



**Structural Benchmark
Action Plan to Reduce Water Sector Losses**

Ministry of Water and Irrigation

August 2013

This document constitutes an integral part with the following set of strategies, policies and Action plans and should be read with them:

1. National Water Strategy 2016-2025.
2. Water Sector Capital Investment Program (2016-2025).
- 3. Action Plan to Reduce Water Sector Losses (Structural Benchmark).**
4. Energy Efficiency and Renewable Energy in the water sector Policy.
5. Water Substitution and Re-Use Policy.
6. Water Reallocation Policy.
7. Surface Water Utilization policy.
8. Groundwater Sustainability Policy.
9. Climate Policy for a Resilient Water Sector.
10. Water Demand Management Policy.
11. National Framework for Decentralized Wastewater Management in Jordan.
12. National Plan for Operation and Maintenance of Wastewater Treatment.

Ministry of Water and Irrigation

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Introduction:

The current costs of providing water are growing and increasingly severe the burden on the nation's finances. Budgetary outlays for the water sector resulted from increased costs caused by increased demand due to fluxes of refugees, electricity tariff increase, increased population, and the unwillingness to recover those costs from existing or new water users through tariff increases. With projected population growth, and with uncertain economic prospects in the region over the coming decade, the harsh fiscal climate in Jordan's water sector will certainly get worse unless concrete actions are taken.

The special geographical and hydro geological conditions in Jordan create an extremely difficult operating environment for provision of water supply and wastewater disposal services, like

- Elevational differences of more than 1,000 meters between sources and consumers
- Long transmission distances of more than 350 km
- Treatment of marginal water sources

Jordanians and the expatriates living in Jordan including the refugees enjoy subsidized water and wastewater services paid by the Jordanian tax payer. The International Monetary Fund (IMF) report estimated the Water companies' losses to be 1% of the Gross Domestic Product (GDP).

In May 2013, The International Monetary Fund (IMF) has issued the May 2013 Report "IMF Country Report No. 13/130 Jordan: First Review Under the Stand-By Arrangement, Request for Waivers of Nonobservance of Performance Criteria, Modification of Performance Criteria, and Rephasing of Access—Staff Report; Press Release on the Executive Board Discussion; and Statement by the Executive Director for Jordan." The report indicated in the Policy Discussions that "the authorities will also start tackling the losses of the water companies", it also identified "bringing the energy and water sectors back to cost recovery" as Structural benchmarks for 2013 which will be supporting the fiscal reform program objectives. The report mentioned that GoJ "will start tackling the losses of the water company. Annual losses could be about one percent of GDP, reflecting inefficiencies (in particular systems losses) as well as problems with revenue collection. MWI will finalize and announce to the public by October 2013 an action plan on how to reduce the company's losses over the medium term (structural benchmark).

This plan aims at identifying and planning the actions and activities needed to achieve the full cost recovery in the water sector, it will also serve satisfying and fulfilling the benchmark as mentioned in the IMF report as well as the milestone agreed upon with the United States of America (USA) government issuance of the Eurobond before end of September 2013. The plan is based upon the operation and maintenance (O&M) balance sheets for WAJ, The right for setting and changing water tariff in Jordan rests with the Cabinet of Ministers, where decisions are taken upon a recommendation of the Minister of Water & Irrigation based on WAJ Board of Directors recommendation.

Current Situation

Billed water quantities and Non-Revenue Water (NRW)

The main revenue stream to WAJ comes from water sales which depends on both quantity billed and tariff, Figure 1 below shows the Total water Billed in (MCM), it also project the billed quantities for the next 10 years based on planned projects and planned levels of Non-Revenue water (NRW) reduction. The NRW reduction policy targets are shown in Figure 2 below.

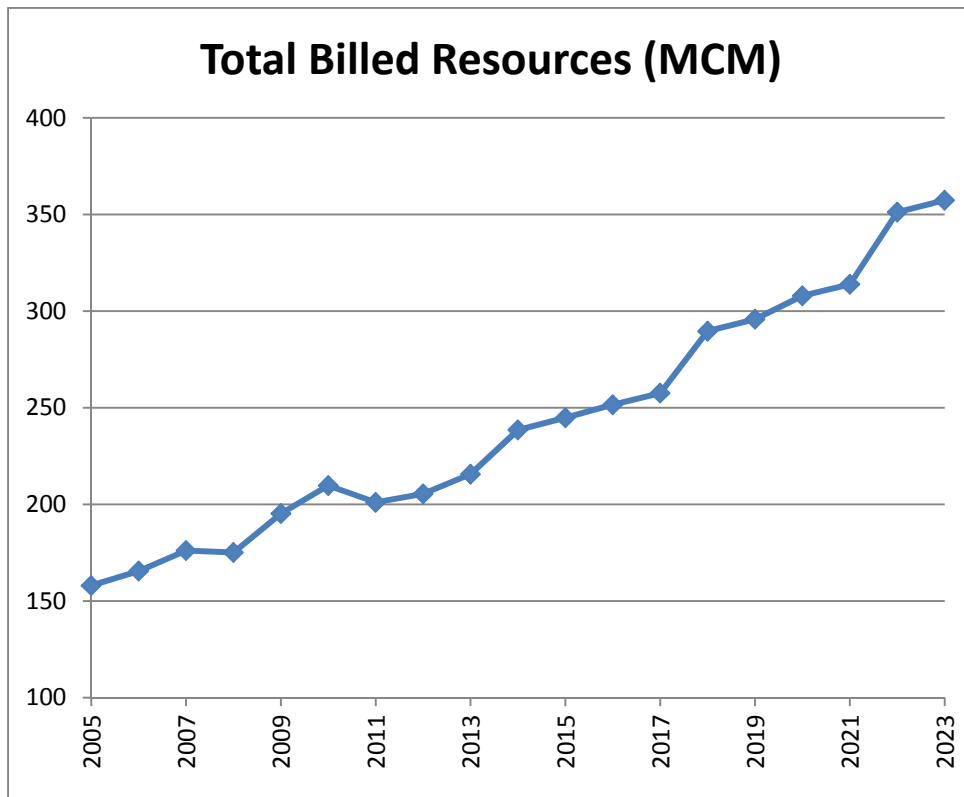


Figure 1 Total Billed Resources (MCM)

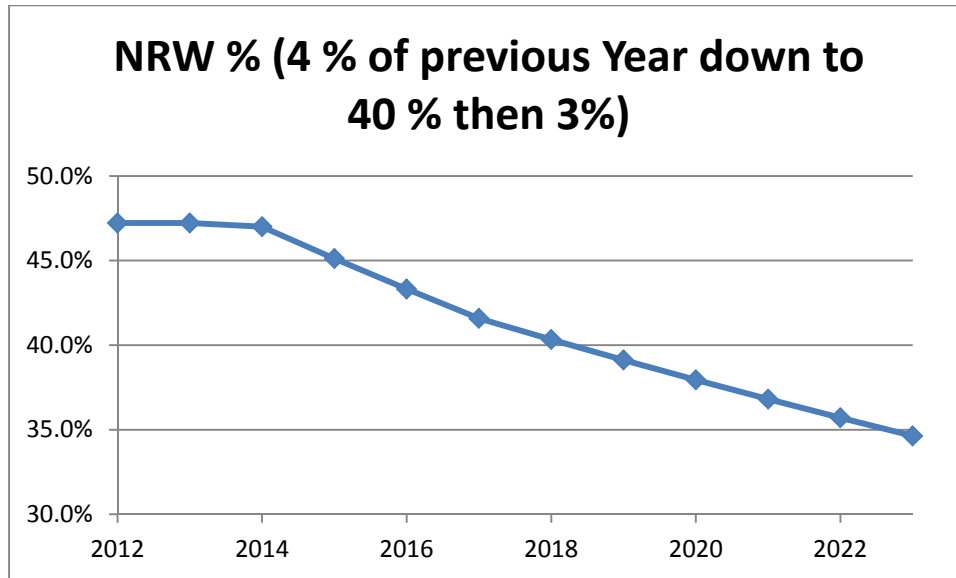


Figure 2 NRW % reduction plan

Current water Tariff

During 2010 MWI has analyzed the tariff structure and found that restructuring the tariff and changing the quarterly billing into monthly billing is a step in forward that will enhance the transparency. This new Tariff structure was implemented starting January 1st 2011 until April 1st 2012 where a Council of Ministers Decision varied both the repetition of billing from monthly back quarterly bills and increased the tariff index included in 2011 structure. Moreover the Decision also increased the Non-Residential customer's tariff.

Two different tariffs are in place: one for governorates operated by WAJ and another for governorates operated by Companies (Miyahuna, YWC, and AW).

Table 1 and Table 2 below include the details of current tariff.

Table 1 Current Tariff for governorates operated by WAJ

Quarterly Block	Unit Price (JD) (JD/ m3 of billed water)			Comulative Fixed Charge (JD/Month)	Adjustment Factor
	Wastewater Price	Water price	Total price		
0-20	0.200	0.500	0.70	0.80	1.00
21--38	0.04	0.075	0.12	1.20	1.00
39--56	0.20	0.400	0.60	1.75	1.00
57--74	0.30	0.650	0.95	1.75	1.10
75--92	0.30	0.650	0.95	1.75	1.15
93--110	0.50	1.000	1.50	1.75	1.15
111--128	0.50	1.000	1.50	1.75	1.15
129--146	0.70	1.200	1.90	1.75	1.20
147--164	0.70	1.400	2.10	1.75	1.20

165--179	0.70	1.400	2.10	1.75	1.20
180 and above	0.70	1.400	2.10	1.75	1.20

Table 2 Current Tariff for governorates operated by Companies (Miyahuna, YWC,AW)

Quarterly Block	Unit Price (JD)- (JD/ m3 of billed water)			Cumulative Fixed Charge (JD/Month)	Adjustment Factor
	Wastewater Price	Water price	Total price		
0-20	0.200	0.700	0.90	0.81	1.00
29--38	0.04	0.145	0.19	1.36	1.00
39--56	0.25	0.500	0.75	1.91	1.00
57--74	0.45	0.850	1.30	1.91	1.10
75--92	0.60	1.000	1.60	1.91	1.15
93--110	0.70	1.400	2.10	1.91	1.15
111--128	0.70	1.400	2.10	1.91	1.15
129--146	0.80	1.600	2.40	1.91	1.20
147--164	0.80	1.600	2.40	1.91	1.20
165--179	0.80	1.600	2.40	1.91	1.20
180 and above	0.80	1.600	2.40	1.91	1.20

Starting from April 2012 a new tariff for Non-residential consumers were adopted by the Council of Ministers, this tariff is a flat rate tariff see Table 3 below.

Table 3 Non-Residential Tariff

Consumption (m3/month)	(JD/Billed water in m3)		Fixed Charge (JD/Month)
	Water Tariff	Wastewater Tariff	
0-2	1.3	0.70	2.0
3 and above	1.3	0.75	2.6

Revenues collected on 2012 based on billed quantity of water of 182MCM and the current tariff was 113.140 MJD from water sales and 43.691 MJD from Wastewater sales, which constitute an increase of 160% of the unit revenue of 2010.

Table 4 Current Tariff revenues

Criteria	Unit	Year		
		2010	2011	2012
Billed Qty (MCM)	MCM	210	201	182
Water sales Revenues	Thousand JD	92,792	112,618	113,141

Criteria	Unit	Year		
		2010	2011	2012
Wastewater sales Revenues	Thousand JD	18,718	39,134	43,692
Total Billing Revenues	Thousand JD	111,510	151,752	156,833
Average water sales Revenue /m3	JD/m3	0.442	0.560	0.620
Average wastewater sales Revenue /m3	JD/m3	0.089	0.195	0.240
Average billing revenue/m3	JD/m3	0.532	0.755	0.860

Effect of Electricity Tariff Increase

As part of the reform program, the Government of Jordan announced a new electricity tariff reform in which the electricity tariff for water pumping has been increased by 316% between 2010 and 2017, see Table 5 and Figure 3 Below. The new tariff will negatively impact the water sector cost recovery and will increase the operation and maintenance deficit, the electricity bill will increase by 456% due to tariff increase and increased water quantities.

Table 5 Electricity tariff increases for water pumping

Date	1 Feb 2010 to 30 Jun 2011	1 Jul 2011 to 28 May 2012	29 May 2012 to 14 Aug 2013	15 Aug 2013 to 31 Dec 2013	1 Jan 2014 to 31 Dec 2014	1 Jan 2015 to 31 Dec 2015	1 Jan 2016 to 31 Dec 2016	1 Jan 2017 to 31 Dec 2017
Fils / Kilo Wat . hr	42	54	66	76	87	100	115	133
% Increase		28.6%	22.2%	15.2%	14.5%	14.9%	15.0%	15.7%

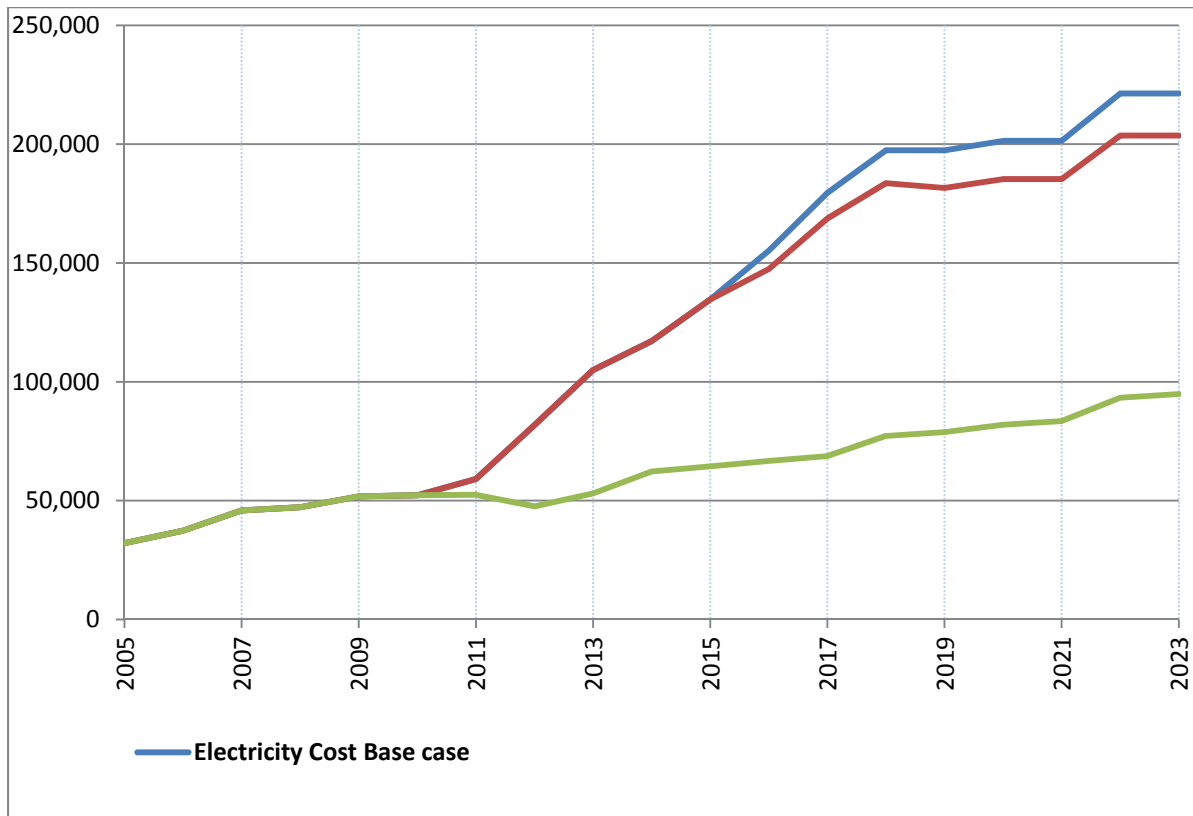


Figure 3 electricity bill (1000 JD)

O&M Cost Recovery Current Situation and Business as Usual (BAU) projections

Figure 4 below shows a sharp increase of O&M cost and total cost in the year 2013,2014 due to the Disi water cost, it worth mentioning that this cost includes the CAPEX cost as Disi water charges was calculated on the BOT basis. The costs in the curves were calculated using the newly announced electricity tariff. The graph shows that the deficit will start growing starting from year 2014.

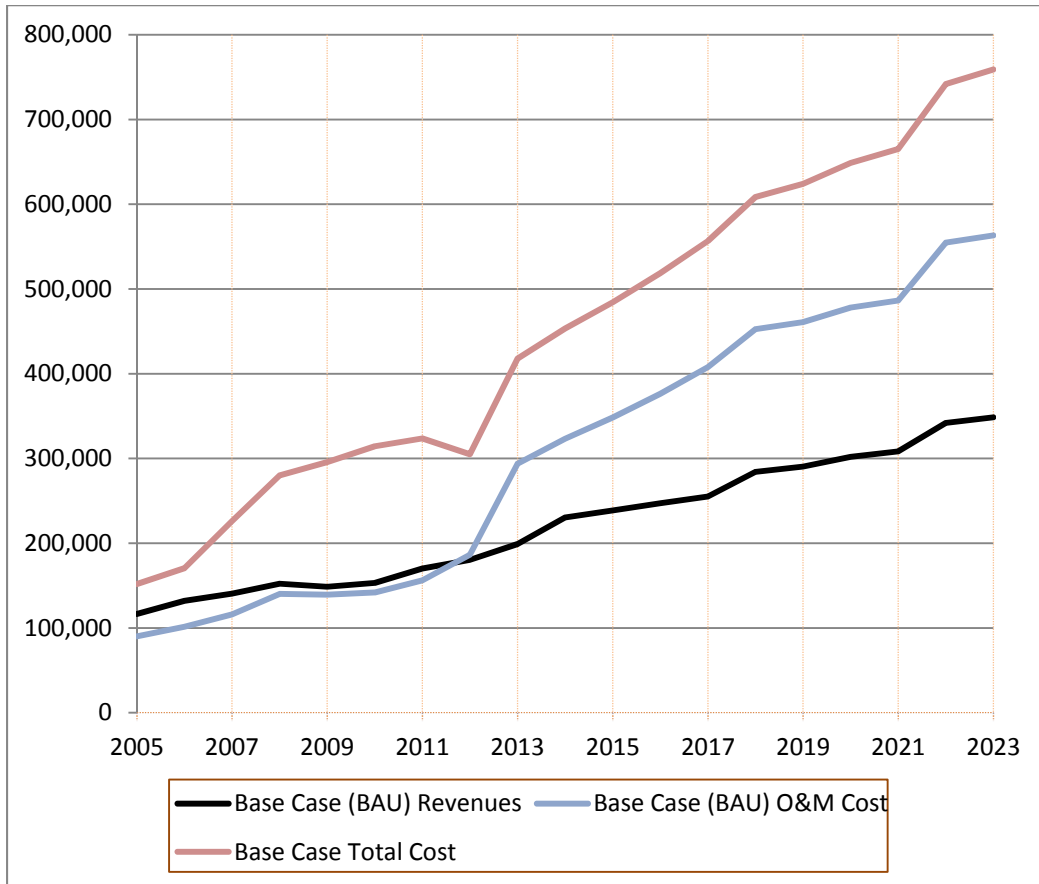


Figure 4 O & M Cost, Total Cost and Revenues of BAU Scenario

SYRIAN REFUGEE Effect

The Syrian refugees enforced Ministry of Water and Irrigation (MWI) to reinforce existing water supply systems to provide adequate water to refugees residing outside the camps (majority of refugees), Rehabilitation of wellfields to increase water production and Protection of water resources near camps (Za'atary) by construction of proper wastewater collection systems. MWI has prepared a report on hosting Syrian refugees cost on the water sector; the report shows that the Direct Short Term Cost for hosting 570,000 refugees is 128 Million JD/yr while the long-term indirect cost is 166 MJD (see Annex 2)

Action Plan

To achieve a full cost recovery, the water tariff to be charged would have to be beyond socially acceptable limits. The current spending on water and wastewater is already about 5% of the average monthly income.

In addition, it should be noted that the most important external cost driving factor, which the water sector cannot influence, is energy if the approved changes in the electricity tariffs will come into effect.

Non-revenue water is the second largest challenge to address, which is related to the nature of water scarcity and supply, i.e. high pumping lift, long pumping distance, direct pumping and marginal water quality which altogether translate into high cost and inefficiency. In particular the technical water losses being about 25% is related mainly to the age of the municipal networks and another 25% for administrative losses and illegal connections.

Figure 4 contains as well projections under consideration of the present geopolitical developments, which again cannot be influenced by the water companies, but heavily affect their performance and might change within very short periods, the projected cost in the figure exclude the cost of increase Syrian refugees.

Thus, the action plan is focusing on activities which can be influenced by the water sector companies, and will reduce the overall losses but cannot achieve full cost recovery due to the above mentioned challenges.

Internal inefficiencies related to energy inputs for pumping water, non revenue water and revenue collection and the systems operation will be addressed, as well as the restructuring, replacement and rehabilitation of water supply systems to reduce water losses.

The action plan covers a planning horizon of 12 years and focuses on:

A) REVENUE IMPROVEMENT

- Increasing collection efficiency through performance based contracting, outsourcing and more Private Sector Participation (PSP), or any projects similar in nature and objectives.
- Reduction of accounts receivable and arrears.
- Initiation of programs to reduce Non-Revenue Water.
- Tariff adjustments to distribute burden to population in a socially acceptable way

B) COST REDUCTION

- Increase energy efficiency in pumping operations despite new and additional expensive water supply projects and alternatives.
- Restructure / rehabilitate water supply systems to reduce physical losses and energy input
- System automation to optimize operation and personnel input

Table 6 below details the activities of the action plan, while the effect of the Effect of Action Plan on WAJ Revenues is shown in Figure 5 below. Costs reduction effect of the action plan activities is shown in Figure 6 below.

Table 6 Planned Actions

Action	Year of enforcement	Details	Average Revenues Increase/Costs Reduction (1000 JD)
A) REVENUE IMPROVEMENT			
Increase Industrial Ground Water Charges	Nov 2013	100% increase (From 0.25 to 0.50 JD/m3)	10,833
Improve collection efficiency through performance based contracting	2014	Internally delegated or externally tendered performance contracts ; 2 % improvement until 100% is reached	3,610
Reduce accounts receivable	2014	Analysis & taskforce action to collect unpaid bills	1,978
Reduce illegal consumption	2014	GIS analysis of customer data, taskforces to identify & charge customers, and new security measures	4,773
Increase sewerage connection ratio	2014	Identify & connect potential & illegal customers, added floors charge	3,425
Increase of WW tariff in Amman by 25% , and other Governorates by 15%	2014	25% of Current Amman WW Tariff 15% of other Governorate WW Tariff	5,790
Increase Water and Wastewater Connection Fees	2015	25 % Increase	4,849
Increase Industrial Ground Water Charges	2016	50% increase (From 0.5 to 0.75 JD/m3)	10,724
Increase Municipal Water Tariff	2015	10% increase	15,858
Increase Ground Water Irrigation Tariff in Highland	2017	Reduce free water from 150,000 m3/a to 75,000 m3/a	8,000
Increase of WW tariff in Amman by 25%, and other Governorates by 15%	2017	25% of Current Amman WW Tariff 15% of other Governorate WW Tariff	7,438

Action	Year of enforcement	Details	Average Revenues Increase/Costs Reduction (1000 JD)
Increase Municipal Water Tariff	2018	15% increase	34,814
Increase Groundwater Irrigation Tariff in Highland	2020	Setting free amount to Zero m3/a	8,000
Increase Water and Wastewater Connection Fees	2020	25 % increase	6,658
Increase Municipal Water Tariff	2020	15% increase	41,664
Selling As Samra Wastewater for Power Plants	2021	22.5 MCM at 0.45 JD/m3	10,125
Selling Water to Oil Shale	2017	5 MCM then increased to 15 MCM	2,500
Miscellaneous	2014 - 2021	Sludge utilization, water tankers, GIS Services, SCADA Services, etc	5,625
Total Yearly Average Revenue Increase by the end of Action Plan			197,365
B) COST REDUCTION			
Cost Savings Due to improved pumping efficiency	2016	Investment in Water pumping & restructuring networks to reduce operating pressure of 75 MJD	20,480
Reduction of technical water losses	2015	Investment in restructuring, replacement & rehabilitation of water networks 150 – 200 MJD	7,558
Automation of water system operations	2017	Expand SCADA system installation & operations data management to optimize operations, investment of 20 MCD	1,868
Introduction of Renewable Energy into Water	2020	20% of energy consumed is from renewable sources	42,400
Total Yearly Average Savings by the end of Action Plan			72,306

Structural Benchmark/ Action Plan to Reduce Water Sector Losses

Action	Year of enforcement	Details	Average Revenues Increase/Costs Reduction (1000 JD)
GRAND TOTAL IMPROVEMENTS by the end of Action Plan			269,671
C) Annual additional cost related To Syrian Refugees Management contributing to low cost recovery		MWI has prepared a report on hosting Syrian refugees cost on the water sector; the report shows that the number of Syrian refugees is 570,000 and the Direct Short Term Cost for hosting 570,000 refugees is 128 Million JD/yr	128,000 Excluding Externalities i.e groundwater pollution
GRAND TOTAL Effect including Syrian Refugees			141,671

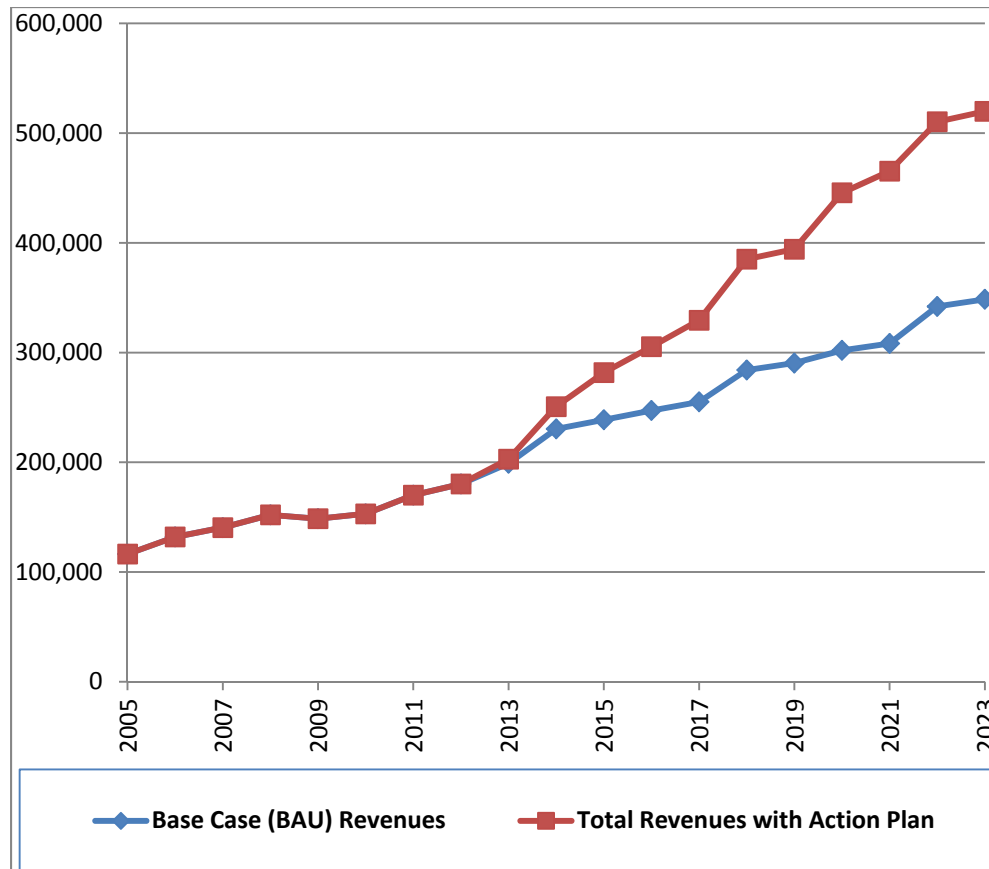


Figure 5 Effect of Action Plan on WAJ Revenues (1000 JD)

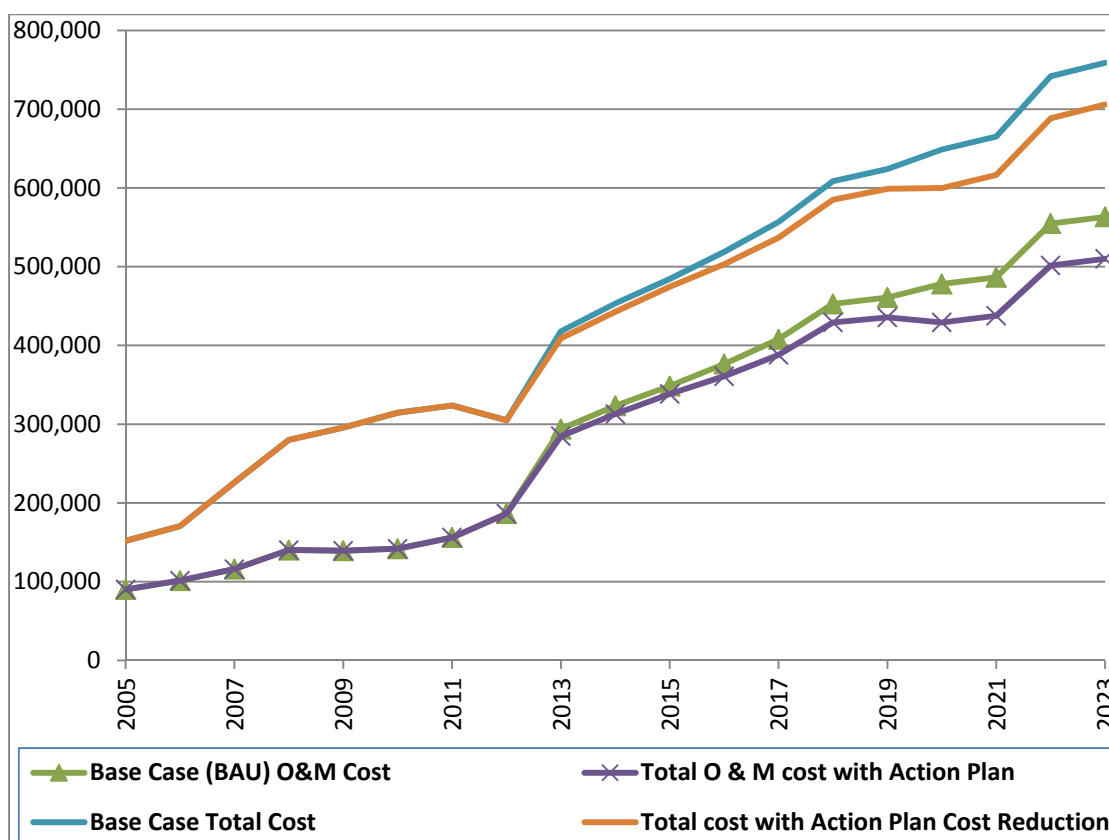


Figure 6 Effect of Action Plan on WAJ Cost (O&M and total cost in 1000 JD)

Effect of action plan on loss reduction

As can be seen in Table 7 below, the enhancement made by the action plan will vanish by the increase of costs specially the energy cost and the expensive new resources. The table indicates that despite the 215% increase in revenues, the O & M cost will be raised from 68% to about 82% in the next 10 years, the overall cost recovery ratio also will be enhanced by 180% (from 36% to 65%).

The O & M and overall Losses shall be covered by governmental subsidies; this should include debt repayment the figure below shows the effect of the Action Plan effect on WAJ balance sheets. See Table 7 and Figure 7.

Table 7 Results of WAJ plan (1000 JD)

Indicator	2012	2014	2016	2018	2020	2022	2023
Base Case (BAU) Revenues	180,294	230,418	247,231	284,108	302,030	342,043	348,553
Total Revenues with Action Plan	180,294	250,747	305,328	385,103	445,618	510,356	519,786
Base Case (BAU) O&M Cost	186,342	323,357	376,352	452,629	478,013	554,761	563,255
Total O & M cost with Action Plan	186,342	312,887	360,856	429,186	429,169	501,473	510,053

Indicator	2012	2014	2016	2018	2020	2022	2023
Base Case Total Cost	304,986	453,283	518,645	608,479	648,726	741,770	758,992
Total cost with Action Plan Cost Reduction	304,986	442,814	503,150	585,036	599,883	688,482	705,790
Base case O & M Cost Recovery Ratio	97%	71%	66%	63%	63%	62%	62%
Action Plan O & M Cost recovery	97%	80%	85%	90%	104%	102%	102%
Total Cost Recovery Ratio	59%	57%	61%	66%	74%	74%	74%
Net O&M Income with Action Plan	-6,047	-62,140	-55,528	-44,082	16,449	8,883	9,734
Net Total Income	-124,691	-192,066	-197,821	-199,933	-154,265	-178,126	-186,004
Government Subsidy needed	124,691	192,066	197,821	199,933	154,265	178,126	186,004
Payment of Accumulated Debt		844,000					

Major contributor to the O&M cost is clearly the rise in electricity tariffs; if the 2010 electricity tariff can be kept, an O&M cost recovery of 100% is achievable.

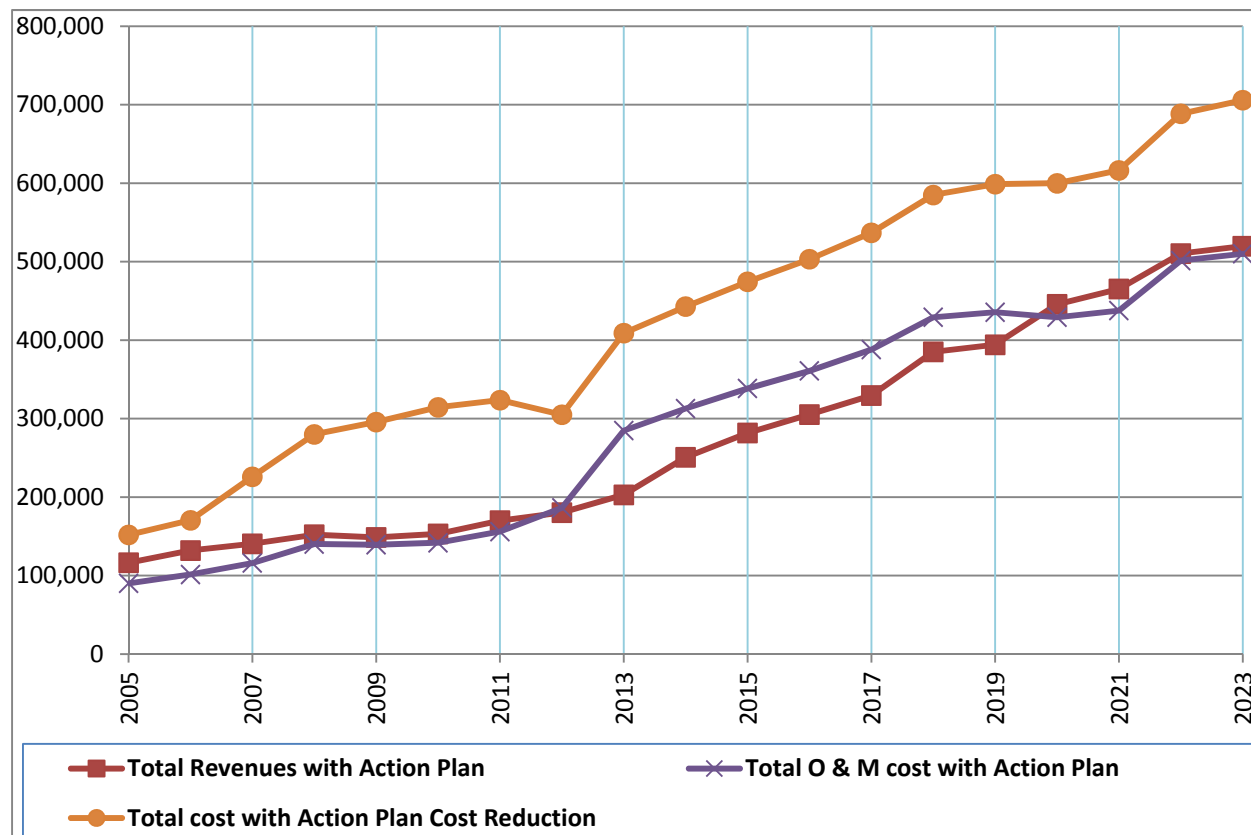


Figure 7 Action Plan effect on WAJ balance sheets (1000 JD)

If the Government of Jordan selects to fix the electricity tariff as of 2013 rates then the water sector will have a better chance for recovering the O & M cost and part of the total cost.

This scenario was analyzed as an option to include in this plan, the results of this option is shown on O & M and full/total cost recovery is shown in Table 8 below.

Figure 8 Cost Recovery based on fixed electricity tariff of 76 fils/kw.hr below also shows the final action plan revenues, O & M costs and full/total costs of water and wastewater delivery in WAJ.

Table 8 Cost Recovery based on fixed electricity tariff of 76 fils/kw.hr

Indicator	2012	2014	2016	2018	2020	2022	2023
Base case O & M Cost Recovery Ratio	97%	75%	76%	77%	77%	74%	74%
Action Plan O & M Cost recovery	97%	84%	99%	112%	130%	126%	125%
Total Cost Recovery Ratio	59%	59%	68%	77%	87%	86%	74%

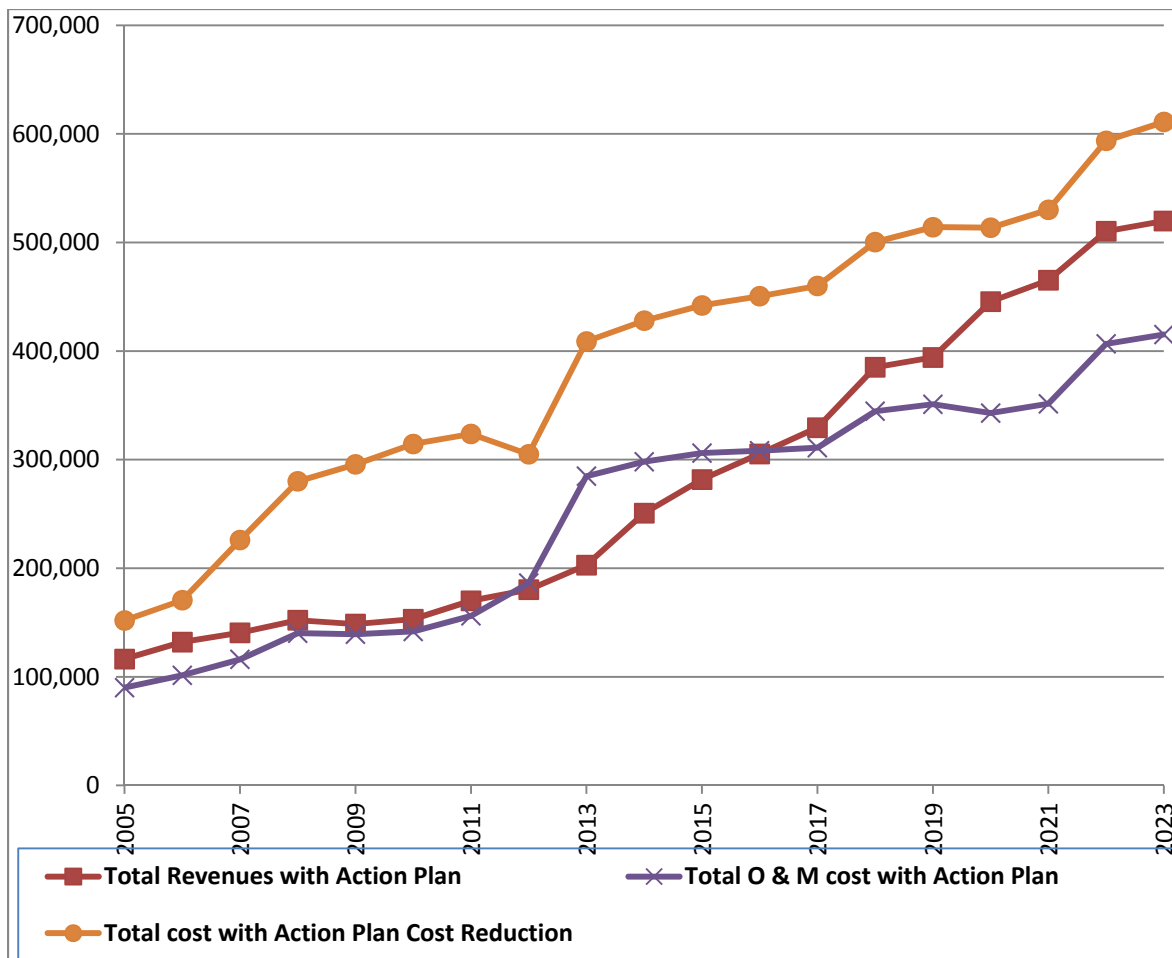


Figure 8 Cost Recovery based on fixed electricity tariff of 76 fils/kw.hr

Risks and prerequisites

Major risks and prerequisites for achieving the planned targets are as follows:

- Availability of required investments for the water sector as well as refugee support in a timely manner (investment volume 4.8 Billion JOD is needed in addition to about One Billion USD for the Red Dead Project/ first phase, see Annex 1)
- No control on increases to electricity tariffs specially after 2017 where it is assumed that no increase will happen to water pumping electricity tariff
- Implementation capacity of the water companies can afford implementing the plan
- Political developments in the area affecting Jordan
- Fixing the electricity tariff as in 2013 (76 fils/kwh)

Conclusion

In view of the above and in particular the electricity increase beyond 2013, it is clear that whatever the action plan measures provide in terms of cost reduction and revenues as a result of tariff increase it will be offset by the electricity increase in the following years i.e 2014,2015,2016 and 2017 which will make the losses of the water companies beyond repair and will affect their efficiency and the sustainability of the provided services. **Therefore, the Ministry of Water and Irrigation will be only committed to the action plan under the condition of fixed electricity tariff rate (76 fils/kwh) for the Water Authority of Jordan as it is in the year 2013.**

Annexes

Annex (1) – Investment Plan -List of projects

Annex (2) Cost of hosting Syrian Refugees on water sector of Jordan

Annex 1

Investment Plan -List of projects

**Ministry of Water and Irrigation Investment Plan/
Projects Without Funding**

Project	Total cost	Projected Expenditure for (2013-2016)years	Results to be achieved
Policy No (1)			
Development and Obtaining new water resources			
Group (1) unfunded projects listed in MOPIC statement			
Red Dead Sea Project (phase 1)--BOT	1,000,000	221,400	Desalination of 100 MCM of sea water
Mukaibeh/Wadi Arab water treatment and conveyance to Zabda/Irbid	60,000	46,300	Treat and Convey id25 MCM from Northern Jordan Valley to Irbid
		0	
Provide, install, and operate Sbeihi/Balqaa wells desalination plant	200	200	Improvement of Water Supply
Construct 3 water reservoirs in Maan	400	0	Improvement of Water Supply and effective management of water resources
4" water line with a length of 8km from Jheir reservoir to Mansoura Shoubak	200	200	Improvement of Water Supply
Supply and construction of Awajan/Zarka wells desalination plant	1000	1,000	Improvement of Water Supply
Protection of Mujib pumping station	1100	1,100	Protect Mujib pumping station from floods to ensure work sustainability
Studies to improve water quality of king Talal dam at Tilal Ad-Dahab	200	200	Ability to implement the project of King Talal dam water quality improvement as its quality suffer from a relative raise in its salinity which may impact its productivity

**Ministry of Water and Irrigation Investment Plan/
Projects Without Funding**

Project	Total cost	Projected Expenditure for (2013-2016)years	Results to be achieved
Transport Fifa and Khneizereh water to Potash and rehabilitation of Pressure Breaking tank of Al Karak conveyer	1270	1,270	Utilize extra water of Wadi Fifa and Khneizereh (around 1.2mm ³) in winter through transporting it and selling it to Botash company as it is not utilized currently
Operate, maintain, and desalinate saline water in middle ghors BOT	300	300	Improve the water quality of King Abdullah canal
Lajjoun Dam	2800	2,800	Provide around (2)mm ³ of water for ground recharge and irrigation
Rehabilitation of the 14.5 km project	2000	2,000	Maintain sustainability and performance of irrigation networks in the 14.5 project, improve service provided to farmers, and reduce water loss
Construct a pumping station and a conveyer from King Abdullah canal to Wadi Al Arab dam	2000	2,000	Benefit from the possible big amount of floods water in winter and save it in Wadi Al Arab dam to use for drinking and irrigation purposes when needed
(1) Total	1,071,470	278,770	
Group (2) unfunded projects that are not listed with MOPIC statement			
Construct wells to collect rain water	400	400	Provision of additional water resources through water harvesting
Disi water conveyance/water procurements (cost available for 2013-2016)	400,000	310,000	Improve water supply through the partnership of the private sector
(2) Total	400,400	310,400	
(1)+(2) Total	1,471,870	589,170	

**Ministry of Water and Irrigation Investment Plan/
Projects Without Funding**

Project	Total cost	Projected Expenditure for (2013-2016)years	Results to be achieved
Policy No (2)	,Raise efficiency of water supply and distribution for household , industrial		
Group (1) unfunded projects listed in MOPIC statement			
Rehabilitation of water networks and meters at Amman	30,000	30,000	Improve and rehabilitate the networks to receive water from Disi water in continuous supply
conveyor line from Abu Alanda reservoir to Khaw(implementation)	24,000	21,300	Improvement of Water Supply
conveyor line from Khaw to Zaatari(implementation)	29,000	23,800	Improvement of Water Supply
construction of Deir Alla desalination plant	5,000	4,100	Improvement of Water Supply
(1) Total	88,000	79,200	
Group (2) unfunded projects not listed in MOPIC statement			
Conveyor line from Abu Alanda reservoir to Khaw(implementation)	320	320	Improvement of Water Supply
Conveyor line from Khaw to Zaatari(Engineering services)	1,500	1,500	Improvement of Water Supply
Prepare and implement control plans and programs on water quality within Jordanian specifications and develop a Jordanian water quality according to the variants	1,500	300	
Water supply for poverty pockects areas	5,000	5,000	improve water supply for poverished areas and improve living standards

**Ministry of Water and Irrigation Investment Plan/
Projects Without Funding**

Project	Total cost	Projected Expenditure for (2013-2016)years	Results to be achieved
Improvement and raising efficiency of Mujib conveyor to Swaymeh and to Potash	4400	0	increase capacity and raise efficiency of conveyor line (Mujib and Zara/Maen) to increase water supply for drinking purposes
(2) Total	12720	7120	
(1)+(2) Total	100,720	86,320	
Policy No (3)	Expansion of sewage services		
Group (1) unfunded projects listed in MOPIC statement			
Karak wastewater networks package1 (no financing resource is available)	5,000	5,000	Increase Number of people connected to sewage networks and improvement of the surrounding environment
Connect North Amman and West Zarqa to As Samra WWTP (Network)	170,000	17,800	
Karak wastewater networks package 2 (no financing resource is available)	5,000	5,000	Increase Number of people connected to sewage networks and improvement of the surrounding environment
Karak wastewater networks package 3 (no financing resource is available)	5,000	5,000	Increase Number of people connected to sewage networks and improvement of the surrounding environment
Expansion of Jarash treatment plant (plant)	20,000	20,000	Raise efficiency of station and its capacity
Bait Ras wastewater project	8,000	8,000	Increase Number of people connected to sewage networks and improvement of the surrounding environment

**Ministry of Water and Irrigation Investment Plan/
Projects Without Funding**

Project	Total cost	Projected Expenditure for (2013-2016)years	Results to be achieved
Wastewater of Irbid western villages (Kufr Yuba, Beit Yafa, and Jamha)	8,000	8,000	Increase Number of people connected to sewage networks and improvement of the surrounding environment
Dleil,Khaldiyeh, Hallabat service (studies)	200	200	Increase Number of people connected to sewage networks and improvement of the surrounding environment
Dleil,Khaldiyeh, Hallabat service (implementation)	20000	20,000	Increase Number of people connected to sewage networks and improvement of the surrounding environment
Wastewater of west Salt vellages	16,000	15,600	Increase Number of people connected to sewage networks and improvement of the surrounding environment
Provide new areas with wastewater services in Madaba	3,500	3,350	Increase Number of people connected to sewage networks and improvement of the surrounding environment
Ain El Basha wastewater studies	1,000	1,000	Increase Number of people connected to sewage networks and improvement of the surrounding environment
Serve miscellaneous areas in Balqaa	1,000	1,000	Increase Number of people connected to sewage networks and improvement of the surrounding environment
Ma'an wastewater project	10,000	10,000	Increase Number of people connected to sewage networks and improvement of the surrounding environment

**Ministry of Water and Irrigation Investment Plan/
Projects Without Funding**

Project	Total cost	Projected Expenditure for (2013-2016)years	Results to be achieved
Expansion and rehabilitation of Ein El Basha treatment plant	700	700	Raise capacity of the station
Azraq wastewater project	30,000	30,000	Increase Number of people connected to sewage networks and improvement of the surrounding environment
Northern and southern Ghors wastewater project	10,000	10,000	Increase Number of people connected to sewage networks and improvement of the surrounding environment
Bab Amman miscellaneous wastewater project	12,000	12,000	Increase Number of people connected to sewage networks and improvement of the surrounding environment
Wastewater conveyer from wadi mousa to Taibeh	1,500	1,500	Increase efficiency of Sewage network
Provide Salem village with wastewater services	2,000	2,000	Increase Number of people connected to sewage networks and improvement of the surrounding environment
Provide shafa badran area with wastewater services	2,000	2,000	Increase Number of people connected to sewage networks and improvement of the surrounding environment
El koura/Burqosh wastewater project	42,000	30,000	Increase Number of people connected to sewage networks and improvement of the surrounding environment
Rehabilitation of force main (1200 diameter) from west Zarka to As-Samra	40,000	35,000	Increase efficiency of Sewage network

**Ministry of Water and Irrigation Investment Plan/
Projects Without Funding**

Project	Total cost	Projected Expenditure for (2013-2016)years	Results to be achieved
Implement new 1500 diameter sayfon from Ain Ghazal to As-Samra	40,000	35,000	Increase efficiency of Sewage network
Rehabilitation existing wastewater pipeline inside Saqf Es-seel culvert from Ras El-Ain to Ain Ghazal (DB)	30,000	25,000	Increase efficiency of Sewage network
Reuse line of Mafraq treatment plant/Jordan obligation in the rehabilitation of Mafraq treatment plant	2,000	2,000	Find alternative treated water
Construction and maintenance of sedimentation basins - Zai station	10,000	10,000	Increase the effeciency of treatment plant
(areas related to companies owned by WAJ) Expansion and rehabilitation of treatment plants and lifting stations all over different areas of the kingdom	1,000	1,000	Increase capacity of treatment plants and efficiency of lefting stations
Serve princess Haya area with wasterwater services	10,000	10,000	Increase Number of people connected to sewage networks and improvement of the surrounding environment
Serve Al Sukhneh area with wasterwater services	25,000	25,000	Increase Number of people connected to sewage networks and improvement of the surrounding environment
Serve miscelleneous areas of Zarka governorate	10,000	10,000	Increase Number of people connected to sewage networks and improvement of the surrounding environment
Reuse line from southern Amman to Ghors	25,000	15,000	Secure treated water as alternative water resource and maintain the environment
(1) Total	565,900	376,150	
Group (2) unfunded projects and not listed MOPIC statement			

**Ministry of Water and Irrigation Investment Plan/
Projects Without Funding**

Project	Total cost	Projected Expenditure for (2013-2016)years	Results to be achieved
Miscellaneous (Khraibet Es-souq, Jawa, and Taibeh) project	2,000	2,000	Increase Number of people connected to sewage networks and improvement of the surrounding environment
Wastewater studies for different parts of the kingdom	1,000	1,000	Increase Number of people connected to sewage networks and improvement of the surrounding environment
Southern shouneh wastewater	12,600	500	Increase Number of people connected to sewage networks and improvement of the surrounding environment
Expansion of Tafileh wastewater treatment plant-implementation phase	25,000	25,000	Increase the efficiency and capacity of treatment plant
Construction of new wastewater treatment plant in wadi zarka	100,000	20,000	Increase Number of people connected to sewage networks and improvement of the surrounding environment
Construction new treated effluent pipeline from Baqaa treatment plant	400	400	Raise efficiency of sewage network
Southern Amman/Phase III studies (to serve the unserved areas in phase I and phase II)	300	300	Increase Number of people connected to sewage networks and improvement of the surrounding environment
Ain Gazal treatment plant	2,000	2,000	Raise efficiency of Odor removal system and maintain the surrounding environment
Mansheyh/Mafraq wastewater project	15,000	15,000	Increase Number of people connected to sewage networks and improvement of the surrounding environment

**Ministry of Water and Irrigation Investment Plan/
Projects Without Funding**

Project	Total cost	Projected Expenditure for (2013-2016)years	Results to be achieved
Drying sludge in main plants in northern governorates	10,000	10,000	Protect environment and eliminate the operational burden on Akeedar landfill
Convey South Amman WWTP Effluent to Jordan Valley	25,000	6,000	
Reuse sludge in kingdom BOT	0	0	Protect Environment, decrease sludge transport costs, and eliminate the operating load on landfills in the Kingdom
(2) Total	193,300	82,200	
(1)+(2) total	759,200	458,350	
Policy No.(4)	Decentralization and more involvement of the private sector		
Group (1) unfunded projects listed in MOPIC statement			
Energy reduction project (Khaw old station) BOT	2,450	1,950	Improve efficiency of energy usage
Operate, maintain, and desalinate saline water in middle ghors BOT	1200	900	Provision of additional water resources
(1) Total	3,650	2,850	
Group (2) unfunded projects and not listed in MOPIC statement			
Establish and operate a company in Zarka through a management contract+completion of projects financed by MCC	15,000	15,000	Improve water supply and wastewater services, reduce the loss, and increase revenues
(2) Total	15,000	15,000	
(1)+(2) Total	18,650	17,850	
Sector Total			
	2,350,440	1,151,690	

**Ministry of Water and Irrigation Investment Plan/
Projects Without Funding**

Project	Total cost	Projected Expenditure for (2013-2016)years	Results to be achieved
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Ministry of Water and Irrigation Investment Plan

Project	Geographical Location	Total Cost	projected expenditure for (2013-2016)	Results to be achieved
Policy no.(1)		Development and obtaining new water resources		
Excavating and developing water resources	National	400	400	secure new water resources and improve water supply
Development and rehabilitation of water and chlorine plants	National	270	270	improve water supply and manage water resources effectively
Construction of reservoirs, pumping stations, and Transmission pipeline	National	200	200	improve water supply and manage water resources effectively.
Operate and prepare water resources	National	200	200	secure new water resources and improve water supply
Operate, maintain water desalination plants (BOT contracts)	National	980	980	Improve management of water resources and raise efficiency of desalination plants
Treat and desalinate water resources	National	320	320	provide additional water amounts and improve water supply
Rehabilitation of pumping stations in southern governorates	Southern Governorates	400	400	reduce water loss and energy consumption, and improve water supply
Rehabilitation of pumping stations in middle governorates	Middle Governorates	400	400	reduce water loss and energy consumption, and improve water supply
Excavate and prepare deep wells in different areas of the kingdom	National	400	400	provide additional water amounts and improve water supply
Desert wells water pumping (through wind and solar energy)	National	200	200	provide water in desert areas through using alternative energy
Water Purchasing from private wells	National	12,000	12,000	provide additional water amounts and improve water supply
Lifting and laydown wells	National	350	350	sustain work of wells and raise its efficiency and save energy
Rehabilitation of public wells	National	7,100	7,100	renovation of public wells and improve productivity
Disi water conveyer	National	670,240	3,720	provide additional amounts of water for citizens (more than 100 mm ³)
Water aspects planning in land usage (BGR)	North Jordan	1620	1,215	protect water resources from contamination
Sharea water pumping station/Balqaa	Balqaa Governorate	500	480	reduce water loss and energy consumption, and improve water supply
Maintain and prepare lajjoun wells in Kara	Karak Governorate	500	300	raise efficiency of wells productivity
Operate, maintain, and desalinate Al Qineyeh -Um Rummaneh plant/Zarka	Zarka Governorate	620	430	sustain station work and raise its efficiency
Kraymeh desalination plant	Irbid Governorate	560	2,240	improve the water situation in partnership with the private sector

Ministry of Water and Irrigation Investment Plan

Project	Geographical Location	Total Cost	projected expenditure for (2013-2016)	Results to be achieved
Excavate and prepare kafrain wells in Balqaa	Balqaa Governorate	500	500	improve watersupply
Operation and maintenance of SCADA system in Hasa	Tafileh Governorate	300	300	increase operation efficiency of water systems
Replacement of lifting lines for wells 5, 9 in Zarka	Zarka Governorate	300	300	raise efficiency of wells productivity
Operation of the wells of the Guardian of the holly mosques	Zarka Governorate	1000	1,000	improve water supply
Study of Aqaba water desalination plant with a capacity of 70 mm ³ annually -BOT	Aqaba	2,000	2,000	provide additional amounts of water
Disi water Ionic exchange treatment plant	National	20000	20,000	improve quality of disi water
Operation and maintenance of conveyor lines	Madaba and Balqaa	4010	4,010	sustain operation of conveyor lines, and continue supplying Amman with drinking water
Integrated development to develop wadi Araba	Aqaba	12695	4868	Develop wadi Araba through constructing irrigation projects ,divding its area into agricultural units and distributing it among farmers, support cooperative associations in the area, and establish a regional center for research and agricultural extension.
Kufranjah dam	Ajloun	25150	15823	Save around (6)mm ³ of water for drinking and irrigation purposes.
Operate, maintain, and sustain dams	National	7650	7650	Continue saving water in different dams effectively because it is considered as a main water resource in the kingdom.
Operate, maintain, and sustain king Abdullah canal	Irbid and Balqaa	21600	21600	Maintain King Abdullah canal and ensure continuity of its operation as needed, and ensure maintining its sorage capacity.
Rehabilitation of pumping stations in northern and middle ghors	Irbid and Balqaa	2500	2500	Rehabilitation of pumping stations to maintain their works
King Abdullah Canal fencing	Irbid and Balqaa	1150	1150	Fencing king Abdullah canal to: eleminate drowinings, to eleminate illegal abstraction of water , and to maintain quality of water in the canal.

Ministry of Water and Irrigation Investment Plan

Project	Geographical Location	Total Cost	projected expenditure for (2013-2016)	Results to be achieved
Construction of different ponds and excavations	National	1400	1400	Enhance groundwater, provide a water resource in badia, and to serve its citizens specially ranchers.
Zarka-As-Samra stream irrigation project	Zarka Governorate	5400	5,400	Maximize benefit from the treated water effluent from As-Samra for irrigation purposes.
Connect King Talal dam conveyor to agricultural units in Qarin area	Irbid	500	500	Connect agricultural units in Qarin area to king talal dam conveyor instead of irrigating it from king Abdullah canal in the north to save fresh water for drinking purposes.
Wadi Ibn Hammad dam	Karak Governorate	30000	18,800	Save around (4)mm ³ for purposes of supplementary irrigation in southern ghors.
Raising height of Wala dam	Madaba	25000	11,150	Raise height of the dam to benefit from floods water that can't be coped through the current storage capacity. This will contribute to increase amounts of water available to leak from the dam, in addition to increase ground charge for Waleh and Heedan wells. Also, it will increase flow of springs below the dam in addition to protection from floods risks.
Rehabilitation of the main gates, pumping stations, and irrigation networks- the 18km expansion project.	Balqaa Governorate	11500	4,000	Maintain sustainability and performance of irrigation networks in the 18km expansion project and to improve level of service submitted.
Al-Wadat dam	Tafileh Governorate	5000	5,000	Save around 2.5 mm ³ of floods water to use it for irrigating lands located below the dam.
Karak dam	Karak Governorate	10200	10,200	Save around (2)mm ³ of water for irrigation purposes.
Zarka-Maen dam	Madaba	10500	10,500	Save around (2)mm ³ of water for rechange purposes.

Ministry of Water and Irrigation Investment Plan

Project	Geographical Location	Total Cost	projected expenditure for (2013-2016)	Results to be achieved
Telal Al Dhahab dam	Balqaa Governorate	10000	6,000	Construct a cement dam with a capacity of 1.9mm ³ for irrigation, industry, and ground recharge purposes.
Connect ZCIII to the northern conveyor line of the treated water	Irbid and Balqaa	4000	4,000	Utilize treated water in irrigation instead of fresh water and to save it for drinking purposes.
Exploring deep groundwater layers studies	Zarka Governorate	2900	1,350	provide additional water resources
Remote sensing project related to the management of water sector	National	1335	930	Improve capacity of workers in the water sector to achieve a sustainable management for water resources available.
Water resources studies - miscellaneous (Water Forum, Memorandum of Understanding with the Public Security-the National project	National	2000	1,200	Quality and quantity protection of water resource
Water harvesting study	Eastern Areas of Jordan	1000	600	find additional water resources
Assessment and management of water resources study for Dead sea basin	Karak Governorate	341	341	optimal and sustainable usage of groundwater resources
Construct buildings and facilities for monitors	National	250	170	improvement of infrastructure
Excavate wells for controlling groundwater basins	National	860	400	obtain information on situation of groundwater
Groundwater modeling studies	National	1000	200	optimal and sustainable usage of groundwater resources
Maintain and wash the water monitoring and control wells	National	700	470	sustainability of water monitoring network
Rehabilitation of measurement stations and surface runoff	National	190	80	obtain information of floods and constant flow to vallies
Maintenance and rehabilitation of irrigation networks	Irbid and Balqaa	1500	1500	improve efficiency of irrigation networks and reduce the loss
Rehabilitation of Zarka Sukhneh stream basin/King Talal dam	Zarka Governorate	4000	4000	maintain environment of Zarka stream
Rehabilitation of southern ghors	Karak Governorate	255	255	rehabilitation of irrigation networks and reduction of loss
Zara-Maen water conveyance	Balqaa Governorate	1500	1500	improve water supply and reduce the loss
Improve water situation in Wadi Araba areas	Aqaba	300	300	Reduce water loss and improve water supply through the rehabilitation of networks and replacement of the damaged ones.
Update SCADA system	Aqaba	200	200	improve water supply and connect water resources to SCADA to increase networks efficiency
Excavate wells in different areas to inhance water productivity	Aqaba	500	500	find new water resources

Ministry of Water and Irrigation Investment Plan

Project	Geographical Location	Total Cost	projected expenditure for (2013-2016)	Results to be achieved
operate and prepare new water resources	Northern Governorates	2400	2400	improve water supply and manage water resources effectively
treatment and desalination of water resources	Northern Governorates	1200	1200	improve water supply and manage water resources effectively
buying water from private wells	Northern Governorates	560	560	provide additional amounts of water for citizens
(1) Total Policy		932,606	208,412	
Policy no (2)	raise efficiency of water supply and distribution systems for household, industrial, commercial, and agricultural purposes			
Emergencies and disasters cases	National	6,000	4,000	addressing emergencies and security of water
Water loss reduction and services improvement in all governorates (settel disputes)	National	8,577	0	improve water supply and reduce the loss
Improve water networks in governorates	National	10,500	10,500	improve water networks and reduce water loss
House connections for southern and middle governorates	Southern and Middle Governorates	6,000	4,000	expansion of water supply services
Improve water systems in middle governorates	Middle Governorates	3,200	3,200	improve water supply and reduce the loss
Networks water loss control	National	425	300	Reduce the network losses
Operate and desalinate water of Karameh dam	Balqaa Governorate	1755	2,000	provide additional amounts of water
improve water systems in southern governorates	Southern governorates	4100	4,100	improve water networks and reduce water loss
Upgrading Rusaifeh water network - Phase I	Zarka Governorate	7,000	2,000	improve water networks and reduce water loss
Water loss reduction and water supply improvement in Gweireyyeh/Awajan/Bani Hashem villages	Zarka Governorate	6822	6822	improve water networks and reduce water loss
Zaatari/Hofa water transmission pipeline	Northern Governorates	34,360	4,100	improve water supply
Water loss reduction programm in Karak- Phase I	Karak Governorate	37,333	11,250	Reduce the loss
Water pipeline at Deir Alla- Kufranja Intersection	Zarka Governorate	180	75	water delivery services
Water projects in poverty pockets and projects for providing the Royal Makrama housing with water in Souf	Balqaa Governorate	244	0	improve water networks and reduce water loss
Rehabilitate water networks in Tafileh (implementation)	Jarash governorate	1,400	1,400	improve water supply to poverished areas and raise living level
Rehabilitate water networks in Tafileh (implementation)	Tafileh Governorate	15000	7500	improve water supply and reduce the loss
Reduce water loss in Balqaa and Madaba (implementation)	Balqaa and Madaba Governorate	12,580	12,800	Reduce the loss

Ministry of Water and Irrigation Investment Plan

Project	Geographical Location	Total Cost	projected expenditure for (2013-2016)	Results to be achieved
Reduce water loss in Balqaa and Madaba (Engineering services)	Balqaa and Madaba Governorate	2,000	1,000	Reduce the loss
Improve and replace water networks in Amman	Amman Governorate	1,347	0	improve water supply and reduce the loss
Upgrade Deir Alla water network (Engineering services)	Balqaa Governorate	162	0	Reduce the loss
Conveyor lines Um lulu/Jarash-Hofa/Ajloun	Jarash and Ajloun Governorate	22,000	22780	improve water supply
Energy Efficiency improvement JICA	Zarka Governorate	11,200	7,900	rationalization of energy consumption
Upgrade water networks of Deir Alla + Ain al Basha + Fuhais, and Mahis (implementation)	Balqaa Governorate	20,000	20,000	loss reduction
House connection /Amman/ third and fourth phase (KFW and WAJ WAJ portion from Miyahuna)	Amman Governorate	17,000	17,000	increase number of people served
Water MCC projects	Zarka Governorate	75,000	75,000	reduce water loss and energy consumption,
Management of MCC projects and supervising water and wastewater MCA projects	Zarka Governorate	18,000	12,000	improve water supply in Zarka governorate,
Water and Wastewater studies MCC	Zarka Governorate	10,000	700	replace old and secondary lines in water network, increase reservoirs storage capacity which will reduce water loss, reduce water pumping cost
Rehabilitation of northern and middle ghors	Irbid and Balqaa	3710	1,900	Improve irrigation networks in the area which will lead to reduce loss of irrigation water (raise efficiency of irrigation in northern and middle ghors)
Rehabilitation of southern ghors irrigation project-Phase I	Karak Governorate	5600	5,600	raise efficiency of irrigation to 87% and reduce water networks loss
Rehabilitation of Husban Kafraïn irrigation project-Phase I	Balqaa Governorate	2600	2,600	raise efficiency of irrigation in Husban
Rehabilitation of Husban Kafraïn irrigation project-Phase II	Balqaa Governorate	3100	3,100	rehabilitation of irrigation networks in Kafraïn
Rehabilitation of Husban Kafraïn irrigation project - Phase III	Balqaa Governorate	4100	4,100	Raise irrigation efficiency in areas benefited from the project.
Protection of Zara pumping station	Balqaa	500	500	Protect Zara pumping station from floods to ensure constant work

Ministry of Water and Irrigation Investment Plan

Project	Geographical Location	Total Cost	projected expenditure for (2013-2016)	Results to be achieved
Construct water networks at Quwereh	Aqaba	300	300	increase number of people connected to water networks and improve water quality
Maintenance of water plants	Aqaba	400	400	improve water supply and manage water resources effectively and reduce energy loss

Ministry of Water and Irrigation Investment Plan

Project	Geographical Location	Total Cost	projected expenditure for (2013-2016)	Results to be achieved
Construction of new water reservoirs at Disi	Aqaba	350	350	improve water supply and manage water resources effectively and reduce energy loss
Construction of new water reservoirs	Aqaba	400	400	improve water supply in the government
Constructing miscellaneous water networks in Aqaba	Aqaba	525	525	increase number of people connected to water networks and improve water quality
Update pumping systems at water stations	Aqaba	755	755	improve water supply and manage water resources effectively and reduce energy loss
Enhance system of production and transport from Disi to Aqaba	Aqaba	1,600	1,600	improve water supply and manage water resources effectively and reduce energy loss
Maintenance of water wells	Aqaba	400	400	improve water supply and manage water resources effectively and reduce energy loss
Maintenance of the main supply network	Aqaba	80	80	improve water supply and manage water resources effectively and reduce energy loss
Maintain lifting and treatment plants	Aqaba	600	600	improve water supply and manage water resources effectively and reduce energy loss
Improve water networks at northern governorates	Northern Governorates	7,000	7,000	Reduce water loss and improve water supply through rehabilitating networks and replacing the damaged ones.
Construct reservoirs and water stations	Northern Governorates	400	400	improve water supply and manage water resources effectively
Conveyor lines all over northern sector	Northern Governorates	2,500	2,500	improve water supply and manage water resources effectively
House water connection	Northern Governorates	1,000	1,000	increase number of people connected to water networks and improve water supply
Water loss reduction in northern governorates	Northern Governorates	7,690	7,690	Reduce water loss, improve water supply, and increase reservoirs storage capacity which lead to reduce water loss, decrease cost of water pumping, and increase per capita of water from 56 to 93 liter/individual/day
Improve energy efficiency of pumping stations at northern governorates	Northern Governorates	29,800	29,800	improve water supply, reduce water loss, and maintain energy
Improve and rehabilitate Amman Balqaa and Madaba water networks for constant supply	,Amman, Balqaa and Madaba	39,620	39,620	improve water supply and reduce water losses
Rehabilitation of Mafraq and Irbid network	Northern Governorates	41180	26,180	improve water supply and reduce water losses
Rehabilitation of Ajloun water networks	Ajloun Governorate	18460	18,460	improve water supply and reduce water losses
Rehabilitation of Jarash water network	Jarash governorate	20590	20,590	improve water supply and reduce water losses

Ministry of Water and Irrigation Investment Plan

Project	Geographical Location	Total Cost	projected expenditure for (2013-2016)	Results to be achieved
Improve energy efficiency at pumping stations	National	10000	10,000	reduce energy cost and improve the efficiency of water pumping stations
Completion of Karak water network rehabilitation (remained loss rehabilitation)	Karak Governorate	12070	12,070	improve water supply and reduce the loss

Ministry of Water and Irrigation Investment Plan

Project	Geographical Location	Total Cost	projected expenditure for (2013-2016)	Results to be achieved
Total policy (2)		547,515	428,947	
Policy no (3)	Expansion of Wastewater services			
Construct and maintain sedimentation and drying basins	National	300	200	Raise efficiency of treatment plants
Clean wastewater lines	National	1,200	400	raise efficiency of wastewater networks
Improve wastewater networks in southern governorates	Southern governorates	1,950	1,950	increase number of people connected to wasetwater networks and improve the surrounding environment
Improve wastewater networks in middle governorates	Middle Governorates	2,500	2500	increase number of people connected to wasetwater networks and improve the surrounding environment
Remove health hazards in southern and middle areas	Middle and Southern Governorates	4,200	2,800	improve wastewater service and maintain Environment
Rehabilitation of wastewater tretment plants	National	300	200	Raise efficiency of treatment plants
Western Jarash villages wastewater project	Jarash governorate	6,275	4,000	increase number of people connected to wasetwater networks and improve the surrounding environment
Greater Irbid/Wadi Shallaleh phase II wastewater	Irbid Governorate	67,790	15500	increase number of people connected to wasetwater networks and improve the surrounding environment
Wadi Shallaleh treatment plant contract 1	Irbid Governorate	42,551	13,351	increase number of people connected to wasetwater networks and improve the surrounding environment
Southern Amman wastewater project -phase I (implementation of networks	Amman Governorate	126,000	0	increase number of people connected to wasetwater networks and improve the surrounding environment
Southern Amman wastewater project (implementation of networks	Amman Governorate	33,000	33,000	increase number of people connected to wasetwater networks and improve the surrounding environment
Southern Amman wastewater services-phase I (engineering service)	Amman Governorate	2,000	1,200	increase number of people connected to wasetwater networks and improve the surrounding environment
Southern Amman treatment plant (implementation of a plant+Engineering service)	Amman Governorate	89,732	66,000	increase number of people connected to wasetwater networks and improve the surrounding environment
Expansion of Karak treatment plant	Karak Governorate	35,000	5,200	increase the efficiency and capacity of treatment plant
Souf Wastewater conveyor and Qairawan networks	Jarash governorate	4,000	35	improve networks efficiency

Ministry of Water and Irrigation Investment Plan

Project	Geographical Location	Total Cost	projected expenditure for (2013-2016)	Results to be achieved
Kufranjah wastewater plant	Ajloun Governorate	20,000	9400	increase the efficiency and capacity of treatment plant
Kufranjah wastewater networks	Ajloun Governorate	5,268	755	increase number of people connected to wasetwater networks and improve the surrounding environment
Kufranjah wastewater (studies)	Ajloun Governorate	3,290	1,000	increase number of people connected to wasetwater networks and improve the surrounding environment
Expansion of Mafraq treatment plant	Mafraq Governorate	20,000	10400	Raise efficiency and capacity of stations

Ministry of Water and Irrigation Investment Plan

Project	Geographical Location	Total Cost	projected expenditure for (2013-2016)	Results to be achieved
Mazar-Mu'tah-Adnaneh wastewater	Karak Governorate	40,000	8,700	increase number of people connected to wasetwater networks and improve the surrounding environment
Expansion of Lajjoun treatment plant	Karak Governorate	5,000	1,300	Raise efficiency and capacity of stations
Improve and transfer damaged wastewater lines in Amman	Amman Governorate	36,000	2,760	raise networks efficiency
Miscellaneous wastewater lines in Balqaa	Blaqaa Governorate	1,500	0	increase number of people connected to wasetwater networks and improve the surrounding environment
Miscellaneous wastewater lines in Madaba	Madaba Goveronrate	850	450	increase number of people connected to wasetwater networks and improve the surrounding environment
Small wastewater plants (Shoubak)	Ma'an Governorate	413	0	Maintain Environment
Small wastewater plants (northern shouneh)	Irbid Governorate	9,667	0	Maintain Environment
Connect Zarka public hospital to sewage	Zarka Governorate	320	0	Maintain Environment
Azraq wastewater project treatment plant and networks (engineering services)	Zarka Governorate	322	0	increase number of people connected to wasetwater networks and improve the surrounding environment
Karak treatment plant reuse line	Zarka Governorate	1,000	1,000	provide alternative treated water
Clean wastewater lines in Zarka	Zarka Governorate	650	650	raise efficiency of wastewater networks
Laying wastewater lines in Tafileh (cement)	Zarka Governorate	800	300	increase number of people connected to wasetwater networks and improve the surrounding environment
Construct a sedimentation basin in Madaba treatment plant	Zarka Governorate	800	800	increase the effeciency of treatment plants
Water &wastewater Infrastructure project study phase /expenditure conducted by the donor	Jarash/Tafileh Ma'an/ Governorates	24,000	0	increase the efficiency of wastewater networks and treatment plants
Naur wastewater project (networks+plants)	Amman Governorate	59,000	26,165	increase number of people connected to wasetwater networks and improve the surrounding environment
Rreplace Al haddadeh/Tafileh wastewater conveyor	Tafileh Governorate	700	700	raise efficiency of wastewater networks

Ministry of Water and Irrigation Investment Plan

Project	Geographical Location	Total Cost	projected expenditure for (2013-2016)	Results to be achieved
Reuse treated water to irrigate northern ghors (formerly wadi darrabeh wastewater	Northern Governorates	32000	28300	improve environmental situation and obtain treated water as alternative resources
Wastewater projects (MCC)	Zarka Governorate	36,000	32,000	increase number of people connected to wasetwater networks and improve the surrounding environment
Expansion and improvement of Zarka lifting plants MCC	Zarka Governorate	14,000	14,000	raise capacity and efficiency of lifting stations
Expansion of As-Samra treatment plant MCC	Zarka Governorate	66,234	54,000	raise capacity of stations and provide additional water for irrigation
Rehabilitation of Al Alameyeh wastewater network	Aqaba	40	40	increase number of people connected to wasetwater networks and improve the surrounding environment
Miscellaneous wastewater projects	Aqaba	600	600	increase number of people connected to wasetwater networks and improve the surrounding environment
Construction, maintenance ,and rehabilitation of manholes	Aqaba	160	160	maintain sustainability and operation of wastewater networks
Rehabilitation of dryness basens and establishment of intesifying unit	Aqaba	250	250	raise efficiency of wastewater networks and sustainability
Completion of sheibeh networks/phase I	Aqaba	750	750	increase number of people connected to wasetwater networks and improve the surrounding environment
Maintenance of sedimentation and drying basins	Northern Governorates	160	160	increase amounts of treated water and use it for agriculture purposes. Raise efficiency of treatment plants
Remove health hazards and serve the subscribers	Northern Governorates	400	400	increase number of people connected to wasetwater networks and improve the surrounding environment
Construction and improvement of wastewater networks	Northern Governorates	3,700	3,700	increase number of people connected to wasetwater networks and improve the surrounding environment
Irbid wastewater	Irbid	3,200	3,200	, increase number of people connected to wasetwater networks , improve the surrounding environment and use treated wastewater for agriculutre purposes
Sarou Jbarat-Jarash wastewater	Jarash	800	800	increase number of people connected to wasetwater networks and improve the surrounding environment

Ministry of Water and Irrigation Investment Plan

Project	Geographical Location	Total Cost	projected expenditure for (2013-2016)	Results to be achieved
Ajloun wastewater	Ajloun	800	800	increase number of people connected to wastewater networks and improve the surrounding environment
Raise efficiency of northern treatment plants	Northern Governorates	2,000	2,000	improve water supply, reduce water loss, and maintain energy
Management and drying sludge in wastewater treatment plants	National	23,000	22,500	protect Environment and reduce costs of sludge transport
Total policy (3)		830,472	374,376	

Ministry of Water and Irrigation Investment Plan

Project	Geographical Location	Total Cost	projected expenditure for (2013-2016)	Results to be achieved
Policy (4)	Decentralization and more involvement of the private sector			
As-Samra treatment plant (As-Samra wastewater treatment/Zarka)	Zarka Governorate	18,000	14,000	improve the environmental situation and obtain treated water as alternative resources
Support PMU	National	3,000	3,000	develop projects of partnership with the private sector and control companies performance
Support directorate of operation and subscribers management	National	7,150	900	improve water services and supply
Service contract to support directorate of operation and subscribers in Karak	Karak Governorate	2,100	1400	improve subscribers services and increase money collection
service contract to support operation and subscribers directorate in Balqaa	Balqaa Governorate	2,800	1784	improve subscribers services and increase money collection
Management and operation contract of Maan wastewater and treatment plant	Ma'an Governorate	5,400	1600	improve management of wastewater treatment plants
Management and operation contract of wadi mousa treatment plant	Ma'an Governorate	4,100	4100	improve management of wastewater treatment plants
Improve efficiency of energy usage KFW	National	32,000	32,000	improve efficiency of energy usage and reduce expenditures
System and Control of water sector utilities in the North SCADA	Northern Governorates	12,000	12,000	raise operation efficiency
Support Yarmouk Water Company	Northern Governorates	20,000	16,000	improve water supply and wastewater services, reduce the loss, and increase returns
Management contract of Yarmouk water company	Northern Governorates	2,350	2,350	support Yarmouk water company
Management contract of Zarka governorate	Zarka Governorate	7,500	1900	improve water supply and wastewater services, reduce the loss, and increase returns
Management and operation contract of Madaba water and wastewater networks	Madaba Goveronrate	8000	1600	improve water supply and wastewater services, reduce the loss, and increase returns
Water Users Assocations	Jordan Valley	2650	2,650	support water users associations and ensure sustainability of its work so as to transfer authority of distributing Irrigation water
Automation of water monitoring network and monitoring of groundwater wells in parthership with the private secotr	National	10000	8,160	Obtain accurate water information on time to make decision
Prepare financial and legal agreement for Earth Water Global BOT	West Jordan	1200	350	find alternative resources
Water Demand Management	National	2000	1,350	Raise efficiency of water usages
Miyahuan projects	Amman	80000	80,000	improve water supply and wastewater services, reduce the loss, and increase returns
Total of policy (4)		220,250	105,144	

Ministry of Water and Irrigation Investment Plan

Project	Geographical Location	Total Cost	projected expenditure for (2013-2016)	Results to be achieved
Total for Sector		2,530,843	1,116,879	

Annex 2

Cost of hosting Syrian Refugees on water sector of Jordan

Hashemite Kingdom of Jordan



MINISTRY OF
WATER AND IRRIGATION

MINISTRY OF WATER AND IRRIGATION

**COST OF HOSTING SYRIAN REFUGEES ON WATER
SECTOR OF JORDAN**

APRIL, 2013

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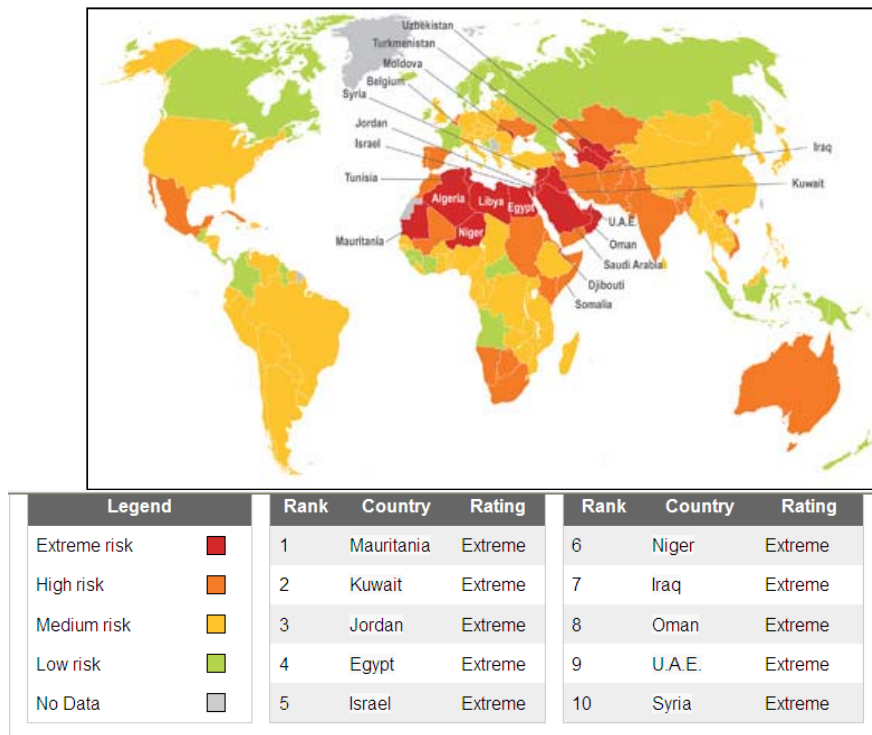
Cost of hosting Syrian Refugees Jordan's water sector

Water Sector in Jordan

Jordan is considered to be one of the four poorest countries worldwide in water resources, available water resources per capita is very low at a level of 145 m³/capita/year far below the international recognized poverty line of 1000 m³/capita/year; competition between demands on limited fresh water quantities is ever increasing. The expanding population and the climatic and topographical conditions of the country have caused enormous pressure on the limited water resources and created a severe water supply-demand imbalance. Water scarcity is an important constraint to Jordan's economic growth and development.

Moreover, the Water Security Risk Index and map, developed by risk analysis and mapping firm Maplecroft, rated Jordan as the third country at 'extreme risk'. This index and map identify the countries where water supply will be limited or interrupted in the future. Maplecroft calculates water security by measuring countries' water stress; population rates; reliance on external water supplies; sustainability of water use; intensity of water use in the economy; government effectiveness; and virtual water use, which is a unique assessment of the water intensity of imported goods, such as food and oil (see Figure 1 below) .

Figure 1 Water Security Index



© Maplecroft, 2011

Source: Maplecroft Risk, responsibility and reputation;
http://maplecroft.com/about/news/water_security.html

Jordan's Water resources consist primarily of surface and groundwater. Groundwater resources are a main source of water in Jordan distributed to 12 basins see Figure 2 below. It is

the only available water resource for some areas of Jordan. Most Jordanian renewable groundwater resources presently are exploited to more than their maximum capacity.

Despite this limited availability, Jordan utilizes more than 100% of its renewable water resources, it exploit the groundwater resources of more than the recharge annual rates. See Figure 3 below.

Figure 2 Ground Water Basins and Sustainable Abstraction

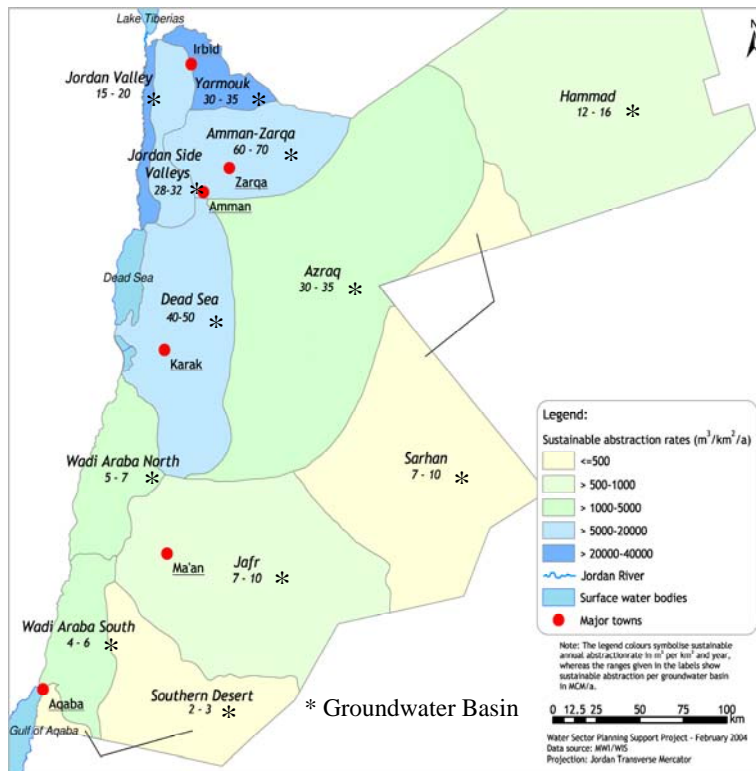
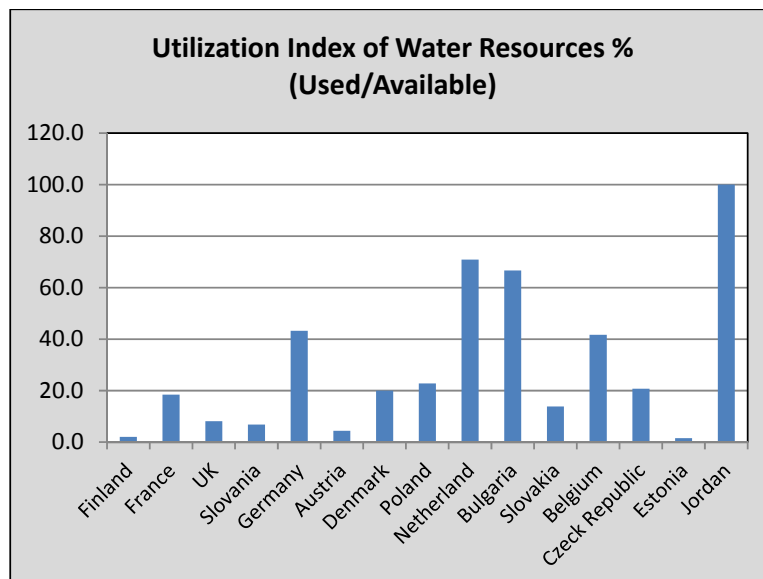


Figure 3 Utilization Index of Water Resources % (Used/Available)



The main groundwater resource in northern of Jordan is the Amman-Zarqa basin, which provided water for irrigation and drinking and is already before the Syrian crises exceeding the recharge limit to the aquifer (184% is the abstraction from the safe yield 87.5 MCM). The Amman-Zarqa basin underlies a large area of Jordan's northern governorates including the area where Za'atari refugee camp is situated. The depth to the groundwater varies within the camp between 100 to 200 meters and the site is part of the Jordanian eastern desert and composed shallow top soil followed by Basaltic and carbonate bedrock. Currently an assessment with the objective of mapping the vulnerability of the aquifer underlying the Za'atari camp is under completion.

Most of the water uses in the highland areas are in the agriculture sector and according to a recent USAID study undertaken by the USAID/Jordan Institutional Support and Strengthening Program (ISSP) from 2011-2012 "Water Valuation Study", which aimed to assess the value of water use in different economic sectors, with a particular focus on the agricultural sector to determine water's value in producing different crops. It showed that the the value returned per unit of water is relatively high especially for winter vegetables which varies from less than one USD up to 10 USD. The trend in the last few years showed that the farmers both in the Jordan Valley and the Highlands started to shift toward high productive crops, which makes the value produced by one cubic meter of water averages to 4 JD/m³(6 USD).

The other main user of water in the highlands area is the municipal sector, in 2011 the volume of water supplied via the water distribution network to whole Jordan reached 340 MCM out of which 70 MCM were supplied to the northern governorate (Yarmouk Water Company) to serve about 1.65 million inhabitants (255 thousand of subscribers), with about 80% Operation and Maintenance cost recovery ratio.

In view of the increasing cost of supply water, there is a high level of Government subsidy to the water sector which reached 339 million \$US in 2012.

Treated wastewater is considered an essential element in the Kingdom's water strategy. The treated wastewater is vital to the water resources equation, as well as a challenge to the water quality and health issues arising.

In northern of Jordan and especially close to the camps areas two main wastewater treatment plants are available; Al-Mafraq WWTP and Al-Akeider WWTP with 1800 m³/day and 4000 m³/day design flow respectively.

Both WWTP's utilize stabilization ponds techniques, Al -Mafraq is already exceeding its full capacity and Al-Akaidar is now operating at nearly full capacity.

Syrian Refugees

Since the beginning of the crisis in Syria in March 2011, the number of Syrian refugees who fled to Jordan till the end of 2012 exceeded 315 thousand out of which 65 thousands in the camps (MOPIC response plan Jan. 2013). The average number of Syrian refugees coming into Jordan at that time was slightly below 1000 refugees per day. However, during the beginning of this year the flow of refugees tripled to reach a daily average of around 3000 refugees. This makes the number to date 480,000 Syrian refugees out of which 125,000 in the camps.

According to the international agencies UNHCR and UNICEF The most likely scenario for Syrian refugees in Jordan is for 400,000 people in camps and 800,000 people in host communities by the end of 2013 (Annex 1: RRP5 Jordan chapter- WASH).

The rapid rise in the number of Syrian refugees caused a sever stress on public water supply systems, serving double more people in certain areas. In some locations, water availability is reaching such low levels that tensions between refugees and Jordanians are rising. Also the vast increase in Syrian refugees is exhausting traditional support systems. The number of refugees living in precarious conditions beyond the reach of support systems is increasing, with households creating their own private WASH facilities and buying water from the markets. This caused an increase almost the double in the prices of water sold from tankers.

It is worth mentioning that another number of Syrians setteled in Jordan before the crisis, majority of those are labors who brought their families seeking safe living. The tribal relation between the people living on both sides of the borders has resulted in another no. of Syrians settled in Jordan estimated to be around 800,000. As a total, the estimated no. of Syrians setteled or sheltered in Jordan raises currenty to 1.2 million forming around 18% increase to the Jordanian population.

Assessments in camps and host communities have shown that access to water is a key challenge for the refugees and is a source of tension with the host communities.

The Syrians are living in Jordan in two separate categories; in camps and in local communities.

SYRIANS SHELTERED IN CAMPS

Over 70 per cent of Syrian refugees in Jordan live amongst host communities, with the rest accommodated in refugee camps “Za’atri camp” or transit sites Cyber City and King Abdullah Park. Other sites are also planned for camping Syrian refugees in Azraq (Al-Mkhaizen) and Azraq (Mraijeb AlFhood). A special category of the Syrian refugees were sheltered in Mafraq Area (Mansheiat Al Elayan).

The UN Agencies are taking the management role of the camps, specific functions are within the responsibility of the Governmet of Jordan, the Ministry of Water and irrigation participate in the Joint WASH meetings.

THE ZA’ATRI CAMP

The Zatari camp was established in Mafraq governorate at the end of July 2012 with the objective to host the Syrians seeking refuge in Jordan due to the violence in their home country. See Figure 4

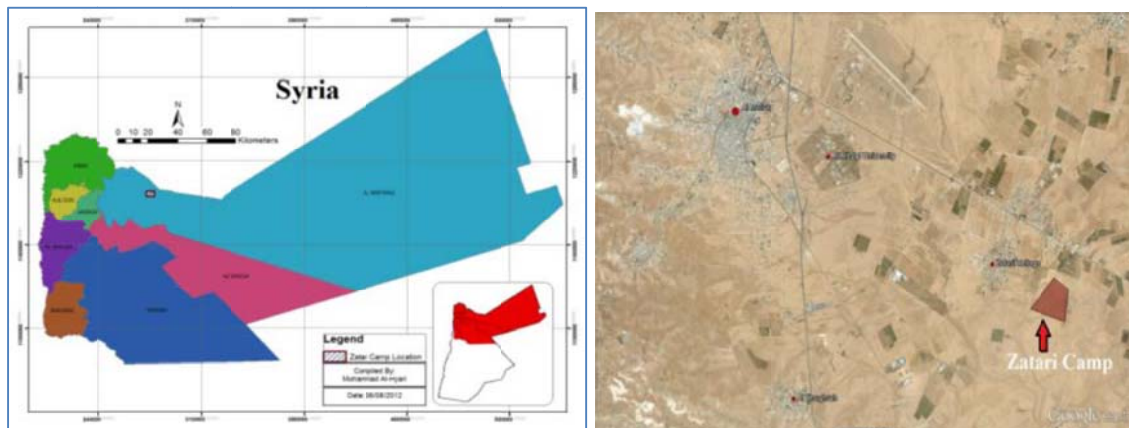
The population of Zatari camp till now is about 125,000 refugees.

Figure 4 Za'atari Camp



The Zatari camp is located in the Mafraq governorate in the northern part of Jordan, around 11 km to the East from Al Mafraq City Center and around 8 km from the Al-Albayet University. The Syrian border is found around 13 km to the North of the camp site. Figure 5 shows the location of Zatarri camp.

Figure 5 Location of the Zatarri camp



1- WATER SUPPLY

Until now, the camp administration depends on water tankers to cover the water demand of the refugees. Water tankers fill the water from private water wells besides the governmental source; the filling stations are found around the camp; the water is transported to special water reservoir tanks in the camp. Water tankers also take their water from the public supplier Yarmouk Water Company.

The required quantity of water depends on the population of the camp. Approximately, 90 tanks of different sizes discharge the loaded water to the camp tanks. The chlorine content in water is checked for every single tank in order to insure that it is sterilized. The chlorine content should be between 1-1.7 mg/l. The average camp's daily consumption of water is 4000-6500 m³/day. This numbers is not fixed because of the changing camp population as mentioned before.

Based on THW information, the required amount of water for each person in the camp is about 50 L/day, but the available amount for each person is about 37 L/day. Hence, a total of 6250 m³/day would be needed for optimal water supply of 125,000 people.

Recently, the Ministry of Water and Irrigation (MWI) in Jordan and Yarmouk Water Company (YWC), a public owned by Water Authority of Jordan (WAJ), has started to replace the tankers by drilling two groundwater wells of productivity around 125 M3/hr. and constructed a pipeline to connect the Camp to Zaatari Pumping Station. The two wells are planned to be the main source of the water for the camp in the near future. Figure 6 shows the drilling operations near the camp site.

Estimated cost within the refugees camps for supplying water by private tankers and evacuation by de-sludging trucks is about (17.4) JD/Capita/month which is divided to; a- 10.86 JD /capita/month and 6.18 JD/capita/month.

Figure 6 Drilling rigs East of the Zaatari camp



2- WASTEWATER

The wastewater produced by the camp inhabitants is drained to around 280 septic tanks distributed within the camp. Originally these septic tanks were built from concrete and blocks, and are paved by some coarse grains aggregates; such design violates the Jordanian standards. The septic tanks in the camp are divided into two types. The first type is for the “black” water and the other type is for “grey” water. The dimensions of the two types are 15 m³ and 4 m³ respectively. Recently all of the cess pits were changed to sealed steel tanks.

Pumping-out of the wastewater from the septic tanks by using truck tanks is the common method to transport the sewage out of the camp. The tankers dispose the loaded wastewater in Al Akider disposal. The drivers of those tankers should submit invoices form the responsible in Al Akider disposal to Zaatari camp management in order to prove that they disposed the loaded wastewater there. “Black” and “grey” wastewaters are uploaded by separate tankers.

On an average 6.3 million litres of water is supplied to Zaatari camp every day, providing about 50 litres per person per day from different sources: (a) trucked from private wells (b) through a pipeline from Za’atari pump station (c) two wells inside the camp (not operational yet).

The wastewater disposal increasingly develops into a critical issue, previous monitoring of the trucked wastewater showed that: out of 4000 m³/d of water trucked into the Zaatari camp, only 1300 m³/d are received at Al Keder plant. Assuming 70% of the water usually to be disposed of as sewage effluent, 2,700 m³/d should be trucked out, resulting in about 1400 m³/d of sewage “disappearing” in the camp. Those figures increasing rapidly as the consumption increases and the uncorrected practices also increase.

This camp has now 2,050 operational latrines, 1,034 showers and 733 water points. The toilets have the capacity to serve some 102,500 refugees at a 1:50 ratio.

It needs to be mentioned, that MWI/WAJ/YWC besides Zaatary camp is at present heavily subsidizing

- a) The water supply to the refugee population living outside the camp by assuming the real cost of water produced (primarily through renting private wells) and distributed incl. losses will be 1.3 JOD/m³ (which will increase as soon as Disi water is supplied to the North) against an average revenue of 0.4 JOD/m³. With about 400,000 refugees living outside the camps, the subsidies amount to 400,000 x 25 m³/capita and year x 0.9 JOD subsidy = 9,000,000 JOD/a.
- b) The sewage disposal to Al Keder treatment plant (YWC receiving 20 JOD/truck and month, which is not even covering the operating cost of the plant) is subsidized; Municipality is charging 0.75 JOD/ton.

Used water is discharged into two holding tanks, one for blackwater (from latrines) and one for the rest of the water (greywater). Since there are some problems with defecation in the showers, the greywater is for health reasons to be handled as blackwater but less concentrated. From the start the holding tanks were made of concrete blocks and not sealed so that some of the wastewater could seep out to the underlying aquifer and the risk of contamination.

Tanks are now being exchanged to sealed steel tanks, still one for blackwater and one for greywater. The holding tanks are regularly evacuated by de-sludging trucks conveying the wastewater on average of 1000 m³ per day to the government wastewater treatment plant, Al-Akeider situated about 35 km north-west of the camp. The treatment plant is now operating at nearly full capacity (Design flow 4000m³/day).

It was also found that the refugees dislike large communal WASH facilities. As a result, many households have created their own washing/bathing spaces and even toilets, resulting in thousands of soak pits throughout Zaatari camp. Which will cause serious hygiene and sanitation risks for the camp population and groundwater aquifer contamination (ACTED Study see Annex 2 ACTED Report Preliminary Report on Informal Grey and Black Water Systems in Zaatari Camp).

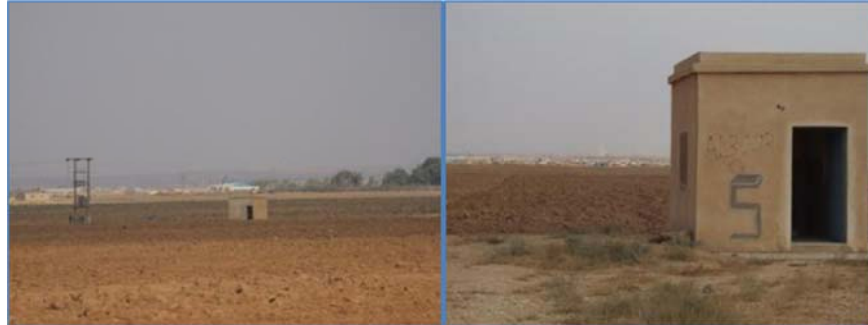
The most sustainable option to manage the greywater and wastewater in the camp is to implement a proper sewage system within the camp and build a pipeline and connect al Za'atari camp to transfer the wastewater to the expanding WWTP in Mafraq. This needs an investment of around 8.2 Million US\$ only for piping to Mafraq WWTP without considering the internal sewerage system within the camp and the treatment (Feasibility assessment by UNICEF; wastewater management at Al-Za'ataru refugee camp).

3- GROUND WATER

The Za'atari camp is located on top of the Amman Zarqa basin, some of the Zatar water supply wells (No. 3, 4, 5, 6), are located to the West of the camp. The general direction of groundwater flow in the camp area is reported to be to the North-West, hence, there might be a possibility that a contamination of the groundwater caused in the area of the Zatar camp may affect the quality of the water which is pumped from those wells (Figure 7). This includes also the eventual infiltration of wastewater from septic tanks. However, to prove this

a thorough chemical analysis of water samples on a longer time period would be needed. Also an accurate map of groundwater contour lines would be necessary to interpret the findings.

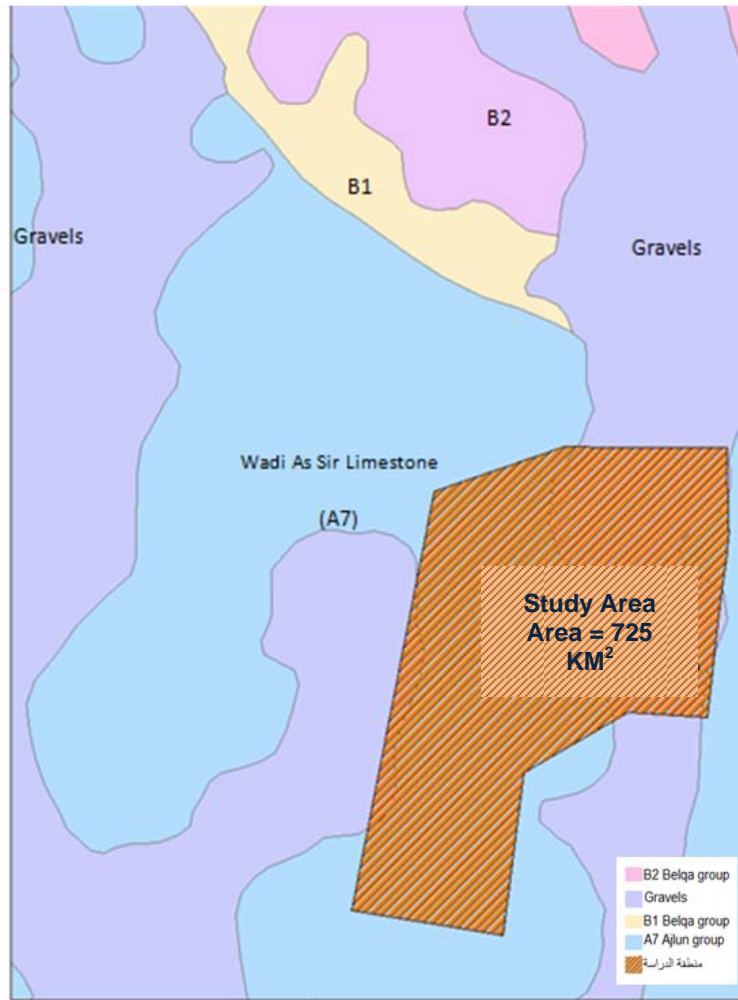
Figure 7 Zadari pumping wells to the West of the camp



4- GEOLOGY AND HYDROGEOLOGY OF ZA'ATARI CAMP AREA:

The dominant outcropping rocks within the area refer to B2/A7 formation, in addition to the basalt and the soil that cover some parts of the area. All of the previous mentioned layers can be considered as one aquifer because it is connected hydraulically; then, aquifer recharge by the rain water is a direct process in that area, which increasing the sensitivity of the area in term of pollutants. See Figure 8 below.

Figure 8 GEOLOGY AND HYDROGEOLOGY OF ZA'ATARI CAMP AREA



Within this area the Groundwater flows from South West to North East, but there are some faults that have SE-NW direction as it shown in Figure 12 below.

The geology of the Za'atary Camp area is described in the map and cross sections shown in Figure 9 to Figure 11

Figure 9 map of Za'atary Camp Area

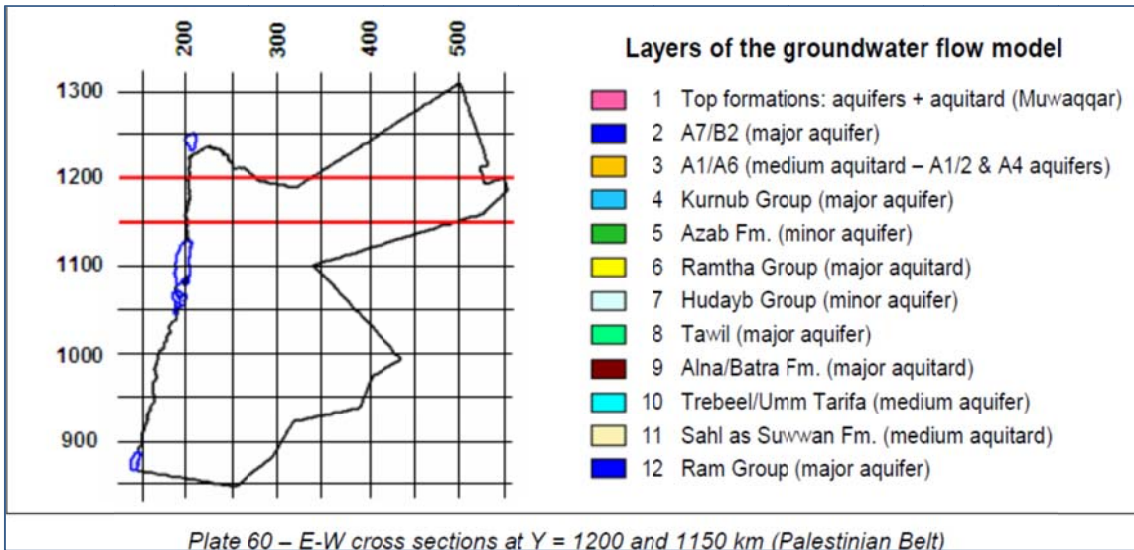


Figure 10 Cross section (1) at Za'atary Camp Area

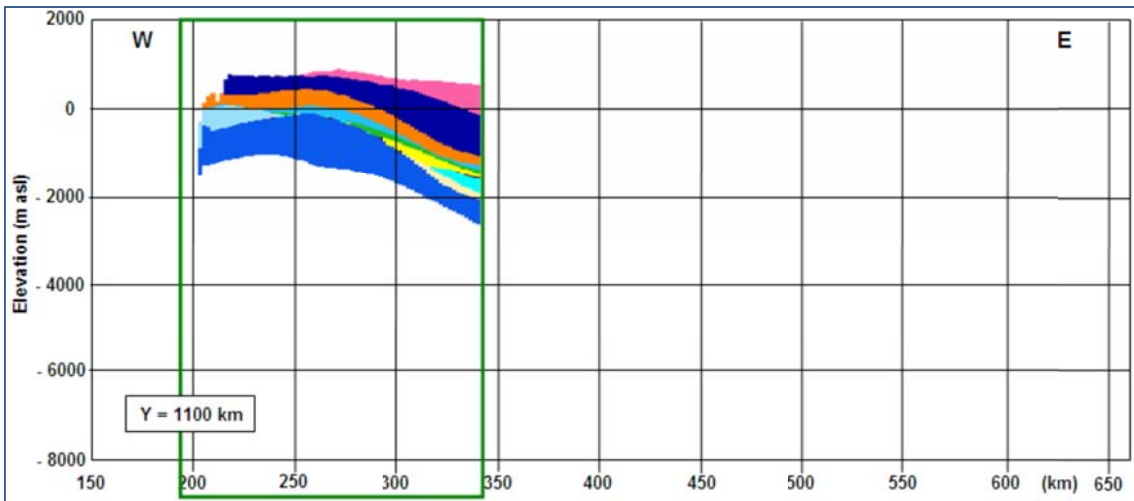
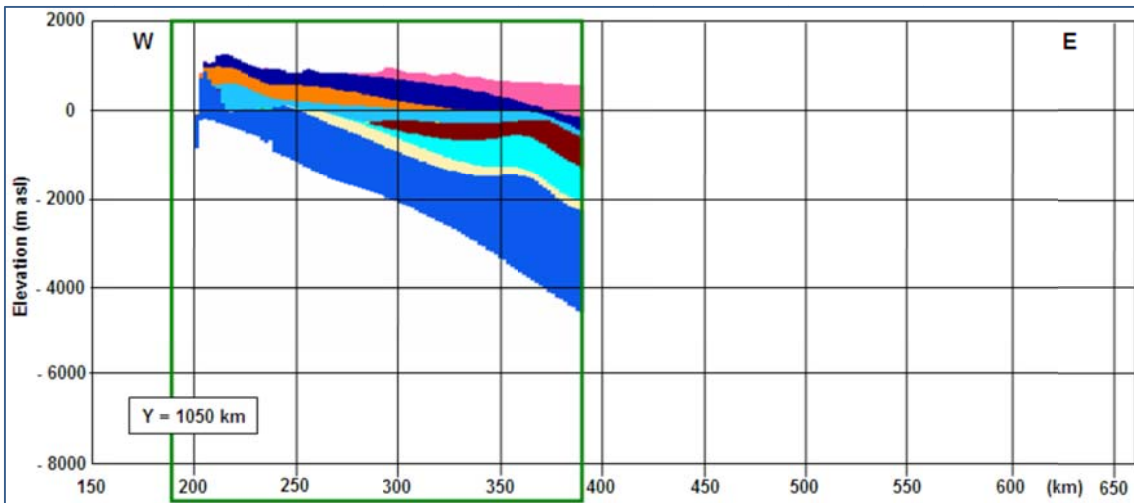


Figure 11 Cross section (2) at Za'atary Camp Area



More than 160 ground water wells are within the area shown in Figure 8 above (Study Area). The 5 km buffer area of the camp contains 42 wells used for agricultural and drinking purposes. Five monitoring wells are also used near the camp. The closest monitoring wells are Zadari well (AL3522), which is located 4 km to the north of the camp, and Thaghrat Al-Jub well (A13394), which located 5 km to the east of the camp. Based on the data of those two wells, the dynamic groundwater level suffered fro a drop of 5-8 meter deeper during the last 10 years.

Figure 13 Figure 13 below shows ZA'TARI MONITORING well (AL3522) the Relationship between Depth to Daynamic Water Level (m) Versus Time, this well is located at the coordinates (E 270500 N 1185720), the total depth of the well (T.D) is 490 m, Elvevation is 660 m, the A4 layer starts at (top) at a depth of 350 m and continues to (bot) depth of 490 m, the well is in Amman_Zarqa Basin-Northeastern Desert-Mafraq.

Figure 14 Figure 14 Thaghrat Al-Jub well (A13394) also indicates the trend of the decreased water level over the past period starting from 1998 till 2012.

Figure 12 Groundwater flows from SW to NE, faults with SE-NW direction

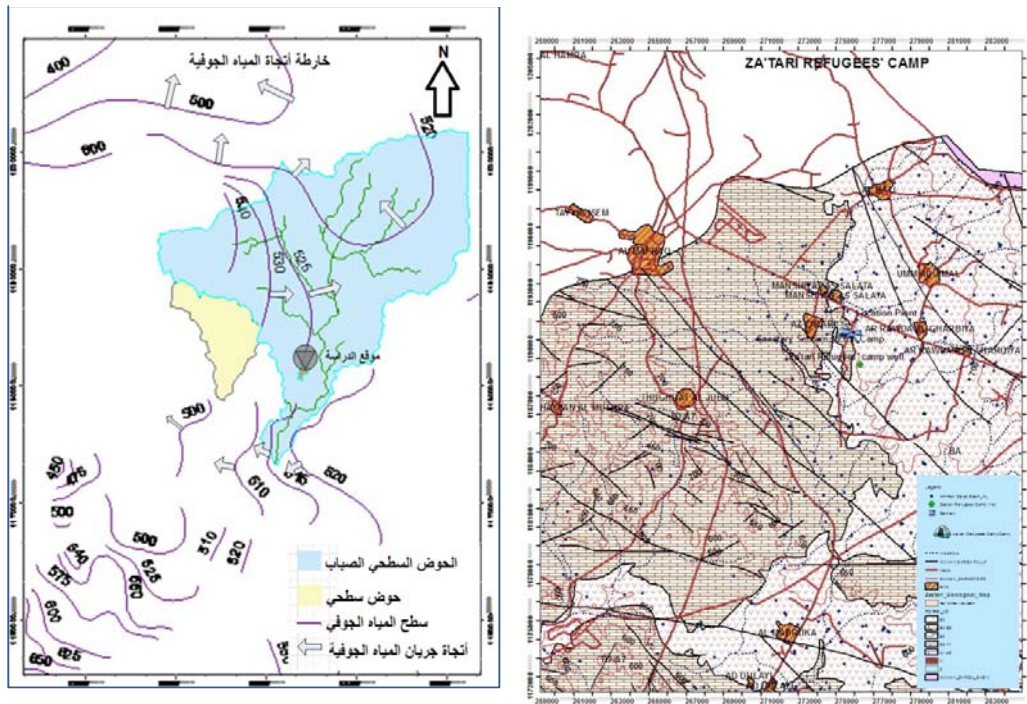


Figure 13 ZA'TARI MONITORING AL3522

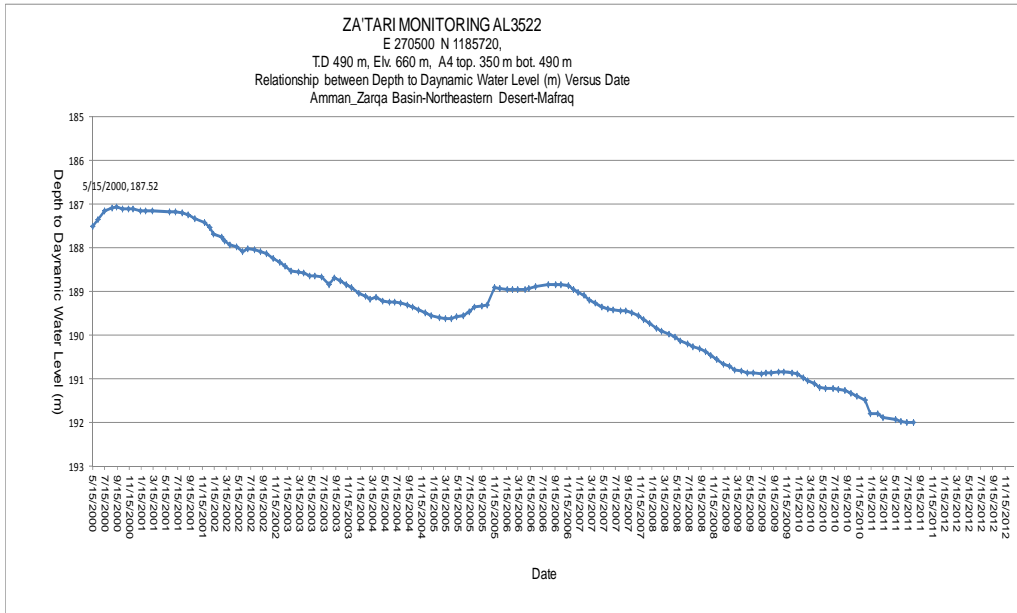
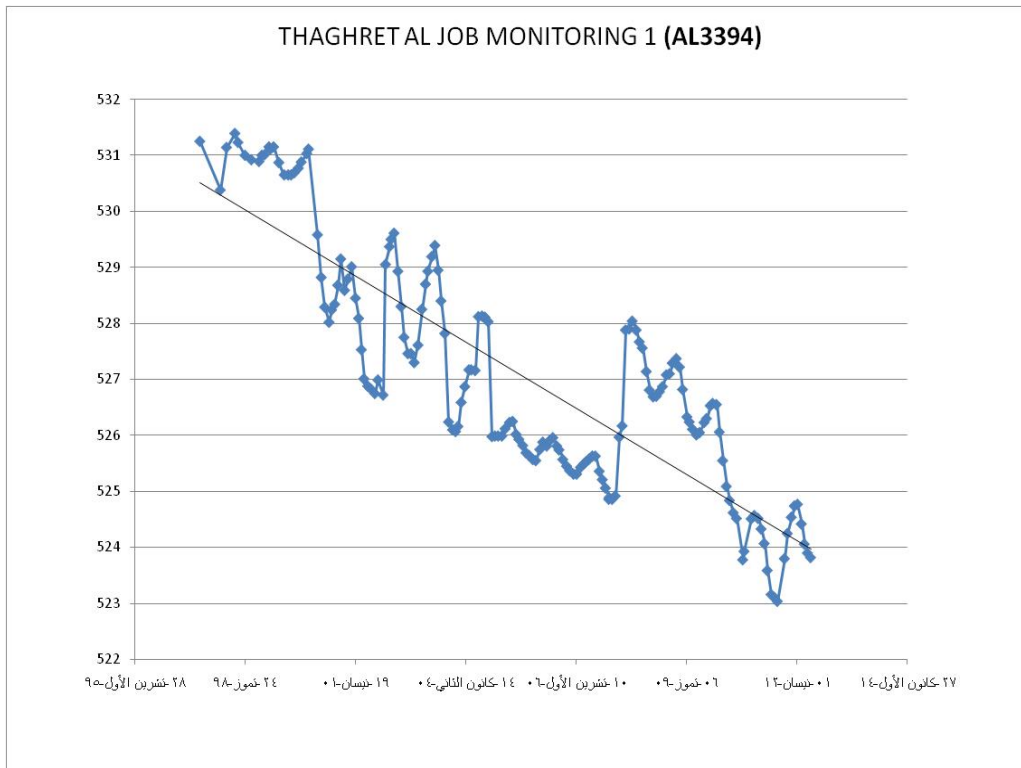


Figure 14 Thaghrat Al-Jub well (AL3394)



The data of the governmental wells shows that the depth of the groundwater in the area ranges between 100 and 200m from the surface and the productive unit is B2/A7, which can give 20-92m³/h. the depth of the wells in B2/A7 unit ranges between 300-400m. Table 1 below contains the depth to water in the monitoring wells.

Table 1 depth to water in monitoring wells

Monitoring well name	ID	Northing	Easting	Depth to water in M	Reading date
THAGHRET AL JOB MONITORING 1	AL3394	1184790	265652	113.46	11-Oct-11
HUSAIN AIR FORCE BASE(BA'IJ)	AL1521	1193480	270660	199.65	16-Nov-11
TW5 / W. ZA'TARI (PP 157)	AL1040	1177834	271278	107.97	4-Oct-11
HUSSAYNIYAT OBS. 1	AL2697	1189940	275200	169.84	8-Jul-08
ZA'TARI MONITORING	AL3522	1185720	270500	191.4	16-Nov-11

OTHER CAMPS

There are other locations for camp sites which are not accommodated yet “Mreijeb Al-Fhoud” (accommodation up to 30,000 refugees) and “Olayan”. The Government of Jordan has identified a new location for setting up a new camp site for Syrians in Al-Azraq area “Azraq camp” (accommodation up to 60,000 refugees). Up until now the Za’atri Camp is in operation and soon will reach its maximum accommodation capacity.

The planned new two camps Mreijeb Al-Fhoud and Azraq/Mkhazin located at Azraq area are lying on top of Azraq Aquifer. below is descriptive text of Mkhazin and Mreijeb Al-Fhoud camps geology and hydrology:

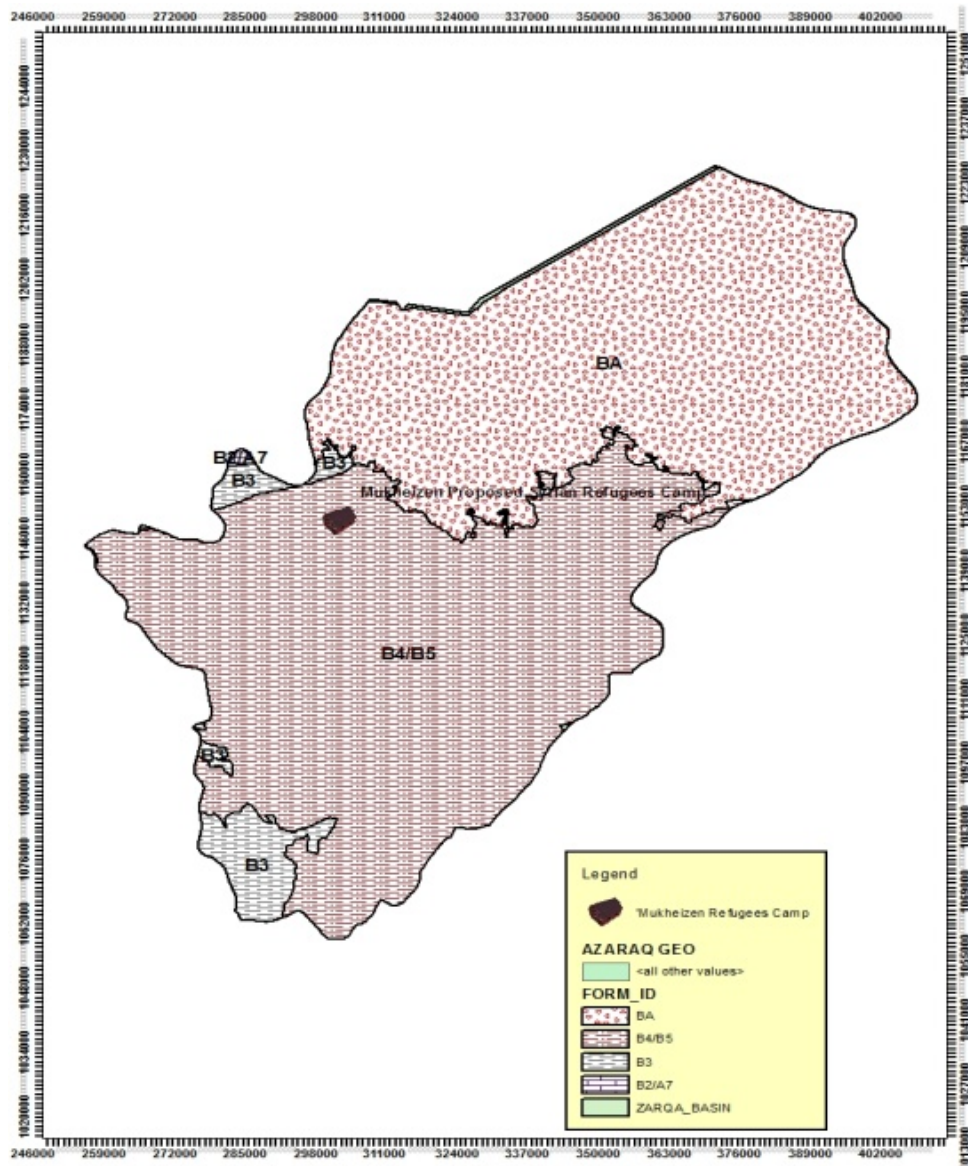
MREIJEB AL-FHOUD AND AZRAQ/MKHAZIN AREA GEOLOGY:

Sandy soil, which refers to the recent geological period, covers some parts of the area. B4/5 unit, which consists of limestone, chalky limestone and chert, outcrops appears within the area. The average thickness of this unit in the area is about 90m.

B3 rocks, which consist of marl and marly limestone, are also outcropping there. The average thickness of the rocks of this unit is about 60m.

B2/A7 Rocks are also appears within the area, it is about 280m thick. See Figure 15

Figure 15 MREIJEB AL-FHOUD AND AZRAQ/MKHAZIN AREA GEOLOGY



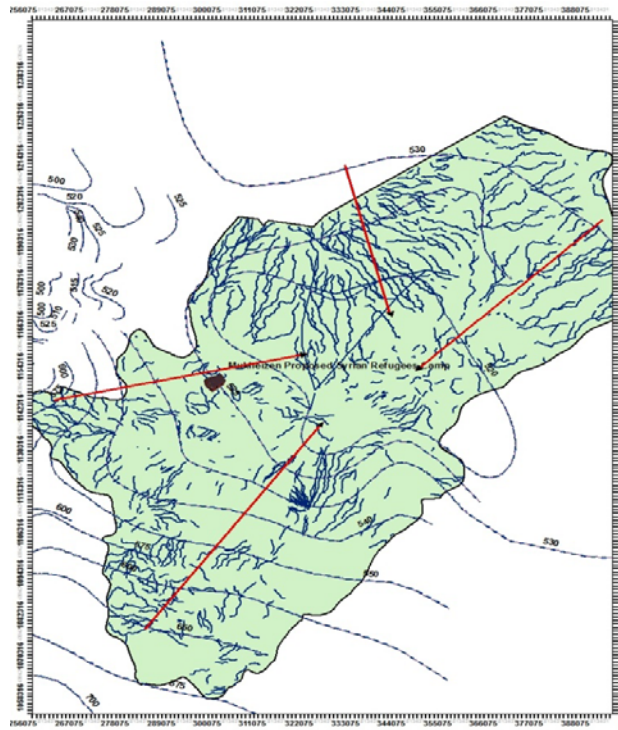
MREIJEB AL-FHOUD AND AZRAQ/MKHAZIN AREA GEOLOGICAL STRUCTURES:

Faults are the dominant type of geological structures appears within the area. Those faults appear as faults sets have NW-SE and NE-SW directions, in addition to small faults have different directions.

MREIJEB AL-FHOUD AND AZRAQ/MKHAZIN AREA HYDROGEOLOGY:

Basalt, B4/5 and B2/A7 units considers as the main aquifer in Azraq catchment area. The possible production amount of those units ranges between 30-100m³/h. Groundwater flows in different directions within Azraq catchment area, it mainly flows in NE-SW and SW-NE directions (passing by the suggested camp location) and NW-SE direction to drain in Azraq basin. See Figure 16

Figure 16 MREIJEB AL-FHOUD AND AZRAQ/MKHAZIN AREA HYDROGEOLOGY



IN COMMUNITIES ACROSS THE KINGDOM

Most of the Syrian refugees who entered the country were progressively sponsored in host communities, mainly in Al-Ramtha, Mafrqa, Irbid (northern governorates) and to a lesser extent, in Zarqa, Amman and southern governorates. They benefit from a number of items and commodities subsidized by the government to ease the burden on lower income Jordanians. Among the subsidized items is water.

In addition the expected 1.2 million Syrian refugees will certainly increase pressures on the environment and on the limited water resources, especially concerned about the risk of groundwater aquifers which are under severe pressure of over abstraction, exceeding the annual safe yield causing lowering on the ground water tables, deterioration in water quality and undesirable environmental impacts.

Planning for the increasing number of Refugees

Normally, different factors are considered while planning to host the refugees in new camp; this include security issues, availability of land, availability of service connection points, environmental aspects, economic and other factors. The capacity of each camp is determined through a political decision based on different reasons including the above.

Jordan started to receive increasing numbers of refugees during 2013, the Zataary camp is the biggest hosting more than 125 thousands, the government started to plan Mrajeeb Al Fhood and Azraq (Mkhazen) camps with capacities of around 50 thousands refugees each, if the rate of rfugees continue at a level of 2500 refugees aday this will mean that the new planned two camps will reach is capacity within 40 days. This indicates the urgent need to valuate the decision concerning the place and capacity of the new planned camps in Azraq area; this urgency is supported theaquifer pollution risk as indicated below. The choice available is to select less risky location for building the new camps.

Polution of Ground Water Aquifer

As a result of investigation and based on the geological characteristics of the layers topping the ground water beneath the camps, it can be concluded that In Zatari camp area, according to the hydrogeological and hydrolic parameters, **the pollutants are expected to reach the saturated zone in the worst case scenario within one year. Whereas, it may reach the saturated zone within ten years in the most optimistic case taking into consideration, continuous disposing of the liquid wastes from the camp to the wadi. To be noticed that infiltration speed usually increased significantly during the rainy season.**

Cost of hosting Syrian refugees/ Water and Wastewater services

The cost implications on Jordan can be classified as **Direct Short Term Cost (DSC) and long term indirect cost:**

DIRECT SHORT TERM COST (DSC)

Delevering the Water and Wastewater services for the Syrian refugees implies both Operation and Maintenance cost and the Capital cost.

The analysis below will be based on 480 thousands refugees and will be also calculated for 1.2 million refugees. Then the cost of hosting 1000 refugees will be estimated to guid budgeting for any future number of refugees that may be displaced to Jordan.

Water and Wastewater Quantities

- Water supply: due to water shortage, the average daily per capita supply in the northern governorates is about 120 liters (equivillant to 43.8 m³/year), the average physical losses percentage is 17% while the administrative part of the losses is 26% with an overall non revenue water of 43%. This means that the consumed amount of the supplied quantity is about 100 liters per capita / day (equivillant to 36.9 m³/year). The billed amount is only 70 l/c/d (equivillant 25.6 m³/year).
- Based on the above the Syrian refugees' consumption will be as in Table 2 below.

Table 2 Syrian refugees Water Consumption and wastewater generated

	Daily rate (l/c/d)	Quantity of 480 thousands refugees per year (MCM)	Quantity of 1.2 million refugees per year (MCM)
Water supplied	120	21.024	52.560
Water consumed	100	17.730	44.326
Water billed	70	12.264	30.660
Wastewater generated	78	13.666	34.164

Cost Components

1- Short Term Operation and maintenance (O&M) cost:

The average O&M cost for the water utilities for delivering the water and waste water through the network is 0.85 JD/m³. The camps population are serviced through tankers with a cost an O&M cost of higher value. Refugees shelterd in Za'atary camp and Mansheyet Al-Olayan camp receive the services through tankers, the UNICEF is paying for Za'atary refugees party while the Government of Jordan (GOJ) is paying for Mansheyet Al-Olayan, Cyber City and King Abdullah Park. It is planned that UNICEF will pay for Azraq (Mkhaizen) while the GOJ with the UAE will pay for services in Mrajeb Al-Fhood. The cost of delivering water and wastewater services through tankers to Mansheyet Al-Olayan camp which shelters less than 10000 refugees is estimated to be 450 thousand JD for the year 2013. The overall average of the O&M cost for servicing all refugees is estimated to be 1.15 JD/m³ (0.72 JD for Water and 0.43 JD for Wastewater).

The above cost does not include the electricity tarrif subsidy given to the MWI by GOJ where the MWI is paying 0.066 JD/KW hr while the actual cost of electricity is 0.2 JD/KW hr.

This means that GOJ is paying a short term O&M cost of about (35) MUSD/year for hosting 480 thousands refugees while it pays around (87) MUSD per year for hosting 1.2 million refugees see Table 3 below . (1 USD is equivillant to 0.708 JD).

- 2- The overall Short Term Capital cost for delivering water and wastewater to customers in Jordan is estimated to be 9600 JD per Subscriber depreciated over 10 years, the average subscriber size is 5.5 persons, based on that the overall Short Term Capital cost is estimated to be 118 MUSD for hosting 480 K refugees and 295 MUSD for hosting 1.2 M refugees. See Table 3 below
- 3- The overall Short Term Direct cost aggregates to 153 MUSD for hosting 480 K refugees while it sums to 382 MUSD for 1.2 M refugees. See Table 3 Below.

Table 3 Direct Short Term Cost of Hosting Syrian Refugees

	Unit cost		Per refugee per year		For 480,000 refugees per year		For 1,200,000 refugees per year	
Direct Short Term Cost DSC(1+2+3)			225.4	JD	108,171,901	JD	270,429,752	JD
1. Water Cost (a+b)					41,319,098	JD	103,297,745	JD
a) Capital Cost (3000 JD/subscriber); depreciated over 10 years			54.5	JD	26,181,818	JD	65,454,545	JD
b) Operation and Maintenance Cost	0.72	JD/m ³	31.5	JD	15,137,280	JD	37,843,200	JD
2. Wastewater Cost (c+d)					63,699,203	JD	159,248,006	JD
c) Capital Cost 6600 JD/subscriber); depreciated over 10 years			120	JD	57,600,000	JD	144,000,000	JD
d) Operation and Maintenance Cost	0.43	JD/m ³	12.7	JD	6,099,203	JD	15,248,006	JD
e) Wastewater ratio	80%		29.6	m ³	14,184,192	m ³	35,460,480	m ³
3. Cost due to Electricity Subsidy	0.15	JD/m³	6.57	JD	3,153,600	JD	7,884,000	JD

LONG TERM INDIRECT COST

1- Environmental Cost due to overpumping of Ground Water

The ground water is being over exploited to satisfy the demand and to gentle the demand supply gap, irrigation activities also consumes ground water.

The overabstraction from the aquifers deteriorated the ground water quality and deepened the static and dynamic water level. Deterioration of groundwater quality is noticeable in terms of salinity, more concentration of different chemical substances including nitrogen and phosphorus. Some ground water needs treatment which cost on average about 0.55 JD per cubic meter. The cost of pumping also increased due to higher energy needs the additional cost implication for energy is estimated to be 0.15 JD/m³

Summing the above indicates that the overall environmental cost of utilizing one cubic meter is 0.7 JD, this adds about 21 MUSD to the cost of hosting 480 K refugees and about 50 MUSD for host 1.2 M refugees.

2- Loss of opportunity cost

The water Valuation study (see above) showed that the the value returned per unit of water is relatively high especially for winter vegetables which varies from less than one USD up to 10 USD. The trend in the last few years showed that the farmers both in the Jordan Valley and the Highlands started to shift toward high productive crops, which makes the value produced by one cubic meter of water averages to 4 JD/m³(6 USD).

Comparing this figure with the estimated cost of one cubic meter as calculated in the Red Sea Dead Sea Project that estimated the cost of one cubic meter delivered as bulk supply to entrance of Amman to be around 5 USD. This indicates that 6 dollars is a good estimate.

The loss of opportunity cost for hosting 480 K refugees is 118.7 MUSD while its cost for 1.2 M refugees sums up to 297 MUSD.

3- Cost of Restoration of Ground water aquifers

A long term plan for restoring the ground water aquifers shall be implemented in Jordan to sustain the main source of drinking water (ground water), the cost of the restoration activities is not included in this report.

4- Crisis Management cost

Twenty percent cost is added to DSC to compensate for managing the Syrian refugees under the crisis as different decision for direct purchases and contracting increased the prices paid by MWI for delivering the services. This cost sums to 1.8 MUSD for 480K refugees and to 4.5 MUSD for 1.2 M refugees.

The overall Long Term indirect Cost excluding the restoration cost sum up to 141.4 MUSD for 480 K refugees and 353 MUSD for 1.2 M refugees. See Table 4 below.

Table 4 Long Term indirect Cost of hosting Syrian refugees

	Unit cost		Per refugee per year		For 480,000 refugees per year		For 1,200,000 refugees per year	
Total Long Term Indirect Costs (4+5+6)			208.6	JD	100,110,863	JD	250,277,157	JD
4. Environmental Cost due to overpumping of GW: Deterioration of GW quality (High salinity, and high cost for desalination. Lowering on the GW tables (High energy cost for pumping).	0.7	JD/m3	30.7	JD	14,716,800	JD	36,792,000	JD
5. Crisis management Cost (1.2% of DSC)	0.012	%	2.7	JD	1,298,063	JD	3,245,157	JD
6. Loss of Opportunity cost	4	JD/m3	175.2	JD	84,096,000	JD	210,240,000	JD

GOJ REVENUES FROM HOSTING THE REFUGEES

- 1- GOJ generates a small amount of revenues from delivering the services to Syrian refugees hosted within the communities from paying the water bills, based on average consumption between 6-15 m3/month per subscriber (billed amount) the average revenue collected per cubic meter is 0.18 JD / m3. The estimated revenue totals to 3.1 MUSD and 7.8 MUSD for 480k and 1.2 M refugees.
- 2- Jordan also received support for hosting the Syrian refugees. Table 5 Projects to support Jordan for Hosting Syrian Refugees detail the support received by GOJ.

Table 5 Projects to support Jordan for Hosting Syrian Refugees

Financer	Project Name	Objective of the Project	Million \$
USAID (through Complex Crisis fund)	Community-Based Initiatives for Water Demand Management in Jordan Project (CBI-2). Note: The majority of the USAID grant of 20 MUS\$ is going into CBO support. Only 7.5 MUS\$ are invested in water supply infrastructure.	Includes working with CBOs that already work with CBIWDM I as well as new CBOs that will be selected to work on this project. It also includes working with Yarmouk Water Company (YWC) to alleviate water scarcity by increasing volume of water to the service area.	20
KFW	Enhancing water and wastewater supply systems	Eliminate the impact of the Syrian refugees on the Jordanian communities	12
UNICEF	Enhancing water supply capacity for Jordanian communities hosting Syrian families in Ramtha and Mafraq, Jordan; implemented by Mercy Corps	-Abu Basal Wells (capacity 50 & 70 m ³ /hr) and Pump Station Upgrade. -Jaber Well (capacity 110 m ³ /hr) and Pump Station Upgrade. -Rehabilitate water supply networks within Mafraq (Hay Al husseini and Al Dahiya Al Janoubiyah).	1.8
	Za'atari Water Supply Wells; implemented by Mercy Corps	Two new wells are constructed in the vicinity of the Za'atari refugee camp with capacity 50 m ³ /hr each.	1.5
	Connect Za'atari camp with water supply pipeline from Za'atari pump station; implemented by YWC	Supply water to the camp with capacity of 50 m ³ /hr	0.39
	Vulnerability study of the aquifer underlying the Za'atari camp	To assess the potential of groundwater pollution from human activities in the camp	0.02
IRD	Support of YWC by IRD (International relief and Development, Inc.),	well rehabilitation and material supply	2
UNHCR & UNICEF	Donation of 10 utility trucks	-two sewage tankers -two backhoe loader -four water tanks -two jetting units	1
THW	Donation of water quality lab.	13 Boxes contains chemicals, reagent, and some field equipments.	0.06
ECHO & UNOCHA	Enhance WASH activities within the camps; implemented through ACTED	-Water supply through private tankers. -water quality monitoring. -solid waste management.	0.7
Miscellaneous	Provided to different international NGO's	Hygiene education within the camps	around 0.5
TOTAL			40

The Table 6 below table represents the yearly cost on the Jordanian government from the burden of the Syrian refugees on water and sanitation services. It shows that the cost of hosting 1000 refugees will cost 425 thousands JOD equivillant to 598 thousands USD. This cost is distributed as Direct Short Term cost (DSC) of 225 thousands JD (316 thousands USD) and 209 thousands JD (294 K USD).

Table 6 Cost on Jordanian Governmnet from Syrian Rfugees (water and sanitation)

	Unit cost	Per refugee per year	For 480,000 refugees per year	For 1,200,000 refugees per year
Direct Short Term Cost DSC(1+2+3)		225.4 JD	108,171,901 JD	270,429,752 JD
1. Water Cost (a+b)			41,319,098 JD	103,297,745 JD
a) Capital Cost (3000 JD/subscriber); depreciated over 10 years		54.5 JD	26,181,818 JD	65,454,545 JD
b) Operation and Maitenance Cost	0.72 JD/m ³	31.5 JD	15,137,280 JD	37,843,200 JD
2. Wastewater Cost (c+d)			63,699,203 JD	159,248,006 JD
c) Capital Cost 6600 JD/subscriber); depreciated over 10 years		120 JD	57,600,000 JD	144,000,000 JD
d) Operation and Maitenance Cost	0.43 JD/m ³	12.7 JD	6,099,203 JD	15,248,006 JD
e)Wastewater ratio	80%	29.6 m ³	14,184,192 m ³	35,460,480 m ³
3.Cost due to Electricity Subsidy	0.15 JD/m³	6.57 JD	3,153,600 JD	7,884,000 JD
Total Other Costs (4+5+6)		208.6 JD	100,110,863 JD	250,277,157 JD

	Unit cost	Per refugee per year	For 480,000 refugees per year	For 1,200,000 refugees per year
4. Environmental Cost due to overpumping of GW: Deterioration of GW quality (High salinity, and high cost for desalination, PO4,NO3....etc). Lowering on the GW tables (High energy cost for pumping).	0.7 JD/m3	30.7 JD	14,716,800 JD	36,792,000 JD
5. Crisis management Cost (1.2% of DSC)	0.012 %	2.7 JD	1,298,063 JD	3,245,157 JD
6.Loss of Opportunity cost	4 JD/m3	175.2 JD	84,096,000 JD	210,240,000 JD
Revenue generated from Syrian refugees	0.18 JD/m3	4.60 JD	2,207,520 JD	5,518,800 JD
Net Direct Cost on the government from syrian refugees		220.8 JD	105,964,381 JD	264,910,952 JD
Net Total Long Term Indirect Cost on the government from syrian refugees		204.0 JD	97,903,343 JD	244,758,357 JD
TOTAL COST		424.7 JD	203,867,724 JD	509,669,309 JD

Regional Response Plan 5 - JORDAN CHAPTER

WASH Working Group Response Plan

1. Chair and Participating Agencies

Lead Agency	UNICEF Jordan Country Office
Implementing Agencies	Mercy Corps, UNOPS, THW, OXFAM GB, ACTED, Relief International, IRD, World Vision International, Handicap International, FPSC, JEN, UNICEF
Working group objectives	<p>Objective 1: Ensure regular access for Syrian refugees living in camps to sufficient and safe drinking water; secure and clean sanitation and hygiene facilities which are culturally appropriate for both genders, giving consideration to those with special needs.</p> <p>Objective 2: Improve access to WASH services and facilities to vulnerable Syrians and urban and rural host communities.</p> <p>Objective 3: Rehabilitate and install gender appropriate water and sanitation facilities for boys and girls in schools, CFS and public places in camps and host communities.</p> <p>Objective 4: Establish and maintain effective mechanisms for WASH sector coordination at national and sub-national levels.</p>
Funds requested	US\$ 116,188,400
Contact Information	<i>Kitka Goyol</i> – kgoyol@unicef.org

2. Achievements and Challenges so far

During the first quarter of 2013, agencies supporting the Government of Jordan have supplied 174,000 Syrian refugees with water and 146,000 with sanitation. Collectively, the agencies supplied hygiene products (soap, baby lotion, diapers, shampoo, etc.) to 118,000 refugees and reached 88,000 with hygiene promotion messages. Nearly 11,000 refugee children received water supply and sanitation in their learning environment. Preparations have started for WASH facilities for 47,000 refugees in a new camp near Azraq.

On an average 3.4 million litres of water is trucked to Zaatari camp every day, providing about 35 litres per person per day, including camp cleaning. This camp now has 2,050 operational latrines, 1,034 showers and 733 water points. The toilets have the capacity to serve some 102,500 refugees at a 1:50 ratio.

The identification and profiling of refugees in urban and rural areas has been challenging, given the frequent movement of refugees. Agency assessments in camps and host communities provided information on the profile and needs of the refugees, producing WASH-related maps for planning and delivery of assistance.

Persons with disabilities, reduced mobility, the elderly and other groups with special needs face physical barriers in accessing the WASH facilities. THW and OXFAM progressively improved the WASH facilities to include the equipment needed for people with disabilities, including ramps, larger toilets and shower stalls and fitting necessary equipment (western toilet, grab bars, shower benches).

As the number of refugees rapidly increased, it became evident that the high costs of providing WASH infrastructure and services is not sustainable and drastic reductions in standards of infrastructure and services are needed if these operations are to continue for several months to come. Measures taken to reduce costs include: supplying only the most basic hygiene items, capping the volume of water supplied at 35 litres per person per day, reducing water waste, using simpler and lighter sanitation facilities, seeking to end the desludging of grey water from the camps, handing over WASH facility cleaning to user committees and halting the installation of hot water supply systems until next autumn. The WASH working group is also advocating with government to take on some of the WASH service provisioning in the camps. More permanent solutions for water supply and sanitation, both in camps and in host communities, require large, costly infrastructure projects, for which the WASH working group is advocating with donors and government.

It was also found that the refugees dislike large communal WASH facilities. As a result, many households have created their own washing/bathing spaces and even toilets, resulting in thousands of soak pits throughout Zaatari camp. This has caused concern about the risk of diseases spreading in the camp. The Ministry of Water and Irrigation is also worried about the risk of ground water contamination. However, the geology of the area and the very deep water table limit such risks to a large degree. OXFAM successfully introduced light portable toilets, allowing expensive rented toilets to be phased out. OXFAM and ACTED developed strong relationships with community and street leaders in Zaatari. In some areas of this camp, JEN has formed WASH committees, consisting of motivated refugees, street leaders and refugees with relevant technical knowledge. These committees discuss water and sanitation related problems and take actions for improvements.

In the absence of active policing in Zaatari camp, theft and vandalism of the WASH facilities has caused losses of nearly one million US\$. While the formation of WASH committees has raised the level of ownership, even committee members are helpless in the face of threats of violence from thieves. The lack of security has also prevented the planned installation of solar panels and lights in the WASH facilities, which would have made these safer for women and girls to use these units at night. The lessons learned in Zaatari camp have been used in designing the WASH services for the new camp in Azraq.

The rapid rise in the number of Syrian refugees outpaced funding availability. Moreover, during the first quarter of 2013, only about half of the Jordan WASH component of RRP4 was funded (UNHCR to confirm). This has created serious financial constraints, especially for UNICEF which is leading the provision of WASH services in Zaatari, KAP and CC camps.

With the support agencies strained to provide WASH services to refugees in camps, those in host communities have received very limited assistance. Indications are that public water supply systems are under severe stress, serving up to 50 per cent more people in certain areas. In some locations, water availability is reaching such low levels that tensions between refugees and Jordanians are rising. There is also anecdotal evidence that the vast increase in Syrian refugees is exhausting traditional support systems. The number of refugees living in precarious conditions beyond the reach of support systems is increasing, with households creating their own private WASH facilities and buying water from the markets.

3. Needs and Response Strategy for January-December 2013

The most likely scenario for Syrian refugees in Jordan is for 400,000 people in camps and 800,000 people in host communities by the end of 2013. Such a rapid increase in the number of refugees threatens to overwhelm the capacity of government, its support agencies and local charities to meet the basic needs of the refugees, including water, sanitation and hygiene. Assessments in camps and host communities have shown that access to water is a key challenge for the refugees and is a source of tension with the host communities.

The support agencies plan to prioritize the WASH needs of the 400,000 refugees in camps, whose survival depends on the continued supply of water, sanitation and hygiene. Agencies also plan to support 250,000 refugees in host communities with improved water supply and the promotion of hygiene and water conservation. Priority will go to households living in temporary settlements, women-headed households, and households with disabled persons. Improving the water supply infrastructure for host communities with the largest concentrations of refugees will be another priority, critical to reduce tensions over water availability especially during the summer months. Schools in camps will be provided with WASH services, while schools with 135,000 refugee children will have improved WASH infrastructure in their learning environment.

The agencies have adopted the following four objectives for their response, till end-2013:

1. Ensure regular access for Syrian refugees living in camps to sufficient and safe drinking water; secure and clean sanitation and hygiene facilities which are culturally appropriate for both genders and accessible for people with special needs.
2. Improve access to WASH services and facilities to vulnerable Syrians and urban and rural host communities.
3. Rehabilitate and install gender appropriate water and sanitation facilities for boys and girls in schools, CFS and public places in camps and host communities.
4. Establish and maintain effective mechanisms for WASH sector coordination at national and sub-national levels.

The expected 1.2 million Syrian refugees will inevitably increase pressures on the environment. The government of Jordan is especially concerned about the risk of contamination of the critical fresh water aquifers underlying much of the country. The current practice of desludging all black and grey water from refugee camps to waste water treatment facilities is becoming unaffordable and the use of soakpits will be inevitable, as the number of refugees continues to rise and limited funding. Other environment-friendly approaches to the management of waste water and solid waste, especially in camps, will be applied.

Concern over sustainability and limited funding will require that per capita costs are lowered as more refugees arrive and existing numbers need continuous services. To reduce costs, refugees will have to contribute to the construction of their own toilets and bathing spaces. Using simpler, more culturally appropriate, toilet designs serving fewer households, should increase ownership and enable refugees to keep their toilets clean and working. For refugees in camps, the cost of WASH services will not exceed US\$ 10 per refugee per month, while the cost of providing the basic WASH infrastructure in new camps will be managed within US\$ 100 per refugee. Agencies will focus their support on refugees with the least resources: those in camps and the most vulnerable among the refugees in host communities.

Water supply will be a challenge in the coming summer months and water saving and re-use practices will be emphasized. Agencies will monitor the effectiveness of services reaching the poorest and least-resourceful and meeting the needs of women and girls equal to men and boys, and ensure activities are adjusted to those with special needs. The needs of the many disabled will receive special attention, with flexible services.

The Government of Jordan is shouldering most of the financial burden for providing water supply and sanitation services to the refugees in host communities. Some of the routine WASH services in Zaatari camp, including solid waste removal and desludging, can be transferred from UNICEF to UNHCR.

Key activities in descending order of priority include:

- Provision of basic water supply and sanitation for refugees in camps
- Provision of basic water supply and sanitation for vulnerable refugees in host communities
- Focus group discussions to record inequities in service delivery, especially in terms of gender, age, physical ability and coping capacity.
- Organising refugees in camps to manage their WASH facilities well.
- Promotion of hygiene and water conservation among refugees in camps and vulnerable refugees in host communities, including the provision of soap and the most basic of hygiene items.
- Provision of basic WASH facilities and services in schools, child-friendly spaces, mosques and health facilities.
- Management of the solid waste in camps.
- Improvements in water supply infrastructure in communities with the largest concentrations of refugees
- Construction or improvements of sewerage systems for camps and host communities.
- Improve the coordination among government and external support agencies to ensure that the most critical needs are met first, to avoid duplication and to optimize the use of local and donor funding.

4. Monitoring and Accountability Framework

Indicator (or outputs if not available)	Achievements (1 Jan – 31 March 2013)	Target 2013	Responsible Agencies	Activities
Objective 1: Ensure regular access for Syrian refugees <u>living in camps</u> to sufficient and safe drinking water; secure and clean sanitation and hygiene facilities which are culturally appropriate for both genders and accessible for people with special needs.				
Number of people provided with safe access to sufficient water for drinking and domestic use	About 100,000 refugees in Zaatari, KAP and CC camps.	400,000 Syrian refugees	Handicapped International, Mercy Corps, OXFAM GB, ACTED, IRD, World Vision International, THW, UNICEF	<ul style="list-style-type: none"> • Provide technical advice to implementing WASH agencies to improve access for persons with disabilities. • Provide critical accessibility modifications at camp level. • Drill borewells and construct pumping stations. • Install water tanks/bladders and public collection points, with immediate and medium term solutions. • Water trucking. • Create/increase camp water storage. • Facilitate the sale of water by private suppliers. • Water chlorination and testing of water quality. • Collect data and map refugee populations WASH facilities and needs. • Formation of WASH committees representing the refugees.
Number of people provided with safe access to appropriately designed toilets (based on a ratio of 1 toilet for 50 persons or better)	About 100,000 refugees in Zaatari, KAP and CC camps.	400,000 Syrian refugees	UNOPS, Mercy Corps, OXFAM GB, ACTED, Relief International, IRD, JEN, UNICEF	<ul style="list-style-type: none"> • Involve refugees in building their toilets, bathing and laundry areas. • Install public latrines in camp market areas. • Provide temporary light latrines, for the first phase/emergency sanitation in new camps. • Construct washing facilities for women. • Sensitize refugees on the proper use and maintenance of sanitation facilities. • Desludge black water from toilet pits. • Provide sewage trucks and equipment. • Employ cash for work labor for camp cleaning. • Ensure public toilets are fit to use for disabled people.

				<ul style="list-style-type: none"> • Construct waste water treatment plants.
Number of people provided with benefitting from solid waste management	About 100,000 refugees in Zaatari, KAP and CC camps.	335,000 Syrian refugees	ACTED, World Vision International, , UNICEF	<ul style="list-style-type: none"> • Provide garbage containers at street and household level. • Collect and remove solid waste, disaggregate as far as possible.
Number of new arrivals provided with a WASH family kit	About 100,000 refugees in Zaatari, KAP and CC camps.	400,000 Syrian refugee families	UNOPS, Relief International, World Vision International, , UNICEF	<ul style="list-style-type: none"> • Provide WASH kits for families, along with information on the use and care of the items in the kit.
Number of people provided with soap.	About 100,000 refugees in Zaatari, KAP and CC camps.	365,000 Syrian refugees	Relief International, World Vision International, ACTED, UNICEF	<ul style="list-style-type: none"> • Distribute soap to new arrivals and on-going soap distribution during hygiene promotion activities. • Provide public handwashing facilities in market areas.
Number of people participating in hygiene promotion activities.	About 78,000 refugees in Zaatari, KAP and CC camps.	400,000 Syrian refugee women, girls, men, boys	ACTED, Relief International, World Vision International, JEN, UNICEF	<ul style="list-style-type: none"> • Promote hygiene and water conservation. • Empower communities to use and maintain WASH facilities. • Raise awareness of WASH related public health risks.
Objective 2: Improve access to WASH services and facilities to vulnerable Syrians and urban and rural host communities.				
Number of people benefitting from improved water supply for drinking and domestic use	About 74,000 refugees in host communities	250,000 Syrian refugees	Mercy Corps, OXFAM GB, ACTED, IRD, World Vision International, Relief International, UNICEF	<ul style="list-style-type: none"> • Drill new wells and rehabilitate existing water wells. • Improve water supply networks, to increase carrying capacity and reduce leakages and waste. • Upgrade pumping stations and storage facilities and networks. • Increase water storage capacity. • Improve household water supply and small water networks. • Distribute household water filters.
Number of people benefitting from improved sanitation	About 46,000 refugees in host communities.	100,000 Syrian refugees	ACTED, Relief International, IRD, UNICEF	<ul style="list-style-type: none"> • Improve/rehabilitate sewerage infrastructure. • Provide households with toilet construction materials. • Provide host and refugee communities with hand washing facilities.

				<ul style="list-style-type: none"> • Rehabilitate and improve waste water treatment plants. • Increase municipal capacities to manage sewage.
Number of people provided with hygiene items	About 18,000 refugees in host communities.	168,000 Syrian refugees	OXFAM GB, Relief International, World Vision International, ACTED, UNICEF	<ul style="list-style-type: none"> • Distribute hygiene kits, soap and other essential hygiene items, along with information on the use and care of the items in the kit.
Number of people participating in hygiene promotion and water conservation activities	About 10,000 refugees in host communities	250,000 Syrian refugees	FPSC, OXFAM GB, Relief International, ACTED, JEN, UNICEF	<ul style="list-style-type: none"> • Build capacity for hygiene promotion. • Promote hygiene and water conservation. • Produce and use hygiene promotion materials. • Obtain community feedback and establish/maintain monitoring mechanisms.
Objective 3: Rehabilitate and install gender appropriate water and sanitation facilities for boys and girls in schools, CFS and in public places in camp and host communities.				
Number of Syrian students benefitting from improved water, sanitation facilities in their learning environment	About 5,000 students.	135,000 Syrian refugee children	Mercy Corps, Relief International, World Vision International, ACTED, JEN, THW, UNICEF	<ul style="list-style-type: none"> • Build or refurbish WASH facilities in schools and other public places. • Distribute soap in schools. • Involve school management in the improvement of WASH facilities.
Number of Syrian students reached with hygiene messages	About 5,000 students.	158,000 Syrian refugee children	Relief International, ACTED, JEN, UNICEF	<ul style="list-style-type: none"> • Promote hygiene through sanitation committees. • Organise awareness raising campaigns on responsible water usage in schools and surrounding communities. • Run teacher hygiene education training. • Establish school hygiene clubs. • Distribute hygiene promotion materials.
Objective 4: Establish and maintain effective mechanisms for WASH sector coordination at national and sub-national levels.				
# of WASH working group meetings held	4 meetings held.	12 meetings	UNICEF	<ul style="list-style-type: none"> • Organise and facilitate effective monthly group coordination meetings. • Form relevant working groups to resolve emerging issues. • Develop an effective information management system along with key tools including 4Ws and capacity maps.
Availability of WASH standards and guidelines	Available in draft form	Finalised	UNICEF	

WASH participation in sub-national level coordination mechanisms	nil	20 meetings	Assigned agency	<ul style="list-style-type: none"> Ensure WASH is represented in sub-national coordination meeting.
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5. Revised Financial Requirements (January-December 2013)

Appealing agency	Initial financial requirement (RRP4)	Revised financial requirements in USD	List of projects and main activities
TOTAL		116,188,400	

Financial requirements by objective

Objectives	Estimated financial requirements
	US\$
1: Ensure regular access for Syrian refugees living in camps to sufficient and safe drinking water; secure and clean sanitation and hygiene facilities which are culturally appropriate for both genders, giving consideration to those with special needs.	87,797,000
2: Improve access to WASH services and facilities to vulnerable Syrians and urban and rural host communities.	22,868,000
3: Rehabilitate and install gender appropriate water and sanitation facilities for boys and girls in schools, CFS and in public places in camp and host communities.	5,511,000
4: Establish and maintain effective mechanisms for WASH sector coordination at national and sub-national levels.	12,400
TOTAL:	116,188,400

Financial requirements by agency

Agency	Estimated financial requirements
	US\$
UNICEF	54,564,400
FPSC	45,000
World Vision International	4,500,000
IRD	3,900,000
Relief International	3,500,000
Mercy Corps	9,630,000
ACTED	26,059,000
UNOPS	4,000,000
OXFAM GB	7,000,000
Handicap International	200,000
THW	1,800,000
JEN	990,000
TOTAL:	116,188,400

Preliminary Report on Informal Grey and Black Water Systems in Zaatari Camp - 25th February 2012 -

There is an increasing trend in the establishment of private bathing, cooking and toilet facilities in tents and caravans in Zaatari camp, particularly in the old camp area, resulting in serious hygiene and sanitation risks for the camp population. The onset of warmer temperatures and major rain events will exacerbate the situation. This preliminary report outlines the extent of and reasons for the issue, the risks, and response options that are currently being discussed.

Photographs illustrating the practices are included in Appendix 1.

1. Outline of the problem

Informal grey and black water systems are being constructed by communities in Zaatari camp to support the establishment of **private bathing, cooking, and toilet facilities** in tents and caravans (see A. in Appendix 1). The water systems constructed usually comprise **dug trenches/canals along with deep holes acting as seep-away pits**, and are becoming more complex, with the use of oil drums to form pits, use of piping, and, most recently, use of buckets as make-shift septic tank systems.

The practice is **most widespread in the old camp**, as digging is much easier where base course has not been laid, but is also **emerging quite rapidly in the new modules**. The construction of these private facilities and networks is a major hygiene and sanitation risk, while also contributing to the **destruction of public facilities**, as materials are removed to be used at a household level (see B. in Appendix 1).

1.1 Reasons for the spread of practices

- i. Current WASH facilities are not meeting needs:
 - There are an **insufficient number of facilities** for the camp population size
 - Facilities are **not maintained to a standard that keeps them operational**
 - This is linked to issues of vandalism and theft, and poor utilisation practices, including waste disposal into latrines
 - Cleanliness is not meeting community expectations
 - This is linked to issues of **poor hygiene and utilisation practises** of the community.
- ii. Preference:
 - There is a strong **cultural preference** in the population for private facilities, in particular for women
 - There is concern about **security of public facilities** at night

1.2 Magnitude of the problem

Observations across Sectors 1 and 2 suggest that **every street in the old part of the camp** (1A and 1B) has evidence of these informal systems. In a study by JEN of 50 women in the camp, **20% reported having private toilets** in their tent/caravan. ACTED expects that the number of households with grey water activities is **significantly higher**, and rough estimates suggest that over 70% of households are engaged in such activities.

2. Risks of these practices

The construction of these private facilities and grey and black water systems is posing **critical risks** to the population – particularly hygiene and sanitation risks – including:

- **Infectious disease risk**, from increasing amounts of stagnant grey and black water
- **Injury risk**, especially for children, from the deep holes dug
- Spreading hygiene risks, from **seepage into the ground** (prohibited by Jordanian government)
- Potential **destabilisation of the land**

- Hygiene risks from **poor construction**. The inclines of these informal systems are often not appropriate, causing grey and black water to run back into the tent/caravan or to pool in public spaces
- Rubbish being placed in the systems is resulting in becoming **increasingly difficult for ACTED’s current cleaning programmes to respond**, as the cash-for-work teams are not equipped to deal with raw sewage (see D. in Appendix 1)
- Rain events such as forecasted in the coming days will result in flooding of this matter, including back into people’s tents and caravans where inclines have not been established properly.

3. Response options

Even if the acceptability and supply of facilities is improved – urgent priorities which are being addressed – these practices are widespread, and are very **unlikely to be changed through hygiene promotion**. Significant police and security activity would be required to enforce any prohibition. **Infrastructure solutions** have been discussed, but the technical feasibility and the cost of responding to formalise this type of activity needs to be properly considered. A **simplified sewerage system** as constructed in slum areas around the world is being considered, and Relief International is providing information to the WASH sector meeting. Importantly, it should be emphasised that the camp community is mobilising themselves and their resources (including financial resources) to respond to this desire for improved WASH facilities. There is an **opportunity to work with the community now**.

Appendix 1

A. Private facilities in tents and caravans

Private toilet in caravan (Modules)



Private kitchen & bathing space – tent + caravan (Modules)



Private kitchen in tent (Modules)



B. Informal black and gray water systems in Sectors 1 and 2



C. Use of public materials in construction

Increasing size of catchments – linked to destruction of THW septic tanks



Use of more sophisticated systems with stolen pipes, bins, etc





Bucket being as a septic tank, fed into by stolen piping



D. Accumulation of rubbish in seep-away systems

