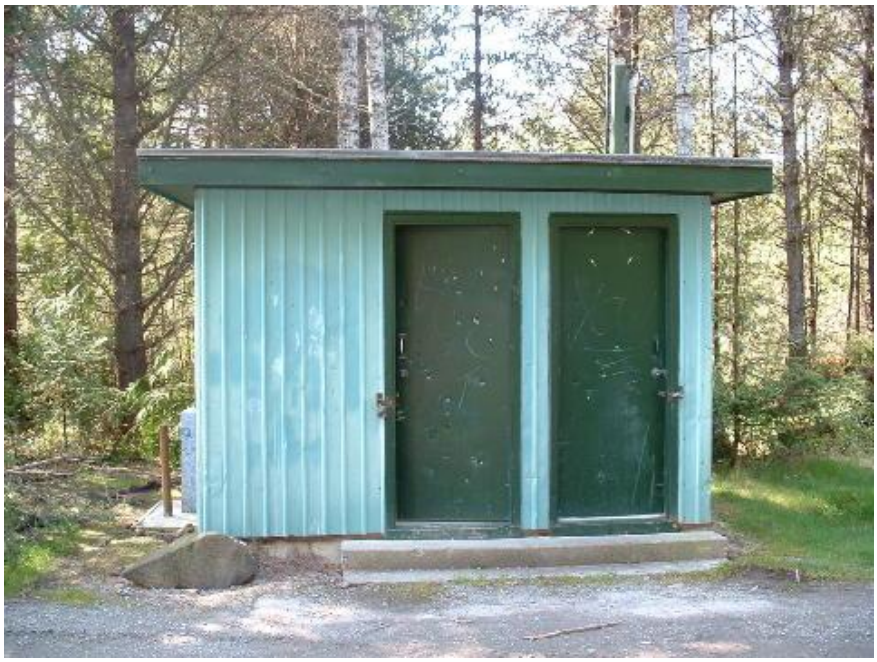
Kemp Lake Waterworks District
Water Treatment Plant
Life Cycle Cost Estimates

Updated December 7, 2012



Global Solutions
in Engineering + Project Services

GENIVAR
constructive people

GENIVAR PROJECT NO.: 121-15126-01

Table of Contents

APPENDICES

1 DISCLAIMER

The material herein reflects the best judgment of GENIVAR Inc. at the time of this report's preparation and is for the sole use of the Kemp Lake Waterworks District. Any use a Third Party makes of this report or any reliance on or decisions to be made based on it are the responsibility of such Third Party. GENIVAR accepts no responsibility for damages, if any, suffered by any Third Party as a result of decisions made or actions based on this Report.

Prepared by: _____ _____

Eric Pettit, P.Eng. Jeff Somerville, P.Eng.

Date: December 7, 2012 Date: December 7, 2012

Reviewed by: Harry Verstraaten, A.Sc.T., Eng.L.

Date: December 7, 2012

2 INTRODUCTION

The Kemp Lake Waterworks District (KLWD) has been mandated to upgrade their current water treatment to comply with the Vancouver Island Health Authority's (VIHA) 4-3-2-1 policy for treatment of surface drinking water. In response to the KLWD's request, GENIVAR undertook a study to determine a recommended form of treatment. That study was delivered to the KLWD in May, 2012, a copy of which can be found in Appendix 'B'. In an earlier 2007 report GENIVAR researched the cost to extend a water service to the Capital Regional District's (CRD) water system near Sooke. A copy of that report and cost estimate is also included in Appendix 'E'.

This follow-up report, done at the request of Kevan Brehart expands on the recommended treatment and water service options.

3 TERMS OF REFERENCE

The terms of reference provided are to compare the overall costs of previously recommended options (water treatment vs. water supply from the CRD), expanding the scope to include two scenarios:

- The KWLD continues to operate as their own utility
- The KLWD is converted to a Water Commission and managed under the auspices of the Capital Regional District Integrated Water Services

Life cycle costs for the options are to be developed and discussed, as are funding and issues regarding obtaining certification for operators.

We understand this report will be presented to the members of the Kemp Lake Waterworks District as reference to determine a preferred option. Eric Pettit, P.Eng. will be available to attend the public meetings arranged by the KLWD to present the options and address questions from the District's ratepayers.

4 WATER TREATMENT & SUPPLY OPTIONS

4.1 DESIGN FLOWS

System demands identified in the May 25, 2012 report were based on the assumption that the raw data provided by the KLWD was provided in US gallons. It has been since discovered that the flow data is in Imperial gallons. The 2012 calculations were understated by 20%. A revised demand table is included below:

Year	Annual Demand	Max day demand	Avg day demand (ADD)	Max day demand (MDD)	peaking factor	# of units	Est. Pop.	Per capital demand
	M L	L	L/s	L/s				L/c/d
2007	102.29	581,436	3.24	6.73	2.1	459	918	305
2006	100.92	764,994	3.20	8.85	2.8	450	900	307
2005	105.01	727,729	3.33	8.42	2.5	424	848	339
2004	99.56	823,552	3.16	9.53	3.0	420	840	325
2003	92.29	717,191	2.93	8.30	2.8	410	820	308
2002	103.65	1,004,659	3.29	11.63	3.5	380	760	374
2001	72.74	785,006	2.31	9.09	3.9	370	740	269
Avg	**96.64**	**772,081**	**3.1**	**8.9**	**2.96**			**318**

Calculations and cost estimates following in this report are based on a water treatment system with the capacity to meet the calculated maximum daily demand (average of records for 2001-2007) plus 10%, or 10 l/s.

4.2 WATER TREATMENT OF KEMP LAKE WATER

The recommended water treatment system for the KWLD is comprised of a two-stage, biologically assisted pressure filter system. This configuration provides a scalable treatment system with a relatively small footprint that does not require chemical addition such as flocculants or coagulants. Operating costs are dramatically decreased over alternative water treatment systems by eliminating the need for chemical addition, since waste water from filter backwash cycles can be discharged on-site rather than stored for trucking and disposal. Alternate treatment options have been reviewed but may not be suitable for the Kemp Lake site; these options include slow sand filtration (large footprint), membrane filtration (high capital cost), dissolved air floatation (high level of operator involvement), and traditional coagulation and pressure filtration (waste stream must be hauled).

By including ozonation, organics removal efficiency is increased. Organics are the primary cause of taste and odour concerns in treatment systems with a surface water source and lead to harmful chlorination by-products such as Trihalomethanes (THMs). Ozone gas can be generated on-site and leaves no residual in the final treated water. Sodium hypochlorite will remain the final disinfectant prior to discharge into the distribution system so that chlorine residual is maintained.

The proposed treatment system would be constructed in a modular building within the Ministry of Transportation right-of-way at the end of Chubb Road. New raw water pumps are included to address the additional headloss through the filters and eliminate the need for separate booster pumps. A similar treatment system is maintained by the CRD for a water commission on Saturna Island with a surface water source. The requirements of the VIHA 4-3-2-1 policy can be met with the proposed system; further details of the process are included in the May 25, 2012 report.

Since the project involves new construction near Kemp Lake, a Riparian Areas Regulation (RAR) assessment will be required to be undertaken by a Qualified Environmental Professional. Results and recommendations of the assessment cannot be anticipated and are not factored in this life cycle cost analysis.

4.2.1 OPERATED BY KLWD

Provided that the water treatment plant is to be operated by the KLWD, it would be constructed to a standard that meets all applicable regulations such as WorkSafeBC, and VIHA. It would not necessarily be designed to full standards of the CRD, which are more stringent and costly. Allowance would be made so that if the KLWD chooses to form a water commission and turn over operation of the treatment plant to the CRD in the future, the required upgrades could be easily accommodated. Some of the CRD standards that would not apply to the KLWD in this case are:

- Building standards and appearance
- Use of approved products and materials, such as pumps, valves, meters, disinfection equipment, and electrical components
- Integration of a wireless SCADA control and communication system, although room will be designed in the control panels for future accommodation of SCADA equipment

Operation of the plant would be completed by a local certified operator, under contract with the KLWD. We recommend the District establish a contract with a second operator who is familiar with the system as an emergency backup. The treatment plant will be fitted with a telephone connection and an auto-dialer to alert the operators of any alarm conditions. Full remote monitoring and/or control are not proposed in this case. Further details of operator certification and training are contained in section 8 of this report.

Daily operator site visits would be routinely required and would include:

- monitor and top-up sodium hypochlorite levels
- record meter readings
- check for faults
- conduct regular maintenance of equipment

The treatment plant is proposed with two parallel filter trains for redundancy and operational flexibility. Backwashing the filters would be required approximately every two weeks, with each filter train backwashed on alternate weeks. For the backwash work, the operator's time on-site is expected to be approximately 3 hours. We have included operator labour in the life cycle cost estimates.

With the KLWD maintaining operation of the proposed water treatment plant, both capital and operational costs are lower than a similar plant operated by the CRD. Details of costs and operator certification/training are included in subsequent sections of this report.

4.2.2 OPERATED BY THE CRD FOR THE KEMP LAKE WATER COMMISSION

If the KLWD became a local area and formed a water commission, granting operation of the water system to the CRD, then basic design of the plant would remain unchanged from what is descirbed above. However, CRD Operations requires some additional features that lead to higher capital costs. The treatment building must be designed to a post-disaster standard and must conform to their building scheme. We recommend the District construct the facility to post-disaster standards regardless of who ultimately operates the plant, as it is a critical infrastructre component. Building costs in this report assume post-disaster standards are implemented.

Additionally, the CRD would require a SCADA communication system for the treatment plant so that overall plant function and alarms can be remotely monitored. Typically this function is achieved through radio communication, but a hard-wired internet connection is also possible. Programming related to the SCADA system is completed by CRD staff and is directly chargeable to the construction budget.

Normal operation of the plant by the CRD would not vary greatly from what is descibed in the section above; however, the CRD's hourly rate for an operator is higher than a local operator and chargable travel time to site is increased. The CRD has many Level II operators on-staff and any training required would not be directly chargeable to the KLWD. To keep costs down in many local service areas, the CRD contracts a local operator to preform regular day-to-day operation of the treament facility with occasional consultation with CRD staff.

4.3 WATER SUPPLY FROM THE CRD

For water supply from the CRD system, a 2,000m, 250mm diameter pipeline would be extended from the KWLD to the existing CRD watermain near Sooke, 200m west of Ella Road. An additional 250m of under-sized watermain within the KLWD would require upgrading as part of this work. The CRD watermain would be the sole water source for the District and provide the required fire flows. The existing Kemp Lake reservoir would remain on-line for fire protection. To maintain an adequate chlorine residual in the Kemp Lake distribution system, re-chlorination may be required at the reservoir; an allowance for this has been included in the life cycle cost estimates.

The proposed watermain route along West Coast Road is generally narrow with extensive vegetation at the road shoulder. Exposed rock is visible in some areas and overhead utility lines exist on both sides of the roadway. The proposed alignment of the watermain would be sympathetic to the existing topography in efforts to limit rock removal and restoration costs. A permit from the Ministry of Transportation is required for the work, which would likely restrict the watermain location to the shoulder of the road without extensive re-paving work.

Two variations of connecting to the CRD water system are described below.

4.3.1 BULK SALE OF WATER TO THE KLWD

In this case, a new watermain would be extended as above and a bulk water meter would be installed at the KLWD boundary. The KLWD as a whole would be charged for water use by the CRD. Individual lot meter reading and billing would remain the responsibility of the KLWD. Consumption rates for each connection type would be established to sustain a reserve fund for regular maintenance of the Kemp Lake distribution system. The CRD would own and maintain the new 250mm diameter watermain and bulk meter, installed to their standards.

If the decision is to extend the pipeline and the KLWD remains intact, there may be an opportunity for the KLWD to register a latecomers' agreement with the CRD to recover some of the capital cost of constructing the watermain. With the agreement, the KLWD would be entitled to contributions from others who would in the future benefit from use of the watermain up to their distribution area. The agreement would remain in place for a maximum of 15 years from registration.

4.3.2 WATER PROVIDED BY THE CRD TO THE KEMP LAKE WATER COMMISSION

An alternate to the bulk purchase of water from the CRD is for the KWLD to become a local area within the CRD, overseen by a water commission. As all connections in the KLWD are already metered, and if most or all of the infrastructure already in place is to CRD specifications, this conversion to a local area should be fairly simple from a capital improvement perspective.

Any maintenance and repair which may be required to bring the distribution system to CRD standards would be completed by the CRD and charged back to the KLWD commission and these improvements would qualify for funding as described in Section 7. We expect the CRD would still require a bulk meter in this case to monitor the system for leaks, un-metered connections, and fire flows; however, regular billing would be based on individual lot water meters. In considering this option, it is assumed the CRD will not require any system upgrades other than those listed above.

5 CAPITAL COST ESTIMATES

5.1 GENERAL BASIS

The cost estimates following are expressed in current 2012 dollars. These are Class 'D' estimates, representing magnitude of cost to be used in estimating long term capital costs and for preliminary discussion of proposed capital costs. Expectation of probable costs of Class 'D' estimates are -30% to +50% of the estimated amount. Corresponding contingencies have been added to the estimated costs, below.

5.2 WATER TREATMENT

The capital cost estimate for the water treatment plant proposed for the KLWD is:

	Cost	
Item	**KLWD Operation**	**CRD Operation**
Pressure filtration system, valves, piping	$ 200,000	$ 200,000
Ozone system	$ 180,000	$ 180,000
Raw water pumps	$ 20,000	$ 20,000
Building	$ 120,000	$ 150,000
Site works, underground, and backwash outfall	$ 60,000	$ 60,000
Electrical, controls, and communication	$ 120,000	$ 150,000
Upgraded BC Hydro service, allowance	$ 50,000	$ 50,000
Start-up and commissioning	$ 30,000	$ 40,000
CRD programming		$ 30,000
CRD administration		$ 50,000
Subtotal	**$ 780,000**	**$ 930,000**
+ Engineering and contingencies (50%)	$ 390,000	$ 460,000
Total	**$ 1,170,000**	**$ 1,390,000**

A $220,000 premium is anticipated if the treatment facility is constructed to CRD standards and under their contract administration, including costs to form a water commission.

5.3 CONNECTION TO CRD WATER SYSTEM

The capital cost estimate for the extension of the watermain to the CRD system is:

	Cost	
Item	**KLWD Operation**	**CRD Operation**
Trench rock excavation	$ 30,000	$ 30,000
250mm PVC pipeline & fittings	$ 570,000	$ 570,000
Meter vault	$ 50,000	$ 50,000
Culvert & surface restoration	$ 60,000	$ 60,000
CRD upgrade charges	$ 60,000	$ 60,000
CRD administration	$ 0	$ 30,000
Subtotal	**$ 770,000**	**$ 800,000**
+ Engineering and contingencies (50%)	$ 385,000	$ 400,000
Total	**$ 1,155,000**	**$ 1,200,000**

The $60,000 CRD upgrade charge was estimated by the CRD at a meeting held in 2007. Since then the CRD has been contacted to update the cost, however at the time of this writing the CRD has responded that they are not willing to discuss cost contributions until formal application has been made by the KLWD. An additional administration fee of $30,000 has been included with option 4 to account for costs associated with forming a water commission.

6 LIFE CYCLE COST

6.1 DEVELOPMENT

Life Cycle Cost (LCC) estimates have been developed for the four options described in this report, including all expected capital, replacement, and operational costs. All costs are factored to a single present-worth for comparison purposes, assuming a 20-year term at a given interest rate. The lifespan of the various facility components are estimated, with replacement costs at the end of the 20-year term included.

It is worth noting that the LCC analysis is an excellent tool for comparing various options, as capital, operational, and replacement costs are all considered. The total present-worth is factored using the time-value of money so the options can be evaluated on equal footing.

Some assumptions used for the analysis are as follows:

- To manage the proposed water treatment plant:
  - KLWD local operator hourly rate: $32 / hour, 15 hours on-site per week, including travel time.
  - CRD operator hourly rate: $50 / hour, 5 hours per week directly chargeable to the water commission. This time is in addition to the local operator described above.
- Inflation is included for annual operation and maintenance costs, generally between 0.5 and 1.0%
- Calculations of the life cycle costs are included in Appendix A, assuming three different costs of capital (borrowing rate) of 4%, 5%, and 6%. For the purpose of further discussion, we have used a 4% cost of capital.

6.2 LCC ESTIMATES AND EVALUATION

Details of the LCC estimates can be found in Appendix A. The estimates are summarized as follows:

Capital and Annual Costs	Option 1	Option 2	Option 3	Option 4
Capital	$1,170,000	$1,390,000	$1,155,000	$1,200,000
Replacement[1]	$915,000	$1,045,000	$0	$0
Annual O+M[2]	$175,000	$213,500	$219,500	$237,000

Present-Worth Costs	Option 1	Option 2	Option 3	Option 4
Capital	$1,170,000	$1,390,000	$1,155,000	$1,200,000
Replacement[1]	$418,702	$478,034	$0	$0
Annual O+M[2]	$2,538,945	$3,102,025	$3,355,183	$3,607,711
Total, present-worth	**$4,127,647**	**$4,970,059**	**$4,510,183**	**$4,807,711**

Option 1: Water treatment, KLWD ownership

Option 2: Water treatment, CRD ownership & management as a local area

Option 3: CRD Watermain connection, bulk water purchase, KLWD operation

Option 4: CRD Watermain connection and system management as a local area

[1] *Replacement costs are accounted for at the end of the equipment life cycle, typically 20 years after initial installation.*

[2] *Includes an allowance for reserve fund contributions*

Included with the annual operation and maintenance costs are contributions to the reserve fund for future improvements. A reserve fund is required for any option chosen; however, if the CRD manages the system on behalf of the Kemp Lake water commission, then a larger contribution is recommended to cover increased administration fees and higher labour rates.

CRD bulk water costs are included with options 3 and 4 at the current rate of $1.5922 per cubic meter. Based on historical data from Kemp Lake, the average annual consumption from 2002 to 2007 is about 96.6 million litres, which totals $154,000. The cost of water supplied to the KLWD from CRD will be passed directly to residents and is by far the highest annual cost in options 3 and 4. Unlike a new treatment system at Kemp Lake in which many of the annual costs are fixed regardless of consumption, water conservation efforts can greatly reduce the annual cost associated with connection to the CRD system.

6.3 FINANCING

With all water treatment and supply options presented, it is expected the KLWD will finance the capital costs associated with design and construction. Annual operation, maintenance, and CRD fees will be paid by users based on the billing model selected by the KLWD. The majority of water treatment equipment proposed has an expected lifespan of 20 years. Contributions to a reserve fund, as shown below, will be used for the eventual replacement of treatment system components at the end of their useful life.

The table below details financing costs and annual charges, assuming a 20-year amortization, monthly repayments, and an interest rate of prime plus 2%, totalling 5%, which is a rate likely provided by a private lending institution, for capital costs. The KLWD would need to negotiate the terms of the financing with either a private institution or the Province. For the purposes of this report, we have not included any annual fees associated with financing.

	Option 1	**Option 2**	**Option 3**	**Option 4**
Financed Amount (Capital Cost)	$1,170,000	$1,390,000	$1,155,000	$1,200,000
Total Interest Charges	$675,206	$802,168	$666,549	$692,518
Annual Repayment	$92,260	$109,608	$91,077	$94,626
Annual O+M Costs	$140,000	$173,500	$214,500	$229,500
Annual Reserve Fund Contributions	$35,000	$40,000	$5,000	$7,500
Annual Payment per Household (459 households assumed)	$582	$704	$677	$722

7 FUNDING DISCUSSIONS

7.1 IMPROVEMENT DISTRICT CONVERSION

Improvement Districts such as Kemp Lake Waterworks District may borrow funds from a financial institution with the passage of a bylaw that has been registered by the Inspector of Municipalities. They may NOT borrow through the Municipal Finance Authority. Debenture funding MAY be arranged for long term loans by the Ministry of Finance.

The vision of the Ministry of Community Services, as stated in their Policy Statement[1], is as follows:

> *"The ministry vision is to encourage the conversion of improvement districts to regional district service areas and municipal jurisdiction. Consistent with that direction, it is important to maintain the existing financial incentives for conversion. Specifically the ministry will:*
>
> > *Restrict Sewer and Water Infrastructure Grants to regional districts and municipalities. This has been a consistent policy for the past 20 years."*

The KLWD will need to decide going forward if they will undertake the project with their own resources, or undertake a conversion and transfer responsibility for the administration and operation of services to the Capital Regional District.

7.1.1 INFRASTRUCTURE FUNDING PROGRAMS

There is currently no Capital Infrastructure Program Funding available for the Regional District to access. All of the following programs[2] have been fully allocated:

- BC Community Water Improvement Program
- Building Canada Fund – Community Component
- Canada / BC Infrastructure Program
- Canada / BC Municipal Rural Infrastructure Fund
- Infrastructure Stimulus Fund

The Infrastructure Planning Grant Program is available to assist in long term planning and assessment studies. This would need to be applied for by the Regional District, and could provide up to $10,000 in funding. This is based on 100% funding of the first $5,000, and 50% funding of the next $10,000 of eligible costs. This program will not cover work that is already underway prior to approval of the grant.

7.2 FUNDING COMPONENTS

When considering a major undertaking such as proposed for Kemp Lake, consideration must be given to the funding sources and means that are currently available, as well as

[1] Improvement District Governance: Policy Statement, BC Ministry of Community Services, 2006
[2] http://www.cscd.gov.bc.ca/lgd/infra/infrastructure_grants/, Ministry of Community, Sport & Cultural Development

those that are reasonably foreseeable in the near future. There is also a clear distinction to be made between the initial Capital Project costs, the ongoing Operations and Maintenance costs, and the Capital Reserve funding that needs to be established for the future.

7.2.1 CAPITAL PROJECT FUNDING

For the Capital Project Funding, the KLWD would need to borrow the necessary funds. Because of the substantial financial impact on the landowners, we would recommend that KLWD should use the Alternative Approval Process, which used to be referred to as a counter petition process. This process informs and advises the electors, and they have an opportunity to petition against the project. Without Conversion, borrowing would need to be from a financial institution, or possibly by debenture with the Ministry of Finance.

7.2.2 OPERATIONS AND MAINTENANCE FUNDING

Operations and maintenance funding reflects the annual costs of providing the necessary services. Parts of these costs are fixed, such as administrative services, billing programs, and employee salaries. Other costs are dependent upon the production, and would include electrical (pumping) costs, as well as chemical costs.

7.2.3 CAPITAL RESERVE FUNDING

All major infrastructure components have a finite life cycle, and eventually require replacement. With no current access to federal or provincial grants to support the eventual costs, the KLWD will need to make prudent financial allocations for these future costs.

7.3 COST RECOVERY MECHANISMS

The means available to the KLWD to recover costs for services are taxation, tolls (user rates), and other charges. When using taxation, the KLWD has the ability to base it on parcels, groups of parcels, area, value of land or improvements, or any combination of them.

7.3.1 WATER RATES

When providing water services, it is important to encourage sound water conservation practices. This ideally includes demand-side management practices.

When planning the mix of taxation, tolls, and other charges, the impact of water conservation can have significant impact on cost recovery. A well-managed conservation program often reduces revenues, sometimes resulting in funding short-falls. Capital funding recovery and capital reserve funding would typically be recovered by taxation, to provide relative certainty in the revenues.

Tolls would typically cover part or all of operations and maintenance funding. As these costs can usually be ascribed to the quantity of water produced, they can be funded with a combination fixed and block rate. Fixed rates cover the system administration and fixed costs, and a separate volume based rate is applied for actual usage.

8 OPERATIONAL REQUIREMENTS

As part of the operational permit for the KLWD facilities, there will be a requirement to provide EOCP certified operators. Currently the system is operating at:

- Water Distribution Level 1 (WD-I) (There does not appear to be any formal facility classification at this time from EOCP)

If water treatment is added to the system, KLWD will need to have an assessment of the system performed to determine the treatment facility level. Based on a preliminary review of the potential classification, the facility may become a Water Treatment Level II (WT-II), with requirement for a WT-II Certified Operator. We have included a draft classification form in Appendix C for reference. (This is preliminary only.)

The permit to operate the facility is currently issued by the Ministry of Health. As the system serves more than 500 people, they are governed by the Drinking Water Protection Act[3] and the Drinking Water Protection Regulations[4]. As part of the amended permit after treatment is provided, there will be requirements for a licensed operator in conformance with the EOCP. [5] The Drinking Water Officer will typically provide a reasonable time frame for the facility and operator to complete the necessary qualifications. Starting from his current position of WD-I, it would take the existing operator a minimum of 4½ years to attain the necessary qualifications to operate a Level II treatment system. This would not likely be acceptable to the Drinking Water Officer due to the time required and number of steps to become certified.

Operator-in-Training

- High school diploma, GED, or equivalent, and
- Three months operating experience in a Class I or higher facility or completion of an approved basic operator-training course.

Operator, Level I

- High school diploma, GED, or equivalent, and
- One year operating experience at a Class I or higher system/facility.

Operator, Level II

- High school diploma, GED, or equivalent, and
- Three years operating experience at a Class I or higher system/facility, and
- A Level I certificate

[3] Drinking Water Protection Act, Province of BC, SBC 2001, Chapter 9
[4] Drinking Water Protection Regulations, Province of BC, B.C. Reg. 200/2003, including amendments up to 87/2011, May 19, 2011
[5] Environmental Operator Certification Program Guide, EOCP,

9 CONCLUSIONS

To meet the VIHA requirements mandated in the 4-3-2-1 policy for treatment of surface drinking water, we have presented the KLWD with two options: filtration and disinfection of raw water drawn from Kemp Lake, or connection to the CRD distribution system. Either option can be operated and managed by the KLWD, or the district could become a local area in which the CRD operates/manages the system with oversight by the Kemp Lake water commission.

If the KLWD continues to maintain their system, it is responsible to meet all applicable regulations for drinking water and continue to administer a sustainable financial model, including maintaining an adequate reserve fund. Alternatively, if a water commission is formed, the CRD would maintain the water system on behalf of Kemp Lake and charge residents for the services provided. While the water commission would have input on the activities of the CRD, the annual cost is expected to be higher with CRD administration and operation.

Connection to the CRD distribution system provides a stable, long-term supply of safe drinking water to the District at a similar capital cost to lake water treatment, but at a higher life cycle cost.

The Kemp Lake watershed is relatively small and there has been significant development within the watershed. This presents a significant risk of contamination or decline in quality and or quantity over time.

Water conservation methods, including rainwater harvesting can greatly reduce the annual cost for consumers. The life cycle cost analysis is an excellent tool for weighing the four options, but the associated risks and consumer risk tolerance should also be considered when determining the future direction of the Kemp Lake water system.

APPENDIX A – LIFE CYCLE COSTS

GENIVAR

Kemp Lake Water District

Water Treatment Options

Life Cycle Cost Analysis

File No.: 121-15126-01

Prepared by: jcs

Date: Nov 21, 2012

Cost of Capital	4.0%
Term, years	20

Capital Costs

Item	*Lifespan (years)*	*Option 1*	*Option 2*	*Option 3*	*Option 4*
Pressure filters, valves, piping	20	$ 200,000	$ 200,000		
Ozone system	20	180,000	180,000		
Raw water pumps	20	20,000	20,000		
Building	40	120,000	150,000		
Site works, underground	50	60,000	60,000		
Electrical, controls, communication	20	120,000	150,000		
BC Hydro service	50	50,000	50,000		
Startup & commissioning	50	30,000	40,000		
CRD programming	20		30,000		
CRD administration	20		50,000		30,000
CRD watermain connection	50			770,000	770,000
Contingency & Engineering (50%)	20	390,000	460,000	385,000	400,000
Total Initial Cost		$ 1,170,000	$ 1,390,000	$ 1,155,000	$ 1,200,000

Option 1: Raw water treatment, KLWD ownership

Option 2: Raw water treatment, CRD ownership & management of the system as a local area

Option 3: CRD connection, bulk water purchase, KLWD operation & management

Option 4: CRD connection & management as a local area

GENIVAR

Life Cycle Cost Analysis

Kemp Lake Water District

Water Treatment Options

File No.: 121-15126-01

Prepared by: jcs

Date: Nov 21, 2012

Cost of Capital	4.0%
Term, years	20

Replacement Costs

Item	*Year*	*PW factor*	*Option 1*	*Option 2*	*Option 3*	*Option 4*
Filter media	10	0.6756	$ 5,000	$ 5,000		
Filters, valves, piping	20	0.4564	200,000	200,000		
Ozone system	20	0.4564	180,000	180,000		
Raw water pumps	20	0.4564	20,000	20,000		
Electrical, controls	20	0.4564	120,000	150,000		
CRD admin	20	0.4564	-	30,000		
Contingency & Eng	20	0.4564	390,000	460,000		
Total Replacement Costs			$ 915,000	$ 1,045,000	$ -	$ -
Total Replacement Costs (present worth)			$ 418,702	$ 478,034	$ -	$ -

Annual O&M Costs

Item	*Inflation*	*PWA*	*Option 1*	*Option 2*	*Option 3*	*Option 4*
Labour	1.0%	14.918	$ 25,000	$ 37,000		
Distribution system	1.0%	14.918	15,000	20,000	15,000	20,000
Chlorine	1.0%	14.918	10,000	10,000	5,000	5,000
Materials	1.0%	14.918	20,000	25,000	-	-
Equipment maintenance	0.5%	14.235	2,500	4,000	500	500
Power Consumption	0.5%	14.235	7,500	7,500	-	-
Admin & insurance	0.5%	14.235	60,000	70,000	40,000	50,000
CRD bulk water costs	1.5%	15.644	-	-	154,000	154,000
Reserve fund contributions	0.5%	14.235	35,000	40,000	5,000	7,500
Total Annual Costs			$ 175,000	$ 213,500	$ 219,500	$ 237,000
Total Annual Costs (Present Worth)			$ 2,538,945	$ 3,102,025	$ 3,355,183	$ 3,607,711

Total Life Cycle Cost (Present Worth)	$ 4,127,647	$ 4,970,059	$ 4,510,183	$ 4,807,711

Option 1: Raw water treatment, KLWD ownership

Option 2: Raw water treatment, CRD ownership & management of the system as a local area

Option 3: CRD connection, bulk water purchase, KLWD operation & management

Option 4: CRD connection & management as a local area

GENIVAR

Life Cycle Cost Analysis

Kemp Lake Water District

Water Treatment Options

File No.: 121-15126-01

Prepared by: jcs

Date: Nov 21, 2012

Cost of Capital	**5.0%**
Term, years	**20**

Capital Costs

Item	*Lifespan (years)*	*Option 1*	*Option 2*	*Option 3*	*Option 4*
Pressure filters, valves, piping	20	$ 200,000	$ 200,000		
Ozone system	20	180,000	180,000		
Raw water pumps	20	20,000	20,000		
Building	40	120,000	150,000		
Site works, underground	50	60,000	60,000		
Electrical, controls, communication	20	120,000	150,000		
BC Hydro service	50	50,000	50,000		
Startup & commissioning	50	30,000	40,000		
CRD programming	20		30,000		
CRD administration	20		50,000		30,000
CRD watermain connection	50			770,000	770,000
Contingency & Engineering (50%)	20	390,000	460,000	385,000	400,000
Total Initial Cost		**$ 1,170,000**	**$ 1,390,000**	**$ 1,155,000**	**$ 1,200,000**

Option 1: Raw water treatment, KLWD ownership

Option 2: Raw water treatment, CRD ownership & management of the system as a local area

Option 3: CRD connection, bulk water purchase, KLWD operation & management

Option 4: CRD connection & management as a local area

GENIVAR

Life Cycle Cost Analysis

Kemp Lake Water District

Water Treatment Options

File No.: 121-15126-01

Prepared by: jcs

Date: Nov 21, 2012

Cost of Capital	**5.0%**
Term, years	**20**

Replacement Costs

Item	*Year*	*PW factor*	*Option 1*	*Option 2*	*Option 3*	*Option 4*
Filter media	10	0.6139	$ 5,000	$ 5,000		
Filters, valves, piping	20	0.3769	200,000	200,000		
Ozone system	20	0.3769	180,000	180,000		
Raw water pumps	20	0.3769	20,000	20,000		
Electrical, controls	20	0.3769	120,000	150,000		
CRD admin	20	0.3769	-	30,000		
Contingency & Eng	20	0.3769	390,000	460,000		
Total Replacement Costs			**$ 915,000**	**$ 1,045,000**	**$ -**	**$ -**
Total Replacement Costs *(present worth)*			**$ 346,049**	**$ 395,046**	**$ -**	**$ -**

Annual O&M Costs

Item	*Inflation*	*PWA*	*Option 1*	*Option 2*	*Option 3*	*Option 4*
Labour	1.0%	13.638	$ 25,000	$ 37,000		
Distribution system	1.0%	13.638	15,000	20,000	15,000	20,000
Chlorine	1.0%	13.638	10,000	10,000	5,000	5,000
Materials	1.0%	13.638	20,000	25,000	-	-
Equipment maintenance	0.5%	13.033	2,500	4,000	500	500
Power Consumption	0.5%	13.033	7,500	7,500	-	-
Admin & insurance	0.5%	13.033	60,000	70,000	40,000	50,000
CRD bulk water costs	1.5%	14.279	-	-	154,000	154,000
Reserve fund contributions	0.5%	13.033	35,000	40,000	5,000	7,500
Total Annual Costs			**$ 175,000**	**$ 213,500**	**$ 219,500**	**$ 237,000**
Total Annual Costs *(Present Worth)*			**$ 2,323,155**	**$ 2,838,241**	**$ 3,064,762**	**$ 3,295,868**

Total Life Cycle Cost *(Present Worth)*	**$ 3,839,203**	**$ 4,623,286**	**$ 4,219,762**	**$ 4,495,868**

Option 1: Raw water treatment, KLWD ownership

Option 2: Raw water treatment, CRD ownership & management of the system as a local area

Option 3: CRD connection, bulk water purchase, KLWD operation & management

Option 4: CRD connection & management as a local area

GENIVAR

Life Cycle Cost Analysis

Kemp Lake Water District

Water Treatment Options

File No.: 121-15126-01

Prepared by: jcs

Date: Nov 21, 2012

Cost of Capital	**6.0%**
Term, years	**20**

Capital Costs

Item	*Lifespan (years)*	*Option 1*	*Option 2*	*Option 3*	*Option 4*
Pressure filters, valves, piping	20	$ 200,000	$ 200,000		
Ozone system	20	180,000	180,000		
Raw water pumps	20	20,000	20,000		
Building	40	120,000	150,000		
Site works, underground	50	60,000	60,000		
Electrical, controls, communication	20	120,000	150,000		
BC Hydro service	50	50,000	50,000		
Startup & commissioning	50	30,000	40,000		
CRD programming	20		30,000		
CRD administration	20		50,000		30,000
CRD watermain connection	50			770,000	770,000
Contingency & Engineering (50%)	20	390,000	460,000	385,000	400,000
Total Initial Cost		**$ 1,170,000**	**$ 1,390,000**	**$ 1,155,000**	**$ 1,200,000**

Option 1: Raw water treatment, KLWD ownership

Option 2: Raw water treatment, CRD ownership & management of the system as a local area

Option 3: CRD connection, bulk water purchase, KLWD operation & management

Option 4: CRD connection & management as a local area

GENIVAR

Life Cycle Cost Analysis

Kemp Lake Water District

Water Treatment Options

File No.: 121-15126-01

Prepared by: jcs

Date: Nov 21, 2012

Cost of Capital	**6.0%**
Term, years	**20**

Replacement Costs

Item	*Year*	*PW factor*	*Option 1*	*Option 2*	*Option 3*	*Option 4*
Filter media	10	0.5584	$ 5,000	$ 5,000		
Filters, valves, piping	20	0.3118	200,000	200,000		
Ozone system	20	0.3118	180,000	180,000		
Raw water pumps	20	0.3118	20,000	20,000		
Electrical, controls	20	0.3118	120,000	150,000		
CRD admin	20	0.3118	-	30,000		
Contingency & Eng	20	0.3118	390,000	460,000		
Total Replacement Costs			**$ 915,000**	**$ 1,045,000**	**$ -**	**$ -**
Total Replacement Costs *(present worth)*			**$ 286,530**	**$ 327,064**	**$ -**	**$ -**

Annual O&M Costs

Item	*Inflation*	*PWA*	*Option 1*	*Option 2*	*Option 3*	*Option 4*
Labour	1.0%	12.515	$ 25,000	$ 37,000		
Distribution system	1.0%	12.515	15,000	20,000	15,000	20,000
Chlorine	1.0%	12.515	10,000	10,000	5,000	5,000
Materials	1.0%	12.515	20,000	25,000	-	-
Equipment maintenance	0.5%	11.978	2,500	4,000	500	500
Power Consumption	0.5%	11.978	7,500	7,500	-	-
Admin & insurance	0.5%	11.978	60,000	70,000	40,000	50,000
CRD bulk water costs	1.5%	13.083	-	-	154,000	154,000
Reserve fund contributions	0.5%	11.978	35,000	40,000	5,000	7,500
Total Annual Costs			**$ 175,000**	**$ 213,500**	**$ 219,500**	**$ 237,000**
Total Annual Costs *(Present Worth)*			**$ 2,133,672**	**$ 2,606,625**	**$ 2,810,089**	**$ 3,022,382**

Total Life Cycle Cost *(Present Worth)*	**$ 3,590,202**	**$ 4,323,689**	**$ 3,965,089**	**$ 4,222,382**

Option 1: Raw water treatment, KLWD ownership

Option 2: Raw water treatment, CRD ownership & management of the system as a local area

Option 3: CRD connection, bulk water purchase, KLWD operation & management

Option 4: CRD connection & management as a local area

APPENDIX B – 2012 WATER TREATMENT REPORT

GENIVAR

File: 121-15126-00
May 25, 2012

Kemp Lake Waterworks District
PO Box 465
Sooke, BC V0S 1N0

Attention: Kevan Brehart

Dear Sir:

Re: Update to Water Treatment Options and Costs

INTRODUCTION

GENIVAR was asked by the Kemp Lake Waterworks District to review and update options for water treatment for distribution, including cost estimates, to meet the VIHA 4-3-2-1 drinking water treatment for surface water policy. The VIHA policy requires:

- 4 log (99.99%) inactivation of viruses
- 3 log (99.9%) removal or inactivation of Giardia cysts and Cryptosporidium oocysts
- 2 treatment processes
- <1 NTU of turbidity

This report is to supplement previous reports prepared by GENIVAR and Bullock Baur, including the October 23, 2007 investigation into a CRD Water connection, and the March 22, 2005 treatment feasibility report.

BACKGROUND

The Kemp Lake Waterworks District (KLWD) is located approximately 2 km west of Sooke, BC on Vancouver Island. The KLWD uses raw water from Kemp Lake to provide potable water to approximately 750 residents. Water is chlorinated at the source and is pumped in a common supply/distribution main to two storage reservoirs, located near opposite ends of the District. The reservoirs control operation of the supply pumps through remote radio telemetry. They are sized to provide emergency and fire storage, and provide balance in the fluctuations of daily demands.

To meet the VIHA 4-3-2-1 policy, the District has the option of either connecting to the CRD domestic water network by constructing a new watermain extension on West Coast Road, or treating the raw water. Through previous investigations, it was determined that pressure filtration would provide the lowest capital costs, a relatively small building footprint, and be suitable for treating the Kemp Lake Surface water. This report will provide a preliminary cost estimate for a modular pressure filtration system that will meet the VIHA 4-3-2-1 policy requirements.

Suite 400, 401 Garbally Road, Victoria, British Columbia, Canada V8T 5M3
Telephone 250-384-5510 ~ Fax 250-386-2844 ~ Email: info.victoria@genivar.com ~ Web: www.genivar.com

RAW WATER QUALITY

Review of the latest raw water analysis reports and testing (available on the Kemp Lake Waterworks District website) shows reasonable water quality with slightly high pH, and acceptable levels of dissolved minerals and elements, including iron and manganese. Limited colour and turbidity tests were performed, but those shown are relatively high. UV transmittance is typically in the low 70's, indicating UV treatment would be ineffective without pre-filtration. While testing for total organic carbon (TOC) has not been undertaken, levels of trihalomethanes (THM's) are above generally accepted levels. THM's are produced when raw water high in organic carbon is chlorinated.

To confirm the expected filter loadings and required removal rates, we recommend regular testing for total organic carbon, colour, and turbidity. Additionally, benzene, toluene, ethylbenzene, and xylenes (BTEX) testing should be undertaken annually, as the Kemp Lake watershed is unprotected and subject to contamination. Based on the test results reviewed, the existing system will not meet the VIHA 4-3-2-1 requirements without additional treatment.

DESIGN FLOWS

Data from 2001-2007 indicates the total yearly consumption varied between 60,500 and 87,500 cubic meters (16.0 and 23.1 million USGAL), with a maximum daily usage between 484,150 and 836,550 litres (127,898 and 220,994 USGAL). While the subject population has consistently grown, the average daily water demand (ADD) has remained relatively consistent. This result is similar to what the CRD has observed in the past 10 years due to water conservation measures. However, maximum daily demand (MDD) varies greatly year-to-year, due to fluctuations in summer rainfall and associated irrigation demands. The highest MDD between 2001 and 2007 is 9.7 l/s, or 154 USGMP, recorded in 2002; the average MDD through the analysis period is 7.4 l/s (118 USGPM).

Year	Annual Demand	Max day demand	Average day demand (ADD)	Max daily demand (MDD)	ADD-MDD peaking factor	# of units
	M L	L	L/s	L/s		
2007	85.17	484,150	2.71	5.60	2.1	459
2006	84.04	636,990	2.67	7.37	2.8	450
2005	87.44	605,960	2.78	7.01	2.5	424
2004	82.90	685,750	2.64	7.94	3.0	420
2003	76.84	597,190	2.44	6.91	2.8	410
2002	86.31	836,550	2.74	9.68	3.5	380
2001	60.57	653,650	1.93	7.57	3.9	370
Average	**80.47**	**642.89**	**2.56**	**7.44**	**2.95**	

PRESSURE FILTRATION SYSTEM

A two-stage, biologically assisted pressure filter system is proposed to treat the Kemp Lake raw water prior to discharge into the distribution system. Raw water will be directed through roughing filters followed by granular activated carbon filters (GAC) with an ozonation system installed upstream of the filters to assist with organics removal. Following the filters, water will be chlorinated using sodium hypochlorite for disinfection and to maintain a residual in the distribution network. This configuration will meet the VIHA 4-3-2-1 requirements, and a UV system could be considered as an additional barrier.

The usage of ozonation as a pre-treatment allows for biological growth on filter media, even at very high flow rates. The half-life of ozone in water is typically 2 to 20 minutes, depending on water quality and temperature. The treatment process as designed intends to take advantage of the biological activity for enhanced treatment efficiency without the use of chemicals.

The proposed treatment system will be designed to have a capacity of at least 9.7 l/s to equal the expected maximum daily demands. The existing 10 hp raw water pumps provide 8.7 l/s when both are running. Storage in the existing reservoirs will provide makeup water to meet the required maximum daily demand, peak hour demand, and fire flows.

We suggest a four-filter system for treatment to provide maximum operational flexibility. During low flows, the required filters will operate while the others remain either static or in a backwash cycle. The operational filter(s) will alternate based on a pre-set working time. During higher flows, both raw water pumps will be operational and all filters will operate in parallel to provide the required flow. As the District grows, additional filters can be added in parallel. As part of the treatment system upgrade, we suggest the raw water pumps be replaced with larger three phase pumps, operated from a variable speed drive (VFD).

The only chemical addition to the filter system is ozone that is generated on-site. Ozone reacts with organics in the water and quickly breaks down, eventually leaving no residual. For this reason, the backwash water may be discharged back into Kemp Lake once it has passed through a settling pond or tank. A sanitary disposal system is not required for this pressure filter configuration.

With ozone, filtration, and chlorination, the proposed system has three separate treatment processes, exceeding the minimum VIHA requirement of two. A turbidity monitor is proposed downstream of the filters to log treated water turbidity. This is required to ensure that a maximum of one NTU is not exceeded, as per the VIHA requirement.

VIRUS REMOVAL OR DESTRUCTION

The table below provides approximate credits for the treatment system proposed:

Treatment Process	*Log Credit*
Ozonation (see note (a) below)	4.0[1]
Conventional Filtration	1.0[2]
Chlorine Disinfection (see note (b) below)	0[3]
TOTAL PROVIDED OR DESIGNED	**5.0**

(a) The CT value for 4 Log removal ($CT_{99.99}$) of viruses at a temperature of 0.5°C is 1.8 min-mg/l.

(b) The CT value for 4 Log removal ($CT_{99.99}$) of viruses at a temperature of 0.5°C is 12 min-mg/l. The other three treatment processes provide a combined credit of 5.0 Log, and only 4 Log removal is required. While chlorination will be done, no credit is being taken.

GIARDIA AND CRYPTOSPORIDIUM REMOVAL OR DESTRUCTION

The table below provides approximate credits for the treatment system proposed:

Treatment Process	*Log Credit*
Ozonation (see note (a) below)	2.0[4]
Conventional Filtration	1.0[5]
Chlorine Disinfection (see note (b) below)	0.0
TOTAL PROVIDED OR DESIGNED	**3.0**

(a) The CT value for 3 Log removal ($CT_{99.9}$) of *giardia* and *cryptosporidium* occysts at a temperature of 0.5°C is 2.9 min-mg/l. To be conservative, we are taking a 2-log credit.

(b) The CT value for 3 Log removal ($CT_{99.9}$) of *giardia* and *cryptosporidium* occysts at a temperature of 0.5°C is 250 min-mg/l. The other two treatment processes provide the required credit of 3 Log. While chlorination will be done, no credit is being taken.

---

[1] EPA Guidance Manual, LT1ESWTR Disinfection Profiling and Benchmarking, Appendix B, CT Tables, May 2003.
[2] Health Canada, Guidelines for Canadian Drinking Water Quality; Supporting Documentation, Enteric Viruses (2010)
[3] US EPA, LT1ESWTR Disinfection Profiling and Benchmarking; Guidance Manual, Jan 2002
[4] EPA Guidance Manual, LT1ESWTR Disinfection Profiling and Benchmarking, Appendix B, CT Tables, May 2003.
[5] Health Canada, Guidelines for Canadian Drinking Water Quality; Supporting Documentation, Protozoa-(2010)

SITE CONSTRAINTS

The existing pump station and chlorination system is located at the end of Chubb Road, a Ministry of Transportation right-of-way, in a small building serviced by overhead power. Installation of the proposed treatment system would require a new wood frame or concrete block building. For access and ventilation, WorkSafe BC requires a building with separate rooms for the ozone unit, raw water pumps and pressure filters, and chlorination. An agreement for land use would need to be reached with the Ministry of Transportation. The minimum building size is estimated at 72 square meters, which could be configured as 12m by 6m to reduce the impact to the traveled portion of the road. We recommend using modified shipping containers set on a concrete pad, complete with added windows and ventilation. If the existing treatment site is not suitable for the new system, then significant costs would be incurred to purchase land and install dedicated watermains to and from the new treatment site.

To service the treatment system and new raw water pumps, a new BC Hydro service is required. It is assumed that the existing overhead power lines along Chubb Road have capacity for the works. A new transformer, service drop, and meter would be required. We have included an estimate for this service in our cost estimate. As previously noted, the backwash water may discharge back to Kemp Lake, through a settlement tank. This tank could be a plastic above ground tank connected to a small pump designed to provide adequate settlement time.

COST ESTIMATE

Below is a Class ‘D’ cost estimate for the complete water treatment system based on information provided by Van Isle Water Services Ltd.

Item		**Cost**
Pressure filtration system, valves, piping		$ 200,000
Ozone system		$ 180,000
Raw water pumps		$ 20,000
Building		$ 120,000
Site works, underground, and backwash tank		$ 60,000
Electrical, controls, and communication		$ 120,000
Upgraded BC Hydro service, allowance		$ 50,000
Start-up and Commissioning		$ 30,000
	Subtotal	**$ 780,000**
+ Engineering and Contingencies (30%)		$ 220,000
	Total	**$1,000,000**

OPERATION AND MAINTENANCE

We expect the new water treatment facility will require an operator certified to either Level I or Level II by the Environmental Operators Certification Program (EOCP). The Kemp Lake Waterworks District currently employs a Level II operator, so additional certification should not be required. To maintain the proposed pressure filtration system, routine daily tasks such as chlorine residual tests will continue with additional effort required to maintain the new works. Additional maintenance tasks would include monitoring headloss, backwashing the filters, review of finished water quality, and data logging.

CRD WATER CONNECTION

Bullock Baur's October 2007 report concluded that extending a water service for the KLWD to the CRD system in Sooke would cost an estimated $997,000, plus tax. Work would entail extension of approximately 2,000m of 200mm diameter watermain from the eastern extent of the KWLD system to Ella Road in Sooke, replacement of approximately 500m of undersized pipe in the KWLD system, upgrades to existing CRD infrastructure to support the added flows, plus engineering and contingencies. Since 2007, approximately 250m of the 500m of undersized pipe in the KWLD has been replaced. The earlier Bullock Baur cost estimate assumed that a 200mm mainline extension would be sufficient based on certain assumptions concerning provision of fire flows. It is possible that a 250mm pipe will be required if a decision is made to take out of service an existing reservoir in the KLWD, therefore the cost estimate is revised to reflect the construction of a larger 250mm diameter pipe to the CRD system in Sooke.

The unit rates shown in the 2007 construction estimate have been increased to reflect the difference in construction costs between 2007 and 2012. The total length of existing undersized pipe still needing replacement has been revised. A summary of the amended costs is attached.

CRD Water has been contacted to obtain an update to their $60,000 estimate for infrastructure improvements, given in 2007. At this time they are not prepared to offer an update without a formal application from the KLWD to obtain a water service. For the purpose of estimating the cost for upgrades, CRD's earlier estimate has been increased by 9% to account for inflation (per the Consumer Price Index) over the past 5 years.

The total estimated cost for extension of a water service to the CRD system, is approximately $979,000.

If you have any questions or require further information, please don't hesitate to contact me.

Sincerely,

GENIVAR

Original Signed Original Signed

Jeff Somerville, P.Eng. Harry Verstraaten, Eng.L., AScT

This report was prepared by GENIVAR for Kemp Lake Waterworks District. The material contained herein, and the recommendations and conclusions reached, reflect GENIVAR'S opinion based upon the information made available at the time of report preparation. Any use which a third party makes of this report, or any reliance on or decisions based upon it, are the responsibility of such third parties. GENIVAR accepts no responsibility for damages of any kind suffered by any third party as a result of decisions made or actions based on this report.

GENIVAR

preliminary cost estimate

Kemp Lake Waterworks District
Kemp Lake/CRD Water connection

File No.: 121-15126-00
Date: Apr. 27, 2012

Item	Description	Quantity	Unit	Rate	Amount
1.0	**general**				
	Trench Rock	200	m^3	150	$ 30,000
			Subtotal:		**$ 30,000**
2.0	**water system**				
	250mm C900 PVC - New	2,000	lm	220	$ 440,000
	250mm C900 PVC - Replace 65mm	250	lm	270	$ 67,500
	250mm Gate valve	6	ea	3,000	18,000
	Tie-ins at each end	2	ea	5,000	10,000
	Air release valve (complete)	5	ea	2,000	10,000
	Meter, backflow preventer & vault	1	LS	50,000	50,000
	Flow control valve, complete	1	LS	15,000	15,000
	Telemetry reconfiguration	1	LS	5,000	5,000
			Subtotal:		**$ 615,500**
3.0	**storm drainage**				
	Shallow culvert crossing repair	6	ea	2,000	$ 12,000
			Subtotal:		**$ 12,000**
4.0	**road works**				
	Gravel shoulder reinstatement	4000	sq m	5	$ 20,000
	Asphalt patching	500	sq m	50	$ 25,000
	Reinstate asphalt driveway crossing	4	ea	1,000	$ 4,000
			Subtotal:		**$ 49,000**

GENIVAR

preliminary cost estimate

Kemp Lake Waterworks District
Kemp Lake/CRD Water connection

File No.: 121-15126-00
Date: Apr. 27, 2012

project cost summary

1.0	**general**		$	30,000
2.0	**water system**			615,500
3.0	**storm drainage**			12,000
4.0	**road works**			49,000
	Construction Total		**$**	**706,500**
	Engineering & Contingencies	30%	$	212,000
	CRD upgrade charges		$	60,000
	Total Project Costs		***$***	***978,500***

This cost estimate is provided with limited site knowledge and is intended as a magnitude-of-cost only.
Assumptions have been made for pipe size and rock excavation volume.
Assumes that radio telemetry signals can be exchanged between the control valve and the Carpenter road reservoir.
Does not include land acquisition costs, if applicable.
Costs do not include taxes.
Does not include the cost of SCADA equipment

APPENDIX C – EOCP REFERENCE MATERIAL

Operator Details

Operator Information

Operator Name =	Roy E Anderson
Certification Number =	4327
Overall Status =	**Not In Good Standing**
Current Dues Status =	C-2012
Active Levels =	WD-I
Date First Certified =	2003-05-16

CEU Summary

Period ---> **01-Sep-2004 - 31-Dec-2007**

Total CEUs Accumulated in Period =	Accumulated = 2.4
Total CEUs from Approved Courses =	Accumulated = 2.4, Required = 2.4 -> Overall Core CEUs Met
Core CEUs for All Certificates =	Accumulated = 2.4, Required = 0.6 -> Overall Core CEUs Met
CEU Summary for Certificate =	WD - Core = 2.4, Related = 0.0 -> CEUs Met for Certificate
Overall CEU Status in Renewal Period --->	**CEU Requirements Met**

Period ---> **01-Jan-2008 - 31-Dec-2009**

Total CEUs Accumulated in Period =	Accumulated = 0.6
Total CEUs from Approved Courses =	Accumulated = 0.6, Required = 2.4 -> Overall CEUs Not Met
Core CEUs for All Certificates =	Accumulated = 0.6, Required = 0.6 -> Overall Core CEUs Met
CEU Summary for Certificate =	WD - Core = 0.6, Related = 0.0 -> CEUs Met for Certificate
Overall CEU Status in Period --->	**CEU Requirements NOT Met**

Period ---> **01-Jan-2010 - 31-Dec-2011**

Total CEUs Accumulated in Period =	Accumulated = 0.0
Total CEUs from Approved Courses =	Accumulated = 0.0, Required = 2.4 -> Overall CEUs Not Met
Core CEUs for All Certificates =	Accumulated = 0.0, Required = 0.6 -> Overall Core CEUs Not Met
CEU Summary for Certificate =	WD - Core = 0.0, Related = 0.0 -> CEUs Not Met for Certificate
Overall CEU Status in Period --->	**CEU Requirements NOT Met**

Period ---> **01-Jan-2012 - 31-Dec-2013** ** Current Period **

Total CEUs Accumulated in Period =	Accumulated = 0.0
Total CEUs from Approved Courses =	Accumulated = 0.0, Required = 2.4 -> Overall CEUs Not Met
Core CEUs for All Certificates =	Accumulated = 0.0, Required = 0.6 -> Overall Core CEUs Not Met
CEU Summary for Certificate =	WD - Core = 0.0, Related = 0.0 -> CEUs Not Met for Certificate
Overall CEU Status in Period --->	**CEU Requirements NOT Met**

Total CEUs for All Course Submitted Since 2004/09/01= 3.00
Total CEUs for All Course Submitted Since First Registered= 5.40

Environmental Operators Certification Program
Suite 201 - 3833 Henning Drive
Burnaby, B.C. V5C 6N5

Web page: www.eocp.org E-mail: eocp@eocp.org
Telephone: 1-866-552-EOCP (Toll Free), (604) 874-4784 Facsimile: (604) 874-4794

Environmental Operator Certification Program Guide

Table of Contents

FOREWORD

A program for the voluntary classification of water and wastewater treatment systems and certification of facility operators has existed in British Columbia since 1966. On February 26, 1992 the *British Columbia Water and Wastewater Operators Certification Program Society* was incorporated as a non-reporting society pursuant to the Society Act under Certificate of Incorporation number S-28724. On November 1, 1995 the name was changed to *Environmental Operators Certification Program* (EOCP).

The offices of Sigalet, Maguire, Marsden, & Vlahos, Barristers & Solicitors, 2904 - 29th Avenue, Vernon, BC, VlT 1Y7 have been established with the Registrar of Companies as being the location of the Society's legal records and for serving all documents on the EOCP.

The Certification Program has established an office at Suite 201, 3833 Henning Drive. Burnaby, BC V5C 6N5 for the purpose of carrying out the day-to-day business of the Program. All records pertaining to individual certified operators, classified facilities, CEU's, and general information for operators and their employers are maintained at this office.

MISSION STATEMENT

To protect human health, the environment, and the investment in facilities through increased knowledge, skill, and proficiency of the members of the Program in all matters relating to water treatment and distribution and wastewater collection, treatment, reuse, and disposal.

STRATEGY

The EOCP focuses its activities to accomplish its mission in the following areas:

1. establish, update, and implement a system of classification for water treatment, water distribution, wastewater collection, and wastewater treatment systems/facilities;
2. establish, update, and implement examinations and prescribe tests of qualification suitable to qualify for admission to the Program;
3. cooperate with other organizations having similar allied objectives and to join, associate with, and affiliate with such other organizations upon such terms and conditions as may be mutually desirable;
4. communicate with members and others;
5. undertake such other activities as may be deemed appropriate.

The mission of the EOCP shall be carried out without the object of gain for its members or officers and any profits or other accretions to the EOCP shall be used in promoting its purposes. This provision is unalterable.

DEFINITIONS

Certification - the process by which a duly constituted body assesses the credentials, including education, experience, and examination results, of an operator in one of the four areas of focus of the program.

Classification - the process of evaluation of the components of a facility whereby a level of complexity is conferred upon the facility.

Continuing Education Unit (CEU) - a measure of the education credit to be awarded for various educational activities an operator may undertake. A fuller discussion is given on page 15.

Direct Responsible Charge (DRC) - individual accountability for and performance of daily, on-site operation of the facility or system, or a major segment of the facility or system.

Class - the complexity of a facility or system is assessed and ranked from Small System, usually the smallest and/or least complex to Class I through Class IV, the most complex.

Level - the degree of qualification of an operator is evaluated according to experience, education, and examination results and categorized progressively from Small System and Operator-in-Training through Level I to Level IV, the most complex or highest.

Chief Operator – where shift operation is not required, the chief operator has "direct responsible charge", accountability for and performance of active, daily on-site operation of the environmental control utility (facility/system) or a major segment of the facility or system.

Where shift operation is required, the chief operator has "direct responsible charge", accountability for the performance of active, daily on-site operation of an operating shift or a major segment of the environmental control utility (facility/system).

OPERATOR - DESCRIPTION OF DUTIES

Water and Wastewater Treatment Operator - performs any combination of tasks pertinent to controlling the operation of a water or wastewater treatment facility including but not limited to:

- control of flow and processing of water/wastewater, residuals, and finished water/effluent.
- monitor gauges, meters, and control panels and observe variations in operating conditions;
- interpret test results to determine processing requirements;
- operate valves and gates either manually or by remote control;
- start and stop pumps, engines, and generators to control and adjust flow and treatment processes;
- maintain shift logs and record meter and gauge readings;
- collect samples and perform routine laboratory tests and analyses;
- perform routine maintenance functions and custodial duties;
- operate power generating equipment and incinerators;
- make operating decisions in the absence of supervisory personnel;
- perform duties of shift supervisor in his/her absence; and other related tasks.

Water Distribution and/or Wastewater Collection Operator - performs any combination of tasks pertinent to installation and control of the operation of a water distribution or wastewater collection system including but not limited to:

- excavation and backfilling of material prior to installation or for the repair of any of the described systems;
- installation of pipe and related appurtenances;
- control of flow of water/wastewater;
- monitor gauges, meters, and control panels and observe variations in operating conditions;
- operate valves and gates either manually or by remote control;
- start and stop pumps, engines, and generators to control and adjust flow;
- maintain shift logs and record meter and gauge readings;
- collect samples and perform routine field analyses;
- perform routine maintenance functions and custodial duties;
- operate power generating equipment;
- make operating decisions in the absence of supervisory personnel;
- perform duties of shift supervisor in his/her absence; and other related tasks.

The term “operator” shall not normally apply to those individuals who do not have direct "hands-on" responsibilities in the facilities described elsewhere in this guide. It is not intended that this title include city, regional district, or industry managers, directors of public works, engineers, technical superintendents, or equivalent, whose duties do not include the actual operation or direct on-site supervision of systems and operators. It shall not apply to welders, equipment operators, carpenters, truck drivers, and others whose work is limited to a single activity, the performance of which does not include direct responsibility for safeguarding public health or the environment in the practice of disciplines described in the guide.

FACILITY – DESCRIPTION OF FACILITY OR SYSTEM

Wastewater Collection System - that portion of a wastewater system including pumping stations in which wastewater is conveyed from the property line in the case of a residential or commercial connection or the perimeter of a unit process in the case of an industrial connection to the wastewater treatment plant or the receiving water.

Wastewater Treatment Plant (also referred to as Pollution Control Facility) - that portion of a wastewater system which improves or alters the physical, chemical, or microbiological quality of the wastewater other than through the process of screening, comminution, and/or disinfection prior to discharge to the receiving environment.

Water Distribution System - that portion of a potable and/or process water system in which water is conveyed from the water treatment plant or point of supply to the point of consumption/use.

Water Treatment Plant - that portion of the water system, exclusive of the act of disinfection or fluoridation, which improves or alters the physical, chemical, or microbiological quality of the water being treated.

AFFILIATIONS

The Environmental Operators Certification Program (EOCP) is an independent body, duly constituted as a society in the Province of British Columbia. Because of the overlap of activities of the EOCP with others, the Program maintains official and unofficial affiliations with a number of organizations within the province and outside.

Association of Boards of Certification (ABC)

In 1973, the certification bodies from a number of jurisdictions came together to harmonize their activities and provide mutual benefits to their members. British Columbia was one of the Charter Members of this organization and remains an active participant in the various programs. ABC provides examinations and marking that is used in BC, the basis of a common program with other jurisdictions, a model for reciprocity between certification agencies, and the opportunity to network with other certification professionals throughout North America.

Reciprocity Agreement

In 1977 BC and Manitoba signed the first reciprocity agreement between Canadian certification programs. This agreement has subsequently been modified a number of times and now includes most of the Canadian certification jurisdictions . Because of this agreement, an operator from BC can go to another province to work and be granted full certification at the level earned in BC.

British Columbia Water and Waste Association (BCWWA)

The Environmental Operators Certification Program and the British Columbia Water and Waste Association both work in British Columbia to advance the profession and professionalism of water

and wastewater facility and system operators. However, the two organizations, while often serving the same people, are separate and distinct organizations. **BCWWA provides operator training in B.C. and Yukon. EOCP adminsters certification exams and classifies facilities in B.C. and Yukon.** While many people are members of both organizations, membership in one does not confer membership in the other. The organizations maintain separate offices, staff, financial records, and membership services.

The BCWWA is also the avenue for membership, by operators, in either the American Water Works Association or the Water Environment Federation. The Board of the EOCP encourages all operators to avail themselves of the benefits of membership in these organizations.

BENEFITS OF A CERTIFICATION PROGRAM

A certified operator is the most valuable resource in a water and/or wastewater system. With the water and wastewater employees properly certified, the public, the corporation, regulatory agencies, owners and managers, and peers can be confident that the certified employee has the skills, knowledge, abilities, experience, and judgement necessary to competently perform his/her job.

Certified employees can maximize the performance of water and wastewater facilities, which will in turn minimize health risks and environmental concerns, optimize the costs of operations, protect the investment in infrastructure, and provide greater return on the utility's or industry's capital investment.

Certifying the water and/or wastewater operator establishes his/her job as a profession. Certification provides a means of recognition to peers, owners and managers, and the public. Certification has resulted in improved safety and reduced accident rates for the certified operator as well as improved compliance with water and pollution control legislation and regulations. Certification also enhances career opportunities for certified operators and aids employers in hiring, promoting, and establishing salary levels based on certification.

Benefits of a certification program include:

1. Defining minimum qualification standards through application and requiring the operator to pass a comprehensive, job-based, certification exam;
2. Establishing a focus for the development of training materials and certification exams based on "Need to Know" criteria and job analysis;
3. Developing a pool of qualified operators.

The key elements of the Certification Program are:

1. Classification system for water and wastewater systems and facilities;
2. Establishment of qualifications for water/wastewater facility operators;
3. Administration of validated Certification examinations;
4. Issuance and renewal of certificates;
5. Maintenance of records (CEU's, Facility Classification, Personal Records, etc.);
6. Achievement of reciprocity between provinces and states regarding operator certification.

CERTIFICATION IN NORTH AMERICA

In North America today there are over sixty (60) certifying authorities representing all Canadian provinces except Quebec, 50 American states, and over 110,000 water and wastewater operators.

Since 1918, certification of water and wastewater operators has been recognized as beneficial to the protection of public health and the environment. International organizations such the American Water Works Association, the Water Environment Federation (formerly Water Pollution Control Federation), Environment Canada, and the United States Environmental Protection Agency have stated their support for facility classification and operator certification.

OPERATOR CERTIFICATION BOARD

The Environmental Operators Certification Program in British Columbia is directed by a Board elected by the members from candidates drawn from various areas of water and wastewater activity throughout the province. The Board consists of nine directors from the following categories:

Five (5) members who, at the time of their election, are certified operators.

One (1) person who:
- Is a member-at large, or
- is an instructor/teacher at a post secondary institution, and,
- has water or wastewater as his/her major field of study/interest

One (1) person who is:
- a consultant; and,
- is directly involved in water and/or wastewater facility design and/or operation.

One (1) person who is:
- employed in a provincial or federal government department, ministry, or agency directly concerned with the regulatory or enforcement aspects of the water and/or wastewater field.

One (1) person who is:
- a representative of a municipality, regional district, or industrial or other private sector operation who employs certified operators and who holds the position of city engineer, director of public works, technical superintendent, or an equivalent position.

Board members are elected by secret ballot by the membership and serve a term of two (2) years. The Board is divided into two groups such that five (5) directors are elected in one year and four (4) directors are elected in the next. If for any reason a Board member is unable to complete his/her term of office, the Board may appoint a replacement to serve the balance of his/her term. In so doing the Board must insure that the majority of Board members are certified operators.

The Board is responsible for conducting all work associated with the promotion, administration, and record-keeping activities required to maintain and expand the program. These duties include: establishing and applying classification standards for all water and wastewater systems and facilities in the province, establishing and applying qualification standards for certification and membership in the Program, establishing, upgrading, and administering certification examinations in the province, and maintaining records of the certification and qualifications of members of the Certification Program.

Members of the Board elect from their number a: Chairman, Secretary, and Treasurer. The Chairman appoints individual Board members to take responsibility for the following: Education Liaison (BCWWA), Exam Co-ordinator, Facility Classification, Industrial Waste, Constitution & Bylaws, CEU Assessment, Newsletter , and such other activities as the Board may determine.

PROGRAM OPERATING PRINCIPLES

The development of a certification program and a classification scheme for water and wastewater that each involve multiple levels has been done by design in virtually all jurisdictions. The basic reason for doing so is to match the levels of qualification of operators with the complexity of the systems they will operate and "assure" that the facilities are operated by appropriately qualified personnel.

The Program believes that all water and wastewater systems/facilities should be operated by appropriately certified personnel. Similar areas of activity (power engineers) covered by other jurisdictions have such mandatory certification and many others of lesser consequence (travel agents and realtors) must show evidence of qualification. In the interest of public health and the preservation of our environment, the EOCP will continue to advocate the implementation of mandatory certification in all jurisdictions for all operating personnel working in water and wastewater systems/facilities where their actions could be of direct consequence to the successful operation of the system/facility.

The Program recognizes an operator's competence develops over time and so provides a staged process whereby an entry level operator can successfully advance in a stable working environment to a position of responsibility for the system. In order to accommodate entry level operators, an Operator-in-Training examination and certificate is available and should be applied for within three months of commencing employment (or transfer into) a water or wastewater system/facility.

At the other end of the scale, the complexity of many systems demands that only fully qualified personnel be given responsibility for their operation. Every facility in the province should be classified according to the criteria explained elsewhere in this guide and at least the "Senior Operator", "Chief Operator", or similar titled individual must be certified at the class of the facility (or higher).

Recognizing that there will be times when the Senior or Chief Operator is not available, the individual in Direct Responsible Charge of a Class III or IV system/facility should be certified at not less than one level below that of the plant and at no time less than Level II.

The Program believes that <u>all operators</u> in a system/facility should be certified at an appropriate level. In large systems/facilities subject to mandatory certification requirements, that employ "single" task employees (including tradesmen) or "labourers", these individuals will not be considered to be gaining <u>operating</u> experience for the purpose of eventual certification if they later apply to be certified.

FACILITY CLASSIFICATION

Classification of a facility provides an indication of the degree of knowledge and training that will be required of an operator of that facility. Since 1975, facilities in British Columbia have been classified on a voluntary basis using standards adopted by the Association of Boards of Certification. These standards are continually upgraded to reflect the ever increasing complexity of modern water and wastewater treatment systems and facilities. Classification of these systems follows two paths. Water distribution systems and wastewater collection systems are classified based on flow, and complexity. Water treatment, and municipal and industrial wastewater treatment facilities are classified based on flow, complexity of operation, variability of influent and effluent requirements, and analytical laboratory controls carried out at the facilities. Facilities are classified from Small Systems to Class I through IV with Class IV systems being the largest or most complex. Figure 1 summarizes the facility classification point system.

The Ministry of Environment, Lands, and Parks (MELP) mandated wastewater treatment plant a system of classification of municipal wastewater treatment facilities effective August 1, 1993. The program is administered by the Environmental Operators Certification Program. Municipal liquid waste discharge permits issued by the MELP were amended commencing March 1993 to include this provision. Effective July 1999, the MELP Municipal Sewage Regulation also requires facility classification. Facility classification forms are available at the Program office.

Small Water and Wastewater Systems

Typically, small water distribution, water treatment, wastewater collection, or wastewater treatment facilities have operators who are not required for full-time attention. The systems are relatively simple, serve only a small population and/or are operating for only a portion of any given year.

Most operators of such facilities are not able to meet the minimum requirements for Level I-IV certification; in particular, achieving the operating experience (2000 hours) required to write a Level I exam in a reasonable period of time. Small System classification and operator certification is intended to insure the qualification of operators who work on systems that may not normally fit within the regular certification process. There are three types of facility classification and operator certification for Small Systems:

- Small Water System (includes distribution and treatment)
- Small Wastewater System – lagoons (includes collection and treatment)
- Small Wastewater System – mechanical (includes collection and treatment)

Small System Criteria

The criteria for Small System classification and operator certification have been developed in conjunction with other jurisdictions in Canada and the U.S. and follow the guidelines as identified with the Association of Boards of Certification.

1. the facility/system serves a maximum population of 500 people or per capita equivalents;
2. the treatment component of the facility/system is classified as a Class I or Class II facility;
3. the operator has at least six calendar months (minimum 50 hours) of hands-on operating experience operating the facility/system or one equivalent to it or higher;
4. the operator must have have completed appropriate training for which a minimum of 1.2 continuing education units have been awarded.

Each of the Small System exams is comprised of 50 multiple-choice questions. An operator holding a Small System certificate will be recognized as a certified operator only at facilities considered Small Systems. A Small System certificate does not preclude an operator from writing exams to obtain a full Level I-III certificate once the required experience and/or education is acquired. An operator holding a Level I or higher certificate is recognized as a certified operator in all facilities including Small Systems up to the level of his/her certificate.

Figure 1 - Facility Classification System

Facility	Units	Class I	Class II	Class III	Class IV
Water Distribution	Point range	<31	31-55	56-75	>75
Wastewater Collection	Point range	<31	31-55	56-75	>75
Water Treatment	Point range	<31	31-55	56-75	>75
Wastewater Treatment	Point range	<31	31-55	56-75	>75
Industrial Wastewater Treatment	Point range	<31	31-55	56-75	>75
Small Water System	Point range	<55		N/A	N/A
Small Wastewater System	Point range	<55		N/A	N/A

Notes:

a) *"In-line" activities such as booster pumping, coarse screening, chlorination, or fluoridation, are considered an integral part of the water distribution system and not a water treatment facility.*

b) *A facility which provides only comminution or screening of wastewater solids, lift stations, chlorination, or odour control prior to discharge to a receiving water is considered an integral part of the collection system and not a wastewater treatment facility.*

Under certain circumstances, the class of a particular plant determined by the point system may not reflect the most appropriate level of operator needed for that facility (by reason of special features, design, or other characteristics). In these rare cases the Board may adjust the class up or down to bring the plant in line with what it should be.

Facility classification provides both the facility operator and the owner with an indication of the level of certificate the facility operators should hold. Under a system of mandatory facility classification it is the owner's responsibility to ensure that operators have access to the training activities needed to upgrade their certificates and the operator's responsibility to ensure that he/she obtains the necessary level of certification. In order for an operator to become certified at a Level III or IV it is first necessary that the facility in which he/she is employed be classified.

OPERATOR CERTIFICATION

Water and wastewater operators will generally be certified as Small Water or Wastewater System, Level I, Level II, Level III, or Level IV operators with IV being the highest or most advanced, paralleling the facility classification. In addition, water and wastewater operators may be certified as an Operator-in-Training. Figure 2 at the end of this section summarizes the combinations of education/training and experience required for eligibility to write the examinations for each level of certification.

The requirements for each level of certification are in accordance with the following outline. The Board will consider a variation in the requirements on a case-by-case basis upon presentation of a request to do so and sufficient explanation of special circumstances.

Small Water System and Small Wastewater System Operator

- Minimum 1.2 continuing education units (CEU's), and
- Minimum of at least six (6) calendar months (minimum 50 hours) of hands-on experience operating the facility/system or one equivalent to it or higher.

Operator-in-Training

- High school diploma, GED, or equivalent, and
- Three (3) months operating experience in a Class I or higher facility or completion of an approved basic operator-training course.

Operator, Level I

- High School diploma, GED, or equivalent, and
- One (1) year operating experience at a Class I or higher system/facility.

Operator, Level II

- High School diploma, GED or equivalent, and
- Three (3) years operating experience at a Class I or higher system/facility, and
- A Level I certificate.

Operator, Level III

- High School diploma, GED or equivalent, and
- Nine hundred (900) instructional hours, or ninety (90) CEU's, or ninety (90) quarter credits, or sixty (60) semester credits of post high school training/education in the water or wastewater field, including core and related education/training, and
- Four (4) years operating experience at a Class II or higher system/facility, and
- For Water Treatment and Wastewater Treatment Operators, two (2) years of direct responsible charge (DRC) operation at a Class II or higher facility, and
- A Level II certificate.

Operator, Level IV

- High School diploma, GED or equivalent, and
- Eighteen hundred (1800) instructional hours, or one hundred eighty (180) CEU's, or one hundred eighty (180) quarter credits, or one hundred twenty (120) semester credits of post high school training/education in the water or wastewater field, including core and related education/training,, and
- Four (4) years operating experience at a Class III or higher facility, and
- For Water Treatment and Wastewater Treatment Operators, two (2) years of direct responsible charge (DRC) operation at a Class III or higher facility, and
- A Level III certificate.

Where applicable, training/education may be substituted for operating and direct responsible charge (DRC) experience as specified below:

1. For Level I, no substitution for operating experience shall be permitted.
2. For Level II, a maximum of four hundred fifty (450) instructional hours, or forty five (45) CEU's or forty five (45) quarter credits or thirty (30) semester credits of post high school training/education in the water or wastewater field, including core and related education/training may be substituted for up to one (1) year of operating experience.
3. For Level III and IV a maximum of nine hundred (900) instructional hours, or ninety (90) CEU's, or ninety (90) quarter credits, or sixty (60) semester credits of post high school training/education in the water or wastewater field, including core and related education/training may be substituted for two (2) years of experience; however, the applicant must still have a minimum of one (1) year of direct responsible charge experience.
4. Training/education applied to operating and/or DRC experience may not also be applied to the training/education requirement.

Where applicable, operating and direct responsible charge experience may be substituted for training/education as specified below:

1. One (1) year of operating experience may be substituted for two (2) years of grade school education,
2. One (1) year of operating experience may be substituted for one (1) year of high school education,
3. For Level Ill, a maximum of one (1) year of direct responsible charge experience (DRC) in a Class II or higher facility may be substituted for four hundred fifty (450) contact hours, or forty five (45) CEU's or forty five (45) quarter credits or thirty (30) semester credits of post high school training/education in the water or wastewater field, including core and related education/training.
4. For Level IV, a maximum of two (2) years of direct responsible charge experience (DRC) in a Class III or higher facility may be substituted for nine hundred (900) contact hours, or ninety (90) CEU's, or ninety (90) quarter credits. or sixty (60) semester credits of post high school training/education in the water or wastewater field, including core and related education/training.
5. Operating and/or direct responsible charge experience (DRC) applied to the training/education requirement may not also be applied to the experience requirement.

At the discretion of the Board, related experience in maintenance, laboratories, other water and pollution control positions, other similar operating positions, and allied trades such as plumbing, millwrighting, or other certification categories, may be substituted for up to one half of the experience requirement.

Figure 2 - Education and Experience Requirements

Category	**Level I**		**Level II**		**Level III**			**Level IV**		
	Educ.	Exp.	Educ.	Exp.	Educ.	Exp.	DRC	Educ.	Exp.	DRC
Water Treatment (WT)	12	1	12	3	14	4	2	16	4	2
Water Distribution (WD)	12	1	12	3	14	4		16	4	
Municipal or Industrial Wastewater Treatment (MWWT or IWWT)	12	1	12	3	14	4	2	16	4	2
Wastewater Collection WWC)	12	1	12	3	14	4		16	4	
Operator-In-Training (OIT)	12 yrs. education				3 months experience or completion of an approved course					
Small Water System (SWS)	1.2 CEU's				6 calendar months experience (min 50 hours) hands-on					
Small Wastewater System (SWWS)	1.2 CEU's				6 calendar months experience (min 50 hours) hands-on					

DIRECT RESPONSIBLE CHARGE (DRC)

The term "direct responsible charge" has specific meaning for the purposes of the Program and is an essential component of an operator's experience when being considered for Level III and IV exam eligibility. DRC goes beyond doing a good job and being responsible for one's own actions; it also includes responsibility for the overall operation of the facility or system and for the other operators under the supervision of the operator in DRC.

Where "direct responsible charge" credit is requested for more than one operator at a time for the operation of segments of a large facility or system, prior Board approval must be obtained including classification of the segments by the Program to assure that they meet the criteria for a Class II or Class III facility or system. DRC experience is required for the issuance of all Level III and Level IV certificates in the Wastewater Treatment and Water Treatment categories.

DRC experience may be substituted for up to one half of the post-secondary education requirements of all Level III and Level IV certificates.

CERTIFICATION EXAMINATIONS

The Certification Program has examinations available to be used in determining skill, knowledge, ability, and judgement in each of the following categories:

- Water Treatment, Level I through IV (100 multiple choice questions)
- Water Distribution, Level I through IV (100 multiple choice questions)
- Wastewater Collection, Level I through IV (100 multiple choice questions)
- Wastewater Treatment, Level I through IV (100 multiple choice questions)
- Operator in Training, WT, WD, WWC, or WWT (100 multiple choice questions per exam)
- Industrial Wastewater Treatment -Biological Systems, Level I through IV (100 multiple choice questions)
- Small Water System (50 multiple choice questions)
- Small Wastewater System – Collection and Mechanical (50 multiple choice questions)
- Small Wastewater System – Collection and Lagoon (50 multiple choice questions)

The certification examinations used by the Certification Program were initially developed by the Association of Boards of Certification (ABC) working in co-operation with all of the Canadian certification boards. The metric system is used throughout the exam series and a formula sheet is provided to each examinee. The examinations are designed to test the candidate in the following areas: general knowledge, support systems, process and quality control, and administration. Figure 3 lists the approximate apportionment of questions in each level of examination.

Figure 3 - Certification Examination Subject Matter

Category	Level I	Level II	Level III	Level IV
General Knowledge	15	15	5	5
Support Systems	20	15	15	10
Process/Quality Control	60	60	60	60
Administration	5	10	20	25
Totals	100	100	100	100

A detailed description of the tasks involved in each of the areas of general knowledge, support systems, process/quality control, and administration may be found in the "Need to Know" job analysis document published by the Association of Boards of Certification. A summary of the "Need to Know" document may be obtained from the Certification Program office.

APPLICATION PROCEDURE

All applications to write certification examinations must be made in writing using the form supplied by the Certification Program. This form provides the candidate an opportunity to demonstrate that he/she possess the requisite combination of education and experience as detailed in Figure 2 and on pages 9 to 11 of this guide. The information provided will be verified by the Board and entered into the certification database. It is important that the candidate take the time to fill out this form completely and accurately, as the information provided will form part of his/her personal file within the Certification Program.

In addition, applications to write an examination in any category must be accompanied by proof of eligibility and/or a job description from the employer and must be confirmed by a supervisor/owner.

Application to write examinations must be submitted no later than **two weeks prior to the examination session**.

After the Board has reviewed the information provided by the candidate, he/she will be informed of his/her eligibility/ineligibility to write a certification examination. Eligible candidates will pay the following fees prior to writing the examination:

- examination fee ($100.00 non-refundable, $50.00 for Small system examinations)
- annual dues ($50.00 if certified for the first time, refundable)
- PLUS GST

The fee structure is set by the Certification Board and subject to review at any time. It is available on request from the EOCP office staff or any Director. Examination sessions will be held at times and places set by the Certification Board, with a suitable advance announcement. Examinations may also be written at the Board office or by special arrangement with any member of the Certification Board.

The passing grade on each examination is 70%. Examinees will be provided with an individual report identifying his/her performance on the exam. Each report lists the total number of questions answered correctly by the examinee out of the total number of questions. The topics report includes reference coding which enables the examinee to identify reference material for further study.

Any examinee may rewrite a failed exam 60 days after receipt of his/her marks if he/she receives a mark of 69% or less. The purpose of the rewrite schedule is to allow the candidate sufficient time to prepare for the exam using the study material suggested in the examination report. Candidates who achieve a passing grade of 70% will be issued a certificate designating his/her qualification. The certificate will state the certified individual's name, the certification level, date of issuance, and the official certificate number.

TERM OF A CERTIFICATE

Certificates will be valid only so long as the holder uses reasonable care, judgement, and application of his/her knowledge in the performance of his/her duties. No certificate shall be valid if obtained or renewed through fraud, deceit, or the submission of inaccurate qualification data. The Certification Board may revoke a certificate at any time if any of the foregoing is determined to apply.

An operator whose certificate has been suspended or revoked shall be entitled, upon application to the Board, to a hearing before the Certification Board at its next regularly scheduled meeting or such special meeting as may be called prior to the next regular meeting. Appeal of the decision of the Certification Board may be made to a court of competent jurisdiction.

CERTIFICATE RENEWAL

Commencing January 1, 2008 certificates shall be renewed every two years through payment of bi-annual dues and completion of continuing education in accordance with criteria established by the EOCP Board as described below.

Members who, for any reason, fail to pay their dues may apply for reinstatement subject to the following restrictions:

1. If the member has been continuously employed as an operator and:

A) their dues have not been paid for one to three years, they may re-enter at the level previously certified upon payment of back dues and late payment levies calculated at the applicable current rate; or
B) their dues have not been paid for more than three years, they may re-enter at one level below the previously certified level upon payment of back dues and late payment levies calculated at the applicable current rate.

2. If the member has not been continuously employed as an operator and:
   A) their dues have not been paid for one to three years, they may re-enter at one level below the previously certified level upon payment of back dues and late payment levies calculated at the applicable current rate.
   B) their dues have not been paid for more than three years, they must re-enter program by successfully passing the Level I examination and paying the appropriate current fees.

During each two year renewal period, operators must complete continuing education appropriate to their work activities and the certificate(s) they hold. Operators holding SWS and/or SWWS certificates only will be expected to complete twelve (12) hours (1.2 CEU's) of approved post-secondary training directly applicable to their certificates. In the situation where an individual holds both certificates they will be expected to complete 50% (6 hr) of their training in each field.

Operators holding Level I-IV certificates will be expected to complete twenty-four (24) hours (2.4 CEU's) of approved, appropriate training in each two year renewal period. In the situation where an operator holds more than one certificate they will be expected to complete a minimum of twenty-five (25%) percent (0.6 CEU) of their training in each of the fields of their certificates.

Members who, for any reason, fail to complete their continuing education requirement for any or all of their certificates will be declared as inactive. Inactive members may apply for reinstatement subject to the following restrictions:

1. If the member has been continuously employed as an operator and:
   A) they are 2.4 CEU's or less in arrears, they may re-enter at the level previously certified upon confirmation that the required training has been completed and payment of the re-instatement fee at the applicable current rate; or
   B) they are more than 2.4 CEU's in arrears, they may re-enter at one level below the previously certified level upon confirmation that the required training has been completed and payment of the re-instatement fee at the applicable current rate.

2. If the member has not been continuously employed as an operator and:
   A) they are 2.4 CEU's or less in arrears, they may re-enter at one level below the previously certified level upon confirmation that the required training has been completed and payment of the re-instatement fee at the applicable current rate; or
   B) they are more than 2.4 CEU's in arrears, they may only re-enter the program by writing the Level I examination the field or fields in which they are presently working.

CONTINUING EDUCATION UNIT (CEU)

Most operators who seek to advance through the levels of certification will need to upgrade their level of education. Even those operators who have completed full year courses at post-secondary institutions will also need to take "short courses" to satisfy the mandatory continuing education requirement described above. While the Certification Program does not offer training, it does provide a mechanism for operators to register their "continuing education" or "professional growth credits". The Certification Board also provides a service to training organizations by assessing training materials and assigning continuing education units (CEU's). A permanent CEU record

serves as documentation for certification at a higher level, and a record of accomplishment in areas of technical and personal development. The term "continuing education unit (CEU)" is registered to the Council on the Continuing Educational Unit in Washington DC. The Council has defined one continuing education unit as *"ten contact hours of participation in an organized, continuing education experience under responsible sponsorship, capable direction, and qualified instruction.* The CEU relates only to non-credit continuing education experiences. The Board will evaluate all training materials/courses with the following criteria:

1. **Is a training need identified:** the training shall be relevant to continuing education and/or job requirements.
2. **Is a learning outcome named:** the program will specify skills, knowledge, and/or attitudes the learner should be able to demonstrate following the activity.
3. **Do the instructional personnel have:** a demonstrated subject competence, an understanding of the learning outcome, knowledge of the learning process to be used, and an ability to communicate.
4. **Is the course content:** consistent with objectives, sequenced in a logical manner, proceeds from basic to advanced levels, and permits the learner to participate and receive feedback.
5. **Course completion:** attendance should be 90% or more; satisfactory course completion, may be based on participant's ability to demonstrate what he/she learned.
6. **Training course assessment:** Formal - written examinations, written reports, completion of project, Informal - self-assessment, oral examination.
7. **Course evaluation:** major aspects of the course are evaluated by participant reaction and sponsor evaluation to maintain quality control.

CEU's will not be awarded for any program of instruction of less than three (3) hours duration or for the following activities:

- Non-educational activities, meetings, conferences, conventions of professional and/or occupational associations, trade shows or exhibits. However, specific seminars held in conjunction with such meetings may qualify if program criteria are met.
- Cultural performances and participation in travel groups unless an integral part of planned training.
- High school equivalency programs.
- Unsupervised study (other than recognized correspondence courses), independent writings, and research reports.
- Mass media programs unless an integral part of planned training.
- On the job training unless planned, structured, and supervised to meet program CEU criteria.

MATERIALS AVAILABLE AT THE EOCP OFFICE

Forms:

Application for Certification Form
Direct Responsible Charge Registration Form
Facility Classification Application Form
Continuing Education Credit Registration Form

Need-to-Know Guide Summaries:

Water Distribution
Water Treatment
Wastewater Collection
Wastewater Treatment

Sample Examinations

Water Distribution
Water Treatment
Wastewater Collection
Wastewater Treatment

Educational Materials:

Correspondence Course Brochure - Sacramento State
ABC Certification Study Guide

Examination Study Guide and Reference Material

Each question in the current series of examinations has been referenced to one or more of the manuals developed for the Sacramento State correspondence courses.

Each examinee receives a mastery report and a sheet of reference materials for each Level I – IV exam written. The mastery report contains a listing of categories and the number of questions answered correctly or incorrectly. The examinee may develop a study program that will assist in preparing for future exams by using the reference sheet where the exam categories will be referenced to the appropriate chapter or appendix in the manual.

Correspondence courses may be obtained by contacting California State University, Sacramento; 6000 J Street, Sacramento, California 95819-6025; Phone: 916-278-6142; Fax: 916-278-5959; E-mail address: wateroffice@csus.edu Website: http://www.owp.csus.edu

Materials Available FOR REVIEW AT the EOCP Office

Correspondence Course Workbooks - Sacramento State
Controlling Wastewater Treatment Processes – Dan Cortinovis
AWWA Water Distribution Operators Handbook
AWWA Basic Chemistry for Water and Wastewater Operators
AWWA Basic Microbiology for Water and Wastewater Operators
National Occupational Guidelines for Water and Wastewater Operators prepared by Environmental Careers Organization (ECO) Canada

Environmental Operators Certification Program
201, 3833 Henning Drive, Burnaby, BC V5C 6N5
Ph: 604.874.4784 Fax: 604.874.4794 Toll Free 1.866.552.EOCP

Application for Classification of Water Treatment Facility

Classification Fee: $50.00 +HST

PLEASE PRINT

Notes:

1. To be considered a water treatment facility, the facility must contain one or more Water Treatment components (see sections 7, 8, 9 and 10). Inline treatment such as chlorination and fluoridation are considered part of the water distribution system unless combined with other chemical or physical treatment processes.
2. An up-to-date process flow schematic **must** accompany this application.

Name of Facility: _____ Facility Number: _____

Location: _____
Street Address City Province Postal Code

Mailing Address: _____
(if different) Street Address City Province Postal Code

Phone: _____ Fax: _____

Facility Email: _____ Facility Location UTM Coordinates Northing _____ Easting _____

Chief Operator: _____ Certification Number: _____
First Name Surname

Address: _____
Street Address City Province Postal Code

Phone: _____ Fax: _____

Email: _____

Name of Owner or Applicant :_____
Municipality, Company, etc.

Contact Person: _____ Title: _____
First Name Surname

Mailing Address: _____
Street Address City Province Postal Code

Phone: _____ Fax: _____

Email: _____

Facility Billing Contact: _____ Title: _____
First Name Surname

Address: _____
Street Address City Province Postal Code

Phone: _____ Fax: _____

Email: _____

MINISTRY OF HEALTH INFORMATION
Health Authority:_____ Local Health Area: _____

Service Delivery Area:_____

OFFICE USE ONLY

Total Points: _____ Initials: _____ Facility Classification: _____

Environmental Operators Certification Program
201, 3833 Henning Drive, Burnaby, BC V5C 6N5
Ph: 604.874.4784 Fax: 604.874.4794 Toll Free 1.866.552.EOCP

1. SIZE

			Pts
a) Population during periods of normal maximum use	800	persons	1 – 5
b) Flow during periods of normal maximum use (daily average)	240	m^3/d	2
c) Design flow (daily average)	300	m^3/d	1 – 5
d) Peak daily flow	750	m^3/d	
e) Clearwell size	N/A	m^3	1 – 5

2. WATER SOURCES & SUPPLY

a) Water Source			
i. Groundwater (confined aquifers)	Yes	No	3
ii. Surface water or groundwater under the direct influence of surface water	X Yes	No	5
iii. Surface water and groundwater (confined aquifers)	Yes	No	7
b) Water Supply			
i. Gravity	Yes	No	0
ii. Pumped	X Yes	No	5

3. VARIATIONS IN RAW WATER (Choose only one)

a) Little or no variation	Yes	No	0
b) Moderate, requires treatment changes 10% to 50% of the time	X Yes	No	2
c) Severe, requires pronounced and/or frequent treatment changes	Yes	No	5

4. RAW WATER QUALITY

a) Raw water quality includes levels requiring treatment of:			
i. Taste and/or odour	Yes	No	3
ii. Colour	X Yes	No	3
iii. Iron and/or manganese	Yes	No	3
iv. Turbidity	X Yes	No	3
v. Total and/or fecal coliforms	Yes	No	3
vi. Algae	Yes	No	3
b) Raw water quality is subject to:			
i. Industrial and commercial waste pollution	Yes	No	5
ii. Agricultural pollution	Yes	No	5
iii. Urban runoff, erosion, and storm water pollution	Yes	No	3
iv. Recreational use (boating, fishing, etc.)	X Yes	No	2

5. PRE-TREATMENT

a) Aeration Treatment Systems			
i. Aeration	Yes	No	3
ii. Packed tower aeration	Yes	No	5
b) Screening, coarse (>5mm)	X Yes	No	2
c) Screening, fine (<5mm)	Yes	No	4

6. CHEMICAL ADDITION

a) Fluoridation	Yes	No	5
b) pH adjustment	Yes	No	4
c) Stability or corrosion control	Yes	No	4
d) Copper sulphate treatment	Yes	No	5
e) Powdered activated carbon	Yes	No	5

Environmental Operators Certification Program
201, 3833 Henning Drive, Burnaby, BC V5C 6N5
Ph: 604.874.4784 Fax: 604.874.4794 Toll Free 1.866.552.EOCP

6. CHEMICAL ADDITION (con't)

			Pts
f) Chemical coagulant addition	Yes	No	2
g) Chemical oxidant addition	~~Yes~~	No	3
h) Rapid mix units			
i. Mechanical mixers	Yes	No	3
ii. Injection mixers	Yes	No	2
iii. In-line blender mixers	Yes	No	2

7. FLOCCULATION

a) Hydraulic flocculators	Yes	No	2
b) Mechanical flocculators	Yes	No	3

8. CLARIFICATION/SEDIMENTATION

a) Horizontal flow (rectangular basins)	Yes	No	5
b) Horizontal flow (round basins)	Yes	No	10
c) Up-flow solids contact sedimentation	Yes	No	10
d) Inclined plate sedimentation	Yes	No	10
e) Tube sedimentation	Yes	No	10
f) Dissolved air floatation	Yes	No	8

9. FILTRATION

a) Single media filtration	Yes	No	3
b) Dual or mixed media filtration	~~Yes~~	No	5
c) Microscreens	Yes	No	5
d) Diatomaceous earth filters	Yes	No	5
e) Cartridge filters	Yes	No	5
f) Slow sand filters	Yes	No	5
g) Direct filtration	Yes	No	5
h) Membranes			
i. Ultrafiltration	Yes	No	10
ii. Nanofiltration	Yes	No	10
iii. Reverse Osmosis	Yes	No	10

10. ADDITIONAL TREATMENT PROCESSES

a) Catalytic oxidation, absorption filtration			
i. Greensand	Yes	No	10
ii. Birm	Yes	No	10
iii. Oxidation/filtration	~~Yes~~	No	10
iv. Sequestration	Yes	No	8
b) Ion Exchange / Softening			
i. Ion exchange	Yes	No	10
ii. Chemical precipitation softening	Yes	No	5
c) Electrodialysis	Yes	No	15

11. DISINFECTION

a) Chlorination			
i. Gaseous chlorine	Yes	No	5
ii. Liquid or powdered hypochlorite	Yes	No	5
iii. Chlorine dioxide	Yes	No	5

Environmental Operators Certification Program
201, 3833 Henning Drive, Burnaby, BC V5C 6N5
Ph: 604.874.4784 Fax: 604.874.4794 Toll Free 1.866.552.EOCP

11. DISINFECTION (con't)

			Pts
b) On-site generation of chlorine	Yes	No	5
c) Ozonization	Yes	No	5
d) Ultraviolet	~~Yes~~	No	5

12. RESIDUALS DISPOSAL

a) Discharge			
i. Discharge to lagoons	Yes	No	1
ii. Discharge to lagoons and then raw water source	~~Yes~~	No	2
iii. Discharge to raw water	Yes	No	4
iv. Disposal to sanitary sewer	Yes	No	2
b) Mechanical dewatering	Yes	No	8
c) On-site disposal	Yes	No	2
d) Solids composting	Yes	No	5

13. LABORATORY ANALYSIS

a) Bacteriological/Biological			
i. All bacteriological/biological laboratory work done outside plant	~~Yes~~	No	0
ii. Membrane filter procedures	Yes	No	3
iii. Use of fermentation tubes or any dilution method, fecal coliform determination	Yes	No	5
iv. Biological identification	Yes	No	7
v. Virus studies or similarly complex work conducted on site	Yes	No	10
b) Chemical/Physical			
i. All chemical/physical laboratory work done by outside personnel	~~Yes~~	No	0
ii. Push button colourimetric methods for simple test such as chlorine residual, pH	Yes	No	3
iii. Additional procedures – titration, jar tests, alkalinity, hardness	Yes	No	5
iv. More advanced determination such as numerous inorganics	Yes	No	7
v. Highly sophisticated instrumentation such as atomic absorption and gas chromatography	Yes	No	10

14. SYSTEM INSTRUMENTATION

a) Flow Measurement			
i. Weir/flume	Yes	No	1
ii. Mechanical/magnetic	~~Yes~~	No	2
iii. Ultrasonic	Yes	No	3
b) Instrumentation (SCADA)			
i. System to provide data with no process operation	~~Yes~~	No	0
ii. System to provide data with limited process operation	Yes	No	2
iii. System to provide data with moderate process operation	Yes	No	4
iv. System to provide data with extensive or total process operation	Yes	No	6

15. OTHER

a) Standby power	Yes	No	2
b) Other (Please Specify) _____	Yes	No	1 - 5

	09
Page 3	18
Page 2	24
	51 +/-

Environmental Operators Certification Program
201, 3833 Henning Drive, Burnaby, BC V5C 6N5
Ph: 604.874.4784 Fax: 604.874.4794 Toll Free 1.866.552.EOCP

COMMENTS BY OPERATOR:

_____

_____

FOR OFFICE USE ONLY:

Date Received: _____ Flow schematics received: Yes No

Date Completed: _____ Signature: _____

Total Points: _____

Comments:

_____

_____

_____

Date Entered: _____ By: _____

APPENDIX D – KLWD FINANCIAL STATEMENTS 2008

KEMP LAKE
WATERWORKS DISTRICT
FINANCIAL STATEMENTS
December 31, 2008

HUTCHESON & CO.
Chartered Accountants

KEMP LAKE
WATERWORKS DISTRICT
FINANCIAL STATEMENTS
December 31, 2008

CONTENTS

HUTCHESON & CO.
Chartered Accountants

HUTCHESON
-CHARTERED ACCOUNTANTS-
& CO.

Partners:
LARRY R. BLOWER, BA, CA
MARLON R. BADESSO, BComm, CA*
BRENT V. ENGLAND, BSc, CA*

*designates incorporated member

ASSOCIATES:
GORDON R. HUTCHESON, FCA*
PHILIP S. WINTERBOTTOM, CA, CBV*
GERALD R. BUNTING, BComm, CGA
TERRY DYER, BComm, CA
WOODY WU, B.Comm, CA
AMMO BAINES, BBA, CA

AUDITOR'S REPORT

To: The Members of Kemp Lake Waterworks District

We have audited the statement of financial position of Kemp Lake Waterworks District as at December 31, 2008 and the statement of operations and changes in net assets for the year then ended. These financial statements are the responsibility of the District's management. Our responsibility is to express an opinion on these financial statements based on our audit.

Except as explained in the following paragraph, we have conducted our audit in accordance with Canadian generally accepted auditing standards. Those standards require that we plan and perform an audit to obtain reasonable assurance whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation.

A cash flow statement has not been prepared by management as it would not provide useful additional information. In these respects, the financial statements are not in accordance with Canadian generally accepted accounting principles.

In our opinion, except for management's decision not to prepare a cash flow statement, these financial statements present fairly, in all material respects, the financial position of the District as at December 31, 2008 and results of its operations for the year then ended in accordance with Canadian generally accepted accounting principles.

Hutcheson & Co.

Victoria, BC
May 6, 2009

Chartered Accountants

200-1137 Yates Street, Victoria, B.C. V8V 3N1 Tel: (250) 381-2400, Fax: (250) 381-1816
E-Mail: admin@hutchco.bc.ca

KEMP LAKE WATERWORKS DISTRICT
STATEMENT OF FINANCIAL POSITION

December 31	2008	2007 (restated - note 5)
Assets		
Cash and short-term investments		
General operating fund	$ 7,871	$ 17,917
Miscellaneous reserve fund	56,421	25,402
	64,292	43,319
Restricted cash and short-term investments fund	67,686	53,532
	131,978	96,851
Accounts receivable		
Taxes	5,133	6,192
Tolls	28,657	24,923
Other	1,835	3,137
	35,625	34,252
Prepaid expenses	4,865	5,070
Waterworks systems and equipment (note 3)	1,422,710	1,461,455
	1,427,575	1,466,525
	$ 1,595,178	$ 1,597,628
Liabilities and Net Assets		
Accounts payable and accrued liabilities	$ 16,373	$ 6,628
Net assets per attached statement of operations and changes in net assets	1,578,805	1,591,000
	$ 1,595,178	$ 1,597,628

Approved by the Board:

_____ _____

See accompanying notes.

HUTCHESON & CO.
Chartered Accountants

KEMP LAKE WATERWORKS DISTRICT
STATEMENT OF OPERATIONS AND CHANGES IN NET ASSETS
Year ended December 31

	Investment in Waterworks and Equipment	Externally Restricted: Renewal Reserve and CEC	Miscellaneous Reserve (Unrestricted)	General Operating (Unrestricted)	2008 Total	2007 Total (restated - note 5)
Revenues						
Taxes	$ -	$ -	$ -	$ 37,080	$ 37,080	$ 36,640
Tolls	-	-	-	72,490	72,490	70,213
Connection fees	-	-	-	600	600	1,200
Renewal reserve charges	-	8,830	-	-	8,830	8,750
Capital expenditure charges (refund)	-	2,000	-	-	2,000	(2,000)
Interest earned	-	1,113	1,019	1,600	3,732	4,314
CRD grant	-	-	-	5,975	5,975	-
	-	11,943	1,019	117,745	130,707	119,117
Expenditures						
Administrative (Schedule A)	-	-	-	35,189	35,189	29,298
Operating (Schedule B)	-	-	-	55,739	55,739	71,456
Amortization	44,974	-	-	-	44,974	44,402
Capital asset revaluation cost (note 5)	-	-	7,000	-	7,000	-
	44,974	-	7,000	90,928	142,902	145,156
Excess (deficiency) of revenues over expenditures	(44,974)	11,943	(5,981)	26,817	(12,195)	(26,039)
Net assets, beginning of year	1,461,455	53,532	25,402	50,611	1,591,000	706,908
Transfers, net	-	2,211	37,000	(39,211)	-	-
Revaluation of waterworks and equipment (note 5)	-	-	-	-	-	910,131
Capital expenditures approved by bylaw (note 4)	6,229	-	-	(6,229)	-	-
Net assets, end of year	$ 1,422,710	$ 67,686	$ 56,421	$ 31,988	$ 1,578,805	$ 1,591,000

See accompanying notes.

1. NATURE OF OPERATIONS

Kemp Lake Waterworks District provides water services to residents of the District. It also has the authority to assess and collect property taxes and water tolls for the District.

The District is incorporated under the Municipal Affairs Act of BC and operates on a not-for-profit basis under the jurisdiction of the BC Ministry of Community Development.

2. ACCOUNTING POLICIES

a) Net assets

i. Investment in waterworks systems and equipment

The District capitalizes additions to the waterworks system and equipment for any significant assets with a useful life beyond one year.

ii. Restricted net assets and revenue

Renewal reserve and capital expenditure charges collected are restricted by the Ministry of Community Development to fund future waterworks systems and equipment upgrading, replacement and purchases. Interest earned on these amounts are also restricted for the same purpose. These funds have been set aside, as restricted cash, and may only be disbursed by a resolution of the Board of Trustees of the District. The Ministry of Community Development provides final verification that these funds are used as originally intended.

b) Cash and short-term investments

Cash and short-term investments consist of highly liquid instruments, such as cash on hand, bank accounts, government T-bills, money market instruments, and guaranteed investment certificates (GIC) which generally have maturities of twelve months or less.

c) Waterworks systems and equipment

Waterworks systems and equipment are recorded at cost less accumulated amortization and are classified according to their functional use. Contributed capital assets are recorded at fair-value at the date of contribution. Amortization is recorded on a straight-line basis over the estimated useful life of the asset commencing the year the asset is put in to service. Estimated useful lives are as follows:

Buildings	30 to 40 years
Reservoirs	40 to 50 years
Machinery & Equipment	5 to 20 years
Water Distribution Systems	20 to 50 years
Computer Equipment & Software	2 to 5 years

d) Use of estimates

The preparation of financial statements in conformity with Canadian generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. By their nature, these estimates are subject to measurement uncertainty. The effect of changes in such estimates on the financial statements in future periods could be significant.

e) Fund accounting

The District follows the restricted fund method of accounting. Funds within the financial statements consist of the General Operating, Investment in Waterworks and Equipment, Renewal Reserve and CEC, and Miscellaneous Reserve funds.

The General Operating fund accounts for the organization's program delivery and administrative activities. This fund reports unrestricted resources and unrestricted operating grants.

The Investment in Waterworks and Equipment Fund reports the assets, liabilities, revenues and expenses related to District's tangible capital assets.

The Renewal Reserve and Capital Expenditure Charge (CEC) Fund is restricted to fund repairs and improvements to the District's waterworks systems and equipment.

The Miscellaneous Reserve Fund is a contingency fund for unplanned expenses or special projects not relating to the above funds.

Transfers between funds are recorded as adjustments to the appropriate fund balances.

f) Revenue recognition

The District recognizes revenue on tolls, taxes, connection fees, renewal reserve fees and subdivision fees in accordance with its bylaws (as approved by the Ministry of Community Development) as follows:

a. Tolls are recognized as water is used by the residents of the District. Water meters are read quarterly and the residents are billed for this usage.
b. Taxes are assessed in the middle of each year based on the classification of each parcel within the District. The taxes are for the calendar year.
c. Renewal reserve fees are assessed quarterly based on the classification of each parcel.
d. Connection fees are recognized when the District has completed connecting the District's water line to a private parcel.
e. Subdivision fees are recognized when the District approves each subdivision plan. Developers are required to pay subdivision fees before subdivision takes place.

3. Waterworks System and Equipment

	Cost	Accumulated Amortization	2008 Net	2007 Net
Land	$ 93,990	$ -	$ 93,990	$ 93,990
Buildings	19,280	(6,087)	13,193	13,693
Reservoirs	382,925	(68,840)	314,085	322,486
Machinery & Equipment	77,264	(38,705)	38,559	38,434
Water Distribution Systems	1,427,599	(468,620)	958,979	990,683
Computer Equipment & Software	5,781	(1,876)	3,905	2,169
Total	$ 2,006,838	$ (584,128)	$ 1,422,710	$ 1,461,455

4. Capital Expenditures

All capital expenditures were approved by the Board of Trustees in 2008.

5. Adjustments due to Revaluation of Waterworks Systems and Equipment

The District has restated its financial statements to comply with the provisions of Section 3150 of the Public Sector Accounting Board Handbook which requires local improvement districts to record and amortize their waterworks systems and equipment on their financial statements. These adjustments are as follows:

Adjustments to 2007 net assets:

Net assets, as previously reported	$ 725,271
Add:	
Revaluation of waterworks systems and equipment	910,131
Less:	
2007 Amortization expense	44,402
Net assets, as restated	$ 1,591,000

5. ADJUSTMENTS DUE TO REVALUATION OF WATERWORKS SYSTEMS AND EQUIPMENT (CONTINUED)

Adjustments to 2007 waterworks systems and equipment:

Waterworks systems and equipment, as previously reported	$595,726
Add:	
Revaluation of waterworks systems and equipment	910,131
Less:	
2007 Amortization expense	44,402
Net assets, as restated	$1,461,455

Adjustments to 2007 liabilities and net assets:

Total liabilities and net assets, as previously reported	$731,899
Add:	
Revaluation of waterworks systems and equipment	910,131
Less:	
2007 Amortization expense	44,402
Liabilities and net assets, as restated	$1,597,628

KEMP LAKE WATERWORKS DISTRICT
SCHEDULES OF ADMINISTRATION AND OPERATING EXPENDITURES

Year ended December 31	2008	2007
		Schedule A
Administration expenditures		
Bank charges	$ **239**	$ 251
Fees and licences	**749**	773
Miscellaneous	**105**	351
Office expenses and supplies	**1,833**	1,405
Postage	**732**	734
Professional fees	**7,750**	7,000
Rent	**1,320**	1,200
Secretary/accounting	**15,000**	10,200
Training	**2,561**	2,834
Trustees honoraria	**4,900**	4,550
	$ **35,189**	$ 29,298
		Schedule B
Operating expenditures		
Engineering costs	$ **188**	$ 7,875
Insurance	**8,545**	14,922
Lab testing	**2,939**	4,639
Labour - sublet/maintenance	**18,357**	15,795
Supplies	**18,457**	21,817
Utilities	**6,926**	6,153
Workers' Compensation	**327**	255
	$ **55,739**	$ 71,456

KEMP LAKE WATERWORKS DISTRICT
SCHEDULES TO THE FINANCIAL INFORMATION ACT
December 31, 2008

The following schedules have been prepared by management of the Kemp Lake Waterworks District in compliance with the requirements of the Financial Information Act, Regulation, and Directive.

These schedules have been reviewed and approved by the Board of Trustees.

1. SCHEDULE OF GUARANTEE AND INDEMNITY AGREEMENTS

None.

2. SCHEDULE OF REMUNERATION TO EMPLOYEES

		2008		2007
Assessor/Collector - D. Anderson	$	**15,000**	$	10,200
Trustee Honoraria - $1,200 each to J. Hemphill and R. Birch ($1,100 each in 2007); $2,500 to K. Brehart ($2,350 in 2007)		**4,900**		4,550
	$	**19,900**	$	14,750

3. SCHEDULE OF EXPENSES PAID ON BEHALF OF EMPLOYEES

None.

4. SCHEDULE OF PAYMENTS FOR GOODS AND SERVICES

		2008		2007
a) Amounts exceeding $10,000, in aggregate, to any one supplier:				
Jarvis Seabrook	$	**21,680**	$	19,723
Van Isle Water Services Ltd.		**9,005**		12,988
b) Consolidated total for all other suppliers		**53,572**		60,841
c) Remuneration to employees (Schedule 2)		**19,900**		14,750
Total expenses per Schedule A and Schedule B plus capital expenditures and cost of capital asset revaluation	$	**104,157**	$	108,302

Approved:_____

APPENDIX E – 2007 GENIVAR WATER SERVICING COST REPORT

bullock baur

Bullock Baur Associates Ltd.
202 – 4430 Chatterton Way
Victoria BC Canada V8X 5J2
phone: 250.386.2521
fax: 250.381.1865
email: office@bullockbaur.ca
www.bullockbaur.ca

civil engineering
community infrastructure
project management

File: 1602-01
October 23, 2007

Kemp Lake Waterworks District
PO Box 465
Sooke BC V0S 1N0
Via mail

Attention: Kevan Brehart
Re: CRD Water Connection

Dear Sir:

INTRODUCTION

In the study commissioned by the Kemp Lake Waterworks District, entitled "Risk Assessment of Kemp Lake as a Raw Water Source" by Giles Environmental Engineering, one of the recommendations included undertaking a study to develop a source of water alternative to Kemp Lake. One such source is the Capital Regional District (CRD) water system in Sooke. This report serves to present preliminary findings on that alternative.

The Kemp Lake Waterworks District (KLWD) is located approximately 2 km west of Sooke, B.C. on Vancouver Island. The KLWD uses raw water from Kemp Lake to provide potable water to approximately 1,000 residents. Water is chlorinated at the source and is pumped in a common supply/distribution main to two storage reservoirs, located near opposite ends of the district. The reservoirs control operation of the supply pumps through remote radio telemetry. They are sized to provide emergency and fire storage, and provide balance in the fluctuations of daily demands.

The KLWD is outside of the CRD Urban Containment Boundary, and so an application must be made to CRD Water for inclusion, before water service is considered. At a February 12, 2007, meeting with CRD Water, Peter Malone, Senior Manager of Engineering and Planning, stated that the CRD would consider the application on the merit of health concerns. Also discussed at that meeting:

- The KLWD would be responsible for the costs of upgrading required to support the connection to the CRD water system. In a subsequent email to

Bullock Baur (30 April, 2007), the CRD indicated that there would be a requirement to upgrade a mainline on Sooke River Road to 500 mm diameter, at an estimated cost of $60,000 to the KLWD.

- The cost of a meter and backflow prevention assembly at the connection to the CRD water system would be the responsibility of the KLWD. In a subsequent email to Bullock Baur (21 Feb, 2007), the CRD estimated the cost of a 150 mm installation at $35,000.
- Connection charges and usage rates to the KLWD will not be different from other retail rate consumers.
- Re-chlorination at the CRD connection will not likely be required.

Design and construction of new works will be undertaken to current CRD water specifications, under the guidance of a professional engineer.

CONNECTION TO THE CRD WATER SYSTEM

West Coast Road stretches between Sooke and the KLWD, and the proposed pipeline to connect the two water systems would follow that route. West Coast Road is a two-lane highway within the CRD and under the jurisdiction of the Ministry of Transportation (MoT), who have requirements concerning the location and construction of municipal services within their right-of-way. Under normal circumstances MoT will not permit construction of a pipeline within the road prism, which is to say anywhere within the boundary between the ditches or embankments on either side of the road. The topography in this area, however, is not conducive to this, as large cut and fill slopes, much in rock, would otherwise require the pipe to significantly deviate in both vertical and horizontal alignment from the road. MoT has allowed the construction of watermain in the shoulder of the road in past replacement and extensions of the water system for the KLWD, and as such the same allowance would be requested for the extension of the system to connect with the CRD system in Sooke.

The connection to the CRD system would be in Sooke at the corner of Ella Road and West Coast Road, as shown on the attached Figure 1. The new pipe would be located on the south side of West Coast Road for the entire length to the existing connection to the KLWD system, also on the south side of the road. It is not anticipated that the pipe would need to cross the road. A GPS survey was undertaken between the two connection points, and although the accuracy of the survey is not high-order, it is sufficient to determine generally the length and profile of the route. This survey found:

- There will be up to five high points (crests) in the pipeline, each requiring an air release valve.

- Bedrock was not predominant as much of the pipe route will be along the downhill, or fill, side of the road.
- Six crossings of driveways will be required.
- Elevations ranged from a low of 1 m to a high of 43 m.
- The width of the gravel shoulder on the south side of the road ranged 3 m to 4 m.

The KLWD water system extends to the east boundary of the District, with the final 500 m being sub-standard 65 mm diameter water pipe that will need to be replaced with 200 mm pipe.

WATER SUPPLY

A study undertaken by Bullock Baur Associates for the KLWD in March 2000 ("Report on Future Improvements to Water System Infrastructure") has calculated water usage rates in the district and makes an estimation of future water consumption demands. That report, together with current (2005/2006) consumption records provided by the District, was used to estimate the required peak-hour domestic demand required from the CRD connection, at 900 L/m.

Information obtained from the CRD water department shows that the static water pressure at the Ella Road connection point, is 462 kPa (67 psi), resulting in a hydraulic grade of approximately 91.2 m at that location. The operating pressure at that same location, with a 900 L/m flow to the KLWD and with the CRD system at maximum day demand, would be about 414 kPa (60 psi), or a hydraulic grade of about 86.0 m.

The KLWD water system was modeled on a computer simulation program to analyse the effect of connecting to the CRD mainline in Sooke. Analysis was performed under two scenarios:

1. Connect to the CRD, and remove the Carpenter Road reservoir.
2. Connect to the CRD, and maintain the Carpenter Road reservoir.

It is important to note that the computer model was prepared using preliminary information with respect to elevations between the CRD system in Sooke, and the KLWD system. Some deviation to these elevations should be expected during detailed design. These deviations may result in minor changes to pressures and flows as output by the model.

With the CRD connection and removing the Carpenter Road reservoir, results indicate that the pressures in the KLWD system remain relatively unchanged from existing pressures (obtained from the Carpenter Road reservoir). However, when

fire flow demands were introduced, it was found that the CRD supply by itself could not provide adequate flows without upgrades to the existing 150 mm diameter watermain on West Coast Road and increasing the diameter of the new connecting pipeline. Without the reservoir and without upgrades to the existing mainlines, fire flows could be obtained using a fire pump. The capital cost of a fire pump installation can be expected to start at $175,000, plus land acquisition costs, if needed. Annual operation and maintenance costs are significant for a fire pump system due to strict requirements for regular maintenance and testing.

A relatively new (1994) storage reservoir is already in place and is operating properly. Keeping the reservoir as a supply for fire suppression water is preferable to dependence on a fire pump. However, if the reservoir is to remain in service together with the CRD connection, proper circulation of fresh water through the reservoir must be maintained. An open connection to the CRD system may result in most of the domestic flows being provided from that source, and so the supply of fresh water to the tank may be limited. One remedy for this situation is to install a booster pump on West Coast Road, and pump fresh water in a dedicated pipe up to the reservoir. The cost of a booster pumpstation and 1.5 km of dedicated pipeline is estimated at $580,000, plus land acquisition costs, if needed.

Alternate to a booster pump is provision of a solenoid control valve at the CRD connection. The valve would, in essence, replace the existing pump at the Kemp Lake source. When the water level in the reservoir drops to a specified level, a signal would be sent to open the valve, and thus the system is replenished. When the reservoir tank has been filled, the valve would close and service from the tank would be restored. During high-flow demands such as fire flow, water would be supplied from both the reservoir and the CRD connection. The control valve could be operated via a radio telemetry signal, such as is currently being used between the reservoir and the Chubb Road pumps. Testing would be required to prove that a signal can be received at the valve location. If site constraints prevent signal reception, then a signal cable would need to be installed between the two locations. The control valve could be installed in the meter chamber. Power will be required to the valve, as well as a PLC controller to relay the signal from the reservoir.

COST ESTIMATE

A cost estimate has been prepared and is attached. Assumptions and conditions include:

- Does not include land acquisition costs.

- Does not include taxes.
- Rock excavation volumes are estimated.
- Assumes radio signal continuity between the reservoir and the control valve, and that the existing telemetry equipment can be reused for this application. Alternately, the cost to install a signal cable is estimated at $75,000.
- Cost of the meter chamber estimated by the CRD.
- Does not include costs to decommission/dismantle existing Chubb Road pump station.
- No allowance has been made for the supply and installation of SCADA equipment, as determination has not been made that this equipment will be required.

LIFE CYCLE COST ANALYSIS

As a part of the Kemp Lake Waterworks District's ongoing investigations on water quality and alternate sources of potable water, a preliminary study on water treatment alternatives was reported to the District in March, 2005. That report briefly described three treatment options:

- Slow sand filter.
- Pressure clarifier.
- Activated carbon filter.

An analysis can be performed on the above three treatment options, together with the option of having water supplied by the Capital Regional District system, to evaluate the relative long-term costs of respective options. This analysis, called a life cycle cost analysis can be used as a comparative tool for competing options. The analysis, considers capital costs, replacement costs, and operation and maintenance costs throughout the life of each option, and then predicts a total cost over a given life span, for each option considered. The results of the life cycle cost analysis is attached to the end of this report. Results indicate the following order of present worth:

1. Activated carbon $917,000
2. Pressure clarifier $967,200
3. CRD connection $1,206,500
4. Slow sand filter $1,672,900

In preparing the cost analysis, inflation was not considered over the two years since the costs of water treatment options were obtained. The results show that the total cost for the activated carbon option is 30% less than the option to connect to the CRD system, although against the same CRD connection option, the operation and maintenance costs are nearly $740,000 higher for the activated carbon. The comparatively high total cost of the CRD connection option is driven largely by the high capital cost, whereas the low cost of the activated carbon option is brought by a comparatively low capital cost.

CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are offered as a result of our findings:

- To connect to the CRD system, the KLWD will need to apply for, and be included in, the CRD Urban Containment Boundary. The approval would be considered on the basis of health concerns.
- Connection to the CRD Water system in Sooke will entail the construction of approximately 2,000 m of watermain along West Coast Road. Cost of all construction, including payments and contributions to the CRD, will be the responsibility of the KLWD.
- Pending verification at the detailed design stage, it appears that the CRD system can supply nearly the same water pressures to the KLWD system as the Carpenter Road reservoir currently provides.
- Without the Carpenter Road reservoir remaining in service, the connecting mainline to the CRD system will need to be increased in diameter from 200 mm to 250 mm, and some existing mainlines in the KLWD system will require upgrading.
- The Carpenter Road reservoir should remain in service to provide redundancy and fire suppression storage. A solenoid control valve can control the flow of water from the CRD service and will provide for circulation of fresh water to the reservoir.
- The estimated cost of connecting to the CRD system while maintaining the Carpenter Road reservoir in service is $997,000, plus taxes.
- Life cycle cost (LCC) analysis shows that the lowest LCC of the options considered is that for activated carbon filtration, although that same option has by a significant margin the highest operation and maintenance (O&M) costs. The highest capital cost and the lowest O&M costs are with the CRD connection option.

If the decision is to proceed with this project, detailed survey should be first undertaken to verify distances and elevations between the proposed location of the connection at Ella Road and the Carpenter Road reservoir. This is to ensure that the available pressures in the CRD Water system are sufficient to deliver water to the elevation at the reservoir.

If you have any questions or require additional information, please do not hesitate to call.

Sincerely,

bullock baur associates ltd

per H.J. Verstraaten, Eng.L., A.Sc.T.

jlb\1602-01\oct2307.hjv.ltr.brehart
encl.

Association of Professional Engineers and Geoscientists of the Province of British Columbia
H. J. P. VERSTRAATEN
ENGINEERING LICENSEE
Limited Licence
125381
OCT 26 2007

The Limited Licence is certified by the Association of Professional Engineers and Geoscientists of British Columbia and contains the following limitations:

1. The detailed design of urban and rural roads, potable water distribution systems, sanitary sewer collection systems, and stormwater management systems, all in accordance with standard design criteria commonly prescribed in typical municipal subdivision control bylaws, in accordance with standard municipal requirements for on-site development, or similar standard design requirements for on-site development, or similar standard design requirements issued by the approving authority.
2. Conceptual design and performance requirements for sanitary pumpstations, and small (less than 5,000 gpd) on-site package type treatment facilities, as necessary for the provision of detailed design drawings and specifications typically provided by the appropriate equipment suppliers, all in accordance with standard municipal requirements.
3. Issuance of technical specifications and contract documents as necessary for the tendering and construction of the above described infrastructure.
4. Administration of construction contracts for the above described infrastructure, including monitoring of construction for adherence to the contract documents, certification and payment for the work performed, and certification of the Record Drawings.
5. All work undertaken shall be strictly within the civil municipal discipline and shall be limited to the provision of municipal type infrastructure designed and constructed in accordance with standard municipal requirements.

bullock baur **preliminary cost estimate**

Kemp Lake Waterworks District
Kemp Lake/CRD Water connection

File No.: 1602-01
Date: Oct. 23, 2007

Item	*Description*	*Quantity*	*Unit*	*Rate*	*Amount*
1.0	**general**				
	Trench Rock	200	m^3	150	$ 30,000
			Subtotal:		**$ 30,000**
2.0	**water system**				
	200mm C900 PVC - New	2,000	lm	200	$ 400,000
	200mm C900 PVC - Replace 65mm	500	lm	250	$ 125,000
	200mm Gate valve	6	ea	2,500	15,000
	Tie-ins at each end	2	ea	5,000	10,000
	Air release valve (complete)	5	ea	2,000	10,000
	Meter, backflow preventer & vault	1	LS	50,000	50,000
	Flow control valve, complete	1	LS	15,000	15,000
	Telemetry reconfiguration	1	LS	5,000	5,000
			Subtotal:		**$ 630,000**
3.0	**storm drainage**				
	Shallow culvert crossing repair	6	ea	2,000	$ 12,000
			Subtotal:		**$ 12,000**
4.0	**road works**				
	Gravel shoulder reinstatement	4000	sq m	5	$ 20,000
	Asphalt patching	500	sq m	50	$ 25,000
	Reinstate asphalt driveway crossing	4	ea	1,000	$ 4,000
			Subtotal:		**$ 49,000**

bullock baur **preliminary cost estimate**

Kemp Lake Waterworks District
Kemp Lake/CRD Water connection

File No.: 1602-01
Date: Oct. 23, 2007

project cost summary

1.0	**general**		$	30,000
2.0	**water system**			630,000
3.0	**storm drainage**			12,000
4.0	**road works**			49,000
	Construction Total		**$**	**721,000**
	Engineering & Contingencies	30%	$	216,000
	CRD upgrade charges		$	60,000
	Total Project Costs		***$***	***997,000***

This cost estimate is provided with limited site knowledge and is intended as a magnitude-of-cost only.
Assumptions have been made for pipe size and rock excavation volume.
Assumes that radio telemetry signals can be exchanged between the control valve and the Carpenter road reservoir.
Does not include land acquisition costs, if applicable.
Costs do not include taxes.
Does not include the cost of SCADA equipment

bullock baur **life cycle cost analysis**

Kemp Lake Water Works
CRD Water Connection

File No.: 1602-01
Prepared By: JCS
Date: Oct 2, 2007

Estimated Life of Works		
Pipe Works	50	years
Treatment Plant, Telemetry	25	years
Pumps	12.5	years
Building	50	years

Life Cycle Discount Rate	**5.0%**

capital costs

Item		*Option 1*	*Option 2*	*Option 3*	*Option 4*
Pipe Works		$ 997,000	$ 100,000	$ -	$ -
Treatment Plant, Telemetry		5,000	855,000	275,000	90,000
Pumps			5,000	10,000	10,000
Building				10,000	10,000
Contingency	10%	100,200	96,000	29,500	11,000
Engineering & Admin	10%	100,200	96,000	29,500	11,000
Total Initial Cost		**$ 1,202,400**	**$ 1,152,000**	**$ 354,000**	**$ 132,000**

replacement costs ***(present worth)***

Item	*year*	*Option 1**	*Option 2*	*Option 3*	*Option 4*
Treatment Plant, Telemetry	25	400	303,000	97,400	31,900
Pumps	12.5	-	3,300	6,500	6,500
	25	-	1,800	3,500	3,500
	37.5	-	1,000	1,900	1,900
Total Replacement Costs *(present worth)*		**$ 400**	**$ 309,100**	**$ 109,300**	**$ 43,800**

* assumes replacement of 25% of the initial value at 25 years

annual O&M costs

Item	*Option 1*	*Option 2*	*Option 3*	*Option 4*
Pipe Works	$ -	$ -	$ -	$ -
Treatment Plant, Telemetry	-	10,000	25,000	38,000
Pumps	-	1,000	1,500	1,500
Building	-	100	100	100
Power Consumption	200	500	1,000	1,000
Total Annual Costs *(Annual Worth)*	***$ 200***	**$ 11,600**	**$ 27,600**	**$ 40,600**
Total Annual Costs *(Present Worth)*	**$ 3,700**	**$ 211,800**	**$ 503,900**	**$ 741,200**

Note: O&M Costs based on 50 year service period. Includes costs for filter media.

Total Life Cycle Cost *(Present Worth)*	**$ 1,206,500**	**$ 1,672,900**	**$ 967,200**	**$ 917,000**

Note: CRD Water charges and revenue generated by the district through usage fees not factored into calculations. The "Total Life Cycle Costs" listed for each option is not intended to reflect the actual cost of each option, but rather are to be used for relative comparison purposes only.

Option 1: Connect to CRD Water system, eliminate existing chlorination system and pumps
Option 2: Slow sand filter, as outlined in Sept 28 2005 report
Option 3: Pressure clarifier (FilterCo), as outlined in Sept 28 2005 report
Option 4: Activated carbon (Everfilt), as outlined in Sept 28 2005 report

APPENDIX F – LONG TERM BORROWING PROCESS,

BC Ministry of Community, Sport and Cultural Development

Please feel free to ask questions or send me draft bylaws for review. Section 746 (1) (b) of the *Local Government Act* requires the trustees to adopt a bylaw in order to borrow. The Inspector generally will not register a borrowing bylaw unless there is evidence that the property owners have been consulted and the borrowing approved by them. The Ministry does not support the use of lines of credit by improvement district as the property owners can't be informed of the amount to be borrowed, the interest rate and term of the loan.

The process for long term capital borrowing for a water service is as follows.

1. Trustees send a letter to me to obtain pre-approval for the capital expenditure in which the desired form of elector assent is discussed. Please include information about the project including current cost estimates and construction budget, including contingency amounts. The budget should include the total estimated cost of the project and the sources of funds (reserves, borrowing) that will be used to finance the project. If the property owners have been informed about the project in the past, please include information about the extent of the consultation. Depending on the cost of the project and the amount of consultation that has occurred, I may request that the trustees seek public approval of the borrowing required to finance the project
2. Approach your financial institution. They will give you terms for construction borrowing. They should also be able to give you terms (interest rate, period) under which the construction borrowing may be put into long term debt
3. Seek approval the property owners, if required. Note that the approval should be for the specific terms offered by the financial institution and should be the same as those that will be specified in the borrowing bylaw (amount, rate, period). See the Improvement District Manual for information on the procedures for obtaining the approval of the property owners.
4. Trustees pass the borrowing bylaw and send three original signed and sealed bylaws to the Ministry for approval and registration. Two of the approved bylaws will be returned to you with the Inspector's approval. I've attached a borrowing bylaw template. The bylaw should authorize sufficient borrowing so that all construction borrowing outstanding may be rolled into long term debt when the project is complete. When the bylaw is submitted for approval by the Inspector, please include the results of the landowner consultation and the most recent engineering estimate of the cost of the project.
5. One of the registered bylaws is taken to the financial institution so the loan can be disbursed and the construction / purchase started.
6. The debt cost is added to the improvement district budget and thereby taxes or tolls levied by the improvement district.

The BC Investment Management Corporation (bcIMC), which manages the borrowing by improvement districts, imposed a change to sinking fund management rates. A new base charge would cost every improvement district $5,000 a year for a sinking fund debenture. This new charge is not in the best interests of most improvement districts that require long term financing. Long term borrowing for a fire service capital project continues to be provided by the Province of British Columbia. However, the fees associated with borrowing from the Province for water services are now so high that it is recommended that improvement districts seek financing from a financial institution.

The Ministry of Community, Sport and Cultural Development will now support improvement districts using their own financial institutions for their long term debt, as well as the short term debt that had always been available. I've attached a few documents for your information. First is a debt analysis for the terms you describe below. It can be manipulated to see how different amounts, interest rates and terms effect tax impact. If the financial institution for the district is not willing to extend long term debt, I've attached a list of contacts at the Royal Bank, who have set up a lending program for improvement districts. Last, I've attached a template borrowing bylaw that would need to be adopted in order to borrow.

RBC Public Sector Contacts for Local Improvement Districts in BC

Location	RBC Contact Details
Vancouver Island South	**Robert Brilhante** Senior Account Manager, Public Sector Commercial Financial Services Royal Bank of Canada 2nd Floor, 707 Fort Street, Victoria, B.C., V8W 3G3 Phone: 250-356-4518 | Fax: 250-356-4567 Email: robert.brilhante@rbc.com
Vancouver Island North & Central	**Dave Abercrombie** Senior Account Manager, Public Sector Commercial Financial Services Royal Bank of Canada 205 Commercial Street Nanaimo, B.C., V9R 5G8 Ph: (250) 741-3582 | Fax (250) 741-3521 Email: david.abercrombie@rbc.com
Central / North Okanagan	**Robin Smith** Senior Account Manager, Public Sector Commercial Financial Services Royal Bank of Canada 1665 Ellis Street - Suite 201 Kelowna, BC, V1Y 2B3 T. 250-868-4206 | F. 250-763-8558 Email: robin.smith@rbc.com
South Okanagan	**Leonard Bell** Senior Account Manager, Public Sector Commercial Financial Services Royal Bank of Canada 2nd Floor – 186 Victoria Street Kamloops, B.C., V2C 5R3 Phone: 250-371-1537 | Fax: 250-374-8466 Email: leonard.bell@rbc.cm
Southeast Interior	**Clayton Richert** Senior Account Manager Commercial Financial Services Royal Bank of Canada 2nd Floor – 2 Cranbrook Street Cranbrook, B.C., V1C 3P6 Phone: 250-426-0303 | Fax: 250-426-5704 Email: clayton.richert@rbc.com

Location	RBC Contact Details
BC North Prince George	**Kent Cooper** Senior Account Manager, Public Sector Commercial Financial Services Royal Bank of Canada 2nd Floor – 550 Victoria Street Prince George, B.C., V2L 2K1 Ph: 250-960-4531 | Fax 250-562-1171 Email: kent.cooper@rbc.com
BC North Terrace	**Malte Juergensen** Senior Account Manager, Public Sector 4640 Lakelse Avenue Terrace, B.C., V8G 1R2 Ph : (250) 635-8012 | Fax (250) 635-4625 Email: malte.juergensen@rbc.com
Fraser Valley	**Bev Poole** Senior Account Manager, Public Sector Commercial Financial Services Royal Bank of Canada 5455 152nd Street, Unit # 118 Surrey, B.C., V3S 5A5 Phone: 604-575-1680 | Fax: 604-575-1687 Email: bev.poole@rbc.com
Pemberton District	**Brian Steeves** Senior Account Manager, Public Sector Commercial Financial Services Royal Bank of Canada 2nd Floor - 1789 Lonsdale Avenue North Vancouver, B.C., V7M 2J6 Phone: 604-981-7809 | Fax: 604-981-7848 Email: brian.steeves@rbc.com