

WATER RECLAMATION AND HEAT RECOVERY SYSTEM

Macdonald Island Park, Fort McMurray, Alberta, Canada

The Regional Municipality of Wood Buffalo (RMWB) has awarded Natural Systems Utilities (NSU), Titus Infrastructure Services and the associated Project Team a \$13.6M contract to design and build a water reclamation and heat recovery facility on Macdonald Island providing 60,000 gpd (227m³/d) of treatment and reuse capacity with equalization and storage for events. This project represents the first integration of direct water reuse with a Titus District Energy



Sharing System (DESS). Services include detail design, permitting, fabrication, delivery, installation and commissioning with project substantial completion scheduled for November 15, 2014. This project will reduce capital expense by \$3M as compared to the conventional wastewater approach while also allowing for water and energy recovery opportunities.

Triple Bottom Line Impacts

- ❖ Reduce indoor potable water use by 30%
- ❖ Reduce wastewater flow to grid by nearly 100%
- ❖ Utilize 100% reclaimed water for golf course irrigation
- ❖ Reduce surface water diversions by 20 MGal per year
- ❖ Recover 240kW of wastewater heat energy
- ❖ Reduce 605 tCO₂e greenhouse gas emissions
- ❖ Reduce capital expense by \$3M

Macdonald Island is located in the RMWB, immediately north of Fort McMurray, Alberta, Canada at the junction of the Snye, Athabasca and Clearwater Rivers. It is currently home to a sports complex that contains three (3) ice arenas, twelve (12) curling rinks, a fitness center, golf course, and an Olympic size swimming pool. Wastewater is conveyed via gravity sewer across the Snye River to downtown Fort McMurray where it is transported via a lift station and force main to an existing centralized treatment plant located on the west bank of the Athabasca. The Macdonald Island golf course receives its irrigation water from the Snye and Clearwater Rivers and uses an average of 20 million gallons (75,708 m³) through the season from May to September. Plans to expand the sports

complex, referred to as Shell Place, include an additional football, soccer, and baseball stadium with capacity for 6,000 - 8,000 spectators along with a proposed 200-unit hotel. Projected wastewater demands for this recreational development exceed the capacity of the existing centralized collection system and would have required directional drilling improvements under the Snye River.

This distributed water treatment and recycling system with heat recovery for MacDonald Island will reduce total indoor potable water use by approximately **30%** (**50%** for the proposed hotel) and reduce wastewater flow to the centralized facilities by nearly **100%**. In addition, diversion from the Snye and Clearwater Rivers for golf course irrigation will also be reduced by up to **100%** by utilizing reclaimed water. This will increase stream flow within the Snye River which is reported to



have environmental concerns with decreasing flow. Energy will be recovered from the treated water before reuse and will be used to heat the indoor pool facilities. The peak energy recovery from the treated water heat system is estimated to be 240kW. The integrated ice

plant refrigeration heat recovery is estimated to peak at 263kW, displacing a total of **2,570 MWh** and resulting in a reduction of **605 tCO₂e** greenhouse gas emissions for RMWB.

PROJECT PARTNERS

Maple Reinders

www.maple.ca

DEC

www.engineeringsustainability.com

newterra

www.newterra.com

Sterling Cooper

www.sterlingcooper.com

OPUS Stewart Weir

www.opussw.com

S+A Falcon

www.smithandandersen.com

Hood Technical

www.hoodengineering.com

The project aims is to provide the lowest impact design and construction while supporting the RMWB intent for low energy and low emissions, to demonstrate world leading sustainable operations in the region. Additional goals include minimizing the Life Cycle Cost for the combined water-energy systems considering district energy and direct water reuse systems. Macdonald Island will serve as the pilot for a Neighborhood Energy Concept which RMWB has recently issued a Request for Expression of Interest on, including a total of 15 projects within Fort McMurray.