

Delphos, OH

- Delphos plant is the second largest plant in the US in terms of rated capacity
- With a total installed cost of approximately \$31M (including digestion, solids handling, and UV), and a construction time of less than two years, the Delphos WWTP has set the bar for new large MBR facilities in the US and around the world.
- Ovivo designed the MBR System to handle average daily flows of 3.83 MGD and peak daily flows up to 6.0 MGD.
- Install cost per gallon - \$2.58



Delphos, OH WWTP

The City of Delphos evaluated several treatment options, including an oxidation ditch, when considering how to upgrade their aging trickling filter facility. Some of the factors considered in the decision making process included current and future permit compliance issues, fluctuating loading conditions, and treatment capacity. The city selected an Enviroquip MBR System using Kubota submerged membrane equipment.

Snapshot

| Description | Value | Note |
|-------------------|--|---------------------------|
| Current Status | Operational | Commissioned October 2006 |
| Client | City of Delphos | Municipal Operations |
| Market Type | Municipal | |
| Population Served | 6900 | |
| Flow | 6 MGD / 6 MGD | MMF / Full Build Capacity |
| Permit | 6-10/12/-/1-1.5/- BOD/TSS/TN/TP/Turbidity | OH Reuse standards |
| Design | <5/<5/ --/1-1.5/-- BOD/TSS/TN/TP/Turbidity | mg/L |
| Brief Description | Design and supply of Enviroquip® MBR System, to include technical support during installation and commissioning. | |

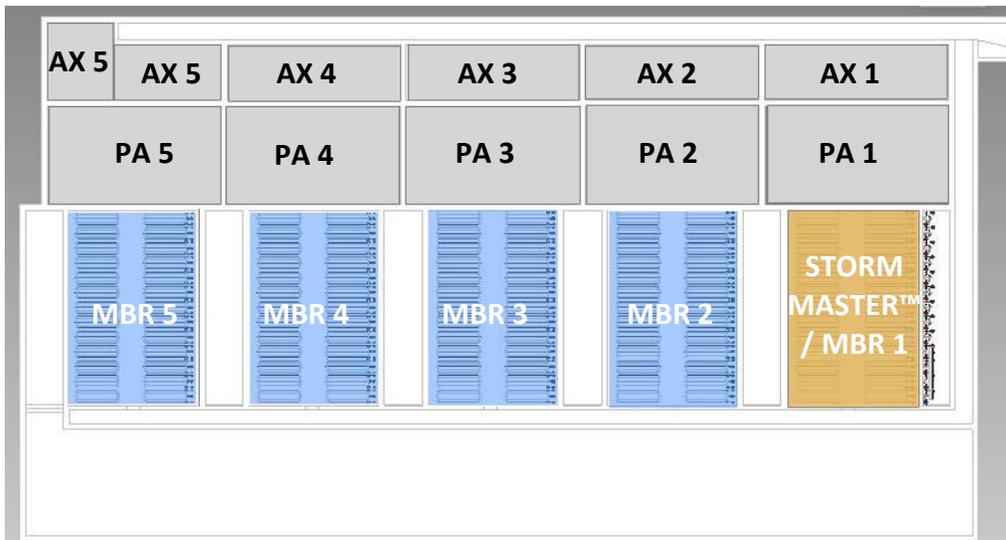
Process Description

At times, treating more flow than any other MBR system in the world, the Delphos plant is the second largest plant in the US in terms of its rated capacity of 6 MGD. Since startup in September 2006, the plant has already been put through its paces and demonstrated its capability to reliably meet permit limits.

Delphos has a sewer system that is 70% combined and 30% separate. This means that 70% of the sewers collect storm water as well as domestic and industrial waste (food processing and laundering). As a result, the new MBR system had to be designed to handle a wide range of waste and hydraulic loading.

Using the concept of *biohydraulics*, the MBR System was designed to exceed biological treatment objectives over the range of expected operating conditions. Designed using the Storm Master™ configuration, the plant is also equipped with the Symbio® technology, which helps to promote simultaneous nitrification and denitrification (SNdN) in the supplemental aeration zone.

The Delphos WWTP is comprised of five independent process trains that include one anoxic zone, one SNdN zone, and one MBR basin. In each MBR basin, there are 26 double-deck Kubota submerged membrane units (SMU).



Design Data

| | |
|----------------------|----------|
| Flow Capacity: | |
| Maximum Flow Rate: | 6 MGD |
| Max Month Flow Rate: | 6 MGD |
| Average Flow Rate: | 3.83 MGD |

Plant Data

| | |
|------------------------|-----------------------|
| MLSS: | 8,000-18,000mg/l |
| No of membrane units: | 26 |
| Membrane model: | EK400 |
| Membrane surface area: | 89,440ft ² |

Project Status

| | |
|---------------|--------------|
| Commissioned: | October 2006 |
| Operated by: | Municipal |