

Wastewater treatment and use

1- ON-SITE WASTEWATER TREATMENT

In order to fulfill environmental and hygienic requirements, Al-Mustaqbal University has established a compact pre-treatment centralized wastewater facility with a capacity of 120 m³/day and an efficiency rating of up to 95%. This facility is situated in the southeastern corner of the university premises (refer to Figure 1). The untreated wastewater is transported to the plant using subterranean screw pumps. Subsequent to the treatment process, the processed wastewater is directed into the wastewater collection system under the regular scrutiny of the Municipal authority to ensure compliance with set standards (BOD < 40 mg/L and TSS < 60 mg/L). The wastewater plant comprises the following units:

- Bar screen (Figure 2)
- Aerated Grit Chamber (Figure 3)
- Rotated nano-filters (Figure 4)
- Chlorination (Figure 5)

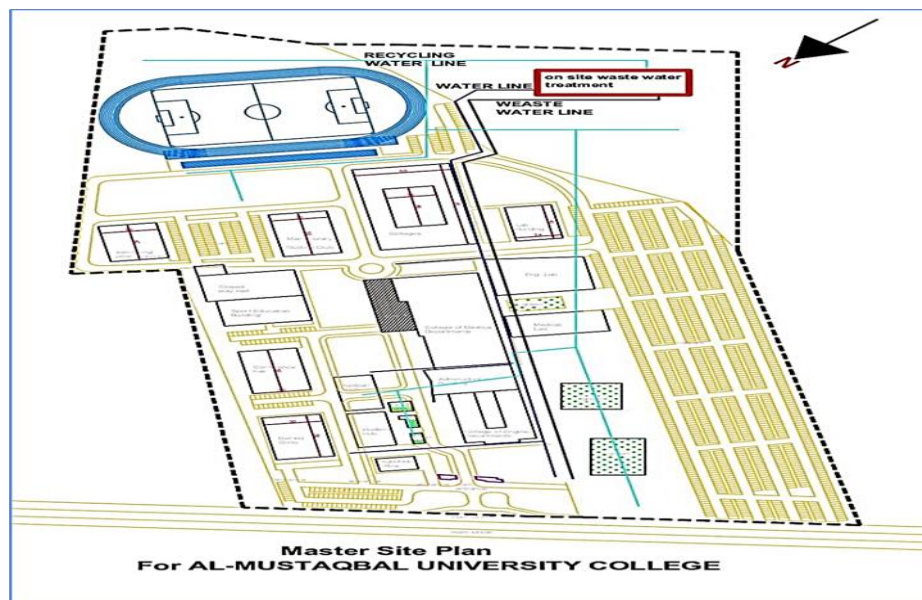


Figure 1: The location of the treatment plant in relation to the university area



Figure 2: Bar screen of MU wastewater treatment plant



Figure 3: Aerated Grit Chamber of MU wastewater treatment plant



Figure 4: Rotated filters used in MU wastewater treatment plant



Figure 5: Chlorination unit of MU wastewater treatment plant



2- Minimize of the water use

Al-Mustaqbal University strictly follows the [Iraqi water footprint specification](#) to reduce its water consumption. Furthermore, the water conservation policy adopted in the university is strictly implemented to conserve the most amount of water possible through the usage of many methods to conserve water in our daily activities on campus. In addition, at AL-Mustaqbal University the procurement unit should approve that any water appliances should meet strict water conserving standards before making the purchase.

Water efficient appliances have been used extensively in Al-Mustaqbal University. These appliances range from clever faucets in its washrooms to drip irrigation systems for its external green areas. The use of these water efficient appliances has managed to reduce water waste by 50%. The details of these appliances are given below.

1. MOTION CENSORED FAUCETS

In accordance with the Al-Mustaqbal university water conservation policy, The Engineering Unit in Al-Mustaqbal University has endeavoured since 2020 in applying motion censored faucets throughout the Al-Mustaqbal university washrooms to minimise water wastage.

2. WATER EFFICIENT FLUSH BASINS

Alongside motion censored faucets, flushing basins were converted to efficient flushing basins. These water conserving basins require less than 2 gallons of water to achieve a full flush.

3. SHUT-OFF NOZZLES AND LOW-FLOW SHOWER HEADS

The engineering unit is upgrading the hoses in the toilets to using shut-off nozzles that are more efficient in preserving water. For the sake of minimizing water consumption, low-flow shower heads have been used in all shower units through-out the Al-Mustaqbal university. The details of these appliances are given in the table below:

Table 1: Number of water conserving appliances

No.	Building	W/C	CF	FB	SON
1	Medical Building I	44	102	136	136
2	Medical Building II	34	95	140	140
3	Student Life Building	9	32	24	24
4	Engineering Unit	6	6	6	6
5	Humanities Building	24	96	138	138
6	Engineering Building	14	44	66	66
7	Laboratories	4	4	14	14
8	Student Admission Building	4	4	7	4

CF: censored faucets, FB: 1.6 gl flush basins, SON: shot-off nozzles.



3- Sustainable agriculture

Al-Mustaqbal University has established a productive partnership with the Department of Agriculture in Babylon, collaborating to cultivate plants adept at thriving in the region's arid summer conditions. Notably, palm and fig trees are among the key species chosen for their ability to adapt to the parched environment. The Date palm, a well-recognized entity, stands out for its capacity to withstand drought. This iconic tree not only enhances the visual appeal of the surroundings but also yields productivity as an evergreen species.




Complementing this, the university has also embraced the cultivation of prickly pear cacti, a plant inherently suited to arid landscapes due to its minimal water demands. Adelfa trees, renowned for their drought-resilient traits, have also found a place across the campus. Table 2 furnishes a comprehensive list of the principal tree species, along with their respective types, that grace the grounds of Al-Mustaqbal University.

It is noteworthy that the cultivated areas encompass a substantial 83% of the university's total expanse. To ensure prudent water usage, all trees are nurtured through the judicious application of drip irrigation techniques, thereby curbing unnecessary water consumption.





Given the region's often constrained agricultural water resources, Al-Mustaqbal University takes an annual initiative to convene meetings involving the ministries of irrigation, agriculture, and environment. These gatherings aim to execute sustainable projects that offer alternatives to traditional irrigation methods. This endeavor aligns with the university's water conservation policy, with the Engineering Unit at the forefront. Through the implementation of sprinkler irrigation systems, the university strives to facilitate efficient and sustainable irrigation practices, minimizing water usage while ensuring adequate nourishment for the cultivated greenery.



Table 2: The number and type of trees planted in the university for the year 2022

Type	Number	Picture
Date palms	1067	
Fig	23	
Pear cactus	20	



<p>Adelfa tree</p>	<p>18</p>	
<p>Others (grass, grape, and flowers)</p>	<p>49</p>	  



4- Rainwater Harvesting

Al-Mustaqbal University has indeed embraced sustainable water extraction technologies. In fact, these technologies allow for the mitigation of adverse environmental effects associated with water extraction from sources such as aquifers, lakes, or rivers. Moreover, these approaches strive to secure the lasting availability of water resources while curbing ecological damage. Several illustrations of sustainable water extraction technologies are as follows:

- **Rainwater Harvesting:** Collecting rainwater for various purposes, including irrigation, toilet flushing, and even drinking water, helps decrease dependence on conventional water sources. In the year 2022, the highest average monthly rainfall intensity measured near Al-Mustaqbal University was 0.9 inches (Figure 6), recorded in February 2022. The schematic representation of the water tank utilized for storing rainwater at the university is depicted in Figure 7 below.

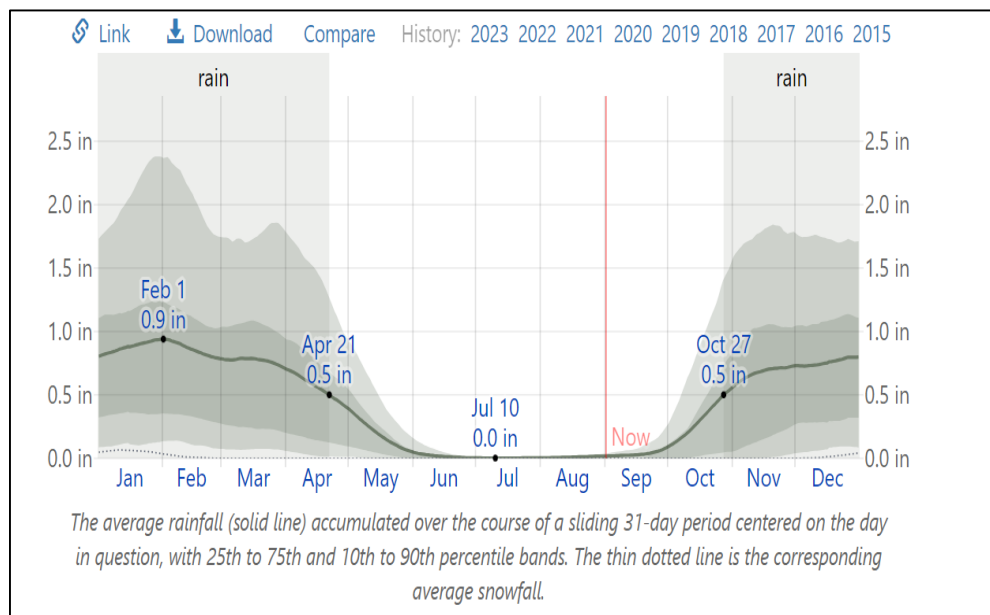


Figure 6: Average rainfall intensity near Al-Mustaqbal university area

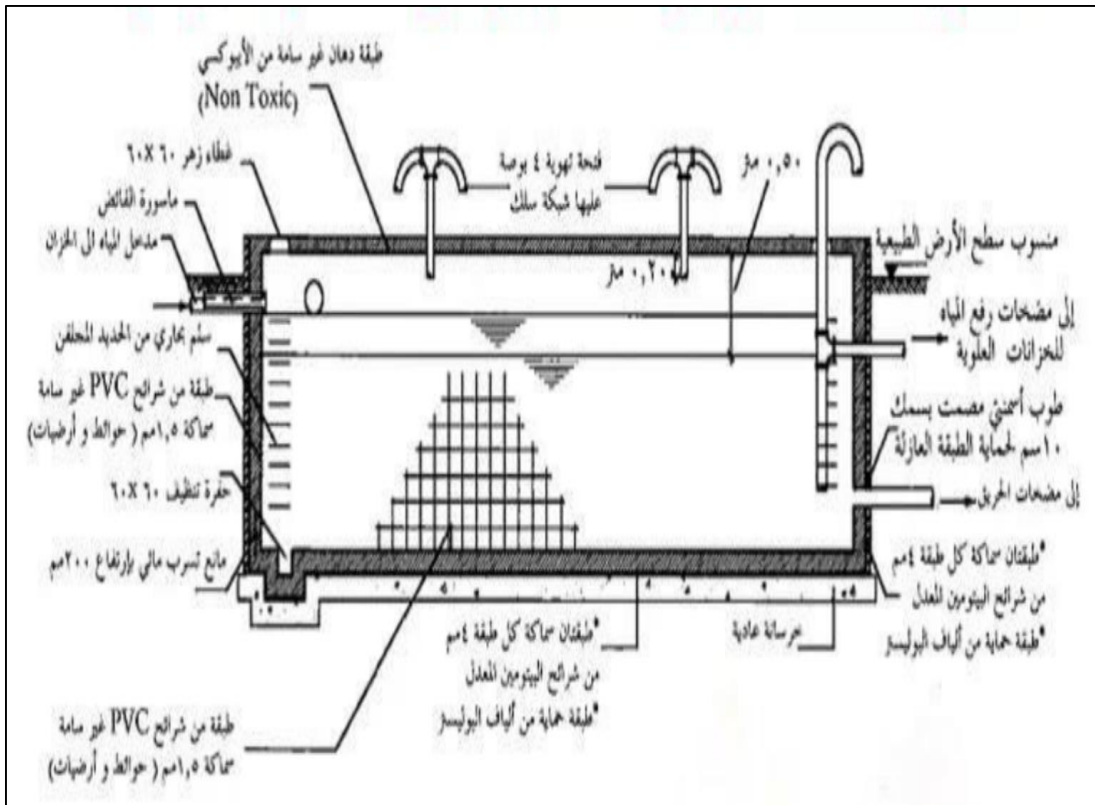


Figure 7: Schematic diagram of rain water storage at Al-Mustaqbal University