



North Okanagan Wastewater Recovery Project Summary Report

304 - 1353 Ellis Street,
Kelowna, BC V1Y 1Z9 | T:
250.762.2517

Contact: Scott Shepherd

T: 250-762-2517

sshepherd@urbansystems.ca

urbansystems.ca



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1.1 Purpose of the Project

The North Okanagan Wastewater Recovery Project (NOWRP) was initiated through a collaborative effort of the Township of Spallumcheen (TOS), the Okanagan Indian Band (OKIB) and the Regional District of North Okanagan (RDNO).

The initial discussions between the three jurisdictions concluded that a co-operative effort was needed to address the long standing issues of on-site septic systems, the deteriorating quality of Swan Lake, the support of agriculture and the annual water deficit, the response to climate change issues and the provision of opportunities for industrial and commercial development.

The purpose of the project is to define how a community sewerage system could be developed that would achieve these objectives while spanning three jurisdictions. These discussions led to the formation of a formal “Partnership” with all three organizations participating and contributing on an equal basis.

1.2 Protection of the Aquatic Environment

One of the critical aquatic environments in the region is Swan Lake. Swan Lake water quality has been assessed through 2016 and 2017 and found to be deteriorating annually, demonstrating increased Ammonia concentration, elevated sulphate concentration, elevated nitrate levels and exceedance of federal/provincial water quality guidelines for protection of freshwater aquatic life.

Swan Lake water quality assessment reports were completed in two consecutive years, 2015 and 2016, by Western Water Associates Ltd. Both sampling seasons indicate exceedance of the Federal and Provincial Regulations (CCME – Canadian Council of Ministers of the Environment). The source of these contaminants is attributed to agricultural fertilization and septic effluent dispersal fields. Wastewater from several RV Parks near Swan Lake was identified as a serious concern.

Executive Summaries of both the Phase 1 and Phase 2 Swan Lake Water Quality Assessment reports can be found in **Appendix 8**.

1.3 Climate Change and Water for Agriculture

The Spallumcheen Valley has historically been used for agriculture. The local climate has an annual water deficit of approximately 400 mm over the 120 day irrigation season. The effects of climate change are expected to increase this deficit by 15-20% in the next 20 years. Accordingly, a chief objective identified in the Township's Climate Change Strategic Framework for the project is to generate water suitable for agricultural irrigation from collected wastewater. The treatment protocol is discussed in the Water and Biosolids Recovery Plan provided in **Appendix 4**, and the Climate Adaption Strategy Framework in **Appendix 6**.

1.4 Climate Change and Biosolids

The treatment process will yield biosolids suitable for composting and to be used locally as soils amendment to increase organics and soil moisture. The anaerobic digestion process will be used to stabilize the biosolids in readiness for mixing with a carbon source and composting.

There have been recent controversies over the disposition of cattle manure in the north region of Spallumcheen. It is intended that part of the anaerobic digestion bio-reactor could be used for processing trucked animal waste. The region has numerous animal operations, including cattle, chickens, hogs, and sheep. It is not anticipated that the anaerobic digester will alleviate all the manure issues in the area, but its availability to provide a “drop-off” for animal wastes will help to alleviate the animal wastes issue.

This aspect is also discussed in the Water and Biosolids Recovery Plan in **Appendix 4**.

1.5 Industrial Water Uses

The service area has a multitude of industrial, commercial and institutional properties in addition to residential areas. There is strong demand for light industry in the area, but development is hampered by the lack of community sewer and fire-fighting water. A study titled the “North Okanagan Employment Lands Study” was completed in February, 2016. This study identifies the opportunities for industrial/commercial development and the beneficial impact on employment in the region. The Executive Summary of this study is found in **Appendix 9**.

The project will provide the service area with a community sewer system and can also make treated effluent available for industrial uses; such as, cooling water, washdown water, and fire protection system in addition to agricultural irrigation use.

1.6 Project Partners

The service area comprises three jurisdictions: RDNO (Regional District of North Okanagan), TOS (Township of Spallumcheen), and OKIB (Okanagan Indian Band). The Memorandum of Understanding (MOU) forms the basis of the Partnership between the three jurisdictions. The MOU is provided in **Appendix 1**.

The Township of Spallumcheen will take the lead in the provision of a suitable site for the wastewater treatment facility and the effluent storage facility. The distribution network for agricultural irrigation will lie generally in the south Spallumcheen area. OKIB will possibly make some use of the irrigation water on IR 4.

Each participant will participate on the basis of a 1/3 share of financial responsibility. However, the timing of the “buy-in” is flexible and each participant can choose when they are ready to actively contribute.

1.7 Background Narrative

The area under consideration has historically been a concern for the lack of a community sewer system. It is suspected of contributing to the deterioration of water quality in Swan Lake; a suspicion confirmed with two recent annual sampling studies. The three jurisdictions that are impacted by the lack of a community sewer system have prudently come together to pursue, elaborate, and implement a concept to deal with these concerns.

The Partnership meetings established the guiding principles and goals and objectives for the community sewer initiative. These can be briefly summarized as follows:

1. Motivators and Vision

- Protection of Swan Lake water quality and habitat. The importance of protecting Swan Lake was recently highlighted in a News Release from the Ministry of Forests, Lands, Natural Resource Operations and Rural Development. The News Release designates Swan Lake (471.5 hectares) area as a Wildlife Management Area (WMA) to help protect migratory birds, animals and species at risk. (See **Appendix 11**)
- Make-up the water deficiency for agricultural irrigation
- Assistance in mitigating the animal waste issues and groundwater contamination
- Recovery of biosolids for soils enhancement in the agricultural sector
- Production of small electrical power from digester gas
- Enhancement of light industrial, commercial and institutional land and increase of employment opportunities
- Provision of an affordable community wastewater system for the Swan Lake region.

2. Guiding Principles

- Collaboration and co-operation between the three jurisdictions
- Equal three-way split of responsibilities and contributions
- Clear benefits to property owners in the service area
- Fairness is a critical component for all negotiations
- Comply with Ministry of Environment MWR for water reclamation and OMRR for biosolids reclamation

3. Goals and Objectives

- Develop a practical and affordable community sewer system to meet present and future needs of the service area
- Phase in extensions to the service area as required
- Apply available GHG reduction practices (see **Appendix 7**)
- Obtain consensus from property owners
- Structure a co-operative partnership model for the three jurisdictions
- Prepare and submit applications to available senior government funding programs
- Provide a sustainable cost recovery plan

2.0 CURRENT AND FUTURE LAND USES

This summary provides an overview of the existing and projected land use situations within each of the Local Government and First Nation areas proposed to be serviced by the wastewater treatment plant.

2.1 Swan Lake – Regional District of North Okanagan

The Swan Lake neighbourhood and commercial area is located within RDNO Electoral Areas B and C, north of the City of Vernon and south of the Township of Spallumcheen. Highway 97 runs through this area from north to south and acts as a connector highway from Washington State to the Trans-Canada Highway. Along this highway is a large concentration of commercial and light industrial uses, such as automobile sales and repair shops, storage facilities, neighbourhood pubs, greenhouses, and warehouses. The Swan Lake Wildlife Management Area is situated to the west of the highway. Active agricultural land within the Agricultural Land Reserve is located east of the highway, adjacent to many of the commercial and light industrial uses. It is integral to the residents of the Swan Lake neighbourhood that these lands remain within the ALR. In pockets surrounding the ALR land, there are clusters of small-lot residential development, largely comprising of single family dwellings. There are also many large rural residential lots (see **Figures 2.1** and **2.2**).

If sewer services are extended, it is anticipated that more development will occur within the Highway 97 corridor and existing residential areas of Swan Lake. Development along the corridor may consist of a wider range of commercial and light industrial uses. Within the existing residential areas, infill is encouraged in the form of carriage homes, secondary suites, and small lot subdivision, as these areas will all be provided with sewer servicing. Agricultural, rural, and environmental areas will all be protected (see **Figure 2.1**).

2.2 Township of Spallumcheen

The subject area of Spallumcheen is concentrated along Highway 97 and comprises of light and general industrial uses, as well as highway & tourist commercial, service commercial, and agricultural uses. An application has been submitted to the Agricultural Land Commission to exclude two parcels from the Agricultural Land Reserve. They are currently being used to grow hay, host grazing cattle, and foster beehives (see **Figure 2.2**).

It is anticipated that this portion of land in South Spallumcheen will become a hub of industrial activity for the region if sewer servicing is provided. The ALR lands are proposed to host industrial uses that will support the wastewater recovery facility. The wastewater facility will provide significant benefits to agriculture and the surrounding industrial parcels, allowing for increased economic activity in the area.

2.3 Okanagan Indian Band

Swan Lake Indian Reserve #4 is within the area proposed to be serviced by sewer in this project. The reserve is located at the north end of Swan Lake, north east of the Swan Lake neighbourhood and south east of TOS. The lands are currently vacant, however it is anticipated that they will be used for highway commercial purposes in the future comprising of a range of uses such as: retail, restaurants, gas stations, storage and warehousing, and automobile sales and repair.

Figure 2.1: Swan Lake Existing Official Community Plan Land Use Designations

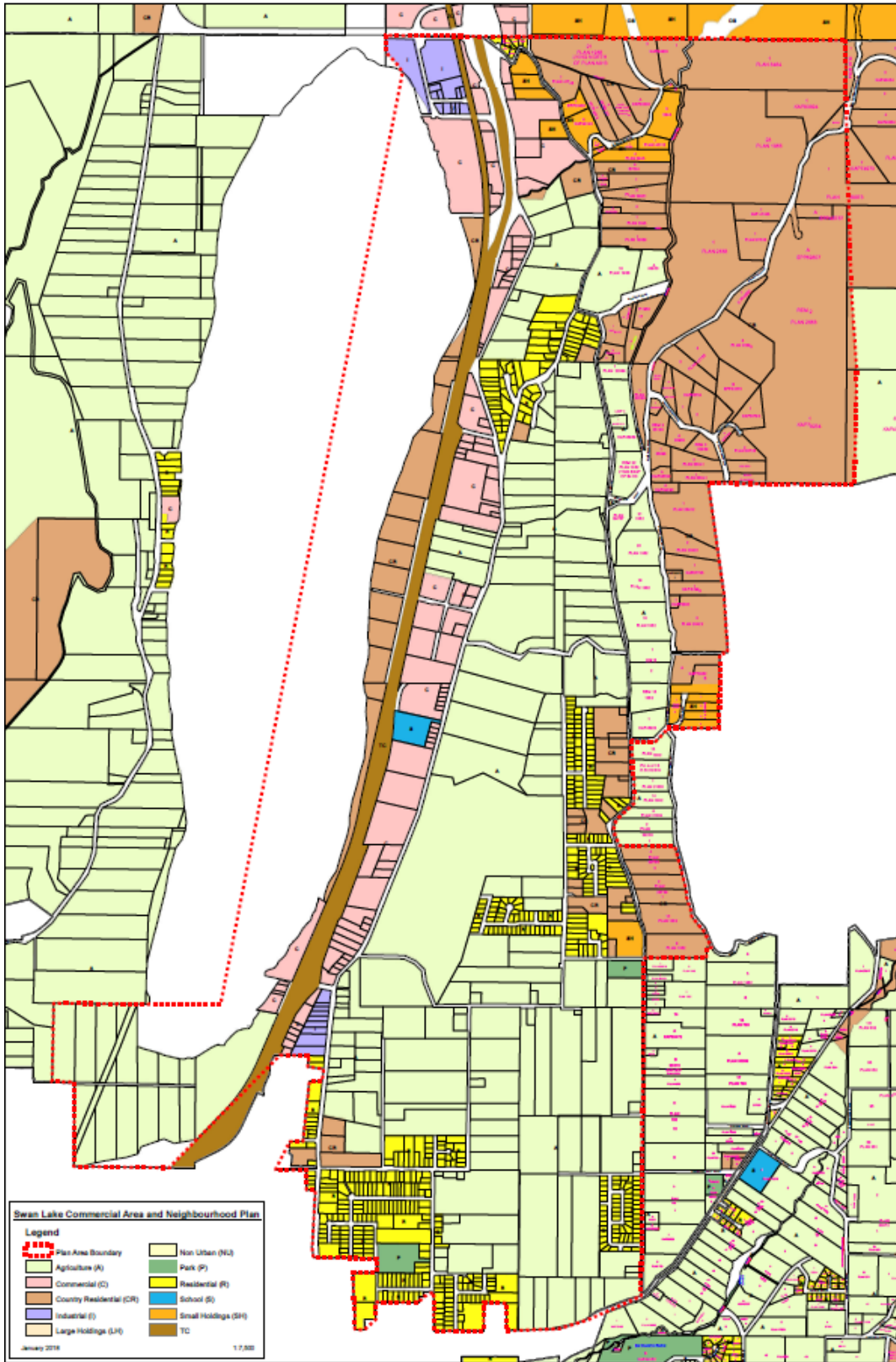
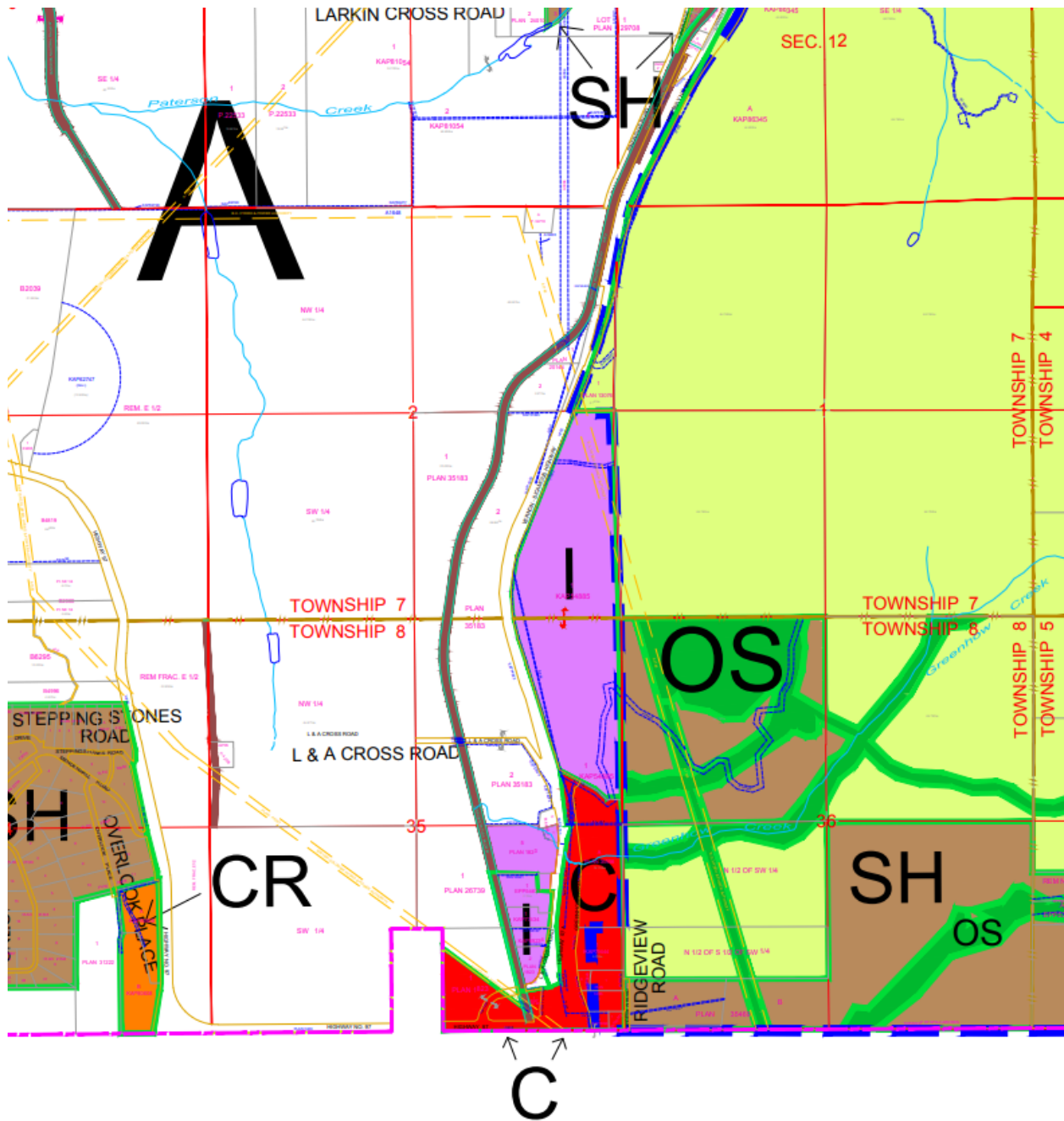


Figure 2.2: Township of Spallumcheen Official Community Plan Land Uses



3.0 DESIGN CRITERIA AND SERVICING STRATEGY

The study involves three participating jurisdictions, each with their own set of design guidelines for infrastructure. Discussions with the team members concluded that a province-wide guideline should be adopted for the purpose of this study. The province-wide guideline available in British Columbia is from the Master Municipal Construction Documents Association (MMCD), Design Guidance Manual, 2014. These Guidelines are used by a wide range of local governments in British Columbia.

The other design guideline with respect to wastewater is the BC Municipal Wastewater Regulation (MWR), deposited April 20, 2012. This Regulation provides effluent quality requirements for all types of discharges and wastewater reclamation projects.

3.1 Unit Wastewater Flows

The MMCD provides the following in the Guidance Manual:

- Industrial/Commercial/Institutional areas: 25,000 L/ha/d
- Residential Average Daily Flow (ADWF): 240 L/capita/d
- Diurnal Peaking Factor for Residential zones: Harmon equation: $PF = 1 + 14 / (4 + P^{0.5})$ (P=population in 1000's).
- Diurnal Peaking Factor for ICI areas: 2.0 (from general literature)
- Inflow/Infiltration allowance: 0.06 L/s/ha, or 5000 L/ha/d

Therefore, the overall flow estimate for ICI areas is 30,000 L/ha/d including the infiltration allowance.

3.2 Study Area

The study area is divided into two main designations:

- a) The core area ICI corridor
- b) The peripheral residential nodes

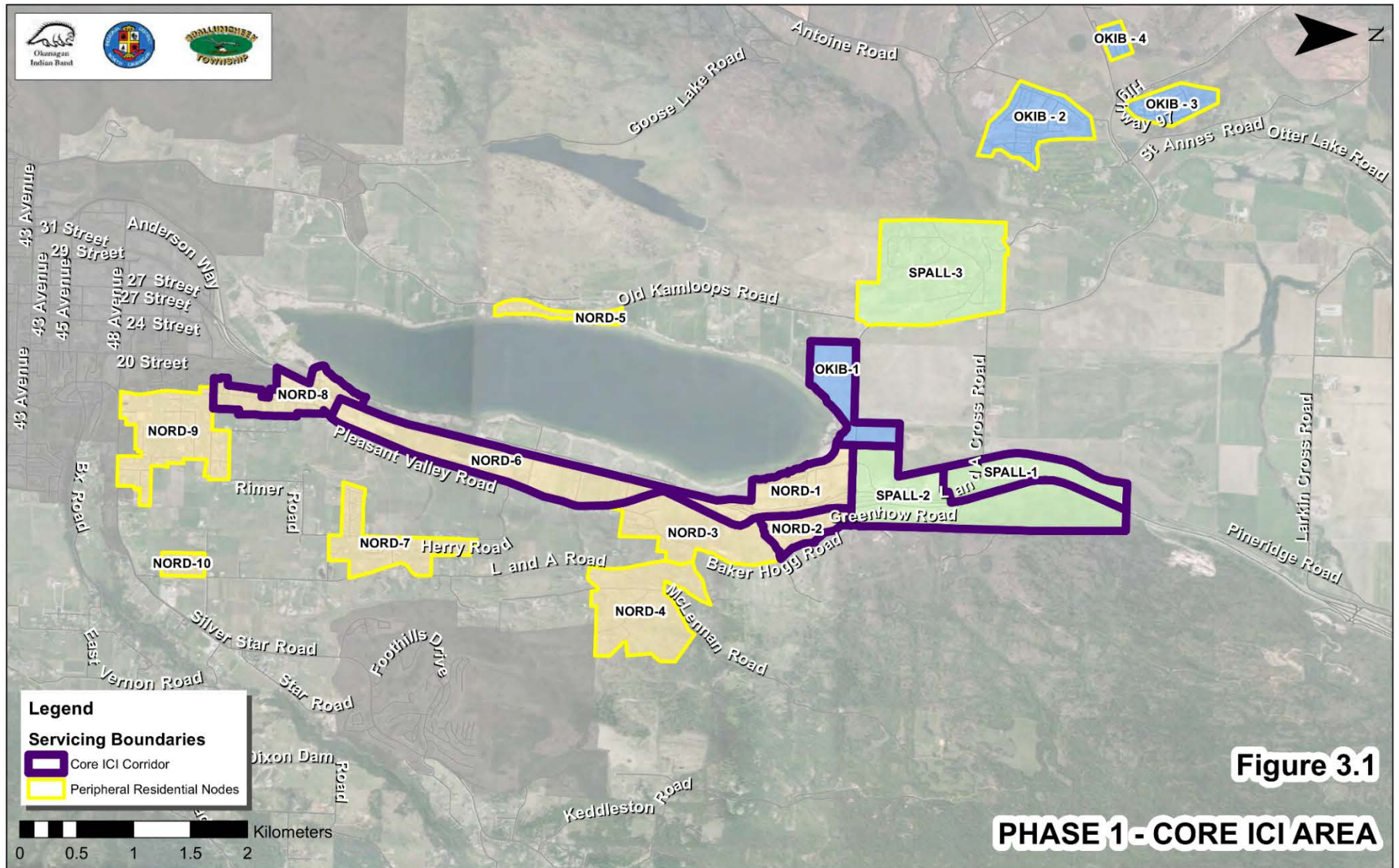
Figure 3.1 illustrates the areas described below. The core area ICI corridor includes areas in all three jurisdictions, designated as follows:

- RDNO -1
- RDNO -2
- RDNO- 6
- RDNO- 8
- Spallumcheen -1
- Spallumcheen -2
- OKIB - 1

These designated core areas will represent Phase 1 of the project. The peripheral segments are largely residential with lower densities, and will represent Phase 2 of the project that may be considered in the future. They include the following areas:

- RDNO-3
- RDNO-4
- RDNO-5
- RDNO-7
- RDNO-9
- OKIB - 2
- OKIB - 3
- OKIB - 4
- Spallumcheen – 3

Figure 3.1: Phase 1 and Phase 2 Service Areas



3.3 Growth Projections

There is often much uncertainty around how fast an area will develop as many factors affect this such as market demand, land and servicing availability. Since there is much uncertainty around development, various scenarios were developed to better understand how growth (however fast it occurs) will affect the sewage flow and the necessary level of infrastructure investment.

Growth projections for ICI areas are difficult to forecast since growth depends to a large extent on the regional economy and market take-up of a range of commercial and industrial ventures. The approach for this study is to adopt a 20-year horizon and apply a range of take-up rates to determine the sensitivity of growth to land consumption.

The relative ICI areas in each jurisdiction are as follows:

- RDNO (Areas 1, 2, 6 and 8): 175 ha
- Spallumcheen (Areas 1 and 2): 119 ha
- OKIB (Area 1): 32 ha

The calculation of percentage of remaining land for a range of consumption rates for the ICI corridor is as follows:

Table 3.1: Range of Potential Land Consumption Rates

Consumption rate per Annum	Percent remaining land after 20 years
1%	80%
2%	60%
3%	40%
5%	0%

The foregoing illustrates that if land parcels are developed for ICI purposes at 5% per annum, there would be no land left for development at the end of 20 years. On the other hand, if take-up is at a rate of 1% per annum, only 20% of the available land would be used up, with 80% remaining for the longer term. For the purpose of this analysis, a consumption rate of 2% per annum has been adopted; resulting in 40% of build-out within the 20-year horizon.

3.4 Flow Projections

The flow projections for ICI flows are made on the basis of serviced area (hectares). The flow projections for residential areas are made on the basis of number of dwelling units. The ICI flows based on developed hectares using the MMCD allowance of 25,000 L/ha/d. The residential flow derivation uses an allowance of 1,000 L/unit/d.

The Build-out and 20-year horizon flow projections for the ICI core area and the peripheral residential areas are summarized in **Table 3.2** below.

Table 3.2: Flow Projections

Area	Build-out (ML/d)	20-Year (ML/d)	10 -Year (ML/d)
1 ICI			
RDNO 1,2,6,8 (175 ha)	4.38	1.75	0.88
Spallumcheen 1,2 (119 ha)	2.98	1.19	0.60
OKIB 1 (32 ha)	0.8	0.32	0.16
RESIDENTIAL			
RDNO 7,9,10 (1160 units)	1.16	0.46	0.23
RDNO 3,4,5 (440 units)	0.44	0.18	0.09
Spallumcheen 3 (100 units)	0.10	0.04	0.02
OKIB 2,3,4 (570 units)	0.57	0.23	0.11
ICI	8.16	3.26	1.64
Totals Residential	2.27	0.91	1.45
TOTAL	10.43	4.17	2.09

The design horizons for various components of the system are different. For example, trunk sewer lines and forcemains are buried and are typically designed for the “build-out horizon, since it not efficient to install a new pipeline every 10 or 20 years. On the other hand, facilities such as pump stations and treatment plants can be phased in accordance with growth patterns. For example, a pump station can be sized with a wet well suitable for the build-out horizon and be equipped with pumps for a 10 or 15-year horizon. Since the life of a pump is generally less than 20 years, pump replacement can be scheduled for a 15 or 20 year interval and upsized to match any flow increase. Similarly, treatment plant facilities can incorporate structures for the long term but utilize equipment for a phased intermediate horizon.

The suggested design horizon flows for various components of the system are as follows: Pipe peak flows are taken as 1.5 times the average flow

The proposed strategy for treatment plant construction is to develop a treatment plant aimed at the 10-year capacity (2 ML/d). The plant can be expanded in 2 ML/d increments in step with growth, with allowance for an ultimate capacity of approximately 10 ML/d.

Gravity trunk sewers and forcemains should preferably be sized for build-out capacity. However, in the case of forcemains, self-cleansing velocities should be maintained to avoid sedimentation and blockage in the pipe. This problem is sometimes dealt with by installing twin forcemains in the same trench, and allowing one to sit empty until flows increase to the appropriate level.

TRUNK GRAVITY SEWERS
Build-Out: 15.6 ML/d
TRUNK FORCEMAINS
Build-Out: 15.6 ML/d
PUMP STATIONS
STRUCTURES
Build-Out: 15.6 ML/d
EQUIPMENT
10-15 year: 2.0 ML/d
TREATMENT PLANT
STRUCTURES
½ of Build-Out: 7.8 ML/d

3.5 Phase 1 Collection System

The Phase 1 collection system consists of trunk sewers and lift stations to service the east Swan Lake corridor and south TOS, as well as IR#4. The sizing of trunk sewers is designed for build-out capacity, including future extensions to cover the entire service area.

Plans of the trunk sewers are provide on **Figures 3.1** through **3.5**.

Figure 3.2: Trunk Sewer Alignment

NORTH OKANAGAN WASTE WATER RECOVERY PROJECT



Project		
NORTH OKANAGAN WASTE WATER RECOVERY PROJECT		
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Figure 3.3: Trunk Sewer Alignment

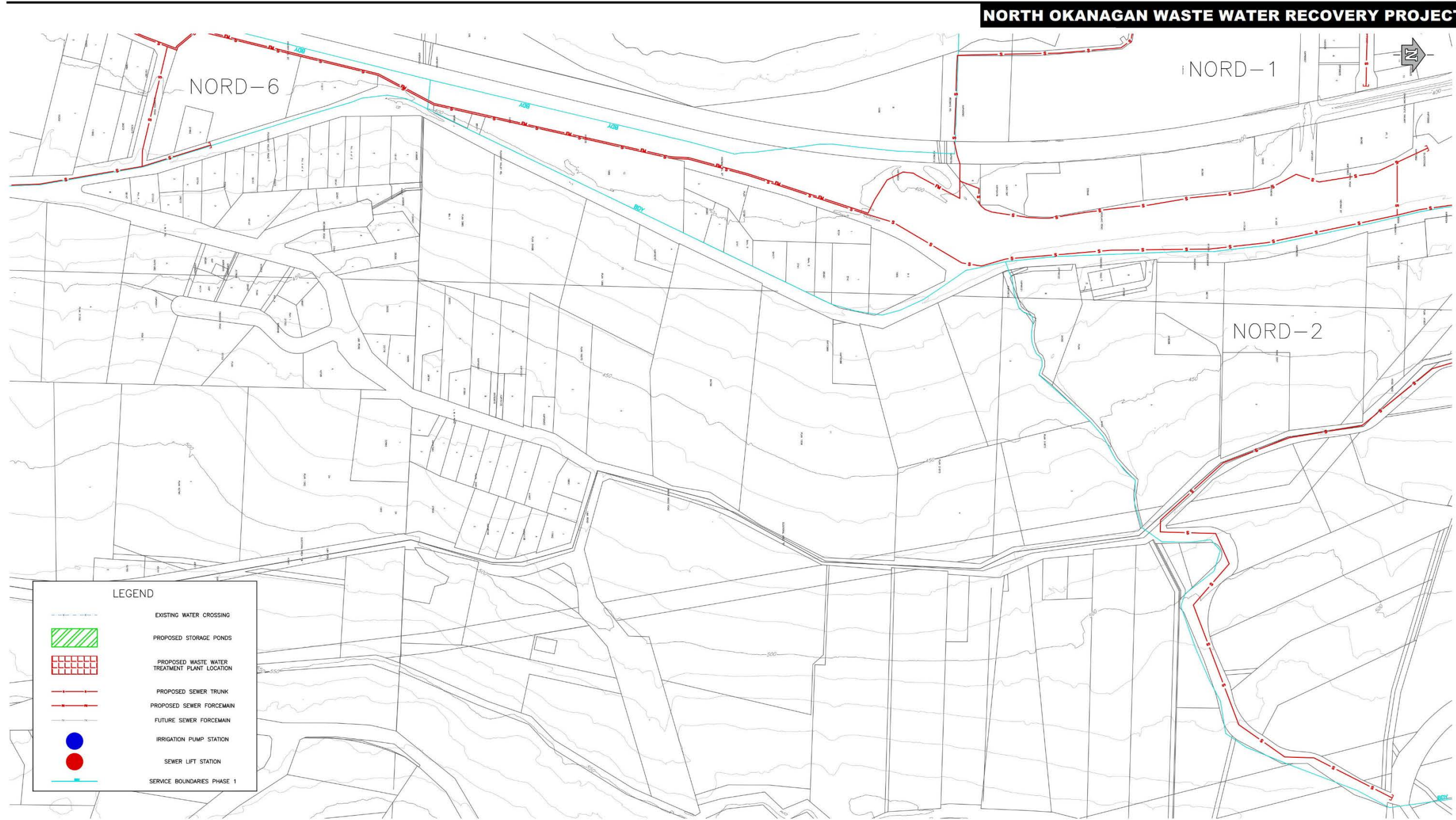


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Figure 3.4: Trunk Sewer Alignment












NORTH OKANAGAN WASTE WATER RECOVERY PROJECT

NORD-6

NORD-1

NORD-2

LEGEND

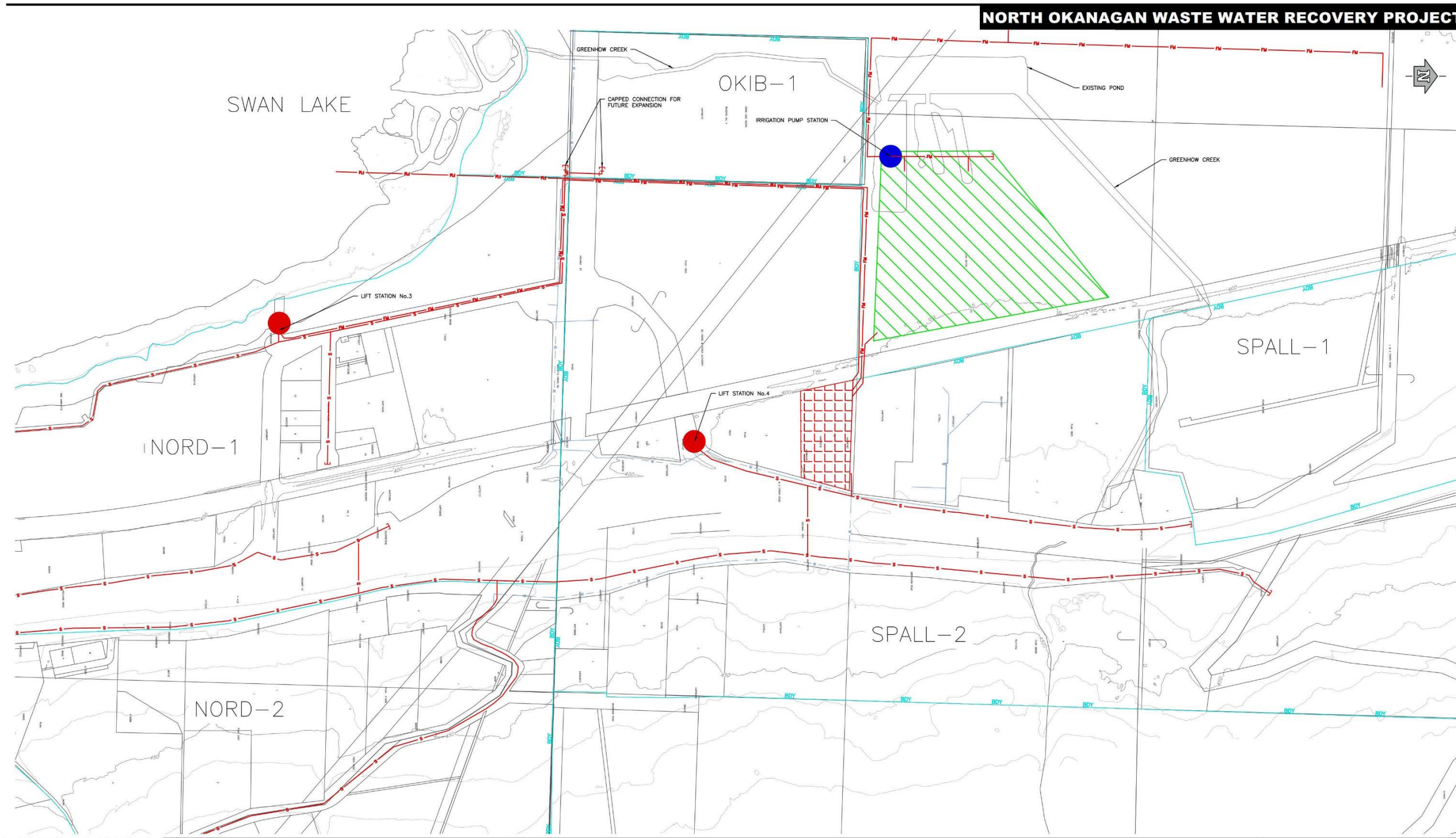
-  EXISTING WATER CROSSING
-  PROPOSED STORAGE PONDS
-  PROPOSED WASTE WATER TREATMENT PLANT LOCATION
-  PROPOSED SEWER TRUNK
-  PROPOSED SEWER FORCEMAIN
-  FUTURE SEWER FORCEMAIN
-  IRRIGATION PUMP STATION
-  SEWER LIFT STATION
-  SERVICE BOUNDARIES PHASE 1



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Figure 3.5: Trunk Sewer Alignment



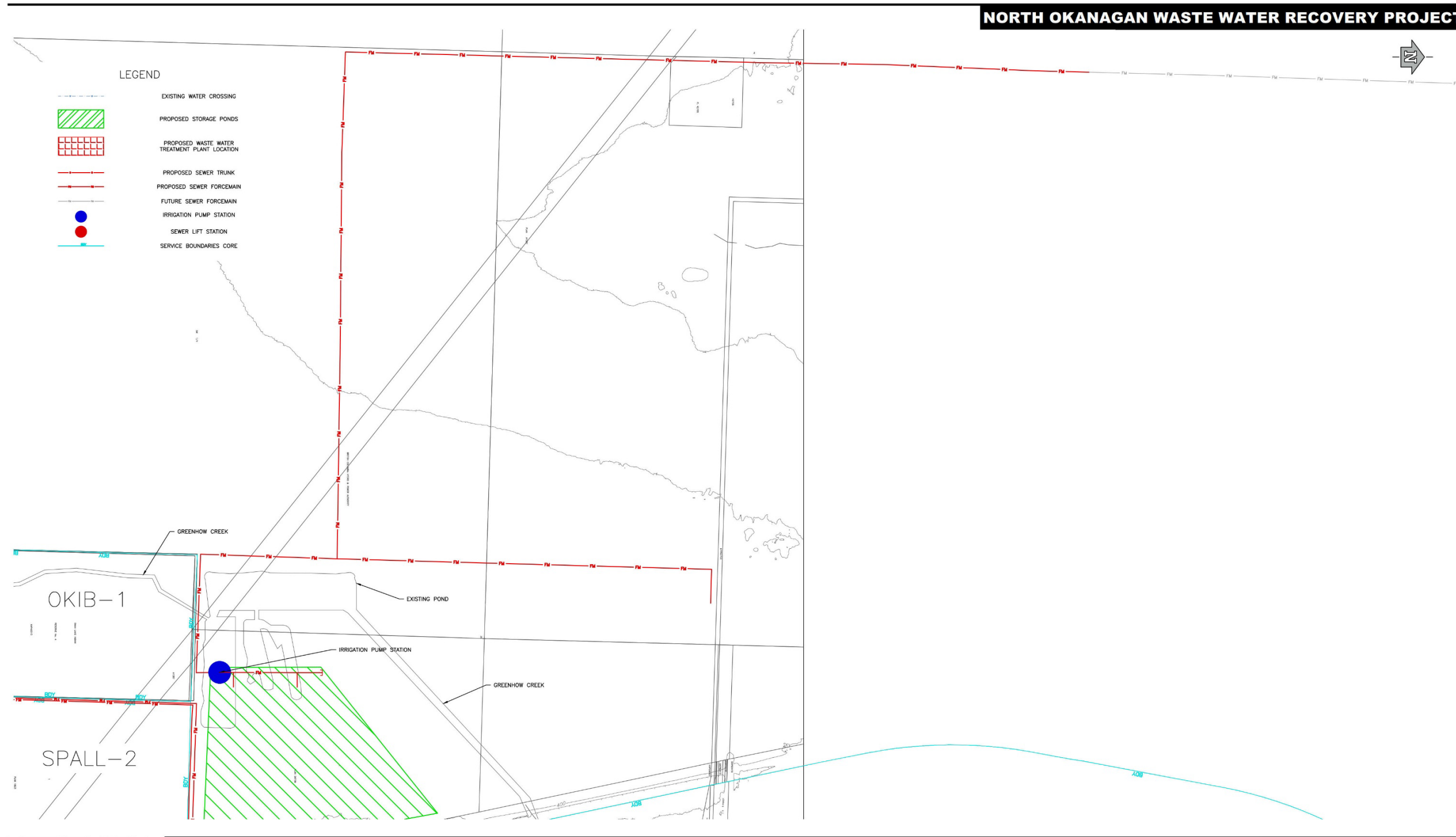
NORTH OKANAGAN WASTE WATER RECOVERY PROJECT



Project		
NORTH OKANAGAN WASTE WATER RECOVERY PROJECT		
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Figure 3.6: Trunk Sewer Alignment



Project		
NORTH OKANAGAN WASTE WATER RECOVERY PROJECT		
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4.0 WATER AND BIOSOLIDS RECOVERY PLAN

4.1 Applicable Regulations

The BC Municipal Wastewater Regulation (MWR) is the applicable provincial legislation for a project of this nature. The federal Wastewater Systems Effluent Regulations (WWSER) are applicable to surface water discharges and will also be adhered to when a discharge to Swan Lake is required. The principal effluent destination is for agricultural irrigation and the target MWR quality is “Greater Exposure Potential”; the second highest standard for reclaimed water.

The MWR provisions applicable to reclaimed water for irrigation require that an emergency discharge to surface water be provided for wet summer seasons where effluent production exceeds irrigation consumption. In this case, the surface water body is Swan Lake and provisions for nutrient removal and UV disinfection are being made to provide further treatment for these potential periodic discharges to comply with both the BC MWR and the Canadian WWSER.

Appendix 4 provides a detailed description of the proposed water recovery plan. **Figure 4.1** provides a schematic of the proposed treatment process.

4.2 Treatment Facility Site Selection

Selection of a suitable site for the treatment facilities is an important task and a site evaluation matrix was developed to assess and compare four potential sites.

The evaluation process and the comparison matrix are provided in **Appendix 5**. The final selection concluded with a property in the industrial area of Spallumcheen as the best site from a variety of perspectives. The site has been purchased by the Township and will be used for construction of the treatment facilities. It is located on L&A Cross Road, Lot A, Section 35, Osoyoos Division of Yale, Plan KAP89234, Township 8, 1.01 Hectare.

The property adjacent to the treatment facility site has been offered for construction of the effluent irrigation winter storage pond. The agreement with the landowner (John Toporchak) is for a long-term lease (99 years) with access to the stored water provided to the owner for use on their farming operations. The irrigation supply line includes a chlorination facility and irrigation options. Provisions are made for extension of the line to service other potential future customers as most of the area in the vicinity is Agricultural Land Reserve. This property is an L&A Cross Road, Lot 1, Section 35, Osoyoos Division of Yale, Plan KAP26739, Township 8, 18.07 Hectares.

4.3 Agricultural Usage Areas

The valley has historically supported agricultural uses and the climate records show a typical annual deficiency of approximately 400 mm for growing such crops as alfalfa and silage corn. The estimated production of reclaimed water in the first phase of the project is 2 ML/d, or 730,000 m³/yr. With an application rate of 400 mm (0.4m), the initial area required is 1,825,000 m², or 182 hectares. The farmer in the lease agreement owns several quarter sections, each at 256 hectares.

The City of Armstrong has been practicing reclaimed water irrigation for many years and has customers in South Spallumcheen. It is reported that the demand for reclaimed water exceeds the available supply. Therefore, the introduction of an additional reclaimed water source will benefit the farming community.

4.4 Biosolids Recovery

The proposed treatment plant will produce sludge from the primary clarifier and from the membrane bioreactor. It is the intent to stabilize this sludge by means of anaerobic digestion. This process requires less electrical power than aerobic digestion and will also produce methane gas, which can be converted to heat and electrical energy.

The initial size of the wastewater treatment plant will not produce sufficient sludge to make anaerobic digestion and gas recovery economical. The recovery plan includes receiving and processing animal waste products in the anaerobic digester. This will provide a sufficiently robust organics load to make anaerobic digestion and gas recovery viable. The diversion of a portion of the animal wastes in the region will help to alleviate the concerns with the entry of animal wastes and nitrates into the area aquifers.

The stabilized biosolids from the anaerobic digester will be dewatered with the use of a centrifuge. The centrate from the centrifuge will be returned to the head of the plant. The dewatered cake will be transported to the Curtis Farms composting operation located near the plant site. Curtis Farms currently processes stabilized waste biosolids from the Enderby treatment plant and from several other sources. The operation is registered with the OMRR and produces a Class A compost which is distributed locally to agriculturalists, Mr. Curtis advises that demand for the Class A compost far exceeds the supply and the composting operation is searching for additional sludge quantities. Once the processing quantity appears to reach the current Authorized value, an amendment application will be prepared and submitted to the Ministry of Environment.

A further description of the biosolids recovery plan is presented in **Appendix 4**.

Figure 4.1: Wastewater Treatment System Schematic

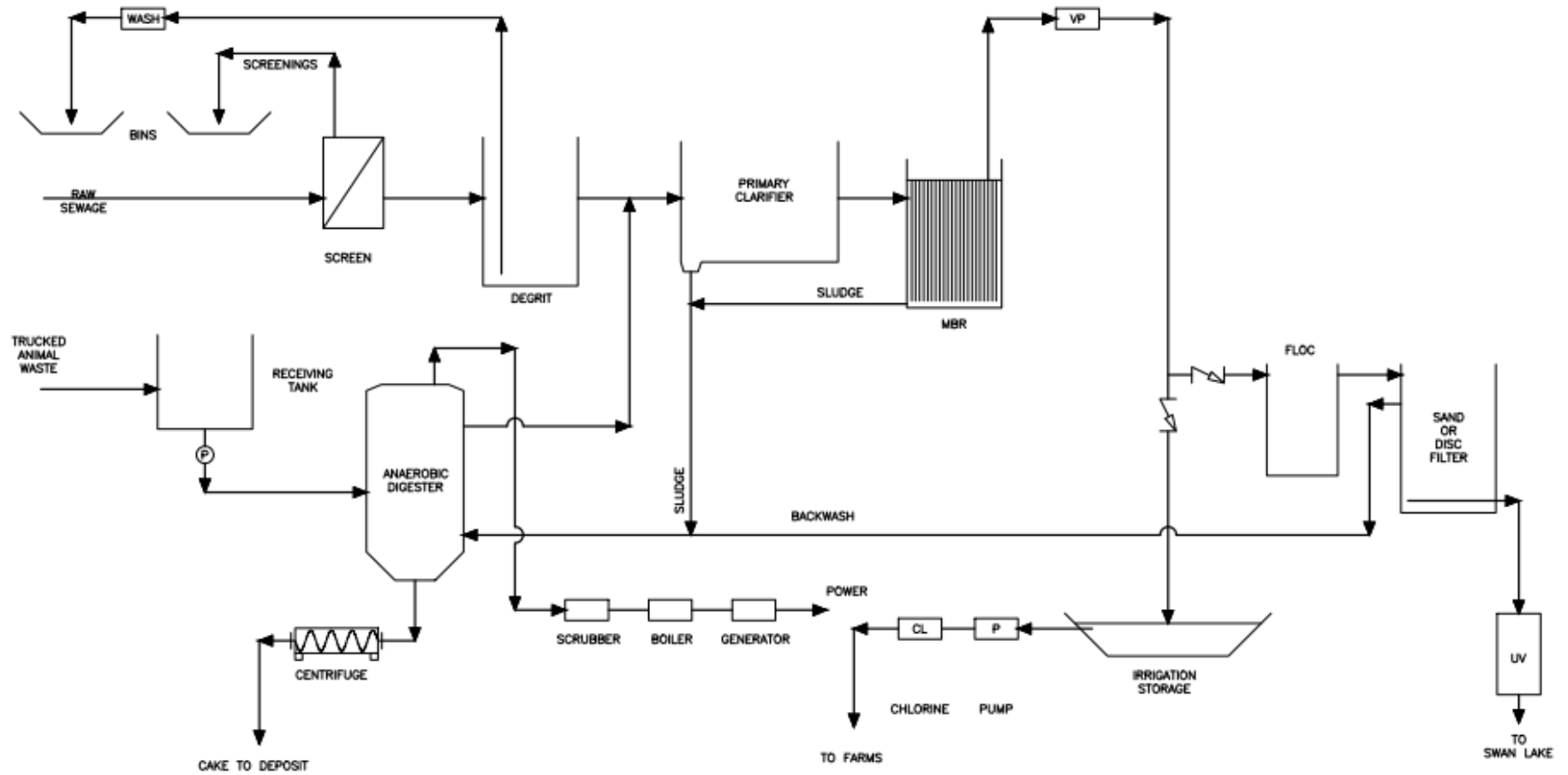


Figure 4.2: Wastewater Recovery System Site Plan



5.1 Capital Cost Estimates

The unit pricing and derivation of detailed cost estimates for the project components (including contingencies and 2 engineering and construction services at 40%) is provided in **Appendix 14**. A summary of the major components is listed below:

Table 5.1: Major Components Estimate

1. Common Works

Wastewater Treatment Facility	\$ 10,178,000
Effluent Storage and Distribution	\$4,984,000
Highway & Railway Crossings	\$252,000
Sub-Total Common Works	\$15,414,000

2. Collection Systems

RDNO 1, RDNO 2	\$10,500,000
RDNO 6, RDNO 8	\$11,004,000
Sub-Total collection systems	\$21,504,000

TOTAL Phase 1	\$36,918,000
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5.2 Annual Operation and Maintenance Cost Estimates

The annual operation and maintenance cost estimates are derived and provided in **Appendix 14**. It is assumed that RDNO will be contracted to undertake the operation and maintenance of the system since RDNO already looks after sewer and water utilities in the area. This additional utility will require additional staff and administrative resources. The estimated annual cost of the phase 1 facilities (including labour, consumables and administration) is \$400,000/year.

5.3 Capital Replacement Cost Estimate

The capital replacement cost is estimated on the basis of a projected 20-year life for mechanical components such as pumps, compressors, electrical gear, etc. Items such as concrete tanks, superstructure, and underground pipes are expected to have a serviceable life in excess of 75 years. The replacement value is estimated at \$372,000 per year.

5.4 Life Cycle Cost Estimates

The total annual cost for the life cycle evaluation are:

Annual O&M Costs	\$400,000 / yr
Capital Replacement Allowance	\$372,000 / yr
TOTAL ANNUAL	\$772,000 / yr

6.0 GOVERNANCE AND FINANCE MODELS

The governance and financing of the wastewater recovery project is set out in a Memorandum of Understanding (MOU) included in **Appendix 1**. The MOU sets out the parameters of an agreement between Township of Spallumcheen (TOS), Regional District of North Okanagan (RDNO), and Okanagan Indian Band (OKIB). The guiding principle behind the partnership MOU is that each of the parties will share in the Wastewater Recovery Project. While OKIB intends to join the system later, they are still an equal partner in the project from the outset.

The key provisions of the MOU are set out below.

6.1 Ownership and Payment

Ownership of works is divided into two categories: Common Works and Attributable Works.

- Common Works are held jointly by Spallumcheen and RDNO.
- Attributable Works are owned separately by each individual jurisdiction: Spallumcheen, RDNO, and OKIB.

The Common Works include:

- The Wastewater Recovery Plant;
- The lines from the Wastewater Recovery Plant to the Storage Lagoons;
- The Storage Lagoons;
- The Supply Lines from the Storage Lagoons to irrigation in fields, and lines to Swan Lake; and
- Railway and Highway crossings and short stubs of major collection system trunks leading into the Wastewater Recovery Plant.

The Attributable Works include:

- Wastewater collection lines that collect and convey wastewater in one jurisdiction; and
- Lift stations, pump stations, attenuation tanks, and force mains that serve to convey wastewater in one jurisdiction.

Only RDNO and Spallumcheen will be initially connecting to the Common Works. RDNO will pay 50% of the net costs after grant funds, and Spallumcheen will pay 50%.

OKIB does not plan to initially connect to the Common Works, but wishes to maintain the option to connect to the Common Works later. When OKIB joins, it will pay for 1/3rd of the net cost of the Common Works, after grant funds.

The capital cost recovery for the initial plant will be determined by each individual party within their jurisdiction. Methods may vary from jurisdiction to jurisdiction.

6.2 Decision making Authority

Swan Lake Wastewater Recovery Joint Stakeholders Committee

Spallumcheen and RDNO will appoint a joint stakeholders committee, the Swan Lake Wastewater Recovery Stakeholders Committee (SLWRSC) to address the Common Works. The SLWRSC will consist of elected representatives from each jurisdiction:

- Township of Spallumcheen
- Electoral Area B
- Electoral Area C

- Okanagan Indian Band

The Committee makes recommendations to Spallumcheen Council and RDNO Board.

OKIB does not wish to initially connect to the Common Works, but wishes to maintain the option to connect later, and OKIB will have a non-voting representative on the Swan Lake Wastewater Recovery Stakeholders Committee to keep informed about the system until they join the system. Once OKIB joins the system, OKIB will have a voting member and the Committee will also make recommendations to OKIB Chief and Council.

Swan Lake Wastewater Recovery Technical Committee

The SLWRSC will have a separate staff Swan Lake Wastewater Recovery Technical Committee (SLWRTC) that reports to the SLWRSC. The SLWRSC will appoint at least one staff member from RDNO, Spallumcheen, and OKIB to the SLWRTC.

For Attributable Works - the individual wastewater collection works - the individual jurisdictions will make decisions.

6.3 Existing and Future Capacity of the Plant

Allocation of capacity

The capacity of the Common Works in the initial plant are allocated as follows:

- 1/3rd allocated to RDNO;
- 1/3rd allocated to Spallumcheen;
- 1/3rd allocated to OKIB.

While OKIB does not wish to initially connect to the Common Works, but wishes to maintain the option to connect later, the parties agree to reserve 1/3rd of the capacity in the initial plant for OKIB.

Allocation of Capacity Beyond Initial Plant

The capacity associated with future expansion of the initial plant will not be allocated to the parties. As growth occurs in each jurisdiction, Development Cost Charges or Connection Charges will be paid by owners who connect or develop, and those charges will be placed in a fund for future plant expansion.

Decisions on Plant Expansion

The SLWRSC will make decisions on the timing and implementation of future plant expansions. The decisions will be made as recommendations to the participating jurisdictions.

6.4 Operations and Management of the system

Common Works

While the common works are the joint responsibility of the Township of Spallumcheen and RDNO, the intent is that the RDNO will operate and maintain the common works.

The RDNO intends to establish and staff a department to operate and maintain the Common Works.

Attributable Works

Attributable Works including Individual wastewater collection works will be the responsibility of each separate Jurisdiction.

Operations and Maintenance Cost Recovery for the Plant

The Operations and Maintenance costs for the Common Works, which are intended to be operated and maintained by the RDNO, will be administered and charged to the parties by the RDNO based on the wastewater flows from each party to the plant.

Wastewater Recovery Regulations

Before connecting to the Common Works each jurisdiction will adopt a bylaw that regulates wastewater.

Wastewater Recovery Utility and Administration

Each jurisdiction will establish a wastewater recovery utility to administer the works within its jurisdiction.

6.5 Asset Management Planning

An asset management plan has been created (see **Appendix 2**) that includes an asset renewal cost forecast to identify and assess the expected replacement costs and needs for each of the SLWWRC assets. This enables the utility to see all of the infrastructure's life cycle cost pressures in one place. The forecast is also an ideal tool to help inform the planned sewer rates and inform rate payers by showing how infrastructure performance and age is linked to annual investments. The forecast includes details and summaries of:

- Current replacement value
- Timing of when assets reach their design service life
- Average Annual Life Cycle Investment (AALCI) required for the ongoing renewal of public infrastructure to keep the infrastructure deficit at zero.

This renewal forecast scenario assumes that an adequate annual operations and maintenance (O&M) budget is in place to optimize asset service lives. Reduced or inadequate O&M budget levels would reduce the service lives and increase cost pressures for renewal. Based on this, the asset management includes a framework for establishing a O&M plan. The O&M framework includes a compilation of records in the form of computer files that formalizes the planning, scheduling, documentation and reporting of preventative maintenance activities, and provides a method of recording unscheduled or corrective maintenance activities.

The preventative maintenance program will include systematic and periodic maintenance work done on system components to prevent breakdown, reduce wear, improve efficiency, and extend the life of equipment and structures.

Ongoing maintenance budgeting will be based on the time needed for maintenance tasks and activities will be tracked and recorded for updating and fine-tuning future budgeting. The O&M for the SWWRC will be funded through the user fees charged by the utility.

7.0 PUBLIC CONSULTATION

Consultation and engagement have been undertaken for two areas impacted by the Swan lake Wastewater Recovery project:

- The Regional District of North Okanagan engaged a range of stakeholders on the Swan Lake Commercial Area and Neighbourhood Plan.
- The Township of Spallumcheen engaged with stakeholders regarding the Wastewater Recovery Facility and associated Agricultural Land Reserve Exclusion in the South Spallumcheen Area

Information has also been provided to the public through the Regional District of North Okanagan Website and through public meetings. The various items provided are set out in **Appendix 10** and include the following:

- Wastewater Recovery Project Launch Communications Plan April 10, 2018
- Wastewater Recovery Project Update June 19, 2018

7.1 North Okanagan Regional District - Swan Lake Commercial Area and Neighbourhood Plan

The Regional District of North Okanagan has undertaken a land use planning process for the Swan Lake area that will be added as a schedule to the existing Official Community Plan for Electoral Areas B & C. This project is directly related to the Swan Lake Wastewater Recovery project as the direction for the plan is heavily dependent on whether the area will receive sewer servicing in the future.

Community engagement was conducted in two phases for this project, with open houses being held and surveys distributed during both phases. The breakdown of participants for each phase of engagement is as follows:

Round One

- Open house held on April 16th, 2018 at Vernon Christian School - ~200 attendees
- Survey distributed via hard-copy and online from April 16th – 23rd – 58 respondents

Round Two

- Open house held on June 19th, 2018 at Vernon Christian School – 105 attendees
- Survey distributed via hard-copy and online from June 19th – July 3rd – 52 respondents

Participants could provide input directly at the open house using sticky notes or green (yes) and red (no) dots on maps and plans.

A summary of the findings relevant the sewer is set out in **Appendix 12**.

The findings indicate that a significant majority are quite in favour of sewer services for the area. The key results are as follows:

- When asked if they support sewer services in principle to the Swan Lake area:
 - 76% said yes
 - 17% said no and
 - 7 % were unsure

- 82% to 100% Yes (Green dots) for various areas in scenario #2 (which includes sewer extension) at the open house;
- 54% to 78% Yes (Green dots) for various areas in scenario #3 (which includes sewer extension) at the open house
- Only 28% Yes (Green dots), and 72% No (Red dots) for Scenario 1 (which does not include sewer extension) at the open house.

7.2 Township of Spallumcheen – ALR Exclusion and Wastewater Facility

The Township of Spallumcheen has undertaken public engagement related to the Swan Lake Wastewater Recovery Project. The primary form of engagement relates to an application to exclude lands from the ALR to support the Wastewater Recovery Project. The ALR exclusion is directly related to the feasibility of the Wastewater Recovery Facility, as the exclusion will allow for Industrial uses that will help to pay for the facility and create the following benefits to Agriculture:

- Treated irrigation water from wastewater treatment process;
- Manure Processing;
- Aquifer Protection for future agricultural use;
- Agricultural enhancement through biosolids;
- Environmental protection;
- Protection of Swan Lake.

In **Appendix 13**, we have provided the following results of public discussion:

- An Agricultural Advisory Committee resolution supporting the Exclusion application
- Letters of support specifically for the wastewater recovery facility from adjacent land owners:
 - Beverly Bird
 - Ted Curtis
 - John and Deanna Toporchak
- Notes of the public hearing to consider the ALR exclusion, which are generally supportive of the ALR exclusion and a Wastewater Recovery Facility

The submissions are supportive of the Wastewater Recovery facility and exclusion of ALR land to support the facility.

7.3 Wastewater Recovery Community Working Group

The partnership of the Regional District of North Okanagan, Township of Spallumcheen, and Okanagan Indian Band will be continuing to engage with the community about the North Okanagan Wastewater Recovery system.

To ensure community insights and ideas are reflected in project design, construction, and start-up, the partnership is establishing a Wastewater Recovery Working Group (WG). The WG's role is to work with the partners and other key stakeholders to build awareness and participation, and to ensure project outcomes reflect community wants and needs. The partnership intends to have about five to seven community members on the group, but may consider more members if the interest is high.

The partnership has created a Terms of Reference and an application process for members of the Working Group. The Terms of Reference for the Working Group is set out in **Appendix 10**.

8.0 COST RECOVERY STRATEGIES

During the Phase 1 Master Wastewater Recovery Feasibility Project, the partners agreed that the servicing costs are too high if each individual community goes alone. As a result, the guiding principal of equal cost sharing for all common works was agreed upon. The initial financial analysis completed during the feasibility study indicated that the project was only viable with significant support from senior government through grants.

8.1 NOWWRC Financial Strategy – Phase 1

This section sets out the results of the financial analysis which includes the approach that each partner is utilizing to fund their share of the project. The potential for grants remains a key variable in the financial strategy that is not within the control of the Township (partnership). The Investing in Canada Infrastructure Program (ICIP) provides a contribution from the Federal Government of up to 40% and from the Provincial government of up to 33.33% to a maximum grant amount of \$24.3 million. The Okanagan Basin Water Board (OBWB) has committed to fund 16% of the capital costs through its Sewage Facilities Assistance (SFA) program.

The Township of Spallumcheen (ToS) intends to fund its share of the project through its reserves and recover costs from benefitting properties through connection charges and sewer rates. The Regional District of North Okanagan (RDNO) intends to borrow its share of the project through a local service area. At this point, the Okanagan Indian Band (OKIB) are not a funding partner but will buy in later for 1/3 of the costs (net of grants).

The following assumptions have been utilized for the funding strategy.

- Common works are those required by all partners and provide benefit to all parties and attributable works provide benefit only to one partner
- 73.33% of the cost is allocated to the ICIP program (to a max of \$24.3M) with priority funding to the common works first followed by attributable works in the core service area second, and directly attributable works beyond the core last. Any remaining costs would be allocated to the directly attributable beneficiary
- 16% of the cost is allocated to the SFA program
- Any borrowing required by the Regional District for this project would be financed through the Municipal Finance Authority (MFA)
- The total project cost is \$36.9M where common works are \$15.4M, core attributable works are \$10.5M and directly attributable works beyond the core are \$11.0M

Based on the above, **Tables 8.1** through **8.6** summarize the cost recovery strategy.

Table 8.1: Cost and Funding Summary

Cost Item/Funding Source	Total Amount	RDNO	Spallumcheen
Total Cost	\$36.9M	\$23.9M	\$13.0M
<i>Common Works</i>	\$17.1M	\$8.55M	\$8.55M
<i>Attributable Works - Core</i>	\$10.4M	\$5.9M	\$4.5M
<i>Directly Attributable Works (RDNO6/8)</i>	\$9.4M	\$9.4M	\$0M
<i>ICIP</i>	\$24.3M	\$14.8M	\$9.5M
<i>OBWB</i>	\$5.9M	\$3.8M	\$2.1M
Grant Support	\$30.2M	\$18.6M	\$11.6M
<i>Local Government</i>	\$6.7M	\$5.3M	\$1.4M

As the value of 73.33% of \$36.9M exceeds the maximum allowable grant amount (\$24.3M) under the ICIP program, the funding summary assumes an overall funding amount of 66% (\$24.3M) from the ICIP project. Based on the agreed upon partnership principles, the grants have been allocated to common works first and directly attributable works lastly.

The ToS intends to fund its share of \$1.4M from its existing non-DCC reserve account. The Regional District does not have reserve accounts to fund its share and intends to fund its share through borrowing via a local service area (LSA). The following outlines the cost recovery details for the RDNO LSA.

8.2 Capital Costs

Regional District of North Okanagan

As set out in the Loan Authorization bylaw, the North Okanagan Regional District intends to borrow \$5.2 million to pay for their portion of the costs not covered by grants.

The assumptions for the borrowing are as follows:

- Amount Borrowed: \$5,200,000
- Term: 20 years
- Interest rate: 3.3% (amount recommended by BC Municipal Finance Authority for 20 years borrowing)
- Annual debt servicing costs: \$365,122, rounded to \$365,000

The \$365,000 annual debt servicing costs will be recovered through a combination of two charges:

- An infrastructure base fee and
- An Ad Valorem property tax based on Land and Improvements and the property class

Infrastructure Base Fee

The Infrastructure Base Fee will be in the form of an annual charge per parcel. Most parcels will pay the same charge but some parcels with heavier users or higher numbers of users on one parcel such as a hotel or RV park will be charged more based on the equivalent units on the site. The Infrastructure Base Fees will be paid by all parcels, regardless of whether or not they contain a use. Vacant parcels will pay the Infrastructure Base Fee as a charge for the benefit of having a sewer line available for connection when a use is located on the site.

The infrastructure base fee will be \$600 per parcel or per equivalent unit. The charges and equivalent units are as follows:

Table 8.2: Infrastructure Base Fee Charges

Use type	Equivalent Unit	Charge per Equivalent Unit	Charge
<i>Single Detached Dwelling and parcel</i>	1	\$600	\$600 per parcel
<i>Mobile home in a Mobile Home Park</i>	0.6	\$600	\$360 per unit
<i>A fully serviced RV unit site, or a park model type of trailer site, in an RV park. E.g. Swan Lake RV Park</i>	0.6	\$600	\$360 per unit
<i>A tent site or unsewered camper site</i>	0.17	\$600	\$102 per site

Use type	Equivalent Unit	Charge per Equivalent Unit	Charge
<i>Commercial or Industrial use with less than 20 employees on the site at any one time</i>	1	\$600	\$600 per parcel
<i>Commercial or Industrial Uses with more than 20 employees on the site at any one time</i>	Approximate number of employees on the site divided by 20. E.g. 75 employees/ 20 = 3.75 round to 4	\$600	E.g. \$2400 for 75 employees on site
<i>Hotel, Neighbourhood pub, Restaurant, Waterslide</i>	Estimate of sewage flows. Every 1000 litre/day = 1 equivalent unit E.g. Hotel 15 E.g. Pub 7	\$600	E.g. Hotel \$9000 E.g. Pub \$4200
<i>School</i>	Estimate of sewage flows. E.g. 385 students at 50 l/d per student = 19250 l/d, so about 20 equivalent units	\$600	E.g. School with 385 students: \$12,000
<i>Vacant parcel</i>	1	\$600	\$600

The Infrastructure Base Fee will generate approximately \$243,000 annually from 404 equivalent units. This contributes towards the \$365,000 debt servicing costs. The remaining \$122,000 will be generated by the Ad Valorem Property Tax based on Land and Improvements.

Ad Valorem Property Tax

The Regional District will need to generate \$122,000 by an Ad Valorem Property Tax based on Land and Improvements

The required tax rates to generate the \$122,000 revenue is set out in **Table 8.3**.

Table 8.3: Tax Rates by Class

Taxation Class	Tax ratio	Tax rates in \$ per \$1000 Assessed value
<i>1 - Residential</i>	1.00	0.5231
<i>2 - Utilities</i>	3.50	1.8308
<i>5 - Light Industry</i>	3.40	1.7785
<i>6 - Business</i>	2.45	1.2816
<i>8 - Rec/Non-Profit</i>	1.00	0.5231
<i>9 - Farm</i>	1.00	0.5231

Most homes in the area fall within the \$300,000 to \$700,000 assessed value range including land and improvements. The impact on a residential use with various representative values is set out in **Table 8.4**.

Table 8.4: Sample Tax Amounts

Assessed value of land and dwelling	Tax rate per \$1000	Tax Amount
\$ 300,000	0.5231	\$ 157
\$ 400,000	0.5231	\$ 209
\$ 500,000	0.5231	\$ 262
\$ 600,000	0.5231	\$ 314
\$ 700,000	0.5231	\$ 366

The combined charges for the Infrastructure Base fee and the Ad Valorem Property Tax is set out in **Table 8.5**.

Table 8.5: Samples of Total Charges

Assessed value of land and dwelling	Infrastructure Base fee	Ad Valorem Property Taxes	Total Annual Capital Cost Recovery charges
\$ 300,000	\$ 600	\$ 157	\$ 757
\$ 400,000	\$ 600	\$ 209	\$ 809
\$ 500,000	\$ 600	\$ 262	\$ 862
\$ 600,000	\$ 600	\$ 314	\$ 914
\$ 700,000	\$ 600	\$ 366	\$ 966

Table 8.5 illustrates that the annual capital cost recovery charges will be in the \$760 to \$970 range for single family dwellings.

Commercial and Industrial uses currently pay property taxes in the range of \$20,000 to \$80,000 per year. The combined Infrastructure Base Fees and Ad Valorem Property Taxes for these types of uses will be in the range of \$3,000 to \$11,000 per year or about a 12% to 17% increase over the current property taxes. Several of the existing commercial or industrial uses are paying significant amounts for sewer pump and haul services, and they will no longer need to pay these charges. The elimination of pump and haul costs will work to completely or partially offset the increase in property taxes in some cases.

Township of Spallumcheen

The Township of Spallumcheen will be paying its portion of the costs remaining after the grant with money it already has in its reserve funds. This provides the Township with significant flexibility in recovering those costs. The Township intends to establish a system of cost recovery that results in charges similar to those calculated for the Regional District of North Okanagan.

Okanagan Indian Band

The Okanagan Indian band does not intent to connect to the system immediately, but when it connects, it will pay 1/3rd of the costs of the Common Works remining after subtracting the grant amount. The Okanagan Band will determine the appropriate method of cost recovery at the time of connection. The impetus for connection may be development on IR#4 and the development proponent may be required to pay for the cost of connecting to the system, as they will be the direct beneficiary.

8.3 Operations and Maintenance Costs

The Operations and Maintenance costs will be charged to each jurisdiction based on the flows originating from that jurisdiction. Initial estimates have the Operations and Maintenance costs for the Wastewater Recovery Facility at about \$400,000 per year.

The Operations and Maintenance costs for each use will be based on estimates of sewage flows for each type of use. Estimates of flows are set out in the British Columbia Sewerage System Standard Practice Manual – Version 3. While the actual flows from each jurisdiction will be determined once the plant is operational, initial estimates indicate that upon commissioning about 90% of the flow will be coming from the Regional District of North Okanagan, and 10% from the Township of Spallumcheen. This means that RDNO would need to recover about \$360,000 per year. Only those parcels and uses connected to the sewer system will pay the user fee. Vacant parcels not generating sewage flows will not be charged fees for Operations and Maintenance.

An initial analysis estimates that the annual and quarterly rates for Operations and Maintenance costs will be approximately as per **Table 8.6**.

Table 8.6: User Fees

Use	Annual Rate	Quarterly Charge
<i>Single Detached Dwelling</i>	\$900	\$225
<i>Mobile Home or RV unit on a serviced site</i>	\$540	\$135
<i>Small to medium Commercial or Industrial Business</i>	\$1350	\$338
<i>Large Commercial or Industrial Business</i>	\$1800	\$450
<i>Hotel, Neighbourhood pub, Restaurant, Waterslide</i>	Estimate of sewage flows. Every 1000 l/day = Equivalent to 1 Single detached dwelling E.g. Hotel 15 x 900 = \$13,500 E.g. Pub 7 x 900 = \$6,300	E.g. Hotel: \$3375 E.g. Pub: \$1575
<i>School</i>	Estimate of sewage flows. E.g. 385 students at 50 l/day per student = 19250 l/day, so about 20 equivalent units. \$18,000	\$4500
<i>Vacant parcel</i>	\$0	\$0

These operations and maintenance fees are similar to those in other small system, such as the system on Okanagan Falls, and examples of the 2018 user fees are set out in **Table 8.7**.

Table 8.7: Okanagan Falls Example User Fees

Category	Annual Rate
<i>Single Family Dwelling</i>	\$862
<i>Mobile home park/per unit</i>	\$775
<i>Restaurant/Lounge/Pub</i>	\$2,585
<i>Small Business, office building</i>	\$948
<i>Larger Business, office building</i>	\$1,981
<i>Industrial/Commercial (20 employees or less)</i>	\$1,034
<i>Industrial/Commercial (20 to 50 employees)</i>	\$1,981

The estimated User Fees to recover O&M costs are similar to those charged in a similar small system, however, the actual flows from each jurisdiction and the O &M costs will be used to determine the user fees charged for the North Okanagan Wastewater Recovery System.

The partnership between TOS, RDNO, and OKIB has been steadfastly working to develop the North Okanagan Wastewater Recovery concept since 2015. The partners have accomplished numerous milestones through meaningful collaboration and engagement. This summary report provides a listing of the activities and accomplishments to make the project a reality. Senior government funding assistance through the TOS is critical to bring the project to fruition.

The partnership has elaborated the project to ensure the guiding principles that were articulated and agreed to at the start of the initiative. The land for the treatment facilities and the irrigation water storage has been secured; public opinion has been solicited and found favourable; support has been garnered from the BC government agencies and other stakeholders, and a finalized MOU has been signed by the three government organizations.

The ICIP application is the first step towards the success of the initiative. Pursuant to the application, the partnership will continue to work on several fronts, including:

- Facilitation the discussions of the public working group to ensure consensus
- Continued news updates through the Communications Plan
- Completion of the RDNO petition process
- Responding to questions arising from the application review
- Consultation with MOTI on preferred routing corridors for the collection system
- Continued communication with the Agricultural Land Commission
- Final reading of the borrowing bylaw for the local government share of the project funding
- Initial contact with railway and highway organizations to establish requirements for crossings

Once the ICIP funding is announced, there are numerous activities required to confirm on-site conditions such as geotechnical investigations, begin the process of permit and approval applications, design and construction scheduling, process equipment selection and procurement, drafting of sewer bylaws, connection policies and other related tasks.

The partnership commits to regular communication with all stakeholders through the implementation process to ensure a clear understanding of the project and duties, benefits and responsibilities of the participating stakeholders.

APPENDIX 1

Partnership MOU

Memorandum of Understanding

For the Provision of Wastewater Recovery Facilities and Services

BETWEEN: **REGIONAL DISTRICT of NORTH OKANAGAN (“RDNO”)**

Of the first part

AND: **TOWNSHIP of SPALLUMCHEEN (“TOS”)**

Of the second Part

AND: **OKANAGAN INDIAN BAND (“OKIB”)**

Of the Third Part

Collectively “THE PARTIES”

PARTY means an individual party to the Memorandum of Understanding: RDNO, TOS or OKIB individually.

JURISDICTION refers, as the context warrants, to the land areas within the boundaries of each party, or areas of responsibility for each party.

1. Background

The Regional District of North Okanagan, the Township of Spallumcheen, and the Okanagan Indian Band signed a Memorandum of Understanding on August 18, 2015 that outlined the intent of the three parties to collaborate on the development of a Master Wastewater Recovery Plan. The parties have now agreed to proceed with implementing the construction, operations and maintenance of a Wastewater Recovery System.

2. Ownership of Works

General

Ownership of works is divided into two categories: Common Works and Attributable Works.

- Common Works are held jointly by all paying partners. Initially, Common Works will be held jointly by TOS and RDNO. However, if OKIB elects to participate by paying 1/3rd of Common Works cost net of grants, OKIB shall receive 1/3rd ownership of Common Works.
- Attributable Works are owned separately by each individual jurisdiction: TOS, RDNO, and OKIB.

Common Works

The Common Works include:

- The Wastewater Recovery Plant;
- The lines from the Wastewater Recovery Plant to the Storage Ponds;
- The Storage Ponds;
- The Supply Lines from the Storage Ponds to irrigation in fields, and lines to Swan Lake; and
- Railway and Highway crossings and short stubs of major collection system trunks leading into the Wastewater Recovery Plant.

Payment for Common Works

Each party will pay an amount proportional to the benefit received from the Common Works.

Only RDNO and TOS will be initially connecting to the Common Works. RDNO will pay 50% of the net costs of the Common Works after application of the grant funds received for the Common Works, and TOS will pay 50% of the net costs of the Common Works after application of the grant funds received for the Common Works. The RDNO and TOS will pay their costs at the time of construction of the Common Works.

If a party contributes additional assets to the Common Works, such as a parcel of land, the value of the asset will be accounted for as contribution to the portion of the total funded by that party.

OKIB does not plan to initially connect to the Common Works, but wishes to maintain the option to connect to the Common Works at a later date. When OKIB joins, it will pay 1/3rd of the net cost of the Common Works, after application of the grant funds that had been received for the Common Works. OKIB will pay 50% of their net costs to TOS, and 50% of their net costs to RDNO. OKIB will pay their costs at the time of connection to the Common Works.

Attributable Works

The Attributable Works include:

- Wastewater collection lines that collect and convey wastewater in one jurisdiction; and
- Lift stations, pump stations, attenuation tanks, and force mains that serve to convey wastewater in one jurisdiction.

The Attributable Works are owned by the individual jurisdiction within which the works are located.

If Attributable Works, such as a collection line or trunk line, extends from one jurisdiction through another jurisdiction, the option exists for the two parties to form an agreement regarding sharing capital costs, operations, and maintenance of that line, without necessarily involving the remaining party.

3. Decision Making Authority

Common Works

Swan Lake Wastewater Recovery Joint Stakeholders Committee

TOS and RDNO will appoint a joint stakeholders committee, the Swan Lake Wastewater Recovery Stakeholders Committee (SLWRSC). The SLWRSC will consist of elected representatives from each jurisdiction:

- Township of Spallumcheen
- Electoral Area B
- Electoral Area C
- Okanagan Indian Band

The Committee makes recommendations to TOS Council and RDNO Board.

OKIB does not wish to initially connect to the Common Works, but wishes to maintain the option to connect at a later date, and OKIB will have a non-voting representative on the SLWRSC to keep informed about the project until they join the system. Once OKIB joins the system, OKIB will have a voting member and the Committee will also make recommendations to OKIB Chief and Council.

Items to be considered for inclusion in the bylaw establishing the Committee are as follows:

- definitions;
- composition of the delegated body;
- method of appointment;
- limitations on delegation;
- no further delegation rule, as laid out in the statute;
- service or services to be administered;
- administration and operational responsibilities of the delegated body;
- voting rules or how decisions are to be made;
- procedures or the applicability of Council procedures bylaw or committee procedures;
- communications to Council and Board;
- reporting requirements of the Committee;
- operating policies;
- reconsideration of decisions

The Committee will provide one vote for each member, and provide each member with Veto Power, allowing each member to veto a decision if they wish. This will provide each party, particularly OKIB, which does not have a formal seat at the Regional District Board or on the Township Council, to have a significant voice providing them with veto power once they join the system, ensuring that no items go to Council or the Board without their approval.

The following responsibilities will be considered for the SLWRSC:

- review and make recommendations on user and regulatory policies,
- review and make recommendations on fiscal policies,

- review and make recommendations on the annual budget,
- review and make recommendations on proposed changes to fees, levies, or charges,
- review and make recommendations on the composition and preparation of reports required by regulatory agencies;
- review and make recommendations on inter-jurisdictional items;
- communicate the Committee’s progress and direction.

Swan Lake Wastewater Recovery Technical Committee

The SLWRSC will have a separate staff Swan Lake Wastewater Recovery Technical Committee (SLWRTC) that reports to the SLWRSC. The SLWRSC will appoint at least one staff member from RDNO, TOS, and OKIB to the SLWRTC. The Swan Lake Wastewater Recovery Technical Committee will address the following items:

- Provide options and recommendations to the SLWRSC on technical items, particularly the items set out below:
 - Identify Budgets in detail;
 - Address Operational details;
 - Address Capital project details;
 - Address Cost recovery mechanics and details;
 - Address reporting requirements of regulatory agencies in detail;
 - Other items that the SLWRSC may request of the SLWRTC.

OKIB does not wish to initially connect to the Common Works, but wishes to maintain the option to connect later, and OKIB will have an observing representative on the Swan Lake Wastewater Recovery Technical Committee to keep informed about the project until they join the system.

Attributable Works

For Attributable Works (the individual wastewater collection works), the individual jurisdictions will make decisions:

- Township Council for wastewater collection works in the TOS.
- The Regional Board for wastewater collection works in Electoral Areas B and C, based on decision making and voting procedures for Electoral Area items.
- Okanagan Indian Band Chief and Council for wastewater collection works in the OKIB.

4. Operations and Management of the System

Common Works

While the Common Works are the joint responsibility of all paying partners, the intent is that the RDNO will operate and maintain the Common Works.

The RDNO intends to establish and staff a department to operate and maintain the Common Works.

Attributable Works

Attributable Works, including Individual wastewater collection works, will be the responsibility of each separate Jurisdiction.

Each jurisdiction can decide if it wants to operate and maintain the system with their own staff, contract with the RDNO, or contract with another entity.

If the OKIB or TOS, wishes to enter an agreement with the RDNO for operation of their collection system, the RDNO will form a separate agreement with each party.

If an agreement is established between OKIB or TOS and RDNO, the agreement will consider generally addressing the following topics:

- Inspection and connection fee requirements;
- Operations and Maintenance by the RDNO;
- Operational and emergency assistance by OKIB or TOS staff;
- Reporting and monitoring requirements;
- Insurance;
- Granting of rights for the RDNO to occupy and use property or interests that OKIB or TOS has in the wastewater recovery system;
- Access by the RDNO;
- Length of term of agreement;
- Dispute resolution;
- Form of notice.

5. Allocation of Capacity of Initial Plant

The capacity of the Common Works in the initial plant are allocated as follows:

- 1/3rd allocated to RDNO;
- 1/3rd allocated to TOS;
- 1/3rd allocated to OKIB.

While OKIB does not wish to initially connect to the Common Works, but wishes to maintain the option to connect at a later date, the parties agree to reserve 1/3rd of the capacity in the initial plant for OKIB. Changes in capacity allocation of the initial plant, and the consequential changes in investment level by each party, can be negotiated and shall be agreed upon by all three parties. The capacity utilized by each party will be determined by the sewage flows measured as originating from each party. If one party requires additional capacity beyond the amount initially allocated to them, the additional capacity can be negotiated and shall be agreed upon by all three parties.

6. Allocation of Capacity Beyond Initial Plant

The capacity associated with future expansion of the initial plant will not be allocated to the parties. As growth occurs in each jurisdiction, Development Cost Charges or Connection Charges will be paid by owners who connect or develop, and those charges will be placed in a fund for future plant expansion. The jurisdictional location of the growth will be irrelevant because regardless of where the growth occurs, funds will be placed in the reserve fund to pay for the expansion. The funds required for expansion will be available when expansion is required.

7. Decisions on Plant Expansion

The SLWRSC will make decisions on the timing and implementation of future plant expansions. The decisions will be made as recommendations to the participating jurisdictions.

8. Capital Cost recovery for the Initial Plant

The capital cost recovery for the initial plant will be determined by each individual party within their jurisdiction. Methods may vary from jurisdiction to jurisdiction.

9. Operations and Maintenance Cost Recovery for the Plant

The Operations and Maintenance costs for the Common Works, which are intended to be operated and maintained by the RDNO, will be administered and charged to the parties by the RDNO based on the wastewater flows from each party to the plant.

The operations and maintenance costs generally include, but are not limited to, the following:

- Operational staff;
- Vehicle costs;
- Administration and billing costs;
- Overhead costs;
- Asset renewal costs;
- Materials, supplies and other consumables;
- Testing and reporting costs; and
- Electrical costs.

A system will be established to account for abnormal climatic conditions such as flooding that results in an increase of the total volume of wastewater flows to the plant from the parties.

The rates established by each jurisdiction to recover the costs allocated to them should have a consistent rate structure across all jurisdictions. The rate charged for a use in one jurisdiction should be the same as the rate charged for the same use in another jurisdiction.

10.Recovering Costs Related to Growth

Common Works

Development Cost Charges will be based on the charges required to pay for expansions to the wastewater recovery plant, such that when the next expansion module is required to the plant, appropriate DCC funds will be set aside in the DCC reserve fund.

The Development Cost Charge will be set by RDNO, collected by each party and passed on to RDNO.

The Development Cost Charge shall be the same charge for all three Jurisdictions.

Attributable Works

Development Cost Charges for expansion to the Attributable Works will be determined by each party for the area within their jurisdiction.

Each jurisdiction can also use other approaches for local works as they wish, which could include, but is not limited to: developer build, latecomer, local service area, phased development agreements, development works agreements, grants, other approaches or combinations of approaches.

11.Wastewater Recovery Regulations

Before connecting to the Common Works each jurisdiction will adopt a bylaw that regulates wastewater. The wastewater recovery system bylaw will generally address items including, but not limited to, the following:

- Definitions;
- Administration;
- Terms and Conditions of Service;
- Inspection and Enforcement;
- Interruption and Discontinuation of Service;
- Service Connections;
- Inspection Chambers and Manholes;
- Requirement to Connect and applications;
- Termination of Service;
- Prohibitions;
- Effluent Limitation Parameters (Wastewater Strength);
- Sampling and Analysis Protocols;
- Pre-Treatment Requirements;
- Volume Control;
- Interception Devices;
- Wastewater Credit Meter Installation Requests;
- Reporting of Accidental Discharges;

- Offences and Penalties.

12. Wastewater Recovery Utility and Administration

Each jurisdiction will establish a wastewater recovery utility to administer the works within its jurisdiction, including but not limited to:

- imposition and collection of wastewater user fees and capital charges;
- operations and maintenance of the system;
- ensuring monitoring and inspection is being undertaken; and
- enforcing the wastewater recovery bylaw.

While each jurisdiction will need to establish a wastewater recovery utility, the utility may contract to another entity to provide administration services. The intent is that TOS and OKIB will contract with RDNO to provide administration services.

13. Lands for the Wastewater Recovery Plant and Associated Facilities

The Wastewater Recovery Plant will be located on Lot A, Section 35, Township 8 ODYD, Plan KAP89234, owned by TOS, as shown in Appendix A.

The Storage Pond and Constructed Wetland will be located on Lot 1, Section 35, Township 8, ODYD, Plan KAP26739, leased from the land owner, as shown in Appendix B.

14. Grant Applications

The parties will work together to secure grants for the construction of the Common Works. The parties will also provide letters of support or other non-financial support to each other for securing grants for the Attributable Works.

The Common Works will not be constructed unless Grants are secured for the project in order to ensure that the costs to the individual property owners fall within the normal range of costs for wastewater recovery in the Okanagan-Shuswap-Thompson area.

15. Amendment of Memorandum of Understanding

This Memorandum of Understanding may be amended upon the agreement of representatives from all three parties.

16. Signatures

This Memorandum of Understanding is signed without prejudice.

Dated for Reference this 27th day of August, 2018

REGIONAL DISTRICT of NORTH OKANAGAN as represented by

W.A. Monahan S. Peavie

TOWNSHIP of SPALLUMCHEEN as represented by

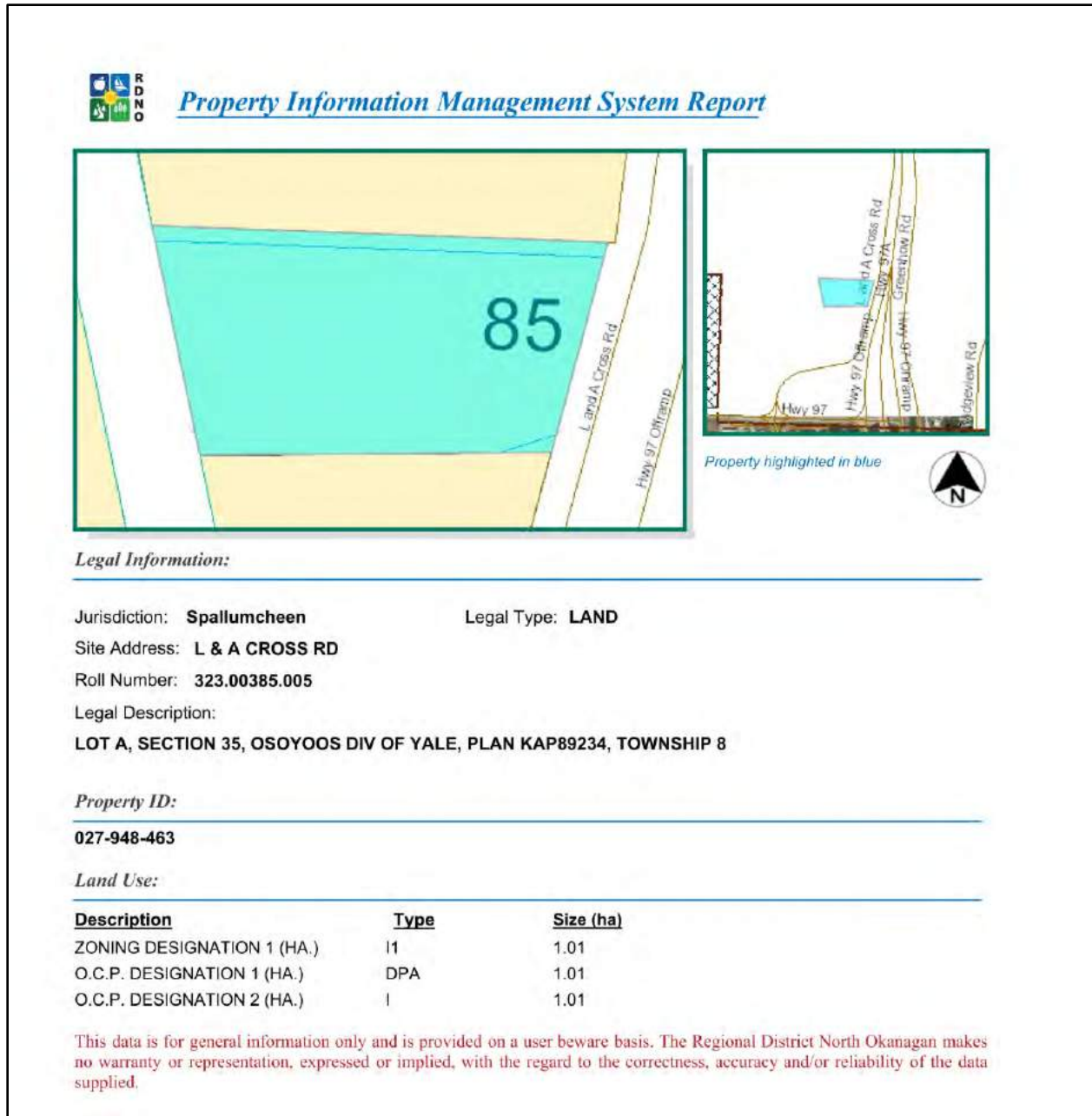
Janece Brown _____

OKANAGAN INDIAN BAND as represented by

Byron Harris _____

Appendix A

Map Showing Lands for Wastewater Recovery Plant



Appendix B

Map Showing Lands for Storage Pond and Constructed Wetland



APPENDIX 2

Asset Management Plans

NOWRP Asset Management Plan

As part of the ICIP application for the NOWRP, an asset management and operations and maintenance plan is required to demonstrate that the sustainable delivery of this service can be achieved and good information has been developed to inform the planning and investment decisions related to this project.

SECTION 1 - ASSET RENEWAL COST FORECASTING

The asset renewal cost forecast has been developed to identify and assess the expected replacement costs and needs for each of the NOWRP assets. This enables the utility to see all of the infrastructure’s life cycle cost pressures in one place. The forecast is also an ideal tool to help inform the planned sewer rates and inform rate payers by showing how infrastructure performance and age is linked to annual investments.

The forecast includes details and summaries of:

- Current replacement value
- Timing of when assets reach their design service life
- Average Annual Life Cycle Investment (AALCI) required for the ongoing renewal of public infrastructure to keep the infrastructure deficit at zero.

This renewal forecast scenario assumes that an adequate annual operations and maintenance (O&M) budget is in place to optimize asset service lives (O&M plan is discussed in **Section 2**). Reduced or inadequate O&M budget levels would reduce the service lives and increase cost pressures for renewal.

The estimated value of the NOWRP major ‘hard’ assets is approximately **\$25 million** (2018) with an Average Annual Life Cycle Investment of **\$372K** based on current tender prices in the Okanagan region and best practices for setting service lives. **Table 1** provides a summary of these values.

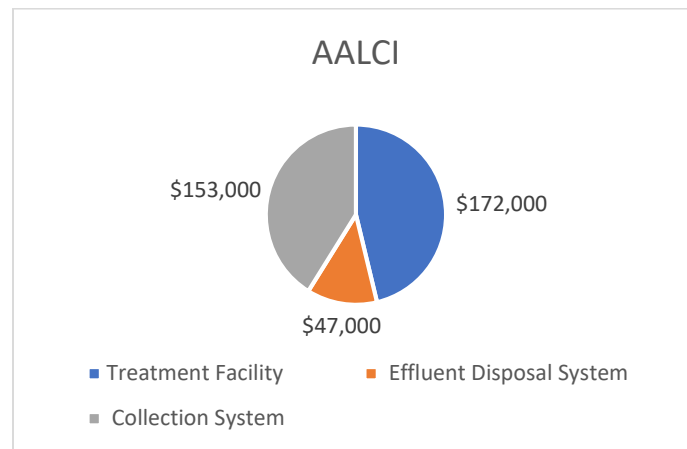
Asset Category	Replacement Value	AALCI
Treatment Facility		
Structure	\$ 1,280,000	\$ 16,000
Elec, HVAC, Instrumentation	\$ 1,440,000	\$ 41,700
Headworks & Process Mechanical	\$ 4,750,000	\$ 114,667
	Sub-Total	\$ 172,367
Effluent Disposal System		
Pond Liner	\$ 2,520,000	\$ 30,000
Mechanical	\$ 794,000	\$ 14,390
Irrigation Piping	\$ 224,000	\$ 2,240
	Sub-Total	\$ 46,630
Collection System		
Gravity Mains	\$ 10,183,125	\$ 74,769
Forcemains	\$ 1,800,000	\$ 45,063
Lift Stations	\$ 1,450,000	\$ 33,250
	Sub-Total	\$ 153,081
	Total (Rounded)	\$ 372,000

The Average Annual Life Cycle Investment (AALCI) is defined as the summation of each asset’s annual depreciation which is based on the assets replacement cost and service life.

$$\Sigma \frac{\text{Replacement Cost}}{\text{Service Life}}$$

The AALCI (\$372,000) is the ideal (**maximum**) funding level for sustaining existing infrastructure over the life cycle of the assets to keep the infrastructure deficit at zero and achieving this annual investment level should be a long term target for the community/utility.

When planned for appropriately, the AALCI can be used in ensuring long term revenue stability, preventing unnecessary risk, and enabling a community to apply one-time funding to support new asset/capital needs as opposed to addressing emergency situations. Figure 1 Illustrates the AALCI by asset category.



Future investments in the renewal of the infrastructure should consider condition but also be prioritized against other factors such as regulatory requirements, safety, energy efficiency, environmental enhancement and service levels. A framework for undertaking this can be completed in the future when the assets have aged.

SECTION 2 - O&M PLAN FRAMEWORK

The maintenance plan will include a compilation of records in the form of computer files that formalizes the planning, scheduling, documentation and reporting of preventative maintenance activities, and provides a method of recording unscheduled or corrective maintenance activities.

The preventative maintenance program will include systematic and periodic maintenance work done on system components to prevent breakdown, reduce wear, improve efficiency, and extend the life of equipment and structures. The main objectives of the plan include:

- preventing unplanned corrective maintenance – it is typically far less expensive and far more effective to regularly spend time and money to carry out preventative maintenance activities rather

than to wait until system components (or assets, pieces of equipment) deteriorate and break down, causing service disruptions and higher repair costs.

- Increased reliability of system components and minimize service interruptions/downtime
- Extend life expectancy
- Increased system performance and minimized major repairs
- Detection and prevention of potential system failures
- Better use of system operators' time through planning and scheduling

The maintenance plan will include a number of interconnected components.

- 1. Asset Inventory and Asset Condition Record Cards:** A list of maintenance tasks to be performed, their frequency, a condition assessment and a list of replacement parts for each system component will be maintained.
- 2. Task Description Cards:** A summary description of each maintenance task to be performed, by whom, necessary tools, consumable materials and equipment including H&S equipment and rental equipment, and other information.
- 3. Maintenance Schedule and Checklist** forming an annual maintenance plan for all assets, with resources and budget information.
- 4. Maintenance Tracking Tool** to support operators and direct contracted parties according to planned activities and to track maintenance work done.
- 5. Inventory system** for spare parts and consumable materials, which are typically stored in a separate storage area for that purpose.

Ongoing maintenance budgeting will be based on the time needed for maintenance tasks and activities will be tracked and recorded for updating and fine-tuning future budgeting. The O&M will be funded through the user fees charged by the utility.

The O&M Anticipated Costs for the NOWRP are estimated to be \$400K/year. Table 2 provides a summary of the costs.

Annual Operation and Maintenance (O&M) Cost Estimate

Labour	\$170,000
Power	\$70,000
Consumables (chemical, etc.)	\$24,000
Trucking (biosolids)	\$16,000
Parts Replacement Allowance	\$18,000
Membrane Replacement (12 years)	\$30,000
Sampling/Testing/Reporting	\$18,000
Vehicle allowance	\$12,000
Administration	\$42,000

TOTAL ANNUAL	\$400,000
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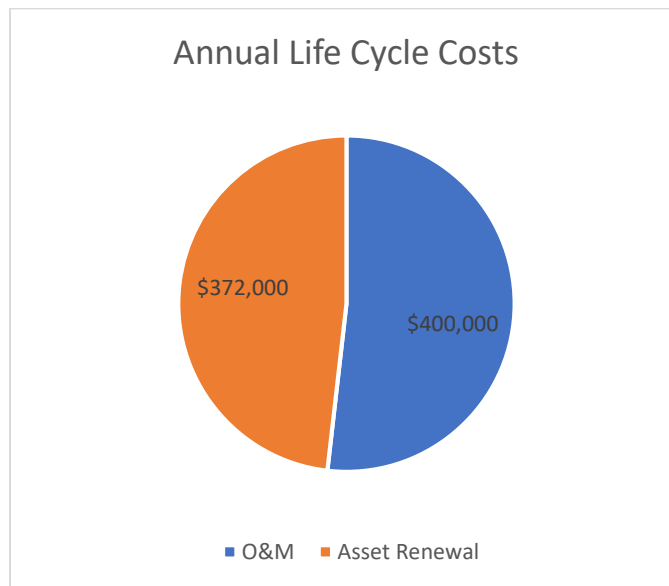
SECTION 3 - DESIGN CONSIDERATIONS

In addition to the preventative maintenance program, the following design considerations will be incorporated into the NOWRP design.

1. The buildings will be orientated to provide adequate allowances for future linear expansions of the various treatment stage and process units and orient the plant so that the best advantage can be taken of the prevailing wind and weather conditions. The building orientation will be used to minimize effects of odours, misting and freezing problems and energy usage (heating). The plant layout will allow for the probability of snow drifting to minimize its effects on operations.
2. Major sites (WWTP and LS's) will be adequately fenced and posted to prevent persons from gaining unauthorized access. The perimeters of the open storage lagoon will also be adequately safeguarded. Gates and buildings will have locks.
3. Within buildings, space will be provided for the replacement of equipment with larger capacity units such as pumps, blowers, boilers and heat exchangers. Adequate working space will be provided around equipment and provision made for the removal of equipment for replacement, or major maintenance operations.
4. Durable materials will be selected that are appropriate under conditions of exposure to hydrogen sulphide and other corrosive gases, greases, oil and other constituents frequently present in sewage. This is particularly important in the selection of metals and paints.
5. Contact between dissimilar materials will be avoided or other provisions made to minimize galvanic action.
6. Pumping equipment will be selected with energy efficiency in mind
7. Meet energy code

SECTION 4 - FINANCING CONSIDERATIONS

The annual O&M costs are estimated to be \$400K and the asset renewal forecast is \$372K. Figure 2 illustrates these amounts.



The funding of annual life cycle costs (O&M and renewal) will be completed through a rate structure that includes a fixed component which includes 100% of O&M costs and a phased approach for funding future asset renewal. As noted above, the AALCI is \$372K/yr to keep the infrastructure deficit at zero. However, based on affordability and the principal of pay-as-you-go financing, the partnership will start by funding the AALCI at 50%. Typically we have seen most communities fund the AALCI at 50% in conjunction with a preventative maintenance program to ensure assets reach their full service life and do not fail early.

SECTION 5 – STRATEGIC FRAMEWORK FOR RESOURCES AND DECISION-MAKING

In order to ensure informed decision-making and achieve the sustainable service delivery objectives outlined in the BC Framework, the following strategy framework has been developed. The strategy includes a commitment to:

- include life cycle cost in decision-making
- provide adequate resources (both financial and human) to ensure assets reach their full service life through a preventive maintenance program
- Ensure job description of the NOWRP operators include assist with management of data, information, assessment of tasks and risks, measure and report against LOS indicators and use of information on the condition/performance of infrastructure to prioritize and schedule asset renewal.
- Understand the function, performance and service delivered by each asset and the risks to disrupting service delivery
- Incorporate on-going training (operations and asset management) to support continuous improvement
- Include O&M and service delivery in regular communications with the public
- Develop and include a set of indicators related to service life targets, operating costs reductions, and asset performance, in overall set of progress measures (current performance) as well as a set of indicators (funding, plans, resources and governance) to measure your preparedness for the future
- Evaluate progress against actions identified above

APPENDIX 3

Environmental Regulatory Review Memorandum
and List of Required Permits



MEMORANDUM

Date: August 22, 2018
To: Scott Shepherd
cc: Peter Gigliotti; Joel Short
From: Graeme Hayward
File: USL 1203.0018.03
Subject: North Okanagan Wastewater Recovery Project – Environmental Regulatory Review

This memo summarizes the findings of an environmental regulatory review that was conducted for the proposed North Okanagan Wastewater Recovery Project (the project). The environmental approvals and regulatory requirements outlined below were identified based on a review of the Phase 1 Master Wastewater Recovery Feasibility Project report (Urban Systems, 2016) and the latest conceptual design details. The attached matrix identifies the applicable permits and approvals for the project.

1.0 Federal

1.1 Canadian Environmental Assessment Act 2012

The project is not anticipated to trigger the Canadian Environmental Assessment Act 2012 unless project activities take place on lands under federal jurisdiction (e.g., Reserve lands). In the event that project activities will be undertaken on Reserve lands, the project will trigger an environmental assessment under the Indigenous and Northern Affairs Canada (INAC) Environmental Review Process.

1.2 Canadian Environmental Protection Act 1999

Under the Canadian Environmental Protection Act 1999, facilities engaged in waste or sewage sludge incineration, and municipal wastewater collection and treatment, must determine if reporting to Environment Canada is required under the National Pollutant Release Inventory (NPRI). Releases that are subject to reporting requirements under the NPRI include those to water, air, land, and transfers to disposal facilities (including sludge and biosolids).

1.3 Migratory Birds Convention Act

By conducting land clearing activities outside of the nesting season for birds (i.e. September 1 to March 15, and possibly earlier for owls), a proponent is able to maintain compliance under this Act. In the event that land clearing is to be conducted during the nesting season, a qualified avian specialist must first assess the area to ensure that birds and their nests will not be adversely impacted.

1.4 Species at Risk Act

The federal Species at Risk Act (SARA) provides protection to species at risk included on Schedule 1 under the Act and their critical habitat, both of which are found on federal lands. It also provides protection to aquatic species and migratory birds (covered by the Migratory Birds Convention Act), wherever they are found. Potential impacts to species at risk and their habitat should be assessed by a Qualified Environmental Professional (QEP) to determine appropriate mitigation measures.

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1.5 Fisheries Act

Section 35 of the Fisheries Act applies to any works that have potential to result in serious harm to fish and fish habitat that are part of or support commercial, recreational or Aboriginal fisheries. Any project with the potential to result in serious harm to fish must be reviewed by Fisheries and Oceans Canada through a Request for Review Application Form. Section 36 of the Act prohibits the deposit of deleterious substances (including sediment) into waters frequented by fish.

1.6 Constitution Act, 1982

The Provincial and Federal Governments are legally obligated to consult and accommodate (where required) First Nations on land and resource decisions that could impact their Aboriginal Interests. The relevant Government agencies will carry out consultation prior to issuing any approvals for the project.

2.0 Provincial

2.1 Environmental Assessment Act

Under the Reviewable Projects Regulation of the Environmental Assessment Act, a water management project is considered a reviewable project if a new dam facility is greater than 15 m high or will be permitted to impound a reservoir containing greater than 10 million cubic metres of water above the natural boundary of the streams that supply the water to the reservoir. A liquid waste management project is also considered a reviewable project under the regulation if a new facility is for the treatment or disposal of municipal waste and is designed to serve greater than 10,000 people. Based on a review of the conceptual design details provided in the Urban Systems memo dated July 20, 2018, the project does not exceed the thresholds stated in the Regulation and is therefore not anticipated to trigger an assessment under the Environmental Assessment Act. The stated thresholds should be revisited if there are changes to the design criteria.

2.2 Environmental Management Act

The Environmental Management Act regulates industrial and municipal waste discharge, pollution, hazardous waste and contaminated site remediation. The Act provides the authority for introducing wastes into the environment, while protecting public health and the environment.

2.2.1 Municipal Wastewater Regulation

The project must comply with the Municipal Wastewater Regulation under the Environmental Management Act. This Regulation provides authorization for the discharge of municipal effluent or use of reclaimed water in British Columbia. Division 3 of the Regulation details the environmental impact study requirements for discharge of municipal effluent to ground or water, and discharge or use of reclaimed water.

2.2.2 Waste Discharge Regulation

The Waste Discharge Regulation defines what industries, trades, businesses, activities and operations require authorizations to discharge to the air, water and land in British Columbia. Anaerobic digestion is a prescribed activity under various classifications of the Regulation. If anaerobic digestion is used for municipal treatment plant sludge, a site specific authorization is likely required.

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2.3 Water Sustainability Act

The BC Water Sustainability Act establishes the broad legal framework for managing water in British Columbia. Any activities that result in changes in or about a stream require Notification or Approval/Authorization under the Water Sustainability Act. Under the Water Sustainability Act, “changes in and about a stream” include a modification to the nature of the stream, including any modification of the land, vegetation and natural environment of a stream or the flow of water in a stream, or any activity that has or may have an impact on a stream or stream channel.

2.4 Wildlife Act

The Wildlife Act protects vertebrate animals from direct harm except as permitted by regulation. Protective measures under the Act make it an offense to kill or harm endangered or threatened species and their critical habitat. Potential impacts to wildlife species and their habitat should be assessed by a QEP to determine appropriate mitigation measures.

2.5 Dike Maintenance Act

The Dike Maintenance Act may be applicable to the construction of the effluent storage pond. The Dike Design and Construction Guide (BC Ministry of Water, Land and Air Protection, 2003) should be consulted for basic principles used in the design and construction of dikes.

2.6 Riparian Areas Regulation

The BC Riparian Areas Regulation (RAR) requires local governments to enact bylaws that protect riparian areas during residential, commercial, and industrial development. The RAR does not apply to ancillary activities regulated or approved by local government under Part 26 of the Local Government Act.

2.7 Heritage Conservation Act

Heritage resources are protected under the Heritage Conservation Act. If archaeological materials are discovered during any phase of development, all ground-altering activities in the vicinity of the materials must be halted immediately and a qualified archaeologist and the relevant First Nations contacted. If a qualified archaeologist considers the materials to be protected under the Heritage Conservation Act, ground-altering activities may only resume with approval of the Archaeology Branch.

2.8 Agricultural Land Reserve

The Provincial Agricultural Land Commission (ALC) is an independent Crown agency dedicated to protecting the scarce supply of agricultural land that is important to the current and future needs of British Columbia. Properties within the ALR are subject to the rules and regulations of the Agricultural Land Commission Act.

3.0 Municipal (Local Government Act)

Before subdivision, land alteration, or construction takes place in a Development Permit Area within the Township of Spallumcheen and/or the Regional District of North Okanagan, property owners must first obtain a development permit that sets out site specific, development requirements.

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3.1 Township of Spallumcheen

Unless exempted, a proponent must obtain a Development Permit for development activities within Industrial, Aquifer Protection, and Water Body Protection development permit areas, as outlined in the Official Community Plan, Bylaw No. 1794, 2011.

3.1.1 Industrial Development Permit

All properties zoned as Industrial are designated an Industrial Development Permit Area. A key objective of this development permit area is to protect and enhance the visual setting of the Spallumcheen Valley and provide for the integration of new industrial development into this setting. As part of the development permit application, a report, certified by a Professional Engineer, registered in the province of British Columbia, must be provided which describes how storm drainage will be managed on the site including collection, retention and disposal to a suitable system of dry-wells or other systems which shall be designed, inspected and certified as-built by a Registered Professional Engineer.

3.1.2 Aquifer Protection – Natural Environment Development Permit

All parcels zoned as Industrial are designated an Aquifer Protection - Natural Environment Development Permit Area. The objective is to protect the subsurface aquifer below the Industrial Park against possible pollution from industrial land use. All applications for a development permit must be accompanied by a report certified by a Professional Engineer or Geoscientist registered in the province of British Columbia and experienced in hydrogeological investigations, including capture zone analysis and groundwater stewardship. On-site sewage disposal must be approved by the Interior Health Authority and designed, inspected and certified as-built by a Registered Professional Engineer with due consideration of the effluent absorption capability of the soils and local groundwater conditions.

3.1.3 Water Body Protection – Natural Development Permit Area

Properties adjoining all water bodies, streams and wetlands are designated as Water Body Protection – Natural Development Permit Areas. Development within these areas requires assessment to ensure protection of fish and riparian habitat from potentially harmful development activities and to ensure that the natural features, functions and conditions that support these habitats are not lost. The objective is to ensure that the lands immediately adjacent to streams are retained, in a largely undisturbed state throughout and after the development process.

3.2 Regional District of North Okanagan

Unless exempted, a proponent must obtain a Development Permit for development activities within the applicable Development Permit Areas (i.e., Industrial, Riparian and Swan Lake, and Environmentally Sensitive Lands), as outlined in the Official Community Plan for Electoral Areas “B” and “C”, Bylaw No. 2626.

3.2.1 Commercial, Industrial and Comprehensive Development Permit Area

All properties that are designated or become zoned for Commercial, Industrial and Comprehensive uses will require a Development Permit for form and character.

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3.2.2 Riparian and Swan Lake Development Permit Area

Most of the land adjoining the east shoreline of Swan Lake is designated as a Riparian and Swan Lake Development Permit Area. In general, this Development Permit Area includes the riparian habitat on both sides of a stream or water body as measured from the high water mark. The primary objective of the Riparian and Swan Lake Development Permit Area designation is to regulate development activities in watercourses and their riparian areas and adjacent natural environments to preserve natural features, functions and conditions that support natural processes.

3.2.3 Environmentally Sensitive Lands Development Permit Area

The Environmentally Sensitive Lands Development Permit Area is comprised of all designated High and Very High conservation value lands. The primary objective is to regulate development activities within these areas to protect rare and fragile terrestrial ecosystems and habitat for endangered species or native rare vegetation or wildlife. An environmental impact assessment and/or habitat assessment, prepared by a QEP, is required for development of lands that fall within the Very High Environmentally Sensitive Lands Development Permit Area.

4.0 Closing

This memo is for guidance purposes only. There may be other regulatory requirements, permits and approvals that apply to the project that are not included in the memo. The legislation and regulations highlighted herein should be consulted for further details. If you have any questions or require any further information; please do not hesitate to contact me.



Graeme Hayward, MNRM, PAg, EP, CESA
Environmental Consultant

/gh

**Attachment 1 -
Environmental Permits, Approvals
and Reporting Matrix**

Environmental Permits, Approvals and Reporting Matrix

Legislation / Regulation	Permit / Approval / Reporting Requirement
FEDERAL	
Canadian Environmental Protection Act 1999	Reporting under the National Pollutant Release Inventory (NPRI)
Fisheries Act: Wastewater Systems Effluent Regulations	Authorization, monitoring and reporting for depositing effluent containing deleterious substances
Constitution Act, 1982	Governments must consult and accommodate (where required) First Nations on land and resource decisions that could impact their Aboriginal Interests
PROVINCIAL	
Environmental Management Act: Municipal Wastewater Regulation	Registration and authorization for discharge of municipal effluent to ground or water, and discharge or use of reclaimed water
Environmental Management Act: Waste Discharge Regulation	Site specific authorization for anaerobic digestion of municipal treatment plant sludge
Water Sustainability Act: Water Sustainability Regulation	Activities that result in changes in or about a stream require Notification or Approval/Authorization
Dike Maintenance Act	Approval may be required for construction of the effluent storage pond
MUNICIPAL	
Township of Spallumcheen (Local Government Act)	<ul style="list-style-type: none"> • Industrial Development Permit • Aquifer Protection - Natural Environment Development Permit • Water Body Protection – Natural Development Permit
Regional District of North Okanagan (Local Government Act)	<ul style="list-style-type: none"> • Commercial, Industrial and Comprehensive Development Permit • Riparian and Swan Lake Development Permit • Environmentally Sensitive Lands Development Permit

APPENDIX 4

Water and Biosolids Recovery Plan

REPORT



Water and Biosolids Recovery Plan



Prepared for:

NORTH OKANAGAN WASTEWATER RECOVERY
PROJECT

304 - 1353 Ellis Street, Kelowna, BC V1Y 1Z9 | T: 250.762.2517

Final

August 2018

File: 1203.0018.03

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Executive Summary

This brief report examines the effluent and biosolids quality targets for the proposed North Okanagan Wastewater Recovery Project.

The treated effluent is to be used as reclaimed water for a variety of potential uses, including agricultural irrigation. The selected reclaimed water category in accordance with the BC Municipal Wastewater Regulation (MWR) is “Greater Exposure Potential” This category provides a high standard of water quality with low risk to any users and safe to use where public contact is likely.

When reclaimed water is used for irrigation it must be stored through the winter months. The MWR requires a provision for an alternate discharge in the event of a wet growing season or an over-production of reclaimed water with respect to demand. The standby discharge provision is proposed as a discharge to Swan Lake. This temporary discharge must provided further treatment for nutrient removal (nitrogen and phosphorus). A sidestream process is provided in the treatment facility to precipitate phosphorus and provide UV disinfection prior to discharge to Swan Lake. It is not expected that this discharge will ever be required, in light of the annual moisture deficiency for agriculture and projected increase of this deficiency due to climate change.

The biosolids production at the wastewater Recovery Plant will be blended with trucked animal waste from the region and anaerobically digested. The resultant digested biosolids will be dewatered mechanically with a centrifuge. The centrifuge cake will be trucked to a nearby composting facility and the mixture composted to a Class A compost product in conformance with the BC Organic Matters Recycling Regulation (OMRR). The existing facility operates under an OMRR authorization and consistently meets Class A parameters. The demand for the composted product in the region is very strong and a healthy market is anticipated.

1.0 Design Criteria

1.1 Water Recovery Quality Objectives and Applicable Legislation

The BC Municipal Wastewater Regulation (MWR) is the default regulatory framework in BC for the management of domestic wastewater, including effluent discharge and the use of reclaimed water. The MWR was published in April 2012, and replaced the Municipal Sewage Regulation, which was promulgated in 1999. The initial concepts for reclaimed water use and development were included as part of the now repealed Municipal Sewage Regulation, and form the basis of what is now required in the MWR.

Under the MWR, effluent that is intended to be used as reclaimed water is categorised according to risk, with a higher quality being required in cases where the risk of human or environmental contact is higher. There are four risk categories: “indirect potable use” (highest risk category), “greater exposure potential”, “moderate exposure potential” and “lower exposure potential” (lowest risk category). The quality criteria associated with each risk category are summarised in Table 1.1. The determination of which quality criteria will be needed is determined on a case by case basis through an environmental impact study, which will assess the risks and potential impacts to human health and the environment.

Table 1.1: Quality Criteria – Reclaimed Water Categories

Parameter	Quality Requirement			
	Indirect Potable Use	Greater Exposure Potential	Moderate Exposure Potential	Lower Exposure Potential
CBOD ₅	≤ 5 mg/L	≤ 10 mg/L	≤ 25 mg/L	≤ 45 mg/L
TSS	< 5 mg/L	≤ 10 mg/L	≤ 25 mg/L	≤ 45 mg/L
Turbidity	≤ 1 NTU	≤ 2 NTU (average); ≤ 5 NTU (maximum)	Not applicable	Not applicable
Faecal coliforms	< 1 CFU/100 mL or < 2.2 MPN/100 mL (as median of 5 consecutive samples)	< 1 CFU/100 mL or < 2.2 MPN/100 mL (as median of 5 consecutive samples); Maximum of 14 CFU/100 mL	100 CFU/100 mL (as median of 5 consecutive samples); Maximum of 400 CFU/100 mL	200 CFU/100 mL (as median of 5 consecutive samples); Maximum of 1,000 CFU/100 mL
pH	Site specific	6.5 to 9.0	6.5 to 9.0	6.5 to 9.0

Indirect Potable Use is the highest standard of reclaimed water identified in the MWR, as this end use is seen as being of greatest risk. The Indirect Potable Use risk category applies to reclaimed water which is being used to replenish a potable water source.

Greater Exposure Potential is the second highest standard of reclaimed water identified in the MWR, and is defined as a use where public contact with the reclaimed water is likely, or where there is a risk to the receiving environment. In addition to the quality requirements outlined in Table 1.1, this category of reclaimed water also requires treatment to remove viruses. The MWR indicates processes which are required for virus removal (storage for 60 days or chemical addition with filtration), although there is the potential for flexibility with an alternative process of choice.

Moderate Exposure Potential is the third highest standard of reclaimed water identified in the MWR, and is defined as a use where public contact with the reclaimed water is likely to be minimal, or where public access to the reclaimed water is restricted and the users are educated as to the risks associated with reclaimed water. The risk to the receiving environment is also considered to be moderate, as a result of the intended use. In addition to the quality criteria outlined in Table 1.1, there may be additional quality requirements, monitoring and access restrictions, depending on the use of the reclaimed water. These additional requirements focus on the irrigation of crops and grazing areas, and increased disinfection in the case of risk of worker contact.

Lower Exposure Potential is the lowest standard of reclaimed water identified in the MWR, and is defined as a use where public access is restricted and users are unlikely to come into contact with the reclaimed water. The uses are intended to be commercial or industrial in nature and the users must be educated with respect to the risks associated with reclaimed water. There must also be a low risk to the receiving environment. In addition to the above quality requirements, as with the moderate exposure risk category, worker contact should be minimised, with additional disinfection being required to ensure a maximum faecal coliform concentration of 14/100 mL in cases where frequent worker contact is expected.

For all three exposure categories (Greater, Moderate and Lower), the MWR indicates that a total residual chlorine concentration of 0.5 mg/L is to be maintained at the point of use unless there are risks to fauna/flora at the point of use. In the case where there is no chlorine residual in the reclaimed water, there is the need for either an increased awareness of the end user with respect to the risks associated with the reclaimed water, or the ability to prove that adequate disinfection was achieved before the reclaimed water is distributed.

In addition to the quality requirements for reclaimed water, the MWR also indicates the following:

1. Although the BC Ministry of Environment has jurisdiction over the MWR, the local health authority must be notified of the intent to use reclaimed water, as there is a provision in the MWR for the local health authority to authorise or prohibit the use of the reclaimed water. However, this requirement can be replaced with a local service area by-law.
2. There is a requirement in the MWR for a back-up approach for effluent management which can be implemented should there be any issues with the ability to use the reclaimed water. Suitable options for a back-up approach to effluent management are:
 - a. An alternative method of disposal, which would be effluent discharge to ground or surface water.

- b. Sufficient storage capacity. This could include storage which will accommodate the maximum anticipated volume of the surplus reclaimed water.

However, the need for a back-up approach can be waived if the reclaimed water use is to a wetland and there are no additional requirements to protect public health or the environment.

3. Monitoring, reporting and precautionary measures, depending on the quality and use of the reclaimed water.

The Reclaimed Water Guideline¹ was published in 2013. The intent of this guideline is to serve as a key reference and guidance document for the use of reclaimed water in BC. The guideline covers several aspects of reclaimed water use, including potential uses and best management tools.

1.2 Applicable MWR Parameters

The MWR applies to all aspects of a wastewater system, including collection, treatment and effluent/reclaimed water management. The facility will need to be registered under the MWR, with the engineering design and environmental studies being completed with the MWR compliance in mind. A few key items are outlined below with respect to specific applicable parameters in the MWR.

1.2.1 Redundancy and Reliability

The reliability category is determined through an evaluation of risks to public health and the environment. The engineering solutions for redundancy need to include the collection system (e.g. pump capacity and number, standby power), treatment (consideration of all components in Table 1 of the MWR), and effluent discharge/reclaimed water use.

For the treatment component, under the MWR, the reliability category focuses on the need to protect public health and the environment through the inclusion of process redundancy at a wastewater treatment facility. The MWR defines three reliability categories:

Reliability Category I relates to wastewater facilities which could result in permanent or unacceptable damage to the environment during a short period of time when poor quality effluent occurs. This category includes discharges to ground or surface water which are located close to drinking water sources, shellfish waters or recreational waters in which direct human contact with the water occurs.

Reliability Category II relates to wastewater facilities which could result in permanent or unacceptable damage to the environment during a prolonged period of time when poor quality effluent occurs. This category includes discharges to ground or surface water which are located near recreational waters/land in which direct human contact with the water occurs.

¹ BC Ministry of Environment (2013). Reclaimed Water Guideline. A Companion Document to the Municipal Wastewater Regulation Made under the *Environmental Management Act*. July, 2013.

Reliability Category III relates to treatment works not otherwise designated as Category I or Category II.

With respect to the proposed effluent/reclaimed water management approach for this site, it is recommended that the assessment completed during the feasibility stage assumes that a reliability category of II is applies. However, this should be reviewed during the environmental impact study process to confirm applicability of this reliability category.

Specifically for this site, seeing as the approach is reclaimed water use, direction will need to be set on alternative approaches to effluent release/reclaimed water management should there be issues with the ability to use the reclaimed water. Issues with the ability to use the reclaimed water could arise from a prolonged winter/wet summer in the case of irrigation, and temporary or permanent operational changes/maintenance schedules should the reclaimed water be used in an industrial setting. Additional discussion on the effluent/reclaimed management approaches is presented in Section 2.0.

1.2.2 Reclaimed Water Quality

The reclaimed water quality will need to be determined through an environmental impact study, using site specific considerations to determine which quality criteria apply. There is an outline for monitoring requirements in the MWR but this is to be reviewed during the environmental impact study process with additional monitoring identified, on a site-specific basis through an assessment of risk factors. Additional discussion on the potential reclaimed quality based on possible use opportunities is presented in Section 2.0.

1.2.3 Authorisations

The facility will need to be registered under the MWR before construction can begin. The current process for registration is:

1. Submission of a preliminary application to the BC Ministry of Environment and Climate Change Strategy.
2. Review of the preliminary application with the Ministry representative.
3. Submission of the final application package.
4. Final review and completion of the registration by the Ministry representative.

The time frame for the registration process is determined as the proponent moves through the application steps. Currently, the indication is that there is a 4 month window between submission of the preliminary application and the meeting with the Ministry representative. A timeline for the final processing will be identified by the Ministry representative during the review meeting.

In the event that the effluent or reclaimed water is released to a surface water which is directly or indirectly connected to fisheries resources, then the Federal wastewater regulation (Wastewater Systems Effluent Regulations) will also apply. Under this regulation, the effluent or reclaimed water has to meet the following criteria:

- Average CBOD₅ ≤ 25 mg/L
- Average TSS ≤ 25 mg/L
- Average total residual chlorine concentration ≤ 0.02 mg/L if chlorine is used for disinfection
- Maximum concentration of un-ionised ammonia to be < 1.25 mg/L, unless a concentration of 0.016 mg/L can be met 100 m downstream of the point of discharge, in which case an application can be made for a Temporary Authorisation which is valid for a 3 year period but can be renewed.

In the event that this site needs to comply with the Federal wastewater regulation, the facility is to be registered on the Effluent Regulatory Reporting Information System (ERRIS). This requires entering information such as site location, contact details and treatment type into the ERRIS database. No approval is needed from Environment Canada to start construction or discharging. Once the discharge starts, monitoring and reporting of the flow and effluent quality is required, with the data to be entered directly onto the ERRIS database by the discharger. The frequency of monitoring varies, and is based on flow, whether the release is continuous or intermittent, and the hydraulic retention time of the treatment facility.

This regulation will apply should there be a release to Swan Lake or any of the tributaries to Swan Lake. In addition, the regulation could also apply to a release to a wetland environment, depending whether the wetland is hydraulically connected to a Swan Lake or one of its tributaries.

2.0 Water Recovery Opportunities

2.1 Agricultural Uses

The general area around Swan Lake is rural with a range of agricultural uses, including raising of livestock and the production of crops which could be consumed by humans or livestock. Key crops for the area include hay, silage corn and tree fruit production.

Irrigation is the most common use of reclaimed water in BC, with the area of highest use being the southern interior of the province where water limitations and hot summer temperatures can occur. In the Thompson-Okanagan area, the Cities of Vernon and Kamloops have been using reclaimed water for the irrigation of agricultural lands for many years. In Kamloops, the approach has been focused primarily on the irrigation of fodder crops and a golf course. The reclaimed water is similar in nature to the lower exposure potential quality defined in the MWR. In Vernon, the reclaimed water is used to irrigate golf courses, silviculture operations, the BC government's Kalamalka Forestry Centre, public playing fields and agricultural land for grazing and hay production. The water from the Vernon Water Reclamation Centre is more aligned with greater exposure potential quality for all uses regardless of whether such a high quality is needed.

For the Swan Lake area, in addition to potential uses of reclaimed water for irrigation, there could also be opportunities to replace the use of freshwater as the make-down water for pesticides and fertilizers.

It is expected that the use of reclaimed water for agricultural purposes in the Swan Lake area should meet the moderate exposure potential quality at a minimum, but this is dependent on the type of crop to be grown and site-specific factors. There are examples in BC where a lower reclaimed water quality is being used for irrigation, but irrigation methodology and the vegetation type/use need to be considered when assessing if this could be applicable for the Swan Lake area. If moderate exposure potential quality is deemed suitable, additional operational constraints will likely be required. These additional operational constraints may not be required if a high quality reclaimed water (i.e. greater exposure potential) is used, and increased operational constraints may be required if a lower quality reclaimed water is used. In addition to the quality, the physical approach to irrigation and the potential impacts to soils and plants as a result of an elevated total residual chlorine concentration will need to be considered.

2.2 Industrial Uses

Given the primarily rural nature of the general area, it is assumed that potential industrial uses will be limited compared with other reclaimed water use opportunities. The following potential industrial uses have been identified for the Swan Lake area: cooling water, equipment washing, wash-down water, dust control and construction activities (i.e. making concrete/washing gravel and compaction of soils). The anticipated reclaimed water quality for these uses is summarised in Table 2.1, and is to be taken as a preliminary assessment for the purpose of engineering feasibility. The actual reclaimed water quality for each use will need to be determined through the completion of a more site-specific environmental impact study.

Table 2.1: Potential Quality – Industrial Uses

Potential Use	Comments	Anticipated Quality
Cooling water	<p>More information is needed on the nature of the cooling system and the water quality considerations with respect to risks of chemical precipitation and mineral fouling within the cooling system.</p> <p>It is expected that this should be a low risk use for public health and the environment. In the repealed Municipal Sewage Regulation, this use was in the restricted public access category, which is equivalent to lower exposure potential in the MWR. Depending on the type of cooling process, the build-up of pathogens over time could be a concern.</p>	<p>Lower exposure potential, but further evaluation is needed based with additional information on use and risks to equipment.</p>
Equipment washing	<p>This is for the washing of equipment and vehicles which are not available for public use. The activity is assumed to be undertaken in a controlled environment where public access is restricted and the wash water will be collected for treatment.</p> <p>It is expected that this should be a low risk use for public health and the environment. In the repealed Municipal Sewage Regulation, this use was in the restricted public access category, which is equivalent to lower exposure potential in the MWR.</p>	<p>Lower or moderate exposure potential, depending on risk of operator contact.</p> <p>Moderate exposure potential is assumed to be more appropriate, due to a high chance of exposure from accidental splashes and aerosols.</p>
Wash-down water	<p>This is for the washing of buildings, e.g. concrete flooring in a barn, and is assumed will be undertaken in a controlled environment where public access is restricted and the wash water will be collected for treatment.</p> <p>Theoretically, this should be a low risk use for public health and the environment.</p>	<p>Lower or moderate exposure potential, depending on risk of operator contact and building use. Moderate exposure potential is assumed to be more appropriate, due to a high chance of exposure from accidental splashes and aerosols.</p>
Dust Control – public roads	<p>This is to replace the use of potable or freshwater on gravel roads which are used by the public. It is assumed that calcium or magnesium chloride could be added to the reclaimed water, in accordance with current practices for dust control.</p> <p>While the risk of run-off is low and can be controlled by the application rate, it is possible that this activity could be undertaken when members of the public are present and using the road, however the access by the public could be controlled.</p>	<p>Moderate or greater exposure potential, depending on access to road by public during application.</p>

Table 2.1 Potential Quality – Industrial Uses (continued...)

Potential Use	Comments	Anticipated Quality
Dust control – privately owned areas and construction	This is for suppressing dust on areas where public access is restricted, either due to the private ownership or construction activities. It is assumed that calcium or magnesium chloride could be added to the reclaimed water, in accordance with current practices for potable or freshwater sources. This should be a low risk use for public health and the environment. In the repealed Municipal Sewage Regulation, this use was in the restricted public access category, which is equivalent to lower exposure potential in the MWR.	Lower exposure potential.
Making concrete/washing gravel – construction	This activity would only take place on construction sites where access is restricted. This should be a low risk use for public health and the environment. In the repealed Municipal Sewage Regulation, this use was in the restricted public access category, which is equivalent to lower exposure potential in the MWR. In the reclaimed water guidance document for the MWR, this use is classified as an industrial use, and notes that the site engineer is to be made aware of the use of reclaimed water in case any amendments are needed to ensure the quality or long-term performance of the concrete.	Lower exposure potential.
Compaction - construction	This is for compaction of soils during construction, with the areas being subject to public access restrictions. This should be a low risk use for public health and the environment. In the repealed Municipal Sewage Regulation, this use was in the restricted public access category, which is equivalent to lower exposure potential in the MWR.	Lower exposure potential.

2.3 Aquatic Enhancement Uses

Assessment of the land use around Swan Lake and water quality in and around the lake was completed in 2016² and 2017³. The information below summarises the outcomes of these two reports.

Swan Lake has an approximate surface area of 440 hectares and a volume of 24,744,000 m³. The lake is shallow (maximum depth 9.1 m and mean depth of 5.6 m) and the hydraulic residence time is estimated to

² Western Water Associates Ltd. (2016). Swan Lake – Land Use and Water Quality Assessment, Vernon, BC. July, 2016.

³ Western Water Associates Ltd. (2017). Phase 2: Swan Lake – Land Use and Water Quality Assessment, Vernon, BC. October, 2017.

be 1 year. There are many uses of the lake including recreation (e.g. fishing, boating, rowing, waterskiing, swimming and winter ice sports) and the support of wetlands which are used by birds. Adjacent to the lake, the main land uses are agricultural (75%) with key crops being corn, hay and fruit (apples and cherries), with some residential use (16%), recreational commercial use (7%) and general industrial use (2%).

There are approximately 8 creeks that drain into Swan Lake. The largest input to the lake is BX Creek (75%) with the other creeks contributing approximately 16% of the lake inputs. The highest flow in all of the creeks occurs during the spring freshet (March to June) as a result of snow melt, with little to no flow for the remainder of the year. Precipitation contributes approximately 10% of the lake inputs with the precipitation occurring during the late fall and winter and entering the lake in the early spring. Groundwater is thought to contribute to approximately 1% of the input to Swan Lake. The outputs from the lake are limited to Vernon (BX) Creek, evaporation and a limited number of water licences. There is a regulated outflow structure on Vernon (BX) Creek.

The wetlands around Swan Lake are described as one of the most important wetland habitats in south central BC. The wetlands are used for staging and breeding of water fowl. In addition, Swan Lake is located on a major provincial migratory corridor and is important for both resting and feeding of migratory birds. The wetlands provide essential nesting habitat, including one of the largest urban great blue heron rookeries in western Canada.

For water quality, the lake is described as being mesotrophic (i.e. in the middle range for nutrient richness), however, there is anecdotal information that seasonal nuisance algal blooms occur. In the reports, an assumption was made that these blooms are most predominant in the spring and fall, when nutrient-rich water is circulated throughout the lake during turn-over. However, the lake is described as having relatively good quality, although there are concerns relating to a number of parameters, as summarised below. The reports indicate that the lake acts as a natural sink for metals, nutrients and other contaminants, and that agricultural activities appear to have the largest influence on the water quality in Swan Lake, which is understandable given that approximately 75% of the land around the lake is used for agricultural purposes.

1. Sulphate was elevated at the foreshores to the east, north and south west, with the source thought to be related to agricultural amendment applications to orchards in the area.
2. Fluoride was elevated in the lake.
3. Chloride was highest at the north end of the lake with the sources thought to be road salts and agricultural activities. A biosolids composting facility located to the north of the lake was also identified as a potential source of chlorides, but there was limited information on this site at the time of the evaluation so no determination could be made on this activity as a source of chloride.
4. Some tributaries bring metals into the lake. Uranium was elevated at all foreshore sampling locations and was thought to be leaching from the natural rock due to inputs of calcium and chloride.
5. Some tributaries bring nitrate into the lake. While nitrate was elevated in a few ditches, there was no elevated concentration of nitrate in the lake. The lack of nitrate in the lake was thought to be due to uptake by riparian vegetation. This assumption resulted in the recommendation to encourage or provide incentives to landowners to maintain and cultivate willow and cattails within at least 10 m of

the lake in the riparian zone to help improve the water quality of Swan Lake. The use of constructed wetlands was also recommended to assist in nutrient reduction before water enters the lake.

6. Ammonia was elevated at the south east shore and was thought to be related to on-site wastewater disposal systems or possibly agricultural inputs. Ammonia was also noted to be elevated in the mid-basin of the lake.
7. Algal growth was observed in Vernon (BX) Creek at the lake outlet and was thought to be due to nutrient-rich water from the lake. Agriculture and on-site wastewater systems were thought to be the sources of the nutrients that caused this algal growth.

There are two possible uses for the reclaimed water: augmentation of stream flows or wetland enhancement.

For stream augmentation, the reclaimed water guidance document clearly states that the intent is to beneficially augment the natural flow of water in a stream. There is the need to demonstrate a net benefit to the environment for this approach, so it is distinguished from a release of effluent into a surface water. Given the seasonal flows for all the creeks into Swan Lake, it is possible that reclaimed water could be used to augment the flows. This would need to be timed to allow flow during times of the year when the natural flows are low or non-existent. With the available information, the streams into Swan Lake flow during the March to June window, with the flows becoming negligible or non-existent for the remaining of the year. Therefore, the window for augmenting these flows would be in the latter part of the spring/early summer, depending on when the freshet flows subside, through to the spring of the following year. The release of flow during the winter may not be possible, depending on freezing conditions. Localised fisheries uses may also need to be considered when developing an approach to augmenting the stream flows, as the flow conditions may vary depending on whether the stream is used/has the potential to be used for spawning or rearing, or is suitable habitat to support adult life. The approach must be accompanied by a stream flow augmentation plan, which should include mitigation measures such as pre-aeration or a surface holding pond.

In addition to the potential to enhance fisheries habitat, the use of reclaimed water to augment the natural creek flows could assist with maintaining riparian vegetation. The presence of riparian vegetation along the creeks that flow into Swan Lake was identified in the 2017 lake assessment report as a possible reason why nitrate that was measurable in the ditches along the east shore was not present in the lake. Uptake of nitrate by the vegetation was assumed and as a result there was a recommendation to encourage or provide incentives to landowners to maintain and cultivate willow and cattails within at least 10 m of the lake in the riparian zone to help improve the water quality of Swan Lake.

In the MWR, the reclaimed water quality is to be determined through an environmental impact study which assesses risk to public health and the environment. The regulation does not state a suitable quality for use to augment stream flows. In the now repealed Municipal Sewage Regulation, water that met the unrestricted public access quality (i.e. equivalent to greater exposure potential) was suitable for using to augment stream flows, with the potential for additional treatment depending on the nature of the receiving water. If chlorine was used for disinfection then dechlorination was required to protect flora and fauna.

The MWR reclaimed water guidance document indicates that the reclaimed water that is used for stream augmentation must meet the indirect potable use category for quality, with additional quality criteria to be set by an environmental impact study. There is an expectation that nutrient removal will be required. The reclaimed water is to be non-toxic to aquatic life and must not adversely affect downstream uses or users. The reclaimed water must complement the naturally present ecosystem and not negatively alter the ecosystem structure or species composition in the receiving environment. The water must also not cause established water quality objectives/guidelines to be exceeded in the receiving environment. In the case where there are no site specific water quality objectives, the water quality guidelines apply, with the appropriate guideline to be selected based on use (e.g. fisheries, recreation, water supply, agriculture). While there are no specific water quality objectives for Swan Lake or any of its tributaries, there are water quality objectives for Lower Vernon Creek into Okanagan Lake. These objectives refer to the stretch of Vernon (BX) Creek between Swan Lake and the confluence with Lower Vernon Creek. Therefore, there will be an expectation that any release of reclaimed water into Swan Lake or any of its tributaries will need to ensure that the water quality objectives for Lower Vernon Creek and Vernon (BX) Creek are met. The water quality objectives for Vernon (BX) Creek include bacteriological parameters, turbidity and suspended solids, ammonia, nitrate, nitrite, algal growth as chlorophyll a and dissolved oxygen.

As with other reclaimed water uses, the quality of reclaimed water which is to be used for wetland enhancement is to be determined through an environmental impact study which assesses risk to public health and the environment. The MWR does not state a suitable reclaimed water quality for use to maintain wetlands/marshes. Reclaimed water used for wetland enhancement under the repealed Municipal Sewage Regulation was required to meet restricted public access quality (i.e. equivalent to lower exposure potential), although additional treatment may be needed with the focus being to prevent algal growth. If chlorine was used for disinfection then dechlorination was required to protect flora and fauna.

The MWR reclaimed water guidance document indicates that indirect potable use and greater exposure potential categories would be suitable for habitat enhancement or restoration, depending on site-specific factors. Temperature, nutrients, algal growth and erosion are all considerations. The reclaimed water added to natural wetlands must not negatively affect the natural ecosystem of the wetland. Reclaimed water could be used in both natural or constructed wetlands. As with the stream augmentation approach, any wetland enhancement which would result in the water connecting directly with Swan Lake, the tributaries to Swan Lake or Vernon (BX) Creek would also need to consider the potential impact on the water quality objectives which have been set for tributaries to Okanagan Lake in the Vernon area. Therefore, nutrient removal would likely be required. Given that the use of reclaimed water in the wetlands around Swan Lake would likely be used to enhance water fowl habitat, it is also possible that a lower water quality requirement could be acceptable. However, given the connection with Swan Lake, the ultimate connection with Okanagan Lake and the uses of Swan Lake, an expected water quality for this use would be either indirect potable use or greater exposure potential use, with both requiring nutrient removal.

2.4 Summary of Uses and Reclaimed Water Quality

There are various potential uses for reclaimed water in the Swan Lake area. These uses vary from agricultural to industrial to habitat/flow enhancement. While it may be possible to use a lower water quality for the agricultural and industrial uses, these uses will require an alternative approach to effluent

management, which would be either release to ground/surface water, or sufficient storage. Use of the reclaimed water for habitat enhancement would likely require a high quality with nutrient removal. While these uses do not necessarily require an alternative approach to effluent management, it is possible that storage may be required in order to clearly meet the intent of a beneficial use. Therefore, release of the reclaimed water in the March to June window may be limited, depending on the magnitude and duration of the spring freshet flows.

The quality would need to be assessed through an environmental impact study. However, for the purposes of this report, an estimation of the potential quality for each use is summarised below.

- Lower exposure potential: cooling water, equipment washing (depending on operator exposure), wash-down water (depending on operator exposure), dust control (private lands), making concrete, washing gravel, compaction.
- Moderate exposure potential: irrigation uses (depending on site-specific factors), equipment washing (depending on operator exposure), wash-down water (depending on operator exposure), dust control on public lands (depending on access restrictions).
- Greater exposure potential: irrigation uses (depending on site-specific factors), dust control on public lands (depending on access restrictions), wetland enhancement (with possible nutrient removal).
- Indirect potable use: stream augmentation (with nutrient removal expected), wetland enhancement (with possible nutrient removal).

3.0 Biosolids Recovery Opportunities

3.1 Projected Biosolids Production (Human Sources)

The proposed strategy is to develop an initial wastewater treatment plant that will serve the communities for a 10 to 15 year horizon and is capable of treating up to 2,000 m³/d. The ultimate capacity of the wastewater facilities is projected to be 12,000 m³/d. Sludge is produced as a by-product during wastewater treatment. **Sludge is defined as the excess organic solids which are produced as a result of treating liquid wastes. These organic solids have not been treated by any recognised solids treatment process in order to produce biosolids. Therefore, the health and environmental risks associated with sludge can be high.**

The amount of sludge that is produced during wastewater treatment is dependent on the type of process used for wastewater treatment and the level of treatment that is needed to achieve the required effluent quality. Typically, sludge production is higher for mechanical treatment processes than lagoons. Also, typically, the higher the effluent quality, the greater the sludge production. From the projections for the desired effluent quality and expected wastewater treatment processes needed to achieve this quality, it is expected that the sludge production will be approximately 60,000 L/d at 1% solids concentration.

On production, sludge is highly liquid in nature (e.g. around 1% solids content with 99% water) and highly biologically active. As both these factors can result in handling challenges, it is a common practice to dewater the sludge, with 20% solids content being reasonable to achieve, and to treat the sludge to produce a more stable product. Once treated, the sludge can be referred to as biosolids. **Biosolids are the excess organic solids which have been treated in order to achieve vector attraction reduction (e.g. flies, birds, rodents, etc.) and a reduction in pathogen concentrations. The treatment of sludge in order to produce biosolids can result in a final product which has low risks to human health and the environment.**

3.2 Projected Biosolids Production (Agricultural Sources)

There are many rural properties in the area and agricultural activities are common. Information from the Census Canada database indicates the general number of various types of livestock in the Spallumcheen area, as summarised in Table 3.1. Using information available from various sources, the potential waste production from each type of animal has been calculated, and is also presented in Table 3.1

Table 3.1: Estimated Waste Production from Agricultural Sources

Type of Livestock	Total Annual Waste Production (tonnes/year)
Horse	6,407
Goat	696
Cattle	160,454
Chicken	18,547

Pig	376
Sheep	700
Total	187,180

From this, there is the potential for a facility to receive around 190,000 tonnes of waste a year from the various farming operations in the area. However, the expectation is that not all of this waste will be collected for disposal to a centralised facility. There is a good potential opportunity to process some of the animal wastes through the anaerobic digesters in concert with the domestic sludge. Indeed, the anaerobic digestion process will benefit from the additional organic load.

3.3 Applicable Regulations (OMRR)

3.3.1 Introduction

The BC Organic Matter Recycling Regulation (OMRR) governs the production, quality and land application of specific types of organic matter, including municipal wastewater sludge and biosolids. A wide range of organic wastes from agricultural sources are also listed in the OMRR, including manures, although other regulations can also apply to the management of manures on farms and the composting of agricultural wastes.

The OMRR defines biosolids as “stabilized municipal sewage sludge resulting from a municipal wastewater treatment process or septage treatment process which has been sufficiently treated to reduce pathogen densities and vector attraction to allow the sludge to be beneficially recycled in accordance with the requirements of this regulation”. Three aspects of the regulation (treatment, quality and uses) are discussed in greater detail below.

The regulatory framework for sludge/biosolids management is Provincial only. There is no Federal regulation for sludge/biosolids. However, the development of the Biosolids Management Strategy in 2012 through the Canadian Council of the Ministers of the Environment clearly indicates that the policy throughout Canada is to encourage the development and use of biosolids, rather than the disposal of what has the potential to be a valuable resource. The concept of disposal includes use at a landfill for intermediate or daily cover, but does not include using the biosolids as a final cap material.

3.3.2 Treatment

The OMRR outlines treatment requirements, focusing on two aspects: pathogen reduction and vector attraction reduction. Pathogen reduction is the decrease in micro-organisms which may be present in the human gut and have the potential to cause illness or disease. These micro-organisms can include bacteria, viruses, protozoa and helminths (e.g. tapeworms). Vector attraction reduction, or stabilisation, is the transformation of organic matter into a state where there is a lower potential for nuisance conditions (e.g. odour, attracting flies, etc.) to occur.

The requirements for pathogen reduction are outlined in Schedule 1 of the OMRR and are based on a temperature-time relationship for the destruction of enteric micro-organisms. The temperature-time relationship allows for either short periods of time when the material is exposed to elevated temperature or long periods of time when the material is exposed to low or ambient temperatures. The higher quality biosolids products all require a period of elevated temperature (i.e. $\geq 50\text{ }^{\circ}\text{C}$), while the lower quality biosolids products only require low or ambient temperature conditions. Common examples of elevated temperature processes include thermophilic digestion (anaerobic or aerobic) and composting. Digestion under ambient temperature conditions or instances when the composting process does not reach and maintain elevated temperature conditions will still result in pathogen kill, but there are risks as to what level of kill is achieved.

Vector attraction reduction is the process by which the organic matter undergoes a change which will result in a less biologically active material. Ideally, this change is to the point where nuisance conditions can be avoided. Acceptable vector attraction reduction methods are outlined in Schedule 2 of the OMRR. There are a number of acceptable methods by which vector attraction reduction can be achieved and, unlike the pathogen reduction processes, there is little difference between the higher and lower biosolids products. Common examples of vector attraction reduction processes are composting and digestion (aerobic or anaerobic).

3.3.3 Quality

Under the OMRR, organic matter is separated into five different categories:

- Class A compost;
- Class B compost;
- Class A biosolids;
- Class B biosolids; and,
- A biosolids growing medium.

Table 3.2 summarises the quality of the 5 organic products, as defined by the OMRR. A biosolids growing medium is the highest quality product and can be used in place of a soil. The other organic products (Class A compost, Class B compost, Class A biosolids and Class B biosolids) are all intended to be used as a soil amendment to enhance the soil nutrient content.

Table 3.2: Summary of Material Quality Under the BC OMRR

Parameter	Medium Type				
	Biosolids Growing Medium	Class A Compost	Class B Compost	Class A Biosolids (Note 1)	Class B Biosolids
Foreign Matter Content (% dry weight)	< 1	< 1	<1	<1	< 1
Sharp Foreign Matter	None present	None present	None present	None present	None present

C:N Ratio	> 15:1	≥ 15:1 and ≤ 35:1	N/A	N/A	N/A
Total Kjeldahl Nitrogen (% by weight)	< 0.6	N/A	N/A	N/A	N/A
Organic Matter Content (% dry weight)	≤ 15	N/A	N/A	N/A	N/A
Faecal Coliforms (MPN/g dry weight)	< 1,000	< 1,000	< 2,000,000, with limits < 1,000 for certain land applications	< 1,000	< 2,000,000, with limits < 1,000 for certain land applications
Maximum Element Concentration (µg/g dry weight)					
Arsenic	13	13	75	75	75
Cadmium	1.5	3	20	20	20
Chromium	100	100	1,060	1,060	1,060
Cobalt	34	34	150	150	150
Copper	150	400	2,200	757	2,200
Lead	150	150	500	500	500
Mercury	0.8	2	15	5	15
Molybdenum	5	5	20	20	20
Nickel	62	62	180	180	180
Selenium	2	2	14	14	14
Zinc	150	500	1,850	1,850	1,850

Note 1: The quality criteria for a Class A biosolids is based on Federal requirements, stated in the Trade Memorandum T-4-93.

3.3.4 Uses

Under the OMRR, the intent is that organic matter can be used to enhance vegetation or plant growth. The acceptable uses range from application to agricultural lands for crop growth, through to urban settings, which can include use of these materials in residential gardens. There are some restrictions and requirements relating to the use of the various types of organic matter, depending on the quality of the organic matter. Given the high quality of a biosolids growing medium and a Class A compost, there are no restrictions for the distribution and use of these products. However, there are restrictions for a Class A biosolids, a Class B biosolids and a Class B compost.

A Class A biosolids can be distributed/used as follows:

- In volumes below 5 m³ per vehicle per day.
- In sealed bags of < 5 m³ for retail purposes, with there being no restrictions on how many bags can be distributed per vehicle per day.
- In volumes > 5 m³ to composting facilities or biosolids growing medium facilities.
- In volumes > 5 m³ per parcel of land per year in accordance with a land application plan.

A Class B biosolids can be used as follows:

- For the enhancement of vegetation under a land application plan.
- For composting, with no volume restrictions.
- To develop a biosolids growing medium as long as pathogen reduction and vector attraction reduction requirements are met. There are no restrictions on the volume that can be diverted to create a biosolids growing medium.

A Class B compost can only be used for the enhancement of vegetation under a land application plan.

3.4 Treatment Options

For a small site, practical treatment options for the sludge that is produced as a result of wastewater treatment can be limited. The costs associated with the management of sludge can be equal to the costs that are required for the wastewater treatment process to produce a defined effluent quality. As a result of these cost implications, the option of amalgamating with other operations should be considered and may be a more viable approach than managing the sludge as a single site operation. However, any facility will also need to accommodate the incoming agricultural waste.

The final destination of the sludge/agricultural waste mix should also be considered, as this will determine the quality of the final product and the treatment needs. For example, if the sludge/agricultural waste mix is to be disposed to landfill, the main consideration is to remove water so that the organic matter can be handled as a solid. This can easily be achieved by a standard dewatering process such as the centrifuge for all liquid forms of organic matter (i.e. less than 4% solids), resulting in an approximate solids content of 20%. However, if the intent is that the sludge will be used on residential properties for plant growth, then extensive treatment is needed for pathogen vector attraction reduction, and has to include a high temperature phase.

There are likely three viable treatment options for the sludge/agricultural waste mix that will be produced: aerobic digestion under ambient temperatures, anaerobic digestion and composting. These are outlined below and also include brief discussion on the implications of no biological treatment, with the sludge/liquid forms of the agricultural waste being mechanically dewatered only.

3.4.1 Mechanical Dewatering

This would use a centrifuge to remove sufficient water to convert the liquid organic wastes into a solid organic waste, which has a consistency similar to wet soil (i.e. approximately 20% solids content). The solid forms of the agricultural wastes would need to be blended to the dewatered material after the centrifuge. While it may be possible to apply this material to land under a Land Application Plan in accordance with the OMRR, with agricultural land being the most likely type of application area, there are significant health and environmental risks, mainly as a result of the highly biologically active nature of the wastewater treatment plant sludge. The health and environmental risks may be lower with the agricultural wastes, depending on the specific nature of the wastes. The possible production of malodours is the highest

risk has been the primary driver for recent termination of biosolids applications in the Thompson Okanagan region.

Should mechanical dewatering be the sole sludge/agricultural waste process used, the only viable end management option is disposal to landfill. This will need to be agreed with the landfill owner and may also need approval from the BC Ministry of Environment and Climate Change Strategy, depending on the conditions in the landfill operational authorisation. Should a landfill owner agree to accept the sludge/agricultural waste mix, it is reasonable to assume that a tipping fee would apply. It is also possible that the agreement may not be long lasting, given the continued direction to divert material from the landfill, including organics, for recycling.

If this approach is to be pursued, it should be viewed as a short-term approach, with a long-term more environmentally sustainable approach to be implemented in the future which meets the vision of the development of a centralised wastewater and agricultural waste facility. The sludge/agricultural waste mix will have a significant value to plant growth through land application based on agronomic needs, and this value will not be fully appreciated if the mix with disposal to landfill.

3.4.2 Aerobic Digestion

Aerobic digestion would likely be achieved in an aerated open tank under ambient temperatures, with the resulting product being a Class B biosolids, due to lack of high temperature during processing. During digestion, there would be a reduction in the organic content of the sludge/agricultural waste, which would result in a reduction in the final volume of material to be managed. Aerobic digestion will also reduce the odour risks and number of pathogens present.

The resulting Class B biosolids can be applied to land either as a liquid or solid, but will require a Land Application Plan under the OMRR. The general trend is for the digested biosolids to be dewatered prior to land application, usually by centrifuge to approximately 20% solids content. The production of a solid organic product for land application has the following advantages:

1. Lower trucking costs.
2. Lower risks during application with respect to run-off and impacts to the environment, including groundwater.
3. Greater ease for storage prior to application. Storage will be required as the application to land will only be able to occur in specific windows.
4. A greater number of opportunities for application, as the general trend is for land owners to prefer biosolids as a solid rather than a liquid.

Should this approach be selected, this will require an aerobic digester and centrifuge to be located at the wastewater treatment plant site. Blending of all organic wastes will be required prior to the aerobic digester, regardless of whether the organic matter is in the solid or liquid state. In the event that there are significant volumes of dry agricultural wastes, water may need to be added to the mixture prior to being fed into the aerobic digester. The use of the resulting digested biosolids will require a Land Application Plan under the OMRR and will likely be limited to the application to land for agricultural use such as fodder crops or range

land. The application of the biosolids could be undertaken as a venture led by the wastewater facility owner or by others, such as amalgamation into an existing land application operation or by an entity that wishes to acquire the biosolids for a specific land application operation.

3.4.3 Anaerobic Digestion

Anaerobic digestion would need to be achieved in a sealed tank and can be under mesophilic (35 °C) temperatures to produce a Class B biosolids or under thermophilic (55 °C) temperatures to produce a Class A biosolids. In both cases, methane gas is produced and can be used as an energy source to assist with the heating of the anaerobic digesters. The expectation is that the amount of methane gas produced during digestion will be insufficient to meet all of the energy needs and will need to be supplemented with electricity or natural gas/propane.

As with aerobic digestion, there will be a reduction in the organic content of the sludge/agricultural waste, which would result in a reduction in the final volume of material to be managed, and there will be a reduction in the risk of malodours when using the final product.

As with aerobic digestion, a Class B biosolids can be applied to land under a Land Application Plan. Should a Class A biosolids be produced, there is a greater flexibility as to the end use options. Larger applications of Class A biosolids to land will require a Land Application Plan under the OMR. Smaller applications to land can be undertaken without the need of a Land Application Plan. In addition, a Class A biosolids can be blended with other materials, such as wood shavings, soils and sands, to produce a biosolids growing medium, which can be distributed without any restrictions. A biosolids growing medium can be used in place of a soil and can be used in both private and public areas, including residential gardens. There are privately-owned companies that produce organic fertilizers and soils, and it may be possible to sell the Class A biosolids to such companies to allow for some recovery of the processing costs.

As with aerobically digested biosolids, similar considerations apply to anaerobically digested biosolids with respect to whether the application to land should be as a liquid or solid.

Should this approach be selected, this will require an anaerobic digester and centrifuge to be located at the wastewater treatment plant site. Blending of all organic wastes will be required prior to the digester, regardless of whether the organic matter is in the solid or liquid state. In the event that there are significant volumes of dry agricultural wastes, water may need to be added to the mixture prior to being fed into the aerobic digester.

3.4.4 Composting

There is no difference in the infrastructure needs and process operation between a Class A compost and a Class B compost. Therefore, should composting be pursued, the aim is to produce a Class A compost, through meeting the high temperature and vector attraction reduction treatment requirements. This will result in a final product that can be used in a wide range of vegetation enhancement situations, from carefully controlled agricultural applications to gardens and public spaces. It is also possible that this product could be sold, which would allow some recovery of the operational costs.

Composting can accommodate sludge and agricultural organic wastes. Blending prior to composting will be required to achieve a consistent feed stock and also needs to consider the inclusion of the bulking agent. However, the presence of wood shavings and straw in the agricultural waste may lower or even remove the need to add a bulking agent for composting. Depending on the amount and type of agricultural waste that is received, it is possible that blending of this waste with the sludge could result in a feedstock that is of suitable consistency for composting (i.e. 15 to 20% dry solids). Therefore, dewatering of the liquid sludge may not be needed prior to composting.

For a compost operation to be developed by the wastewater facility operations, the following will be required:

1. Land acquisition for the location of the compost operation.
2. Development of facility infrastructure, which could include an impermeable surface, covering, heavy equipment for turning, aeration, leachate control, odour control, etc., depending on the location and risk factors.
3. Appropriate operator training.
4. Notification and possible approval under the OMRR.
5. Monitoring, record keeping and reporting.
6. Distribution and possible marketing of the final product.

While it is possible for the sludge/biosolids to be composted as part of the wastewater facility operations, there is an existing compost facility located on L&A Cross Road approximately 1.2 km to the north of Swan Lake, on a parcel of land within the Agricultural Land Reserve. The facility is registered under the OMRR (authorisation number 105573) and processes sludge/biosolids from the Enderby wastewater treatment plant, fruit waste sludge from the Brandt Creek wastewater treatment plant, waste from the Sleeman Brewery in Vernon and septage from the Salmon Arm area. The facility is registered to produce up to 1,620 tonnes of Class A compost a year using a windrow process. All of the compost is used as a fertilizer/soil amendment on 400 acres (162 hectares) of agricultural land to produce silage corn.

Discussions with Kevin Curtis, owner of the compost facility, indicated that there is interest in taking the organic matter from the wastewater facility for composting. There are the following considerations with respect to this opportunity:

- 1, Confirmation is needed as to whether this will result in the need to amend the OMRR compost facility registration and whether this would trigger any additional requirements. For example, a permit from the BC Ministry of Environment is needed if a compost facility processes food waste or biosolids and has a design production capacity of $\geq 5,000$ tonnes/year; under the OMRR, an environmental impact study is required for an existing facility should it be expanded to a production capacity of $> 20,000$ tonnes.
- 2.As the facility currently receives sludge/biosolids from the Enderby wastewater treatment plant, it is assumed that there are no constraints within the OMRR registration which would prevent the receipt of similar waste organics from the North Okanagan centralised wastewater facility.

3. There is a discrepancy within the OMRR with respect to the definitions relating to wastewater solids and the organic matter that is deemed to be acceptable for composting. Schedule 12 of the OMRR lists the organic matter that is suitable for composting. While domestic septic tank sludge, manures and carcasses are included on the list, there is no reference to sludge, only to biosolids. In the OMRR, biosolids are defined as stabilised municipal sewage sludge that has been sufficiently treated to reduce pathogen densities and vector attraction. However, there are composting facilities that are in operation where the main organic matter feed source is sludge. This discrepancy in the OMRR is recognised by the BC Ministry of Environment and Climate Change Strategy and there has been regular discussion over the years regarding amending the regulation to address this discrepancy.

It is possible to compost either sludge or biosolids. The advantage of composting sludge is that the high biological energy that is characteristic of sludge results in an expectation that the elevated temperatures needed for Class A will be met and maintained. Stabilisation of sludge to produce biosolids prior to composting will result in a reduction in the biological activity of the organic matter. This could compromise the ability to meet the Class A pathogen destruction temperatures. This concern can be addressed by adding an increased amount of biologically active organic matter to the blend prior to starting the composting process.

There is a lower risk of malodours with the composting of biosolids, compared with sludge. However, this lower risk may not be a reality, depending on whether additional biologically active organic matter needs to be added to reach and maintain Class A temperatures. In the event that odours are an issue, this can be addressed through a compost process selection that will allow a greater control. Windrow processes have the lowest potential for control, compared with aerated static pile or in-vessel composting, where containment and collection/treatment of foul air is possible.

Should composting be selected as a suitable option, this could require a centrifuge to be located at the wastewater treatment plant site depending on whether there is a risk that blending with the agricultural wastes will be sufficient to enable a suitable solids content to be met prior to composting. The option of adding aerobic or anaerobic digestion may also be considered, with advantages and disadvantages both existing for this process choice. The final product should be a Class A compost, which can be used and distributed without restriction. There is no requirement for a Land Application Plan under the OMRR.

3.5 Potential Destinations for Agricultural Uses

With the greatest land use in the general area being rural, there are many opportunities for using the final product for a soil enhancer.

With a Class B biosolids, greater attention is needed to ensure protection for public health and the environment. Land Application Plans will be needed and are to be site-specific, considering soil conditions, the nature of the material to be applied, the type of crop, land aspect and proximity to buildings, residential areas, roads, surface water and groundwater. The Land Application Plan may need to be updated on an annual basis. Typical opportunities for a Class B biosolids include forage crops and rangeland, but this does not eliminate options for other crops, depending on the application approach.

There are greater opportunities for a Class A biosolids and a Class A compost. While a Land Application Plan is needed for a Class A biosolids for large applications, in all other cases, there are no such requirements. A Class A biosolids or Class A compost can also be used to develop a biosolids growing medium. A Class A product or a biosolids growing medium can be used for many different types of crops and can also be used in public areas such as playing fields and boulevards, and in residential gardens.

4.0 Governance and Finance Models

4.1 Operation Responsibility – monitoring and reporting

Monitoring and reporting is a requirement within both BC and Federal regulations. If the facility releases reclaimed water or effluent either directly or indirectly into fisheries waters, effluent quality and flow monitoring is required under the Federal wastewater regulation. This information is to be submitted to the Environment Canada database (ERRIS). The frequency of monitoring and reporting is based on the plant flow conditions.

It is assumed that the wastewater facility will be registered under the MWR. There are monitoring and reporting requirements in the MWR, based on the flow, quality and effluent management approach. The monitoring and reporting requirements are also evaluated further through an environmental impact study and may also include the need for monitoring of the receiving environment. Monitoring of any sludge/biosolids management approaches is outlined in the OMRR, with some of the monitoring requirements to be developed on a site specific basis.

APPENDIX 5

Site Selection Technical Memorandum

MEMORANDUM

Date: January 24, 2018
To: Leah Mellott
cc: Scott Shepherd
From: Peter Gigliotti
File: 1203.0018.02
Subject: **NOWRP - Site Assessment**

The next step in the development of the NOWRP is to identify and assess potential sites for the proposed treatment facility. Assessment for effluent storage sites will be completed separately. The remainder of this memo summarizes site assessment.

Through discussions with the Partnership, four treatment plant sites have been identified and assessed utilizing a set of multiple bottom line parameters.

The four potential sites for the treatment facility are illustrated below in Figure 1. The sites are:

- Site 1 – North Swan Lake Area (elev. 395 m)
- Site 2 – Thomas Hayes (elev. 400 m)
- Site 3 – Regional District of North Okanagan (RDNO) Park (elev. 520 m)
- Site 4 – Swan Lake Corridor (elev. 398 m)



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Assessment Parameters

There are a few parameters which are necessary for determining a feasible site. These include the parcel size of 4 Ha, land ownership, proximity to effluent storage and users, capital costs, noise, odor and zoning to name a few. The four categories for assessing all parameters include these as well as numerous others based on previous assessments completed by Urban Systems.

The four categories of assessment parameters for evaluating each of the potential treatment plant sites include:

- General
- Economic
- Environmental
- Public Impact

Within each assessment category the following criteria were used to score and evaluate.

GENERAL

1. Useable area
2. Topography/Aspect
3. OCP compliance
4. ALR status
5. Ownership
6. Sector Desirability

ECONOMIC

1. Site Preparation/Utilities
2. Access
3. Land Cost
4. Transmission to Site

5. Transmission from Site

ENVIRONMENTAL

1. Soils
2. Groundwater
3. Habitat
4. Risk Factors

PUBLIC IMPACT

1. Winds/Odour
2. Visibility
3. Proximity/Noise
4. Land Use

Each category has been assessed and scored on a point scale from 1 to 10 using the above criteria. For example, a site with a high usable area scores high points. Deductions are made for steep slopes, marshes, etc. Overall site characteristics that better lend themselves to the installation of a wastewater treatment facility are given a higher score.

The Partnership may want to assign “importance” multipliers comparing the importance of one parameter with respect to another. For example, undesirable soil conditions can be mitigated by engineered solutions, so it might not be considered as important as land cost or odour control.

Assessment Results

The matrix below summarizes the results of the assessment. Based on the evaluation completed, Site 1 scored the highest and seems to lend itself well to developing a treatment facility.

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Site #	General	Economic	Environmental	Public Impact	Total
1	8	8	7	6	29
2	6	5	7	8	26
3	4	4	5	4	17
4	6	8	5	4	23

A detailed copy of the assessment scoring is attached to this memo.

Next Steps

Based on the results of the draft assessment, we suggest that the Partnership review the results and consider the importance of each parameter. This initial assessment suggests that Site #1 is the most suitable for the wastewater treatment facility.

Please contact the undersigned if you have any questions or require any clarification of the above. We are looking forward to meeting soon to review these results and advancing this exciting project forward.

Sincerely,

URBAN SYSTEMS LTD.

A handwritten signature in blue ink, appearing to read 'P. Gigliotti'.

Peter Gigliotti, P.Eng.

A handwritten signature in blue ink, appearing to read 'Scott Shepherd'.

Scott Shepherd, A.Sc.T.

/pg
Enclosure

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WWTP SITE COMPARISON

Site 1 North Swan Lake Area (28)

A. GENERAL (8)

1. Usable Area: OKIB IR 4 has potential for 4 Ha; other sites will require purchase of 4 Ha at current ALR bare land costs
2. Topography: most parcels in this area are gently sloping southerly.
3. OCP/ALR: lands are zoned either ALR or Commercial/Industrial. WWTP would require municipal public utility zoning.
4. Ownership: site on OKIB IR#4 would need to be leased. Other sites are privately owned and would need to be purchased.
5. Sector Desirability: a WWTP site would require substantial screening and odour management in this area because of adjacent commercial and tourist land uses.

B. ECONOMIC (8)

1. Site Preparation/Utilities: Most sites in the area have access to water and power as well as natural gas and telecommunications. Site preparation is conventional.
2. Access: access would be required either off Hwy 97 or Hwy 97A. In either case, provision of a single access off a major provincial highway will require a traffic analysis.
3. Land Cost: ALR land appears to be in the \$5,000 to \$10,000/Ha range, while Industrial/Commercial land is in the \$1.0 million to \$1.5 million per Ha range.
4. Transmission to and from Site: the area is central to the anticipated service area, so transmission to the WWTP will be a reasonable distance. Transmission from the WWTP area to storage and irrigation sites will be significant (over 5 km).

C. ENVIRONMENTAL (7)

1. Soils: surficial soils are largely clay/silt mixtures with low permeability.
2. Groundwater: groundwater in the area is relatively deep and overlain by a confining clay layer
3. Habitat: the north end of Swan Lake includes several wetlands which provide habitat for migratory birds. An initial habitat screening is required
4. Risk Factors: risk factors include accidental spills and potential for Swan Lake contamination. Mitigating design feature will be required

D. PUBLIC IMPACT (6)

1. Winds/Odour: prevailing winds are north –south in winter and south –north in summer. There are residential areas in both directions.
2. Visibility: Sites are highly visible from HWY 97 and 97A – extensive visual screening is desirable
3. Proximity: reasonable distance to residential areas, but close to potential commercial.

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Site 2 – Thomas Hayes Site (26)

A. GENERAL (6)

1. Usable Area: a large part of this site is occupied by the City of Armstrong effluent storage facilities; another portion of this site includes a small creek valley. The City may require additional area for their wastewater treatment facilities. The availability of a 4-Ha site is uncertain.
2. Topography: the presence of a small creek valley will require offsets from the high water mark. The remainder of the site is gently sloping.
3. OCP/ALR; the site is zoned for public utility and is owned by the City of Armstrong. Adjacent land uses are largely industrial, with some agricultural uses.
4. Ownership: the site (1/4 Section) is reportedly owned by the City of Armstrong
5. Sector Desirability: Use of the site for a WWTP is compatible with adjacent land uses.

B. ECONOMIC (5)

1. Site Preparation/Utilities: the site will require earthworks for WWTP construction but not expected to be excessive. Utilities such as water and power are available.
2. Access: access to this site is through a local road and considered good.
3. Land cost: the land is already owned by the City of Armstrong so a partnering agreement would be the most likely approach.
4. Transmission To and From: transmission of raw sewage to this site for treatment will involve a relatively long forcemain. Pumping raw sewage over large distances requires special provisions to avoid sedimentation and high maintenance. Transmission of treated effluent from a facility at this site is very short if the City of Armstrong effluent storage pond is used.

C. ENVIRONMENTAL (7)

1. Soils: Soils are unknown but anticipated to be clay/silt based on the typical surficial deposits in the area
2. Groundwater: groundwater is at depth; it is a source of water supply for the Eagle Rock Water District.
3. Habitat: this site is not anticipated to be an environmentally sensitive area
4. Risk factors: the risk factors for potential spills include the creek which runs through the site.

D. PUBLIC IMPACT (8)

1. Winds/Odour: land uses in the general vicinity of this site are largely industrial, commercial and institutional. Odours, properly managed, are not expected to be a significant issue
2. Visibility: this site is reasonably well shielded from public visibility.
3. Proximity: there are no high density residential areas in close proximity to this site.

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Site 3: RDNO Park (18)

A. GENERAL (4)

1. Usable Area: the overall park site is over 50 Ha. However, allocating 4 Ha for a WWTP facility may encounter public resistance.
2. Topography: the site, while not excessively steep, will require sidehill construction methodology
3. OCP/ALR; the area will be designated public park, so an exclusion application will be required to allow a WWTP facility.
4. Ownership; the site is owned by RDNO
5. Sector Desirability: the site is not central and is adjacent to residential uses on both the east boundary and the north boundary. The west boundary abuts the OKIB reserve (IR#1).

B. ECONOMIC (4)

1. Site preparation/utilities: this site will involve sidehill construction so site preparation work may be significant. There are no known utilities such as water and power so extensions will be required.
2. Access: access is limited; a right-of-way through private property may be required
3. Land Cost: it is understood that the parcel has been acquired by RDNO. There is an opportunity cost associated with giving up park space for a WWTP facility.
4. Transmission To and From: raw sewage will need to be pumped from the valley bottom to approximately 120 m above the valley floor. This is an unusual but achievable pumping head for raw sewage. The forcemain from a central pump station location will need to run approximately 2 km. The site may have sufficient space for an effluent storage pond, in which case the transmission from the plant to the pond will be minimized. The pond will be at an elevation which can enable effluent distribution for irrigation without supplementary pumping.

C. ENVIRONMENTAL (6)

1. Soils: the soil types for this site are not known at this time
2. Groundwater: given the depth to water table at the valley bottom, it is anticipated that the water table will be relatively deep
3. Habitat: this site has been designated a regional park so it is expected that there may be important habitat for a variety of species
4. Risk Factors: the site does not present any significant risk factors for accidental spills if appropriate spill management procedures are in place

D. PUBLIC IMPACT (4)

1. Winds/Odour: north and south winds will carry odours to residential areas, so odour management features will be required
2. Visibility: the site's visibility from downslope areas is minimal. The upslope adjacent area is in the OKIB reserve and has not been developed at this time. However, visibility may become a factor if the adjacent OKIB area is opened for development
3. Proximity: the current residential areas lie to the north and to the east of the site. Residential development is low density. It would, however, be subject to pressure to increase density once community sewer service is in place.

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Date: January 24, 2018
File: 1203.0018.02
Subject: NOWRP - Site Assessment
Page: 7 of 7



Site 4: Swan Lake Corridor (23)

A. GENERAL (6)

1. Usable Area: No publicly-owned parcels have been identified, so a minimum 4 Ha parcel will need to be purchased
2. Topography: the land between the Swan Lake shoreline and Hwy 97 is all gently sloping towards the lake
3. OCP/ALR Status: Most of the land in this corridor is designated Commercial. There are pockets of ALR land existing
4. Ownership: all the land is privately owned
5. Sector desirability: the facility would be in a sector that is primarily industrial and commercial, so a WWTP facility would not have a significant impact on adjacent land uses

B. ECONOMIC (8)

1. Site preparation/utilities: land is gently sloping; common utilities such as water, power, natural gas and telecommunication are available
2. Access: access can be achieved from side roads connecting to Hwy 97 depending on where the site is selected
3. Land cost: most of the land is zoned industrial or commercial, so it is anticipated that land cost will be relatively high
4. Transmission To and From Site: this area is very central to any community collection system in the corridor, so transmission costs to the WWTP facility will be low. However, pumping to an effluent storage facility may require length forcemain.

C. ENVIRONMENTAL (5)

1. Soils: soils (surficial) are not known, but expected to be manageable
2. Groundwater: the groundwater table is expected to be shallow in this area
3. Habitat: it is anticipated that there are important habitat areas in the corridor
4. Risk Factors: if a site close to Swan Lake is selected, risk factors for spills of such items as raw sewage, sludge, and/or chemicals, the risk factors for Swan Lake will need mitigation.

D. PUBLIC IMPACT (4)

1. Wind/Odour: this area is somewhat densely developed so odour management will be critical
2. Visibility: sites in this area are highly visible from Hwy 97, so rigorous visual screening is required
3. Proximity: sites in this area would be close to commercial and retail sales as well as recreational residences and facilities.

APPENDIX 6

Agricultural Climate Adaption Strategic Framework

Agricultural Climate Adaptation Strategic Framework

The Township of Spallumcheen has begun the process of integrating asset management and climate change planning into organizational planning and its decision-making. One of the first steps of this process is to assess its asset management, service delivery and climate change capacity. Based on the outcomes of a recent assessment workshop using the Asset Smart 2.0 tool, the Township identified the need to develop a strategic framework (specifically related to the agricultural sector) for including climate adaptation into its long-term planning.

INTRODUCTION

A large part of the Township of Spallumcheen is located in the Agricultural Land Reserve (ALR). The Township has many different types of farming operations located within its borders and is the main economic engine of Spallumcheen.

Climate change is an important issue for Spallumcheen and its agricultural sector. One of the most serious impacts of climate change is the increase of extreme events – warm days and precipitation. Forecasts suggest that the North Okanagan will experience temperature increases by mid-century, relative to historical average, of between 2 to 4°C. It is anticipated that the number of heavy precipitation events will increase in frequency and magnitude and there will be a shift in the seasonal pattern of occurrence.

These changes will likely result in a longer growing season and changing soil conditions due to increased likelihood of floods and droughts. Increased temperatures could reduce the water supply and therefore drought can significantly impact soil moisture across one or more seasons causing significant stress to crops and livestock. Flooding from intense storms events can wash contaminants into surface water supplies, overtop drainage courses/dykes and overload farmland with floodwaters containing sediments and contaminants. All of which could significantly inhibit the production of the agricultural sector and impact the economy and the quality of life in the region negatively.

Incorporation of climate change into asset management, master plans and long-term community planning has so far been limited, with the vast majority of literature identifying problems and less so on solutions or adaptation measures. Based on this, the Township has utilized the PLAN2ADAPT tool from the Pacific Climate Impacts Consortium to help assess climate change in the region to specifically develop a framework to assist the Township (specifically related to the agricultural sector) in adapting to the changing climate. In doing so, this framework will provide the Township (and its neighbors) the information and confidence to make sound planning decisions (be proactive) in order to continue to have a robust agricultural sector today and long into the future.

PLAN2ADAPT

The Plan2adapt tool was created by the Pacific Climate Impacts Consortium (PCIC) using global climate models for BC and is designed to help inform in local and regional community planning. The tool uses six climate variables and illustrates the project changes across three-time periods (planning horizons). **Table 1** below shows projected changes in average (mean) temperature, precipitation and several derived climate variables from the baseline historical period (1961-1990) to the 2020's, 2050's and 2080's for the North Okanagan region derived from the Plan2Adapt Tool.

Table 1 – Plan2Adapt Summary of Climate Change

Summary of Climate Change for North Okanagan to 2099 (PLAN2ADAPT)*				
Climate Variable	Season	Projected Change (Ensemble Median) from 1961-1990 Baseline		
		2020's (2010 -2039)	2050's (2040 -2069)	2080's (2070 - 2099)
Mean Temperature (°C)	Annual	+1.0 °C	+1.9 °C	+2.8 °C
Precipitation (%)	Annual	+4%	+6%	+7%
	Summer	-5%	-10%	-11%
	Winter	+3%	+7%	+12%
Snowfall** (%)	Winter	-7%	-15%	-23%
	Spring	-32%	-57%	-76%
Growing Degree Days** (degree days)	Annual	+178 degree days	+359 degree days	+549 degree days
Heating Degree Days** (degree days)	Annual	-354 degree days	-658 degree days	-972 degree days
Frost-Free Days** (days)	Annual	+14 days	+24 days	+37 days


* The table above shows projected changes in average (mean) temperature, precipitation and several derived climate variables from the baseline historical period (1961-1990) to the 2080s for the North Okanagan region. The ensemble median is a mid-point value, chosen from a PCIC standard set of Global Climate Model (GCM) projections.

** These values are derived from temperature and precipitation.

The tool indicates that the North Okanagan region can expect warmer temperatures, more annual precipitation (in the form of rainfall) but less snowfall. As a result, there will be less moisture stored as snow in the winter/spring to recharge reservoirs and surface water bodies during the Spring freshet, thus significantly impacting the amount of irrigation water available for farmers. **Figure 1** below is an output of the plan2adapt tool which lists these potential impacts related to changes in hydrology.

Figure 1 – Plan2Adapt Potential Hydrology Impacts

 **Hydrology**


 **Increased runoff and potential flooding**

- Flooding may increase in frequency and magnitude where flooding is already an issue.
- Seasonal water quality may be reduced.
- Stream bank erosion may increase.

 **Earlier freshet and extended dry season**

Advance of freshet:

- Dry period may be longer.
- Water supply may be reduced.
- Storage reservoir demand may be increased.
- Water use restrictions may need to be tightened.

 **Possible increase in waterlogged soil**

- Water quality may be negatively affected by nutrient and input (fertilizer, agricultural chemical) runoff.
- Excess water will require coordination between regional ditch, drainage and diking system.
- Steep slopes may be destabilized by additional water load.
 - Assess local land use, steep slope soil composition, and slope hazards.
 - Consider additional local studies and geotechnical analysis.
 - Consider a risk assessment to understand liability (e.g. slope failure, falling trees) for local government.

As a result, there is a significant potential for a shortfall of water to support irrigation of farmland through the growing season which will negatively impact the economic productivity of Spallumcheen. **Figure 2** below is an output of the plan2adapt tool which lists the majority of the other potential impacts that may affect agriculture the North Okanagan region over the next 80 years.

Figure 2 – Plan2Adapt Potential Impacts

 **Agriculture**



Possible increase in waterlogged soil

- Excess water on farmland may need improved management. Regional infrastructure, ditch, and drainage coordination may be required to allow on-farm drainage to work.
- Planting schedules or techniques may need to be adjusted.
- Pollination success may be negatively affected.
- Harvesting may be delayed or interrupted. Consider changes to equipment or harvesting techniques.



Seasonal moisture availability decreases

- Soil moisture may decrease in one or more seasons.
 - Consider options for managing soil moisture and improvements in irrigation infrastructure.



Warmer and shorter cold season

- Potential growing and production seasons for certain commodities may be increased in length.
- Heating costs in the cold season may be reduced.



Projected increase in hot/dry summers

- Potential crop productivity may improve.
- Plant and livestock stress may increase, requiring management measures.



Possible increase in growing season

- Increased productivity may be possible.
- Production season may be longer.
- New crops and varieties may become viable.
- Potential range of southerly crops may expand, but also consider effects of possible increased spring rainfall.

There are also impacts to other sectors in the region such as fisheries, tourism and forestry and to the biodiversity, land-use and infrastructure of the area. These include a higher risk of wildfire, decline in lake productivity, species migration to higher elevations, undersized infrastructure and potential for recreational activities to be negatively impacted. Based on the outputs of the tool, it is apparent, that a changing climate has many potential impacts including several significant ones the agricultural sector and a set of strategies to assist Spallumcheen in adapting to these impacts is necessary.

ADAPTATION STRATEGIES FOR AGRICULTURE

These potential impacts from anticipated increased temperature and changes in precipitation need to be considered in a set of strategies to ensure the long-term sustainability of the agricultural sector in the North Okanagan. The development of a set of strategic initiatives (framework) began with a review of the projected changes in climate and the resulting impacts using the Plan 2 Adapt tool (described above). These impacts have been prioritized through staff workshops and discussions with the local agricultural sector. The primary concern raised was related to insufficient water and infrastructure for farmland irrigation. Therefore, the key strategic goal for Spallumcheen’s planning is ensuring a robust supply of irrigation water.

There are a host of other impacts and initiatives included in the strategic framework. A list of supporting actions to adapt and plan for improving the resiliency of the agricultural sector have been categorized into urgent, plan for and investigate further (see **table 2** below).

Table 2 – Strategic Framework

Strategic Initiative	Action	Priority	Funding Source	Timing
Improve water supply and irrigation systems	Investigate Effluent Storage and Re-use to support farmland irrigation as part of the North Okanagan Regional Wastewater Facility design	Urgent	Community Works Fund	2017/18
Drought Management Planning	Demand Management/Supply Augmentation: Update Water Supply Strategy to include priorities for different water uses, restrictions and optimizing of water sources and irrigation cycles	Urgent	IPGP	2018/19
Flash flood protection	Develop a flood plain mapping and risk scenario assessment using LiDAR mapping and the RAIT tools. Develop mitigation solutions to protect critical areas/infrastructure.	Plan for	NDMP	2018/19
Reduce GHG's	Research into new technology or practices to produce lower emission crops (i.e. organic, on-farm energy production, fuel switching), efficient management techniques for carbon/nitrogen – livestock manure management.	Plan for	TBD	2019
Upland wildfire protection planning	Prepare a plan for reducing hazardous fuel accumulations in the forest as well as in the watershed drainage basins	Plan for	UBCM	2020
Optimize agricultural operations	Create an agriculture master plan to support adaption measures such as less-intensive activities, altering irrigation patterns (different harvest times), perhaps incentives to introduce new crop varieties. Consider	Investigate	TBD	By 2024

	policy development and partnerships with the province to support these initiatives			
Soil, nutrient and crop management/enhancements	Develop Resilient soils management (conservation) plans, research into increasing diversification of crops in the region (drought tolerant)	Investigate	TBD	By 2024

CLOSING

Adapting the Township’s priorities and operations to meet climate change challenges requires careful consideration and long term planning. However, adaptation planning is not necessarily a new effort distinct from other local government practices. Since adaptation strategies often provide multiple benefits, the results of this project and adaptation planning can be integrated into existing efforts for emergency response planning, agricultural management plans, capital investment planning, irrigation water supply and demand planning, conservation practices, sustainability goals, and infrastructure maintenance.

This memorandum and strategic framework will help Spallumcheen adopt a flexible and iterative approach to consider what adaptation options to implement in response to climate change, and ensure that strategies are complementary to capacity building, emergency response activities, capital planning, and sustainability planning. The adaptive approach, will result in robust decision-making process that builds operations that are more resilient to the climate impacts faced by the Township, specifically its agricultural sector.

Preparing communities for climate change and ensuring infrastructure to support extreme events provide environmental benefits to upstream and downstream recipients is critical. A community that is minimally impacted by an extreme climate event will result in less impact to the environment and neighboring communities.

Regards,

Scott Shepherd, BA, AscT

Attachment A

Spallumcheen Agricultural Climate Change Adaptation Summary

Spallumcheen Agricultural Climate Change Adaptation Summary

Projections

Summary of Climate Change for North Okanagan to 2099 (PLAN2ADAPT)*				
Climate Variable	Season	Projected Change (Ensemble Median) from 1961-1990 Baseline		
		2020's (2010 -2039)	2050's (2040 - 2069)	2080's (2070 - 2099)
Mean Temperature (°C)	Annual	+1.0 °C	+1.9 °C	+2.8 °C
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** These values are derived from temperature and precipitation.

Adaptation Strategies for Agriculture

- Flash flood protection
- Drought Management Strategies
- Develop Water supply and irrigation systems
- Produce lower emission crops (i.e. organic)
- Resilient soils management plans
- Increase diversification of crops in the region (drought tolerant)
- Consider adopting policies to support adaption measures such as less-intensive activities, altering irrigation patterns (different harvest times), incentives to introduce new crop varieties
- Explore seasonal changes and sowing dates
- Research into new technologies
- Upland wildfire protection planning

How will it Impact Agriculture

-  **Possible increase in waterlogged soil**
 - Excess water on farmland may need improved management. Regional infrastructure, ditch, and drainage coordination may be required to allow on-farm drainage to work.
 - Planting schedules or techniques may need to be adjusted.
 - Pollination success may be negatively affected.
 - Harvesting may be delayed or interrupted. Consider changes to equipment or harvesting techniques.
-  **Seasonal moisture availability decreases**
 - Soil moisture may decrease in one or more seasons.
 - Consider options for managing soil moisture and improvements in irrigation infrastructure.
-  **Warmer and shorter cold season**
 - Potential growing and production seasons for certain commodities may be increased in length.
 - Heating costs in the cold season may be reduced.
-  **Projected increase in hot/dry summers**
 - Potential crop productivity may improve.
 - Plant and livestock stress may increase, requiring management measures.
-  **Possible increase in growing season**
 - Increased productivity may be possible.
 - Production season may be longer.
 - New crops and varieties may become viable.
 - Potential range of southerly crops may expand, but also consider effects of possible increased spring rainfall.

High Consequence Hydrology Impacts to Agriculture

- Increased runoff and potential flooding (increase frequency and magnitude)
- Reduced Seasonal Water
- Earlier freshet and extended dry season (water supply reduced)
- Storage reservoir demand may be increased



Developed using:



PLAN2ADAPT



APPENDIX 7

Greenhouse Gas (GHG) Estimates

MEMORANDUM

Date: August 29, 2018
To: North Okanagan Wastewater Recovery Project
From: Shiloh Johnson
File: 1203.0018.03
Subject: Greenhouse Gas (GHG) Estimate

CURRENT EMISSIONS

The current GHGs being emitted that are proposed to be removed are as follows:

The septic tank systems at the Swan Lake RV Resort, Swan Lake Nursery, and the Castle at Swan Lake are not functioning properly and raw sewage being pumped and hauled on a daily basis to the Vernon wastewater treatment facility. This service is a large expense for the local industries. The proposed added infrastructure will eliminate all trucking emissions from hauling to the Vernon facility. With recorded pump and haul volumes at 52,000 L/day and an average capacity for a hydro-vacuum truck at 15,000 L, an estimated 4 trips a day are made to dispose of this sewage. A 1-way trip is approximately 20 km. Considering this to be a gasoline heavy duty truck with estimated emissions at 0.63 kg CO_{2e} per km, there are approximately 18 tonnes of CO_{2e} emitted per year.

Many of the residents within the proposed service area are currently using septic systems to service their sewage needs. While operating correctly, the GHG emissions are estimated at 0.24 tonnes CO_{2e} per capita per year. With approximately 150 addresses using this method of sewage handling, it is estimated that current emissions are 36 tonnes CO_{2e} per year. There is a small, but additional trucking emission for pump and hauling the septage from these systems. This occurs once every 3 years and is based on a 50 km trip by a gasoline heavy duty truck with the same estimated emissions as stated above. Servicing these residents with sanitary sewer will eliminate these emissions.

Currently there is a considerable amount of GHG emissions from local farm animals (cattle, pigs, chicken, etc.). Within the Township of Spallumcheen, there are approximately 1,990 cattle (50/50 dairy and beef), 828,521 poultry, 515 pigs, 774 horses, 733 goats, and 1,060 sheep. Their manure left on the pasture accounts for approximately 3,159 tonnes of CO_{2e} per year of emissions. The proposed facility will have a receiving bay to collect the animal waste, process it, and haul it to a local composting facility. This new procedure will reduce some of the GHG emissions of the livestock manure, but it is not possible to forecast the volume until the number of participating farmers is determined. The intent is to make a receiving facility available for those that wish to use it.

ADDED EMISSIONS

Transporting the centrifuge cake from the proposed treatment facility to a local composting facility will be a direct emission in the proposed project. Considering this to be a rigid gasoline heavy duty truck with the same emissions per km as stated above, an approximate 4 km round trip estimated once per week yields 0.15 tonnes CO_{2e} per year.

There will be new emissions that will result from agricultural waste (manure) being hauled to the proposed treatment facility. These wastes are currently left on farms and pastures. A 1-way trip is 12 km on average.

MEMORANDUM

Date: August 29, 2018
 File: 1203.0018.03
 Subject: Greenhouse Gas (GHG) Estimate
 Page: 2 of 2



With an estimated one trip a week in a rigid gasoline heavy duty truck, an approximate 0.4 tonnes CO₂e per year of emissions is expected.

Additional emissions will result from the composting process. Once the proposed treatment facility has produced centrifuge cake, it will be transported to a local composting facility. This by-product cake of the treatment process (heavy in Nitrogen) is expected to release fewer GHGs in the aerobic composting process than if sent to a landfill. The result of this process is a 'Class A' compost material that can be sold as high-quality fertilizer for commercial or private use. The approximate composting area is 8000 m². For an average 75-day composting period (5 cycles per year), an estimated 642 tonnes of CO₂e per year is expected.

EMISSIONS SUMMARY TABLE:

Type	Current emissions to be removed (tonnes of CO ₂ e / year)	Added emissions (tonnes of CO ₂ e / year)
Pump & Haul septic from Swan Lake RV Resort to Vernon WWTP	18	
Haul centrifugal cake from proposed WWTP to compost		0.15
Septic System	36	
Haul centrifugal cake from proposed WWTP to compost		0.40
Livestock manure left on pasture	3,159	
Composting treated manure		642
Total	3,213	642
Net Reduction	2,570	

Sincerely,

URBAN SYSTEMS LTD.

Shiloh Johnson

/sj
 Enclosure

APPENDIX 8

Swan Lake Water Quality Executive Summaries

SWAN LAKE - LAND USE AND WATER QUALITY ASSESSMENT, VERNON, B.C.

Prepared for:

**Regional District of
North Okanagan
9848 Aberdeen Road
Coldstream B.C. V1B 2K9**



Prepared by:

**Western Water Associates Ltd.
#106 - 5145 26th Street
Vernon B.C. V1T 8G4**

July 2016

Project: 14-076-01

July 29, 2016

Laura Frank, MA, MCIP, RPP, Regional Planning Projects Manager
Regional District of North Okanagan
9848 Aberdeen Road
Coldstream, B.C.
V1B 2K9
Via e-mail: laura.frank@rdno.ca

Dear Ms. Frank:

Re: PRELIMINARY LAND USE AND WATER QUALITY ASSESSMENT OF SWAN LAKE, NORTH OF VERNON, B.C.

Western Water Associates Ltd. (WWAL) is pleased to provide this report on the Land Use and Water Quality Assessment of Swan Lake. The program aimed to help elucidate the potential sources of water quality impact on Swan Lake.

We undertook a water quality sampling program in the area surrounding Swan Lake. Further, we assessed land use as it relates to potential water quality impact on Swan Lake by apportioning the mass flux of chloride and nutrients entering the lake from the various land uses surrounding the lake.

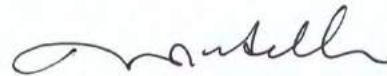
We trust that the professional opinions and advice presented in this document are sufficient for your current requirements. Should you have any questions, or if we can be of further assistance in this matter, please contact the undersigned.

WESTERN WATER ASSOCIATES LTD.

Reviewed by:



Bryer Manwell, M.Sc., P.Eng.
Hydrogeological Engineer



Douglas Geller, M.Sc., P.Geo.
Senior Hydrogeologist

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Appendix A Water Quality Results

Appendix B Laboratory Reports

Appendix C Excerpt from “Peer review of: Swan Lake Land Use and Water Quality Assessment (January 2016)” by Heather Larratt, 2016

EXECUTIVE SUMMARY

In 2015, WWAL conducted a land use and water quality assessment for the RDNO in the vicinity of Swan Lake. The assessment included a first order approximation of the Swan Lake water budget (balance), which found that over 90% of the water in Swan Lake is derived from BX Creek inflow, with the remainder comprised of overland flow from surrounding lands and a small component of groundwater discharge. Water quality, as it relates to land use surrounding Swan Lake, was assessed based on an initial water quality sampling program conducted in 2015 and through apportioning of chloride by land use around the lake.

When we compared the surface waters at and around Swan Lake to provincial and federal aquatic life guidelines, we see the quality of water in Swan Lake and at the outlet of Swan Lake (Vernon Creek) is good. With only fluoride exceeding the Canadian water quality guidelines for the protection of freshwater aquatic life (CCME AL) in Swan Lake and in Vernon Creek. At the inlet of Swan Lake, Greenhow Creek (FS-43(SW)), we see exceedances of the CCME AL for uranium, chloride, and fluoride. Further, at a culvert draining into the northeast end of Swan Lake nitrate (at 5.98 mg/l) exceeded the CCME AL 30-day average (chronic) guideline (3 mg/l). However, this CCME AL guideline is based on 5 weekly samples collected within a 30-day period; which our sampling program did not involve, further sampling will help substantiate if nitrate is chronically elevated at this culvert.

When we compared groundwater and near-surface groundwater at the perimeter of Swan Lake to B.C. Contaminated Site Regulation (CSR) upper cap concentrations we are able to provide a preliminary assessment of land uses that could potentially degrade water quality in Swan Lake.

Specifically, ammonia at high concentrations was observed at two locations on the southeast shore of Swan Lake and is likely related to disposal of on-site wastewater at the shoreline. Given the ongoing measured impact at FS-32, which we believe is related to wastewater disposal at the shoreline, collection of wastewater from campgrounds and RV Parks surrounding Swan Lake should be considered in the Master Wastewater Recovery Plan. Further, at foreshore waters on the east, north, and southwest shores of Swan Lake, sulphate concentrations were found to be elevated above CSR Standards. We interpret these elevated sulphate concentrations to potentially be related to agricultural amendment applications in the area. The operators of agricultural lands above Swan Lake should create and implement Land Application Plans, which aim to reduce the input of sulphate into Swan Lake.

Uranium was above the B.C. CSR for Irrigation Water and Drinking Water upper caps of 0.01 and 0.02 mg/l, respectively at all but one (FS-31) sampled foreshore locations around Swan Lake. We recognize that uranium is found naturally occurring in Okanagan Valley sediments. However, background groundwater quality in deeper groundwater, present at MW-3 in the current study, showed uranium to be low. There is potential for land use surrounding Swan Lake (specifically anthropogenic input of calcium and chloride) to change the solution chemistry of the near-surface groundwater, resulting in increased solubility of uranium. The results assessed were a snap-shot in time and further sampling should be performed to substantiate or refute the finding from the 2015 study.

Using chloride as an indicator of water quality impact and estimating chloride mass loading rates from the land uses surrounding Swan Lake, agricultural activities around the lake most likely form the largest contribution to potential water quality impact on Swan Lake.

PHASE 2: SWAN LAKE - LAND USE AND WATER QUALITY ASSESSMENT, VERNON, B.C.

Prepared for:

**Regional District of
North Okanagan
9848 Aberdeen Road
Coldstream B.C. V1B 2K9**



Prepared by:

**Western Water Associates Ltd.
#106 - 5145 26th Street
Vernon B.C. V1T 8G4**

October 2017

Project: 14-076-02

October 25, 2017

Laura Frank, MA, MCIP, RPP, Regional Planning Projects Manager
Regional District of North Okanagan
9848 Aberdeen Road
Coldstream, B.C.
V1B 2K9
Via e-mail: laura.frank@rdno.ca

Dear Ms. Frank:

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Western Water Associates Ltd. (WWAL) is pleased to provide this report on the Land Use and Water Quality Assessment of Swan Lake. The program aimed to help elucidate the potential sources of water quality impact on Swan Lake.

We undertook a water quality sampling program in the area surrounding Swan Lake. Further, we assessed land use as it relates to potential water quality impact on Swan Lake by apportioning the mass flux of chloride and nutrients entering the lake from the various land uses surrounding the lake.

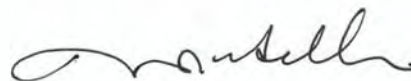
We trust that the professional opinions and advice presented in this document are sufficient for your current requirements. Should you have any questions, or if we can be of further assistance in this matter, please contact the undersigned.

WESTERN WATER ASSOCIATES LTD.

Reviewed by:



Bryer Manwell, M.Sc., P.Eng.
Hydrogeological Engineer



Douglas Geller, M.Sc., P.Geo.
Senior Hydrogeologist

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EXECUTIVE SUMMARY

In 2015 and 2016, WWAL conducted a land use and water quality assessment for the RDNO in and around Swan Lake. The purpose of the study was to assess impacts of the current land uses on groundwater and surface water quality in and around Swan Lake. Further, we provide recommendations related to changes in land use to help maintain or improve water quality in and around the lake.

Water quality, as it relates to land use surrounding Swan Lake, was assessed based on a water sampling program conducted in 2015 and 2016. Further, the assessment included a Swan Lake water budget (balance) approximation, which found that over 75% of the water in Swan Lake is derived from BX Creek inflow, with the remainder comprised of other smaller creeks and springs, overland flow from surrounding land, and a small component of groundwater discharge into the lake. Stream gauging of the in-flowing and out-flowing streams was conducted in 2016 to update and help constrain the surface water components of the water balance. Using chloride as an indicator of water quality impact and estimating chloride mass loading rates from the land uses surrounding Swan Lake, agricultural activities around the lake were found to be the largest contribution to potential water quality impact on Swan Lake. The study scope did not include identifying potential water quality influences on the tributary creeks including BX Creek.

When we compared surface water quality within and around Swan Lake to provincial and federal aquatic life guidelines, we see the quality of water in Swan Lake and at the outlet of Swan Lake (Vernon Creek or Lower BX Creek) is relatively good. With fluoride and ammonia exceeding the Canadian water quality guidelines for the protection of freshwater aquatic life (CCME AL) in Swan Lake and fluoride, along with several metals exceeding guidelines in Vernon Creek. At the creeks, and springs flowing into Swan Lake we see more apparent impact from surrounding land use; specifically, we see elevated metal concentrations and nutrient (nitrate) concentrations at several of the in-flowing tributaries and springs (SE Spring, NE Cowboys Creek, NE Culvert, and SW Spring) exceeded the CCME AL 30-day average (chronic) guideline (3 mg/l). This CCME AL guideline is based on 5 weekly samples collected within a 30-day period. Although our sampling program did not involve weekly sampling for 5 consecutive weeks, based on the consecutively elevated concentrations of nitrate at the SE Spring and at Site 3 (NE Cowboy Creek), both draining the hillside east of Swan Lake, we can infer that the nutrient levels at these locations are elevated above the CCME AL guideline over-time.

When we assess groundwater and near-surface groundwater around the perimeter of Swan Lake by comparing the results to provincial and federal drinking water, livestock watering and irrigation watering guidelines and viewing spatial and temporal trends we are able to provide an assessment of land uses that are likely degrading water quality in Swan Lake. At foreshore waters on the east, north, and southwest shores of Swan Lake, sulphate concentrations were found to be elevated above background concentrations and above federal and provincial water quality guidelines. We interpret the elevated sulphate concentrations to potentially be related to agricultural amendment applications in the area. The operators of agricultural lands above Swan Lake should create and implement Land Application Plans, which aim to reduce the input of sulphate into Swan Lake.

Further, ammonia at high concentrations was observed at two locations on the southeast shore of Swan Lake and is likely related to disposal of on-site wastewater at the shoreline. Given the ongoing measured input of nutrients in surface water and near-surface groundwater along the eastern shoreline of Swan Lake, which we believe is related to domestic wastewater disposal, a collection and treatment of

wastewater from the development along, at least the eastern and northeastern vicinity of Swan Lake. This proposed new infrastructure should be considered in the Master Wastewater Recovery Plan.

APPENDIX 9

Regional Employment Land Action Plan
Executive Summary



Employment Lands Report

URBAN
systems

Regional District of the North Okanagan
April 26, 2016

Abstract

Effective management and offering of employment lands can play an integral part of an open and effective economic system, and function as a major catalyst for community economic development. Yet, the benefits of employment lands do not accrue automatically and evenly across regions, sectors and communities. Macro-economic conditions, sectorial trends, regional and local policies, and relationships in the investment marketplace strongly affects an individual community's ability to attract and retain businesses. In order to realize the benefits of utilizing employment lands, individual communities need to focus their limited resources strategically and look for partnership synergies at the regional, provincial and national scale. The challenges communities are often faced with are unrealistic expectations of their economic development efforts in regards to economic metrics; such as increased tax base and increased employment. Primarily host communities need to establish a transparent, broad and effective enabling environment for investment, and to build the human and institutional capacities to implement them.

The following Plan looks at the current situation of the communities within the North Okanagan as they relate to actions that can be implemented within the next 5 years to increase the number of employment opportunities in the region.

Wayne Robert MBA APEC IBIZ
Henri Cullinan MTRP MSAPI (Pr.PIn)

Urban Systems Ltd. April 2016

Executive Summary

The strategic development of employment lands within a region can act as the catalyst to create significant economic growth and regional prosperity. Today, more than ever, it is essential that communities through inter-municipal cooperation and regional efforts undertake careful and comprehensive strategic regional planning along with committed and focused action to preserve and enhance economic circumstances and quality of life. The reality that faces communities across Canada is that local governments rely heavily on local taxes to fund their budgets. Therefore, they are more likely to see local economic development as a way of increasing their tax base to finance local services, assets, and amenities. In these instances local economic development is highly oriented towards attracting and expanding business with success measured in property tax development. This is often the root cause of strained relationships that are at best operating in silos and at worst aggressively competing and seeking win-lose approaches to business attraction and retention. The reality of this is that it is a very costly and competitive ethos pace and the individual communities do not have the capacities nor the land mix to be successful on their own. Therefore, the impetus for the development of this Employment Land Action Plan is to enhance the capacity of the communities with the North Okanagan, to prioritize and coordinate the development of employment lands to support new industrial, commercial and institutional growth in these communities. This Employment Land Action Plan (Plan) suggests that the individual communities within the North Okanagan must adopt a regional mindset to investment attraction – North Okanagan Investment Zone. With this precondition the Plan provides the framework to coordinate decision making on employment lands by local politicians, councils, and citizens.

In order to create a platform that would allow local governments to develop a coordinated plan and partnership approach for developing employment lands, Urban Systems, working closely with the Regional Growth Strategy Support Team (RGSST), have developed guiding principles, processes and protocols to adhere to. This framework was created to help drive forward the engagement in a fair, objective and transparent manner. These tools and protocols not only resulted in the prioritization of lands through

the development of investment corridors, and the process for identifying actions, but they have also established a foundation for greater cooperation and collaboration to guide implementation efforts.

Further, to support this effort, a geo-spatial analysis of the employment lands in the North Okanagan was conducted to determine if any patterns would emerge with regards to potential employment land nodes. This technical analysis provided a broad overview of the distribution and typology of the approximately 260 ha employment lands identified in the Region; this was then used to develop action items. Key findings from this analysis included:

- 84% of the current employment lands inventory falls within the core of the region - Vernon, Coldstream, Spallumcheen, and Armstrong;
- 81% of the parcels are less than a hectare in size, and only 7% of the current land supply is greater than 5 hectares;
- only 8% of the employment lands identified are currently serviced; and,
- the majority (86%) of employment lands identified are located within 1 km of a major highway.

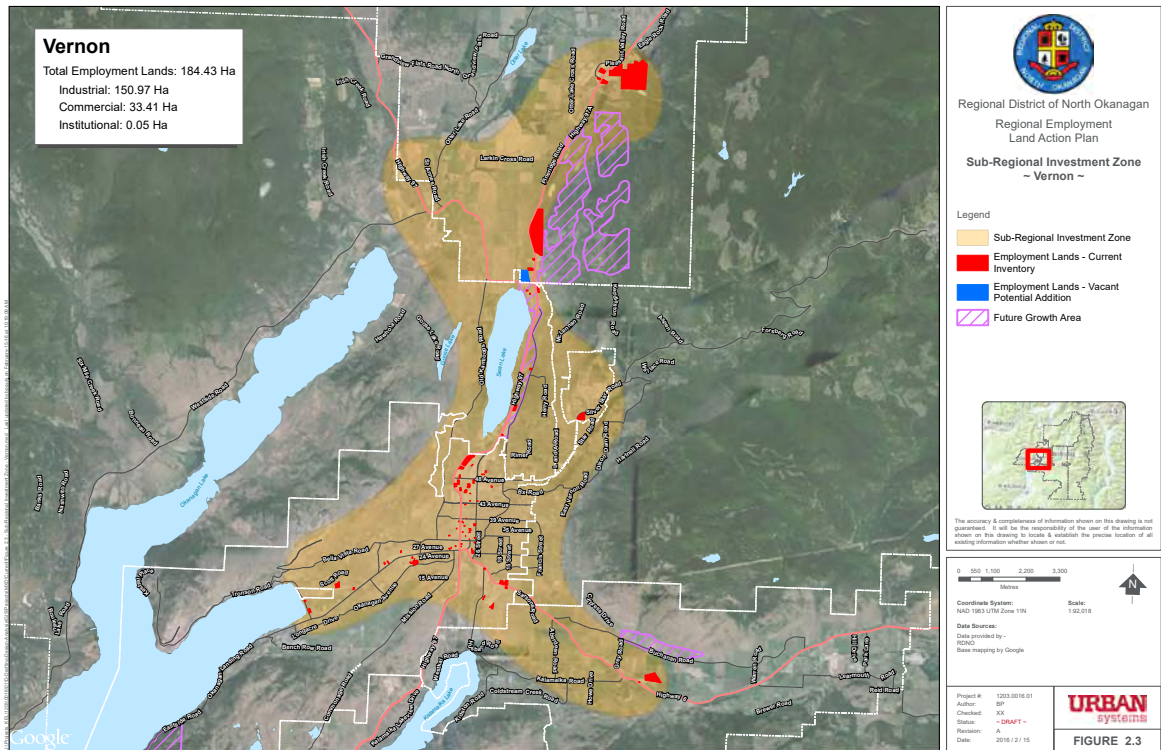
A primary outcome of this analysis was the establishment of a Regional Investment Corridor concept to make effective use of the economic geography of the Region, and to support regional economic integration and growth. The goal of the Regional Investment Corridor concept is to promote regional employment land growth by focusing on transportation connections; in this case Highways 6 and 97. In order to prioritize parcels of land that will yield the most benefit in terms of employment lands development, the Regional Investment Corridor was further broken into four (4) Investment Zones. Investment zones were defined by having sufficient infrastructure, traffic patterns, visibility, market (investor) attractiveness.

Based on the partnership principles, geo-spatial analysis, and the Regional Investment Corridor and Investment Zones identified, an action plan was developed to better prepare the region to capitalize on existing and evolving demands over the next 5 years.

Priority Investment Zone – Vernon, Coldstream, Spallumcheen, Okanagan Indian Band, & Electoral Areas B and C

This Investment Zone forms the core of the Regional Corridor stretched to cover a significant urban setting that runs north-south along Highway 97 and east along Highway 6. This integrated peripheral rural setting also includes part the OKIB and Electoral Areas B and C. This corridor is anchored by the City of Vernon, which acts as the investment hub supported by land development opportunities along the Highway road network; this supports the functionality of the Investment Zone. This zone is characterized as an urban setting with a diversity of employment lands, which also vary in parcel size, land use designation and accessibility to key infrastructure. Furthermore, this zone is subject to development pressures attempting to capitalize on its spatial equity/concentration of activities; this strengthens access to economic opportunities. Fulfilling the vision of this zone will require greater coordination of both public and private investment that results in a higher accessibility to goods and services for communities, while ensuring more economic service delivery. The zone possesses many key success factors, including: a clear intent and objective of regional economic growth; strong leadership and collaboration with a shared development vision; a high level of accessibility; sound planning directives; highly applicable densities and thresholds, with accurate land data; and, strong information management. One of the critical success factors is the availability of infrastructure services and budget alignments.

Map 4.2.4 - Priority Investment Zone – Vernon, Coldstream, Spallumcheen, Okanagan Indian Band, and Electoral Areas B and C:



The map above depicts the distribution of employment lands throughout the Investment Zone. The bulk of the industrial employment lands are to the north along Hwy 97 corridor with a good balanced land use mix in and around the City of Vernon. It is evident that the commercial lands are concentrated within the urban context of Vernon. Institutional lands are limited to this investment zone and forms a small part of the employment lands. Refer to Table 4.1.1 for more detail.

Investment Zone Priorities

Through the in-depth economic development and lands conversations it became evident that there are many localized challenges and opportunities within the respective communities which complement the regional employment lands objectives. Contribution towards employment lands for each of the communities varies due to local context, functional role and character as well as its geographic location within the region.

The following key contributions are noted.

- District of Coldstream – Mixed Use Agriculture with support industries as well as Industrial Estate Development
- Spallumcheen – heavy and light Industrial Mixed Use,
- Okanagan First Nation Indian Band – Mixed industrial and Commercial Use

- City of Vernon – Industrial, commercial and Institutional
- Area B – Swan Lake Corridor has existing potential for service commercial use
- RDNO Areas B and C - Largely the generation of employment would be accomplished through mixed use agriculture and industrial (Agri-processing)

Investment Zones Key Initiatives

The following critical actions for this zone are:

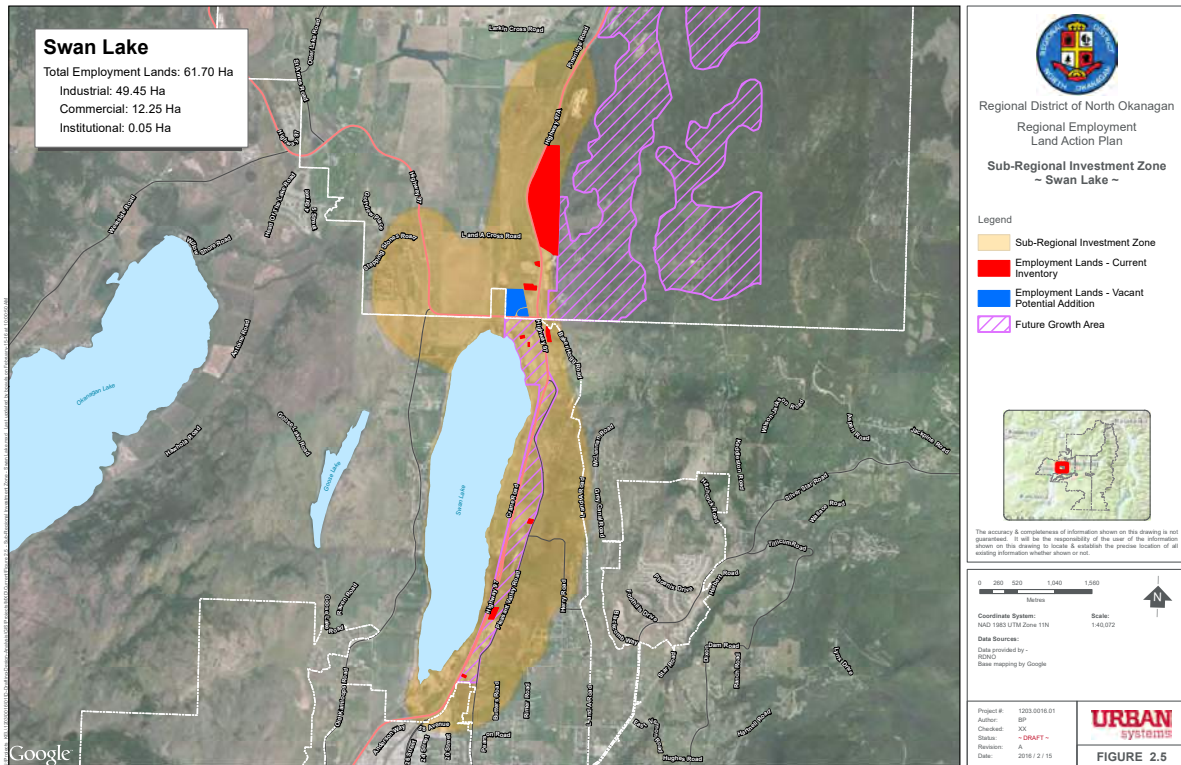
- Expand infrastructure servicing specific to water and sewer;
- Remediate sites which have environmental impediments;
- Draft Community Land Use Plan for OKIB and Land Use designation confirmation– in process
- Local Area Plan Swan Lake Commercial Corridor.
- Develop Partnerships and Shared Service Agreements for shared investment and revenue sharing for infrastructure;
- Focus efforts to support in-fill and redevelopment of under-developed and under-utilized employment lands; and
- Utilize sustainable growth principles while accessing to additional land – boundary expansion.

Sub-regional Priority Investment Zone - Swan Lake (Vernon, Spallumcheen, Okanagan Indian Band, and Electoral Areas B and C)

This sub-regional investment zone is highlighted as a pressure point due to on-going development initiatives and the need to provide supportive infrastructure. The sub-zone should not be seen in isolation, but as part of the sum total of the overall Regional Investment Corridor. Consultation with affected stakeholders and other interested parties confirmed the need

to collaborate and create a discussion platform to align and integrate initiatives. One of the critical issues highlighted by all parties was the lack of infrastructure services, but more specifically sewage disposal.

Map 4.2.5 - Sub-regional Priority Investment Zone – Swan Lake (Vernon, Spallumcheen, Okanagan Indian Band, and Electoral Areas B and C)



Subsequently, a Waste Water Recovery Partnership MOU was concluded in May 2015 as a first step toward regional collaboration with mutual interest towards preserving Swan Lake and the wetlands surrounding the lake and to improve the opportunity for economic development. The partnership consists of the Okanagan Indian Band (OKIB), the Regional District of North Okanagan and the Township of Spallumcheen. The partnership acknowledges the need for information exchange, need to align current initiatives and activities, and formulate an Action Plan to address the infrastructure challenges in a coordinated manner. The underpinning principles of the partnership is guided by:

- Waste water is considered a water resource;
- Working together will achieve better results
- Sharing resources and expertise improves the feasibility of the initiative
- Respect for individual partners mandates and decision-making processes

- Open and transparent dissemination and communication amongst parties and to the public.

The following key contributions are noted.

- Spallumcheen – heavy and light Industrial Mixed Use,
- Okanagan First Nation Indian Band – Mixed industrial and Commercial Use
- City of Vernon – Industrial, commercial and Institutional
- RDNO Areas B and C - Largely the generation of employment would be accomplished through mixed use agriculture and industrial (Agri-processing)

Investment Zones Key Initiatives

The following critical actions for this zone are:

- Expand infrastructure servicing specific to water and sewer;
- Remediate sites which have environmental impediments;
- Draft Community Land Use Plan for OKIB and Land Use designation confirmation – in process
- Develop Partnerships and Shared Service Agreements for shared investment and revenue sharing for infrastructure;
- Focus efforts to support in-fill and redevelopment of under-developed and under-utilized employment lands;
- Design and provide side road networks to the land that will ensure safe and effective movement amongst the investment zone while capitalizing on the highway access; and
- Utilize sustainable growth principles while accessing to additional land – boundary expansion.

Note: The Sub-Investment Zone referred to as Swan Lake do not include those employment lands as shared by the Draft Land use Plan of OKIB. Two land parcels recorded and which were identified by the said Land Use Plan are designated as mixed commercial and encourages a broad range of complementary commercial uses. The map below depicts the land par-

Map 4.2.6 - OKIB Land Use Plan mixed use parcels



APPENDIX 10

Project Engagement Materials



North Okanagan Wastewater Recovery Project

Project Launch Communications & Engagement Plan

April 10, 2018

The North Okanagan Wastewater Recovery Project is a multi-year undertaking requiring specific communications and engagement strategies and actions for each stage: Launch, Design, Construction, Implementation. This document outlines the proposed communications and engagement activities for the official launch of the project. Before work commences, this plan may be refined to reflect feedback from the partnership team and senior local government staff.

1. PROJECT UNDERSTANDING

The Swan Lake Corridor lies mainly along the east and north shores of Swan Lake and is bisected by Highway 97. It includes Regional District of North Okanagan (RDNO) Electoral Areas B and C, the Township of Spallumcheen's south industrial/commercial area, and portions of Okanagan Indian Band IR 4 on the north shore of Swan Lake.

Historically, septic systems have been used to treat residential and commercial/industrial wastewater within the corridor. Research has shown that many of these systems are now leaching contaminants into Swan Lake, thereby impacting surface and groundwater quality, bird habitat, and recreational use of the corridor.

Additionally, economic development in all three jurisdictions is compromised by the corridor's lack of sewer. Ideal for commercial and light industrial uses, the corridor requires a wastewater treatment facility and reclaimed water storage sites that enable sewer connections to optimize business growth and the jobs it brings. Wastewater recovery and reuse would also benefit agriculture in the area, as growers are constantly looking for new sources of irrigation water during the hot summer months.

In 2015, the three jurisdictions formalized an agreement to address these challenges and opportunities through a collaborative and cost-sharing Memorandum of Understanding (MOU), which outlines the following objectives and guiding principles. Also shown below are technical, governance, and funding activities to date.

OBJECTIVES

- Preserve Swan Lake and surrounding wetlands, and
- Improve opportunities for economic development.

GUIDING PRINCIPLES

- Wastewater is a resource.
- Collaboration, and the sharing of human and financial resources, achieves better results.
- Respect for each partner's mandates and decision-making processes strengthens the partnership.
- Open and transparent communication among the parties and with the public optimizes project support and success.

TECHNICAL CONSIDERATIONS

To date, partners have collaborated to identify and assess:

- Existing environmental conditions (i.e., water quality analyses conducted in 2015, 2016 and 2017 confirmed that leachates from septic systems are impacting lake health);

- Existing and potential commercial and industrial uses in the plan area (i.e., 2016 RDNO Employment Lands Report);
- Wastewater treatment, reuse and disposal strategies and options (i.e., 2016 Phase 1 Feasibility Study);
- Concurrent processes (i.e., 2018 Swan Lake Local Area Plan and 2017 work program for natural capital assets planning with approved funding of \$120,000 under the SPF Capacity Building Stream)

GOVERNANCE & FUNDING

- Each partnership meeting has involved elected officials from each jurisdiction and technical staff and/or consultants as needed.
- Financial commitments were shared for Phase 1 scoping and Phase 2 technical analyses.
- RDNO received \$10,000 Infrastructure Planning Grant from Province of BC in 2017 for a Phase 2 update. The Phase 2 application to the Clean Water and Wastewater Fund is due June 1st, 2018.
- Due to staff capacity issues, OKIB has stepped back from day-to-day project planning, but will be involved in key decisions as the project unfolds. The band will also be involved in the natural capital asset planning process.

2. PROJECT LAUNCH COMMUNICATIONS & ENGAGEMENT CAMPAIGN

CAMPAIGN TIMELINE

- March 26-June 1, 2018

CAMPAIGN OBJECTIVES

Project partners are committed to building community awareness about, participation in, and support for the North Okanagan Wastewater Recovery Project. To that end, RDNO and Spallumcheen seek to inform and engage residents and businesses about:

- Swan Lake Corridor environmental and economic development challenges and opportunities;
- Partnership parameters and past achievements;
- Wastewater treatment and reuse options;
- Project costs, phases and timelines; and
- Opportunities for residents/businesses to provide input.

CAMPAIGN AUDIENCES

The campaign is designed to meet the communication needs of internal and external stakeholders.

Internal stakeholders include RDNO, Spallumcheen, and OKIB elected officials and staff and technical consultants. The objectives of internal communications are to:

- Inform internal stakeholders of project processes, meeting dates and times, and contact people and information;
- Respond to internal stakeholders' requests for information clearly and consistently;
- Enable elected representatives and key staff to respond to comments, concerns and questions by presenting an informed, clear, and consistent message; and
- Identify project media spokespersons and provide orientation.

External stakeholders include relevant government agencies, project area residents and businesses, OKIB resident band members and leaseholders, the City of Vernon, and the media. The objectives of communications and engagement with external stakeholders are to:

- Provide clear, relevant, and timely information that will enable and encourage informed input and support;
- Enable and promote a forum for participation of area residents and businesses (e.g., advisory committee);
- Respond promptly to requests for information; and
- Conduct open, honest, and proactive communications and address misinformation promptly.

STAGE 1 LAUNCH CAMPAIGN APPROACH

The overarching launch campaign strategy (or approach) is to inform area residents and businesses about the project while providing ongoing opportunities for meaningful and productive community input through a Wastewater Recovery Project Advisory Committee.

Given that the project has potential localized impacts (e.g., potential for concern about plant location, odour, disruptions during construction, cost), an Advisory Committee should be struck to help solicit input and feedback from project area residents and businesses, OKIB residents band members and leaseholders, and other government agencies in an inclusive and consultative process throughout the entire project lifespan. Adding community committee members would also bring two other benefits: 1) new and different insights and ideas; and 2) the ability to connect with the community, therefore building awareness about and support for the project. This approach also fosters broader outreach and transparency and helps minimize negative input from uninformed parties.

Subsequent project phases will provide additional opportunities for community input once potential design features have been identified and assessed, and recommendations made.

Recommended communications/engagement activities during the launch campaign include:

PHASE 1: PREPARATION

- Develop communications plan and project brand, protocols, key messages, and FAQs
- Identify communications contacts and relevant protocols and tools for RDNO, Spallumcheen, and OKIB
- Gather contact information for key stakeholders (e.g., residents and businesses within corridor)
- Identify potential project risks and opportunities and develop related issues management strategies
- Initiate Advisory Committee (terms of reference, promotion, recruitment, orientation)

PHASE 2: CONSULTATION

- Announce project (e.g., visit local businesses, mailout to all affected residents, possible open house)
- Prepare for and host Advisory Committee meetings
- Create post-meeting updates for circulation to key stakeholders and the media
- Prepare for and host open house for business community and public at large
- Monitor and manage issues

PHASE 3: ELECTORAL ASSENT (TBD)

- Develop appropriate communications tools/materials for AAP, if needed
- Develop appropriate communications tools/materials for referendum, if needed

3. PROJECT LAUNCH COMMUNICATIONS & ENGAGEMENT PLAN & SCHEDULE

The following is a high-level overview of tasks and time proposed for Phases 1 and 2. Please note this is subject to change. Only hours used will be invoiced.

PHASE 1: PREPARATION

STRATEGIES	ACTIONS (JdV/JE)	PARTNER ACTIONS	TIMELINES
DEVELOP PROJECT LAUNCH COMMUNICATION/ ENGAGEMENT PLAN & BUDGET <i>(To guide all communications and engagement activities and materials)</i>	<ul style="list-style-type: none"> ▪ Review background information ▪ Consult with project partners regarding goals and objectives ▪ Confirm communications protocols and approval processes ▪ Prepare and circulate draft communication/engagement plan for partner review ▪ Refine plan to reflect partner input ▪ Prepare and circulate launch budget ▪ Revise budget to reflect partner input ▪ Identify list of key external contacts (residents, Businesses, etc.) 	<ul style="list-style-type: none"> ▪ Provide input, review, approve 	Mar 12-Apr 15
DEVELOP PROJECT BRAND <i>(To be used in all project materials to increase project awareness and ensure a professional and consistent identity)</i>	<ul style="list-style-type: none"> ▪ Prepare and circulate sample graphics and text ▪ Refine preferred graphic and text for use in colour and B/W applications ▪ Circulate approved brand materials to partners with directions for use 	<ul style="list-style-type: none"> ▪ Provide input, review, approve 	Apr 9-20
EXPLORE POTENTIAL COMMUNICATION/ ENGAGEMENT RISKS & OPPORTUNITIES <i>(To identify opportunities, and anticipate and prevent project misconceptions and roadblocks)</i>	<ul style="list-style-type: none"> ▪ Meet with partners to confirm specific project objectives, and potential opportunities and challenges for communication and engagement based on public perception and input to date ▪ Create issues and opportunities matrix to address potential risks and opportunities ▪ Refine matrix to reflect client input 	<ul style="list-style-type: none"> ▪ Provide input, review, approve 	Apr 11-20

<p>DEVELOP FAQs & KEY MESSAGES FOR INTERNAL & EXTERNAL USE</p> <p><i>(To ensure clear, concise and consistent messaging through the project launch campaign)</i></p>	<ul style="list-style-type: none"> ▪ Prepare and circulate internal FAQs to guide the creation of external key messages for project launch materials (e.g., news releases, newsletters, web copy, ads, posters) ▪ Include information about project history, rationale, benefits, design, construction, timelines, cost, etc.) ▪ Refine to reflect partner input ▪ Circulate approved key messages to partners with directions for use ▪ Use approved key messages to develop FAQs for use on partner websites ▪ Update key messages and FAQs as needed 	<ul style="list-style-type: none"> ▪ Provide input, review, approve 	<p>Apr 16-27</p>
<p>CREATE DEDICATED WEB PAGES & SOCIAL MEDIA</p> <p><i>(To ensure prominent and consistent project information easily accessible by area residents and businesses)</i></p>	<ul style="list-style-type: none"> ▪ Work with staff in each jurisdiction to create webpage with approved key messages and FAQs ▪ Provide partners with text and graphics and appropriate links to news release, FAQs, etc. ▪ Establish a project email and encourage people to sign up for email updates 	<ul style="list-style-type: none"> ▪ Prepare and introduce web page ▪ Upload social media posts as provided by JdV 	<p>Apr 23-27</p>

PHASE 2: CONSULTATION

<p>CREATE ADVISORY COMMITTEE</p> <p><i>(To foster community input in project development. To prevent potentially contentious decisions (e.g., location, odour, cost, disruption during construction). To ensure open and transparent communication throughout.)</i></p>	<ul style="list-style-type: none"> ▪ Finalize committee structure with partners (e.g., existing members plus 3-5 community representatives) ▪ Design a process and materials (e.g., Terms of Reference, newspaper ad, web copy, social media posts) to invite community input on the committee ▪ Provide partners with text and graphics and links regarding committee Terms of Reference and Application Form ▪ Work with partners to create a selection committee and application screening guidelines 	<ul style="list-style-type: none"> ▪ Provide input on committee structure; approve ▪ Provide input on process and materials; approve ▪ Promote committee participation on partner websites and in local media ▪ Screen applicants 	<p>Apr 23-May 25</p>
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<p>HOST INTRODUCTORY ADVISORY COMMITTEE MEETING</p> <p><i>(To set the stage for a meaningful and productive process)</i></p>	<ul style="list-style-type: none"> ▪ Work with partners to create materials for introductory advisory committee meeting (e.g., agenda, presentations, minutes) ▪ Attend meeting ▪ Document meeting outcomes ▪ Use outcomes to create introductory <i>Project Update</i> (see below) 	<ul style="list-style-type: none"> ▪ Host introductory advisory committee meeting 	<p>May 28- Jun 1</p>
<p>DEVELOP & DISTRIBUTE LAUNCH MATERIALS</p> <p><i>(To inform area residents and businesses about the project and invite participation in the Advisory Committee)</i></p>	<ul style="list-style-type: none"> ▪ Work with partners to identify potential opportunities for advertising and public service announcements ▪ Prepare ad/PSA materials as needed (e.g., RDNO insert for Morning Star) ▪ Prepare news releases for local media and web pages ▪ Work with partners to draft letter for corridor businesses (i.e., to inform them about the process and invite participation on the advisory committee) ▪ Follow letter up with phone call and/or visit to primary business contacts ▪ Inform Swan Lake/BMX Community Association about the project and invite participation on the advisory committee ▪ Create posters for distribution throughout the project area ▪ Optional: Host open house in project area ▪ Optional: Host business gathering at one place of business to ensure collective understanding and buy-in) 	<ul style="list-style-type: none"> ▪ Provide input, review, approve 	<p>By May 21</p>
<p>INTRODUCE PROJECT UPDATE</p>	<ul style="list-style-type: none"> ▪ Work with partners to create a template for <i>Project Updates</i> that would be created and widely circulated following each advisory committee meeting ▪ Create first edition of <i>Project Update</i> following introductory advisory committee meeting 	<ul style="list-style-type: none"> ▪ Provide input, review, approve 	<p>Before and after first advisory committee meeting</p>
<p>OPTIMIZE OPPORTUNITIES FOR ALIGNMENT WITH SWAN LAKE LOCAL AREA PLANNING PROCESS</p>	<ul style="list-style-type: none"> ▪ Work with RDNO planning staff to identify opportunities for collaboration (e.g., open house) ▪ Provide input and materials as appropriate 	<ul style="list-style-type: none"> ▪ Provide input, review, approach 	<p>April 16th Open House</p>

**ATTEND PROJECT &
PROJECT
MANAGEMENT
MEETINGS/PREPARE
& RESPOND TO
EMAILS**

- Attend Technical Team and Communications/Engagement Team meetings
- Document and circulate communication/engagement strategies and actions

5 meetings

PHASE 3: ELECTORAL ASSENT (TBD)

Prepared by:

Joanne de Vries, Alliance Communications

Jan Enns, Jan Enns Communications



Wastewater Recovery Community Working Group

TERMS OF REFERENCE

and BACKGROUND INFORMATION

*Prepared for: Regional District of North Okanagan /
Township of Spallumcheen / Okanagan Indian Band*

SEPTEMBER 2018



INTRODUCTION

In 2015, the Regional District of North Okanagan (RDNO), Township of Spallumcheen (ToS), and Okanagan Indian Band (OKIB) struck a partnership to address environmental challenges and enhance economic opportunities within the Swan Lake Corridor (SLC), the ToS south-east industrial area, and OKIB IR4. Led by a Partnership Committee that includes elected officials and senior staff from all three jurisdictions, the resulting initiative is the North Okanagan Wastewater Recovery Project.



WASTEWATER RECOVERY COMMUNITY WORKING GROUP

The partnership is committed to wastewater recovery and reuse to protect environmental assets, support area agriculture, enable and encourage economic growth, and enhance recreational use.

To ensure community insights and ideas are reflected in project design, construction, and start-up, the partnership is establishing a Wastewater Recovery Community Working Group consisting of 13-15 members.

The Working Group's role is to work with the partners and other key stakeholders to build awareness, and to ensure project outcomes reflect community wants and needs.

These Terms of Reference outline the role, expectations and required commitment of Working Group members during the launch, design, construction and start-up of the North Okanagan Wastewater Recovery Project.

PURPOSE

The Working Group will:

- Working with the partnership committee to build awareness of the need for providing wastewater recovery, treatment, and reuse;
- Provide a community perspective on the project development and implementation; and,
- Identify and assess options for meeting partnership objectives.

TASKS

Individual Working Group members are expected to:

- Attend meetings as required;
- Review materials and provide feedback to the Working Group;
- Act as liaison to area residents, businesses, and larger stakeholder groups; and,
- Assist in various public meetings and open house events.

MEETINGS

- It is anticipated the Working Group will hold two meetings per month in the early stages of the project.
- Working Group meetings will be facilitated by RDNO staff and/or project consultants.
- Discussion will be recorded as 'meeting notes'.
- Decisions regarding recommendations to the partnership committee will be made by a majority vote.

RESOURCES

Staff, technical experts, and project consultants will support the Working Group through a variety of functions, such as conducting research, arranging meetings, developing and distributing meeting agendas and materials, and preparing meeting notes.

APPLICATION and SELECTION PROCESS

The partners wish to establish a Working Group that includes residents and business owners from throughout the project area, and individuals representing technical and non-technical interests.

Applicants must meet the following criteria:

- Willingness and ability to commit the necessary time;
- Willingness to assist with public information and engagement activities;
- Ability and desire to work respectfully toward consensus with people holding different views; and
- Willingness to recognize and respect the Working Group process.

Participation on the Working Group is voluntary, with no remuneration provided.

CONFLICT of INTEREST

Working Group members are tasked with making recommendations for the good of the whole community and therefore cannot be seen to be influenced by personal interests such as financial gain, special consideration or advantage, or obligation to others. Potential conflicts must be declared and Working Group members must not participate in discussion topics involving a conflict.

BACKGROUND INFORMATION

Historically, septic systems have been used to treat residential and commercial/industrial wastewater within the Swan Lake corridor, ToS south-east industrial area, and OKIB IR4. Water quality assessments have shown that many of these systems are now leaching contaminants into Swan Lake, thereby impacting surface and groundwater quality, bird habitat, and recreational use of the corridor.

Additionally, economic development in all three jurisdictions is compromised by the corridor's lack of community sewer. Ideal for commercial and light industrial uses, the corridor requires a wastewater recovery system to enhance business growth and the jobs it brings. Wastewater recovery and reuse would also benefit agriculture in the area, as growers are constantly looking for new sources of irrigation water during the hot summer months.

The partnership Memorandum of Understanding (MOU) signed by the three jurisdictions in 2015 outlines the following project objectives and guiding principles.

OBJECTIVES

- Preserve Swan Lake and surrounding wetlands; and
- Improve opportunities for economic development.

GUIDING PRINCIPLES

- Wastewater is a resource.
- Collaboration, and the sharing of human and financial resources, achieves better results.

- Respect for each partner's mandates and decision-making processes strengthens the partnership.
- Open and transparent communication among the parties and with the public optimizes project support and success.

An updated and more detailed and action-focused MOU, signed by all partners in 2018, outlines factors such as administrative functions, ownership of sewer works, decision-making authority, operations and systems management, allocation of plant capacity, capital costs recovery, and wastewater recovery regulations.

GOVERNANCE

Having the three jurisdictions working together on this project:

- *Increases leverage when applying for provincial and/or federal funding;*
- *Facilitates the development of consistent and integrated plans, policies, and programs;*
- *Ensures an integrated approach to public outreach and engagement; and*
- *Sets the stage for future collaborations.*

TECHNICAL CONSIDERATIONS

To date, partners have worked together to:

- Assess existing environmental conditions (i.e., water quality analyses conducted in 2015, 2016 and 2017 confirmed that leaching from septic systems is impacting lake health);
- Identify existing and potential commercial and industrial uses in the plan area (i.e., *2016 RDNO Employment Lands Report*); and
- Identify wastewater treatment, reuse and disposal strategies, options, and costs (i.e., *2016 Phase 1 Feasibility Study* and *2018 Phase 2 Feasibility Study*).

Research outcomes, in all cases, support construction of a wastewater recovery plant and associated water storage facilities to address environmental challenges, enhance economic growth, and provide much-needed irrigation water to area farmers.

CONCURRENT PROCESSES

- Swan Lake Commercial Area and Neighbourhood Plan; and
- Natural Capital Assets Planning, with approved federal funding of \$120,000 under the Strategic Priorities Fund Capacity Building Stream.

FUNDING

- An application for \$24.3 million of the \$36.9 million total project cost has been submitted to the *Investing in Canada Infrastructure Program*. If grant funding is approved, the additional amount will be funded from the Okanagan Basin Water Board Sewerage Facilities Assistance Grant (\$5.9 million), Spallumcheen reserves (\$1.5 million), and RDNO borrowing (\$5.2 million).

FEASIBILITY STUDIES

- Undertaken in 2015/16, the Phase 1 Feasibility Study prepared by Urban Systems explored options for providing wastewater treatment and supported development of wastewater recovery and reuse in principle.
- A Phase 2 Feasibility Study is underway to refine technical aspects of the project and examine funding options and governance structures.

COMMUNITY OUTREACH and ENGAGEMENT

The North Okanagan Wastewater Recovery Project is a multi-year undertaking requiring specific outreach and engagement strategies and actions for each stage: Launch, Design, Construction, and Implementation.

Partners are committed to building community awareness and support for the project and have established a Wastewater Recovery Community Working Group to ensure project outcomes reflect community wants and needs.

Given that the project has potential local impacts (e.g. concern about odour, disruptions during construction, cost), the Working Group will help solicit input and feedback from project area residents and businesses and other government agencies in an inclusive and consultative process.

For more information:

Leah Mellott / Regional District of North Okanagan / leah.mellott@rdno.ca

Doug Allin / Township of Spallumcheen / cao@spallumcheentwp.bc.ca

Victor Rumbolt / Okanagan Indian Band / ed@okanagan.org

June 19, 2018

Next steps are to complete Feasibility Study and secure funds

The Regional District of North Okanagan (RDNO), Township of Spallumcheen, and Okanagan Indian Band (OKIB) continue work on the North Okanagan Wastewater Recovery Project. Next steps are to:

- Complete Phase II of the Feasibility Study; and
- Submit grant applications for funding from federal and provincial governments.

Decision-makers agree that for the project to be viable, user fees for potential residential, commercial, and industrial customers must be comparable with what other jurisdictions are charging for similar services. This can only be achieved with federal and provincial grant funding. To that end, a grant application will be submitted prior to the August 29th deadline for the federal *Investing in Canada Infrastructure Program*.

Project partners have also decided that, if the wastewater recovery facility is built, residences within the corridor will not be forced to connect. Residential properties will be encouraged to tie in through reasonable connection fees and other incentives, but the three participating local governments will not make residential connection mandatory.

Decision-makers are also committed to getting the public involved in this exciting project. A multi-sector working group of volunteers is being established to help guide the process and ensure community needs are met (see sidebar).

BACKGROUND

In 2015, elected officials from RDNO, Spallumcheen, and OKIB struck a formal partnership to address environmental challenges and enhance economic opportunities within the Swan Lake Corridor. The resulting initiative is the North Okanagan Wastewater Recovery Project.

Wastewater Recovery Community Working Group

An area-wide, multi-sector Wastewater Recovery Community Working Group will be established to ensure community insights and ideas are reflected in project design, construction, and start-up.

Working group volunteers will collaborate with RDNO, Spallumcheen, and OKIB elected officials and staff and other key stakeholders to build awareness and participation, and to ensure project outcomes reflect community wants and needs.

Stay tuned for more information about how you can be involved! To share any comments or questions, please contact Leah Mellott at leah.mellott@rdno.ca.



The project Memorandum of Understanding was signed in 2015 by RDNO Area C and B Directors Mike Macnabb (left) and Bob Fleming (right), OKIB Chief Byron Louis, and Spallumcheen Mayor Janice Brown.

Historically, septic systems have been used to treat residential and commercial/industrial wastewater within the corridor. Research has shown that many of these systems are now leaching contaminants into Swan Lake, thereby impacting surface and groundwater quality, bird habitat, and recreational use of the corridor.



Additionally, economic development in all three jurisdictions is compromised by the corridor's lack of sewer. Ideal for commercial and light industrial uses, the corridor requires a wastewater treatment facility and reclaimed water storage sites that enable sewer connections to optimize business growth and the jobs it brings. Wastewater recovery and reuse would also benefit agriculture in the area, as growers are constantly looking for new sources of irrigation water during the hot summer months.

A collaborative and cost-sharing Memorandum of Understanding among the three jurisdictions outlines project objectives and guiding principles.

OBJECTIVES

- Preserve Swan Lake and surrounding wetlands; and
- Improve opportunities for economic development.

GUIDING PRINCIPLES

- Wastewater is a resource.
- Collaboration, and the sharing of human and financial resources, achieves better results.
- Respect for each partner's mandates and decision-making processes strengthens the partnership.
- Open and transparent communication among the parties and with the public optimizes project support and success.



Swan Lake Corridor provides abundant environmental, recreational, and economic opportunities for RDNO, Spallumcheen, and OKIB. Wastewater recovery would restore and protect Swan Lake, enhance recreational use, support suitable economic development, and provide much-needed irrigation water to local growers during the hot summer months.

TECHNICAL FINDINGS SUPPORT WASTEWATER RECOVERY

To date, RDNO, Spallumcheen, and OKIB have collaborated to:

- Assess existing environmental conditions (i.e., water quality analyses conducted in 2015, 2016 and 2017 confirmed that leachates from septic systems are impacting Swan Lake health);
- Identify existing and potential commercial and industrial uses in the plan area (i.e., 2016 RDNO Employment Lands Report); and
- Identify wastewater treatment, reuse and disposal strategies and options (i.e., 2016 Phase 1 Feasibility Study prepared by Urban Systems).

Research outcomes, in all cases, support construction of a wastewater treatment facility and associated water storage facilities in the corridor to address environmental challenges, enhance economic growth, and provide much-needed irrigation water to area farmers.

STAY TUNED FOR MORE PROJECT INFO! In the meantime, please forward any comments and questions to Leah Mellott (RDNO) at leah.mellott@rdno.ca

APPENDIX 11

News Articles

NEWS RELEASE

For Immediate Release
2018FLNR0158-001230
June 20, 2018

Ministry of Forests, Lands, Natural Resource Operations
and Rural Development

Province protects Swan Lake in the Okanagan

VICTORIA – A unique Okanagan lake, long recognized for its important wetland habitat, is now designated as part of a new wildlife management area (WMA), to help protect migratory birds, animals and species at risk.

“Located just north of Vernon, Swan Lake is an unusually shallow and marshy lake with intact shoreline and undisturbed habitat,” said Doug Donaldson, Minister of Forests, Lands, Natural Resource Operations and Rural Development. “We want to protect it for generations to come, because it is on a major migratory corridor for waterfowl, with over 200 bird species found in the area, as well as mammals and amphibians.”

The 471.5-hectare wildlife management area will help ensure locals and visitors alike can continue to enjoy a healthy environment, recreation opportunities and natural attractions.

The designation will also support:

- development of a management plan for the area that encourages conservation and shared stewardship;
- the engagement of local First Nations and stakeholders on conservation and management issues;
- additional legal tools for the ministry to consider in conservation management; and
- partnership opportunities for research and education.

A 3.2-hectare conservation property on the eastern shore of the lake owned by The Nature Trust of BC, and currently leased to the Province, will be included in the new wildlife management area. The wildlife management area will complement the existing Swan Lake Nature Reserve Park at the south end, which includes lands owned by the Regional District of North Okanagan and Ducks Unlimited Canada. There are walking trails, interpretive signs and a bird blind in the regional park.

The wildlife management area lies within the traditional territory of both the Okanagan Nation and the Secwepemc Nation Lakes Division. The lands of the Okanagan Indian Band border the north end of Swan Lake. The band provided support for the wildlife management area proposal.

Quotes:

Jasper Lament, The Nature Trust of BC —

“The Nature Trust of British Columbia purchased our Swan Lake property in 1993, with funding support from the Province and local conservation organizations. Swan Lake was first proposed

for habitat protection back in 1922. Almost 100 years later, we are delighted to work with our partners to establish a large conservation land complex at Swan Lake.”

Dan Buffett, manager of provincial operations, B.C., Ducks Unlimited Canada —

“As one of the conservation partners, Ducks Unlimited Canada is pleased with the WMA designation of Swan Lake, as it strengthens the habitat protection and management of the site for the many waterfowl and other species that rely on the area throughout the year. Swan Lake is an important nexus for wildlife migrating through or breeding in the Okanagan, and an important link in the chain of habitats that allows wildlife to co-exist in an urbanizing valley. We appreciate the work from our many partners including the Province of B.C., First Nations, local governments and neighbouring landowners that made this project possible for the wildlife and the community.”

Bob Fleming, Regional District of North Okanagan (RDNO) —

“Swan Lake is a fantastic natural asset for our region being both an extremely important habitat for wildlife, particularly waterfowl, and a wonderful little lake for various kinds of recreation. The RDNO looks forward to working closely with the Province to protect and preserve all that Swan Lake has to offer to our region.”

Quick Facts:

- Wildlife management areas help to meet government’s mandate to sustainably manage B.C.’s ecosystems, rivers and lakes, improve wildlife management and habitat conservation, and collaborate with stakeholders.
- With this new designation for Swan Lake, there are now a total of 30 wildlife management areas in B.C., ranging in size from the 17-hectare Coquitlam River, to the 122,500-hectare Todagin in northwestern B.C.
- Together, these sites encompass over 246,000 hectares.

Learn More:

For a map of the new Swan Lake wildlife management area and a list of all similarly designated areas in the Province, visit: <http://www.env.gov.bc.ca/fw/habitat/conservation-lands/wma/list.html>

For more information about wildlife management areas in British Columbia, visit: <http://www.env.gov.bc.ca/fw/habitat/conservation-lands/wma>

Contact:

Media Relations
Ministry of Forests, Lands, Natural Resource
Operations and Rural Development
250 356-7506

Connect with the Province of B.C. at: news.gov.bc.ca/connect

Coming together on project

Chantelle Deacon - Aug 27, 2018 / 2:51 pm



Photo: Contributed

A big step forward was taken in the construction of a wastewater recovery system that would provide environmental and economic benefits to the Regional District of North Okanagan, Township of Spallumcheen, and the Okanagan Indian Band.

A Memorandum of Understanding was signed this week by all three jurisdictions.

“This partnership is critical to advancing the environmental protection of our lake and our drinking water,” said OKIB Chief Byron Louis. “It’s great to be working with our neighbours. More funding opportunities arise when small governments stop competing for provincial and federal grant dollars and start collaborating.”

The system would serve residents and businesses in the proposed service area. The wastewater recovery facility could potentially be located on L&A Cross Road in Spallumcheen, where the Township recently purchased a 2.5-acre site.



“We are extremely honoured to partner with the Township of Spallumcheen and OKIB on making this project a reality,” said RDNO Board Chair and Electoral Area “B” Director Bob Fleming. “While we recognize there is still much to be done, we’re inspired by so many potential benefits for our residents, businesses, and the environment.”

The next big step is secure cash to fund the project.

The partners will be submitting a grant application to the Investing in Canada Infrastructure Program.

The requested grant amount of \$24.3 million represents approximately 66 per cent of the \$36.9 million total project cost.

The remaining amount is proposed to be funded through the Okanagan Basin Water Board Sewerage Facilities Assistance Grant (\$5.9 million), Township of Spallumcheen reserves (\$1.5 million) and RDNO borrowing (\$5.2 million).

A petition will be used to confirm support for the project and borrowing of \$5.2 million. The petition will be available in the near future.

“We are excited to see the positive movement on this,” said Spallumcheen Mayor Janice Brown. “We’ve seen water quality challenges, lack of water for our farmers, and economic opportunities missed. This system will help fix those problems.”

News

Collaboration Drives Funding Application for Wastewater Recovery System



By [Todd Westcott](#) 09:33AM August 28, 2018



SHARE

A Memorandum of Understanding (MoU) was signed this week by the Regional District of North Okanagan (RDNO), Township of Spallumcheen, and Okanagan Indian Band (OKIB) that will help the jurisdictions move toward construction of a wastewater recovery system.

The system would serve residents and businesses in the proposed service area, which includes portions of RDNO electoral areas, the Township of Spallumcheen’s south-east industrial area, and parts of OKIB IR4 north of Swan Lake. The wastewater recovery facility could potentially be located on L&A Cross Road in Spallumcheen, where the Township recently purchased a 2.5 acre site.

“This partnership is critical to advancing the environmental protection of our lake and our drinking water,” said OKIB Chief Byron Louis. “It’s great to be working with our neighbours. More funding opportunities arise when small governments stop competing for provincial and federal grant dollars and start collaborating.”



Left to right: RDNO director Mike Macnabb, Chief Byron Louis, Spallumcheen Mayor Janice Brown, and RDNO director Bob Fleming . Image Credit: RDNO.

Next, the project partners will look to secure funding to undertake the work. They have agreed that the project is contingent on grant funding and will be submitting a grant application to the Investing in Canada Infrastructure Program.

“We are extremely honoured to partner with the Township of Spallumcheen and OKIB on making this project a reality,” said RDNO board chair Bob Fleming. “While we recognize there is still much to be done, we’re inspired by so many potential benefits for our residents, businesses, and the environment.”

The requested grant amount of \$24.3 million represents approximately 66 per cent of the \$36.9 million total project cost. The remaining amount is proposed to be funded through the Okanagan Basin Water Board Sewerage Facilities Assistance Grant (\$5.9 million), Township of Spallumcheen reserves (\$1.5 million), and RDNO borrowing (\$5.2 million).

“We are excited to see the positive movement on this,” said Spallumcheen Mayor Janice Brown. “We’ve seen water quality challenges, lack of water for our farmers, and economic opportunities missed. This system will help fix those problems.”

Funding is also contingent on a successful petition from the RDNO electoral areas’ residents and businesses within the proposed service area. The petition will be used to confirm support for the project and borrowing of \$5.2 million.

APPENDIX 12

Swan Lake Area Plan Engagement Results Summary

Swan Lake Commercial Area and Neighbourhood Plan Engagement

EXECUTIVE SUMMARY OF RESULTS RELEVANT TO SEWER SERVICING

The Regional District of North Okanagan has undertaken a land use planning process for the Swan Lake area that will be added as a schedule to the existing Official Community Plan for Electoral Areas B & C, Bylaw No. 2626, 2014 upon adoption. This project is directly related to the Swan Lake Wastewater Recovery project as the direction for the plan is heavily dependent on whether the area will receive sewer servicing in the future.

Community engagement was conducted in two phases for this project, with open houses being held and surveys distributed during both phases. The breakdown of participants for each phase of engagement is as follows:

Round One

- Open house held on April 16th, 2018 at Vernon Christian School - ~200 attendees
- Survey distributed via hard-copy and online from April 16th – 23rd – 58 respondents

Round Two

- Open house held on June 19th, 2018 at Vernon Christian School – 105 attendees
- Survey distributed via hard-copy and online from June 19th – July 3rd – 52 respondents

This summary provides an overview of the feedback received during the engagement period that is relevant to the Wastewater Recovery project.

1. Residential Uses

During the first round of engagement, community members were asked to provide their input on residential uses that are best suited for each of the existing residential nodes within the Swan Lake area (Figures 1 and 2).

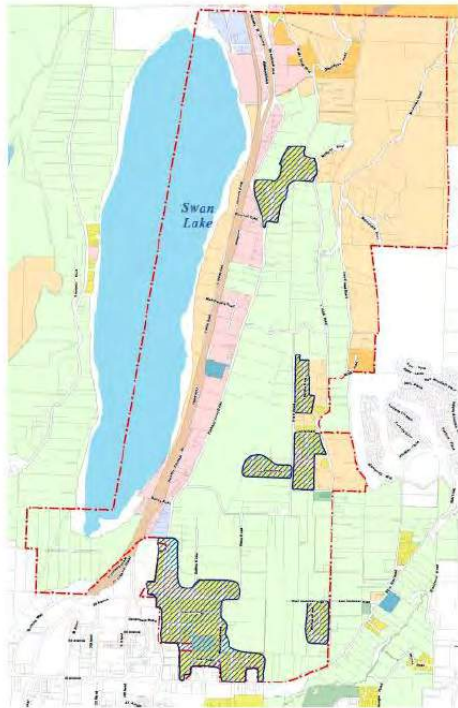


Figure 2. Residential Areas - 1

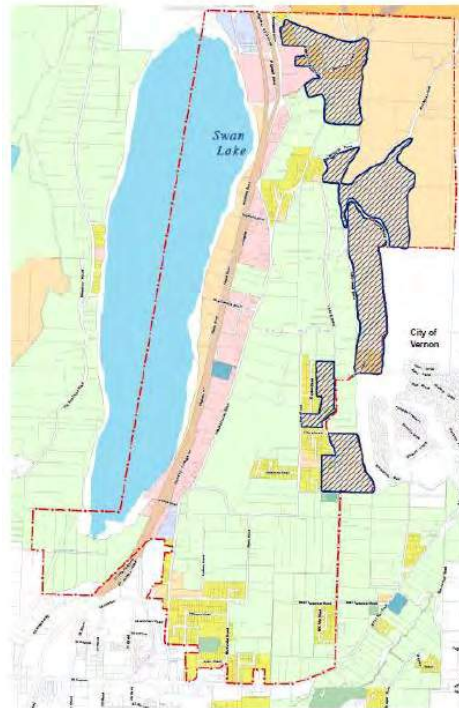


Figure 1. Residential Areas - 2

Community members largely identified that secondary suites and carriage homes are acceptable future residential uses, with 88 of 152 responses demonstrating support for these uses in question 1a) of the survey (see Figure 3), and 88 of 183 responses demonstrating support for these uses in question 1b) (see Figure 4). 33 of 183 responses were in support of residential subdivision.

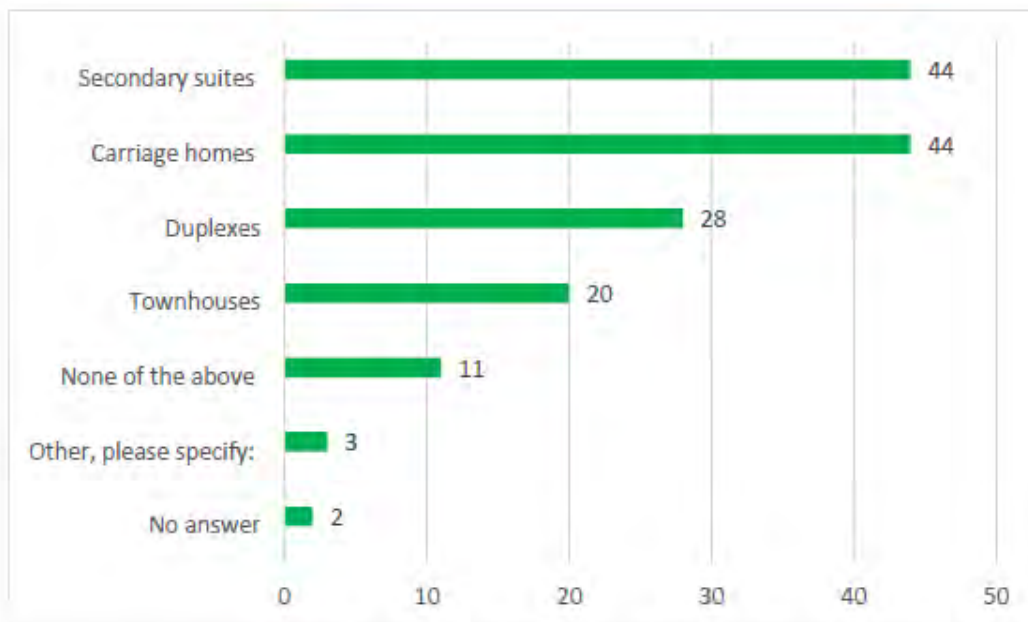


Figure 3. Support for Secondary Residential Uses

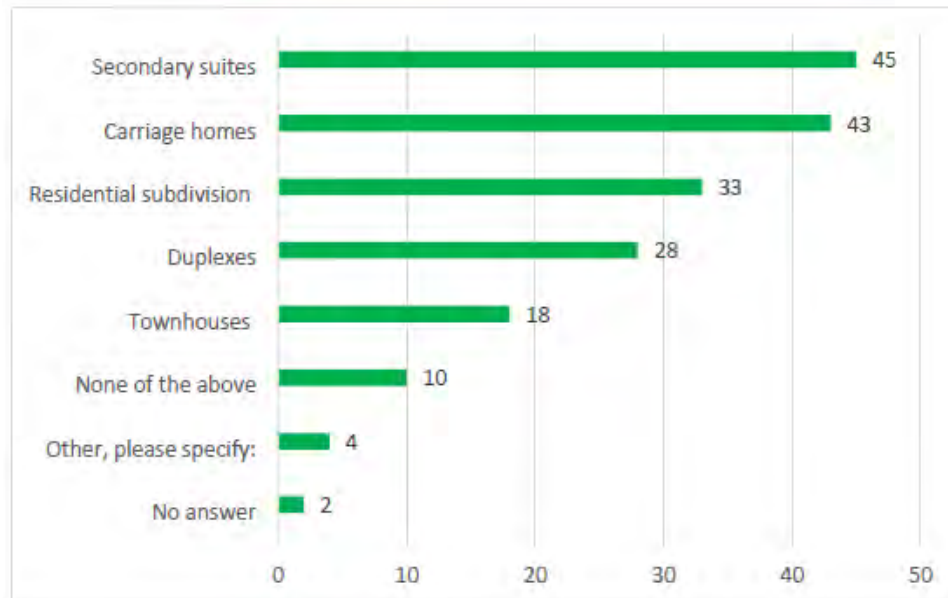


Figure 4. Support for Secondary Residential Uses and Subdivision

During the second round of engagement, open house attendees and survey respondents were asked to indicate their preference for a series of development scenarios. The scenarios were as follows:

- Scenario #1 displayed land use patterns reflecting no sewer servicing, therefore most uses would stay the same (see Figure 6)
- Scenario #2 – displayed land use patterns with some infill in the form of carriage homes and secondary suites within existing residential cluster areas. This is based on the premise that these areas would be serviced by sewer (see Figure 7).
- Scenario #3 – displayed land use patterns with some infill within the existing residential cluster areas in the form of secondary suites, carriage homes, and small lot subdivision, as well as subdivision of larger parcels (see Figure 8).

The survey results demonstrated a combined support of 64% for the scenarios based on sewer servicing, with 39% of respondents supporting Scenario 3 (carriage homes, secondary suites, and infill subdivision) and 26% of respondents supporting Scenario 2 (carriage homes and secondary suites), as demonstrated in Figure 5.

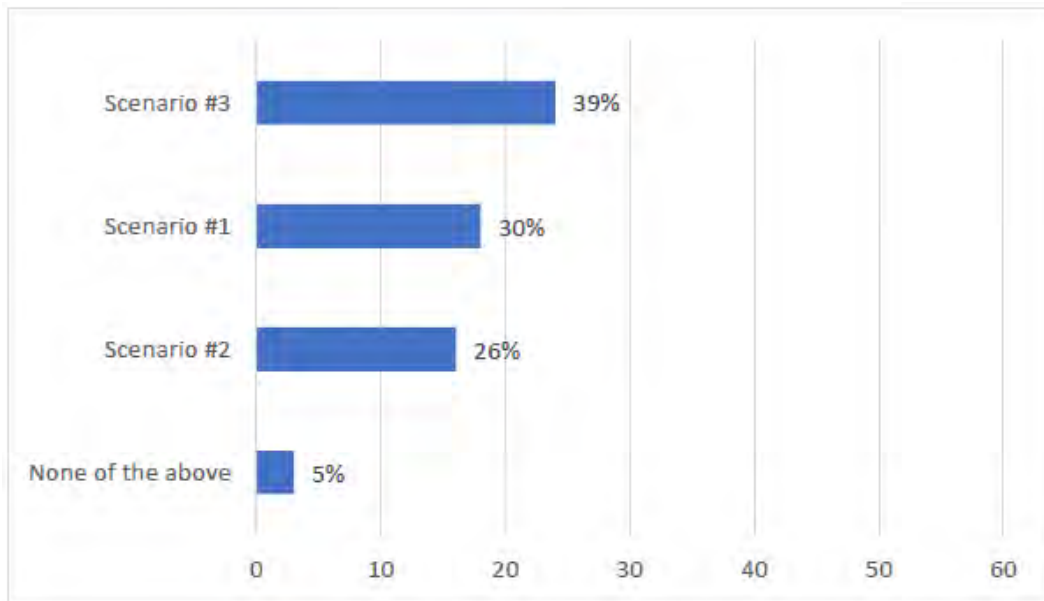


Figure 5. Development Scenario Preferences.

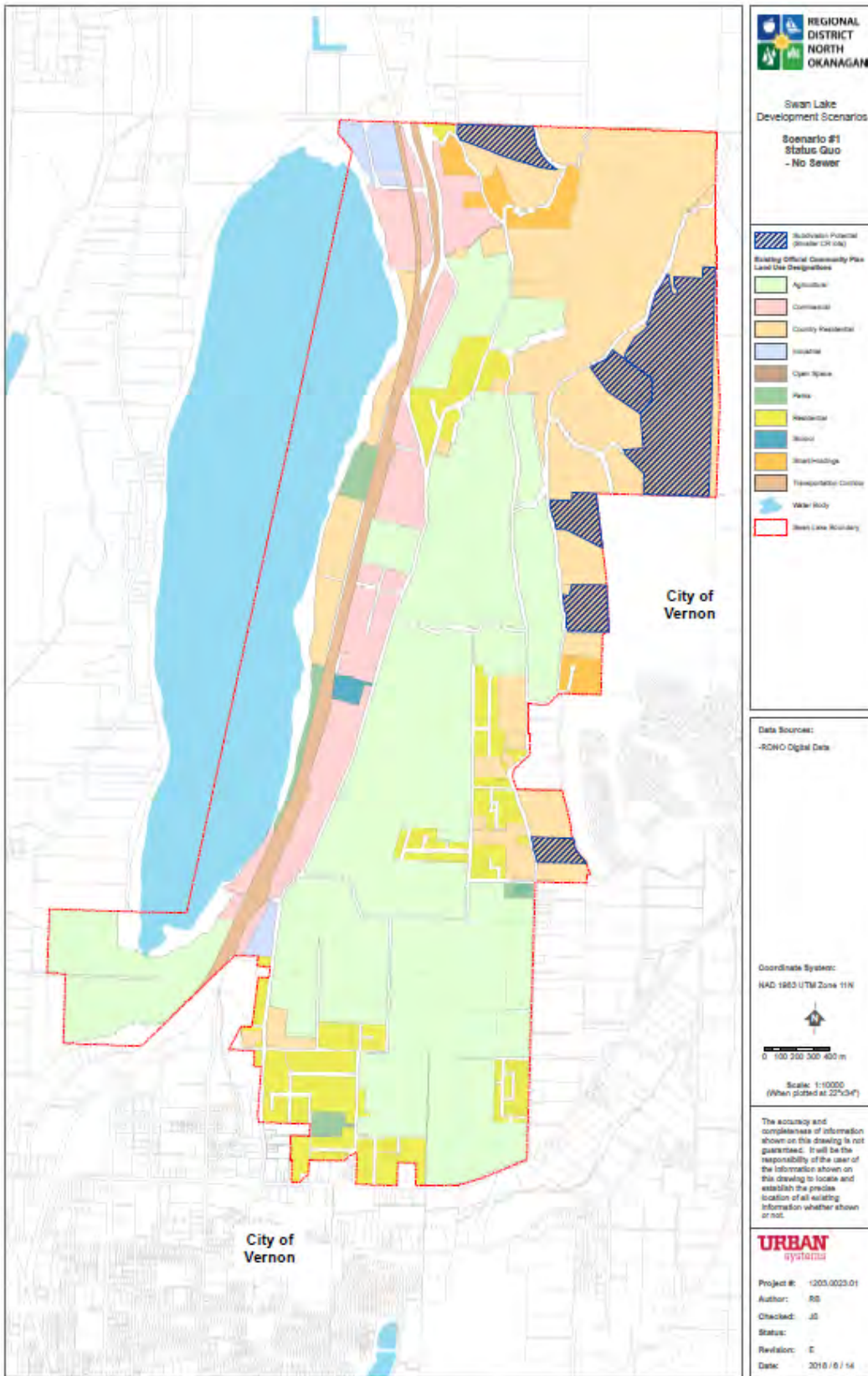


Figure 6. Scenario 1 – Status Quo - No Sewer

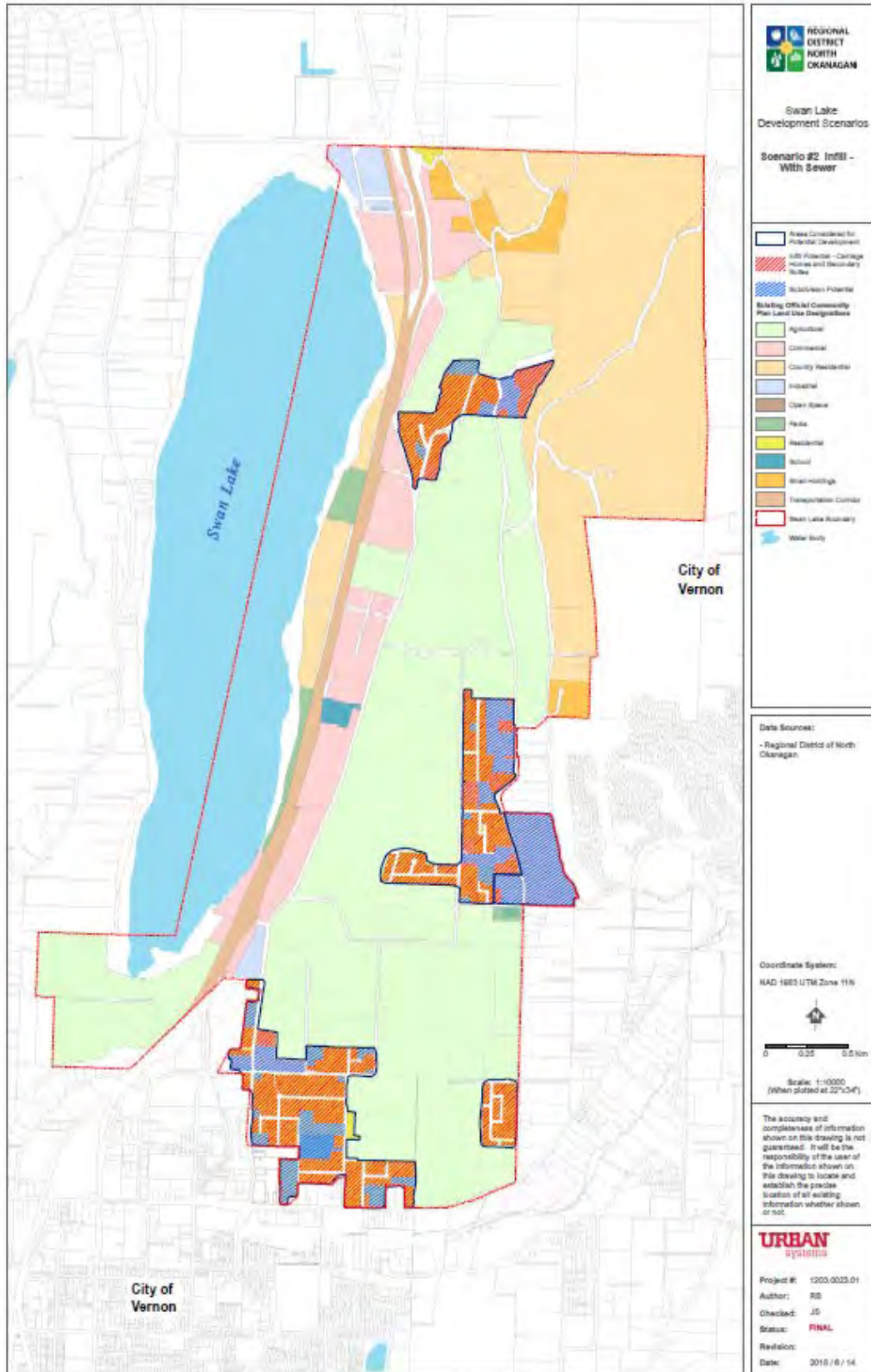


Figure 7. Scenario 2 - Infill - With Sewer

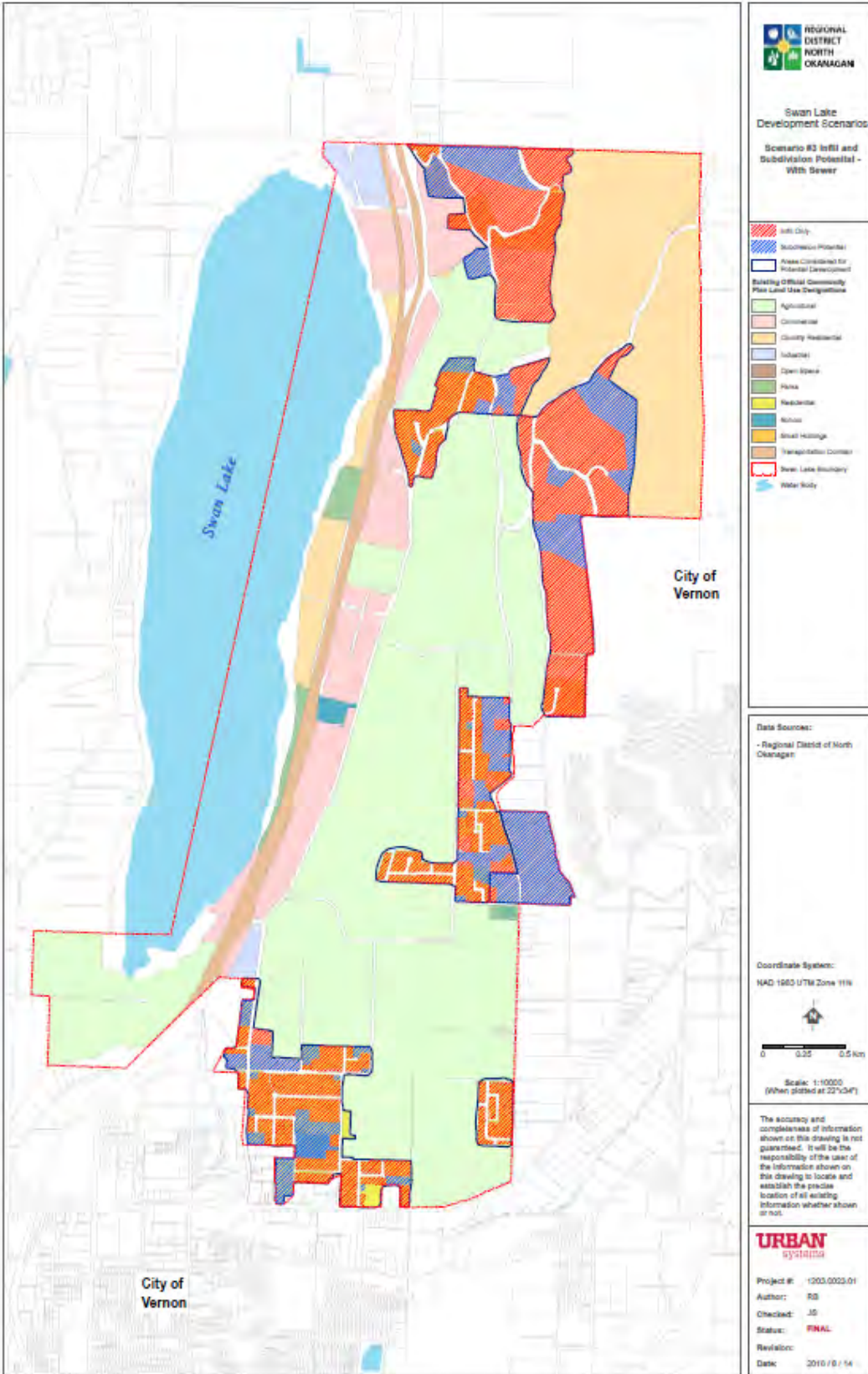


Figure 8. Scenario 3 - Infill With Subdivision - With Sewer

At the open house, attendees were invited to participate in an activity that asked participants to indicate their preference for each of the three scenarios proposed, specifically by residential area (see Figures 10 and 12 for the residential areas in scenarios 2 and 3. Scenario 1 did not outline changes to residential areas as this scenario proposed a status quo of land uses).

Placing a green dot next to one of the areas indicated that the participants liked the scenario, while a red dot indicated that they did not. 72% of attendees who participated in the panel activities indicated that they did not like Scenario 1, which does not propose sewer servicing to the Swan Lake area. However, an overwhelming level of support was demonstrated for Scenario 2 (carriage homes and secondary suites), as attendees indicated carriage homes and secondary suites are appropriate for most residential areas, with the level of support ranging from 82%-100% (see Figures 9 and 10). For Scenario 3, the level of support ranged from 54%-78% for carriage homes, secondary suites, and subdivision within existing residential areas (see Figures 11 and 12).

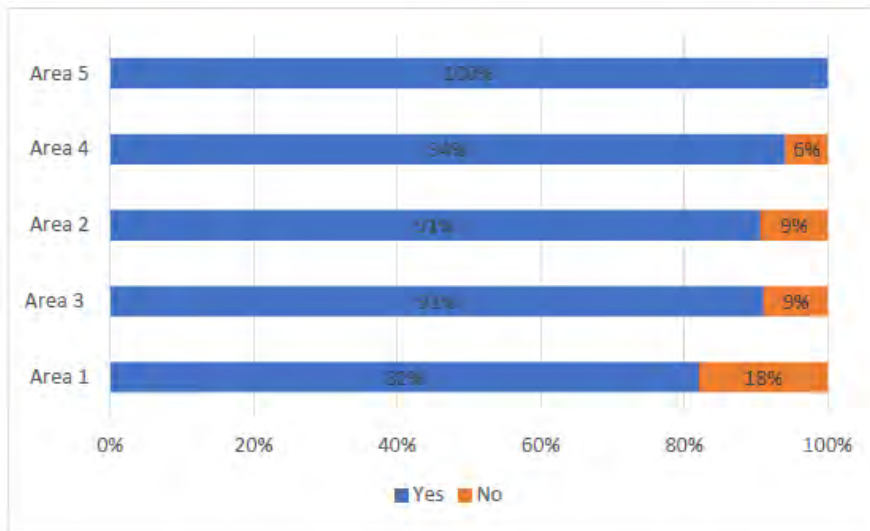


Figure 9. Level of Support for Scenario 2 Residential Land Uses

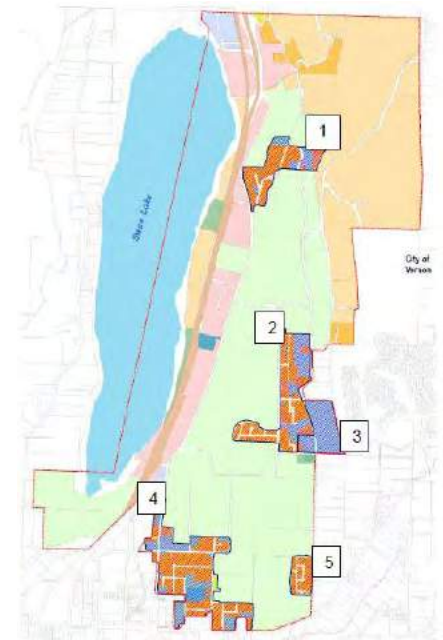


Figure 10. Scenario 2 Residential Areas

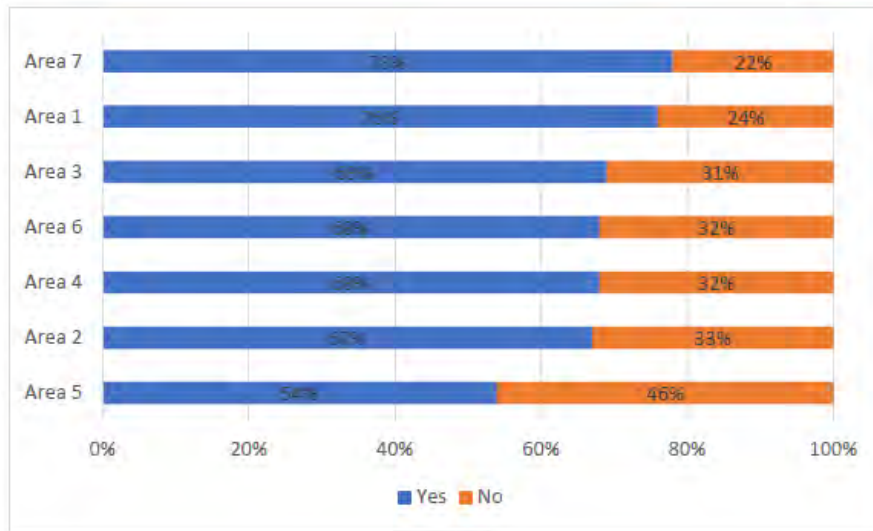


Figure 11. Level of Support for Scenario 3 Residential Land Uses.

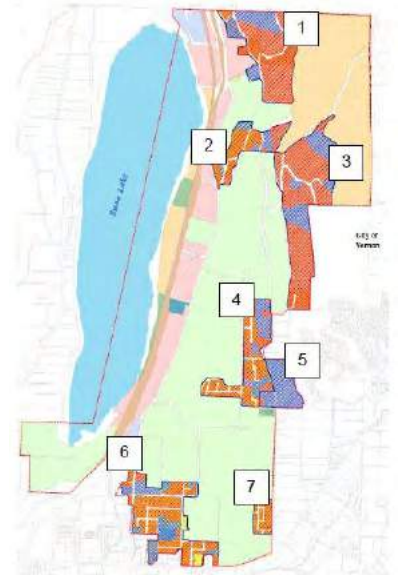


Figure 12. Scenario 3 Residential Areas

Some concerns that were raised about the development scenarios based on sewer servicing include: cost, too much density, and loss of rural character.

2. Sewer Servicing

The survey for the second round of engagement asked respondents to indicate if they supported sewer servicing in principle to the Swan Lake area. 76% of respondents specified that they support sewer servicing, as shown in Figure 13. Reasons for this support were listed by survey respondents as:

- enhanced environmental protection;
- increased economic development and growth opportunities;
- elimination of septic tanks; and
- ability to advance agriculture (i.e. irrigation, better land preservation).

A large portion of those who indicated lack of support for sewer servicing is due to the unknown associated cost.

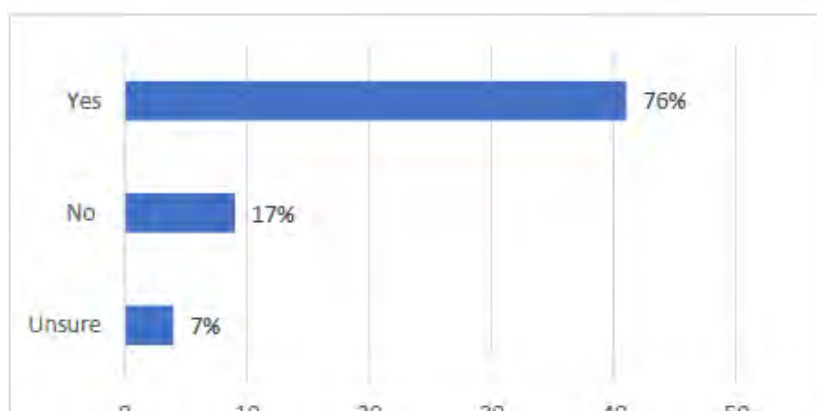


Figure 13. Support for Sewer Servicing to Swan Lake

APPENDIX 13

Letters of Support

August 16, 2018

Investing in Canada Infrastructure Program

RE: Letter of Support for the Swan Lake Master Wastewater Recovery Project

As the Operations and Grants Manager for the Okanagan Basin Water Board (OBWB), I'm very pleased to support the application of the Regional District of North Okanagan, Okanagan Indian Band and Township of Spallumcheen, for the Swan Lake Master Wastewater Recovery Project.

The proposed project around the Swan Lake corridor would address a gap in Okanagan source water protection, leading to better water quality for drinking water, agriculture, and the ecosystem throughout the Okanagan – Canada's most water-stressed region. Since 1970, the OBWB has provided Okanagan local governments with grants to move from septic to tertiary wastewater treatment systems in order to improve source water quality throughout the region. This program has led to significant improvements in lake water quality in each main-stem lake on the Okanagan system, reducing eutrophication, particularly from Phosphorus and Nitrogen. The Swan Lake Wastewater Recovery Project will be eligible for an OBWB sewer grant, providing 16% of total project costs in matching funds to a successful award from the Investing in Canada Infrastructure Program.

Further, this project will allow for the sustainable development of new areas in the communities, which is now restricted by the lack of sewerage infrastructure. This means that the communities and the local ecosystem will become more resilient to change, and more able to accommodate future population growth while preserving ecosystem services, offsetting the future costs of grey infrastructure.

I strongly urge you to support this important project. Please don't hesitate to contact me if you would like further information.

Sincerely,



K. James Littley
Operations and Grants Manager
Okanagan Basin Water Board



August 24, 2018

To Whom It May Concern,

Re: Support for the Swan Lake Master Wastewater Recovery Project

Interior Health – Healthy Communities is pleased to provide a letter of support to the Regional District of North Okanagan's *Investing in Canada Infrastructure Program* grant application for the Swan Lake Master Wastewater Recovery project.

It is our experience that the Regional District of North Okanagan, in collaboration with Interior Health, is committed to offering community facilities and services which improve the health of the citizens it represents.

Community sewer maximizes economies of scale, provides a sustainable and safe method for sewage disposal by preserving the natural environment (i.e. groundwater and surface water), and can allow for increased density and commercial/industrial development. Furthermore, connection to community sewer is an important component of long term sustainable development. As such, Interior Health supports community sanitary sewer systems where feasible.

The wastewater recovery project would consist of Class A treatment and the wastewater recovery will be used primarily for agricultural irrigation. This treatment plant will service RDNO Electoral Areas B and C, Swan Lake corridor, part of the Okanagan Indian Band, and the south Spallumcheen industrial lands. The proposed project also includes a digester and storage tank that can accept animal manure. The digester aligns with, "deploying innovative technology to beneficially manage and utilize animal waste and mediate contaminated aquifers," as identified in the provincial government review report *From Crisis to Solutions: Towards Better Source Water Protection and Nutrient Management in the Hullcar Valley*. Interior Health commends the RDNO in being part of the solution in protecting the Hullcar aquifer.

Interior Health – Healthy Communities aims to improve health and wellness by working collaboratively with local governments and community partners to create policies and environments that support good health. As such, Interior Health is supportive of the Swan Lake Master Wastewater Recovery Project and is committed to continuing to build our relationship with the RDNO to collaboratively build healthy communities.

Sincerely,

Janelle Rimell, B.Sc, B.Tech, C.P.H.I.(C)
Healthy Communities
Environmental Health Officer



File reference: 329283

August 23, 2018

Doug Allin
Chief Administrative Officer
Township of Spallumcheen
mail@spallumcheentwp.bc.ca

Re: North Okanagan Wastewater Recovery Project

Dear Doug:

Please accept this letter as confirmation of support in principle from the Ministry of Environment, Environmental Protection Division regarding the Township of Spallumcheen's application to Infrastructure Canada's "Investing in Green Infrastructure – Environmental Quality" program being administered by the BC Ministry of Municipal Affairs and Housing.

Your decision to pursue a wastewater recovery facility that will serve portions of the Township, Okanagan Indian Band and Electoral Areas B and C is to be lauded. I understand this is the last remaining area of the Okanagan water basin without wastewater treatment. The need for this is particularly noticeable at this time of year.

If you have any questions, please contact the undersigned.

Yours truly,

David Morel
Assistant Deputy Minister
Environmental Protection Division

pc: Brady Nelles, Regional Operations

**Ministry of Environment and
Climate Change Strategy**

Office of the Assistant Deputy
Minister
Environmental Protection
Division

Mailing Address:
PO Box 9339
Stn Prov Govt
Victoria BC V8W 9M1

Telephone: 778 698-9242
Facsimile: 250 387-6003
Website: www.gov.bc.ca/env



To Whom It May Concern

August 27, 2018

Re: Letter of Support for the *Swan Lake Master Wastewater Recovery Project*

As Director of Resource Management, Thompson Okanagan Region, Ministry of Forests, Lands and Natural Resource Operations and Rural Development (FLNRORD) I am happy to support the application of the Regional District of North Okanagan, Okanagan Indian Band and Township of Spallumcheen for the *Swan Lake Master Wastewater Recovery Project*.

Swan Lake is one of the only remaining low elevation shallow, marshy lakes in the Okanagan. In June 2018 the Province designated a wildlife management area (WMA) on Swan Lake and its foreshore to better protect its significant wetland and shoreline habitats for both resident and migratory birds and several federal and provincial species at risk. The lake is considered to be regionally significant for its bird life and nesting. The lake also supports many Vernon area recreationalists and a healthy sport fishery.

Good water quality is vital to supporting the natural ecosystems, wildlife and enjoyment of the lake for generations to come. As the *Swan Lake Master Wastewater Recovery Project* is aimed at improving water quality and would integrate with the intent of the recently designated WMA, I strongly urge you to support this important project. If you would like further information, please do not hesitate to contact Susan Omelchuk, FLNRORD Land and Resource Management Specialist by email at Susan.Omelchuk@gov.bc.ca or by phone 250-828-4263.

Yours truly,

A handwritten signature in black ink, appearing to read "J. Ted Zimmerman", with a long horizontal flourish extending to the right.

Ted Zimmerman,

Regional Director of Resource Management
Thompson Okanagan Region
Ministry of Forests Lands and Natural Resource Operations and Rural Development

Bannister Honda

Owned and Operated by
0940231 B.C. Ltd.

6425 Highway 97 North
Vernon, B.C. V1B 3R4
Tel: 250-545-0531
Fax: 250-545-0566
Toll Free: 1-888-545-0531
www.bannisterhonda.com

Oct 27, 2016

To whom it may concern,

This letter is written to support Bob Fleming of RDNO, and his application for funding from the Rural BC Dividend fund, in order to assist with phase 2 of the Master Waste Water Recovery Feasibility Project. We the SLCBA believe that we require more detail on all aspects of the possible service and its details, in order to make a proper decision as a group that represents this region. There is no doubt in our minds that we require this info structure for the growth of the northern region of Vernon, but need to make the best decision for both today and for the future. We require more detailed study and information in order to make this so important decision.

We ask that you consider this grant to help fund both the RDNO and Bob Fleming to move these studies ahead.

Thank you for your consideration.

Regards,



Pat Loehndorf

President

Swan Lake Corridor Business Association

3425 Hwy 97 N

Vernon, BC

V1B3R4



HONDA

THE CORPORATION OF THE TOWNSHIP OF SPALLUMCHEEN

4144 Spallumcheen Way, Spallumcheen, BC V0E 1B6
Phone: 250-546-3013 • Fax: 250-546-8878 • Toll Free: 1-866-546-3013
Email: mail@spallumcheentwp.bc.ca • Website: www.spallumcheentwp.bc.ca



TOWNSHIP OF SPALLUMCHEEN AGRICULTURAL ADVISORY COMMITTEE

CERTIFIED RESOLUTION

Moved by Kevin Curtis/seconded by Dave Derbowka:

“That the Township of Spallumcheen Agricultural Advisory Committee supports the Township of Spallumcheen application to remove the following subject parcels from the Agricultural Land Reserve:

- *Parcel #1 (4305 L&A Cross Road, legally described as Lot 2 Section 2 Township 7 and Section 35 Township 8 Osoyoos Division Yale District Plan 35183 Except Plans 35556, KAP54885 and KAP74082; and*
- *Parcel #2 (29 L&A Cross Road, legally described as Lot 1 Section 35 Township 8 Osoyoos Division Yale District Plan 1823 Except Plan H433 and KAP74091).”*

CARRIED

I hereby certify the above to be a true and correct copy of a resolution adopted by the Township of Spallumcheen Agricultural Advisory Committee held on Wednesday, December 6th, 2017.

Dated: December 12th, 2017



Cindy Graves
Deputy Corporate Officer

Henry Derksen, 4542 Lansdowne Road	<ul style="list-style-type: none">• He lives below one of the lots proposed. The hillside is volcanic rock and crumbles easily. He has concerns with building a house close to the edge and what could happen.• The Township's Deputy Planning Manager advised a Building permit will be required prior to building and the property owner will be required to meet the setbacks within the Zoning Bylaw. He noted that buildings must comply with the <i>BC Building Code</i>. He further advised that the Building Inspector can require for a professional engineering review as a condition of the Building Permit.
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(iii) Closing Statement by Mayor

Mayor Janice Brown called three times for any member of the public, who believe they have an interest in the zoning text amendment application, to make their concerns known. There being none, the Mayor declared the hearing closed at 7:20 pm.

(b) Opening Statement for Public Hearing by Chairperson – ALR Exclusion Application for the properties legally described as Lot 2, Sec 2, Twp 7 and Sec 35, Twp 8, ODYD, Plan 35183, Except Plans 35556, KAP54885 and KAP74082, located at 4305 L & A Cross Road and owned by 416988 BC Ltd. And 416989 BC Ltd. and Lot 1, Sec 35, Twp 8, ODYD, Plan 1823, Except Plans H433 and KAP74091, located at 29 L&A Cross Road and owned by Arthur Robatzek and Alexander Majerech (File No. 17-0465-SPL-ALR)

Mayor Janice Brown opened the public hearing at 7:22 pm for the property legally described as Lot 2, Sec 2, Twp 7 and Sec 35, Twp 8, ODYD, Plan 35183, Except Plans 35556, KAP54885 and KAP74082, located at 4305 L & A Cross Road and owned by 416988 BC Ltd. And 416989 BC Ltd. and Lot 1, Sec 35, Twp 8, ODYD, Plan 1823, Except Plans H433 and KAP74091, located at 29 L&A Cross Road and owned by Arthur Robatzek and Alexander Majerech.

(i) Introduction of the ALR Exclusion Application proposed

The Township's Chief Administrative Officer introduced the ALR Exclusion Application noting the Official Community Plan Amendment bylaw process for the properties are at third reading. The Official Community Plan Amendment Bylaw 1940 is on hold to allow for the ALR application.

Joel Short, Planner, Urban Systems Ltd. provided a PowerPoint presentation reviewing the application for those in attendance. The presentation will be included on the Township's website for information and is a summary of the documents included on the agenda.

(ii) Presentations by Public beginning with the Applicant

(a) Letter from John and Deanna Toporchak, Residents, 4400 L & A Cross Road, dated October 6th, 2017 – Re: Support for the Proposed Agricultural Land Reserve Exclusion Application

First Opportunity

<p>Nyra Cochrane, 309 Highway 97A</p>	<ul style="list-style-type: none"> • Lives at North end of Parcel #1 • Has concerns with the potential location of the sewer treatment plant. • Is moving back to her property and is in the process of making renos. • Not in favour of parcel 1 becoming industrial as it is the closest parcel to her property.
<p>Ted Curtis, 5058 Parkinson Road</p>	<ul style="list-style-type: none"> • Currently is farming some of the property in the area. • Excellent way out of a big problem. South end to assist with the issues in the north end (Hullcar aquifer issues). • Their farm can participate in taking the effluent. • This will be good for farmers to increase water and deal with manure issues. • The only way out of this mess. • Overall an excellent idea
<p>David Doran, 4420 Hullcar Road</p>	<ul style="list-style-type: none"> • Urban Systems provided a good sales job. • There are some things that he questions and he has concerns that there are promises that might not be fulfilled. • Generally supportive but asking that Council move carefully with due diligence before allowing development. Make sure environmental assessments are done. Mentioned past issue about whey vanishing off the property and no one knows where it went. • Council should lead the way diligently.
<p>John Toporchak, 4400 L & A Road</p>	<ul style="list-style-type: none"> • Property borders Parcel #1. • No objection to exclusion of Parcel #1. • Parcel #2 is at south end and is farmed. A number of years ago part of the property along the highway was lifted with fill. Good land underneath that could still be used for agriculture. • For parcel #2 it might be acceptable for land along highway to come out, but rest needs to stay agricultural. • Industrial properties need a buffer zone. • Who is going to pay for the ALR Exclusion Application? • The Chief Administrative Officer advised that the Township can recover costs if it's successful.

	<ul style="list-style-type: none"> • Wants to ensure that his water license is protected and that he will have the same amount of water after the potential development.
The Deputy Corporate Officer read the Letter from John and Deanna Toporchak, Residents, 4400 L & A Cross Road, dated October 6 th , 2017 in to the public record.	<ul style="list-style-type: none"> • In favour

Second Opportunity

Nyra Cochrane, 309 Highway 97A	<ul style="list-style-type: none"> • Questioned whether decisions regarding the location of the sewage plant had been determined. • The Mayor advised the wastewater plant location has been discussed to be in the southern portion near Highway 97, if possible. • The Mayor noted that studies have shown that reclaimed water from the treatment plant (promoted through the Hullcar aquifer issues) can increase fire flow and can assist with farming. It's all preliminary. • The Township's Chief Administrative Officer (CAO) advised the timeline for the treatment plant could be 3 to 15-20 years. • The CAO noted that there has been a lot discussed hydro geologically to recover and store. All of the matters are simultaneous proposals.
--------------------------------	---

(iii) Closing Statement by Mayor

Mayor Janice Brown called three times for any member of the public, who believe they have an interest in the zoning text amendment application, to make their concerns known. There being none, the Mayor declared the hearing closed at 7:54 pm.

4. ADOPTION OF THE MINUTES:

(a) Regular Council Meeting Minutes of Monday, November 20th, 2017

303/2017 LeMaire/Hanoski: THAT the minutes of the Township of Spallumcheen Regular Council Meeting held on Monday, November 20th, 2017 be adopted.

CARRIED

(b) 125th Anniversary Committee Meeting Minutes of Monday, November 20th, 2017

304/2017 LeMaire/Van Tienhoven: THAT the Township of Spallumcheen Council approve the following amended Township of Spallumcheen 125th Anniversary Events and budgets as follows:

- **Thomas Hayes Ecological Trail – \$5,100;**
- **Heritage Historical Curling Show – \$4,500;**

Little Feather Global Corporation

Cell Phone: 5
Email: .net

February 26, 2018

Township of Spallumcheen
4144 Spallumcheen Way
Spallumcheen, BC
V0E 1B6

RE: Master Wastewater Recovery Project

TO WHOM IT MAY CONCERN:

My company owns farmland properties on the north of Swan Lake:

Address: 4350 & 4360 L&A Crossroad
PID – 015 765 440 AND 015 765 474
Roll #20-83-323-00120.004 and 20-83-323-00120.002

I met with Christine Fraser in 2017 and had discussions with her regarding the wastewater recovery proposal to the government and development at north of Swan Lake.

Upon review of the Memorandum of Understanding between the Township of Spallumcheen, Okanagan Indian Band and Electoral Areas "B" and "C" of the Regional District of North Okanagan found at the Township of Spallumcheen website, I believe that this project is a benefit to farmland and farmland owners in the Swan Lake Corridor.

There are two (2) existing ponds on my farmlands, one on each of the properties, which did not dry up during the 2017 draught. These ponds can be utilized for future developments in the wastewater project.

I contacted Larkin Water District Association in 2017 requesting access to domestic water for these two farmland properties. I was informed that I am not part of the Larkin Water District.

Although these farm properties are for sale, I am in full support of the Master Wastewater Recovery Project.

Regards,



Beverly Bird, President
LITTLE FEATHER GLOBAL CORPORATION

Cc: Chief Byron Louis, Okanagan Indian Band

RECEIVED

APR 23 2018

SPALLUMCHEEN

5058 Parkinson Rd.,
Armstrong B.C.
V0E 1B4

Municipality of Spallumcheen;

As per our previous letter, we at Curtis Farms are willing and able to utilize the products from the new Waste Water Treatment Plant.

We have a 25 year lease on the property owned by John + Deanna Taporchak on L + A Crossroad.

John Taporchak is completely in agreement with the plan.

We have not only adequate acres for the project, but also the knowledge + experience working with the products. We have the equipment necessary to proceed. We also have adequate room for storage ponds.

yours truly;

G.E.(Ted) Curtis



123.000

RECEIVED

AGENDA ADDITION

John and Deanna Toporchak
4400 L & A Cross Road
Vernon, BC
V1H 1W9

DEC 16 2017

October 6, 2017

SPALLUMCHEEN

Township of Spallumcheen
4144 Spallumcheen Way
Spallumcheen, BC
V0E 1B6

RE: Proposed Wastewater Recovery Facility

To Whom it May Concern:

Public HEARING.
3(b)(ii)(a)

✓

VIA EMAIL

Mayor		
Mayor & Council		
DEC 4 / 17	Council Agenda	✓
	I/C Agenda	
	Ctte Agenda	
Council Table		
CAO	✓	CFO
DCO		PWM
DEV SVS		BLDG INS
FILE	✓	OTHER <u>Joel Smith</u>

USL

We currently own 565 acres of farmland in the south end of the Township of Spallumcheen. We have heard about the Wastewater Recovery project being proposed by the Regional District, the Township, and the Okanagan Indian Band. We would be interested in using reclaimed water from the proposed Wastewater facility for irrigation for crops. There is a shortage of irrigation water currently and we believe that the recovered water would definitely be a benefit to agriculture in the area.

We are also in support of the ALR exclusion for Industrial on the Sengotta property located on L & A Cross Road, this land is beside the current Industrial Lands and mostly lower quality farmland.

Thank you,

DEC 04 2017

REGULAR COUNCIL MEETING
ITEM: 3(b)(ii)(a)

John and Deanna Toporchak

John Toporchak
Deanna Toporchak

AGENDA ADDITION

APPENDIX 14

Cost Estimates



CAPITAL COST ESTIMATE

NORTH OKANAGAN WASTEWATER RECOVERY PROJECT

USL File: 1203.0018.03

Date: 29-08-2018

This Estimate is Class: C

COST ESTIMATE

	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	SUBTOTAL COSTS
1.0	Common Works				
	WWTF				
1.1	General Requirements	LS	1	\$280,000.00	\$280,000.00
1.2	Concrete	LS	1	\$1,100,000.00	\$1,100,000.00
1.3	Building Trades	LS	1	\$800,000.00	\$800,000.00
1.4	Plumbing	LS	1	\$60,000.00	\$60,000.00
1.5	HVAC	LS	1	\$110,000.00	\$110,000.00
1.6	Electrical	LS	1	\$350,000.00	\$350,000.00
1.7	Instrumentation/SCADA	LS	1	\$200,000.00	\$200,000.00
1.8	Site Grading	LS	1	\$260,000.00	\$260,000.00
1.9	Process Equipment (2ML/day) - Supply	LS	1	\$1,850,000.00	\$1,850,000.00
1.10	Phosphorus Removal	LS	1	\$1,300,000.00	\$1,300,000.00
1.10	Process Equipment - Installation	LS	1	\$800,000.00	\$800,000.00
1.10	Back-up Power	LS	1	\$160,000.00	\$160,000.00
	Subtotal Section 1.0				\$7,270,000.00
	Engineering and Contingency (40%)				\$2,908,000.00
	Total				\$10,178,000.00
2.0	Effluent Storage and Distribution				
2.1	Earthworks	m3	220,000	\$4.50	\$990,000.00
2.2	Storage Pond Liner	m2	100,000	\$12.00	\$1,200,000.00
2.3	Pumphouse c/w standby power (Irrigation Pump Station)	LS	1	\$370,000.00	\$370,000.00
2.4	Chlorination Facility	LS	1	\$80,000.00	\$80,000.00
2.5	Constructed Wetland	LS	1	\$200,000.00	\$200,000.00
2.6	Outfall piping to Swan Lake (100mm Forcemain)	l.m.	1,000	\$350.00	\$350,000.00
2.7	Irrigation Transmission (100mm Forcemain)	l.m.	1,055	\$350.00	\$369,250.00
	Subtotal Section 2.0				\$3,560,000.00
	Engineering and Contingency (40%)				\$1,424,000.00
	Total				\$4,984,000.00
3.0	Wastewater Collection (Common)				
3.1	Highway Crossing	l.m.	25	\$4,000.00	\$100,000.00
3.2	Railway Crossing	l.m.	20	\$4,000.00	\$80,000.00
	Subtotal Section 3.0				\$180,000.00
	Engineering and Contingency (40%)				\$72,000.00
	Total				\$252,000.00
4.0	CORE				
	RDNO-1				
4.1	200mm Gravity Main	l.m.	535	\$450.00	\$240,750.00
4.2	200mm Gravity Main in Roadway	l.m.	3,110	\$550.00	\$1,710,500.00
4.3	100mm Forcemain	l.m.	370	\$350.00	\$129,500.00
4.4	100mm Forcemain in Roadway	l.m.	1,840	\$475.00	\$874,000.00
4.5	Service Connections	ea.	19	\$8,500.00	\$161,500.00
4.6	Restoration	l.m.	3,300	\$95.00	\$313,500.00
4.7	Highway Crossing	l.m.	90	\$4,000.00	\$360,000.00
4.8	Railway Crossing	l.m.	20	\$4,000.00	\$80,000.00
4.9	Lift Station No. 3	LS	1	\$530,000.00	\$530,000.00
	Subtotal RDNO-1				\$4,399,750.00



CAPITAL COST ESTIMATE

NORTH OKANAGAN WASTEWATER RECOVERY PROJECT

USL File: 1203.0018.03

Date: 29-08-2018

This Estimate is Class: C

COST ESTIMATE

	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	SUBTOTAL COSTS
RDNO-2					
4.10	200mm Gravity Main in Roadway	l.m.	860	\$550.00	\$473,000.00
4.11	Service Connections	ea.	18	\$8,500.00	\$153,000.00
4.12	Restoration	l.m.	860	\$95.00	\$81,700.00
Subtotal RDNO-2					\$707,700.00
SPALL-2					
4.13	200mm Gravity Main in Roadway	l.m.	1,830	\$550.00	\$1,006,500.00
4.14	100mm Forcemain	l.m.	495	\$350.00	\$173,250.00
4.15	100mm Forcemain in Roadway	l.m.	530	\$475.00	\$251,750.00
4.16	Service Connections	ea.	18	\$8,500.00	\$153,000.00
4.17	Restoration	l.m.	1,830	\$95.00	\$173,850.00
4.18	Highway Crossing	l.m.	55	\$4,000.00	\$220,000.00
4.19	Lift Station No. 4	LS	1	\$410,000.00	\$410,000.00
Subtotal SPALL-2					\$2,388,350.00
Subtotal Section 4.0					\$7,500,000.00
Engineering and Contingency (40%)					\$3,000,000.00
Total					\$10,500,000.00
RDNO 6/8					
5.0 RDNO-8					
5.1	200mm Gravity Main in Roadway	l.m.	1,285	\$550.00	\$706,750.00
5.2	Service Connection	ea.	10	\$8,500.00	\$85,000.00
5.3	Restoration	l.m.	1,285	\$95.00	\$122,075.00
Subtotal RDNO-6					\$913,825.00
RDNO-6					
5.4	200mm Gravity Main	l.m.	1,100	\$450.00	\$495,000.00
5.5	200mm Gravity Main in Roadway	l.m.	4,995	\$550.00	\$2,747,250.00
5.6	100mm Forcemain	l.m.	2,890	\$350.00	\$1,011,500.00
5.7	100mm Forcemain in Roadway	l.m.	595	\$475.00	\$282,625.00
5.8	Service Connections	ea.	20	\$8,500.00	\$170,000.00
5.9	Restoration	l.m.	4,995	\$95.00	\$474,525.00
5.10	Highway Crossing	l.m.	85	\$4,000.00	\$340,000.00
5.11	Railway Crossing	l.m.	60	\$4,000.00	\$240,000.00
5.12	Lift Station No. 1	LS	1	\$445,000.00	\$445,000.00
5.13	Lift Station No. 2	LS	1	\$445,000.00	\$445,000.00
Subtotal RDNO-8					\$6,650,900.00
Total Section 5.0					\$7,860,000.00
Engineering and Contingency (40%)					\$3,144,000.00
Total					\$11,004,000.00
TOTAL CONSTRUCTION COST (Rounded)					\$36,918,000.00

NOTES

Unit rates for linear pipe are based on the reuse of native backfill

Annual Operation and Maintenance (O&M) Cost Estimate

Labour	\$170,000
Power	\$70,000
Consumables (chemical, etc.)	\$24,000
Trucking (biosolids)	\$16,000
Parts Replacement Allowance	\$18,000
Membrane Replacement (12 years)	\$30,000
Sampling/Testing/Reporting	\$18,000
Vehicle allowance	\$12,000
Administration	\$42,000

TOTAL ANNUAL	\$400,000
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