AECOM




District of Lake Country

Liquid Waste Management Plan – Amendment
Stage 1 – Final Report

Prepared for:
District of Lake Country
10150 Bottom Wood Lake Road
Lake Country, BC V4V 2M1

Prepared by:
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September, 2009
v1.7

Project No. 103121

Distict of Lake Country

Liquid Waste Management Plan – Amendment Stage I – Final Report

Prepared by:

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Project Number:

103121-03

Date:

September 4, 2009

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September 4, 2009 Project Number: 103121-03

Michael Mercer, P.Eng.
Director of Engineering
District of Lake Country
10150 Bottom Wood Lake Road
Lake Country, BC, V4V 2M1

Dear Michael:

Re: District of Lake Country - Liquid Waste Management Plan Amendment

Please find attached the LWMP Amendment Stage I Final Report. This report is intended to provide a background to liquid waste management planning in the District of Lake Country, an overview of the various current issues with possible solutions, and a summary of the Stage I public information meeting.

Once reviewed and accepted by the Advisory Committee this report will be finalized and we will move to Stage II of the planning process.

If you have any questions about this report, require clarification, or further information, please don't hesitate to contact us.

Sincerely,
AECOM Canada Ltd.

Jan R. James Bath, A.Sc.T.
jan.bath@aecom.com

JRB:jrb
Encl.
cc: (see report distribution list)

Signature Page

Report Prepared By:

Jan Robert Bath, A.Sc.T.

Report Reviewed By:

Rick Bitcon, P.Eng.

Executive Summary

The Ministry of Environment (MoE) encourages local governments to develop Liquid Waste Management Plans (LWMP) to facilitate planning decisions for the management, collection, treatment, and return of treated wastewater to the receiving environment.

The District of Lake Country (District) has observed changes in the community and has recognized the need to modify its existing LWMP. Through consultation with MoE the District has decided to amend its current LWMP, retain a consultant, and form various committees to assist in the planning process. With help of the general public, this amendment will amalgamate the previous LWMP with any subsequent engineering reports, planning updates, and changes in the community.

Developing a LWMP is typically a three stage process that involves identifying issues & solutions, developing & selecting the preferred solution(s), and submitting the results to MoE. The committees for this LWMP amendment are currently engaged in Stage I.

'The committees… are currently engaged in Stage I'

The Advisory Committee for this LWMP combines the Technical and Public Advisory Committees and includes representatives from a diverse group. Together with the general public, they have identified several issues which will require consideration within the wastewater management planning framework and will be addressed in Stage II. These include:

- The desire to have an RV sani-station in Lake Country
- Lake Country Wastewater Treatment Plant capacity
- Servicing future growth areas
- Servicing existing neighbourhoods
- WWTP effluent return to the environment

All ideas suggested on how to resolve these issues have been documented in this Stage I report and will form the basis for discussion for Stage II of the LWMP process.

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1	Catriona Weidman, Ministry of Community Development	X	
1	Peter Withers, Lake Country Chamber of Commerce	X	
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Revision Log

Revision #	Revised By	Date	Issue / Revision Description
1	AECOM	December, 2008	Draft Report Version 1.0
2	Jan Bath	January, 2009	Stage I – Draft Report Version 1.1
3	Jan Bath	April 24, 2009	Stage I – Draft Report Version 1.2
4	Jan Bath	May 7, 2009	Stage I – Draft Report Version 1.3
5	Jan Bath	May 21, 2009	Stage I – Draft Report Version 1.4
6	Jan Bath	June 23, 2009	Stage I – Draft Report Version 1.5
7	Jan Bath	August 18, 2009	Stage I – Final Report Version 1.6 (For Steering Committee review)
8	Jan Bath	September 4, 2009	Stage I – Final Report Version 1.7

Definitions and Acronyms

Item	Description
ADF	Average Day Flow
BOD	Biochemical Oxygen Demand
BNR	Biological Nutrient Removal. An advanced tertiary sewage treatment process that removes nutrients biologically from sewage
Disinfection	A treatment process used to destroy pathogenic material. Chlorination and UV are processes commonly used for disinfecting effluent before discharge to the environment
Effluent	The liquid resulting from the treatment of municipal sewage.
Filtration	The removal of solid particles from an effluent by passing the effluent through a filtering medium such as sand, membrane, anthracite, or any other comparable filter medium or combination of filter media, or any physical barrier or device or septum onto which the solids are deposited.
Irrigation	The application of reclaimed water at agricultural rates for the beneficial use of a crop or vegetation.
LWMP	Liquid Waste Management Plan
m^3/d	Cubic metres per day.
MoE	Ministry of Environment
ML	Mega Litres (1,000,000 litres or 1,000 m^3)
MSR	Municipal Sewage Regulation
OCP	Official Community Plan
Pathogen	Bacteria, viruses, or cysts that may affect the health of humans or animals
RI	Rapid Infiltration
Septage	The semi-solid waste pumped from septic tanks
Septic Tank	A watertight vessel into which municipal sewage is continually conveyed such that solids within the municipal sewage settle, anaerobic digestion of organic materials occurs and an effluent is discharged.
Sewage	Also known as raw sewage, municipal wastewater, municipal sewage, liquid waste, or wastewater
SFE	Single Family Equivalent (1 single family household is equivalent to 2.5 people)
Sludge	The solid or semi-solid waste from a sewage treatment plant
Stormwater	The runoff from rainfall, snow, or snowmelt.
STP	Sewage Treatment Plant
TSS	Total Suspended Solids
Treatment	The removal or reduction of contaminants from wastewater.

Treatment, Primary	Primary treatment is essentially the removal of solids from wastewater. Specifically, primary treatment means any form of treatment, excluding dilution, that consistently produces an effluent quality with a BOD not exceeding 130 mg/L and TSS not exceeding 130 mg/L.
Treatment, Secondary	Secondary treatment consists of primary treatment plus the removal of BOD from wastewater. Specifically, secondary treatment means any form of treatment, excluding dilution, that consistently produces an effluent quality with a BOD not exceeding 45 mg/L and TSS not exceeding 45 mg/L, except for lagoon systems for which the effluent quality is not to exceed a BOD of 45 mg/L and a TSS of 60 mg/L.
Treatment, Tertiary	Tertiary treatment consists of secondary treatment with nutrient removal processes added.
TWAS	Thickened Waste Activated Sludge
UV	Ultraviolet light (UV) is used to disinfect water or wastewater by destroying pathogenic material with high intensity ultraviolet light.
Wastewater	Referring to municipal wastewater, which could include raw sewage, septage, or stormwater.
WWTP	Wastewater Treatment Plant

1. Introduction

The Ministry of Environment (MoE) encourages local governments to develop Liquid Waste Management Plans (LWMP) to facilitate planning decisions for the management, collection, treatment, and return of treated wastewater to the receiving environment. A LWMP can also address a variety of related planning issues such as lot sizes, zoning, water conservation, and public education programs. A LWMP is developed through public participation to identify cost-effective and environmentally considerate solutions to wastewater management issues.

'…public participation to identify cost-effective and environmentally considerate solutions to wastewater issues'

Although the District of Lake Country already has a LWMP, an amendment is presently being developed to respond to development pressures and address current wastewater management issues within the District. This amendment will amalgamate the previous LWMP with any subsequent engineering reports, planning updates, and changes in the community's direction or growth. In addition, this amendment will involve identifying and developing options for the return of effluent to the receiving environment from the District of Lake Country's Wastewater Treatment Plant (WWTP).

Developing or amending a LWMP is a three stage process that generally involves…

- Stage I - Data gathering and Option Identification
- Stage II - Option development and selection
- Stage III - Finalization

'…Stage I – Data gathering…will identify existing and future wastewater issues'

The Stage I report will identify existing and future wastewater management issues. The report will also identify potential options for the resolution of those issues. This report will form the basis of discussion for Stage II of the LWMP process.

2. How do you develop a LWMP?

Liquid Waste Management Plans were introduced to British Columbia in the mid-1980s as a way of directly involving the people of a community in the process of selecting their preferred long term solution to the problem of managing liquid wastes in their community. The process involves ensuring all reasonable options are considered, and it culminates in the selection of a preferred solution or mix of solutions. The preferred solution is detailed in the LWMP documents, as well as details of the public consultation program.

After the Minister of Environment provides formal approval the community may request grant monies for the implementation of the LWMP. Communities with an approved LWMP for the handling of their liquid wastes normally have a greater chance of success with their grant applications than those who do not.

The following section provides details on the LWMP process.

2.1 What is a LWMP?

A LWMP is a plan for a municipality or local government that charts the future course of action with respect to wastewater, stormwater and other wastewaters, including the management, collection, treatment, and return of effluent to the environment. A LWMP covers more than solutions for managing liquid wastes. It can also deal with lot sizes, zoning issues in unsewered areas, water conservation programs, and public education programs.

'…tool used to develop…solutions to address local liquid waste issues'

A LWMP is a tool used to develop cost-effective 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…'

Public participation is mandatory for the development of an effective LWMP 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 taxpayers to assist in the process of identifying and selecting the best options for the management of liquid wastes for their community and can increase support for implementation of the recommendations to address their current and future needs.

Furthermore, there is a higher likelihood of obtaining grant monies for implementing a LWMP as the community issues that require remedial action, the environmental and health benefits of the LWMP implementation are all clearly identified in the LWMP.

2.3 What is the process?

The District has recognized the need to amend its LWMP. It has retained consultant(s), notified the Ministry of Environment of its intent to amend its LWMP, and formed committees to assist in the process.

In this LWMP a decision has been made to combine the Technical Advisory Committee and the Public Advisory Committee to form a single wastewater Advisory Committee (AC). This committee will take into account all the technical details and provide insight into local issues, review information, and ensure the LWMP is meaningful and relevant to the citizens of the plan area.

There is also a Steering Committee consisting of District staff, Ministry staff, the Consultant, and Operations staff. (See section '2.4 Roles and Responsibilities' for more information)

2.3.1 LWMP Ground Rules

a. A LWMP should identify and solicit input from a variety of sources including:
   - Appropriate government agencies
   - Non Government Organizations (NGOs)
   - First Nations
   - Special interest groups (if any)
   - The general public in the plan area

b. Answer all questions completely and openly.

c. Consider all ideas suggested.

d. Discard suggested options only for sound technically defensible reasons with a clear explanation of the reasoning behind the decision.

e. Elected officials make the final decision on the selected LWMP solution or mix of 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 A Three Stage Process

A LWMP is developed as a three stage process.

2.3.2.1 Stage I: Data Collection and Option Identification

- Identify existing issues (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

2.3.2.2 Stage II: Option Development, Cost Analysis and Option Selection

- Develop identified options in sufficient detail to permit comparison between different options. This includes options that may be identified even after the completion of Stage I
- 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 preferred solution (or mix of solutions) to the Council for consideration based upon the information developed throughout the LWMP process and – most importantly – feedback from an informed public

Stage I
Identify the options…

Stage II
Option development, cost analysis, and option selection

Stage III
Finalization

2.3.2.3 Stage III: Finalization

- An Executive Summary is to be included in the Stage III report, based on the Stage I and Stage II reports, which would include:
  - Details of the selected option
  - the process followed
  - and rationale for not selecting options
- An outline of what is to be done; level of treatment and effluent disposition required
- A schedule of stages and phases for 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 II)
- Identify any required Bylaws and who is responsible for their preparation
- 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 appendices of the Stage I and Stage II reports)
- Two copies of the documents for each of the three stages of the LWMP are forwarded to the Ministry of Environment office.
- Ministry staff would then provide comments on the plan and the adequacy of the public consultation for the Minister during the review and approval phase.

2.4 Roles and Responsibilities

The following section describes the reporting structure for the various parties contributing to this LWMP and their responsibilities.

2.4.1 Reporting Structure

Figure 1 details the reporting structure and relationships for the elected representatives, steering committee, advisory committee, and public.

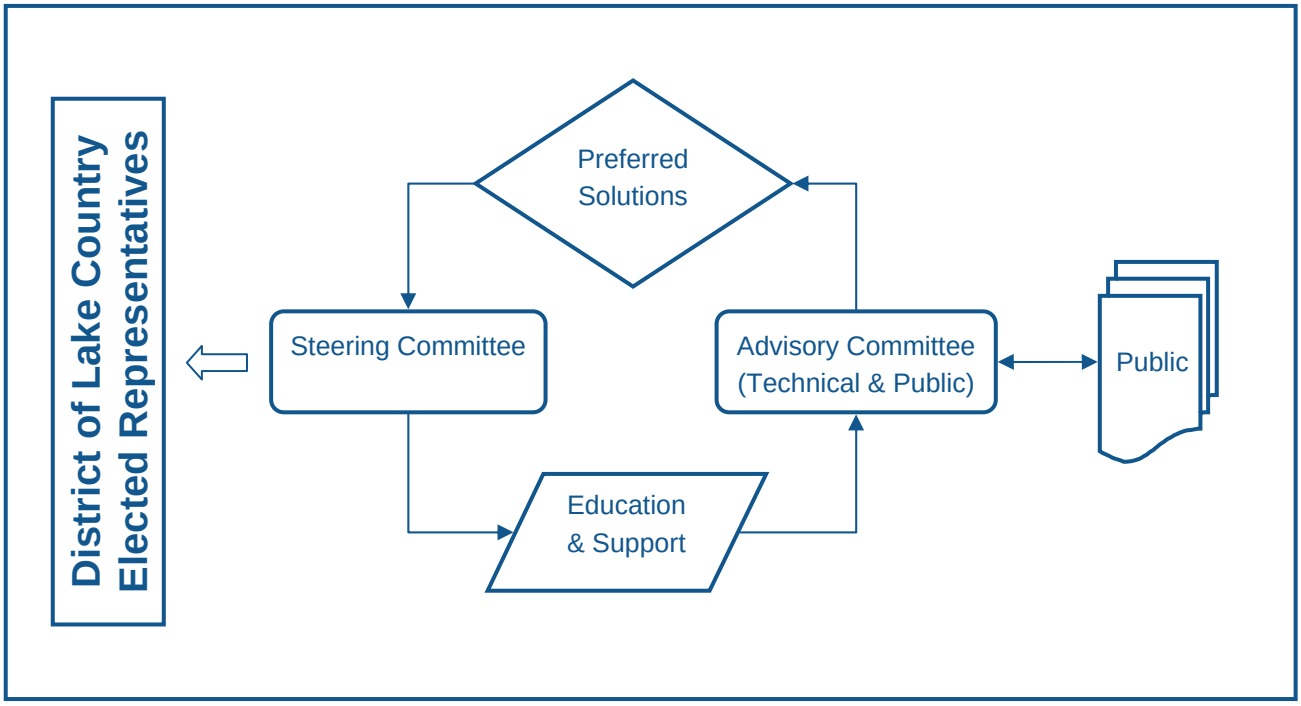


Figure 1 - Committee Reporting Structure

2.4.2 The Steering Committee (SC)

The Steering Committee for this LWMP amendment is comprised of members of the District of Lake Country staff, WWTP Operations, the consultant (AECOM), and representation from the Ministry of Environment.

The role of the Steering Committee is to provide guidance to ensure no option is summarily dismissed and to ensure that council is kept informed of the progress of the LWMP amendment.

All other committees report to the Steering Committee, as indicated in Figure 1.

2.4.3 The Advisory Committee (AC)

The Advisory Committee for this LWMP combines the Technical and Public Advisory Committees and includes representatives from a diverse group, which includes members of Lake Country's general public, municipal staff & elected representatives, the Ministry of Environment, the Ministry of Transportation, Interior Health Authority, Environment Canada, the Okanagan Basin Water Board, Agricultural Land Commission, Fisheries and Oceans Canada, Regional representatives (other municipalities and local governments), and consultants (AECOM). It is anticipated that some members of the committee (notably the government agencies) will not personally attend all meetings, but will provide relevant comments relating to their agency mandates.

The AC acts in an advisory capacity to the Steering Committee and provides insight on community objectives and local issues for inclusion in the LWMP. The feedback the AC provides will help ensure that proposed programs and policies are in the best interests of all residents of Lake Country. In addition, the AC acts as liaison to larger stakeholder group(s), with the assistance of information summaries developed as part of the public consultation process and assists with the public meetings and open house events.

The AC will be responsible to review information and provide comments, concerns, ideas, and potential opportunities for consideration in developing the LWMP. Ultimately, the AC must select a preferred solution or mix of solutions from the identified options in Stage II for consideration and approval by the elected representatives.

2.4.4 Elected Representatives

The role of the elected representatives in the LWMP process is to encourage the public to become aware of the issues and options, to be aware of the LWMP progress, and to await feedback from an informed public and the AC. At the end of Stage II the elected representatives will be asked to make decisions based on the recommendations of the Advisory Committee and public input.

3. Lake Country LWMP

3.1 Study Area

The District of Lake Country is situated within the Regional District of Central Okanagan and to the north of the City of Kelowna. The District encompasses the communities of Winfield, Okanagan Centre, Oyama, and Carr's Landing (Figure 2 - Study Area below or Appendix B). The District of Lake Country is bounded on the west by Okanagan Lake, south by the City of Kelowna, east by the Regional District of Central Okanagan (RDCO), and to the north by the City of Vernon.

The urban area of the District of Lake Country is situated north of Beaver Lake Road along Highway 97 and to the east along Bottom Wood Lake Road. The urban area is located within the ecologically sensitive Kalamalka-Wood Lake Basin, which drains to Okanagan Lake.

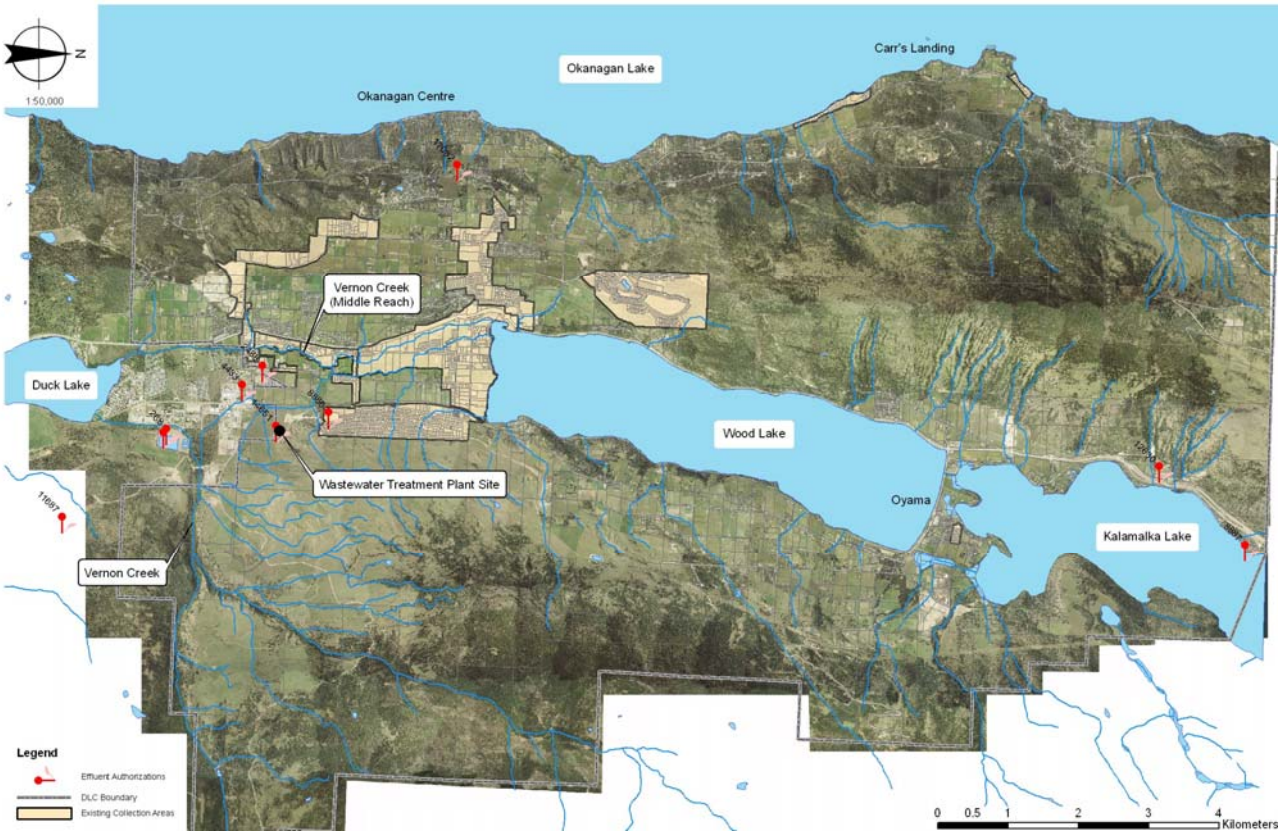


Figure 2 - Study Area

Figure 2 also indicates the locations of all MoE effluent authorizations within Lake Country. MoE authorizes several types of discharge. The District of Lake Country's authorization is an Operation Certificate for their WWTP.

3.2 LWMP History

The impact of nitrogen and phosphorus loadings on the sensitive ecosystem in the Okanagan Basin was studied and documented in the early 1970s. Since that time, the MoE has encouraged communities in the Okanagan Valley to reduce nutrient loadings into the Okanagan Lake system to combat eutrophication. The effluent requirements for discharge to lakes within the Okanagan Basin are among the most stringent in Canada.

In the early 1970s, residential septic tanks were identified as a major contributor of phosphorus to the Kalamalka-Wood Lake Basin. At that time, it was recommended that the use of septic tanks be curtailed, and that sewer collection systems and treatment plants be installed to treat wastewater in the various urban areas to reduce phosphorus loadings to the lakes.

The MoE documented several cases of tile field failures in the Clearwater Subdivision in Lake Country, which is located between Duck Lake and Wood Lake on the east side of Winfield. The Ministry was actively involved throughout the development of the subsequent Liquid Waste Management Plan, and the implementation of Lake Country's Sewer Project.

'In December of 1998, the first phase of Lake Country's sewer system was commissioned…'

In 1988, a Liquid Waste Management Plan was prepared by Associated Engineering for Electoral Area 'A' of the Regional District of Central Okanagan. The Liquid Waste Management Plan recommended that a community sewerage system be installed in the urban area between Duck and Wood Lakes. The system was intended to service the tourist area at the south end of Wood Lake, the residential area in Winfield Flats and along Highway 97, the commercial area along Highway 97 and Bottom Wood Lake Road, and the Clearwater Subdivision. The Waste Management Plan recommended that effluent from the WWTP be disposed of using rapid infiltration in the alluvial fan area near the upper reach of Vernon Creek.

In 1995, the District of Lake Country was incorporated to include much of the area previously included in Electoral Area 'A'. At the time of incorporation, the responsibility for sewer collection and wastewater treatment was transferred from the RDCO to the District of Lake Country. The Liquid Waste Management Plan originally prepared by the Regional District was amended by the newly formed District of Lake Country and the District of Lake Country portion was incorporated into a new Liquid Waste Management plan to cover their proposed new sewage collection and treatment system.

In December of 1998, the first phase of Lake Country's sewer system was commissioned and put into service. The first phase of the sewer system consisted of a collection system serving the central portion of Woodsdale, which would provide a 'backbone' that the District could use to expand to other areas, as the

wastewater utility developed. Since Phase 1 was constructed, sewer service has been extended to the west side of Highway 97, to the north along Woodsdale Road, south along Bottom Wood Lake Road and across Highway 97 extending toward Okanagan Center, and to the Clearwater subdivision.

3.2.1 Wastewater Treatment Plant

'…a Biological Nutrient Removal (BNR) WWTP was constructed…and a rapid infiltration gallery…'

As part of the Phase 1 project, a Biological Nutrient Removal (BNR) WWTP was constructed on a 2 hectare parcel of land on the former Eldorado Ranch property and a rapid infiltration gallery was constructed to the south of the WWTP due north of Beaver Lake Road (refer to Figure 2 - Study Area). Phase 1 of Lake Country's WWTP had the capacity to treat wastewater from the equivalent of about 800 homes or Single Family Equivalents (SFE).

In 2001, a new septage receiving facility was constructed at the Lake Country WWTP to receive and treat septage generated within the Central Okanagan.

In 2005, construction started on the Phase 2 expansion of the WWTP. The Phase 2 expansion included a new secondary clarifier, additional infiltration galleries, and a new sludge dewatering system. This expansion was to increase the nominal WWTP capacity to 5000 people (approximately 2000 SFE).

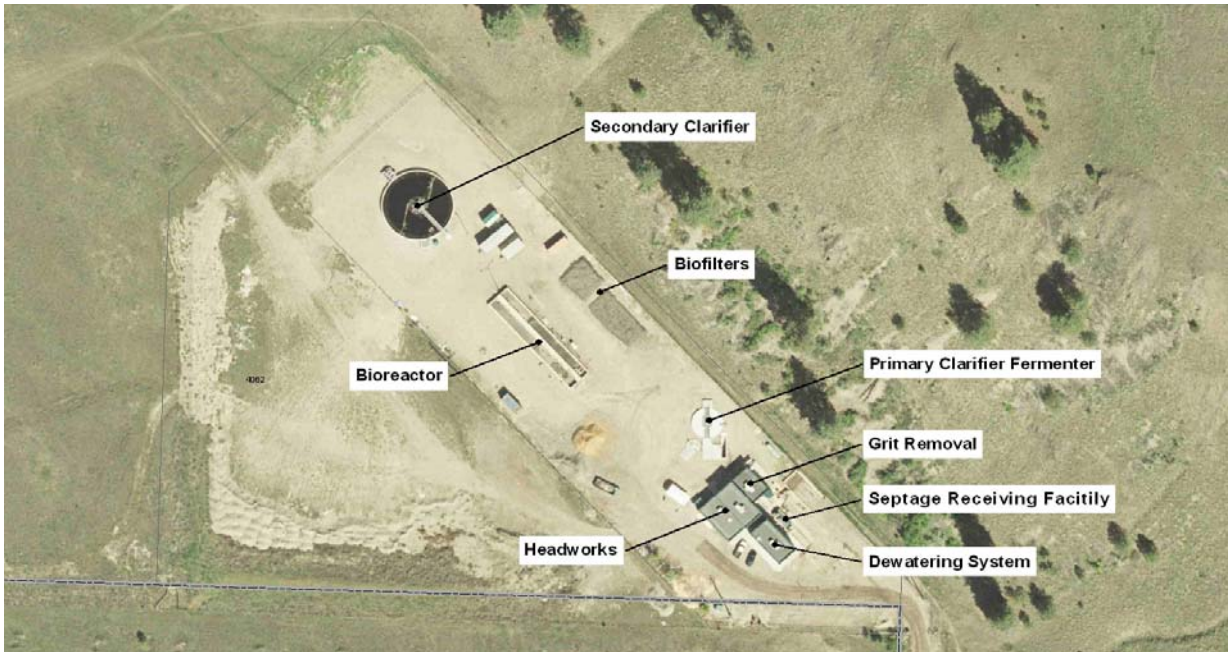


Figure 3 - WWTP Site Plan

3.2.2 Central Collection System

Currently, the central collection system has been extended out toward Okanagan Centre and Chase Road, up to The Lakes development and the Davidson Road area (refer to Figure 4 – Central Collection System below or Appendix B). This collection system delivers raw sewage to the District of Lake Country's WWTP via a series of lift stations and forcemains. Additionally, there are several small subdivisions which were 'dry sewered' in anticipation of future connection to the collection system.

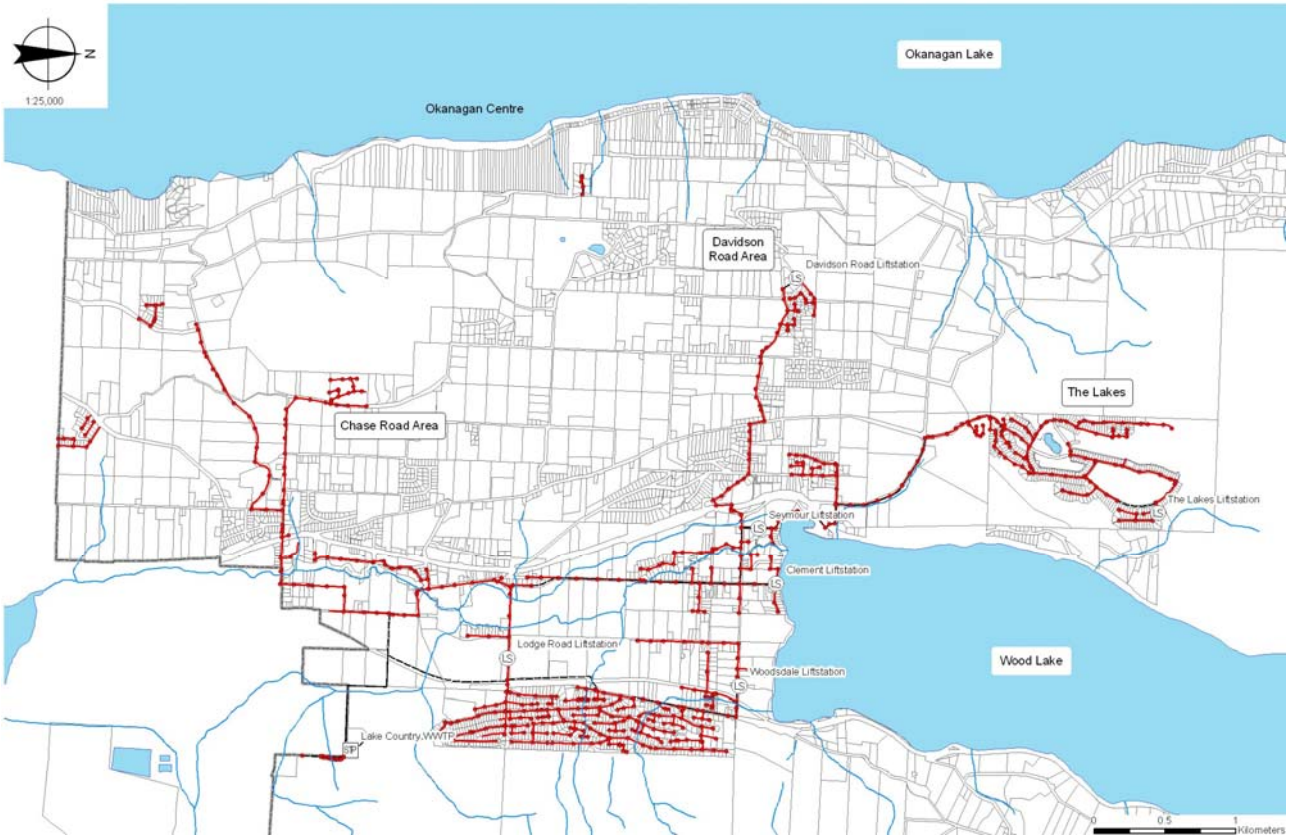


Figure 4 – Central Collection System

3.2.3 Other Collection & Effluent Return Systems

In addition to the central collection systems there are three smaller satellite systems within the District boundary; two systems in Carr's Landing and one in the Oyama area.

3.2.3.1 Oyama Collection & Effluent Return System

There is a small collection system in the Oyama area situated between Wood and Kalamalka Lakes (see Figure 5), which currently services about 27 properties. This system transmits liquid waste to a small packaged secondary treatment facility which returns effluent to an infiltration gallery.

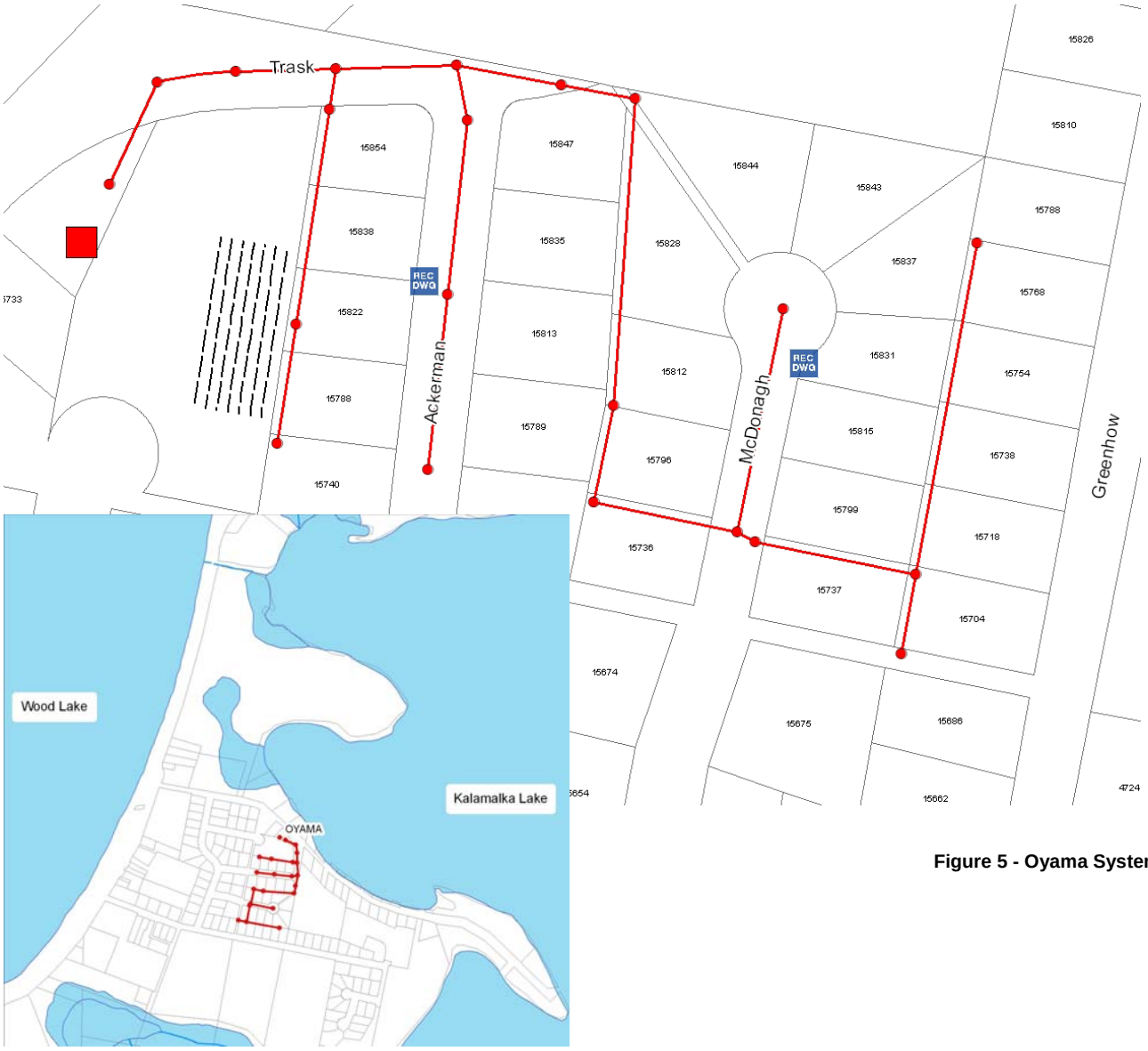


Figure 5 - Oyama System

3.2.3.2 Carr's Landing Collection & Effluent Return System #1 (Whitson-Nuyens)

Carr's Landing System #1 currently services up to 30 properties situated on Okanagan Lake accessed via Carr's Landing Road. A low pressure collection system delivers raw sewage to a centralized liftstation, which in turn delivers the sewage to a septic treatment system discharging to an infiltration field accessed from Barkley Road (refer to Figure 6).

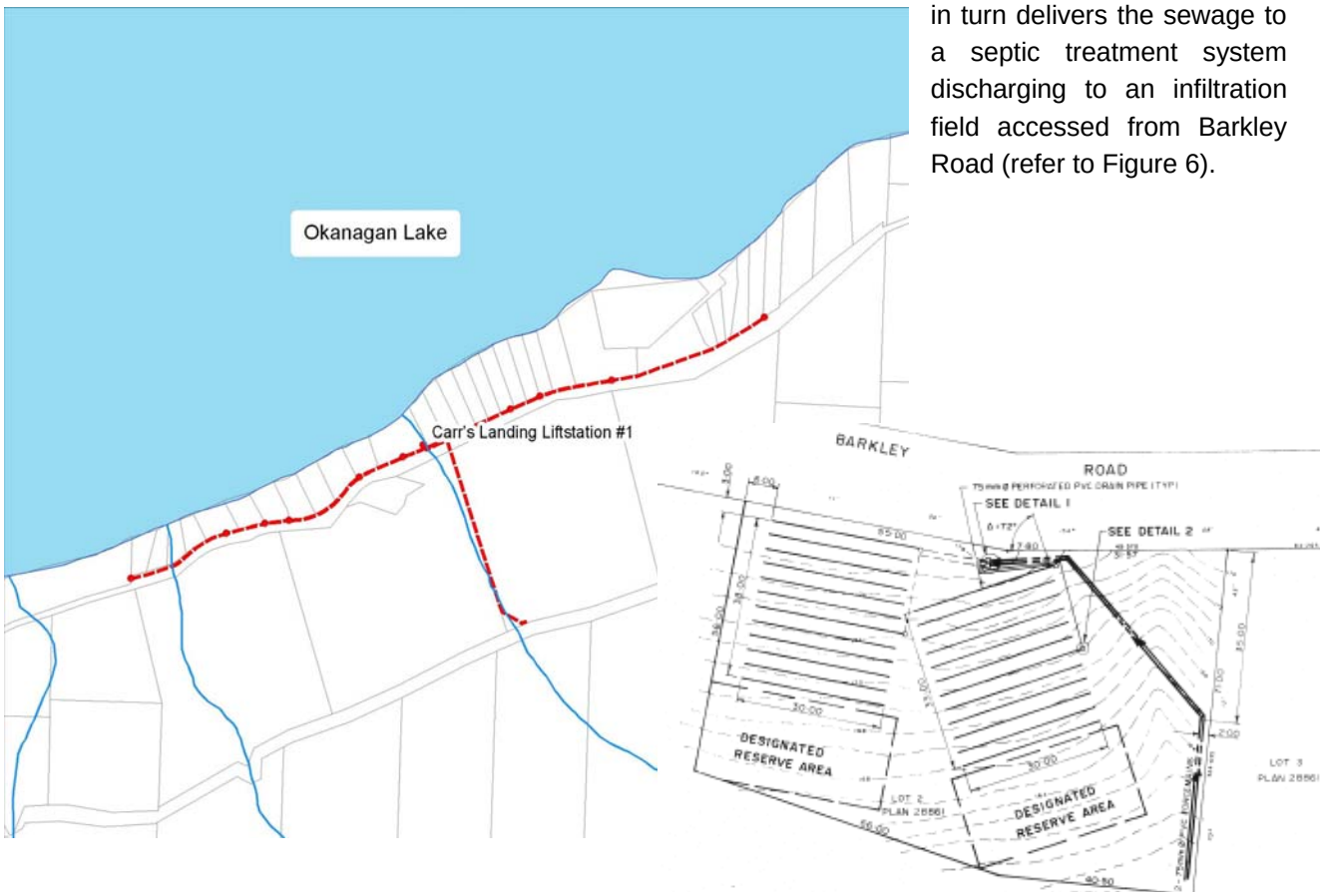


Figure 6 - Carr's Landing System #1

3.2.3.3 Carr's Landing Collection & Effluent Return System #2 (Marshall)

Carr's Landing System #2 services 14-16 properties along Okanagan Lake off Carr's Landing Road. The system is comprised of a gravity collection system which feeds into a liftstation; the liftstation sends wastewater to a septic treatment system which delivers effluent to an absorption field (refer to Figure 7).

Figure 7 - Carr's Landing System #2

3.3 Official Community Plan (OCP)

An Official Community Plan (OCP) documents the community's vision for its future. It will contain goals, policies, drawings and plans that are used as a guide by District staff for planning and land use management decisions in a manner that reflects that vision. An OCP is developed with consultation of the community it represents. The OCP will reflect values that a community has for issues such as environmental sustainability, landuse, future growth, and lot sizes throughout the plan area.

The District of Lake Country's current OCP was adopted in 2002. The future general landuse as documented in the current OCP is illustrated in Figure 8 - Landuse Plan (refer to Appendix B). The District is currently undergoing an update to their OCP. This section will be updated as new landuse information becomes available.

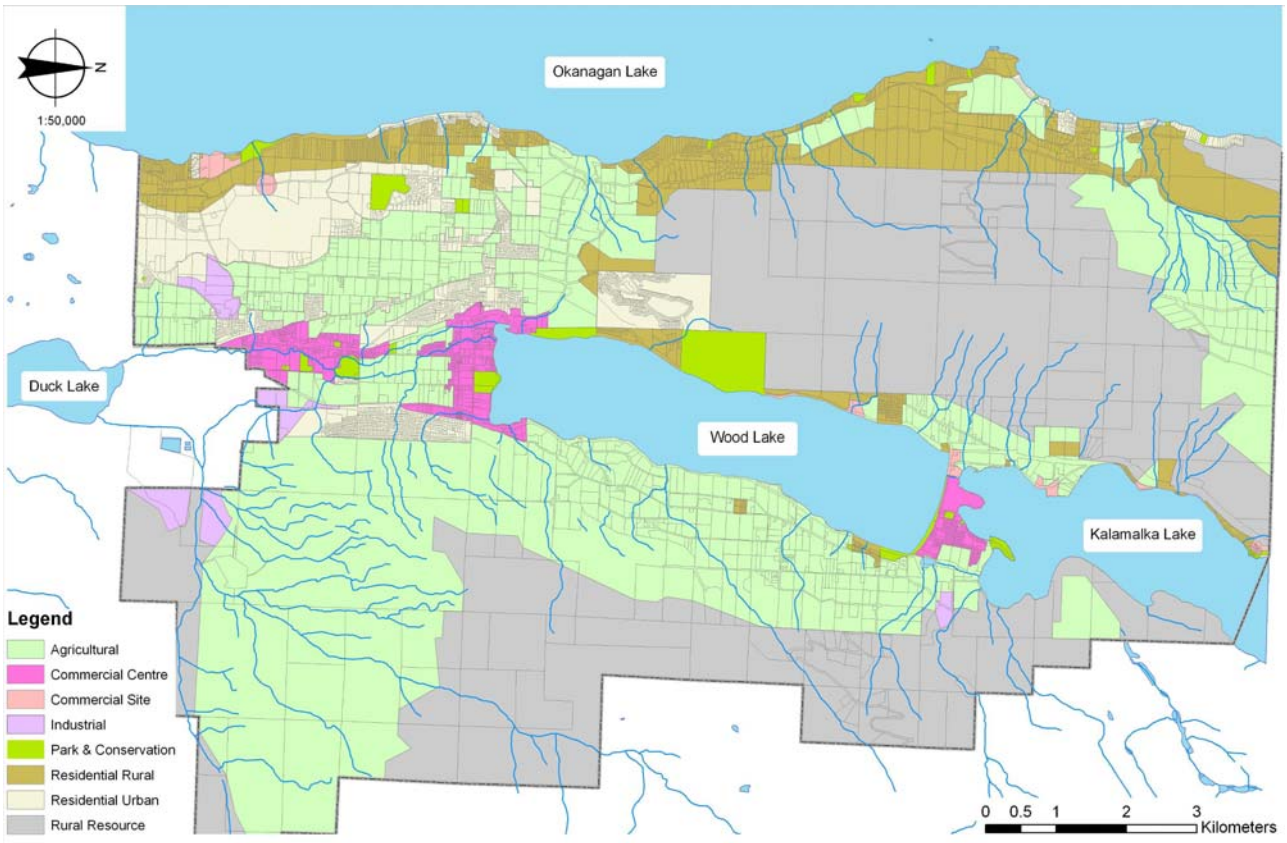


Figure 8 - Landuse Plan

Provincial policy guidelines require that a LWMP and any adopted OCP(s) must be in accord and cannot conflict in any substantive detail.

3.4 Future Service Areas

Future and existing service areas within the District of Lake Country are shown below (refer to Figure 9 - Service Areas or Appendix B). These area boundaries and/or the expected population may be revised as a result of the current OCP amendment.

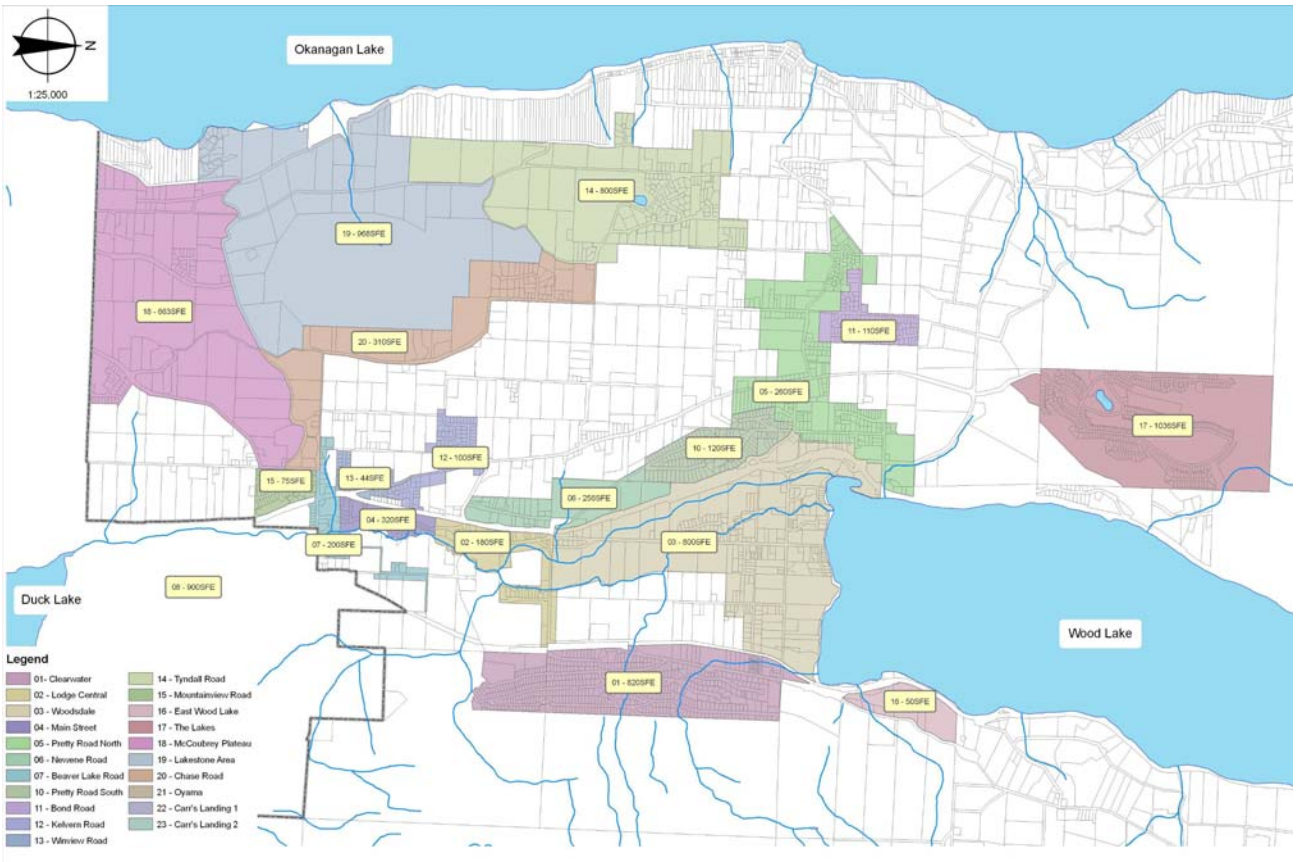


Figure 9 - Service Areas

3.5 Current Stormwater Management

The District of Lake Country has completed several stormwater management plans within the study area boundary, including the following:

- Oyama Road & Williams Hill Master Drainage Plan & Geotechnical Investigation
- Knopf Brook Basin Drainage Study, July 1998 - Associated Engineering
- Woodsdale Area Drainage Plan
- Town Centre Road Stormwater Management Plan
- Winfield Town Centre Storm Drainage Plan
- Tyndall Road and Area Master Drainage Plan

In addition, the District's Subdivision and Development Servicing Bylaw (Section 6.08, Section 6.09, Schedule C.2, and Schedule C.8) handle stormwater management requirements for new development with the District.

3.6 Other Wastewater Management

The District's currently has several bylaws and policies which regulate and manage other wastewaters (e.g. industrial, commercial, or agricultural) as well as municipal wastewater. These include:

- Liquid Waste Management Plan (c.1998)
- Sanitary Sewer Regulation and Rate Bylaw (98-214)
- Official Community Plan
- Sewer Establishment Bylaw (98-181)
- Subdivision and Development Servicing Bylaw
- Satellite Sewer and Enhanced Septic Policy (c. 2003)

In addition, the provincial Health Act Sewage Disposal Regulation and the Municipal Sewage Regulation (MSR) help regulate and control wastewater returns to the receiving environment within the District's boundaries.

4. Current Wastewater Management Issues

Several issues have been identified by District staff, the consultant, and the Advisory Committee which require consideration within the wastewater management planning framework. The issues currently before the Advisory Committee are discussed in the following sections.

4.1 WWTP Effluent Return to Receiving Environment

The District of Lake Country's WWTP currently returns effluent to the receiving environment via a series of infiltration galleries.

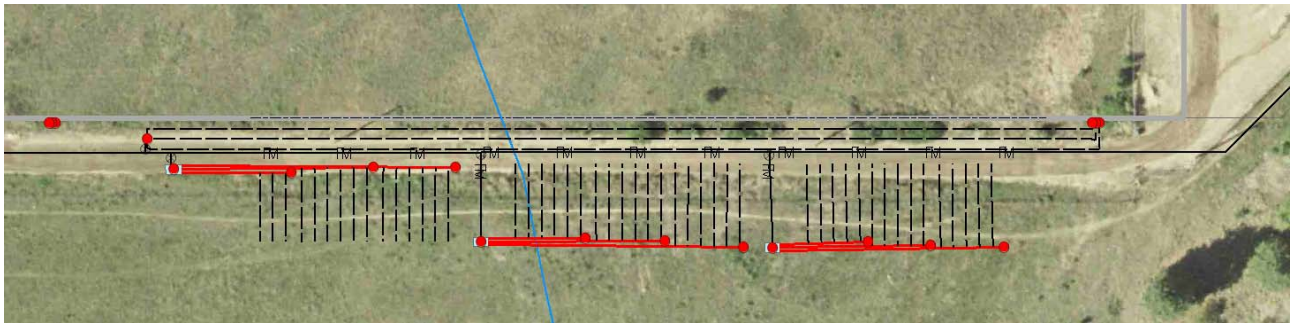
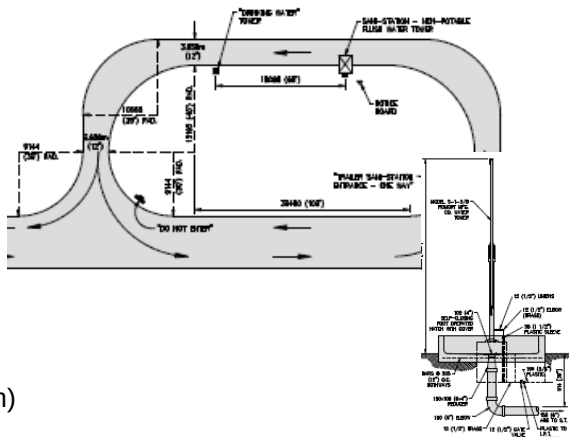


Figure 10 - WWTP Infiltration Galleries

The existing infiltration gallery site is nearing maximum capacity. A decision on future effluent returns is required and will need to be based in part on community growth expectations, land requirements, cost, technical viability, and environmental considerations.

4.2 Recreational Vehicle Sani-Station

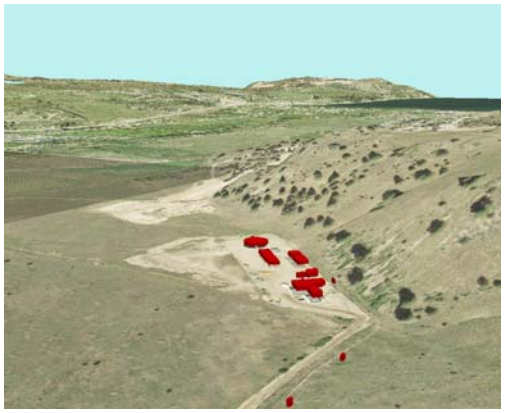
Local groups and residents have long expressed a desire to have a RV sani-station in Lake Country. The reasons vary from environmental impacts of travelling to distant communities to discharge wastewater to promoting tourism in Lake Country by having and supporting local facilities.



There are numerous considerations for the Advisory Committee, including:

- cost recovery
- location
- accessibility
- treatment plant impacts
- disposal method (if not discharging to collection system)

4.3 WWTP Design & Capacity



The current WWTP associated with the central collection system has process restrictions that require upgrading. These upgrades will be staged according to cost, demand, level of treatment, and treated effluent requirements.

4.4 Servicing Growth Areas

The District of Lake Country continues to grow at an annual average rate of at least 3%[1], although the current rate may be higher. Statistics Canada population numbers from 2006 indicate a nearly 4%[2] increase from the previous population count in 2001 and places the population at 9,606. And British Columbia Statistics population estimates (refer to Figure 11) indicate an 8%[3] growth rate from 2007 to 2008, which places the current population over 11,000.

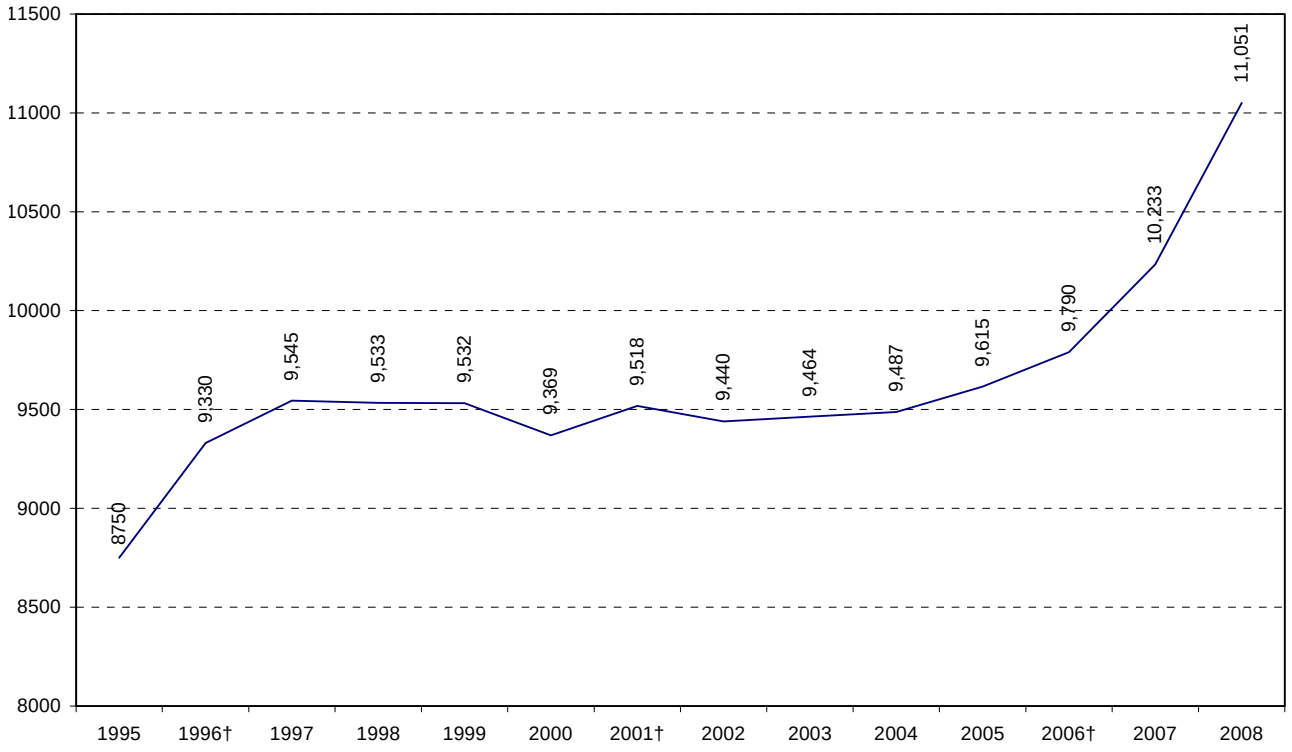


Figure 11 - BC Stats Population Estimates (1995-2008)

[1] *District of Lake Country OCP, 2001*
[2] *Statistics Canada - http://www12.statcan.gc.ca/census-recensement/2006*
[3] *BCStats - http://www.bcstats.gov.bc.ca/*

Regardless of the current rate, population growth places increasing demands on existing liquid waste services and requires planning for expanded collection, treatment, and disposal.

In addition, some of these areas require specific strategies due to terrain or geography; including Oyama, Okanagan Centre, and the potential for IR#7 servicing (refer to Figure 12 or Appendix B).

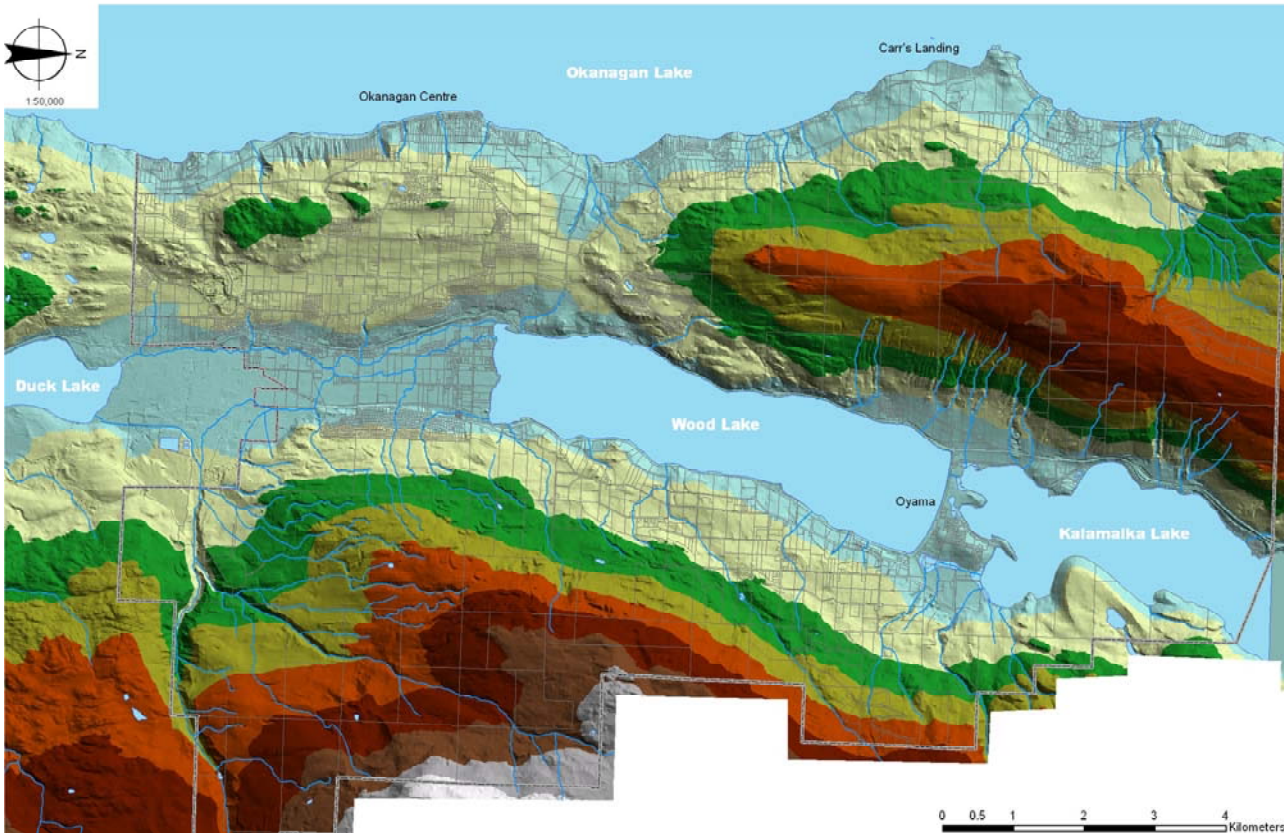


Figure 12 - Elevation Model

4.5 Servicing Existing Neighbourhoods

There are a number of existing neighbourhoods that are known to have failing community or individual septic systems. These are generally either small hillside or lakefront lots and pose a concern due to potential environmental and health issues. Some known examples are:

- Carr's Landing lakefront
- Mountainview Area
- Bond Road Area
- Pretty Road Area
- Oyama Isthmus
- Oyama west side of Wood Lake
- Okanagan Centre Townsite
- Winview Road Area
- Willet Road Area

5. Wastewater Management Solutions

Stage I of the LWMP process is concerned with identifying wastewater management issues and all potential solutions. The various options being considered by the Advisory Committee are presented in the following sections along with an overview of the criteria that will be used in Stage II to select the preferred solutions.

5.1 Selection Criteria

Selection criteria will be developed, ranked, and weighted by the Advisory Committee prior to evaluating the options in Stage II of the LWMP process. Selection criteria will be divided into five categories as shown in Table 1.

Table 1 - Selection Criteria Categories

Category	Description
ENVIRONMENTAL AND HUMAN HEALTH & SAFETY	Protect lake and groundwater quality for human and aquatic health
	Protect terrestrial environment
	Minimize emissions
FINANCIAL	Ensure affordable annual costs per household (including operation and maintenance costs and capital cost financing)
	Ensure phased approach that enables expansion
TECHNICAL	Ensure system reliability
	Optimize operational ease and efficiency
	Minimize odour
SOCIAL	Minimize impact of wastewater operation(s) on nearby residents
	Enhance local economy by improving land values
ADMINISTRATIVE/ PLANNING	Ensure options compatible with land use plans, transportation corridors, etc.
	Ensure land base for expansion and buffering

5.2 WWTP Effluent Return Options

5.2.1 The 'Do Nothing' Option

This option would see no changes to the existing treatment or effluent return systems. The capacity of the existing infiltration galleries and groundwater extraction system is approximately 2 ML/d.

This option would limit development in the central collection area to a population of 5,000 people (approx. 2000 SFE) and may require further education programs for those with septic systems.

5.2.2 Limit or Eliminate Septage Receiving

The District of Lake Country's WWTP currently hosts an RDCO septage receiving facility which contributes less than 3%[4] of the total annual flow into the treatment plant. Limiting or eliminating the septage receiving facility might extend the capacity of the infiltration galleries. Theoretically, this would increase the capacity an additional 150 SFE or approximately 375 people.

5.2.3 New Satellite Treatment Facilities

This option would see limited infill growth within the primary collection area and new development constructing additional satellite collection and treatment facilities. Typically, this strategy lacks the economies of scale and the systems are costly to construct, operate, and maintain. However, the District of Lake Country currently has a bylaw[5] that regulates the requirements for these systems. It ensures the systems are ultimately owned and operated by the District and that they meet a minimum design and treatment standard.

5.2.4 Discharge Sewage to Kelowna

This option involves decommissioning the District of Lake Country WWTP and redirecting raw sewage flow south to the City of Kelowna.

5.2.5 Upgrade Wastewater Treatment Plant

The District's WWTP currently has a defined capacity. This option would identify and address process limitations, but would not address the infiltration gallery limitation of 2 ML/d. In effect, the outcome of this option would be similar to the 'Do Nothing' option described in Section 5.2.1 in that it would limit development in the central collection area to 5,000 people. Although, with plant upgrades, infiltration gallery improvements, and utilization of the ground water extraction system this option may marginally increase the current WWTP capacity. This option could be characterized as fine turning of the existing WWTP processes, operations, and maintenance.

[4] *AECOM – Septage Facility Review Report, February 2009*
[5] *http://lakecountry.civicweb.net/contentengine/document.asp?id=291 – Sewer System Establishment Bylaw 98-181*

5.2.6 Expand Existing Central Collection Area & WWTP

All elements of the existing liquid waste management system would be expanded. The existing Central Collection System would be expanded as required to suit population growth and the servicing of existing un-sewered areas within the District. The liquid and solids treatment trains would be expanded as required using conventional BNR technology to accommodate the additional hydraulic, organic and nutrient loadings from population growth within the District. A revised expansion phasing strategy would be developed to ensure plant capacity is meeting predicted service populations.

'requires one or more hydrological effluent return options…'

Since the capacity of the wastewater treatment system would be limited by the capacity of the effluent return system, this option requires one or more of the following *hydrological effluent return* options to increase the capacity beyond 2000 SFE (pop. 5000).

5.2.6.1 Via the City of Kelowna

This option would discharge effluent from the District of Lake Country's WWTP to Kelowna's sewage collection and treatment system.

5.2.6.2 Upgrading Existing Site

This option would expand the existing infiltration system to its maximum capacity.

5.2.6.3 New Infiltration Site

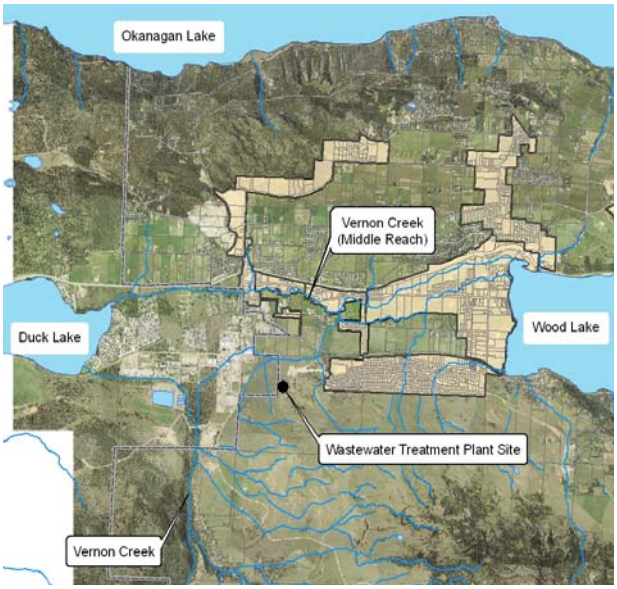
This option would return effluent to the hydrological system via new infiltration galleries constructed at another site.

5.2.6.4 Spray Irrigation

This option would see the construction of an effluent reservoir (storage ponds), chlorine disinfection system, and irrigation water distribution system; which could be used to irrigate any available farms, ranch lands, forest lands, or golf courses.

5.2.6.5 *Enhanced or Constructed Wetlands*

This option would include the construction of an enhancement to an existing wetland area which would return effluent to the environment via Vernon Creek, Duck Lake, Wood Lake, or Okanagan Lake. In addition, the Lake Country WWTP would be upgraded to include UV disinfection.



5.2.6.6 *Infiltration plus Enhanced Extraction*

This option would see the construction of polishing galleries which would return effluent to the environment via Vernon Creek, Duck Lake, or Wood Lake. This option would also require the District's WWTP to be upgraded with additional wastewater treatment (e.g. filtration).

5.2.6.7 *Lake Discharge*

This option would see effluent returned via a direct outfall to Duck Lake, Wood Lake, or Okanagan Lake and would require additional upgrades at the Lake Country WWTP, including tertiary filtration, UV disinfection, and chemical precipitation.

5.3 Expanded Collection System

Areas outside the central collection area will require additional consideration when discussing expanded wastewater service. The following section addresses two types of expanded service areas, those within the municipal boundary and those outside the boundary.

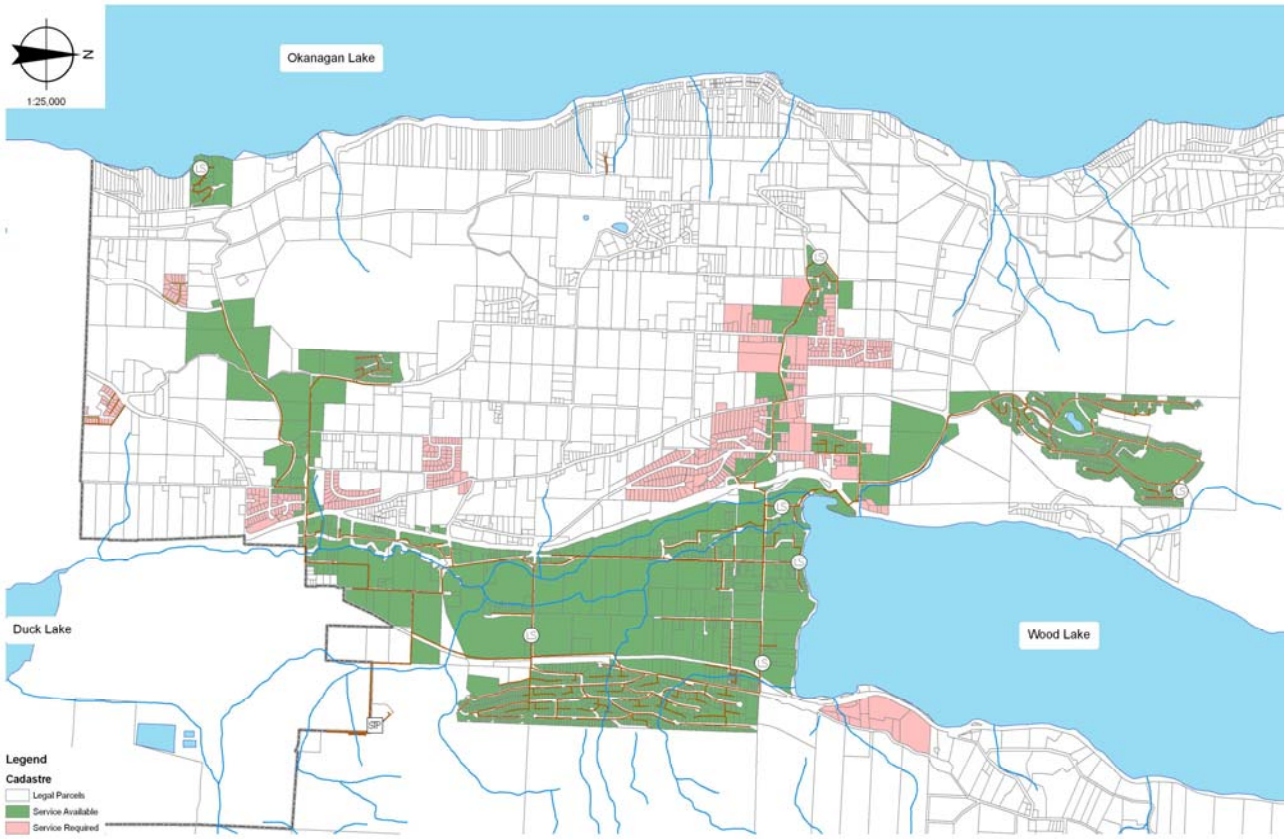
5.3.1 Within the Municipal Boundaries

Generally, the areas within the municipal boundary and outside the central collection area are in Carr's Landing, Oyama (including east bench of Wood Lake), and Okanagan Centre. Additionally, existing small lot subdivisions with septic systems or previously dry sewered subdivisions could be considered for expanded service. The District's Satellite Sewer and Enhanced Septic Policy currently address the type of collection and treatment required for these areas. There are three basic options for expansion of wastewater management services for properties within these areas.

5.3.1.1 *Centralized Collection & Treatment*

This option would see the development of a sewer collection system within the area and a liftstation or series of liftstations to convey wastewaters to the Lake Country WWTP. Figure 13 highlights some of the existing subdivisions that could be included in the central collection system.

Figure 13 - Central Collection System Expansion



5.3.1.2 *Construct New Satellite Systems near Development Nodes*

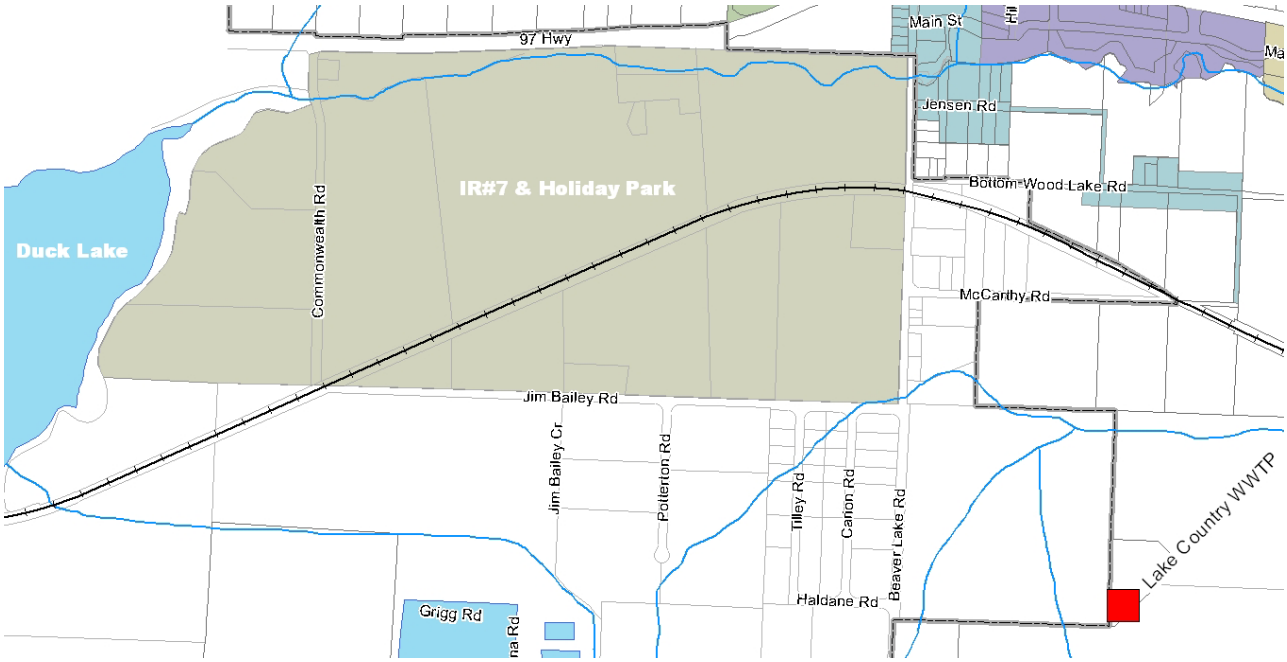
This option would see expansion of existing satellite systems and creation of new collection systems and treatment facilities.

5.3.1.3 *Enhanced Septic Systems*

This option would utilize enhanced septic systems as defined in the District's Satellite Sewer & Enhanced Septic Policy and Subdivision & Development Servicing Bylaw for lots with an area between 450m^2 - 835m^2.

5.3.2 Beyond the Boundaries

There are areas outside the municipal boundary which could be serviced in the future by the Lake Country wastewater management system. For example, IR#7 located just south of the District of Lake Country is currently discussing the option to connect to the District's WWTP. The option to include specific areas outside the municipal boundary may be considered in this LWMP.



6. Stormwater Management

The District of Lake Country currently has several Stormwater Management plans, including the following:

- Oyama Road & Williams Hill Master Drainage Plan & Geotechnical Investigation
- *Knopf Brook Basin Drainage Study, July 1998* - Associated Engineering
- Woodsdale Area Drainage Plan
- Town Centre Road Stormwater Management Plan
- Winfield Town Centre Storm Drainage Plan
- Tyndall Road and Area Master Drainage Plan

These plans combined with the District's current Subdivision and Development Servicing Bylaw[6] (Schedule C.8) sufficiently manage stormwater within the District of Lake Country.

7. Agricultural Wastewater Management

If any issues related to agricultural wastewater or runoff identified will be discussed in this section.

8. Other Wastewater Management

There are currently no other known wastewater management issues.

9. Government & Agency Comments

Local governments and Provincial government agency comments are based upon each organizations legislated mandate and any comments received will be quoted verbatim. Comment will be solicited from the following organizations:

- Ministry of Transportation
- Interior Health
- Ministry of Environment
- Ministry of Agriculture and Lands
- Environment Canada
- Regional District of Central Okanagan
- Okanagan Basin Water Board
- City of Kelowna
- City of Vernon

[6] http://lakecountry.civicweb.net/contentengine/document.asp?id=919 – *Subdivision and Development Servicing Bylaw 97-139*

Appendix A

Advisory Committee

Meeting Minutes

Advisory Committee – March 5, 2009

AECOM

Liquid Waste Management Plan Amendment

Advisory Committee
Meeting March 5, 2009

Agenda

- Introductions
- Meeting Objectives
- Presentation
  - Basic Understanding of Liquid Waste Management Planning
  - Known Issues
  - Previously Identified Options
  - What's Next?
  - Overview Summary

District of Lake Country
Municipal Office
10150 Bottom Wood Lake Road
Lake Country, British Columbia
Telephone: 250.766.5650 Fax: 250.766.0116

MEETING NOTES

LIQUID WASTEWATER MANAGEMENT PLAN
AMENDMENT ADVISORY COMMITTEE

Date:	March 5, 2009
Time:	1:30pm
Place:	Council Chambers Municipal Office 10150 Bottom Wood Lake Road
Present:	James Baker, Mayor, District of Lake Country Barbara Leamont, Councillor, DLC Randy Rose, Administrator, DLC Stephen Banmen, Director of Finance, DLC Michael Mercer, Director of Engineering, DLC Mark Koch, Development Services Manager, DLC Lyle Brewer, Economic Development, OKIB Chris Radford, RDCO Jeff Oland Carmen Stanek
Consultants:	Jan Bath, AECOM Tim Forty, AECOM

- Jan Bath explained the process of the Plan and how the committee members fit together to develop it.
- The Committee members introduced themselves and their affiliations.
- Tim Forty presented AECOM's report, attached to these notes, highlighting the following:
  - which members can vote;
  - the responsibilities of the Advisory and Steering Committees;
  - the three stages of developing the plan;
  - the importance of the LWMP and OCP working together; and
  - how the Ministry of Environment ensures the transparency of the process

- Jan Bath asked the committee to present any other issues than those presented to be dealt with. The Committee identified the following:
  - water conservation programs;
  - hydrological studies; and
  - storm water studies.

- The next meeting will be held at the end of March/beginning of April.

Advisory Committee – April 9, 2009

AECOM

Liquid Waste Management Plan Amendment

Advisory Committee
Meeting April 9, 2009

AECOM

Advisory Committee Meeting – April 9, 2009

Agenda

- Meeting Objectives
- Presentation
  - Identified Issues
  - Identified Options
  - What's Next?

DISTRICT OF LAKE COUNTRY
Municipal Office
10150 Bottom Wood Lake Road, Lake Country, British Columbia V4V 2M1
Telephone: 250-766-5650 Fax: 250-766-0116

MEETING NOTES

LIQUID WASTE MANAGEMENT ADVISORY COMMITTEE

Date: Thursday, April 9, 2009

Time: 10:00 a.m.

Place: Council Chambers, Municipal Hall
10150 Bottom Wood Lake Road

Present: Jan Bath
Noreen Guenther
Barb Leamont
Jake Thiessen
Vic Jensen
Rod Pooley
Peter Withers
Gary Kozub
Mike Reiner
Brynn Lord
Isaac Yung
Lyle Brewer

Staff: Michael Mercer, Director of Engineering
Mark Koch, Planning
Randy Rose, Administrator
Shantelle Clarke, WWTP
Stephen Banmen, Director of Finance
Mike Reiley, Director of Planning (10:25)
Deb Youngest, Recording Secretary

The meeting was called to order by Jan Bath at 10:05am.

I. Agenda

Jan Bath presented an informal agenda:

- Objectives – outline issues facing DLC, outline options
- Presentation

No "formal adoption" – wants this to be presentation/brainstorming session/ informal discussion

II. Objectives:

a. Outline issues
b. Outline options

III. Presentation (Jan Bath)

Identified issues

1) Treatment & disposal outside primary service areas (Carrs Landing, Oyama, Okanagan Centre)

2) Infiltration site nearing maximum capacity

3) Sewage treatment issues - Process bottlenecks, upgrading, staging and costs

Responses were solicited for other identifiable issues, which prompted comments on the following:

- IR #7 is on the fringe of the service area but will likely want services in future.
- The original design capacity has been subject to some limitations due to the original galleries not operating as well as expected; these galleries have been operating more reliably since the installation of new galleries has removed some of the load from the original galleries.
- The desire to integrate the plan into broader water management plans such as stormwater management and sensitive habitat mapping. It was noted that the LWMP is mandated to focus on sewage disposal issues,
- Whether the galleries could last longer if only accepting effluent from the DLC. It was noted that the volume of effluent entering the system from the RDCO Septage receiving facility is marginal.

Identified Options

Option 1: Status quo, no change

- Limits development of core DLC to 5000 people.

Option 2: New satellite plants near development nodes (similar to Oyama/Carrs Landing)

- Lacks economies of scale
- More difficult for Operations to manage

Discussion followed, including:

- DLC Bylaw and policy regulates the requirements for such systems, ensuring they are owned and operated by DLC and meet certain design and treatment-quality specifications.
- Cost issues involved in constructing such systems

- Concerns over the environmental impact of failing septic fields; whether it is "better to do something over nothing".
- Concerns that adding sewer to certain rural areas would act as a stimulus for growth in these areas:
  - Existing zoning would allow for significant growth if sewer were present
  - Whether the general public would be on-board with such growth
- Whether lake discharge for such systems were an option. It was noted that all existing DLC satellite plants are ground discharge, and that private developments are prohibited from discharging to water source.

Option 3: Discharge Raw Sewage to Kelowna System + shut down DLC WWTP

- Would require contribution to DCC's in Kelowna, ongoing user fees, cross-jurisdictional agreements, + still need to invest in DLC infrastructure.
- Previously an option that was rejected. But it is an option.

Option 4: Expand Existing DLC System

Option 5: Expand with Liftstation Connection to Primary System

Option 6: Option 4 + a hydrological system return of effluent via expanding existing infiltration galleries

- Limited additional disposal capacity (possibly none).

Comments include:

- Possiblity that groundwater may eventually reach the lake.
- Whether water being returned to the same aquifer from which it is drawn. It was noted that DLC does not draw water from aquifers; discharge to aquifer through infiltration galleries recharges groundwater.
- Availability of suitable land dependent on successful land negotiations and the ability develop infrastructure to reach new areas.
- The potential impact of wastewater on groundwater that may one day be needed as a source of drinking water, and the impact on private utilities (such as Alto) that currently draw from groundwater sources.

Option 7: Option 4 + hydrological return of effluent via Kelowna

Option 8: Opt 4 + hydrological system return of effluent via spray irrigation

- Would require expansion of treatment plant and construction of effluent reservoir and irrigation distribution system.
- Limited to small communities (approx 5000).
- Requires contingency plans for successive wet years; the contingency plan could be to use existing infiltration system.

Comments included:

- Public concerns related to effluent sprayed on food crops or food-animal grazing lands. It was noted that the agricultural community is not on-board, with concerns over the impact of negative public perception on their ability to market product.
- This option is being used effectively in Vernon, Oliver, Osoyoos and other communities. It was noted that public attitude may be shifting.
- Possible use for turf, golf courses, Christmas tree farms or rangeland? It was noted that some landowners have already been approached to determine interest, and that positive response to date does not provide a large enough land base to use this type of hydrological return system.

Option 9: Option 4 + expanded infiltration galleries with groundwater extraction and hydrological system return of effluence via alternate receiving environment (such as a wetland area)

Option 10: variation on Option 9

Option 11: Option 4 + effluent discharge directly to receiving environment (lake)

- Would require additional treatment before water could be suitable for lake discharge (for example, fiiltration and UV disinfection).

Discussion included:

- Whether the receiving environment could be something other than a water body, such as an abandoned gravel pit. It was noted that subsurface disposal tends to channel and flow to areas where it is not desired.
- The ability to augment creek flows with discharge water. The possibility of discharging to Vernon Creek was discussed, noting:
  - Data loggers are being installed to develop base data.
  - There is an option on DLC's permit to discharge to Vernon Creek provided sufficient data is collected to prove "no negative impact". For example, temperature and nutrient issues must be analyzed.
  - The infrastructure exists to hard-pipe discharge water, and has been tested.

Option 12: Stormwater Management

- DLC studies on stormwater are numerous and varied, needing to be melded into a single consolidated document and set of policies. While time and budget constrains presently exist, groundwater issues should be melded into the next iteration of the LWMP.

Jan solicited comment on other potential options, issues or comments. Comments that followed included:

- The ultimate plan with probably be a hybrid containing bits and pieces from various strategies, employed based on what makes sense economically.

- Stormwater discharges from the industrial park affect DLC processes; an awareness of this issue is beneficial but this topic is not a priority with City of Kelowna.
- Whether the entire Okanagan Basin hydrological system should be looked at as a whole. It was noted that the Okanagan Basin Water Board is looking at the regior as a whole, and that the LWMP is intended to be a "local" look at what works best for the local region.
- The interrelation with water planning issues such as metering and conservation. It was noted that conservation practices do have an effect on sewage treatment, as reduced water use leads to a more concentrated effluent and increased nutrient loading. This has design and treatment ramifications; historical assumptions may no longer apply.
- Jan Bath concluded by noting that identifying the issues is Stage One of the process. The resulting document will be distributed to Committee members, and will be followed by at least two public meetings before moving forward to Stage Two. The Administrator noted that this is an update to a current plan, and that there is a lot of existing policy. At the request of Committee members, Jan Bath confirms that some additional background information will be distributed to the Committee in the information package to be distributed, ideally within the next two weeks.

IV. Next meeting

It was planned that the Committee should reconvene in approximately four weeks, and should receive the report/information package at least one week in advance of the next meeting.

V. Adjournment

Jan Bath adjourned the meeting at 11:45 a.m.

Advisory Committee – May 28, 2009

AECOM

Liquid Waste Management Plan Amendment

Advisory Committee
Meeting May 28, 2009

Advisory Committee Meeting – May 28, 2009

Agenda

- Adopt Agenda
- Adopt April 9, 2009 Meeting Minutes
- Stage 1 - Draft Report
  - Presentation
  - Discussion
- Stage 1 - Public Information Meeting
  - Suggested Date: Tuesday, June 23, 2009
  - Discuss sample story boards, newsletter, media
  - Review roles and expectations of committee
- Adjournment

District of Lake Country
Municipal Office
10150 Bottom Wood Lake Road, Lake Country, British Columbia V4V 2M1
Telephone: 250-766-5650 Fax: 250-766-0116

MEETING NOTES

LIQUID WASTE MANAGEMENT PLAN ADVISORY COMMITTEE

Date: Thursday, May 28, 2009

Time: 10:00 a.m.

Place: Council Chambers, Municipal Hall
10150 Bottom Wood Lake Road

Present: Jan Bath
Barb Leamont
Jake Thiessen
Peter Withers
Brynn Lord
Chris Radford

Staff: Michael Mercer, Director of Engineering
Mark Koch, Planning
Randy Rose, Administrator
Willene Perez, Recording Secretary

The meeting was called to order by Jan Bath at 10:15 a.m.

1. Stage 1 Draft Report

Jan Bath asked if the committee members had any additional issues regarding the Draf Report. The following were brought forward:

- The need for an Executive Summary in the report. It will be included in the final report following the public information meeting.
- Inclusion of neighbouring jurisdictions, e.g Hiram Walker, industrial park, IR#7. Jan Bath stated that Stage 1 of the process is intended to identify issues with no comment about viability.
- Highlight the importance of boundaries in the report as the industrial park is only partially serviced by Kelowna.
- The capacity assessment of the current plant is currently being performed. The results will be available by Stage 2.
- Add sections 4.5 – Servicing Existing Neighbourhoods and 4.6 – Carr's Landing to the report. (photocopy of notes given to Jan Bath)
- Existing areas in current plan are experiencing septic failure and need to be serviced.
- The plan and report need to differentiate between growth areas and existing neighbourhoods requiring expansion of the sewer collection system.

- The existing areas of development requiring service include Oyama, Okanagan Centre, Mountview/Janet Roads, Daniel Road, Pretty Road, Winview and Willet Roads. These can be added in Stage 2 along with others that may arise during the public information meeting.
- Interior Health has background information on failing areas that can be added to the report to support the need for service.

Jan Bath asked the committee members if they had any additional solutions that should be taken into consideration. The following were brought forward:

- The Chamber of Commerce and Council has strongly identified a sani-station as a need. It must be decided where it would be located and if it will connect to the plant. The Winfield Shopping Centre, Cooper's Mall and the Winfield arena were mentioned as possibilities.
- The criteria to eliminate solutions were discussed. The first committee meeting following the public information meeting will comprise of weighting the criteria, examining the solutions and performing the initial sorting.
- Infrastructure grants are currently available from the government, so timing is an issue.
- The Official Community Plan future growth map is evolving but engineering is requesting that it be as accurate as possible. It may change in future draft reports.

2. Public Information Meeting

The meeting will be held on Tuesday, June 23, 2009, consisting of two presentations followed by question and answer periods. Committee members are expected to attend and assist in fielding questions. The intention of the meeting is to solicit feedback and bring them forward to the committee. Attendees will be given an exit survey.

The draft report is available on the District's webpage. Newsletters will also be mailed to residents a week prior to the meeting.

Jan presented the outline of the storyboards for the public meeting and the newsletter to be mailed one week prior to the meeting.

3. What's Next?

- The Stage 1 report will be redrafted prior to the public meeting
- The Stage 1 report will be finalized following the public meeting
- Move on to Stage 2

Jan Bath adjourned the meeting at 10:57 a.m.

Appendix B

Figures

AECOM

District of Lake Country

Liquid Waste Management Plan

1:50,000

Okanagan Lake

Carr's Landing

Okanagan Centre

17082

Vernon Creek
(Middle Reach)

24988

4433

14651

8886

268

Duck Lake

Wood Lake

12630

Wastewater Treatment Plant Site

Oyama

Kalamalka Lake

8887

11687

Vernon Creek

Legend

- Effluent Authorizations
- DLC Boundary
- Existing Collection Areas

0 0.5 1 2 3 4 Kilometers

Study Area

Figure 2

Printed: L:\work\103000\103121\02a-CAD\WATI\103121-S1-FIGURE 2 Study Area.mxd, 2009-04-09, 3:52 pm, jan.bath

AECOM

District of Lake Country

Liquid Waste Management Plan

N

1:40,000

Okanagan Lake

Okanagan Centre

Carr's Landing

Carr's Landing Liftstation #2

Carr's Landing Liftstation #1

Davidson Road Liftstation

Davidson Road Area

The Lakes

Chase Road Area

The Lakes Liftstation

Seymour Liftstation

Clement Liftstation

Lodge Road Liftstation

Woodsdale Liftstation

Wood Lake

Lake Country WWTP

Oyama

Oyama WWTP

0 250 500 1,000 1,500 2,000 2,500 Meters

Figure 6 - Carr's Landing System #1

Figure 7 - Carr's Landing System #2

Figure 5 - Oyama System

Printed: L:\work\103000\103122102a-CADWAT\103121-Stage1-FIGURE 4 Sewer Collection System .mxd, 2009-06-23, 9:34 am, jan.bath

Overview of Existing Sanitary Sewer Collection Systems

Figure

4

AECOM

District of Lake Country

Liquid Waste Management Plan

1:50,000

Okanagan Lake

Duck Lake

Wood Lake

Kalamalka Lake

Legend

- Agricultural
- Commercial Centre
- Commercial Site
- Industrial
- Park & Conservation
- Residential Rural
- Residential Urban
- Rural Resource

0 500 1,000 2,000 3,000 4,000 Meters

Printed: L:\work\10300\10312102a-CAD\WAT1103121-Stage1-FIGURE 8 OCP.mxd, 2009-05-06, 2:00 pm, jan.bath

Landuse (OCP)

Figure 8

AECOM

District of Lake Country

1:25,000

Okanagan Lake

14 - 800SFE

19 - 968SFE

18 - 663SFE

20 - 310SFE

11 - 110SFE

05 - 260SFE

17 - 1036SFE

10 - 120SFE

12 - 100SFE

13 - 44SFE

15 - 75SFE

06 - 256SFE

04 - 320SFE

07 - 200SFE

02 - 180SFE

03 - 800SFE

08 - 900SFE

Duck Lake

Wood Lake

01 - 820SFE

16 - 50SFE

Legend

- 01- Clearwater
- 02 - Lodge Central
- 03 - Woodsdale
- 04 - Main Street
- 05 - Pretty Road North
- 06 - Newene Road
- 07 - Beaver Lake Road
- 10 - Pretty Road South
- 11 - Bond Road
- 12 - Kelvern Road
- 13 - Winview Road
- 14 - Tyndall Road
- 15 - Mountainview Road
- 16 - East Wood Lake
- 17 - The Lakes
- 18 - McCoubrey Plateau
- 19 - Lakestone Area
- 20 - Chase Road
- 21 - Oyama
- 22 - Carr's Landing 1
- 23 - Carr's Landing 2

Sewer Service Area

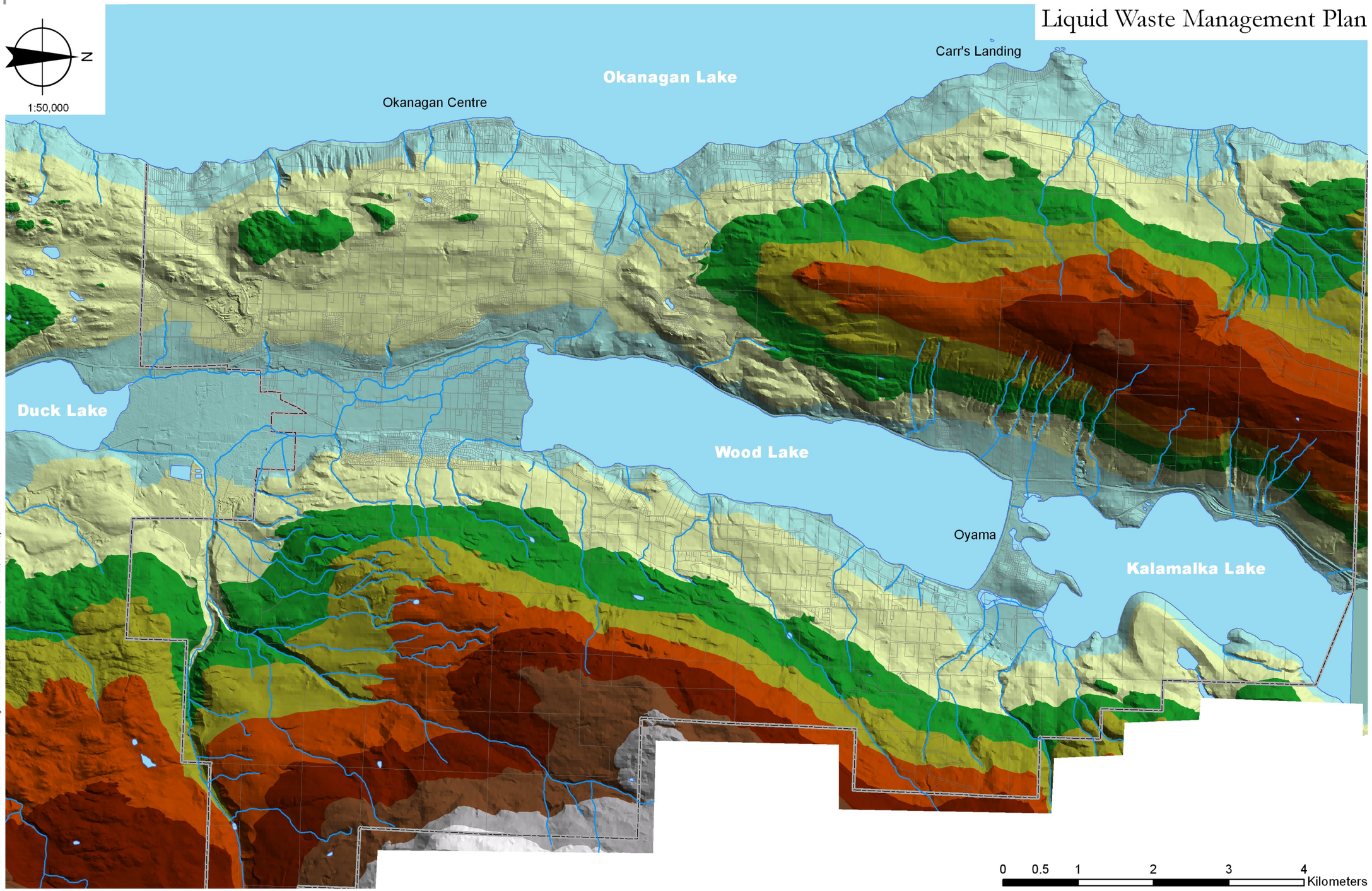
Figure

9

AECOM

District of Lake Country

Liquid Waste Management Plan



Printed: L:\work\103000\103121\02a-CAD\WAT\103121-Stage1-FIGURE 12 Elevation Model.mxd, 2009-06-23, 9:09 am, jan.bath

Elevation Model

Figure 12

AECOM

District of Lake Country

Central Collection System - Sewer Service Area

Serviced Neibourhoods & Existing Neighbourhoods Requiring Service

1:25,000

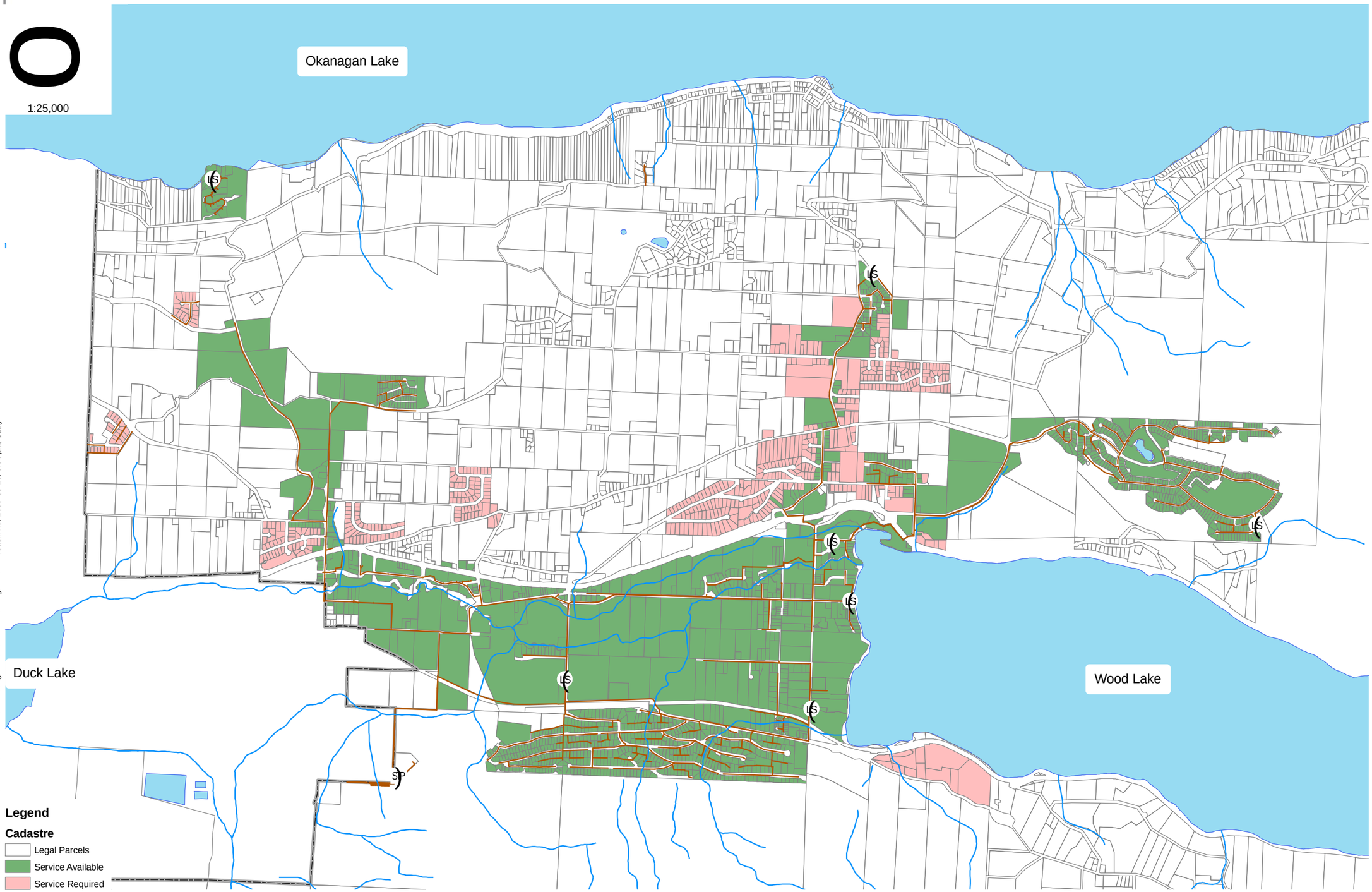


Figure 13

Printed: L:\work\103000\103121\02a-CAD\WAT\103121-Stage1-FIGURE 13 Existing Service Areas.mxd, 2009-08-19, 3:04 pm, bathj

Appendix C

Advisory Committee Members

Advisory Committee Members

Organization (Representing)	Name	Contact email	Bus. Phone
District of Lake Country Mayor	James Baker	baker@lakecountry.bc.ca	
District of Lake Country	Stephen Banmen	sbanmen@lakecountry.bc.ca	(250) 766-5650
AECOM Canada Ltd	Jan Bath	jan.bath@aecom.com	(250) 762-3727
AECOM Canada Ltd	Rick Bitcon	rick.bitcon@aecom.com	(250) 762-3727
OKIB	Lyle Brewer	lyle.brewer@okanagan.com	(250) 542-4328
United Water	Shantelle Clarke	Shantelle.Clarke@unitedwater.com	(250) 766-1478
Agricultural Land Commission	Martin Collins	Martin.Collins@gov.bc.ca	(604) 660-7021
AECOM Canada Ltd	Tim Forty	tforty@shaw.ca	
District of Lake Country Councillor	Noreen Guenther	guenther@lakecountry.bc.ca	
Fisheries and Oceans Canada	Jeff Guerin		(250) 851-4950
Ministry of Environment, Environmental Protection	Vic Jensen	Vic.Jensen@gov.bc.ca	(250) 490-8208
District of Lake Country	Mark Koch	mkoch@lakecountry.bc.ca	(250) 766-6674
City of Vernon	Shirley Koenig		(250) 550-3623
Public	Gary Kozub	gary_kozub@telus.net	(250) 766-3576
Environment Canada	Snehal Lakhani	snehal.lakhani@ec.gc.ca	(604) 664-9100
District of Lake Country Councillor	Barbara Leamont	leamont@lakecountry.bc.ca	
Interior Health Authority	Bryn Lord	bryn.lord@interiorhealth.ca	(250) 549-5724
District of Lake Country	Michael Mercer	mmercer@lakecountry.bc.ca	(250) 766-6677
Public	Jeff Oland		
Lake Country Environmental Society	Rod Pooley		(250) 766-0591
Regional District of Central Okanagan	Chris Radford	chris.radford@cord.bc.ca	(250) 469-6237
District of Lake Country	Randy Rose	rrose@lakecountry.bc.ca	(250) 766-6671
City of Kelowna	Fred Schaad	fschaad@kelowna.ca	(250) 469-8706
Ministry of Transportation	Bill Sparkes	Bill.Sparkes@gov.bc.ca	(250) 490-2229
Okanagan Basin Water Board	Anna Warwick Sears	anna.warwick.sears@obwb.ca	(250) 550-3779
Public	Jake Thiessen		
Ministry of Community Development	Catriona Weidman	Catriona.Weidman@gov.bc.ca	
Lake Country Chamber of Commerce	Peter Withers	pwithers@direct.ca	
Ministry of Agriculture and Lands	Carl Withler	Carl.Withler@gov.bc.ca	(250) 861-7229

Appendix D

Public Information Meeting

Advertising & Newsletters

District of Lake Country
Municipal Office
10150 Bottom Wood Lake Road
Lake Country, British Columbia V4V 2M1
E-mail: admin@lakecountry.bc.ca
Telephone: (250) 766-5650 / Fax (250) 766-2903

NOTICE OF PUBLIC MEETING
LIQUID WASTE MANAGEMENT PLAN AMENDMENT

A public meeting soliciting input into the Liquid Waste Management Plan Amendment will be held on **Tuesday, June 23, 2009 from 4:00 to 8:00 p.m. in the Carr's Landing Room at the Municipal Hall.**

A Liquid Waste Management Plan is a plan for a municipality that charts the future course of action with respect to wastewater, stormwater and other wastewaters, including the management, collection, treatment and return of effluent to the environment.

Presentations by the consultant will be held at 4:00 p.m. and 7:00 p.m., with time for questions and answers in between.

FOR IMMEDIATE RELEASE

Lake Country Undertakes a Liquid Waste Management Plan Amendment

Lake Country, BC (June 3, 2009) — The District of Lake Country has begun the process of amending its current Liquid Waste Management Plan (LWMP) and will be holding a Public Information Meeting on June 23, 2009.

A LWMP is a plan for a municipality that charts the future course of action with respect to wastewater; including the management, collection, treatment, and return of effluent to the receiving environment. Developing a LWMP is a three stage process that involves:

- (Stage 1) Identifying issues & options
- (Stage 2) Analysing, ranking options, and making recommendations
- (Stage 3) Presenting the plan to the Ministry of Environment

The Advisory Committee for the LWMP has nearly completed Stage 1 of the process and would like to present the issues and potential solutions they've identified. In addition, the Advisory Committee, the consultant (AECOM), and the District would like to solicit input from the public on any additional wastewater management issues or solutions to wastewater management within the District of Lake Country.

A Public Information Meeting will be held on June 23, 2009 from 3:00 to 8:00 p.m. in the Carr's Landing room at the Municipal Hall with presentations by the consultant at 4:00 p.m. and 7:00 p.m. This is a great opportunity for the pubic to get involved and contribute their issues and ideas to this important discussion.

- more -

About Lake Country — The District of Lake Country is located near the centre of the Okanagan Valley and is made up of four distinct neighbourhood communities: Oyama, Winfield, Carr's Landing and Okanagan Centre. Lake Country is a beautiful, unique place rich in its own cultural history.

For more information about Lake Country refer to their web site at http://www.lakecountry.bc.ca

For more information on Lake Country's Stage I – LWMP Amendment:
http://lakecountry.civicweb.net/contentengine/launch.asp?ID=1132

For more information, press only:

Jan R. James Bath, A.Sc.T.
Senior Technologist, Water Group
AECOM Canada Ltd.
250.762.3727 or jan.bath@aecom.com

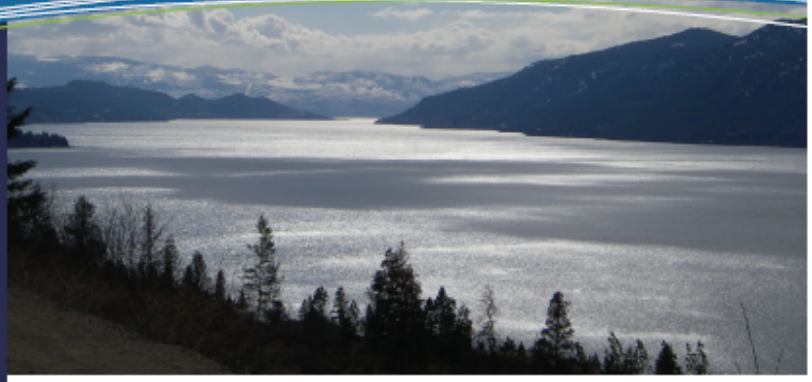
# # #

Amendment to:

LiquidWaste Management Plan

District of Lake Country—Stage 1

June 2009



District of Lake Country

Municipal Office
10150 Bottom Wood Lake Rd
Lake Country, BC V4V 2M1
P: (250) 766-5650
E: admin@lakecountry.bc.ca

Lake Country Undertakes a Liquid Waste Management Plan Amendment!

Public Information Meeting
June 23, 2009 - 3:00 to 8:00 pm
Carr's Landing Rm—Municipal Hall
Presentations:
4:00pm & 7:00pm

The District of Lake Country has begun the process of amending its current Liquid Waste Management Plan (LWMP) and will be holding a Public Information Meeting on June 23, 2009.

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For more information on Lake Country's Stage I – LWMP Amendment:
www.lakecountry.bc.ca

For more information:

AECOM
Jan R. James Bath, A.Sc.T.
Senior Technologist, Water Group
250.762.3727 or jan.bath@aecom.com

District of Lake Country

Come see where you belong...

June 2009

What is a LWMP?

A LWMP is a plan for a municipality that charts the future course of action with respect to wastewater; including the management, collection, treatment, and return of effluent to the environment.

It is a tool used to develop cost-effective solutions to address local liquid waste issues. The plan allows a community to protect human health and the environment, develop wastewater management strategies, meet water conservation goals, and address wastewater return and reuse issues.

Why should you participate?

A LWMP is most effective if residents are involved in its development and implementation. Your participation will not only ensure the plan reflects residents' wants and needs, but will contribute to the long-term social, environmental, and economic health of Lake Country.

What are we doing?

The District of Lake Country has begun the process of amending its current Liquid Waste Management Plan (LWMP). A Public Information Meeting is being held on **June 23, 2009 from 3:00 to 8:00p.m. in the Carr's Landing room** at the Municipal Hall with presentations by the consultant (AECOM) at 4:00 p.m. and 7:00 p.m.

A LWMP is a plan for a municipality that charts the future course of action with respect to wastewater; including the management, collection, treatment, and return of effluent to the receiving environment. The plan is developed through public participation to identify solutions to local wastewater management issues. Public participation is critical for the development of an effective LWMP to ensure the Plan reflects the current and future needs of the community.

Although the District of Lake Country already has a LWMP, an amendment is being developed to address current issues and development pressures within the District. This amendment will combine the previous LWMP with subsequent reports, planning updates, and changes in the community's direction.

'...public participation is critical for the development of an effective LWMP...'

Developing a LWMP is a three stage process that involves:

Stage 1 - Identifying issues & solutions

Stage 2 - Analysing, ranking options, and making recommendations

Stage 3 - Presenting the plan to the Ministry of Environment

The Advisory Committee for the LWMP is currently engaged in Stage 1 of the process and would like to present the issues and potential solutions they've identified. In addition, the Advisory

continues on back...

Who is involved?

The Advisory Committee for this LWMP combines the Technical and Public Advisory Committees and includes representatives from a diverse group, which includes members of Lake Country's general public, municipal staff & elected representatives, the Ministry of Environment, the Ministry of Transportation, Interior Health Authority, Environment Canada, the Okanagan Basin Water Board, Agricultural Land Commission, Fisheries and Oceans Canada, Regional representatives (other municipalities and local governments), and consultants (AECOM). ■

www.lakecountry.bc.ca

Current Wastewater Management Issues...

Several issues have been identified by District staff, the consultant, and the Advisory Committee which require consideration within the wastewater management planning framework.

WWTP Effluent Return to the Environment

The District of Lake Country's WWTP currently returns effluent to the receiving environment via a series of infiltration galleries. The existing gallery site is nearing maximum infiltration capacity. A decision on future effluent returns is required and will need to be based in part on community growth expectations, land requirements, cost, technical viability, and environmental considerations.

Recreational Vehicle Sani-Station

Local groups and residents have long expressed a desire to have a local RV sani-station in Lake Country. The reasons vary from environmental impacts of travelling to distant communities to discharge wastewater to promoting tourism in Lake Country by having and supporting local facilities.

WWTP Design and Capacity

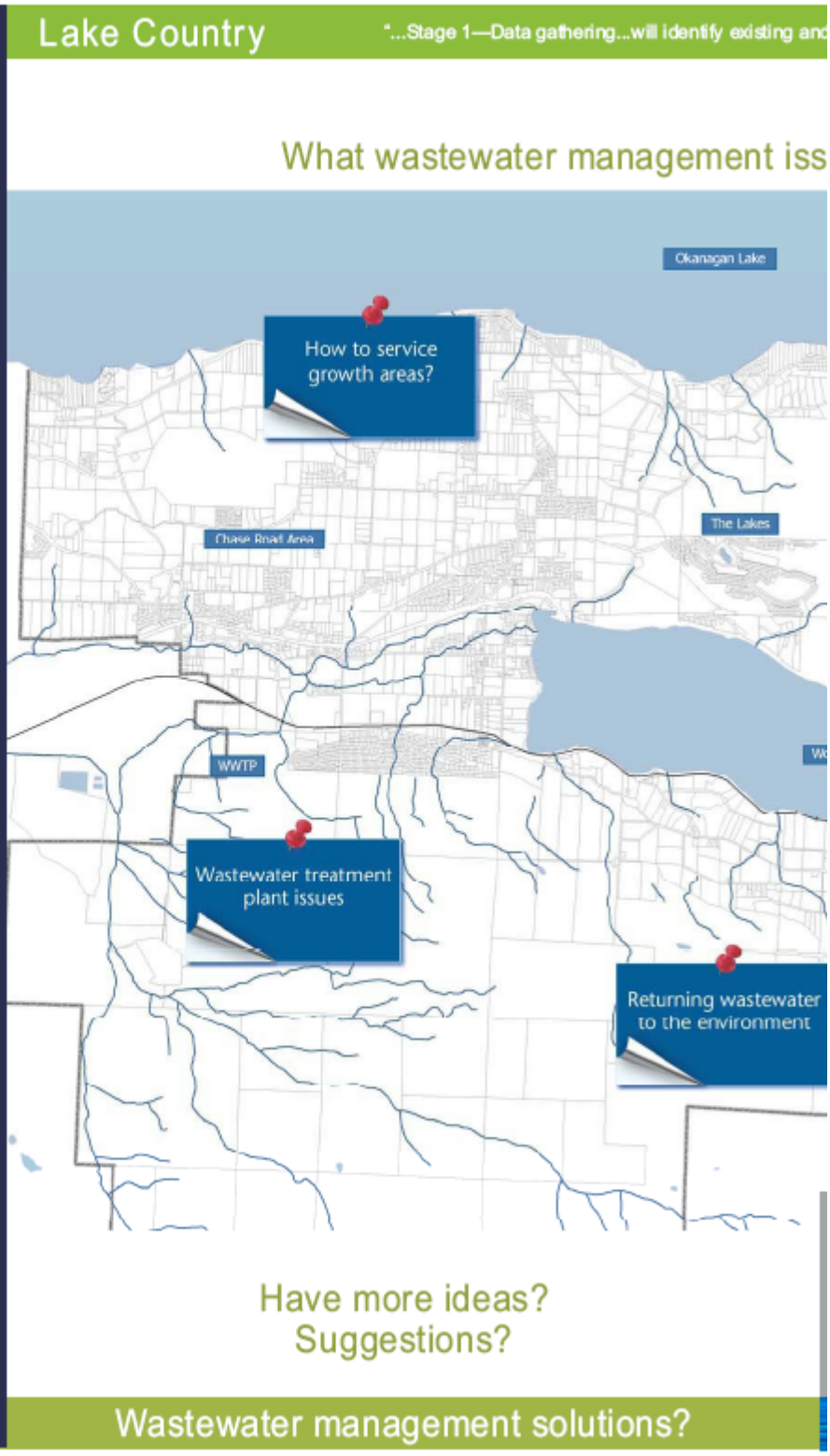
The current WWTP associated with the central collection system has process restrictions that will require upgrading. These upgrades will be staged according to cost, demand, level of treatment, and treated effluent requirements.

Servicing Growth Areas

The District of Lake Country continues to grow at an annual rate that may exceed previous expectations. Population growth places increasing demands on existing liquid waste services and requires planning for expanded collection, treatment, and disposal. Some of these growth areas require specific strategies due to terrain or geography; they include Carr's Landing, Oyama, and Okanagan Centre.

Servicing Existing Neighbourhoods

There are numerous potential environmental and health concerns in existing neighbourhoods with failing septic fields and sewer systems.



future wastewater issues"

ues have already been identified?

A brief Liquid Waste Management Plan History...

The impact of nitrogen and phosphorus loadings on the sensitive ecosystem in the Okanagan Basin was studied and documented in the early 1970s. Since that time, the MoE has encouraged communities in the Okanagan Valley to reduce nutrient loadings into the Okanagan Lake system to combat eutrophication. The effluent requirements for discharge to lakes within the Okanagan Basin are among the most stringent in Canada. In 1988 a LWMP was prepared for Electoral Area 'A'. Much of that

continues on page 4...

ADVISORY COMMITTEE

Members (AC)

The AC acts in an advisory capacity to the Steering Committee and provides insight on community objectives and local issues for inclusion in the LWMP. The feedback the AC provides will help ensure that proposed programs and policies are in the best interests of all residents of Lake Country. In addition, the AC acts as liaison to larger stakeholder group(s), with the assistance of information summaries developed as part of the public consultation process and assists with the public meetings and open house events.

Member	Organization (Representing)
James Baker	*DLC Mayor*
Stephen Banmen	*District of Lake Country*
Jan Bath	*AECOM*
Rick Bilcon	*AECOM*
Lyle Brewer	*OKIB*
Shantelle Clarke	*United Water*
Martin Collins	*Agricultural Land Commission*
Tim Forty	*AECOM*
Noreen Guenther	*District of Lake Country*
Jeff Guerin	*Fisheries and Oceans Canada*
Vic Jensen	*MoE, Environmental Protection*
Mark Koch	*District of Lake Country*
Shirley Koenig	*City of Vernon*
Gary Kozub	*Public*
Snehal Lakhani	*Environment Canada*
Barbara Leamont	*District of Lake Country*
Bryn Lord	*Interior Health Authority*
Michael Mercer	*District of Lake Country*
Jeff Oland	*Public*
Rod Pooley	*Environmental Society*
Chris Radford	*RDCO*
Randy Rose	*District of Lake Country*
Fred Schaad	*City of Kelowna*
Bill Sparkles	*Ministry of Transportation*
Anna Warwick Sears	*OBWB*
Jake Thiessen	*Public*
Catriona Weidman	*Community Development*
Peter Withers	*Chamber of Commerce*
Carl Withler	*Ministry of Agriculture & Lands*

Stages of a LWMP

Developing (amending) a LWMP is a three stage process that generally involves...

- Stage I - Data gathering and issue & option identification
- Stage II - Option development and selection
- Stage III - Finalization

The Stage I report will identify existing and future wastewater management issues. The report will also identify potential options for the resolution of those issues. This report will form the basis of discussion for Stage II of the LWMP process.

Selection criteria?

The Advisory Committee will use the following criteria to evaluate the potential solutions identified in Stage I.

Environmental and Human Health & Safety: Protect lake and groundwater quality for human and aquatic health.

Financial: Ensure affordable annual costs per household.

Technical: Ensure System reliability. Optimize operational ease and efficiency.

Social: Minimize impact of wastewater operations on nearby residents.

Administrative/Planning: Ensure options compatible with land use plans, transportation corridors, and land base for expansion and buffering.

What are we doing?

...continued from front

Committee, the consultant (AECOM), and the District would like to solicit input from the public on any additional wastewater management issues or solutions to wastewater management within the District of Lake Country.

This is a great opportunity for the public to get involved and contribute their issues and ideas to this important discussion. ■

What's next?—Stage 2

Stage 1 of the LWMP will conclude with the addition of any new issues or solutions gathered from the public meeting to the Stage I report. Once completed the Stage I report will be presented to the District of Lake Country's Mayor and Council, and then forwarded to the BC's Ministry of Environment (MoE) for its approval.

In the next stage of the process (Stage 2) the Advisory Committee, with input from the consultant (AECOM) will develop each solution and using selection criteria, begin the process of short-listing the options. Ultimately the preferred solutions will be presented to the public for input and comment via the District of Lake Country's website, newsletters, and public meetings.

You can track the Advisory Committees progress on the District's website or visit us at our next Public Meeting. ■

History

...continued from page 3

area became the District of Lake Country in 1995. The Liquid Waste Management Plan originally prepared by RDCO was amended by the newly formed District and was incorporated into a new Liquid Waste Management Plan to cover their sewage collection and treatment systems. ■

District of Lake Country

Municipal Office
10150 Bottom Wood Lake Rd
Lake Country, BC V4V 2M1
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For more information:
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AECOM, Water Group
250.762.3727 or jan.bath@aecom.com

Stage I—Liquid Waste Management Plan Amendment—District of Lake Country June 2009

Appendix E

Public Information Meeting

Results

Public Information Meeting – June 23, 2009

OVERVIEW

A public information meeting was held on June 23, 2009. The session consisted of 13 display panels for the Open Houses, afternoon and evening presentations, and Q&A discussions following each presentation.

The objectives of the meeting were to provide the public with a basic understanding of:

- Liquid Waste Management Plans (LWMP)
- the LWMP planning process
- their role in the process

And to:

- present the issues defined by the Advisory Committee
- present the solutions identified to address the issues
- request feedback from the public

Each session was attended by 25 to 30 people; who included the general public, District staff, Advisory Committee members, and District of Lake Country Councillors.

SURVEY RESULTS

1. Location…

Q. Where do you live?

Oyama	Carr's Landing	Okanagan Centre	Winfield	Other	Total
3		2	1		6

2. Current wastewater management issues…

Q. How important is…A recreational vehicle sani-station?

Very Important	Somewhat Important	Neutral	Somewhat Unimportant	Very Unimportant	No Comment
1	1		3	1	

Q. How important is…Servicing existing neighbourhoods?

Very Important	Somewhat Important	Neutral	Somewhat Unimportant	Very Unimportant	No Comment
1	4	1			

Q. How important is…Servicing growth areas (new developments)?

Very Important	Somewhat Important	Neutral	Somewhat Unimportant	Very Unimportant	No Comment
1	4	1			

Q. How important is…Wastewater treatment plant nearing capacity?

Very Important	Somewhat Important	Neutral	Somewhat Unimportant	Very Unimportant	No Comment
5		1			

Q. How important is…Existing effluent infiltration system approaching capacity?

Very Important	Somewhat Important	Neutral	Somewhat Unimportant	Very Unimportant	No Comment
5		1			

3. Criteria for ranking the proposed solutions…

Q. How would you rank …Environment?

Very Important	Somewhat Important	Neutral	Somewhat Unimportant	Very Unimportant	No Comment
5	1				

Q. How would you rank …Financial?

Very Important	Somewhat Important	Neutral	Somewhat Unimportant	Very Unimportant	No Comment
2	4				

Q. How would you rank …Technical?

Very Important	Somewhat Important	Neutral	Somewhat Unimportant	Very Unimportant	No Comment
4	2				

Q. How would you rank …Social?

Very Important	Somewhat Important	Neutral	Somewhat Unimportant	Very Unimportant	No Comment
1	4	1			

Q. How would you rank …Planning?

Very Important	Somewhat Important	Neutral	Somewhat Unimportant	Very Unimportant	No Comment
3	2		1		

3. Open house…

Q. Were you satisfied with the information presented?

Very Satisfied	Somewhat Satisfied	Neutral	Somewhat Dissatisfied	Very Dissatisfied	No Comment
1	4	1			

4. Do you know of any other wastewater management issues in Lake Country?

- Central or satellite collection – Boat pump out – Lagoons – Spray Irrigation – Separating agri water from potable – Eliminate trucked waste important
- Leaching sewer in Oyama from the houses not on the sewer system. We paid $50,000 per lot for our satellite system. We do not want to be charged again. Very important.
- I have a concern with the overloading at the seasonal camp grounds.
- McCoubrey Road Sub Div; Also Tyndal Road Sub Div

ADDITIONAL COMMENTS

- We should investigate article entitled “Energy gleaned from waste”, regarding recovering energy from WWTP.
- Oyama properties on Greenhow that could be serviced (through an existing backyard easement & collection system) are not hooked up. There is physical evidence of septic leaching onto the properties below.
- Kalamalka Lake has a foamy surface and appears brown after spring/summer time long week-ends.
- Trask Road area is another area with high percentage failing septic fields.
- Could spray irrigation be used on forest or free-range lands above Lake Country? Perhaps after logging activities?

- Diff. types of sewage plants and the diff. in long term costs, as we should be looking ahead 50 yrs not 10. It makes no sence to me, to pump sewage over mtn's to get to one main plant, where the ground is already becoming saturated. I guess one solution would be to irreg. the forests and grazing lands, but would require a different type of process at the plant to break down the waste farther. As to using less water going to the plant, then having to add water at the plant dosn't make much sence to me other than the size of the sewage mains. I realize that smaller plants in outlying areas would require more help, but does not the Barten flow systems in place now mostly run by computers from a central station? The cost is the greatest factor right? But if there is Fed. money avail. for the greenest proposals, and also Prov. then if there the best there is, I think we should bite the bullet and get on with it. Prob. Within 10 yrs we are going to be looking at, at least 50,000 people, so what we do better no be a patch up job, but something that can be expanded over the years. Sooner or later were going to have to clean up our waste to the point where what isn't used for irreg., can be dumped into the lakes right? So we better plan for it and spend the money and let some of the other not so important things slide to the side.

Appendix F

Statement of Qualifications and Limitations

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:

- **are subject to the budgetary, time, scope, and other constraints and limitations in the Agreement and the qualifications contained in the Report (the "Limitations");**
- **represent Consultants' 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;**
- **have not been updated since the date of issuance of the Report and their accuracy is limited to the time period and circumstances in which they were collected, processed, made or issued;**
- **must be read as a whole and sections thereof should not be read out of such context;**
- **were 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.**

Unless expressly stated to the contrary in the Report or the Agreement, Consultant:

- **shall not be responsible for any events or circumstances that may have occurred since the date on which the Report was prepared or for any inaccuracies contained in information that was provided to Consultant;**
- **makes no representations whatsoever with respect to the Report or any part thereof, other than that the Report represents Consultant's professional judgement as described above, and is intended only for the specific purpose described in the Report and the Agreement;**
- **in the case of subsurface, environmental or geotechnical conditions, is not responsible for variability in such conditions geographically or over time.**

Except as required by law or otherwise agreed by Consultant and Client, the Report:

- **is to be treated as confidential;**
- **may not be used or relied upon by third parties.**

Any use of this Report is subject to this Statement of Qualifications and Limitations. 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.

THIS DOCUMENTATION IS SUPPLIED TO CLIENT BY CONSULTANT AND CONSTITUTES CONFIDENTIAL TRADE SECRETS, OR COMMERCIAL, FINANCIAL, SCIENTIFIC, OR TECHNICAL INFORMATION. THIS DOCUMENTATION IS SUBMITTED TO CLIENT IN CONFIDENCE. IT HAS SIGNIFICANT ECONOMIC VALUE TO CONSULTANT AND ITS DISCLOSURE, WITHOUT THE EXPRESS CONSENT OF CONSULTANT, COULD REASONABLY BE EXPECTED TO LEAD TO SIGNIFICANT AND UNDUE FINANCIAL AND OTHER HARM TO CONSULTANT, INCLUDING HARM TO CONSULTANT'S COMPETITIVE AND NEGOTIATING POSITIONS, AND UNDUE FINANCIAL GAIN TO ONE OR MORE THIRD PARTIES.