Final Report
on the implementation of the project
"Adaptive Circular Economy Approach in Schools – Al-Manakher Schools"

Submitted by
Climate Action Network Jordan

On
13 July 2024

Project Information

Doner	Partners	Durations	Budget	Status
Mitsubishi Corporation	Jordan Ministry of Education	12 Months	25.000 JD	On Going

Implementing agency
Climate Action Association, known as Climate Action Network Jordan (CAN)

Program Goal
The project is designed to address key water issues faced by Jordan: water scarcity, low levels of wastewater treatment, and increased water stress levels on available resources at the institutional level.

Program outcomes

- Upscaling systems to increase the amount of water reuse, increase agriculture and food production, and widen the community, raising awareness and building capacity.
- Implement systems with modification at the household institutional level for greywater management and rainwater management.
- Testing and implementing modified systems that meet all the reuse standards JS 1776- 2013.
- Providing a business model to reuse the treated greywater for generating income (e.g., irrigating and selling local herbs).

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Acronyms list

BOD	**Biological Oxygen Demand**
BoQ	Bill of Quantities
CAN	Climate Action Now
CFU	Colony Forming Unit
COD	Chemical Oxygen Demand
CSL	Cross-sectional organic Loading rate
CW	Constructed Wetland
E. coli	Escherichia coli
FAO	Food and Agriculture Organization (FAO) is a specialized agency of the United Nations.
HFCW	Horizontal Flow Constructed Wetland
FOG	Fat, Oil, and Grease
HLR	Hydraulic Loading Rate
HRT	Hydraulic Retention Time
JD	Jordanian Dinar
JS	Jordanian Standards
JSMO	Jordan Standards and Metrology Organization
L/W	Length/Width
M.L	Mass Loading rates
MPN	Most Probable Number
MWI	Ministry of Water and Irrigation
NbS	Nature based Solution
NGO	Non-Governmental Organizations
NTU	Nephelometric Turbidity Init
O&M	Operation and Maintenance
pH	Potential of Hydrogen
SS	Suspended Solids
TC	Total Carbon
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
USD	US Dollar
VF	Vertical Flow
WASH	Water Sanitation and Hygiene
WWTP	Wastewater Treatment Plant

Summary

More than 300 students in the Al-Manakher Schools compound are now served with a reliable water supply system, sustainable agriculture, advanced education, and trained staff to handle water scarcity as the main climate change threat hitting the Al-Manakher community. The project achieved all its significant milestones in its management, installation, capacity building, and final reporting phases. By November 2023, the project had secured external funding approval from the Ministry of Planning and International Cooperation (MoPIC) and other approvals from the Ministry of Education, received facilitation letters from the Ministry of Education, conducted technical evaluations, held focus group discussions with key stakeholders, developed a comprehensive project work plan, and prepared engineering drawings and procurement needs. By February 2024, the rainwater harvesting system was rehabilitated, greywater treatment and reuse systems were installed, a water-conservative irrigation system was set up, and an agricultural greenhouse and its adjacent garden were equipped and planted. Monitoring and evaluation of the treated greywater quality and quantity were conducted from February to April 2024, and the greenhouse was operated jointly with the schools. A circular business model for the school was finalized in April 2024, along with an Operation & Maintenance manual. By May 2024, curricular and extracurricular activities related to climate change, water conservation, and sustainable agriculture were prepared and executed using our developed materials that were approved by the Ministry of Education, necessary materials and equipment were procured, and building capacity training for teachers was completed targeting more than 330 students in the school's complex. A mural was created to convey project messages, and a closing ceremony was held to showcase achievements and hand over the school to the Ministry of Education. The final report was submitted in July 2024. The Ministry of Education has now elevated the school to the status of a productive school rather than a regular one, which means it will receive a higher budget. Additionally, the school now generates its own products, earning an income of approximately $1000 per semester, a significant amount in the context of Jordan.

School products are packaged and designated for sale during April 2024

Strawberry products using vertical farming inside the school

The stakeholders gathering for the handover process

Overview

The project aims to address the key water scarcity issues facing Jordan ,including associated unsustainable agriculture practices at the institutional level.

The specific aims are:

- Reducing the volume of freshwater consumed for agricultural purposes by reusing grey water, thereby increasing the quantity of fresh water available for more suitable uses.
- Demonstrating the potential for rainwater harvesting as an approach to water conservation.
- Providing the school with green growth opportunities by producing parent plants or crops that will be grown in available greenhouses and sold to the surrounding community, thereby enhancing synergy among community members and strengthening social and economic conditions.
- Increasing awareness among students, teachers, and community members about the importance of water conservation and the environmental impacts of poor water management. Enhancing synergy among community members and strengthening social cohesion among them by providing a mutually beneficial cooperative relationship for water reuse for all beneficiaries.

Implemented Items:

- Gray Water Treatment and Reuse System.
- Rainwater Harvesting System.
- Adequate storage tanks of about 20 m^3
- Maintenance of the greenhouse and its Cultivation in innovative ways
- Planting Trees and medical herbs in the School Garden.
- Building Capacity Training for the schoolteachers on operating and maintenance.
- Raise awareness sessions and activities for the school's students.

On the next page, a table summarizes the progress per activities mentioned based on the project activities mentioned in the agreement.

Table 1: Percentage of completion of the activities agreed upon to be completed in the project agreement

1	***Project Management - Gateway Approvals & Plans***	**Completion %**	**Month**
1.1	Obtaining external funding approval from MoPIC	100%	11/2023
1.2	Obtaining a letter facilitating tasks from the Ministry of Education	100%	10/2023
1.3	Conducting a technical evaluation of the school to inform the work plan	100%	11/2023
1.4	Conduct Focus Group Discussions with the direct beneficiaries (the schools, directorates, ministry & key locals) to inform the project plan	100%	11/2023
1.5	Set the project work plan that endorsed by all the beneficiaries	100%	11/2023
1.6	Preparing engineering drawings, work requirements, & commencing required procurement	100%	11/2023
2	***Systems Installation and Required Rehabilitations***		
2.1	Rehabilitate the rainwater harvesting system	100%	Feb/2024
2.2	Install the greywater treatment and reuse system	100%	Dec/2023
2.3	Install a water-conservative irrigation system	100%	Dec/2023
2.4	Equipping and planting the agricultural greenhouse	100%	Feb/2024
2.5	Monitor the treated grey water quality & quantity using water bills and quality testing	100%	Feb – April/2024
2.6	Operate the greenhouse jointly with the schools	100%	Feb-Mar/2024
2.7	Finalize the circular business model of the school	100%	April 2024
2.8	Monitor and evaluate the schools while operating the systems and applying the developed business model	!00%	April-May 2024
2.9	Finalize the Operation & Maintenance (O&M) Manual of the circular systems applied, printing it and submitting it to the beneficiaries	100%	April 2024
3	***Building Capacity, Education Activities, and Awareness Raising Activities***		
3.1	Preparing curricular and extracurricular activities for students, jointly with the schools, related to climate change, water conservation, and sustainable agriculture. All will be included in an activity's manual	100%	May 2024
3.2	Procurement and provision of all materials and equipment necessary to carry out these activities	100%	May 2024
3.3	Graphic design and printing required materials for the soft activities and the activities manual	100%	April 2024
3.4	Conducted planned curricular and extracurricular activities with the students	100%	May 2024
3.5	Conduct building capacity training for the teachers and other relevant personnel on the O&M of the applied systems, water conservation, and climate change	100%	May 2024
3.6	Executing a mural inside the school that reflects the desired messages from the project about climate change, water conservation, and environmental conservation	100%	Mar 2024
3.7	Closing ceremony at the school to hand it to MoE and showcase its achievement	100%	May 2024
4	***Final reporting***		
4.1	Submit final report	100%	July 2024

Greywater Treatment System

A system has been implemented to separate greywater from sinks and water coolers in the school, where it is collected in an iron collection tank constructed away from the students' reach and in a manner that avoids any unwanted interference. The tank is installed under the ground and is designed to consist of three compartments; the process involves the settling of small, suspended particles and the separation of oils in two of the compartments, while the third compartment is equipped with air blowers to enable biological treatment of water as well as sensors to operate the pump. The pump, which operates temporarily, draws greywater from the last compartment in the collection tank up the ground to the sand filtration unit located in a secure enclosed area. After purification, the treated water is directed to the final collection tanks for treated water. From there, the treated water tank is connected to the irrigation system, allowing for the reuse of this water in watering gardens or other green spaces within the school.

Figure 1: Greywater Treatment Unit Installed Underground

Figure 2: The Closed Cabinet Containing The Sand Filtration and The Control Panel.

Figure 3: Treated Water Collection Tank

The control cabinet contains a control panel with buttons designed to facilitate monitoring and control operations. The top buttons indicate the availability of electricity on the panel. In contrast, other buttons relate to the treatment system, where these buttons operate automatically without manual intervention, making system operation easier. The only button that requires manual intervention is the irrigation pump activation button, which is manually operated when watering the greenhouse or the school garden with treated water and harvested rainwater. This system provides a high level of automation and ease of use, making the monitoring and operation of the system more efficient and reliable.

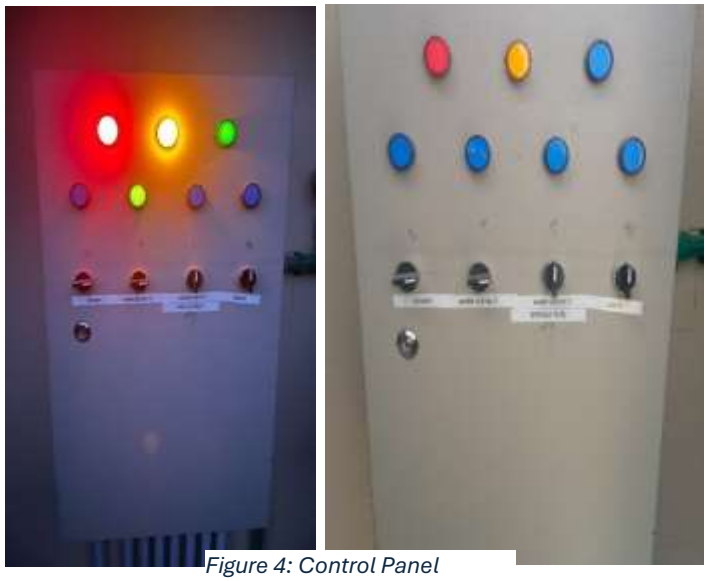

Figure 4: Control Panel

Figure 5: A Comparison Between The Untreated Greywater (Right) and Treated Greywater (Left)

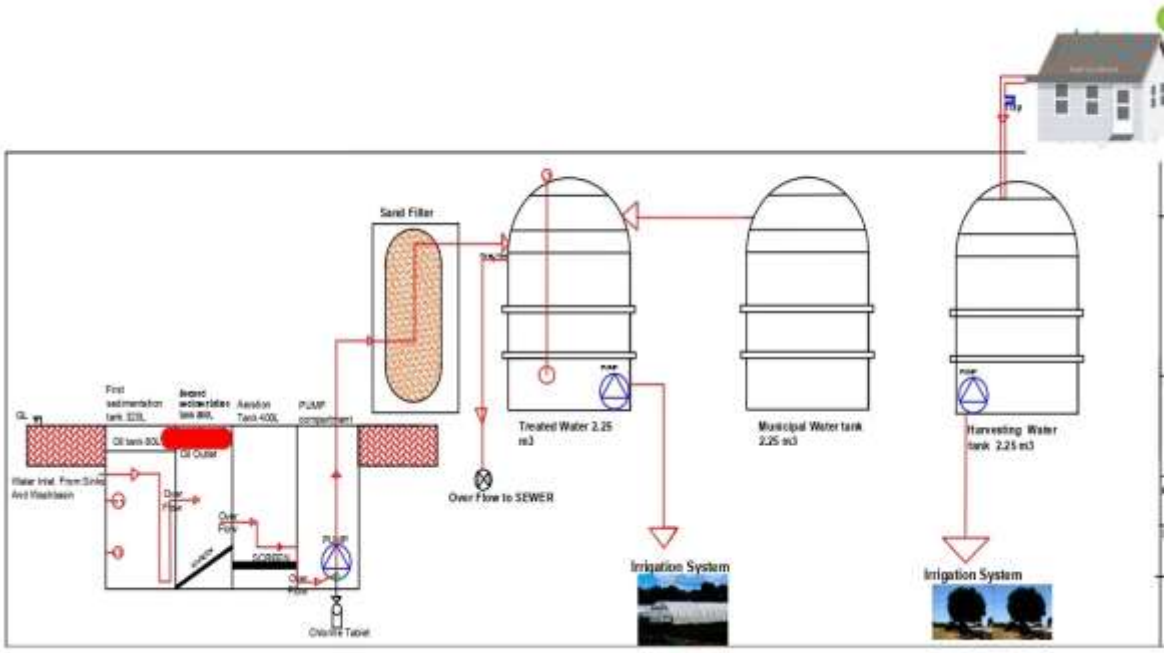

Figure 6: Greywater Treatment System Design.

Rainwater Harvesting System

The roof surface rainfall runoff channel has been connected to an iron tank with a capacity of 14 cubic meters, which is linked to the irrigation system for water use in irrigation. A special outlet was designed for soil and debris after the first storm, which is opened to dispose of debris before starting the rainwater collection process. This design helps protect the system and maintains the collected water quality, ensuring that the accumulated water will be clean and ready for irrigation after rainfall.

Figure 7: Galvanized Iron 14 m^3 storage tank

Figure 8: Rainwater harvesting system trap of sediment

Garden Planting

The school garden has been planted with four cherry shrubs, a Miss Flora tree, five grape shrubs, and five Nabali olive trees. Perlite material has been added to the soil to enhance its moisture retention ability for longer, promoting plant growth and maintaining health. This garden has been connected to an irrigation system, which is operated through the irrigation pump, ensuring the adequate water supply to the plants at the right time, thus providing a suitable environment for their growth and producing high-quality crops in the home garden. A fence of about 80 rosemary seedlings was planted as a fence for the garden. Establishment of the Medicinal and Aromatic Plants Garden: A total of 120 seedlings of rosemary (Rosmarinus officinalis) have been planted, along with 10 seedlings each of aloe vera, mint, thyme, oregano, and cumin. These lines have been connected to a drip irrigation system operated by an irrigation pump. We have also implemented this approach within the school, encompassing the application of fertilizers, insecticide treatment, and insecticide spraying.

Figure 9: Red cherry trees that were planted

Figure 10: The medical garden established at the school

Rehabilitating the Greenhouse

The external cover of the plastic house is just a mesh and damaged in some parts; that's why it has been replaced with a new plastic one to preserve the temperature inside, aiming to provide optimal conditions for plant growth. Subsequently, the area of the plastic house has been divided into eight lines, including six horizontal lines designated for planting various crops, such as cucumbers, green peppers, colored bell peppers, black tomatoes, red cabbage, and eggplants. Perlite material has been added to the soil to retain moisture for longer, enhancing plant growth. These lines have been connected to a drip irrigation system operated by an irrigation pump. Additionally, two vertical farming lines have been established using vertical pipes equipped with perlite, where seedlings are planted on these lines. The first line includes the cultivation of strawberries, while the second line includes the cultivation of iceberg lettuce and broccoli. These lines have been connected to a drip irrigation system operated by an irrigation motor, ensuring the necessary moisture supply for optimal plant growth and development. The greenhouse, in total, has accommodation for about 900 seedlings.

Figure 11: Planted Greenhouse

Figure 12: Vertical Farming

Figure 13: Drip Irrigation

Figure 14: Strawberry vertical farming pipes

Figure 15: Lettuce vertical farming pipes

Table 2: Summary of The Executed Hard Item Quantities

Item Number	Item Description	Quantity/Unit
1	Iron greywater collection and treatment tank	1
2	Sand treatment system including sand treatment unit with control panel to operate the treatment system and irrigation system	1
3	Pumps	3
4	JR Irrigation system	500 meters

Figure 16: Educating Students About The Project

Educational Mural

The concept of the Circular Water Economy represents a fundamental shift in our perception and management of water resources. It embodies innovative approaches to water resource recovery and resilience. The "Circular Economy Sector for Water Harvesting." has been vividly brought to life through artwork by Pharmacist Banan Zahran, School Principal Ikram Al-Zyoud, Teacher Bayan Zahran, and Student Lama Abu Hassan.

Figure 17: Mural Painting

Community Engagement

The project received great interest from the local community and stakeholders, as it received several visits from the Ministry of Education, its affiliated directorates, community police, agricultural experts, a representative from UNDP, and a nearby electricity company. They all expressed their admiration for the project and stressed the possibility of replicating it in other places and that it would bring financial revenue to the school.

The students were instructed to share the knowledge and experience they gained through the project with their parents and siblings. This activity raised awareness of the community to an astounding level, almost 1000 community members were therefor indirect beneficiaries. Along with that the opportunity to learn and engage with the project were given to 10 university students as well as 10 housewives who started using the garden for education and business reasons.

Additionally, three interns from the USA spent one month in Jordan working and volunteering for this project as they wanted to glean from the knowledge that has been applied.

Figure 18: The school staff, CAN staff, and three interns from the USA

Training in Operations and Maintenance (O&M)

First, a comprehensive O&M manual was developed to guide users in adequately caring for the installed systems. Copies of the manual were printed and distributed to ensure accessibility. Training sessions were then conducted for 10 female staff to ensure they understood how to operate and maintain the systems effectively. This process ensured that the greywater treatment and reuse systems at Manakher School were well-maintained and utilized correctly, promoting sustainable water management practices.

CAN

دليل التشغيل لنظام معالجة المياه الرمادية والحصاد المائي

جدول المحتويات

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Figure 19: Al Manakher School Staff Training Session

Building the Students' Capacity

The capacity-building initiative at Al Manakher School has successfully developed user-friendly training materials and organized training workshops focusing on circular economy principles. The training material was reviewed and approved by the Ministry of Education. Field trips were arranged to raise awareness among students about greywater treatment, water harvesting, and the application of circular economy approaches within the school. These trips included visits to facilities demonstrating greywater treatment processes, water harvesting systems, and examples of recycled water usage for irrigation. Additionally, circular economy concepts have been integrated into the curriculum, student projects, and community engagement activities, ensuring the sustainable implementation of these practices and fostering a culture of environmental consciousness and resource efficiency within the school and the wider community.

Figure 20: Al Manakher School Students' Capacity Building

Raising Awareness

Raising awareness at Al-Manakher School involves utilizing the school radio to address topics such as climate change, water shortages, sustainable agriculture, water harvesting, gray water treatment, and the circular economy. By allocating airtime to these critical issues, students and staff can learn about the importance of environmental sustainability and practical solutions like reusing harvested water and treated gray water. This approach will empower the school community to adopt circular economy principles and contribute to a more sustainable future.

Figure 21: Raising Awareness at Al Manakher School

We utilized the morning broadcast at Al-Manakhir Basic Mixed School to raise awareness about our initiatives effectively. Each morning, informative segments were dedicated to educating students and staff on the importance of sustainable practices, the benefits of the greenhouse project, and the principles of the circular economy. These broadcasts featured engaging content, including interviews with key project participants, updates on the progress of various initiatives, and practical tips on water conservation and environmental stewardship. By incorporating these topics into the daily routine, we ensured that the entire school community became more informed and involved in our efforts to promote sustainability and resource efficiency.

Figure 22: Students at Al-Manakhir School Morning Broadcast

Final Ceremony

On Tuesday, May 21, 2024, the Director of Educational Affairs, Dr. Mohammad Al-Waqfi, presided over the opening ceremony for the third season of the Greenhouse Project at Al-Manakhir Basic Mixed School. Dr. Al-Waqfi emphasized the project's significance for the school, highlighting its role as an investment project that meets students' needs and addresses the need for investment resources in the Manakher area, a simple village in Amman. School Principal Ikram Al-Ziyoud underscored the importance of community partnership in the project's success, with significant support from the Greater Amman Municipality, represented by Dr. Khaldoun Al-Hawadi, Director of Health and Professional Monitoring, and Dr. Mirvat Mehairat, Deputy Director for Health and Agricultural Affairs. A video showcasing the greenhouse project's agricultural produce and production stages was presented. The event concluded with the honoring of project supporters. The event was attended by key figures including:

- Engineer Lina Al-Darous, Head of Vocational Education at the Ministry of Education
- Ms. Amal Al-Suleiti, Head of Home Economics
- School Principal, Ms. Ikram Al-Ziyoud
- Engineer Hayat Abu Zaid, Vocational Education Section, Sehab Education Directorate
- Engineer Amani Al-Safarieh, Head of School Buildings Section, Sehab Education Directorate
- Engineer Alham Al-Shurafat, Climate Action Network Jordan

Other notable attendees included:

- Dr. Nader Al-Dabboubi, Educational Supervisor
- Mr. Mohammad Al-Hadreb, Administrative Coordinator of Al-Khashafiya Network
- Mr. Alaa Al-Atoum, Vocational Education Supervisor
- Dr. Maryam Abu Zaid, Head of Media Section, Sehab Education Directorate
- Mr. Mohammad Farhan, Monitoring Section, Sehab Education Directorate
- Mr. Fayez Abu Maala from Queen Rania Academy

The event was attended by several members of the local community, including:

- Respected educator, Ms. Hasniya Al-Dabaybeh
- Community leader, Mr. Yousef Al-Dajjah
- Mr. Mohammad Al-Dabboubi
- Mr. Nidal Al-Dajjah
- Mr. Wael Al-Dajjah

Figure 23: Final Ceremony and Site Visit

Agricultural Production and Income

The greenhouse project has seen the cultivation of various crops:

1. Vegetables such as tomatoes, cucumbers, pumpkins, peppers, eggplants, and squash.
2. Fava beans, funded by the sale of grape leaves from the school garden.
3. Strawberries, school gardens, medicinal gardens, and olive trees.

Figure 24: Different Plants Grown in The Greenhouse

From now on, the schools will incur fixed and variable costs across various products, totaling $257. Fixed costs were consistent at $10 per product, while variable costs varied. The products included strawberries, lettuce, red cabbage, green pepper, capsicum, grapes, eggplant, baby cucumber, wild thyme, tomatoes, sage, mint, Oliveira, Miss Flora, and red and green cherries. Total revenues from these products amounted to $1,180. With a gross profit of $923, the project demonstrates significant profitability, highlighting its financial success and sustainability within the Jordanian context.

Table 3: Economic Feasibility Study

Product	Fixed Costs	Variable Costs	Revenues
Strawberry	10	15	130
Lettuce	10	12	100
Red Cabbage	10	10	90
Green Pepper	10	10	50
Capsicum	10	0	125
Grapes	10	0	50
Eggplant	10	10	90
Baby Cucumber	10	20	100
Wild Thyme	10	0	50
Tomatoes	10	10	50
Bay Leaf	10	0	50
Sage	10	5	30
Mint	10	5	30
Oliveira	10	0	45
Miss Flora	10	0	90
Red and Green Cherries	10	0	100
Total Cost	257	Total Revenues	1180
Gross Profit	923		

Water Quality and Quantity Monitoring

The photo captures two water samples side by side – a vivid testament to our natural solution's remarkable impact on water treatment. On the left, marvel at the clarity and purity of the treated water, a result that not only meets but significantly surpasses national standards. This leap in quality showcases CAN's green technology prowess, designed with our planet and its people at heart. The water testing report is discussed in this report.

Figure 25: A Comparison Between The Untreated Greywater (Right) and Treated Greywater (Left)

From January 2023 to January 2024, water consumption was significantly reduced by more than 50%. The initial period from January 1, 2023, to December 31, 2023, saw varying water consumption amounts, with a high of 254 cubic meters in the second quarter and a subsequent decrease. By January 2024, the consumption had dramatically decreased to 28 cubic meters, showcasing the effective water-saving measures implemented throughout the year. This substantial reduction highlights the project's success in promoting water conservation and sustainable practices.

Table 4: Invoices

Invoice value	Consumption amount (in cubic meters)	Invoice end date	Invoice start date
80.1	16	2023-31-3	2023-1-1
368.440	254	2023-30-6	2023-4-1
219.720	150	2023-30-9	2023-7-1
91.83	63	2023-31-10	2023-10-1
44.64	30	2023-30-11	2023-11-1
80.39	55	2023-31-12	2023-12-1
28.91	19	2024-31-1	2024-1-1

Raw greywater Characterization,

As a first step in designing CWs, the characteristics of the raw greywater were identified in two steps. First, samples were collected over three days, and a composite sample was tested and analyzed in the laboratories of the Water Authorities of Jordan. The second step is from the previous tests that were collected in different mosques in the same city and other cities in Jordan. This step was necessary to check if the greywater characteristics are within the regular limits and the water consumption practices and to be sure no critical parameters or illegal behaviors, such as disposing of industrial wastewater or slaughter wastewater in the mosque WASH units, exist for the selected mosque. Table 5 shows the raw greywater parameters used to design the HFCW.

Table 5: Raw Greywater Characteristics

Characterization of Raw Wastewater		
Parameter	Unit	Raw greywater
BOD	mg/l	100
COD	mg/l	153
TSS	mg/l	200
NH_4	mg/l	less than 5
NO_3-	mg/l	13
Turbidity	NTU	16
Temperature	C	25

The main parameters considered for designing the CW were TSS and the BOD. The target effluent concentrations have been determined according to the Jordanian standards for reclaimed and reuse-treated greywater JS 1776/2013. Table 6 shows the acceptable limits for the reuse of the treated greywater. For this project, “Food crops intended for human consumption including raw consumption,” reuse options have been considered. The daily greywater influent is deemed to be 1 cubic meter daily; although the mosque generates more greywater during the peak time, the flow has been selected due to the limited budget available. The system has been designed with a dosing pump that doses a specific amount in a specific time of greywater from the first collection tank to the constructed wetland. This means that during peak times, if the greywater flow exceeds the system capacity, the system will not be affected, and the overflow of the greywater will go directly to the sewer system and not to the treatment system.

Jordanian standards

The Jordanian Government established a standard for reusing and treating greywater in 2013. The standards describe some obligatory conditions; for example, chlorination is obligatory when using treated greywater for toilet flushing. Table 6 summarizes the main parameters and reuse limits for treated greywater for different reuse purposes.

Table 6: Jordanian Standard for Greywater Reuse JS 1776/2013

Parameter	Cooked vegetables, parks, playgrounds, and roadsides within cities.	Food crops intended for human consumption, including raw consumption	Toilets flushing
BOD_5 (mg/l)	60	60	<10
COD (mg/l)	120	120	<20
TSS (mg/l)	100	100	<10
pH	6 - 9	6 - 9	6 - 9
NO_3^- (mg/l)	70	70	70
TN (mg/l)	50	50	50
Turbidity NTU	undefined	undefined	< 5
E. coli (CFU/100 ml)	10000	1000	<10
Helminth eggs (egg/l)	<1	<1	<1
Fat, Oil, & Grease (FOG) (mg/l)	8	8	8

While the sampling process was carried out by local expert engineers who followed sampling procedures of "STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, 23RD EDITION" (Rodger B. Baird, Chair Eugene W. Rice and Andrew D. Eaton, 2017), tests are being carried in laboratories of Water Authority of Jordan. The tests to be performed also according to "STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, 23RD EDITION" (Rodger B. Baird, Chair Eugene W. Rice and Andrew D. Eaton, 2017).

The tables below summarize the performance of the CWs for the first three months of operation according to Jordanian standards.

Table 7: Treated Greywater vs Jordanian Standards

Parameter	April	May	June	Cooked vegetables, parks, playgrounds, and roadsides within cities.	Food crops intended for human consumption, including raw consumption	Toilets flushing
BOD_5 (mg/l)	20	15		60	60	<10
COD (mg/l)	43	23		120	120	<20
TSS (mg/l)	0	<10		100	100	<10
pH	7.38	7.4		6 - 9	6 - 9	6 - 9
NO_3^- (mg/l)		17		70	70	70
TN (mg/l)		33		50	50	50
Turbidity NTU	0	<0.2		undefined	undefined	< 5
E. coli (CFU/100 ml)	2300	400		10000	1000	<10
Helminth eggs (egg/l)		<1		<1	<1	<1
FOG (mg/l)		8		8	8	8

Table 8: Treatment Efficiencies

Parameter	April			May			June		
	Raw	Treated	Efficiency	Raw	Treated	Efficiency	Raw	Treated	Efficiency
BOD_5 (mg/l)	379	20	95%	411	15	96%			
COD (mg/l)	496	43	91%	523	23	96%			
TSS (mg/l)	23	0	100%	55	<10	82%			
pH	7.22	7.38		7.41	7.4				
NO_3^- (mg/l)				19	17	11%			
TN (mg/l)				35	33	8%			
Turbidity NTU	12	0	100%	15	<0.2	99%			
E. coli (CFU/100 ml)		2300		2800	400	86%			
Helminth eggs (egg/l)				<1	<1				
FOG (mg/l)				<1	<1				