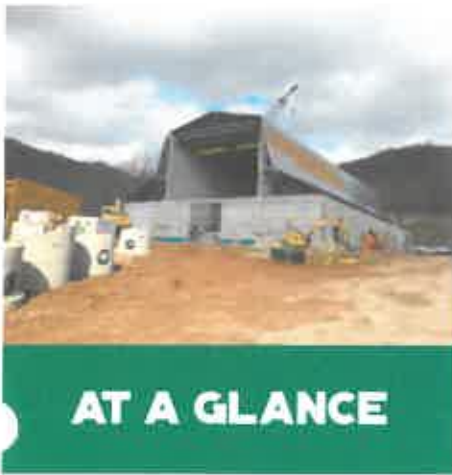


## MBR CASE STUDY

### RESORT/MUNICIPAL SNOWSHOE MTN/POCAHONTAS, WV



*Location: Pocahontas Cty, WV*  
*Influent: 225 BOD/TSS*  
*Effluent: <5 BOD/TSS*  
*Capacity: .550 MGD AADF*  
*1.6 MGD Peak Flow*  
*Year: 2017*

## BACKGROUND

Snowshoe Mountain Resort, located on Cheat Mountain in Pocahontas County, West Virginia, is a popular winter destination for snow-related activities. It has also become popular for off-peak sports such as cross country racing, golf, and mountain biking. The resort and surrounding area had previously used an aging lagoon system, that was struggling with compliance issues.

## CHALLENGE

The new system had to be hardy enough to deal with the flows that varied from an average of .1 MGD to 1.6 MGD, and deliver consistently high-quality effluent, as the plant discharges into a trout stream. To this end, the plant also utilizes a heat exchanger to comply with temperature requirements. Additionally, the plant was required to be multi-train for scalability redundancy purposes.

## SOLUTION

A3-USA built a three-train, skid mounted MBR to conform to the specifications outlined by the resort, the county and the design engineering firm. The skid was built in Pennsylvania, and delivered to Pocahontas County, ready for installation.

It was started up in early 2017.



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## MBR CASE STUDY

### PACKAGED MBR BEAR REPUBLIC BREWERY



## BACKGROUND

The production of beer extends nearly as far back in recorded human history as, well, recorded history itself. And for good reasons left here unexplored. Brewing, however, produces large amounts of wastewater that can be troublesome to deal with. Extremely high levels of organics and varying pH levels can wreak havoc on conventional treatment systems. In fact, with the explosion of popularity of microbreweries over the past decade, many municipal systems have begun imposing stiff fines and/or simply refusing to accept brewery waste over a certain volume.

## CHALLENGE

BRBC was faced with discharge limits and stiff fines for violation, and was in turn incurring expenses for having to truck wastewater to another site for disposal. A3 was asked to design a packaged MBR wastewater treatment plant

that had a small footprint, was easy to operate, and would consistently deliver effluent below the poundage required by the city. Moreover, the system needed to be delivered in a very compressed timeline. Finally, the system had to be designed to robustly handle current brewery effluent, while being flexible enough to account for an eventual anaerobic digester contracted to be installed between the brewery and the MBR.

## SOLUTION

Faced with the size constraints dictated by the brewery footprint, A3 introduced a fully modular plant design that incorporates interchangeable, skid-contained tanks. Tanks are used for equalization, aeration and membrane filtration. All process-required equipment and controls are also contained on the skid, making it a fully-contained unit. The system arrived on trucks primarily pre-assembled, and is helping BRBC stay well below its target effluent limits.



## AT A GLANCE

*Location: Bear Republic  
Brewing Company (BRBC)  
Cloverdale, California  
Influent: 6000+ BOD  
Effluent: <5 BOD PPM  
Capacity: Variable to  
BOD Loading (32,000  
process gallons capacity)  
Year: 2015*





## MBR CASE STUDY

### MUNICIPAL MBR MILLHEIM, PENNSYLVANIA



#### AT A GLANCE

*Location: Millheim, PA*  
*Influent: 350 BOD*  
*Effluent: <5 BOD/TSS*  
*Capacity: 100,000 GPD*  
*Year: 2007*

## BACKGROUND

For years, the trickling filter used by the city of Millheim had not consistently met the BOD and TSS standards for discharge into the nearby river. With a higher than normal influent strength due to several incoming industrial waste streams, it relied very heavily on a healthy biomass to produce a clean effluent. In the summer all was well. But in the winter, when the cold weather contributed to a slow and inefficient biomass, the effluent quality was greatly affected and the system was

## SOLUTION

In 2007 a MaxFlow® MBR was commissioned to replace the failing trickling filter. Because the MBR operates in a relatively high MLSS concentration (12,000-15,000), it is able to thrive even in the coldest of winters.

Since installation, the Millheim plant has been producing high-quality, superior effluent (non-detectable BOD5 and TSS) in all seasons, warm or cold.

As of late 2017, the plant is still operating at design flux with its original membranes.

## CHALLENGE

Provide a wastewater treatment solution that dealt with the city's high-strength waste while delivering consistently clean water in all seasons.



## MBR CASE STUDY

### FOOD PLANT EXPANSION ESAROM, G.M.B.H.



## OVERVIEW

Headquartered in Oberrohrbach, Austria, esarom G.m.b.H. is a producer and distributor of a variety of products for the food industry. In business for over 50 years, esarom focuses specifically on country-specific, on-site processing.

When anticipating increased production at a facility that processes food flavors, esarom decided to expand an existing, on-site wastewater treatment plant. 24 pre-assembled and pre-wired U70-002 MaxFlow® modules were installed, and the facility was expanded to meet production demands. Perhaps most importantly, the expansion was performed within the existing floor space constraints.



## AT A GLANCE

*Location: Austria*

*Influent: Food Flavor Prod.*

*Effluent: <5 BOD/TSS*

*Capacity: 66,000 GPD*

*Module: U70-002*

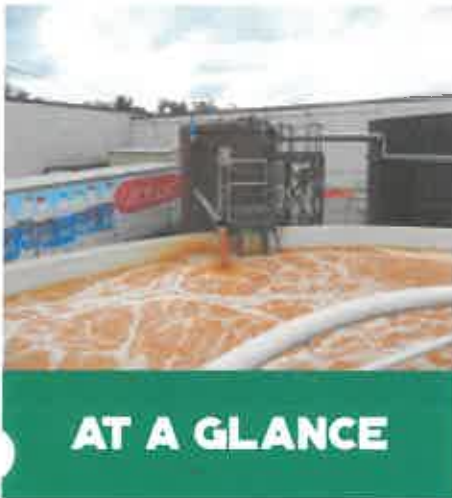


*Double-stacked MaxFlow® modules being lifted into tank*



## MBR CASE STUDY

### MEMBRANE RETROFIT COTT BEVERAGES (SODA)



### AT A GLANCE

*Location: Pennsylvania  
Influent: 18,000 BOD  
Effluent: <5 BOD/TSS  
Capacity: 52,000 GPD  
Year: 2011*

## BACKGROUND

The manufacture of soft drinks produces some of the highest levels of BOD and COD in the food and beverage processing segment. The resultant slurry is thick with – you guessed it – sugar. A soft drink manufacturer on the east coast was struggling with their discharge, and faced heavy fines and/or shutdown if their effluent didn't come into CWA compliance. Moreover, the manufacturer was operating in a limited footprint, and didn't have the ability to add acres of drainage, lagoons, etc.

## SOLUTION

Tasked with the design and build of the updated WWTP, the soda manufacturer moved forward with installation of the proprietary MaxFlow® membranes. Fourteen U70-003 units were installed into the system, which was rebuilt into an air-efficient and space-saving MBR. After proper configuration and training, the system has been delivering non-detectable BOD and TSS levels at each test, and all compliance issues have been resolved.

## CHALLENGE

Quickly provide a long-term, easy-to-operate solution that cleaned sugar water waste to acceptable standards; solution must fit within existing space constraints.



## MBR CASE STUDY

### SMALL MUNICIPAL WOLF CREEK, MT



### AT A GLANCE

*Location: Wolf Creek, MT*  
*Influent: 350 BOD, 400 TSS*  
*Effluent: <5 BOD/TSS*  
*Capacity: 16,000 GPD*  
*Year: 2014*

## BACKGROUND

The Township of Wolf Creek is a small unincorporated community in Lewis County, Montana. Wolf Creek sought a cost-effective upgrade from septic systems after witnessing other local towns struggle with coliform levels in their drinking water.

## CHALLENGE

Wolf Creek needed a system that would function reliably and consistently without continual operator oversight. Additionally, the system had to deliver a very high-quality effluent, as it discharges to a blue ribbon fly fishing stream,

which in turn feeds one of the top fly fishing rivers in the country. The system also had to meet a competitive price point for the small community.

## SOLUTION

A packaged design built around a single, baffled steel tank was selected to meet Wolf Creek's criteria. The plant was manufactured at A3's facility in Pennsylvania, and shipped complete to Montana.

The system is able to deal with seasonal flows from the community, and has been delivering very high-quality effluent, which is released into a nearby stream.



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## MBR CASE STUDY

### MEMBRANE RETROFIT PENN STATE WILKES BARRE



#### AT A GLANCE

*Location: Wilkes Barre, PA  
Influent: 300 BOD; 275 TSS  
Effluent: <3 BOD; .3 NH3  
Capacity: 50,000 GPD  
Year: 2012*

## BACKGROUND

Penn State University (PSU) is perhaps the most iconic higher education institution in Pennsylvania. Located in the picturesque northeast portion of the state, the Wilkes-Barre campus traces its history back to the early 1900s.

Prior to the installation of their new MBR, PSU Wilkes-Barre had been operating a basic aeration basin to reduce loading prior to discharge to a local tributary of the Susquehanna River.

## CHALLENGE

PSU was interested in upgrading to a more technically advanced solution, and in particular one that offered low daily maintenance with the ability for the system to run over the weekend without physical oversight. More importantly, the system had to deliver consistently clean effluent even through rain and other events affecting the flow.

Finally, it was desired that existing infrastructure be used for the new plant.

## SOLUTION

A membrane and equipment skid custom-designed for the size and space requirements was designed and delivered to the University's Wilkes-Barre campus.

The MaxFlow® membrane offered an excellent fit for achieving the project goals outlined by the University. Because the membrane is a physical barrier (allowing passage of only molecules of a certain size), maintaining a consistently clean effluent has been achieved, even through rain and upset events. Additionally, the MBR allowed the former tanks to be used as equalization basins, providing extra storage to offset rain events.

Finally, due to the rugged nature and design of the membranes and plant controls, the plant has delivered on PSU's other goals: low daily maintenance and operation without operator oversight on the weekends or holidays.



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## MBR CASE STUDY

### PACKAGED MBR MILITARY: AFGHANISTAN



#### AT A GLANCE

**Veolia Water/Norwegian Army**  
Location: Meymeneh, Afghanistan  
Capacity: 24,000-36,000 GPD  
Influent: Army camp wastewater

Design, manufacturing, and supply of a mobile containerized MBR plant for the treatment of wastewater generated by the Norwegian Army camp in Meymaneh, Afghanistan. The plant is designed to treat wastewater from 600 soldiers and constructed using three 20-foot containers. The treated effluent is used for irrigation purposes and washing cars without further treatment.



#### AT A GLANCE

**German Armed Forces**  
Location: Mazar-e-Sharif, Afghanistan  
Capacity: 1,500-3,000 pop. equiv.  
Influent: Army camp wastewater

Design, supply and operation of a containerized MBR plant consisting of 5 containers for the German military. The MBR plant is designed to treat wastewater for the German Federal Armed Forces in Mazar-e-Sharif, Afghanistan. The plant is constructed in phases. The first phase treats wastewater from 1,500 soldiers. In future phases three additional containers will be added handling 500 soldiers each.

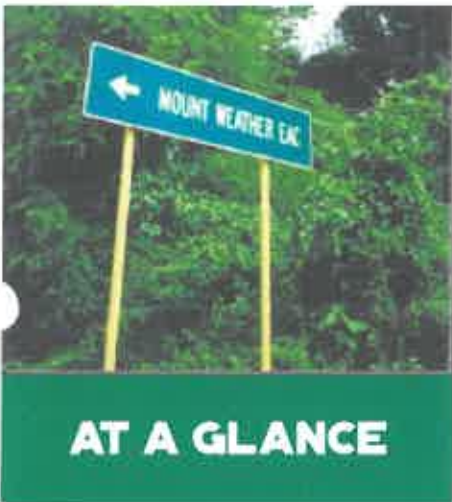




## MBR CASE STUDY

GOVERNMENT  
DEPT. HOMELAND SECURITY, VA

*Note: due to the classification level required for this project, no images from the site or plant were allowed to be taken. All images shown are taken from the public domain; similarly, all narrative below is taken from publicly-available reports.*



Location: Virginia  
Influent: --  
Effluent: <5 BOD/TSS  
Capacity: 180,000 GPD  
Year: 2017

## BACKGROUND

*The Mount Weather Emergency Operations Center is a civilian command facility in the U.S. Commonwealth of Virginia, used as the center of operations for the Federal Emergency Management Agency (FEMA). Also known as the High Point Special Facility (HPSF), its preferred designation since 1991 is "SF".[1]*

*The facility is a major relocation site for the highest level of civilian and military officials in case of national disaster, playing a major role in continuity of government (per the U.S. Continuity of Operations Plan).[2]*

*--[https://en.wikipedia.org/wiki/Mount\\_Weather\\_Emergency\\_Operations\\_Center](https://en.wikipedia.org/wiki/Mount_Weather_Emergency_Operations_Center)*

A3-USA provided an MBR plant for this facility.



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