Regional District of Okanagan-Similkameen

Okanagan Falls Area
Liquid Waste Management Plan - Amendment
Combined Stage 1 & Stage 2 Report

Prepared by:

AECOM
201 – 3275 Lakeshore Road
Kelowna, BC, Canada V1W 3S9
www.aecom.com

250 762 3727 tel
250 762 7789 fax

Project Number:

111102-03

Date:

June 3, 2010

Statement of Qualifications and Limitations

The attached Report (the "Report") has been prepared by AECOM Canada Ltd. ("Consultant") for the benefit of the client ("Client") in accordance with the agreement between Consultant and Client, including the scope of work detailed therein (the "Agreement").

The information, data, recommendations and conclusions contained in the Report (collectively, the "Information"):

- is subject to the scope, schedule, and other constraints and limitations in the Agreement and the qualifications contained in the Report (the "Limitations")
- represents Consultant"s professional judgement in light of the Limitations and industry standards for the preparation of similar reports
- may be based on information provided to Consultant which has not been independently verified
- has not been updated since the date of issuance of the Report and its accuracy is limited to the time period and circumstances in which it was collected, processed, made or issued
- must be read as a whole and sections thereof should not be read out of such context
- was prepared for the specific purposes described in the Report and the Agreement
- in the case of subsurface, environmental or geotechnical conditions, may be based on limited testing and on the assumption that such conditions are uniform and not variable either geographically or over time

Consultant shall be entitled to rely upon the accuracy and completeness of information that was provided to it and has no obligation to update such information. Consultant accepts no responsibility for any events or circumstances that may have occurred since the date on which the Report was prepared and, in the case of subsurface, environmental or geotechnical conditions, is not responsible for any variability in such conditions, geographically or over time.

Consultant agrees that the Report represents its professional judgement as described above and that the Information has been prepared for the specific purpose and use described in the Report and the Agreement, but Consultant makes no other representations, or any guarantees or warranties whatsoever, whether express or implied, with respect to the Report, the Information or any part thereof.

The Report is to be treated as confidential and may not be used or relied upon by third parties, except:

- as agreed in writing by Consultant and Client
- as required by law
- for use by governmental reviewing agencies

Consultant accepts no responsibility, and denies any liability whatsoever, to parties other than Client who may obtain access to the Report or the Information for any injury, loss or damage suffered by such parties arising from their use of, reliance upon, or decisions or actions based on the Report or any of the Information ("improper use of the Report"), except to the extent those parties have obtained the prior written consent of Consultant to use and rely upon the Report and the Information. Any damages arising from improper use of the Report or parts thereof shall be borne by the party making such use.

This Statement of Qualifications and Limitations is attached to and forms part of the Report and any use of the Report is subject to the terms hereof.

AECOM
201 – 3275 Lakeshore Road
Kelowna, BC, Canada V1W 3S9
www.aecom.com

250 762 3727 tel
250 762 7789 fax

June 3, 2010

Andrew Reeder, P.Eng.
Engineering Services Manager
Regional District of Okanagan-Similkameen
101 Martin Street
Penticton BC V2A 5J9

Project No: 111102-03

Dear Mr. Reeder:

Regarding: RDOS Okanagan Falls Combined Stage 1 / 2 LWMP Report

Attached please find one (1) printed copy of the RDOS Okanagan Falls combined Stage 1 / 2 report. The report has been revised and updated since the Public Information Meeting on November 18, 2009 and has been reviewed by the members of the Advisory Committee. All feedback and comments from the Advisory Committee, the public, government agencies and involved RDOS staff members has been incorporated. Please forward this report to the Board for ratification that we may formally proceed with the Stage 3 report and complete this LWMP amendment.

Sincerely,
AECOM Canada Ltd.

T.R. Forty, P.Eng.

TF:tf

Distribution List

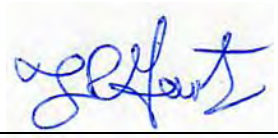
# of Hard Copies	PDF Required	Association / Company Name
1	1	Andrew Reeder, RDOS

Revision Log

Revision #	Revised By	Date	Issue / Revision Description
0	Tim Forty	July 2009	Draft combined Stage 1 and Stage 2 Report
1.0	Jan Bath	August 6, 2009	Revised Draft combined Stage 1 and Stage 2 Report
1.1	Piero Galvagno	August 28, 2009	Revised combined Stage 1 & Stage 2 Report
1.2	Tim Forty	September 9, 2009	Revised and updated combined Stage 1 and Stage 2 Report
1.23	Tim Forty	September 17, 2009	Revised and updated combined Stage 1 and Stage 2 Report
1.3	Tim Forty	September 27, 2009	Revised and updated combined Stage 1 and Stage 2 Report
1.4	Tim Forty	October 4, 2009	Revised and updated combined Stage 1 and Stage 2 Report
1.5	Tim Forty	October 4, 2009	Revised and updated combined Stage 1 and Stage 2 Report
1.6	Tim Forty	November 3, 2009	Revised and updated combined Stage 1 and Stage 2 Report
2.0	Tim Forty	November 24, 2009	Revised and updated combined Stage 1 and Stage 2 Report after PIM
2.1	Piero Galvagno	November 25, 2009	Revised and updated combined Stage 1 and Stage 2
3.0	Tim Forty	December 15, 2009	Updated report, inserted feedback and review comments
3.1	Piero Galvagno	December 15, 2009	Updated report
3.2	Tim Forty	January 19, 2010	Updated report, inserted review comments
4.0	Tim Forty	February 15, 2010	Inserted effluent return option clarifications and PIM presentation
4.1	Piero Galvagno	February 20, 2010	Reviewed and updated combined Stage 1 and Stage 2
4.2	Tim Forty	February 22, 2010	Reviewed and accepted changes and Inserted AC meeting minutes into Appendix B
4.3	Tim Forty	February 23, 2010	Inserted the correct version of the November 2009 Newsletter
4.4	Tim Forty	March 4, 2010	Updated and revised the report based on RDOS Staff review comments
4.5	Tim Forty	June 3, 2010	Updated report based on Ministry Staff review comments.

AECOM Signatures

Report Prepared By:



Timothy R. Forty, P.Eng., Stamp
Senior Project Engineer

Report Reviewed By:

Piero Galvagno, P.Eng., Stamp
Project Engineer

Executive Summary

This report details the results of the combined Stage 1 / Stage 2 effort for the amendment of the existing Liquid Waste Management Plan for the Regional District of Okanagan-Similkameen (RDOS) for the Okanagan Falls (Okanagan Falls) area. This Amendment provides an update to the previous LWMP and summarizes existing conditions with the Okanagan Falls area. The "Okanagan Falls area" includes the currently serviced Okanagan Falls residential area plus Skaha Estates and Kaleden. The work undertaken as part of the combined Stage 1 / Stage 2 process involved, in part, reviewing the *Okanagan Falls Sewage Treatment Plant Strategic Review Study* (referred to hereinafter as the 2005 *Strategic Review*) completed in 2005 by AECOM under the previous company name of Earth Tech Canada Ltd. The 2005 *Strategic Review* involved identifying and developing suitable options for the management of domestic wastewater for the Okanagan Falls, Kaleden and Skaha Estates areas. Due to the extensive public involvement throughout the 2005 *Strategic Review* development process, this study was considered to be essentially equivalent to a conventional Stage 1 process for the development of a Liquid Waste Management Plan (LWMP). As a result, the Ministry of Environment authorized the RDOS to utilize a combined Stage 1 / Stage 2 process for this LWMP amendment rather than two separate Stages. A series of Advisory Committee (AC) meetings plus an open house, served as a forum for feed-back and education. The open house format Public Information Meeting held at the Okanagan Falls Elementary School on November 18, 2009,

Based on feed-back from the committee and the general public, the current approach to wastewater management is not sustainable.

The 2005 *Strategic Review* identified and assessed 10 options for the treatment plant process, 4 options for the plant location, and 2 options for expansion of the sewer service area. The options covered a variety of wastewater management approaches ranging from expanding the existing sewage treatment operation to relocating the treatment system to a new site. A summary of the options for the treatment plant and the costs are presented in Section 10. To complement recommendations made in the 2005 *Strategic Review* several new concepts for the beneficial reuse of the plant effluent as well as two supporting public education programs were identified. The LWMP Advisory Committee (AC) endorsed the findings of the 2005 *Strategic Review* and these newly identified reuse and the public education program concepts. The public feedback after the Public Information Meeting showed that the public were strongly supportive of the Preferred Solutions selected by the Advisory Committee and wanted to proceed as quickly as possible with the Stage 2 implementation which would provide sewer service to both the Kaleden Lakeshore area and Skaha Estates. The Preferred Solutions and all options considered are discussed at length in the body of the report. Ministry of Environment staff were of the opinion that the public may not have fully understood that the worst case scenario could result in 100% of the plant effluent being discharged to Okanagan River and required the RDOS to prepare and send out a special newsletter with this possibility clearly explained to all the residents in the plan area. No negative feedback was received from the public as a result of this newsletter.

The sewage treatment option endorsed by the Advisory Committee and the public in this LWMP involves constructing a new wastewater treatment plant at a new site located south of the existing plant. This option, first proposed by the 2005 "Strategic Review", was supported by 89% of the public in a June 2005 survey.

The options for the discharge of effluent to the environment were all generally supported by the Advisory Committee and the public. . The public supports using effluent for irrigation and habitat enhancement. In particular, effluent could be used for enhancement of wetlands in the Vaseux Lake area. In addition, irrigation of sports fields at Keogan Park with effluent could free up potable water for other uses and act as a demonstration project for irrigation with reclaimed water. The demonstration project for the irrigation of Keogan Park would only utilize about 45 m3/day but could be expanded to other areas if sufficient interest were generated. There is a possibility that the wetlands

enhancement and the initial demonstration irrigation project will be unable to handle all the effluent and the fallback option would be to utilize a river diffuser as a means of discharging effluent to the environment. It is possible that the river discharge could be used to discharge 100% of the effluent although that is not the preferred solution. Environmental Impact Studies for both the river discharge and the wetlands enhancement option are required prior to implementation. At least one public information meeting will be held during the pre-design stage to allow the opportunity for public feedback on the selected options. The public information meeting will be conducted once the Environmental Impact Studies have been finalized and the sewer costs updated. Results of the pre-design and public feedback should serve as the basis for the option or mix of options that will be selected for implementation with the new wastewater treatment plant.

Based on the work conducted in this combined Stage 1 / Stage 2 LWMP, and feedback from the Advisory Committee and the general public, it is recommended that preparation begin for Stage 3 of the LWMP. The Stage 3 report should be finalized as soon as possible in preparation for the implementation of design and construction of the new wastewater treatment plant at the site south of Okanagan Falls purchased by the RDOS specifically for this purpose. This recommendation is supported by the Advisory Committee, Regional District of Okanagan-Similkameen staff and most importantly by the majority of residents in the Okanagan Falls, Kaleden and Skaha Estates areas who provided feedback.

Definitions and Acronyms

• **AC**	Advisory Committee, composed of members of the public and government agencies to provide advice during the development of the LWMP
• **ADF**	Average Day Flow
• **AWWT**	Advanced Waste Water Treatment
• **Biosolids**	The solids waste, or sludge, from a wastewater treatment plant that has received treatment to remove pathogens and is of a quality that it is suitable for use as a soil amendment or soil conditioner (See OMRR)
• **Blackwater**	Waste associated with toilets
• **BOD**	Biological Oxygen Demand. The amount of oxygen needed to breakdown the organic matter in the wastewater.
• **BNR**	Biological Nutrient Removal. An advanced tertiary wastewater treatment process that removes nutrients biologically from sewage wastes and can produce an effluent that may be discharged to surface waters without negative impact
• **CCME**	Canadian Council of Ministers of the Environment
• **COP**	Code of Practice. Refers to a code which defines acceptable practices, developed under the Municipal Sewage Regulation. An example is the Code of Practice for the Use of Reclaimed Water which is a key reference and guidance document for implementing reclaimed water use and complying with the MSR
• **Disinfection**	A treatment process used to kill or deactivate pathogenic material. Chlorination and UV are processes commonly used for disinfecting effluent before discharge to the environment
• **Effluent**	The treated liquid discharge from a wastewater treatment plant
• **Greywater**	Waste associated with wash water (ie, shower/bath, cooking, etc)
• **IHA**	Interior Health Authority
• **LWMP**	Liquid Waste Management Plan
• **MCRD**	Ministry of Community and Rural Development formerly known as the Ministry of Community Development, (MCD), the Ministry of Community Services, (MCS), the Ministry of Corporate, Aboriginal and Women"s Services (MCAWS), and prior to that as the Ministry of Municipal Affairs, (MA).
• **MoE**	Ministry of Environment
• **ML**	Mega Litre (1,000,000 litres or 1,000 m^3)
• **MSR**	Municipal Sewage Regulation. A regulation that prescribes the treatment requirements for the authorized discharge of municipal wastes to the environment

• **OC**	Operational Certificate. The OC provides the conditions under which a discharge, authorized by the Minister when a LWMP was approved, must occur
• **Okanagan Falls Area**	The Okanagan Falls Area includes the currently serviced residential area of Okanagan Falls, Skaha Estates and Kaleden
• **OK Water**	Okanagan Water Quality Control Project, a Ministry of Environment project team tasked with developing and implementing LWMPs for communities in the Okanagan Basin to resolve high phosphorus loadings to the Okanagan Lake system.
• **OMRR**	Organic Matter Recycling Regulation. The regulation that prescribes the required treatment for sludge to produce a useful biosolids product that may be utilized as a soil amendment or soil conditioner.
• **Oxidation Ditch**	The existing WWTP is an Oxidation Ditch. A secondary wastewater treatment plant which uses a rotating “brush aerator” in an oval racetrack configuration to create an aerobic environment wherein microbes break down the sewage wastes.
• **Primary**	Primary treatment consists of the removal of suspended solids from the influent wastewater.
• **Reclaimed Water**	The effluent from a wastewater treatment plant that has undergone sufficient treatment that it may be used for golf course or crop irrigation, for wetlands enhancement or for stream flow augmentation.
• **ROW**	Right-of-Way.
• **RI**	Rapid Infiltration.
• **Secondary**	Secondary treatment consists of primary treatment plus the removal of BOD from wastewater.
• **Sewage**	Also known as raw sewage, municipal wastewater, liquid waste or wastewater
• **Sludge**	The solid or semi-solid waste from a wastewater treatment plant. Sludge may be processed into useful biosolids in accord with the requirement of the OMRR.
• **Septage**	The semi-solid waste pumped from septic tanks.
• **STP**	Sewage Treatment Plant.
• **Tertiary**	Tertiary treatment consists of secondary treatment with nutrient removal processes added. The City of Kelowna operates an advanced tertiary treatment plant utilizing BNR technology to produce effluent of such high quality that it can be discharged directly to Okanagan Lake with no adverse affect.
• **TSS**	Total Suspended Solids.
• **UV**	Ultra Violet. UV is a form of disinfection where high intensity ultraviolet light is used to kill or deactivate pathogenic material.
• **Wastewater**	Often meant as a short form for Municipal Wastewater in the LWMP context, one portion of which is raw sewage.
• **WWTP**	Wastewater Treatment Plant.

Table of Contents

List of Figures

List of Tables

Appendices

1. INTRODUCTION

A Liquid Waste Management Plan (LWMP) amendment is being developed for the Regional District of Okanagan-Similkameen (RDOS) for the Okanagan Falls area. LWMPs are encouraged by both the Ministries of Environment and Health, where existing or anticipated impacts from wastewater treatment and disposal practices threaten the environment or public health. A LWMP investigates existing circumstances, researches viable alternatives and improvements and finally, with public input, recommends the most financially and environmentally acceptable solutions.

The RDOS and the Ministries of Environment and Health are all concerned that continued management of sewage wastes in the Okanagan Falls area utilizing the existing sewage treatment and effluent disposal system is simply not sustainable in its present form. This view is shared by the LWMP Advisory Committee and the general public in the Okanagan Falls area.

Subsequent qualifications for senior government infrastructure grant funding will be greatly assisted by an approved LWMP.

A study conducted by AECOM (formerly Earth Tech Canada Ltd.) entitled "*Okanagan Falls – Sewage Treatment Plant – Strategic Review*" dated August 2005, identified a number of options that could be utilized to upgrade the existing sewage collection, sewage treatment and effluent handling systems. There was considerable public involvement in the development of this strategic review, and subsequently the Ministry of Environment agreed that a combined Stage 1 / Stage 2 LWMP process would be appropriate. The recommendations from the 2005 *Strategic Review* study have been incorporated directly into the body of this report as they are the background required for a complete Stage 1 report. Based on the strength of public support for the recommendation in the 2005 *Strategic Review,* that the new wastewater treatment plant should be relocated to the South of the existing plant, away from populated areas, the RDOS made arrangements to purchase a property that met these requirements. Prior to final purchase the property was removed from the ALR and rezoned to permit the construction and operation of a wastewater treatment plant. These recommendations regarding the location and treatment process are two of the *Preferred Solutions* that form the core of the first part of the first stage of the implementation of this LWMP.

This LWMP amendment will provide an update with respect to wastewater management and existing conditions in the Okanagan Falls area and detail the impact upon the environment since the completion of the original LWMP in 1989. The amendment will involve identifying and developing suitable option(s) for the management of domestic wastewater in the plan area for both the short and long term and will build upon the results of the 2005 *Strategic Review* and other related studies undertaken by the RDOS.

During the process of developing the LWMP, several ideas were suggested for the beneficial reuse of the effluent produced by the proposed new wastewater treatment plant. Additionally there were two public information and education programs that were identified as *Preferred Solutions* needed to complete the first stage of the implementation of this LWMP.

2. LWMP DEVELOPMENT

2.1 What is a LWMP?

This LWMP is a plan for a specific area that charts the future course of action with respect to sewage, stormwater and other wastewaters, including the management, collection, treatment, and disposition of the effluent. However, a LWMP considers more than community sewers as solutions for managing liquid wastes. It can also deal with lot sizes, zoning, development permits, water conservation programs, public education programs and septic tank maintenance bylaws aimed at making septic systems more environmentally friendly.

A LWMP is a tool used to develop cost-effective and sustainable solutions to address local liquid waste issues, it allows a community to: protect human health and the environment, develop strategies to minimize wastewater generation, meet water conservation goals, maximize use of reclaimed water, and address stormwater issues.

Public participation is mandatory for the development of an effective Liquid Waste Management Plan to ensure the Plan reflects the needs of the community, now and for the future. This is especially important as the implementation of any recommendations will be funded by those in the Plan area.

2.2 Why Develop a LWMP?

Advance planning can ensure that current and future needs for the management of liquid wastes for the community are met. It saves both the environment and the taxpayer by creating proactive solutions rather than the more costly option of reacting to problems as they arise.

A LWMP provides an opportunity for ratepayers to assist in the process of identifying and selecting the best solutions for their community and can increase support for implementation of the recommendations to address their current and future needs.

Further, there is a higher likelihood of obtaining grant monies for implementing a LWMP as the community need, environmental and health benefits are all clearly identified in the LWMP.

2.3 How is a LWMP Developed?

2.3.1 LWMP Ground Rules

- Identify and solicit input from appropriate government agencies, Non Government Organizations (NGOs), special interest groups (if any) and the general public in the plan area
- Answer all questions completely and openly
- Consider all ideas suggested
- Discard suggested options only for sound technically defensible reasons with a clear explanation of the reasoning behind the decision
- Elected officials make final decision on the selected LWMP preferred solution or mix of preferred solutions for the management and future management of wastewaters for the LWMP plan area ONLY after carefully considering all presented information including feedback from an informed public

2.3.2 LWMP Process

The Regional District must first recognize the need for a LWMP amendment. It must then retain consultant(s), notify the Ministry of Environment of its intent to develop a LWMP and form committee(s) to assist in the process. In this LWMP amendment, a decision has been made to combine the Technical Advisory Committee and the Public Advisory Committee to form a Single Advisory Committee known as the Advisory Committee or AC. This committee will take into account all the technical details and provide an insight into local issues, review information, and ensure the LWMP is meaningful and relevant to the citizens of the plan area. Membership in the current committee includes RDOS staff; consultants representatives; Ministry of Environment and Interior Health representatives; and members of the Single Advisory Committee who have been selected by the RDOS to provide a representative cross section of the various communities and interests in the plan area. A list of individuals who have participated in the process is included in Appendix A.

The Ministry and the RDOS have agreed that in light of the substantial effort and public involvement during the development of the 2005 *Strategic Review* that this LWMP amendment may utilize a combined Stage 1 / Stage 2 process with only a single public open house being required. The combined process is defined in the following sections.

2.3.2.1 Combined Stage 1 / Stage 2

Data collection plus option identification followed by option development, cost analysis and finally selection of the Preferred Solution; and would:

- Identify existing situation including known environmental and health issues with respect to wastewater(s)
- Identify possible future issues with respect to wastewater(s)
- Identify potential options for the management of wastewater(s) to resolve the issues
- Develop identified options in sufficient detail to permit comparison between different options. This includes new options that may be identified by the public at the Public Information Meeting
- Provide clear and reasoned explanation for those options that are technically impractical

- Develop the Cost Analysis to a sufficient level to permit Order of Magnitude cost comparisons between options - including costs on a per household basis
- Present the Advisory Committee"s preferred solution (or mix of solutions) to the Regional Board for consideration based upon the information developed throughout the LWMP process and – most importantly – feedback from an informed public

2.3.2.2 Stage 3: Finalization

Stage 3 is characterized as finalization of the process. An Executive Summary is to be included in the Stage 3 report, based on the combined Stage 1 / Stage 2 report, and would provide:

- Details of the selected option, the process followed, and rationale for options not selected and why
- An outline of what is to be done; level of treatment and effluent disposition (disposal or reuse) required
- A schedule of stages and phases for the wastewater treatment plant and collection system installation and upgrades if appropriate, including costs and timing of each stage and phase of upgrade (Extracted and condensed from Stage 2)

The following additional information is also included in the Stage 3 report:

- Any required Bylaws and who is to prepare them
- A summary of public involvement, including the public information meetings, presentations, media advertisements, handouts, mail-outs or other information made available to the public. (Copies of the original documents are included for reference in the appendix of the combined Stage 1 /2 report.)

Two copies of the documents for the combined Stage 1 / 2 and the Stage 3 reports developed for the LWMP are forwarded to the Penticton Ministry of Environment office. Ministry staff will provide comments on the plan and the adequacy of the public consultation for the Minister during the final review and approval phase.

Ministry staff and RDOS staff work co-operatively to develop the Operational Certificate (OC) that will be necessary for the treatment facilities proposed by the LWMP.

2.4 LWMP Operational Certificate and Regulatory Issues

The Operational Certificate (OC) for the Okanagan Falls WWTP was issued on January 12, 1999 in conformance with the Waste Management Act, which was the enabling legislation at that time. The OC was issued in accordance with the Approved Liquid Waste Management Plan (LWMP). The LWMP was submitted on Aug 24, 1989 and received Ministerial Approval on May 22, 1990.

A LWMP and an Official Community Plan (OCP) must also be in accord with one another and cannot differ in any substantive detail. It is good policy to review the OCP, either prior to or during the LWMP process to ensure that both reflect current conditions and the wishes of the community.

Wastewater issues were discussed in a report prepared by Urban Systems entitled "*Okanagan Falls Area Sewerage Study*", issued in December 1998. The report discusses flows, treatment options and a collection area expansion to include Skaha Estates and Kaleden. This report was never utilized as a basis for an LWMP upgrade. The report bears some resemblance to the August 9, 2004, report by Urban Systems entitled "*Okanagan Falls Sewage Treatment Plant Capacity Assessment*". These earlier studies indicate a

concern about sewering issues on the part of the Regional District and have been brought to the public"s attention during the LWMP amendment process.

A water conservation programme will be an essential component of the LWMP. Reducing water consumption can reduce the hydraulic loading on the wastewater treatment plant. A public information program could also remind the public that garburettors, under the sink devices that turn waste food into organic slurry, add to the biological load on the already taxed WWTP and are prohibited in the current OC.

The Operational Certificate will need to be amended after the Minister approves the updated Liquid Waste Management Plan. This will include new flow information, WWTP location and, details and the disposition (Reuse and/or disposal) of the effluent produced. In addition, reference to current legislation and regulations (specifically the Organic Matter Recycling Regulation) will need to be included.

The current Okanagan Falls OC makes reference to the Waste Management Act, which has been superseded by the Environmental Management Act. Any such references will need to be updated in the amended OC that would be issued after the amended or updated LWMP has been approved by the Minister. Due to Ministry of Environment staffing constraints it is recommended that the RDOS or its consultant prepare a first draft in Microsoft Word of an amended OC. This draft OC would be based on an update of the old OC. It would be reviewed and suggestions for changes made by both Ministry and RDOS staff, a negotiation process that can take several weeks. The amended OC should contain estimated annual flows for at least 10 years into the future, and all the necessary constraints and monitoring requirements contained within the current OC but amended for current and future conditions as spelled out in the amended LWMP.

3. LWMP AREA

The LWMP study area includes the communities of Okanagan Falls, Kaleden, and Skaha Estates. The LWMP areas are shown on **Figure 3.1** below.

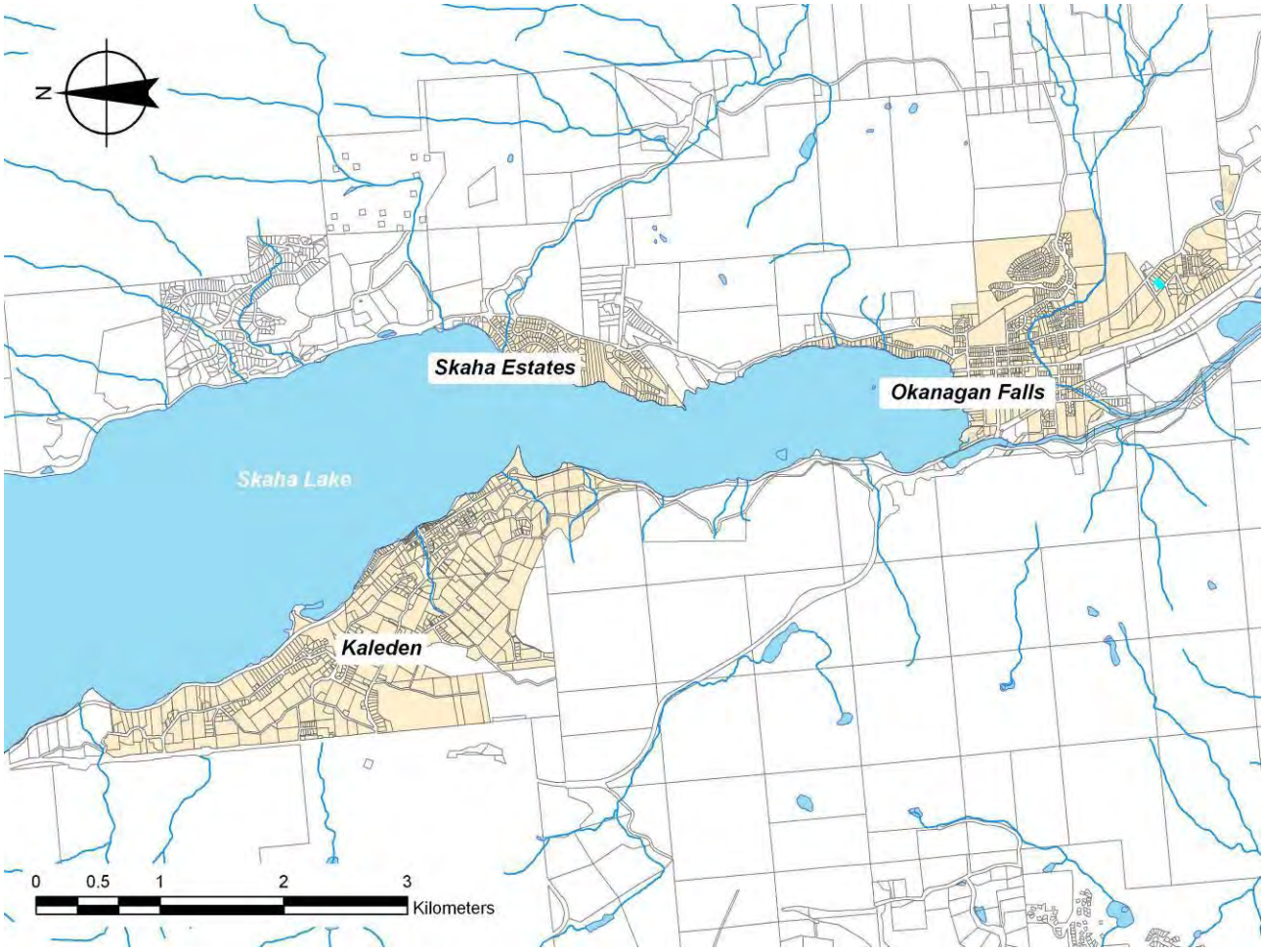


Figure 3-1 - LWMP Potential Sewage Collection Areas

Sewage wastes are currently collected only within the Okanagan Falls Sewerage Area and are directed to the existing oxidation ditch secondary treatment facility. A study conducted by AECOM (formerly Earth Tech Canada Ltd.) entitled "*Okanagan Falls Sewage Treatment Plant – Strategic Review*" dated August 2005, identified the costs of providing sewer service to Kaleden and Skaha Estates and this information has been updated and is included in this report.

4. EXISTING CONDITIONS AND FLOW ASSUMPTIONS

The Okanagan Falls Wastewater Treatment Plant (WWTP) is an oxidation ditch process, constructed in the late 1970's along with a piped sewer system. The Okanagan Falls WWTP is located near the confluence of Shuttleworth Creek and the Okanagan River (Figure 4-1). The treatment plant consists of a bar screen, oxidation ditch, clarifier and sludge drying beds. Clarified effluent from the plant is pumped to rapid infiltration basins located approximately 2.7 km from the WWTP.

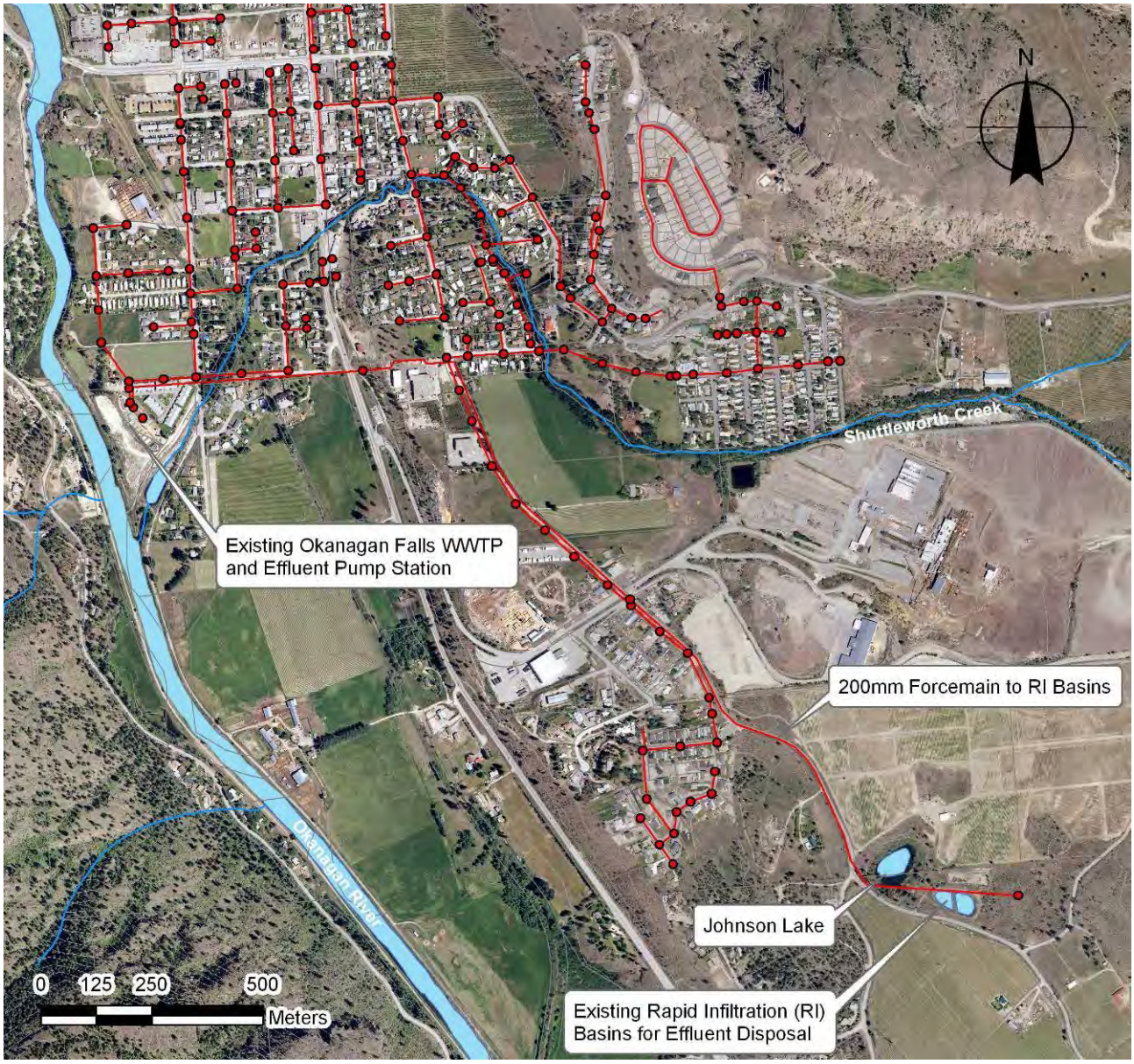


Figure 4-1 - Existing System

In 1989, the RDOS completed a Liquid Waste Management Plan (LWMP) for Rural Osoyoos, Rural Oliver and Rural Okanagan Falls / Kaleden. The LWMP was completed by T.R. Underwood Engineering and it determined that the Okanagan Falls WWTP and the Rapid Infiltration effluent disposal system were providing an adequate level of phosphorus removal. However, the Kaleden Lakeshore and Skaha Estates areas, which were serviced by septic fields, could potentially have a negative impact on Skaha Lake as those treatment systems age. The LWMP suggested a time frame of 1999-2004 for addressing phosphorus loading from Skaha Estates and Kaleden through sewering.

In the early 1990"s, a multi-family development was permitted for construction adjacent to the existing treatment plant. Neither the treatment process nor the original sludge management systems were designed for odour control. As a result, the encroachment of development and loss of a buffer has increased the frequency of odour and noise complaints received by the RDOS.

Previous studies have highlighted the need to upgrade the existing wastewater treatment plant. A 1998 report by Urban Systems, reported that the treatment capacity of the plant was constrained by the clarifier capacity. The clarifier was estimated in the report to have a capacity of 750 m^3/day, based on a surface loading rate of 10 – 13 m^3/day/m^2. A more recent report by Earth Tech suggests that the clarifier capacity is 850 m^3/day based on a surface overflow rate of 40 m^3/day/m and a raw wastewater instantaneous peaking factor of 3. The difference does not materially change the recommendation that an upgrade is required. Even in 1997, maximum daily flows exceeding 900 m^3/day were recorded.

Effluent from the oxidation ditch process is pumped to a set of infiltration basins on Oliver Ranch Road, an elevation difference of approximately 65 metres. The most recent Urban Systems report (August, 2004) concludes that the maximum infiltration rate is limited to 800 m^3/day because of clogging or mounding in one of the basins. Since the basins are used sequentially, the reduced capacity of one basin results in a "bottleneck" in the effluent disposal operation. As a further complication, the discharge of effluent has resulted in the formation of a small pond in a kettle located down-gradient of the basins. The pond, now referred to as Johnson Lake, provides habitat for indigenous aquatic species.

As a result of the limited disposal capacity and habitat issues, consideration needs to be given for the future long term disposal of effluent from the Okanagan Falls WWTP.

The three key issues that were addressed as part of the 2005 S*trategic Review* of long-term upgrade options were:

1. Existing Plant Capacity - the existing flows regularly exceed the theoretical capacity of the WWTP;
2. Future Growth – any treatment plant upgrades must allow for future growth in Okanagan Falls, as well as an expanded sewerage area to include Kaleden and Skaha Estates; and
3. Local Impacts – treatment upgrades must be sensitive to the presence of local residents.

In 2005 a Salsnes fine screen filter unit was installed to remove approximately 30% of the influent BOD. By reducing the loading, the oxidation ditch could be operated at a lower mixed liquor suspended solids, thereby increasing the clarifier hydraulic capacity. As a result, the fine screen filter permitted the existing oxidation ditch aeration system to handle a larger influent sewage flow.

The Salsnes filter upgrade was recognized to be a temporary fix and longer term upgrade strategy was required. The 2005 *Strategic Review* was developed with extensive public input and is considered a critical precursor to this LWMP amendment. The Ministry of Environment recognized the value of the public

involvement and authorized the RDOS to develop a streamlined combined Stage 1 / Stage 2 LWMP rather than the separate three stage LWMP normally required for an LWMP amendment of this complexity. A number of options were identified in the 2005 *Strategic Review* and they will be discussed in some detail in the following section of this report, as is appropriate for a combined Stage 1 / 2 LWMP report.

The 2005 *Strategic Review* report included flow monitoring results provided by RDOS treatment plant staff. The data illustrated that flows were increasing with time until at least 2003 as more and more people were connected to the system. In the past several years the wastewater flows seemingly have declined. The decline could be due to the effects of water conservation practices, declining industrial wastewater generation, and aging flow meters at the treatment plant. Industrial wastewater generation has declined in Okanagan Falls over the past few years when several years ago a dried fruit processing industry was shut down and more recently due to the economic downturn the Weyerhaeuser sawmill discontinued operation.

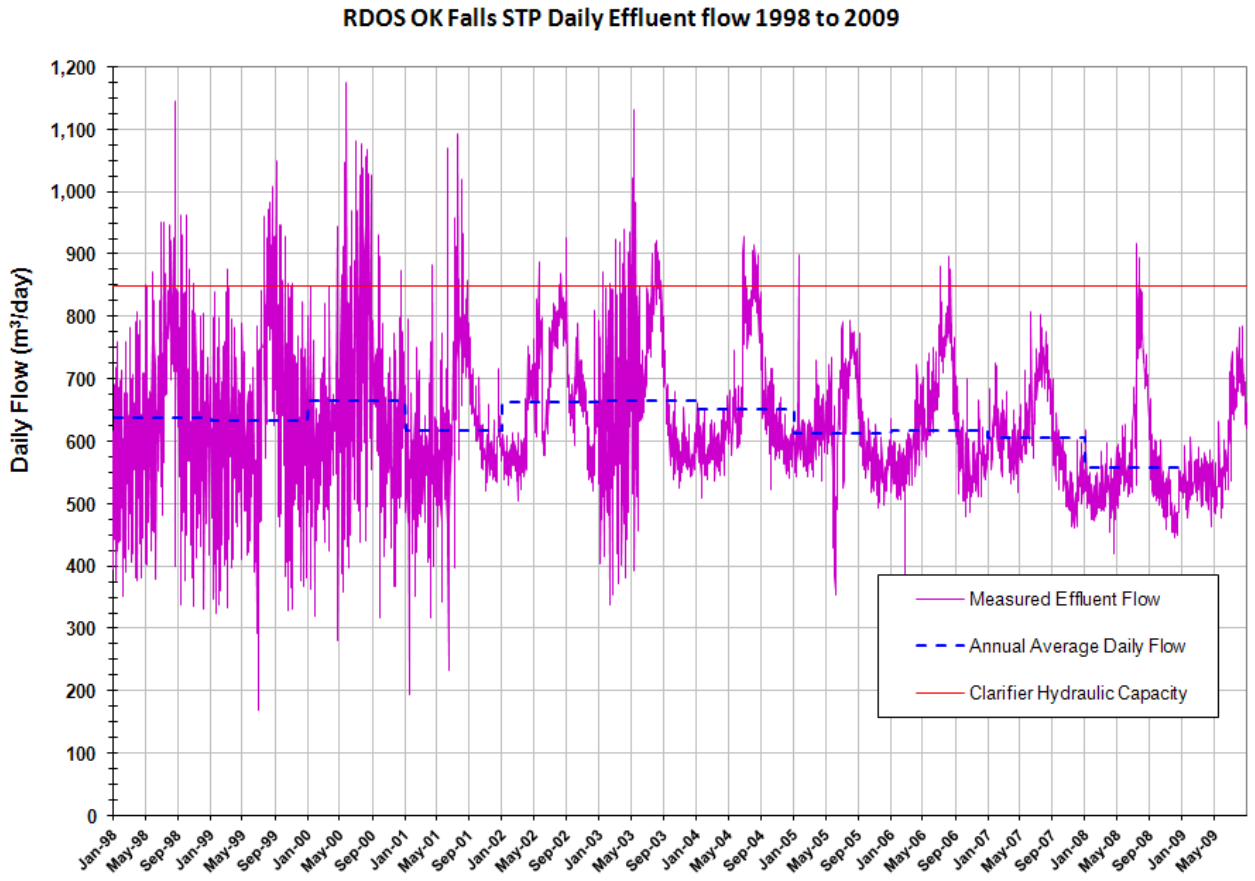


Figure 4-2 - Daily Effluent Flow from the Okanagan Falls WWTP 1998 to 2009

In spite of the data accuracy and meter error issues, there are long term indications that plant flow has exceeded the hydraulic capacity of the clarifier on a great many occasions for many years. It is probable that the situation has not become critical due to industry shutdowns and the fact that while high flows do occur they do not appear to have a significant duration for any one instance. There is also speculation that the data

was showing unrealistically high spikes as the measurements were reportedly not all taken at precisely the same time each day, resulting in some longer “days” and some shorter ones, with the resulting highly variable results. This variability does indeed show in the data prior to September 2001 but appears to have been resolved since that time as there is significantly less fluctuation in the plotted data after that time except for a short period in the early months of 2003.

The daily flow to the WWTP is characterized by higher flows in the summer months from late June to early September. Peaks, troughs and annual average flows peaked in 2003 and have declined since that time. The 2009 data is only partial as the year is not yet complete but the low flow data appears very similar to the 2008 data. The peak flow in 2009 did not exceed the clarifier capacity as it did in many other years.

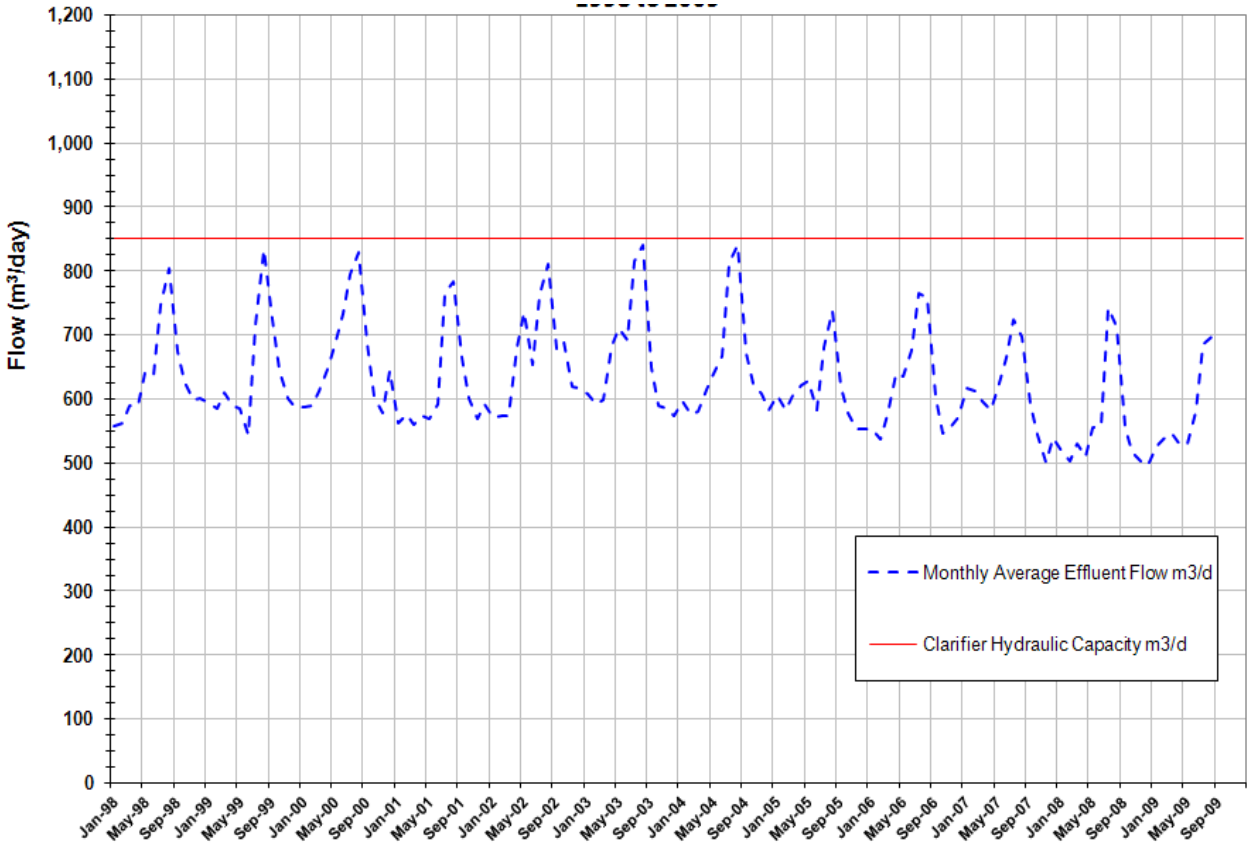


Figure 4-3 - Monthly Average Effluent Flow from the Okanagan Falls WWTP 1998 to 2009

Compiling the daily data into monthly average daily values essentially negates the variability introduced by erratic daily measurements and clearly shows the very high flows that are experienced by the plant during the summer months of July and August each year. The very high flows may be somewhat exaggerated by metering errors but nonetheless they indicate that the summer peak flows are substantially higher than the fall, winter and spring flows.

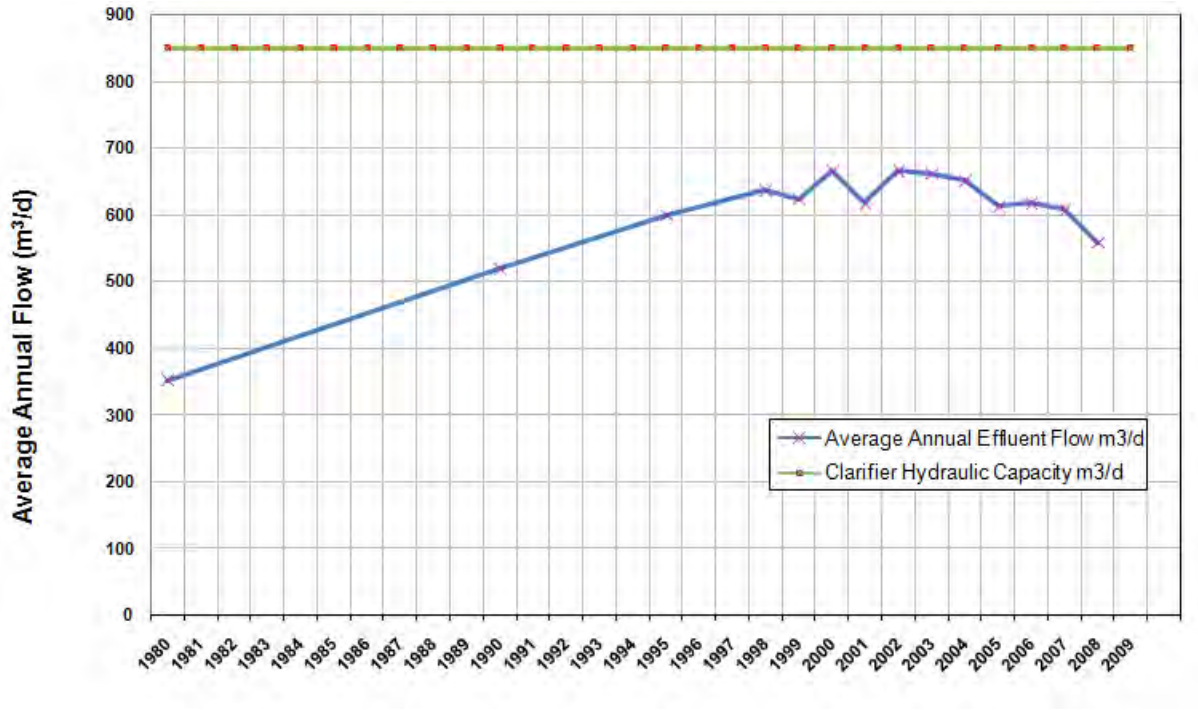


Figure 4-4 - Annual Effluent Flow from the Okanagan Falls WWTP 1980 to 2008

The total annual effluent flow data shows a definite upwards trend from 1980 to 2003 but appears to have levelled off and has slightly decreased since that time.

Sewage wastes are not collected in either Skaha Estates or Kaleden at this time and on-site wastewater treatment systems utilizing septic tank tile field systems are the preferred method of handling sewage wastes in those areas.

Although the data is rather sketchy there is an indication that the daily flow to the WWTP is characterized by higher flows in the summer months from late June to early September. The flow characteristics to the WWTP for the period of January 1998 to October 2006 are summarized as follows:

- Average Annual Flow (AAF) in the peak flow years is in the order of 650 m^3/day
- Maximum Average Month Flow (August 2004) was about 840 m^3/day
- Maximum Day Flow exceeded 1100 m^3/day prior to 2001 on several occasions and reached or exceeded 850 m^3/d (Maximum plant capacity) on many occasions since that time
- Maximum Day Flow / AAF in the peak flow years is 1.7
- Peak Hour Flow / Average Day Flow: 3.0 (assumed)

The RDOS does not record peak instantaneous flows to the WWTP, but the data available suggests that the WWTP was at approximately 80% of its theoretical capacity during AAF during the peak flow years of 2000 to 2003.

Based on the 2004 average annual daily flow of 650 m^3/day and using the 2005 serviced population of 1,380 people, the per capital wastewater contribution was calculated to be about 470 L/day. This calculated per capita flow rate in Okanagan Falls is at the high end of rates found in other areas of the Okanagan but is similar to that for the City of Penticton (see Table 4-1 – Flow Rate Comparison).

Table 4-1 - Flow Rate Comparison

Penticton per capita flow:	472 L/Capita/day
Vernon per capita flow:	363 L/Capita/day
Kelowna per capita flow:	437 L/Capita/day

For the purposes of sizing treatment components and projecting flows, an average per capita wastewater rate of 470 L/day would be appropriate.
The population variability in Okanagan Falls can be best characterized as “extremely variable” between summer and winter. The number of connections was reported as 1208 in 2006 and has increased to 1240 in mid-2009 but the anticipated linear flow increase has not occurred. In fact the 2008 flow is lower than in previous years and indications are that 2009 will be quite similar. The available flow per connection data is shown in Table 4-2.

Table 4-2 - Flow By Connection

2006	1208 connections	618 m^3/day	0.512 m^3/connection/day
2007	1215 connections	607 m^3/day	0.500 m^3/connection/day
2008	1225 connections	559 m^3/day	0.456 m^3/connection/day
2009	1240 connections	N/A m^3/day	N/A m^3/connection/day

Based on this limited data it would appear that the flow per connection is dropping. Typically, a representative flow per connection would be based on 2 to 2.5 persons per connection; however it is dropping to levels consistent with a single resident per connection. This change may be due in part to the recent economic downturn that has resulted in the shutdown of one of the area"s largest employers, the Weyerhaeuser mill. The mill shutdown may have resulted in people having to relocate or commute to other areas to work. It is also possible that water conservation measures are showing an effect on the plant inflow volume. In addition, a high number of seniors may also account for the lower than expected flows in recent years. It has long been known that senior citizens - on average - use substantially less water than younger people, especially those with children.

Although the anomalous nature of the data indicates that the flow per connection is decreasing, it is unlikely that this trend will continue and a flow of 470 L/day/capita is recommended – as noted above for long term flow calculations. Under normal circumstances for most communities the average population is in the order of 2.5 persons per connection, thus for the known 1240 sewer connections in the Okanagan Falls service area a normal serviced population equivalent to 3100 persons would be anticipated. Therefore at a flow of 470 L/day/capita a total sewage flow could be anticipated to reach 1,457 m^3/day. Interestingly, the sewage flow is only a little over 1/3 of that rate, averaging 559 m^3/day in 2008. This anomaly may be explained as discussed above however if the plant expansion is not designed to accommodate the potential flow of 1,457 m^3/day the potential of overwhelming the new wastewater treatment plant exists if the economic downturn should end and the population expands to a more normal 2.5 persons per connection.

5. POPULATION GROWTH ASSUMPTIONS

5.1 Okanagan Falls

Population growth projections from the *„Area D-2 East Skaha, Vaseux Official Community Plan (OCP Bylaw No. 2454, 2008)"* indicate an anticipated low to medium annual residential growth rate in the order of 1.5% to 2.5% to 2016. The population of Okanagan Falls was estimated to be 1,380 people in 2005 and was expected to reach 1,698 by 2009. Given the current economic downturn and the closure of the Weyerhaeuser mill it is probable that the original growth projections may have been somewhat optimistic. However, it is not unrealistic for the population growth to meet the original projections on a long term basis.

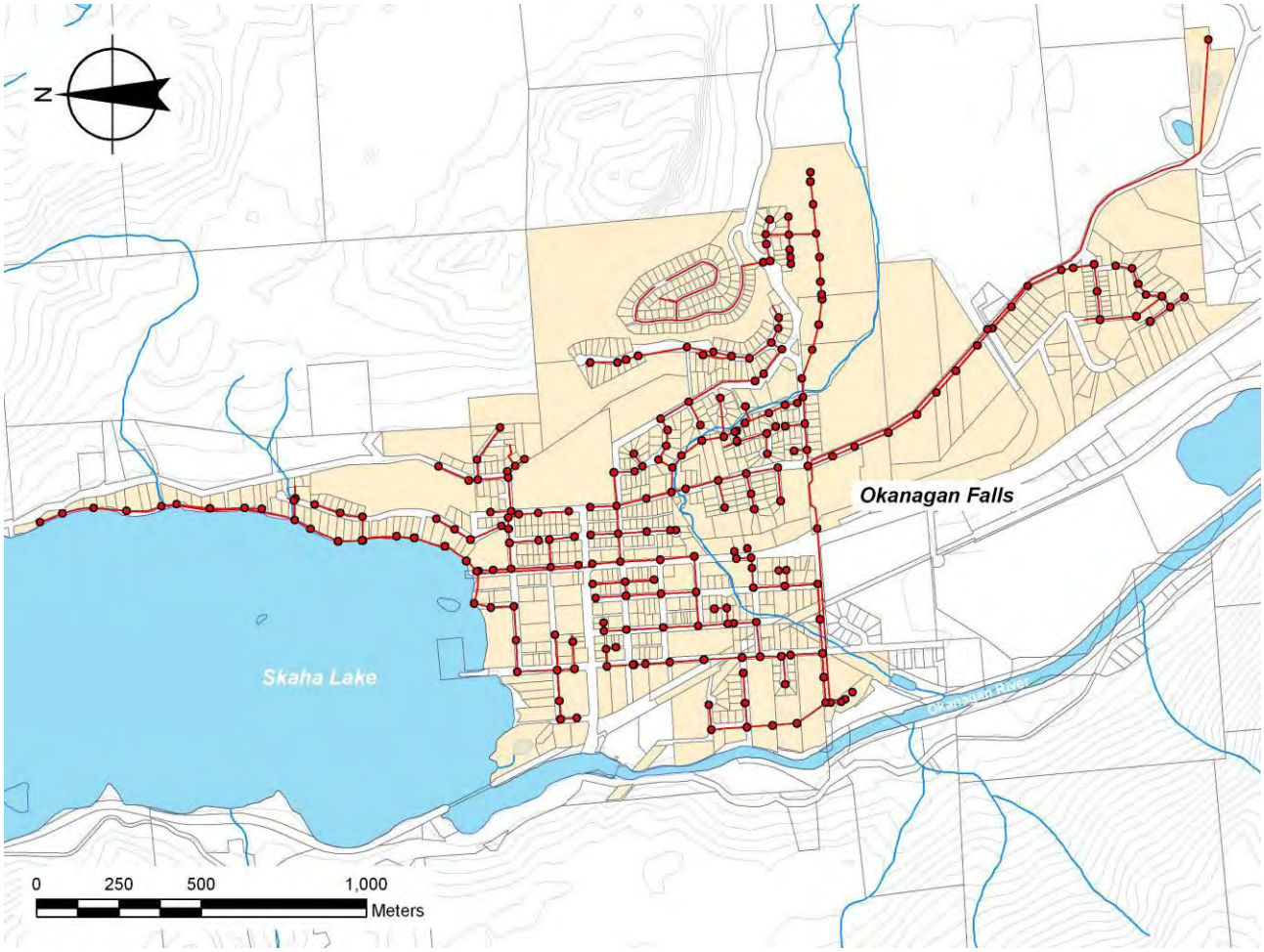


Figure 5-1 - Okanagan Falls Service Area

There are currently 1,240 sanitary service connections within the Okanagan Falls sewerage area which includes residential, commercial and industrial units.

While the average long-term growth rate target is projected to be in the order of 1.5 to 2.5%, short-term population growth can be substantially larger. Interestingly, the growth rate with respect to connections to the sewer system has held fairly steady over the past 3 years at about 1%. Currently, development proposals

being considered by the RDOS may result in an increase of up to 300 residential, multi-family and recreational units. A recent report entitled *Okanagan Falls Sewage Treatment Plant DCC* prepared by Urban Systems and dated August 2009 projected that there could also be an additional 300 units constructed by 2030.

5.1 Skaha Estates

Figure 5-2 - Skaha Estates Service Area

Skaha Estates is an established community on the east shore of Skaha Lake. The current estimated population of Skaha Estates is 550 people. The community consists of a core area of single family residential lots, surrounded by larger agricultural or Crown Land holdings. The higher density single family area which is targeted for sewering is largely built-out and there is little opportunity for growth. As a result, a nominal 1.0% annual growth rate is assumed to account for densification after sewers are installed.

5.1 Kaleden

Population growth projections from „*Area D-1 Kaleden-Apex Southwest Sector Official Community Plan (OCP Bylaw No. 2456, 2008)*" indicate that Kaleden can be characterized as a predominately rural community interspersed with areas of higher density single family development. The total population of the community is estimated to be 1,300 people. A relatively large proportion of the parcels occur along the lakeshore which is associated with the historical core of the community. The population of the Kaleden Lakeshore area is estimated at 426 persons and it is the area that is proposed for servicing. Most of the existing parcels are built-out and subdivision of the larger, agricultural parcels is constrained by the Agricultural Land Reserve (ALR). As a result, a low population growth is assumed for Kaleden to take into account nominal densification.

Figure 5-3 - Kaleden Service Area

6. FUTURE WWTP INFLUENT FLOW PROJECTIONS

Based on the above estimates of average unit per capita flow rates and populations, future wastewater flowrates can be projected. Table 6-1 provides an estimate of future populations and wastewater flow rates for Kaleden, Skaha Estates and Okanagan Falls. Based on these estimates, the maximum day wastewater flow into the treatment plant will be 2.2 ML/day in 2030, if the sewerage area is expanded to include both Skaha Estates and Kaleden. Based on the existing sewerage area which includes only Okanagan Falls, the future maximum day flow into the plant in 2030 is estimated to be 1.4 ML/day. This table was extracted from the *2005 Strategic Review* which was also utilized by Urban Systems in their treatment plant report. As discussed previously, the estimated flow appears to be inaccurate, this LWMP looks into the future assuming the ending of the economic downturn and population growth occurs as expected. The table provided below is the best information that is available at this time and is thus included in this LWMP.

Table 6-1 - Projected Population and Wastewater Flow Rates

Year		Projected Population			Projected Flow (ML/day)			
					Okanagan Falls, Kaleden & Skaha Estates		Okanagan Falls	
		Okanagan Falls	Skaha Estates	Kaleden Lakeshore	Average Annual Daily Flow (ML/day)	Maximum Day Flow (ML/day)	Average Annual Daily Flow (ML/day)	Maximum Day Flow (ML/day)
2005	0	1,380	550	426	1.11	1.58	0.65	0.93
2006	1	1,480	556	430	1.16	1.66	0.70	0.99
2007	2	1,580	561	435	1.21	1.73	0.74	1.06
2008	3	1,680	567	439	1.26	1.80	0.79	1.13
2009	4	1,698	572	443	1.28	1.82	0.80	1.14
2010	5	1,715	578	447	1.29	1.84	0.81	1.15
2011	6	1,733	583	452	1.30	1.86	0.81	1.16
2012	7	1,751	589	456	1.31	1.88	0.82	1.18
2013	8	1,769	594	460	1.33	1.90	0.83	1.19
2014	9	1,786	600	464	1.34	1.92	0.84	1.20
2015	10	1,804	605	469	1.35	1.93	0.85	1.21
2016	11	1,822	611	473	1.37	1.95	0.86	1.22
2017	12	1,840	616	477	1.38	1.97	0.86	1.24
2018	13	1,857	622	482	1.39	1.99	0.87	1.25
2019	14	1,875	628	486	1.40	2.01	0.88	1.26
2020	15	1,893	634	491	1.42	2.03	0.89	1.27
2021	16	1,910	640	496	1.43	2.05	0.90	1.28
2022	17	1,928	646	500	1.44	2.07	0.91	1.30
2023	18	1,946	652	505	1.46	2.09	0.91	1.31
2024	19	1,964	658	509	1.47	2.10	0.92	1.32
2025	20	1,981	664	514	1.48	2.12	0.93	1.33
2026	21	1,999	669	519	1.50	2.14	0.94	1.34
2027	22	2,017	675	523	1.51	2.16	0.95	1.36
2028	23	2,035	681	528	1.52	2.18	0.96	1.37
2029	24	2,052	687	532	1.54	2.20	0.96	1.38
2030	25	2,070	693	537	1.55	2.22	0.97	1.39

7. SKAHA LAKE WATER QUALITY MONITORING

The *2005 Strategic Review* included a section on Skaha Lake water quality. This has been updated and revised and appears below as the information is relevant to this LWMP.

The issue of monitoring lake water quality to determine the impact of a small subdivision on a lake is one that has been attempted on many occasions. The challenge is measuring what is essentially a diffuse source of pollution and characterizing its impact on a large, dynamic water body.

Skaha Lake is approximately 15 km long by 2 km wide (Figure 3-1). Most of the flow enters the north end of Skaha Lake and exits the south end via the Okanagan River Channel. Based on the total lake volume and average inflow, the retention time in the lake is less than 2 years. However, the lake has a tapered shape in a north-south direction with the narrower end at Okanagan Falls. The physical shape suggests that the flushing rate is higher at its narrowest sections, beginning at the south end of Kaleden and Skaha Estates.

On average, the annual per capita contribution of phosphorus is approximately 1.1 kg (dry weight). The phosphorus is discharged to the wastewater stream in the form of wash water, food processing wastes, urine, and feces. The amount of phosphorous that each person contributes to a septic tank on a daily basis is relatively small. The actual concentration of phosphorous entering a septic tank, given an average consumption of 470 L/capita/day would be in the 6 to 9 mg/L range. Phosphorous is removed in a septic system by soils and further dilution by groundwater. The amount of phosphorus that actually enters the lake will depend on the proximity of the septic system to the lake, groundwater level and soil conditions. The phosphorus concentration entering the lake may not be noticeably different from its natural or background concentration. The background concentration of phosphorus for Skaha Lake is approximately 0.025 mg/L.

As part of the Okanagan Water Quality Control Project (OK Water) (1986 to 1995) considerable effort was expended attempting to determine the impact of subdivisions located along the shorelines of Okanagan valley lakes. The OK Water team found that it was possible to detect what were believed to be inflows from houses in the subdivisions into the lake using a device called a “Fluorimeter”. The device monitored the water and showed noticeable spikes when towed behind a boat past houses that were situated along the lake shoreline. Unfortunately, subsequent sampling efforts rarely showed levels that differed appreciable from background. It was determined that the devices were probably responding to the whiteners in laundry soap contained in effluent from septic tanks.

The mandate of the OK Water Project was to identify and prioritize areas that were contributing phosphorous to the lakes so that the appropriate remedial measures could be initiated. The method selected was to utilize the existing detailed soils mapping information and prepare a series of phosphorous transmission polygons on a series of maps that covered the entire Okanagan basin. The houses were counted on each polygon, a standard occupancy rate of 2.5 persons per household was applied and the computer generated the raw phosphorous input information. The computer also generated the required phosphorous loading information for all the communities around the lakes in the Okanagan using the phosphorous transmission polygons. This was done for the Kaleden and Skaha Estates areas and the information was presented in the original Liquid Waste Management Plan Stage 1 Report dated March 1988. This report was entitled “*Waste Management Plan for Electoral Areas A, C & D Stage One Report - Part 2 Analysis of Alternatives*” and was prepared by TRUE for the RDOS.

The report recognized that the Skaha Estates area has a phosphorus transmission rate of moderate or higher. It also noted that there was a high water table along the Kaleden Lakeshore which coupled with High to Very High Phosphorus Transmission classifications made the Kaleden area a concern.

Considerable time has gone by since the 1988 report and many additional houses have been built along the lakeshore in both Kaleden and Skaha Estates.

Waste flows from the septic fields through the ground to the lake have been occurring for a relatively long period of time. Therefore, noticeable attached algae growth would be established where any significant phosphorus inputs were occurring (Vic Jensen, Ministry"s Environmental Section). Dye testing and visual sub-surface surveys of the lakeshore for algae growths would indicate a phosphorus loading condition. According to representatives from the Ministry of Environment the studies have not yet been conducted but sample sites are in process of being selected and the study will begin shortly, with – hopefully – the results available for the next update to this LWMP.

8. EMERGING ISSUES AND UNCERTAINTIES

As our understanding of the water environment improves and population densities increase, the trend towards more stringent discharge limits and the identification of more priority pollutants is likely to continue.

8.1 Climate Change

The impacts of climate change also introduce additional uncertainties. In 2004, Environment Canada released a report summarizing research on climate change within the Okanagan Basin (*Expanding the Dialogue on Climate Change and Water Management in the Okanagan Basin*). The report concludes that climate change within the Okanagan will result in less precipitation and a longer growing season in the future. The increasing demand for irrigation water due to a longer growing season will further strain dwindling water resources.

8.2 Micro-Contaminants in Effluent

Acute or short-term toxicity of wastewater is associated with ammonia, trace metals and organic compounds. Secondary treatment removes a good portion but not all these compounds.

Chronic or long-term effluent toxicity concerns exist for the potential impacts on human health and other organisms due to micro-organic contaminants – long-term lethality, reproduction impairment or negative behavioral response. The compounds of concern include pharmaceuticals, hormone mimickers and other micro-organic contaminants. The chemical contaminants detected are those associated with our everyday life.

Micro-organic contaminants detected in effluent include veterinary and human antibiotics, prescriptions drugs, non-prescription drugs and steroids and hormones.

At the micro level, these chemicals are being detected in the parts per billion. In terms of micro-organic compound contamination, detergent metabolites, steroids, plasticizers and non-prescription drugs are most commonly detected (80%). Although they are detectable at very low concentrations, concern has been raised because the compounds may find their way into drinking water sources.

Currently, the environmental impacts and human health effects of low concentrations of these compounds is incomplete. Considerable research is currently being undertaken to assess the health and environmental impacts. As well, new or modified wastewater treatment technologies are being developed to eliminate them in the effluent. Ultimately, managing these organic contaminants of concern from cradle to grave will be essential for minimizing the presence of this class of pollutants in the environment.

In order to promote inter-jurisdictional cooperation and coordination on environmental issues, the Canadian Council of Ministers of the Environment (CCME) was established. The CCME is a collection of federal, provincial and territorial ministers. A technical steering committee works with the CCME to provide on-going advice. In this way, member governments can respond quickly to emerging issues, set national environmental strategies and develop long-term plans. Currently, the CCME is working on a Canada-wide

strategy for managing wastewater effluent discharges. In addition to development of a harmonized national regulatory framework, the CCME will prepare action plans on emerging issues and develop a risk management model for various pollutants. The work being undertaken by the CCME will provide important tools for future management of wastewater effluent discharges. In the Okanagan Basin, the Municipal Sewage Regulation currently requires the removal of both ammonia and phosphorus. It is expected that national standards will be set which may require additional treatment processes to be added to existing wastewater treatment plants. Therefore, any consideration of surface water discharges should provide for additional processes, such as UV disinfection, to address future national standards.

Starting in December, 2006, the CCME issued the first of a series of high priority chemical substance lists. In total, 200 substances have been deemed to be high priority for removal from the environment because of the risks they pose. Issuing of the lists and information on the chemicals is considered the first step. In the near future, the CCME will work with stakeholders to develop risk management strategies and product stewardship.

9. IDENTIFIED ISSUES

A number of wastewater issues have been identified that need to be considered in this LWMP amendment.

9.1 The Wastewater treatment plant is nearing maximum capacity

The existing flows regularly exceed the theoretical capacity of the treatment plant. Any treatment plant upgrades must allow for future growth in Okanagan Falls, as well as an expanded sewerage area which could provide sewer service to Kaleden and Skaha Estates when required.

9.2 Nearby residents complain of noise and odour issues with the plant

Treatment system upgrades must be sensitive to the presence of local residents.

9.3 The effluent infiltration system is nearing maximum capacity

The *Okanagan Falls Sewage Treatment Plant Capacity Assessment* (2004) by Urban Systems Ltd. concludes that the maximum infiltration rate is limited to 800 m^3/day because of clogging or mounding in one of the Rapid Infiltration (RI) basins. Since the basins are used sequentially, the reduced capacity of one basin results in a “bottleneck” in the effluent disposal operation.

9.4 Aquatic species at risk in Johnson Lake

The discharge of effluent to the infiltration basins has resulted in the formation of a small pond in a kettle located down-gradient of the basins. The pond, now referred to as Johnson Lake, provides habitat for indigenous aquatic species. A complete relocation of the effluent disposal to another area would result in the drying up of Johnson Lake and the resulting loss of that specific local habitat which would negatively impact the aquatic life that has benefitted from that habitat.

9.5 Sewer Service Area Expansion

The Okanagan Falls sewerage area could be expanded to include Kaleden and Skaha Estates (Figure 3-1). The original LWMP Stage 1 Report dated March 1988, prepared by TRUE for the RDOS notes that “… the Skaha Estates area is constructed on mapping polygons having moderate to Very High phosphorus transmission classifications. Recognizing that the entire Skaha Estates area has a phosphorus transmission rate of Moderate or higher, the objective of an alternative sewerage system will be to service the entire area.” The high water table along the Kaleden Lakeshore coupled with „High“ to „Very High“ phosphorus transmission classifications make the Kaleden Lakeshore area a concern, as well.

The Stage 2 report dated May 1989 suggested that the costs did not justify sewering Kaleden and Skaha Estates at that time and the project was given a low action priority. It was suggested that Skaha Estates and Kaleden portions of the project could eventually proceed and that the appropriate easements be procured in the meantime.

In 1998, Urban Systems proposed an area and assessed the costs to include Skaha Estates and the Kaleden Lakeshore area into the Okanagan Falls Sewerage Area.

To address the inclusion of Kaleden and Skaha Estates in the Okanagan Falls Sewerage Area a servicing plan is proposed within this report. Since the earlier 1998 report, additional homes have been constructed in both Kaleden and Skaha Estates which will exacerbate the situation thereby increasing impacts on the environment.

For Kaleden, the option of sewering the bench area, in addition to the lakeshore area is investigated to determine whether servicing the entire community would reduce the unit cost compared to servicing only the 32 hectare area fronting Skaha Lake. Construction cost estimates for each of the communities were based on similar work carried out recently in the Okanagan.

9.6 Kaleden & Skaha Estates Residents Sewer Survey Results

A November 2007 survey of the Kaleden and Skaha Estates residents indicated that 98% of the respondents held the opinion that Skaha Lake was an important natural resource that should be protected and 79% of those same respondents were in favour of the extension of sewer service to Kaleden and Skaha Estates IF two thirds senior government funding and 18% Okanagan Basin Water Board funding were available. However that support dropped to 36% if such funding were not available.

10. IDENTIFIED OPTIONS

There are several sets of options that were considered during the development of the Strategic Review, and this LWMP amendment. As noted earlier the Strategic Review is considered to have covered most of the requirements for the first stage of a LWMP. The first set of options, discussing the treatment processes was examined during the Strategic Review, and resulted in the selection of a Biological Nutrient Removal (BNR) treatment process. The second set of options involved providing Skaha Estates and / or Kaleden with sewer service. The third set of options involved the return of treated effluent to the environment and the final set of options discussed specific public education programs that were identified as being required.

10.1 Treatment Plant Upgrade Options

The *2005 Strategic Review* examined ten options for upgrading the Okanagan Falls wastewater treatment plant. As required in the LWMP process reporting, all the options including advantages and disadvantages are provided in the following sections. The option that was selected as the *Preferred Solution* was Option 7, which requires an upgrade of the treatment process to BNR at a site downstream of the existing site.

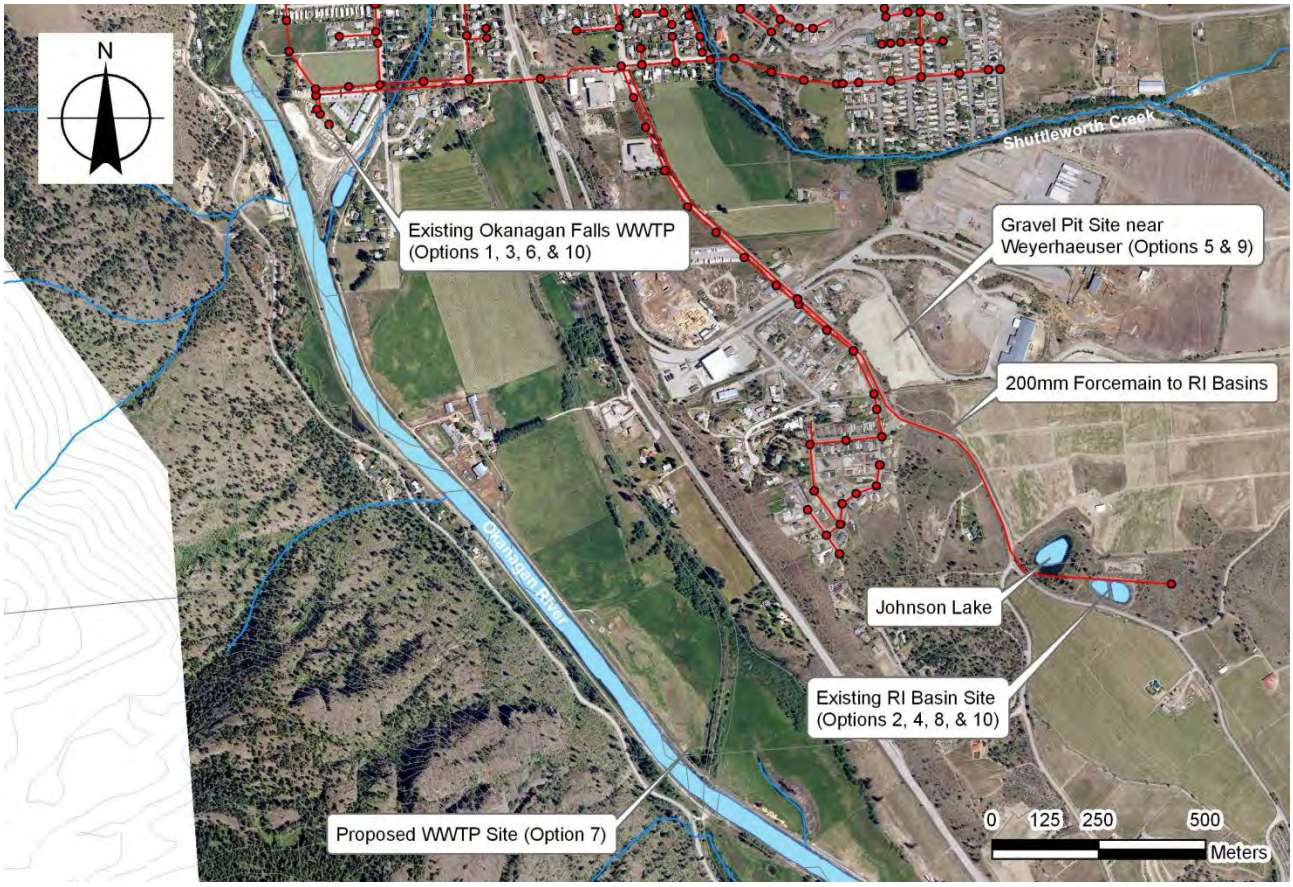


Figure 10-1 - Location of Treatment Options

10.1.1 Option #1: Upgrade Oxidation Ditch at Existing WWTP Site

***Description*:** The existing oxidation ditch could be increased in size to provide for the 25 year servicing horizon. The upgrade oxidation process would be designed with a mechanical sludge thickener and de-watering facility, noise attenuation and advanced odour control to minimize impacts to the surrounding residential area.

Residuals from the plant would be trucked to the Campbell Mountain composting facility. The effluent pump station would be retained to allow disposal of effluent at the RI site. The amount of pumping could be reduced during the growing season by supplying effluent for irrigation water.

***Advantages*:** Upgrading to the existing oxidation ditch treatment system would capitalize on existing knowledge and experience – the learning curve to operate and maintain the plant would be minimal. Typically, oxidation ditch treatment systems have a relatively low power and operator requirement.

Existing nearby fields could be supplied with treated wastewater for growing animal fodder.

Since the existing site is owned by the RDOS, there would be no additional costs associated with land purchase.

***Disadvantages*:** The oxidation ditch process requires a relatively large area – approximately two times the space of an activated sludge process. The larger surface area of the oxidation ditch would make advanced odour control more expensive.

Although the existing site could accommodate an oxidation ditch process designed to treat wastewater loadings to 2030 (i.e. the 25-year time horizon), it may be a challenge to provide for longer term servicing (i.e. 25 – 75 years).

Even if the treated wastewater is reused as irrigation water, effluent disposal would require continued use of the pumpstation and RI basins during the winter.

Any trucking of residuals for disposal would require passing through residential and commercial areas of town.

***Decision*:** This option was not selected by the *2005 Strategic Review* PAC or this LWMP AC for further consideration, due to the weight of the disadvantages noted above.

10.1.2 Option #2: Oxidation Ditch at RI Site

Description: An oxidation ditch could be constructed at the existing rapid infiltration (RI) basin to provide for the 25 year servicing horizon. The existing wastewater treatment plant would be de-commissioned and the effluent pumpstation converted to a wastewater liftstation. Wastewater would be pumped through the existing forcemain to the RI basins. Effluent would be disposed of at the RI basins.

The new oxidation ditch process would be designed with a mechanical sludge thickener and de-watering facility. Residuals from the plant would be trucked to the Campbell Mountain composting facility. Since the site can provide for a buffer zone, the facility could be designed with moderate odour control and noise attenuation.

Advantages: The close proximity of the RI basins to the plant would reduce maintenance requirements.

The RI site is located in an agricultural area (grapes) with a low population density, suggesting a low public impact.

With disinfection, treated wastewater could be used as irrigation water to grow animal fodder.

Since the existing site is owned by the RDOS, there would be no additional costs associated with land purchase.

Disadvantages: An oxidation ditch located at the RI site will rely on the uninterrupted operation of the wastewater liftstation. Back-up power and pumping redundancy increase the reliability of the liftstation, however, a forcemain rupture would result in sewage overflows unless emergency storage is provided. Therefore, emergency storage should be provided.

Wastewater pumps are designed with an open impeller to handle the high solids content – this feature reduces the pump efficiency. Pumping wastewater to a plant near the RI basins would have an increased power and maintenance cost over existing pumping. In addition, substantial upgrades to the existing pumps (or construction of a booster pump station) are required to provide for a high-lift wastewater station.

Currently, there are no developed fields nearby that could be supplied with effluent for irrigation water.

Vineyards are located adjacent to the RI basins. The presence of a wastewater treatment facility may be perceived as a land-use conflict.

***Decision*:** This option was not selected by the *2005 Strategic Review* PAC or this LWMP AC for further consideration, due to the weight of the disadvantages noted above.

10.1.3 Option #3: Conventional Activated Sludge (Secondary) at Existing WWTP Site

Description: A conventional activated sludge process could be constructed at the existing treatment plant site to provide for the 25 year servicing horizon. The process would consist of concrete bio-reactor tanks designed to minimize the vertical profile. A digester would be incorporated into the facility to stabilize waste sludge and mechanical equipment would be used for dewatering. The dewatered sludge would be trucked to the Campbell Mountain composting facility.

The facility would be designed with advanced odour control and noise attenuation to minimize impacts on nearby residents.

The effluent pump station would be retained to allow disposal of effluent at the RI site. The amount of pumping could be reduced during the growing season by supplying effluent for irrigation water.

Advantages: Treated wastewater could be used as irrigation water in nearby fields to grow animal fodder.

Since the existing site is owned by the RDOS, there would be no additional costs associated with land purchase.

Disadvantages: The capital cost of an activated sludge process is higher than an oxidation ditch process.

Any trucking of residuals for composting would require passing through residential and commercial areas of town.

Even if the treated wastewater is reused as irrigation water, effluent disposal would require continued use of RI basins during the winter.

***Decision*:** This option was not selected by the *2005 Strategic Review* PAC or this LWMP AC for further consideration, due to the weight of the disadvantages noted above.

10.1.4 Option #4: Conventional Activated Sludge (Secondary) at the RI Site

Description: A conventional activated sludge process could be constructed at the RI site to provide for the 25 year servicing horizon. The process would consist of concrete bio-reactor tanks designed. A digester would be incorporated into the facility to stabilize waste sludge. Mechanical equipment would be used to dewater the sludge. Residuals from the plant would be trucked to the Campbell Mountain composting facility. Since the site can provide for a buffer zone, the facility could be designed with moderate odour control and noise attenuation. Effluent would be disposed of at the RI basins.

The effluent pumpstation at existing WWTP site would need to be converted to a wastewater liftstation. Wastewater would be pumped through the existing forcemain to the RI basin site.

Advantages: Treated wastewater could be used as irrigation water in nearby fields to grow animal fodder.

The close proximity of the RI basins to the plant will consolidate maintenance requirements and lower operational costs.

The RI site is located in an agricultural area (grapes) with a low population density, suggesting a low public impact.

Since the existing site is owned by the RDOS, there would be no additional costs associated with land purchase.

Disadvantages: Wastewater pumps are designed with an open impeller to handle the high solids content – this feature reduces the pump efficiency. Pumping wastewater to a plant near the RI basins would have an increased power and maintenance cost over existing pumping. In addition, substantial upgrades to the existing pumps (or construction of a booster pump station) are required to provide for a high-lift wastewater station.

A treatment plant located at the RI site will rely on the uninterrupted operation of the wastewater liftstation. Back-up power and pumping redundancy increase the reliability of the liftstation, however, a forcemain rupture would result in sewage overflows unless emergency storage is provided. Therefore, emergency storage should be provided.

Vineyards are located adjacent to the RI basins. The presence of a wastewater treatment facility may be perceived as a land-use conflict.

Decision**:** This option was not selected by the *2005 Strategic Review* PAC or this LWMP AC for further consideration, due to the weight of the disadvantages noted above.

10.1.5 Option #5: Conventional Activated Sludge (Secondary) Near Weyerhaeuser

Description: A conventional activated sludge process could be constructed near the Weyerhaeuser mill sit to provide for the 25 year servicing horizon. The existing wastewater treatment plant would be de-commissioned and the effluent pumpstation converted to a wastewater liftstation. Wastewater would be pumped through the existing forcemain to the new site. The process would consist of concrete bio-reactor

tanks, a digester to stabilize waste sludge, and mechanical equipment to dewater the sludge. The dewatered sludge would be trucked to the Campbell Mountain composting facility. Effluent would be pumped to RI basins for disposal.

Since the area is zoned industrial and can provide for a buffer zone, the facility could be designed with moderate odour control and noise attenuation.

Advantages: The plant would be located in an industrial area with a low risk of public impact.

Treated wastewater could be used as irrigation water in nearby fields to grow animal fodder.

The close proximity of the RI basins to the plant would reduce maintenance requirements.

Disadvantages: Wastewater pumps are designed with an open impeller to handle the high solids content – this feature reduces the pump efficiency. Pumping wastewater to a plant near the Weyerhaeuser site would have an increased power and maintenance cost over existing pumping. In addition, substantial upgrades to the existing pumps (or construction of a booster pump station) are required to provide for a high-lift wastewater station.

A treatment plant located near the Weyerhaeuser site will rely on the uninterrupted operation of the wastewater liftstation. Back-up power and pumping redundancy increase the reliability of the liftstation, however, a forcemain rupture would result in sewage overflows unless emergency storage is provided. Therefore, emergency storage should be provided.

There are limited existing fields in the vicinity currently being used to grow animal fodder – additional agricultural fields would need to be developed to use all the effluent for irrigation.

A community water supply well which is located approximately 300 metres from the site will create a potential or perceived conflict of use.

This option would require purchase or lease of property.

Decision**:** This option was not selected by the *2005 Strategic Review* PAC or this LWMP AC for further consideration, due to the weight of the disadvantages noted above.

10.1.6 Option #6: Biological Nutrient Removal (Tertiary) at Existing Plant Site

Description: A biological nutrient removal (BNR) plant could be constructed at the existing treatment plant site to provide for the 25 year servicing horizon. The process would consist of concrete bio-reactor tanks, a volatile fatty acid (VFA) fermenter, and mechanical equipment to dewater the sludge. The dewatered sludge would be transported to the Campbell Mountain composting facility for final stabilization of the residuals. Since the site cannot provide for a buffer zone, the facility would be designed with advanced odour control and noise attenuation.

The effluent pump station would be retained to allow disposal of effluent at the RI site. The amount of pumping could be reduced during the growing season by supplying effluent for irrigation water.

Since the existing site is owned by the RDOS, there would be no additional costs associated with land purchase.

Advantages: Treated tertiary wastewater could be used as irrigation water in nearby fields to grow animal fodder or for high public use areas such as a golf course. The effluent could also be discharged to the river or a constructed wetland during the winter period.

The BNR process is a modified activated sludge process which could be configured to operate as either a conventional activated sludge or BNR process. This would allow production of tertiary or secondary effluent, depending on the use.

Since the existing site is owned by the RDOS, there would be no additional costs associated with land purchase.

Disadvantages: The capital and maintenance cost of the BNR process is slightly more than an activated sludge process.

Any trucking of residuals for composting would require passing through residential and commercial areas of town. The frequency of trucking would be similar to other processes.

***Decision*:** This option was not selected by the *2005 Strategic Review* PAC or this LWMP AC for further consideration, due to the disadvantages noted above.

10.1.7 Option #7: Nutrient Removal (Tertiary) Downstream of Existing WWTP

Description: A biological nutrient removal (BNR) plant could be constructed downstream of the existing treatment plant site, near the cattle feed-lot. The process would consist of concrete bioreactor tanks and mechanical equipment to dewater the sludge. The dewatered sludge would be transported to the Campbell Mountain composting facility for final stabilization. Since the area can provide for a buffer zone, the facility could be designed with moderate odour control and noise attenuation.

Treated wastewater could be used as irrigation water in nearby fields to grow animal fodder. As a contingency measure, the effluent forcemain alignment could be reconfigured to allow use of the RI basins for disposal.

Advantages: The high quality effluent produced by the BNR plant will provide for flexibility in terms of reuse and reduce (or eliminate) reliance on disposal via the RI basins.

An access road from Highway 97 would need to be provided, reducing impacts on residential and commercial areas from truck traffic.

Disadvantages: This option would require purchase or lease of the property, application for possible exclusion under the Agricultural Land Reserve and an OCP amendment. (The RDOS has already purchased the subject property on the strength and support accorded the *2005 Strategic Review* so this is can no longer really be considered to be a significant disadvantage.)

The existing gravity trunk would need to be extended to the new facility.

Decision*:** This option was selected by the *2005 Strategic Review* PAC. This option was also confirmed by this LWMP AC and the public, as their ***Preferred Solution for the treatment process for sewage wastes and for the relocation of the plant south of Okanagan Falls near to the feedlot.

10.1.8 Option #8: Fixed Film RBC at Existing RI Site

Description: A Rotating Biological Contactor (RBC) plant could be constructed at the existing RI site to provide for the 25 year servicing horizon. A RBC consists of a series of plates mounted on a rotor. The biological film which grows on the plates as they are cycled through the wastewater consumes carbonaceous BOD5. Sludge can usually be mechanically de-watered without further stabilization and trucked to a composting or landfill facility. Effluent would be disposed of at the RI basins.

The effluent pumpstation at the existing WWTP site would need to be converted to a wastewater liftstation. Wastewater would be pumped through the existing forcemain to the RI basin site.

Advantages: Treated wastewater could be used as irrigation water in nearby fields to grow animal fodder.

RBC"s have relatively low power consumption.

Since the existing site is owned by the RDOS, there would be no additional costs associated with land purchase.

Disadvantages: Wastewater pumps are designed with an open impeller to handle the high solids content – this feature reduces the pump efficiency. Pumping wastewater to a plant near the RI basins would have an increased power and maintenance cost over existing pumping. In addition, substantial upgrades to the existing pumps (or construction of a booster pump station) are required to provide for a high-lift wastewater station.

A treatment plant located at the RI site will rely on the uninterrupted operation of the wastewater liftstation. Back-up power and pumping redundancy increase the reliability of the liftstation, however, a forcemain rupture would result in sewage overflows unless emergency storage is provided. Therefore, emergency storage should be provided.

RBC"s are sensitive to overloading and low temperature conditions (i.e., not as robust as other treatment processes).

Vineyards are located adjacent to the RI basins. The presence of a wastewater treatment facility may be perceived as a land-use conflict.

***Decision*:** This option was not selected by the *2005 Strategic Review* PAC or this LWMP AC for further consideration, due to the weight of the disadvantages noted above.

10.1.9 Option #9: Fixed Film RBC at Site Near Weyerhaeuser

Description: A Rotating Biological Contactor (RBC) plant could be constructed at a site near the Weyerhaeuser mill to provide for the 25 year servicing horizon. A RBC consists of a series of plates mounted on a rotor. The biological film which grows on the plates as they are cycled through the wastewater consumes carbonaceous BOD5. Sludge can be mechanically de-watered without stabilization and trucked to a composting or landfill facility. Effluent would be pumped and disposed of at the RI basins.

The effluent pumpstation at the existing WWTP site would need to be converted to a wastewater liftstation. Wastewater would be pumped through the existing forcemain to the RI basin site.

Advantages: Treated wastewater could be used as irrigation water in nearby fields to grow animal fodder

RBC"s have relatively low power consumption.

Disadvantages: Wastewater pumps are designed with an open impeller to handle the high solids content – this feature reduces the pump efficiency. Pumping wastewater to a plant near the Weyerhaeuser site would have an increased power and maintenance cost over existing pumping. In addition, substantial upgrades to the existing pumps (or construction of a booster pump station) are required to provide for a high-lift wastewater station.

A treatment plant located near the Weyerhaeuser site will rely on the uninterrupted operation of the wastewater liftstation. Back-up power and pumping redundancy increase the reliability of the liftstation, however, a forcemain rupture would result in sewage overflows unless emergency storage is provided. Therefore, emergency storage should be provided.

RBC"s are sensitive to overloading and low temperature conditions (i.e., not as robust as other treatment processes).

A community water supply well which is located approximately 300 metres from the site may create a potential or perceived conflict of use.

This option would require purchase or lease of property.

Decision**:** This option was not selected by the *2005 Strategic Review* PAC or this LWMP AC for further consideration, due to the weight of the disadvantages noted above.

10.1.10 Option #10: Primary at Existing WWTP Site and Secondary at RI Site

Description: The treatment process could be split and located at two separate locations. The existing oxidation ditch could be converted to a primary treatment facility. Residuals from the primary treatment system could be dewatered and composted. Due to the close proximity of residential units, the primary process would need to be designed with advanced odour control and noise attenuation.

Primary effluent would be pumped to a oxidation ditch (secondary) treatment facility located at the RI site.

The new oxidation ditch at the RI site would be designed with a mechanical sludge thickener and de-watering facility. Residuals from the plant would be trucked to the Campbell Mountain composting facility. The facility would require moderate odour control and noise attenuation.

Advantages: The close proximity of the RI basins to the plant would reduce maintenance requirements.

Due to the lower solids content, pumping primary effluent to the RI basins would require only one lift compared to 2 lifts for raw wastewater.

The RI site is located in an agricultural area (grapes) with a low population density, suggesting a low public impact for the oxidation ditch.

With disinfection, treated wastewater could be used as irrigation water to grow animal fodder.

Since both sites are owned by the RDOS, there would be no additional costs associated with land purchase.

Disadvantages: An oxidation ditch located at the RI site will rely on the uninterrupted operation of the wastewater liftstation to pump primary effluent. Back-up power and pumping redundancy increase the reliability of the liftstation, however, a forcemain rupture would result in primary effluent overflows unless emergency storage is provided. Therefore, emergency storage should be provided.

Currently, there are no developed fields nearby that could be supplied with effluent for irrigation water.

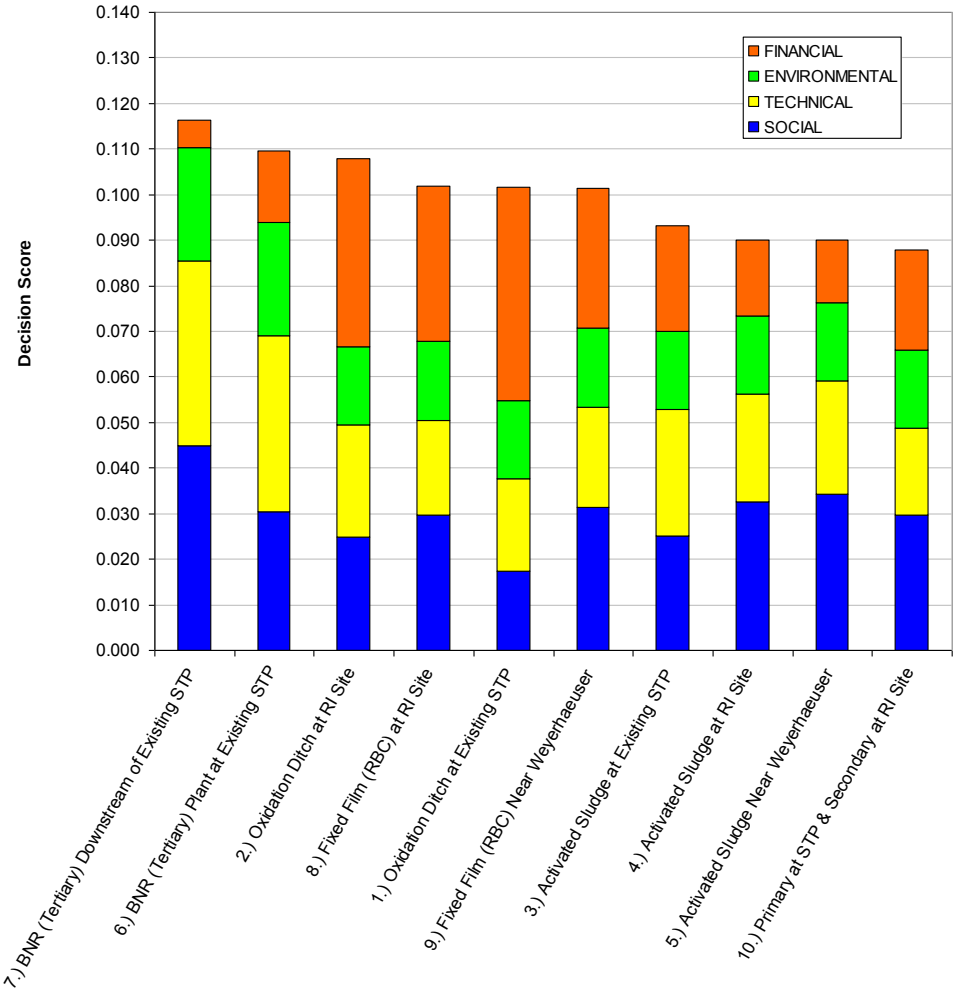
Trucking residuals from the primary treatment site for disposal would require passing through residential and commercial areas of town.

Vineyards are located adjacent to the RI basins. The presence of a wastewater treatment facility may be perceived as a conflict.

Decision**:** This option was not selected by the *2005 Strategic Review* PAC or this LWMP AC for further consideration, due to the weight of the disadvantages noted above.

The two BNR options (#6 and #7) are among the highest life-cycle cost options However, these options rate very high in the Social and Technical groups. The BNR treatment options trade-off relatively high capital and operating costs for low public impacts, low environmental impacts, high flexibility and good reliability. This costing table was developed for the *2005 Strategic Review* report and is included here as it presents the relative costs for each of the options.

Figure 10-2 - Decision Scores by Group



As reported in the *2005 Strategic Review*, based on the feed-back from the PAC, the highly involved public and decision analyses, the preferred option was to construct a BNR facility downstream of the existing site. It was recommended that the Regional District advance Option 7 as the preferred upgrade option to take advantage of the high social benefits. This was the ultimate finding of the *2005 Strategic Review* and was passed on to this LWMP for confirmation. The LWMP AC confirmed the *2005 Strategic Review* PACs recommendation as their *Preferred Solution* for the treatment process and location.

10.2 Expansion of the Sewer Service Area

The Okanagan Falls sewerage area could be expanded to include Kaleden and Skaha Estates (Figure 5-1). The original LWMP Stage 1 Report dated March 1988, prepared by TRUE for the RDOS notes that "… the Skaha Estates area is constructed on mapping polygons having moderate to Very High phosphorus transmission classifications. Recognizing that the entire Skaha Estates area has a phosphorus transmission rate of Moderate or higher, the objective of an alternative sewerage system will be to service

the entire area." The high water table along the Kaleden Lakeshore coupled with „High" to „Very High" phosphorus transmission classifications make the Kaleden Lakeshore area a concern, as well.

The original LWMP Stage 2 report suggested that the costs did not justify sewering Kaleden and Skaha Estates at that time and the project was given a low action priority. It was suggested that Skaha Estates and Kaleden portions of the project could eventually proceed and that the appropriate easements should be procured in the meantime.

In 1998, Urban Systems proposed an area and assessed the costs to include Skaha Estates and the Kaleden Lakeshore area into the Okanagan Falls Sewerage Area.

To address the inclusion of Kaleden and Skaha Estates in the Okanagan Falls Sewerage Area an updated servicing plan is proposed. The servicing plan presented in this report builds on the Urban Systems report (1998). Since the earlier 1998 report, additional homes have been constructed in both Kaleden and Skaha Estates which will exacerbate the situation thereby increasing impacts on the environment.

For Kaleden, the option of sewering the bench area, in addition to the lakeshore area was investigated to determine whether servicing the entire community would reduce the unit cost compared to servicing only the Kaleden Lakeshore area. Construction cost estimates for each of the communities were based on similar work carried out recently in the Okanagan.

10.2.1 Sewer Service Extended to Skaha Estates (*Preferred Solution*)

Sewer service could be provided to Skaha Estates.

Capital costs were originally estimated in the 2005 *Strategic Review* for constructing a sewer system in Skaha Estates to service a 54 hectare area along Skaha Lake and have been updated for this report. Figure 3-1 provides a map showing proposed pipe alignments and sewerage area extents. Figure 10-3 shows the line alignments to connect to the Okanagan Falls sewer system. The estimated capital cost in 2009 of sewering for the Skaha Estates sewerage area is $4,470,000 as shown in Appendix C Table C-3. The additional cost of the works to convey the collected sewage to the plant for Skaha Estates, the Common Conveyance costs, are estimated at $1,413,323 and the treatment costs would add another $1,190,000 for a total cost of about $7,070,000 including engineering, contingencies and taxes (5% GST).

Conveyance costs, are estimated at $1,413,323 and the treatment costs would add another $1,190,000 for a total cost of about $7,070,000 including engineering, contingencies and taxes (5% GST).

Table 10-1 - Skaha Estates Sewage System Capital Cost

Skaha Estates Sewering Cost Breakdown					
	Sewage Treatment	Sewage Collection	Common Conveyance	Total Cost	Total Cost (Rounded)
Skaha Estates	$ 1,190,000	$ 4,470,000	$ 1,413,323	$ 7,073,323	$ 7,070,000

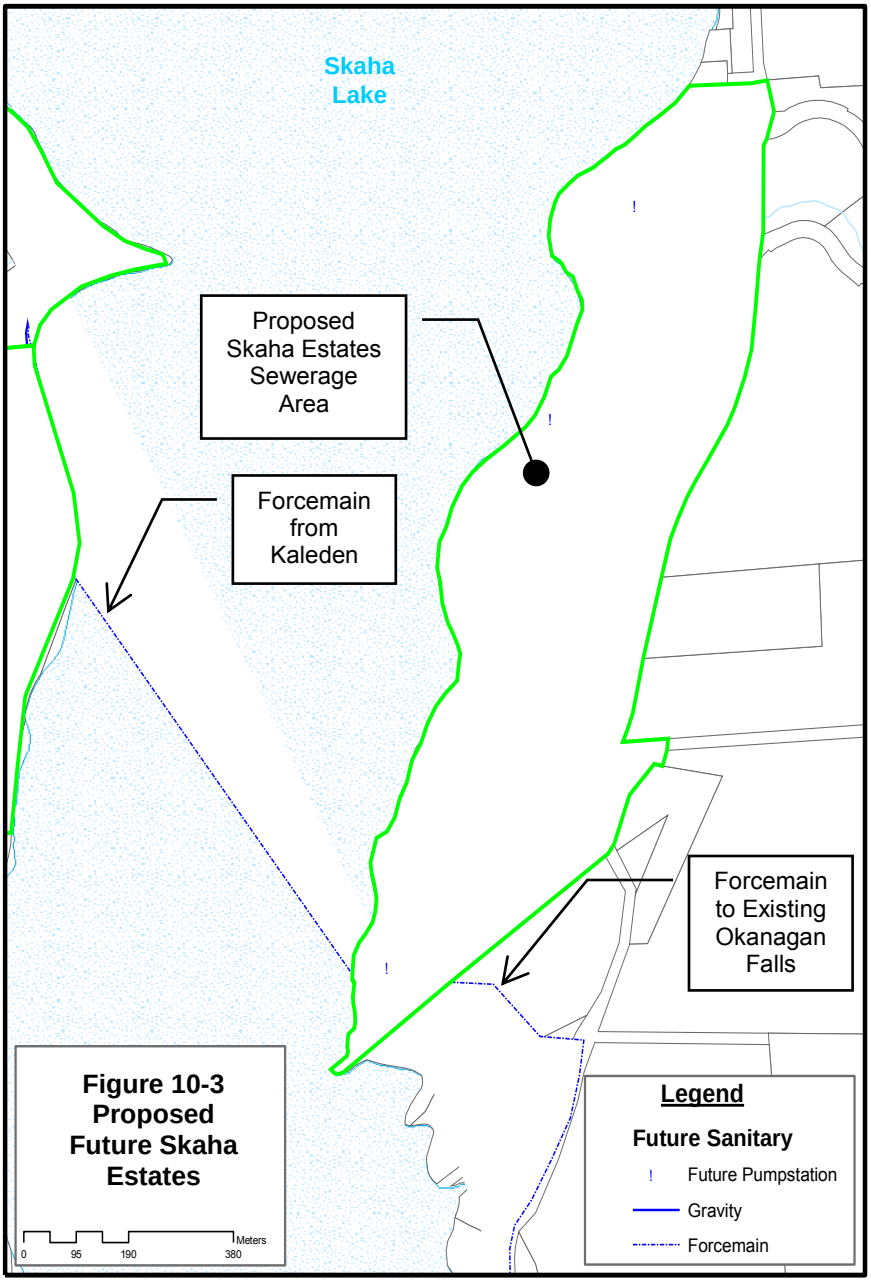


Figure 10-3 - Proposed Future Skaha Estates Sewerage System

There are a total of 183 lots that are likely to be serviced in the Skaha Estates sewerage area, which could be serviced for a cost of about $7,070,000 as noted above. The Skaha Estates area is not included in the grant monies received for the current treatment plant upgrade. Although, there is currently a 2/3 senior government infrastructure grant program available and the OBWB will provide a grant of up to 18% of the total capital works, the individual connection costs on a per lot basis were not developed as it is likely that

costs and grant funding amounts will change over time. The costs and available grants will need to be reviewed and updated at such time as grant monies are available to service the Skaha estates area.

The residents of Skaha Estates were surveyed and indicated that they supported the extension of sewer service to Skaha Estates provided that senior government grants (two thirds) and Okanagan Basin Water Board Grants (18%) were available to assist in the cost of the capital works. The AC confirmed this recommendation and this option also forms part of the *Preferred Solution.* Costs should be developed and grant applications submitted once the treatment plant portion of the project is underway. The public feedback received from the November 18, 2009 PIM was very strongly in support of proceeding as soon as possible with a grant application for sewering the Skaha Estates area. The public voiced comments at the PIM regarding areas to the north and south of the Skaha Estates subdivision area that may have septic waste issues and that might also benefit from sewer service. This was confirmed by the Interior Health representative who was present at the meeting. Additional connections to the system would lower the unit cost of both collection and treatment for everyone and so there would be a benefit in costing out the inclusion of these areas when the costs are developed for providing sewer service to Skaha Estates.

10.2.1 Sewer Service Extended to Kaleden

Sewer service could be provided to Kaleden.

Capital costs were estimated in the 2005 *Strategic Review* for constructing a sewer system in Kaleden to service only the high-priority area along the lakeshore. Figure 10-4 provides a map showing proposed sewer pipe alignments. The servicing concept was extended to include the remainder of Kaleden (i.e. the bench area). However the Kaleden Bench is not rated as „high" for phosphorus transmissivity, and therefore, does not constitute a high priority for sewering. Cost estimates were developed for the purposes of determining whether the cost of sewering the entire community would lower the overall parcel cost.

Kaleden Lakeshore

The Kaleden Lakeshore area has been defined as a 32 hectare area fronting Skaha Lake between Ponderosa Point and the end of Alder Avenue. Concern about the older age of septic systems in this area, coupled with a high groundwater table has made this a priority area for sewering. Estimated 2009 costs for sewering this area are presented in Appendix C, in Table C-2.

Table 10-2 - Kaleden Lakeshore Sewage System Capital Costs

Kaleden Sewering Cost Breakdown					
	Sewage Treatment	Sewage Collection	Common Conveyance	Total Cost	Total Cost (Rounded)
Kaleden Lakeshore Area	$ 920,000	$ 4,640,000	$ 1,096,677	$ 6,656,677	$ 6,660,000

The total cost for sewering the Kaleden Lakeshore area is estimated to be $4,640,000 including engineering, contingencies and taxes (5% GST). The additional cost of the works to convey the collected sewage to the plant in Okanagan Falls for Kaleden, the Common Conveyance costs, are estimated at $1,096,677 and the treatment plant capital costs would add another $920,000 for a total cost of about $6,660,000 including engineering, contingencies and taxes (5% GST).

There are a total of 142 lots serviced in the Kaleden Lakeshore sewerage area, which could be serviced for a cost of about $6,660,000 as noted above. The Kaleden Lakeshore area is not included in the grant monies received for the current treatment plant upgrade. Although, there is currently a 2/3 senior government infrastructure grant program available and the OBWB will provide a grant of up to 18% of the total capital works, the individual connection costs on a per lot basis were not developed as it is likely that costs and grant funding amounts will change over time. The costs and available grants will need to be reviewed and updated when grant monies are available to service the Kaleden Lakeshore area.

The residents of Kaleden were surveyed and indicated that they supported the extension of sewer service to Kaleden provided that senior government grants (two thirds) and Okanagan Basin Water Board Grants (18%) were available to assist in the cost of the capital works. Sewering the lakeshore of Kaleden was selected rather than the entire Kaleden area due to substantially higher costs to sewer all of Kaleden. The LWMP AC confirmed this recommendation and this option also forms part of the *Preferred Solution.* Costs should be developed and grant applications submitted once the treatment plant portion of the project is underway. The public feedback received from the November 18, 2009 PIM was very strongly in support of proceeding as soon as possible with a grant application for sewering the Kaleden Lakeshore area. Comments were voiced by the public regarding the proposed service area and it would be prudent to conduct an on-the-ground survey to ensure that all the lots that would benefit from sewer service are included.

Kaleden Bench and Kaleden Lakeshore Combined

The Kaleden Bench sewerage area encompasses a 349 hectare area and includes most of the community of Kaleden. A preliminary sewer pipe layout is provided in Figure 10-4. Based on the proposed pipe layout, the total capital cost of sewering the bench area estimated for the *2005 Strategic Review* was $11,900,000.

There are a total of 438 lots that would be serviced in the Kaleden Bench sewerage area. Based on the estimated construction cost in the *2005 Strategic Review*, the parcel cost of sewering the Bench Area was $27,170.

On a per parcel basis, the cost of sewering the Bench Area was significantly higher than the Lakeshore Area. A large proportion of the Bench Area is made up of relatively large agricultural parcels. This makes for a low parcel density which requires longer lengths of sewer pipe.

If the Lakeshore Area and Bench Area were combined into a single sewerage area, then from the *2005 Strategic Review* the total capital cost of sewering Kaleden would be $15,060,000. The combined capital cost averaged over the 580 parcels amounts to $25,970 per property. Therefore, compared to a local sewering of the Lakeshore Area, undertaking a full sewering of the Kaleden area would substantially increase the cost to the residents in Lakeshore Area and provide little benefit by way of additional environmental protection. This option was rejected in the *2005 Strategic Review*.

The option of sewering both the lakeshore area and the bench are of Kaleden, was not recommended by the LWMP AC for implementation thus confirming their acceptance of the recommendation of the *2005 Strategic Review* that only the Kaleden Lakeshore residences be sewered.

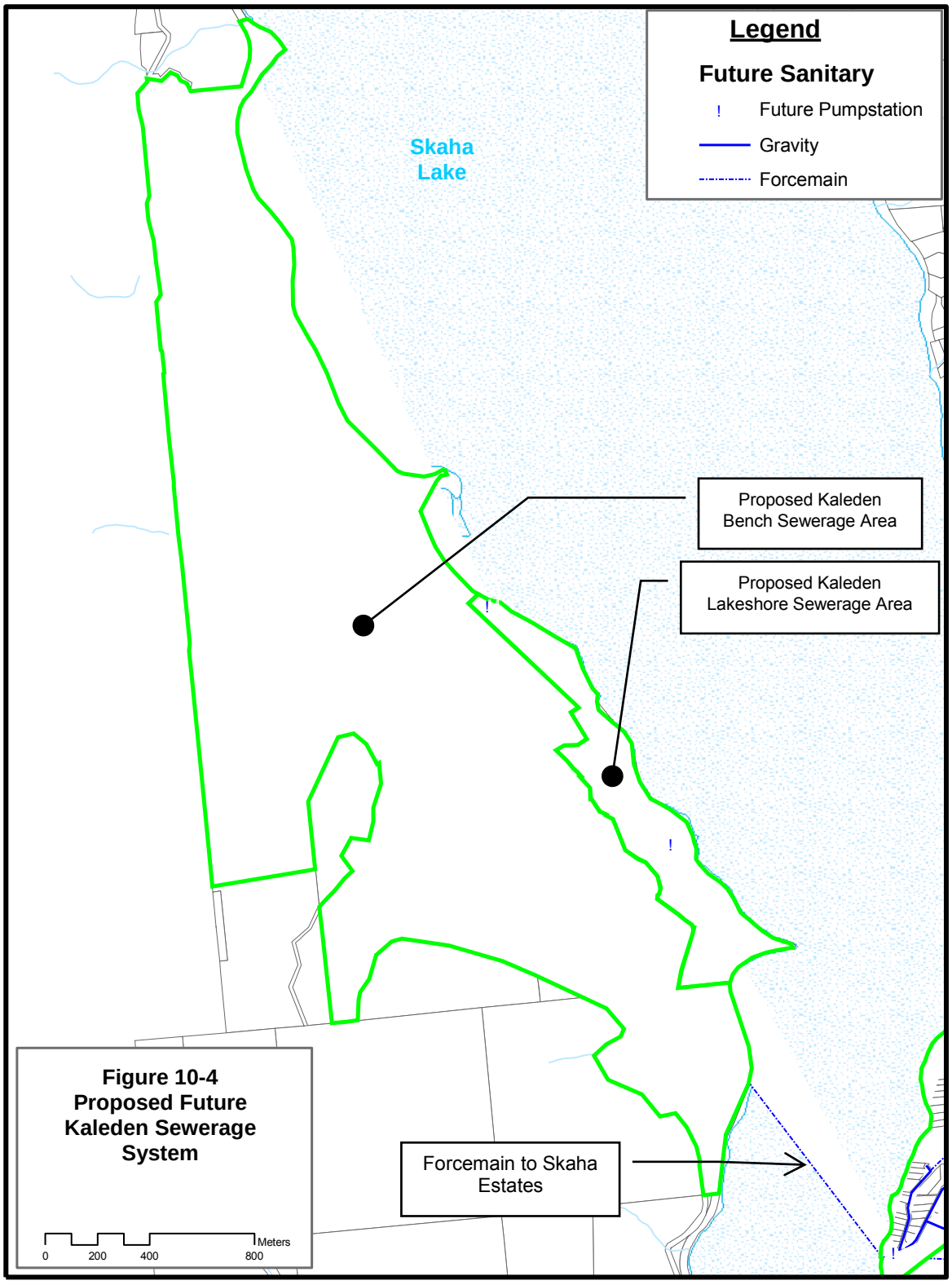


Figure 10-4 - Proposed Future Kaleden Sewerage System

10.2.3 Common Conveyance Upgrades

Upgrades and new construction of facilities for conveying wastewater from Kaleden and Skaha Estates to Okanagan Falls were assessed and are shown in Appendix C, Table C-4. These are common facilities, required for both communities and are shown in Figure 10-5 below. As a result, the cost of implementation would be shared by both Kaleden and Skaha Estates.

The pumpstation at the south end of Skaha Estates would accommodate wastewater from both Kaleden and Skaha Estates. From here, the wastewater would be pumped to Okanagan Falls through a forcemain on Eastside Road. An upgrade to the existing sewer system in Okanagan Falls is proposed which would allow by-pass of the liftstation at the north end of Main Street, on Skaha Lake (LS #3).

The LWMP AC confirmed that this option also forms part of the *Preferred Solution.* This option is required when sewer service is provided to Kaleden Lakeshore and Skaha Estates as it conveys their collected sewage wastes to the treatment plant. The public supported this *Preferred Solution* and supported implementation proceeding as a part of providing sewer service to Kaleden Lakeshore area and Skaha Estates as soon as possible.

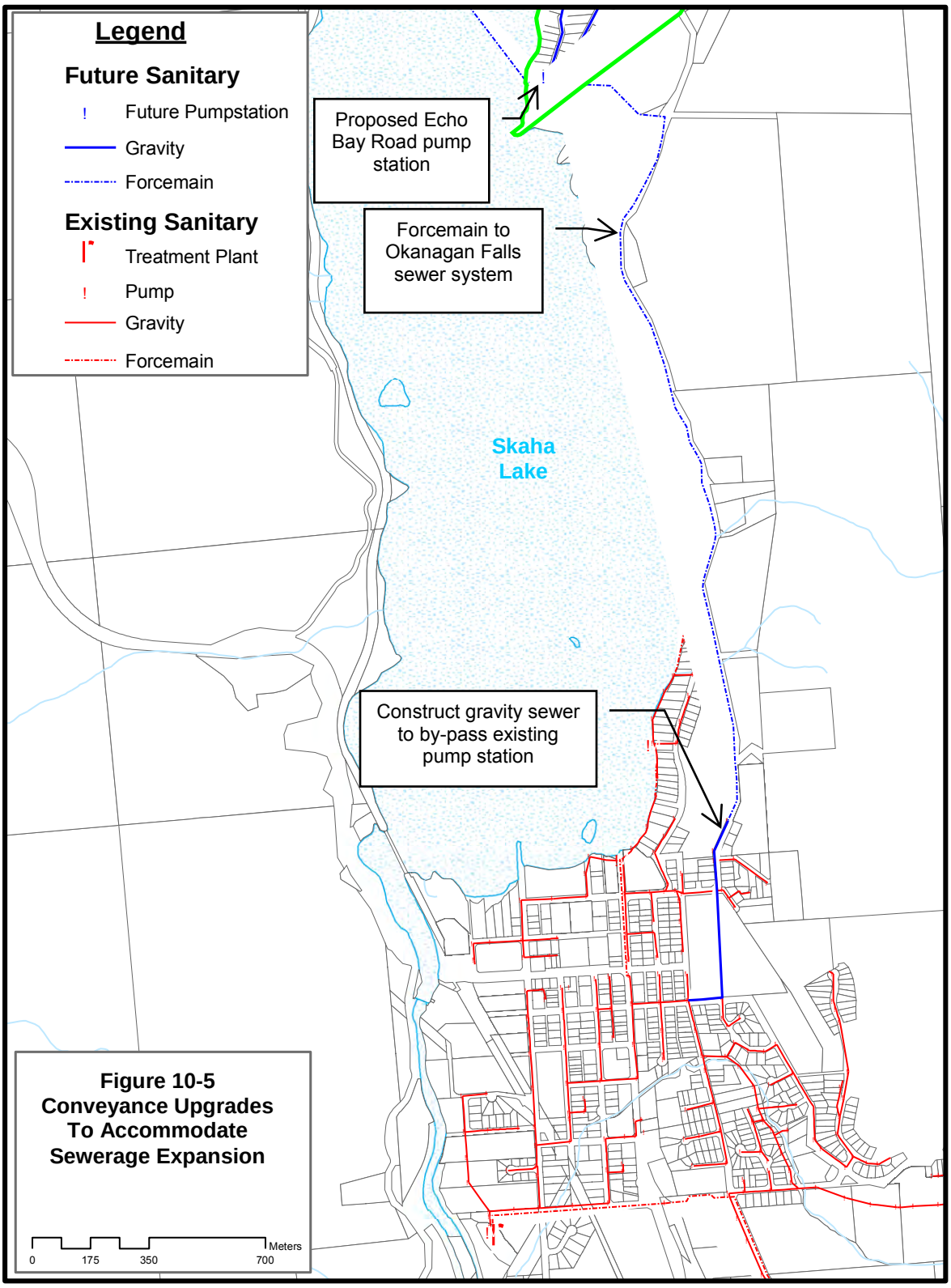


Figure 10-5 - Conveyance Upgrades To Accommodate Sewerage Expansion

10.3 Effluent Returned to the Environment

There are a number of options that were suggested as being suitable for the handling of the effluent that might be utilized for the Okanagan Falls wastewater treatment plant effluent. Effluent could continue to be discharged to the existing Rapid Infiltration (RI) basins or discharged to new RI basins. Effluent could be utilized for irrigation of parks, grasslands or field crops. Effluent could be discharged directly to the Okanagan River or utilized for the enhancement of wetland areas adjacent to the Okanagan River Channel. The discharge of effluent to the Okanagan River channel could handle up to 100% of the effluent depending upon the actual capacity of the wetlands enhancement and the irrigation options to handle effluent. The options are presented in some detail below, and while on the surface all the options would appear viable, Environmental Impact Studies and cost estimates need to be completed before any final decisions can be made with regards to any of the options, specifically the wetlands enhancement option or the river outfall option. It is conceivable that high costs or environmental issues could eliminate the possibility of implementing one or more of the possible options. It is therefore recommended that an additional Public Information Meeting (PIM) be held during the pre-design stage of the new wastewater treatment plant to assess public feedback prior to making a final decision for any of the effluent management options. The capacity of the existing Rapid Infiltration basins in not sufficient to handle the combined effluent flows from the Okanagan Falls, Skaha Estates and Kaleden and thus is not a feasible option.

10.3.1 Utilize Existing RI Basins

The potential exists to continue to utilize the existing RI basins to handle the effluent from the upgraded plant. This would have the twin advantages that the facility already exists and that it is supplying water to maintain the specialized environment of nearby Johnson Lake. This option is rather limited as current studies indicate that the maximum sustained flow that can be handled is about 800 m^3/d. This capacity is insufficient if the site were to be tasked with handling all the effluent generated from future plant upgrades. The site could handle a portion of the flow and would make an ideal backup for a reclaimed water irrigation system or a wetlands enhancement system.

The new wastewater treatment plant is to be designed to produce effluent that is suitable for direct discharge to the Okanagan River. It would appear unnecessary to treat the effluent to this high standard merely to continue to pump it – at some considerable cost - to the existing RI basins. The long term use of the RI basins is not feasible as they cannot accommodate the estimated combined flow of effluent from the existing Okanagan Falls sewered area plus Skaha Estates and Kaleden. BNR treatment with irrigation, wetland enhancement and river discharge methods was recommended by the AC as being superior to conventional activated sludge (secondary) treatment with discharge to the RI basins.

This option was selected by the LWMP AC and supported by the public for further consideration.

10.3.2 Utilize new RI Basins

It is possible that one or more additional RI sites could be identified and hydrological testing conducted to prove it out however there would be considerable additional expense involved and the land would need to be purchased by the RDOS.

This option was not selected by the AC for further consideration.

10.3.3 Develop Reclaimed Water Irrigation

There is potential for utilizing reclaimed water (suitably treated effluent) on farmlands for grass production or for parklands to replace fresh water. Bob Daly, Chair of the Parks Board, indicated that the Parks Board would not be opposed to considering the use of reclaimed water on Keogan Park, and perhaps on other parklands as well. The pressure main to convey effluent from the new plant site to the RI site could be routed such that a take off for Keogan Park could be made at the park property line. The details of this option, including costs, would need to be finalized during the design stage for the effluent forcemain from the new plant to the RI basins. Chlorination of the filtered, reclaimed water intended for irrigation use would be required. The chlorination system would be similar to those used for potable water systems to preclude pathogen re-growth in the distribution system. Mr. Daly further advised that Keogan Park required about 40,000 gpd (150,000 L/d) of irrigation water. This option could form part of the solution for the management of the effluent.

This option would be of value to demonstrate the viability of reclaimed water irrigation. If the option of maintaining the rapid infiltration basins for emergency use in the event of a plant upset is retained, then irrigation of Keogan park would likely be relatively straightforward. However if the rapid infiltration basins are to be phased out of service, costs will need to be developed for a small forcemain to Keogan Park.

This option was selected by the LWMP AC and supported by the public for further consideration.

10.3.4 Discharge to the Okanagan River Channel

Effluent could be discharged directly into the Okanagan River channel from the new BNR WWTP which is to be located directly adjacent to the river channel. Filtration and UV disinfection facilities would be needed for this option. This option could provide a backup or safety valve if there were more effluent produced than could be beneficially utilized by some of the reuse options.

This option was selected by the LWMP AC and was supported by the public, for the management of the effluent produced by the new treatment plant. Whilst this option is not the preferred solution it is probable that it will be needed to handle a portion of the effluent and may need to handle all the effluent in the winter months

10.3.5 Enhance Wetlands Adjacent to the Okanagan River Channel

There are wetlands on both sides of the Okanagan River Channel that could benefit from an additional influx of water. The reclaimed water will have already been treated to an exceptionally high degree in the new BNR plant and will have been subject to UV disinfection. The nutrients in the reclaimed water would be at a very low level and given the very high degree of pathogen kill with modern UV systems there would appear to be no negative environmental effect from utilizing the effluent to enhance the wetland areas.

Comments received from Environment Canada indicated that they were not opposed to such a venture providing that an Environmental Impact Study was conducted to confirm that there would be no negative

environmental impact. Ducks Unlimited expressed a great deal of interest in participating, as a partner, in a wetlands enhancement venture utilizing the reclaimed water from the proposed new wastewater treatment plant.

The results of the Environmental Impact Study and assessment of costs for developing the wetlands option should be presented to the public during the pre-design stage in order to obtain feedback and assist in the decision-making process. This cost of the wetland enhancement option would be in addition to the outfall cost since discharging effluent to the wetlands may not be possible year-round.

This option was selected by the LWMP AC and was supported by the public for further consideration.

10.4 Public Education Programmes

Public education programs are an essential part of the implementation of any successful LWMP.

10.4.1 Water Conservation

The plant effluent flow data suggest that water consumption in Okanagan Falls used to be higher than average but as there is some question regarding the current population estimates that statement may not be as accurate today with the steadily decreasing flows reported. However, a water conservation strategy in Okanagan Falls would still be a good idea for the long term as the current drop in flow may be due to the effects of the economic downturn. In the long term a water conservation program would likely have good potential for reducing wastewater flow to the treatment plant and would also reduce the demand on the potable water system. The RDOS should work with the Okanagan Falls Irrigation District to implement a water conservation strategy for the Okanagan Falls sewerage area. The program should include bylaws to require new development to install low flow fixtures and an education campaign could target existing users.

This option was selected by the LWMP AC and was supported by the public, as part of their ***Preferred Solution***.

10.4.2 Sewer Use

A public information program explaining what should not be discharged to the sewer system would be and it could also remind the public that garburettors, which are under the sink devices that turn waste food into organic slurry, are prohibited in the current OC as the slurry adds to the biological load on the already taxed WWTP. In addition to the normal domestic waste, sanitary flows can carry disease-causing pathogens and toxic substances such as motor oil, heavy metals, paint thinner, pesticide residues, and solvents. Most of these substances are known to have negative human and environmental impacts and are normally addressed through a sewer use bylaw and a public education program.

This option was selected by the LWMP AC and was supported by the public, as part of their ***Preferred Solution***.

10.4.3 Septic Tank Operating and Maintenance

There will likely be a number of people within the LWMP study area that will remain on septic tank tile field systems for the foreseeable future. The replacement of a failed septic system can be very costly under the new health regulations with costs beginning at around $15,000 and increasing up to perhaps as high as $45,000 for high tech systems in problem areas. A public information programme explaining how to operate and maintain septic tanks could potentially save some homeowners a very large sum of money and at the same time preclude failures which could negatively affect public health and the environment.

This option was selected by the LWMP AC and was supported by the public, as part of their ***Preferred Solution***.

10.5 Additional Options

10.5.1 Draft Operational Certificate (OC)

Ministry of Environment staff will prepare a first draft of an amended OC, in Microsoft Word format. This draft OC would likely be based on an update of the old OC. It would be reviewed and suggestions for changes made by both Ministry and RDOS staff, a negotiation process that can take several weeks. The amended OC should contain estimated annual flows for at least 10 years into the future, and all the necessary constraints and monitoring requirements contained within the current OC but amended for current and future conditions as spelled out in the amended LWMP. The current Okanagan Falls OC makes reference to the Waste Management Act, which has been superseded by the Environmental Management Act. Any such references will need to be updated in the amended OC that would be issued after the amended or updated LWMP has been approved by the Minister.

11. PREFERRED SOLUTION

In 2005, following a review of the potential options and guided by the decision criteria selected by the Public Advisory Committee, the decision to replace the existing treatment plant with a new facility was made as part of the Strategic Plan. At the time that the decision was made, the location of a wastewater treatment plant site had not been secured. However, in the intervening time, based on the overwhelming support shown by the public in the *2005 Strategic Review*, the RDOS purchased land for a new site, made arrangements to remove the land from the ALR and had the property rezoned to permit the construction and operation of a proposed wastewater treatment plant on the site. Based on the work undertaken as part of the Strategic Plan and subsequent work by RDOS to secure a treatment plant site, the LWMP Advisory Committee reaffirms its support for both the plant process and the plant site. The public also indicated support for this approach both during the *2005 Strategic Review* process and at the November 18, 2009 Public Information Meeting.

Table 11-1 - Proposed Treatment Plant Costs Per Connection For Okanagan Falls Alone

Sewage Treatment Plant Cost Breakdown						
OK Falls (Cost per connection)	Sewage Treatment Plant Capital Cost	Total Cost per Connection	Annual Cost per Connection with no grants*	Annual Cost per Connection with $6.25M Grant	Annual O&M Cost + Capital Reserve per Connection	Total Annual Cost per Connection
Capital Cost, OK Falls Alone	**$ 10,149,300**	$ 8,185	$ 680	$ 243	$ 395	$ 639
* Annual cost is calculated as being amortized over 20 years at 5.3% interest.						

The detailed 2009 cost estimate for the wastewater treatment plant is given in Appendix C as Table C-1. The total cost is estimated at $10,149,300 including engineering, contingency and taxes (GST at 5%). The cost for the treatment plant would be borne by all connected users on a per connection basis as shown in Table 11-1 which works out, for the 1,240 connections in the Okanagan Falls sewered area, to be an annual cost of about $639 per year per connection for 20 years at the current Municipal Finance Authority (MFA) rate of 5.3% and with the 2/3 infrastructure grant. Grant monies will be forthcoming from the OBWB under their capital works grant but as the formula is extremely complex their actual grant amount has yet to be determined, but it will reduce the annual cost per connection.

Given the very strong feedback from the public at the Public Information Meeting on November 18, 2009, it is anticipated that the RDOS will apply for additional grant funding to provide service to both Kaleden and Skaha Estates as soon as new infrastructure grant programs are announced. Once those areas are serviced, the total number of connections will increase, which will reduce the cost to all users for the remainder of the 20 year loan repayment to MFA. This means that the Okanagan Falls users will benefit from both a capital cost and operating and maintenance (O&M) cost saving each year, once the Skaha Estates and Kaleden Lakeshore areas are provided with sewer service. Additionally, Development Cost Charges (DCCs) paid by any new developments would further reduce the debt load and reduce the annual per connection capital cost loan repayment amount.

Table 11-2 - Treatment Plant Annual Operating Costs Per Connection, Okanagan Falls Alone

O&M Annual Connection Cost Breakdown			
	O&M Cost per Year	Number of connections	Annual O&M Cost per Connection
OK Falls	$ 490,000	1,240	$ 395

Based upon the estimated annual operating cost for the treatment plant shown in Table C-5 in Appendix C the annual cost per connection for the treatment plant will be about $395 for Operations, maintenance and capital replacement for each connection in the Okanagan Falls sewer service area.

As noted above it is anticipated that the RDOS, based on feedback from the public and the recommendations of this LWMP, will be applying for additional grant monies to provide sewer service to Skaha Estates and the Kaleden Lakeshore areas. There will be a small additional power cost involved due to the additional flow but the annual operating and maintenance cost per connection will drop, due to economy of scale with more users connected. There will also be a small additional pumping cost to the Skaha Estates and Kaleden Lakeshore users to convey their sewage to the treatment plant.

The proposed treatment plant will be constructed downstream of the existing treatment plant site, near where the KVR right of way crosses the Okanagan River Channel (Figure 11-1). The treatment process will likely consist of concrete bioreactor tanks and mechanical equipment to dewater the sludge.

An appropriately sized buffer around the treatment plant site would be highly desirable and was supported by the public at the November 18, 2009 public information meeting. A berm and or a vegetative screen would be beneficial to shield the treatment plant from view. Sensitive architectural input into building design is needed to ensure that the plant buildings blend into the rural farming nature of the surrounding area. A specialist architectural consultant, Bevanda Architecture Inc., was retained to produce conceptual drawings of aesthetically pleasing “Farm like buildings and structures” suitable for housing the proposed treatment plant that would not be out of place in the rural farming area where the plant is to be located. Public interest and support for the concept was shown at the November 18, 2009 PIM and several local residents expressed a desire to be involved with the selection process for the final design of the architectural treatment for the plant buildings. RDOS staff at the Public Information Meeting enthusiastically supported the inclusion of public involvement in the design and also advised that a special PIM would be held to confirm overall public support for the selected concept during the predesign stage. A conceptual architectural rendering for the treatment plant buildings and civil works is shown in Figure 11-2 and in expanded detail in Appendix D.

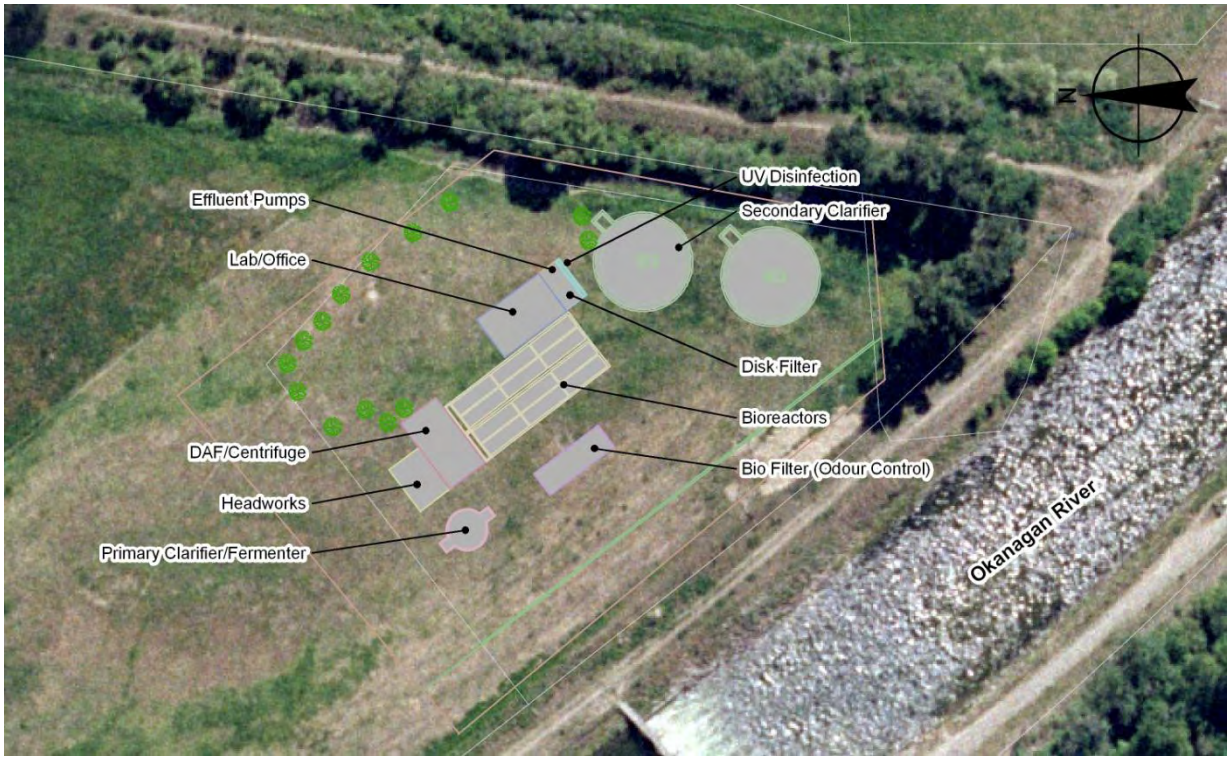


Figure 11-1 - Proposed Treatment Plant Site

Figure 11-2 - Proposed Treatment Plant Site With Conceptual Architectural Treatment

There will be additional grant funding of up to 18% of the capital works costs from the OBWB, which will lower the overall costs for both the treatment plant and the later expansion of the collection system to Skaha Estates and the Kaleden Lakeshore areas. Due to the complexity of the calculations the exact amounts are not available at this time.

The cost estimates for all the works proposed for this LWMP are shown in Appendix C, and the breakdown tables are included in the Options section above.

It is proposed that the dewatered sludge would be transported to the Campbell Mountain composting facility for final stabilization. The Campbell Mountain composting facility is operated by the City of Penticton. The RDOS is currently reviewing the long term aspects of the management of sludge from all treatment plants in the area. The present concept of biosolids production from sludge is expected to continue for the foreseeable future. There is a possibility that the operation could be relocated to a new Regional Landfill site, if one should be selected when next the Regional Solid Waste Management Plan is updated.

The treatment facility will be designed with odour control and noise attenuation to minimize impacts to surrounding residents. In addition, the treatment plant site has a provision for a buffer which will further reduce impacts to residents.

A small portion of the highly treated effluent could be beneficially re-used for the irrigation of Keogan Park. This would reduce demand for potable water. The public supported this concept and will be asked to confirm their support once the Environmental Impact Studies and costing of all the effluent management options is completed during the predesign stage. It is possible that effluent irrigation of nearby fields to grow animal fodder could be utilized once the small scale demonstration project demonstrates its effectiveness. School grounds and playing fields are being irrigated with highly treated effluent in other Okanagan communities and it is recommended that this additional alternative use be investigated. Prior to the implementation of reclaimed water irrigation a thorough investigation of the requirements will be conducted in accord with the *Code of practice for the use of Reclaimed Water* This Code of Practice is a companion document to the Municipal Sewage Regulation.

Wetlands adjacent to the Okanagan River Channel could benefit from additional water flow and the treatment plant effluent. Costs have yet to be developed for this concept as an Environmental Impact Study is required to determine if it is possible to enhance these wetlands with effluent. On the plus side this concept has been successfully utilized elsewhere and *Ducks Unlimited* are very enthusiastic supporters. The public were very positive about this concept and will be asked to reconfirm this support after the EIS and costing has been completed during the predesign stage. Prior to the implementation of reclaimed water use for the enhancement of the wetlands a thorough investigation of the requirements will be conducted in accord with the *Code of practice for the use of Reclaimed Water.*.

The RDOS contacted Ducks Unlimited and were advised that they have "…had previous experience with treated sewage effluent being used to supplement the water supply in natural and managed wetlands. The wetlands at Vaseux NWA and adjacent areas may be good candidates for receiving treated effluent." Ducks Unlimited cautioned that this would have to be approved by Environment Canada and looked at in detail but considers the option in their mind "worthy of consideration."

An effluent outfall and diffuser will need to be constructed to allow effluent to be discharged to the Okanagan River channel. The other options combined will not be able to handle all the effluent generated once the

Skaha Estates and Kaleden Lakeshore areas are serviced and it is likely that there will be seasonal flow variations that preclude wetlands enhancement and irrigation during the winter months so the outfall must be designed to be capable of handling all the effluent. The public supported the concept of an effluent outfall and will be asked to reconfirm this support after the EIS and costing has been completed, during the proposed PIM in the predesign stage.

As a contingency measure, the effluent forcemain alignment should be reconfigured to allow use of the existing RI basins for disposal on an as needed basis, such as during plant start-up and for use in the event that the effluent quality should temporarily exceed the requirements of the Operational Certificate. Concern has been expressed regarding the potential for water from the RI basins to negatively impact the aquifer from which potable water is extracted for Okanagan Falls. It is recommended that a source impact study be undertaken to determine the risk from the infiltration basins on the Okanagan Falls aquifer. If the impact is determined to be unacceptable it would be appropriate to decommission the existing RI basins. The public supported the concept of retaining the RI basins and will be asked to either reconfirm this support after the EIS and costing has been completed, during the proposed PIM in the predesign stage or to support their decommissioning if that should be the recommendation of the EIS. A suggestion was made that the specialized artificial environment created by the unexpected surfacing of RI basin effluent in the newly formed “Johnson Lake” be relocated to the wetlands area.

The RDOS has purchased and rezoned the proposed plant site to permit a wastewater treatment plant to be constructed and operated on the strength and support accorded the Strategic Review. The RDOS made application to remove the plant site property from the Agricultural Land Reserve and has already received conditional approval from the Agricultural Land Commission.

A water conservation strategy should be developed and implemented for the Okanagan Falls sewerage area. The strategy should include a water conservation education programme and bylaws to require new development to install low flow fixtures. The RDOS does not inspect plumbing to ensure it meets BC Building Code and as a result it is possible that the somewhat more expensive low flow fixtures may not actually be being installed in new buildings as mandated. Garburettors are also prohibited under the current Operational Certificate, however as they are available for purchase in local building supply retail outlets it is possible that some units are being installed. It would be prudent for the RDOS to implement plumbing inspections to ensure compliance with the BC Building Code and the Operational Certificate to reduce the flow of excess water and unnecessary biological material that must be treated at the treatment plant. The public supported this recommendation and it forms part of the “Preferred Solution” for Okanagan Falls and area.

A sewer use strategy also needs to be developed and implemented for the Okanagan Falls sewerage area. The strategy should include a sewer use educational programme explaining what should not be discharged to the sewer system and a sewer use bylaw to prohibit the discharge of unsuitable materials to the sewer system. The public supported this recommendation and it forms part of the “Preferred Solution” for Okanagan Falls and area.

Additionally, a public information programme should be developed to explain how to operate and maintain a septic tank for those residents who are in the LWMP area but will not be connected to sewer service. The information developed during the sewer use strategy could also be utilized to assist those who are still using septic tank tile field systems to prolong the longevity of their systems as what should not be discharged to a community sewer system should also not be discharged to a septic system. The public supported this recommendation and it forms part of the “Preferred Solution” for Okanagan Falls and area.

The RDOS has a 1 hectare minimum lot size requirement for new subdivisions without sewer. As a result, there may be some additional demand for sewer service from new subdivisions. The OCP and ALR will provide controls on this type of development and appropriate DCCs will ensure that there are adequate resources available to cover off the replacement of the necessary plant capacity that would be utilized by latecomers to the system.

An access road from Highway 97 will need to be provided, reducing impacts on residential and commercial areas from truck traffic. Negotiations are currently underway between the RDOS and the Ministry of Transportation and Highways who have yet to make a decision with respect to the proposed new access road.

The existing gravity trunk will need to be extended to the new facility.

12. PUBLIC CONSULTATION

Public Consultation is a very important component of any LWMP and this LWMP is no exception. There was considerable public consultation during the development of the *2005 Strategic Review* and that was documented with the final report. In essence there was sufficient public support for the recommended course of action in the *2005 Strategic Review* that the RDOS began the implementation of the recommendations even prior to the completion of this LWMP. The report options and the selection of the preferred option is summarized above in Section 10. In summary, the *2005 Strategic Review* recommended that the treatment process be upgraded to a full BNR process and that the treatment plant should be relocated to a new location south of Okanagan Falls near the feedlot. The RDOS purchased the land requested and received permission from the Agricultural Land Commission to remove the property from the Agricultural Land Reserve and rezoned the property to permit the construction and operation of a community wastewater treatment facility. The LWMP AC and the public feedback at the November 18th 2009 Public Information Meeting confirmed support for the findings of the *2005 Strategic Review*.

The November 18, 2009 Public Information Meeting had a count of about 60 people who signed in but counts at the three presentation sessions indicated that there were closer to 100 persons who attended the PIM. The PIM was advertised in the newspapers and an informational mailout was sent to everyone in Okanagan Falls, Kaleden and Skaha Estates. The newsletter mailout contained a brief review of the *2005 Strategic Review* findings and timelines showing the project milestones. The mailout outlined the LWMP AC"s Preferred Solutions including the first stage of implementation for the treatment plant and the second stage for the extension of sewer service to Kaleden Lakeshore and to Skaha Estates. Support items such as effluent return to the environment options and public education items were also noted. A copy of the mailout appears in the first section of the Public Consultation Support Documentation in Appendix B.

The Open House began at 4:00pm. There was a public sign in log and several members of the RDOS Staff and two members of the AECOM consulting team were present to answer questions. Ten storey boards were setup as an informational aid to help the visiting public understand the details of the LWMP process and the Preferred Solutions. Presentation of the Preferred Solutions was repeated three times (5:00pm, 6:00pm and again at 7:00pm). The presentation which included details of the LWMP process and why it is in the community"s best interests to conduct a LWMP concluded with an overview of the Preferred Solutions and was generally well received. There were many interesting questions and answers and based on comments from the exit survey the public were generally very satisfied with the process. The exit survey compilation can be found in its entirety in the third section of the Public Consultation Support Documentation in Appendix B.

13. AGENCY CONSULTATION

Consultation with government agencies and their subsequent feedback is the component of the LWMP process that ensures that the mandates of the agencies are respected and that all issues and concerns related to those agencies mandates are addressed.

13.1 Ministry of Environment

Ministry of Environment staff were very supportive throughout this LWMP process and provided assistance and support for the grant funding applications for the implementation of the LWMP even prior to the completion of the LWMP. Their support was based upon the findings and overwhelming public support for the *2005 Strategic Review*. This review recommended that the treatment process be upgraded to full Biological Nutrient Removal and that the plant should be relocated to the south of the Okanagan Falls residential area near to an existing feedlot. The three letters signed by three different Ministry staff members are included in Appendix F.

A Ministry Ecosystems Biologist provided the comment that a suitably qualified profession be retained to identify site specific environmental concerns and appropriate recommendations regarding requirements for the proposed wetlands enhancement option and also noted that there would also be requirements from Environment Canada. The letter is included in Appendix F.

13.2 Interior Health Authority

Interior Health Authority staff were very supportive throughout the LWMP process and provided letters of support for the application for grant funding for the implementation of the LWMP even prior to the completion of the LWMP. The three letters signed by three different Interior Health Authority staff members are included in Appendix F.

Interior Health also indicated during the course of the Public Information Meeting that there were other areas adjacent to Skaha Estates that are currently experiencing septage disposal issues that they would like to see included when the Skaha Estates area is sewered. A separate email letter was sent providing additional details of this concern and a copy of this email letter is included in Appendix F.

13.3 Environment Canada

The Canadian Wildlife Service of Environment Canada provided a letter of comment for the concept of beneficial utilization of effluent for the enhancement of wetlands wherein a recommendation was made that a thorough environmental assessment be conducted. The letter is included in Appendix F

14. FIRST NATIONS CONSULTATION

Repeated attempts to contact both the Penticton Indian Band and the Okanagan Nation Alliance met with no response. Details are contained in Appendix H.