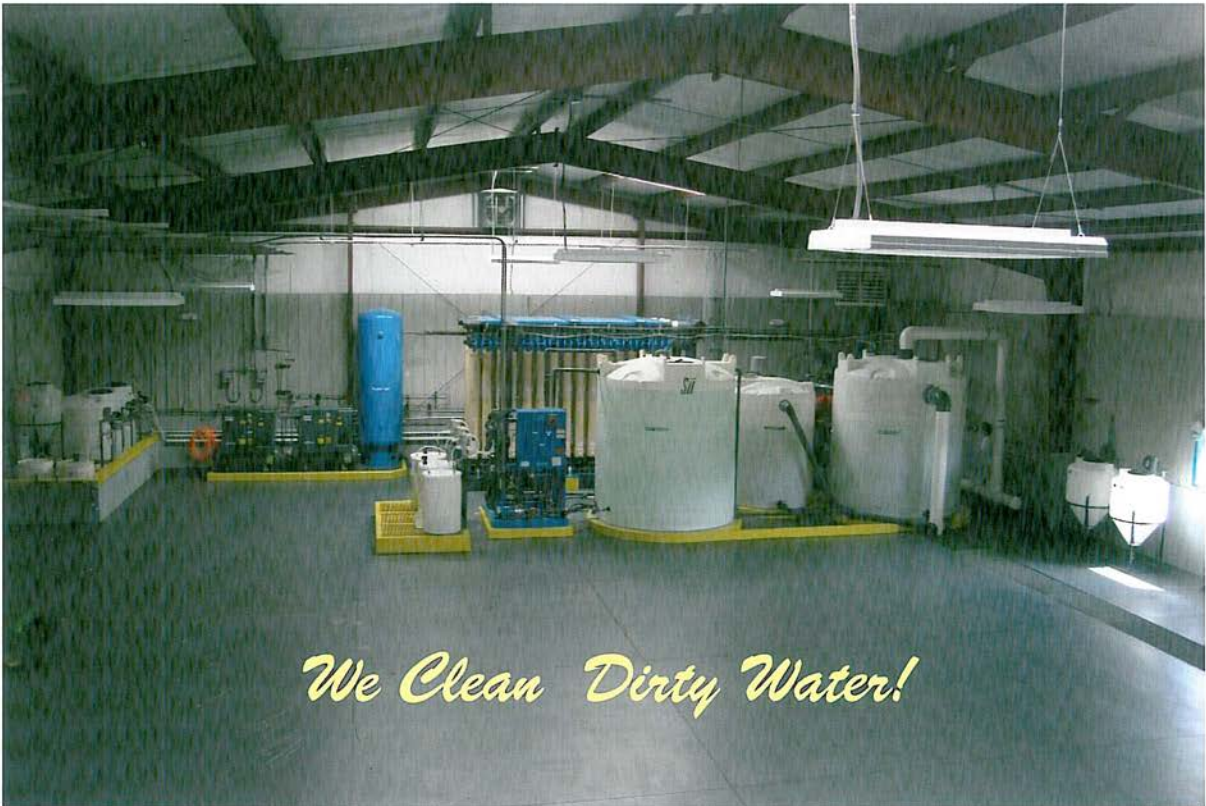


Wastewater Depot, LLC.

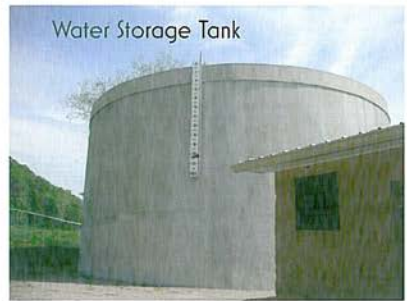
"The MBR Process"



*We Clean Dirty Water!*



Chemical Cleaning Equipment



Water Storage Tank

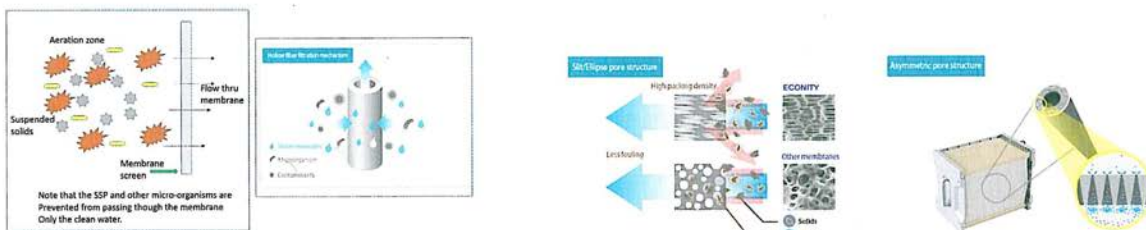
## What is the MBR Process in Wastewater Treatment?

Membrane Bioreactor (MBR) is generally a term used to define a wastewater treatment processes where a perm-selective membrane, e.g. microfiltration or ultrafiltration, is integrated with a biological process – specifically as suspended growth bio reactor.



## How Is the MBR Process Being Used

The MBR process being used in the wastewater treatment industry is a method to produce high quality effluent from a raw waste stream being discharged from the site facilities. This effluent will be of a quality high enough to be permitted to be re-used as grey water or discharged to coastal water, surface waterways or to be reclaimed for irrigation. The advantages of MBR process over conventional processes would include a small footprint and ease of upgrade or retrofit of existing wastewater treatment systems. MBR will allow the wastewater treatment system to be operated at a higher mixed liquor concentration of the suspended solids (MLSS).



## Nutrient Removal - Another Advantage of the MBR Process

In the wastewater treatment industry, nutrient removal is one of the main effluent quality concerns, especially in areas that are sensitive to eutrophication. The definition of eutrophication is - The process by which a body of water becomes enriched in dissolved nutrients (such as phosphates) that stimulate the growth of aquatic plant life usually resulting in the depletion of the dissolved oxygen in the water.

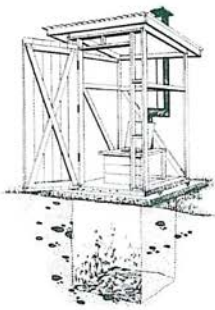
As in the conventional extended aeration wastewater treatment process, nitrification is currently the most widely used technology for N-removal from domestic wastewater. The nitrification process requires both a in combination of de-nitrification to achieve the removal of the nutrients being discharged from the effluent. This takes more tankage volume, which requires more space, and therefore is more expensive.

### Integral Tank Submerged Type

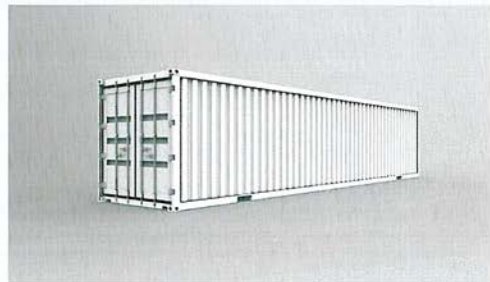
The integral tank membrane system type will be installed within the bioreactor chamber directly. The membranes can be either flat sheet or tubular, or combination of both. The membrane system is equipped with a backwash system. Its purpose is to clean the surface fouling of the membrane by water washing using the membrane permeate, pumping it back through the membrane. For membranes requiring extreme cleaning, a soak procedure will be required. This will require the membrane to be removed from the bio chamber and transferred to the cleaning tank. In addition, the membrane will have to be exposed to air washing to provide air scouring to reduce fouling.

### External and Adjacent Side Stream Type

The membrane filtration unit shall be installed externally to the bio-reactor, often in a plant room. The biomass is either pumped directly through a number of membrane modules in series and back to the bioreactor, or the biomass is pumped to a bank of modules, from which a second pump circulates the biomass through the modules in series. Cleaning and soaking of the membranes can be undertaken in place with use of an installed cleaning tank, pump and pipework.



Our industry has gone from the technology on the left to this type of treatment, cleaning wastewater for reuse with all equipment in a 40 foot container!



### Screening the Membranes

Screening requirements vary widely between the different applications for the MBR process. The hollow fiber systems have a much higher propensity for screening hair and other fibrous materials which can wrap around the membrane fibers and damaging them. For this reason WWD would recommend using a fine screen prior to the membrane system.

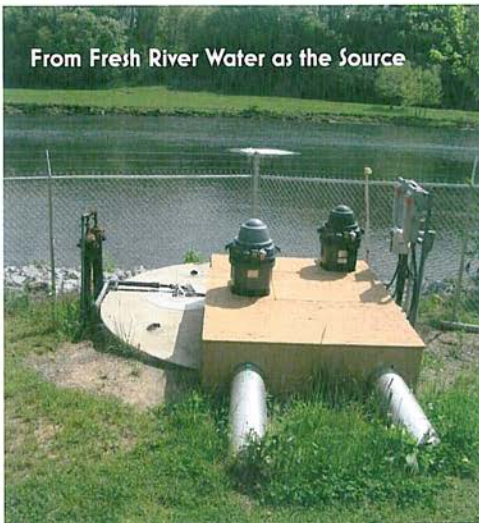
### Smaller Footprint from Conventional

The MBR system will require a reduced footprint as compared to the conventional biological system processes because it is not necessary to have a primary clarifier, additional aeration, and final clarifier for its use.

### Cleaning the Membranes

The submerged membranes shall be cleaned by the use of a coarse bubble air scour system which is used to assist in the cleaning of the biofilm collected on the face surface of the membrane fibers. For several applications, using pressure backwash procedures to eliminate the biofilm from the membrane surface is required. During the backwash procedure, as permeate flow is reversed and pumped back into the inside of the hollow fiber membranes, causes the material to be removed from the solids. In addition, chemical cleaning of the membranes may be required to remove and dislodge particles from the fibers. During this cleaning the membranes shall be placed in a chamber with concentrated chemicals and soak for a time in order to remove those particles.

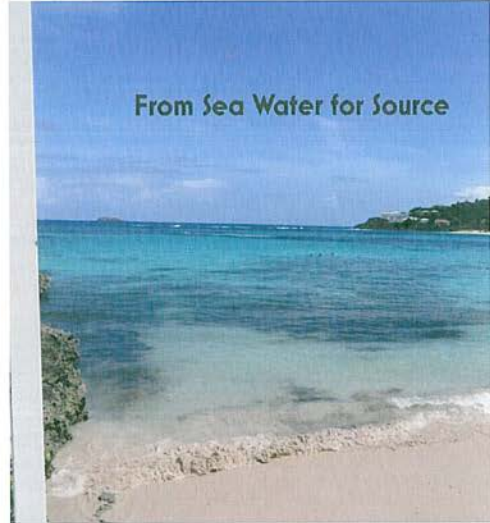
From Fresh River Water as the Source



Source Water Supply

It will be necessary to know the type of source water is being used. Fresh water, brackish water, salt water. The photos on the right and left show several applications source examples.

From Sea Water for Source



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