination Plants In Gaza strip	Beit Hanoon	Khadija well DP	Maintenance of DP plants components and steel container	ACF-OCHA
5	Rehabilitation of Public desalination Plants In Gaza strip	Beit Lahia	AL Mashroo Well DP	Maintenance of DP plants components and steel container	ACF-OCHA
6	Rehabilitation of Public desalination Plants In Gaza strip	Jabalia	AL Zohor DP	Complete transfer DP to AL zohor well location and maintenance of DP with new steel shed	ACF-OCHA
7	emergency Repair of essential wash Facilities in Gaza strip	Khanyounis	AL Rahma Well	Drilling new complete water well with electromechanically components and maintenance works for the existing pumps + construction of new well building room	MAAN-OCHA
8	emergency Repair of essential wash Facilities in Gaza strip	AL Shokah	AL Matar Well	Supply & install new complete vertical pump with new 6" manifold	MAAN-OCHA
9	Construction of destroyed water well No W2 in tal al sultan- Rafah	Rafah	W2- Ground Tank	Drilling new complete water well with electromechanically components and new vertical turbine pump	PEF
10	Maintenance of Mechanical works in water Facilities in Gaza strip	Nusairat	G 57 well	Rewinding 50 HP hollow shaft motor with new bearings	GIZ
11	Maintenance of Mechanical works in water Facilities in Gaza strip	Al Shokah	AL Jameya well	Rewinding 60 HP hollow shaft motor with new bearings	GIZ
12	Maintenance of Mechanical works in water Facilities in Gaza strip	Rafah	P15 well	Rewinding 75 HP hollow shaft motor with new bearings	GIZ
13	Maintenance of Mechanical works in water Facilities in Gaza strip	Beit Lahia	Salateen well	Rewinding 150 HP hollow shaft motor with new bearings	GIZ
14	Maintenance of Mechanical works in water Facilities in Gaza strip	Rafah	Safa well	Rewinding 75 HP hollow shaft motor with new bearings	GIZ
15	Maintenance of Mechanical works in water Facilities in Gaza strip	Beit Hanoon	Khadija well	Maintenance of existing vertical pump	GIZ
16	Maintenance of Mechanical works in water Facilities in Gaza strip	Rafah	Saudi tank well	Maintenance of existing vertical pump + new 4" pipes	GIZ

17	Maintenance of Mechanical works in water Facilities in Gaza strip	Khanyounis	Southern UN Well	Maintenance of existing vertical pump	GIZ
18	Maintenance of Mechanical works in water Facilities in Gaza strip	Khanyounis	Hamad2 Well	Maintenance and rehabilitation well bore hole	GIZ
19	Maintenance of Mechanical works in water Facilities in Gaza strip	CMWU	STLV 10,000	Rewinding two 100 HP hollow shaft motor with new bearings	GIZ
20	Maintenance of Mechanical works in water Facilities in Gaza strip	Jabaliala	Omari Well	Maintenance of existing vertical pump + New complete 6" manifold	GIZ
21	Maintenance of Mechanical works in water Facilities in Gaza strip	Maghazi	S90 Well	Maintenance of existing vertical pump + Bearing for motor	GIZ
22	Maintenance of Mechanical works in water Facilities in Gaza strip	Rafah	Ground tank well	Rewinding 60 HP hollow shaft motor with new bearings	GIZ
23	Maintenance of Mechanical works in water Facilities in Gaza strip	Bureij	Ben Saeed Well	Supply and install complete new submersible pump 30HP with steel pipes 4"	GIZ
24	Maintenance of Mechanical works in water Facilities in Gaza strip	Beit Hanoon	Al Ezba Well	supply and install new distribution complete 6" manifold	GIZ
25	Maintenance of Mechanical works in water Facilities in Gaza strip	Jabaliala	Al Bosna well	Maintenance of existing vertical pump	GIZ
26	Rehabilitation of Public DP's in Gaza Strip	Maghazi	AL muntazah DP	Maintenance works for the existing DP	AAH
27	Rehabilitation of Public DP's in Gaza Strip	Bani Suhaila	AL Najar DP	Maintenance works for the existing DP	AAH
28	Rehabilitation of Public DP's in Gaza Strip	Khanyounis	Al Satar DP	Maintenance works for the existing DP	AAH
29	Rehabilitation of Public DP's in Gaza Strip	Khanyounis	Al Huda DP	Maintenance works for the existing DP	AAH
30	Rehabilitation of Public DP's in Gaza Strip	Nusairat	Kalabosh DP	Maintenance works for the existing DP	AAH
31	Rehabilitation of Public DP's in Gaza Strip	Nusairat	Al Forqan DP	Maintenance works for the existing DP	AAH
32	Rehabilitation of Public DP's in Gaza Strip	Um Al Nasser	Second Valley DP	Replace the existing DP with new containerized DP	AAH
33	Rehabilitation of Public DP's in Gaza Strip	Jabaliala	Hawuz DP	Maintenance works for the existing DP	AAH
34	CMWU O&M Maintenance of W-WW Facilities 2021	Al Shokah	Booster pumps	Maintenance of existing vertical pump	ICRC
35	CMWU O&M Maintenance of W-WW Facilities 2021	Nusairat	Taj AL Waqar	Dismantle the deteriorated submersible pump	ICRC
36	CMWU O&M Maintenance of W-WW Facilities 2021	Al Shokah	ANERA tank Boosters	Maintenance of existing vertical pump	ICRC
37	CMWU O&M Maintenance of W-WW Facilities 2021	Rafah	TRC2 well	Maintenance of existing vertical pump	ICRC

38	CMWU O&M Maintenance of W-WW Facilities 2021	Jabalia	AL Hessi well	Supply and install new upper and lower bearings for electrical motor 125 HP	ICRC
39	CMWU O&M Maintenance of W-WW Facilities 2021	Deir AL Balah	Al Oreef well	Replace the existing submersible pump	ICRC
40	CMWU O&M Maintenance of W-WW Facilities 2021	Deir AL Balah	Al Maani well	Replace the existing submersible pump	ICRC
41	CMWU O&M Maintenance of W-WW Facilities 2021	Eastern water council	TIKA well	Maintenance of existing vertical pump	ICRC
42	CMWU O&M Maintenance of W-WW Facilities 2021	Rafah	P-148 well	Construction of new electrical and SCADA room	ICRC
43	CMWU O&M Maintenance of W-WW Facilities 2021	Zahraa	G-50 well	Maintenance of gland box, bearing for electrical motor	ICRC
44	CMWU O&M Maintenance of W-WW Facilities 2021	Nusairat	G-49 well	Maintenance of existing vertical pump	ICRC
45	CMWU O&M Maintenance of W-WW Facilities 2021	Wadi Gaza	AL Rayyes well	Maintenance of existing vertical pump	ICRC
46	CMWU O&M Maintenance of W-WW Facilities 2021	Nusairat	G-56 well	Maintenance of existing vertical pump	ICRC
47	CMWU O&M Maintenance of W-WW Facilities 2021	Beit Lahia	AL Nozha well	Rewinding 75 HP hollow shaft motor with new bearings+ maintenance of the gland box	ICRC
48	CMWU O&M Maintenance of W-WW Facilities 2021	CMWU	CMWU warehouse	Rewinding 150,100,75,40,30 HP hollow shaft motors with new bearings	ICRC
49	CMWU O&M Maintenance of W-WW Facilities 2021	CMWU	STLV 10,000	Rewinding 100 HP hollow shaft motor with new bearings	ICRC
50	CMWU O&M Maintenance of W-WW Facilities 2021	Jabalia	Aregoni well	Maintenance of existing vertical pump	ICRC
51	CMWU O&M Maintenance of W-WW Facilities 2021	Jabalia	AL Zohor well	Supply and install new complete 8" manifold	ICRC
52	CMWU O&M Maintenance of W-WW Facilities 2021	Rafah	Sika well	Supply and install fittings, G.v6", 4", ARV2", pressure gauges	ICRC
53	CMWU O&M Maintenance of W-WW Facilities 2021	Rafah	CANADA Tank well	Supply and install fittings	ICRC
54	CMWU O&M Maintenance of W-WW Facilities 2021	Bureij	Maqbola well	Spy and install complete submersible pump with 30HP motor	ICRC
55	CMWU O&M Maintenance of W-WW Facilities 2021	Khanyounis	Stadium well	Rewinding 75 HP hollow shaft motor with new bearings	ICRC
56	CMWU O&M Maintenance of W-WW Facilities 2021	AL Nasser	water network	Supply and install steel bend 12"	ICRC
57	CMWU O&M Maintenance of W-WW Facilities 2021	Deir AL Balah	Abu Nasser Well	Supply and install fittings	ICRC
58	CMWU O&M Maintenance of W-WW Facilities 2021	Deir AL Balah	Abu Marwan Well	Supply and install fittings + maintenance of vertical pump unit	ICRC

59	CMWU O&M Maintenance of W-WW Facilities 2021	AL Nasser	World Bank well	Supply and install upper bearing for 75HP motor	ICRC
60	CMWU O&M Maintenance of W-WW Facilities 2021	Beit Lahia	Ghaben well	Maintenance of existing vertical pump	ICRC
61	Installation of Solar Panels in DP's in Gaza Strip	Jabalia	Hawuz DP	Supply and install complete PV system to operate the DP	AAH
62	Installation of Solar Panels in DP's in Gaza Strip	Beit Hanoon	Khadija well DP	Supply and install complete PV system to operate the DP	AAH
63	Installation of Solar Panels in DP's in Gaza Strip	Um Al Nasser	Seconded Valley DP	Supply and install complete PV system to operate the DP	AAH
64	Installation of Solar Panels in DP's in Gaza Strip	Beit Lahia	AL Mashroo DP	Supply and install complete PV system to operate the DP	AAH
65	Installation of Solar Panels in DP's in Gaza Strip	Zawaida	Municipality DP	Supply and install complete PV system to operate the DP	AAH
66	Installation of Solar Panels in DP's in Gaza Strip	Maghazi	AL muntazah DP	Supply and install complete PV system to operate the DP	AAH
67	Installation of Solar Panels in DP's in Gaza Strip	Abasan Khabira	AL Masara DP	Supply and install complete PV system to operate the DP	AAH
68	CMWU O&M Maintenance of W-WW Facilities 2021	Rafah	P138 well	Maintenance of existing vertical pump	ICRC
69	CMWU O&M Maintenance of W-WW Facilities 2021	Deir AL Balah	Muntazah, Abu Nasser, Abu Marwan and J32 wells	Sand Blasting and repaint the manifolds+ maintenance of gland boxes	ICRC
70	CMWU O&M Maintenance of W-WW Facilities 2021	Deir AL Balah	Different wells	Supply and install fittings	ICRC
71	CMWU O&M Maintenance of W-WW Facilities 2021	Zawaida	Tal Al Zohor, Rawdah wells	Sand Blasting and repaint the manifolds+ maintenance of gland boxes	ICRC
72	CMWU O&M Maintenance of W-WW Facilities 2021	Jabalia	Aregoni well	Supply and install cooling system	ICRC
73	CMWU O&M Maintenance of W-WW Facilities 2021	Jabalia	Asalia well	Supply and install cooling system	ICRC
74	CMWU O&M Maintenance of W-WW Facilities 2021	Rafah	P-148 well	Construction of new well room including electromechanically maintenance for the pump and panel	ICRC
75	CMWU O&M Maintenance of W-WW Facilities 2021	Beit Hanoon	Hamad well	Supply and install cooling system	ICRC
76	CMWU O&M Maintenance of W-WW Facilities 2021	Bani Suhaila	Western Tank	Maintenance of the gland boxes	ICRC
77	CMWU O&M Maintenance of W-WW Facilities 2021	Qarara	AL Jeya well	Supply and install new complete 6" manifold	ICRC
78	Maintenance of Mechanical works in water Facilities in Gaza strip	CMWU	CMWU warehouse	Supply materials for water facilities to CMWU warehouse	GIZ

79	Maintenance of Mechanical works in water Facilities in Gaza strip	Beit Lahia	AL Shawwa well	Rehabilitation of well borehole+ rewinding electrical motor + maintenance works for existing manifold+ maintenance of the existing vertical pump	GIZ
80	Drilling, Construction and Equipping of New Water Well To Feed RO Plant	Rafah	Ben Taymiya DP raw water well	Drilling new water well, new steel pipes 12", new well room and new 160mm UPVC pipes with length of 350m, supply and install vertical turbine pump with new electrical panel and connect the well with GEDCO electrical network.	Human Appeal
81	Maintenance of Mechanical works in water Facilities in Gaza strip	CMWU	AL Bassa STLV	Supply and install mechanical seal for permeate water booster pumps	GIZ
82	Maintenance of AL Nasser No.3 Water Well	AL Nasser	AL Nasser3 well	Dismantle the existing well casing pipes and drilling new water well borehole, install new S.S screen with existing and new 12" steel pipes, supply and install new submersible pump, rehabilitation works for existing electrical panel, supply and install new 160mm UPVc pipes with length o 1000m.	ANERA
83	Maintenance of F203 Water Well	Moghraqa	F203 Well	Dismantle the existing well casing pipes and drilling new water well borehole, install new S.S screen with existing and new 12" steel pipes, maintenance works for the existing vertical pump, rehabilitation works for existing electrical panel, Construction works new service building	ANERA

The repair records show that more than **100** predictive, preventive and corrective maintenance job orders were carried out and applied at various areas. While, the registry of major mechanical & electrical repairs, and maintenance job orders reached **80** of various repairs.

B. Upgrading of Water Resource facilities:

B.1: upgrading of Ben Taymiya desalination plant to be 2400 m³/d – Rafah:

It is under upgrading, a water desalination plant to produce 2,400m³ of clean water every day. The plant will treat water against salinity, bacterial contamination and high rates of nitrates. Source water will be secured through the construction of three public municipal wells of 50m³ per hour to feed the plant.

Gaza municipalities pump domestic water through the networks to serve the population of Gaza. However, the supplied water is for domestic use only and does not fit for drinking as the salinity of tap water would be between 3,000 to 5,000 ppm and the total dissolved solids (TDS) can reach up to 10,000

ppm (parts per million) in some parts of Rafah. In this project, water treatment will aim at producing clean water of TDS less than 500 ppm at all time.

After the treatment process, product water will be mixed with partially treated and safe water in a 100m³ tank and will then be pumped through the networks to beneficiaries. The purpose of blending is to improve the quality of domestic water from 7,000 ppm before blending to 500ppm or less after blending. According to WHO standards, TDS of 300 to 600ppm is considered good quality. Blending is a national policy endorsed by Palestinian Water Authority. All municipalities of the Gaza Strip blend water to increase the quantities of water while maintaining a good water quality standard.

The desalination plant shall be comprising of two modular packaged skid mounted type with all associated equipment and installations.

The plant inflow raw water shall be pumped from the water wells to 150m³ concrete raw water tank, pumped and passing through the plant processing stages of pre-treatment, RO treatment and post treatment from which the permeate water shall be collected into 100 m³ product water tank where blending and disinfection and PH adjustment shall be applied to modify the water quality matching WHO water quality standards. (PH in range 6.5 - 8)

As a result of RO desalination process, high concentrated saline water shall be rejected as brine water of more than 10000ppm TDS concentration for such plant having the raw brackish water of 7000-7500 ppm TDS. The brine water shall be drawn to the nearest existing drainage chamber which shall be connected to the brine rejection and collection system to be pumped to the nearest sewage discharge point along with made of UPVC pipes.

The location for the plant will be next to Ben Taymiya Desalination plant (served Al Brazil camp and Al Salam district), within the same area but to cover the need for Eastern area of Rafah city (Al Juninah and Amer project districts).

CMWU has been granted ownership of the land allocated to this project

Beneficiaries will directly access water via grid. CMWU is the water utility responsible for supplying homes with water directly in Rafah not via municipalities. Therefore, there is no mediator between CMWU and direct beneficiaries.

Once desalinated, water will go straight to people's homes. Beneficiaries will access water directly to their homes via the metered grid.

In other governorates of Gaza, it is the municipalities who manage water supplies. However, in Rafah only it is the total responsibility of CMWU, as a semi-governmental organisation, to supply water to households directly.

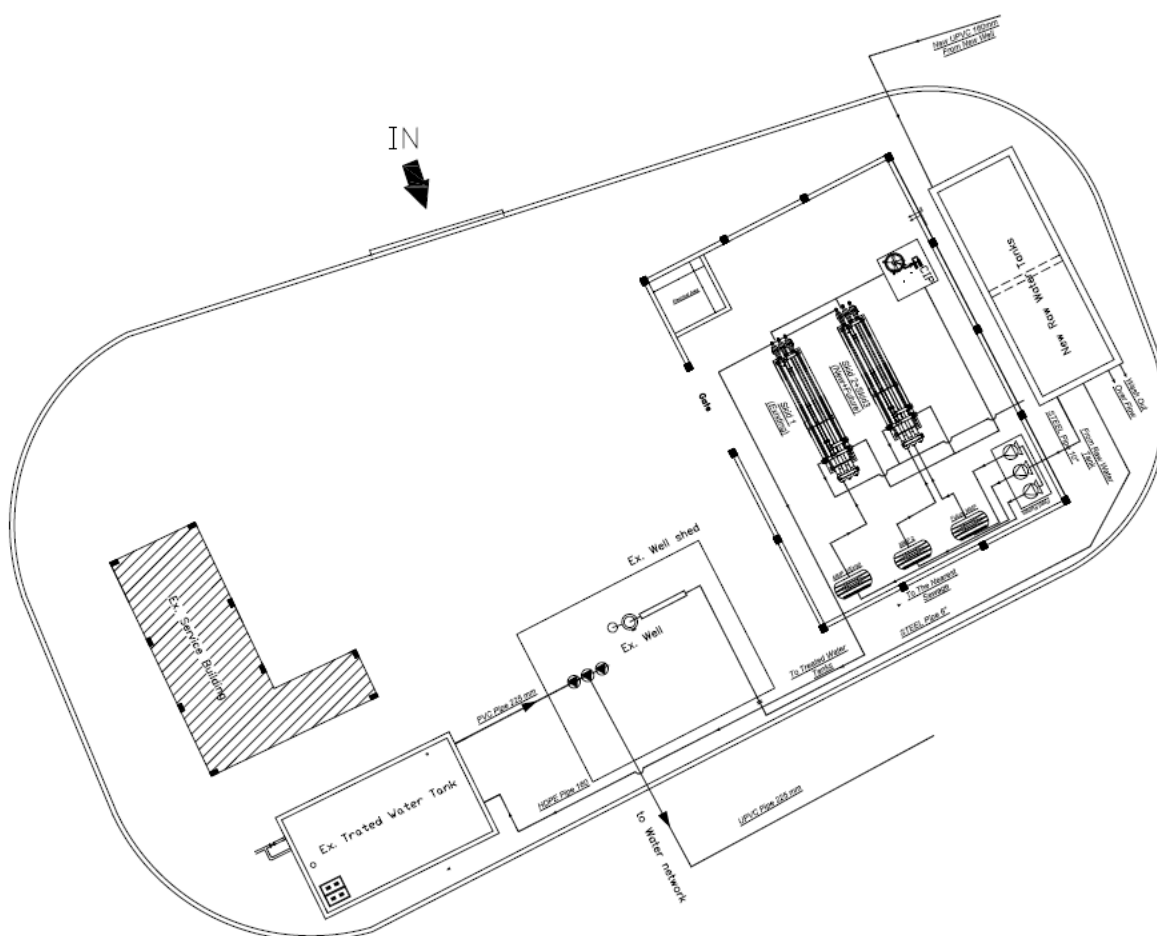
The project separated to two packages:

- ✓ Package no.1: Package 01: Drilling, construction and equipping of new water well to feed RO Plant with Brackish Raw Water supply (outcome no.1).
 - Drilling one public water well of 80m³ per hour capacity, equipped with all electromechanical systems, to serve as the feed for the desalination plant.
 - Supply and install 6" diameter UPVC pipeline to connect the new drilled water well to the new concrete 150 m³ raw water tank.
 - Contraction of new well room with all associated works.

After agreement signature on Nov. 2021, CMWU technical team with partnership with H.A team started preparation of the tender documents, dates and

- ✓ Package 02: Construction and Equipping Additional Well Head Brackish Water Desalination Plant of 50 m³/hr Capacity (outcome no.2).

- Construction and equipping of 50 m³/hr (1,200m³/day), Modular Skid Mounted RO Brackish water desalination plant –Rafah eastern region /Bin Taymiya Plant.
- Construct a 150m³ concrete intake brackish water tank with all associated fittings and accessories.
- Upgrade the existing distribution booster station including a new pump with all associated fittings.
- Upgrade the main electric panel board with transformer and grid connection in coordination with the Gaza Electricity Distribution Company
- Establish brine rejection lines
- Supply and install 8" diameter UPVC pipeline to connect Product Water booster station and Rafah City water distribution network.



Schematic drawing for Ben Taymeya DP location

Schematic drawing for Ben Taymeya DP location

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

- The mobile mechanical service maintenance unit established by CMWU continues to provide all metal works repairs for various municipal water wells and other facilities including specialized pipelines connections which used to be repaired in the past by private services contractor.
- Mechanical repairs and refurbishment of 28 water pumping manifolds for both water and wastewater pumping stations.
- Repair and adjustment of 30 water meters for water wells exits
- Mechanical repair of water distribution valves on the network throughout all operating areas of Gaza strip; more than 40 job orders were done.
- Carry out 21 mechanical repairs and preventive maintenance activities for south Gaza STLV sea water RO desalination plant.
- Carry out several water and wastewater networks repairs, replacement and reconnection work at various CMWU operational areas along Gaza strip.



Figure 17 Part of mobile mechanical maintenance and repair workshop activities

4- Fuel Distribution

Despite of electricity scarcity and unreliability in Gaza strip and having regards to slight improvement of grid supply this year, but still electrical power deficit reaches more than 50% compared with demand requirements, which continue to affect water and wastewater services provisions in Gaza strip. Since November 2018, all emergency Diesel fuel supply programs from different donors were stopped assuming that the slight improvement of grid electricity enough to mitigate the risks, leaving services under threatening conditions.

However, during the last offensive May 2021, ICRC and UNICEF distributed fuel as an emergency intervention of total quantity 600,000 liter during 2021.

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

A.3 Improve Water Wells Functionality

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

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

Where:

Q_w : flow rate of each well.

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

Dm: No of days of the month

Water wells operating hours have been managed and recorded as per operational registry 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 have been traced and calculated for the targeted period from which the annual target of functionality efficiency for year 2021 has reached its targeted level of 95.36 % which express the high level of operational readiness for water wells.

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

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

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

The monthly monitoring program of water wells functionality measured throughout the services targeted Southern and Middle areas for the year 2021 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 95.36% is achieved.

Table 13 The monthly water wells functionality efficiency -Middle and South Governorates -YEAR 2021

Water Wells Functionality % - Year 2021								
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	Rafah area	8946	745792	1494	538	42488	94.77%	93.49%
	Khan Youins Area	12157	832718	2241	911	61151	90.95%	
	Middle Area	15570	1030853	3559	1505	101179	94.76%	
February	Rafah area	8001	681107	1551	534	43798	94.14%	93.37%
	Khan Youins Area	10842	726791	2210	900	59059	89.08%	
	Middle Area	13436	892906	3475	1634	101005	96.89%	
March	Rafah area	9446	775559	1442	503	40272	93.12%	93.34%
	Khan Youins Area	12415	850985	2248	934	62714	92.98%	
	Middle Area	15419	1210732	4019	1471	113218	93.91%	
April	Rafah area	9714	792416	1433	508	40310	93.74%	95.18%
	Khan Youins Area	13041	906627	2248	982	64044	94.96%	
	Middle Area	19440	1251540	3615	1627	105025	96.84%	
May	Rafah area	9486	767463	1655	622	47134	94.92%	95.64%
	Khan Youins Area	12108	877739	2831	1072	81661	96.16%	
	Middle Area	19043	1259025	4201	1850	120800	95.85%	
June	Rafah area	9873	809867	1666	623	47668	95.40%	94.29%
	Khan Youins Area	13754	979447	2349	1043	66116	93.82%	
	Middle Area	22311	1530531	4733	1901	132970	93.64%	
July	Rafah area	11650	943142	1646	582	45980	93.13%	94.81%
	Khan Youins Area	14747	1017115	2417	1068	69084	95.28%	
	Middle Area	25839	1643024	4431	2014	127639	96.02%	
August	Rafah area	11073	901137	1629	579	45398	92.90%	94.36%
	Khan Youins Area	14925	1029882	2540	1081	73011	95.82%	
	Middle Area	25169	1697117	5064	1992	143357	94.37%	
September	Rafah area	11330	893530	1604	608	46467	96.59%	94.38%
	Khan Youins Area	14626	1011128	2442	1030	66954	91.38%	
	Middle Area	22021	1383759	4463	2005	127445	95.18%	
October	Rafah area	10604	866560	1610	554	44000	91.08%	92.42%
	Khan Youins Area	14409	965188	2347	1068	64457	91.53%	
	Middle Area	17690	1178346	4880	1956	138565	94.65%	
November	Rafah area	9603	778698	1618	587	45232	93.16%	94.28%
	Khan Youins Area	11830	810668	2426	1129	68717	94.40%	
	Middle Area	20730	1180989	4386	2031	125389	95.29%	
December	Rafah area	8721	715095	1605	553	43389	90.12%	92.14%
	Khan Youins Area	10811	761365	2364	963	64031	90.30%	
	Middle Area	14020	943820	4154	1623	119642	96.00%	
Average water Wells Functionality Efficiency % in Jan-December 2021								95.36%

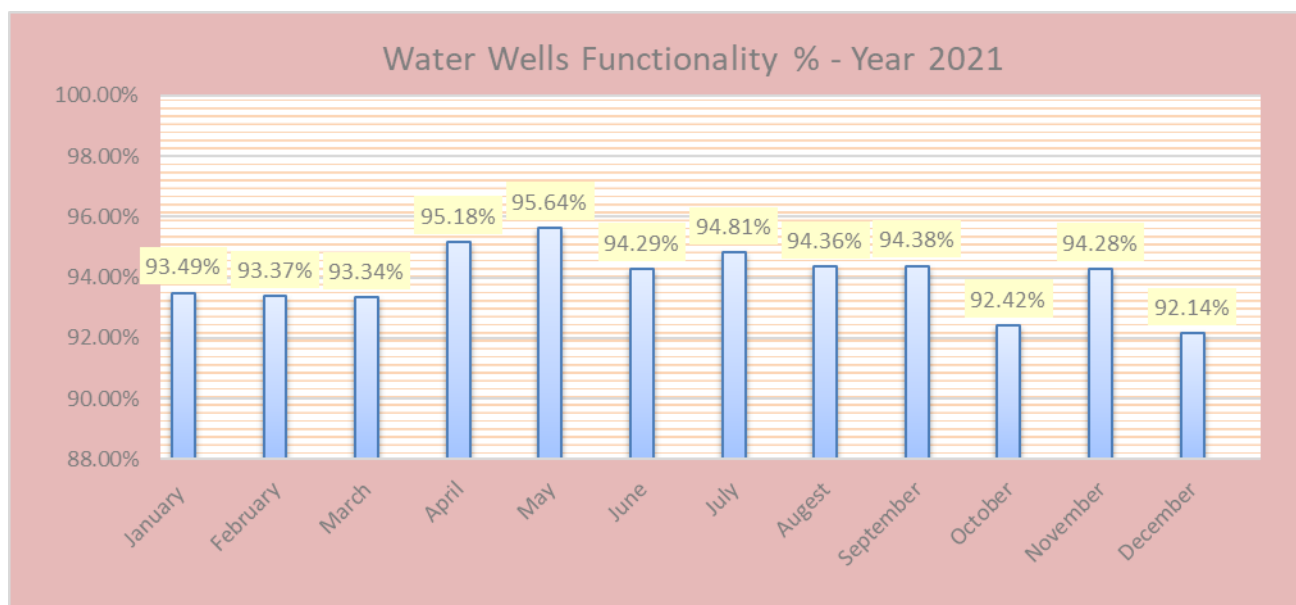


Figure 18 Monthly Functionality Percentage for served Areas-Year 2021

A.4 Improve Energy Consumption

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

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

During the year 2021, the prevailing conditions of electricity cut off occurred and scheduled on daily basis has become part of the operating inputs and conditions for the systems in the Gaza Strip, and the annual targeted value of specific power consumption of water production wells within the targeted areas have been progressively improved in comparison with the previous year to reach **0.426 KWh/m³** of water produced from wells where the value last year 2020 was **0.452 KWh/m³**. this was achieved due to the new renewable energy (PV systems) installed in the past years, and the increase of desalinated water and Mekerot quantities which decrease the wells pumping hours.

CMWU have continued to manage the efficiency of the pumping equipment utilized in the water wells, many water wells pumps turbines throughout several services areas have been replaced and changed

by new more efficient turbines. This intervention improves the pumping efficiency and reduces the specific power consumption for each cubic meter of water produced under the same hydraulic conditions. The management program set for monitoring of energy consumed by water production wells shows that during the year 2021 of report period, the overall specific Energy consumption in the three targeted regional Areas is **0.426 KWh/m³**.



Figure 19 Monthly Specific Energy Consumption 2020

Table 14 The monthly water wells specific power consumption -Middle and South Governorates -YEAR 2021

Average % specific energy Consumption - Year 2021					
Month	Area	Energy	Production	% Specific	Average % per month
		KW	m3	KWh/m3	KWh/m ³
January	Rafah	224229	745792	0.301	0.394
	Khan Younis	387071	832718	0.465	
	Middle	398344	983801	0.405	
February	Rafah	361195	623758	0.579	0.456
	Khan Younis	336196	726791	0.463	
	Middle	326136	892906	0.365	
March	Rafah	317685	704297	0.451	0.443
	Khan Younis	426779	850985	0.502	
	Middle	438110	1116175	0.393	
April	Rafah	332073	710362	0.467	0.437
	Khan Younis	435240	906627	0.480	
	Middle	488640	1255867	0.389	
May	Rafah	290255	700943	0.414	0.413
	Khan Younis	394744	877739	0.450	

	Middle	485561	1259025	0.386	
June	Rafah	324377	735321	0.441	0.419
	Khan Younis	456589	979447	0.466	
	Middle	577659	1529977	0.378	
July	Rafah	356661	850723	0.419	0.414
	Khan Younis	489499	1017115	0.481	
	Middle	606016	1643025	0.369	
August	Rafah	17837	40164	0.444	0.395
	Khan Younis	465841	1013682	0.460	
	Middle	604059	1697117	0.356	
September	Rafah	381756	873308	0.437	0.478
	Khan Younis	362220	385240	0.940	
	Middle	519313	1383759	0.375	
October	Rafah	307794	847534	0.363	0.431
	Khan Younis	490170	964448	0.508	
	Middle	491194	1180989	0.416	
November	Rafah	300201	705595	0.425	0.438
	Khan Younis	393099	808878	0.486	
	Middle	484705	1178101	0.411	
December	Rafah	247733	645065	0.384	0.408
	Khan Younis	354470	760585	0.466	
	Middle	583340	1496719	0.390	
Yearly Average % specific energy in January-December 2021					0.426

B. Improve Water Quality

B.1 Disinfection Efficiency

Despite of all prevailing operational conditions, the water disinfection task was of high priority and the maximum recorded disinfection efficiency for the period from January to December 2021 approaches around **99.24%** by the end of December 2021. Over the report period, the disinfection efficiency has progressively increased successfully maintaining a high level of Chlorination throughout the water distribution networks in all Gaza strip governorates. As indicated through the chlorine monitoring program, CMWU is confident that most of the water supply and distribution networks can be disinfected to maximum coverage using the chlorination systems installed, operated and maintained at various water production and pumping facilities.

B.2 Residual Chlorine Monitoring Program

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

Tests are being carried out for free and total chlorine on a fixed number of sampling points of 594 locations (sampling points) carefully selected to give a true representation of the whole distribution network.

It is clearly shown that by the end of December 2021 there is a significant achievement in which the disinfection efficiency target of the network has been progressively approached and reached the targeted value.

The test results show a maintained residual chlorine level that is consistent within each municipality. During the year 2021, 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 15:

Table 15 Water Disinfection Monitoring Program -Year 2021

Monthly Water Disinfection Monitoring Program														
No.	Municipality	Total No. of Samples	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			Number of negative samples	Number of negative samples	Number of negative samples	Number of negative samples	Number of negative samples	Number of negative samples	Number of negative samples	Number of negative samples	Number of negative samples	Number of negative samples	Number of negative samples	Number of negative samples
1	Um Al Nasser	9	0	0	0	1	2	0	0	0	0	0	0	0
2	BeitHanoun	19	0	0	0	0	0	0	0	0	0	0	0	0
3	Beitlahia	24	3	0	1	0	0	0	0	0	0	0	0	0
4	Jabalia	48	0	0	0	0	0	0	0	0	0	0	0	0
5	Gaza	87	0	0	0	0	0	0	0	1	0	0	0	0
6	Wady Gaza	8	0	0	0	0	0	0	0	0	0	0	0	0
7	Al Moghraka	12	0	0	0	0	0	0	0	0	0	0	0	0
8	Al Zahra	12	0	0	0	0	0	0	0	0	0	0	0	0
9	Al Nusseirate	24	0	0	0	0	0	0	0	0	0	0	0	0
10	Al Burij	22	0	0	0	0	0	0	0	0	0	0	0	0
11	Al Maghazy	24	0	0	0	0	0	0	0	0	0	0	0	0
12	Al Zawaida	25	0	1	0	0	0	0	0	0	0	0	0	0
13	Al Mussader	13	0	0	0	0	0	0	0	0	0	1	0	0
14	Deir Al Balah	36	0	0	0	11	0	0	0	0	0	7	0	0
15	Wady Al Salqa	12	0	0	0	0	0	0	0	0	0	0	0	0
16	Al Qrara	16	0	0	0	0	0	0	0	0	0	0	0	0
17	Khanyounis	44	0	0	0	0	0	0	0	0	0	0	0	0
18	BaniSuhila	28	0	0	0	0	0	0	0	0	0	0	0	0
19	Abssan Al Kabera	21	1	3	0	0	0	1	2	2	3	1	0	0
20	Abssan Al jadedda	16	0	0	0	0	0	0	0	0	0	2	0	0
21	Khezaa	16	0	0	0	0	0	0	0	0	0	0	0	0
22	Al Fokhary	12	0	0	0	0	0	0	0	0	0	0	0	0
23	Al Nasser	12	0	0	0	0	0	0	0	0	0	0	0	0
24	Al Shuka	8	0	0	0	0	0	0	0	0	0	0	0	0
25	Rafah	46	1	1	1	1	1	1	1	1	1	1	0	1
Total		594	5	5	2	13	3	2	3	4	4	12	0	1
Monthly Disinfection Efficiency			99%	99%	100%	98%	99%	100%	99%	99%	99%	98%	100%	100%

Monthly water disinfection efficiency records												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg. 2021
99.16%	99.16%	99.66%	97.81%	99.49%	99.66%	99.49%	99.33%	99.33%	97.98%	100.00%	99.83%	99.24%

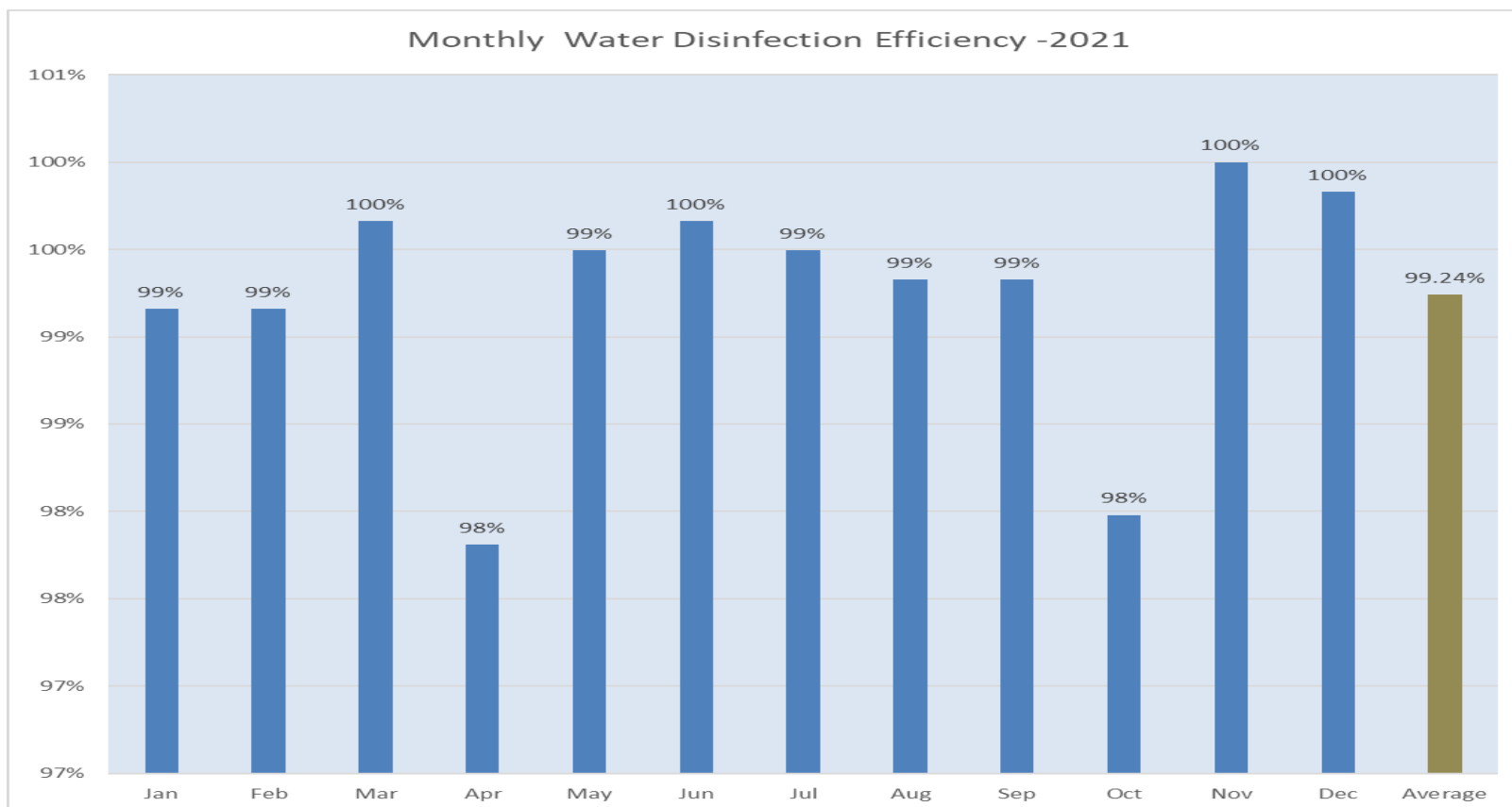


Figure 20 Monthly Water Disinfection Percentage 2021

B.3 Chlorine Dosing Units:

CMWU have continued to manage the repair and replacement of faulty dosing units and all associated systems. The records show **that 25 new chlorine dosing units were installed** to replace defective units and **130** repair jobs have been applied for malfunctioning systems at various water wells and pumping facilities.

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

During the year 2021 CMWU has continued to provide support through a new On-Call Service Procedure allowing Municipal chlorination technicians to contact CMWU at any time to log faulty systems, CMWU then ensures the repair is carried out within 48 hours. This procedure has improved the availability of operational dosing pumps, ensuring all water entering the distribution network is securely well disinfected.

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

Since the start of year 2021, a total quantity of 1000 m³ of Sodium Hypochlorite solution NaOCl (10%-12% active chlorine) has been managed, supplied and distributed to the water production and treatment installations throughout all Gaza Strip governorates. The scope of chlorine delivery and supply contract managed by CMWU has included in addition to Chlorine, other water treatment chemicals necessary for the operation of both 100 small and medium scale RO brackish and three Short Term Low Volume (STLV) sea water desalination plants in the Gaza strip. This includes Hydrochloric Acid, citric acid, Sodium Met-bisulfite, Caustic Soda and Anti-scalant and ferric chloride. The provision of these chemicals is essential to the operation of reverse osmosis desalination plants, and contributes significantly to the improvement of water quality at various served areas of Gaza strip.



Figure 21 Chlorine solution supply to water facilities

C. New Water Resource

As the underground coastal aquifer is the main source for water supply to the population of more than 2.2 million living in the Gaza Strip, and Based on various relevant studies, the groundwater deterioration has continued in both quality and quantity in the Gaza Strip due to over abstraction of the aquifer compared to the recharge quantities which led to seawater intrusion and lowering the groundwater table. It has become crucially important to safeguard available fresh water supplies and provide new additional potable water supplies to protect the lives and public health of the people in Gaza. The provision of a Short-Term Low Volume (STLV) seawater desalination plant is one of the mitigation measures integrated in the Comparative Study of options for additional supply of water for the Gaza Strip, currently three STLV desalination plants are existing and the work is ongoing to expand the southern one to reach 20,000m³/day, moreover PWA through KDF and WB funds is still implementing the associated works of Gaza central seawater desalination plant (GCDP) , in parallel the efforts are exerted to secure the funds for construction another three STLVs besides the existing ones to cover the water needs for the fast and medium term as the construction of GCDP may delay and exceed the planned year of construction 2025 , the following interventions are proposed as Fast

Interim Additional Potable Water Supply Facilities& Systems to Solve Gaza Strip Water Scarcity and Crisis during the coming years :

- Construction, equipping and operate additional 10,000 m³/day sea water desalination modules adjacent to existing North Gaza STLV plant to serve western parts of North Gaza governorate.
- Construction, equipping of new 20,000 m³/day sea water desalination plant to serve /south western districts of Gaza City.
- Expand existing Middle Area STLV desalination plant by additional 5000 m³/day desalination modules.
- Expand existing Southern Area STLV desalination plant by additional 20,000 m³/day desalination modules.

C.1 Sea Water Desalination Plants

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

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

The desalination plant has been constructed through three phases, the first phase starting with 600m³/day capacity, then IsDB has financed the second phase with 2000 m³/Day capacity and lastly USAID has financed the third phase with 3400m³/day. all phases are, linked and connected to produce in total 6000 m³/day to serve 30,000 inhabitants of the Middle area residents (Deir Al Balah & Al Zawaida cities) through 4000 m³ capacity water blending tank (Al Aqsa).

2- Expansion of the Southern Sea Water Ro Desalination Plant

Southern governorate sea water RO desalination plant is operational now with 6000m³/day capacity, it supplies a good quality water to around 75,000 inhabitants at Rafah and Khan Younis cities.



Figure 22 Sea Water Desalination Plant – Southern Governorates

In cooperation with CMWU and PWA, UNICEF through EU fund SGDP expansion project is being implemented. The construction and electromechanical works of the plant are almost completed and the contractor prepares to start the trial operation early 2023. This project will increase the production capacity of the plant to 20,000 m³/day, the project also includes connecting the plant with the

dedicated power line, this line has been linked with the newly constructed PV system 0.5 megawatt , hence the availability of power supply will assure operating the plant enough hours to meet the needed demand for more than 250,000 inhabitants in Rafah and Khan Younis cities.



Figure 23 Expansion of Sea Water Desalination Plant – Southern Governorates

3- Construction of 10,000 m³/day Sea Water Ro Desalination Plant in Gaza City:

Gaza seawater desalination plant is one component of the STLV program that aims to improve the potable water supply system for more than 250,000 inhabitants in the Western part of Gaza City. , the plant is operational and pumps on daily basis 10,000 m³ of desalinated water to Al Sheikh Radwan blending tank, and then the water is pumped to distribution network with acceptable quality. This plant has released a remarkable impact on the quality of water at the western part of Gaza city which suffered from high saline water for a long time. Recently and to enhance the capacity of the plant to feed more citizens at Gaza city with good water quality, PWA in cooperation with CMWU and Emar Palestine are going to expand the plant through adding 2500m³/day of desalination units, this project is financed by IDB and will start in the third quarter of 2023.

On the other hand, and due to the significant increase of water salinity in the North governorate, especially at the western part of Jabalia and Bet lahia, the CMWU in cooperation with PWA has implemented two connection from Gaza STLV to be expanded later through KFW project to reach the two blending tanks at both areas. For the short term limited quantities of desalinated water will be pumped from Gaza STLV to those two tanks, whereas the plan of PWA and CMWU is to construct another STLV for Gaza city and keep the existing one for the Northern governorate, this will be the

medium term solution for water scarcity as the timeframe of construction GGCDP is still unclear in the same time the demand of water is increasing and there are no water resources available for the time being besides the groundwater and Mekerot.



Figure 24 Gaza STL Desalination plant

C.2 Brackish Desalination Plants:

Besides that, CMWU have continued to manage, upgrade, rehabilitate and monitor the 109 existing brackish desalination plants with variant capacities, which were installed from different donations in several areas whereas the groundwater quality is not acceptable for distribution aiming at providing adequate water service for specified areas that are used to be deprived of water supply system. The small capacity plants supply the surrounding population by fountains outside the plant; while the other plants with 600 m³/day or more are used to feed the network in certain areas.

- CMWU in cooperation with HA has started the construction of the first phase of Bin taymiya Ro desalination plant 50m³/hr at Rafah, two tenders under this project have been launched the first is for construction the water well which will feed the plant and the second is for construction the plant itself, both components are still ongoing, whereas the main obstacle behind the delay in progress is the Israeli restrictions on materials entry, in this regards the CMWU exerts the efforts with the concerned parties to facilitate entering the material, hopefully to get all of them by mid of 2023.

- the CMWU through AAH support has completed the rehabilitation of 12 RO units of which 10 have been provided with PV solar energy,

Figure25: rehabilitation of RO plants

Figure



26 Rehabilitation of brackish RO plants and supply spare parts for RO plants

Figure 27 providing 6 RO plants with PV solar energy

- Through KDF fund, Al Forqan brackish RO plant at Al Nusirat has been provided with 80 KW -PV solar system, the PV system has been developed to operate separately the RO Desalination plant or the existing water well. the project is completed and the system is operational now.

C.3 Water Networks

This section handles water network plans, upgrading, reconfiguration, resizing. CMWU has succeeded during the year 2021 to implement water networks projects varies between upgrading, reconfiguration, and construction new carrier lines and distribution systems at different areas in the Gaza Strip besides fixing and repairing 2021 war damages, the activities include but not limited to :

- Through PHG fund the CMWU has completed “Rehabilitation of water networks at Al Salam area-Rafah,

2. Fixing and repairing the damaged water networks at the affected areas during Israeli escalations through ICRC, UNICEF, Oxfam, NRC, HA, AAH and Anera funds



- 3.
4. Rehabilitation of water networks at different areas in Rafah through Anera fund, the project is completed. The new water pipelines improve the water supply at the targeted areas and eliminate suffering from water shortage.
5. In cooperation with CMWU, Anera and through USAID fund has completed the project of rehabilitation of water networks at Rafah, Khan Younis, Dair Al balah and beit hanoun. This project covered large parts of needed water interventions and released remarkable impact on water supply in those areas.
6. Rehabilitation of water network at Eastern villages in Khan Younis, the project is still ongoing

7. throughout 2022, PWA in cooperation with CMWU has followed up the implementation of GCDP' associated works, the launched and ongoing packages including the southern carrier line , construction of water tanks, reconfiguration works, construction of the main pumping stations
8. The CMWU in cooperation with Islamic relief is currently working on rehabilitation of the water network at Al Shifa hospital



Al Shifa water network

9. In cooperation with CMWU, GVC through EU fund, is implementing the NRW project at Khan Younis, the project includes developing the water model for KH networks and implementing 2 DMAs at Maan area. The progress is going well and the model was developed in 2022 where the two DMAs will be launched and implemented during the second quarter of 2023.
10. Through CHF fund, the water networks at many areas throughout Gaza Strip will be rehabilitated during 2023
11. The CMWU in cooperation with Anera is preparing the tenders for rehabilitation of water networks at the Eastern villages of Khan Younis mainly at Khuza'a and Abasan
12. The CMWU maintenance crews continued to fix and repair the emergency water networks damages in different areas in Gaza Strip.



Figure 28: Maintenance jobs for water & WW networks

C.4 Water Tanks

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

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

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

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

The consultant has reviewed and prepared the tender documents for the following packages which are related to the Program: Water Security Development - Gaza Central Desalination Program – Associated Works- Phase 1, the program includes the following packages:

Reconfiguration of Water Distribution Systems – KhanYounis and Rafah, which includes:

1. Reservoirs Upgrading Works - Rafah Governorate including:
 - A. ST-037 (Saudi) Reservoir in Rafah - Upgrading works (RRAFT1)
 - B. ST-038 (Tal Sultan) Reservoir in Rafah - Upgrading works (RRAFT2)
 - C. ST-018 Reservoir in Rafah - Upgrading works (RRAFT5)
 - D. ST-036 (Rafah 1&2) Reservoir in Rafah - Upgrading works (RRAFT4)
 - E. ST-019 (Al Naser) Reservoir in Rafah (RENAT1)
 - F. ST-028 (AlFukhari) Reservoir in Rafah - Upgrading works (KFUKT1)
 - G. ST-022 (AlShoka) Reservoir in Rafah (RRAFT4)
2. Reconfiguration of Water Distribution Network - Downstream for Rafah Municipality
3. Reconfiguration of Water Distribution Network - Downstream for Al-Shoka Municipality
4. Reconfiguration of Water Distribution Network - Downstream for AL-Naser Municipality
5. Rafah Wells Upgrading Works
6. Connections Wells-Reservoirs for Rafah Governorate
7. Reservoirs Upgrading Works - Khanyounis Governorate
8. Reconfiguration of Water Distribution Network - Downstream for Khanyounis Municipality
9. Reconfiguration of Water Distribution Network - Downstream for Al-Qarara Municipality
10. KhanYounis Wells Upgrading Works
11. Connections Wells-Reservoirs for Khanyounis Governorate
12. Reinstatement Works -Rafah & Khan Youins

13. Telemetry and SCADA Communication system

Reconfiguration of Water Distribution Systems - Middle Gaza which includes

- 7 Reservoirs Upgrading Works - Middle Governorate (ST-006 Reservoir in Al Nusarait, ST-01B Reservoir in Al Bureij, ST-002 Reservoir in Al Maghazi, ST-008, ST-005, ST-004 and ST-003 Reservoir in Deir El Balah
- Reconfiguration of Water Distribution Network: HDPE 8.66 km in Downstream, HDPE 6.85 in Upstream connections between the selected wells and the reservoirs.
- 23 Middle Wells Upgrading Works including electromechanical equipment's (10 in Deir el Balah, 5 in Burij, 3 in Nusirat, 3 in Maghazi, 2 in Zawida)
- Connections Wells-Reservoirs for Middle Governorate
- Reinstatement Works – Middle
- Telemetry and SCADA Communication system

The work is ongoing in close cooperation with CMWU and municipalities' teams, some of the above mentioned project is still ongoing and others are under tendering and evaluation process. the mentioned two packages of reconfiguration are financed by WB through PWA.

Reconfiguration of Water Supply Project in Gaza and North Gaza Governorate

- Upgrading of 2 existing concrete reservoirs
- Reconfiguration of the existing water distribution systems by installing 14 km of different diameter
- Construction of Al Kashef and Nuzha Reservoirs 8000 m3

D. Waste Water Treatment Plants:

Wastewater Treatment Plants

There are five operational waste water treatment plants in the Gaza strip, three of them are central plants (Khan Younis WWTP, Al Buraj WWTP and North Gaza WWTP) , whereas the other two plants are considered intermediate plants located in Rafah and Gaza city.

CMWU has continued its operational and management roles to manage and carry out comprehensive monitoring program related to the wastewater treatment plants located throughout Gaza strip Governorates and provide for all mitigation measures and improvement programs.

Due to the insecure and intermittent supply of the electricity from GEDCO Grid, it is operationally unrealistic to have sustainable and stable treatment process, however the improvement of the electrical supply for some time during the year had a little effect in the treatment process. Hence

to overcome the electricity shortage the three newly constructed WWTPs are provided with PV solar energy, as the power is needed all the time for continuous oxygen supply of the aerobic bacteria.

During 2022 there was a remarkable improvement in wastewater treatment efficiency, the efficiency has reached **82 %** in average, whereas the efficiency is affected by the low treatment efficiency of Al Sheikh Ejleen and Rafah which are operated by an aerobic lagoon technology along with unreliable electricity supply.

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

North Gaza Wastewater Treatment Facilities:

North Gaza wastewater treatment plant (NGWWTP) of 35600 m³/day treatment capacity is still under emergency /safe mode operation with minimum staff requirements. CMWU has continued to provide technical operation and maintenance support and assistance for the terminal sewage pumping station and lagoons facilities in Beit Lahia, from which the sewage pumped to new NGWWTP. The plant is being equipped with *** Mega watt of solar energy through AFD fund The main activity in this year in the north area was the implementation of ICRC-financed maintenance and refurbishment contract provided to upgrade the Terminal Pumping Station (TPS) including the following items:

- Install UPVC pipe 400mm, with all needed fittings and accessories the work include excavation, backfilling and connection to existing manhole near bar screen
- Painting Existing manifold
- Supply and install PVC corrugated sheet for shed and painting.
- Maintenance of Hollow shaft electrical motor 100HP the work includes dismantle, reinstall, rewinding, upper bearing and lower bearing.
- Supply and install Stainless Steel Basket screen, with electric hoist guided by rails which curved in the upper area in order to ease emptying the basket over the containers.
- Maintenance of electromagnetic flow meter 16”.
- Cleaning wet pit of vertical turbine pumping station.
- Maintenance of NRV 10”
- Supply and install Stainless steel access hatches with different sizes.
- Sluice gate maintenance and re-assemble.

Gaza Wastewater Treatment Facilities –Sheikh Ejleen

All previous refurbishment and upgrading works and installations; the existing Sheikh Ejleen wastewater treatment plant (WWTP) brought back into operation mode; the results of treated

effluent meet the pre-set design figures achieving about 60 ppm BOD. Also, the efforts continued during 2021 and many maintenance interventions have been completed and others are still ongoing in order to keep the plant in efficient operation.

The progress of the construction works and associated installations of the Central Treatment Plant (Al Buriej WWTP) funded by KFW is satisfactory with total daily capacity of 60,000 m³/day. In January 2022; 25,000 to 30,000 m³/day of Gaza wastewater has been diverted to the BWWT in order to improve the treatment. The sea contamination by the wastewater is stopped due to the operation of Sheikh Ejleen WWTP.

3.5 MW of solar energy project was constructed in the central wastewater treatment plant (BWWT) and start operation feeding the plant with the required power in addition to 1.2 MW module completed at Al Sheikh Ejleen WWTP and put into operation.

Khan Younis Wastewater treatment plant

The records of the last quarter of 2022 showed that 15000 m³/day are being pumped to the newly operated KHWWT ; the wastewater flow is only collected from Khanyounis city and part of Bani Suhila, whereas there is no flow pumped from the eastern villages since no sewage system is existing there, in this regard PWA and CMWU succeeded in 2022 to secure a fund for construction the main pumping station at the eastern villages (PS.04) which is located at Abasan Al Kabera, it serves Abasan Al Kaber, Absan Al Jadeda, part of Bani Suhila and Khuzaa, this PS and its main collector are being implemented and will be completed and operated by end of 2023. This project contributes to increase the inflow of WWTP and eliminate sewage floods resulted from cesspits' collapse in different areas in the EV , in addition, the CMWU is still working on refurbishment and upgrading ,of the existing pumping systems to cope with the hydraulic characteristics and to convey all the generated sewage from Khan Younis city (around 18,000m³/day) to KHWWT. Until completion these upgrading works the remaining wastewater quantity "around 3000-4000m³/day" will be pumped to the temporary WWTP system located west of the city.

Rafah Wastewater treatment plant

The existing wastewater treatment plant in Rafah with 14,000m³/day average capacity is relatively stable as a subsequent of energy provision stability, but the treatment technology itself having bio towers treatment process has limited removal efficiency and it needs upgrading and modernization to achieve a good quality effluent matching with reuse requirements.

Two phases of solar energy provision were executed to feed 320 KW to the plant, which help improve the functioning of the plant,

Through Japanese fund, different rehabilitation and maintenance interventions have been implemented in Rafah WWTP for the existing Grit removal and sand removing system with mechanical bar screen equipment and cleaning anaerobic inlet lagoons, which relatively improved the treatment efficiency.



Figure 32 Cleaning of anaerobic wastewater lagoons –Rafah wastewater treatment plant

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

D.1 Gaza Central WWTP Project

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

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

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



Figure 33 Central WWTP and Central PS Wadi Gaza

The contractor has completed all the civil works and electro-mechanical works in the plant, the remaining components of the treatment plant such as Boiler and the desulphurization unit were commissioned and put into operation early 2021. While the CHPs were tested and commissioned by the manufacturer mid 2021 but still not operational due to the quality of the generated bio-gas. (High H₂S concentration).

The treatment plant is operational with its full capacity (60,000 m³/day) since 2022, it receives around 40,000 m³/day of sewage flow from the middle area and 20,000 m³/day from Gaza city. The main power feeder for GWWTP are the existing solar energy system 3.5 Megawatt and CHPs which will be put into operation soon.

D.2 Khan Younis Wastewater Treatment Plant (KHWWTTP)

The permanent KHWWTTP is implemented through two phases with capacity 26,656 m³/day for phase I and 44,948 m³/day for phase II; the project is financed by ISDB (KDF), JICA and implemented by (UNDP and CMWU in cooperation with PWA), the construction of the first phase was completed in 2019 and put into operation in the same year after three months of trial operation. The plant is not operational with its full capacity as the Eastern villages are still not connected with sewage networks and the inflow is only generated from Khan Younis city.

The construction of the dedicated power supply line to the treatment plant is also completed, moreover the plant is being equipped with PV solar energy through different donations. During 2022 UNDP has equipped the plant with 1.3 Mw of PV solar energy and there is another ongoing contract to equip the plant with additional 3.7 Mw of PV solar energy through IDB fund also EU is committed to provide 2.0 Mw through 2023-2024 to have in total 7 Mw of solar energy to cover the total energy load of the treatment plant.



Figure 39 Khanyounis Central TP

D.3 The Permanent Northern Treatment Plant (NGEST)

The new wastewater treatment plant of daily capacity 35600m³/is currently operated by PWA-PMU dedicated staff. In the construction agreement among PWA and WB (Multi donors fund); it is clearly mentioned that CMWU is the operator. An MOU has been drafted among PWA, CMWU and Northern Municipalities which abide the CMWU to operate the NGEST, signing the mentioned MOU is currently under processing

E. Storm Water Activities

Many storm water collection and pumping facilities constructed and upgraded during the past five years have become operational. This provide remarkable improvement and relief and reduce the risk of flooding at various areas of Gaza strip and positive impacts have been significantly recorded from various hot spots in the field. During 2022, the CMWU has continued implementation of the most needed storm water interventions either through construction new projects or through dealing with all commitment, in cooperation with all partners and municipalities in order to alleviate the situation in some hotspots areas through the following interventions:

- Disburse materials and spare parts for sewage and storm water pumping stations and associated systems from the main CMWU stores to the Municipalities as preparedness activities before the winter season.
- Provide mechanisms and workers to clean up rain water gullies and manholes along streets and districts of the Gaza Strip as per on going works projects during the rainy days.
- Manage annual maintenance and operational preparedness of mobile self-priming storm water trash pumping sets driven by Diesel engines and distribute it throughout various stations spread all over Gaza strip governorates with all associated pressure and intake hoses requirements and fuel needs.
- Cleaning, upgrading of water flows channels to cope, reduce and eliminate the risks of flooding such as construction of additional storm water gullies and pipes, cleaning infiltration basins and storm water lagoons collection systems and rehabilitation of storm water pumping stations.
- Supply all required safety and protective tools, clothes and equipment for technicians and labours working under the storm and flooding conditions.



Cleaning stormwater gullies and WW sewage PS -Preparedness activities for winter season

- UNICEF has supported and financed the preparedness & winterization activities for 2021-2022 winter season, the activities include but not limited to:

- Tools and spare parts supply,
- Maintenance and cleaning of storm water basins, gullies and wet pits at the middle and southern governorates.

- Hiring on call to intervene during emergencies.



cleaning Wadi Beit Hanoun through UNICEF project

-
- The CMWU in cooperation with AAH has completed Repairing of War's affected stormwater networks at Al Mahata area in Khan Younis, Abu Khair and Naj'a in Jabalia in addition to Khalili Al Wazeer street at Beit Hanoun.
- Construction of stormwater pipeline at Abed Al Qader Al Hussaini street in Gaza city through Qatat fund. The project was completed and put into operation during 2022.
- Construction of Stormwater Network from Gaza Street (Near Beit Hanoun Hospital) to El Seka Street through Anera fund. The intervention released remarkable impact during winter season 2021-2022 as no flood occurred in this targeted area.
- Construction of Gravitational Stormwater Network at Al Aqad area near Abu Al Reesh Basin in order to divert the flow directly to this new pipeline instead of discharging the flow to the basin. The project was financed by UNICEF and completed in 2022.

- Expansion of the Stormwater System at European neighbourhood in Fukhari, the project was financed by Anera and completed.



Stormwater network at Al Fakhari

- Construction of Stormwater pipeline from Mansora Street to Montar Street near shijaiaa schools, the project is financed by Anera and still ongoing.



Fig**: Stormwater pipeline at Mansora Street-Gaza city

- Rehabilitation of Fukhari Stormwater Basin at European neighbourhood in Fukhari, the project is financed by save the children and still ongoing.



Al Fakhari stormwater basin

- Upgrading of Shaat Collection Basin in Khan Younis, through extending the existing stormwater pipeline to the basin inlet. The project is financed by Save the children and still ongoing.
- Extending the main collector of Al Sheikh Zayed stormwater basin to the existing gravity network which discharges the flow to Al mashrou basin at Beit lahia. The project is financed by AAH and completed.



Figur**: Stormwater pipeline from Sheikh Zayed basin to the main collector of Al mashroua basin

F. Waste Water Activities

F.1 WW Networks

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

1. PWA through Austrian fund has completed updating of sewage master plan and producing the detailed design for sewage system at the eastern villages of Khan Younis governorate, this project was of one of top priorities needs, since the central WWTP is operational now and it was designed to serve and receive sewage flow from Eastern villages besides Khan Younis city to work with its full capacity 26,500 m³/day. The consultant provided the final tender documents of the packages, the first and most prioritized package has been launched for implementation which includes

construction of PS.04 at Absan Al kabera and its force main to PS.08 in addition to part of gravity networks. The work in this package is still ongoing and the CMWU in cooperation with PWA has been working on securing further funds to implement the other packages in order to connect the EV with sewage system and to ensure operating WWTP with its full capacity.

Figure 46 WW networks in Al Nussirat

2. Repairing the damages of affected wastewater networks at Beit lahia, the project was financed by Oxfam through PEF
3. Repairing the damages of affected wastewater networks at Beit Hanoun through UNICEF fund
4. Repairing the damages of affected wastewater networks at Al Nussirat and dair Al Balah, the project was financed by Maan.
5. Repairing of War's affected networks at Beit lahia, Jabalia and Khan younis, the project was financed by AAH.
6. Rehabilitation of wastewater networks at beit lahia, Beit Hanoun and Gaza city, the project was financed by Anera and it was completed in June 2022.
7. Construction of Wastewater Networks at Jort Al loot, Baten El Sameen, Gizan El Najjar Area and Qaa Al Qreen Municipal areas at Khan Younis. The project was financed by Anera and it was completed in August 2022.
8. Construction of wastewater network at Al Zohoor neighborhood at Rafah, the project was completed in 2022 and financed by PHG
9. Construction of wastewater networks and household connections in Al-Furqan neighborhood in western of Rafah, the project was financed by UNICEF and it was completed in March 2022
10. Construction of wastewater network at Wadi Gaza and connecting it with the existing sewage pumping station. the project was financed by UNICEF



WW at Wadi Gaza-UNICEF financed project

11. Construction of a force main from Wafia Sewage Pumping Station to Energy Breaker of Sewage Pumping Station NO.08 at Khan Yunis. The project is still ongoing and financed by IsDB



Figure**: Al Wafiya PL

12. Construction of Wastewater Networks in Mustafa Salama street at Alsatar Municipal area, the project is ongoing and financed by Anera.
13. Strengthening households' preparedness and response capacity to the winter season and improve safe access to sanitation for most vulnerable people in Abasan Al Kabera. The project was finished and financed by PEF.
14. Construction of Wastewater Networks at Beit Hanoun and Beit Lahia. The project is completed and financed by Maan



WW networks at Beit Hanoun-Maan Financed project

15. Construction of Wastewater network at Jort Al Loot community in Khan Yunis, the project is still ongoing and financed by AAH



Fig***: WW at Jort Al Loot-AAH financed project

16. Construction of Wastewater Networks at Qaa Al Qreen area at Khan Younis, the project is still ongoing and financed by AAH
17. Construction of wastewater Networks in Al kateba and Al Salam neighborhoods - Khan Younis, the project is completed and financed by Anera



WW networks at Khan Younis

18. Construction of a Sewage Network and Household Connections in Qlebo at Beit Lahia Municipal area, the project is ongoing and financed by Human Appeal.



WW networks at Beit Lahia-HA financed project

19. Launching a tender for construction sewage networks at Gaza city, Al Nussirat and Al Burej, this project is financed by UNICEF and will start early 2023
20. Separation between stormwater and sewage networks at Jabalia, the project is financed by Anera and still ongoing



separation between stormwater and WW networks-Jabalia

21. Construction of sewage networks at Al manshiya area in beit lahia, the project is still ongoing and fianced by AAH



Al Manshiya WW networks

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

During the period of this report from January to December 2021, 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.

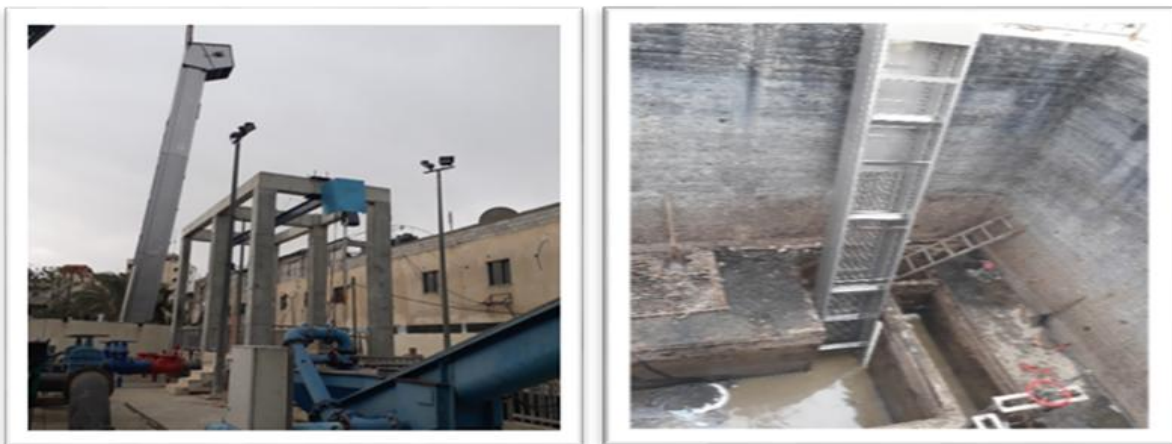
Meanwhile, most of wastewater and storm-water services and pumping facilities were continued to be severely overused and overloaded during the last storm events hit Gaza strip in the last year and create several emergency needs for repairs during flooding times. Therefore, CMWU has taken all possible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

Several activities have been implemented in more than 62 facility summarized here below and carried out to maintain, repair and improve wastewater and storm water systems

- 1 Manage and carry out comprehensive electromechanical maintenance and repair program for sewage pumps of wastewater pumping stations, the work includes replace the damaged pumps, rewinding electrical motors, changing the bearing sets (upper & Lower bearings), changing mechanical seals sets (Water & oil mechanical seals sets), changing wear rings, rubber rings, rubber repair kits, changing impellers, rotors, etc., and carry out all work shop requirement i.e. changing bolts, impeller balancing, sand blasting, painting, etc. Maintenance task orders exceeded 32 pumps during year 2021.

- 2 Manage and carry out comprehensive electromechanical maintenance and repair program for pressure manifolds of wastewater pumping stations, the work includes maintenance of gate valves, non-return valves, changing flanged coupling, pipes sand blasting, painting, etc. Maintenance task orders were more than 10 tasks per year of 2021.
- 3 Manage and carry out comprehensive electromechanical maintenance, replacement, repair program for automatic mechanical bar screens of wastewater pumping at 4 sewage pumping stations.
- 4 Manage and carry out comprehensive cleaning process for sewage pumping stations, cleaning process includes pump wet pit, bar screen chamber, inlet chamber, grit removal, pumping station yard. Cleaning process takes two times for each pumping stations, but for central pumping station may be per week, this is for huge sand quantities comes by influent wastewater coming to the sewage pumping stations, as well as this process may be after each storm. Cleaning process task orders were more than 12 sewage pumping station for year 2021.
- 5 Launching the tender for construction wastewater networks at Al Fokhari which will discharge the flow to PS.08 which is being upgraded, the project is financed by IsDB.

Figure 49 Installing mechanical Bar Screen



- 6 Rehabilitation and Upgrading of AL Hawaber sewage pumping station, the works included installation of fourth pump and replacement the existing manifold and pressure line, the project is completed and was financed by OCHA through AAH, however additional works during 2021 through ICRC to maintain another segment of the pressure line is still ongoing due to the materials entry restrictions.



The implemented maintenance works during 2021 are listed in the below table per each Governorate:

Rafah Governorate:

Municipality	Site/Facility	Work Description
Rafah	Al Junina P.S	Cleaning the pumping stations. The work includes removing the garbage instantly to RWWTP for Al Junina P.S The work includes cleaning of wet pit, grit chamber, screen chamber, inlet chamber, P.S yards, For (Al Junina P.S) - Rafah
Rafah	RWWTP	Supply, replace, install, fabricate, redesign, connect and test a complete package of a sewerage submersible pumping unit with all its accessories for the Effluent Pump Station
Rafah	Rafah WWTP	Rewinding the electrical motors of Sewage multi-manufacturer pumps of (1-6) KW
Rafah	Jumazit Al-Sabeel PS	Supply and install L-shape 3cm thick
Rafah	Jumazit Al-Sabeel PS	Cleaning the pumping stations Sewage multi-manufacturer pumps of (210) KW

Rafah	Tal Al Sultan PS	Supply, install, connect and test a complete package of a sewerage submersible pumping unit detailed here below including all associated fittings and accessories which include but not limited to, protection sensors and their receptive devices in the control panel, disconnecting switch, all required electrical cables and electrical components and hydro ranger programming, pump electrical cables not less than 30m length, pump base, Steel Base L Shape 3 cm thickness, 30m S.S 316L chain, One 3" guide holder S.S 316L, all Bolts/anchors S.S 316L, S.S 316L Steel Plate 10mm for fixing the guide holder, the Price includes P.S cleaning several times for installation and testing the new package, P.S dewatering, and transfer the garbage,, ,etc., all as per engineer approval and instructions.
Rafah	Rafah WWTP	Rewinding the electrical motors for Sewage multi-manufacturer pumps of (16-45) KW
Rafah	Block-O PS	Supply and cast reinforcement concrete B250
Rafah	UNDP PS	Cleaning the pumping stations Sewage multi-manufacturer pumps of (7-15) KW
Rafah	Block-O PS	Standby Generator: Supply ,install, and test 50 KVA, 400V, 50HZ standby diesel generating set complete with factory made acoustic proof
Rafah	Al Jneena PS	Rewinding the electrical motors for Sewage multi-manufacturer pumps of (46-90) KW

Khanyounis Governorate:

Municipality	Site/Facility	Work Description
Khanuonis	Hesbit Al Samak P.S	Design, Locally manufacture, fabricate, duplicate, install ,test, commission and operate a Complete clamshell grab for handling submerged materials, mud, sands, slime, stones.
Khanuonis	Al Wafia P.S	Cleaning the pumping stations. The work includes removing the garbage instantly Khanuonis WWTP for Al Wafia P.S. The work includes cleaning of wet pit, grit chamber, screen chamber, inlet chamber, P.S yards, For (Al Wafia P.S) - Khanuonis
Khanuonis	CMWU Warehouse	Supply spare part for pumping wastewater for CMWU Warehouse M.Seal-M.Seal-L,Flygt,125KW, CT 3231/705 M43-30-4AA
khanyounis	Al Tanfizia P.S	Cleaning the pumping stations Sewage multi-manufacturer pumps of (1-6) KW
khanyounis	Al Majadla	Cleaning the pumping stations Sewage multi-manufacturer pumps of (7-15) KW
khanyounis	Al Majadla PS	Rewinding the electrical motors for Sewage multi-manufacturer pumps of (7-15) KW
khanyounis	Al Maqaber PS	Rewinding the electrical motors of Sewage multi-manufacturer pumps of (1-6) KW
Bani Suhila	Bani Suhila PS	Rewinding the electrical motors of Sewage multi-manufacturer pumps of (7-15) KW
khanyounis	Hesbet Al-Samak	Rewinding the electrical motors for Sewage multi-manufacturer pumps of (91-210) KW
khanyounis	Sofa WWTP	Rewinding the electrical motors for Sewage multi-manufacturer pumps of (16-45) KW

khanyounis	Sofa WWTP	Provisional items for bar screen, manifold and pumps ...etc.: Repair, General Overhauling, Rehabilitation, electromechanical maintenance and operation unpredictable Defects of pump, manifold, risers, guide rails, valves (4- 20)inch valves, pumps base, pump electrical cables, shrinkable connections, also Repair unpredictable Defects of Bar Screen,,,etc....
Bani Suhila	Abu Sroor PS	Rewinding the electrical motors of Sewage multi- manufacturer pumps of (1-6) KW
Bani Suhaila	Bani Suhaila PS	Supply and install Submersible sewage pump 13.5KW Flygt type, the work include mini case (NP 3153.180 HT3-451) Q=160m ³ at head=19m

Middle area Governorate:

Municipality	Site/Facility	Work Description
Deir El Balah	Ad-Hoc, Repair of Deir El Balah Pressure Pipe Line	Supply and install polyethylene HDPE pipes 710 mm diameter (12.5 bar pressure) with thickness 52.2 mm
Al Nussirat	Central Pump Station	Rewinding the electrical motors. The work include replacement of all required associated sensors, and checked to three required functional level before assembling the 85kw Submersible Flygt Pump.
Al Nussirat	Al Hassina Pump Station	Checking and inspection for deteriorated pumps/parts at the site (P.S) and in the workshop. the work include Carry out all work shop requirement i.e. (machining, cutting ,welding , filling, balancing, grinding, sand blasting, base paint with two coats of epoxy,,,etc..) for (impeller, rotor, drive shaft, pump casing and other components,,,etc..), the work include replacement of deteriorated parts i.e. (S.S bolts, nuts, washers, elect. glands,,,etc..), to bring back the assembly into good working conditions. The work include removing, dismantling, reinstalling (clean around the pump base), drying the winnings, fiber insulators, sensors, float switch, shrinkable connections, pump electrical cables, pump control cable, rubber repair kit O-rings, Wear ring, rubber ring, transferring, hanging lubricating and cooling oil, greasing, testing, operating and testing functionality of electric and controls of the pump, pump control panels and float switches. Sewage multi-manufacturer pumps of 54KW.
Al Nussirat	New Camp Pump Station	Rewinding the electrical motors. The work include replacement of all required associated sensors, and checked to three required functional level before assembling the 27 kw Submersible Flygt Pump.
Al Nussirat	Abu Mualla Pump Station	Rewinding the electrical motors. The work include replacement of all required associated sensors, and checked to three required functional level before assembling the 12KW Submersible Flygt Pump.
Al Nussirat	Alhasayina Pump Station	Supply, install, operate new type impeller for Flygt pump 54 KW in Alhasayina Pump Station at Nuseirat area (As per manufacturer installation manual).

Al Nussirat	Central Pump Station	Cleaning, arranging and transporting any type of waste from the pump pit to any place (According to CMWU Engineer supervision) in Nusirat Central Pump Station.
Deair Al Balah	Al Bassa P.S	Manufacture, Supply, install (100*160)cm rectangular access pump door cover made of S.steel 316L open able with hinges including frame, hinges, stopping chains, lock, painting, protection Grating and all accessories
Al Nussirat	Al Hasaina P.S	Supply and install 2" with minimum 4mm thick stainless steel 316L guide rails for the basket screen of the wet pit installation in order to lower and lift the Basket screen out from the sump
Al Moghraqa	Al Moghraqa P.S	Supply ,install and test complete screen assembly with all electrical and mechanical installations and materials to be installed inside 5 meters deep chamber ,where the system is comprising but not limited of course ,boxed basket bar screen raised and lowered in the shaft via an electric hoist and guided by stainless steel U channel rails ,all made of stainless steel grade 316L .
Deair Al Balah	AL Bassa P.S	Cleaning the pumping stations. The work includes removing the garbage instantly to RWWTP for Al Junina P.S, Wadi Gaza WWTP for Al Bassa P.S and Khanuonis WWTP for Al Wafia P.S. The work includes cleaning of wet pit, grit chamber, screen chamber, inlet chamber, P.S yards, For (AL Bassa P.S) - Deair Al Balah
Al Nussirat	Abu moala P.S	Supply, install, connect, and test 250mm UPVC pipe to convert the flow of gravity line to Al Nusirat main P.S using the existing 400mm UPVC pipe line
Deir Al Balah	Al -Bassa PS	Carry out Complete electromechanical Overhauling and repair of one ton hoist crane
Deir Al Balah	Al Bassa PS	Rewinding the electrical motors for Sewage multi-manufacturer pumps of (46-90) KW
Al Moghraqa	Al Moghraqa PS	Rewinding the electrical motors of Sewage multi-manufacturer pumps of (7-15) KW
Al Zawayda	Al Sawarha PS	Cleaning the pumping stations of Sewage multi-manufacturer pumps of (16-30) KW
Al Buriij	Block 8 PS	Supply, install, connect, test, and replace a complete package of a Flygt type sewage submersible pumping unit 5.9 kw
Deir Al Balah	Al Bassa PS	Supply, install, and replace the duck foot for a 54kw Flygt pump, the work include supply and install Steel Base L Shape 3cm thickness all according to approval and engineer instructions.
Al Nussirat	Wadi gaza WWTP	Provisional items for bar screen, manifold and pumps ...etc...: Repair, General Overhauling, Rehabilitation, electromechanical maintenance and operation unpredictable Defects of pump, manifold, risers, guide rails, valves (4-20)inch valves, pumps base, pump electrical cables, shrinkable connections, also Repair unpredictable Defects of Bar Screen,,,etc....
Al Buriij	Block 8 (Al Maqbara) PS	Supply and cast reinforcement concrete B250 for raising the wet pit walls 50cm above the existing roof
Deir Al Balah	Al-bassa sea water desalination Plant	Dismantle existing horizontal pump and re-install the pump, the work include trimming, balance , new base, Stainless steel pipe, Flanges, bolts, ekelon box, High pressure mechanical seal, New column shaft, supports, New box for mechanical seal and clamps needed
Deir Al Balah	Al Berka P.S	Manufacture, supply, install and remove rectangular access pump door

Northern Governorate:

Municipality	Site/Facility	Work Description
Jabalia	Hawaber sewage P.S	Installing, connect and operate submersible pump KSB 78KW
Um Al Nasser	Um Al Nasser P.S	Supply ,install and test complete screen assembly with all electrical and mechanical installations and materials to be installed inside 5 meters deep chamber ,where the system is comprising but not limited of course ,boxed basket bar screen raised and lowered in the shaft via an electric hoist and guided by stainless steel U channel rails ,all made of stainless steel grade 316L .
Bait Hanoon	Al Sultan Abd Al Hammed PS	Rewinding the electrical motors for Sewage multi-manufacturer pumps of (16-45) KW
Bait Hanoon	Al Sinaiya PS	Supply and install Impeller Case (Volute Casing) with suction cover for KSB pump 78kw as per manufacturer instructions.
Beit Lahia	Amer PS	Provisional items for bar screen, manifold and pumps ...etc.: Repair, General Overhauling, Rehabilitation, electromechanical maintenance and operation unpredictable Defects of pump, manifold, risers, guide rails, valves (4-20)inch valves, pumps base, pump electrical cables, shrinkable connections, also Repair unpredictable Defects of Bar Screen,,,etc....
Om A l Naser	Om A l Naser PS	Rewinding the electrical motors for Sewage multi-manufacturer pumps of (16-45) KW
Beit Lahia	Al Manshia PS	Rewinding the electrical motors for Sewage multi-manufacturer pumps of (46-90) KW
Beit Lahia	Al Siafa PS	Rewinding the electrical motors of Sewage multi-manufacturer pumps of (7.4) KW
Jabalia	Al Hawaber PS	Rewinding the electrical motors for Sewage multi-manufacturer pumps of (46-90) KW
Jabalia	Abu Rashed PS	Rewinding the electrical motors for Sewage multi-manufacturer pumps of (91-210) KW
Beit Lahia	Al Ron PS	Rewinding the electrical motors of Sewage multi-manufacturer pumps of (1-6) KW
Beit Lahia & Jabalia	Hawaber pressure line	Supply, install and replace Four 4" S.Steel 316L Air release valves - ARI type with 4" gate valves - Hakohav type or Fucoli Somepal type
Beit lahia	Beit lahia WWTP (TPS)	Install UPVC pipe 400mm , the work include excavation, backfilling and connection to existing manhole near bar screen
Jabalia	Mahader P.S	Manufacture, supply, install and remove rectangular access pump door cover (95*130*0.3)cm made of stainless steel 316L

During the period of this report from January to December 2021, more than 54 several mechanical repairs have been carried out for the municipal heavy machines including engines overhauling, fabrication new sewage tanks, suction pumps maintenance, tires replacement, filters & oil replacement, body repairs, gear box, transmission system, drive shafts, disc clutches, engines, pins, buckets, lights, absorption dampers, steering joints, in order to keep these machines in good operation and to help the municipal teams to fix the emergency repairs for water and wastewater facilities and infrastructures, usually such repairs are supported by ICRC to make sure that all equipment and machines are operational and ready for emergency cases.

Table 17: list of major repairs/ Heavy machineries

Site/Facility	Municipality	Work Description
Wheel Loader 936	Al Qarara	Supply and install loading bucket cutting edge with it's protective the item includes all required parts and fittings to complete the installations.
Wheel Loader 938	CMWU	Supply, install and replace complete front glass windshield and the right glass, the item includes all required parts and fitting to complete the installation.
Excavator 336F		Supply, install, test and operate Complete 80cm Original front bucket for the excavator the work includes any parts, fittings and accessories to complete operation and installation of the new bucket.
Backhole Loader - Case	Rafah	General Repair, Complete Overhauling and Maintenance gear system, the item includes supply and install fiber discs' sets, steel discs sets, rubber discs sets and gear pump sets for gear system. The item includes changing all deteriorated parts and fittings of the gear system.
		Supply and installing all filters (Air, Oil, Fuel, Hydraulic , etc), changing motor oil, and changing the back differential joints oil ,etc.
Tractor	Al Fakhari	General overhauling and maintenance of the main suction pumping unit, the work includes changing set of vanges, springs, plungers, cylinders, shafts, rods, seals, bearings, blocks, heads, lubrication system, filters,,, etc, the work includes changing any deteriorated parts and fittings i.e. pump base, drive shaft, hoses, valves, gauges, air release valves, clamps,, pipes, belts, pulleys, driving system, etc, to complete installation , operation and testing of the suction system and unit.
		Supply and install dry batteries 100 Ambers, Solit, Volta, and Varta or equivalent, the work includes changing cables, clamps ,,,,etc.
		Complete Maintenance steering joints, the item includes replacing all required parts and fittings to complete installation and operation of the steering system.
Mercedes		Supply and install complete Turbocharger unit, the item includes all required parts and fittings to complete installation and operation of the turbocharger system, also the works includes supply and install enter killer hose with all the fitting needed to complete installation and operation of the system.

Water Vehicle - Mercedes	CMWU	General over hauling, complete maintenance, of the gear system the work includes replacing any deteriorated part of the gear and supply and install any spare parts and fittings needed to complete the works, all as engineer instruction and approval.
Water Vehicle - Mercedes		Supply and install 6Hp water pump KAMA type, the work includes all required parts and fittings to complete installation and operation of the system.
Backhoe Loader - 428BD	Dair Al Balah	Maintenance, replacing and overhauling rear/back bucket and all adapters and tips, the item includes changing all deteriorated parts and fittings of pins, hinge pips, bushes, seals, retainers, repair kits, sups, cones,, etc, to complete installation and operation of rear bucket.
		Maintenance, replacing and overhauling front bucket and all adapters and tips, the item includes changing all deteriorated parts and fittings of pins, hinge pips, bushes, seals, retainers, repair kits, sups, cones,, etc, to complete installation and operation of the front bucket
		Supply, install, test, replace, and operate a complete set of braking system, the work includes replacing any defected part to complete operation of the system, all work as per manufacturer instruction and engineer instruction and approval.
		Supply and install upper Brake system pumps, the item includes all required parts and fittings to complete installation.
		General overhauling, maintenance of the main fuel pump and fuel system, the item includes all parts, fittings and accessories to complete installation and operation of the fuel system
		General overhauling, maintenance of the electrical fuel pump and fuel system, the item includes all parts, fittings and accessories to complete installation and operation of the fuel system.
		Supply and install complete water pump, the item includes all required parts and fittings to complete installation and operation water cooling system.
		Supply, install, and replace four injectors as recommended by manufacture of required engine.
		Complete maintenance of main hydraulic front and rear jack sets, the item includes all required parts and fittings from hoses, connectors, pipes,,etc to complete operate and installation of hydraulic system for jacks system.
		Supply and install all pins, cups, cones, bushes, shafts, hoses, seals,,, etc. for the rear and front right/ left support legs/ stabilizer cylinder, steering system, front bucket, and loading cylinders/jacks, the item include all required parts and fittings to complete the installation and operation, all works as engineer instructions and approval.
Wheel Loader - CAT F950	Khuza'a	Supply and install all middle pins, cups, cones, bushes, etc., the item include all required parts and fittings to complete the installation and operation, all works as per manufacturer instruction and engineer approval.
		Supply and install dry batteries 160 Ambers, Solit, Volta, and Varta or equivalent, the work includes changing cables, clamps ,,,,etc.

		Supply and install all filters, i.e. oil, fuel, water, and air filters,, etc., the work includes changing the oil, and doing all needed works and maintenance required to complete the work, and replacing any needed parts to bring back the engine in good working condition, all work as per engineer instruction and approval.
		Maintenance and repair the radiator assembly ,the item includes all required parts and fittings to complete installation and operation of cooling system , the item includes supplying water radiator.
Tractor	Khuza'a	Supply and install a complete radiator assembly for the Tractor ,the item includes all required parts and fittings to complete installation and operation of cooling system , the item includes supplying water radiator.
		Supply, install, and replace the selector, the work includes any fittings, hoses, spare parts and electrical connection needed to operate the system. Also the work include all pistons of the crane.
		Supply , install and replace all the crane arms (supports) the works includes all the fittings, parts, and accessories needed to complete operation of the system.
		Maintain the hydraulic pump unit for the hydraulic jacks, the item includes all required parts and fittings to complete installation and operation of the hydraulic system.
		Supply and install rear bearings, seals for the Gear system, the item includes changing all deteriorated parts, fittings and accessories to complete installation.
		Maintain piston steering, the item includes changing all deteriorated parts, fittings and accessories to complete installation.
		Supply and install right and left front steering ball joints, the item includes replacing all required parts and fittings to complete installation and operation of the steering system.
		Supply and install rear bearings, seals for the drive shaft system, the item includes changing all deteriorated parts, fittings and accessories to complete installation.
Tractor	Khuza'a	Supply and install a complete radiator assembly for the Tractor ,the item includes all required parts and fittings to complete installation and operation of cooling system , the item includes supplying water radiator.
Pop Cat - Daewoo	Abasan Al Jadida	Supply, install, replace and test the pop cat diesel engine with 1600hp, 4cylinder engine original or equivalent, the work includes replacing the mechanical and electrical spare parts and connections, filters, oil and fuel pumps, connecting the transmission gear system, clutch system, checking all electrical connections and hydraulic connections and replace any deteriorated parts to complete the operation and installation of the new engine all works as per manufacturer instructions and engineer approval.
Mitsubishi		Supply, install, and replace front light sets (left and right) and replace the light signals (left and right) for the front and back of the vehicle including the breaking lights, the item includes all required spare parts and fittings for installation and operation of the lights and electrical system.

		Supply and install Tubeless tires of 15/195, steel belted, 12ply, 125psi, Bridgestone or equivalent manufactured date is maximum six month from supplying and installation day.
		General overhauling and complete maintenance of electrical system, the item includes all required parts and fittings to complete operation and installation of electrical system, wires, cables,,etc.
		General overhauling, complete maintenance, sand blasting, changing deteriorated parts of the ground of the vehicle, the work includes replacement of any deteriorated parts, the item includes supply and install any damaged spare parts, all as per engineer instruction and approval.
		Supply and install complete suspension system for the front and back of the vehicle the work includes all require parts and fittings to complete installation and operation of the suspension system.
Toyota	Al Moghraga	Supply and install Wheel Loader tires of 235/75/15, steel belted, 8ply, triangle or equivalent manufactured six month from supplying day,,, etc., the work includes changing any deteriorated parts of the wheel system, i.e. bolts, nuts, rim, bearings,,, etc.
		Supply and install cover of the back box of the vehicle made from fiber glass, the item includes all required parts and fittings to complete installation works.
		complete Car seat upholstery and cladding the work includes replacing spring, and black rubber of the floor for the driver cabinet and the passengers cabinet.
Wheel Loader CAT 936E	Buraij	Complete overhauling, electromechanical maintenance of the vehicle main engine and its related system. The item includes changing engine parts and all deteriorated and malfunctioning parts and fittings i.e. pistons, cylinders, valves, exhaust valves, springs, gaskets, kits, bearings, belts, gears, pulleys, cam shaft, crank shaft, injectors, etc. also the work includes supplying and installing all filters (Air, Oil, Fuel ,etc..) and changing oil,,etc... The work includes overhauling and replacement of any deteriorated parts and fittings related to the engine system i.e. fuel, lubrication, transmission, water cooling, exhaust, flywheel, disc-clutch, gear box, disc - clutch wire, alternator, electrical, control,,etc... complete the overhauling according to technical issues and specifications, and any needed parts to bring the engine and its related systems back into good working condition, all as per engineer instruction and approval.
		General Repair, Complete Overhauling and Maintenance gear system, the item includes supply and install fiber discs' sets, steel discs' sets, rubber discs sets and gear pump sets for gear system. The item includes changing all deteriorated parts and fittings of the gear system.
		General overhauling and maintenance of the hand brake system, the item includes changing all deteriorated parts and fittings, i.e. lever, rods,,,etc..., to complete operation of the hand brake system.

		Supply and install all filters, i.e. oil, fuel, water, and air filters,, etc., the work includes changing the oil, and doing all needed works and maintenance required to complete the work, and replacing any needed parts to bring back the engine in good working condition, all work as per engineer instruction and approval.
		Supply and install battery ,100 AMP. Ordinary pole, akas or equiv.
Wheel Loader 936	Al Nussirat	General overhauling and maintenance of the brake system for all tires, the item includes supply and install repair kit of the brake system, speed pans ,drums, and changing any deteriorated and required parts and fittings to complete installation and operation of the system.
Tractor 4240		General overhauling and maintenance of the brake system for all tires, including supply and install repair kit of the brake system, speed pans ,drums, and changing any deteriorated and required parts and fittings to complete installation and operation of the system.
Toyota		General overhauling, complete maintenance, sand blasting, changing deteriorated parts of the vehicle, replacement of any deteriorated parts of the vehicle, locks, body, wiper, motors, light, wipers, chairs, renewing the cabinet furniture, etc. and full body repair and painting of deteriorated parts of the tractor body, supply and install any damaged emergency water German stickers
		General overhauling, complete maintenance, of the gear system the work includes replacing any deteriorated part of the gear and supply and install any spare parts and fittings needed to complete the works, all as engineer instruction and approval.
		Maintenance of the rear brake system and front brake mass, the item includes supply and install changing any deteriorated and required parts and fittings to complete installation and operation of the system.
Backhole Loader - JCB	Bait Hanoun	Supply and install front Backhole Loader tires of 18/12.5, steel belted, 18ply, 30 bar, triangle or equivalent manufactured date is maximum six month from supplying and installation day, the work incloudes changing the wheel rim and any deteriorated parts of the wheel system i.e bilts, nuts, rim, bearings,,etc.
		Supply and install rear Tubeless tires of 18.4/26, steel belted, 16ply, 30 bar, triangle or equivalent manufactured date is maximum six month from supplying and installation day, the work incloudes changing the wheel rim and any deteriorated parts of the wheel system i.e bilts, nuts, rim, bearings,,etc.
		Supply, install and replace all Hydraulic hoses, the work incloudes all associated fittings, and changing all detetiorated parts in the hydraulic system.
		Supply and install dry buttry 100A, Volda or equivalent, the work incloudes changing the cable clamps.

		General repair, complete overhauling and maintenance of the Hydraulic jacks, and pins, cones,,, etc. the work includes changing all deteriorated parts and fittings.
		Supply, install and replace windshield glass of the backhole cabinet from all sides, with all associated fittings and parts as per engineer instruction and approval.
		Supply, install and replace the complete front frond with the steering units with it, the work includes any fittings, accessories and parts to complete the job.
Wheel loader - CAT 950G	Gaza	Supply and install tyres of 23.5R25 , steel L3 psi 60 triangle or equivalent manufactured six month from supplying day ..,the work includes changing any deteriorated parts of the wheel system i.e. bolts , nuts,...etc.
Wheel Loader G950 - CAT	Bait Hanoun	Supply and install Wheel Loader tires of 25/23.5, steel belted, 20 ply, triangle or equivalent manufactured six month from supplying day,,, etc., the work includes changing any deteriorated parts of the wheel system, i.e. bolts, nuts, rim, bearings,,, etc.
		Supply and install all pins, cups, cones, bushes, shafts, hoses, seals,,, etc. for c loader jacks, the item include all required parts and fittings to complete the installation and operation.
		Supply and install loading bucket cutting edge with it's protective the item includes all required parts and fittings to complete the installations.
Mitsubishi - L200 T47K	Bait lahia	Supply, install, convert and replace the automatic gear shift system to manual gear system, the item includes supply and install complete manual gear system, supply and install fiber discs sets and gear pump set for the gear system, the work include replacing the bearing of the front wheels and checking and maintenance of the break system, also, replacing all deteriorated parts and fitting to complete the installation of the new gear system.
		General overhauling and complete maintenance of the electrical system, the item includes all replacing all required parts and fittings to complete operation and installation of the electrical system, i.e.,, wires, alarm system, windshield wipers, automatic windows opening, cables, switches, also the work includes replacing the car light and signal lights.

Jetting Truck - Renulut	Bait lahia	Supply, install, replace, test and operate complete original diesel engine 320hp, Disc - clutch set, clutch wire, and transmission gear box, as similar vehicle manufacturer specifications, the item includes all required and related parts and fittings to complete installation and operation of the engine. the item includes overhauling and replacement of any deteriorated parts and fittings, all the vehicle related engine systems i.e. Fuel, Lubrication, Transmission, water cooling, exhaust, Flywheel, Disc - Clutch, Gear Box, wire, Alternator, break system, replacing the dry shaft and it's support, supplying and installing new air compressor, all Electrical connections and fitting needed, dry batteries 160 Ambers, Solit, Volta, and Varta or equivalent type, control,, etc. The item includes supplying and installing all filters (Air, Oil, Fuel,, etc.) and changing oil,, and supplying all spare parts recommended by the manufacturer.
Wheel loader 438D - CAT	Jabalialia	Supply, install, replace, test and operate complete original diesel engine, Disc - clutch set, clutch wire, and transmission gear box, as similar vehicle manufacturer specifications, the item includes all required and related parts and fittings to complete installation and operation of the engine. the item includes overhauling and replacement of any deteriorated parts and fittings, all the vehicle related engine systems i.e. Fuel, Lubrication, Transmission, water cooling, exhaust, Flywheel, Disc - Clutch, Gear Box, wire, Alternator, break system, replacing the dry shaft and it's support, supplying and installing new air compressor, all Electrical connections and fitting needed, dry batteries 160 Ambers, Solit, Volta, and Varta or equivalent type, control,, etc. The item includes supplying and installing all filters (Air, Oil, Fuel,, etc.) and changing oil,, and supplying all spare parts recommended by the manufacturer. Supply and install hydraulic pump unit for the hydraulic jacks, the item includes all required parts and fittings to complete installation and operation of the hydraulic system.
Transportaion - Renault	Jabalialia	Supply, install, replace, test and operate complete original diesel engine, Disc - clutch set, clutch wire, and transmission gear box, as similar vehicle manufacturer specifications, the item includes all required and related parts and fittings to complete installation and operation of the engine. the item includes overhauling and replacement of any deteriorated parts and fittings, all the vehicle related engine systems i.e. Fuel, Lubrication, Transmission, water cooling, exhaust, Flywheel, Disc - Clutch, Gear Box, wire, Alternator, break system, replacing the dry shaft and it's support, supplying and installing new air compressor, all Electrical connections and fitting needed, dry batteries 160 Ambers, Solit, Volta, and Varta or equivalent type, control,, etc. The item includes supplying and installing all filters (Air, Oil, Fuel,, etc.) and changing oil,, and supplying all spare parts recommended by the manufacturer. Supply, install and replace complete back differential joints, the work includes any related parts and fittings to complete the work.

Transportaion - Mazda	Um Al Nasser	Complete overhauling, electromechanical maintenance of the vehicle main engine and it's related system. The item includes changing engine parts and all deteriorated and malfunctioning parts and fittings i.e. pistons, cylinders, valves, exhaust valves, springs, gaskets, kits, bearings, belts, gears, pulleys, cam shaft, crank shaft, injectors,,, etc. also the work includes supplying and installing all filters (Air, Oil, Fuel,,etc..) and changing oil,,etc... The work includes overhauling and replacement of any deteriorated parts and fittings related to the engine system i.e. fuel, lubrication, transmission, water cooling, exhaust, flywheel, disc-clutch, gear box, disc - clutch wire, alternator, electrical, control,,etc... complete the overhauling according to technical issues and specifications, and any needed parts to bring the engine and it's related systems back into good working condition, all as per engineer instruction and approval.
		Complete Maintenance steering joints, the item includes replacing all required parts and fittings to complete installation and operation of the steering system.
		Supply, install and replace a complete set of front and rear shock absorbers, the work includes changing all deteriorated parts of the suspension system.
		Complete overhauling, electromechanical maintenance of the vehicle main engine and it's related system. The item includes changing engine parts and all deteriorated and malfunctioning parts and fittings i.e. pistons, cylinders, valves, exhaust valves, springs, gaskets, kits, bearings, belts, gears, pulleys, cam shaft, crank shaft, injectors,,, etc. also the work includes supplying and installing all filters (Air, Oil, Fuel,,etc..) and changing oil,,etc... The work includes overhauling and replacement of any deteriorated parts and fittings related to the engine system i.e. fuel, lubrication, transmission, water cooling, exhaust, flywheel, disc-clutch, gear box, disc - clutch wire, alternator, electrical, control,,etc... complete the overhauling according to technical issues and specifications, and any needed parts to bring the engine and it's related systems back into good working condition, all as per engineer instruction and approval.
		Supply and install complete suspension system for the front and back of the vehicle the work includes all required parts and fittings to complete installation and operation of the suspension system.
Jetting Truck - Mack	gaza	Supply and install Sewer cleaning hose 1" inner diameter, used in jetting machines working pressure not less than 250 bar, with the following specifications: Polyethylene based compound, 2 layers of braided high-resistance synthetic fibers, Pin pricked anti-abrasion polyurethane. with its connections fittings, adapter, swivel, spin type nozzle No.02, accessories of male-female made from stainless steel 316L. As per engineer approval and instruction.
		Supply and install tyres of 295/80R22.5 ,18 ply , triangle , linglong or equivalent manufactured six month from supplying day ..,the work includes changing any deteriorated parts of the wheel system i.e. bolts , nuts,...etc.

		Supply and install tyres of 315/80R22.5, 18 ply, triangle, linglong or equivalent manufactured six month from supplying day .., the work includes changing any deteriorated parts of the wheel system i.e. bolts, nuts, ...etc.
		Supply and install dry battery, 105 AMP. Ordinary pole, akas or equiv.
		Supply and install radiator assembly of Perkins engine 75*60cm, the item includes all required parts and fittings to complete installation and operation of cooling system, the item includes supplying water radiator.
		Supply and install radiator assembly 100*74cm, the item includes all required parts and fittings to complete installation and operation of cooling system, the item includes supplying water radiator.
		Supply and install driveshaft spider.
		Supply and install complete clutch mechanism.
		Supply and install turbocharger garret or equiv of Perkins engine.
Jetting Truck - Mack	Gaza	Supply and install Sewer cleaning hose 1" inner diameter, used in jetting machines working pressure not less than 250 bar, with the following specifications: Polyethylene based compound, 2 layers of braided high-resistance synthetic fibers, Pin pricked anti-abrasion polyurethane. with its connections fittings, adapter, swivel, spin type nozzle No.02, accessories of male-female made from stainless steel 316L. As per engineer approval and instruction.
		Supply and install tyres of 295/80R22.5, 18 ply, triangle, linglong or equivalent manufactured six month from supplying day .., the work includes changing any deteriorated parts of the wheel system i.e. bolts, nuts, ...etc.
		Supply and install tyres of 315/80R22.5, 18 ply triangle, linglong or equivalent manufactured six month from supplying day .., the work includes changing any deteriorated parts of the wheel system i.e. bolts, nuts, ...etc.
		Supply and install dry battery, 105 AMP. Ordinary pole, akas or equiv.
		Supply and install radiator assembly of Perkins engine 75*60cm, the item includes all required parts and fittings to complete installation and operation of cooling system, the item includes supplying water radiator.
		Supply and install radiator assembly 100*74cm, the item includes all required parts and fittings to complete installation and operation of cooling system, the item includes supplying water radiator.
		Supply and install driveshaft spider
		Supply and install complete clutch mechanism

Wheel Loader - CAT 950G	Gaza	Supply and install tyres of 23.5R25 , steel L3 psi 60 triangle or equivalent manufactured six month from supplying day ..,the work includes changing any deteriorated parts of the wheel system i.e. bolts , nuts,...etc.
		Supply and install dry battery ,105 AMP. Ordinary pole, akas or equiv.
Mercedes-Axor	Gaza	supply and install synchronizer kit 1st/2nd consist of : engaging ring 2 ,synchronizing cone 2, spring 2,guide sleeve 1,engaging sleeve 1 , that include all requirements oil ,filters, bolts, ...
		supply and install synchronizer kit 3rd/4th consist of : engaging ring 2 ,synchronizing cone 2, spring 2,guide sleeve 1,engaging sleeve 1 , that include all requirements oil ,filters, bolts, ...
		supply and install synchronizer kit planetary consist of : follower ring 1, spring 2,synchronizing cone 2,guide sleeve 1 , engaging sleeve 1, sliding pad 2, engaging ring 1 , that include all requirements oil ,filters, bolts, ...
		Supply and install gearbox valve wabco no. 4422302221 and 4 valves on gear box
		Supply and install battery ,180 AMP. Ordinary pole, akas or equiv.
Wheel Loader- Case 821C	Gaza	Supply and install tyres of 23.5R25 , steel L3 psi 60 triangle or equivalent manufactured six month from supplying day ..,the work includes changing any deteriorated parts of the wheel system i.e. bolts , nuts,...etc.
		Supply and install dry battery ,105 AMP. Ordinary pole, akas or equiv.
Wheel Loader 936	Al Nussirat	General overhauling, complete maintenance, sand blasting, changing deteriorated parts of the wheel loader, the work includes replacement of any deteriorated parts of the fenders, locks, body, wiper, motors, light, wipers, chairs, renewing the cabinet furniture,,, etc. The item includes full body repair and painting of deteriorated parts of the tractor body, the item includes supply and install any damaged emergency water German stickers, all as per engineer instruction and approval.
		General overhauling, complete maintenance, of the gear system the work includes replacing any deteriorated part of the gear and supply and install any spare parts and fittings needed to complete the works, all as engineer instruction and approval.
Tractor 4240	Al Nussirat	Manufacture, supply, replace, and install complete 5mm thickness sewage tank of suction tanker, tank capacity not less than 5 cubic meter, complete with two steel partitions, base paints, asphalt internal and external paints, two layers of epoxy painting, final oven paint, the item includes all required parts and fittings of wooden sheets, beams, chassis, clamps, bolts, flanges, nipples, pressure gauges, pipes, hoses, valves,, etc. to complete installation and operation of the suction tank and related systems, as per engineer instruction and approval.

		Supply and install heavy duty hook with lock at least 25ton, the item includes all required parts and fittings to complete installation and operation of the hooking system.
		Complete overhauling, electromechanical maintenance of the vehicle main engine and it's related system. The item includes changing engine parts and all deteriorated and malfunctioning parts and fittings i.e. pistons, cylinders, valves, exhaust valves, springs, gaskets, kits, bearings, belts, gears, pulleys, cam shaft, crank shaft, injectors,,, etc. also the work includes supplying and installing all filters (Air, Oil, Fuel,,etc..) and changing oil,,etc... The work includes overhauling and replacement of any deteriorated parts and fittings related to the engine system i.e. fuel, lubrication, transmission, water cooling, exhaust, flywheel, disc-clutch, gear box, disc - clutch wire, alternator, electrical, control,,etc... complete the overhauling according to technical issues and specifications, and any needed parts to bring the engine and it's related systems back into good working condition, all as per engineer instruction and approval.
Ford Transit Bus	Al Zahra	Complete overhauling, electromechanical maintenance of the vehicle main engine and it's related system. The item includes changing engine parts and all deteriorated and malfunctioning parts and fittings i.e. pistons, cylinders, valves, exhaust valves, springs, gaskets, kits, bearings, belts, gears, pulleys, cam shaft, crank shaft, injectors,,, etc. also the work includes supplying and installing all filters (Air, Oil, Fuel,,etc..) and changing oil,,etc... The work includes overhauling and replacement of any deteriorated parts and fittings related to the engine system i.e. fuel, lubrication, transmission, water cooling, exhaust, flywheel, disc-clutch, gear box, disc - clutch wire, alternator, electrical, control,,etc... complete the overhauling according to technical issues and specifications, and any needed parts to bring the engine and it's related systems back into good working condition, all as per engineer instruction and approval.
		General overhauling, complete maintenance, sand blasting, changing deteriorated parts of the bus, the work includes replacement of any deteriorated parts of the bus, locks, body, wiper, motors, light, wipers, chairs, renewing the cabinet furniture,,, etc. The item includes full body repair and painting of deteriorated parts of the tractor body, the item includes supply and install any damaged emergency water German stickers, all as per engineer instruction and approval.
		Supply and install complete front glass windshield, the item includes all required parts and fitting to complete the installation.

Mercedes Transit Bus	Deair Al Balah	Supply, install, replace, test and operate complete original diesel engine, Disc - clutch set, clutch wire, and manual transmission gear box, as similar vehicle manufacturer specifications, the item includes all required and related parts and fittings to complete installation and operation of the engine. the item includes overhauling and replacement of any deteriorated parts and fittings, all the vehicle related engine systems i.e. Fuel, Lubrication, Transmission, water cooling, exhaust, Flywheel, Disc - Clutch, Gear Box, wire, Alternator, break system, replacing the dry shaft and it's support, supplying and installing new air compressor, all Electrical connections and fitting needed, dry batteries 160 Ambers, Solit, Volta, and Varta or equivalent type, control,, etc. The item includes supplying and installing all filters (Air, Oil, Fuel,, etc.) and changing oil,, and supplying all spare parts recommended by the manufacturer.
Wheel Loader 950B	Dair Al Balah	Supply and install complete Turbocharger unit, the item includes all required parts and fittings to complete installation and operation of the turbocharger system.
		Supply and install all filters, i.e. oil, fuel, water, and air filters,, etc., the work includes changing the oil, and doing all needed works and maintenance required to complete the work, and replacing any needed parts to bring back the engine in good working condition, all work as per engineer instruction and approval.
		Supply, install and replace complete fuel injectors, the item includes all required parts and fittings to complete installation and operation of the fuel system.
		Maintenance, renewing and overhauling front bucket, the item includes changing all deteriorated parts and fittings of pins, hinge pipes, bushes, seals, retainers, repair kits, cups, cones,,etc., to complete installation and operation of the front bucket.
		Supply and install loading bucket cutting edge with it's protective the item includes all required parts and fittings to complete the installations.
		Maintenance , supply and install all hydraulic hoses and engine hoses, with all associated fittings, and changing all deteriorated parts in the hydraulic system.
		Supply and install complete pre- fuel pump (primary) the item includes any needed parts to complete installation and operation of the system.
		Supply and install cooler for the water system to complete operation of the cooling system.
		General overhauling and maintenance of the hand brake system, the item includes changing all deteriorated parts and fittings, i.e. lever, rods,,etc., to complete operation of the hand brake system.
		General overhauling and maintenance of water radiator, the work includes changing any deteriorated parts and fittings to complete the works.

Water Vehicle - Mercedes	Al Bassa D.P	Supply ,install and test Effer or equivalent European made modular truck mounted CRANE with all associated mechanical and hydraulic control installations and mechanisms of max loading 5 ton and 1.5 ton for (9-13 meter) maximum reach .The work includes dismantling the S.Steel 10m3 tank to be delivered to the contract and it's price to be discount from the total price of the works, around (34,000.00NIS).
		Supply ,fabricate ,install and test modular and traffic licensed truck steel metal plate form with side boxing including all associated fittings and accessories required to accommodate CRANE system detailed as per item no. (1) the work includes Modify, fabricate, the back tipper of the vehicle to be operating as tipper truck with crane, the work includes the hydraulic system with pump ,selectors, hoses ,controls and protections with all associated fittings and accessories required to operate the entire tipper and crane also the work includes fabricate and install a steel sides 1.2m from all sides for the tipper to be working as a box tipper, all works as engineer instruction and approval.
		Supply ,install ,connect and test modular hydraulic systems with pump ,selectors, hoses ,controls and protections with all associated fittings and accessories required to operate the entire crane.
		Supply and install dry batteries 160 Ambers, Solit,Volta, and Varta or equivalent, the work includes changing cables, clamps ,,,,etc.
		Supply and install complete Group of disc and clutch, Bearing and Plates, clutch wire and rod..etc., the work includes change any deteriorated parts and any needed parts to complete installation and operating disc and clutch system.
Toyota	Al Moghraga	General overhauling, complete maintenance, sand blasting, changing deteriorated parts of the vehicle, the work includes replacement of any deteriorated parts of the vehicle, locks, body, wiper, motors, light, wipers, chairs, renewing the cabinet furniture,,, etc. The item includes full body repair and painting of deteriorated parts of the tractor body, the item includes supply and install any damaged emergency water German stickers, all as per engineer instruction and approval.
		Supply and install dry batteries 160 Ambers, Solit,Volta, and Varta or equivalent, the work includes changing cables, clamps ,,,,etc.
		Supply, install and replace a complete set of front and rear shock absorbers, the work includes changing all deteriorated parts of suspension system.
		Supply and install right and left front steering ball joints, the item includes replacing all required parts and fittings to complete installation and operation of the steering system.

Tractor 4240	Al Buraij	Complete overhauling, electromechanical maintenance of the vehicle main engine and it's related system. The item includes changing engine parts and all deteriorated and malfunctioning parts and fittings i.e. pistons, cylinders, valves, exhaust valves, springs, gaskets, kits, bearings, belts, gears, pulleys, cam shaft, crank shaft, injectors,,, etc. also the work includes supplying and installing all filters (Air, Oil, Fuel,,etc..) and changing oil,,etc... The work includes overhauling and replacement of any deteriorated parts and fittings related to the engine system i.e. fuel, lubrication, transmission, water cooling, exhaust, flywheel, disc-clutch, gear box, disc - clutch wire, alternator, electrical, control,,etc... complete the overhauling according to technical issues and specifications, and any needed parts to bring the engine and it's related systems back into good working condition, all as per engineer instruction and approval.
		Supply and install steering pump, the work includes all required parts and fittings to complete installation and operation of the steering system.
		Supply and install Fuel filter, the item includes all required parts and fittings to complete installation.
		Supply and install Oil filter, the item includes all required parts and fittings to complete installation.
		Supply and install Air filter, the item includes all required parts and fittings to complete installation.
		Supply and install complete drive shaft number 06 for operating the jetter pump , the work includes all required parts and fittings to complete the works.
		Supply and install complete Group of disc and clutch, Bearing and Plates, clutch wire and rod..etc., the work includes change any deteriorated parts and any needed parts to complete installation and operating disc and clutch system.
Tractor MS 390	Al Buraij	General overhauling and maintenance of the jetting pumping unit, the work includes changing set of vans, springs, plungers, cylinders, shafts, rods, seals, bearings, blocks, heads, lubrication system, filters,,,etc.. The item includes changing all deteriorated parts and fittings i.e. pump base, hoses, valves, gauges, air release valves, clamps, pipes, belts, pulleys, driving system,, etc. to complete installation, operation, and testing of the jetting system and unit.
		Supply and install steering pump, the work includes all required parts and fittings to complete installation and operation of the steering system.
		Supply and install steering ball joints, the item includes all required parts and fittings to complete installation.

		General overhauling and maintenance the heavy duty hook with lock, the item includes machining, welding, fabrication and any required parts and fittings to complete rehabilitation and operation of the hooking system.
		Supply and install complete drive chair/set, the item includes all required parts and fittings to complete installation.
		Supply and install Fuel filter, the item includes all required parts and fittings to complete installation. C1191
		Supply and install Oil filter, the item includes all required parts and fittings to complete installation.
		Supply and install Air filter, the item includes all required parts and fittings to complete installation. AF25524
		Supply and install complete water pump, the item includes all required parts and fittings to complete installation and operation water cooling system.
Trailer Jetter Tank	Al Maghazy	Supply and install jetting pump number FEC type (FMC Piston Pump / Model Number L 1118 sac) on the trailer jetter tank, the item includes all required parts and fittings i.e. hoses, clamps,, etc. to complete installation and operation of the system.
		Supply and install complete Group of disc and clutch between the motor and the jetting pump, Bearing and Plates, clutch wire and rod..etc., the work includes change any deteriorated parts and any needed parts to complete installation and operating disc and clutch system.
		Supply and install complete pressure valve, for reducing the extra pressure, the work includes any needed fittings and spare parts to complete installation and operation of the system.
		Supply and install a pressure gauge (0 - 400) bar with all necessary accessories and fitting to complete the installation and operation of the system.
Mitsubishi	Al Masdar	Supply, install and replace a complete set of front and rear shock absorbers, the work includes changing all deteriorated parts of suspension system.
		General overhauling, complete maintenance, sand blasting, changing deteriorated parts of the vehicle, the work includes replacement of any deteriorated parts of the vehicle, locks, body, wiper, motors, light, wipers, chairs, renewing the cabinet furniture,,, etc. The item includes full body repair and painting of deteriorated parts of the tractor body, the item includes supply and install any damaged emergency water German stickers, all as per engineer instruction and approval.

		General overhauling and complete maintenance of the electrical system, the item includes replacing all required parts and fittings to complete operation and installation of the electrical system, i.e., wires, alarm system, windshield wipers, automatic windows opening, cables, switches, also the work includes replacing the front car light and signal lights.
Jetting Truck - Renault	Khanuonis	Supply and install jetter pump (Pressure=2000PSI, Speed=1450RPM, and Q= 65GPM) FMC type with external engine, the work includes supply and install any related spare parts, fittings and works to complete installation and operation of the system.
Tractor	Al Fukhary	Supply and install steering pump, the work includes all required parts and fittings to complete installation and operation of the steering system.
		Supply and install main hydraulic pump for the hydraulic jacks, with all required parts and fittings to complete the installation and operation the jacks hydraulic system all works as manufacturer instructions.
		Supply and install tractor front tires of 12.4/11-24, 8ply, Triangle, Ling long or equivalent manufactured six month from supplying day,,etc., the work includes changing any deteriorated parts of the wheel system i.e. bolts, nuts, rim, bearings,,etc..
		Supply and install the front bearing wheel, the item includes changing all deteriorated and required parts and fittings to complete installation and operation of the system.
		Supply and install dry shaft gear interlock, the work includes all required parts and fittings to complete the works.
		General overhauling the fuel pump, with all required parts and fittings to complete the installation and operation the fuel system all works as manufacturer instructions.
Wheel Loader - CAT936F	Abasan Al Kabera	Supply and install loading bucket cutting edge with it's protective the item includes all required parts and fittings to complete the installations.
		Supply and install battery ,120 AMP. Ordinary pole, akas or equiv.
		Supply and install all middle pins, cups, cones, bushes, etc., the item include all required parts and fittings to complete the installation and operation, all works as per manufacturer instruction and engineer approval.
Suction Track - Mack	Bani Suhaila	General overhauling and maintenance of the main suction pumping unit, the work includes changing set of vanes, springs, plungers, cylinders, shafts, rods, seals, bearings, blocks, heads, lubrication system, filters,,, etc., the work includes changing any deteriorated parts and fittings i.e. pump base, drive shaft, hoses, valves, gauges, air release valves, clamps,, pipes, belts, pulleys, driving system,,, etc., to complete installation , operation and testing of the suction system and unit.

		Complete overhauling, electromechanical maintenance of the vehicle main engine and it's related system. The item includes changing engine parts and all deteriorated and malfunctioning parts and fittings i.e. pistons, cylinders, valves, exhaust valves, springs, gaskets, kits, bearings, belts, gears, pulleys, cam shaft, crank shaft, injectors,,, etc. also the work includes supplying and installing all filters (Air, Oil, Fuel,,etc..) and changing oil,,etc... The work includes overhauling and replacement of any deteriorated parts and fittings related to the engine system i.e. fuel, lubrication, transmission, water cooling, exhaust, flywheel, disc-clutch, gear box, disc - clutch wire, alternator, electrical, control,,etc... complete the overhauling according to technical issues and specifications, and any needed parts to bring the engine and it's related systems back into good working condition, all as per engineer instruction and approval. Supply and install six rear Tubeless tires of 15/1100, and two Tubeless tires of 315/80R22.5 steel belted, 12ply, 125psi, Triangle, Ling long or equivalent manufactured date is maximum six month from supplying and installation day.
Wheel Loader G950 - CAT	Bani Suhaila	Supply and install Wheel Loader tires of 25/23.5, steel belted, 20 ply, triangle or equivalent manufactured six month from supplying day,,, etc., the work includes changing any deteriorated parts of the wheel system, i.e. bolts, nuts, rim, bearings,,, etc. Supply and install all filters, i.e. oil, fuel, water, and air filters,, etc., the work includes changing the oil, and doing all needed works and maintenance required to complete the work, and replacing any needed parts to bring back the engine in good working condition, all work as per engineer instruction and approval.
Wheel Loader - CAT	Khuza'a	Supply and install engine head CAT type, the work includes all necessary spare part and fittings to complete installation and operation of the vehicle, all works as per engineer instruction and approval. Supply and install all pins, cups, cones, bushes, etc., the item include all required parts and fittings to complete the installation and operation of the front bucket, all works as per manufacturer instruction and engineer approval. Supply and install piston seals, the work includes any fittings and spare parts needed to complete installation of the seals.

Tractor	Khuza'a	Complete overhauling, electromechanical maintenance of the vehicle main engine and it's related system. The item includes changing engine parts and all deteriorated and malfunctioning parts and fittings i.e. pistons, cylinders, valves, exhaust valves, springs, gaskets, kits, bearings, belts, gears, pulleys, cam shaft, crank shaft, injectors,,, etc. also the work includes supplying and installing all filters (Air, Oil, Fuel,,etc..) and changing oil,,etc... The work includes overhauling and replacement of any deteriorated parts and fittings related to the engine system i.e. fuel, lubrication, transmission, water cooling, exhaust, flywheel, disc-clutch, gear box, disc - clutch wire, alternator, electrical, control,,etc... complete the overhauling according to technical issues and specifications, and any needed parts to bring the engine and it's related systems back into good working condition, all as per engineer instruction and approval.
		Supply and install all filters, i.e. oil, fuel, water, and air filters,, etc., the work includes changing the oil, and doing all needed works and maintenance required to complete the work, and replacing any needed parts to bring back the engine in good working condition, all work as per engineer instruction and approval.
Tractor	Khuza'a	Complete overhauling, electromechanical maintenance of the vehicle main engine and it's related system. The item includes changing engine parts and all deteriorated and malfunctioning parts and fittings i.e. pistons, cylinders, valves, exhaust valves, springs, gaskets, kits, bearings, belts, gears, pulleys, cam shaft, crank shaft, injectors,,, etc. also the work includes supplying and installing all filters (Air, Oil, Fuel,,etc..) and changing oil,,etc... The work includes overhauling and replacement of any deteriorated parts and fittings related to the engine system i.e. fuel, lubrication, transmission, water cooling, exhaust, flywheel, disc-clutch, gear box, disc - clutch wire, alternator, electrical, control,,etc... complete the overhauling according to technical issues and specifications, and any needed parts to bring the engine and it's related systems back into good working condition, all as per engineer instruction and approval.
		Supply and install all filters, i.e. oil, fuel, water, and air filters,, etc., the work includes changing the oil, and doing all needed works and maintenance required to complete the work, and replacing any needed parts to bring back the engine in good working condition, all work as per engineer instruction and approval.
		Supply and install battery ,100 AMP. Ordinary pole, akas or equiv.
		Supply and install main hydraulic pump for the hydraulic jacks, with all required parts and fittings to complete the installation and operation the jacks hydraulic system all works as manufacturer instructions.
Jetting Truck - Mack	Rafah	Supply and install four rear Tubeless tires of R20/1100, and two front tires of 315-80R-22.5 steel belted, 12ply, 125psi, Triangle, Ling long or equivalent manufactured date is maximum six month from supplying and installation day.

		Supply and install complete front glass windshield, the item includes all required parts and fitting to complete the installation.
		General overhauling and complete maintenance of the electrical system, the work includes supply, install and maintenance all parts and fittings to complete operate and installation of the electrical system, wire, cables, switches,, etc.
		Complete maintenance and overhauling the rear (jetting) reel, the work includes all required parts, fitting, and accessories to complete installation and operation of the system, also the work includes replacing the chain, socket, motor, reel base and any other spare parts needed to complete the work.
		General overhauling and maintenance of the vehicle air system, includes supply and install complete air release valve unit, and all parts, fittings and accessories to complete installation and operation of the air system, also the work includes replacing the biggest air filter housing, all works as engineer instruction and approval.
		Supply, install and replace complete motor starter. The work includes all electrical fittings and electromechanical parts needed to complete installation and operation of the starter system.
		Supply and install front break chamber with air hoses, the work includes all required parts and fittings to operate the break system.
		Supply and install electrically operated gear handle, with all associated fittings, and changing all deteriorated parts to complete installation and operation of the gear system.
		General overhauling and maintenance of the brake system for all tires, the item includes supply and install repair kit of the brake system, speed pans, drums, and changing any deteriorated and required parts and fittings to complete installation and operation of the system.
Jetting Truck - Mack	Rafah	Complete maintenance and overhauling the rear (jetting) reel, the work includes all required parts, fitting, and accessories to complete installation and operation of the system, also the work includes replacing the socket and any other spare parts needed to complete the work.
		General overhauling and complete maintenance of the electrical system, the work includes supply, install and maintenance all parts and fittings to complete operate and installation of the electrical system, wire, cables, switches,, etc.
		General overhauling and maintenance of the vehicle air system, includes supply and install complete air release valve unit, and all parts, fittings and accessories to complete installation and operation of the air system, all works as engineer instruction and approval.

		Supply and install complete fuel pump for the rear engine, the item includes all required parts and fittings to complete installation and operation of fuel system.
		Supply and install front wings/fenders, the item includes painting and all required parts and fittings for installation.
		Supply and install cabinet drive stairs, the item includes all required parts and fittings to complete installations.
		Supply and install complete water radiator for the rear engine, the work includes all required parts and fittings to complete operate and installation of the water cooling system.
Tractor	Al Nasser	Supply and install tractor front tires of 12.4/11-24, 8ply, Triangle, Ling long or equivalent manufactured six month from supplying day,,etc., the work includes changing any deteriorated parts of the wheel system i.e. bolts, nuts, rim, bearings,,etc..
		Supply and install rear tires 34-16.9, 8ply, triangle or equivalent manufactured six month from supplying day,,etc., the work includes changing any deteriorated parts of the wheel system i.e. bolts, nuts, rim, bearings,, etc.
		Supply and install rear tires for the wastewater tank of the Tractor number PR14 9.00-20, steel belted, 10 ply, triangle or equivalent manufactured six month from supplying day,,, etc., the work includes changing any deteriorated parts of the wheel system, i.e. bolts, nuts, rim, bearings,,, etc.
		Supply and install complete group of disc and clutch, bearing and plates, clutch wire and rods,, etc., the work includes changing any deteriorated parts and any needed parts to complete installation and operation of the disc and clutch system.

2. ACTIVITIES PROGRESS

2.1 Geographic Information System (GIS)

During 2021 GIS department at the CMWU has moved forward open access to its operational database through online web dashboards and online web application through its main web @ <https://gis.cmwu.ps>. These application can be summarized; (a) water infrastructure include and not limited to domestic water wells, water networks, valves, water tanks and water pump stations and can be directly access through <https://gis.cmwu.ps/water2020>, (b) wastewater infrastructure includes and not limited to sewage pump stations, sewage network collections and wastewater treatment plants and can be access through <https://gis.cmwu.ps/ww2020>, (c) new story map includes and not limited to water quality monitoring system tab, water distribution schema by either

facility or zone, and coordination map used by the ICRC in the emergency situation classified either by facility or map number, and can be access through <https://gis.cmwu.ps/cmwustory.html>.

Environmental Management Plan (EMP)

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

3. OTHER ACTIVITIES

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

The following activities illustrate the CMWU other activities;

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

- CMWU Board of Directors has agreed on a decision that all municipalities who receive O&M services from the CMWU should pay 10 % of the O&M cost to the CMWU account. This step was applied for all the municipalities whereas some municipalities paid their dues on a monthly basis.
- Restructuring CMWU head quarter and regional offices for better performance.
- Expand the CMWU work activities to integrate extra municipalities in the utility system.
- Enhance the interface management between CMWU and PWA by regular meeting and close coordination.
- Municipality of Gaza and Jabalia have re-joined the CMWU.
- CMWU in cooperation with the MoLG and the PWA finalized MOUs for the municipalities that receive desalinated water, and signed them
- A consultancy service for transferring the CMWU to regional water utility has been launched by PWA through AFD finance.
- CMWU operates the new WWTPs in accordance with the water law,
- CMWU has prepared and published the O&M budgetary plan as a holistic view to operate and maintain the WASH systems including the strategic facilities

3.2 Continuity of Services during COVID-19 Outbreaks:

Despite of all challenges including Corona pandemic, CMWU in cooperation with WASH departments at municipalities has succeeded to operate WASH facilities to keep the acceptable level of services for all

Gaza Strip. In the meantime, all WASH facilities, CMWU and municipal teams have been provided with the needed safety tools and equipment to avoid infection during the work.

In addition, the CMWU cooperated with MOH in order to connect the quarantine centres with water and wastewater networks including:

- European hospital through ICRC fund
- Dair Al Balah QC (water network) through ICRC fund
- Rafah QC (water & WW network)
- Turkish hospital (wastewater network)

CMWU partners have cooperated and provided the CMWU with emergency needs to enable the CMWU to control the situation, these supports included

- 1- supplying sterilization materials, face masks and gloves for CMWU and municipalities operation teams, through NRC, IR, HA, GIZ fund.
- 2- supplying chlorine for disinfection purposes in wastewater pumping stations and WWTPs, through ICRC fund
- 3- supplying chlorine and chemicals for water facilities (water wells and desalination plants)





Figure 54: Supplying Hygiene and safety tools to CMWU

3.3 Coordinate with other entities:

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

IsDB: is financing the expansion of Gaza sea water desalination plant through adding 2500 m³/day of desalination units. Also, IsDB has allocated 5 M USD for construction of PV solar plant for KHWWT, , in addition to financing the construction of wastewater networks and PS.04 at the Eastern villages with around 4 M USD

UNICEF: still financing the second phase of STLV (SGDP) desalination plant, in addition to launching and financing during 2022 wastewater networks at different areas

ICRC: has financed different projects which aim to improve the operational schemes and assure continuity of water and wastewater services. The last projects supported by ICRC are, , maintenance works and providing the Second power line for wastewater facilities, maintenance of heavy machines,

KFW: will partially finance the operation and maintenance cost of Gaza central WWTP for the coming 5 years, KFW has allocated 20M Euros for water sector MIP (Multi sectorial program) the fund is allocated for Energy Management Program in addition 16 M Euro has been allocated for stormwater projects.

EU: is still financing the expansion of seawater desalination plant STLV at the southern governorate to reach 20,000 m³/day by adding additional 14,000m³/day. In addition to financing the storm water project at Rafah and PV solar energy for some Wash facilities through KFW. Already the CMWU in cooperation with KFW, EU, PWA and MOF started the projects' preparation

Oxfam: has financed many projects for repairing the damages of the last escalations on Gaza, in addition to financing the consultancy services related to developing O&M plan for 5 years for all WASH facilities

SC: in cooperation with CMWU, SC has rehabilitated Al Fokhari stormwater basin in addition to construction the main stormwater pipeline for Shaat basin at Khan Younis

AAH: in cooperation with CMWU; AAH has financed the construction of wastewater and stormwater networks at Beit lahia and Khan Younis, in addition to repairing the damages resulted from the last escalations in both areas.

NRC: in cooperation with CMWU, has financed the construction of wastewater networks at Al Burej and rehabilitation of stormwaeter networks at Beit Hanoun, in addition to repairing the damages of WASH facilities at Beit Hanoun which resulted from Israeli escalations.

Anera: in cooperation with CMWU, Anera has financed many of water , wastewater and stormwater projects throughout Gaza Strip with more than 2 M USD

Maan: in cooperation with CMWU has completed reparing the damages in wastewater networks at the middle area, in addition to construction wastewater networks at beit lahia and beit hanoun.

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

3.3 Missions to CMWU Facilities:

During the period of this report, many donors' agencies and diplomatic missions have been postponed due to COVID-19 outbreaks, the limited visits took place in the sea water desalination plants, WWTPs and some facilities that needs interventions to rehabilitate or upgrade, the following are the main visits:

- On February 2020, EU mission visited different facilities which will be targeted under EU WASH programs
- On February 2020, Minister of MOLG accompanied with CMWU had visited Gaza WWTP
- On February, signing MOU between PWA Minister Mr. Mazen Ghonaim and Eng. Monther Shoblaq for delegation the CMWU to operate the three existing STLVs plants.
- On February 2020, in the presence of PWA Minster Mr. Mazen Ghoniam, CMWU participated in the conference organized by Al Aqsa university about water situation in Gaza Strip.



- On February 2020, an opening ceremony for Al Amal stormwater project has been held in the presence of Mr. Mazen Ghonaim ,the Ministerial delegation, IDB representatives, CMWU and Emmar palestine
- On February 2020, an opening ceremony for Al Safa Water Tank has been held in the presence of Mr. Mazen Ghonaim ,the Ministerial delegation, CMWU and Emmar Palestine
- On September 2020, Ministerial delegation visited the CMWU HQ to discuss the water sector needs and challenges.



- On November 2020, Academic team from Islamic university visited the CMWU HQ to discuss the cooperation between universities and the CMWU.
- On December 2020, EU- ambassadors accompanied with UNICEF and PWA visited the Southern STLV site, to follow up the progress of the expansion project.



Figure55: Ministerial and donors' missions

3.4 Public awareness campaigns:

Public Awareness campaigns implemented during the last year relied on the methodology of raising the public awareness messages mainly about COVID-19 either to customers or to CMWU and Municipal operation teams, besides the other awareness activities related to water and wastewater projects. the media and awareness activities are summarised below:

- Preparing the relevant media and awareness programs for several water and wastewater projects. Including the following topics
 - Saving water
 - Paying Water Bills
 - Cleaning tanks
 - Water situation in Gaza Strip
- Preparing public awareness materials about COVID-19 and sharing it with partners and Municipalities.
- Conducting Awareness sessions about COVID-19 for CMWU and Municipalities technical teams.
- Coordination for scientific trips and accompanying the visitors to different water and wastewater facilities.
- preparing the design and printing posters either for water and wastewater projects or for CMWU other activities.
- Assisting CMWU partners to organize different workshops related to public awareness campaigns, besides hosting many of workshops in the CMWU headquarter.
- Ceremonies: 4 projects' opening ceremonies have been conducted during 2020.
- Publishing CMWU news on social media and newspaper Activities
- Printing CMWU Water bills with The COVID-19 related messages for 12 months.
- Printing Multicolour billboards and installed for two months.
- Broadcasting radio advertisements on Radio Alwan (10).
- Multicolour printing of poster and distributing them to water and wastewater facilities.
- Printing 1000 Multicolour brochures







MAIN OBSTACLES

One of the main and major obstacles towards continuity of water and wastewater services during 2022 was the Israeli escalations on Gaza Strip which caused severe damages in the infrastructure and WASH facilities. However, the CMWU in cooperation with its partners has managed and fixed all those damages to provide the services within the acceptable level, on the other hand the depreciation of the economic situation still affects negatively the collection efficiency during the year, besides the inherited tariff; which is low in comparison to the actual services costs, this issue adds extra burdens on the CMWU which already suffers from lack of emergency resources like (Fuel for standby generators ,spare parts for maintenance jobs, safety and protection materials, ..etc) added to that; the effect of siege forced on the Gaza commercial borders towards importing the necessary goods to finish the works.

Moreover, the catastrophic shortages and unreliability of electricity power supply 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.

Over the last years the operational electrical demand for the water and wastewater facilities was 45 MW , where it has increased to around 75 MW since the central facilities (WWTPs and STLVs) entered the operation mode during 2020.

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

Operation of strategic facilities like WWTPs, STLVs and reservoirs has put an extra financial burden on the CMWU.

SUCCESS STORY

COVID-19 WASH Response Plan

As a prior mitigation, CMWU with its partners have developed WASH response plan to mitigate Corona risks and to avoid any drop in the services. In August, 2020; the pandemic has spread in Gaza Strip and immediately after that Gaza Strip has been put under strict lockdown. Unfortunately, the epidemic is still active and affected negatively on the WASH services.

CMWU worked hard with all donors and partners in order to secure chlorination materials (Sodium hypochlorite solution) which is essential for water disinfection to ensure pumping safe water to the people.

In addition, the CMWU succussed to secure the chemicals materials for water desalination plants like (Antiscalant, caustic soda, SMBS, sodium hypochlorite solution) to avoid stoppage of the three sea water desalination plants and 100 brackish water desalination plants which are considered one of the main sources for safe drinking water in Gaza Strip.

Despite of the harsh socio-economic situation, Corona pandemic, continuation of siege and electricity shortages , the CMWU in cooperation with municipalities succeeded to provide acceptable water and wastewater services to all Gaza strip, and that achieved by the assistance of partners who helped the CMWU to bridge the gaps in O&M expenses by supplying spare parts, disinfection materials , chemicals, and implementation of various fast track emergency maintenance and refurbishment works.

The below are the main fast track interventions implemented after COVID-19 outbreaks:

- Connecting European Hospital and Turkish friendship hospital with the sewage collection System. Those two hospitals are the main hospitals dealing with the infected cases by CCOVID-19.
- Providing Safety cloths, Hygienic Hand cleaning Gel, Masks, gloves and other sterilization to all municipalities staff.
- additional 4 MCM of water produced from water wells.
- Distribution chlorine for disinfection for all municipalities.
- Providing the quarantine centres with fresh Water.
- Connecting the quarantine centres with the water networks.
- Collecting and treat the generated sewage from the quarantine centres.
- Public awareness sessions and brochures are provided.

Dr. Yousef Abu Al Reesh (Deputy of minister -MoH) thanked the CMWU for its support during this pandemic. Also, CMWU appreciates the efforts of partners “ KfW, UNICEF, NRC, Oxfam, AAH, Islamic relief, ICRC, Human appeal” for their valuable support during the pandemic.



Figure 57 Providing the Quarantine centers with water & WW services

CONCLUSION

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

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

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

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

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

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

CMWU shall follow up the staff transfer from the municipalities to the CMWU and follow up a clear business plan in order to reach the sustainability by 2025.

END

Annex 01

WWTPs Records-2021												
		Influent					Effluent					
Facility	Total Quantity 2020	BOD (mg/l)	COD (mg/l)	TSS (mg/l)	PH	EC (ms/cm)	BOD (mg/l)	COD (mg/l)	TSS (mg/l)	PH	EC (ms/cm)	Av. Treatment Efficiency
RWWTP	5,597,720	539	1248	580	8	5076	103	280	87	8	4793	81%
KhWWTP(Laggons)	4,009,383	416	945	449	8	3319	206	324	199	8	3398	51%
KhWWTP(Sofa)	4,946,287	460	910	420	8	5200	8	39	10	8	5000	98%
Gaza(Al Sheikh Ajlin)	17,995,000	541	1096	585	8	4686	137	302	120	8	4398	75%
Al Buriy WWTP	11,217,759	431	850	475	8		88	116	47	8		80%
NGEST	14,651,299	422		379	8.1		12		17	8		97%
Total Quantities (m³)	58,417,448											
Avg. Treatment efficiency for all		82%										

Average Wastewater Quantities and Treatment Efficiency for the WWTPs during 2021

Facility	Effluent discharge
RWWTP	All treated WW is pumped to the sea
KhWWTP(Laggons)	All treated WW is pumped to the sea
KhWWTP(Sofa)	All treated WW is pumped to infiltration basins
Gaza(Al Sheikh Ajlin)	Treated WW is pumped to the sea (during 2021, the average annual treatment efficiency affected by rehabilitation works which were executed during the year 2021, nowadays the treatment efficiency is
NGEST	Treated WW is pumped to infiltration basins

