



*Aerial view of Northern Moraine Wastewater Reclamation District*

# Northern Moraine Wastewater Reclamation District

By Eric Lecuyer & Todd Sheridan

The Northern Moraine Wastewater Reclamation District, or NMWRD, was formed in 1969 under the 1917 *Illinois Sanitary District Act* for the purpose of providing regional wastewater services to the communities of Island Lake, Lakemoor and Port Barrington, Illinois. Located in northeastern Illinois, the District straddles southwestern Lake and southeastern McHenry counties. The District has a very large service area with a facility planning area of 16,700 acres, of which 3,700 widely spaced acres are currently within the corporate boundaries. The District's facilities were originally constructed in 1978 when the District was known as the Island Lake Sanitary District with the name of the District changed in 2003 to better reflect the regional nature of the District and distinguish the District from the individual villages it serves.

The collection system initially consisted of two lift stations in Island Lake and has grown over the years to be comprised of 22 lift stations and over 75 miles of sewers. A low pressure sewer

system was constructed to provide service to the riverside Village of Port Barrington, to replace failing and flood-prone septic systems that were causing health and environmental concerns. The District owns and operates over 200 grinder pump stations that serve individual lots, vastly adding to the operations, maintenance and replacement burden on the District. The entire collection system is relatively modern and constructed of modern pipe materials including plastic truss pipe, PVC and HDPE materials with even the oldest parts of the system being less than 34 years old. As a result, there is very little inflow or infiltration and since the District has no significant industrial users, residential grease presents the main operation and maintenance challenges within the collection system. The District has recently completed a full system televising project wherein Red-Zone Robotics completed CCTV televising of all previously un-inspected pipes as well as inspections of each of the District's 1,505 manholes. The District's

operating staff, under the direction of Operations Supervisor Todd Sheridan, did a tremendous job of preparing for the televising project by cleaning more than 80% of the entire collection system in approximately six months using the District's Vactor and jetting equipment. Much of the work required access to remote lake front manholes and the need to drag hundreds of feet of hose through side yards. With this project complete and the powerful software included in the RedZone program, the District has completed many elements of a successful CMOM program.

The resource recovery facility is situated in an unincorporated area just south of the Village of Island Lake. The plant currently utilizes only eight acres of a 31-acre parcel, so there is more than adequate room for expansion. The plant is bordered on the north and west by a protected wetland that stretches to the Fox River and a scattering of residences to the south, the nearest being a quarter-mile away.

The original 1.2MGD plant constructed in 1978 consisted of a comminutor, raw pumping and two 78-foot diameter Topco contact stabilization package plants, followed by seasonal gaseous chlorination and a 4,500 foot, 30 inch outfall pipeline discharging through a submerged structure in the middle of the Fox River. In 1991 sulfur dioxide gas dechlorination was added due to IEPA requirements, and in 1992 the comminutor was replaced with a 31-inch Rotamat fine screen.

By 1998 the plant was nearing capacity, was over 20 years old and could not meet the newer ammonia nitrogen limits. The District commissioned a design-build project that increased the capacity of the plant and added treatment units needed to meet more modern discharge standards for BOD, Suspended Solids and new criteria for ammonia nitrogen. Nearly every part of the process was upgraded or replaced during the expansion completed in 1999.



NMWRD Clearspan

The existing Rotamat was supplemented with a higher capacity 40-inch unit and the four raw sewage pumps were replaced with higher capacity VFD driven units. A two ring, 1.2MG oxidation ditch with Orbal disc aerators was constructed and the original package plants were repurposed to serve strictly as aerobic digesters. The existing coarse and fine bubble diffusers were left in place in the repurposed digesters and one section was converted into two small gravity thickeners for solids stabilization and management.

Two new 85-foot secondary clarifiers and a 4MGD RAS pump station were placed online, as was a new chlorine contact tank. The chlorine and sulfur dioxide gas building was constructed adjacent to the new contact tank. A sludge handling building was constructed to house a 1.5 meter Komline belt filter press as an alternative to the existing drying beds. The resulting dried Class B sludge is stored onsite and ultimately land applied on area farms providing for beneficial use of this recovered resource.

Plant capacity was increased from 1.2 MGD to 2.0 MGD DAF, 5.0 MGD DMF, and the ammonia nitrogen being discharged was reduced from 20mg/l down to an average of 0.075mg/l. Thanks to good planning foresight, the clarifiers, RAS station and oxidation ditch were designed to be easily expanded to 3.0 MGD with BNR capability, but with the current flow just above 50% of design and population projections within the service area make it unlikely that a capacity expansion will be needed for 20 or more years.

Over the past three years, the District has completed a number of projects to enhance safety and customer service as well as improve facility operations and efficiency.



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NMWRD Covered Digesters

The District purchased the small horse farm adjoining the East boundary of the plant site and converted the house to an administration building and boardroom. The administrative office was relocated from the control building at the plant site and features a drive up window for the convenience of many customers who make payments in person.

In order to reduce safety risks, the District's operators converted the chlorination and de-chlorination system from gaseous chlorine and sulfur dioxide to a far safer liquid sodium hypochlorite and sodium bisulfite feed system. The District's operating team devised and constructed the system entirely in-house.

A Centrisys decanter centrifuge has been installed as the main sludge dewatering process, while the aging belt filter press serves as a backup unit. The centrifuge can also be used for mechanical thickening of sludge during the aerobic digestion process, reducing the District's



L-R: Tony Sahs, Bryan Gainer, Todd Sheridan, Eric Lecuyer, Russ Nelson and Andy Peterson.

dependency on good settling sludge and a good quality decant to create the volumetric capacity needed for waste activated sludge.

A section of the drying beds used for dewatered sludge storage has been covered with two ClearSpan engineered fabric covers to prevent the dewatered sludge from being rewetted by rain or snow. The covers provide for a minimum of nine months of storage and the results have been vastly reduced odors and very dry, high quality and easily handled sludge for land application.

The two existing aerobic digesters have been completely rehabilitated. The original package plant equipment was removed and a new Sanitaire full floor medium bubble aeration system and aluminum covers have been installed on each tank. This enhancement has provided much more digestion capacity, easily meeting the temperature design criteria, even during the extremely

bitter winter of 2013-14. The digestion process is so efficient that massive solids reductions have been experienced, vastly reducing the need to dewater sludge. A new high efficiency centrifugal blower with an 180hp VFD-controlled motor was included and is expected to use 33% less power than the three existing blowers combined, while meeting the aeration requirements for the digesters. The existing blowers will be relegated to back up units. The District was awarded a grant from the Illinois Clean Energy Community Foundation that will provide for 4.5-year payback for the high efficiency blower, based on energy savings.

An existing twenty-one year old 31" Rotomat screen has been replaced with a 36" Lakeside perforated plate screen to enhance removal of debris and non-treatable material from the influent. Design is under way to add variable frequency drives (VFDs) the Orbal disc motors for improved dissolved oxygen

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NMWRD Centrifuge



NMWRD Oxidation ditch - clarifiers

(D.O.) control and additional energy savings. The enhanced D.O. control will aid in the future undertaking of biological nutrient removal needed to meet pending phosphorus removal limits.

The District's staff consists of three highly experienced and dedicated operators, Andy Peterson, Russell Nelson and Bryan Gainer, led by Operations Supervisor Todd Sheridan. The operators are fully cross-trained and are responsible for the operation, maintenance and repair of the treatment facility and the entire collection system. With the initiation of an aggressive preventative maintenance program, system reliability remains very high with equipment failures being very unusual. A part-time lab technician performs most of the required monitoring for process control and compliance reporting with the three operators filling in and assisting with lab work when needed. District Clerk Maria Carrera and Assistant Clerk Debi Martin handle all of the administrative work including the monthly billing of the District's 5,000 customers, while District Manager Eric Lecuyer does his best to try to take credit for the outstanding work completed by the District's staff. The District is governed by a five member Board of Trustees that is highly committed to the District's success and sustainability and recently endorsed a long range Capital Improvement Plan intended to assure that funding is available to repair, replace or renew facilities and equipment as they reach the end of their useful lives.

The Northern Moraine Wastewater Reclamation District has an outstanding compliance record and constantly seeks to provide exceptional customer service. The District is committed to the professional development of its small staff with the operating staff frequently attending local operator meetings as well as seminars and other training opportunities. Operations Supervisor Todd Sheridan is looking forward to serving on one of the Central States Operations Challenge teams and the opportunity to compete at WEFTEC in New Orleans this fall. [CS](#)

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