

SHORT GUIDE ON REUSE



The reuse of domestic wastewater, also known as recycled water or reclaimed water, is a practice that involves treating wastewater from households, industries, or other sources to make it suitable for subsequent use in various non-potable applications. This helps conserve freshwater resources, enhance water use efficiency, and alleviate stress on drinking water sources.

It's important to note that the water treatment for reuse varies based on the requirements of each application. Some uses might demand more extensive treatment than others to ensure that the recycled water meets quality standards and poses no risk to health and the environment.

The reuse of domestic wastewater is a sustainable approach gaining popularity in many regions worldwide where the availability of freshwater is limited or when managing water demand becomes a significant concern.

That's why, in addition to properly treating your domestic wastewater, DBO International also proposes reusing it to give this water a second life.

DIFFERENT REUSE APPLICATIONS

While DBO International advocates for wastewater reuse, it is of paramount importance to ensure that the results obtained from using System O)) comply with the standards and laws of the country, province, or state in which the installation will take place. To avoid any legal and/or environmental complications, we strongly suggest that you reach out to a specialist in the field of your desired wastewater reuse. This person will be able to guide you so that you can fully benefit from the advantages our technology can offer! For informational purposes, here are some reuse techniques and methods that we recommend through this guide, focusing particularly on irrigation.

- **Agricultural Irrigation:** Treated water can be used for irrigating crops and parks, thus reducing the demand for potable water for these purposes.
- **Green Spaces and Gardens Irrigation:** Recycled water can be used to water lawns, public and private gardens.
- **Industrial Use:** Certain industries can utilize recycled water in their manufacturing or cooling processes.
- **Groundwater Recharge:** In some regions, treated water can be injected into groundwater to replenish underground water reserves.
- **Toilet Flushing:** Water recovery for refilling toilet bowls. This water serves solely as a conveyance for solid waste and does not need to be potable.
- **Others:** Roadway maintenance, car wash, fire suppression systems, sports facilities (snow cannons, golf courses)...



Figure 1. Example of Reuse for a Car Wash in Algeria.

AGRICULTURAL IRRIGATION

The optimal method of irrigation with treated water will depend on several factors, including the quality of the recycled water, the type of crops, resource availability, and irrigation objectives. Here are some commonly used methods for irrigation using water treated by System O):

Drip Irrigation: This method delivers water directly to the plant roots through perforated tubes or drippers. Drip irrigation is effective as it allows precise and targeted water use, reducing waste and losses through evaporation. It's particularly useful for moisture-sensitive crops and in areas with limited water.

Sprinkler Irrigation: Sprinkler irrigation involves projecting water into the air as droplets that fall onto the crops. This method suits large agricultural operations and field crops. The efficiency of sprinkler irrigation depends on system design and water quality.

Flood Irrigation: Flood irrigation involves temporarily submerging cultivated land with water. It is best suited for crops that tolerate constant moisture and flat lands. However, this method can lead to water wastage if not well-controlled.

Subsurface Irrigation: Subsurface irrigation, also known as capillary irrigation, uses underground channels to deliver water to plant roots. This method is more water-efficient and is often used for greenhouse crops.

Micro-Sprinkler Irrigation: This method is similar to sprinkler irrigation but uses smaller nozzles that produce finer droplets. This allows for more precise water application, ideal for water-sensitive plants.

Controlled Flow Irrigation: This approach employs sophisticated control and regulation systems to precisely adjust the amount of water supplied to each zone based on specific crop needs.

Aerial Spray Irrigation: In certain situations, aerial spray irrigation can be used to water large areas, especially for fallow crops or extensive green spaces.

IMPORTANT - GUIDELINES FOR THE USE OF TREATED WASTEWATER IN IRRIGATION

The ISO 16075-2 standard helps establish consistent practices and quality criteria for the reuse of treated water world-wide. It facilitates the adoption of this sustainable approach by providing internationally recognized guidelines and standards for wastewater reuse projects.

Table 1 - Suggested quality of treated wastewater based on chemical, physical, and biological parameters

Class	Type of Treated Wastewater	BOD		TSS		Turbidity		Thermotolerant coliforms		Intestinal nematodes		Possible Uses Without Barrier	Corresponding Treatment
		mg/l		mg/l		NTU		Qty/100 ml		egg/l			
		Mean	Max.	Mean	Max.	Mean	Max.	95th percentile	Max.	Mean	Max.		
A	Very High-Quality Treated Wastewater	≤ 5	10	≤ 5	10	≤ 3	6	≤ 10 or below detection limit	100	–	–	Unrestricted urban irrigation and agricultural irrigation of food crops consumed raw	Secondary, contact bed filtration or membrane filtration and disinfection
B	High-Quality Treated Wastewater	≤ 10	20	≤ 10	25	–	–	≤ 200	1000	–	–	Restricted urban irrigation and agricultural irrigation of food crops that are processed	Secondary, filtration and disinfection
C	Good Quality Treated Wastewater	≤ 20	35	≤ 30	50	–	–	≤ 1000	10 000	≤ 1	–	Agricultural irrigation of non-food crops	Secondary and disinfection
D	Medium Quality Treated Wastewater	≤ 60	100	≤ 90	140	–	–	–	–	≤ 1	5	Restricted irrigation of industrial and seed crops	Secondary or high speed clarification with coagulation, flocculation

Figure 2. Part 2: Project Development. (ISO 16075-2)

THE DRIP IRRIGATION METHOD

This irrigation method offers growers the flexibility to employ either conventional or organic (intensive) production techniques, with or without machinery, in open fields or greenhouses. As such, it is a versatile system that can be quickly and easily set up. Even a child could do it! Drip irrigation doesn't require the purchase of a lot of equipment, and the components are very affordable. For these reasons, it becomes a more cost-effective solution compared to other irrigation methods in the market.

A drip irrigation system comes with numerous advantages. It can save 30% to 70% of water and can even reach up to 80% compared to other irrigation methods (*Center for Agriculture, Food, and the Environment, 2013*). It also leads to a 40% reduction in fertilizer usage, as fertilizers are directly applied to the plants (*Shamshery, 2017*). Thus, it's both an economical and environmentally friendly technique.

Drip irrigation can be used with machinery (such as tractors), but with limitations. Tools that disturb the soil could lift and damage the tubing when it's installed. Soil work should therefore be carried out between two crops or at the end/beginning of the harvest season.

This type of irrigation offers several advantages (*USGS, 2023*):

- Reduced wastage
- Minimal evaporation and runoff
- Significant water savings
- Improved and greater water absorption by the soil
- Affordable (\$)
- Easy to install
- Simple maintenance
- Replacement of small sections possible
- Integration of fertigation possible
- Can be connected to an automated control system (timer, sensors, etc.)



Figure 3. Drip irrigation system.

IN CONCLUSION

The reuse of treated waters stands as tangible evidence of our ability to find harmonious solutions between human needs, biodiversity protection, and environmental preservation. By embracing this environmentally responsible approach, we embark on a path towards a more sustainable future, where peaceful coexistence between humanity and nature becomes a reality to uphold for generations to come.

Contact our experts for the planning of your wastewater sanitation projects, including the reuse of treated waters for the preservation of potable water.