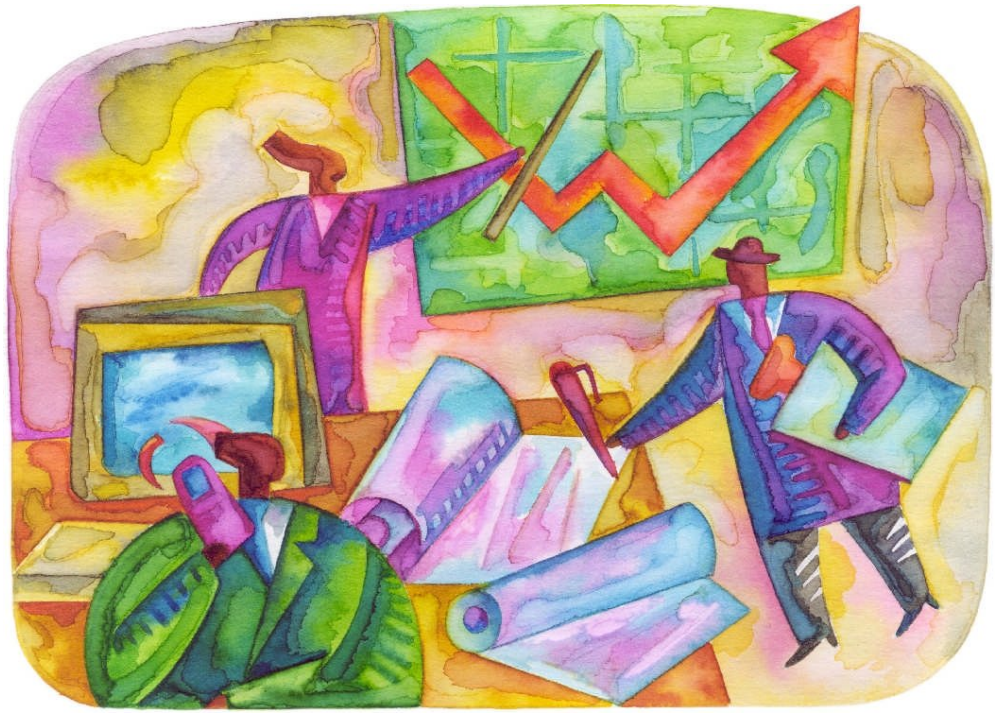
District of Lake Country

Water Quality Configuration Options - Shortlist

7 September 2010



Mould Engineering

WATER QUALITY CONFIGURATION OPTIONS - SHORTLIST
(WITH FILTRATION DEFERRAL)

CONCEPT	OPTION	OPTION TITLE	Primary Water Source	Secondary/ Backup Source	OPTION DESCRIPTION WITH FILTRATION DEFERRAL	CAPITAL COSTS PHASE 1 1 - 5 YRS	CAPITAL COSTS PHASE 2 6 - 10 YRS	CAPITAL COSTS PHASE 3 11 - 15 YRS	Capital Cost without Finance Considerations	Annual Operating Costs
DUAL DISTRIBUTION-INTERCONNECTED	1	Dual Distribution Systems for the Three Largest Water Systems. FIGURE 1	Okanagan & Kalamalka Lakes (Domestic)		DUAL DISTRIBUTION Systems for Beaver/Okanagan Lake WS, Oyama Lake WS & Kal Lake WS. Domestic water supplied from Okanagan and Kalamalka Lakes with systems interconnected. Dual disinfection at each source only. Irrigation water supplied from Beaver & Oyama Lakes. FILTRATION DEFERRAL REQUIRED AT OKANAGAN & KALAMALKA LAKES	$14,800,000	$27,000,000	$11,200,000	$53,000,000	$530,000
SINGLE DISTRIBUTION-INTERCONNECTED	2	Single Distribution Systems for the Three Largest Water Systems. FIGURE 2	Beaver, Kalamalka, Oyama & Okanagan Lakes	Okanagan & Kalamalka Lakes	SINGLE DISTRIBUTION Systems for Beaver/Okanagan Lake WS, Oyama Lake WS & Kal Lake WS. Domestic and Irrigation water supplied from Beaver, Kalamalka, Oyama and Okanagan Lakes with Beaver/Okanagan Lake WS and Oyama Lake WS interconnected. Kal Lake System remains separate. Large treatment plant at Eldorado Reservoir. Oyama Lake discharge diverted to Eldorado Reservoir. Backup water supplied from Okanagan and Kalamalka Lakes. Kal and Okanagan Lake systems operate similar to existing. FILTRATION DEFERRAL REQUIRED AT OKANAGAN & KALAMALKA LAKES	$25,300,000	$12,700,000	$10,000,000	$48,000,000	$540,000
SINGLE DISTRIBUTION-NOT INTERCONNECTED	3	Single Distribution System for Beaver/Okanagan Lake WS FIGURE 3	Beaver & Okanagan Lakes	Okanagan Lake	SINGLE DISTRIBUTION Systems for Beaver/Okanagan Lake WS. Domestic and Irrigation water supplied from Beaver and Okanagan Lake. Treatment plant at Eldorado Reservoir. Backup water supplied from Okanagan Lake. No interconnection between Beaver/Okanagan Lake WS and Oyama Lake / Kal Lake WS	$22,200,000	$10,300,000	$12,400,000	$45,000,000	$540,000
	WITH	Single Distribution Systems for Oyama Lake WS & Kal Lake WS FIGURE 3	Oyama & Kalamalka Lakes	Kalamalka Lake	SINGLE DISTRIBUTION Systems for Oyama Lake WS & Kal Lake WS. Water supplied from Oyama and Kalamalka Lake. Treatment plant at Oyama Creek intake. Backup water supplied from Kalamalka Lake.					
SINGLE/DUAL DISTRIBUTION-INTERCONNECTED	4	Single Distribution System for Beaver/Okanagan Lake WS FIGURE 4	Beaver & Okanagan Lakes	Okanagan Lake	SINGLE DISTRIBUTION Systems for Beaver/Okanagan Lake WS. Domestic and Irrigation water supplied from Beaver and Okanagan Lake with backup water from Okanagan Lake. Treatment Plant at Eldorado Reservoir.	$23,200,000	$18,500,000	$13,500,000	$55,200,000	$530,000
	WITH	Dual Distribution System for Oyama Lake WS & Kal Lake WS FIGURE 4	Beaver Lake	Okanagan Lake	DUAL DISTRIBUTION Systems for Oyama Lake WS & Kal Lake WS. Domestic system interconnected with Beaver/Okanagan Lake WS. Domestic water supplied from Beaver Lake. Backup water from Kalamalka Lake. Irrigation water supplied from Oyama Lake.					

WATER QUALITY CONFIGURATION OPTIONS - SHORTLIST
(WITHOUT FILTRATION DEFERRAL)

CONCEPT	OPTION	OPTION TITLE	Primary Water Source	Secondary/ Backup Source	OPTION DESCRIPTION WITHOUT FILTRATION DEFERRAL	CAPITAL COSTS PHASE 4 (Future)	Total Capital Cost without Finance Considerations	Additional Annual Operating Costs
DUAL DISTRIBUTION-INTERCONNECTED	1	Dual Distribution Systems for the Three Largest Water Systems. FIGURE 1	Okanagan & Kalamalka Lakes (Domestic)		Filtration plant added at Okanagan Lake Reservoir site and Kalamalka Lake Reservoir site. Irrigation water supplied from Beaver & Oyama Lakes	$25,000,000	$78,000,000	$270,000
SINGLE DISTRIBUTION-INTERCONNECTED	2	Single Distribution Systems for the Three Largest Water Systems. FIGURE 2	Beaver, Kalamalka, Oyama & Okanagan Lakes	Okanagan & Kalamalka Lakes	Okanagan Lake water pumped to Eldorado Reservoir; expansion of treatment plant at Eldorado Reservoir. Filtration plant added at Kalamalka Lake Pump Station site.	$21,000,000	$69,000,000	$170,000
SINGLE DISTRIBUTION-NOT INTERCONNECTED	3	Single Distribution System for Beaver/Okanagan Lake WS. FIGURE 3	Beaver & Okanagan Lakes	Okanagan Lake	Okanagan Lake water pumped to Eldorado Reservoir; expansion of treatment plant at Eldorado Reservoir.	$16,000,000	$61,000,000	$220,000
	WITH	Single Distribution Systems for Oyama Lake WS & Kal Lake WS FIGURE 3	Kalamalka & Oyama Lakes	Kalamalka Lake	Kalamalka Lake water pumped to Oyama Creek Treament Plant; expansion of treatment plant at Oyama Creek.			
SINGLE/DUAL DISTRIBUTION-INTERCONNECTED	4	Single Distribution System for Beaver/Okanagan Lake WS FIGURE 4	Beaver & Okanagan Lakes	Okanagan Lake	Okanagan Lake water pumped to Eldorado Reservoir; expansion of treatment plant at Eldorado Reservoir.	$11,000,000	$66,200,000	$140,000
	WITH	Dual Distribution System for Oyama Lake WS & Kal Lake WS FIGURE 4	Beaver Lake	Okanagan Lake	No future filtration is required as Kalamalka and Oyama Lake sources will be utilized for irrigation demand only.			

DISTRICT OF LAKE COUNTRY

WATER QUALITY CONFIGURATION OPTIONS – SHORTLIST
OPTION #1 - DUAL DISTRIBUTION, INTERCONNECTED

EXECUTIVE SUMMARY

OPTION SELECTION PROCESS

Option #1 was analyzed using the evaluation matrix and scored the lowest (51%) of the four 'Shortlist' options. The evaluation matrix consisted of 10 criteria each with an assigned 'weight' depending on the importance of the criteria. The weight was assigned to each criterion by the Water Advisory Committee. Mould Engineering, using a scale of 1 to 10, evaluated each option against the 10 criteria and calculated the results as a percentage. Option #1, Dual Distribution, involves the most drastic change to the DLC domestic water systems and it is also estimated to be the most expensive. However, Option #1 provides the opportunity to compare costs, social and economic, as well as evaluate the impact an installation of this magnitude would have on the community.

OPTION DESCRIPTION

Option #1 is based on the concept of a separate distribution system for domestic use utilizing the two best water sources in the valley, namely Okanagan Lake and Kalamalka Lake. Domestic use is described as in-house and yard watering, which matches the use of the existing domestic services within the District. This option includes an interconnection between the Beaver/Okanagan Lake System and the Oyama Lake System. The connection provides each system with a backup domestic water supply, although only at a portion of their respective maximum daily demands.

Irrigation as well as some fire flow requirements will continue to be supplied from Beaver Lake & Oyama Lake through the existing distribution systems. However, considerable portions of the new domestic system will also be designed for fire flows as numerous areas will have no irrigation system (e.g.: Town Centre, The Lakes, etc.). If at some point the Okanagan and Kalamalka Lake sources are deemed not suitable for filtration deferral, a filtration facility will be required at each source. Two figures are attached that show the proposed system.

WATER SOURCES

All four water sources will continue to be utilized, Beaver and Oyama Lakes for irrigation purposes, and Okanagan and Kalamalka Lakes for domestic purposes. Additional capacity will be available within the irrigation systems once the domestic demand is transferred off. The Okanagan and Kalamalka Lake pump stations will both be utilized to near full capacity when meeting the domestic maximum day demand. Therefore, pump station upgrades will be required at each facility to provide backup pumping capacity. Further upgrades or new source facilities will be required to supply growth.

Option 1 does not have a backup water source for domestic purposes other than the interconnection between the systems.

COST ESTIMATE NOTES

The estimates are based on conceptual designs and should be viewed to be accurate within an order of magnitude of 25%.

Notes pertaining to the order of magnitude cost estimate that are common to all estimates are as follows:

1. *The Lakestone Reservoir and Booster station, shown as part of the Beaver/Okanagan Lake Water System, are assumed to be facilities that will be funded through development. Also, the Building Canada grant funded works shown within the Kalamalka and Oyama Lake Systems has been excluded from the capital cost estimates.*

2. *No allowance has been made for incorporating any other utilities (e.g. Ponderosa, Lake Pine, Alto).*

3. *Long term system renewal and existing infrastructure improvements have not been considered in the estimate with the exception of some 100 mm diameter pipe and domestic services as noted below.*

4. *Cost of expanding the system to service existing properties or development has not been considered in this estimate.*

5. *No allowance has been made for the acquisition of real estate.*

6. *No allowance has been made for the installation of universal water meters.*

7. *No allowance has been made within the annual operating costs for renewal of the new distribution system.*

There are also specific conditions associated with the installation of a separate domestic distribution system, upon which the estimates are based.

- *This estimate includes only the cost of reconnecting existing domestic services to the new watermain. No allowance has been made for the complete renewal, including curb stops, of domestic water service connections (\$3 M)*
- *No allowance has been made for the connection of domestic services along the recently installed Okanagan Centre Rd East watermain and not transferred to the new pipe (\$350,000)*
- *No allowance has been made for the replacement of larger pipelines and hydrants in numerous areas currently serviced by 100 mm diameter pipelines and hydrants that do not meet minimum fire flows.*
- *New pressure reducing stations for all three water systems are only included where a new domestic watermain is installed.*
- *The capital cost of installing a complete duplicate water distribution system does not include replacing some of the existing distribution system or resurfacing the entire road width.*

CONSTRUCTION PHASES

This option has been divided into four phases. Ultra-violet disinfection will be installed at Okanagan Lake in Phase 1, which provides the dual disinfection required. The Ultra-violet disinfection system at Kalamalka Lake will be installed under the Building Canada Fund project, which is currently in the planning stages. The phasing approach assumes that deferral of filtration approval will be obtained at both lakes.

The first three phases each contain construction of a domestic distribution system. Oyama, the smallest of the three, will be in the 3rd phase because that system already provides high quality water to its users and will have dual disinfection at the source. The fourth phase is the future installation of filtration facilities at Okanagan Lake and Kalamalka Lake.

CAPITAL & OPERATING COST ESTIMATES

Below is a cost summary of the first 3 phases spread over a period of 15 years. The annual operating cost is estimated to be ***$530,000****.*

OPTION 1 - CONSTRUCTION PHASES 1 to 3

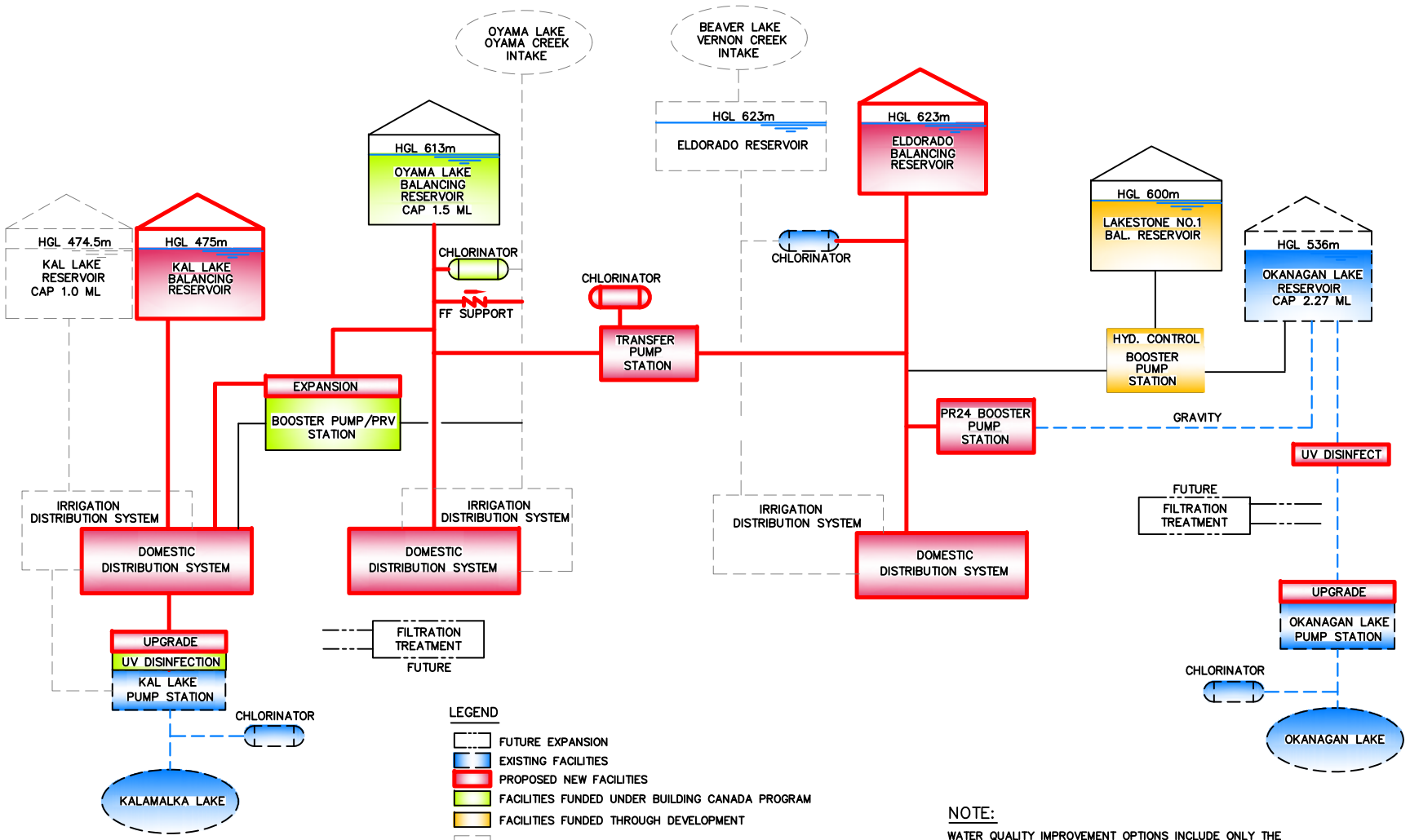
PHASE 1: (1 - 5 YRS)			
1	*UV Disinfection Facility at Okanagan Lake Pump Statio*	*$1,600,000*	
2	*Okanagan Lake Pump Station - Pump Upgrade*	*$900,000*	
3	*Dual Distribution System - Oyama Lake*	*$11,000,000*	
4	*Kalamalka Lake Pump Station Upgrade*	*$1,300,000*	
	Total Estimated Capital Cost - Phase 1		*$14,800,000*
PHASE 2: (6 - 10 YRS)			
1	*PR24 Booster Pump Station*	*$1,300,000*	
2	*Dual Distribution System - Beaver/Okanagan Lake WS*	*$23,000,000*	
3	*Eldorado Balancing Reservoir*	*$2,700,000*	
	Total Estimated Capital Cost - Phase 2		*$27,000,000*
PHASE 3: (11 - 15 YRS)			
1	*Transfer Pump Station & Chlorination Facility*	*$1,700,000*	
2	*Watermain from Beaver/Okanagan Lake WS to Transfe*	*$3,500,000*	
3	*Dual Distribution System - Kal Lake WS*	*$4,000,000*	
4	*Kalamalka Lake Balancing Reservoir*	*$2,000,000*	
	Total Estimated Capital Cost - Phase 3		*$11,200,000*
	Sub-Total Estimated Cost - Option 1, Phases 1 to 3 (excluding HST)		*$53,000,000*

Below is a cost summary for the fourth phase if filtration deferral is not approved and maintained. The annual operating cost is estimated to be ***$270,000****.*

OPTION 1 - CONSTRUCTION PHASE 4

PHASE 4: (FUTURE FILTRATION)		
1	*Filtration, Chlorination & Dual Disinfection @ Okanagan Lake (40 ML/da*	*$20,000,000*
2	*Filtration, Chlorination & Dual Disinfection @ Kalamalka Lake (7 ML/day)*	*$5,000,000*
	Sub-Total Estimated Cost - Option 1, Phase 4 (Future Filtration)	*$25,000,000*
	Total Estimated Cost - Option 1	*$78,000,000*

DUAL DISTRIBUTION SYSTEMS FOR THE THREE LARGEST WATER SYSTEMS



WATER SOURCE:

PRIMARY WATER SOURCE: OKANAGAN LAKE (DOMESTIC)
SECONDARY WATER SOURCE: KALAMALKA LAKE (DOMESTIC)

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DUAL DISTRIBUTION–INTERCONNECTED OPTION 1

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FIGURE 1

DISTRICT OF LAKE COUNTRY

OPTION 1–DUAL DISTRIBUTION, INTERCONNECTED

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LEGEND:

- EXISTING DOMESTIC WATER SYSTEM
- PROPOSED DOMESTIC WATER SYSTEM (DEVELOPER OR GRANT FUNDED)
- PROPOSED DOMESTIC WATER SYSTEM
- FUTURE WORKS

SCALE: NTS

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OKANAGAN LAKE

OKANAGAN LAKE PUMP STATION & CHLORINATOR

PUMP UPGRADE & UV DISINFECTION

FUTURE FILTRATION, UV & CHLORINATION

RESERVOIR & BOOSTER

JARDINES RD PUMP STATION 150 HP

LAKES LOWER RESERVOIR AND PUMP STATION 50hp ELEV. = 584m, 4000m³

LAKES UPPER RESERVOIR ELEV. = 641.5m, 1500m³

BOOSTER

INTERCONNECTION PIPELINE

RESERVOIR

TRANSFER PUMP STATION c/w CHLORINATOR

WOOD LAKE

FUTURE FILTRATION, UV & CHLORINATION

RESERVOIR

INTER-CONNECT PRV & METER CHAMBER TO BE REMOVED

PR STA 2 HGL = 496.1m TO BE REMOVED

KALAMALKA LAKE PUMP STATION & CHLORINATION

STATION UPGRADE & UV DISINFECTION

KALAMALKA LAKE

BOOSTER

CHLORINATOR TO BE REMOVED

RESERVOIR & CHLORINATOR

DISTRICT OF LAKE COUNTRY

WATER QUALITY CONFIGURATION OPTION – SHORTLIST
OPTION #2 - SINGLE DISTRIBUTION, INTERCONNECTED

EXECUTIVE SUMMARY

OPTION SELECTION PROCESS

Option #2 was analyzed using the evaluation matrix and tied for the highest score (62%) of the four 'Shortlist' options. The evaluation matrix consisted of 10 criteria each with an assigned 'weight' depending on the importance of the criteria. The weight was assigned to each criterion by the Water Advisory Committee. Mould Engineering, using a scale of 1 to 10, evaluated each option against the 10 criteria and calculated the results as a percentage. Option #2, Single Distribution, received some of the highest evaluations in the criteria of low capital cost, low social impact, low risk and reliability. The majority of the new facilities needed for this configuration can be phased in without interrupting existing services and most of the construction is outside populated areas.

OPTION DESCRIPTION

Option #2 consists of maintaining the single distribution pipelines for the three largest water systems. The principal water source is Beaver and Oyama Lakes, the latter of which will be diverted to Eldorado Reservoir via Clark Creek. The option includes a large full treatment facility at Eldorado Reservoir to treat maximum daily domestic and irrigation demands. This option includes a large interconnection to convey water from the Beaver/Okanagan Lake System to the Oyama Lake System. Kalamalka Lake Pump Station will continue to supply its current area.

If at some point the Okanagan and Kalamalka Lake sources are deemed not suitable for filtration deferral, a filtration facility will be required at Kalamalka Lake. Rather than also install a filtration facility at Okanagan Lake, this option includes pumping lake water through a dedicated mainline to an expanded treatment facility at Eldorado Reservoir. Two figures are attached that show the proposed system.

WATER SOURCES

All four water sources will continue to be utilized for both irrigation and domestic purposes. The Kalamalka and Okanagan Lake sources would continue to serve their respective areas. The treatment facilities at Eldorado reservoir will be sized to maximize the existing mainline gravity supply. Once the treatment facilities and interconnection works are operational, Oyama Lake water will be diverted via Clark Creek to Eldorado reservoir to supplement water supply for treatment.

COST ESTIMATE NOTES

The estimates are based on conceptual designs and should be viewed to be accurate within an order of magnitude of 25%.

Notes pertaining to the order of magnitude cost estimate that are common to all estimates are as follows:

1. *The Lakestone Reservoir and Booster station, shown as part of the Beaver/Okanagan Lake Water System, are assumed to be facilities that will be funded through development. Also, the Building Canada grant funded works shown within the Kalamalka and Oyama Lake Systems has been excluded from the capital cost estimates.*

2. *No allowance has been made for incorporating any other utilities (e.g. Ponderosa, Lake Pine, Alto).*

3. *Long term system renewal and existing infrastructure improvements have not been considered in the estimate.*

4. *Cost of expanding the system to service existing properties or development has not been considered in this estimate.*

5. *No allowance has been made for the acquisition of real estate.*

6. *No allowance has been made for the installation of universal water meters.*

7. *No allowance has been made within the annual operating costs for renewal of the existing distribution system.*

CONSTRUCTION PHASES

This option has been divided into four phases. Ultra-violet disinfection will be installed at Okanagan Lake in Phase 1, which provides the dual disinfection required. The Ultra-violet disinfection system at Kalamalka Lake will be installed under the Building Canada Fund project, which is currently in the planning stages. The first phase of construction also, the treatment facility at Eldorado Reservoir sized for approximately 70% of the water demand. The phasing approach assumes that deferral of filtration approval will be obtained at both Lakes.

During the second phase the transfer pump station and connecting pipeline to the Oyama Lake System will be constructed. Until then, residents of the Oyama and Kalamalka Lake areas will continue receiving water from their respective water systems. Once Oyama Lake water can be diverted to Eldorado Reservoir and the interconnecting pipeline has been constructed, the full-sized treatment facilities at Eldorado will completed in Phase 3.

The fourth phase is the future installation of filtration facilities at Kalamalka Lake and the expansion of the filtration facilities at Eldorado to accommodate the additional pumped capacity from Okanagan Lake. The future filtration is sized to accommodate one pump operating (230 lps) at Okanagan Lake Pump Station.

CAPITAL & OPERATING COST ESTIMATES

Below is a cost summary of the first 3 phases spread over a period of 15 years. The annual operating cost is estimated to be ***$540,000****.*

OPTION 2 - CONSTRUCTION PHASES 1 to 3

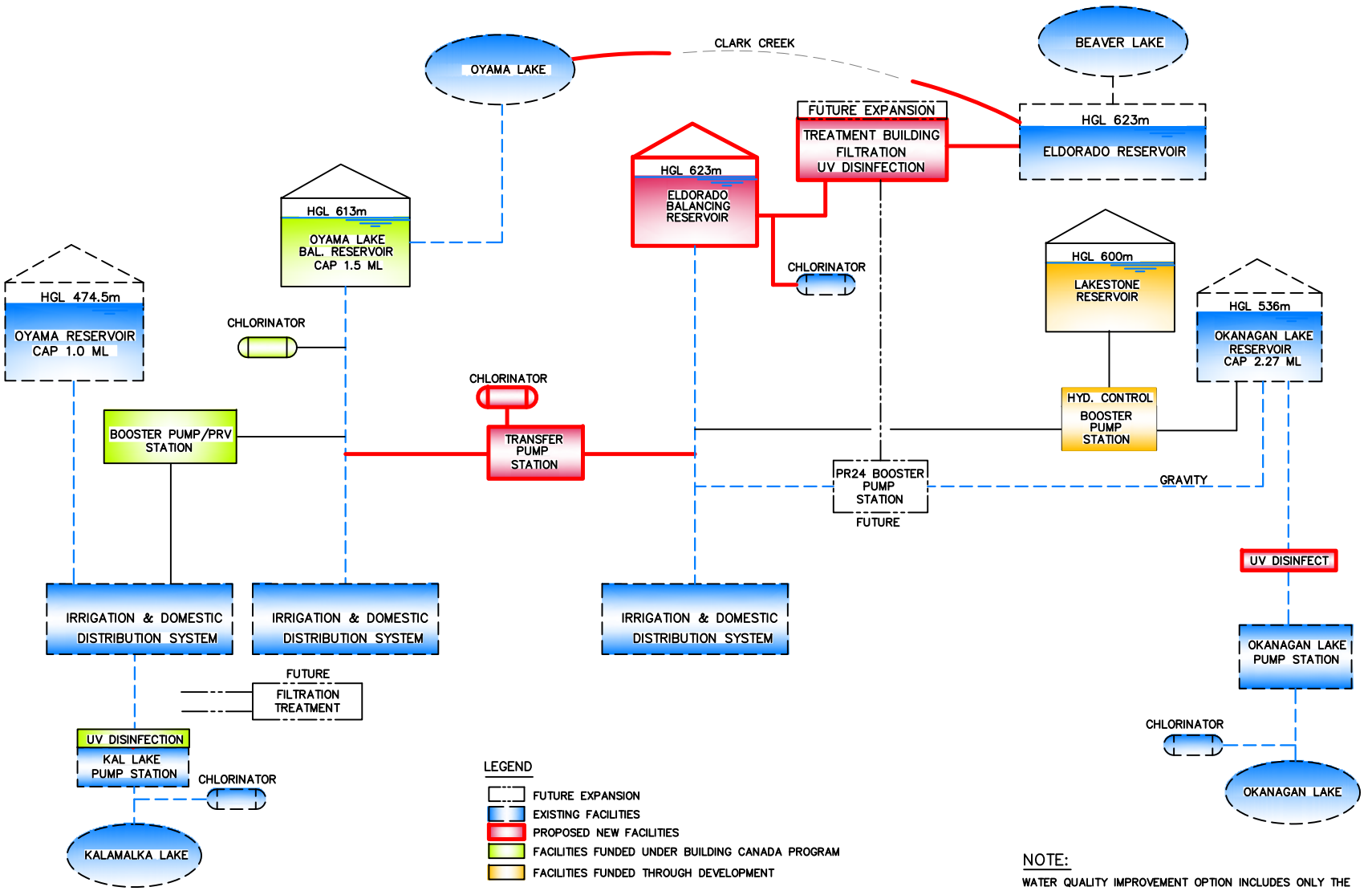
PHASE 1: (1 - 5 YRS)			
1	UV Disinfection Facility at Okanagan Lake Pump Station	$1,600,000	
2	Eldorado Balancing Reservoir	$2,700,000	
3	Treatment Facilities at Eldorado Res (Partial Demand, 60 ML/day)	$21,000,000	
			$25,300,000
PHASE 2: (6 - 10 YRS)			
1	Transfer Pump Station & Chlorination Facility	$1,700,000	
2	Watermain from Beaver/Okanagan Lake WS to Transfer Pump Station	$8,000,000	
3	Oyama Lake Diverted to Clark Creek & Eldorado Reservoir	$3,000,000	
			$12,700,000
PHASE 3: (11 - 15 YRS)			
1	Treatment Facilities at Eldorado Res (Remainder of Demand, 26 ML/da	$10,000,000	
			$10,000,000
	Sub-Total Estimated Cost - Option 2, Phases 1 to 3		**$48,000,000**

Below is a cost summary for the fourth phase if filtration deferral is not approved and maintained. The annual operating cost for Option 2 Construction Phase 4 is estimated to be ***$170,000****.*

OPTION 2 - CONSTRUCTION PHASE 4

PHASE 4: (FUTURE FILTRATION & MISC WATERMAINS)			
1	PR24 Booster Pump Station	$1,300,000	
2	Watermain from PR24 to Eldorado Reservoir	$1,400,000	
3	Filtration Expansion @ Eldorado Treatment Site (20 ML/dy)	$8,000,000	
4	Filtration, Chlorination & Dual Disinfection @ Kal Lake (16 ML/day)	$11,000,000	
5	Misc Piping Configurations	$1,000,000	
	Sub-Total Estimated Cost - Option 2, Phase 4 (Future Filtration)		**$21,000,000**
	Total Estimated Cost - Option 2		**$69,000,000**

SINGLE DISTRIBUTION SYSTEMS FOR THE THREE LARGEST WATER DISTRIBUTION SYSTEMS



WATER SOURCE:

PRIMARY WATER SOURCE: BEAVER LAKE
& OKANAGAN LAKE
SECONDARY WATER SOURCE: KALAMALKA LAKE
BACKUP WATER SOURCES: KALAMALKA LAKE
& OKANAGAN LAKE

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DISTRICT OF LAKE COUNTRY

SINGLE DISTRIBUTION – INTERCONNECTED
OPTION 2

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FIGURE 2

DISTRICT OF LAKE COUNTRY

OPTION 2–SINGLE DISTRIBUTION, INTERCONNECTED

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LEGEND:

- EXISTING DOMESTIC WATER SYSTEM
- PROPOSED DOMESTIC WATER SYSTEM (DEVELOPER OR GRANT FUNDED)
- PROPOSED DOMESTIC WATER SYSTEM
- FUTURE WORKS

SCALE: NTS

AUG. 2010

OKANAGAN LAKE PUMP STATION & CHLORINATOR

UV DISINFECTION

OKANAGAN LAKE

RESERVOIR & BOOSTER

JARDINES RD PUMP STATION 150 HP

LAKES LOWER RESERVOIR AND PUMP STATION 50hp ELEV. = 584m, 4000m³

LAKES UPPER RESERVOIR ELEV. = 641.5m, 1500m³

BOOSTER

INTERCONNECTION PIPELINE

WOOD LAKE

TRANSFER PUMP STATION c/w CHLORINATOR

INTER–CONNECT PRV & METER CHAMBER TO BE REMOVED

PR STA 2 HGL = 496.1m TO BE REMOVED

UV DISINFECTION & FUTURE FILTRATION

KALAMALKA LAKE

RESERVOIR

WATER TREATMENT & DUAL DISINFECTION FACILITY FUTURE FILTRATION EXPANSION

CLARK CREEK DAM & OUTLET WORKS

EXISTING DAM, SPILLWAY & OUTLET WORKS MODIFY & MAINTAIN

CLARK CREEK

OYAMA LAKE

BOOSTER

CHLORINATOR TO BE REMOVED

PIPELINE

INTAKE

CLARK CREEK

RESERVOIR & CHLORINATOR

DISTRICT OF LAKE COUNTRY

WATER QUALITY CONFIGURATIONS – SHORTLIST
OPTION #3 - SINGLE DISTRIBUTION, NOT INTERCONNECTED

EXECUTIVE SUMMARY

OPTION SELECTION PROCESS

Option #3 was analyzed using the evaluation matrix and scored marginally higher than Option #1 (52%). The evaluation matrix consisted of 10 criteria each with an assigned 'weight' depending on the importance of the criteria. The weight was assigned to each criterion by the Water Advisory Committee. Mould Engineering, using a scale of 1 to 10, evaluated each option against the 10 criteria and calculated the results as a percentage. Option #3 was not included on Shortlist #1 because of the perception that two treatment plants will be too costly to construct, operate and maintain. It was only decided to include this option in the final shortlist to provide the opportunity to analyze the use of two smaller treatment plants. As well, this is the only option that does not include a long interconnection pipeline between the two principal water systems.

OPTION DESCRIPTION

Option #3 is similar to Option #2 in that single distribution pipelines are maintained for the three largest water systems. However, there is no long pipeline interconnect, but rather a second treatment facility on the Oyama Lake source. This option includes full treatment facilities for the Beaver/Okanagan Lakes water system at Eldorado Reservoir. In the future Okanagan Lake water will be pumped directly from the Okanagan Lake Reservoir by a new booster pump station and dedicated pipeline. This concept avoids having to install future filtration facilities at Okanagan Lake.

As mentioned, a new treatment facility will be installed at Oyama Creek intake to supply treated water to the Oyama Lake single distribution system. If at some point the Kalamalka Lake source is deemed not suitable for filtration deferral, a filtration facility will be required at the Oyama Creek Intake. This option includes pumping Kalamalka Lake water through a dedicated mainline to an expanded treatment facility at Oyama Intake facility.

Two figures are attached that show the proposed system.

WATER SOURCES

All four water sources will continue to be utilized for both irrigation and domestic purposes. The water treatment facility at Eldorado will treat primarily Beaver Lake water for the Beaver/Okanagan Lake WS. If filtration deferral is not acceptable, Okanagan Lake water will be pumped to the Eldorado treatment facility to blend with Beaver Lake water. No future filtration will be required at Okanagan Lake.

Similarly, Oyama Lake water will be the primary source of treated water for the Oyama Lake System. If filtration deferral is not acceptable, Kalamalka Lake water will be pumped to the treatment facilities to blend with Oyama Lake water.

COST ESTIMATE NOTES

The estimates are based on conceptual designs and should be viewed to be accurate within an order of magnitude of 25%.

Notes pertaining to the order of magnitude cost estimate that are common to all estimates are as follows:

1. *The Lakestone Reservoir and Booster station, shown as part of the Beaver/Okanagan Lake Water System, are assumed to be facilities that will be funded through development. Also, the Building Canada grant funded works shown within the Kalamalka and Oyama Lake Systems has been excluded from the capital cost estimates.*

2. *No allowance has been made for incorporating any other utilities (e.g. Ponderosa, Lake Pine, Alto).*

3. *Long term system renewal and existing infrastructure improvements have not been considered in the estimate.*

4. *Cost of expanding the system to service existing properties or development has not been considered in this estimate.*

5. *No allowance has been made for the acquisition of real estate.*

6. *No allowance has been made for the installation of universal water meters.*

7. *No allowance has been made within the annual operating costs for renewal of the existing distribution system.*

CONSTRUCTION PHASES

This option has been divided into four phases. Ultra-violet disinfection will be installed at Okanagan Lake in Phase 1, which provides the dual disinfection required. The Ultra-violet disinfection system at Kalamalka Lake will be installed under the Building Canada Fund project, which is currently in the planning stages. The phasing approach assumes that deferral of filtration approval will be obtained at Okanagan Lake and Kalamalka Lake.

The first three phases each contain a treatment facility. Oyama/Kal Lake will be in the 3rd phase because that system already provides high quality water, improved under the Canada Building Fund, to its users and will have dual disinfection at the source.

The fourth phase is the future expansion of the filtration facilities at both treatment plants to accommodate the additional capacities from Okanagan Lake and Kalamalka Lake complete with booster pumps and dedicated piplines.

CAPITAL & OPERATING COST ESTIMATES

Below is a cost summary of the first 3 phases spread over a period of 15 years. The annual operating cost is estimated to be ***$540,000****.*

OPTION 3 - CONSTRUCTION PHASES 1 to 3

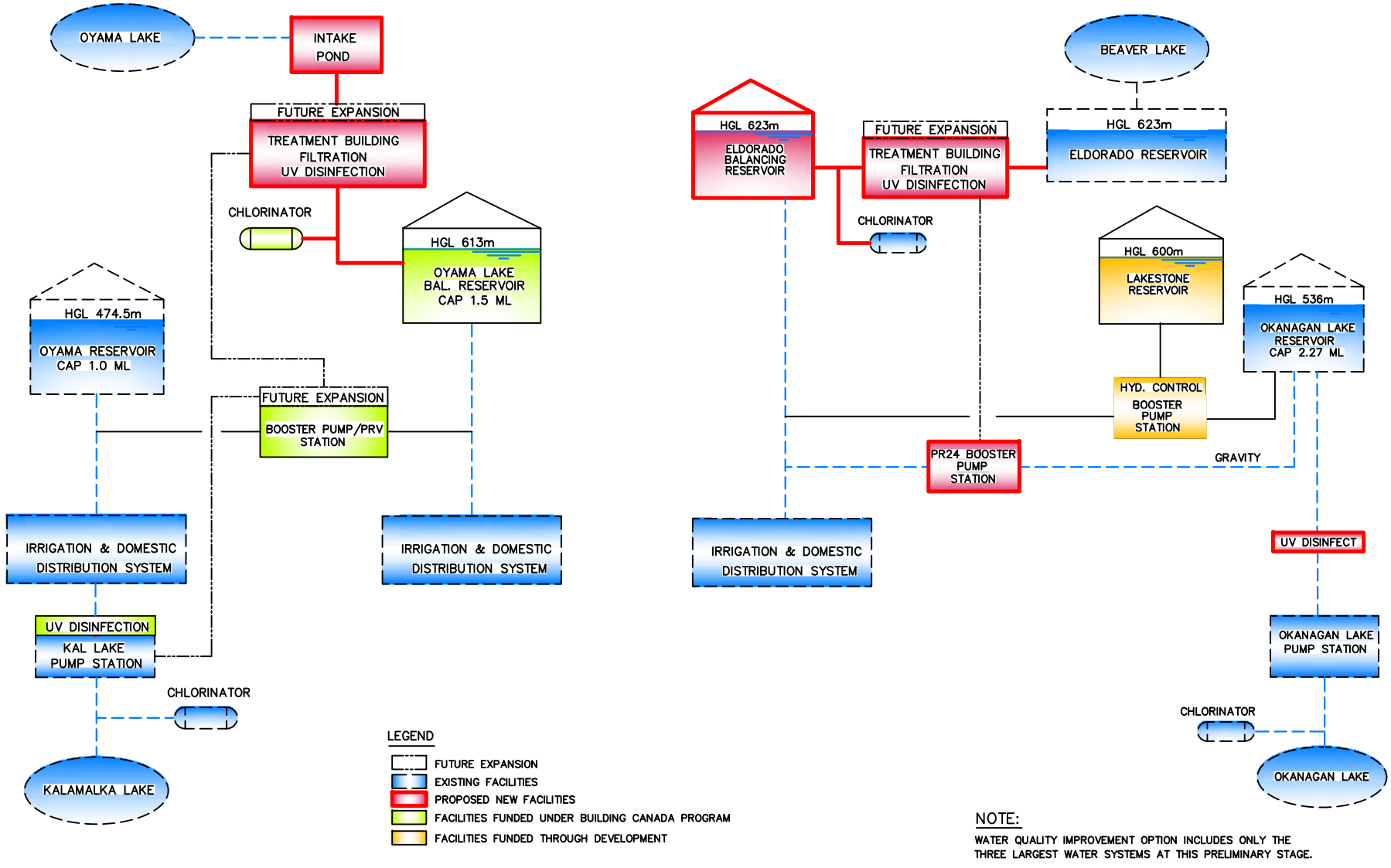
PHASE 1: (1 - 5 YRS)			
1	UV Disinfection Facility at Okanagan Lake Pump Station	$1,600,000	
2	Eldorado Balancing Reservoir	$2,600,000	
3	Treatment Facilities at Eldorado Res (Partial Demand, 50 ML/day)	$18,000,000	
			$22,200,000
PHASE 2: (6 - 10 YRS)			
1	Treatment Facilities at Eldorado Res (Remainder of Demand, 23 ML/day	$9,000,000	
2	PR24 Booster Pump Station	$1,300,000	
			$10,300,000
PHASE 3: (11 - 15 YRS)			
1	Treatment Facilities at Oyama Creek (Total Demand, 27 ML/day))	$11,000,000	
2	New Oyama Creek Intake Pond	$1,400,000	
3	Booster / PRV Station Expansion	$1,000,000	
4	New Watermains	$1,300,000	
			$12,400,000
	Sub-Total Estimated Cost - Option 3, Phases 1 to 3		**$45,000,000**

Below is a cost summary for the fourth phase if filtration deferral is not approved and maintained. The annual operating cost for Option 2 Construction Phase 4 is estimated to be ***$220,000****.*

OPTION 3 - CONSTRUCTION PHASE 4

PHASE 4: (FUTURE FILTRATION & MISC WATERMAINS)			
1	Filtration Expansion @ Eldorado Treatment Site (20 ML/day)	$8,000,000	
2	Filtration Expansion @ Oyama Creek Treatment Plant (16 ML/day)	$6,000,000	
4	Watermain from PR24 to Eldorado Reservoir	$1,700,000	
	Sub-Total Estimated Cost - Option 3, Phases 4 (Future Filtration)		**$16,000,000**
	Total Estimated Cost - Option 3		**$61,000,000**

SINGLE DISTRIBUTION SYSTEMS – BEAVER / OKANAGAN WS, OYAMA LAKE & KAL LAKE WS



NOTE:

WATER QUALITY IMPROVEMENT OPTION INCLUDES ONLY THE THREE LARGEST WATER SYSTEMS AT THIS PRELIMINARY STAGE.

WATER SOURCE:

PRIMARY WATER SOURCE: BEAVER LAKE & OKANAGAN LAKE

BACKUP WATER SOURCE: OKANAGAN LAKE

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SINGLE – NOT INTERCONNECTED OPTION 3

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FIGURE 3

DISTRICT OF LAKE COUNTRY

OPTION 3–SINGLE DISTRIBUTION, NOT INTERCONNECTED

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DISTRICT of LAKE COUNTRY

LEGEND:

- EXISTING DOMESTIC WATER SYSTEM
- PROPOSED DOMESTIC WATER SYSTEM (DEVELOPER OR GRANT FUNDED)
- PROPOSED DOMESTIC WATER SYSTEM
- FUTURE WORKS

SCALE: NTS

AUG. 2010

OKANAGAN LAKE PUMP STATION & CHLORINATOR

UV DISINFECTION

OKANAGAN LAKE

RESERVOIR & BOOSTER

JARDINES RD PUMP STATION 150 HP

LAKES LOWER RESERVOIR AND PUMP STATION 50hp ELEV. = 584m, 4000m³

LAKES UPPER RESERVOIR ELEV. = 641.5m, 1500m³

BOOSTER

WOOD LAKE

TRANSFER PUMP STATION c/w CHLORINATOR

RESERVOIR

WATER TREATMENT & DUAL DISINFECTION FACILITY FUTURE FILTRATION EXPANSION

CLARK CREEK

INTER-CONNECT PRV & METER CHAMBER TO BE REMOVED

PR STA 2 HGL = 496.1m TO BE REMOVED

UV DISINFECTION

KALAMALKA LAKE

BOOSTER EXPANSION

CHLORINATOR TO BE REMOVED

WATER TREATMENT & DUAL DISINFECTION FACILITY FUTURE FILTRATION EXPANSION

INTAKE POND

RESERVOIR & CHLORINATOR

DISTRICT OF LAKE COUNTRY

WATER QUALITY CONFIGURATIONS – SHORTLIST
OPTION #4 – SINGLE/DUAL DISTRIBUTION, INTERCONNECTED

EXECUTIVE SUMMARY

OPTION SELECTION PROCESS

Option #4 was analyzed using the evaluation matrix and tied for the highest score (62%) of the four 'Shortlist' options. The evaluation matrix consisted of 10 criteria each with an assigned 'weight' depending on the importance of the criteria. The weight was assigned to each criterion by the Water Advisory Committee. Mould Engineering, using a scale of 1 to 10, evaluated each option against the 10 criteria and calculated the results as a percentage. Option #4, Single/Dual Distribution, is similar to Option #2 except that the Oyama and Kalamalka Lake WS will both become single distribution systems. The size and cost of duplicating these two systems are more manageable as 80% of the water is used for agriculture.

OPTION DESCRIPTION

Option #4 is based on the concept of a combination of single and dual distribution systems for domestic use. The Beaver/Okanagan Lake system will remain as a single distribution system and will be supplied from a treatment facility at Eldorado Reservoir. The Oyama and Kalamalka Lake systems will be duplicated for domestic use and receive their supply from the Eldorado treatment facility through a long interconnection pipeline. Domestic use is described as in-house and yard watering, which matches the use of the existing domestic services within the District.

Irrigation as well as some fire flow requirements will continue to be supplied from Oyama Lake through the existing distribution systems. However, considerable portions of the new domestic system will also be designed for fire flows as numerous areas will have no irrigation system such as the two urban residential areas in Oyama.

WATER SOURCES

All four water sources will continue to be utilized; however, only Beaver and Okanagan Lake sources will be utilized for domestic purposes. The lone treatment plant will be located at Eldorado Reservoir and supply treated water to Oyama and Kalamalka systems via a long connecting pipeline and transfer pump station. Oyama Lake and Kalamalka Lake will continue to provide irrigation water to their respective areas. Kalamalka Lake will be a backup source for domestic water as long as filtration deferral is maintained.

COST ESTIMATE NOTES

The estimates are based on conceptual designs and should be viewed to be accurate within an order of magnitude of 25%.

Notes pertaining to the order of magnitude cost estimate that are common to all estimates are as follows:

1. *The Lakestone Reservoir and Booster station, shown as part of the Beaver/Okanagan Lake Water System, are assumed to be facilities that will be funded through development. Also, the Building Canada grant funded works shown within the Kalamalka and Oyama Lake Systems has been excluded from the capital cost estimates.*
2. *No allowance has been made for incorporating any other utilities (e.g. Ponderosa, Lake Pine, Alto).*
3. *Long term system renewal and existing infrastructure improvements have not been considered in the estimate.*
4. *Cost of expanding the system to service existing properties or development has not been considered in this estimate.*
5. *No allowance has been made for the acquisition of real estate.*
6. *No allowance has been made for the installation of universal water meters.*
7. *No allowance has been made within the annual operating costs for renewal of the existing distribution system.*

There are also specific conditions associated with the installation of a separate domestic distribution system for the Oyama and Kalamalka Lake system, upon which the estimates are based.

- *This estimate includes only the cost of reconnecting existing domestic services to the new watermains. No allowance has been made for the complete renewal, including curb stops, of domestic water service connections* (*$1.1 M*)

- *No allowance has been made for the replacement of larger pipelines and hydrants* (*$670,000*) *in numerous areas currently serviced by 100 mm diameter pipelines and hydrants that do not meet minimum fire flows.*

- *The capital cost of installing a complete duplicate water distribution system does not include replacing some of the existing distribution system or resurfacing the entire road width.*

CONSTRUCTION PHASES

This option has been divided into four phases. Ultra-violet disinfection will be installed at Okanagan Lake in Phase 1, which provides the dual disinfection required. The Ultra-violet disinfection system at Kalamalka Lake will be installed under the Building Canada Fund project, which is currently in the planning stages. The phasing approach assumes that deferral of filtration approval will be obtained at both lakes.

The first phase contains the construction of the treatment facility at Eldorado Reservoir sized for approximately 70% of the water demand. The 2nd and 3rd phases contain the domestic distribution systems of Oyama and Kalamalka Lake systems. Oyama, the smallest of the three, will be in the 3rd phase because that system already provides high quality water to its users and will have dual disinfection at the source. The completion of the treatment facility at Eldorado is scheduled for the 3rd phase when treated water will be required in the Oyama and Kalamalka service areas.

The fourth phase is the future expansion of filtration facilities at Eldorado Reservoir to handle the increased capacity from Okanagan Lake.

CAPITAL & OPERATING COST ESTIMATES

Below is a cost summary of the first 3 phases spread over a period of 15 years. The annual operating cost is estimated to be ***$530,000****.*

OPTION 4 - CONSTRUCTION PHASES 1 to 3

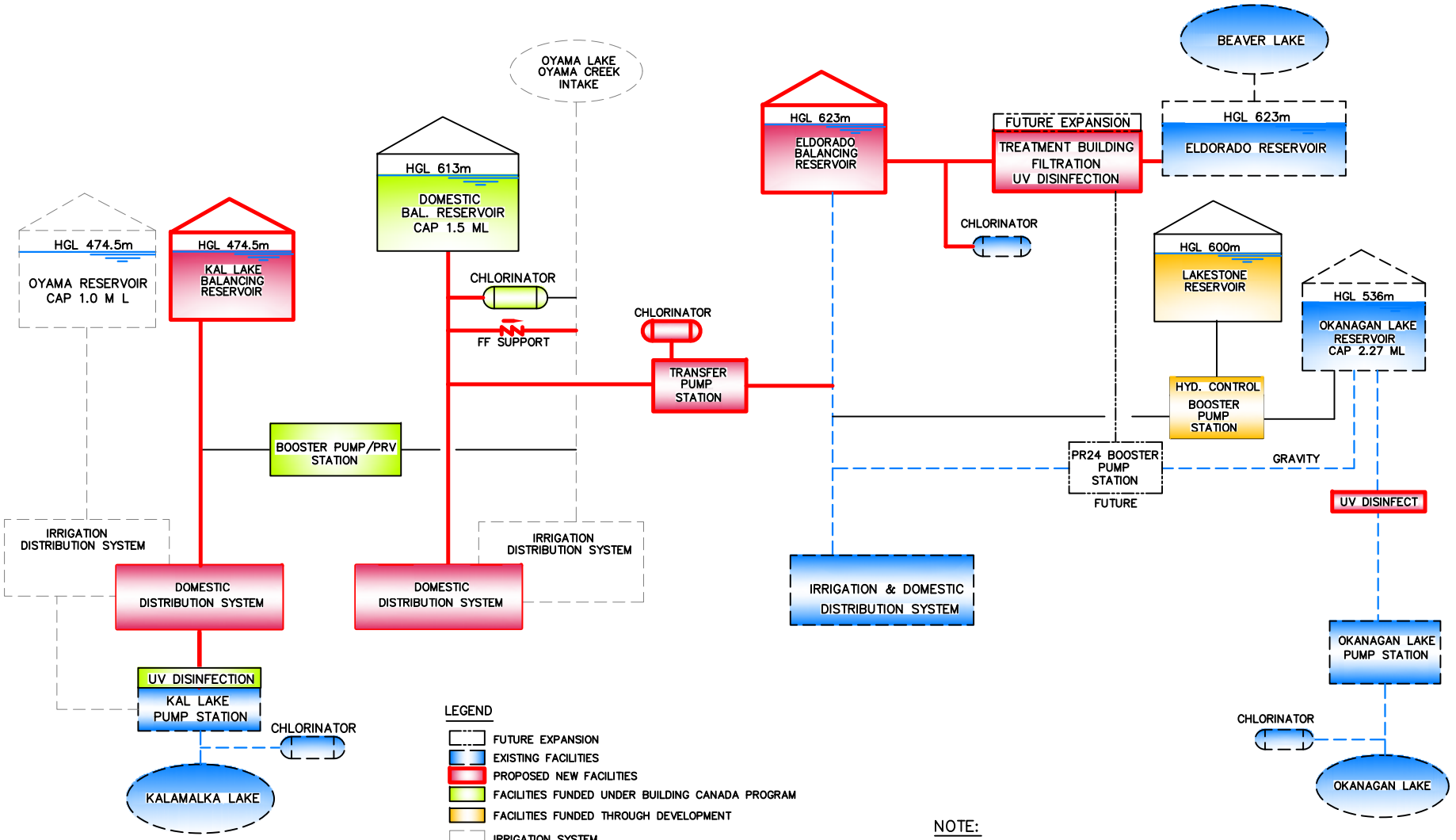
PHASE 1: (1 - 5 YRS)			
1	UV Disinfection Facility at Okanagan Lake Pump Station	$1,600,000	
2	Eldorado Balancing Reservoir	$2,600,000	
3	Treatment Facilities at Eldorado Res (Partial Demand, 53 ML/day)	$19,000,000	
			$23,200,000
PHASE 2: (6 - 10 YRS)			
1	Dual Distribution System - Oyama Lake WS	$13,000,000	
2	Transfer Pump Station & Chlorination Facility	$1,700,000	
3	Watermain from Beaver/Okanagan Lake WS to Transfer Pump Station	$3,800,000	
			$18,500,000
PHASE 3: (11 - 15 YRS)			
1	Dual Distribution System - Kal Lake WS	$500,000	
2	Kalamalka Lake Balancing Reservoir	$2,000,000	
3	Treatment Facilities at Eldorado Res (Remainder of Demand, 27 ML/day	$11,000,000	
			$13,500,000
	Sub-Total Estimated Cost - Option 3, Phases 1 to 3		**$55,200,000**

Below is a cost summary for the fourth phase if filtration deferral is not approved and maintained. The annual operating cost is estimated to be ***$140,000****.*

OPTION 4 - CONSTRUCTION PHASE 4

PHASE 4: (FUTURE FILTRATION & MISC WATERMAINS)			
1	Filtration Expansion @ Eldorado Treatment Facilities (20 ML/day)	$8,000,000	
2	PR24 Booster Pump Station	$1,300,000	
3	Watermain from PR24 to Eldorado Reservoir	$1,700,000	
	Sub-Total Estimated Cost - Option 3, Phases 4 (Future Filtration)		**$11,000,000**
	Total Estimated Cost - Option 3		**$66,000,000**

SINGLE / DUAL DISTRIBUTION SYSTEM – BEAVER/OKANAGAN LAKE WS & OYAMA/KAL LAKE WS



NOTE:
WATER QUALITY IMPROVEMENT OPTION INCLUDES ONLY THE THREE LARGEST WATER SYSTEMS AT THIS PRELIMINARY STAGE.

WATER SOURCE:

PRIMARY WATER SOURCE: BEAVER LAKE & OKANAGAN LAKE
BACKUP WATER SOURCE: OKANAGAN LAKE

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DISTRICT OF LAKE COUNTRY

SINGLE/ DUAL – INTERCONNECTED OPTION 4

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FIGURE 4

DISTRICT OF LAKE COUNTRY

OPTION 4–SINGLE/DUAL DISTRIBUTION, INTERCONNECTED

Mould Engineering

DISTRICT of LAKE COUNTRY

LEGEND:

- EXISTING DOMESTIC WATER SYSTEM
- PROPOSED DOMESTIC WATER SYSTEM (DEVELOPER OR GRANT FUNDED)
- PROPOSED DOMESTIC WATER SYSTEM
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SCALE: NTS

AUG. 2010

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RESERVOIR

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INTER-CONNECT PRV & METER CHAMBER TO BE REMOVED

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KALAMALKA LAKE

TRANSFER PUMP STATION c/w CHLORINATOR

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