**Oxford Pollution Control Plant**

**Application:** Conventional wastewater treatment plant retrofit

**Capacity:**
- ADF: 3.6 MGD (13,620 m$^3$/d)
- MDF: 6.8 MGD (25,880 m$^3$/d)
- PHF: 9.0 MGD (34,050 m$^3$/d)

**Location:** London, Ontario, Canada

**Commissioning:** April 2008

**Challenge**

The city of London, Ontario is experiencing significant residential growth in the area serviced by the Oxford Pollution Control Plant (PCP). In 2005, it was recognized that the existing plant capacity needed to be almost doubled in the near-term, with a long-term future capacity of about five times the existing capacity.

In addition to the increased capacity, the expanded plant would be required to meet more stringent effluent objectives, including total phosphorus less than 0.5 mg/L, and summer ammonia less than 2.0 mg/L. It was apparent from the performance of the existing plant that tertiary filtration would likely be required in order to meet the phosphorus requirement. And, due to the relatively low alkalinity in the influent wastewater, it was apparent that the nitrification process could be inhibited, making the ammonia requirement more difficult to achieve reliably.

Several other factors were important to consider in the expansion plans for the Oxford PCP. The plant is located along a road that serves as a main link between the city and the surrounding areas. The location is also on the banks of the Thames River, along which are planned future multi-use trails and recreational areas. A golf course and several new residential areas are also a short distance from the plant site. Finally, the plant location is upstream of three First Nations communities. In order to be sensitive to these factors, the plant expansion needed to minimize the additional required footprint in order to reduce the visual impact from the road and surrounding areas, and at the same time ensure a high-quality effluent that considered the environment into which the treated effluent would be discharged.

**Solution**

An evaluation process was undertaken to compare various options for the plant expansion, including several conventional treatment options along with membrane bioreactor (MBR) technology. The evaluation process resulted in the selection of MBR technology as the basis for the expansion, and following a competitive bid process involving three membrane equipment suppliers, SUEZ was selected to provide ZeeWeed* membrane equipment for the project.
A key consideration in the selection of MBR technology was that the membranes could be installed within the former secondary clarifier tanks, and that the pumping equipment could be arranged within the existing pump gallery. This retrofit design served to greatly reduce the amount of footprint and construction cost that would otherwise be required.

In addition, selection of an MBR process ensured that the effluent quality requirements would be met consistently and reliably. A coagulant is added to precipitate dissolved phosphorus compounds, and the ZeeWeed ultrafiltration membranes, with a pore size of 0.04 microns, ensure removal of virtually all suspended solids, resulting in effluent total phosphorus concentrations well below 0.5 mg/L. In addition, MBR systems allow for precise control of SRT, and this, combined with the inclusion of anoxic zones to increase the alkalinity of the process, ensures that the effluent ammonia requirements will be met year-round.

A final consideration was that the expansion and upgrade needed to be affordable. A detailed cost comparison between the conventional treatment option and MBR technology was performed, and it was found that the 20-year life-cycle costs of the two options were comparable. Key factors in the MBR design that resulted in a favorable capital cost were that much of the existing infrastructure could be reused, and that the membranes themselves could be placed within existing tanks.

**process overview**

The retrofit of the Oxford PCP from conventional to MBR technology occurred with the plant staying in operation throughout the construction process.

- New 2-mm drum screens were added to the pretreatment processes.
- Primary clarification capacity was increased.
- An additional aeration tank was constructed.
- ZeeWeed membranes were installed into the former secondary clarifier tanks. The membranes were assembled into six trains, with four ZeeWeed 500d cassettes installed per train.
- UV disinfection capacity was increased, due to the increased flow rate.
- A ZeeWeed membrane sludge thickener was added for WAS thickening.