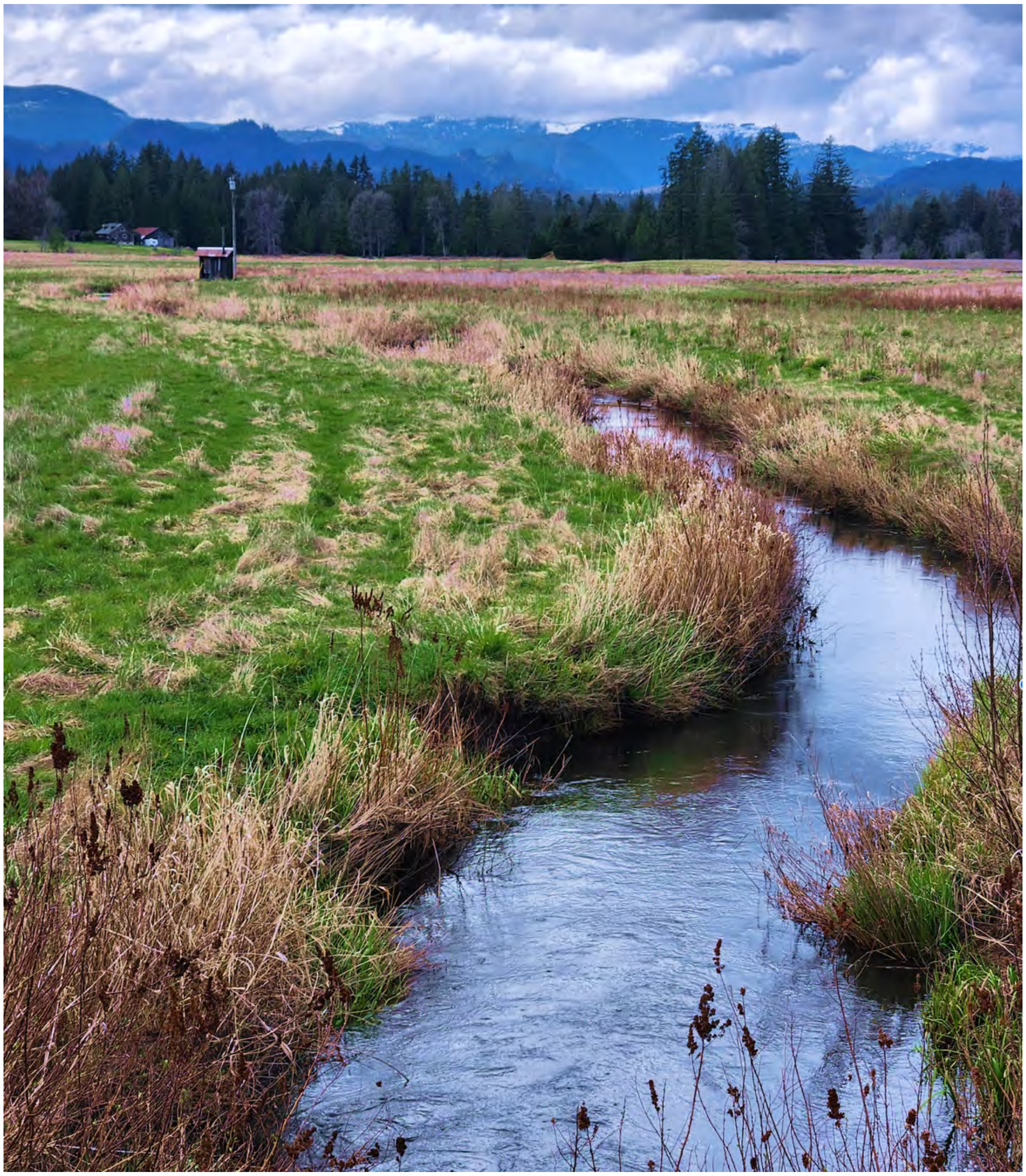
Alberni Valley

Agricultural Water Plan



2025

ALBERNI-CLAYOQUOT REGIONAL DISTRICT

upland agricultural consulting

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LAND ACKNOWLEDGEMENT

Alberni-Clayoquot Regional District serves the communities of the central and west coast of Vancouver Island located on the ḥahahuułi (traditional territories) of the Nuu-chah-nulth Nations of Ahousaht, Ditidaht, Hesquiaht, Hupačasath, Huu-ay-aht, Tla-o-qui-aht, Toquaht, c̓išaaʔatḥ (Tseshaht), Uchucklesaht, and Yuułuʔiłʔatḥ. 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.

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ALBERNI-CLAYOQUOT REGIONAL DISTRICT

DELIVERED BY:

Investment Agriculture Foundation

FUNDING PROVIDED BY:

BRITISH COLUMBIA

Canada

ACRONYMS

AAFC	Agriculture and Agri-Food Canada
ACRD	Alberni-Clayoquot Regional District
ADC	Agricultural Development Committee
AF	Ministry of Agriculture and Food
AFI	Alberni Farmers' Institute
ALUI	Agricultural Land Use Inventory
ALR	Agricultural Land Reserve
AWDM	Agricultural Water Demand Model
BCWS	Beaver Creek Water System
CAWS	Council for Agricultural Water Supply
CCWWD	Cherry Creek Waterworks District
FSEP	Food Security Emergency Plan
Ha	Hectare
HFN	Hupačasath First Nation
IH	Island Health
M	Million
m^3	Cubic Metres
PMFLA	Private Managed Forest Land Act
PRV	Pressure Reducing Valve
OiC	Order in Council
QEP	Qualified Environmental Professional
TFN	Tseshaht First Nation
TPO	Temporary Protection Order
WLRS	Ministry of Water, Lands and Resource Stewardship
WSA	Water Sustainability Act
WUC	Water Users' Community

1.0 Introduction

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 watering, and food processing is essential to ensure the agricultural sector's success and to be able to support community food security goals.

At the same time, the Province of BC has introduced the *Water Sustainability Act* (WSA), which restricts the use and/or diversion of water resources through the requirement of licensing and authorizations. Those who are currently farming, or who are interested in getting involved in agriculture, indicate that water access and water supply are key deciding factors when considering whether to start a new farm or to expand an existing operation. If a parcel of farmland does not yet have a water licence associated with it for irrigation, then one must be obtained from the provincial government, and this process can be onerous and take a long time (often years). Without a licence, it is still possible to harvest rainwater or snow that has not yet entered a stream, but this limits irrigation water source options. Furthermore, even if a water licence is granted, there is no guarantee that the water supply will be available year-round, particularly during the summer or fall when irrigation needs are highest and when water supply is lowest. In some cases, producers may be asked to curtail irrigation activities during periods of extreme drought through a Temporary Protection Order (TPO) issued by the province. In addition to ecosystem needs, a growing population base across the region is also influencing water management plans and the availability of water for agricultural purposes.

The Somass River watershed is held as sacred by both Tseshaht and Hupačasath First Nations, as it is listed in both of their traditional territories and has been accessed for both food and ceremonial purposes since time immemorial[1,2]. Therefore, any large-scale project(s) as discussed within this report would require support and partnership with both Nations.

1.2 Scope and Objectives

Two of the goals set forth in the *Alberni Valley Agricultural Plan* (2011) speak directly to the objectives of this project: Goal 7*: Improve the Productivity of the Land Base* and Goal 12: *Increase the Availability of Water for Agriculture*. The ACRD received funding through the Investment Agriculture Foundation BC’s Agricultural Water Infrastructure Grant Fund to develop this *Agricultural Water Plan* for the Alberni Valley. It has been developed within the evolving context of First Nations rights and title, provincial legislation, local government jurisdiction, and an overall desire to support and sustain the agricultural community.

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[1] Tseshaht Land Use Plan, 2023. https://tseshaht.com/land-use-plan/

[2] Hupačasath First Nation Traditional Territory. Website accessed October 2025.

The project's scope includes identifying and quantifying agricultural water opportunities within Electoral Area 'B' - Beaufort, Electoral Area 'D' - Sproat Lake, Electoral Area 'E' - Beaver Creek, Electoral Area 'F' - Cherry Creek, and the City of Port Alberni. Land in the Agricultural Land Reserve (ALR) and non-ALR land that may have agricultural viability based on soil classification were considered within the scope of analysis (see Section 3 for more details). A mix of irrigation equipment types, based primarily on crop feasibility and viability, were also included in the modelling. Table 1 (following page) provides a summary of the water supply options that were included in this review, along with notes as to which section of the report provides information about each option.

2.0 METHODOLOGY

2.1 REVIEW OF EXISTING REPORTS AND DATA

Over the past several years, the ACRD has commissioned several plans, studies, and other documents that have established a body of knowledge regarding agriculture and water in the Alberni Valley. These are summarized in detail in the accompanying *Background Report*. Key among them include:

- Alberni Valley Agricultural Plan (2011);
- Alberni Valley Agricultural Land Use Inventory (2016);
- Alberni Valley Council for Agricultural Water Supply (CAWS) *Water Supply and Producer-Led Watershed Data Collection Project* report (2023);
- Studies by Koers & Associates Engineering regarding Alberni Valley Regional Water System Assessment, Beaver Creek Improvement District Water Source Options, and Infrastructure Assessments, and associated updates (1995, 2010, 2011, 2017, 2020);
- Studies by EBA Engineering Consultants, and GW Solutions Inc. regarding groundwater supply options within the Beaver Creek Improvement District (2005, 2008);
- Cherry Creek Waterworks District Conversion Study (2023); and
- Technical memos concerning Beaver Creek Water System Groundwater Feasibility Assessment; Surface Water Feasibility Assessment; and Final Report by McElhanney Consultants (2025).

In addition to hydrological reports, climate change data was also examined. The ACRD has a higher average summer maximum temperature than all other regions on the Island.[3] Projected warming is consistent even when baselines vary with topography. The ACRD's climate change modeling predicts an overall increase in annual precipitation of 5% by the 2050s[4] but agricultural regions in the Alberni Valley will receive considerably less precipitation and drought conditions continue to arise during summer. Projections show 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.[5]

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

[4] Ibid.

[5] Climate and Agriculture Initiative BC. Regional forecasting. Accessed October 2024.

Table 1. Water supply options assessed in this report.

Water Option	Key Areas / Communities	Notes
Establishment of regional water storage options (reservoirs).	All Electoral Areas	This is covered in Section 5.1.
Diversion from natural reservoirs (e.g. Great Central Lake and/or Sproat Lake).	All Electoral Areas	This is covered in Section 5.2 and in Section 6.2.
Partnering with existing licence holders to share water allocation.	All Electoral Areas	This is covered in Section 5.3.
Creation of an irrigation district through the phased installation of pipes/canals to agricultural land in the Beaver Creek electoral area and subsequent expansion to ALR land in the Cherry Creek, Beaufort, and Sproat Lake electoral areas.	All Electoral Areas	The Province (WLRS) indicated early on in the engagement process that an irrigation district was unlikely to be approved. Therefore, the report includes options on irrigation infrastructure that can be shared by a group of users (Water Users Community) instead, as described in Section 6 and Section 8.
Reactivation of the McKenzie Road Pump station for non-potable agricultural water use.	Electoral Area 'E' – Beaver Creek	This is explored in Section 6.3.
Redesignation of the Stamp River water licence 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.	Electoral Area 'B' – Beaufort and Electoral Area 'E' – Beaver Creek	The Province (WLRS) indicated that redesignation of the license is not a necessary step, and the ACRD can use the water allocation however it deems to be appropriate. This is covered in Section 6.3.
Expansion of groundwater wells for irrigation purposes.	All Electoral Areas	This option was ruled out of scope early on in the project based on results from previous engineering assessment reports, which indicated low feasibility. This is further discussed in Section 4.1.
Use of on-farm water storage (dugouts) and/or changes to production methods.	All Electoral Areas	This is first covered in Section 6.1 and then more details are provided in Section 7.
Development of a new ACRD Agricultural Water Supply service for one or more electoral areas, including the costs associated with the system and the approval of the service via referendum.	All Electoral Areas	This is considered in Section 8 (Governance).

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 and an extension of the productive season through increased growing degree days and frost-free days.[6] The Pacific Climate Impacts Consortium has created a community climate summary that indicates that temperatures in the Alberni Valley will continue to increase over the next few decades (Figure 1)[7]. Although precipitation is expected to rise during the fall by up to 20% it will likewise decrease by 17% in the summer months.

TEMPERATURE:	Recent Past *1981-2010*	2050s *2041-2070*	2080s *2071-2100*
AVERAGE TEMPERATURE	9.2°C	11.6°C	13.7°C
HOTTEST DAY	31.4°C	34.7°C	37.3°C
NUMBER OF DAYS ABOVE 27°C	14 days	43 days	72 days
DAYS WITH HUMIDEX >30	10 days	32 days	57 days
HEATING DEGREE DAYS	3259	2550	2082
COOLING DEGREE DAYS	45	215	465
FROST DAYS	76 days	28 days	10 days
PRECIPITATION:			
ANNUAL PRECIPITATION	2217 mm	2352 mm +6%	2485 mm +12%
FALL PRECIPITATION	693 mm	772 mm +11%	835 mm +20%
SUMMER PRECIPITATION	135 mm	116 mm -14%	112 mm -17%
MAX PRECIPITATION IN A DAY	63 mm	72 mm +14%	78 mm +24%
WET DAYS ≥ 20 MM	31 days	35 days	38 days
OTHER:			
FIRE SEASON LENGTH	256 days	312 days	344 days

Figure 1. Climate projections for the Alberni Valley (source: PCIC, 2025).

Regional precipitation that was previously a mix of snow and rain is projected to become exclusively rain, reducing snowpacks and altering groundwater resources.[8] Warmer and drier summer conditions are a key concern in correlation with increasing precipitation and extreme rainfall events. These impacts are already being borne out, as evidenced from precipitation data collected from the Alberni Valley Airport[9] between

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

[7] The PCICS summary was derived from data retrieved from climatedata.ca under high emissions scenario SSP5-8.5 for Census Subdivision Alberni Clayoquot Area 'E' – Beaver Creek. Snowfall data was retrieved from Plan2Adapt.

[8] Ibid.

[9] Alberni Airport monthly precipitation, historical data. Website accessed September 2025. https://portalberni.weatherstats.ca

2015 and 2025, which shows lower monthly precipitation events in the winter and spring, reducing base flows and leading to summer and fall seasons that are set up for drought conditions (Figure 2).

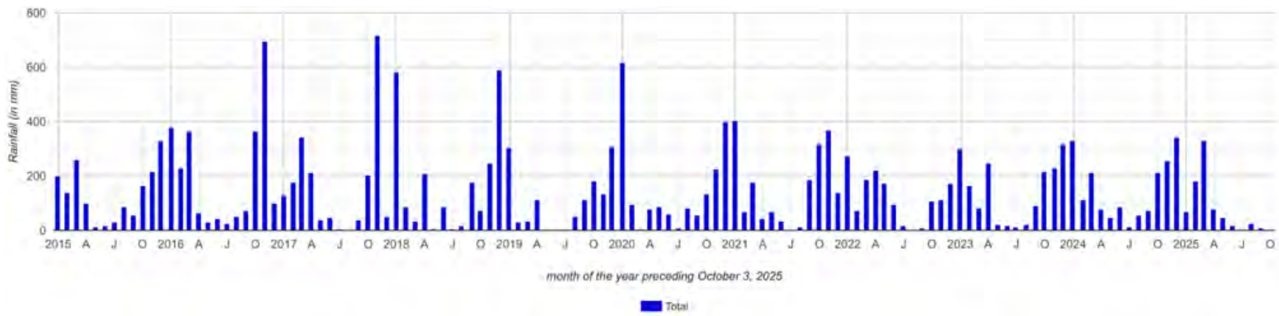

Figure 2. Monthly precipitation (mm) measurements at the Alberni Valley Airport from 2015-2025.

2.2 Engagement

In addition to reviewing existing reports, it was important to gather input from the agricultural community, First Nations communities, local and provincial government staff, and other key knowledge-holders.

Several methods of engagement were used to build an understanding of issues, opportunities, and constraints regarding regional and agricultural water supply and demand. Details of the engagement and feedback is documented in the accompanying *Agricultural Water Plan What We Heard Report*. The timeline of meetings is illustrated in Figure 3. The period of engagement began in late summer 2024 and was completed in the fall of 2025. Key engagement activities included a survey, in-person meetings, delegations, and farm site tours.

All feedback was incorporated into the assessment of water supply options described in this report.

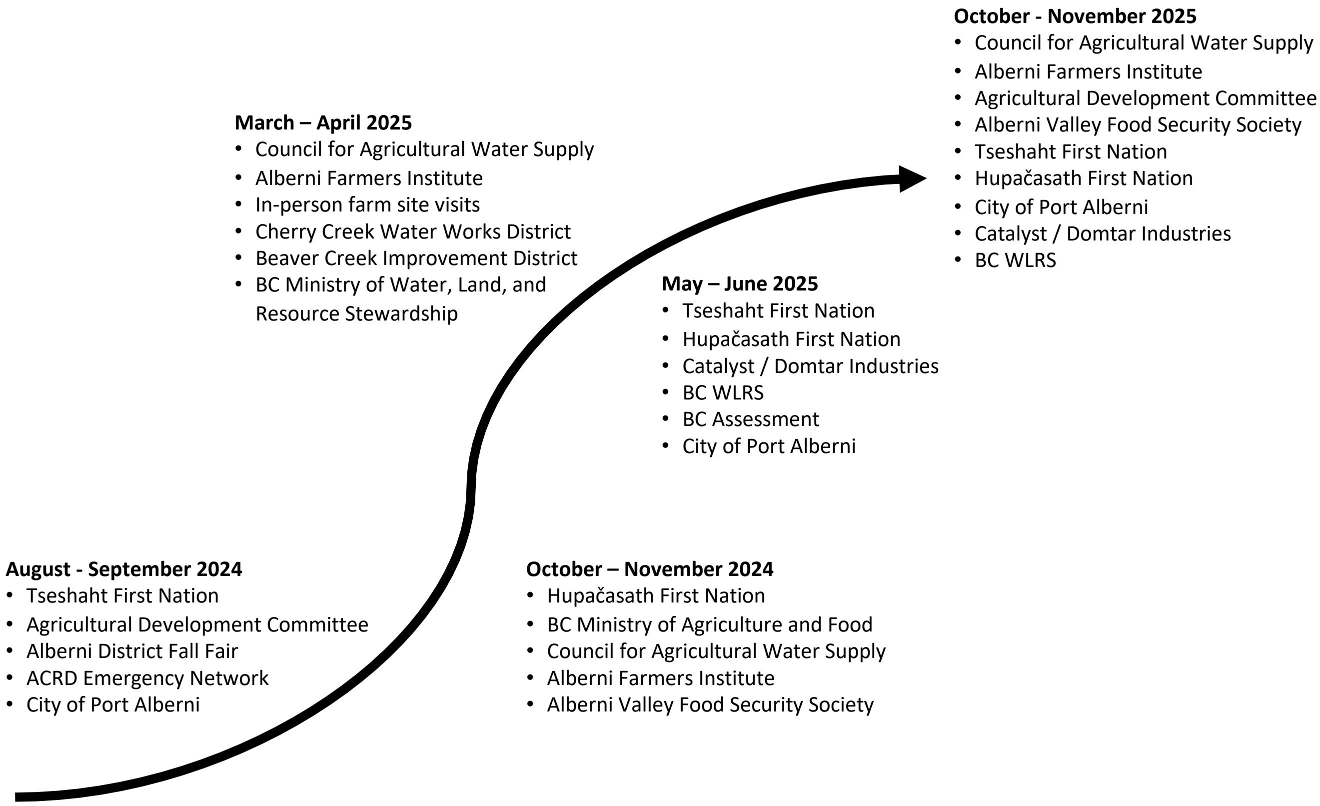

Figure 3. Timeline of engagement on the Agricultural Water Plan project.

2.3 Agricultural Activities in the Alberni Valley

In 2016, the Alberni Valley was assessed by the BC Ministry of Agriculture and Food (MAF) through and Agricultural Land Use Inventory (ALUI). The assessment indicated that there are 7,776 ha of ALR in the ACRD, which includes fertile valley bottoms (1,312 ha).[10] Three-quarters (5,383 ha) of ALR was not being farmed and was in a natural or semi-natural state (Figure 4).[11] While the ALR in a natural state can be important to preserve ecosystem functioning, it also presents an opportunity for agricultural expansion in the region. In 2016, forage and pasture were the most common crop accounting for 97% of all cultivated land.[12] The Statistics Canada Agricultural Census in 2021 also showed that beef and hay farms dominated the area, however there are a variety of farm types, which speaks to the potential diversity of livestock being produced and crops that are being grown (Table 2). Agricultural production in the Alberni Valley is only somewhat reliant on irrigation: only 26% (365 ha) of the cultivated land was found to be utilizing irrigation in 2016.[13] Over one-third (35%) of forage fields were irrigated, while only 2% of pasture fields were irrigated. Giant gun systems were by far the most common irrigation type (86%), followed by

[10] Ministry of Agriculture. Agricultural Land Use Inventory Alberni-Clayoquot Regional District. 2016.
[11] Ibid.
[12] Ibid.
[13] Ibid

sprinklers and then a limited use of trickle systems. In the 2021 Agricultural Census, similar results were found: 15 farms reporting irrigation on a combined total of 361 ha[14].

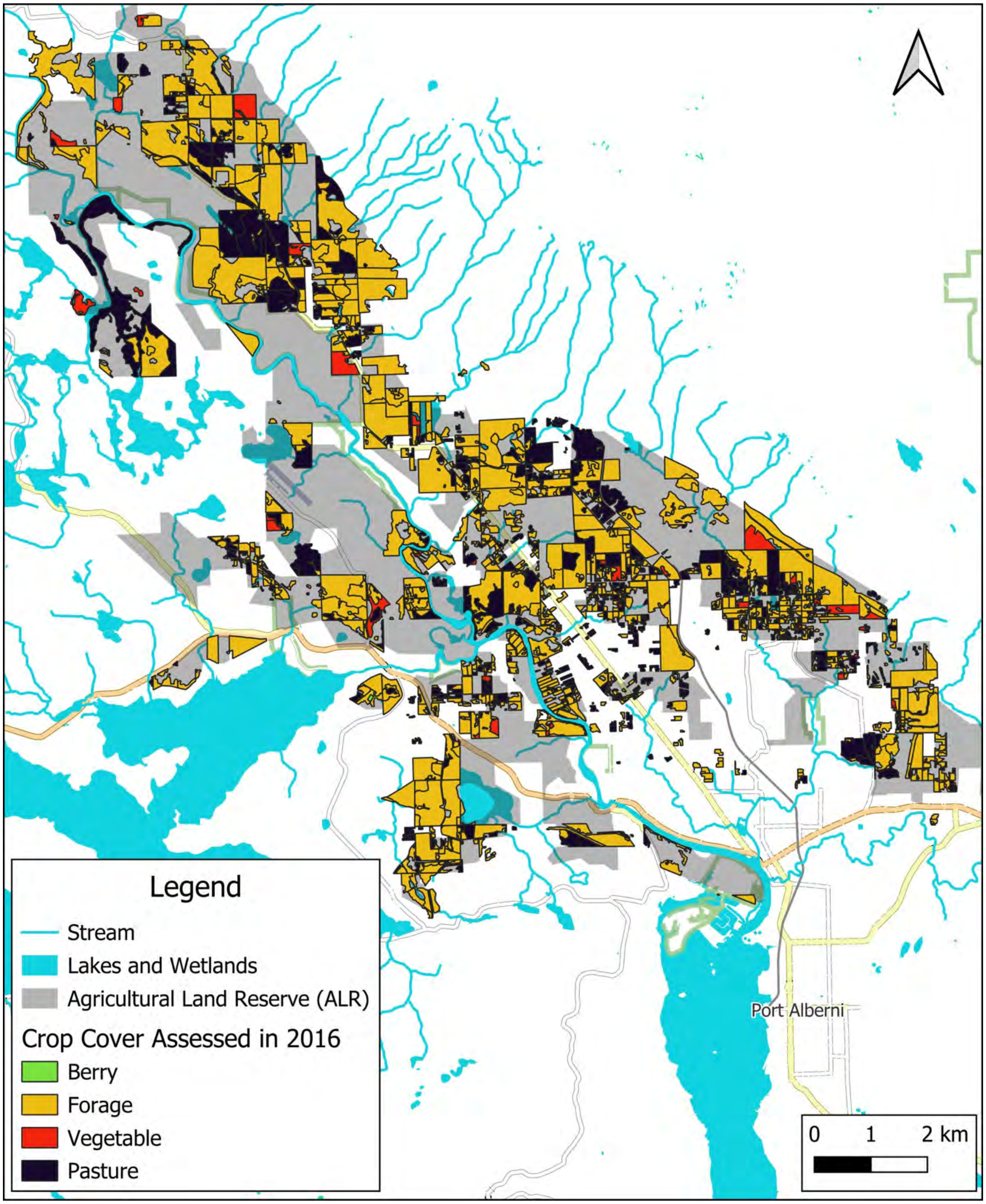

Figure 4. Major crop types indicated via the Agricultural Land Use Inventory (source: MAF, 2016)

[14] Statistics Canada. [Table 32-10-0368-01 Land inputs, manure and irrigation, Census of Agriculture, 2021]

Table 2. Number of each type of farm in ACRD in 2021. [15]

	2021	
	# of farms	%
Total	**76**	**100**
Beef cattle	14	18
Hay	13	17
Animal combination	11	14
Poultry and egg	8	11
Horse and equine	5	7
Apiculture	5	7
Vegetable	4	5
Fruit, grapes, tree nuts	3	4
Sheep	3	4
Goat	2	3
Crops under cover	2	3
Dairy cattle	1	1
Nursery	1	1
Maple syrup	1	1
Other crop farming	3	4

The BC Assessment farm class data is another source of information to provide an overview of current agricultural activities.[16] The data provides details about the number of commercial farm operations within the ACRD (Table 3, next page).[17] There are 150 parcels of land with farm tax class in the ACRD as determined by BC Assessment. Parcels are classified based on their predominant use.

Input from members of the Alberni Farmers Institute indicates that there has been an overall decline in some types of farming over the last ten years, particularly dairy farming and larger livestock operations. This decline may be somewhat tied to retirement and lack of succession planning within the local agricultural community. The average age of farmers in the region is 60, and 85 farm operators are currently over 55 years old.[18] At least 75% of existing farms in the region report that they do not have succession plans.[19]

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[15] Statistics Canada. Table 32-10-0231-01 Farms classified by farm type, Census of Agriculture, 2021

[16] The *Assessment Act* is administered by BC Assessment, a provincial Crown Corporation responsible for the classification of properties in for property tax purposes. Farm classification will only be granted if the land (or a portion of it) is being actively used for agriculture. Farm status may or may not include ALR properties. A minimum amount of gross income must be produced from the agricultural production, and vary depending lot size.

[17] BC Farm Tax Assessment parcel data, 2023. BC Assessment.

[18] Statistics Canada. Table 32-10-0381-01 Characteristics of farm operators: Age, sex and number of operators on the farm, Census of Agriculture, 2021

[19] Statistics Canada. Table 32-10-0244-01 Succession plan for the agricultural operation, Census of Agriculture, 2021

Table 3. Number of parcels assessed as farm tax class in ACRD in 2023.

Farm Type	Number of Parcels
Other	56
Grain & Forage	27
Mixed	24
Beef	17
Dairy	12
Vegetable	5
Poultry	3
Small Fruits	2
Tree Fruits	1
Total	**147**

*Note: "Other" farm type indicates that the classifications of BC Assessment aren't applicable and could include activities such as apiculture, floriculture, and other activities. "Mixed" farm type is used when there is no predominant form of agriculture, particularly on a small farm which has several ongoing activities used to meet the requirements of the farm tax classification standards.

A summary of agricultural characteristics is provided in Figure 5 (following page).

While the level of agricultural production is constantly in flux and is influenced by a variety of factors, the impact of drought and uncertainty of water access in the future arose as a key concern in the work conducted in 2023 (*Water Supply and Producer-Led Watershed Data Collection Project*) and in a survey that was distributed amongst the farming community in 2025.

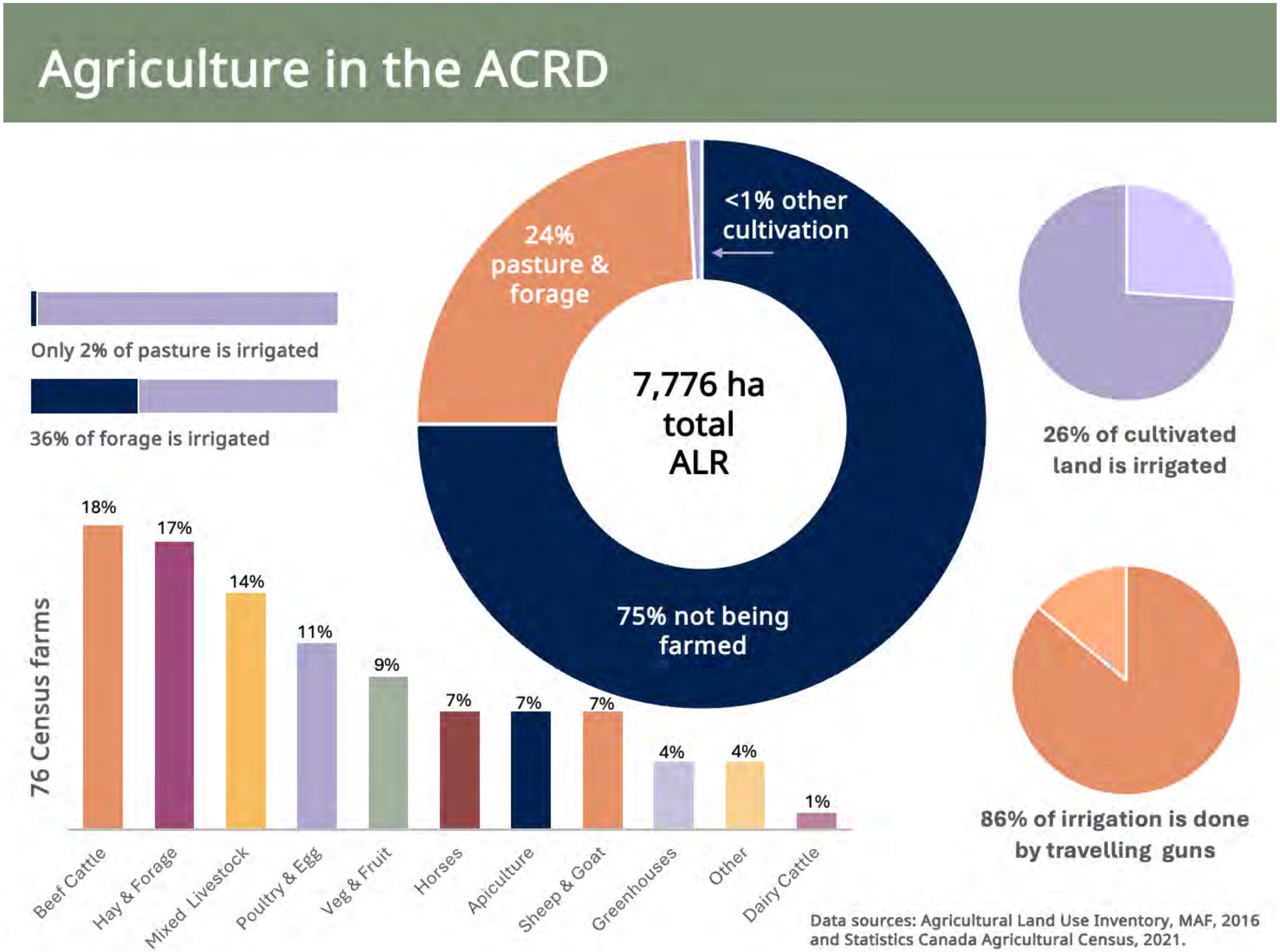

Figure 5. Agricultural characteristics of the ACRD.

2.4 The Agricultural Water Demand Model

The BC Ministry of Agriculture and Food's Agricultural Water Demand Model (AWDM) was used in conjunction with cropping and irrigation equipment scenarios to determine the volume of irrigation water that may be required in the future, if all arable land in the Alberni Valley were to come into agricultural production.

The AWDM was first developed for use in the Okanagan watershed in 2004[20]. It was initiated in response to rapid population growth, increasing drought conditions, and the need for a plan to meet anticipated water needs from urban and rural users. Climate change scenarios developed by the University of British Columbia and crop water needs data from Agriculture and Agri-Food Canada's (AAFC) Summerland Research and Development Centre were used to predict increases in agricultural water demand due to warmer, drier, and longer summers in the Okanagan. Over the past 20 years, this initial modeling has been further refined for use in other regions of the province. Individual landowners can now access a website-based version of the AWDM online to determine current and future water needs for their farms using the BC Water Calculator.[21] At a community-scale or regional scale, the AWDM uses current and future agricultural water demand to calculate water use on a property-by-property basis and sums the demand for each property across the wider region to obtain a total peak water demand for the entire basin or each sub-basin. Data on crop type, livestock, irrigation system type, soil texture and climate can be inputted and used to calculate the peak water demand.

For the purposes of this project, the AWDM was run as a means of determining the gross peak demand for irrigation water assuming all lands within the Alberni Valley with the potential for agriculture were cropped and irrigated. While livestock watering was not included in the calculations at the regional level, it was considered when exploring examples of dugout needs at the farm level. The rationale for omitting livestock watering demand at the regional level is that it is a very small proportion of water use when compared with crop irrigation. The AWDM was applied to land that fit within the characteristics described in Section 2.4.1. This provided a "wide net" approach so that a gross estimation of potential future water demands for agriculture could be calculated. The criteria that were applied resulted in volume estimates that are not considered to be conservative. Additional details regarding the AWDM methodology is provided in the Appendix and is summarized in the AWDM factsheet[22].

2.4.1 Scenario Development Criteria

The following criteria were applied to ensure that the modelling results encompassed all possible future agriculture and food production land use scenarios: agricultural capability, parcel size, land activity, and land area. Each are further described below:

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[20] BC Ministry of Agriculture Factsheet 500.320-2 dated September 2015

[21] BC Water Calculator: https://bcwatercalculator.ca/

[22] Agricultural Water Demand Model Fact Sheet, 2015. BC Ministry of Agriculture and Food.

Agricultural Capability

> This scenario approach allows for the model to estimate the amount of water that would be required in the future to irrigate a mix of crop types, using applicable irrigation equipment, if all arable land was in production. Therefore, it is not reflective of *current* irrigation water demand.

The Canada Land Inventory (CLI), developed in the 1980s, applies agricultural capability ratings for soils across Canada. There are seven classes of capability, with Classes 1-3 considered the best for agriculture (or "prime") and Classes 4-6 considered "marginal". Class 7 is generally applied to waterbodies, rocky outcrops, steep slopes, or other locations where agriculture is not viable. While Classes 4-6 are considered marginal, they can be excellent for forage crops and specialty crops (such as fruit and nut trees). Each soil polygon mapped includes a CC rating (unimproved conditions) and an IC rating (improved conditions). The IC rating indicates whether the classification could be improved if certain management practices were applied to mitigate any limitations that have been identified. These practices may include drainage, irrigation, stone removal, etc. For the purposes of building the irrigation scenarios for the AWDM in the Alberni Valley, all soils that fall within the CC (unimproved) classification range of 1 – 5 were selected, whether they are within the ALR or not. The mapping data was obtained from publicly available digital soils mapping via the BC Soil Information Tool Finder (BC SIFT). The key rationale for including Class 4 and Class 5 soils is that they are instrumental for producing perennial forage crops.

Parcel Size

A range of land parcel sizes are found within the Alberni Valley. The largest parcels are in the rural areas of the electoral areas, whereas the smaller parcels tend to be found within the City of Port Alberni and rural residential areas. For the purposes of the AWDM, a minimum parcel size threshold of 0.25 acres (0.10 ha) was selected. The rationale for this parcel size is that a quarter acre of land can provide for a substantial food-producing garden at the household level (and thus contribute to food security), even when accounting for the residential footprint. Any parcels smaller than 0.25 acres were ruled out as they were considered to be urban residential lots. Proximity to water, land ownership and elevation data were not considerations for the AWDM model run.

Land Activity

The inputs to the AWDM include land that may or may not be currently farmed. However, any land that was currently being used for commercial, industrial or institutional uses was omitted. The rationale for omitting these parcels is that even if they are large, in practice they rarely revert from non-agricultural to agricultural uses over the long term. Some of these properties occur within the ALR.

2.4.2 Scenario Land Area Modeled

The total area included in the model measured approximately 175 km^2. It represents a range of proportions of each Electoral Area and the CPA (Table 4). This is equivalent to about 10% of the entire ACRD.

Table 4. Land area modeled under each subarea of the ACRD (source: Statistics Canada and AWDM).

Electoral Area	Total Area (km^2)	Area Modelled (km^2)	Area Modelled (% of total area)
Area 'B' – Beaufort	92.2	47.1	51.1%
Area 'D' – Sproat Lake*	1,398.9	62.3	4.5%
Area 'E' – Beaver Creek	21.9	19.3	88.1%
Area 'F' – Cherry Creek	186.5	38.6	20.7%
City of Port Alberni	19.5	8.1	41.5%
Total Area Modelled	**1,719.0**	**175.4**	**10.2%**

*Note: While much of the northern part of Electoral Area 'D' – Sproat Lake is mountainous terrain, it is an important component of the Great Central Lake watershed and therefore some of it was included in the initial analysis. However, for presentation purposes only a subset of the relevant arable area is included in the maps in this report (e.g. Figure 6, following page). During the feasibility assessment, Electoral Area 'D' – Sproat Lake was further partitioned into two subareas (North and South) where the dividing line between the two is the Sproat River. This division was done since the Electoral Area D has significant, but different, irrigation water source options in the north and south of the area.

2.4.3 Scenario Climate Models and Associated Data

Climate models were used to determine future water demands out to year 2050. The models used in the AWDM have been refined over several years through water demand modelling of numerous areas throughout the province[23]. The base climate dataset (minimum, mean, and maximum temperature and precipitation from each day of the year from 1961 to 2010) is based on data collected from available climate stations. Each model uses the following parameters: evapotranspiration, temperature-sum, effective precipitation, frost free days, first frost date, growing degree days (with base temperatures of 5°C and 10°C), and corn heat units. These climate and crop parameters are used to determine the growing season length as well as the beginning and end of the growing season. The models are then run for monthly demand for each year using predicted climate data for 2021-2050 to determine monthly water demand given the above input parameters.

[23] Agricultural Water Demand Model – Regional District Reports. BC Ministry of Agriculture and Food.

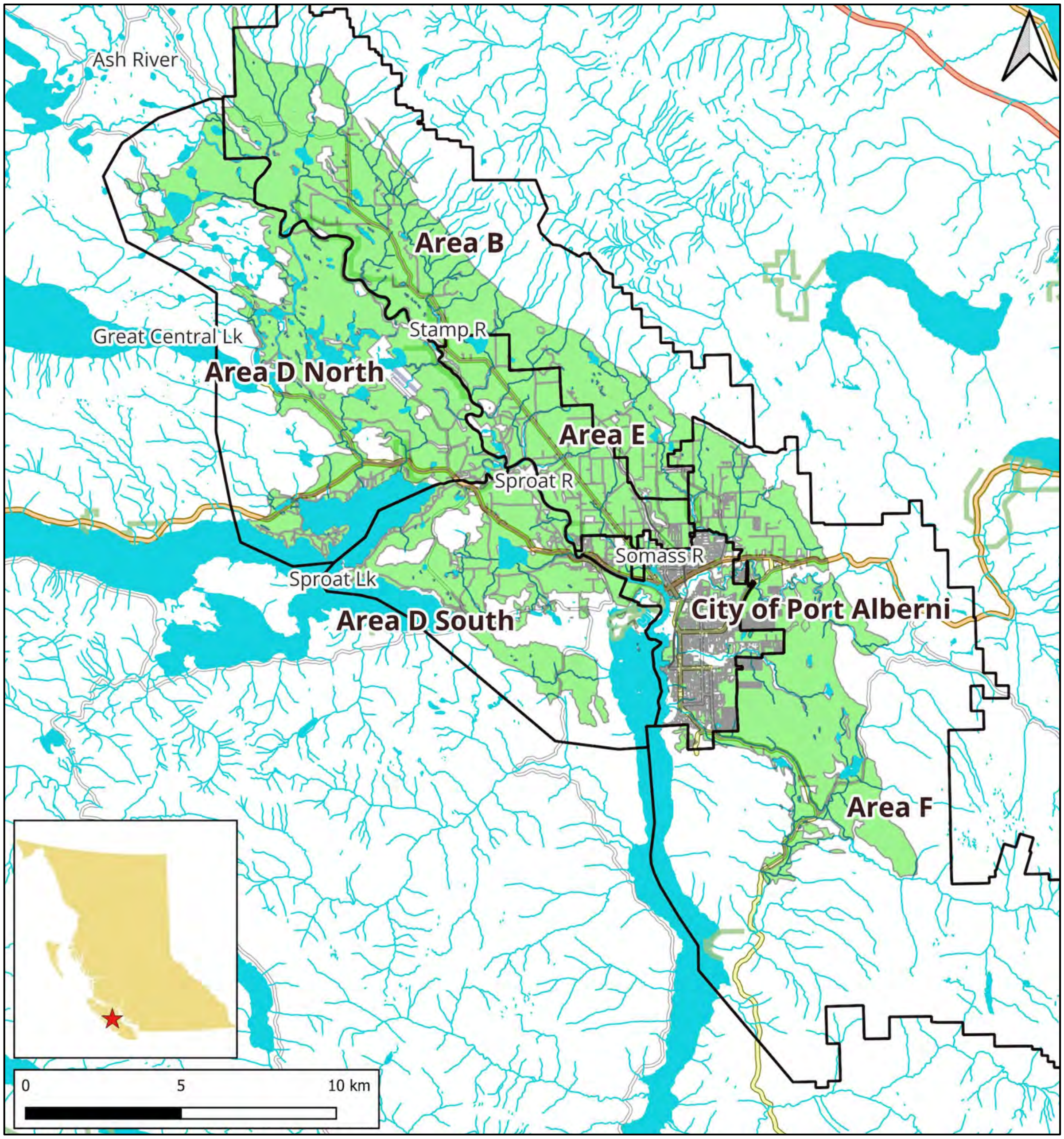

Figure 6. Area of land included in the AWDM model after all criteria have been applied.

The three models' monthly outputs were then summed to determine three scenarios – a 'dry' year, an 'average' year and a 'wet' year. Annual water demand predictions that were in the first quartile (the lowest water demand values) of the three models runs from 2021-2050 were considered 'wet' years where the water demand was low presumably due to higher-than-average precipitation resulting in less water demand for irrigation. Conversely years that were in the third quartile (higher water demand values) were considered 'dry' years with lower-than-average precipitation. An 'average' or 'normal' year was also run.

These multiple outputs were useful for finding a likely range of agricultural water demand for any given year based on variations of annual weather patterns.

2.4.4 Crop and Irrigation Buildout Scenarios

Within the AWDM, potential future irrigation water needs were calculated based on various crop and irrigation equipment scenarios for each Electoral Area and the CPA, to obtain a total water demand across the Alberni Valley if all arable land with Agricultural Capability 1-5 and over 0.25 acres in size, were to be irrigated. The scenarios reflect the existing mix of crops and systems which are typically or expected to be used within the Alberni Valley[24] and are similar to those used in other AWDM modeling across BC. The following crop types were included:

- Forage (e.g. hay, timothy, alfalfa)
- Pasture (e.g. grazing areas for livestock)
- Berry (e.g. blueberries, strawberries)
- Vegetable (e.g. roots, greens)

The scenarios also applied a mix of typically used irrigation equipment, depending on the size of the parcels and the anticipated crops, as follows:

- Drip (for small areas of vegetables)
- Micro-sprinkler (for berries)
- Sprinkler (for forage, pasture, or vegetables)
- Travelling gun (for forage)

Table 5 and Figure 7 present the types of crops and associated irrigation systems that were assigned to each subarea. Each combination (crop + irrigation system) was assigned a proportion of the modeled area, and that proportion is presented both as km^2 and hectares (ha). For example, in Electoral Area 'D' – South Sproat Lake, the model applied the following scenario:

- 20% of the modeled area (467 ha) is planted in berries and irrigated with micro-sprinklers;
- 15% of the modeled area (351 ha) is cultivated in forage and irrigated with sprinklers;
- 20% of the modeled area (467 ha) is cultivated in forage and irrigated with a travelling gun;
- 15% of the modeled area (351 ha) is used for pasture and irrigated with sprinklers; and
- 30% of the modeled area (704 ha) is cultivated in vegetables and irrigated with sprinklers.

[24] The AWDM assumes average irrigation system management efficiency. Specific sites, crop system combinations and operators may be able to improve irrigation water use efficiency.

Table 5. Subarea, crop, irrigation system, percent land cover, and total area calculated for AWDM scenarios.

Subarea	Crop	Irrigation System	Modeled Area (%)	Total Area (km^2)	Total Area (Ha)
Area B - Beaufort	Berry	Microsprinkler	15	7.07	707
	Forage	Sprinkler	15	7.06	706
	Forage	Travelling Gun	35	16.54	1,654
	Pasture	Sprinkler	15	7.05	705
	Vegetable	Sprinkler	20	9.41	941
		Subtotal	**100**	**47.13**	**4,713**
Area D - North Sproat Lake	Berry	Microsprinkler	20	7.86	786
	Forage	Sprinkler	20	7.77	777
	Forage	Travelling Gun	25	9.66	966
	Pasture	Sprinkler	15	5.83	583
	Vegetable	Sprinkler	20	7.8	780
		Subtotal	**100**	**38.92**	**3,892**
Area D - South Sproat Lake	Berry	Microsprinkler	20	4.67	467
	Forage	Sprinkler	15	3.51	351
	Forage	Travelling Gun	20	4.67	467
	Pasture	Sprinkler	15	3.51	351
	Vegetable	Sprinkler	30	7.04	704
		Subtotal	**100**	**23.4**	**2,340**
Area E - Beaver Creek	Berry	Microsprinkler	20	3.86	386
	Forage	Sprinkler	30	5.78	578
	Pasture	Sprinkler	20	3.86	386
	Vegetable	Sprinkler	30	5.83	583
		Subtotal	**100**	**19.33**	**1,933**
Area F - Cherry Creek	Berry	Microsprinkler	30	7.71	771
	Forage	Sprinkler	35	13.5	1,350
	Pasture	Sprinkler	25	9.64	964
	Vegetable	Drip	10	3.85	385
	Vegetable	Sprinkler	10	3.86	386
		Subtotal	**100**	**38.56**	**3,856**
City of Port Alberni	Berry	Microsprinkler	50	4.08	408
	Vegetable	Sprinkler	50	4.06	406
		Subtotal	**100**	**8.14**	**814**
		Total		175.48	17,548

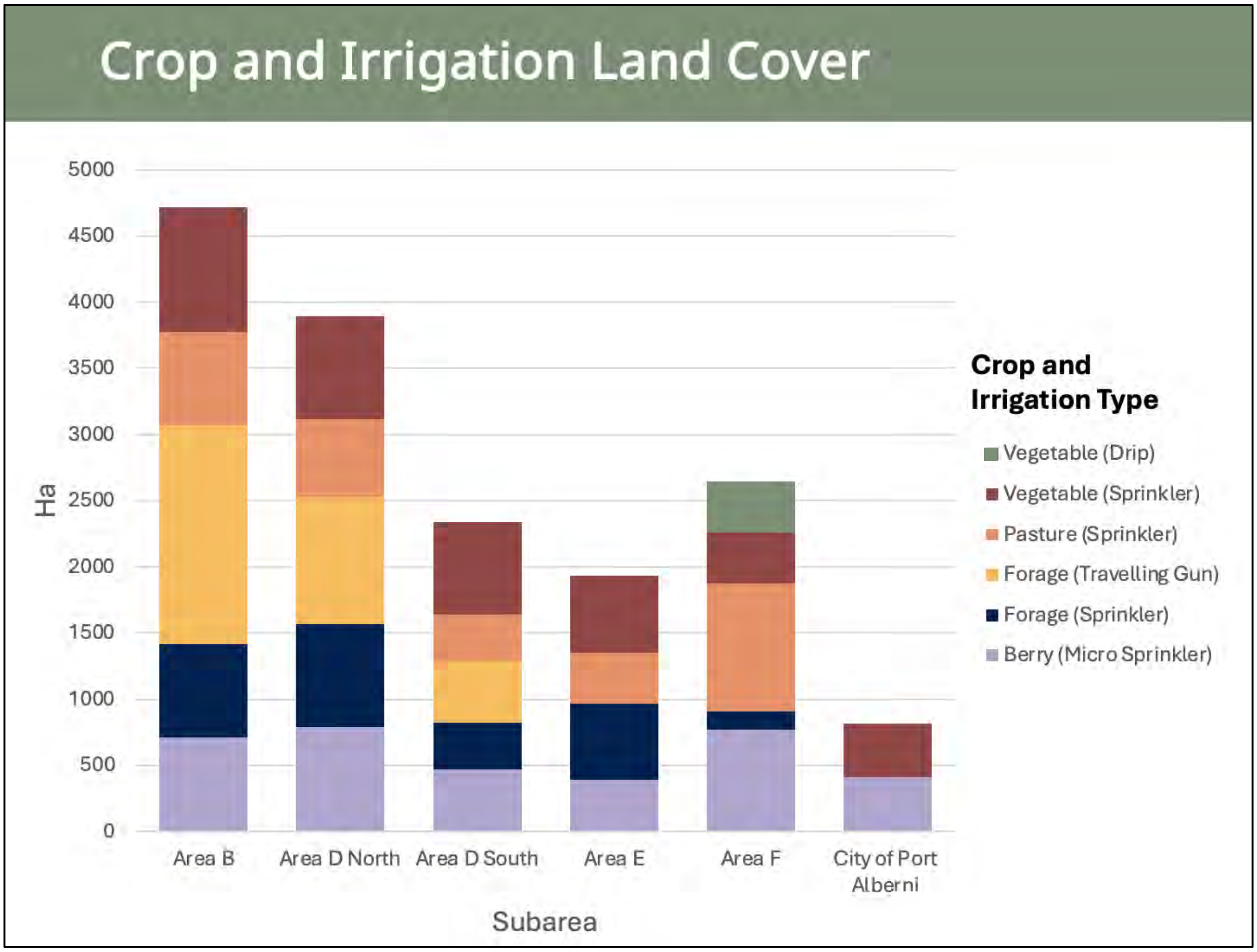

Figure 7. Summary of crop and irrigation types assigned through the AWDM scenarios per subarea.

3.0 Agricultural Water Demand Model Results

The results of the modeling indicate that, if all potentially arable land was being used for crop production, that projected water demand (m^3) would range from about 97.6 million (M) m^3 in a wet year, to 120.5 M m^3 in a dry year, with an average year demand of 110.7 M m^3 (Table 6).

Table 6. AWDM results for a wet, average, and dry year for the entire modelled area.

Projected Water Demand (m^3)	Description
97,576,419	Wet Year
110,718,407	Average Year
120,482,778	Dry Year

The ADWM results also indicate an increasing trend of water demand over time, from 2025 to 2050, with high variability year over year (Figure 8). This variability is indicative of the strong influence that a wet vs. a dry year would have on the overall amount of irrigation water required.

Seasonality is also a factor - the irrigation season varies even from farm to farm within the Alberni Valley due to local climatic conditions, topography, soil types and specific crop water requirements. Irrigation needs typically begin in late April with small volumes and extend throughout the growing season, ending in September with demand occasionally extending into early October. The model predicts that peak demand across the Alberni Valley will occur in July in all areas whether the year is wet, dry, or normal (Table 8).

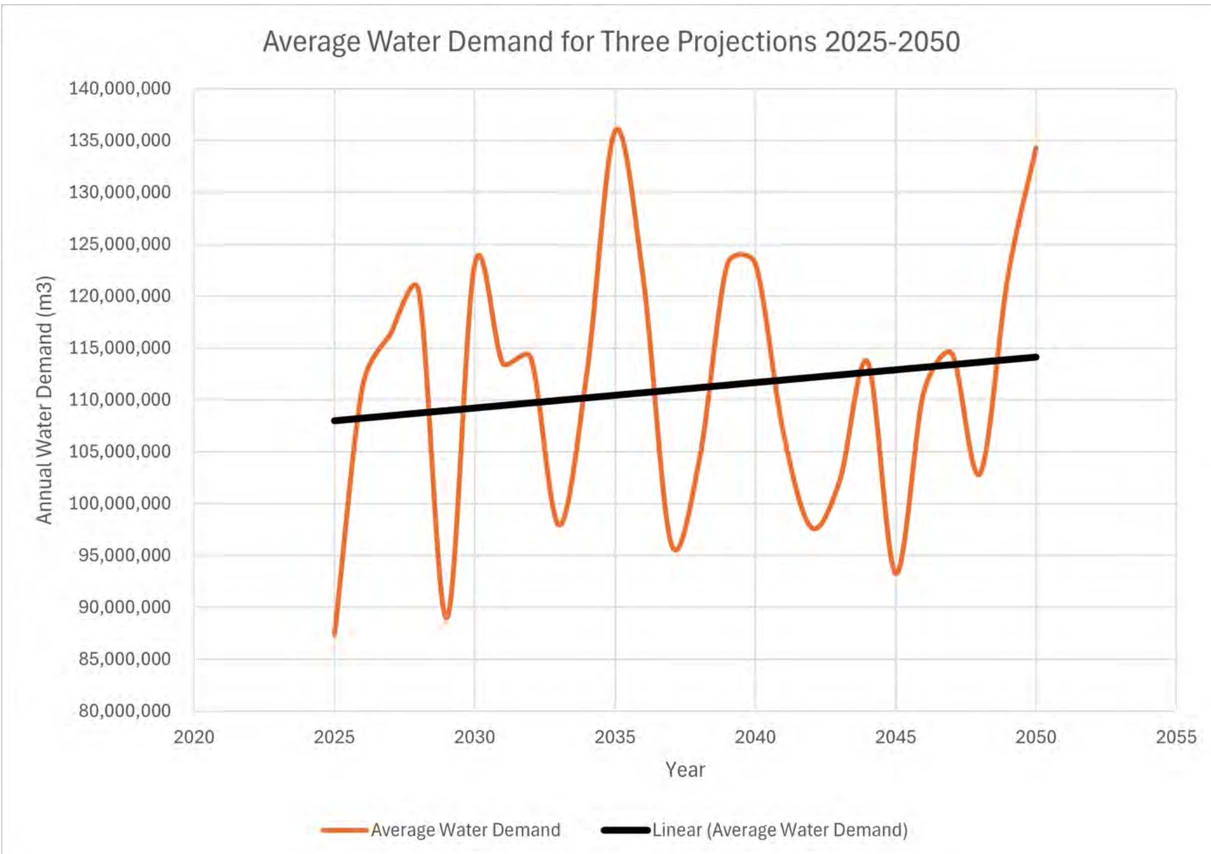

Figure 8. Average of three AWDM models run between 2025 and 2050 with linear average.

The monthly results from an average year are presented Table 7 and Figure 9. Based on an average demand for water (m^3/ha), farms in the Area D - North Sproat Lake area will have the highest demand, followed by farms in Area B – Beaufort, and Area D South Sproat Lake. The City of Port Alberni has the lowest water demand on a m^3/ha basis. These demands are driven by the crop and system combinations used with the buildout scenarios.

The highest demand is related to forage/pasture and travelling gun/sprinkler combinations, as these crops require relatively high amounts of water to grow and travelling gun/sprinkler systems are susceptible to higher evaporation rates than drip or micro-sprinkler systems.

Table 7. Projected monthly water demand for an average year.

Month	Area B - Beaufort (m^3)	Area D - North Sproat Lake (m^3)	Area D - South Sproat Lake (m^3)	Area E – Beaver Creek (m^3)	Area F – Cherry Creek (m^3)	City of Port Alberni (m^3)	Monthly Total (m^3)
Apr	54,501	265,831	65,394	14,008	81,372	209	**481,316**
May	2,571,516	2,922,365	1,035,300	450,314	1,944,618	79,819	**9,003,932**
Jun	8,389,900	7,913,225	3,746,951	2,572,727	5,739,039	955,502	**29,317,344**
Jul	11,521,988	10,101,615	5,419,409	3,962,356	8,004,401	1,778,809	**40,788,578**
Aug	5,624,268	4,938,521	2,501,699	1,833,709	3,957,639	798,687	**19,654,523**
Sep	3,065,486	3,067,145	1,327,155	935,041	2,380,707	251,993	**11,027,527**
Oct	100,563	197,269	55,964	32,003	59,352	37	**445,188**
Total m^3	**31,328,222**	**29,405,971**	**14,151,873**	**9,800,159**	**22,167,127**	**3,865,056**	**110,718,407**
Irrigated area (ha)	4,713	3,892	2,340	1,933	3,856	814	17,548
m^3/ha	**6,647**	**7,556**	**6,048**	**5,070**	**5,749**	**4,748**	**6,310**

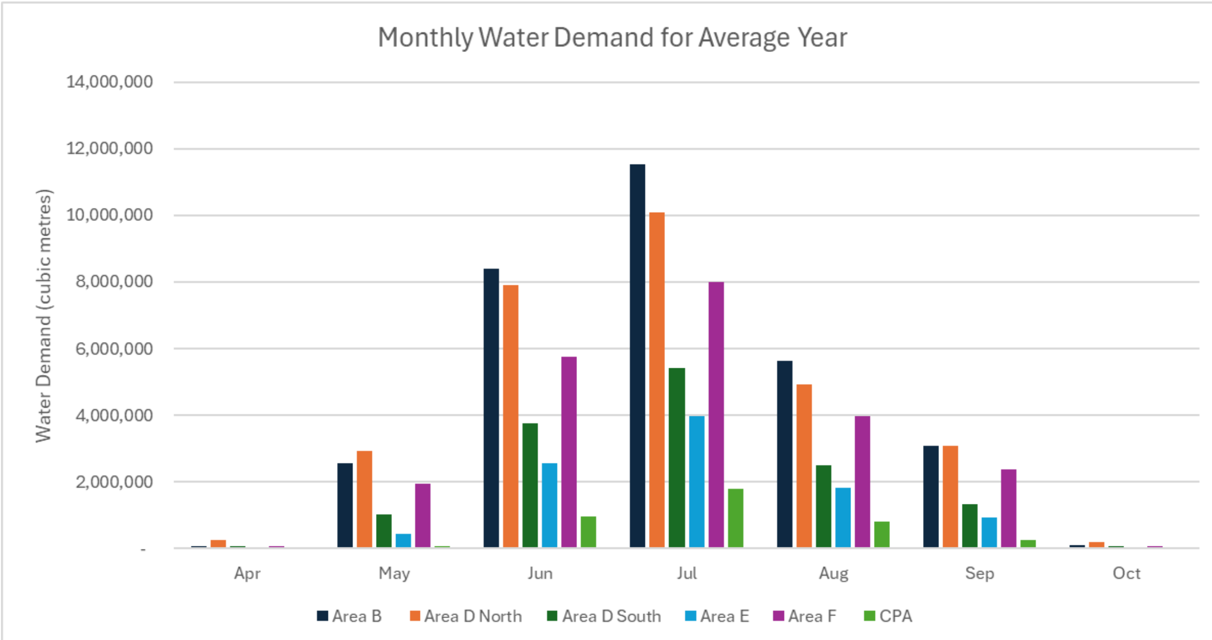

Figure 9. Predicted water demand during an average year.

It is important to note that these results are monthly averages and do not consider variations in water demand within the month or during the day. Peak weekly or daily irrigation water demand levels could easily increase water volume demand if multiple large-scale irrigators need to access water at the same time. Furthermore, although averages are an important metric to understand general water use when considering the irrigation water source and infrastructure required, the highest monthly demand figures for the 'dry' year (the month of the July) are the most applicable (Table 8 and Figure 10) because they will dictate the overall size of infrastructure required to meet this demand level.

Table 8. Predicted water demand for July during a wet, average, and dry year.

	Area B - Beaufort (m^3)	Area D - North Sproat Lake (m^3)	Area D - South Sproat Lake (m^3)	Area E – Beaver Creek (m^3)	Area F – Cherry Creek (m^3)	City of Port Alberni (m^3)	Monthly Total (m^3)
July - Wet	8,964,714	8,295,669	4,105,369	2,906,969	6,050,981	1,205,064	**31,528,767**
July - Average	11,521,988	10,101,615	5,419,409	3,962,356	8,004,401	1,778,809	**40,788,578**
July - Dry	12,266,670	10,901,713	5,712,337	4,105,337	8,514,198	1,804,012	**43,304,268**

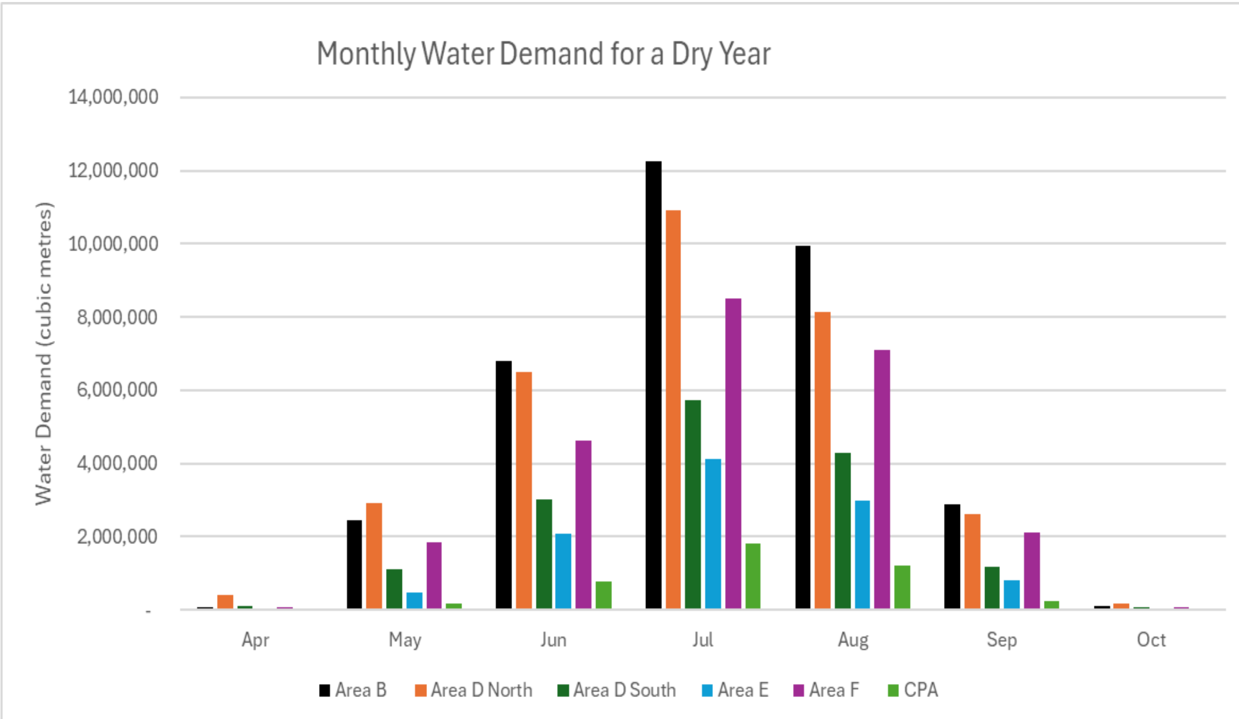

Figure 10. Predicted monthly water demand during a dry year.

Therefore, a key consideration of designing irrigation systems will include coordination among water users (irrigators) or oversight by a governing body if irrigators are accessing the same water source at the same time. This could also be partly achieved by adding metering or including irrigation scheduling requirements (e.g. having farms formally take turns irrigating).

For the purposes of this report, we assume that the average monthly water demand for each area modelled will provide sufficient water for the irrigation community through coordination and collaboration. Furthermore, it is assumed that irrigation conservation and efficiency practices[25] will be promoted and adopted.

[25] Irrigation Tips to Conserve Water on the Farm, 2015. BC Ministry of Agriculture and Food. Water Conservation Factsheet No. 500.310-1.

4.0 Potential Irrigation Water Supply Sources in the ACRD

The Alberni Valley can be broadly described as a series of fertile lowlands and lakes surrounded by steep, forested, mountainous slopes. Intact forests function as natural sponges for watersheds by intercepting, absorbing, storing, and slowly releasing rainwater and snowmelt, which helps to regulate water flow, prevent floods, and ensure a steady supply of clean water. Forest cover slows down erosion and delays the release of water into streams, helping to stabilize the quality and quantity of water in the area.[26]

Much of the forested areas upslope from the agricultural lowlands in the Alberni Valley are parcels of land owned by forestry companies, many with active logging licences.[27] The 2003 *Private Managed Forest Land Act* (PMFLA) puts no limit on the volume of timber that can be harvested on privately-held forested land, as opposed to limits to logging on Crown Land.[28] Sections 13 and 14 of the PMFLA refer to objectives around water quality and fish habitat, but these are not reinforced by the Private Managed Forest Land Regulation in the same way that critical wildlife habitat is treated. Assessments such as those commissioned by the Beaufort Watershed Stewards have indicated that privately managed forest parcels have a higher risk of damage to water and habitat compared to forests on public land.[29]

Over the past few decades, Alberni Valley farmers have documented the impacts that some of this logging activity has had on farm water resources. Debris slides have been noted to occur on hillslopes in the years following logging activity and/or wildfires, particularly after heavy precipitation events. For example, debris slides from forested slopes have impacted water intakes on farms in the Beaufort area, and some producers have had to install expensive filtration system to mitigate water quality for meat processing activities. Other debris slides have resulted in soil materials being deposited onto farm fields, blocking culverts, and otherwise impacting watercourses. In addition to debris slides, activity from logging-related machinery has been linked to water lines being broken, herbicides being applied in close proximity to agricultural water intakes, and/or silt entering water systems. The agricultural community has expressed the need for independent, third-party hydrologist reports as a requirement for any proposed logging activity on hillslopes above farms with water licenses, whether the logging activity is within privately-owned or Crown Land parcels. The objective would be to identify best practices to minimize both the water quality and water quantity impacts on water systems in the valley bottoms, and to monitor outcomes in order to protect the longstanding water rights that agricultural users hold.

4.1 Groundwater

There are six known aquifers in the Alberni Valley (Figure 11, next page), and they are used extensively by rural parcel owners. Groundwater in the Alberni Valley has been studied and assessed several times to determine it if would be feasible to expand its potential use as a regional source. All studies note that the

[26] Natural Resources Canada. Accessed October 2025. Sustainable Forest Management.
[27] Ministry of Forests, Government of BC. (2023). South Island Natural Resource District Profile.
[28] Government of BC. (2025). Private Managed Forest Land Act.
[29] Alberni Valley News. November 4, 2025. Job protection means status quo for BC's private forestland: Parmar.

general lack of groundwater data impedes the ability to determine its characteristics. A provincial groundwater monitoring well does not exist in the valley, and the installation of one (or several) is a common recommendation in previous feasibility reports and remains a key recommendation. In the meantime, it is recommended that producers access the well measuring device that is managed and maintained by the Council for Agricultural Water Supply to gather data regarding their wells.

A recent (2025) groundwater study was commissioned to determine whether wells could replace residential water supply in the Beaver Creek Water System service area[30]. The report, which included all of Electoral Area 'E' – Beaver Creek and parts of Electoral Area 'D' – Sproat Lake, found that:

- Six aquifers underlay the valley – some of which have provincial notations indicating that additional water licences would be unlikely to be issued.
- Based on an analysis of 160 existing well records, the maximum estimated yield from a single well is 545 m^3/day. Two wells were reported as having this yield (one in Electoral Area 'E' and one if Electoral Area 'D') but it was determined that other wells drilled in the area would be expected to yield less than 545 m^3/day.
- The report concluded that the cost of development for meeting the Beaver Creek Water Supply (BCWS) future demand in 2044 of 3,600 m^3/day was unfeasible given the high drilling costs that would need to be outlaid, with no guarantee of finding suitable water yields. The pump costs, maintenance needs, water conveyance infrastructure, and costs for land acquisition or easements for infrastructure locations were other constraining considerations.
- The report also noted that when planning for additional groundwater expansion, consideration would need to be given to potential impacts to existing groundwater users, and the overall impacts that could arise on the drawdown of the aquifer.

Groundwater quality was assessed in 2007[31] for the former Beaver Creek Improvement District (now BCWS) in Electoral Area 'E' – Beaver Creek using a similar study area as the 2025 report[32]. The 2007 study provided an assessment regarding the potential to develop a groundwater supply source that could replace the Stamp River source, and that would meet future water demands[33]. 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. The report concluded that a series of smaller production wells placed so that the interference between them was minimized, could create a "large well" effect, but the report cautioned that additional pumping would likely result in additional water quality treatment requirements. A report by Koers (2010)[34] anticipated that the groundwater would be classified as being under the direct influence of surface water and therefore would require treatment in the form of UV light followed by chlorination. Land

[30] Technical Memo to the ACRD concerning Beaver Creek Water System Groundwater Feasibility Assessment. (2025). McElhanney. 2025.
[31] Beaver Creek Improvement District: Investigation of Potential Groundwater Supply. (2007). GW Solutions Inc.
[32] Technical Memo to the ACRD concerning Beaver Creek Water System Groundwater Feasibility Assessment. (2025). McElhanney. 2025.
[33] Beaver Creek Improvement District: Investigation of Potential Groundwater Supply. (2007). GW Solutions Inc.
[34] Beaver Creek Improvement District Water Source Options and Treatment Study (2010).

would also need to be secured for the well sites, the water main, the access roads to the wells, and the water treatment building.

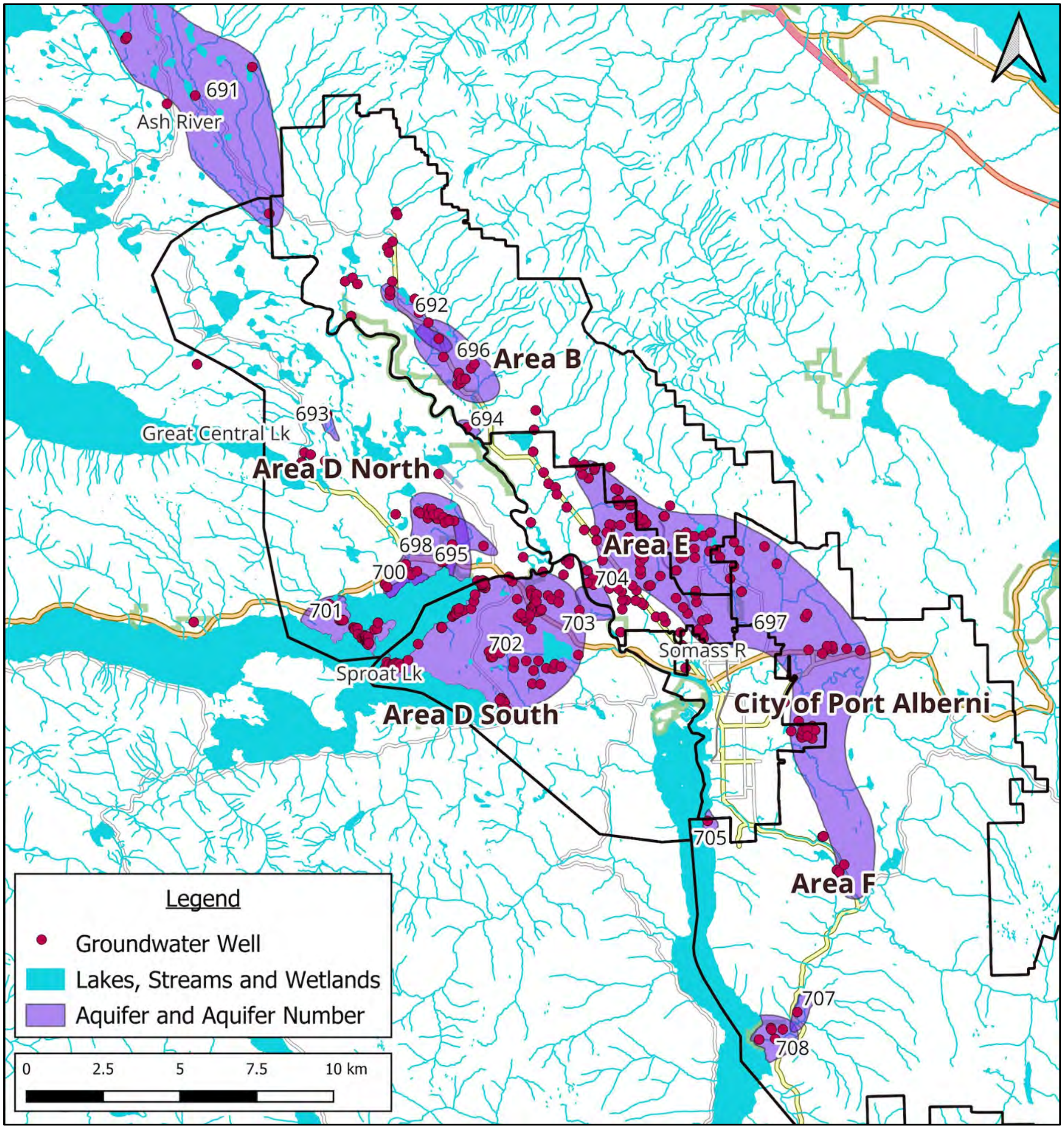

Figure 11. Location of aquifers (purple) within the Alberni Valley (source: BC Freshwater Atlas).

4.2 SURFACE WATER

The Alberni Valley has significant surface water resources that could theoretically be accessed for irrigation water. A watershed map produced by Koers & Associates in 2010 outlines the major watershed boundaries and indicates key lakes, rivers, and streams in the Alberni Valley (Figure 12, next page).

These include:

- The Stamp River, Sproat River, and Somass River, each of which flow southeast through the valley towards the Alberni Inlet;
- China Creek, which is located in the southeast of the region;
- Two large lakes (Great Central Lake and Sproat Lake) with surface areas of 51 km^2 and 38 km^2 respectively. Great Central Lake drains into the Stamp River and joins the Sproat River, after which both become the Somass River;
- Smaller lakes such as Bainbridge Lake and Lacy Lake; and
- Numerous small creeks that predominantly originate in the Beaufort Mountains to the northeast and connect to the Stamp River, Somass River, and support the recharge of aquifers.

Studies to explore domestic water supply options from surface water in the Alberni Valley have been commissioned multiple times over the past 30 years. One such baseline study was completed by Koers & Associates Engineering in 1995. It considered 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 (now managed by the ACRD through the BCWS), Cherry Creek Waterworks District (CCWWD), Sahara Heights and Arrowsmith Heights water user communities, and McCoy Lake, Sproat Lake, and Bell/Stuart Road services areas[35].

The 1995 Koers study determined that regional water supply could be provided in the short term by using China Creek, Somass River, and Lacy Lake as key sources. However, Somass River water quality was not consistent, and its use would require a filtration in a water treatment plant. For the long term, Great Central Lake was identified as the best potential water source for the Alberni Valley. It was expected that adequate watershed protection could be achieved, and it could be the sole source of water for the valley or in combination with China Creek. Without using Great Central Lake as a source, an alternative could include upgrading and expanding the Somass River intake and pump station, along with water treatment at that source. The anticipated costs of upgrades and expansions from 1997-2020 of the four options using 1995-dollar values (with 2025 values provided in italics based on the Bank of Canada inflation calculator) were estimated as follows[36]:

- Great Central Lake: $45,127,000 *($84,799,653* in 2025 dollars)
- Great Central Lake and China Creek: $49,492,400 *($93,002,822* in 2025 dollars)
- Somass River: $36,586,200 *($68,750,351* in 2025 dollars)

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[35] Alberni Valley Regional Water Study. (1995). Koers & Associates Engineering.

[36] Alberni Valley Regional Water Study. (1995). Koers & Associates Engineering. Bank of Canada inflation calculator was used to calculate 2025 dollar values.

- Somass River and China Creek: $43,515,500 *($81,771,430* in 2025 dollars)

It was suggested that the costs could be covered through a combination of Development Cost Charges, parcel taxes, and user rates.

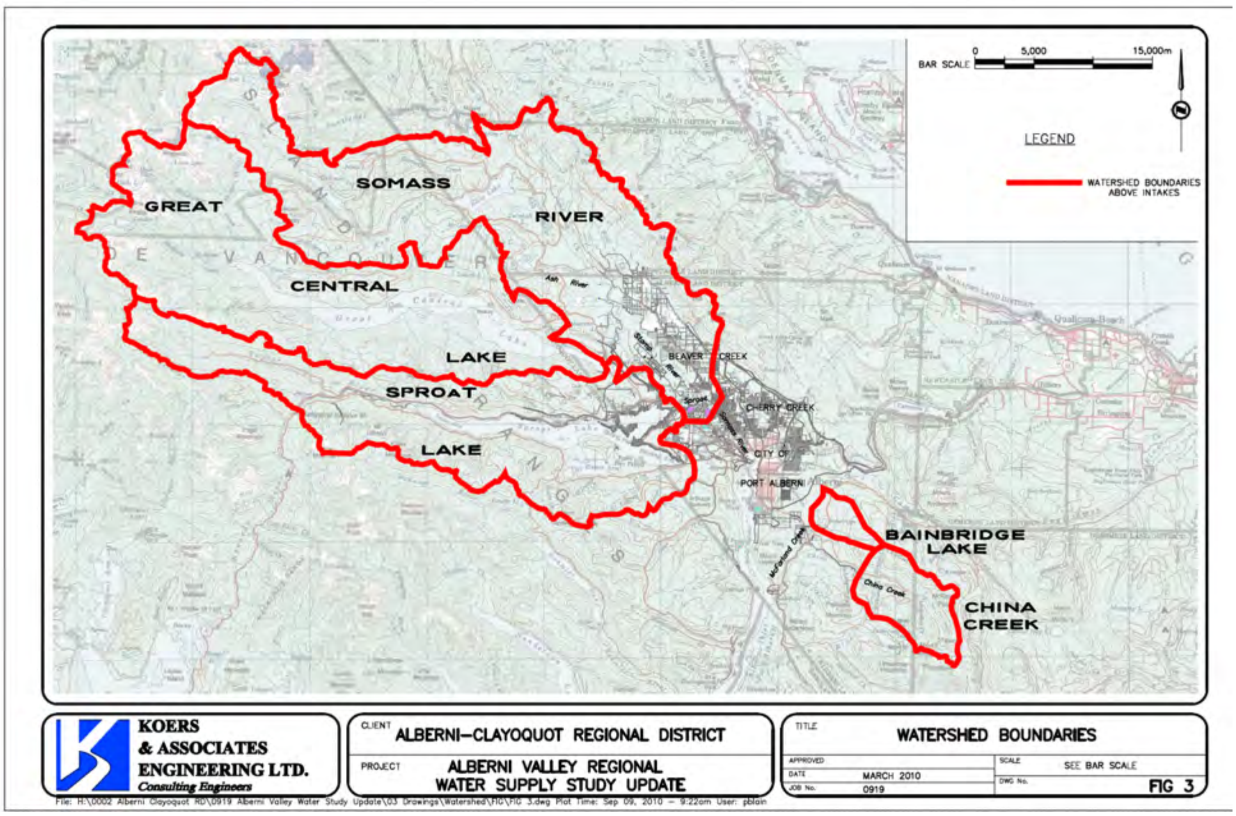

Figure 12. Watershed boundaries in the ACRD (Koers & Associates, 2010).

The 1995 Koers study was updated in 2010 when the Vancouver Island Health Authority (IH) introduced new water treatment requirements. Changes that were incorporated into the Koers and Associates 2010 update[37] included new population and water use projections (both were scaled down since the 1995 report) and additional regional water source options. Sproat Lake was added as a potential source because Catalyst Paper Corporation (now owned by Domtar Industries) had expressed interest in transferring some of its excess water supply capacity to a regional water supply authority or to the CPA, and a new supply main had been installed from the Sproat Lake intake to the mill, within proximity to the CPA's water distribution system. It was acknowledged that use of Great Central Lake would require a new pump station and associated infrastructure and water licensing. Use of the Somass River would require disinfection as well as a new pump station and water mains. Using Sproat Lake as a secondary supply was considered the

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

most affordable, with costs of about $11 million in 2010-dollar values *($15.5 million* in 2025 dollars) and would include a new pump station and an agreement between the ACRD and Domtar to set the terms and costs and transfer a portion of the allocated volume in the water licence.

Additional options were considered for independent water suppliers. For example, the CPA could add the Somass River as a secondary source with additional filtration and chlorination and the Beaver Creek Improvement District (now managed by the ACRD through the BCWS) could upgrade the Stamp River intake and McKenzie Rd pump station. CCWWD upgrading options were still being studied at that time, however it was assumed that both filtration and chlorination would be required. It was also recommended that discussions begin about the feasibility of forming a regional water authority.

4.3 Summary of Surface Water and Groundwater Assets vs. Agricultural Needs

If all arable land in the Alberni Valley were to come under agricultural production and require irrigation it would be challenging to provide the volumes required from a water supply, water storage, and water delivery infrastructure perspective without significant investments. For example, as previously noted, modelled demand volume in July alone across the valley in a dry year projects a need for over 43 M m^3 of water (and 110 M m^3 over the entire irrigation period April to October) to irrigate all arable parcels across the entire Alberni Valley, based on the modelled outputs presented in Section 3.

To understand the magnitude, current water usage and natural flow data can be used for context:

- **Stamp River**: The average flow from June-September is estimated at 4.1 M m^3/day. For the same period, the AWDM predicts an average need of 0.83 M m^3/day – representing 20% of the average daily Stamp River discharge. During peak demand times in July, the AWDM projects a need of 1.3 M m^3/day - representing 33% of the average daily Stamp River discharge for July.
- **Sproat River**: The historical flows during the period from June- September averages 1.3 M m^3/day. For the same period the AWDM predicts an average need of 0.83 M m^3/day - representing 65% of the average daily Sproat River discharge during that period.
- **Beaver Creek Water System**: The BCWS total annual consumption was 366,896 m^3 in 2024 with an average consumption in July of 50,000 m^3/month[38]. The AWDM predicts that during the irrigation period (7 months from April to October) the average total demand in the area that is served by the BCWS would be approximately 9.8 M m^3, which is 27 times the volume of water the area currently consumes. For the month of July during a dry year, the AWDM predicts 4.1 M m^3 would be required, which is 82 times the current consumption for the month of July.
- **City of Port Alberni Water System**: The CPA provides potable water to parcels within its boundaries and to the BCWS. The latest water demand figures provided by the CPA[39] for 2024 (that exclude bulk water sold to BCWS) indicate that water usage is 10,046 m^3/day (average) and 19,074 m^3/day (peak). The total water volume provided by the CPA is 3,666,629 m^3 per year. This is approximately 3% of the total irrigation water demand volume for the valley during a dry year. The CPA's total

[38] Beaver Creek Water System Annual Report, 2024.
[39] Per.comm Dave Arsenault P.Eng.

reservoir storage capacity is 34,000 m^3, with a combined lake storage of 1.81 M m^3. The AWDM predicts that the CPA alone would require 1.8 M m^3 for irrigation within July (the peak irrigation period), which is approximately 5,700 m^3 per day or 30% of current peak water use.

- Regional Reservoir Storage Size Needs: If water were collected throughout the winter and spring and stored to satisfy irrigation demand in July alone, reservoir volumes would range from 4 M - 12 M m^3 across the five electoral areas. For reference, a reservoir that is 6 m deep and capable of storing 1 M m^3 would require 18 ha of land. Therefore, storing 4 M m^3 of water would require a footprint of approximately 70 ha and storing 12 M m^3 of water would require a footprint of 210 ha. These reservoirs would require water licenses through the *Water Sustainability Act* and would likely need to be regulated through the provincial Dam Safety Regulation[40]. To illustrate, if an Olympic sized swimming pool holds 2,500 m^3 of water then a reservoir that satisfies the potential average irrigation demand in the Alberni Valley would need to be equivalent to 1,600 swimming pools. In order to store enough water to meet potential future peak (July) irrigation demand, the reservoir would need to be the equivalent of 28,000 swimming pools.

Although the water demand projections are approximate, they illustrate the magnitude of the potential demand relative to known water resources and use rates in the Alberni Valley if all arable areas were to come under irrigated crop production. This narrows the options for irrigation water supply significantly and puts the focus on developing regional reservoirs, diverting water from large bodies of water (lakes), partnering with those who have existing licences, or building smaller storage (e.g. dugouts – see Figure 13) to satisfy irrigation of smaller parcels. These are further explored below.

Figure 13. Dugout on a farm in the Alberni Valley.

[40] The Dam Safety Regulation defines a dam as a barrier constructed for the purpose of enabling the storage or diversion of water from a stream or an aquifer, or both, plus any other works incidental to or necessary for the barrier. The Regulation sets requirements and best practices for all aspects of dam design, construction, operation, maintenance, removal, and decommissioning of dams. Regulated dams require a water license under the *Water Sustainability Act*.

5.0 Feasibility of Regional Water Supply Options

This section provides a description of the feasibility of three options that could be initiated by the ACRD to provide irrigation water volumes at a regional scale. The options are:

1. Build regional scale irrigation reservoirs (one or more) to store and distribute water.
2. Use Great Central Lake and/or Sproat Lake at sources of water to divert to a new agricultural water distribution system.
3. Partner with existing licensees (such as Domtar (previously Catalyst Paper Corporation)) to secure additional water allocation volumes for agricultural use.

The evaluation of these options includes important considerations of water licensing. Under the *Water Sustainability Act*., anyone who diverts and uses water for anything other than domestic (household) use is required to obtain a water licence and pay water fees and rentals. This includes local government water users. Water licences may allow for diversion, storage and/or the use specific quantities/volumes of water for dedicated uses, including irrigation. A water licence is typically associated to a specific parcel ID, however the ACRD could apply for a waterworks licence and be responsible for delivery to multiple parcels as a purveyor. The location and design specifics of the irrigation system will determine which licences and approvals may be required. Table 9 provides an overview of what legislation may need to be consulted.

Table 9. Legislation to consider for regional irrigation systems.

Irrigation Component	Legislation to consider
Constructing a large reservoir	• *Water Sustainability Act* – Water licence for reservoirs connected to groundwater and/or filled via surface water, waterworks licence. • *Agricultural Land Commission Act* and regulations if the land is in the ALR and land work is required. • *Dam Safety Act* if the reservoir meets certain size thresholds.
Diverting water from a lake or river (e.g. pumphouse, intake pipe)	• *Water Sustainability Act* – Water licence and possibly Notification of Instream Work when the infrastructure is being installed. • *Fisheries Act* – fish screening at intake. • Local government land use bylaws and/or Development Permit Areas (if applicable).
Constructing water pipelines to convey water to individual parcels	• *Water Sustainability Act* – Water licence for individual parcels receiving water, or for the local to government body that is acting as a water purveyor. • *Land Tenure Act* if pipeline is crossing Crown Land. • Ministry of Transportation and Transit authorizations if pipeline is crossing under roads. • Local government land use bylaws and/or Development Permit Areas (if applicable).

5.1 Regional Option 1: Regional Scale Irrigation Reservoirs and Distribution Systems

Description

Multiple regional water storage facilities (reservoirs) could be established throughout the Alberni Valley, in proximity to where irrigation demands are anticipated to be highest to "capture, hold, and release" water. In this scenario, winter and spring precipitation events would be used to collect water naturally flowing overland or pumped from full rivers and tributaries when flows are highest, into regional reservoirs for use in the summer and fall. During the irrigation period, water would be pumped from the reservoirs through a conveyance system at rates that the water sources could sustain, accommodate, and afford.

However, the size and scale of these reservoirs may be cost prohibitive. For instance, in order to store 14 M m^3 of water (e.g. the volume required to satisfy the irrigation needs of Area D 'Sproat Lake' South), reservoir dimensions would be in the order of 900 m long by 2,100 m wide by 8 m deep (189 ha). A 30 M m^3 reservoir (e.g. the volume required to satisfy the irrigation needs of Area B 'Beaufort'), would need to be 1,500 m wide by 2,500 m long and 8 m deep (375 ha).

Conceptually, the infrastructure to accomplish this would include the following:

- Several sites would need to be identified and secured for building water storage. This could occur one at a time based on land availability, funding, and/or need priority. Ideally there would eventually be an irrigation reservoir (or several) in each Electoral Area. These reservoir sites would likely need to be at higher elevation to support a gravity-fed delivery method to minimize delivery costs (e.g. reduce pumping needs). The sites may fall within Crown land or on managed forested lands and would need to be purchased or leased, and easements would need to be established.
- Engineering and design of the reservoirs may need to follow *Dam Safety Act* and regulation requirements, depending on scope and size of the project.
- In parallel, conversations with WLRS would need to occur to ensure that any reservoir development is following the Water Sustainability Regulation and associated licensing requirements. Depending on the governance and delivery of the system, licences may need to apply to individual landowners on a parcel basis or could be streamlined through a waterworks licence held by the ACRD[41].
- Conveyance systems (pumps and pipes and/or ditches) would need to be installed to bring the water from rivers and streams into the reservoirs during winter and spring months.
- A piped water distribution network with pumping stations (if not gravity fed) would need to be installed to bring water from the reservoirs to agricultural parcels throughout the valley.

In this scenario, it would be prudent for the ACRD to oversee the governance of the new agricultural waterworks infrastructure and delivery, for licensing purposes and such that adequate insurance and

[41] Additional information is available on the Farm Water Storage fact sheet published by the BC Ministry of Agriculture and Food.

liability coverage could be assured, and possible government funding could be obtained for capital investments.

Full buildout across all subareas for a full irrigation reservoir system capable of meeting irrigation demands across the Alberni Valley (capital and design costs) could easily exceed $100 million for multiple reservoirs.[42] This would include pumping stations, an extensive buried distribution network, engineering, permitting, long term maintenance and annual operating costs.

Feasibility and Recommendations:

- While building a regional reservoir system may be the best-case scenario from a water security perspective, it may be unrealistic from a cost and engineering perspective at this time.
- In addition to costs, this option would take several years to complete.
- If the opportunity and funding arise to build a single reservoir as a pilot project, it could be a worthwhile endeavour – particularly if can be sited in a location that is in close proximity to farm parcels. The outcomes of the pilot project could then be assessed to determine if the water access promotes additional agricultural production. If so, investment in additional reservoirs could be warranted.
- ***It is recommended that further detailed examination of the feasibility of a regional reservoir system be completed if funding becomes available and/or landowners/partners in specific subareas indicate interest and suitable land can be identified***. At that time, a full costing analysis would need to be conducted to determine how costs could be recouped through an agricultural water users fee (applied as an annual lump sum or by volume/usage) over the long term.

5.2 Regional Option 2: Diversion from Great Central Lake and/or Sproat Lake

Description

Great Central Lake and Sproat Lake are two possible sources for diverting large water volumes for irrigation. According to the Vancouver Island Large Lakes Management Plan[43]:

- Great Central Lake has a total estimated volume of 6,305 M m^3. The total amount of annual agricultural water demand in a dry year (120 M m^3) would therefore represent 1.9% of the lake's volume per year (without accounting for recharge from precipitation).
- Sproat Lake has a total estimated volume of 7,361 M m^3. The total amount of annual agricultural water demand in a dry year (120 M m^3) would therefore represent 1.6% of the lake's volume per year (without accounting for recharge from precipitation).

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[42] Using Province of BC Class 5 cost estimates. The Province of BC's cost estimate Class 5 is often used for developing cost estimates for transportation infrastructure projects at the concept options screening stage, with an intended accuracy of -150% to +100% of costs.
[43] Vancouver Island Large Lakes Management Plan, 2014. BC Ministry of Forests, Lands, and Natural Resource Operations.

However, the easily available pool of water may be limited to gravity flow or pumpable water, and removing large volumes of water from either lake will mean that it is then unavailable for discharge into the outlets of Stamp River, Sproat River, and Somass River. It is not clear whether this would have a significant impact on the aforementioned river flows or not. The Stamp River already experiences some days when flows are reduced below 15 m^3/second, which is the discharge rate threshold that the ACRD and regulatory agencies have determined to be the minimum flow desirable for instream fish[44].

Similar to Option 1, the ACRD would need to apply to WLRS for a water licence, and consideration would need to be given to the impacts that these withdrawals may have on the environmental health of the lakes and their tributaries. The decision to issue a water licence lies with the Provincial Water Manager and would only be contemplated via an application.

Feasibility and Recommendations

- Distribution of water from these lakes to all areas of the Alberni Valley would be cost intensive. This option is therefore most likely as a source of water for subareas of the valley, such as in Electoral Area 'D' – Sproat Lake (see section 6.2 for further discussion).
- The Somass River watershed is held as sacred by both Tseshaht and Hupačasath First Nations, as it is listed in both of their traditional territories and has been accessed for both food and ceremonial purposes since time immemorial[45,46]. ***Any large-scale project such as discussed here is not recommended except if supported by, and in partnership with, both Nations.***
- There remain several unknowns regarding the impacts of large-scale water removals on the overall health of the lakes and their tributaries. Therefore, ***it is recommended that a hydrometric study be completed on Great Central Lake and/or on Sproat Lake that contemplates the impacts of water diversion prior to this option moving forward***.
- It is worth flagging that, in terms of authorizations, there is a notation on Great Central Lake that was placed by the province in 1955, which indicates that Great Central Lake maintains the flows in the Somass River, and requests that authorizations staff notify the ACRD of any water licence applications on Great Central Lake.
- There is also an existing provincial water reserve notation for the Somass River and its tributaries that was applied through an Order in Council (OiC) in 1922 (OiC #0842-1922). The OiC "reserves" all the flow in the watershed for all purposes, stating that the reserve does not have "priority" purposes. The 1922 OiC was then amended in 2015 (OiC 0161-2015). In the past, WLRS has not been prepared to issue further water licences to the ACRD for the purpose of waterworks on the Somass River. However, it could be argued that the OiC's proposed water reserve attribution to the Somass River is outdated – this would need to be tested through the submission of a water licence application[47].

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[44] Technical Memo to the ACRD concerning Beaver Creek Water System Groundwater Feasibility Assessment. (2025). McElhanney. 2025.
[45] Tseshaht Land Use Plan, 2023. https://tseshaht.com/land-use-plan/
[46] Hupačasath First Nation Traditional Territory. Website accessed October 2025.
[47] Pers. comm., Water Authorizations Specialist, WLRS, 2025.

- The ACRD could therefore get a clearer understanding of how the notations would affect future water allocations from Great Central Lake by applying for a new water licence for waterworks. Current information and conditions would inform the technical review, and additional needs for data and/or analysis would be identified through that process. The decision to grant or refuse an application would lie with a WLRS Water Manager, and it is unclear at this time if an ACRD waterworks application would be approved[48].

5.3 Regional Option 3: Partnering with Existing Water Licensees

Description

An opportunity exists within the current *Water Sustainability Act* legal framework to amend existing licences of other licence holders so that a portion of their current allocated volumes can be shared with the ACRD. This is called a *Partial Transfer of Appurtenancy*.

An opportunity to pursue a partial transfer may exist with Domtar Industries. The corporation currently has two water licences (C113381 and C113369) that are related to the diversion of water from Sproat Lake via a pipeline and used for “paper mill” purposes for the Port Alberni Mill and a water storage facility (Figures 14-16). The permitted volume or flow of water in the licences total 2.81 m^3/sec or 242,784 m^3/day. It has indicated that it is currently only using approximately 31% of the volume permitted through the licence. Therefore, 69% of their allocation is not currently being used. In BC, water cannot be sold, therefore there would be no direct costs associated with the transfer. However, costs associated with leasing the associated infrastructure may be required.

Domtar also owns and operates two dams (Robertson Creek dam and the Great Central Lake dam) at the outfall of Great Central Lake, which regulates flows into the Stamp River, and the Sproat Lake weir. If the ACRD were to undertake water removal/diversion from these waterbodies then it may be able to negotiate a shared use of this infrastructure.

Through the course of this project, there were meetings held with representatives of Domtar staff and ACRD staff. While no decisions or agreements were made, the door was left open for future discussions regarding water licensing.

Feasibility and Recommendations

- This option is legally feasible because a *Partial Transfer of Appurtenancy* is possible under Section 27 of the *Water Sustainability Act*, upon application. However, further discussions would be required between the ACRD and Domtar to solidify interest in the partial transfer by both parties.

[48] Pers. comm., Water Authorizations Specialist, WLRS, 2025.

- A hydrological or similar technical review would be required to determine the details of the impacts of the *Partial Transfer of Appurtenancy*. A full cost accounting of the potential fees associated with using third-party water infrastructure would also be required.
- Distribution of the water to agricultural properties would need to be designed and costed.
- If the ACRD is interested in sharing use of the Robertson Creek dam and/or the Great Central Lake dam and/or the Sproat Lake weir, then coordination for instream flow release to achieve minimum required baseflows for fish habitat would need to occur to ensure all users have adequate access to this water source. Access to the Sproat Lake weir (in order to add or remove weir plates) is through land owned by Mosaic, with whom Domtar has an access agreement. This would have to be transferred or renegotiated if the ACRD took over maintenance of the weir.
- ***It is recommended that the ACRD continue to keep lines of communication open with Domtar and with other license holders.*** While Domtar is one of the main large scale water license holders in the Alberni Valley, others may come forward if the ACRD publicly expresses interest. Memoranda of Understanding and/or other documents could be drafted such that if the fiscal opportunity were to arise to undertake the *Partial Transfer of Appurtenancy* that it could be accomplished with expediency.

Figure 14. Water intake infrastructure on Sproat Lake owned by Domtar Industries.

Figure 15. Water distribution infrastructure owned by Domtar Industries (with people shown for scale).

Figure 16. Domtar Industries water storage infrastructure located near Sproat Lake.

5.4 SUMMARY OF THE FEASIBILITY OF REGIONAL SUPPLY OPTIONS

Based on the assessment provided above, the most feasible option would be to work with existing large-scale licence holders to share unused water allocations. The feasibility of the three regional options is summarized in Table 10.

Table 10. Summary of regional irrigation water supply options feasibility.

Water Option	Key Areas / Communities	Feasibility
Regional water storage reservoirs	All Electoral Areas	While this option would likely provide the most water security it is also cost-prohibitive without significant collaboration/partnerships and would require large amounts of land and a long engineering timeline. Overall current feasibility: **LOW**
Diversion from Great Central Lake and/or Sproat Lake	All Electoral Areas	Engagement/partnership with and support from TFN and HFN is required before exploring this option in earnest. Additional hydrometric studies would be required to determine the impact of the diversion levels on aquatic health. In addition to licensing, there would need to be design and costing developed for the distribution system. Overall current feasibility: **LOW**
Partnering with existing licensees	All Electoral Areas	Communication with existing large-volume licensees should remain open to discussing partial transfer opportunities. In particular, Domtar may be a potential partner for future collaboration. Overall current feasibility: **MEDIUM**

6.0 Feasibility of Sub-Regional Water Supply Options

While the scope of this investigation has been to conceive of what the water needs would be if all potentially arable land was put into production and irrigated, a more realistic likelihood is that this increasing need for irrigation water will occur incrementally over several years or decades, or in localized subareas. As such, it is worthwhile considering solutions that are smaller in nature than those considered in Section 5, which could accommodate a smaller volume, or a proportion of the volume, that would otherwise be required at full crop buildout. These are explored for each Electoral Area and the City of Port Alberni in this section. For context, Figure 17 indicates the location of parcels that already have irrigation water licenses in the Alberni Valley. Note that the majority are in Electoral Area B.

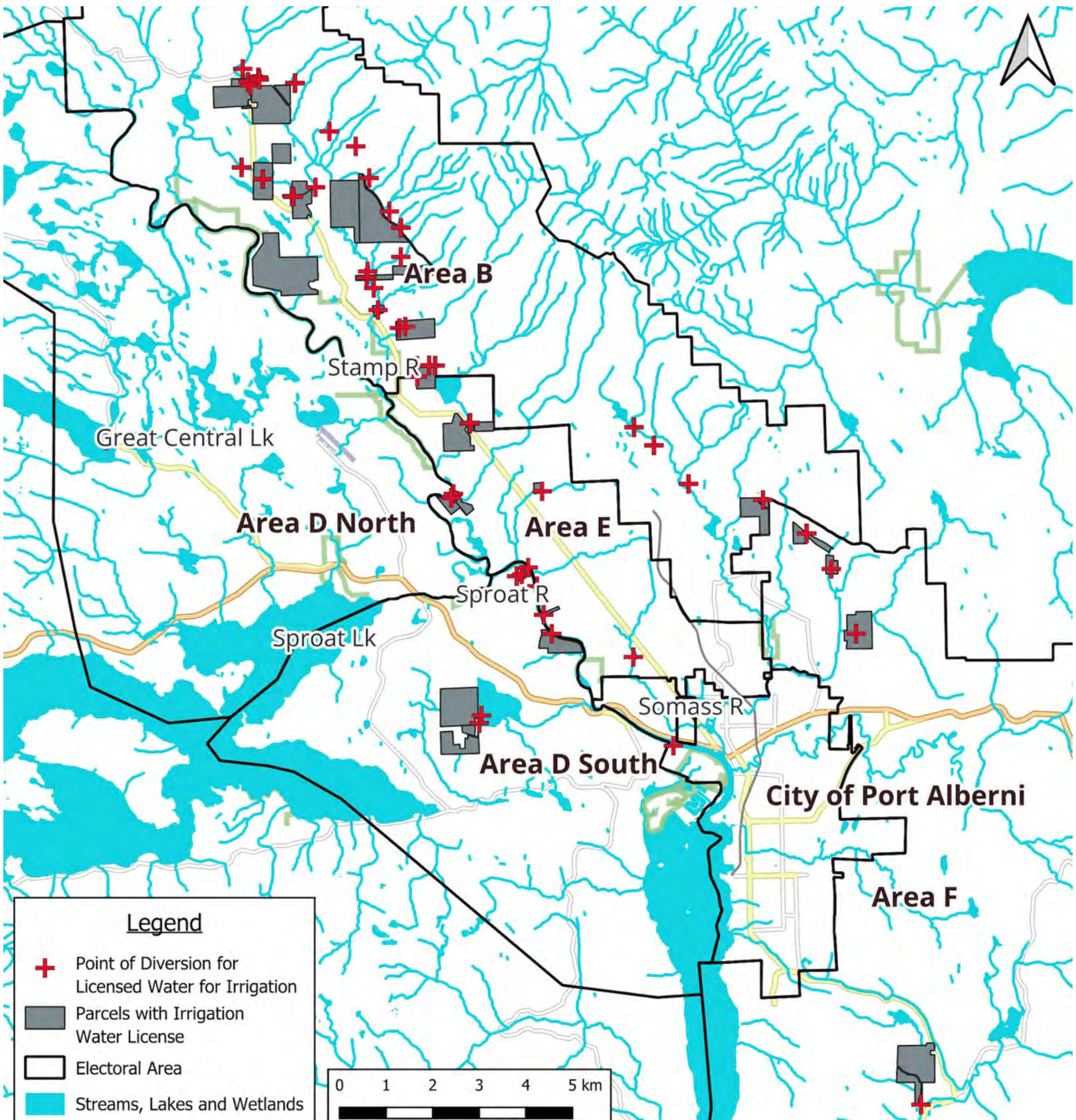

Figure 17. Parcels with water licenses in the Alberni Valley.

6.1 Electoral Area 'B' – Beaufort

Electoral Area 'B' – Beaufort represents 47.2 km^2 (26.9%) of future potential irrigated area of the entire Alberni Valley (Figure 18).

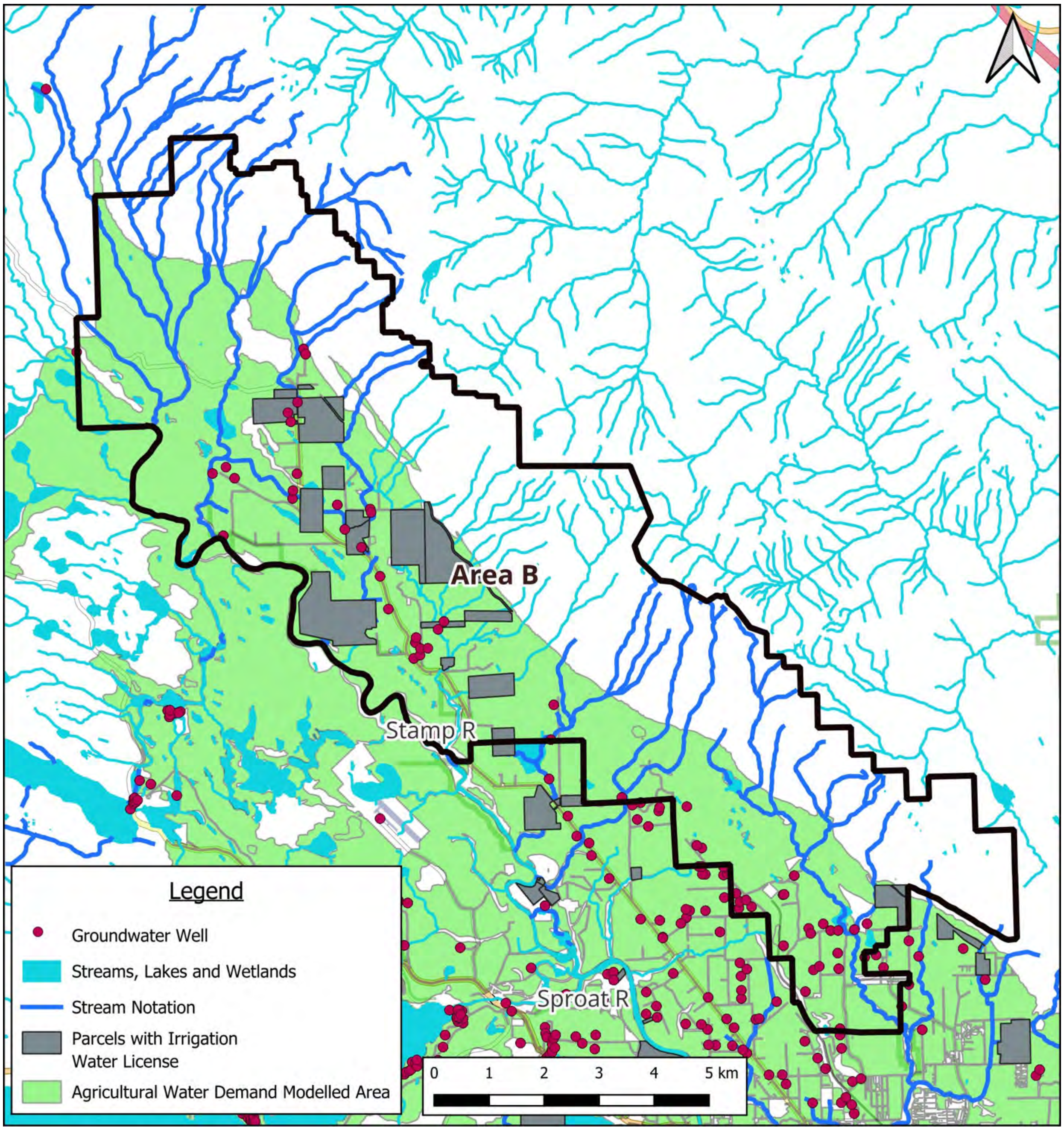

Figure 18. Details of Electoral Area "B" Beaufort study area and wells (red dots).

The majority of current agricultural activities in the Beaufort area are categorized as forage, pasture, and small-scale livestock production. There is one dairy farm remaining in this area. Many of the agricultural parcels already have water licences, although not all are actively irrigating their crops.

The main water sources in this area include:

- The natural drainage and seepage that occurs from general saturation off the Beaufort Mountain range, which collects and runs along the Log Train Trail, particularly in the winter and early spring. Some parcels have water licenses allowing for the diversion of some of this water for farm use (Figure 19a and 19b).
- Lanterman Creek and Wolf Creek, which flow into the Ash River (which subsequently flows into the Stamp River).
- Bear Creek, Hal Creek, and Deer Creek, which flow into the Stamp River.

Figure 19a and 19b. Water seepage and collection at the bottom of the Beaufort Mountain Range.

Agricultural producers in the Beaufort area have observed changes in the hydrologic regimes of these surface water resources based on logging activities in the Beaufort Mountains, with some indicating they have noticed changes in flow levels, or in water quality (e.g. silt in the water), and others have pointed to changes in the path that water has taken on the land over time, and believe that forestry activities are actively influencing these streams.[49] A small number of surface water licences can be found along the bottom of the Beaufort mountains and along Deer Creek. Groundwater is also used by many properties and there are a few water diversion licences.

[49] Council for Agricultural Water Supply and Producer-Led Watershed Data Collection Project. Final Report, 2023.

According to WLRS, most surface water sources in this area are either fully allocated or restricted, and several have notations, meaning it could be challenging to issue new surface water licences for withdrawal during the summer and fall period. Options for increasing access to irrigation water are therefore somewhat limited and include accessing water from the Beaufort Mountain range and using it directly on an individual farm basis (or collectively across several parcels) or diverting it to a farm-scale dugout. All of these options would require appropriate water licensing and conveyance infrastructure such as piping or ditches along the log train trail to pump or convey water to one or several water storage areas or dugouts. The water storage could fill during the wet winter and spring seasons and then be used for irrigation during the summer and fall months.

In the hypothetical example below (Figure 20), 370 ha of farmland in Electoral Area 'B' – Beaufort could theoretically be collectively irrigated if a storage reservoir accommodating 925,940 m^3 of water (higher end for forage) or 694,460 m^3 (lower end for vegetables) could be established.

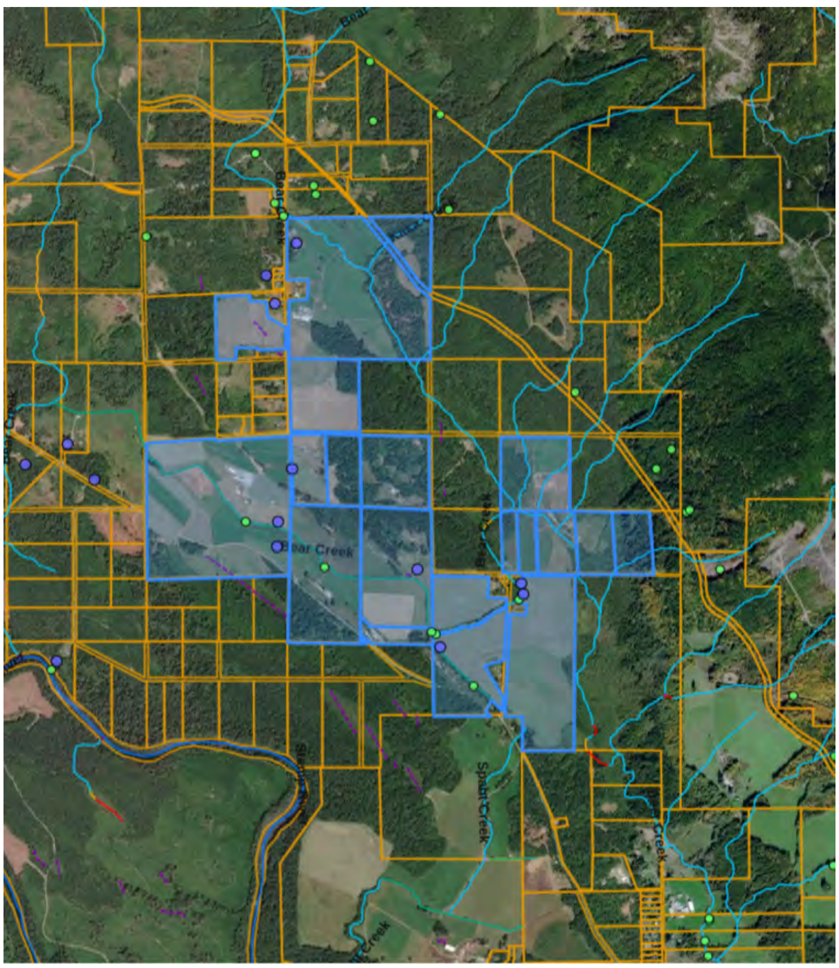

Figure 20. Example of potential collaboration in the Beaufort area - blue and green dots are existing wells.

As described in section 4.3, it takes approximately 18 ha to store 1 M m^3 of water at a depth of 6 m. Using that conversion, a reservoir between 12.46 - 16.65 ha would be required. A single reservoir would therefore likely be too large, but a more feasible solution could include several smaller reservoirs to be developed that would be filled during the winter spring period from surface runoff and then distributed to the licensed parcels during peak demand.

If several neighbouring parcels in the Beaufort area wished to set up a small waterworks system using water from the Beaufort Mountain range, this could be accomplished through the establishment of a Water Users' Community (WUC). A WUC is a group of six or more water licensees, each with their own licences, who create and maintain a system to store and deliver water to their respective places of use. WUCs are incorporated and named by the provincial Comptroller of Water Rights. A WUC allows members the right to bundle their water licences (each member retains "ownership" over their individual water rights) and collectively divert, store and deliver water.[50] The WUC can also acquire, build, maintain, improve, replace, and/or operate waterworks. The WUC structure may help members save money and time through sharing resources in order to collaboratively divert water to their properties. This could benefit producers in the Beaufort area by sharing the costs, such as laying pipes, digging trenches or ditches, or constructing the water storage facilities or dugouts. Maintenance costs could also be shared. More information about WUCs is provided on the Provincial Government Website. There are several WUCs throughout the province that have been established between a group of producers to supply water for irrigation, including in the West Kootenays (Upper Pass Creek) and the Shuswap areas (Larch Hill).[51]

6.2 Electoral Area 'D' - Sproat Lake

Electoral Area 'D' - Sproat Lake represents 35.5% of future potential irrigated area in the Alberni Valley and is divided into two subregions: North (22.2% of total study area) (Figure 21) and South subregion (33.3% of total study area) (Figure 22). There are several wells registered in the area, particularly for residential use along the shores of Sproat Lake. The Northern portion of the Electoral Area has access to both Great Central Lake and Sproat Lake.

Farming in the area includes dairy, livestock, forage, and vegetable production. The Southern portion includes some mixed farming, recreational properties, as well as Federal Reserve Lands.

[50] Small Water System Guidebook. 2024. BC Ministry of Health.
[51] Upper Pass Creek Water Users Community Certificate of Incorporation (2006) and the Larch Hill Water Users Community Certificate of Incorporation (2008).

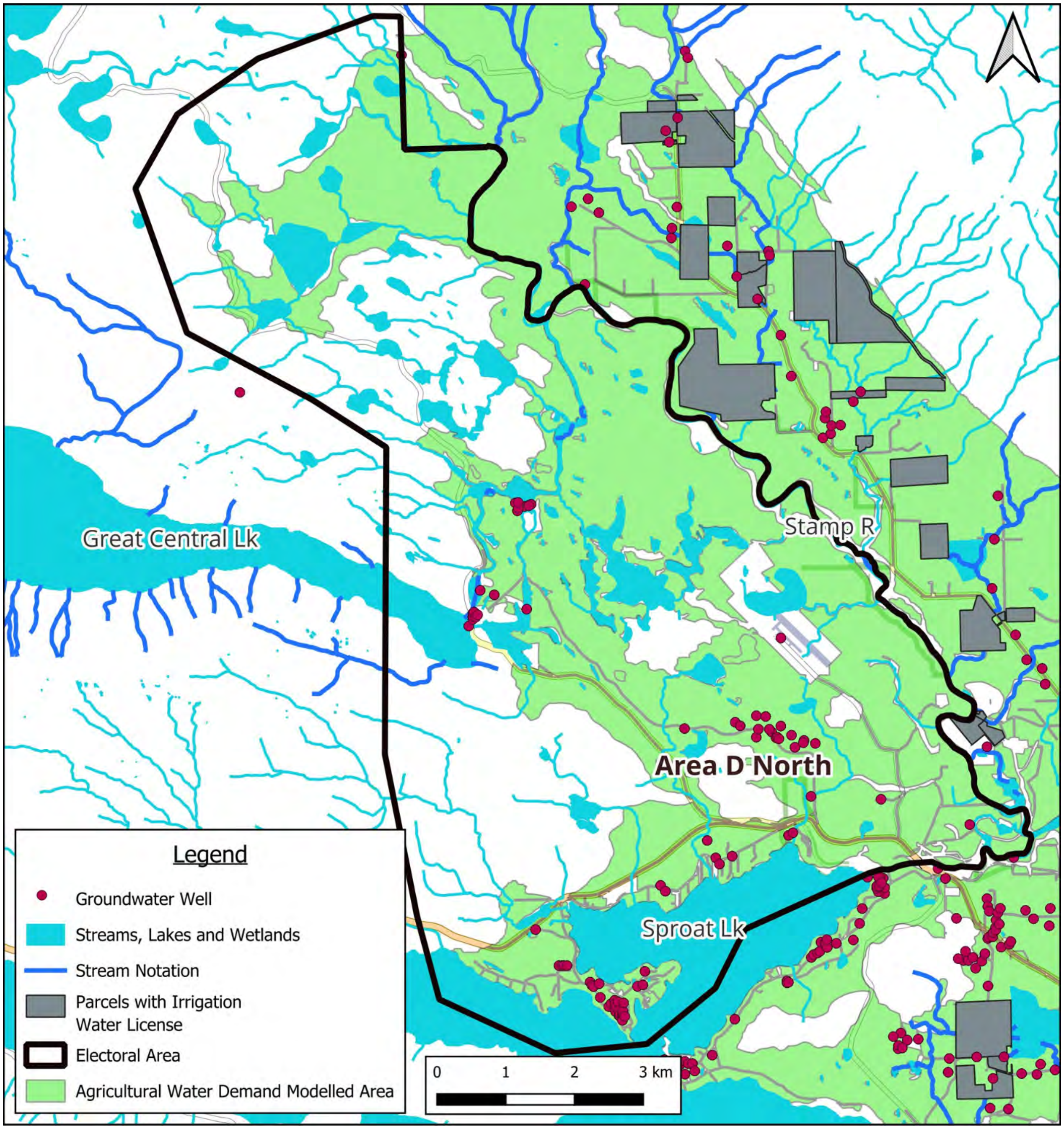

Figure 21. Electoral Area “D” Sproat Lake – North and existing well licences (red dots).

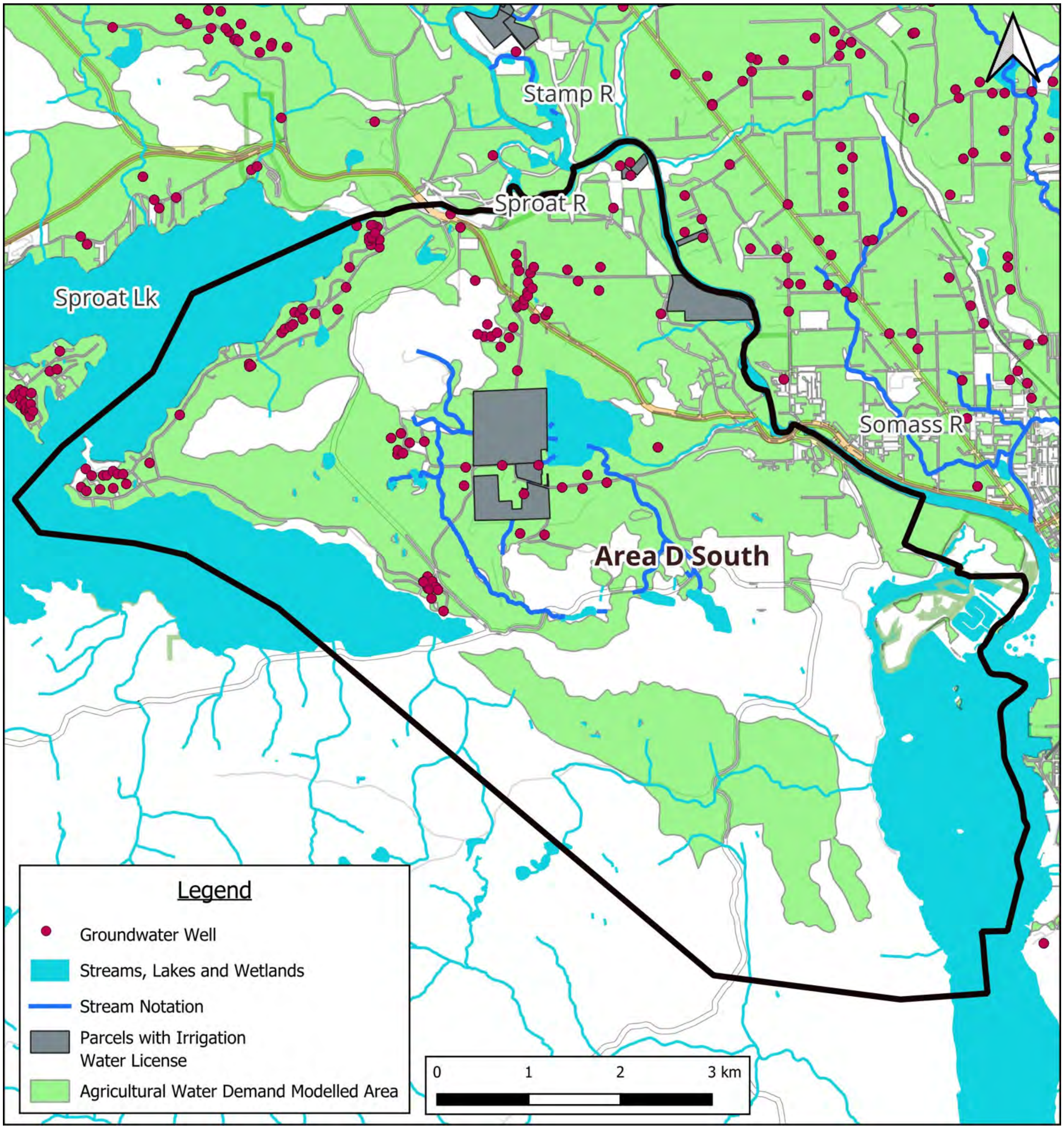

Figure 22. Electoral Area "D" Sproat Lake – South and existing well licences (red dots).

If several neighbouring parcels in the Electoral Area wished to set up a small waterworks system using water from Great Central Lake, Sproat Lake, or another water source, then an application could be made to WLRS to establish a Water Users' Community (WUC) (see information in section 6.1 for more on WUCs).

As an example, 14 parcels totalling 560 ha of farmland in Electoral Area 'D' – Sproat Lake North (Figure 23) near the airport were examined as a possible cluster of properties that could collectively seek out a water supply solution. In this theoretical example, it is assumed that a future agricultural buildout of 60% of the area (336 ha) would result in irrigation for forage crops using travelling gun irrigation equipment. It is also assumed that the watering needs for a total of 672 head of cattle (336 beef and 336 dairy) would be included. Using the [BC Agriculture Water Calculator,](#) the annual crop water demand at that level of build out would be estimated at 1,153,630 m^3 per year and the annual livestock water demand at 22,080 m^3 for a combined total of 1,180,710 m^3 of water. The elevation of the area is approximately 55 m above sea level.

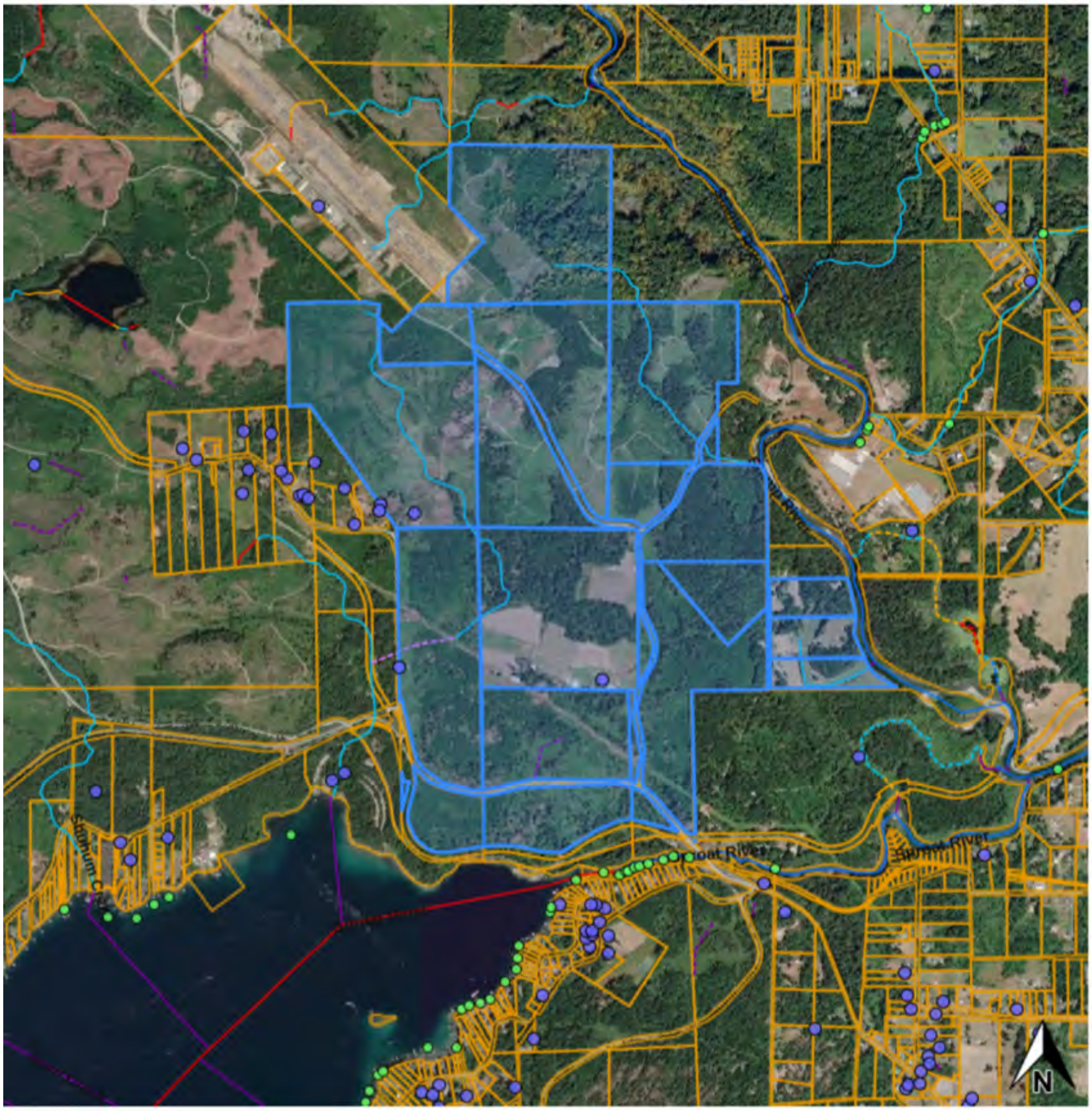

Figure 23. Example potential water infrastructure collaboration in the Sproat Lake North area.

Three potential sources were examined: Great Central Lake, Sproat Lake, and a smaller unnamed lake just off of Turtle Main Rd on Mosaic land to the north of the Alberni Airport (Figure 22).

In addition to water licensing requirements, considerations for a shared irrigation design include:

- **Sproat Lake**: A pump station and 1,200 m pipe conveyance system would be required. The elevation of Sproat Lake is 27 m above sea level and the agricultural area is 55 m above sea level, leaving a net gain requirement of 29 m, and requiring pumping.

- **Great Central Lake**: The topography may support a largely gravity-run system with reduced pumping requirements and associated costs but would require approximately 5,300 m of piping. A small pump station would likely be required, located midway in the system, because while the elevation of Great Central Lake is 82 m above sea level and the agricultural area is 55 m above sea level there is some complicating terrain within the pathway that includes a peak elevation of approximately 100 m (see Figure 25).

- **Turtle Main** unnamed lake: This is a third option from an unnamed lake with an elevation of 87 m above sea level, peak height of terrain in the pathway of 97 m. The total length of piping would be approximately 2,500 m and a small pump may be required. The land is owned by Mosaic and an access agreement would be required in order to undertake water system maintenance.

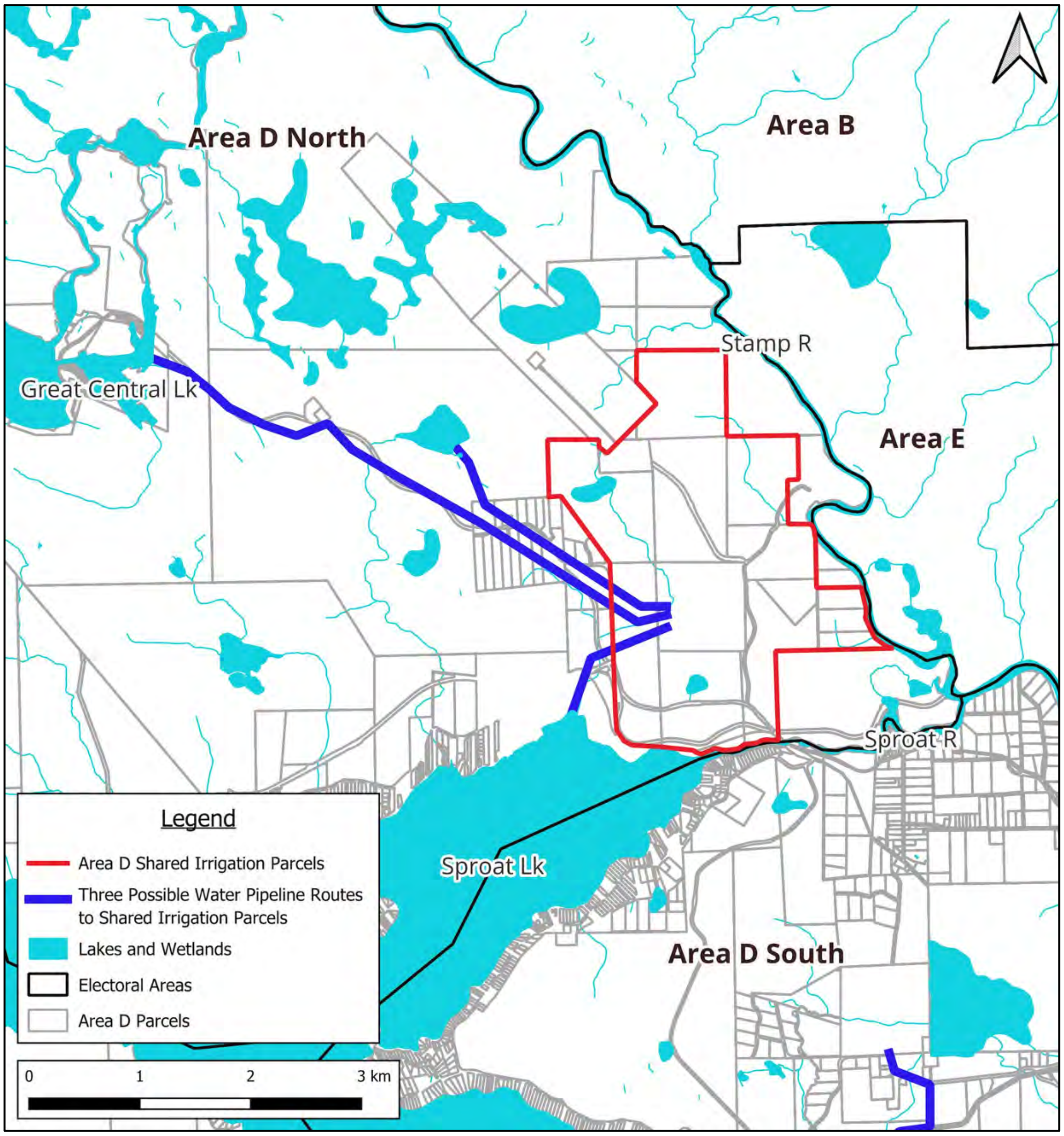

Figure 24. Three possible sources of water to an agricultural area in Sproat Lake Area North.

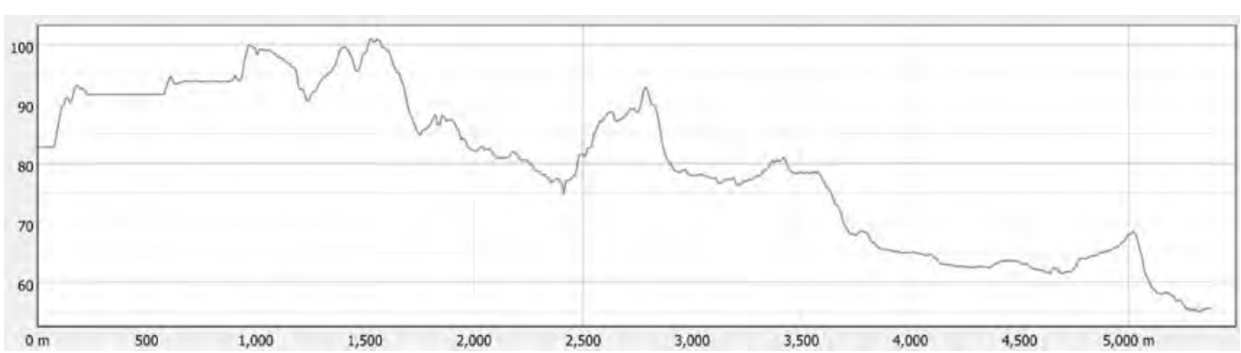

Figure 25. Elevation profile for pipeline from Great Central Lake (left) to farm properties (right).

6.3 ELECTORAL AREA 'E' - BEAVER CREEK

Electoral Area 'E' – Beaver Creek represents 1,933 km^2 or 11% of the total Alberni Valley study area (Figure 26). Key watercourses include the Stamp River, Beaver Creek, and Truman Creek.

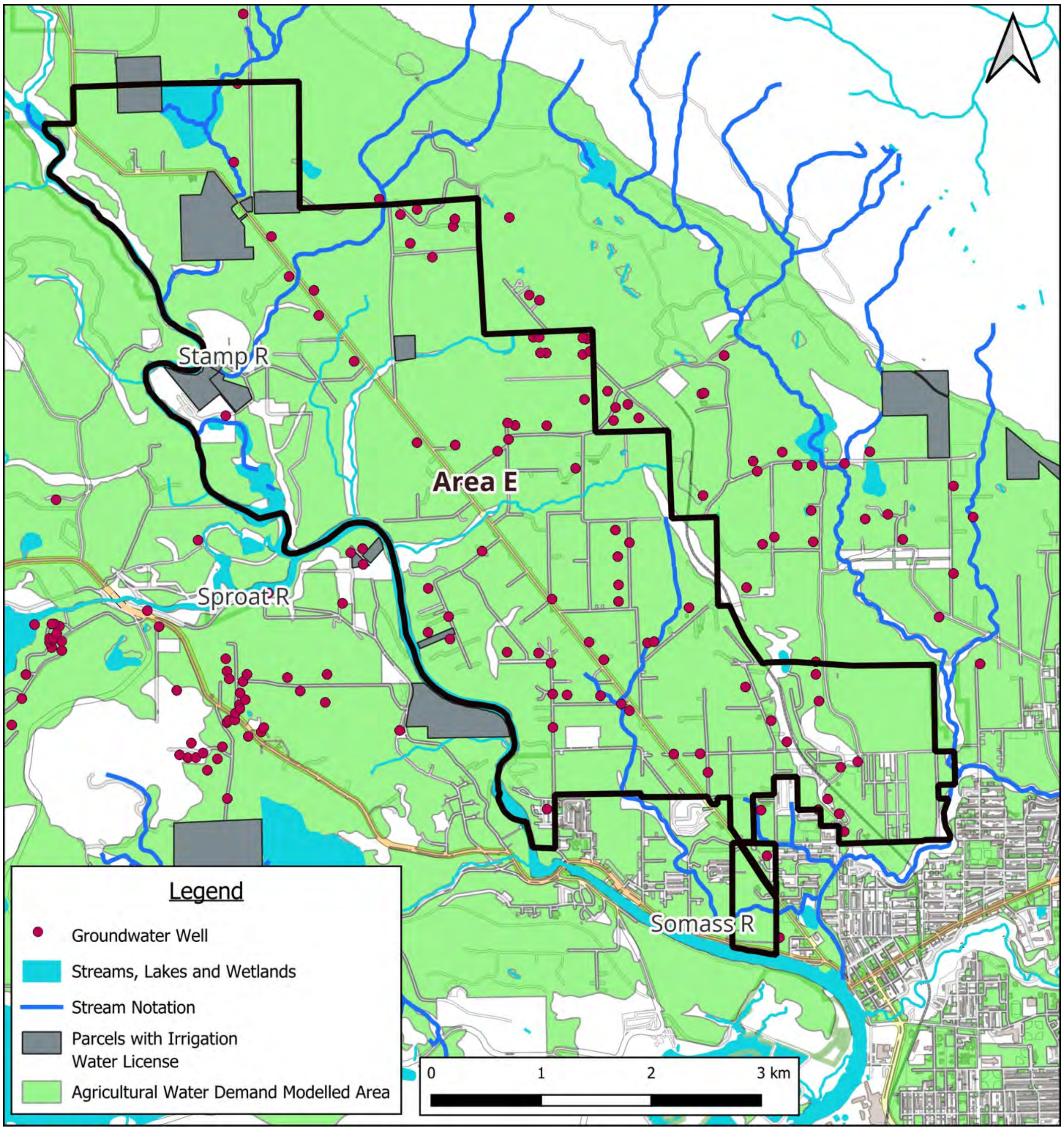

Figure 26. Electoral Area "E" Beaver Creek.

Current agricultural activities in the area include mixed livestock, forage, pasture, and vegetables on small, medium and large parcels.

The Beaver Creek Water System (BCWS) is the main water purveyor in the Area E and serves 1,081 connections within the community. The system's original source was the Stamp River, via the McKenzie Rd pump station (Figure 27). The McKenzie Rd pump station was constructed in 1959. Raw water was withdrawn from the Stamp River through an infiltration pipe buried approximately 0.5 m beneath the riverbed. A chlorine gas system was used to disinfect the raw water, but it was removed in 2014 when the pump station stopped providing potable water to the BCWS. The electrical service and controls were updated between 2010 and 2014[52]. Additional upgrades included a generator, analyzers for chlorine residuals and turbidity, and a SCADA system to monitor flow rate.

The BCWS currently receives treated water from the City of Port Alberni (CPA) through a bulk water agreement signed in 2024. CPA water is chlorinated and enters Beaver Creek at the Strick Road Booster Pump Station, where it is re-chlorinated before distribution.

Figure 27. Exterior and interior of the McKenzie Rd pump station.

While the Stamp River intake is no longer in use, it has been maintained by the ACRD for emergency purposes. However, it was confirmed through meetings with WLRS staff that the water purveyor (the ACRD) can allocate the water to end users for whatever purpose is deemed appropriate.[53] The use need not be for an emergency or for a strictly residential use, but it must keep within the volume limits. The licence, however, cannot be transferred to another intake source (such as a lake) - this would require a new licence application.

[52] Beaver Creek Water Service McKenzie Road Water Supply Pump Station Reactivation vs. Decommissioning Review (2020).
[53] Pers. Comm., L. Robinson, Water Authorizations Specialist, WLRS, 2025.

In 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[54]. The cost estimates for upgrades were summarized as follows (assuming 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.
- According to Beaver Creek Water Advisory Committee meeting minutes from 2020, the additional cost to each customer of approximately $150 per year for 10 years. The on-going maintenance costs after that time would be $50/year. This would not result in a potable water source and a boil water advisory would be required.

Stamp River Environmental Flows

The Stamp River boasts the largest summer Steelhead run on Vancouver Island and is of major environmental, economic, and cultural importance. Control of water temperatures is important for adult salmonoids during their upstream migration. Through discussions with the ACRD Sustainability Planning department, it was indicated that the Stamp River requires an absolute minimum of 15 m^3/s and preferably a minimum of 17 m^3/s to maintain adequate water temperatures for fish habitat. Based on the available hydrometric data, the Stamp River fell below 17 m^3/s on 21 days.

Given the increased likelihood and duration of drought conditions in the region, it is likely that meeting this minimum flow level will become increasingly difficult during the summer months and presents a high level of risk, particularly in addressing water needs during increasingly prolonged periods of drought.

In 2020, the Beaver Creek Water Advisory Committee voted to recommend that the ACRD decommission the McKenzie Road pump station[55]. While the pump station has not been demolished, the 2020 Beaver Creek Water System Annual Report indicates that the facility has since been operationally decommissioned[56].

Other features of the Beaver Creek water system include:

- Strick Road pump station
- Darnley Road pump station

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[54] Reactivation vs. Decommissioning Cost Review of the McKenzie Road Water Supply Pump Station (2020)
[55] Beaver Creek Water Advisory Committee meeting minutes, Wednesday November 18, 2020.
[56] Beaver Creek Water System Annual Report, 2020. Alberni Clayoquot Regional District.

- North Reservoir pump station
- Kitsuksis Road concrete reservoir: 1,135 m^3
- Kitsuksis Road glass reservoir: 1,135 m^3
- Beaver Creek Road steel reservoir (Figure 27): 273 m^3
- Length of water mains: 45 km
- Number of fire hydrants: 127
- Total bulk water consumption in 2024: 366,896 m^3

The CPA has given the ACRD notice that it intends to terminate the current bulk water agreement with the BCWS and replace it with a re-negotiated agreement that would have a higher bulk water rate.

In 2025, a report by McElhanney Engineering[57] indicated that moving forward with further investigation of the Stamp River in order to proceed with an alternative water source.

ACRD staff have recommended that the consultant proceed with further investigation of the costs for moving the intake upstream of Truman Creek. The main concern associated with Truman Creek is that it introduces high levels of sediment into the Stamp River, creating turbidity and water quality concerns with IH. Moving the intake upstream reduces the impact of sedimentation and turbidity.

Figure 28. Steel water reservoir located on Beaver Creek Road.

The average summer flow of Stamp River is 4,057,236 m^3/day with historic lows reaching less than 25% of the average flow. The ACRD's current water licences (C129531 and C129544) allow for the withdrawal of 1,635 m^3/day and 1,476 m^3/day (3,111 m^3/day total or 1,135,515 m^3 per year). The McElhanney report indicates that current demand ranges from 500 m^3/day to 2,500 m^3/day and is expected to reach 3,600 m^3/day in 2044 (this does not include the water volumes included in the AWDM irrigation scenario calculations).

The results of the AWDM calculations indicate a total of 9.8 M m^3 of water would be required in Area 'E' – Beaver Creek if every arable parcel was irrigated, which greatly exceeds currently licensing. However, gains

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[57] Technical Memos to the ACRD concerning Beaver Creek Water System Groundwater Feasibility Assessment; Surface Water Feasibility Assessment; and Final Report, 2025. McElhanney Consultants.

could be met by increasing availability of water via the McKenzie Rd pump station system for farms in proximity to that area, in addition to encouraging the use of dugouts on individual parcels.

This scenario would require the reactivation of the McKenzie Rd pump station. Koers (2020) determined that a one-time cost in 2020 dollars would be $861,000 plus an annual $10,000 operation and maintenance costs.

In terms of conveyance, a new water distribution network could be installed to ensure the separation of potable and non-potable irrigation water supply. This would require a new (second) system to be installed, the costs of which are unknown but that the McElhanney report indicate would be high. This new distribution network could be largely parallel to the existing potable water network along Beaver Creek Rd and along secondary roads leading to agricultural parcels.

Alternatively, the existing potable water network could be used if the intake is adjusted to accommodate water quality that is in line with IH requirements (e.g. upstream of Truman Creek) and the water quality for the entire system can be ensured. There are also significant costs associated with this option, including a new intake build and water treatment system.

There would need to be several determining factors in the design and layout of the distribution system, pointing to the need for a formalized governance system to manage the water resource. These considerations would include:

- Which agricultural properties would receive irrigation water (e.g. within a 2 km, 5 km, or 10 km distance from the pumpstation)?
- What would be the quantity and delivery schedule of water to each of the agricultural parcels?
- Would water reservoirs be used, typically at either end of the distribution network, to store water for peak water demand periods and to maintain pressure?
- What would be the costs that would need to be borne by the end users?
- Would the water users allow for the water to also be made available for emergency purposes, such as wildfires?

A new non-potable water system could resemble the conceptual layout in Figure 29 (next page), which depicts water mains (brown lines) to most arable areas in Electoral Area 'E' – Beaver Creek. The distribution system would include over 27 km of water pipelines aligned closely with the current BCWS distribution layout. It follows existing roads and rights of way and includes two reservoirs located at either end of the system in close proximity to the existing potable water reservoirs (the 'North' and 'South' reservoirs). Based on initial calculations, this non-potable distribution network would cost in the range of $32-$37 M, including a 30% contingency.[58]

As an alternative to a new distribution network, water could be pumped using the existing pipe network to a newly constructed elevated or in-ground reservoir in close proximity to the pumping station, where bulk

[58] This is a Class 5 cost estimate based on currently-available quotes for laying pipes at $600 per m plus pumps, valves, and other materials. The Province of BC's cost estimate Class 5 is often used for developing cost estimates for transportation infrastructure projects at the concept options screening stage, with an intended accuracy of -150% to +100% of costs.

water withdrawals could be made for irrigation. This concept would work best for vegetable and/or berry producers on small acreages that require limited quantities of water, however it would not be sufficient to satisfy agricultural parcels using irrigation equipment on large parcels (e.g. irrigating forage crops, and/or greater than 5 ha).

It is recommended that the opportunity to provide water to agricultural sources and associated costs be included in the scope of the next phase of analysis of the BCWS by McElhanney Engineering.

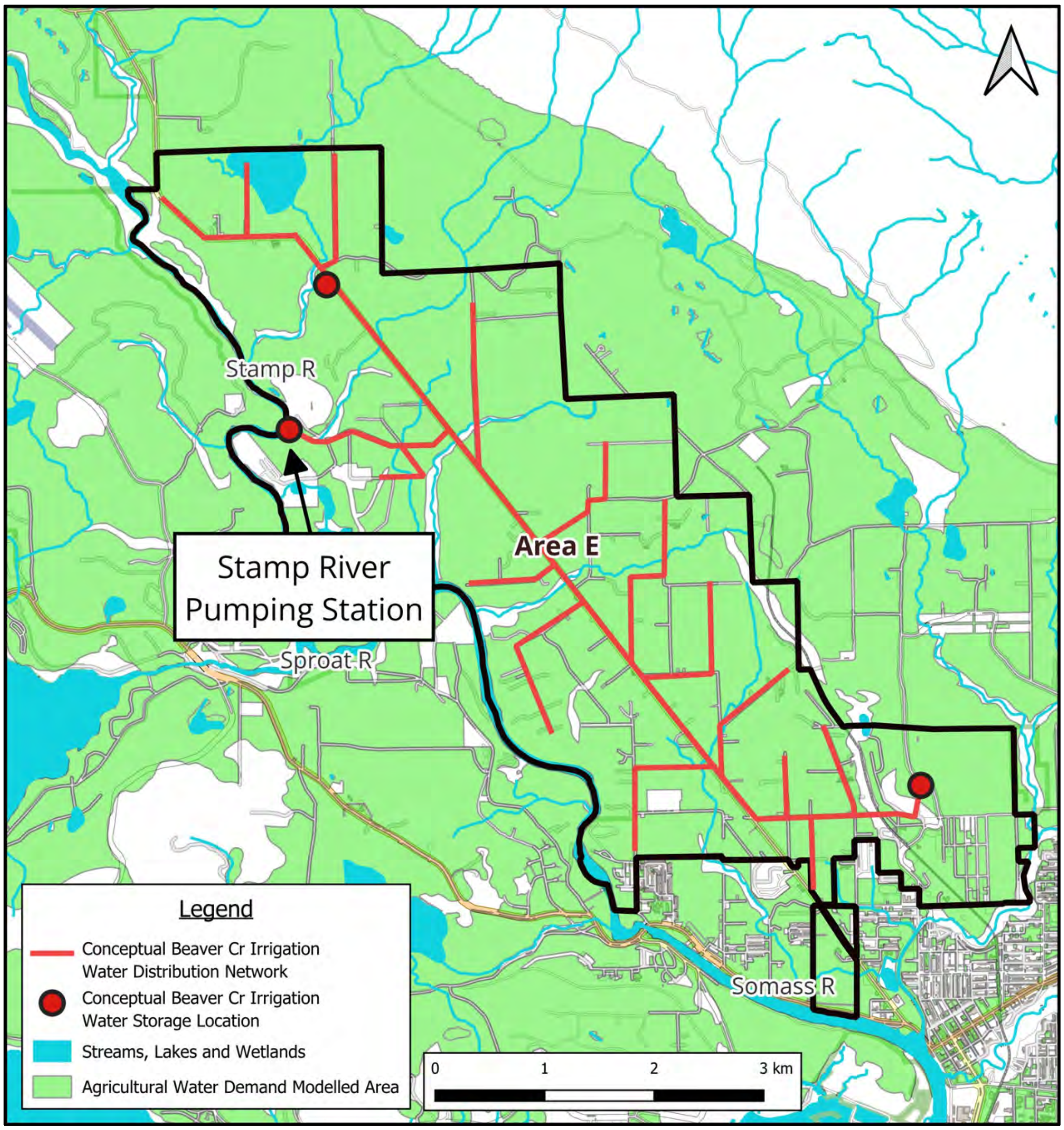

Figure 29. Conceptual water distribution network in Beaver Creek using non-potable water from the McKenzie Rd pump station to agricultural parcels.

6.4 Electoral Area 'F' - Cherry Creek

Electoral Area 'F' – Cherry Creek is a large area, however only a portion of it is currently used for residential purposes, and an even smaller area for agricultural purposes. There are currently farms that are active both north and south of the Alberni Highway in Electoral Area 'F', though much of the south part of the Electoral Area remains undeveloped from an agricultural perspective (Figure 30).

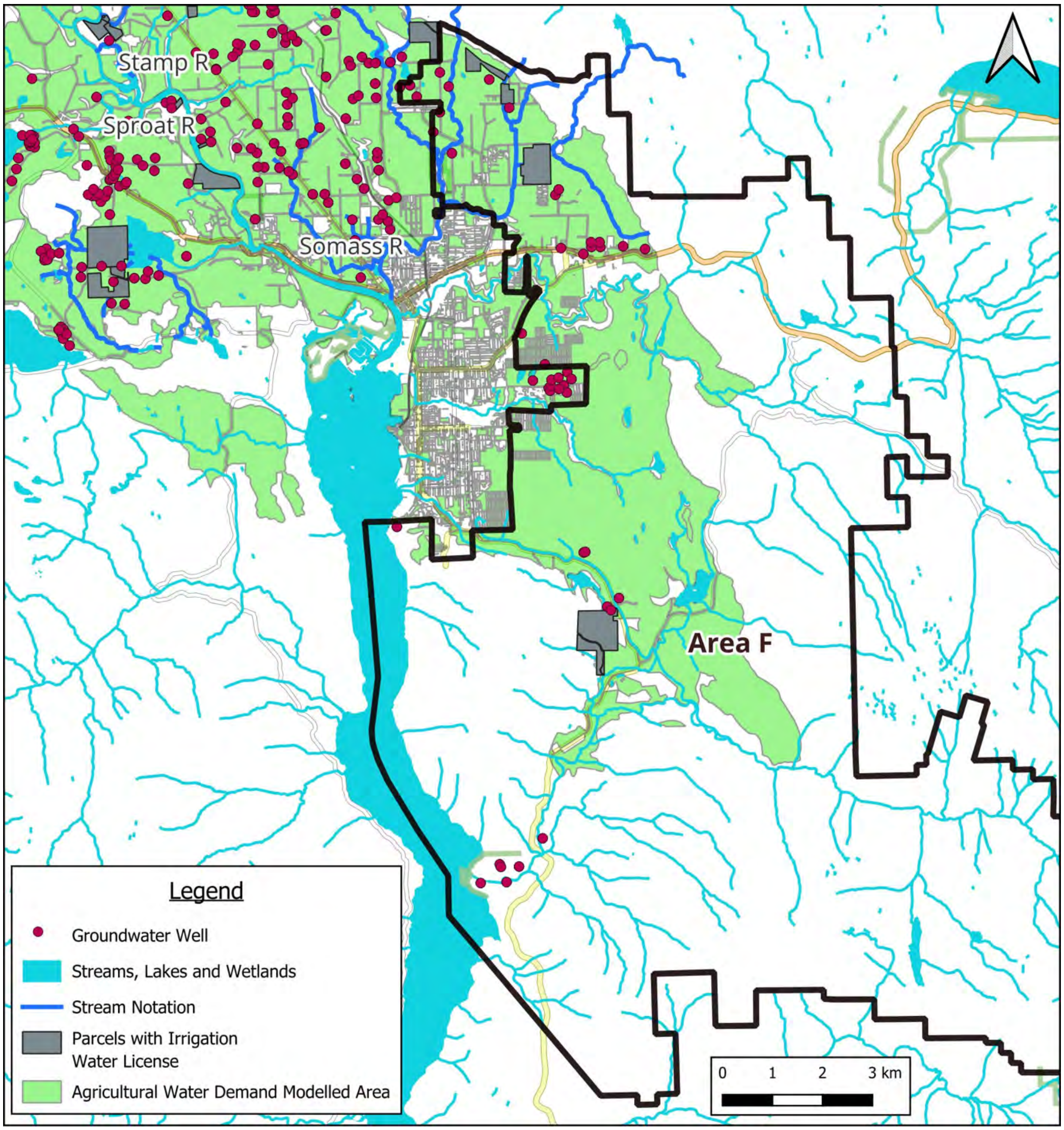

Figure 30. Electoral Area "F" Cherry Creek.

The Cherry Creek Waterworks District (CCWWD) was established in 1957 and provides potable water and fire protection services mostly to properties within Electoral Area ‘F’ – Cherry Creek that are located north of the Alberni Highway 4, and a few that are located south of the highway (Figure 31).

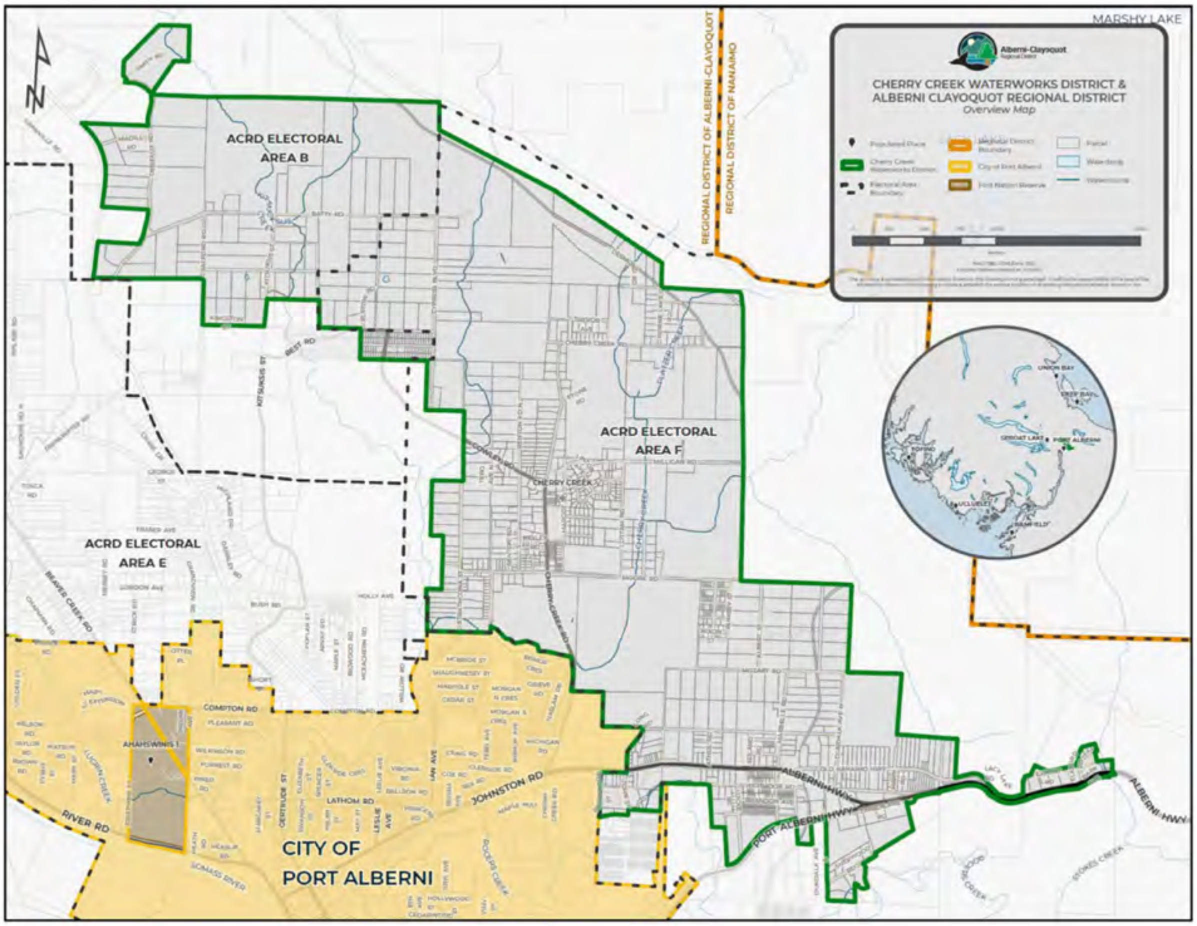

Figure 31. Cherry Creek Waterworks District service area.

Key features of the water service include[59]:

- CCWWD derives its water from Cold Creek, with headwater storage at Lacy Lake, located approximately 2.5 km northeast of the Cherry Creek community.
- CCWWD holds a lease with Mosaic Forest Management for approximately 32 acres, including the lakebed and surrounding area.
- There are three dams on Lacy Lake, constructed in 1958 and in 1968 to increase the storage capacity of the lake. Weekly dam inspections are conducted in line with the provincial Dam Safety Regulation.
- CCWWD holds water licences (C34830 and C34829) for the storage at Lacy Lake and withdrawal on Cold Creek (3,028 m^3/day or 1,105,200 m^3 per year).

[59] Cherry Creek Waterworks District Conversion Study, 2024. Connections Planning Associates and Urban Systems.

- Lacy Lake has an area of approximately 143,000 m^2 at full pool, and an estimated total volume of approximately 600,000 m^3. There is a live storage volume of approximately 370,000 m^3 allocated to CCWWD.
- Water is fed into Cold Creek via piped connection and water levels in the lake are monitored. When water levels are higher, Cold Creek is fed by an overflow spillway. The elevation of the spillway is raised with wooden weirs in early spring to maximize storage of the lake throughout the summer.
- A diversion dam and intake structure is located on Cold Creek approximately 2 km downstream of the Lacy Lake outlet.
- The CCWWD service area includes distribution to approximately 790 parcels (748 residential and 42 commercial/industrial connections), through approximately 38 km of water mains.
- The CCWWD water system includes distribution system piping, fire hydrants, pressure reducing valves, water meters, and other system valves and fittings. There are five pressure reducing valves (PRVs) dividing the system into three main pressure zones. There are no booster pumps on the system, and aside from the five PRVs, the system pressures are entirely a function of elevation and distance from the PRVs.

Cherry Creek's water treatment currently consists of chlorination. In 2012, residents of Cherry Creek voted in favour of treating the current Lacy Lake water source to a higher level (e.g. filtration), and CCWWD has since been working on feasibility and design options for a new water treatment plant. The estimated cost of the treatment plant is approximately $6 to $8 million, to be funded from a variety of sources including capital reserves, parcel taxes, and new borrowing. In recent years, additional challenges have arisen due to aging infrastructure, rising costs (both construction and administrative), reduced capacity (both staff and elected officials), and the inability to access senior government grants. Of note, the CCWWD, as an improvement district, cannot apply directly for senior government grants and must finance upgrades from Cherry Creek residents.

Recently, a conversion study was completed to examine the costs associated with the potential operational, administrative, and financial impacts of service conversion to the ACRD[60]. As part of this study, replacement value of the current Cherry Creek water system was estimated to require an annual investment of approximately $426,000 in 2024 dollars. CCWWD has identified the replacement of approximately 15 kilometres of aging watermains as a priority. Residents participated in a referendum in 2025 to determine if the CCWWD should be converted to the ACRD's water and fire systems, with the majority of residents voting 'no'[61].

Outside of the CCWWD service area, wells and surface water licences are used for parts of Area F that are south of the Alberni Highway, particularly around China Creek, Cox Lake, and Bainbridge Lake.

[60] Cherry Creek Waterworks District Conversion Study, 2024. Connections Planning Associates and Urban Systems.
[61] Cherry Creek Waterworks District Conversion Referendum results, 2025.

The AWDM future irrigation scenario provided a mix of berry, forage, pasture, and vegetable crops over a total area of 38.6 km^2 (3,856 ha) of possible irrigated area. The amount of water required to irrigate this area would be 22.2 M m^3 per year. Despite this large potentially arable area, most of southern part of Area F is currently forested. Therefore, it is anticipated that only some of this area could be moved into active agricultural production in the short to medium term (e.g. less than 10 years), if and when water would be made more available for irrigation.

Figure 32 presents a hypothetical group of 24 parcels that could collaborate in the future to irrigate 80% (160 ha) of the combined total 200 ha area. Depending on the types of crops grown (e.g. forage, vegetables, berries), the demand would range from 374,140 m^3 to 505,330 m^3 per year. While Cold Creek is in close proximity, the watercourse contains notations from the province that indicate that it is fully recorded and that it would be unlikely for new licences to be allocated except in exceptional circumstances. However, if the parcels already have individual water licences, then a Water User's Community (WUC) could be formed and investments into pumps, pipes, and other waterworks infrastructure could be shared.

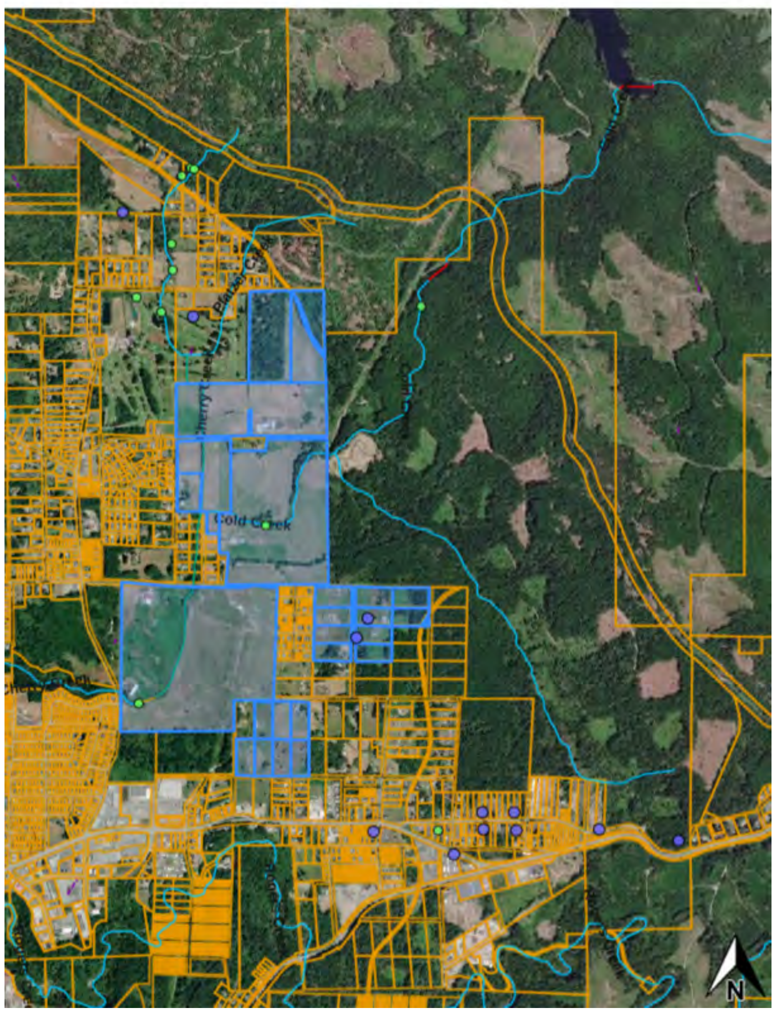

Figure 32. Example of a group of parcels that could collaborate on shared irrigation infrastructure.

6.5 City of Port Alberni

Within the CPA most parcels of land are small city lots, but some larger parcels are currently used for agricultural production and market gardens (Figure 33).

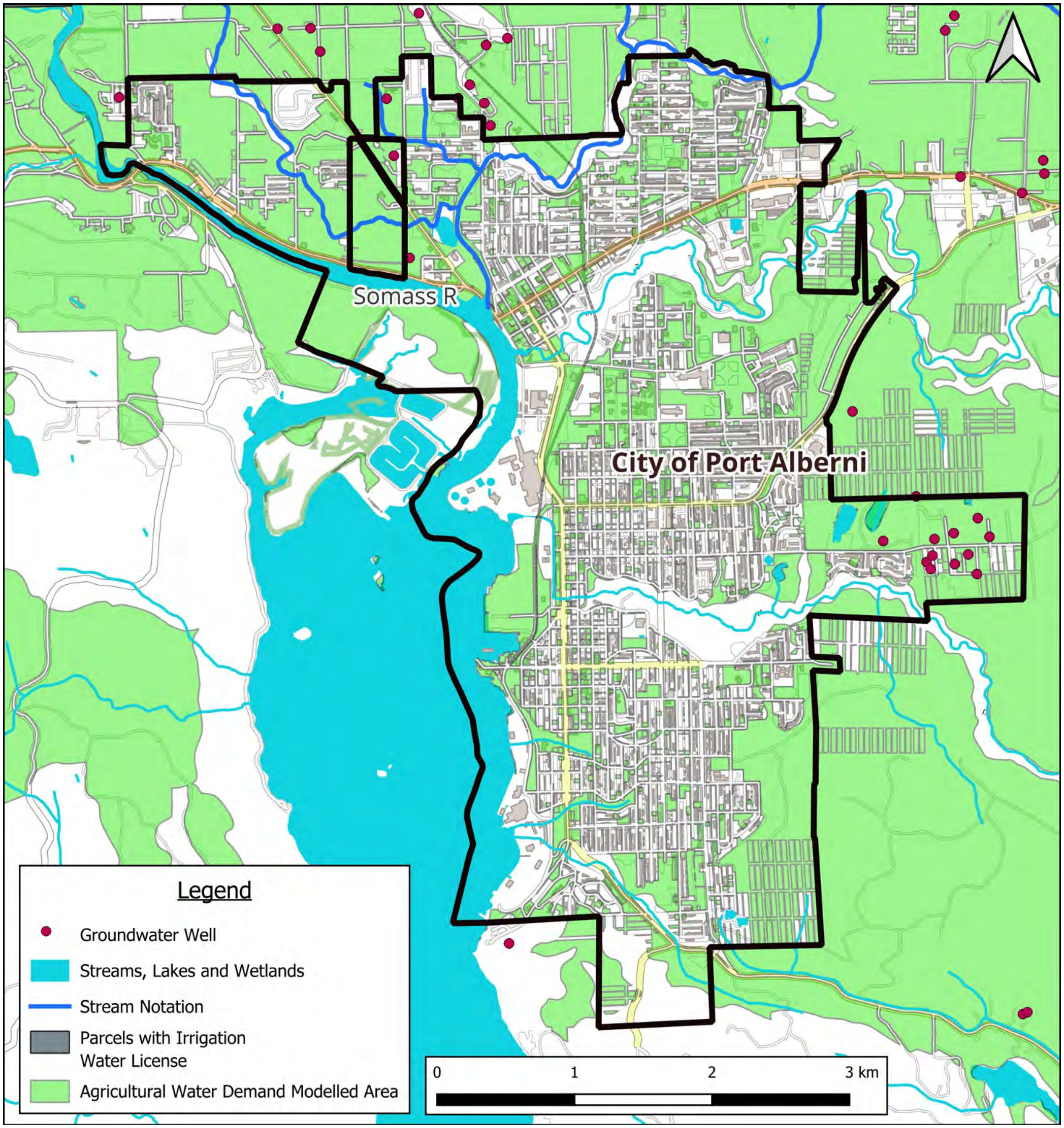

Figure 33. City of Port Alberni.

The City of Port Alberni (CPA) water system is supplied by three water licences[62]:

- China Creek (gravity fed): 24,451 m^3/day
- Bainbridge Lake (pumped): 9,763 m^3/day
- Somass River (pumped): 13,564 m^3/day (for emergency use only)

While the total permitted volume is 47,778 m^3/day or 17,438,970 m^3/year, in 2024 the total annual usage was just over 4 M m^3, indicating that the level of demand is less than the total allocated volume. The CPA water system includes three dams, five pump stations, three chlorination stations, and five reservoirs (total storage volume of 34,000 m^3). There are a total of 165 km of distribution mains and 6,462 connections.

The AWDM was calculated for lots within the CPA over 0.25 acres in size (Figure 34). Future scenarios provided for a mix of berry and vegetable crops over these parcels, which in total amount to 8.2 km^2 of possible irrigated area. Most of these would be residential gardens or rural/residential market gardens. The total amount required to irrigate this additional production would be 3,865,056 m^3 per year. This volume could be partly accommodated through onsite water storage such as rainwater collection into cisterns and/or small dugouts, therefore local policies and regulations should support the use of these tools.

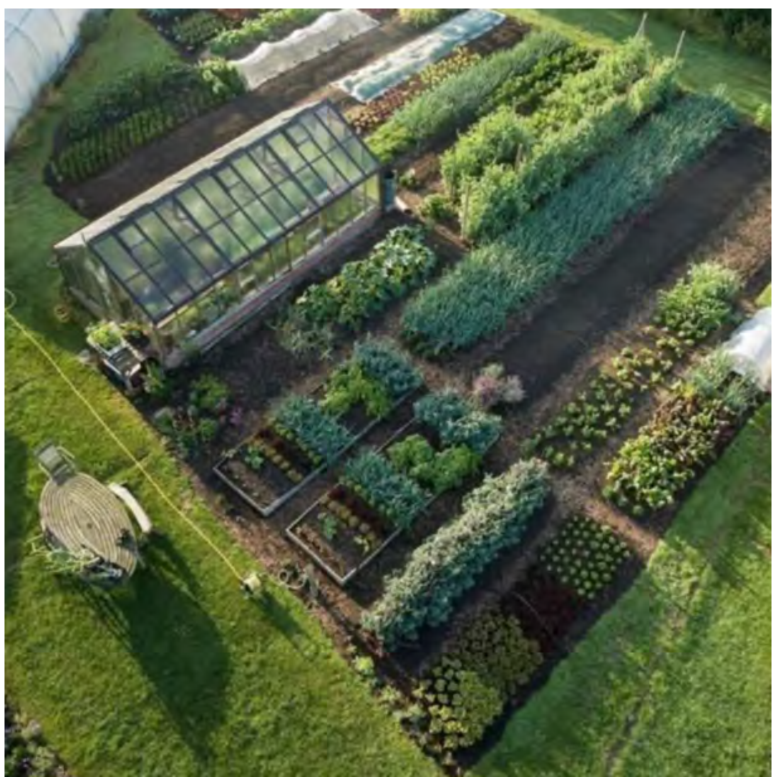

Figure 34. Example of production on 0.25 acres or less.

[62] City of Port Alberni Waterworks Inventory, 2025.

7.0 Individual On-Farm Water Storage (Dugout) Considerations

In place of construction of a sub-regional storage reservoir to serve a larger group of farm parcels, or the use of cisterns on smaller parcels, individual storage units (dugouts) could be constructed. Since there are significant winter surface water flows within this area, individual farm water storage is seen as a viable option for irrigation water supply. Due to the fact that peak irrigation water demand comes in the driest part of the growing season and peak source availability comes over the winter, on-farm storage appears to be one of the more viable options for irrigation water supply within the ACRD. This section provides an overview of regulatory, sizing, and costing considerations of dugouts.

7.1 Dugout Regulatory Considerations

The Water Sustainability Regulation (WSR) is the main consideration when designing and building a dugout. When dugouts are designed to utilize diverted winter flows from existing watercourses, or if they interact with groundwater, then a licence will be required through the WSR. However, if they do not connect to an aquifer and if they are only capturing overland runoff (winter drainage from the subject parcel), then they may not require a licence. It is worth noting the following:

- No dugout construction standards exist for storing non-vested water in dugouts, as soil characteristics are variable across the province. The onus is on the water user to provide evidence that there is no interference occurring with groundwater, nor with water from a "stream" as defined in the WSA.
- If building a soil-lined dugout, be sure to indicate the type of non-permeable material (bentonite or other clays) and the method of compacting the clay layer(s) in the water licence application.

It is always best to check with a Water Authorizations Officer at WLRS to determine the need for a licence when designing a dugout. If the water storage licence is approved, then the licence must make beneficial use of the water within three years. Diverting water from an ephemeral stream to fill a dugout is a possibility, however a timeline as to when the water can be diverted (e.g. Oct-April) and when the water can be used (e.g. July-Aug) may be required. Furthermore, only gazetted (named) streams may be licensed (a license is required for groundwater whether it is officially mapped or not).

The Dam Safety Regulation is another regulatory consideration. If the topography of the site allows, a reservoir may be created in a depression with a low head dam or berm at the outlet. All dams are regulated by the Province through the Dam Safety Regulation and fall into two broad categories: minor dams and larger dams. Minor dams must be less than 7.5 m in height and water storage cannot exceed 10,000 m^3.

Additional requirements are included for dams that are[63]:

[63] BC Ministry of Water Land and Resource Stewardship. Dam Safety Regulation. https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/laws-rules/dam-safety-regulation

- Greater than 1 m in height that store more than 1 M m^3; or
- Greater than 2.5 m in height that store more than 30,000 m^3; or
- Greater than 7.5 m regardless of the volume of water stored; or
- The dam has a significant, high, very high or extreme risk of failure.

Minor dams are easier to permit since they pose a smaller risk to public safety than major dams. These could be relatively easily excavated as a dugout without having to meet the Dam Safety Regulation requirements and adding additional liability.[64] [65] Most farm dugouts would be small enough that they would not require compliance with the Dam Safety Regulation.

Local bylaws may also apply, such as Development Permit Area applications, environmental setbacks, etc.

Lastly, funding may be available to support covering costs related to dugout design and build, however most funding programs require that the farm have "Farm Tax Status" as conferred by BC Assessment. New entrants who do not yet have farm tax status should consider applying to BC Assessment for 'developing farm status' classification in order to be able to apply for funding.

7.2 Dugout Sizing Considerations

Dugouts need to be sized according to the specific demand for the agricultural activities associated with each parcel, and it is possible that not every agricultural parcel will be able to accommodate a dugout, therefore this solution may not work for each farm. The size and placement of on-farm storage reservoirs (dugouts) will be very site specific. Sizing is primarily based on the irrigation water demand which varies with crop type and irrigation system type. Placement will vary depending on soils, topography and access to either winter streamflow or surface run-off from the parcel. Dugout designs should be completed by Qualified Environmental Professionals (Hydrologist, Professional Geologist, Professional Agrologist, or Professional Engineer). Dugout sizes can be estimated using the BC Agriculture Water Calculator. Two examples are provided below.

The required storage volumes could be as low as 2,075 m^3 per irrigated hectare (berries, micro sprinkler, silty clay loam soil) or as high as 5,375 m^3 per irrigated hectare (forage, sprinkler, sandy loam soil). As a rough average estimate across the entire study area, a volume of 3,500 m^3 per irrigated hectare could be used as a base calculation.

[64] Application of the Dam Safety Regulation Info Sheet, 2016. BC Ministry of Forests.

[65] Guidance of Farm Water Storage: Water Supply Fact Sheet No. 510.100-1, 2021. BC Ministry of Agriculture, Food, and Fisheries.

Example 1: Electoral Area 'B' – Beaufort – 16.5 ha property

As an example, five crop scenarios were developed to illustrate the dugout sizing needs for irrigating different portions of a 16.5 ha parcel in Electoral Area 'B' - Beaufort. The five crop/irrigation system scenarios were:

- 10 ha of forage irrigated by sprinkler; or
- 10 ha of forage irrigated by travelling gun; or
- 5 ha of vegetables irrigated by sprinkler; or
- 1 ha of berries irrigated by micro-sprinkler; or
- 10 ha of pasture irrigated by sprinkler.

Table 11 provides examples of potential dugout sizes that would accommodate the irrigation requirements of the above five crop scenarios on a portion of the property. The results are based on the BC Agriculture Water Calculator and are preliminary and would need to be verified by a QEP before applying them to an actual dugout design. However, they indicate a range of water volumes that would depend on the crop scenario (e.g. between 2,268 m^3 for 1 ha of vegetables using a micro-sprinkler, and up to 45,048 m^3 for forage using a travelling gun), which would in turn correspond to a dugout requiring 1.5% to 8.7% of the parcel coverage (0.2 ha to 1.4 ha in surface area) of a 16.5 ha parcel. Some farms may choose to build more than one dugout (Figure 35).

Table 11. Example of dugout sizes required in Electoral Area 'B' – Beaufort.

Crop	Irrigation system	Irrigated area	Annual Crop Demand (1)	Required Storage (2)	Dugout Size (3)				
					Depth	Length	Width	Surface area	% of parcel (4)
		ha	m^3	m^3	m	m	m	ha	%
forage	sprinkler	10	34,120	40,944	4	144	90	1.3	7.9
forage	travelling gun	10	37,540	45,048	4	160	90	1.4	8.7
vegetable	sprinkler	5	12,800	15,360	4	95	55	0.5	3.2
berry	micro sprinkler	1	1,890	2,268	4	40	30	0.2	1.5
pasture	sprinkler	10	34,120	40,944	4	144	90	1.3	7.9

Notes:
1. Crop demand based on standard irrigation system efficiency and a loam soil.
2. Required storage is based on 120% of irrigation demand to account for losses and efficiency of use within the storage.
3. Dugout construction assumes a side slope of 0.25 m/m and end slope of 0.67 m/m.
4. This is the percent of the surface area of the 16.5 ha parcel that would be covered by the dugout footprint.

Figure 35. Two dugouts on a farm parcel used for irrigation.

<u>Example 2: Electoral Area ‘F’ – Cherry Creek – 24 ha property</u>

A more detailed example of how a dugout for 5 ha of vegetables on a loamy sand soil in Electoral Area ‘F’ – Cherry Creek might be configured on a 24-ha property are shown in Figures 36 and 37. The irrigation demand is ~16,800 m^3 throughout the growing season and storage volume calculated at ~19,200 m^3. Note the dugout would fall under the Dam Safety Regulation as it is larger than 10,000 m^3. The dugout footprint would cover about 6,800 m^2 or roughly 3% of the parcel. The assumed source of water would be from diverted winter flows from an adjacent watercourse although surface runoff from the parcel could be a source as well. Therefore, the diverted water would likely require licencing under the WSA.

Agriculture Water Demand Report

Generated by: www.bcagriculturewatercalculator.ca (v2.4.3)

Date: Jul. 29, 2025

Property

Property ID (PID):

Total Area: 24 hectares

Irrigation

Climate ID: 25471689

Peak Evapotranspiration (ET): 5.8 mm/day

Peak Flow Rate: 71.7 US gpm

Field 1

Irrigated Area: 5 hectares

Crop: Vegetable

Soil: Loamy Sand

Irrigation Type: Sprinkler

Irrigation season: May. 1 - Oct. 2 (155 days)

Annual crop irrigation water demand: 16,800 m3

Annual crop irrigation water demand (all fields combined): 16,800 m3

Crop irrigation water demand by month (all fields combined):

May	790 m3
June	3,830 m3
July	5,870 m3
August	4,540 m3
September	1,730 m3
October	32.6 m3

Map Annotations

Irrigated Area

#1: Area: 50,511 sq m

Description: vegetable field

Dugout

#1: Location (WGS84)

Description: Dugout 1

Surface Area: 6,800 m2

Depth: 4 m

Other Area

Description: Dugout 1

Pump Location (WGS84)

Pipeline

#1: Centre (WGS84)

Surface Water Point of Diversion

#1: Location (WGS84)

Figure 36. Example layout for a dugout for 5 ha of vegetables on a 24-ha parcel in Area 'F' – Cherry Creek.

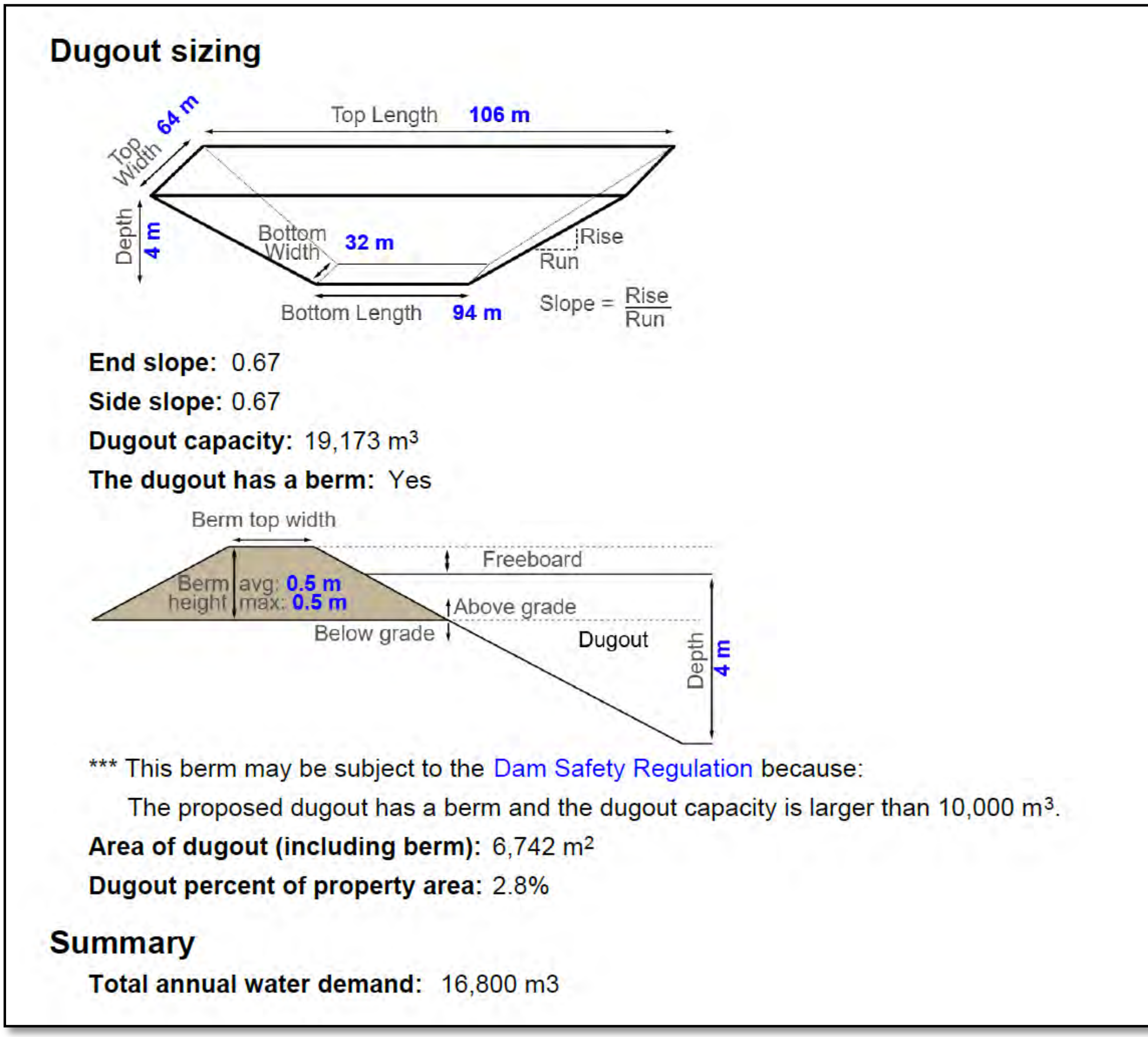

Figure 37. Dugout sizing and design for 16,800 m^3 to irrigate of 5 ha of vegetables.

7.3 Dugout Costing Considerations

The cost of constructing a dugout can vary significantly due to site and soil conditions, whether excavated soil is stored on or off site, local availability of contractors, and whether a dugout liner is required. Individual dugout storage volumes on a m^3/ha basis to meet irrigation demand vary significantly with soil type, irrigation systems, crop type, and Electoral Area within the ACRD but can typically range from \$8 / m^3 - \$15 / m^3 (Figure 38). For example, cost estimates for a dugout in the Tsolum River watershed averaged \$10 / m^3 - \$20 / m^3 in 2021, with a large component of the cost related to removal and disposal of soil material.[66]

[66] Tsolum River Watershed Management Plan, Phase 2, 2021. Elucidate Consulting.

Small dugout cost considerations:

For a small dugout that stores under 1,000 m^3 of usable water (accounting for dead storage along the dugout bottom, and evaporation), a 4 m deep dugout where the soil material remains on site and requires no liner would cost about $15,000 or $15 / m^3.[67] It is advisable to work with a QEP to locate the dugout in subsurface soils that are clay (e.g. bentonite) in order to form an impervious barrier. Dugout liners can be very expensive and can far exceed the excavation and haul costs. Removal and disposal of soil material may also be required, particularly if the farm site is small and there is no beneficial use for the material. The overall dugout expense could double if the soil material must be hauled and disposed of off-site.

Large dugout cost considerations:

A 2025 cost estimate for 10,000 m^3 lined dugout in the Armstrong area ranged between $8/ m^3 and $12 / m^3 for a site that was going to utilize local materials for regrading and berm construction, no import or export of soil materials and was to be lined.[68] The dugout was 50 m wide, 75 m long, and 4 m deep with a side slope of 0.25 m/m and end slope of 0.67 m/m. Liners are only 50 m wide, which therefore limited the width of this dugout. The liner in this case cost $30,000. Additional costs would include development permits and annual water licence fees (under most circumstances), a pump and electrical hookup, water filters if irrigating with a micro-drip, and piping supply and installation from the dugout to the field. Site preparation (removal of rocks and trees) and machine costs ($200/hr at 10 hours a day for 10 to 20 days to complete would be $20,000 - $40,000) plus labour are additional costs.

For the Electoral Area 'F' – Cherry Creek dugout example requiring approximately 19,200 m^3 of water, assuming the excavated material is left on site, and no liner is required, the cost could be $75,000 - $155,000 for excavation, packing and regrading. If liner was required, the costs would rise by $30,000 to $50,000.[69]

7.4 Other Dugout Resources

Additional resources on dugouts include:

- BC Farm Water Dugouts
- Guidance of Farm Water Dugouts: Factsheet
- Water Storage Evaluation and Examples
- Dugout Planning Checklist
- Provincial policy on dugouts

[67] Using Province of BC Class 4 cost estimates, which have an accuracy range of -30% to +50%.

[68] Pers. comm., K. Campbell, Environmental Farm Plan Advisor, 2025, using Province of BC Class 3 cost estimates , with an accuracy range of -20% to +30%.

[69] Using Province of BC Class 4 cost estimates , which have an accuracy range of -30% to +50%.

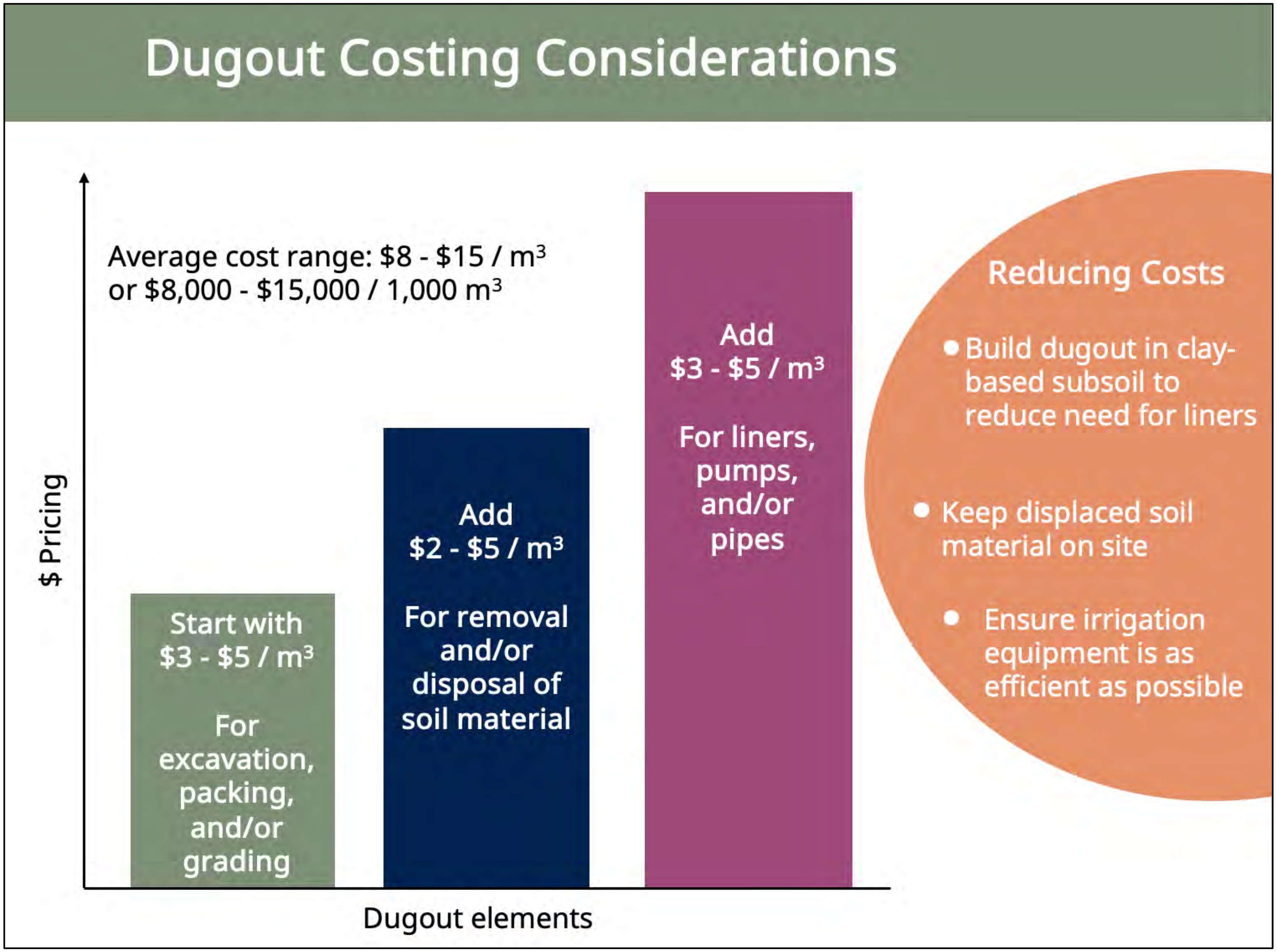

Figure 38. Dugout costing considerations.

Beneficial Practices for Irrigation Efficiency

Agricultural practices can improve soil structure, reduce evapotranspiration, and retain soil moisture, thereby reducing the overall volume of water (and dugout size) needed.

These practices include:

- Incorporate compost into the top layer of the soil or apply mulch to the soil surface.
- Use a combination of subsurface drainage and irrigation to remove excess winter gravitational water and lessen surface ponding and saturated soil (thus increasing rooting depth) particularly for perennial and long season annual crops. Providing a controlled outlet on the drainage system increases the ability to hold water in the soil coming out of the winter period
- Explore "keyline water management" approaches.
- Ensure existing irrigation systems are maintained and well functioning.

Encouraging and incorporating more of these practices can support agricultural production even when access to irrigation is reduced.

Figure 39. Example of a dugout in the Alberni Valley.

8.0 WATER GOVERNANCE CONSIDERATIONS

When contemplating large-scale engineering and infrastructure projects that would serve multiple properties (such as a regional reservoir, or reactivating the McKenzie Rd pump station), it is reasonable to consider how these new assets will be governed.

8.1 A WATER USERS' COMMUNITY GROUP

As discussed in Section 6.1, a Water Users' Community (WUC) is a group of six or more water licensees, each with their own licence(s), who create and maintain a system to store and deliver water to their respective places of use. There are several WUCs that are active on Vancouver Island and some include uses for irrigation purposes. A WUC may acquire, hold and control property and water licences. The community may also acquire, construct, hold, maintain, improve, replace and operate works. WUC members may save money and time through sharing resources and works used to divert water.

WUCs active on Vancouver Island include the following[70]:

- Blenkinsop Lake WUC (Victoria)
- Boat Harbour WUC (Nanaimo)
- Denham Brook WUC (Lake Cowichan)
- Puntledge Townsite WUC (Courtenay)
- Florence Lake WUC (Ladysmith)
- Prospect Lake / Tod Creek WUC (Victoria)
- Sunset Beach WUC (Lantzville)

A previous WUC based in the Port Alberni area, which has since been dissolved, is the Dickson Drive WUC.

At this time, if a group of landowners with respective water licences on contiguous parcels of land were interested in collaborating to invest in shared irrigation infrastructure and equipment, then it is recommended that a WUC framework be considered.

8.2 A REGIONAL AGRICULTURAL WATER GOVERNANCE BODY

Some of the options discussed in this report, such as regional reservoirs as described in Section 5, may require the establishment of an ACRD-led water governance body to raise capital, to contract out the infrastructure build, and administer the water supply to producers. As a local government, the ACRD would be able to apply for funding and financing opportunities that individual landowners or improvement

[70] Water Users Community Document Search, Ministry of Water Land and Resource Stewardship. Accessed August 2025.

districts would not otherwise have access to. In addition, the ACRD could assume the liability for the infrastructure through appropriate insurance.

Benefits of this governance system include producers having less administrative/licensing burdens to manage and having dual purposes for the water – irrigation and emergency use – which could create more grant funding opportunities. However, the challenges of establishing an ACRD-led governance system include:

- Gaining licensing for an irrigation district is difficult to achieve and the province is generally moving away from this framework.
- Previous experience (e.g. the previous Beaver Creek Improvement District and the CCWWD) suggests independent water services struggle with high borrowing costs for infrastructure upgrades and maintenance.
- Service establishment would likely require a referendum; long-term sustainability is a concern.
- The water supply asset may prioritize some parcel connections (e.g. agricultural) over others.
- Questions remain about how costs would be recouped, and whether the ACRD would subsidize or charge farmers for the new water supply access or would need to enter into financing.
- The governance body would require oversight by the ACRD or a Committee.

It is recommended that if any of the larger-scale infrastructure projects as outlined in Section 5 are pursued that the ACRD work with the province to explore waterworks licensing.

9.0 Summary of Feasibility of Options and Recommendations

This report explored the feasibility of specific water supply options. These are summarized in Table 12.

Table 12. Water supply options assessed in this report.

Water Option	Key Areas / Communities	Feasibility
Establishment of regional water storage options (reservoirs).	All Electoral Areas	**Low** due to costs, regulatory requirements and land needs.
Diversion from natural reservoirs (e.g. Great Central Lake and/or Sproat Lake.	All Electoral Areas	**Low** due to need for First Nations' support, additional studies, costs, and regulatory requirements.
Partnering with existing licence holders to share water allocation.	All Electoral Areas	**Medium** and will depend on willing partners, and distribution/ conveyance costs.
Creation of an irrigation district through the phased installation of pipes/canals to agricultural land in the Beaver Creek electoral area and subsequent expansion to ALR land in the Cherry Creek, Beaufort, and Sproat Lake electoral areas.	All Electoral Areas	**Low** because the Province (WLRS) indicated early on in the engagement process that an irrigation district was unlikely to be approved as the province is moving away from that model on the whole.
Reactivation of the McKenzie Road Pump station for non-potable agricultural water use.	Electoral Area 'E' – Beaver Creek	**Medium** and will depend on additional feasibility studies, governance, and overall cost sharing framework.
Redesignation of the Stamp River water licence 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.	Electoral Area 'B' – Beaufort and Electoral Area 'E' – Beaver Creek	**Not assessed** because the Province (WLRS) indicated that redesignation of the license is not a necessary step, and the ACRD can use the water allocation however it deems to be appropriate.
Expansion of groundwater wells for irrigation purposes.	All Electoral Areas	**Low** based on results from previous engineering assessment reports, which indicated low feasibility and lack of data.
Use of on-farm water storage (dugouts / cisterns) and/or changes to production methods.	All Electoral Areas	**High** feasibility generally, but details will be farm-dependent. Opportunities exist for neighbouring farms to work collectively on a shared irrigation system through the Water Users Community (WUC) framework.
Development of a new ACRD Agricultural Water Supply service, including the costs associated with the system and the approval of the service via referendum.	All Electoral Areas	**Low**, and likely unnecessary unless there is a large regional agricultural water project being developed.

9.1 Recommendations Regarding Agricultural Water Supply Options

Based on the findings of this report, the following recommendations are put forward for consideration in no particular order:

1. **Establish a single multi-jurisdiction water group in the Alberni Valley.** This group should include First Nations, agriculture, forestry, and local & provincial government representatives to coordinate and co-operate on water-related matters in a unified voice. This group could build upon, and eventually replace, the CAWS, whose scope is focused on agriculture alone. The formation of a regional waterworks governance body could be revisited if and/or when there is progress made towards larger regional-scale projects (e.g. regional reservoirs or water system upgrades).

2. Advocate to the Province to **install a groundwater monitoring well** in the Alberni Valley. In the meantime, producers can gather data regarding their wells using the well measuring device managed by CAWS.

3. Advocate for **third-party hydrologist reporting as a requirement for any proposed logging activity on hillslopes above farms**, to identify best practices to minimize water quality and quantity impacts on farmland, and to monitor outcomes to protect the water rights of agricultural users.

4. **Revisit the regional reservoir concept at a later date** if land and/or capital and/or interest arises.

5. Request that the scope of **any future work on water system upgrades consider agricultural water needs** and include agricultural conveyance in modeling and costing of infrastructure options.

6. Seek funding to **complete hydrometric studies on Great Central Lake, Sproat Lake, or other waterbodies of interest** to determine impacts from potential bulk water withdrawals.

7. Perform **a technical review of the impacts of a *Partial Transfer of Appurtenancy*** and consider drafting a memorandum of understanding with Domtar.

8. Explore **additional partial water volume transfer opportunities** with other large volume licence holders.

9. **Support landowners in forming Water Users Community groups** if and when the interest arises for collaborating on shared irrigation infrastructure.

10. Continue to liaise with provincial officials at WLRS and MAF to **ensure that local producers have up-to-date, clear, and accurate information regarding dugouts**. The use of cisterns and other forms of water storage may also be appropriate water storage tools, commensurate with the volume of water required on a property-by-property basis.

9.2 Alignment with Provincial Recommendations

It is worth noting that the Premier's Task Force on Agriculture and Food Economy released a suite of recommendations in 2025, and many aligned with the notion of creating water storage at the regional level. Notable recommendations include:

- **Prioritize a province-wide effort to slow and hold water by building water storage** at both on-farm and larger community-scales, including both conventional dugouts, dams and reservoirs, as well as nature-based solutions that slow and store water (such as Beaver Dam Analogues and aquifer recharge) in both WLRS permitting and AF funding programs.
- **Streamline requirements under the Dam Safety Regulation** for lower-risk agricultural and environmental flow dams, dugouts and reservoirs and explore options to streamline permits for water infrastructure projects.
- **Develop clearer pathways to securing public and private low interest financing** for community-scale agricultural water infrastructure projects (e.g., community and cooperative investment vehicles, infrastructure bonds, public-private partnerships, and federal investment).
- **Identify opportunities to proactively set aside water for potential agricultural water infrastructure projects** through agricultural water reserves and Water Sustainability Plans, which links watershed planning directly to build water storage.
- **Develop provincial guidelines that require local governments to play a leadership role** in regional planning and infrastructure for agricultural water security and ensuring other development decisions do not adversely impact long-term agricultural water security.

Furthermore, the Provincial Watershed Security Strategy and Fund Intentions Paper[71] also indicated several recommendations that align with working regionally and with First Nations to secure water supplies and watershed health over the long term. These include:

- **Enable new approaches** to watershed governance through inclusion, capacity building, and collaboration.
- **Pursue legislative change, policy development and alignment of laws and policy** to be consistent with the UN Declaration.
- **Build a strong foundation of watershed science and knowledge** that is accessible for use by Indigenous Peoples, local governments, and communities.
- **Apply holistic approaches to watershed management and ecosystem protection**.

This is further supported through the Watershed Security Fund, a $100 million endowment that supports projects which fulfill those recommendations.

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[71] BC Watershed Security Strategy and Fund Intentions Paper, 2023. https://engage.gov.bc.ca/app/uploads/sites/121/2025/04/WSSF-Intentions-Paper-March2023.pdf

9.3 Alignment with Council for Agricultural Water Supply Report Recommendations

Several of the recommendations in the CAWS 2023 report[72] were considered and included in this report, including investigating the feasibility of a regional irrigation district, exploring water storage for small scale producers, and exploring the feasibility of re-activating the McKenzie Rd pump station. Other recommendations that were out of scope but still remain relevant include:

- **Develop criteria** that considers potential or expected impacts to agriculture in upstream land use or development rezoning applications.
- **Review the existing hydrometric monitoring network** in the Alberni District to assure that surface water resources are adequately quantified against future changes.
- **Advocate for the installation of a groundwater observation well(s)** in the Alberni District as part of the provincial groundwater monitoring network to assist in area aquifer assessment and future changes to groundwater levels in the district.

Figure 40. Stamp River Falls during spring freshet 2025.

[72] Council for Agricultural Water Supply and Producer-Led Watershed Data Collection Project. Final Report, 2023.

APPENDIX

AGRICULTURAL WATER DEMAND MODEL METHODOLOGY

Model Inputs

The Model is based on a Geographic Information System (GIS) database that contains data on crop type, irrigation system type, soil texture and climate. An explanation of how the data is compiled for each variable is provided in this section. Figure 2 shows the surveyed area including all properties within the ALR and areas that were zoned for agriculture by the local governments. The survey was conducted by the Ministry of Agriculture (AGRI) staff, and professional contractors and summer students hired by the Ministry of Agriculture.

Cadastre and Polygon

Cadastre data was provided by the Integrated Cadastral Information Society (ICIS). All of the cadastre data was unified into one seamless cover for the entire project area. This process allows the Model to calculate water demand for each parcel and to report out on subbasins, local governments, water purveyors or aquifers by summing the data for those areas. Aerial photographs were used to conduct an initial review of crop type by cadastre. Within each cadastre, permanent physical structures (e.g. farmstead and driveways) were separated from cropping areas by creating new polygons and excluded from the calculation of water demand. If a difference in crop type could be identified on the aerial photographs, the polygon would be split so each new polygon would contain a unique crop type. This data was entered in the GIS land use database that was used by the field crew to conduct and complete the ALUI.

Agricultural Land Use Inventory (ALUI)

The Alberni Valley ALUI was completed in 2016. The survey crew drove by each property and checked the database for accuracy using visual observation and the aerial photographs on the survey maps. A Professional Agrologist with local knowledge verified what was on the site, and a GIS technician altered the codes in the database as necessary. When the survey was completed for the entire project area, post-survey data quality control was conducted to ensure the additional polygons were accurately entered into the database. The smallest unit for which water use is calculated are the polygons within each cadastre. A polygon is determined by a change in crop type or irrigation system type within a cadastre. Each cadastre has a unique identifier as does each polygon. The polygon identifier is acknowledged by PolygonID. This allows the survey team to call up the cadastre in the database, review the number of polygons within the cadastre and ensure the land use is coded accurately for each polygon.

Soil Information

Soil data was obtained digitally from the British Columbia Ministry of Environment. Soil attributes required for this project were the soil texture, available water storage capacity, and the peak infiltration rate for each texture type. The intersection of soil boundaries with the cadastre and land use polygons creates additional polygons that the Model uses to calculate water demand. The Model calculates water demand using every different combination of crop, soil and irrigation system as identified by each polygon.

Climate Information

The agricultural water demand is calculated using climate data, crop type, irrigation system type and soil texture. The climate generally gets cooler and wetter from south to north and as elevation increases. To incorporate the climatic diversity, climate layers were developed for the entire Province on a 500 metre by 500 metre grid. Each grid cell contains daily climate data, minimum and maximum temperature (Tmin and Tmax), and precipitation all of which allow the Model to calculate a daily reference evapotranspiration rate (ETo) value. A range of agro-climatic indices such as growing degree days (GDD), corn heat units (CHU), frost free days and temperature sum (T-sum) can also be calculated for each grid cell based on temperature data. These values are used to determine seeding dates and the length of the growing season in the Model. The climate dataset has been developed by using data collected from climate stations across the Province from 1961 to 2010. This climate dataset was then interpolated to provide a climate data layer for the entire Province on the 500 metre by 500 metre grid. The climate grid cell that is prominent for a cadastre boundary is assigned to that cadastre. Additional polygons are not generated with the climate grid.

The attributes attached to each climate grid cell include: Latitude, Longitude, Elevation, Aspect, Slope, Daily Precipitation, Daily Tmin and Tmax.

A climate database contains Tmin, Tmax, Tmean and Precipitation for each day of the year from 1961 until 2010. The parameters that need to be selected, calculated and stored within the Model are evapotranspiration (ETo), T-sum, effective precipitation (EP), frost free days, first frost date, GDD with base temperatures of 5 ^{o}C and 10 ^{o}C, and CHU. These climate and crop parameters are used to determine the growing season length as well as the beginning and end of the growing season in Julian day.

Model Calculations

The Model calculates the water demand for each polygon by using crop type, irrigation system type, soil texture and climate data as explained below. Each polygon was assigned an ID number as mentioned previously.

Crop

The CropID is an attribute of the PolygonID as each polygon contains a single crop. The crop information is collected (as observed during the land use survey) and stored with the PolygonID. CropID provides cropping attributes to the Model for calculating water use for each polygon. CropID along with the climate data is also used to calculate the growing season length and the beginning and end of the growing season. The attributes for CropID include rooting depth, availability coefficient, crop coefficient and a drip factor.

- Rooting depth is the rooting depth for a mature crop in a deep soil.
- An availability coefficient is assigned to each crop. The availability coefficient is used with the IrrigID to determine the soil moisture available to the crop for each PolygonID.
- The crop coefficient adjusts the calculated ETo for the stages of crop growth during the growing season. Crop coefficient curves have been developed for every crop. The crop coefficient curve allows the Model to calculate water demand with an adjusted daily Eto value throughout the growing season.
- The drip factor is used in the water use calculation for polygons where drip irrigation systems are used. Since the Model calculates water use by area, the drip factor adjusts the percentage of area irrigated by the drip system for that crop.

Irrigation

The IrrigID is an attribute of the PolygonID as each polygon has a single irrigation system type operating. The irrigation system type is collected (as observed during the land use survey) and stored with the PolygonID. The land use survey determines if a polygon has an irrigation system operating, what the system type is, and if the system is being used. The IrrigID contains an irrigation efficiency listed as an attribute. Two of the IrrigID, Overtreedrip and Overtreemicro are polygons that have two systems in place. Two irrigation IDs occur when an overhead irrigation system has been retained to provide crop cooling or frost protection. In this case, the efficiency factors for drip and microsprinkler are used in the Model.

Soil

The digitized soil database came from the BC Ministry of Environment and Climate Change. In addition, soil data provided by Agriculture and Agri-Food Canada (AAFC) was also used to generate multiple soil layers within each polygon. Each parcel was assigned the most predominant soil polygon, and then for each crop field within that soil polygon, the most predominant texture within the crop's rooting depth was determined and assigned to the crop field. Note that textures could repeat at different depths. The combined total of the thicknesses determined the most predominant texture. For example, a layer of 20 cm sand, followed by 40 cm clay and then 30 cm of sand would have sand be designated as the predominant soil texture. The attributes attached to the SoilID is the Available Water Storage Capacity (AWSC) which is calculated using the soil texture and crop rooting depth. The Maximum Soil Water Deficit (MSWD) is calculated to decide the parameters for the algorithm that is used to determine the Irrigation Requirement (IR). The Soil Moisture Deficit (SMD) at the beginning of the season is calculated using the same terms as the MSWD.

Climate

The climate data in the Model is used to calculate a daily reference evapotranspiration rate (ET) for each climate grid cell. The data required to calculate this value are:

- Elevation, metres (m)
- Latitude, degrees (o)
- Minimum Temperature, degree Celsius (^{o}C)

- Maximum Temperature, degree Celsius (^{o}C)
- Classification as Coastal or Interior
- Classification as Arid or Humid
- Julian Day

Data assumed or are constants in this calculation are:

- Wind speed: 2 m/s
- Albedo or canopy reflection coefficient: 0.23
- Solar constant Gsc: 0.082 MJ-2min-1
- Interior and Coastal coefficients, KRs: 0.16 for interior locations, 0.19 for coastal locations
- Humid and arid region coefficients, Ko: 0 ^{o}C for humid/sub-humid climates 2 ^{o}C for arid/semi-arid climates

Reference:

Agricultural Water Demand Model, Ministry of Agriculture and Food.

https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/agriculture-and-seafood/agricultural-land-and-environment/water/agriculture-water-demand-model/500300-27_ag_water_demand_model_-_qrd.pdf

WATER LICENCE APPLICATION INFORMATION

Supporting information for water licence applications:

1. Please refer to Section 3 of the Water Sustainability Regulation and to Water Licence - New - Authorization Guidance - Natural Resource Online Services for meeting the minimum requirements for a complete application. It is advisable for the applicants to provide as much information regarding the planned water use as possible, including the volume (and rationale for the volume), timing of use, intentions for storage if applicable, the crop type and size of field, and irrigation methods, for example. Co-applicant consent(s) and agent authorizations (WSR Section 13) may also be needed.

2. For aquifers that are hydraulically connected to a fully recorded stream, the decision maker must consider the environmental flow needs. An EFN assessment may be requested from the applicant per WSA Section 15.

3. The Guidance for Technical Assessments in Support of an Application for Groundwater Use in BC – please refer to Table 1 (pages 4 and 5) for the technical assessment levels and factors which may trigger additional assessment.

4. As previously shared, here is the policy bulletin for Authorization requirements for storage and use of water in dugouts, which describes when licensing is/isn't required when employing a dugout.

5. If the applicant is pursuing funding through the Agriculture Water Infrastructure Program, please advise them to state this in the water licence application.

FrontCounterBC will assist applicants with the application process and submission requirements.