

AGRICULTURAL WATER PLAN FOR THE ALBERNI VALLEY

BACKGROUND
REPORT

January 2025



Prepared for: Alberni-Clayoquot Regional District

Prepared by:



TABLE OF CONTENTS

LAND ACKNOWLEDGEMENT	III
ACRONYMS.....	III
1.0 PROJECT BACKGROUND, SCOPE AND OBJECTIVES	1
1.1 CONTEXT	1
1.2 SCOPE AND OBJECTIVES.....	1
2.0 KEY DOCUMENT REVIEW	2
2.1 TIMELINE OF REGIONAL AGRICULTURAL WATER DISCUSSIONS	2
2.2 TIMELINE AND FINDINGS OF KEY WATER SYSTEM AND INFRASTRUCTURE REPORTS	5
3.0 WATER POLICY AND LICENSING	15
3.1 WATER AUTHORIZATIONS.....	15
4.0 CLIMATE CHANGE PROJECTIONS	17
5.0 NEXT STEPS	19

LAND ACKNOWLEDGEMENT

Alberni-Clayoquot Regional District serves the communities of the central and west coast of Vancouver Island located on the ɥahahuuli (traditional territories) of the Nuu-chah-nulth Nations of Ahousaht, Ditidaht, Hesquiaht, Hupačasath, Huu-ay-aht, Tla-o-qui-aht, Toquaht, ʕišaaʔath (Tseshaht), Uchucklesaht, and Yuuʔuʔiʔath. Since time immemorial, Nuu-chah-nulth Peoples have walked gently in these places where we live, work, learn, and play. We are committed to building relationships based in honour and ʔiisaak (respect), and we offer our gratitude.

ACRONYMS

ACRD Alberni Clayoquot Regional District

ALR Agricultural Land Reserve

ALUI Agricultural Land Use Inventory

BCID Beaver Creek Improvement District

BCWS Beaver Creek Water System

CAI BC Climate Action Initiative

CCID Cherry Creek Improvement District

DCCs Development Cost Charges

IAF Investment Agriculture Foundation

VIHA Vancouver Island Health Authority

WSA Water Sustainability Act

1.0 PROJECT BACKGROUND, SCOPE AND OBJECTIVES

1.1 CONTEXT

The availability of water to meet current and future agricultural and food security needs, especially under a changing climate, has become a real and growing concern for producers in the Alberni Clayoquot Regional District (ACRD). A secure and reliable water source for irrigation, livestock, and food processing is essential to ensure the agricultural sector's success and support community food security goals. At the same time, First Nations communities have underscored the sacredness of key watercourses in the region and the Province of BC has introduced the Water Sustainability Act, which limits the use of water resources through licensing. Producers may be asked to curtail irrigation during extreme drought through a temporary protection order, to ensure critical flows remain within watercourses to sustain aquatic ecosystem health. While this has not yet happened in the Alberni Valley, a similar scenario has occurred further south on Vancouver Island in the Koksilah River watershed. This underscores the pressing need for the ACRD to explore the feasibility of additional water supply options for agriculture.

The ACRD received funding through the Investment Agriculture Foundation (IAF)'s Agricultural Water Infrastructure Grant Fund to develop an Agricultural Water Plan for the Alberni Valley. The plan is being developed within this evolving context of First Nations rights and titles, provincial legislation, local government jurisdiction, and an overall desire to support and sustain the agricultural community. This Background Report is the foundational piece of work to accompany the Agricultural Water Plan - it provides an overview of the scope and objectives of the plan, a literature review, and a policy overview. As the project is located on the traditional, unceded territory of the Tseshaht and Hupačasath First Nations, efforts are being taken to engage with these communities. Engagement with the agricultural community will also inform the feasibility of various water supply options. Additional, but separate, components of the Agricultural Water Plan will include an Engagement Summary Report and a Final Report (including technical assessments of the water supply options, costing, mapping, and recommendations).

1.2 SCOPE AND OBJECTIVES

The project's geographic scope includes identifying and quantifying agricultural water opportunities within the areas of Beaufort, Beaver Creek, Cherry Creek, the eastern portion of Sproat Lake, the City of Port Alberni, and federal reserve lands. It considers both Agricultural Land Reserve (ALR) and non-ALR but farmable land.

In terms of governance, the development of a new ACRD Agricultural Water Supply service will be explored under the context of the feasibility assessment of the supply options.

The objectives of the project are to develop an understanding of agricultural water needs and examine the feasibility of the following water supply options:

1. Reactivation of the McKenzie Road Pump station for non-potable agricultural water use.

2. Redesignation of the Stamp River water license for “emergency use” for agricultural use during drought and/or fire suppression in the Beaufort electoral area, including a metered bulk water station or reservoir for storage and distribution.
3. Creation of an irrigation district through the phased installation of pipes/canals to agricultural land in the Beaver Creek electoral area, with subsequent potential expansion to ALR land in the Cherry Creek, Beaufort, and Sproat Lake electoral areas.
4. Development of regional water storage options, such as lakes or reservoirs, in the event that a temporary protection order is issued by the province.
5. Support for farm-based agricultural water storage options such as dugouts, cisterns, reservoirs, or changes to production methods.

The purpose of this background report is to provide an overview of the current water system in the Alberni Valley and the agricultural water discussion that has taken place within the community.

2.0 KEY DOCUMENT REVIEW

2.1 TIMELINE OF REGIONAL AGRICULTURAL WATER DISCUSSIONS

Over the past 15 years, the challenges and opportunities of a stable agricultural water supply have been widely discussed within the farming community of the Alberni Valley, with numerous reports assessing the situation. The following provides an overview of these documents and their associated timeline.

In **2011**, the *Alberni Valley Agricultural Plan*¹ was developed, with a scope and timeline extending to 2031. There were 12 key goals delineated in the action plan, and Goal 12 is “To increase the availability of water for agriculture”. The overall objective of the goal is to ensure that farmers are involved in local water planning processes. Actions included: hosting a workshop to advise farmers about the impact of recent policy and regulatory changes on local agriculture; ensure there is farm representation on all committees related to water use and allocation; dedicate part of the AAC meetings to identifying current and future water supply and demand for agriculture; and develop a long-term plan to increase water availability/allocation for farmers. It is this last action that this Agricultural Water Plan aims to fulfill.

In **2016**, a progress review of the Alberni Agricultural Plan highlighted the following progress on Goal 12: a presentation of agriculture water options at rainwater harvesting workshops in Ucluelet and Tofino and a Water Demand Model study completed in the summer of 2016 (with \$7,000 of funding support from the Partnership for Water Sustainability in BC). As the next steps, a rainwater harvesting workshop in the Alberni Valley was planned, including earthworks options. Upcoming changes to the provincial Water Sustainability Act were flagged. An “Agricultural Water Use” project was to be launched including the development of a regional working committee.

¹ Rolston, G. and S. Pritchard. 2011. Alberni Valley Agricultural Plan.

In **2017**, the *Alberni Agricultural Plan Implementation Project Phase 3 report*² indicated that the next step would include an ‘Agricultural Use of Water’ project that would assist in securing a safe, affordable, and accessible water supply for producers, one of their top priorities in 2014. It was to be funded in part by the Real Estate Foundation of BC (\$7,950). Also in 2017, the *ACRD Agricultural Support Workers’ year in review and next steps* report listed that funds were received from REFBC to complete an Agricultural Use of Water Project. However, no external consultants had responded to the ACRD’s request for proposals. Instead, one of the Agricultural Support Workers was able to complete the project within the timeframe before the funding expired. The final report for the project was “*Water for Growth: Recommendations and Findings from the Agricultural Use of Water Project.*” This report proposed a range of 7 program policies, from economic incentives (such as rebates or tax credits) to infrastructure upgrades (such as twinning water lines) and government advocacy. It also recommended amending the community water license to allow emergency use and developing a drought management plan. The project report was presented to the City of Alberni’s Food Security and Climate Disruption Committee in January **2018**, and two of the recommended programs were subsequently included in their annual recommendations to the City of Port Alberni Council.

In **2019**³, a grant application was submitted to REFBC to establish a Council for Agricultural Water Supply. An on-farm event was hosted for the ACRD Board and other interested parties to witness climate change impacts (flooding, drought) on a local farm.

The *ACRD Agricultural Plan Implementation Plan progress report* for **2020**⁴ indicated that the primary activities that year included meeting to discuss the key water needs of producers. The REFBC grant was successful, which provided funding for the ACRD Council for Agricultural Water Supply to be established. Opportunities for water supply expansion were being explored in collaboration with the BC Climate Action Initiative (CAI). Further, an RFP for a Project Coordinator was drafted.

In **2021**, the *ACRD Agricultural Support Program progress report*⁵ highlighted that the ACRD Council for Agricultural Water Supply had been launched. The initial work included outreach and/or representation from local producers, Provincial ministries, Tseshaht First Nation, Hupačasath First Nation, Fisheries & Oceans Canada, the Regional District of Nanaimo (Drinking Water and Watershed Protection Program), Mosaic Forest Management, the BC CAI, and others. In addition, the producer-led monitoring project component was expanded through additional funding from BC CAI.

² Alberni Agricultural Plan Implementation Project. Phase 3 report. February 22, 2017.

³ ACRD Agricultural Support Workers Activities and Outcomes, 2019.

⁴ ACRD Agricultural Plan Implementation Project, 2020.

⁵ ACRD Agricultural Support Program Progress Report. 2021.

In **2022**, the *ACRD System Change Project Year 1 Report* indicated that the next step included working towards permanency for ACRD agri-support programs, including the Council for Agricultural Water Supply or a similar committee⁶. That same year, the Producer-Led Monitoring Project was launched.

In **2023**, the Council released findings from the “*Water Supply and Producer-Led Watershed Data Collection Project*”, which included a review of past monitoring projects, climate and water data, and engagement with local producers and water services⁷. This project involved discussions with local fire services on delivery of water to producers, and discussions with the ACRD regarding the development of a community water license. From the review of the available climate and water related data and discussion of measurement feasibility, it was determined that additional information related to groundwater wells would provide the greatest overall value to the agricultural community. The producer-led monitoring aspect of the project was focused on the measurement of groundwater well depth using a measurement tool that was acquired for the project and remains available for loan by producers by the AFI.

Some of the recommendations arising from the project included: ensuring that the water council continue their work; creating a detailed climate assessment to assure that the existing meteorological measurement stations are representative of the Alberni Valley; conducting a review of the existing hydrometric monitoring network in the ACRD to assure that surface water resources are adequately quantified against future changes; and the installation of a groundwater observation well(s) in the ACRD as part of the provincial groundwater monitoring network to assist in area aquifer assessment and future changes to groundwater levels in the region. Additional recommendations included investigating the feasibility of an irrigation district, which would require financing as well as investigating the option of using the McKenzie Road pump station as a possible water source for agricultural producers. The report noted that the Beaver Creek Water Tower is an active water reservoir, with a line from the Strick Road pump station into a distribution system servicing an area within a 16 km radius. However, the ACRD noted the use of the reservoir would not be a viable option for agricultural use, and users would need to pay the full cost of the water including the treatment system. Additional recommendations directed to the ACRD included supporting the placement of at least one observation well and to connect the weather station with the provincial Farmwest website.

In June **2023**, the *ACRD System Change Year 2 Report* indicated several outcomes regarding agricultural water⁸. These include the permanent establishment of the ACRD Council for Agricultural Water Supply and hosting Agricultural Water Management Workshops with the Alberni Farmers’ Institute, Ministry of Agriculture & Food, and Irrigation Industry Association of BC. Finally, information about agricultural water uses was shared at the 1st Annual World River’s Day event.

In **2024**, the ACRD was successful in receiving grant funding from the Investment Agriculture Foundation (IAF) to undertake this Agricultural Water Plan. Additionally, the BC Ministry of Agriculture & Food has been providing workshops and support for the sector regarding drought management.

⁶ ACRD System Change Project: Year 1 Report (June 2021 – June 2022).

⁷ Council for Agricultural Water Supply and Producer-Led Watershed Data Collection Project. (2023).

⁸ ACRD System Change Project: Year 2 Report (June 2022 – June 2023).

2.2 TIMELINE AND FINDINGS OF KEY WATER SYSTEM AND INFRASTRUCTURE REPORTS

Several documents related to the water supply options are outlined and summarized in this section. They are presented in chronological order. Figure 1 provides a visual overview of the locations of the watersheds for reference.

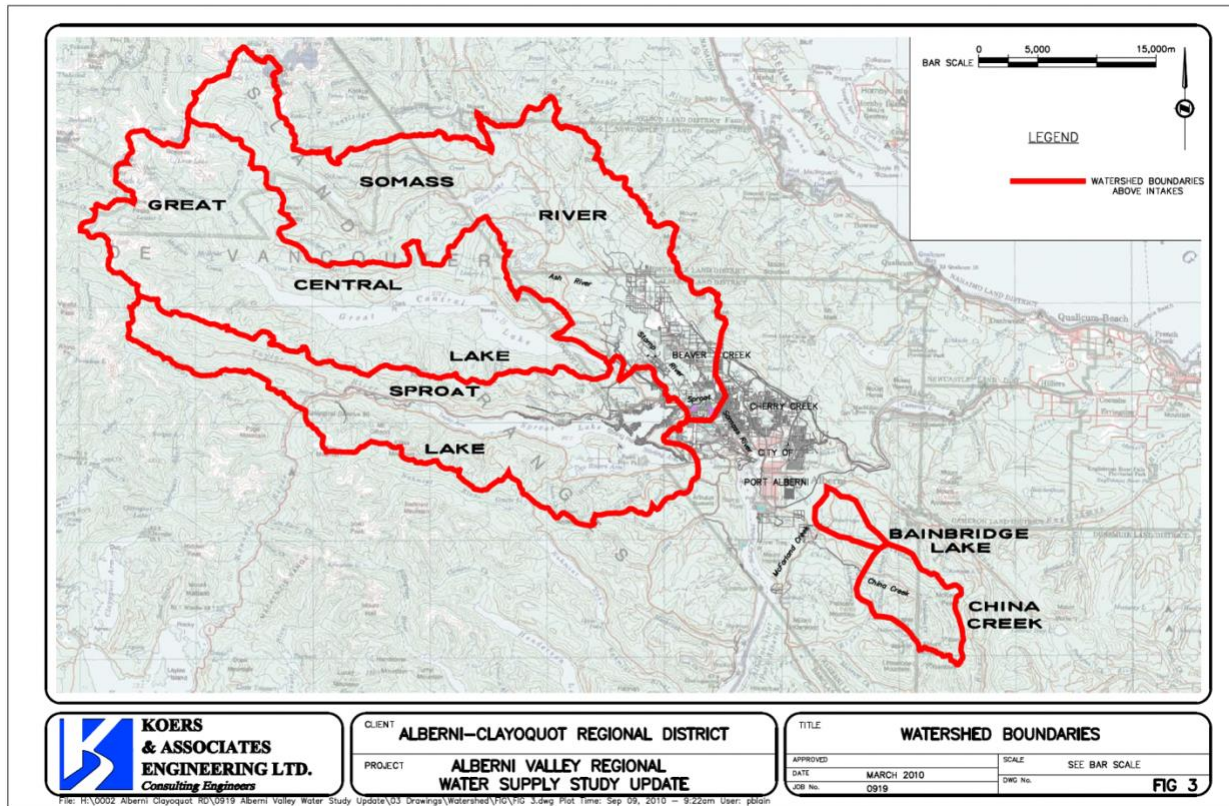


Figure 1. Watershed boundaries (Koers & Associates, 2010).

Alberni Valley Regional Water Study (1995)

This water study was completed by Koers & Associates Engineering and considered four alternatives for short term and long term regional water supply for the Alberni Valley communities of the City of Port Alberni, Beaver Creek Improvement District (BCID), Cherry Creek Improvement District (CCID), Sahara Heights and Arrowsmith Heights water user communities, and McCoy Lake, Sproat Lake, and Bell/Stuart Road services areas⁹. It included cost estimates (capital and annual) and cost recovery options for comparison. The four alternative supply systems ranged from a new system to replace all existing sources

⁹ Alberni Valley Regional Water Study. (1995). Koers & Associates Engineering.

to a staged implementation of a regional supply system using most of the existing sources to minimize costs.

The study determined that regional water supply could be provided in the short term by existing water systems by improving connections between systems and using China Creek, Somass River, and Lacy Lake as key sources. It was noted that China Creek and Lacy Lake can be supplied via gravity to minimize pumping costs, but will require a new water main connection from Cowichan Reservoirs to the Johnston St reservoir. It was noted that the Somass River water quality was less consistent and its use would require a filtration water treatment plant.

Over the long term, Great Central Lake was identified as the best water source for the Alberni Valley. It was expected that adequate watershed protection could be achieved and the high costs associated with water treatment could be postponed over a longer period of time. It could be the sole source of water for the valley or in combination with China Creek. Some of the China Creek steel supply main was reaching the end of its expected useful lifespan. The report recommends that an Integrated Watershed Management Plan be developed for the Great Central Lake watershed. Without using Great Central Lake as a source, the other alternative would be to look at upgrading and expanding the Somass River intake and pump station, along with water treatment at that source. The report considered Somass River as a sole source of water as well as in conjunction with China Creek.

The anticipated costs of upgrades and expansions from 1997-2020 of the four options using 1995 dollar values were estimated as follows:

- Great Central Lake only: \$45,127,000
- Great Central Lake and China Creek: \$49,492,400
- Somass River only: \$36,586,200
- Somass River and China Creek: \$43,515,500

Although the Great Central Lake options were higher, when considering the annual costs of operation and maintenance in addition to the capital costs, the Great Central Lake options become marginally cheaper after mandatory treatment had been implemented. It was also noted that the costs associated with a new regional water supply system could be somewhat offset by the elimination of existing annual costs required to operate and maintain existing individual water supply systems. It was suggested that the costs could be covered through a combination of Development Cost Charges (DCCs), parcel taxes, and user rates.

It was recommended that the Great Central Lake and China Creek option be selected, as this will allow for excess capacity as well as increased security of supply from two sources, on opposite sides geographically of the system. Furthermore, longer term costs of upgrades would be less with two sources entering the system. Additional recommendations included instituting universal water metering, increasing block water user rates, and public education to encourage water conservation. In the interim, short term upgrading and interconnection options could be investigated to allow for a gradual phased approach to implementing the new supply system. Finally, the DCC Bylaw be implemented to collect funds to assist in the financing of the proposed new water supply system.

New Well Study for the Beaver Creek Improvement District (2005)

EBA Engineering Consultants completed a study to investigate a backup to the current Stamp River water source for the BCID, particularly for times of the year when turbidity increases¹⁰. The study focussed on an area outside of the floodplain within a 1 km radius of the McKenzie Rd pump house station, along the easement held by BCID extending parallel to the diversion pipe from the Stamp River to McKenzie Rd.

The target yield should be equal to or greater than 5.6 l/s, but preferably greater than 12.6 l/s to safely cover periods of the year when turbidity is highest. At the time of the study, no water wells were recorded in the study area. In the surrounding area, existing wells were either shallow dug wells or deep dry wells, except for a well drilled in Stamp Falls Provincial Park, approximately 4 km upstream of the study area. That well is 12.8 m deep and yields water at a rate greater than 1.9 l/s.

The study acknowledged the low potential of groundwater yields from surrounding bedrock geology and, therefore focused on fluvial sediments (coarse-grained sands and gravels) that underlie the floodplain and extend to the south. It was noted that it is uncertain if this potential surficial aquifer would be confined or unconfined. If unconfined, water quality treatment may be necessary. Three potential well locations were selected, and one was identified as a possible location for further investigation. The drilling would result in moderate infrastructure costs and the well would be the least susceptible to flooding. Furthermore, it is located within the BCID easement and therefore land acquisition may not be required. However, water quantity and quality at the three locations are unknown due to the lack of site-specific well logs or other information. Therefore, further investigation was recommended by drilling an investigation hole and potentially a production well, followed by pump testing to characterize the water supply and quality. The estimated costs of the next investigation steps were approximately \$40,000 in 2005 dollar values.

Investigation of Potential Groundwater Supply for the Beaver Creek Improvement District (2007) and subsequent pump testing (2008)

This feasibility study was authored by GW Solutions Inc. and provides an assessment regarding the potential to develop a groundwater supply source that could replace the Stamp River source, and that would meet future water demands¹¹. The work included a review of mapped aquifers within a 20 km radius of the Stamp River (McKenzie Rd) pump house station.

Of the various aquifers assessed, none had suitable characteristics for the completion of a single large and highly productive well. This is mainly due to the fact that bedrock in the surrounding vicinity has low aquifer potential. Unless located along major fault lines, bedrock wells are expensive to drill and are low yield producers. An investigation well was drilled in an area that presented that more permeable deposits might be located. The well exposed an aquifer approximately 13 m thick representing sand and gravel, with

¹⁰ New Well Location Study for the Beaver Creek Improvement District. (2005). EBA Engineering Consultants Ltd.

¹¹ Beaver Creek Improvement District: Investigation of Potential Groundwater Supply. (2007). GW Solutions Inc.

bedrock encountered at 18 m. The lateral extent of the aquifer was not assessed; however, the report indicates it likely corresponds to an old meander of the Stamp River, which has now been backfilled and is now represented as a slough.

The well pumped at a rate of approximately 3 l/s. Based on the BCID target yield of 44 l/s to meet projected water demands, it appears possible that such a yield could be obtained if a series of production wells were completed in the aquifer. If this were to occur, the wells should be placed along the slough at a distance of 20 m – 30 m from each other to minimize interference or close to one another to create a “large well” effect.

The water quality test results provided evidence that all parameters met or exceeded drinking water quality guidelines except for dissolved chloride and total dissolved solids. The chlorides are likely derived from seawater intrusion, either due to historic or current exposure. It was estimated that these levels would likely decrease over time as pumping continues as the recharge would be occurring from freshwater (the Stamp River).

The report cautions that the aquifer is likely “leaky” and pumping from wells will create a recharge from the surface water present in the slough. This may result in the water requiring water quality treatment. Furthermore, the aquifer is in the floodplain, and the risk of flooding would need to be accounted for in the design of the wells and associated infrastructure. Finally, the report indicated that right of ways would need to be secured from property owners where the production wells would be located.

Subsequently, in 2008, GW Solutions undertook a pumping test and water quality monitoring of the aquifer that was identified. The test occurred over eight days in October 2008. The test well was pumped at a rate of 4.7 l/s initially and then increased to 6.0 l/s. Water samples were collected daily and the drawdown was measured using a probe and data logger. Total dissolved solids and chloride concentrations showed decreasing concentrations over time and continued to decline until they were below water quality guidelines for drinking water. The report concludes that the water table was relatively shallow (< 2 m), the discharge rate was high and near the maximum yield for a well of a 1.4 m diameter screen, and a steady state was reached quickly – indicating that the water was delivered to the aquifer at the same rate it was being pumped. The test confirmed a specific yield of 1 l/s/m when taking drawdown into consideration. A larger well (12 inches) could probably achieve a safe yield of 10.7 l/s. The BCID target yield of 44 l/s could be met if the system included a series (at least 5) of production wells.

Beaver Creek Improvement District Water Source Options and Treatment Study (2010)

Koers & Associates Engineering reviewed three water source options for the BCID: Stamp River, groundwater, and connection to the City of Port Alberni. The assessment was conducted within the context of the BCI needing to meet the conditions of its revised Water System Operating Certificate. It was noted that each option will require approvals or permitting from other levels of government. It was recognized that the ACRD was concurrently considering a regional water supply system.

To meet VIHA water quality standards, the BCID was required to show how these standards could be achieved. Previous investigations indicated that the Stamp River source would require the construction of a new water treatment plant. The infiltration gallery and the pump house were also noted as needing replacement. The updates would result in the need to dispose of the suspended solids that would be removed in the process. It was determined that the costs associated with upgrading the McKenzie Rd pump house to meet the new VIHA standards would range from \$3.69 M to \$6.09 M depending on the type of filtration process that could be successfully applied. An additional 1.0 acre of land would be required for the sand filtration system. If land couldn't be secured then the filter system could be established at the BCID office property at a cost of \$1.62 M in water main extension.

The groundwater option was also explored, based on the previous work undertaken by GW Solutions. It is anticipated that the groundwater would be classified as being under the direct influence of surface water and therefore required treatment in the form of UV light followed by chlorination. Land will also need to be secured for the well sites, the water main, the access roads to the wells, and the water treatment building. The estimated cost for developing the groundwater sources was \$2.57 M in 2010 dollar values.

The third option assessed a connection to the City of Port Alberni water system. This could occur at several locations and may require a booster pump station, depending on which pressure zone it connects to. It would also require the construction of an additional water main, land for the booster pump station (if required), a possible stream crossing. The range of costs was estimated at \$0.79 M to \$1.58 M depending on the pressure zone and routes selected. It was also assumed that BCID would be responsible for a portion of any water treatment upgrades incurred by the City of Port Alberni.

If the BCID participated in a regional water service, preliminary costing analysis shows that BCID's portion of the capital cost and water treatment could range from \$2.67 M to \$5.38 M depending on options, based on 2010 dollar values.

Alberni Valley Regional Water Study Update (2010)

The impetus for updating the 1995 Alberni Valley regional water study was the introduction of new water treatment requirements by the Vancouver Island Health Authority (VIHA) in 2008 mandated under the Drinking Water Protection Act. This Koers & Associates Engineering report presents and compares regional options, as well as individual water supply and upgrading options, to meet the VIHA requirements. It was underscored that if a regional approach was not going to be feasible that each individual water system (i.e., City of Port Alberni, BCID, and CCID) would need to provide VIHA with a plan and a schedule for becoming compliant as soon as possible or otherwise may be in contravention of the Act.

Additional changes that were incorporated into the update included new population and water use projections (both scaled down since the 1995 report), additional regional water source options, available water conservation initiatives, cost comparisons of local vs. regional solutions, and a review of current approval requirements. All three systems have universal water metering and show a decline in water use per capita over time.

The report notes that while the regional service area has not changed since 1995 (i.e., City of Port Alberni, BCID, and CCID) future service areas have expanded to include Sproat Lake, Bell/Stuart Rd, Klehkoot Reserve #2, Alberni Reserve #2, McCoy Lake, and Beaufort. The main regional water supply sources considered for the study were China Creek/Bainbridge Lake, Great Central Lake, Sproat Lake, and Somass River. Sproat Lake was added since the 1995 report because Catalyst Paper has expressed interest in transferring some of its excess water supply capacity to a regional water supply authority or the City of Port Alberni, and a new supply main has been installed from the Sproat Lake intake to the Mill, within close proximity to the City's water distribution system. Groundwater was not considered in the report, as at the time of writing there was no credible evidence of a large aquifer that could supply the volume required. However, as evidenced by the GM Solutions investigation, this could be an option for the Beaver Creek area.

The City of Port Alberni is supplied by China Creek and Bainbridge Lake (gravity); BCID is supplied by the Stamp River (pumped); and CCID is supplied by Cold Creek (gravity). Supply (water quantity) was not identified as a concern, with all having sufficient capacity to supply growth to 2050. The City of Port Alberni also has a licenced emergency water supply source on the Somass River (pumped), which is able to supply about half of the city's projected demands. Although each water system involves chlorination treatment, none were meeting the VIHA surface water treatment requirements at the time of writing.

The report prioritizes the use of the China Creek/Bainbridge Lake gravity supply by using it as the main source of all regional options. A secondary source with consistently low turbidity should then be established to replace China Creek/Bainbridge supply during periods of the year when it might exceed VIHA turbidity requirements. Finally, a filtration deferral should be submitted to VIHA but in the case where it is not approved, a filtration treatment should be added to China Creek/Bainbridge, rather than a double disinfection (UV and chlorination) system.

With those criteria in mind, the following four options were assessed: 1) China Creek/Bainbridge with no secondary supply, 2) with Sproat Lake as a secondary supply, 3) with Somass River as a secondary supply, or 4) with Great Central Lake as a secondary supply system. With option 1, filtration treatment along with distribution upgrades to BCID and CCID would be required along with reservoirs. Option 2 would require double disinfection (UV and chlorination) at both the China Creek/Bainbridge and the Sproat Lake supply. A pump station would be required along with an agreement between the ACRD and Catalyst Paper to set the terms and costs and transfer a portion of the water licence. Option 3 would also require disinfection as well as the conversion of an existing pump station, upgrading of water mains, and an additional new pump station. Option 4 requires similar infrastructure upgrades as option 2. Of the four options, Option 2 was considered the most affordable with costs of about \$10.6 M in 2010 dollar values. Option 3 and Option 4 are at least double that price within the range of \$22.6 M to \$22.0 M in 2010 dollar values.

Additional options were provided for independent water suppliers. For example. The City of Port Alberni could allow for 2050 growth and comply with VIHA treatment requirements by adding filtration and chlorination to China Creek/Bainbridge Lake source; adding Sproat Lake as a secondary source and double disinfection; or adding Somass River as a secondary source with additional filtration and chlorination. BCID could upgrade filtration treatment and chlorination along with the upgrading of the Stamp River intake and

McKenzie Rd pump station. CCID upgrading options were being studied at the time of the report writing. However, it was assumed that filtration and chlorination would be required at a minimum.

The report examined approval requirements, which at the time were governed by VIHA. These included source approvals for new drinking water sources and treatment system approval for treatment systems, as well as detailed design approval for piping, pumping, and reservoir systems. New water supplies will also require a water license however in the case of Sproat Lake it is anticipated this would take the form of a transfer of a portion of the Catalyst license to the regional water authority.

The overall recommendation of the report is to support Option 2 (China Creek/Bainbridge Lake with Sproat Lake as a secondary source). It is assumed that a filtration deferral could be obtained for both sources and that the filtration treatment would not be required until after 2035. It was also recommended that discussions begin between the ACRD, the City of Port Alberni, BCID, and CCID about the feasibility of forming a regional water authority.

Beaver Creek Improvement District Water Infrastructure Assessment (2011)

This report by Koers & Associates Engineering provides a review of the implications of incorporating Beaver Creek's water system into a regional service area¹². As part of the conversion analysis, this technical report provided cost estimates associated with capital upgrades and system replacement.

According to the report, the majority of the BCID system was constructed in the 1960s and the total length of the water mains is 43,600 m. The water system services 974 parcels. At the time of the report writing, the system was prone to leaks and water main breaks due to aging pipe material. This resulted in up to 38% of water being unaccounted for, based on metering (all commercial and residential services are fully metered). Similarly, the fire hydrants associated with the system were not equipped with modern standards.

The source of water supply is the Stamp River and the McKenzie Rd pump station. Once pumped from the intake, the water is chlorinated and distributed via piping to a south reservoir and a north reservoir (1,136 m³ and 390 m³ capacity respectively). This storage capacity was considered adequate for meeting population growth to 2030 but was not measured against agricultural needs. However, the water quality did not meet new surface water treatment requirements, and the south reservoir did not meet seismic standards. The upgrades required to fix the south reservoir were estimated at \$250,000 in 2011 dollar values.

The report acknowledges that the BCID owns two water licenses that allow for combined maximum daily diversions of up to 6,228 m³. The report also indicated that several recent upgrades were undertaken between 2005 and 2010 including pump upgrades, a new power supply, a standby generator, installation of analyzers for chlorine and turbidity, a SCADA system, and a bridge replacement. Despite these upgrades, computer modelling pointed out that the supply and distribution of water throughout the system did not

¹² Beaver Creek Improvement District Water Infrastructure Assessment. Koers & Associates Engineering Ltd (May 2011).

meet adequate pressures at peak hour demand and for fire suppression needs. In particular, the fire hydrants for two schools would not be able to offer adequate fire protection. The required distribution system upgrades would cost at least \$1.8 million in 2011 dollar values.

In summary, the report indicated that if the Beaver Creek Improvement District continued to provide water services via the Stamp River intake (McKenzie Rd pump station), there would \$4.8 million required for a new river intake and pump house and filtration plant in 2011 dollar values. Alternatively, if the BCID were to join the Alberni Valley Regional System the costs would be directed to new connections and capital supply system shares, which would total \$3.3 million in 2011 dollar values. Regardless of the option selected, an additional \$2 million in distribution and seismic upgrades will be required.

Agricultural Land Use Inventory (2016)

In the summer of 2016, the BC Ministry of Agriculture & Food and its partners conducted an Agricultural Land Use Inventory (ALUI) within the Alberni-Clayoquot Regional District¹³. ALUIs can be used to understand the type and extent of agricultural activities within the Agricultural Land Reserve (ALR) as well as inform Agricultural Water Demand Model reporting. The ALUI data quantifies how much land is currently used for agriculture, how much land is unavailable for agriculture, and how much land may have potential for agricultural expansion. Information regarding irrigation practices is also collected. The data provides baseline information that can be used to track trends in agricultural land use and to measure changes over time. The data also enables the estimation of agricultural water demand with the use of an irrigation water demand model.

There was 7,810 ha of ALR land surveyed for the ALUI report:

- 75% (5,383 ha) was in a natural or semi-natural state.
- 18% (1,312 ha) of the ALR (plus another 149 ha outside of the ALR) was being farmed.
- 7% (483 ha) was modified (buildings and roads)

97% of all of the cultivated land was forage and pasture. Other crops included Christmas trees, vines & berries, oats, vegetables, tree fruits, and nursery crops.

The availability of water delivery infrastructure and supply of water for irrigation are often requirements for growing high-value crops. Insufficient water supply or infrastructure can limit the potential to increase production. Irrigation information was captured by crop type and irrigation type to assist in informing an agricultural water demand model. Only 26% of the total cultivated land surveyed was using irrigation at the time of the inventory. Of the forage fields, only 35% were being irrigated. Giant gun systems were the most common irrigation type being used, found on 315 ha whereas sprinklers were being used on 41 ha. Only 9 ha was being irrigated by trickle irrigation systems.

¹³ Agricultural Land Use Inventory: Alberni-Clayoquot Regional District. Summer 2016. BC Ministry of Agriculture Strengthening Farming Program.

This suggests that there may be an opportunity to increase crop yields if irrigation practices can expand. At the same time, there may be a need to encourage methods of irrigation that can promote water conservation.

Beaver Creek Water System Infrastructure Assessment Update, Koers & Associates Engineering (2017)

This report provides a summary of the infrastructure that comprises the Beaver Creek Water System (BCWS), previously the BCID. In June 2014, the BCID became a local service area of the ACRD. Since that time, several improvements were made including water distribution main upgrades and the construction of the Kitsuksis Reservoir and the Strick Road pump station. This pump station provides the BCWS with potable water from the City of Port Alberni that meets VIHA's regulations. The Stamp River intake has been maintained by the ACRD for emergency purposes only. The capacity of the McKenzie Rd pump station was upgraded by installing higher volume pumps and a new power supply, which provides sufficient capacity to meet maximum day demands beyond 2035. Additional upgrades include a generator, analyzers for chlorine residuals and turbidity, and a SCADA system to monitor flow rate.

The system served approximately 2,800 people in 2017. There are three pressure zones associated with the system, which has over 46 km of PVC and asbestos cement water mains. In 2017 there were three storage reservoirs: Kitsuksis (new) with a volume of 816 – 1,111 m³, Kitsuksis (old) with a volume of 1,135 m³, and the North reservoir with a volume of 390 m³. This is a total of at least 2,341 m³ of water storage for the BCWS.

There are 990 service connections, of which 967 were active in 2017, which was up from 939 connections in 2005, representing a growth rate of 0.54%. In 2015, the total annual consumption was 261,413 m³.

The report concluded that the existing system is capable of providing peak hour demands and maintaining adequate pressure (280 kPa or 40 psi) through the water system with some minimal exceptions (in areas next to reservoirs or at elevations greater than 78 m). However, large sections of the system are not able to meet minimum fire flow requirements, and larger pumps will be required to rectify this. It was also determined that about 30% of the water was 'non revenue water' that is circulated during flushing or wasted in leakages. The report recommended implementing annual contributions of \$617 per lot for an infrastructure renewal plan.

Reactivation vs. Decommissioning Cost Review of the McKenzie Road Water Supply Pump Station (2020)

Koers & Associates Engineering Ltd. prepared cost estimates for the short-term emergency use of the pump station; the permanent emergency use of the pump station; and the decommissioning/removal of the pump station.

The report indicates that the pump station, located at 7690 Sportsman Rd, was constructed around 1959 when the Beaver Creek Improvement District (BCID) was incorporated. It is a small building, approximately 30 m². When operating, the pump station draws water from the Stamp River via an infiltration pipe buried

in the riverbed. The withdrawn water is discharged into a well below the pump station and then pumped into a distribution system. Historically, disinfection occurred via a connected chlorine gas system, however, this was removed in 2014 when the operation of the pump ceased and the Beaver Creek Water Service supply source switched to the City of Port Alberni via the Strick Road water booster station.

At the time of the report writing in 2020, the cost estimates were summarized as follows (all assume non-potable water requirements):

- Emergency use, short term (2-3 years): in the event of the loss of water from the City of Port Alberni: \$294,000 one-time cost plus \$10,000 per year for operation and maintenance.
- Emergency use, permanent (50 years): similar to the short-term costs but also includes funds to be included annually for asset management and replacement/renewal of the pump station building and equipment. \$861,000 one-time cost, due to required building improvements, plus \$10,000 per year for operation and maintenance and \$40,580 per year in contribution to a replacement fund.
- Decommissioning/removal: includes estimated costs associated with decommissioning and removing the pump station building: \$200,000 one-time cost. This includes demolition of the building and foundation above the well, filling the well with drain rock, backfilling the site, and removing the asphalt and concrete at the building site. Site restoration (topsoil and hydroseeding) was also included.

In 2020, the Beaver Creek Advisory Committee voted to recommend that the ACRD decommission the McKenzie Road Pump Station¹⁴.

While the pump station has not been demolished, the 2020 Beaver Creek Water System Annual Report indicates that the facility has since been operationally decommissioned¹⁵.

¹⁴ Beaver Creek Water Advisory Committee meeting minutes, Wednesday November 18, 2020.

¹⁵ Beaver Creek Water System [Annual Report, 2020](#). Alberni Clayoquot Regional District.

3.0 WATER POLICY AND LICENSING

The Provincial government plays the primary role in water resource management, particularly through the *Water Sustainability Act* (WSA) which came into effect in 2016. The WSA provides for the licensing of activities including the use, diversion, and storage of water, for both surface water and ground water.¹⁶ Farm operators must apply for water licenses to secure groundwater and surface water rights for irrigation and livestock watering. Typical purposes associated with agriculture in the WSA include “irrigation,” “storage,” “livestock and animal,” “crop harvesting, protection and composting” and “greenhouse and nursery.” Farm operators have been encouraged to apply for water licenses to secure groundwater and surface water rights.

The WSA also provides local governments with the ability to undertake Water Sustainability Plans, which may include a designation for “dedicated agricultural water,” also known as agricultural water reserves. This allows the water sustainability planning process to prioritize or establish unique rules for agriculture, which will be particularly useful when considering how reductions in water use will be handled through drought planning and management.

3.1 WATER AUTHORIZATIONS¹⁷

If agricultural operators were already using water from a well before March 1, 2016, they had until March 2022 to apply for a water license to secure their water rights. If groundwater use began on or after March 1, 2016, the producer is considered as a “new user” and they must apply for a water licence before they can lawfully begin diverting and using groundwater.

There are a limited number of situations where an authorization is not required.¹⁸ These include:

1. If a producer intercepts water before it enters a stream or the ground. For example, water is collected from a greenhouse roof or barn roof and stored in a reservoir or tank, OR surface runoff collected from a property during spring freshet flows and stored in an impermeable dugout (See Figure 2).
2. Producers obtaining water from a water purveyor or an irrigation district. The water purveyor holds the licence with the Province in this situation and producers are covered under their licence. Water may be delivered through a piping or ditch network by the water purveyor.
3. Tanks or reservoirs that are filled with water provided by a water purveyor.

Livestock Watering

Livestock watering is defined as an “industrial” water use purpose and all industrial livestock watering requires a water authorization under the WSA. All livestock producers using surface water require water authorization. A person who takes water without authorization has no legal standing to use the water. If drought or water scarcity occurs, unauthorized users are the first to be ordered to cease diverting water.

¹⁶ Government of British Columbia. 2016. Water Sustainability Act.

¹⁷ Licensing Groundwater in B.C. Questions and Answers on Livestock Watering and Dugouts. Government of BC. Nd.

¹⁸ WATER LICENCES FOR AGRICULTURE. Water Supply Factsheet. Ministry of Agriculture and Food. 2021.

This requirement to licence surface water for livestock watering purposes was in place under the former *Water Act* and remains so under the WSA.

Dugouts

An authorization under the WSA is needed if any of the water in the dugout comes from groundwater or a “stream” as defined under the WSA. The WSA definition of a stream is very broad. It covers any natural watercourse or body of water, whether or not it was modified, and even where water is only available seasonally. An authorization can be a water licence or use approval. A water licence is long-term, while a use approval is for shorter-term use of up to 24 months.

An authorization is needed for a dugout that:

- 1) has groundwater seepage or water that comes from a well. A dugout likely has groundwater seepage, unless it has an impermeable liner or was constructed with impermeable material that does not allow for any seepage (e.g., clay or bentonite clay), OR;
- 2) In any way intercepts or is built within a stream (as defined under the WSA).

An authorization for a dugout is not required if:

- 1) The diversion, use, or storage is exempted by legislation (e.g. the diversion of water while fighting a fire or the use of groundwater for domestic purposes); OR,
- 2) The dugout fills entirely from precipitation or runoff and is impermeable.

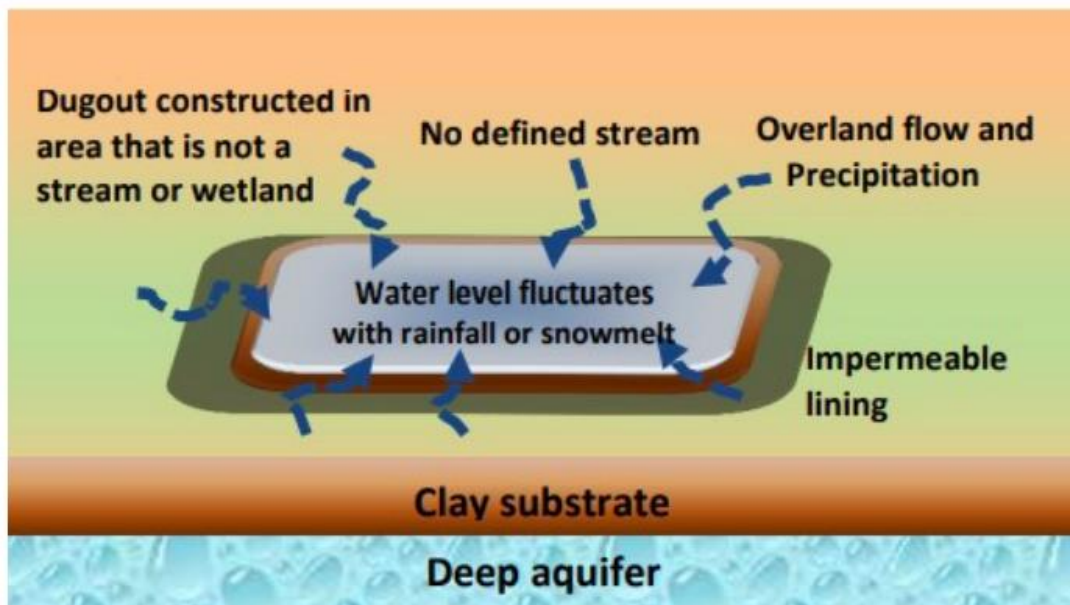


Figure 2. Dugout that does not require an authorization.¹⁹

¹⁹ Licensing Groundwater in B.C. Questions and Answers on Livestock Watering and Dugouts. Government of BC. Nd.

4.0 CLIMATE CHANGE PROJECTIONS

Responding to weather changes and weather-dependent planning are critical for producers. Adapting to climate change, however, involves a more systematic assessment and coordinated response from all food system participants. Agriculture is highly vulnerable to changes in climatic conditions and even small shifts could have significant consequences for farm viability and food production.

The ACRD has a higher average summer maximum temperature than all other regions on the Island.²⁰ Projected warming is consistent across the coastlines and valleys of the ACRD even when baselines vary with topography.²¹ The ACRD receives the largest amount of annual rainfall on Vancouver Island (mostly on the west coast); climate change modelling predicts an overall increase in annual precipitation of 5% by the 2050s²² with this concentrated on the coastline and mountains. Agricultural regions in the Alberni Valley receive considerably less precipitation and drought conditions arise in summer months, with local groups having expressed the need for a water strategy.²³ Projections show both increasing and decreasing precipitation seasonally; increases are expected to occur in winter months in the form of rainfall, with decreases in summer rainfall and winter snowfall, changing the water holding capacity and hydrological systems.²⁴

For the ACRD, climate projections from the *BC Agriculture & Climate Change Vancouver Island Regional Adaptation Strategies* suggest significant increases in temperature as early as the 2050s: overall reduced snowfall in winters with increased precipitation as rain, and an extension of the productive season through increased growing degree days and frost-free days.²⁵ Table 1 offers a more detailed look at the current projections for Vancouver Island inclusive of the ACRD.

Table 1. Climate Projections for Vancouver Island in the 2020s, 2050s, and 2080s.²⁶

Characteristic	Season or Annual	2020 change from 1961-1990 baseline	2050 change from 1961-1990 baseline	2080 change from 1961-1990 baseline
Temperature	Annual Average	+1.3°C	+2.6°C	+4.2°C
Precipitation	Spring	0%	+2%	+5%

²⁰ BC Agriculture & Food Climate Action Initiative. 2020. Vancouver Island Adaptation Strategies. BC Agriculture & Food Climate Action Initiative. Accessed October 2024

²¹ Ibid.

²² Ibid.

²³ Ibid.

²⁴ Climate and Agriculture Initiative BC. Regional forecasting. Accessed October 2024.

²⁵ BC Agriculture & Food Climate Action Initiative. 2020. Vancouver Island Adaptation Strategies. BC Agriculture & Food Climate Action Initiative. Accessed October 2024

²⁶ Adapted from the BC Agriculture & Food Climate Action Initiative Vancouver Island Adaptation Strategies 2020, accessed October 2024.

Characteristic	Season or Annual	2020 change from 1961-1990 baseline	2050 change from 1961-1990 baseline	2080 change from 1961-1990 baseline
	Summer	- 7%	-13%	-22%
	Fall	+4%	+12%	+20%
	Winter	+5%	+4%	+12%
Growing Degree Days	Annual	+308 degree days	+660 degree days	+1154 degree days
Frost-free days	Annual	+28 days	+48 days	+67 days

These climate changes are likely to increase the risk of extreme precipitation events and extreme heat events.²⁷ Regional precipitation that was previously a mix of snow and rain is projected to become exclusively rain. This impacts snowpacks and will alter surface water and groundwater resources.²⁸ Warmer and drier summer conditions are a key concern in correlation with increasing precipitation and extreme rainfall events. Potential impacts to agriculture specifically related to water resources from these changing environmental conditions are described in Table 2.

*Table 2. Climate change conditions and impacts to agriculture within the ACRD.*²⁹

Climate Change Conditions and Impacts	Potential Agricultural Impacts
Warmer and drier summer conditions	<ul style="list-style-type: none"> - Decrease in productivity and quality of crops and livestock under water stress - Reduction in water supply during times of high demand - Surface water sources are at risk and secure access to alternate sources is necessary - Adjacent forestry activities use impacting watershed and increasing water runoff
Increasing precipitation and variability of precipitation (especially in winter)	<ul style="list-style-type: none"> - Increase in crop losses and risk due to unpredictable frost timing and extreme precipitation events - Increase in soil erosion and moisture management challenges due to altered precipitation patterns

²⁷ Ibid.

²⁸ Ibid.

²⁹ Pacific Climate Impact Consortium. [Plan 2 Adapt – Alberni Clayoquot](#). Accessed October 2024.

Climate Change Conditions and Impacts	Potential Agricultural Impacts
	<ul style="list-style-type: none"> - Interruptions to pollination - Increase in nutrient and input leaching
Increase in extreme weather events (rain events, extreme heat)	<ul style="list-style-type: none"> - Decrease in productivity and quality of produce - Increase in building maintenance and damage costs - Increase in cooling and ventilation costs - Interruptions to regional infrastructure, utilities and supply lines - Impacts on livestock health and productivity - Increase in waterlogged soil

More extreme weather events and longer drier summers with less snowpack availability threaten agricultural production in the region over the next 30 years. An integrated response plan from all food system participants inclusive of water is critical to successfully adapt to the changing climate.

5.0 NEXT STEPS

Several activities will occur in the coming months to complete the Agricultural Water Plan.

- 1) A water demand scenario will be created for the Alberni Valley. This scenario will estimate the current agricultural water needs and project future water needs under various climate and crop/livestock production scenarios.
- 2) Continued engagement with the agricultural community, Tseshah First Nation and Hupačasath First Nation will occur. Site visits will take place in the spring to discuss the project and evaluate the current agricultural water supply infrastructure.
- 3) Technical assessments of water supply options will be completed, along with mapping.
- 4) A final Agricultural Water Plan report will be developed, bringing all information together into concise, practical recommendations to improve water supply for agriculture in the Alberni Valley.