

Canadian Consulting Engineering Awards 2011

20

RANGE ROAD 14

Regional Septage Receiving Station and Forcemain

CATEGORY: WATER RESOURCES

TWP ROAD

TWP ROAD 392

RANGE ROAD 12

Sylvan Lake



Stantec

Regional Septage Receiving Station and Forcemain

CATEGORY: WATER RESOURCES

PROJECT HIGHLIGHTS i

Wastewater collections systems can be very costly to construct and without a sufficient return on investment either through developer levies and/or end user unit rates, it is very difficult for municipalities to justify their construction. However, the provincial government has demonstrated that if such projects involve wastewater collection and transmission to an urban wastewater treatment plant, the province can provide significant funding to support that initiative. Versus independent wastewater systems, a regional wastewater system realizes a number of cost saving and treatment benefits.

The Sylvan Lake Regional Wastewater Commission (Commission), formed in 2008 as a branch of the Sylvan Lake Regional Partnership, represents two counties and six municipalities to address the wastewater issues affecting the surrounding Sylvan Lake area. Ultimately, the project will involve the total collection of wastewater from all the surrounding communities around Sylvan Lake for treatment 22 km east at the City of Red Deer Wastewater Treatment Plant. This submission focuses on the conception and construction of the first leg of the project as it represents the consensus and cooperation of a variety of stakeholders, addresses immediate environmental regulatory changes, and demonstrates how a consultant's adaptability in managing a changing scope can add value at all phases of a project.

Adjacent to Sylvan Lake are a number of Summer Villages. Currently each dwelling in most of the Summer Villages are required to maintain their own wastewater collection tanks. For a variety of long term environmental reasons, the Commission was interested in constructing a regional wastewater system to encourage each of the Summer Villages to install internal wastewater collection systems with a communal storage tank and lift station for connection to the regional pipeline. The full system was projected to cost \$74M - \$83M and the system would need to be phased to qualify for provincial funding.

In 2009, the Commission engaged Stantec to author a pre-design report to determine the viability of the existing Town of Sylvan Lake Wastewater Treatment Plant (SLWWTP) for interim wastewater treatment services until such time a regional wastewater transmission pipeline is constructed to the City of Red Deer Wastewater Treatment Plant. Alberta Environment has noted that wastewater discharges upstream of the City of Red Deer WWTP will be phased out. As such, the Town of Sylvan Lake WWTP, which discharges into Cygnet Lake, and in turn outlets into the Red Deer River upstream of the City, is not considered a long term viable option for regional wastewater treatment. Stantec evaluated the SLWWTP in the context of interim regionalization and recommended a number of minor upgrades to the SLRWWTP in that report.

Alberta Environment supported the interim recommendation and under Alberta Transportation's Water for Life funding program, funding was approved and Stantec was commissioned to proceed with the detailed design. However, concurrent to the efforts of Stantec and the Commission, Alberta Environment was also in the process of phasing out regulations regarding the dispersal of septage in open fields.

Septage haulers can receive special permission from Alberta Environment to dump septage on open fields but unregulated dumping has been reported by municipalities. Since the septage receiving station (SRS) in Sylvan Lake was consistently at capacity with recreation vehicle use, the municipalities responded to the change in regulation by requesting a new SRS to be constructed. Stantec reviewed several locations for the SRS focusing

Regional Septage Receiving Station and Forcemain

CATEGORY: WATER RESOURCES

PROJECT HIGHLIGHTS ii

on existing infrastructure and capital costs and recommended the station be located outside the Town of Sylvan Lake. By locating the SRS outside of Sylvan Lake, revenue can be generated for the Commission through user rates and reinvested into the regional system and the SRS can receive regional wastewater flows until the full regional transmission and the collection systems are in place. Realizing this added value, the Commission requested Stantec shift from a detail design of the Sylvan Lake WWTP Interim Upgrades to recommending a SRS location and pipeline alignment.

After reviewing several routes, Stantec recommended a septage receiving station north of Sylvan Lake to pump waste through a 13 km horizontally directionally drilled forcemain located within existing County Road allowances to the Sylvan Lake wastewater treatment plant. By only allowing horizontally directional drilling as a construction method, no roads were closed for construction and the Commission was able to negotiate a right of way within the counties road allowance, thus avoiding the risk of an unfavorable land acquisition process. Spin off benefits of construction within an existing developed road allowance include next to no disturbance of undeveloped land, farmland and wildlife.

During the detail design phase, one county revealed that the design alignment is adjacent to an existing development corridor and requested through the Commission that Stantec review the pipeline design and their proposed development with focus on cost sharing opportunities. Stantec conducted the review and recommended the inclusion of a provisional oversize option in the tender. The Commission approved the recommendation and two schedules (basic and oversize) which were tendered with costs shared with the County and Commission. This added value to the project by allowing the County to save potentially millions of dollars in engineering and construction costs without breaching the Government's funding conditions for the Commission.

The SRS was constructed in 2010. It is currently in operation generating investment revenue for the next regional phase, the County is able to connect their new developments into the regional system and septage haulers can adjust to the changing regulations. Through construction, no roads were closed allowing the peak summer recreational traffic to access the lake unrestricted and no farmland or undeveloped land was disturbed.

Although wastewater collections systems can be very costly, the cooperation of a variety of stakeholders ensured a successful first step to a fully regionalized wastewater system.

Regional Septage Receiving Station and Forcemain

CATEGORY: WATER RESOURCES

PROJECT DESCRIPTION 1

Project Background

The population and economic activity in the central Alberta region continues to increase significantly with development. The result are needs for wastewater treatment expansion not only in areas already served by existing public systems, but also within new areas where public wastewater services do not yet exist. In many municipalities there is an immediate and urgent need to increase wastewater treatment capacity and in almost every municipality of the central Alberta Region, significant upgrades and expansions will be required to meet long-term wastewater treatment needs.

Providing for expanded treatment capacity could continue to be addressed by municipalities on an individual or stand-alone basis but the challenges and opportunities clearly favor a cooperative, regional approach. The decision of the Government of Alberta to prohibit the continuous release of treated effluent into the Red Deer River upstream of the City of Red Deer has removed the option of independent solution from municipalities south and west of the City of Red Deer. These municipalities have been moving ahead with the planning of regional projects. For municipalities to the west and north, regional solutions, while not mandated, are seen by municipalities as clearly desirable options for wastewater treatment and offer the opportunity to look at a common solution.

Providing for expanded treatment capacity could continue to be addressed by municipalities on an individual or stand-alone basis but the challenges and opportunities clearly favor a cooperative, regional approach.

Beginning in 2005 with the Concept Study sponsored by Alberta Environment, and continuing with the 2007 Concept Refinement Study funded by Alberta Infrastructure and Transportation, central Alberta municipalities have been examining and developing the concept of a system that would:

- Provide wastewater treatment at a single major treatment facility located at or near the City of Red Deer which will discharge treated effluent downstream of the water supply intake; and
- Convey, by way of three major transmission mains or legs, untreated sewage effluent or wastewater from the municipalities to this central treatment facility.

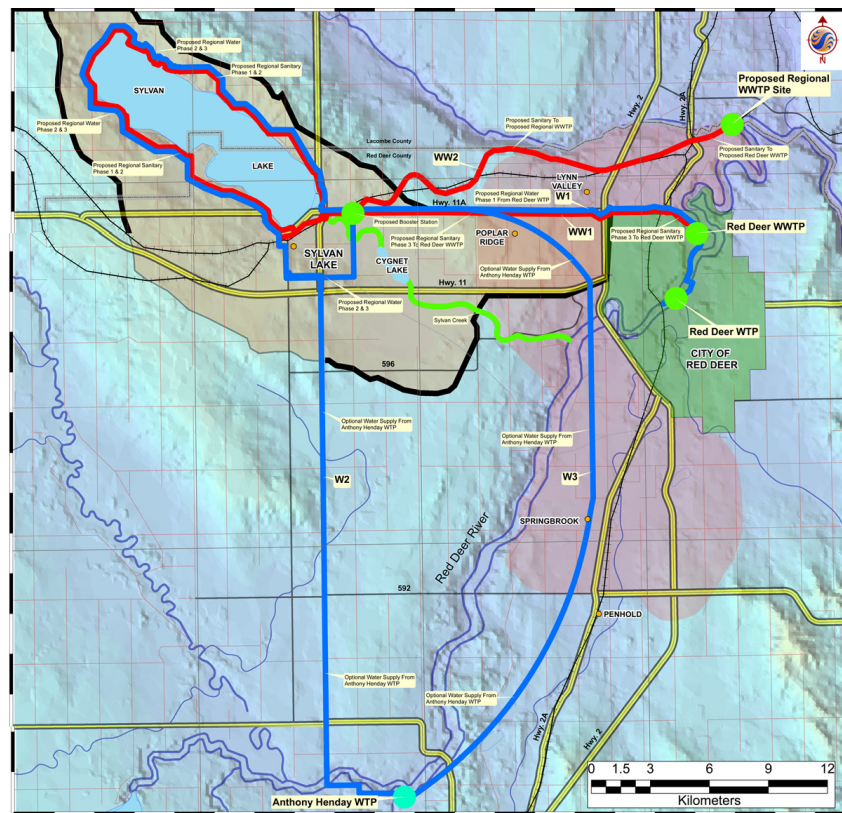
The Sylvan Lake Regional Wastewater Commission (Commission), formed in 2008

Regional Septage Receiving Station and Forcemain

CATEGORY: WATER RESOURCES

PROJECT DESCRIPTION 2

as a branch of the Sylvan Lake Regional Partnership, represents two counties and six municipalities, and was created to address the wastewater issues surrounding Sylvan Lake. The Commission's goal is to develop and operate the west leg of the regional system in accordance with the CARWW System Master Plan.



Shown in "red" are two wastewater regionalization options considered in the SLRPI Feasibility Study

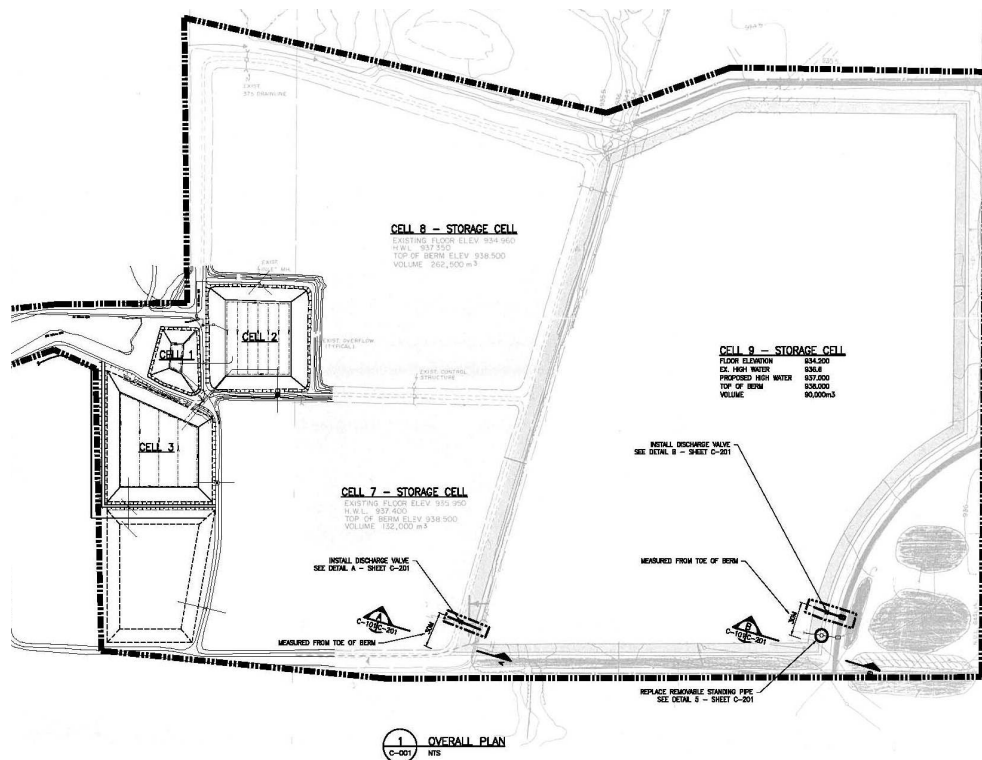
Regional Septage Receiving Station and Forcemain

CATEGORY: WATER RESOURCES

PROJECT DESCRIPTION 3

Stantec is the Commission's engineering consultant and advisor to the Commission's Technical Committee. Responsible for advising the Commission on technical matters, Stantec has planned, designed, and project managed hundreds of kilometres of regional water and wastewater systems in central Alberta. Stantec also provided additional benefits that were incorporated into our solutions, exceeding the Commission's expectations.

Since, Alberta Environment mandated no new continuous wastewater discharges upstream of the City of Red Deer WWTP, the Commission engaged Stantec in 2009, to author a pre-design report and evaluate the existing Town of Sylvan Lake WWTP facility for interim wastewater treatment services. It was Stantec's determination that the Town of Sylvan Lake WWTP discharges into Cygnet Lake, and in turn outlets into the Red Deer River upstream of the City and therefore, could not be considered a long-term viable option for regional wastewater treatment. However, Stantec also evaluated the facility in the context of short-term (5-7 year) regionalization until the regional line to Red Deer could be constructed.



Proposed improvements to the Sylvan Lake Wastewater Treatment Plant included lagoon upgrades that would allow the cells to drain within the regulated discharge time



Regional Septage Receiving Station and Forcemain

CATEGORY: WATER RESOURCES

PROJECT DESCRIPTION 4

The recommended facility improvements included the following upgrades:

- Upgraded headworks lift station pumps to service the required capacity;
- A new connection line and valve between the storage cells #7 and #9;
- A twinned Cell #9 discharge line to increase the discharge flow (during their seasonal discharge, operators are unable to fully drain the lagoons within the regulated window to do so); and
- A raised Cell #9 overflow to increase the cell's capacity.

Alberta Environment was able to support the short-term interim recommendation to upgrade the WWTP because Stantec's solution addressed the Town's inability to discharge its lagoons in the allotted time. Under Alberta Transportation's Water for Life program, funding was approved and Stantec was commissioned to proceed with the detailed design of the upgrades.

Until the Summer Villages construct a sanitary collection system, each dwelling is responsible for maintaining its own septic tanks. It is common for private septage haulers to be contracted to vacuum and clean these tanks. In the past, septage haulers could receive special permission from Alberta Environment for the land application of septage on specific, pre-selected sites, but unregulated dumping has been reported.

Alberta Environment has outlined five priority goals on septage management to eliminate risks of septage mismanagement impacts on human and environmental health. [Three of the five] require the following:

- Disposal of septage at approved wastewater facilities as a general rule;
- Creation of the infrastructure needed for effective liquid waste management (society's investment in liquid waste management should be equivalent to its investment in solid waste management); and
- Identification of specific sites and situations where application of septage to land is allowed in the absence of reasonable access to wastewater treatment facilities.

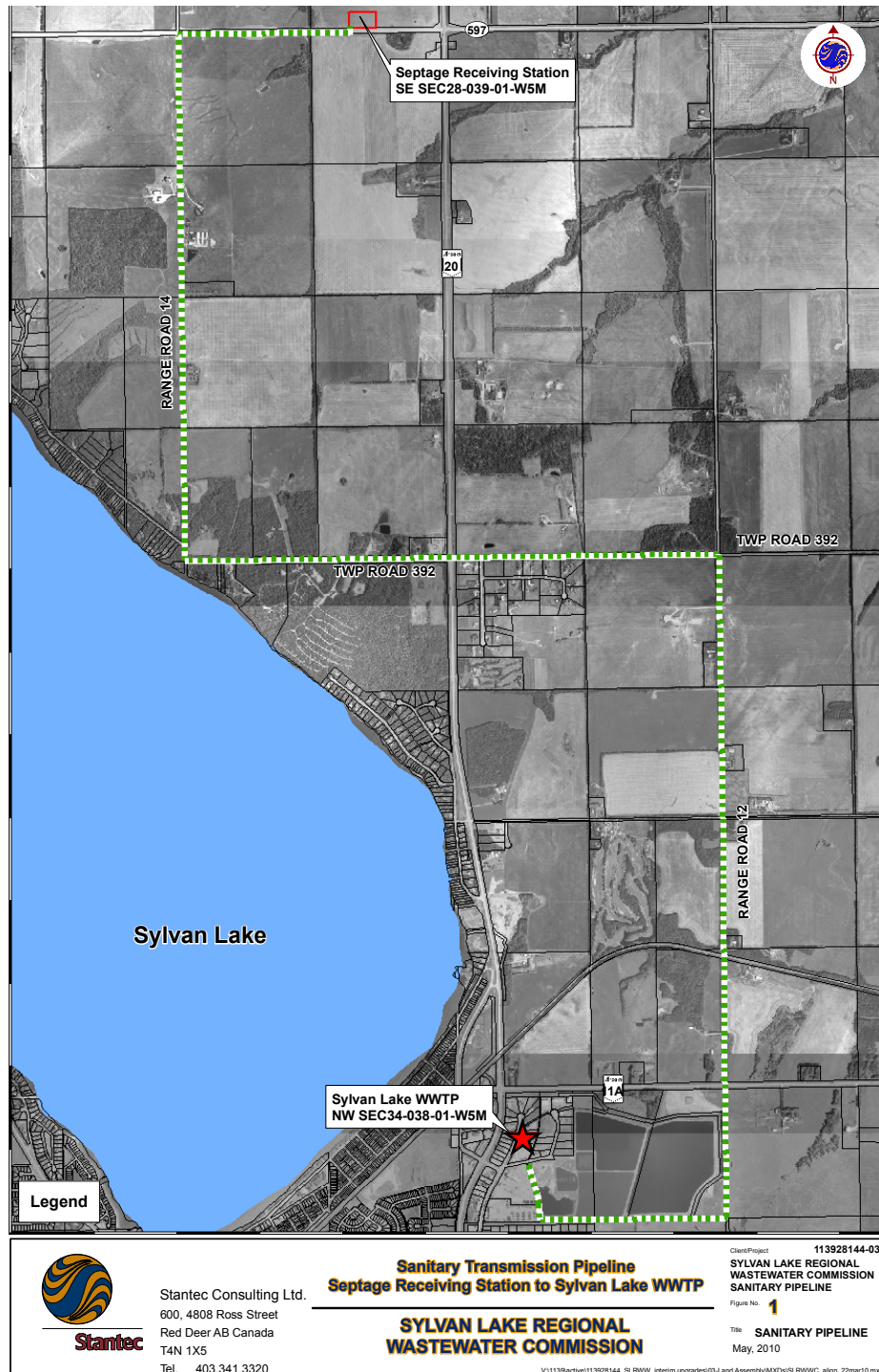
About 50% of the septage haulers utilized the existing Town of Sylvan Lake septage receiving station (SRS). However, since Sylvan Lake is a destination recreation location, the SRS was consistently at capacity with recreation vehicle use during the peak summer months. The rural communities and Summer Villages requested Stantec recommend a solution.

Stantec conducted an evaluation of the existing SRS and recommended a new unit be

Regional Septage Receiving Station and Forcemain

CATEGORY: WATER RESOURCES

PROJECT DESCRIPTION 5



Regional Septage Receiving Station and Forcemain

CATEGORY: WATER RESOURCES

PROJECT DESCRIPTION 6

constructed outside of Sylvan Lake. Based on the short (or interim) and long-term horizons, Stantec recommended the SRS be located outside of Sylvan Lake, in Lacombe County, on the east side of the lake.

Stantec then evaluated several specific SRS sites and concluded that a 13 km horizontally directionally drilled forcemain, located within existing County Road allowances, to the Sylvan Lake WWTP represented the first concrete step towards a regional system for the communities on the east shore of Sylvan Lake. The recommended forcemain alignment can link Birchcliff and Sunbreaker Cove to the regional system as soon as construction to the internal sanitary collection systems is complete. These Summer Villages were scheduled to be connected to a regional system by the end of 2013 and by installing this interim forcemain, a connection to the regional system could occur up to two years ahead of schedule. Also seeing this benefit, Alberta Transportation confirmed funding can be reallocated to proceed with the new recommendations. The Commission directed Stantec to shift from a detail design of the WWTP upgrades to a detail design of the SRS and regional forcemain.

During the detail design phase, one county determined that the design alignment would be adjacent to a future development corridor and thereby, requested through the Commission that Stantec review the pipeline design and proposed development with a focus on cost sharing opportunities. Stantec conducted the review and recommended the inclusion of a provisional oversize option in the tender. The Commission was then able to compare the real tendered values of each option and separate the County's proposed costs and the Commission's funded costs. The County agreed to pay the additional costs and two schedules (basic and oversize) were tendered. This added value to the project by allowing the County to save a significant sum in engineering and construction costs without contradicting the Government of Alberta's funding conditions for the Commission.

Regional Septage Receiving Station and Forcemain

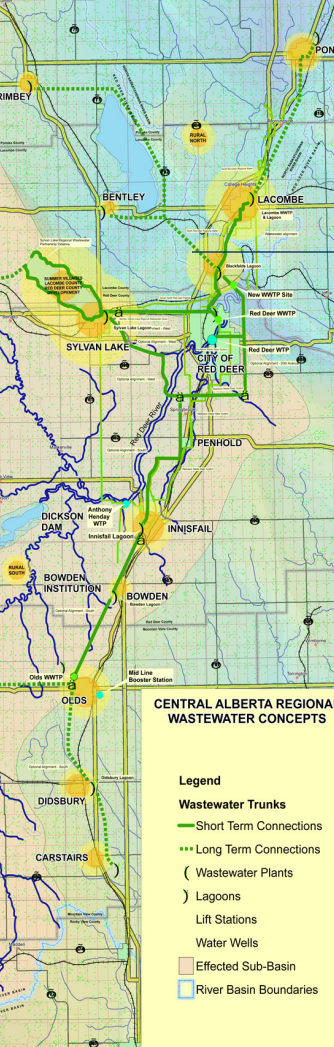
CATEGORY: WATER RESOURCES

PROJECT DESCRIPTION 7

COMPLEXITY

Collectively known as the Central Alberta Regional Wastewater (CARWW) System, the project divides into four distinct components: four pipeline legs and City of Red Deer Wastewater Treatment Plant (WWTP) upgrades. While there are significant immediate wastewater needs among municipalities to be served by the CARWW System, the initial lack of available treatment capacity and the time that it will take to construct the treatment capacity needed, dictate that the development of the CARWW System must proceed on a staged basis. Since all of these needs cannot be met initially by the regional system, it will be necessary to undertake interim upgrades to bridge the time gap until the regional system becomes available.

It is prudent to appreciate the complexities of a development involving diverse and dynamic stakeholders. Stantec's solutions were realized through outstanding achievements in cross regulatory and political facilitation, obtaining group consensus, and maintaining a clear focus on the project goal. Stantec recognized the dynamic nature of the client and the multiple parties involved, presenting value added solutions that included positives for the Commission and its member municipalities.



Regional Septage Receiving Station and Forcemain

CATEGORY: WATER RESOURCES

PROJECT DESCRIPTION 8

MEETING & EXCEEDING OWNER'S/CLIENT'S NEEDS

From fixing the lagoon discharge issues with the WWTP upgrade to over sizing the pipeline and structuring the tender so as not to contradict funding rules, meeting and exceeding the owners needs derives from the spin off benefits included in each of the recommended solutions.

A number of added value measures were included in the detail design. By using only horizontally directional drilling as a construction method, no roads were closed for construction and the Commission was able to negotiate a right of way within the counties' road allowance, thus avoiding the risk of an unfavorable land acquisition process. Construction within an existing developed road allowance includes other added benefits, such as next to no disturbance of undeveloped land, farmland, and wildlife; none of which were disturbed throughout construction. After meeting with the Counties' operations departments, obstruction signs were installed for the grader operator marking the new manholes on the edge of the road.

From fixing the lagoon discharge issues with the WWTP upgrade to over sizing the pipeline and structuring the tender so as not to contradict funding rules, meeting and exceeding the owners needs derives from the spin off benefits included in each of the recommended solutions.

Stantec's solution provides regional connections to the sanitary system up to two years ahead of schedule allowing the Commission to generate additional revenue from end users for reinvestment into the regional system. Early connection also reduces the Summer Villages dependency on potentially malfunctioned septage tanks. As the Summer Villages are located directly adjacent to Sylvan Lake, groundwater contamination can potentially impact the lake.

The County is able to connect its new developments into the regional system and septage haulers can adjust to the changing regulations. The Commission agreed that the new location, though more expensive in terms of initial capital, operations, and maintenance costs, offers a permanent SRS location and removes the commercial septage hauler traffic from the Town of Sylvan Lake. The Commission is also able charge the SRS users a fee and begin generating revenue. The SRS and forcemain are currently in operation, generating investment revenue for the next regional phase.

Regional Septage Receiving Station and Forcemain

CATEGORY: WATER RESOURCES

PROJECT DESCRIPTION 9

ENVIRONMENTAL IMPACT

The importance of safeguarding water quality has been emphasized by the Government of Alberta through its Water for Life initiative and is certainly of overlying importance to central Alberta municipalities. The release of treated sewage into the streams and rivers has significant environmental implications with respect to water quality and so the manner in which the Government of Alberta and the municipalities approach wastewater treatment will be critical to ensure that water quality in central Alberta is preserved and improved.

In the Summer Villages, it was common for private septage haulers to be contracted to vacuum and clean these tanks. In the past, these septage haulers could receive special permission from Alberta Environment for the land application of septage on specific, pre-selected sites, but unregulated dumping has been reported by municipalities. About 50% of the septage haulers utilized the existing Town of Sylvan Lake SRS. Stantec's SRS solution provides a legal way for septage haulers to dispose of the septage, without the environmental impact of illegal dumping.

By accelerating the delivery timeline by up to two years with the installation of the interim forcemain, the risk of a malfunctioning septic tank leaching waste into Sylvan Lake is drastically reduced. The horizontally directional drilling used to construct the forcemain was low impact, resulting in minimal land disturbance and no effect on wildlife.



Regional Septage Receiving Station and Forcemain

CATEGORY: WATER RESOURCES

PROJECT DESCRIPTION 10

NEW APPLICATION/ORIGINALITY/ INNOVATION

During the construction of the 13 km forcemain to the Sylvan Lake WWTP, Stantec specified that horizontally directional drilling be the required method.

SOCIAL & ECONOMIC BENEFITS

As Sylvan Lake is a destination recreation location, the SRS was consistently at capacity with recreation vehicle use during the peak summer months. The construction of the new SRS gives septage haulers a dump station outside of town, which reduces the wait times for recreation vehicles using the SRS within Sylvan Lake.

The peak recreation period could have been impacted by the construction of the forcemain, but the use of the horizontally directional drilling method prevented road closures and ensured that summer tourism supporting the local economy was not impacted.

CONCLUSION

Wastewater collections systems can be very costly to construct, and without a sufficient return on investment through developer levies and/or end user unit rates, it is very difficult for municipalities to justify the construction. However, a regional wastewater system realizes a number of cost saving and treatment benefits over several independent wastewater systems. As demonstrated through the Sylvan Lake Regional Septage Receiving Station and Forcemain project, by maintaining a clear focus on the project goal and maximizing the benefits of a dynamic client, the Commission successfully achieved a significant milestone in their goal to regionalize wastewater treatment around Sylvan Lake.