University : Al-Mustaqbal University (formerly name: Al-Mustaqbal University College)
Country : Iraq
Web Address : https://uomus.edu.iq/Home/IndexEn

6.3.2: Preventing water system pollution Year: in place by 2025: Processes to prevent polluted water entering the water system, including pollution caused by accidents and incidents at the university.

Link to the public evidence:
https://sustainability.uomus.edu.iq/SDG_Hub/Goals/6

At Al-Mustaqbal university, a policy and programs for water pollution control are fully implemented and monitored regularly, through following procedures:

A) Rainwater Harvesting and Safe Storage for Pollution Prevention

Al-Mustaqbal University has implemented water management infrastructure aimed at supporting water quality protection and reducing potential contamination risks across the campus.

1. Rainwater Harvesting and Storage: The university utilizes rainwater collection and storage facilities to support sustainable water management. These facilities provide an opportunity to manage collected rainwater separately and apply appropriate measures to prevent contamination (Figures 1–2).

2. Smart Water Distribution System: The university operates energy-efficient, solar-powered pumping systems equipped with adjustable flow controls and electronic valves. These technologies enable controlled water distribution and support the management of water flow across campus facilities (Figure 3).

Together, these initiatives contribute to the university's water management infrastructure and provide a foundation for implementing preventive measures against water system pollution.

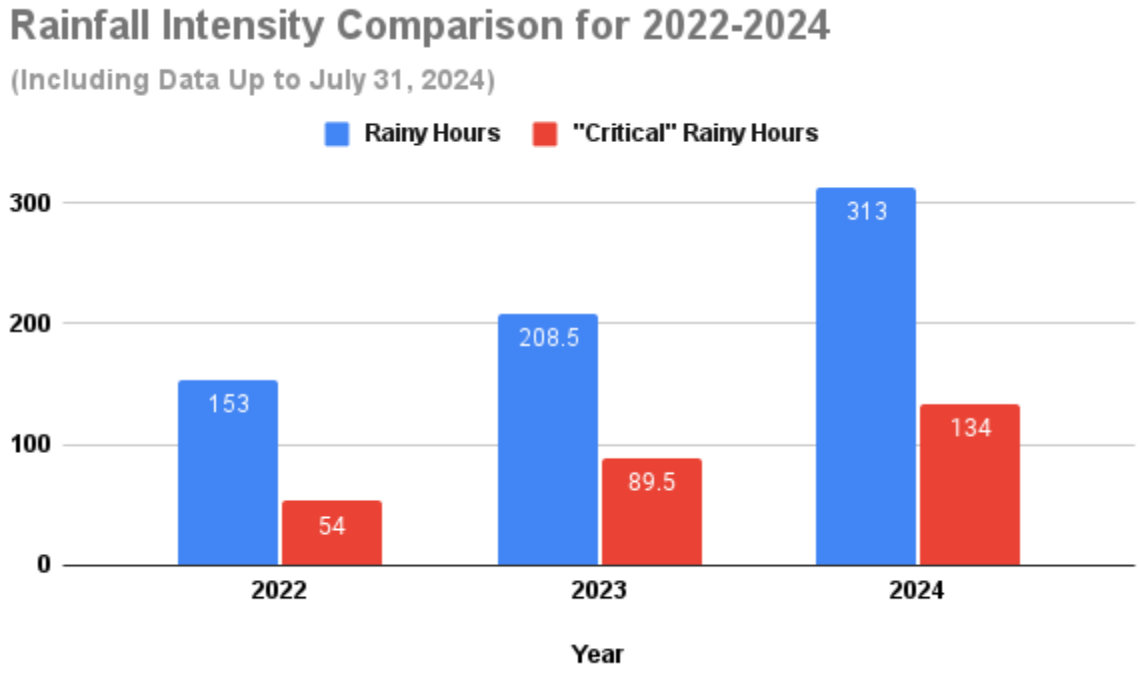


Figure 1: Rainfall Intensity Comparison for 2022, 2023 and 2024. Source: DOI: 10.13140/RG.2.2.23829.84965

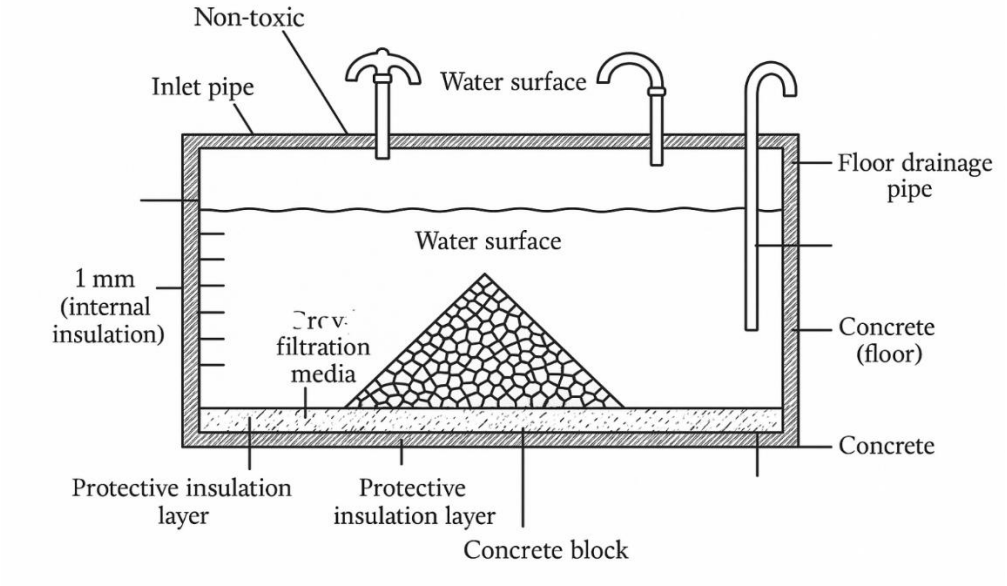


Figure 2: Schematic diagram of rainwater storage at Al-Mustaqbal University

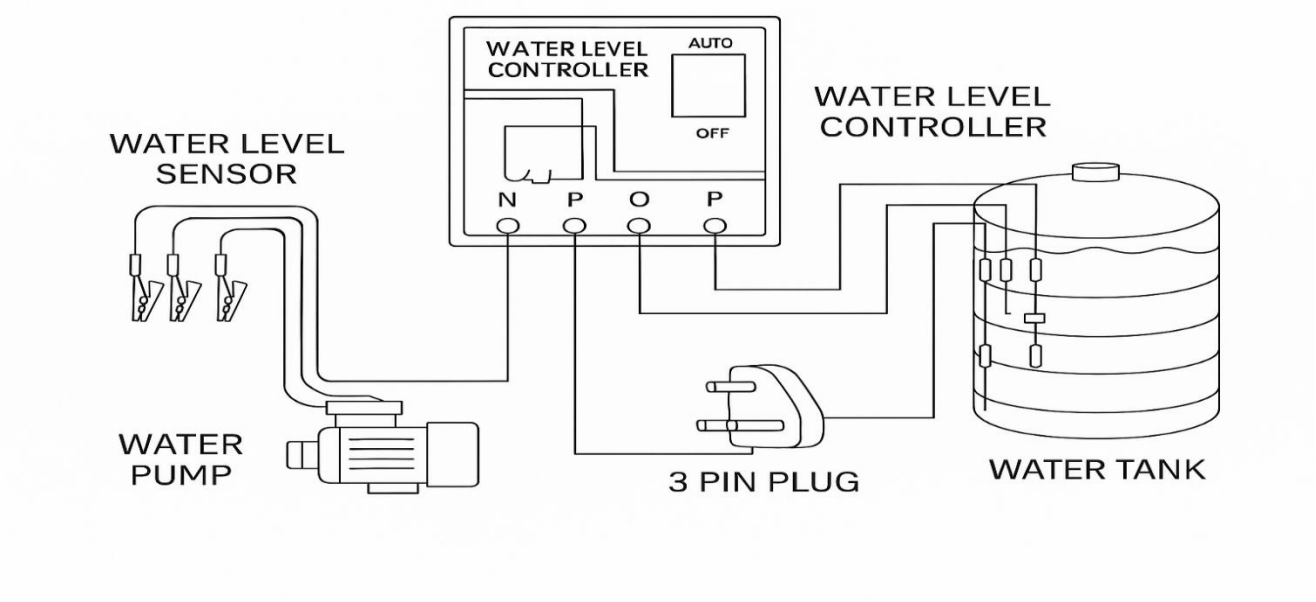


Figure 3: The water pumping and storage system used at the university.

B) Al-Mustaqbal University applied conventional treatment processes of all type of wastewater prior to recuse it in agricultural and irrigation purposes .

1- The pretreatment process includes:

- Neutralization of acids and bases to maintain pH within permissible limits.
- Oil and grease separation to prevent hydrocarbons from entering the sewage system.
- A grit/screening chamber to remove sand, gravel, and metallic particles.

After completing these stages, the treated water is safely discharged into the university's internal sewer system, which then flows into the municipal sewage network in compliance with environmental regulations.

2- Simplified Standard Operating Procedure (SOP)

In fact, the main purpose of installation of this unit is to ensure safe and effective preliminary treatment of laboratory wastewater before final disposal. This unit serves all teaching and research laboratories at the university (Figure 4).

Procedure:

- Collection: Laboratory wastewater is collected through a dedicated pipeline with primary strainers for coarse solids.
- pH Neutralization:
  - Measure pH in the equalization tank.
  - Add acid/alkali in controlled doses until the pH reaches the acceptable range (6–9).
  - Record readings in the operational logbook.
- Oil & Grease Removal: Wastewater passes through an oil and grease separator; collected oil is removed periodically and sent to an authorized waste contractor.
- Grit and Metal Removal: Flow continues through a grit chamber where sand, gravel, and metallic particles are trapped; chamber is cleaned routinely.
- Safe Discharge: Once parameters are verified (pH within limits, no visible oil, solids removed), the water is released into the internal sewer system and then into the municipal sewage network.

Monitoring & Records:

- pH measured per operating shift and logged.
- Daily visual check for oil layers in the separator.
- Maintenance records for strainers and grit chamber.

- Disposal receipts for oil/solid waste handled by contractors.

Safety Measures:

- ✓ Use PPE (gloves, goggles, aprons).
- ✓ Store acids/alkalis in ventilated cabinets with labels.
- ✓ Spill response plan in place, with neutralizing and absorbent materials available.

Responsibilities:

- Engineering Unit: Operation and maintenance of treatment units.
- Lab Supervisors: Prevent source contamination (no disposal of solids or prohibited solvents in sinks).
- Health, Safety & Environment Division: Regular inspection and documentation.

C) Pretreatment of laboratories wastewater
This is accomplished by the following treatment system

1. **Equalization Tank (pH Neutralization Basin)**
   - Surface Area: **4 m²**
   - Function: Stabilizes flow and allows for controlled chemical dosing to adjust pH levels (6–9).
2. **Oil & Grease Separation Unit**
   - Surface Area: **12 m²**
   - Function: Removes floating oils, fats, and grease through gravity separation, ensuring hydrocarbons are not discharged downstream.
3. **Grit & Sand Removal Channel**
   - Dimensions: **Length 10 m × Width 0.75 m**
   - Function: Traps coarse particles (sand, gravel, metallic fragments) before wastewater enters the main collection system.
4. **Flow Direction**
   - Laboratory and domestic wastewater → Equalization Tank → Oil & Grease Separator → Grit Removal Channel → Main Sewer Collection System.

Additionally, Al-Mustaqbal University has established a comprehensive water conservation policy designed to prevent pollution and promote responsible water usage across campus. To support this policy, our Engineering Unit works closely with the chemical laboratory of the College of Health and Medical Techniques (as shown in Figure 4). Together, they regularly analyze water samples from various campus locations, assessing parameters such as BOD5, COD, pH, TDS, EC, turbidity, and total hardness. Furthermore, rigorous testing is conducted on potable water carriers that supply Reverse Osmosis water bottles to campus buildings. These stringent procedures ensure that water quality and safety standards are consistently upheld throughout the university.



Figure 4: Laboratory of College of Health and Medical Techniques used to test water samples

The following table presents the results of the chemical and biochemical tests conducted at the Al-Mustaqbal wastewater treatment plant in Year: 2024. Kindly note that these results reflect the

monthly average of tests conducted. *It can be seen that all results of treated wastewater comply with the Iraqi standards for the quality of treated wastewater released into the aquatic environment* https://wiki.dorar-aliraq.net/iraqilaws/law/13246.html *and* https://www.moj.gov.iq/uploaded/4225.pdf

Table 1: Data gathered from Al-Mustaqbal wastewater treatment plant (average value), year: 2024. Where INF and Eff terms referred to untreated and treated wastewater, respectively.

ITEM	UNIT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Temp.	°C	15	14	16	21	24	26	28	27	22	18	16	15
Inflow	m^3/day	105	98	92	85	95	52	76	40	58	68	90	82
pH INF.	-	8.3	8.5	8.1	7.8	7.9	8.2	8.4	8.3	8.6	8.0	8.1	8.4
pH EFF.	-	7.5	7.8	7.6	7.4	7.6	7.4	7.8	7.7	7.6	7.5	7.4	7.7
TDS INF.	mg/L	1180	1820	2350	2250	3180	3100	2980	2850	1050	1850	2100	1950
TDS EFF.	mg/L	1120	980	1300	1180	1420	1260	1050	880	820	960	1040	1000
TSS INF.	mg/L	950	880	520	610	680	720	500	540	760	730	960	780
TSS EFF.	mg/L	58	62	48	32	30	34	50	52	25	28	36	40
BOD_5 INF.	mg/L	1420	1120	1050	1760	980	1500	1600	1180	1100	1020	940	760
BOD_5 EFF.	mg/L	11	16	14	12	10	11	10	9	12	14	11	9
Turbidity	NTU	36	46	14	18	28	23	18	19	16	18	24	20

For more information about the laboratory facilities at Al-Mustaqbal University, please see this report (QR code):