

**Assessment of Impacts of Development Project RZ OCP 25-3 - 1533 Cedar Avenue on the
Brooklyn Creek Watershed**

Brooklyn Creek Watershed Society

March, 2026

Executive Summary

The BCWS has been asked by the Town of Comox to comment on a proposed high density (>36 units/hectare) 99-unit residential complex to be located on 1.36-hectare parcel immediately adjacent to Brooklyn Creek at 1533 Cedar Avenue, Comox. The principle document informing our conclusions was the Riparian Areas Protection Report (RAPR) dated November 12, 2025.

In our view, the RAPR has serious deficiencies, including failure to fully consider the year-round presence of coho salmon, including spawners and their redds (places in the gravel streambed where eggs are deposited) in the immediate vicinity of the planned stormwater outfall. Discharge of stormwater will likely cause increases in water temperature and tire contaminants known to cause coho mortality. We also found lack of consideration of downstream impacts, no details on mitigation plans, and possible contribution to the spread of invasive American bullfrogs.

BCWS Board Members obtained user data for the Brooklyn Creek Greenway, and noted that the trails along Brooklyn Creek are the most heavily-used in Comox. We are concerned that increased foot traffic on the already-busy trails will negatively impact users' enjoyment, and will likely also have deleterious effects on the watershed ecosystem. The Department of Fisheries and Oceans review was limited in scope, and considered only the design of the stormwater outflow, and the plans for restoring riparian vegetation.

We therefore strongly and unanimously recommend that the Town rejects the proposal.

1.0 Introduction

Brooklyn Creek, a 6-km long urban stream in Comox, originates in the Crown Isle area and drains into the Courtenay River Estuary. The creek's watershed covers approximately 650–709 hectares.

It is often called a "community jewel" and also runs through Mack Laing Park, the site of one of the largest known shell middens in the Comox Valley. The creek supports year-round populations of salmon (coho and pink) as well as cutthroat trout, but faces challenges from urban runoff and historical degradation. As a result of considerable urbanization and land use pressures on the Brooklyn Creek Watershed, a group of concerned citizens joined together and in the spring of 2007 the Brooklyn Creek Watershed Society was formed. The BCWS has provided stewardship for the creek ever since. The BCWS has consistently restored fish habitat over the lower five kilometers of the creek for the past 20 years. Fifteen years ago, members of the society also

created a fish fence, which is used annually to count coho salmon fry and smolts leaving the creek in the spring. The annual count of juvenile coho by volunteers provides important information on the salmon population and its health.

BCWS is fortunate to have Board Members with a broad range of professional expertise, including ecotoxicology, engineering, community engagement and fisheries assessment. Two members have extensive experience with assessment of anadromous and marine fish populations. One member recently served as the Marine Fish Co-chair for COSEWIC, Canada's national scientific committee for evaluating the status of species at risk. Thus, our group brings much relevant experience to this particular assessment.

2.0 What's at Stake

The Town of Comox has already recognized Brooklyn Creek as a natural asset through the Ecological Accounting Protocol (EAP), which quantified the creek corridor's stormwater, habitat, recreation, flood mitigation and property-value services and established a financial precedent for treating it as long-lived infrastructure within the Town's municipal asset management framework. The EAP findings, and the subsequent incorporation of Brooklyn Creek protection, greenway assembly, and natural-asset management provisions into the Official Community Plan (OCP), commit the Town to move beyond minimum riparian regulation toward systematic protection, enhancement, and public acquisition of the corridor over time.

However, the 1533 Cedar Avenue proposal exposes a significant policy-to-practice gap between these commitments and current permit-level decisions. The project's Riparian Areas Protection Regulation (RAPR) assessment does not reference the Brooklyn Creek EAP, OCP greenway vision, or Water Balance Methodology, provides no natural-asset tenure (SPEA dedication, right-of-way, or contribution for public access), and omits the hydrologic modelling needed to assess pre- and post-development runoff volumes and flow-duration impacts on creek condition. Key risk factors—thermal loading from extensive paved surfaces, metals and road salt contamination, chronic pet waste and encroachment, stormwater infrastructure intruding into the SPEA, and minimalist monitoring limited to plant survival—remain largely unaddressed in terms of safeguarding Brooklyn Creek's service capacity as an infrastructure asset and salmon-bearing ecosystem.

BCWS therefore sees this as a test case for whether Comox will operationalize the EAP and related OCP policies in day-to-day development approvals. Readers are encouraged to consult this Report's Appendix for: background on the EAP process and its acceptance by Council and Staff in 2018; detailed analysis of policy-to-practice gaps, supporting citations, and some recommended steps that could align future development approvals with the Town's clearly stated natural-asset and greenway objectives for Brooklyn Creek.

Most recently, BCWS has participated in a four-year long program of stream restoration in the Birkdale Farm reach. In total, more than one kilometer of stream has been restored with 15

riffle/pool complexes added, and riparian vegetation replanted with native species after removal of invasive plants. About \$100,000 was spent on this work in 2025, including funds from foundations, private donors and many hours of volunteer time. A walk-through by members of the BCWS Board last fall found evidence on spawning on every riffle area added over the past four years, a total of 15 locations.



Figure 1. BCWS awarding a commemorative plaque to the owner of Birkdale Farm, Mr. Guy Sim during riparian restoration in 2025. (photo: D. Adamson)

The newly-adopted (February, 2026) Official Community Plan (OCP) considers the health of the Brooklyn Creek watershed to be a core value. For example, S. 7.13 states that it is the intention of the Town to “Enhance and maintain the ecological function and biodiversity of sensitive ecosystems such as the K’ómoks Estuary, Lazo Marsh, and Brooklyn Creek through restoration, land acquisition, lot consolidation, and dedication during development.” In presentations to Council during the development of the OCP, BCWS strongly supported these commitments, and the limitation of developments along the Brooklyn Creek watershed to residential three story, ground oriented. The proposed development at 1533 Cedar Avenue is not consistent with the newly-adopted OCP, and a Variance must therefore be sought.

3.0 Temperature impacts

Warmer stream temperatures can occur directly through the removal of overhanging shade trees during urban developments, or indirectly from the construction of dark, impervious surfaces (e.g. parking lots, roofs) that produce warmer, extreme storm-flow events and/or which heat the underlying soil and groundwaters that feed into streams (Kolath and Egemouse, 2023).

Cunningham et al. (2023) found that the removal of only one in three trees along streambanks can significantly increase water temperatures.

Warmer waters directly elevate the metabolism of juvenile and adult salmonids, which in turn affects growth, development and survival rates (Richter and Kolmes, 2005; Spanjer et al., 2018). There is also a strong, inverse relationship between water temperature and dissolved oxygen levels. Therefore, at higher temperatures fish may struggle to obtain enough oxygen, especially as their metabolism speeds up forcing them to burn more energy and consume more oxygen.

The acceptable water temperatures for coho (and other salmonids) survival, growth and development are strongly dependant on the life cycle stage, being significantly lower for early life stages such as eggs, alevin and fry (Richter and Kolmes, 2005). Alevin and fry survival and health may be optimum at constant temperatures of only 4^o to 8^o C, but the long-term survival of eggs and alevin remains acceptable up to 11-12^o C (Tang et al., 1987; McCullough et al., 2001). Juvenile growth and survival is maximized at 12-15^o C (Richter and Kolmes, 2005; Cunningham et al., 2023), while smoltification (i.e. when juveniles prepare to transition from freshwater to the sea), is increasingly impaired at average temperatures above 15^o C (Tang et al. 1987). Temperatures that persist above 25^o C are lethal to juvenile coho and other salmonids in laboratory tests (Richter and Kolmes, 2005), but under real-world conditions average persistent temperatures above 17-20^o C are highly likely to cause significant stress and mortality to coho at all stages of life (Tang et al., 1987; McCullough, D. A., et al. 2001; Richter and Kolmes, 2005; Cunningham et al., 2023)

While we lack temperature data for Brooklyn Creek in recent years, we can consider the available data from the nearby Millard-Piercey Creek system to be a reasonable proxy. In this case, peak late summer temperatures are observed of around 18^o C. As noted above, it is generally considered that coho fry begin to suffer negative impacts of elevated water temperature at around 18-20^o, and juveniles will seek cool water refugia, if available.

If the temperatures reflect those experienced in Brooklyn Creek, this would imply that peak summer water temperatures in Brooklyn Creek are already close to sub-optimal for coho fry, and there is no little or no scope for additions of warmer water.

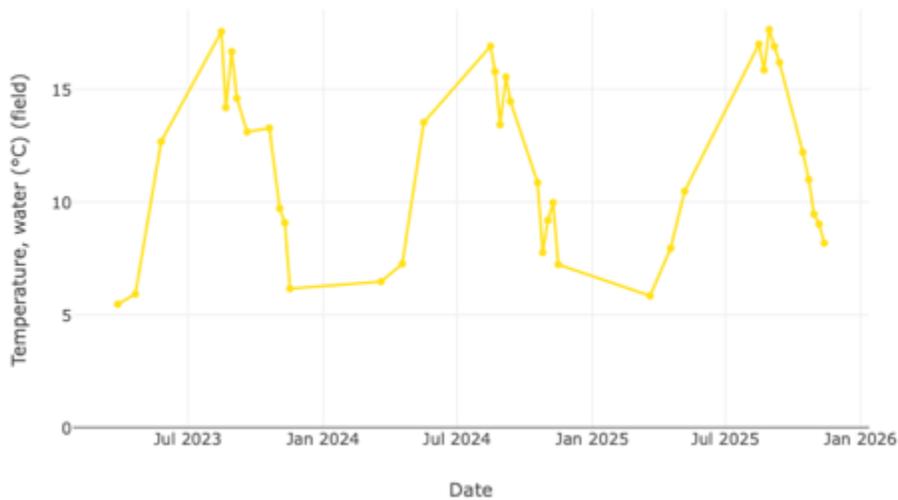


Figure 2. Recent water temperature data from the lowermost station, Millard Creek 2023-2025.

4.0 Tire contaminants

Our organization has been part of an Island-wide program for testing of salmon streams for the extremely toxic auto tire additive known as 6 PPD-Q. Unfortunately, some of the samples taken in Brooklyn Creek has a measurable level of this dangerous compound. In samples taken in December 2023, concentrations reached levels which exceeded the LC50 level for causing mortalities in coho salmon fry. These were samples taken about 250 m downstream of the planned development. It is important to note that the proposed stormwater drain collects water from the building site including a parking area for more than 100 cars, and *discharges within tens of meters away from documented spawning sites for coho salmon. Given this, it is reasonable to assume that the proposed development will directly cause salmon mortality and will be in contravention of the Fisheries Act.* The water samples were analyzed by the Vancouver Island University, and the data are publicly available (<https://experience.arcgis.com/experience/597c33d27da84f1789bc41a36e37253d/page/Tire-Wear-Toxins>), and they are shown below for the daily samples in the Creek, as well as for the Balmoral Avenue point source outflow.

While the project proponents have mentioned the use of rain gardens (in the RAPR) to mitigate the impact of 6 PPD-Q, no technical descriptions of the planned mitigation are available, nor is it clear where such infrastructure will be placed in the limited space available. Moreover, recent peer-reviewed scientific literature indicate that rain gardens are not always completely effective during moderate to heavy rain events, and regular effective maintenance must be part of any mitigation plan.

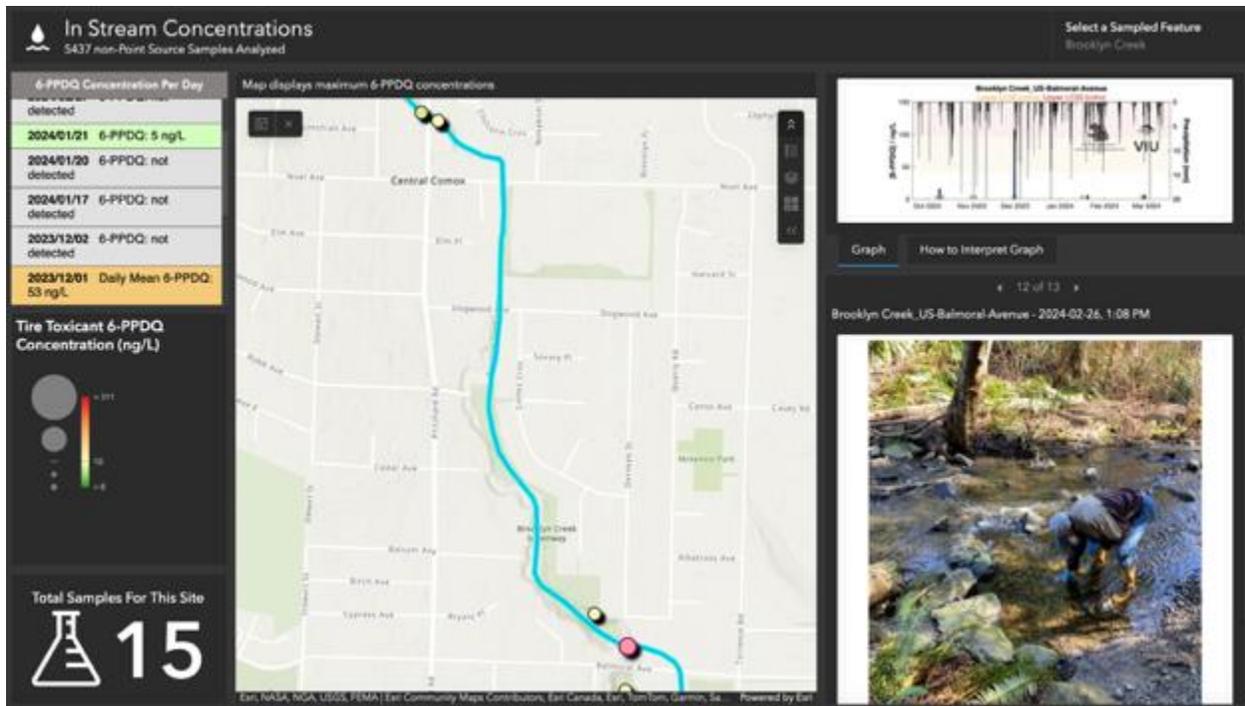


Figure 3. In stream samples in Brooklyn Creek immediately upstream from Balmoral Avenue. Samples were collected for tire wear toxins (6 PPD-Q) collected by BCWS volunteers and analyzed by VIU, 2023-2024.

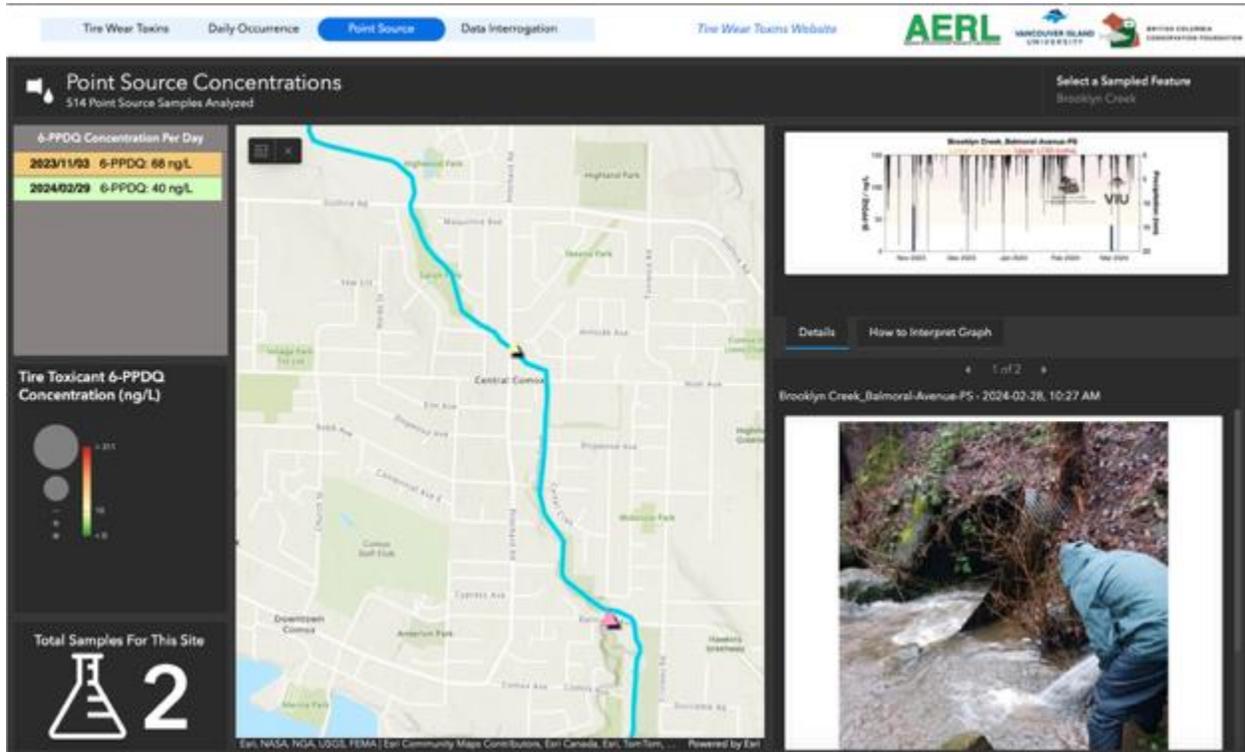


Figure 4. Point source samples entering Brooklyn Creek immediately upstream from Balmoral Avenue. Samples were collected for tire wear toxins (6 PPD-Q) collected by BCWS volunteers and analyzed by VIU, 2023-2024.

5.0 Invasive Bullfrogs

In 2025, a new threat to Brooklyn Creek's fish populations was discovered. Over 400 American Bullfrog (*Lithobates catesbeianus*) tadpoles were recorded in the smolt count box. This does not include, of course, any that were washed over the containment fence during high water flows nor when the fence was not installed. This was the first time any tadpoles were seen in the spring count.

American bullfrog tadpoles are large, easily filling the palm of a hand. The arrival of American bullfrogs is another new stress on Brooklyn Creek's salmon population.



Figure 5. American bullfrog tadpole captured in Brooklyn Creek Smolt Trap, May, 2025. (photo: John Neilson)

During all stages of their life cycle, American bullfrogs are voracious predators. Tadpoles forage creek bed vegetation disturbing aquatic plant life competing with young coho salmon for food. They also feed on salmon eggs. Juvenile and adult American bullfrogs prey on fry and smolts. They also can introduce a deadly fungal pathogen that can infect salmon.

Tadpoles mature into adult frogs in two years. Adult American bullfrogs are territorial and young American bullfrogs migrate in search of new ponds or water bodies.

Storm water controls like retention/detention ponds provide a still water environment preferred by American bullfrogs to lay eggs. We can learn from experience elsewhere in the Comox Valley.

For example, last summer 384 adult American bullfrogs were removed from nine retention ponds on the Crown Isle Golf Course. There were many more American bullfrogs which were not caught. Female American bullfrogs can lay between 6,000 and 20,000 eggs during the breeding season.

Building retention and detention ponds that are directly adjacent to Brooklyn Creek will provide new breeding locations. Once hatched, tadpoles will have easy access to Brooklyn Creek. It is difficult to totally remove American bullfrogs once they become established.

This invasive species is a tenacious threat to the salmon existence in Brooklyn Creek. Any stormwater mitigation system that provides habitat for American bullfrogs must be avoided.



Figure 6. Adult American Bullfrog, from a display on invasive species at the Royal BC Museum (photo: J. Neilson)

6.0 Adequacy of Regulatory Oversight, and supporting documentation

Several levels of government are involved in review of development projects such as this. The federal Department of Fisheries and Oceans has responsibility under the Fisheries Act and the Species at Risk Act, the Provincial Government follows the Riparian Areas Protection Regulations (RAPR), and the municipal government has final authority for authorizing development once the project has passed scrutiny by provincial and federal authorities.

The DFO has issued a Letter of Advice on April 29th, 2025 indicating that subject to conditions, “the Program is of the view that your proposal is not likely to result in the contravention of the above-mentioned prohibitions and requirements.” However, the scope of review was limited to the design of stormwater outfall, and restoration of the riparian area only. BCWS has contacted the DFO office in charge (Feb. 23, 2026), and highlighted that there are threats to salmonid population that were not addressed or adequately documented in the RAPR report prepared on behalf of the developer, including concerns of increased water temperature, tire contaminants and providing habitat for invasive American bullfrogs.

Other concerns with the proposal and the adequacy of the supporting documents include:

- The RAPR notes that the Streamside Protected Environment Area abuts against the building, and recommends some type of fencing to protect the SPEA from humans and their pets. However, given the size of the buildings on the property footprint, there appear to be few opportunities to exercise pets elsewhere and there will be a strong motivation to circumvent fencing to access the protected SPEA.
- Much more consideration of the water balance model developed for Brooklyn Creek needs to be considered. Will any mitigation works meet the water balance targets identified in P. 29 of Ecological Accounting Watershed Assessment of 2018? See https://brooklyncreek.ca/wp-content/uploads/2019/04/EAP-Demonstration_Sep2018.pdf, and Appendix 1 of this report.
- Commonly used flood mitigation measures include detention ponds. However, such approaches usually result in longer durations of peak flows. Given that unstable streamside banks exist downstream, any structure that extends the duration of peak discharges may result in erosion issues, and damage to the stream. See an example of an unstable bank within the subject property below.



Figure 7. Streamside bank within the subject property, showing signs of past erosion. Photo taken from 2025 RAPR.

7.0 Possible impacts of people and dogs on salmon and salmon habitat

Much of the reason for the thriving fish populations is the fact that large areas of the creek are currently protected by parks and relatively undisturbed forest vegetation.

To survive in the creek, salmon and trout need healthy forest ecosystems that provide good water quality; natural forest vegetation beside the stream and a minimum of disturbances. Coho salmon and cutthroat trout are present in the creek all year. Salmon adults return to spawn in the fall and trout in the spring. The juvenile fish remain in the creek for one year in the case of salmon and two years in the case of trout.

The summer is the most critical time for these juvenile fish, as the creek levels recede due to hot summer drying conditions. In very hot summers, the creek might be reduced to isolated pools with almost no water flow. As people in the summer seek out forest walks to escape the heat, negative impacts to salmon can occur. Disturbances from people and dogs of the remaining pools that provide shelter for the salmon can cause death or very high stress to these juvenile fish during these summer dry periods.

As noted earlier, recent dry spells during summers have raised the water temperature in the creek to critical levels, and temperatures over 20 degrees can be lethal to juvenile salmon. Shade from large trees in the summer reduces water temperatures by up to 3 degrees, and the removal of even a single large tree can affect shade distribution over the creek and cause elevated water temperatures.

In the fall, disturbances from people and dogs can interfere with spawning activities and result in low survival of salmon eggs. In the winter, the salmon and trout eggs are incubating under the gravel, so disturbances from people and dogs walking in the creek can often cause physical crushing of the eggs, and the settling of silt on the redds which can suffocate the eggs.

The proposal to build a 99 unit housing development will likely add 200-300 people residing beside the creek. These people will likely frequently walk along the trails beside the creek adding further disturbances to fish and fish habitat. The best thing we can do to help salmon and trout is to let them exist in the creek with no disturbances.

8.0 The Overall Impact of the Proposed Development on Visitors' Enjoyment of the Brooklyn Creek Greenway

Data from the Town of Comox Parks Department trail counter system show that a recent annual average of 81,454 park users made use of Mac Laing Park along lower Brooklyn Creek. Parks data also indicate that the Brooklyn Creek Greenway is the most used nature trail in the Town. Interestingly, a peak month for visitation is often October, in years when larger pink salmon migrations can be witnessed at the foot of the Balmoral fish ladder. For example, in 2023, trail counter data indicated 10,111 visits in October coincident with the run. This indicates the value of healthy salmon runs to the public, and their enjoyment of the park.

Pick any time of the year, and you'll find the Brooklyn Creek Park, Comox community's gem, busy with visitors. Community members walk their dog in the park every day; families both local and out of town explore the trails, and classes of preschoolers spend the morning near the shore of Comox Bay. Some visitors head to the neighbouring MacDonald Woods Park or, during low tide, dare to cut across to Filberg Park.

In the spring, an amazing array of early wildflower blooms pop up all along the banks of the creek, such as Vanilla Leaf, Trillium, giant Skunk Cabbages, wild Bleeding Hearts, Bunchberries, giant horsetails and even tiny orchids, such as the Rattlesnake Plantain, to name just a few. This is also the time of the salmon count, as a couple of species have found their way back into the creek. Keeping track of coho smolts and fry that are making their way toward the estuary, the Brooklyn Watershed Society annually enlists volunteers to trap and release the salmon for several months in the spring.

As spring turns into summer, the park provides refuge from the heat under its mature Sitka spruces, cedars, Douglas firs and Grand firs. The creek runs low at this time and sometimes slows down to a trickle. Unfortunately, this is also a time when dog owners let their dogs into the

creek, unaware that this leads to soil compaction, which leads to reduced plant presence and increases rainfall interception, thereby reducing available water for salmon and other species and contributing to erosion. In addition, dog urine, which cannot be removed from soils, has high nitrogen and low pH levels which may further reduce soil water absorption capacity and diversity of soil microbiome. Dogs entering salmon habitat can also destroy gravel redds and stir up sediments*. In addition, the dogs disturb the habitats of ground nesting birds as well as the river otters that live by the salmon ladder. This is bad enough as it is, with the trails near the creek being highly popular with dogs and their owners and not everyone respecting the leashed-dogs-only rules. The proposed development of 99 apartment units bordering onto the creek will add heavily to the strain the park is already under, increasing foot and dog traffic. In addition, the proposed 120+ above ground parking spaces - covered with non-porous asphalt as shown in drawings - will likely contribute to the burden of tire derived toxic chemicals entering into the creek.

In the fall, salmon return to the creek: coho, chum and even pink use the first heavy rainfalls and subsequent rains to make their way up the creek. A seemingly impossible task, when considering the low waters, debris in the creek and cement ladders. The riparian work done by the Creek Society near Birkdale Farms, finally provides some respite to the returning salmon, offering shadowy redds where some of them rest and spawn.

The additional streamside residents in the proposed development and their pets will likely be heavy users and place an additional burden on the narrow Brooklyn Creek Greenway. Several studies have shown that people recreating in natural areas are likely to underestimate the influence their presence and activities have on wildlife, or attribute the blame to other user groups altogether. Park visitors tend to believe that seeing any wildlife during their visits suggests they are not causing any disturbance to the animals*. But human and canine presence puts a heavy strain on wildlife and further reduces habitat. And speaking of habitat loss - displacing the barred owls currently nesting in the two sheds on the property as well as driving out a current bat population (as per the environmental report) is an additional threat.

For Brooklyn Creek Park to remain the incredible and fragile Gem that it is, with a salmon bearing stream, kingfishers nesting and river otters hunting, a much more sustainable and ecologically sensitive approach is needed when adding new development. The Brooklyn Park is indeed a rare gem, a precious wildlife wonder attracting tourists and locals right here in Comox.

The current proposal is giving no meaningful consideration to the environmental footprint of the development. Neither the overall concept, that would change a single family lot into a 99-unit apartment building, nor the construction schedule, (which, for example, proposes a biologist and contractor meet up a mere three days before breaking ground) indicate that any consequential measure has been taken to protect wildlife or watershed.

9.0 Conclusions and Recommendations

The salmonid populations of Brooklyn Creek and the surrounding watershed already face a growing number of threats. The proposed development places additional burdens on this highly-valued public resource, without adequate identification of the risks and acceptable mitigation approaches. The BCWS considers the risks to the Brooklyn Creek watershed to be unacceptably high, and strongly and unanimously recommends that the Comox Town Council to reject the development proposal.

REFERENCES

- Cunningham, D.S., et al. 2023. Forestry influences on salmonid habitat in the North Thompson River watershed, British Columbia. *Canadian Journal of Fisheries and Aquatic Sciences* 80, 1053-1070. <https://doi.org/10.1139/cjfas-2022-0255>.
- Feist, B.E., et al. 2011. Landscape ecotoxicology of Coho Salmon spawner mortality in urban streams. *PLoS ONE* 6(8): e23424. <https://doi:10.1371/journal.pone.0023424>.
- Kolath, A.S. & Egemose, S. 2023. Influences of urban discharges and urban heat effects on stream temperature. *Hydrology* 10(2), 30. <https://doi.org/10.3390/hydrology10020030>.
- Lo, B.P., et al., 2023. Acute toxicity of 6PPD-Quinone to early life stage juvenile chinook (*Oncorhynchus tshawytscha*) and coho (*Oncorhynchus kisutch*) salmon. *Environmental Toxicology and Chemistry* 42, 815–822. <https://doi.org/10.1002/etc.5568>
- McCarthy, S.G., et al. 2008. Coastal storms, toxic runoff, and the sustainable conservation of fish and fisheries. In: McLaughlin K.D., ed. *Mitigating Impacts of Natural Hazards on Fishery Ecosystems*. American Fisheries Society, Bethesda, MD, USA. pp 7–27.
- McCullough, D. A., et al. 2001. Issue Paper 5. Summary of technical literature examining the physiological effects of temperature on salmonids. EPA-910-D-01-005. Prepared as part of U.S. EPA Region 10 Temperature Water Quality Criteria Guidance Development Project. <https://nepis.epa.gov/Exe/ZyNET.exe/P100LVKL.TXT?ZyActionD=ZyDocument&Client=EPA&Index=2000+Thru+2005&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C00thru05%5CTxt%5C00000034%5CP100LVKL.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL>.
- Richter, A. & Kolmes, S.A. 2005. Maximum temperature limits for chinook, coho, and chum salmon, and steelhead trout in the Pacific Northwest. *Reviews in Fisheries Science* 13(1): 23–49. <https://www.noaa.gov/sites/default/files/legacy/document/2020/Oct/07354626288.pdf>
- Spanjer, A. R., et al. 2018. Juvenile coho salmon growth and health in streams across an urbanization gradient. *Science of The Total Environment*, 625, 1003-1012. <https://doi.org/10.1016/J.SCITOTENV.2017.12.327>.

Tang J., et al. 1987. Effect of temperature extremes on the mortality and development rates of coho salmon embryos and alevins. *The Progressive Fish-Culturist*, 49: 167–174. [https://doi.org/10.1577/1548-8640\(1987\)49<167:EOTEOT>2.0.CO;2](https://doi.org/10.1577/1548-8640(1987)49<167:EOTEOT>2.0.CO;2)

Tian, Z., et al. 2020. A ubiquitous tire rubber-derived chemical induces acute mortality in coho salmon. *Science* 371 (6525), 185-189. <https://doi.org/10.1126/science.abd6951>.

Tian et al. 2022. Erratum to “A ubiquitous tire rubber-derived chemical induces acute mortality in coho salmon.”. *Science* 375 (6582). <https://www.science.org/doi/10.1126/science.abo5785>

USEPA. 2026. 6PPD-quinone. What is 6PPD-quinone? U.S. Environmental Protection Agency, On-line article, <https://www.epa.gov/chemical-research/6ppd-quinone>, accessed February 1, 2026.

*<https://pkols-mountdouglas.ca/wp/wp-content/uploads/2023/08/UnderstandingtheEcologicalImpactsofDogsinNaturalAreas.pdf>, Mount Douglas Conservatory 2023)

Review of Brooklyn Creek’s Ecological Accounting Process (EAP), The Town of Comox OCP (Bylaw No. 2054) and the 1533 Cedar Avenue Development Proposal: Policy-to-Practice Gaps

Prepared by Vanessa Scottⁱ for BCWS

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Executive Summary

In 2018, the Town of Comox pioneered British Columbia’s first multi-jurisdictional Ecological Accounting Process (EAP) for Brooklyn Creek, which quantified the stream corridor as a “natural asset” worth approximately **\$2,700 per linear metre** with **more than \$725,000–\$780,000 cumulative Town, public and volunteer investment** in lower-creek restoration for the research period 2006-2018. [1][2] Council embraced the EAP as a sustainability precedent [3], referred it to Staff, publicly promoted it as a “beacon of hope” for “reconnecting hydrology and ecology” [4][5], and subsequently embedded strong Brooklyn Creek protection policies into the Town’s guiding documents and greenway priorities, including in the most recent Official Community Plan, Bylaw No. 2054 [6].

However, the 1533 Cedar Avenue development proposal reveals a **serious policy-to-practice gap**: while it may meet minimum provincial riparian standards under the Riparian Areas Protection Regulation (RAPR) on paper, the BCWS finds this seriously deficient; furthermore, it does not comply with the Town’s OCP in terms of its natural-asset policies and framework, or the Water Balance Methodology and modelling that the Town has applied in practice in previous developments such as the detailed hydrologic modeling of its *Northeast Comox Stormwater Management Plan - Phase 3* [7]. All of these factors reveal a narrow and incomplete regulatory lens that leaves Council and Staff with two disconnected, incompatible narratives: “RAPR is satisfied” vs “Brooklyn Creek is a long-term natural asset and core infrastructure that we have committed to protect, enhance and assemble as a public greenway.”

This submission connects the Brooklyn Creek EAP and Comox’s OCP to key oversights in the Cedar Ave application. Overall, the development proposal is a **test case** for whether Comox will use these tools — including the OCP’s natural asset priorities it has just endorsed — or permit them to be merely performative rather than substantive in practice.

What is the Brooklyn Creek EAP?

The Ecological Accounting Process Report quantifies Brooklyn Creek as a “**natural commons asset**” that provides essential and continuous municipal services: stormwater conveyance, flood attenuation, groundwater recharge, habitat, recreation, and property value enhancement [1][2]. The EAP was presented to Council and Staff in September 2018 by the Partnership for Water Sustainability BC and BCWS [8], establishing that:

- Brooklyn Creek’s package of ecological services justifies systematic protection, enhancement and investment—not just ad-hoc minimum regulatory compliance [1][2][9]
- The corridor’s financial value (\$2,700/m) based on BC Assessment data provides a basis for long-term asset-management decisions comparable to roads and pipes [1][2]

The EAP is a “twin pillar” with Water Balance Methodology for sustainable watershed systems, explicitly aligned with Asset Management BC’s framework for treating natural systems as infrastructure. [1][2][10] Yet the RAPR does not include water balance modelling or related performance targets, or natural asset management standards, as outlined below.

Taken altogether, these shortcomings wrongly relegate Brooklyn Creek to the position of a development constraint to be protected, rather than treating it for what it is: a quantified infrastructure asset whose hydrologic services, functions and corridor continuity should be maintained and improved by the Town’s development over time, due to its ongoing service delivery and long legacy of quantified and ongoing financial investments and values.

Comox Council originally acknowledged the EAP as precedent-setting and since then has incorporated Brooklyn Creek’s natural asset values, Streamside Protection and Enhancement Area (SPEA) protection, and restoration goals into the OCP [3][4][6]. Yet the policy-to-practice gap remains, as the Cedar Ave development proposal shows EAP and its many correlated OCP policies, vision and principles are not embedded in development permit requirements.

Critical Policy-to-Practice Gaps in the 1533 Cedar Avenue Proposal

In addition to the deficiencies identified in the main BCWS Report, the Cedar Avenue RAPR exhibits critical gaps when evaluated against the Town’s EAP and OCP commitments.

1. No Mention of EAP or OCP Natural-Asset, Greenway or Design & Planning Priorities

The RAPR report does not reference the Brooklyn Creek EAP or the OCP’s greenway vision, infrastructure objectives for natural assets, or the stated OCP commitments and priorities for managing Brooklyn Creek as a core municipal asset.[1][2][3][4][6] Will any of these be factors such as greenway provision be confirmed publicly and incorporated as permit requirements?

The OCP’s Infrastructure Objectives clearly direct Council and Staff to “Identify and value natural assets and incorporate [them] into the Town’s asset management plan.” (Policy 5[G.]). It explicitly includes “natural assets” in this commitment to “Make infrastructure planning, investment, operations and maintenance decisions from an asset management perspective” (Policy 5.1). The fiscal rationale for including natural assets like Brooklyn Creek is thoroughly explained in Section 7: “The degradation of ecosystems threatens biodiversity and **increases costs for local governments** by eliminating the 'free' services provided by healthy ecosystems—also known as natural assets—such as carbon sequestration, stormwater management, and cooling.” (P 40).

Section 7 goes on to identify Brooklyn Creek as a high-priority ecological corridor and greenway with clear directives to protect, restore and eventually assemble it into a continuous, publicly owned riparian greenway, for the goals of prioritizing ecological integrity, habitat, public access via trails, and long-term watershed health:

- “Seek public ownership of land adjacent to Brooklyn Creek to form a continuous, naturalized Streamside Protection and Enhancement Area **as identified in the Parks and Trails Master Plan.**” (Policy 7.10)
- “**Seek public ownership** of lands to connect Brooklyn Creek Park to Skeena Park and the Northeast Woods... **to support biodiversity and enhance ecological connectivity.**” (Policy 7.11)
- “**Enhance and maintain the ecological function and biodiversity** of sensitive ecosystems such as ... Brooklyn Creek through **restoration, land acquisition, lot consolidation, and dedication during development.**” (Policy 7.13)
- Encourage upstream/middle reach action “to **improve the long-term health of Brooklyn Creek and the marine environment of the Comox Harbour...**” (Action 7.22)

Additionally, the Parks, Trails and Open Space Planning and Design policies emphasize:

- **Increasing trail connectivity “from the ocean to the upland extents of the Town”** and acquiring or securing rights-of-way for an “Ocean to Upland Trail Network” and “existing greenways.” (Policies 4.15–4.16)

The OCP frames the Brooklyn Creek corridor as both a valuable natural asset *and* a continuous SPEA/greenway that is to be publicly owned over time, restored, enhanced, valued as infrastructure, and connected to other major parks as part of a network, not incrementally encroached on, or degraded in piecemeal parcels, by development.

Due of the importance of integrating Town assets into comprehensive decision-making, the Planning and Design Section of the OCP directs Council “to maximize the multifunctional use of town assets—supporting recreation, enhancing aesthetics, providing cultural opportunities, and managing stormwater where appropriate” by integrating parks with other infrastructure initiatives (Policy 4.2). Brooklyn Creek exists squarely in this category of a “multifunctional” infrastructure asset that should be considered wholistically, as a whole watershed approach [11].

The Cedar Ave RAPR reveals that the EAP and the OCP’s asset management framework for Brooklyn Creek are **not integrated or operationalized in permit-level development decisions.**

2. No Natural-Asset Valuation or Verifiable Greenway Contribution

The EAP documented that **Comox and BCWS invested ~\$780,000 in lower Brooklyn Creek from 2006-2018 (with many more financial and volunteer contributions in the subsequent seven years, including \$100,000 in habitat restoration in 2025) and identified ongoing maintenance needs [1][2]. This financial value is in fact the core purpose of the EAP** because it ensures that it can be operationalized, not as a static one-time bookkeeping insight, but to form a continuously guiding “strategy for community investment...” [12].

To this end, the EAP financial value is rigorous and scientific, as the outcome of a process developed through a wider six-year program of applied research with nine case studies, 13 local governments, and innumerable volunteer streamkeepers, in order to establish a “3-stage building block process of testing, refining, and mainstreaming the methodology and metrics for financial valuation of stream systems...to answer the question for local governments: **how much should communities budget each year for maintenance and management of stream systems**” [12].

Yet the Cedar Ave development proposal has:

- No stated SPEA dedication or verifiable right-of-way to the Town for greenway assembly
- No financial contribution linked to the \$2,700/m EAP valuation to fund natural-asset monitoring, maintenance, repair and/or enhancements
- No demonstration that the Town will be left in a no-worse position regarding creek **maintenance and repair costs due to the absence of water balance modelling.**

Thus far in the development permit process, with no statements otherwise in documentation or publicly available, this contradicts the OCP’s objectives that it will use acquisition and dedication during development to complete a continuous SPEA/public greenway. Policies 7.10–7.13 explicitly direct the Town to acquire land along Brooklyn Creek and during development approvals to create a continuous, naturalized SPEA and improve ecological function.

3. No Water Balance Analysis or OCP Infrastructure & Stormwater Policies

The proposal lacks continuous hydrologic modeling showing pre- vs. post-development annual runoff volume and flow-duration impacts, which are essential for assessing the impacts of smaller, more frequent rainfall events with cumulative effects that drive channel erosion and habitat degradation. Simply maintaining “runoff rates” up to the 1-in-100-year event, as outlined in the RAPR, restricts the focus to major storms and is insufficient because it omits the impacts of frequent lesser events and cumulative volumes.

Province-wide *and* locally implemented examples of Water Balance Methodology (such as the *Northeast Comox Stormwater Management Plan – Phase 3*) explicitly target these small-to-moderate events [7]. Tools are regionally available to support this modeling [13], but it was not required in the RAPR. So, it remains unknown whether the proposed development maintains the WBM target that only ~10% of annual rainfall is expressed as fast surface runoff in comparison to pre-development conditions. The ~10% annual runoff threshold is critical for stream health, hence the WMB performance objective to keep urban post-development runoff volumes at or near this 10% threshold [14]. In contrast, Comox’s *Northeast Comox Stormwater Management Plan - Phase 3* documents a detailed hydrologic modeling exercise equivalent to WBM to assess pre-development hydrology, test stormwater Best Management Practices (BMPs), and set targets based on revised historical rainfall data for the area. [7]

Similarly, the OCP Section 5: Infrastructure priorities direct stormwater management plans to protect downstream creeks and habitats. These OCP stormwater policies require “post-development flows not to exceed pre-development flows” and to “mimic natural ecosystem processes,” explicitly prioritizing preservation of “water absorbing capabilities of soil, vegetation and trees particularly along riparian corridors.” (Policies 5.9–5.10)

Any development that increases impervious surfaces raises concern about loss of these “soil sponge” water-absorbing capabilities and ecosystem infiltration. However, the RAPR for Cedar Ave states that significant infiltration is not expected due to underlying till and therefore relies on water detention and conveyance through stormwater directed into Brooklyn Creek. This may be technically justified on-site, but from a watershed and asset management perspective, it raises the question: is there enough distributed infiltration elsewhere in the Brooklyn watershed to compensate, or is this development incurring lost soil-sponge capacity? The RAPR does not mention use of green-infrastructure features (raingardens, trees, deep topsoil) to restore soil-sponge function, only that “Runoff from driving surfaces will be routed through raingardens to treat 6-PPD Quinone prior to discharge to Brooklyn Creek” (P. 12).

4. Thermal and Contaminant Impacts Unaddressed

As mentioned in the BCWS Report, large paved areas and 99-unit density create thermal mass and contaminant loading (copper, zinc *and* seasonal applications of road salt), yet no thermal assessment or expanded water-quality analysis beyond 6-PPD Quinone was submitted. Coho and Cutthroat salmon are cold-water species vulnerable to temperature increases and metal toxicity.

Road salts applied in wintertime for safety and de-icing of roadways, parking lots and walkways are also well-documented degraders of urban streams: they can create short, intense spikes of

chloride that kill or deform salmon eggs and weaken young salmon by stressing their bodies and slowing growth. It also gradually and cumulatively degrades overall stream health by harming salmon food supply (insects, larvae) and other sensitive stream life, reducing the creek's ability to support healthy salmon runs.

5. Pet Waste and Chronic Encroachment

Placing 99 units beside a narrow riparian corridor guarantees sustained human and pet pressure, not only in the form of physical access, but also vastly increased and cumulative fecal and nitrogen contamination from pet waste. However, no pet-management plan, dog-waste infrastructure, or robust encroachment prevention measures are proposed in the RAPR (e.g., signage, prohibitions against off-leash dogs in the SPEA, fines/penalties, strata bylaws). Generic fencing recommendations ignore the long-term degradation risk from informal trails, litter, pet waste including urine, and off-leash dogs, all of which degrade Brooklyn Creek as a salmon-bearing ecosystem and as an ecological and infrastructure asset, which the Town has committed to managing as such.

6. Stormwater Infrastructure Intrudes into SPEA

A stormwater outfall through the SPEA requires construction machinery access and creates scour risk. The SPEA is supposed to be a “no-works” protected zone; this intrusion sets precedent for future encroachment and foregoes any transition buffer between intensive development and sensitive habitat. The RAPR does not explore whether this outfall can be designed to minimize its footprint or disturbance within the SPEA.

7. Monitoring is Minimalist

Five-year monitoring focuses only on plant survival and general condition—not on water quality (temperature, turbidity, conductivity, metals, salts, E. Coli), flow dynamics, scour, erosion, clogging, raingarden success at toxicity filtration or failure to perform, or bank stability. Without these metrics, there is no feedback loop to verify whether the natural asset's service capacity is being maintained, as asset-management logic requires.[1][2]

Suggestions & Ideas to Help Operationalize the Brooklyn Creek EAP

The BCWS Report unanimously and strongly recommends Comox Town Council reject the rezoning/OCP amendment and the proposed development at Cedar Avenue. Outlined here, as follows, are opportunities *specific to the Ecological Accounting Process* to use the Cedar Ave

application to illustrate how Comox could begin operationalizing the EAP to bring development permit processes into alignment with the Town’s natural asset management policies and OCP.

1. **Request supplemental Water Balance analysis** demonstrating that post-development hydrology maintains Brooklyn Creek’s functioning condition as a natural asset, using regional Water Balance Express targets or equivalent continuous simulation.
2. **Require natural-asset tenure and contribution:**
 - Officially, in permitting, dedicate the SPEA to the Town for future assembly and public access
 - Establish a Brooklyn Creek Natural-Asset Contribution based on EAP valuation (~\$2,700/m of creek frontage) to fund corridor restoration, enhancement and monitoring
3. **Expand monitoring requirements** to include full water-quality and hydrologic indicators (temperature, turbidity, conductivity, bank stability etc.) with explicit thresholds triggering adaptive management, consistent with protecting the asset’s service capacity.
4. **Address pet management and encroachment** through on-site dog-waste stations, strata bylaws prohibiting off-leash creek access, and physical barriers (split-rail fence, dense native shrub buffer). See the photos below for an example from the City of Courtenay at “Acadia on the Walk” apartment complex, located beside the Millard Creek Conservation Area, at 355 Anfield Rd.





Systemic (All Brooklyn Creek Related Development):

5. **Adopt interim development permit guidelines** requiring Water Balance Model outputs and EAP-informed natural-asset assessments for all major development in the Brooklyn Creek watershed.
6. **Prepare a Brooklyn Creekshed Implementation Plan** (as requested by BCWS in 2018 [8]) integrating EAP valuation, Water Balance targets, OCP policy, and clear expectations for land tenure, contributions, and monitoring and maintenance.
7. **Establish a Brooklyn Creek Natural-Asset Reserve Fund** to receive contributions and transparently track investment in corridor maintenance, restoration, enhancement and monitoring over time. A natural asset reserve fund is a dedicated municipal reserve account used to save and invest money specifically for acquiring, protecting, restoring, and managing natural assets —such as creeks— that provide services like drainage, flood protection, and recreation. It is the financial mechanism that lets a municipal council treat natural systems as long-lived infrastructure assets, similar to roads or pipes, within its budgeting and asset management framework. [15]

Closing Quote from Brooklyn Creek EAP Author and National EAP Expert Tim Pringle (2025)

The situation in Comox with the Cedar Ave development proposal is a **textbook case of the underlying reason why British Columbia and local governments innovated the EAP** into

reality: to bring valuable natural assets into the quantified realm of true asset management. “Communities rarely manage streams as ecological systems; rather they are sliced and diced to suit land development objectives,” says Tim Pringle, EAP Chair at the Partnership for Water Sustainability BC and adjunct professor at Vancouver Island University. [16]

“Nature is a system – you cannot slice and dice it. When streams are sliced and diced, consequences follow: erosion, flood damage, loss of property enjoyment, diminished aquatic habitat. There will be no stream to produce ecological services if land use intensity destroys riparian conditions. EAP provides a number that communities need to include streams in budgets for asset management and tackle Riparian Deficits. EAP builds on the ‘big idea’ that use and conservation of land are equal values. EAP provides a value picture of a stream system”

Tim Pringle, EAP Author, Chair at the Partnership for Water Sustainability BC and adjunct professor at VIU [16]

Conclusion

The Town of Comox has already done the pioneering work with BCWS and the Partnership for Water Sustainability BC – the Brooklyn Creek EAP is professionally documented, financially quantified, Council-endorsed, and nationally recognized as a first-in-BC project.[1][2][3][4]

The Cedar Avenue situation presents an opportunity not just to better protect one critical reach of salmon spawning habitat in the creek, but also to **operationalize the EAP in day-to-day permit decisions, closing the gap between the Town’s stated policies and its regulatory practice.**

Without binding EAP and Water Balance requirements at the development permit level, projects will continue to meet bare minimum standards while missing opportunities to advance the key portions of the OCP, contribute to natural-asset stewardship, and honor the considerable public, municipal and volunteer **investment already made in the well-loved Brooklyn Creek.**

References

[1] Partnership for Water Sustainability in BC. (2018). *Brooklyn Creek Demonstration Application in the Comox Valley: Ecological Accounting Process*. <https://waterbucket.ca/gi/2019/07/03/demonstration->

[application-of-ecological-accounting-process-brooklyn-creek-in-the-comox-valley-completed-august-2018/](#)

[2] Partnership for Water Sustainability in BC. (2018). *Brooklyn Creek Demonstration Application – EAP Final Report* (August/September 2018). https://brooklyncreek.ca/wp-content/uploads/2019/04/EAP-Demonstration_Sep2018.pdf

[3] Town of Comox. (2019). *News Release: Town of Comox precedents are working examples of what is possible* (September 22, 2019). https://www.comox.ca/sites/default/files/2022-04/News_Release_Sustainability.pdf

[4] Partnership for Water Sustainability in BC. (2019). *Town of Comox – A “Beacon of Hope” for Citizen Science in Action* (Watershed Case Profile Series #8, September 2019). https://waterbucket.ca/rm/wp-content/uploads/sites/5/2019/09/Comox-Beacon-of-Hope_Sep2019.pdf

[5] Town of Comox. (2019). Joint News Release with the Partnership for Water Sustainability BC. Town of Comox precedents are working examples of what “reconnecting hydrology and ecology” looks like in practice. <https://www.comox.ca/sites/default/files/2022-04/News%20Release%20Sustainability.pdf>

[6] Town of Comox. (2026). Official Community Plan. Bylaw Number 2054. <https://www.comox.ca/sites/default/files/2026-01/Proposed%20OCP%20Bylaw%20No.%202054.pdf>

[7] Town of Comox. (2018). North East Comox Neighbourhood Stormwater Management Plan - Phase 3 of 3. Prepared by McElhanney Consulting Services Ltd. <https://www.comox.ca/sites/default/files/2022-04/NE%20Comox%20Report%20Phase3.pdf>

[8] Burton, M. (2018, December 10). Brooklyn Creek: it’s surviving, but faces old and new threats from upstream development. *Decafnation*. <https://decafination.ca/2018/12/10/brooklyn-creek-its-surviving-but-faces-old-and-new-threats-from-upstream-development/>

[9] Town of Comox. (2019). Natural Asset Enhancement & Creekshed Function: Case Study Implications for Comox. https://www.assetmanagementbc.ca/wp-content/uploads/Sustainable-Watershed-Systems-Natural-Asset-and-Function-Enhancement_Town-of-Comox_MKamenz.pdf

[10] Water Balance Methodology. Comox Valley Water Wise. <https://cvwaterwise.squarespace.com/water-balance-methodology>

[11] Asset Management for Sustainable Service Delivery: A BC Framework. (2014). Partnership for Water Sustainability. <https://waterbucket.ca/wscblog/files/2015/01/Asset-Management-for-Sustainable-Service-Delivery-A-Framework-for-BC-Dec-2014-short-version.pdf> and <https://www.assetmanagementbc.ca/>

[12] HOW WE CHANGE WHAT WE ARE DOING ON THE LANDSCAPE: Synthesis Report on the Ecological Accounting Process (EAP), a BC Strategy for Community Investment in Stream Systems. (2023). Partnership for Water Sustainability BC. <https://waterbucket.ca/gi/2023/02/21/synthesis-report-on-eap-the-ecological-accounting-process-a-bc-strategy-for-community-investment-in-stream-systems-released-by-the-partnership-for-water-sustainability-june-2022/>

[13] Comox Valley WaterWise. *Water Balance Methodology*. <https://www.comoxvalleywaterwise.ca/water-balance-methodology/>

[14] The Water Balance Model for BC. (2003). *The Water Balance Model for BC: A Tool for Integration of Perspectives*. <https://www.waterbucket.ca/gi/sites/wbcgi/documents/media/228.pdf>

[15] Legal Primer: Natural Asset Management by Local Governments in Canada. (2023). Municipal Natural Assets Initiative. https://naturalassetsinitiative.ca/wp-content/uploads/2024/07/Legal_Primer-Natural_Asset_Management_by_Local_Governments_in_Canada.pdf

[16] THE ECOLOGICAL ACCOUNTING PROCESS: “Communities rarely manage streams as ecological systems; rather they are sliced and diced to suit land development objectives.” (2025). Partnership for Water Sustainability BC. <https://waterbucket.ca/gi/2025/05/08/eap-the-ecological-accounting-process-2/>

ⁱ Vanessa Scott served as a Director on the Board of BCWS and acted as its representative to the Comox Valley Land Trust and Conservation Partnership during the finalization of the Ecological Accounting Process Report (2017-2018). She presented the EAP and delivered the Report to the Town of Comox Council and Staff on Sept 18, 2018, with author Tim Pringle.

Recognized a lead BC and national Canadian expert in the EAP, Pringle serves as a founding Director and current Chair of the Ecological Accounting Process initiative for the Partnership for Water Sustainability BC (2026). He is an adjunct professor and adjunct faculty member at Vancouver Island University in the Master of Community Planning department, specifically in relation to the Ecological Accounting Process (EAP).

For more information, please contact BCWS.