enpure

ultraBLOX™

SiC TERTIARY FILTRATION & REUSE

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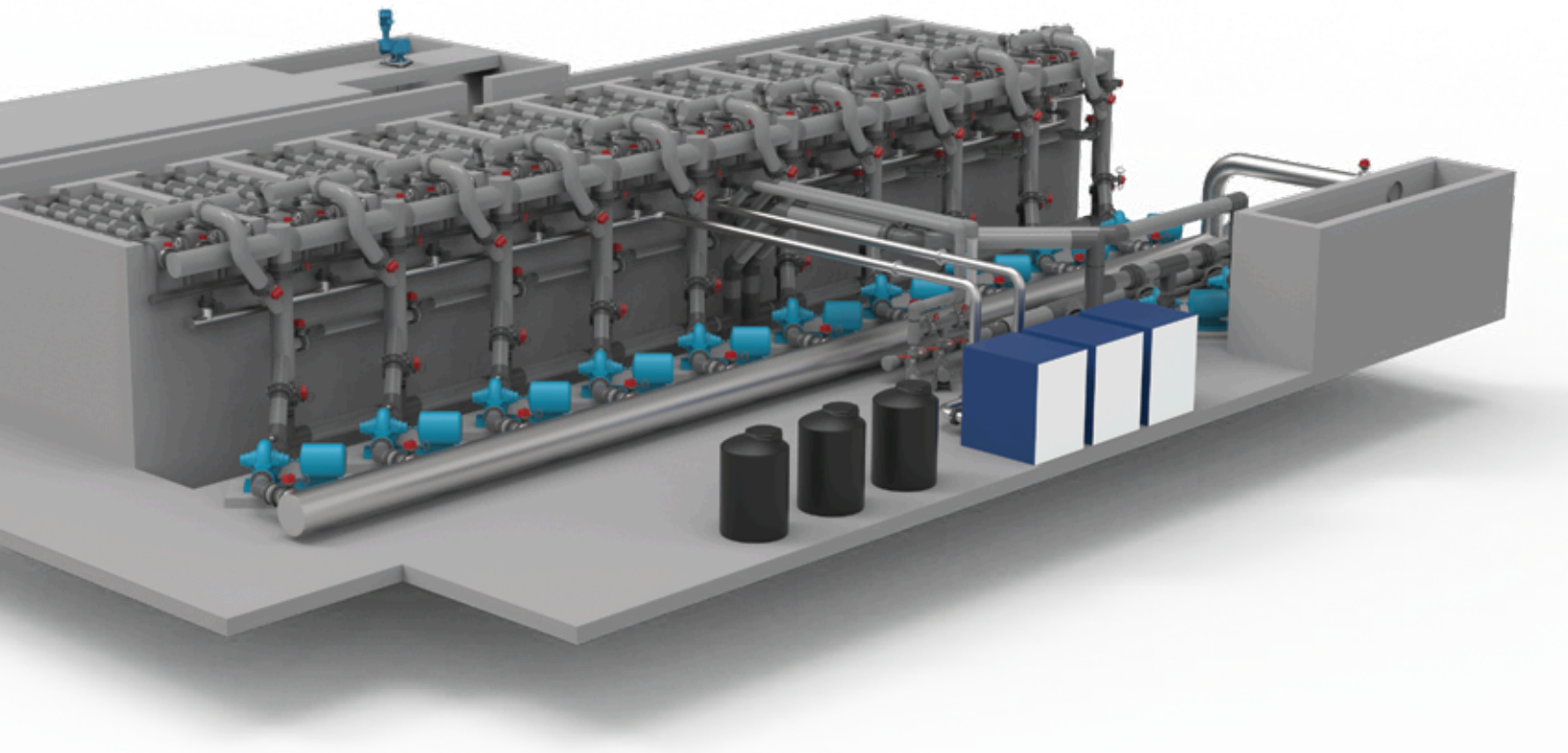
There simply isn't enough clean water in our world today. Freshwater supplies are under severe duress due to demand and pollution. What clean water we do have is rapidly vanishing as extreme droughts strengthen their grip. Simply put, we need more water! Effluent from conventional wastewater treatment plants is a readily available, reliable, and renewable resource that we don't take advantage of. ultraBLOX is the most versatile and advanced tertiary system for creating clean, pure, and safe water. Placing the SiC membrane at the final step of the plant allows you to prevent phosphorus, metals, pathogens, and other trace contaminants from passing. Reuse and discharge to our waterways is safer than ever before. By creating a new and reliable water source, ultraBLOX helps alleviate pressure on already strained water sources.



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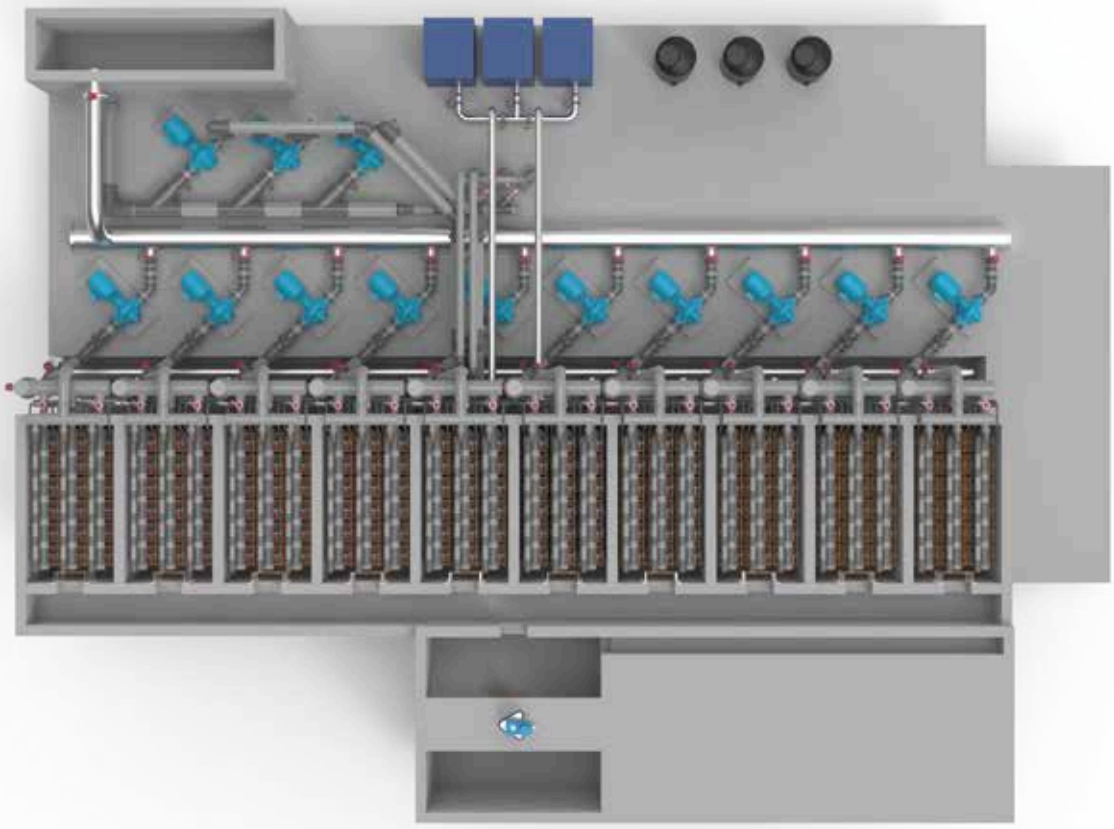


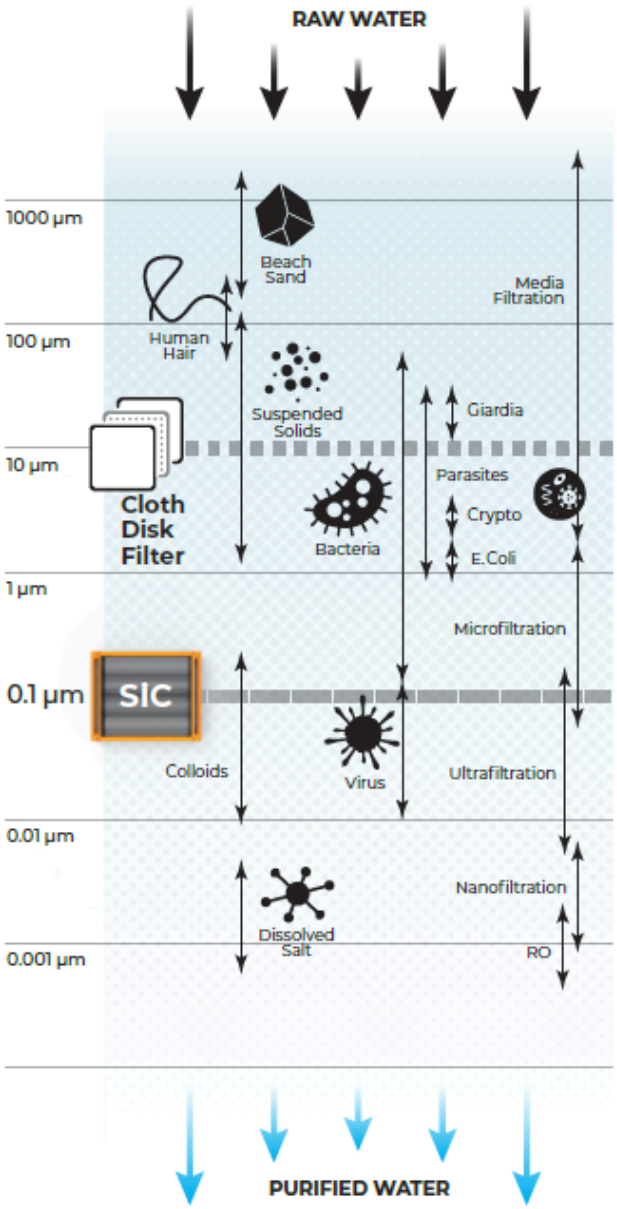
ULTRABLOX IS USED IN THE FOLLOWING MARKETS:

- Advanced treatment of secondary effluent to essentially zero solids.
- Advanced reuse such as DPR, IPR, and Title 22
- Industrial process water make-up
- UF/MF membrane plant rehab

BENEFITS OF ULTRABLOX:

- Increase capacity of existing UF/MF membrane plants
- Quick and full recovery, minimize impacts of EPS and algae fouling
- Combine with ozone, PAC, enhanced coagulation, or tertiary MBR for advanced treatment capabilities
- Takes less chemical to achieve low TP limits
- Pathogen removal
- Heavy metal removal
- Lower downstream treatment (RO, UV, etc.) costs

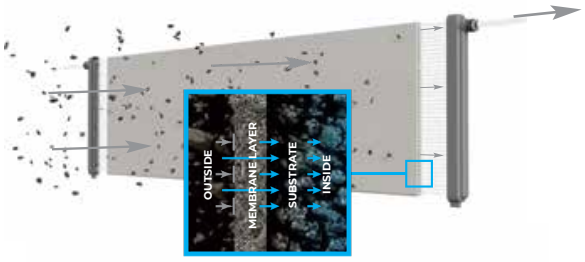
HOW DOES SiC OPERATE?



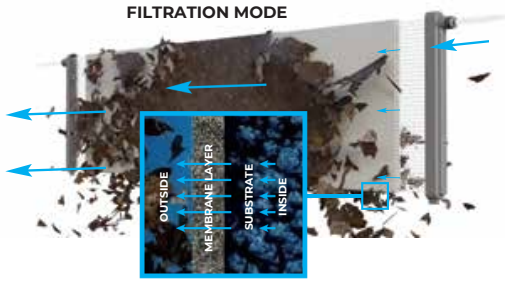
SiC is an ultrafiltration flat plate membrane used in water and wastewater applications. With a 0.1 µm pore size, SiC creates a physical barrier blocking solids, pathogens, heavy metals, and oil & grease.

A slight vacuum is applied to the membrane to pull water through the 0.1 micron membrane pores. SiC is one of the few membrane materials that is naturally and permanently hydrophilic, meaning organic foulants, including oil, are repelled by the membrane while water is naturally drawn in. SiC is also chemical inert and extremely hard, meaning most anything can be used to clean it.

Solids, pathogens, and other contaminants are blocked by the membrane pores and are retained on the surface. Periodically, water is reversed back through the membranes to dislodge and remove solids that have accumulated on the surface. In some applications, air is bubbled up in between plates to provide a scouring action which further helps keep the membrane clean. Various types of spray washes can be employed to quickly and effectively remove solids from the membrane surface. While this regeneration procedure may sound quite normal for a membrane, SiC is far superior to all others.



FILTRATION MODE



One would think filtration of secondary effluent would be a straightforward task due to low TSS and BOD concentrations, but unfortunately it is not. Secondary effluent from municipal wastewater plants presents several treatment challenges for any filtration technology.

Compared to MBRs, CAS plants typically have shorter SRTs which generates high levels of EPS which can choke off most filtration technologies. Algae blooms are also common in municipal wastewater treatment plants that quickly and easily blind off filters. To combat these treatment challenges, a resilient technology is needed to recover from such upsets completely, and quickly.

RESILIENT MEMBRANE

ultraBLOX system utilize FX series modules which were designed specifically for applications like tertiary where shrinking the membrane basin down is critical. The FX series modules have a unique cleaning process which consists of an automated spray wash, or sprinkler, system to remove deposited solids from the membrane surface.

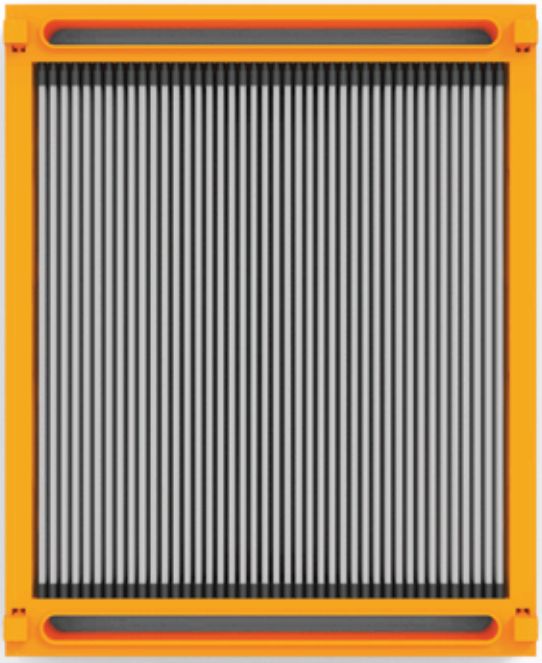
Here's how a typical clearBLOX system works for tertiary filtration:

1. At the start of each backwash cycle, the membrane basin is drained.

2. Both the backwash and sprinkler systems are activated

3. Solids are fully removed from the membrane surface and flushed from the basin.

FX SERIES



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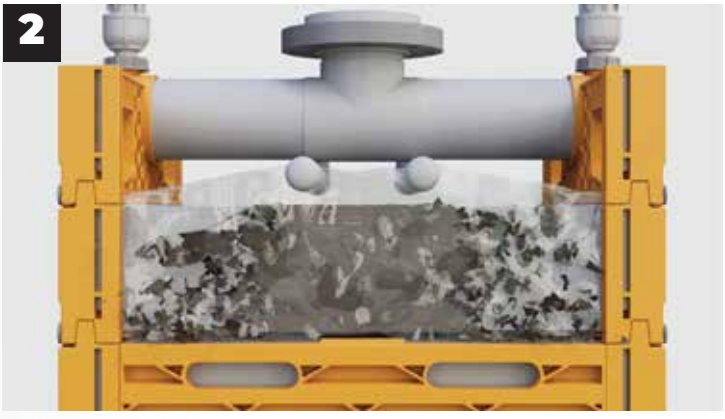

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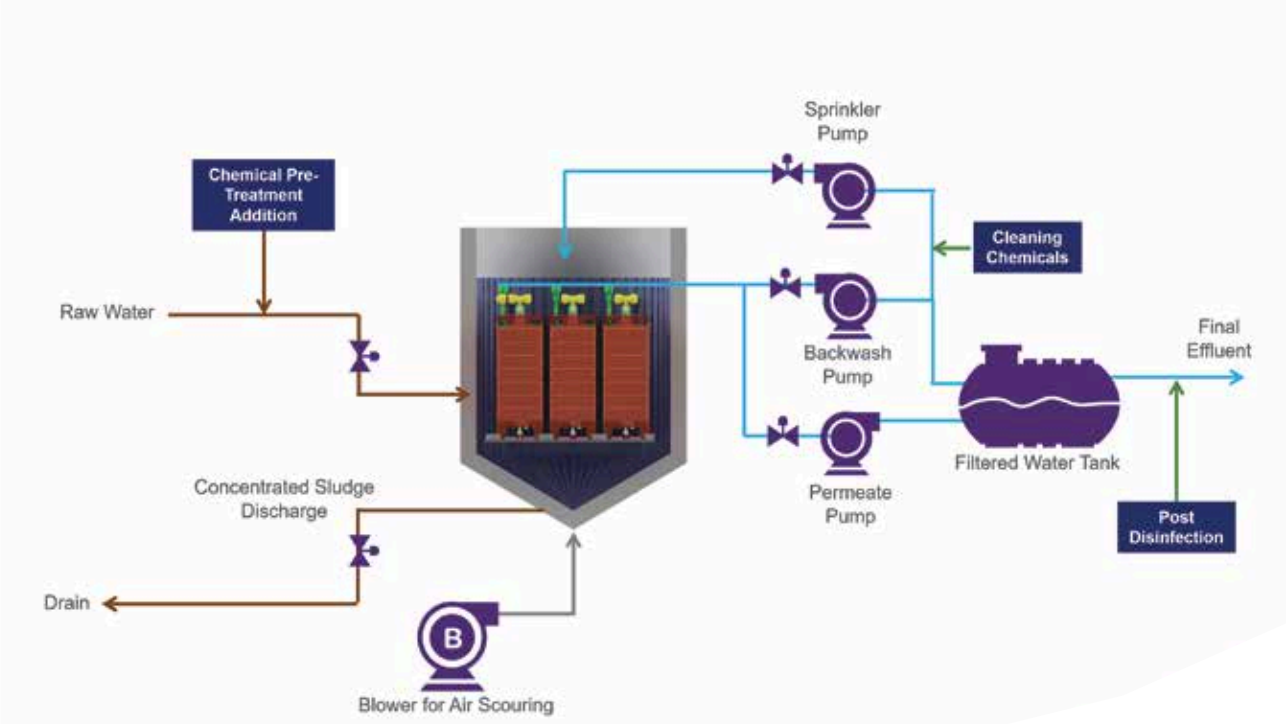
HOW DOES IT WORK?

ultraBLOX is a submerged ultrafiltration membrane processes used to treat secondary effluent for numerous reuse and effluent polishing applications. Depending on the source water quality various pre-treatment chemicals, such as coagulants or oxidants, can be added to the influent prior to the membrane basin. In some cases SiC can be combined with powdered activated carbon to effectively remove organic compounds, such as DOC and PFAS, by creating a targeted cake layer on the membrane surface.



Tertiary sources contain numerous compounds that can impact long term, sustainable membrane permeability. Whether it is organic material, TSS spikes, or heavy metals, tertiary membrane systems encounter numerous fouling mechanisms that require different cleaning approaches. ultraBLOX has the most effective set of fouling mitigation methods to ensure membrane performance is stable over its entire life regardless of feed quality, which is only made possible with SiC membranes.

Method	Backwash	Air Scour	Sprinkler Wash	Pressure Wash	Chemical Cleaning
Purpose	Solids removal	Solids removal	Solids removal	Dewatering removal	Organic, scale, metals removal
Frequency	30 to 60 min	Continuous or during backwash	Daily to weekly	As needed	Monthly to yearly

TYPICAL EFFLUENT QUALITY

ULTRABLOX IS TITLE 22 APPROVED

PARAMETER	ACHIEVABLE VALUE
Effluent TSS	<1.0 mg/l
Effluent Turbidity	<0.1 NTU
Effluent SDI	<2.0
Metal Removal	>90%
Effluent Fecal	<2.2 MPN/100 ml

Conventional tertiary plants can struggle when influent conditions have changed from the original basis of design. Increases in both EPS and TSS require more and more chemical cleaning with no guarantee of achieving required treatment goals. ultraBLOX system are able to achieve not only a much higher quality effluent than conventional systems, but do so even when influent conditions change. Regardless of what comes into the plant, ultraBLOX will always meet effluent requirements. The small footprint makes it easy to integrate into any WWTP.

WWTP Effluent Polishing

With tighter and tighter treatment limits being imposed on existing wastewater treatment plants, the need for reliable and effective polishing of existing effluent has never been greater. Whether it is TSS, total phospho- rous, or heavy metals, ultraBLOX systems are the most effective at elevating effluent quality to meet any standard.

ultraBLOX system require less chemical to achieve low phosphorous limits due to the physical barrier layer provided by the SiC membranes. The same benefit applies to heavy metal removal where effluent levels far exceed today's treatment standards.

Membrane Upgrade

UF/MF membranes have been widely used in tertiary filtration systems for decades but have experienced operational issues, especially in CAS plants that do not nitrify. In non-nitrifying plants, the biology has a tendency to slough of EPS due to young sludge age which can quickly foul any membrane downstream of the secondary clarifiers. While EPS can be cleaned, if it is a frequent fouling occurrence it can lead to a rapid decline in polymeric membrane performance.

ultraBLOX can be used to retrofit existing UF/MF tertiary plants that are struggling to meet hydraulic capacity or are suffering from membrane degradation issues. While EPS fouling is difficult to avoid entirely, the SiC membranes are easily and quickly recovered without experiencing any performance degradation.

Advanced Reuse

Advanced reuse applications, such as Title 22, potable reuse, and industrial process water, rely on a consistent high quality feed source free of contaminants. Continued concerns over bacteria and viruses coupled with emerging pollutants such as PFAS and pharmaceuticals stretch the limits of existing technologies.

By utilizing a membrane made from sand, ultraBLOX systems ensure the highest effluent quality due to the superior membrane integrity. This is particularly important when RO is used downstream as just a few broken hollow fibers can impact performance.

Additional treatment technologies, like ozone or powdered activated carbon, can be directly integrated into ultraBLOX systems to provide additional treatment for advanced reuse applications.

INTEGRATION

ul traBLOX-micro

Conventional, in-ground tertiary plants are often cost prohibitive for plants under 1.0 MGD in size. ultraBLOX- micro SiC Packaged Tertiary Plants are complete, skid mounted ready to operate systems that can be customized for a variety of flow ranges up to 1.0 MGD.

The widest operational window of ultraBLOX-micro systems make it able to address any tertiary treatment challenge.

ultraBLOX™micro

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Max capacity : 0.4 MGD

Max capacity : 0.6 MGD

Max capacity : 0.8 MGD

ultraBLOX - storm

ultraBLOX-storm is the combination of ultraBLOX and stormBLOX technologies. When coupled together, ultraBLOX-storm systems can be utilized to address high peaking issues in conventional treatment plants. During storm events, the ultraBLOX-storm system is able to achieve secondary treatment standards in an extremely small footprint. During dry weather, the ultraBLOX-storm system switches to a tertiary filtration system.

ultra storm

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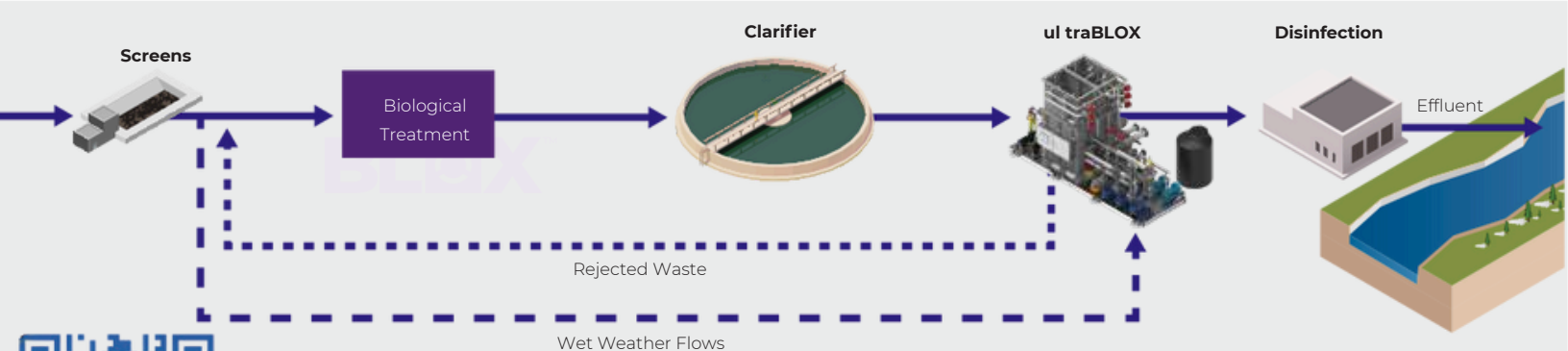

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