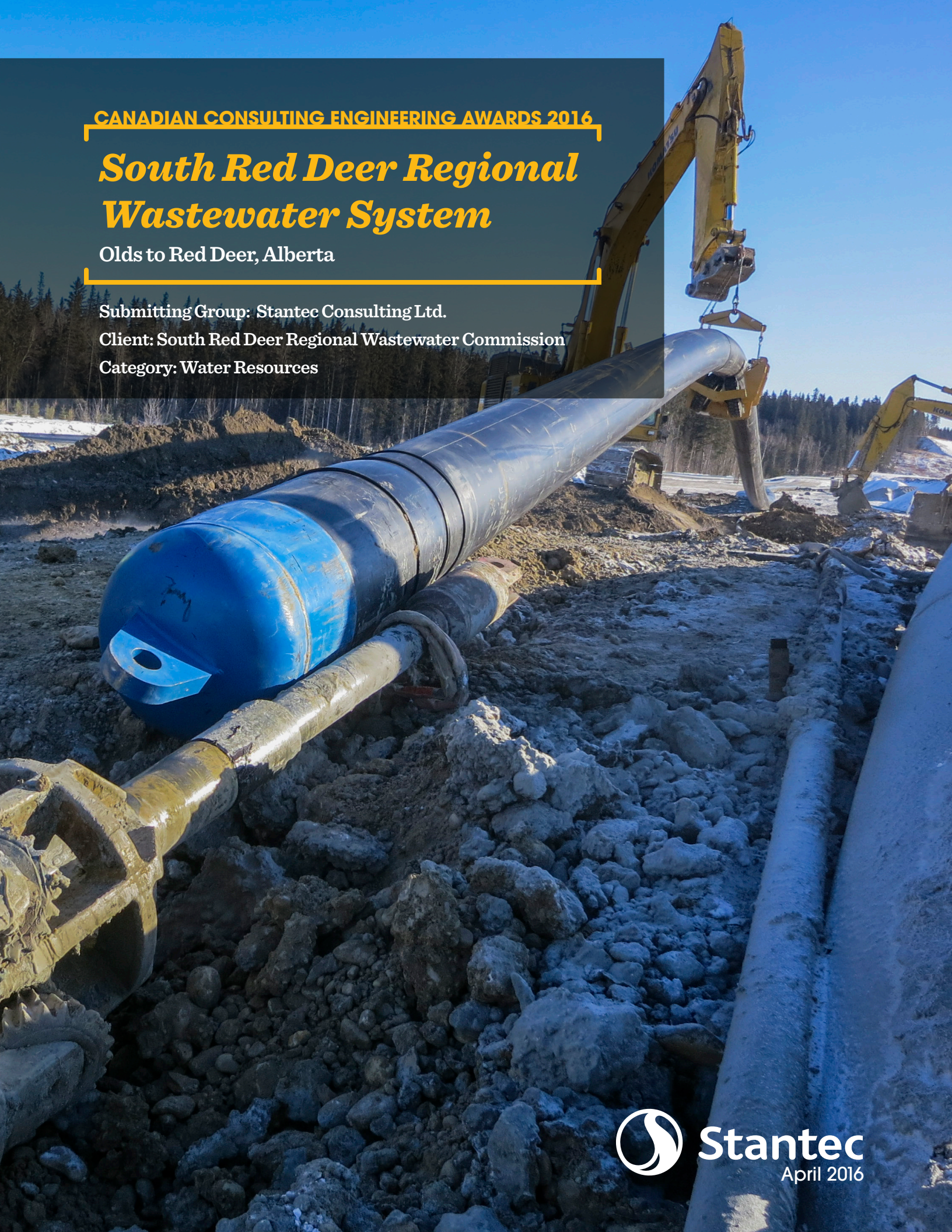


CANADIAN CONSULTING ENGINEERING AWARDS 2016

South Red Deer Regional Wastewater System

Olds to Red Deer, Alberta

Submitting Group: Stantec Consulting Ltd.

Client: South Red Deer Regional Wastewater Commission

Category: Water Resources

Stantec

April 2016

Background of Completed Project

Eight years ago, the South Red Deer Regional Wastewater Commission (SRDRWC) and Stantec started designing a system that would impact communities for years to come. By linking these Central Alberta communities — Olds, Bowden, Innisfail, Penhold, Mountain View County, and Red Deer County — to the City of Red Deer's Wastewater Treatment facility, this 90 km regional line alleviates the pressure faced by these communities and their overloaded treatment systems.

Project Overview

The sheer length of the South Red Deer Regional Wastewater System (SRDRWS) posed a huge design challenge on its own, never mind the fact that construction occurred in a highly populated corridor, and crossed several environmentally sensitive areas. Each government body – municipal, provincial and federal – had individual requirements that had to be met. The final product: **a unique and highly sophisticated system**.

Designed for a 25-year horizon, the $140-million SRDRWS will allow the communities along it to grow at a steady rate for years to come through a number of complex systems including:

- Four major wastewater lift stations equipped with odour treatment
- Approximately 90 km of forcemain with an outside diameter ranging from 550 mm to 850 mm
- Alberta's first dual-media Odour Management Facility
- Stantec-designed, state-of-the-art operation and monitoring system with a user friendly interface for operators
- A pipeline alignment that would minimize the impact on the environment (wetlands, wildlife, plants) and extensive environmental monitoring for the impacted areas
- A triple barrel siphon under the Red Deer River
- Ensuring the City of Red Deer wastewater plant could accept the wastewater from them SRDRWS by completing extensive upgrades

Following 15 years of concepts, studies, consultations, design / construction phases, and testing, the SRDRWS went online in the summer of 2015. With the system now operational, wastewater from each of the six communities is being treated to higher standards at the City of Red Deer Wastewater Treatment Plant (CRD WWTP). This treatment will help **protect the aquatic environment and the quality of the source water for much of Central Alberta**.

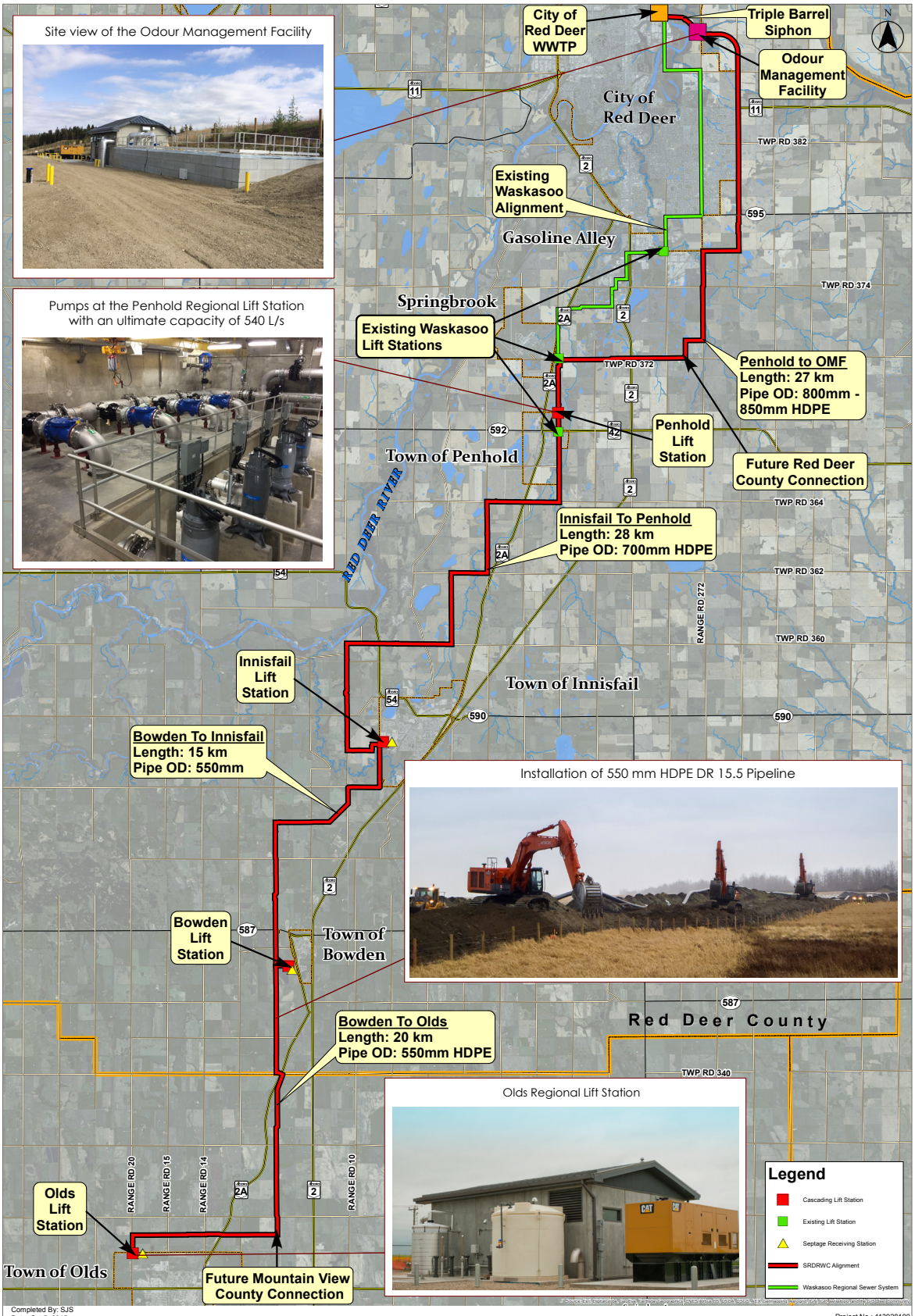
The successful completion of the SRDRWS can now be used as a model for the north and west legs of the Central Alberta Regional Wastewater System. But most importantly, the system will ultimately help to protect one of our valuable natural resources, while supporting growth in the region for years to come.

"The South Red Deer Regional Wastewater System is an exemplary model of building a regional wastewater system through partnership and technical excellence," said the judges of the 2016 Consulting Engineers of Alberta.

In February 2016, the SRDRWS received the **2016 CEA Award of Excellence for Water Resource and Energy Production**. The system was also recognized by the **American Public Works Association - Alberta Chapter - with the Project of the Year Award for Environment**, the **Association of Professional Engineers and Geoscientists of Alberta 2016 Project Achievement Summit Award**, and the **America Public Works Association SC/RC Public Works Project of the Year in the Environment** category.

Ground-breaking ceremony

Grand-Opening Ceremony - October 2015



Completed By: SJS
Date: Oct 5, 2015

Project No.: 113928100

Stantec

REGIONAL WASTEWATER COMMISSION

SRDRWC Facilities Overview

South Red Deer Regional Wastewater Commission

Innovation

The South Red Deer Regional Wastewater System required innovative approaches and leading edge technology to manage the long pumping distances and high variability in wastewater retention times, which can range from 1.5 to 4 days across the length of the system.

Odour Management

Due to the 90 km length of the system, the long retention time of the wastewater creates a high potential for odour generation and gases – specifically H2S - to be released wherever the system vents to atmosphere, especially under dry weather conditions. This was a critical concern for the operations at the CRD WWTP, where gases could harm the Biological Nutrient Removal process and be hazardous to operator health and equipment.

Odour Management Facility

A state-of-the-art Odour Management Facility (OMF) was designed to ensure that the high levels of H2S generated do not negatively affect the CRD WWTP and its operations, or cause safety concerns for the operators.

The OMF includes treatment for both vapour and liquid phase odours, which happens in a number of steps (see diagram below for more detail).

1. First, the raw wastewater enters the stripping chamber of the OMF through pressure sustaining valves.

2. Next, using coarse bubble diffusers, the stripping chamber removes the dissolved sulfides and other odourous compounds from the solution by adding dissolved oxygen into the wastewater prior to mixing with wastewater from the City of Red Deer.

3. The vapour phase treatment then takes odourous air that is driven off with the coarse bubble diffusers and sends it through a two-stage (inorganic and organic) biofilter system. The air goes through an inorganic media biofilter (expanded clay media with a nutrient coating) that treats 95% of the high concentrations of H2S , as well as volatile organic compounds.

4. Finally, the air is sent through an in-ground organic media system (wood chips or compost overs) to remove over 99% of the H2S and odours, such as mercaptans and other similar compounds.

Additional Odour Treatment

Each of the four lift stations features a tower biofilter and chemical injection systems to control vapour and liquid phase odours. The biofilter keeps the wet well under a negative pressure to draw off the air while removing 90% of the total odours before being released to the atmosphere. By treating the vapour, removing the H2S and preventing odours at the sites, the working conditions for the operators was greatly improved and life of the facilities was extended. The lift stations also have a chemical injection system, which adds a bioxide chemical (Nitrate) into the wastewater. This reduces the generation of H2S in the pipeline keeping it entrained in the wastewater until it reaches the OMF, where it is stripped off.

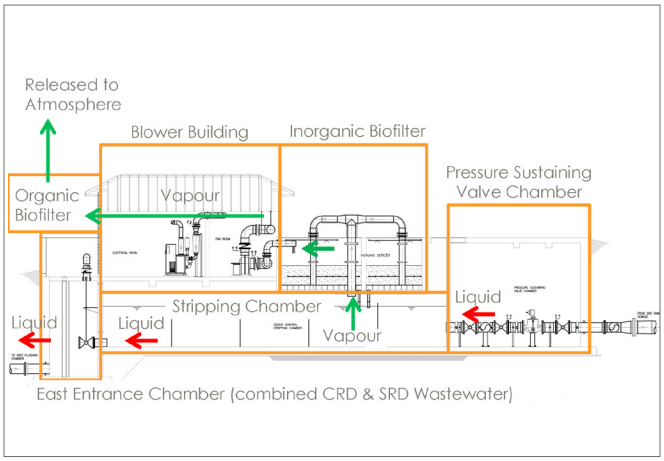
The forcemain pipe contains a number of combination air vacuum valves that automatically release air as required. As the air is released from the forcemain, it creates an odour potential, which is forced through an inorganic media. This process ensures the H2S and odour are removed prior to it being released to atmosphere.

Pipeline Features

The SRDRWS includes approximately 90 km of forcemain pipelines – all of which was constructed with jointless pipe, making it the longest regional wastewater system in Alberta. Fused high-density polyethylene (HDPE), a corrosion proof material, was selected. A common material for pressurized forcemains, the fused HDPE eliminates the use of gasketed joints, greatly reducing the possibility of leakage and provides a more robust system.

Hydraulic Modelling

A hydraulic model of the system optimized the pump and piping sizes. The analysis determined that the pipe sizes ranged from 550 mm outer diameter on the Olds to Innisfail leg, up to 850 mm outer diameter section on the Penhold to Odour Management Facility leg. Using the model, the pressure rating of the pipe was optimized based on the pressures of the different sections of the system and resulted in lower costs for the pipe.



Liquid & Vapour Phase Treatment Train at the Odour Management Facility

Fused strings of 32-inch HDPE DR 17 pipe

In locations of horizontal directional drills (HDD), the pressure rating of the pipe increased to ensure the pull strength would allow the drill rig to pull without compromising integrity. Throughout the system, the pipe pressure ratings range from 126 PSI to 202 PSI, depending on location and the topography of the area.

Pressure Sustaining Valves

Overall, the topography from the Town of Olds to the City of Red Deer is downhill, dropping 168 meters over 90 km. Therefore, pressure sustaining valves (PSV) were strategically placed along the alignment to make sure the pipeline stays full when the lift stations are not pumping. This improves the operation of the system by eliminating the air pockets and vacuum conditions that would otherwise occur from a partially full pipe and reduces the amount of air / odour released. The PSVs are located at three lift stations (Bowden, Innisfail, Penhold) and the Odour Management Facility, just before the forcemain releases the wastewater to atmospheric pressure.

Alignment Section

The selection of the alignment for the SRDRWS had numerous challenges to overcome. The biggest challenge was choosing a pipeline alignment that considered:

- engineering principles
- economics
- project design criteria
- public impacts
- operational maintenance requirements
- minimizing environmental impacts

In an effort to have the most cost effective alignment, each option was evaluated based on topography, access to appurtenance on the pipeline, length, hydraulics, water body crossings, constructability, geotechnical investigation, and landowner considerations.

Once the optimal alignment was determined, a geotechnical investigation was completed to evaluate soil conditions and avoid areas where soils were less suitable for construction. This reduced the risk of lengthy drills, borehole instability, and refusal when installing the pipe via HDD. In some instances, the drill path was lowered under wetlands or creeks to ensure more cover over the pipe, reducing the potential risk of a frac out in environmentally sensitive areas.

Horizontal Directional Drilling (HDD)

HDD was used extensively to minimize overall disturbances to the environment and the public, and mitigate construction concerns where space was limited for traditional open cut installation. Like most projects of this magnitude, many environmentally sensitive areas fell within the limits, making it crucial to the stakeholders and Alberta Environment and Parks to minimize the environmental impacts. To reduce the environmental impacts in these sensitive areas, HDD was used instead of conventional trenching. Public disturbances from construction were also minimized by installing the pipeline via HDD at all roads, residential accesses or other developed areas, to prevent road closures and disturbances to private property.

Triple Barrel Siphon

The triple barrel siphon river crossing was completed in conjunction with the City of Red Deer, providing long-term capacity for both the SRDRWS ultimate flows and future growth for the northeast side of the city. Installing the siphons together reduced the environmental impact of multiple construction events, as well as the design and construction costs for both parties.

For the siphons, fused HDPE was used with 600 mm, 700 mm, and 800 mm diameters to accommodate the low initial year flows and ultimate high 25-year design flows. Detailed geotechnical and geophysical investigations were completed prior to the drilling. This was to determine ground conditions, establish no drill zones and to minimize the risk with the horizontal directional drilled river crossing.

Since the Red Deer WWTP is situated on the west side of the Red Deer River, an HDD installation was required to extend the triple barrel siphon across the river. A unique two-stage tender process was used to pre-qualify HDD bidders in Stage 1, helping the tender to close at Stage 2 with approved bidders already identified, thereby reducing project risk. The HDD triple barrel river crossing was completed ahead of schedule and under budget with no negative environmental impacts.

SCADA Programming

During design it was determined an up-to-date operation system was sorely needed. The Supervisory Control and Data Acquisition Records and Reporting (SCADARR) system is a web-based platform that enables operators to easily monitor, record, report, manage assets, and access GIS maps. With input from the SRDRWC operators, Stantec designed the system to suit the needs of the commission, and incorporate the existing WRSS, so operators could easily maintain both transmissions lines through one system.

Because the system has numerous stakeholders needing to access the operational data, but a single party responsible for operations, a dashboard and records information were open to all users on a password-protected basis. Access is available through any smart-phone, tablet,or computer; however, control of system operations is limited to SRDRWC operators.

Redundancy

To facilitate maintenance or replacement of equipment, the lift stations were designed to allow one of the two wet wells to be isolated for maintenance without affecting operation or the overall system. Two cam lock connections on the exterior of the building can be used to bypass pump around the wet wells with a portable pump or pump into trucks if required. These cam locks can also be used in the case of maintenance that requires electrical systems and pumps to go off-line or in emergencies. Numerous other redundancies were built into the system for the safety of the operators and public, such as multiple level sensors in the wet wells, backup pumps, and oversized inlet piping to allow for storage if required.

Helping to protect a sensitive watershed — the Red Deer River Basin — that supplies drinking water for 160,000 Albertans.

Oversized Inlet Pipe

To provide storage and reduce the effective peak flows, the gravity pipe connecting the collections systems of the various towns with the SRDRWS lift stations was oversized. This provides attenuation to the influent at the lift stations; therefore, slightly lower design pump rates at each lift station are possible. The storage potential allows extra time for the operators to address any issues at the lift station and gives flexibility if the system needs to be shut down for a short period. By using the extra storage of the oversized pipe, the operators have the ability to push larger slugs of wastewater down the line at one time and flush solids through the system so they do not settle at the bottom of the pipe

Dealing with Environmentally Sensitive Areas

With 90 km of forcemain, many environmentally sensitive areas were encountered, including approximately 120 wetlands, 10 creeks, and the Red Deer River. Strategies were implemented to reduce potential impacts to sensitive areas using both construction methods and timing. The forcemain was installed under sensitive waterbodies via HDD and lesser sensitive features were open cut during dry or frozen conditions to reduce the risk of rutting and compaction. Migratory bird surveys were completed prior to vegetation clearing or clearing was done outside of the general nesting period of migratory birds. Creek crossings were completed outside of restricted activity periods.

Emergency Storage Ponds

The SRDRWS includes emergency storage ponds at the lift stations in Olds, Bowden, and Innisfail. The use of emergency storage ponds means the forcemain did not need to be oversized to accommodate unusually high wet weather flows; therefore, the cost of the pipeline was reduced significantly. Where practical, lift stations were strategically placed near the community's existing treatment facilities allowing existing lagoons to be converted into the ponds.

Complexity

Pipeline Installation

The sheer size and weight of the pipe posed a significant challenge during installation. A one-meter section of 800 mm DR 17 HDPE weighs approximately 116 kg. The pipe comes in 18.29 m sections that weigh approximately 2,143 kg. To install the pipeline via conventional trenching at a depth of 3 meters for frost cover, the contractors were required to suspend 2 to 4 joints of pipe, which in turn weights approximately 4,286 kg to 8,850 kg. The deeper the pipe was installed, the more lengths of pipe the contractor had to suspend as the pipe was lowered into the trench - increasing the weight.

Since the project used HDPE pipe, the pipe required above ground fusing for efficiency, with some of the fused strings up to 800 km long. With these strings weighing up to 93,440 kg, and the inefficiency of completing the fusing directly beside the trench due to confined working spaces in some locations, the strings needed to be moved before they could be installed. Moving pipe of this size and weight had to be done with significant care to make sure the pipe was not damaged in the process.

Another concern was proper pipeline fusion as a large part of the construction occurred in the winter. This required a portable, heated enclosure be placed around

the fusing machine to ensure the fuse cooled slowly, preventing a cold fusion. The shelter also protected against weather that could affect the quality of the fuse. A brand new product from McElroy Manufacturing Inc. was designed and constructed just for these situations. The McElroy Quickcamp climate controlled enclosure allowed the fusing of the pipe to happen in a controlled environment.

Case Boring

During the alignment selection, it was determined the pipeline would have to cross Highway 2 – the busiest stretch of highway in Alberta. As the main connector between Calgary and Edmonton, Highway 2 accommodates up to 40,000 vehicles per day. Case boring was used to make sure no settlement occurred while drilling the pipe under this essential corridor. Case boring also facilitates future replacement of the pipe without drilling another hole and risking settlement. The alignment also had four railway crossings. Case boring, along with close track monitoring, reduced risk as it protected the pipeline from settlement.

Interim Pumping

As the construction was staged over a number of years, interim pumping was used to relieve the pressure off some of the communities' wastewater treatment plants. This allowed the overloaded plants to meet their effluent quality limits prior to the entire system being operational. Once the SRDRWS was constructed from the Town of Olds to Springbrook, a crossover connection was installed to the existing Waskasoo Regional Sewer System (WRSS), which was also owned by the SRDRWC and ultimately leads to the CRD WWTP.

During peak hours, the WRSS was at capacity; however, through programming, the SRDRWS was able to take partial flows from the communities during non-peak hours and pump into the WRSS without overloading the system. A portion of the wastewater from Olds and Innisfail were diverted into the SRDRWS and then through WRSS at Springbrook to the CRD WWTP.

Interim pumping began in May 2013, by first bringing on the partial flows from Innisfail. In October 2013, the partial flows from Olds were pumped into the SRDRWS. This allowed both communities to meet Alberta Environment and Parks discharge standards with their existing plants. Bowden's existing lift station required major upgrades to continue operating, so in April 2015 the town was connected to the SRDRWS and its flows were added to the interim flows of the system.

Commissioning of the System

With a system this large and so many stakeholders involved, a detailed commissioning and communication plan was required. This was to ensure that all parties understood their responsibilities and information could be relayed properly for a successful startup of the system. By using a staged approach to bring the wastewater flows onto the system, risks of an incident occurring were reduced during the commissioning and startup.

It was also important to increase the flows in smaller increments because if the flows into the CRD WWTP changed by too large of a percentage, there was a possibility that biological process at the plant could be disrupted — which could have drastic environmental impacts on the Red Deer River.

During the planning of the commissioning, contingency plans were developed for all plausible emergency situations. In developing the commissioning plans and contingency plans, constraints such as travel time, equipment placement, and manpower deployment had to be considered.

Once all the facilities had been constructed and individually commissioned, the staged startup of the overall system began. The first phase involved terminating the interim pumping into the WRSS. Before any wastewater was pumped down the last section of the pipeline (Springbrook to WWTP), potable and stormwater was used to push as much air as possible out of this section and ensure flows were getting to the CRD WWTP.

McElroy Quickcamp climate controlled enclosure to be able to fuse pipe in a controlled environment

Case boring under Highway 2

Once all parties had signed off on the system, verifying their confidence in the system, the initial wastewater was brought online. By using the interim pumping systems that were in place at Olds and Innisfail and completing the permanent connections over a two-week period, the flows were gradually increased in stages until all the wastewater from the communities was flowing through the SRDRWS in July 2015.Through careful planning and communication, the overall startup of the project was successful and went online without incident. Coordination between operators, Stantec, multiple contractors, the CRD WWTP, and the impacted communities was imperative to this success.

Tendering Constraints

With the project funded by Alberta Transportation through the Water for Life program, the Commission was required to publicly tender the contracts, and the lowest bid had to be accepted. Throughout the project, Alberta Transportation's standards on pre-qualifying changed a number of times. Sometimes the commission could pre-qualify and other times it was not allowed.

When pre-qualification was not allowed, which also aligned with downturns in the economy (2008/09 and 2014/15), the commission received a number of bids from contractors who were not experienced in projects of this size and/or scope, or who had tendered a bid price that was obviously much too low to complete the contract. In these situations, Stantec and SRDRWC worked with the contractors to help educate them about working with this large diameter pipe and on the construction standards that were required.

With the tender bids that were much too low, Stantec, SRDRWC, and the third party construction inspector worked with the contractor to try to complete the project. Unfortunately, not all of the contractors were able to complete their contracts, forcing the SRDRWC and Stantec to look at alternative options, including terminating five contracts over the course of the project.

Penhold Lift Station Inlet Chamber and oversized pipe

"The (SRDRWS) is going to solve the effluent challenges for all of Central Alberta, south of Red Deer, for the next 20 to 25 years, Our board, the towns and the counties have worked very hard for this. This ensures growth and stability for the long term."

Dennis Cooper
Mayor of Penhold and Chair of the SRDRWC

Even through this process, Stantec and SRDRWC efficiently managed the costs and completed the project, either by retendering contracts where time and circumstances permitted or negotiating completion of the work by other contractors.

Social and Economic Benefits

Economic Growth and Development

The completion of the SRDRWS ensures the communities served by the SRDRWC have a reliable system with a design capacity for the next 25 years — enabling the ability for growth and economic development within each community.

The SRDRWS allowed for the existing treatment facilities at Olds and Innisfail to be decommissioned and reclaimed. The land around both facilities is prime real estate, but due to development setbacks, this land could not be developed while the facilities were in use. Once the reclamation has been completed and the setbacks reduced, it will open up millions of dollars' worth of land for development and redevelopment in the communities.

Source Water Quality

With the elimination of three low quality treatment discharge locations into the Red Deer River Basin, the raw water quality at the intakes of the Anthony Henday WTP and the City of Red Deer WTP has been improved. This mean that less treatment is required at each plant, thus reducing the operational cost to produce water — a savings that can be passed along to the residents in reduced utility rates for water.

Most importantly, the successfully completed SRDRWS will be used as a model for the north and west legs of the Central Alberta Regional Wastewater System. It will ultimately protect a large portion of the Red Deer River Basin, one of Central Alberta's most valuable natural resources.

Reduced Wastewater Treatment

Three of the SRDRWC communities gained the benefits of being able to decommission their existing wastewater treatment plants. This has reduced their operational and maintenance budgets because fewer qualified staff and equipment is needed.

The responsibility to report to the regulatory bodies on wastewater discharges has now been transferred from the communities to the City of Red Deer WWTP, as the plant is the final discharge point. Each community's liability has been reduced, but not eliminated. The towns are still liable for the strength and composition of the wastewater entering the plant, but are not liable for the discharge of the wastewater.

Partnerships

During the design stage of the SRDRWS, the commission entered into two partnerships to share costs and realize other benefits. Recognizing that the Mountain View Regional Water Services Commission was also designing a water pipeline between Innisfail to Olds at the same time, the SRDRWC used the opportunity to design the wastewater line in the same area. The two commissions acquired a common right-of-way for both pipelines and shared the costs. As Stantec was the engineering consultant for both, they designed, tendered, and constructed large portions of both pipelines together, while still meeting the individual needs of each. By working together, both commissions not only saved costs but also reduced the environmental impact with a smaller overall footprint.

The ideal alignment for the SRDRWS through the City of Red Deer to the CRD WWTP was within the future ring road right-of-way on the east side of the city. The land for the future ring road was not acquired yet, so the SRDRWC partnered with the City of Red Deer to share the costs of acquisition. **This was a highly favored option by the Province of Alberta, as it maximized the use of public funds and demonstrated a high degree of cooperation among the municipalities, the commission, and several Provincial government departments**.

Due to similar alignments, members of the Waskasoo Regional Services Board voted to amalgamate their wastewater system into the SRDWRS, providing shared operations and growth capacity for the Town of Penhold and Red Deer County.

Environmental Benefits

The implementation of the SRDRWS improves the water quality of the Red Deer River, protecting source water for many communities in the Central Alberta region and downstream. The use of one centralized, state-of-the-art wastewater treatment plant ensures an increased level of treatment with biological nutrient removal and UV disinfection before the effluent is released into the river. Another benefit of a centralized system is the ability for the CRD WWTP and City of Red Deer to economically upgrade and implement improvements — which would not have been a viable option for the individual communities.

Environmental Monitoring

Due to the length of the project, many environmentally sensitive areas fell within the construction limits. To minimize the risk of damage to sensitive wetlands and waterways, environmental monitoring was conducted on an ongoing basis to ensure the construction work complied with the *Provincial Environmental Protection and Enhancement Act and Water Act*. During all HDD installations under a watercourse, environmental and turbidity monitoring was conducted on a full time basis. Turbidity monitoring was done in compliance with the *Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body* to quickly identify and respond to any potential releases and reduce negative impacts to fish and habitat.

Environmental Engagement

Environmental engagement was implemented through all phases of the project. Baseline studies were performed to identify existing sensitive wetlands, soils, wildlife, fish and fish habitat, rare plants, and historical resources along the proposed alignment. Numerous applications and notifications were submitted to both Federal and Provincial regulatory agencies.

As a Class I pipeline, Conservation and Reclamation (C&R) plans were completed and submitted to Alberta Environment and Parks for approval prior to

Reclaimed creek crossing that was open cut

construction of the different stages. The C&R plans were included as part of each tender package and used by the contractors throughout construction. Post construction reclamation assessments were conducted after completion of each stage to assess landscape, soils, and vegetation following reclamation.

Fused HDPE was chosen for the pipeline to reduce the possibility of leaks because it does not have joints or gaskets – the areas where a pipeline would normally fail. HDPE has excellent abrasion resistance properties, which also reduces the likelihood of leakage or failure, as well as the possibility of any environmental mishaps occurring from leaks in the pipeline in the future.

Treatment Plant Upgrades

In order for the City of Red Deer to accept wastewater from the SRDRWS, the CRD WWTP required extensive upgrades as the plant was already operating close to its capacity. These upgrades increased the capacity of the CRD WWTP from 47.5 MLD to 72 MLD, and will service a population of over 150,000 people. This additional capacity will allow the City of Red Deer and the SRDRWS communities the ability to continue to grow and increases the level of treatment of the effluent.

With the regionalization of the wastewater, the CRD WWTP becomes the regional hub for the overall Central Alberta Regional Wastewater (CARWW) system. It will allow for future upgrades to improve the discharge water quality, as well as increasing capacity at one location instead of several locations. With one single wastewater treatment plant, the overall capital required to ensure high quality treatment is also reduced.

This increased level of treatment reduces biochemical oxygen demand and total suspended solids from Olds, Bowden, and Innisfail by 20%, and also reduces the discharged ammonia and phosphorus concentrations.

As part of the upgrades to the plant, a cogeneration system was installed on the digesters. This allows the plant electrical demands to be largely offset by power generate from biogas of the wastewater. Additionally, heat from the electricity generation is used to heat the digesters. The cogeneration system uses byproducts of the treatment system to reduce the operational costs of the plant which can then be passed on to the residents of the communities.

Protection of the Red Deer River

By implementing the SRDRWS, the stakeholders of the project are directly protecting approximately 65 km of the Red Deer River plus an additional 54 km of the Little Red Deer River, from receiving effluent discharges from aging wastewater treatment systems with lower treatment standards. The regionalization and higher quality of treatment also protects hundreds of kilometers of river downstream of the City Red Deer.

Meeting Clients Needs

In 2000, the wastewater treatment plants at the Town of Innisfail and Town of Olds were nearing capacity, requiring significant upgrades in the near future. Other communities around the City of Red Deer were also growing quickly, with many unable to pay for required infrastructure improvements. The idea of a centralized wastewater system was conceptualized where all wastewater would flow to one treatment plant — supporting significant growth while helping address existing capacity and funding concerns.

An initiative, helping to build support and secure funding for what is now the Central Alberta Regional Wastewater (CARWW) system, was developed. The CARWW system is made up of three main components – south, north, and west. The overall initiative started with the most critical portion, the SRDRWS.

90 km of pipeline directly impacted 133 properties, and indirectly impacted many more. Stantec's communication strategies mitigated potential conflicts before they turned into delays.

Addressing the Need

Three communities south of the City of Red Deer discharged their wastewater into tributaries of the environmentally sensitive Red Deer River. For many years, the treatment plants for two of the communities — the Town of Olds and Town of Innisfail — were operating on outdated systems and were over capacity. This led to a reduced quality of treated wastewater being discharged and was seriously limiting the community's ability to grow.

The City of Red Deer's Water Treatment Plant and nearby Anthony Henday Water Treatment Plant also draw water from the river — downstream of the wastewater discharges — so eliminating these discharges into this sensitive watershed provides significant source water protection. The two plants supply approximately 160,000 people with potable water throughout a 150 km reach of Central Alberta.

Government Collaboration

The commitment to the CARWW and regionalizing wastewater treatment in the Central Alberta area was an unprecedented agreement on regional infrastructure that involved the Province of Alberta and 16 local governments.

The delivery and funding of the SRDRWS required engagement at all three levels of government: federal, provincial and municipal. Above the initial CARWW agreement, numerous agreements between all the parties were required over the project's duration for the success of the SRDRWS. The funding for the overall project involved all parties:

- The Federal Government was involved in the partial funding of the triple barrel siphons in conjunction with City of Red Deer, SRDRWC and Province of Alberta
- The Province of Alberta funded 90% of the SRDRWS and approximately 50% funding for the wastewater treatment plant upgrades (which accounted for all of SRDRWS flows) through the Water For Life program, which is managed by Alberta Transportation
- The SRDRWC funded the remaining 10% of the SRDRWS
- The City of Red Deer funded the remaining 50% of the wastewater treatment plant upgrades

Regionalization

The detail design of the $140 million SRDRWS began in 2008, and the entire system was designed and modeled using the proposed alignment. Construction was staged to coincide with available capital funding and ensure competition among contractors. In total, the project had 19 contracts between 2009 and 2015. To complete the project, 12 different contractors were hired. The upgrades to the CRD WWTP cost approximately $72 million, with approximately $35 million of the cost required to receive the SRDRWS flows.

During the concept stage of the CARWW and SRDRWS, a review of regionalization versus standalone wastewater treatment plants at each community was investigated. It was determined that in looking at the long term, a regionalized system was the more cost effective approach. Even with the large initial capital cost of the regional system, the yearly operational and maintenance costs of the standalone plants was significantly larger over the lifetime of the systems. The large initial capital cost for the regional system did cause some concerns if the SRDRWC had to finance the entire project themselves — as the utility rate that the communities and their residents would be paying would be unrealistic for them to afford. With the Government of Alberta funding 90% of the regional system and 100% for the attributed capacity increase at the City of Red Deer WWTP (approximately 50% of overall upgrades), this lowered the utility rate to a realistic rate.

"Central Alberta is growing at a rapid pace, putting stress on the wastewater treatment systems. In places like Olds and Innisfail, their aging infrastructure was stressed, reducing the quality of wastewater that was discharged into natural water systems. This facility will meet the needs of Central Alberta for the next 25 years, and will produce high quality wastewater, reducing the risk to the environment as the wastewater is reintroduced into the Red Deer River."

John Van Doesburg, Project Manager

SRDRWC

The Successful Completion of an Environmentally Friendly Project

Following 15 years of concepts, studies, consultations, design / construction phases, and commissioning, the SRDRWS successfully went online in the summer of 2015. The regionalized system ensures that the six impacted communities served by the SRDRWC – as well as the City of Red Deer – will have a reliable system to meet their growing needs for the next 25 years. The SRDRWS also ensures wastewater from these communities is now treated to higher standards at the City of Red Deer Wastewater Treatment Plant which, ultimately, protects the aquatic environment and the quality of source water for most of Central Alberta.

Most importantly, the successfully completed SRDRWS will be used as a model for the north and west legs of the Central Alberta Regional Wastewater System, and will ultimately protect an even larger portion of the Red Deer River Basin, one of Central Alberta's most valuable natural resources.