ALBERNI-CLAYOQUOT REGIONAL DISTRICT
ALBERNI VALLEY REGIONAL WATER STUDY UPDATE

EXECUTIVE SUMMARY

This report updates the previous Alberni Valley Regional Water Study, carried out by Koers & Associates Engineering Ltd. in 1995, to account for:

- New VIHA (Vancouver Island Health Authority) surface water treatment requirements.
- Major changes in population and water use projections.
- Additional regional water source options.
- Available water conservation initiatives to reduce water demands.
- Cost comparisons of local versus regional solutions.
- Current Approval requirements.

Regional Service Area

The regional service area is the same as for the 1995 study.

Presently serviced entities include:

- City of Port Alberni, including Ahahswinis Reserve # 1, and providing bulk water to Tsahaheh Reserve # 1
- Beaver Creek Improvement District (BCID)
- Cherry Creek Improvement District (CCID)

Future service areas include:

- Sproat Lake
- Bell/Stuart Road
- Klehkoot Reserve # 2
- McCoy Lake
- Alberni Reserve # 2
- Beaufort

Existing Water Supply Systems

The existing water supply systems all have surface water supplies: China Creek and Bainbridge Lake (gravity) for the City of Port Alberni, Stamp River (pumped) for BCID, and Cold Creek (gravity) for CCID. All water supplies have sufficient capacity for growth to 2050. The City of Port Alberni has a licenced emergency water supply source on the Somass River (pumped), which is able to supply about 50% of the projected City demands.

Each water supply is chlorinated, but none meet the new VIHA surface water treatment requirements. BCID has been issued with a new Operating Certificate

requiring compliance with the new VIHA treatment requirements by April 30, 2011. CCID has been issued with a new Operating Certificate requiring compliance with the new VIHA treatment requirements by September 1, 2013, with preliminary design having been completed by April 2011. The City of Port Alberni has not yet been issued with a new Operating Certificate, pending the completion of the current regional water study update and the submission of a plan for compliance.

Unless water treatment improvements are made in each jurisdiction, the systems will be in contravention of the B.C. Drinking Water Protection Act.

Population and Water Demand Projections

The total Alberni Valley population is projected to grow from 25,000 in 2009 to between 30,000 and 35,000 people by the year 2050. This is considerably less than the projection in the 1995 report of 54,000 people for the year 2020.

All three water systems have universal metering. Per capita demands in the present water systems are in line with, or slightly lower than in other Vancouver Island municipal systems with universal metering, and show a continuing decline over the past 5 years. There is considered to be additional opportunity to further reduce per capita water use. Water demand projections in this study have used a range of maximum day per capita demands from 0.80 to 1.00 m^3/day/cap, down from a range of 1.25 – 1.45 used in the 1995 report.

The resulting range of year 2050 maximum day water demand projections for this report is a low of 24,000 m^3/day and a high of 35,000 m^3/day. For purposes of this report, we have used a year 2050 supply capacity demand of 30,000 m^3/day.

Regional Water Sources

The following have been considered as primary or secondary regional water supply source:

- China Creek/Bainbridge Lake
- Great Central Lake
- Sproat Lake
- Somass River

The Sproat Lake source was not considered in the 1995 report as it was not thought to be available due to capacity needed by the pulp mill and concern about the deteriorating state of the wood stave water supply main. Catalyst Paper now projects it will have sufficient spare capacity to accommodate regional water demands, and the supply main has been replaced with a buried HDPE main.

Groundwater has not been considered as an option for regional water supply in the Alberni Valley, as there is no credible expectation of the presence of a large aquifer in the valley. A large-scale and costly exploration program would be required to prove this out. Forestry and gravel extraction operators in the area have reported that they have not found large volumes of year-round subsurface water in the gravel deposits in the lower China Creek and Bainbridge Lake drainages. Several deep wells drilled in the Beaver Creek area have encountered large quantities of water that is entirely not suitable for drinking water.

Drinking Water Quality Criteria

Drinking water quality legislation in Canada is developed on a provincial level, administered by regional authorities under a Drinking Water Officer, as governed by the Drinking Water Protection Act and the Drinking Water Protection Regulation. On Vancouver Island this is the Vancouver Island Health Authority (VIHA).

In March 2008 VIHA adopted the 4-3-2-1 treatment rule for surface water, which specifies a minimum of 99.99% (4-log) removal of viruses, 99.9% (3-log) removal of *Cryptosporidium* and *Giardia*, a minimum of 2 separate treatment processes, usually filtration and disinfection, and maximum 1 NTU turbidity in the finished water supply. BCID has been required to comply with the new VIHA rules by April 30, 2011 and CCID by September 1, 2013. The City has not yet been given a schedule for compliance, pending completion of the regional water study update and the submission of a plan for compliance.

The policy allows for the operation of two separate disinfection systems in lieu of filtration if source water turbidity is consistently below 1 NTU and E.Coli is within acceptable limits on a consistent basis, subject to approval by the Drinking Water Officer based on ongoing monitoring results and the absence of other parameters of concern. When turbidity exceeds 1 NTU, subsequent disinfection processes become less effective due to shielding of microbes by particles that contribute to turbidity.

Water quality for each of the proposed regional sources is excellent when compared to the Canadian Drinking Water Quality Guidelines, with the exception of seasonal turbidity and colour for China Creek, Bainbridge Lake, and Somass River.

Regional Water Supply Strategy

The regional water supply options have been developed to meet the following strategies:

1. Maximize the use of the China Creek/Bainbridge Lake gravity supply by using it as the primary source for all regional options.

2. Establish a secondary source of consistently low turbidity (< 1 NTU), to automatically take the place of the China Creek/Bainbridge supply during periods when it threatens to or exceed 1 NTU.

3. If a filtration deferral is not approved by VIHA for the primary source, then filtration treatment will be added to that source in lieu of double disinfection.

In developing this strategy it is expected that Great Central Lake and Sproat Lake will meet the requirements for a year-round filtration deferral. The China Creek and Bainbridge supplies will operate with fail-safe shut-off provisions when turbidity threatens to exceed 1 NTU, allowing these sources to operate without filtration but with double disinfection (UV and Chlorination) when turbidity is less than 1 NTU. The Somass River supply will not qualify for a filtration deferral and will require filtration immediately.

Proposed Regional Water Supply Options

Four regional water supply options have been considered for comparison. To remain on the conservative side, we have used the cost of low density membrane filtration with chemical addition, but minimal other pre-conditioning processes in all options (ie. no sedimentation or dissolved air flotation).

	Primary Supply	**Secondary Supply**
Option I	China Creek/Bainbridge Lake	None
Option II	China Creek/Bainbridge Lake	Sproat Lake
Option III	China Creek/Bainbridge Lake	Somass River
Option IV	China Creek/Bainbridge Lake	Great Central Lake

Option I requires immediate filtration treatment, followed by chlorination for the combined China Creek/Bainbridge Lake supply at the existing chlorination station site and internal upgrading of the Port Alberni distribution system on Third Avenue to supply water to BCID and CCID. BCID and CCID will be supplied by a pump station and supply main to the nearest existing or proposed reservoir. The existing chlorinated Somass River source would be available for emergency supply.

Option II requires double disinfection (UV and Chlorination) at China Creek/Bainbridge and at the Sproat Lake supply. The Sproat Lake supply will require source approval from VIHA and pumping from the end of the Mill supply main at Stamp Avenue. A pump station will be required at Huff and King to backfeed from the Sproat Lake source to the Cowichan Reservoirs during winter

operation. An agreement will be required between the regional water authority and Catalyst Paper to safeguard long term public water supply requirements, to set the cost of using Catalyst infrastructure, and to transfer a portion of Catalyst's water licence. The requirements to connect for BCID and CCID are the same as for Option I.

Option III requires double disinfection at the China Creek/Bainbridge supply and immediate filtration and chlorination at the Somass supply. The Somass supply will require the conversion of the existing pump station to a low lift station and a new high lift station, upgrading of watermains from the intake to Compton Road and along Johnston from Helen to the Johnston reservoir. A pump station will be required at Huff and King to backfeed from the Somass source to the Cowichan Reservoirs during winter operation. The requirements to connect for BCID and CCID are the same as for Option I.

Option IV requires double disinfection (UV and Chlorination) at China Creek/Bainbridge and at the Great Central Lake. The Great Central source will require source approval from VIHA and a water licence from MoE and requires pumping. A 15 km long supply main will be required from Great Central Lake into the Beaver Creek system, and upgrading from Beaver Creek into the Johnston pumped zone. A pump station will be required at Huff and King to backfeed from the Great Central Lake source to the Cowichan Reservoirs during winter operation. The BCID system can connect to the supply main without pumping, but the CCID system will still require a pump station and supply main.

The review of regional options includes the infrastructure required to interconnect and supply the serviced areas for projected growth to the year 2050. No provision has been included for distribution piping and reservoir upgrading to suit internal distribution or fire protection needs.

The regional water supply options include capacity for projected growth to the year 2050 in all of the future possible service areas, such as Sproat Lake, Bell/Stuart Road, Klehkoot Reserve # 2, McCoy Lake, Alberni Reserve # 2 and Beaufort. It is anticipated that the Bell/Stuart Road area and Klehkoot Reserve # 2 will be serviced as extensions from the Tsahaheh Reserve # 1 via the bulk water connection from the City of Port Alberni, as is being proposed by others. Alberni Reserve # 2 would be serviced from extension of the City of Port Alberni distribution system. The Sproat Lake, McCoy Lake and Beaufort areas will require connecting mains from the various regional options, once a decision is made to service these areas. At present, no allowance has been made in the regional option comparisons for connecting these areas to the proposed regional water supply, other than providing capacity in the water supply and treatment facilities. Likewise, no provision has been included for internal distribution piping and reservoir requirements for any of these areas.

Independent Water Supply Options

Port Alberni

The report reviews three options for upgrading the existing City of Port Alberni system to allow for growth to 2050 and to comply with the new VIHA treatment requirements. All three options include the existing China Creek/Bainbridge Lake supply as the primary supply source.

Option PA I keeps the China Creek/Bainbridge Lake source as the only compliant source (with the existing Somass source as a non-compliant emergency source). The source would require immediate filtration and chlorination treatment. As the design demand would be about 85% of the regional demand, no internal system upgrading will be required.

Option PA II adds the Sproat Lake source as a secondary source. Both sources would require double disinfection (UV and Chlorination).

Option PA III adds the Somass River source as a secondary source. The Somass source would require filtration and chlorination treatment immediately.

Beaver Creek Improvement District

Beaver Creek has had its own supply and water treatment assessment completed by Koers & Associates in early 2010. It considers several options. For comparison purposes, to compare equitably with the regional option treatment estimates, we have used the cost of the low density membrane filtration process with chemical conditioning but minimum other pre-treatment processes, followed by chlorination. The costs include the required upgrading of the Stamp River intake and pump station, and have been directly quoted from the BCID study.

Cherry Creek Improvement District

We have not been supplied with a recent water supply upgrading study for the CCID, which we assume is underway. We have been supplied with limited system information by the CCID and its consultant McGill Associates Engineering Ltd.

From the information obtained it is clear that CCID will also require filtration treatment and chlorination, but likely not upgrading of its intake on Cold Creek, and it will not require pumping. As turbidity levels are likely to be consistently lower than those in the BCID supply, due to the mitigating effects of upstream Lacy Lake and the intake impoundment, we have used the lower cost direct filtration process for cost estimates.

Approvals

Approvals for water works on Vancouver Island are governed by VIHA under the Ministry of Health Drinking Water Protection Act and the Drinking Water Protection Regulation.

Approvals include source approval for any new source, treatment system approval for any proposed treatment system, and detailed design approval of any piping, pumping, and reservoir systems.

In the case of some of the Alberni Valley regional options, these anticipate the approval of double disinfection in lieu of filtration for low turbidity sources. This approval is required at an early stage, and needs to be based on an extended monitoring period.

Any new water supply would require a water licence. In the case of the Sproat Lake supply, this is expected to take the form of transfer of a portion of the Catalyst licence to the regional water authority.

Cost Comparisons

Total capital costs for all regional and local options are shown in Table 8. Total costs for the regional options have been proportioned to each of the three existing water systems on the basis of 2025 relative population estimates. All regional option estimates include an assumed capital cost contribution of $500,000 from each of BCID and CCID to Port Alberni for the use of its infrastructure. A capital cost contribution for use of Catalyst infrastructure and water licence for regional option II will be the subject of negotiation, subject to a satisfactory agreement to safeguard long term public water supply interests.

Table 8 also lists the estimated net present value of the total phased capital costs and 25 years of operation and maintenance costs, using a discount rate of 3%.

Analysis

On the basis of total capital costs, Regional Option II, China Creek with Sproat Lake, at an estimated cost of $10,643,500, is by far the most attractive regional option. The next lowest cost option is Regional Option I (China Creek/ Bainbridge Lake on its own).

The City's, BCID's, and CCID's estimated share of the capital cost of Regional Option II is significantly less than their go-it-alone costs.

The capital costs of Regional Option III (China Creek with Somass River) is estimated at $22,649,550 and IV (China Creek with Great Central Lake) at $22,906,800.

Capital costs are eligible for senior government funding when funding programs are available. Such funding would have very significant impacts on the comparison of capital costs, particularly when considering the cost of go-it-alone options for BCID and CCID, as they are not eligible for senior government funding under their present form of organization.

Senior government funding has not been considered in the capital cost comparisons presented in Table 8.

A net present value (NPV) (or total life cycle cost) assessment has been included in the comparison of options, which considers capital costs and operation and maintenance costs of the various options over a 25 year period. These are included in the summary in Table 8.

On the basis of total life cycle costs (NPV), the cost of Regional Option II is also much lower than that of the other regional options.

The impact of high operation and maintenance costs over the lifetime of a project is most pronounced when considering the go-it alone costs for BCID and CCID. Because both systems will require immediate filtration treatment on their own, the high operation and maintenance cost of such systems has a dramatic impact on the total life cycle costs comparison for the improvement districts.

As can be seen from Table 8, the life cycle costs for the BCID and CCID go-it-alone systems are at least double their chare of the estimated life cycle costs for Regional Option II.

The estimated life cycle costs for Port Alberni (Option PA II) on its own is slightly lower than the City's share of estimated life cycle costs for Regional Option II.

Water Conservation

In 2008 the Province of B.C. set out new provincial water priorities in the Living Water Smart plan. The plan sets goals for water conservation and initiates action on a new water governance model, which not only addresses the opportunities and implications of surface water and groundwater governance, but also how municipalities will be required to conserve water and become more efficient and sustainable with respect to its use of the water resource.

The plan considers healthy water and watersheds vital to B.C.'s economy, and needs to be in place to safeguard water for the long term. The plan includes, among many other initiatives, regulating groundwater supplies, encouraging communities to do watershed management planning, and to require active water conservation initiatives by communities, such that by 2020 water use will be 33 percent more efficient (in other words, 50% of new municipal water needs will be

acquired through conservation).

The provincial government has gone on record of stating that it will enforce these initiatives onto municipalities and regional districts by tying grant approvals to proven records of compliance with the B.C. Water Plan.

Section 11 of this report deals with how municipalities can conserve water and presents a review of the literature on what communities in B.C. have achieved and what type of conservation initiatives may work in the Alberni Valley.

Conclusions

The following conclusions may be drawn from the work presented in this report:

1. The existing water treatment systems for the City of Port Alberni, the Beaver Creek Improvement District and the Cherry Creek Improvement District will be in contravention of the B.C. Drinking Water Protection Act unless improvements are made to meet the new 2008 Vancouver Island Health Authority (VIHA) water treatment requirements.
2. The proposed Alberni Valley regional water system is designed to meet the new treatment requirements and would service the existing water systems of the City of Port Alberni, including Ahahswinis Reserve # 1 and Tsahaheh Reserve # 1, and the Beaver Creek and Cherry Creek Improvement Districts, as well as potential future service areas for the Sproat Lake, Bell/Stuart Road, McCoy Lake and Beaufort communities, and the Klehkoot Reserve # 2 and Alberni Reserve # 2.
3. The existing water systems in the Alberni Valley all have surface water supplies and have sufficient capacity for growth to the year 2050. They all have chlorination treatment, but none meet the new VIHA surface water treatment requirements. The BCID and CCID have been issued with an Operating Certificate amendment specifying compliance with the new VIHA treatment requirements by April 30, 2011 and September 1, 2013, respectively. The City of Port Alberni has been requested to present a plan for compliance following completion of the regional water study update.
4. The present Alberni Valley population is estimated at 25,000 people. The high growth rate projected in the 1995 study has been downgraded substantially from 2.4% to an average of 0.5 – 0.75% per annum. This results in a design population of between 30,000 and 35,000 people for the year 2050.
5. All three water systems have universal metering. Per capita water demands are similar, if not slightly lower, than most municipal systems on Vancouver Island, and are showing a gradual annual reduction during the past 5 years.
6. As a result of water conservation measures through universal metering and increasing public awareness, target water demands for future projections have been downgraded from a range of 1.25 – 1.45 m^3/day/cap used in the 1995 report to a range of 0.80 – 1.00 m^3/day/cap for the new 2050

projections. This is expected to result in a year 2050 maximum day demand of 30,000 m^3/day, down more than 50% from the 2020 design demand projected in the 1995 report.

7. The 1995 report considered three regional water supply sources, ie. China Creek/Bainbridge Lake, Great Central Lake and the Somass River. The present update report considers these three sources plus Sproat Lake, as Catalyst Paper has expressed an interest in transferring some of its excess water supply capacity to a regional water supply authority or the City, and a new buried HDPE supply main has been installed from the Sproat Lake intake to the Mill, within close proximity to the City water distribution system.
8. Groundwater has not been considered as part of a regional water supply option, as information to-date has not indicated the presence of a large good quality aquifer in the valley and the cost of an extensive exploration program cannot be justified. Information obtained from a local well driller indicates the existence of drilled wells in the Beaver Creek area that accessed large quantities of water entirely unsuitable for drinking water.
9. Drinking water quality legislation is developed provincially under the provisions of the Drinking Water Protection Act and Regulation. On Vancouver Island, the regional authority administering this legislation is the Vancouver Island Health Authority (VIHA). In March 2008, VIHA adopted the 4-3-2-1 treatment rule for surface water, which aims to provide drinking water year-round with less than 1 NTU turbidity and a dual barrier treatment system, usually filtration followed by disinfection. Alternatively, when a source can provide raw water consistently below 1 NTU turbidity, two disinfection systems in series, capable of 4-log (99.99% removal of viruses) and 3-log (99.9%) removal of *Giardia* and *Cryptosporidium* may be approved to comply with the new rule.
10. Four regional water supply options have been compared, namely:

	Primary Supply	Secondary Supply
Option I	China Creek/Bainbridge Lake	None
Option II	China Creek/Bainbridge Lake	Sproat Lake
Option III	China Creek/Bainbridge Lake	Somass River
Option IV	China Creek/Bainbridge Lake	Great Central Lake

11. Local supply options (the above options, except Great Central Lake for the City, the Stamp River source with filtration for BCID, and the Cold Creek source with filtration for CCID) were compared against the cost of participating in the regional options.
12. Based on total capital costs, Regional Option II, China Creek/Bainbridge Lake with Sproat Lake as secondary source, is by far the most attractive option. This assumes that a filtration deferral can be obtained for both sources, and that filtration treatment would not be required until sometime after the year 2035.

13. The capital cost comparison of the individual options show that the cost for the City, BCID and CCID to proceed on their own is considerably higher for each than the cost of joining Regional Option II.
14. Government funding has not been considered in the cost estimates presented in the draft report. A regional or a local City supply and treatment system improvement qualifies for government funding, whereas the improvement districts do not qualify for such funding, unless they organize under a regional local service area function.
15. On the basis of Net Present Value (NPV) of the phased capital costs and the full cost of operation and maintenance of the supply and treatment systems over 25 years, Regional Option II is also much lower than the other regional options.
16. When considering NPV estimates for the go-it-alone options for the two improvement districts, it becomes very clear that operation and maintenance costs of individual filtration treatment plants have a large additional cost implication. The NPV of capital and operation and maintenance costs over 25 years for the go-it-alone options for the improvement districts is almost double the proportional share of those costs in a regional system context.
17. In 2008 the Province of B.C. set out new provincial water priorities in the Living Water Smart Plan. The province has set a goal that by 2020 water use in the province will be 33% more efficient, with the implication that each municipality or regional district will need to meet this objective. Section 11.0 of this report deals with a discussion on how municipalities can conserve water, presents an overview of what communities in B.C. have achieved to-date, and which type of initiatives may work in the Alberni Valley.
18. A public Open House was held on July 28, 2010 at the Echo Centre to provide information on the second draft report and to solicit feedback from the public. A summary of the feedback received is included in Appendix B.

Recommendations

Based on the conclusions reached in this study, we recommend that:

1. The City of Port Alberni, the Beaver Creek Improvement District and the Cherry Creek Improvement District immediately start discussions on how to meet the new VIHA water treatment requirements, established under the provisions of the B.C. Drinking Water Protection Act.
2. In order to keep initial capital and operation and maintenance costs to a minimum, a regional water supply system is established in the Alberni Valley, adopting the following strategies:
    - Maximize the use of the China Creek/Bainbridge Lake gravity supply.
    - Establish a secondary source with year-round low turbidity, such as Sproat Lake or Great Central Lake, which automatically comes on line when China Creek and Bainbridge Lake turbidity threatens to equal or

exceed 1 NTU, assuming VIHA will approve these sources for a filtration deferral.

- Provide each source with double disinfection, UV radiation followed by chlorination, with sufficient property available to expand to add filtration treatment at a later date, when such is mandated.

3. Regional Option II – China Creek/ Bainbridge Lake with Sproat Lake as the secondary source be selected as the preferred regional water supply system, on the basis of obtaining a filtration deferral for both sources, so that the high capital and ongoing operation and maintenance expense of filtration treatment can be postponed to beyond the year 2035.
4. The water quality data collection in support of the application to VIHA for a filtration deferral, in particular raw water turbidity at China Creek/Bainbridge Lake and Sproat Lake, continue for at least one full year.
5. Additional raw water quality data be collected, starting at the earliest convenience, on both the China Creek/Bainbridge Lake and Sproat Lake sources, including UVT for the future sizing of UV reactors, E.Coli, total bacteria, organic carbon, and regular general drinking water quality parameter scans, in further support of the filtration deferral application, and that VIHA be consulted on which parameters to be included in the ongoing monitoring.
6. Discussions start as soon as possible between the ACRD, City, BCID and CCID about the feasibility of forming a regional water authority, and the selection of the preferred regional water supply option.
7. If a Sproat Lake secondary supply is to be considered for regional or City water supply development, discussions should take place as soon as possible with Catalyst Paper to explore the conditions and costs for transfer of a portion of the water licence and for the use of existing Catalyst infrastructure, such as the intake, pump station and water supply main, and to determine the conditions necessary to protect long term public water supply interests.
8. Source approval for Sproat Lake to be applied for to VIHA.
9. A schedule for implementation is established to be submitted to VIHA relative to the implementation dates currently specified in the individual Operational Certificates.
10. Government support and funding sources be explored for the preferred option, and using every available opportunity to apply for funding.
11. The regional district and/or City meet with the appropriate authorities to clarify the objectives of the B.C. Water Plan, and to determine the base line against which water conservation goals are to be measured.
12. A water conservation plan is prepared for the proposed regional water supply system, along the lines discussed in Section 11.0 of this report, and designed to comply with or surpass the provincial objectives.

Table 8. Capital Cost and Net Present Value Summaries - Filtration Treatment Postponed to after 2035 26-Aug-10

	Regional Options	Year of Implementation	Capital Cost & NPV Summary			
			Total	Port Alberni	BCID	CCID
I	**China Creek/Bainbridge Alone**	2011				
	Cost with Filtration	Total Capital Cost	19,798,450	12,922,219	3,602,050	3,274,181
	NPV Capital Costs and 25 years of O&M	**NPV**	**35,243,653**	**26,380,000**	**4,767,000**	**4,097,000**
II	**China Creek/Bainbridge and Sproat Lake**	2011				
	Cost with Filtration Deferral on both sources	Total Capital Cost	10,643,500	5,491,067	2,652,649	2,499,784
	NPV Capital Costs and 25 years of O&M	**NPV**	**18,946,726**	**13,358,000**	**2,974,000**	**2,614,000**
III	**China Creek/Bainbridge and Somass River**	2011				
	Cost with Filtration Deferral on China Cr/Bainbridge	Total Capital Cost	22,649,550	13,582,517	4,705,225	4,361,807
	NPV Capital Costs and 25 years of O&M	**NPV**	**40,318,958**	**30,435,000**	**5,325,000**	**4,559,000**
IV	**China Creek/Bainbridge and Great Central Lake**	2011				
	Cost with Filtration Deferral on both sources	Total Capital Cost	22,906,800	15,776,050	3,762,913	3,367,837
	NPV Capital Costs and 25 years of O&M	**NPV**	**37,802,535**	**28,545,000**	**4,780,000**	**4,056,000**
	Go-It-Alone Options					
PA I	**Port Alberni with China Creek/Bainbridge Alone**	Total Capital Cost		15,610,000		
	NPV Capital Costs and 25 years of O&M	**NPV**		**27,787,701**		
PA II	**Port Alberni with China Cr/Bainbridge and Sproat Lake**	Total Capital Cost		7,910,000		
	NPV Capital Costs and 25 years of O&M	**NPV**		**14,080,763**		
PA III	**Port Alberni with China Cr/Bainbridge and Somass River**	Total Capital Cost		16,030,000		
	NPV Capital Costs and 25 years of O&M	**NPV**		**28,535,353**		
Beaver Creek ID. (Stamp River Source)		Total Capital Cost			4,600,000	
	NPV Capital Costs and 25 years of O&M	**NPV**			**8,188,560**	
Cherry Creek ID. (Cold Creek Source)		Total Capital Cost				3,100,000
	NPV Capital Costs and 25 years of O&M	**NPV**				**5,518,378**