LAKE COUNTRY
Life. The Okanagan Way.

Agenda
Regular Council Meeting

Tuesday, September 10, 2024, 7:00 p.m.
Council Chambers/Video Conference
10150 Bottom Wood Lake Road
Lake Country, British Columbia V4V 2M1

Pages

1. **Call to Order and Territorial Acknowledgement**
   We acknowledge that we are conducting our business today on the unceded territory of squilx"/syilx (Okanagan) peoples. As a Council, we recognize the importance of doing our best to build respectful relationships that contribute to stewarding the land and waters in the community with integrity and consideration for future generations.

2. **Adoption of Agenda**

   Recommendation
   THAT the Regular Council Meeting Agenda of September 10, 2024 be adopted.

3. **Adoption of Minutes**

4. **Mayor's Report**

5. **Announcements**
   Anyone with a passion for safely getting around the community is invited to attend an "Idea Generator" workshop at Beasley Community Centre on Wednesday, September 18th (3:00-5:00pm) to share input and ideas on building a culture for sharing roads safely in Lake Country. This session is inspired by SAFR (Safety Awareness Friends and Residents) - a group of residents with partners from Interior Health, UBCO, RCMP, District of Lake Country and Lake Country Health.

6. **Delegations**

   6.1 **RCMP Strategic Priorities** — 4
   Presentation from Insp. Jason Charney and Acting NCO/ic Cpl. Ryder Birtwistle.

   6.2 **SAFR- Safety Awareness Friends & Residents** — 32
   Presentation from Janice Larson, on behalf of SAFR, a citizen group working with partner agencies to inspire road safety initiatives throughout the District of Lake Country.

   6.3 **Larratt Aquatic** — 41
   Presentation of reports prepared for the District of Lake Country by Larratt Aquatic: Zebra and Quagga Mussels Risk Assessment Mapping-Summary Report and Wood Lake BC, A Review of Historical Conditions, Current Trends and Recommendations for a Sustainable Future.

7. **Planning and Development Applications**

two separate strata lots, as shown on Attachment A-S0000598-Site Plan to the Report to Council dated September 10, 2024, be approved in accordance with Section 242 of the Strata Property Act.

9. **Bylaws for Adoption and Readings Following a Public Hearing**

10. **Rise and Report from In Camera**

11. **Council Committees**

12. **External Committees and Boards**

13. **Strategic Priorities** 276

14. **Report from Councillors**

15. **Adjournment**

posted September 5, 2024
Reyna Seabrook, Corporate Officer

Lake Country RCMP 2024 - 2028 Strategic Plan

REDUCE & PREVENT CRIME

- Implement intelligence-led projects and initiatives that prioritize response to serious and repetitive crimes
- Implement intelligence-led projects and initiatives focused on repeat and problem offenders
- Strengthen external communication to increase public awareness and decrease crimes of opportunity

REINFORCE ROAD SAFETY

- Increase the visibility of traffic enforcement
- Prioritize the enforcement of impaired driving by alcohol and drugs

ENHANCE COMMUNITY RELATIONS

- Enhance relationships with community youth, seniors, and vulnerable citizens
- Develop partnerships and strengthen key stakeholder relations to enhance integrated community response to existing and emerging social issues
- Develop and implement a seasonal policing visibility patrol (foot and/or bike)

SERVE WITH EXCELLENCE | TAKE RESPONSIBILITY | DEMONSTRATE COMPASSION | ACT WITH INTEGRITY | SHOW RESPECT

Driving Positive Change in Our Community

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LAKE COUNTRY RCMP

FIVE YEAR STRATEGIC PLAN

2024-2028

Proud of our traditions and confident in meeting future challenges, we commit to preserve the peace, uphold the law and provide quality service in partnership with the community of Lake Country.

STRATEGIC PRIORITIES 2024-2028

1. **Reinforce Road Safety**
2. **Reduce and Prevent Crime**
3. **Enhance Police/Community Relations**

MESSAGE FROM THE OFFICER IN CHARGE KELOWNA REGIONAL DETACHMENT

Our 2024-2028 Strategic Plan reflects the commitment of our Lake Country RCMP police officers and support staff to enhance the community's sense of safety and well-being. Working with our community aligned in our objectives, we can and will make a significant impact.

Through excellence in policing services, we are dedicated to serving the citizens of Lake Country. This is why our strategic planning process is centered on our clients—we are here to listen and here to serve. Informed by crime and data analysis, this plan identifies our best opportunities to address crime trends, complex social factors, and overall community safety.

We also recognize our citizens as valued partners in crime prevention. The Lake Country Mayor and Council, representing the interests of our community, have provided essential guidance on our objectives and goals.

Being chosen as Lake Country's policing service is a privilege, and with that comes the responsibility of continuously improving our service delivery. The wellness of every one of our policing professionals is essential to ensuring we can show up at our best for every citizen. The principles of client-centered service—empathy, listening, and follow-through—are embedded throughout this Strategic Plan.

Superintendent Kara Triance

M**ESSAGE FROM THE REGIONAL OPERATIONS OFFICER RESPONSIBLE FOR LAKE COUNTRY RCMP**

As the Regional Operations Officer responsible for policing services in Lake Country, I am excited to present our 5-year Strategic Plan for policing in your community. Lake Country is growing at a rapid pace and with that comes the need to maintain citizen safety as a priority through education, prevention and law enforcement. We are here for you and we commit to making a positive difference in the community.

Our three strategic priorities encompass community feedback, feedback from your elected officials, consultation with your Lake Country police officers and, of course, data and analytics gathered as we respond to calls for service in your community. We will continue to respond to calls for service and to provide excellence in service delivery while also pro-actively addressing the priorities this process has identified: road safety, crime-reduction and police/community relations. We look forward to serving you and interacting with you in our community.

Inspector Jason Charney

THE DISTRICT OF LAKE COUNTRY

The District of Lake Country is gathered on the unceded territory of squilx"/syilx (Okanagan) peoples. The District of Lake Country was incorporated in May 1995 and encompasses four wards: Carr's Landing, Okanagan Centre, Oyama and Winfield, each having their own rich histories and cultural life.[1]

Lake Country is one of BC's fastest growing communities with a population of 15,817 as reported in the 2021 census, up 22.4% from the previous census. Lake Country has a land area of 122.16 square kilometers with a population density of 129.5/km2 in 2021. The average age of the population is 42.8 years with seniors (65+) only accounting for 18.7% of the population. The median household income is $98,000 and the median dwelling value is $800,000. 66.2% of the population aged 15 and over is employed - the main industry is construction (14.4% of the total labour force) followed by Health Care and Social Assistance (12.10%) and the retail trade (9.4%) [2]

Lake Country has 3 elementary schools, a middle school and a secondary school. Lake Country boasts a high quality of life with outstanding outdoor recreation often focused around Okanagan Lake, Kalamalka Lake and Wood Lake. Lake Country is in close proximity to the Kelowna International Airport and UBC Okanagan.

The District of Lake Country has strong agricultural roots. Agriculture and agriculturalists have played a defining role in creating the community that exists today and shall continue to be a large part of the community in the future. Approximately 43% of all land in Lake Country is within the Agricultural Land Reserve. Of this land, approximately half is used for grazing or pasture, while the other half is used for orchards, vineyards and other crops.[3]

ABOUT THE LAKE COUNTRY RCMP-GRC

The Lake Country RCMP Detachment is located at: 3231 Berry Road, Lake Country. They are part of the larger Kelowna Regional Detachment, which covers a geographic area beginning in Lake Country and ending mid-way between Peachland and Merritt on Highway 97C.

The Lake Country RCMP is currently comprised of 19 police officers and 3 support staff broken down as follows:

- Senior Leadership: 3 Police Officers (Sergeant commander and 2 Corporal supervisors)
- Front line policing: 12 Police Officers (11 General Duty and 1 x Traffic)
- Specialized policing: 4 Police Officers (3 x General Investigation Section and 1 x School Resource Officer)
- Support Services: 3 Municipal Employees

Planning for additional future resources is underway.

[1] History and Heritage - District of Lake Country
[2] Overview - Economic Development Data Platform (lakecountry.bc.ca)
[3] Official-Community-Plan-(2018-2038)-Bylaw-1065,-2018---CONSOLIDATED.pdf (lakecountry.bc.ca)

GUIDING OUR SERVICE TO LAKE COUNTRY

RCMP MISSION:

We will :

- Be a progressive, proactive and innovative organization
- Provide the highest quality service through dynamic leadership, education and technology in partnership with the diverse communities we serve
- Be accountable and efficient through shared decision-making
- Ensure a healthy work environment that encourages team building, open communication and mutual respect
- Promote safe communities
- Demonstrate leadership in the pursuit of excellence

RCMP VISION:

Proud of our traditions and confident in meeting future challenges, we commit to preserve the peace, uphold the law and provide quality service in partnership with our communities.

RCMP CORE VALUES:

- Act with Integrity
- Show Respect
- Demonstrate Compassion
- Take Responsibility
- Serve with Excellence

DISTRICT OF LAKE COUNTRY GUIDING PRINCIPLES[4]

- Preserve our rural and agricultural character
- Created a vibrant town centre
- Promote development in existing neighbourhoods
- Achieve sustainable development through smart growth
- Protect and enhance our natural environment
- Facilitate an active, healthy inclusive community
- Maintain high-quality municipal services

[4] Official-Community-Plan-(2018-2038)-Bylaw-1065,-2018---CONSOLIDATED.pdf (lakecountry.bc.ca)

LAKE COUNTRY RCMP

STRATEGIC PLAN GRAPHIC

2024-2028

OUR 2024-2028 LAKE COUNTRY POLICING PRIORITIES:

1. **REINFORCE ROAD SAFETY**

Our dedicated traffic member, assisted by front line members and reservists, contribute to traffic enforcement with the goals of improving both road safety and the overall safety of the Lake Country community. Some of the many areas of traffic safety we focus on are: school zones, distracted driving, impaired operation of a motor vehicle, speeding, seatbelt usage, unsafe vehicles on the roadways and improper equipment for inclement weather.

We commit to:

- Increase the visibility of traffic enforcement through intelligence-led initiatives (school zone initiatives, speed enforcement, distracted driving enforcement, prohibited drivers and commercial vehicle safety initiatives)
- Prioritize the enforcement of impaired driving by alcohol and by drug

How we will measure our actions (through quarterly reporting):

- During the first year of the plan (2024) the goal will be to increase traffic interactions by all uniform personnel to create baseline statistics for use in reporting in subsequent years
- Addition of a second Traffic Unit position (Target: position to be created by end 2027)
- Number of:
    - Hours of Citizen on Patrol Volunteer patrols
    - Vehicles checked for violations by Citizen on Patrol Volunteers
    - Warning letters issued by Citizen on Patrol Volunteers
    - Vehicles checked for signs of auto crime by Citizen on Patrol Volunteers
- Number of:
    - Impaired driving initiatives (dedicated roadblocks, Alexa Team Award recipients)
    - Impaired driving violations and recommended charges (impaired operation, IRP's, 24-hour suspensions)
    - Speeding violation tickets / excessive speed violation tickets / warnings
    - Distracted driving violation tickets
    - CVSE (or similar) inspections
    - Recommended charges submitted to BC Prosecution Service for prohibited drivers police removed from the road
    - School zone initiatives

Actions we will take to meet our objectives:

- Relevant training for our members (radar, DRE, SFST)
- Pro-active initiatives addressing our objectives
- Budget requests to the District of Lake Country for specialized traffic enforcement equipment

2. REDUCE AND PREVENT CRIME

Lake Country boasts a relatively low crime rate and member case load. Additionally, the overall number of calls for service to the Detachment have decreased 2019-2023. The concern, however, is that the number of criminal code offences has been steadily rising over the past decade to an average of just over 2 reported incidents per day. While that may seem like a small number it is indicative of a trend that we want to address and reverse. These are the most serious offences and are more labour intense to investigate. As your police of jurisdiction, we want to pro-actively address this trend and continue to keep the crime rate in Lake Country well below provincial averages.

We commit to:

- Implement intelligence-led projects / initiatives focused on the crime types that are impacting the Crime Severity Index and driving up the number of Criminal Code Offences in Lake Country
- Implement intelligence-led projects / initiatives focused on repeat and / or problem offenders
- Enhance external communication to increase public awareness and decrease crimes of opportunity

How we will measure our actions (through quarterly reporting):

- Priority staffing to GIS (General Investigation Section / Serious Crime) to address: the increasing numbers of Criminal Code Offences (Target: 1 position created by the end of 2027 and another created by the end of 2028)
- Number of:
    - Intelligence-led projects / initiatives focused on the crime types that are impacting the Crime Severity Index and driving up the number of criminal code offences in Lake Country
    - Intelligence-led projects / initiatives focused on repeat and / or problem offenders
    - Curfew checks (Target: 5% annual increase 2024-2028)
- Police-led crime reduction public education releases based on crime trends (Target: At least 1 educational media release per quarter)

Actions we will take to meet our objectives:

- Through the use of data analytics we will identify the crime drivers in our community and take pro-active actions to address them
- Through the use of data analytics we will identify repeat offenders for monitoring (reviewed quarterly)
- Develop a system in partnership with the Kelowna Regional Detachment Crime Intelligence Analysis Unit (CIAU) to identify quarterly crime trends for use in drafting educational media releases and for focusing projects / initiatives and patrols

3. ENHANCE POLICE / COMMUNITY RELATIONS

We respect the rich cultures and histories of the neighborhoods, wards and communities we live and work in. We strive to excel in providing transparent communication, accountability and responsiveness to community concerns and feedback. We aim to increase awareness of options for, and what to expect when, reporting crime. Developing and fostering partnerships with the community at all levels is a priority for us.

We commit to:

- Enhance relationships with community youth, seniors and vulnerable citizens
- Develop / foster partnerships and strengthen key stakeholder relations to enhance integrated community response to existing and emerging social issues
- Support and expand crime prevention programs
- Develop and implement a seasonal policing visibility patrol (foot and / or bike)

How we will measure our actions (through quarterly reporting):

- Number of events attended by members where the focus is on youth, seniors or vulnerable citizens
- Number of community events / celebrations and / or community service group meetings attended by members
- Number of Coffee with a Cop sessions (Target: 1 per quarter)
- Organization and implementation of Bi-annual Open Houses at the Detachment beginning 2024
- Number of bike patrol and / or foot patrol shifts

Actions we will take to meet our objectives:

- Form a committee to plan and execute the initial Detachment Open House
- Liaise with local coffee shops, cafes and markets to establish Coffee with a Cop opportunities
- Prepare and present budget information for a seasonal policing inatives. Year 1 would be the pilot and would operate as an overtime initiative.

KELOWNA REGIONAL DETACHMENT STRATEGIC ENABLER:

As part of the Kelowna Regional Detachment, the Lake Country RCMP have adopted and continue to support the Kelowna Regional Detachment strategic enabler:

Show up at our best for every citizen.

As your police of jurisdiction, the Lake Country RCMP commit to a comprehensive understanding of the law enforcement and safety needs of your community, including partnerships with key stakeholders for the purposes of identification and remedy of the root causes of increases to unwanted criminal behaviours.

To be able to show up at our best for every citizen and serve your community with dedication, professionalism and the necessary skill sets, we must focus on our people. We will invest in their wellness, cultural competence and training.

To ensure our people show up at their best for every citizen we commit to:

- Advocate for increased staffing levels proportionate to published crime statistics and community expectations for both police officers and civilian support staff
- Participate in the Kelowna Regional Detachment comprehensive Equity, Diversity and Inclusion program
- Ensure each police officer in Lake Country receives the training necessary for skill development in their current position

How we will measure our strategic enabler (through quarterly reporting):

- Continued commitment to increasing the number of uniformed resources at the detachment to meet the goal of 24/7 policing for the community (1 additional resource for each of the fiscal years: 2024/2025, 2025/2026, 2026/2027, 2027/2028 and 2028/2029)
- Addition of a Detachment Watch Support Officer (ME) to assist with: priority 3 and 4 calls for service; member requested follow-up; duties associated to the arrival and use of body-worn cameras; and other administrative duties as needed
- Number of training sessions attended by detachment members and support staff
- Quarterly reports to Mayor and Council highlighting crime trends (which ultimately identify resource requirements)

Lake Country RCMP

Key Factors influencing service delivery:

- population
- Cop/pop ratio
- cost per capita
- crime rate
- case load
- authorized strength
- case load
- calls for service
- criminal code offences
- CSI
- Prisoner admissions
- Response time

Lake Country

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At a Glance

- Located on the unceded territory of the squilz”/syilx (Okanagan) peoples
- Population 15,817 (2021 census)
- Incorporated in May 1995
- Comprised of four (4) wards:
    - Carr’s Landing
    - Okanagan Centre
    - Oyama
    - Winfield
- Emerged to 90:10 policing in 2023

7 Municipal Guiding Principals from the OCP

1. Preserve our rural and agricultural character
2. Create a vibrant town center
3. Promote development in existing neighbourhoods
4. Achieve sustainable development through smart growth
5. Protect and enhance our natural environment
6. Facilitate an active, healthy, inclusive community
7. Maintain high-quality municipal services

Lake Country RCMP at a Glance

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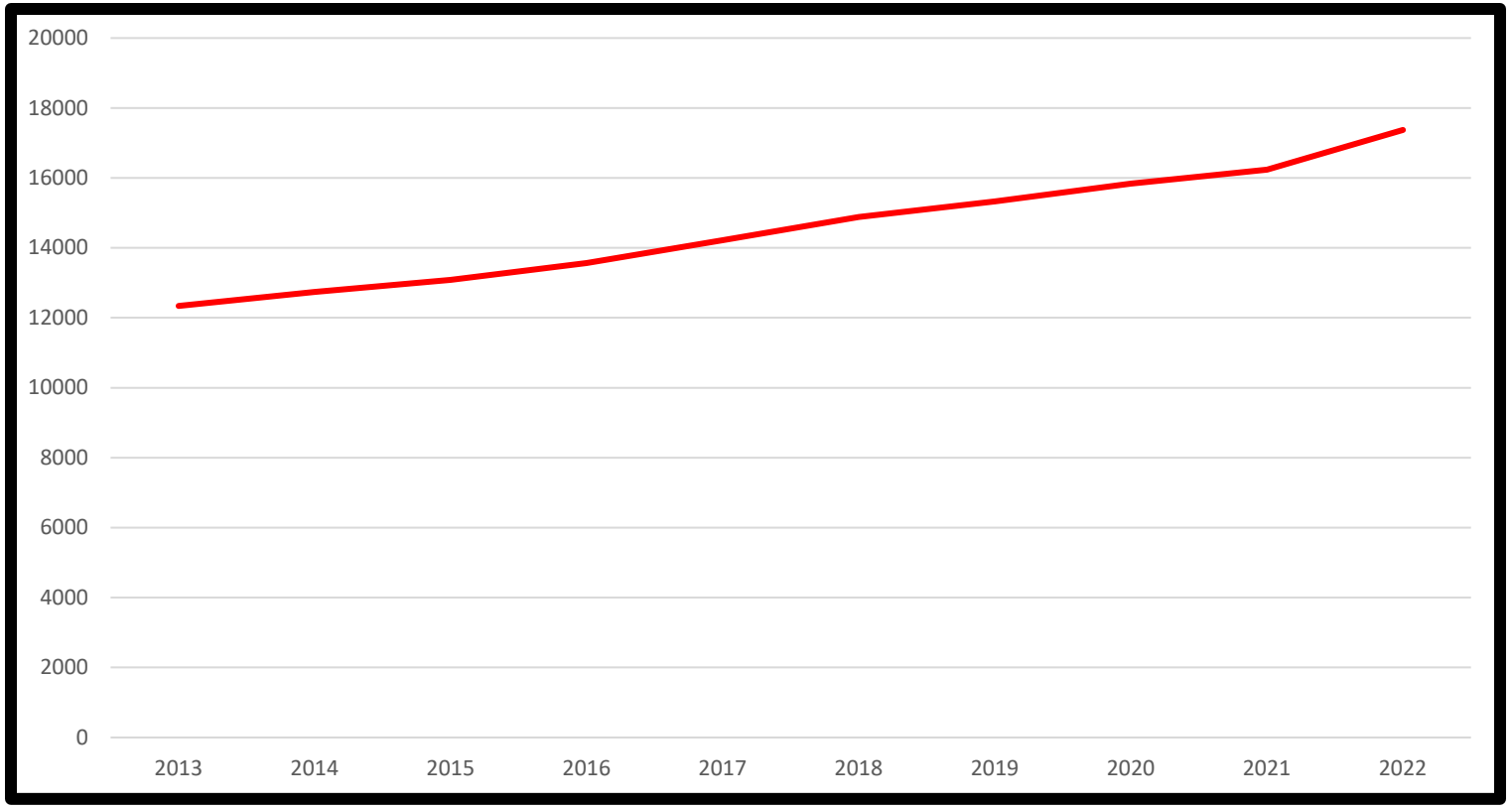
Population	**Grew by 40.78%** (from 12,340 to 17,372) 2013-2022. The provincial rate grew by 14.89% over this same period.
Population per Officer	**965** (8th highest in 2020; 7th highest in 2021; 6th highest in 2022) Average = 785
Cost per Capita	**$162** (2nd lowest for municipalities over 15K population) Average = $284
Crime Rate	**44** (2nd lowest) Average = 83
Member Case Load	**42** (3rd lowest) Average = 68
Calls for Service (CFS)	**3,351 in 2023** as compared to 3,789 in 2019
Criminal Code Offences	**752 in 2022** (up from 538 in 2013). *Only KRD jurisdiction to see an increase in CC offences in 2022*
Crime Severity Index (CSI)	**60.43** Relatively stable over past 5 years. Lower than BC average 100.37 & lower than all other KRD jurisdictions
Prisoner Count	**71 in 2022** (up from 27 in 2016)
Call Response Time	**8.3 min for Priority 1** positive trend for Priority 1 calls but not priority 2 & 3 calls

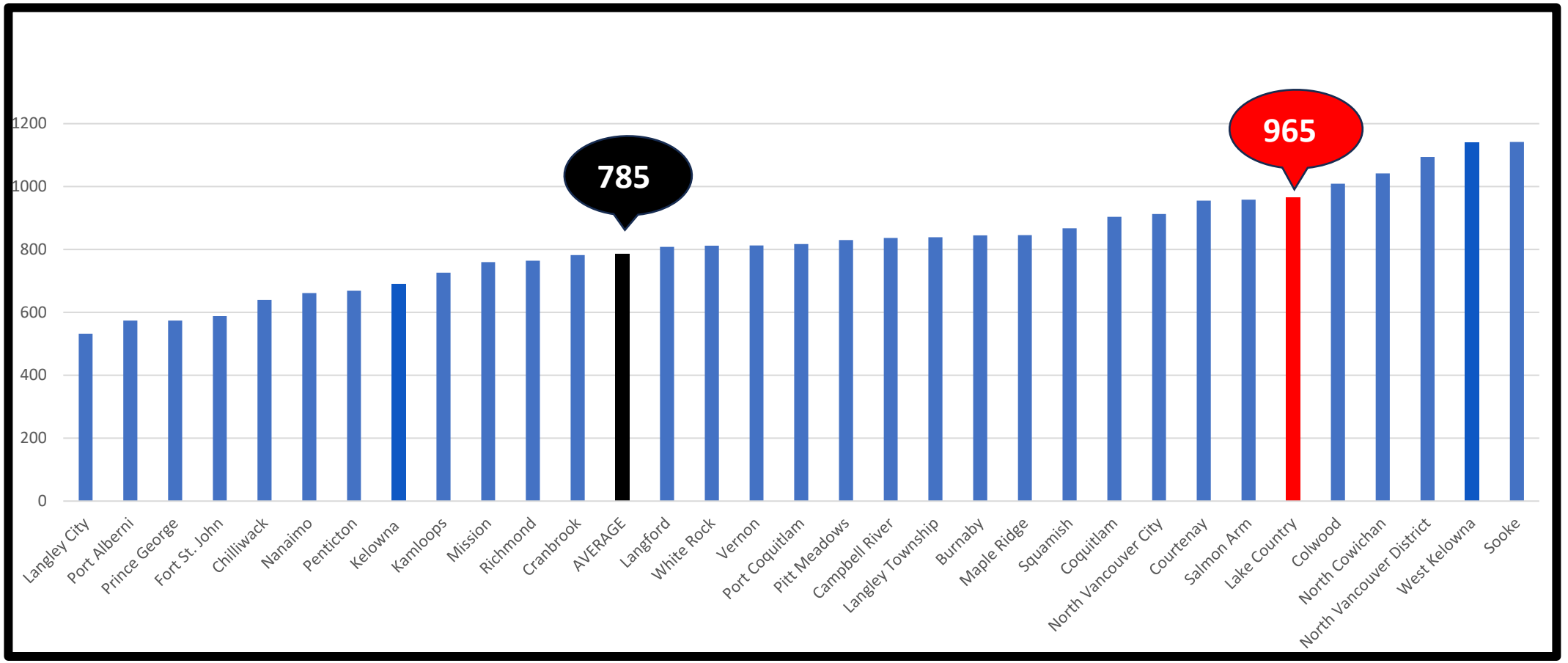
Lake Country Population 2013-2022



Population per Officer (cop/pop) - 2022

RCMP Municipal Units: 15,000 population and over

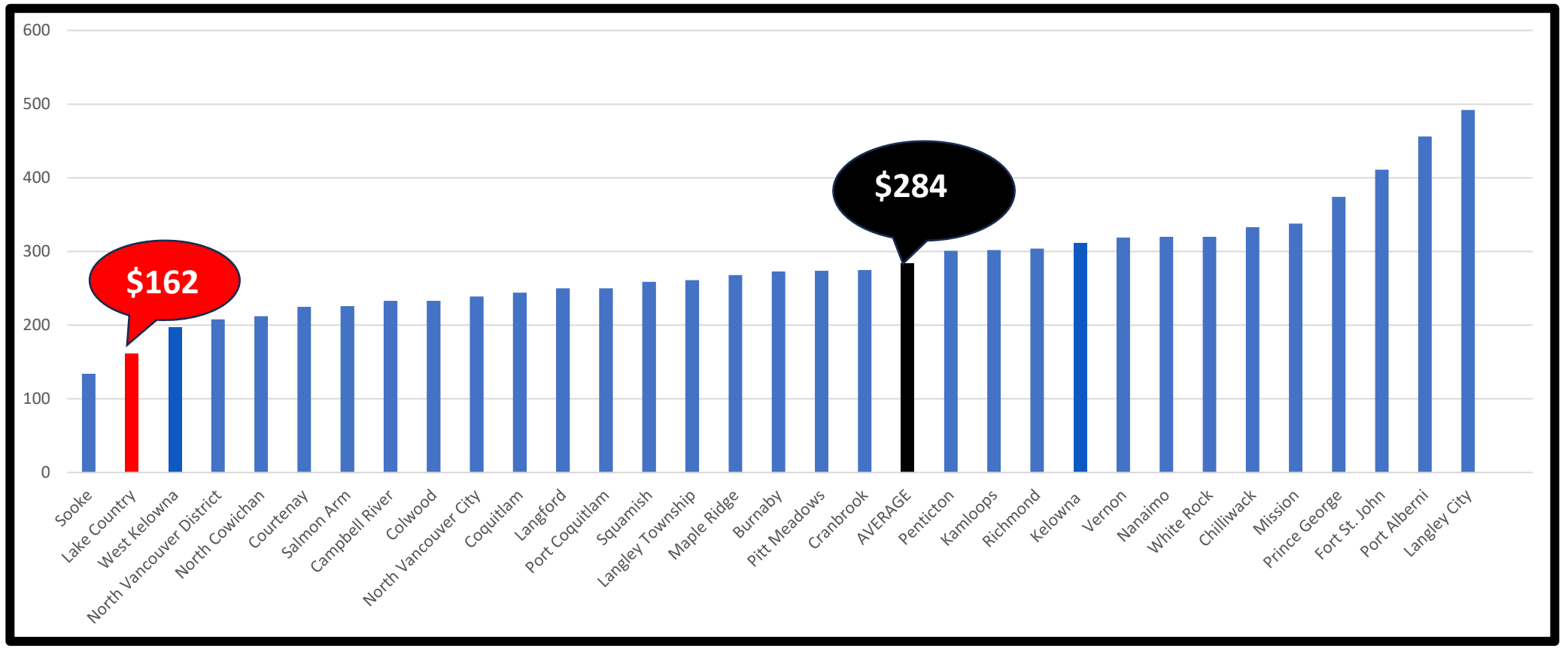
(Source: Police Resources in BC 2022)



Cost Per Capita - 2022

RCMP Municipal Units: 15,000 population and over

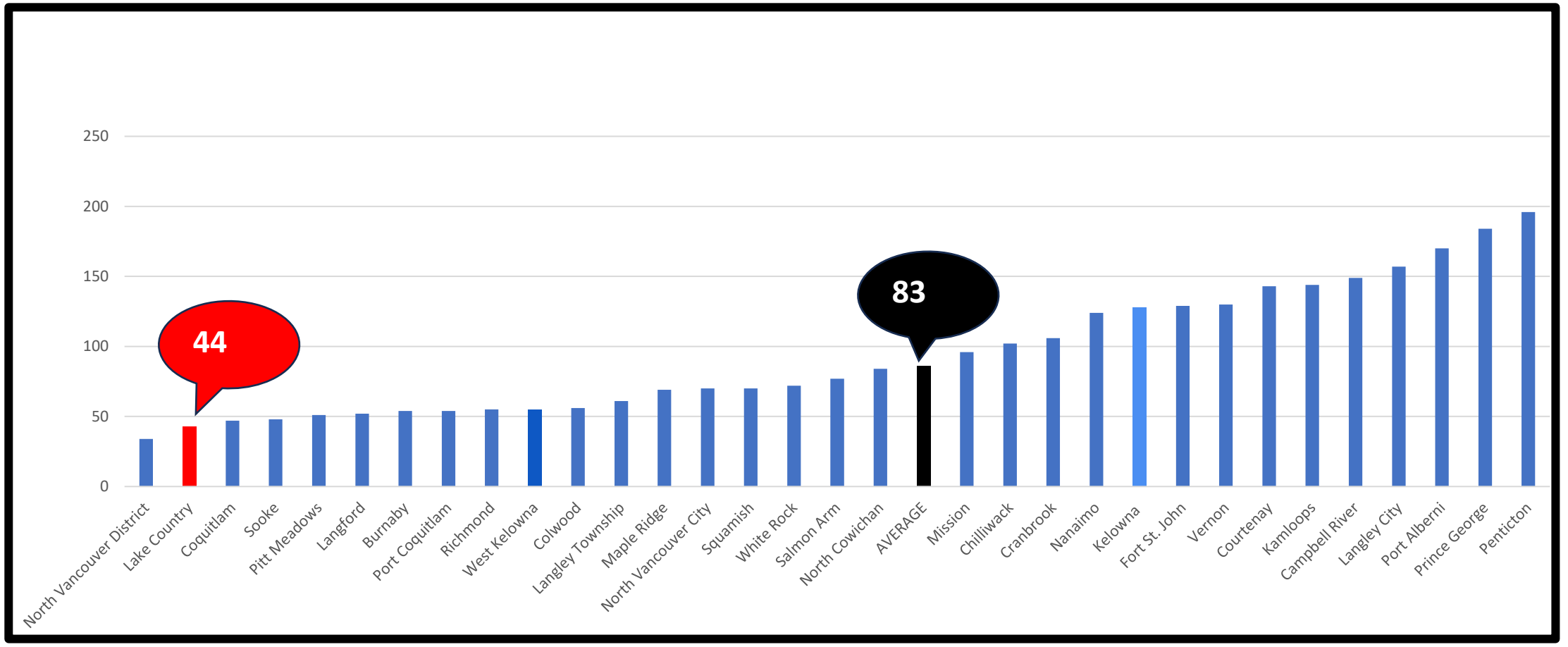
(Source: Police Resources in BC 2022)



Crime Rate - 2022

RCMP Municipal Units: 15,000 population and over

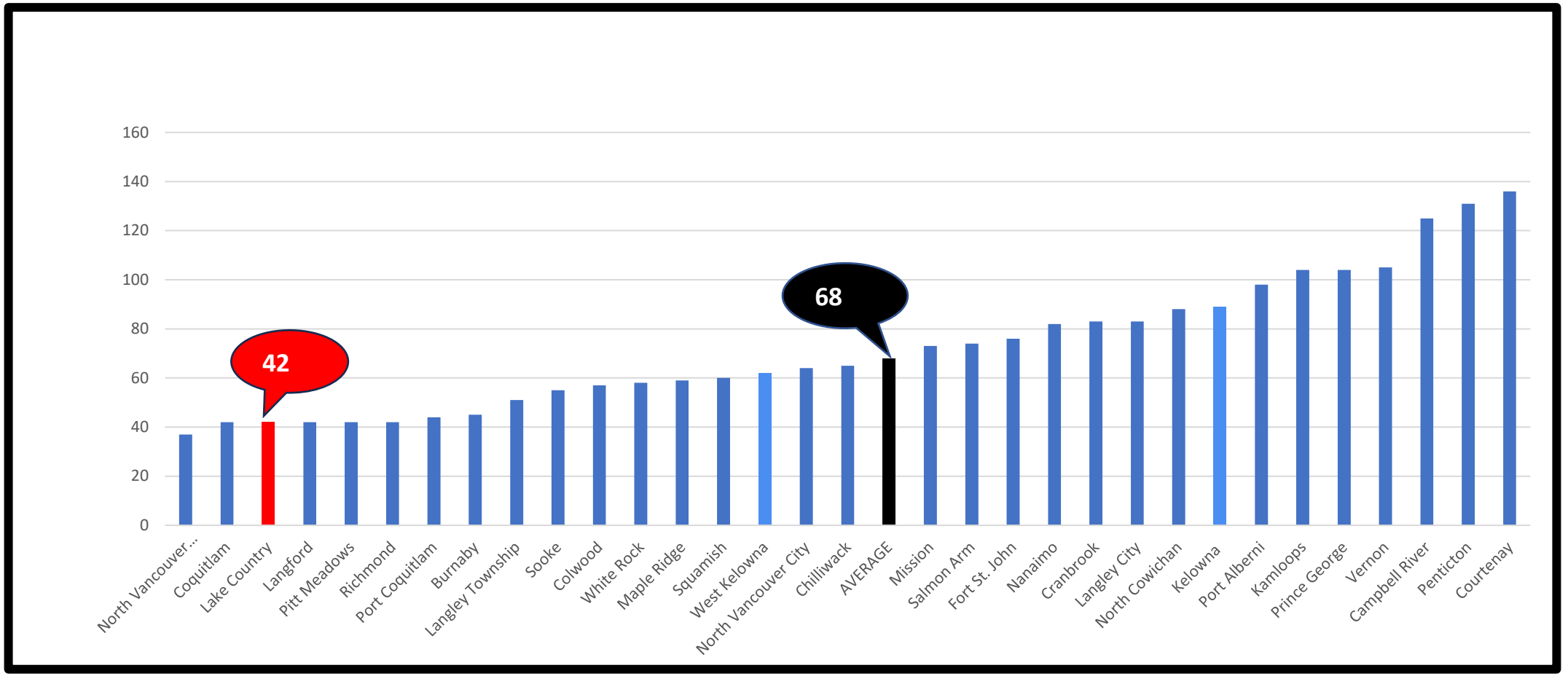
(Source: Police Resources in BC 2022)



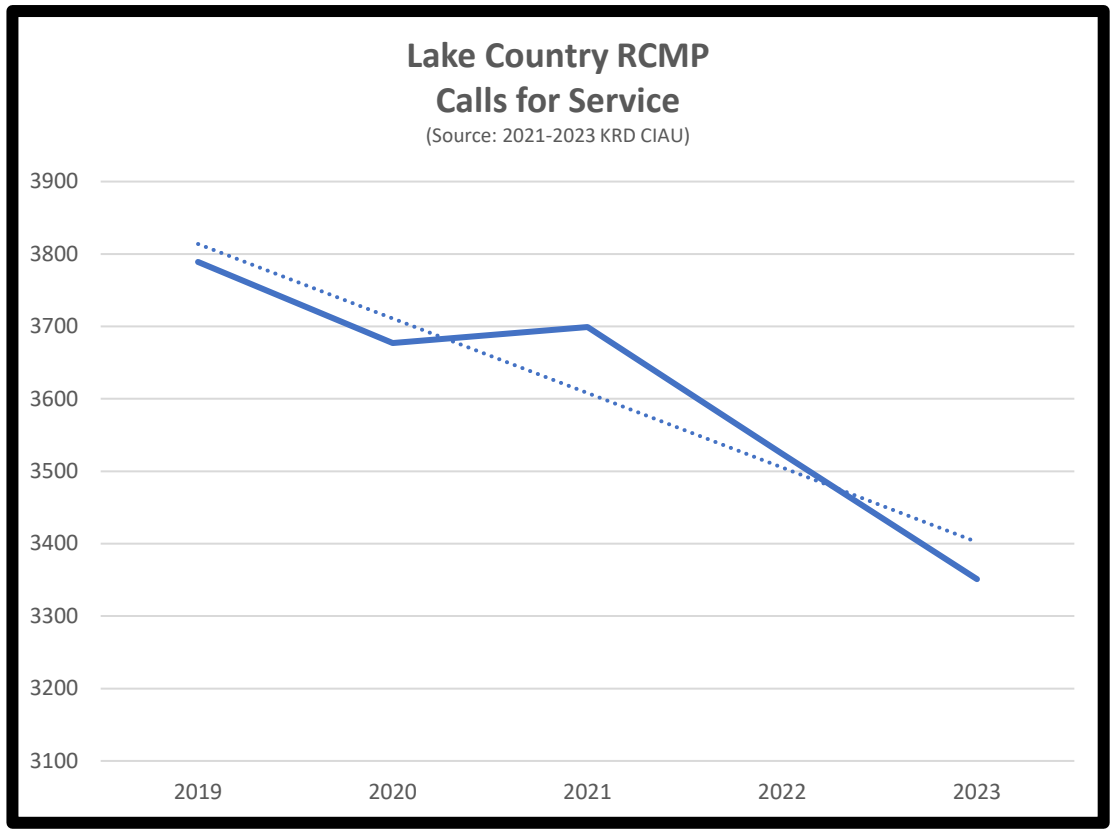
Member Case load 2022

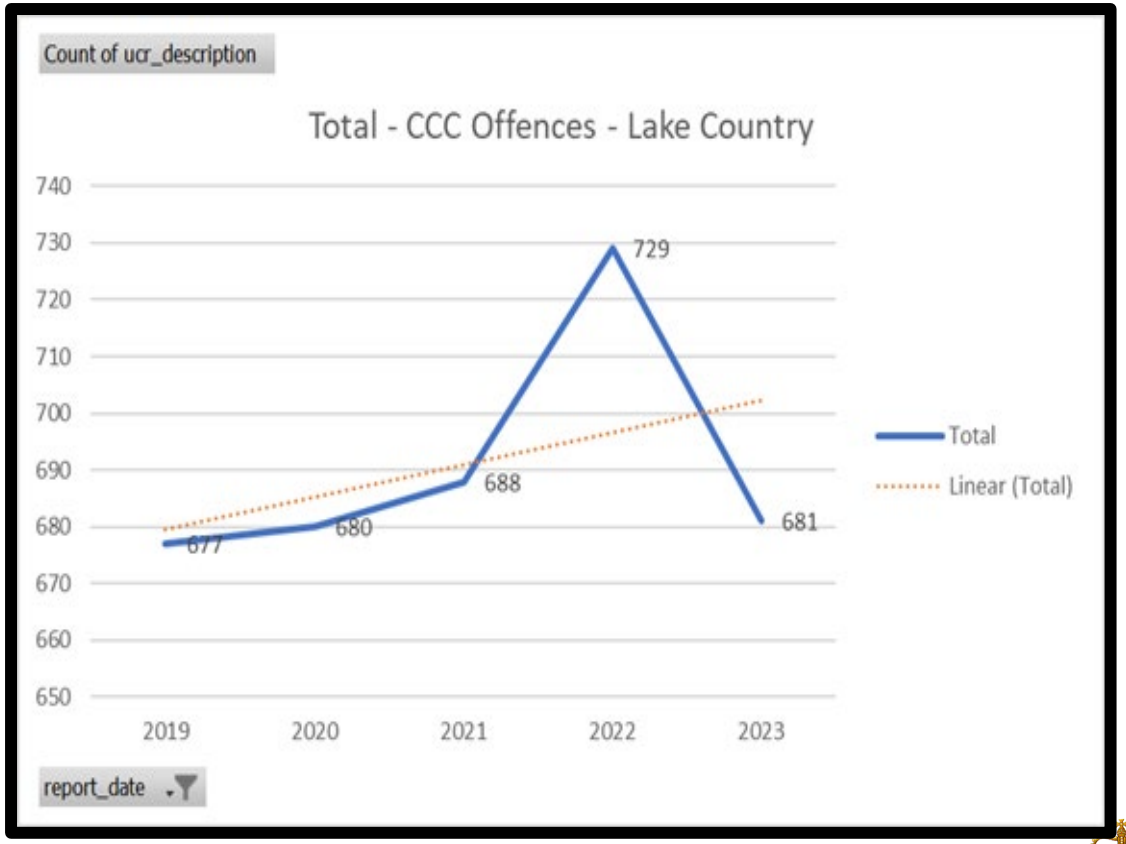
RCMP Municipal Units: 15,000 population and over

(Source: Police Resources in BC 2022)



Calls for Service / Criminal Code Offences





Property Crime - Break and Enter

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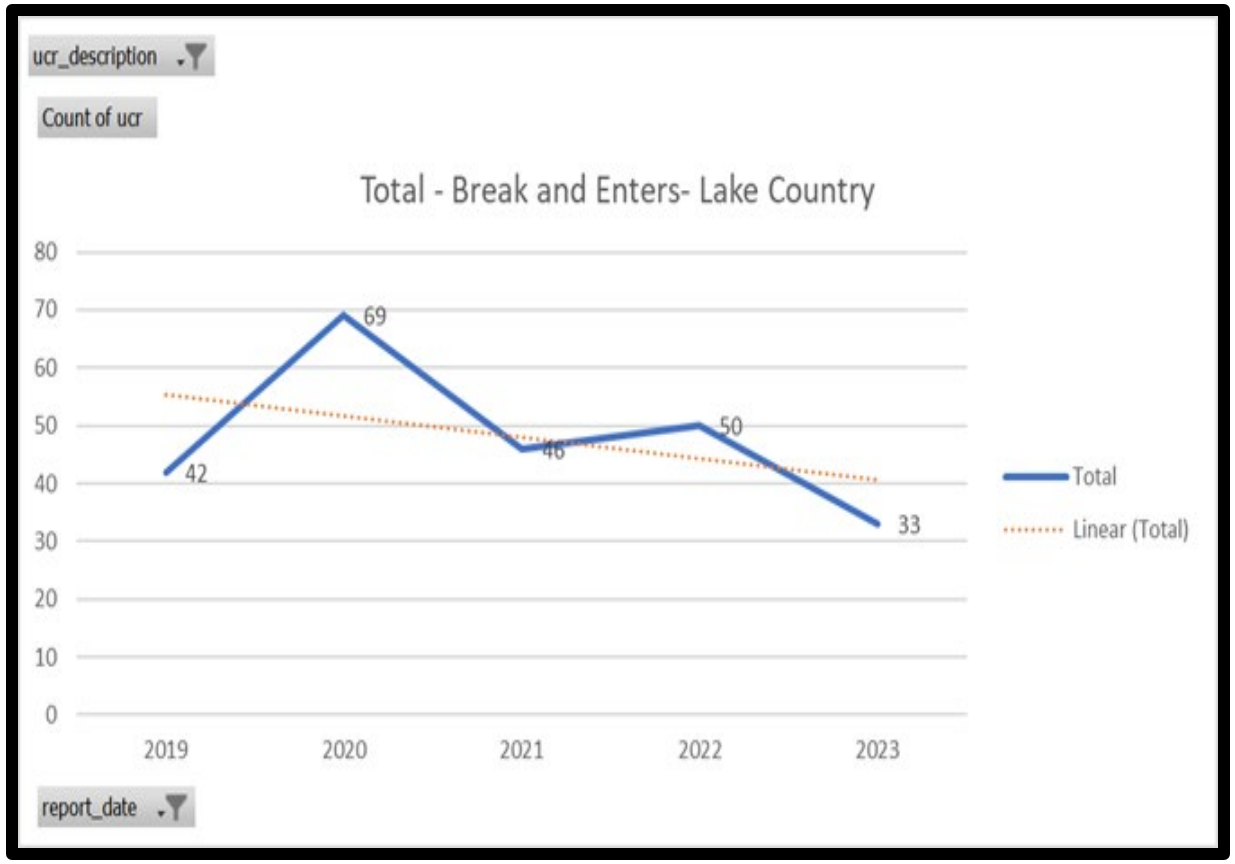

Persons Crimes

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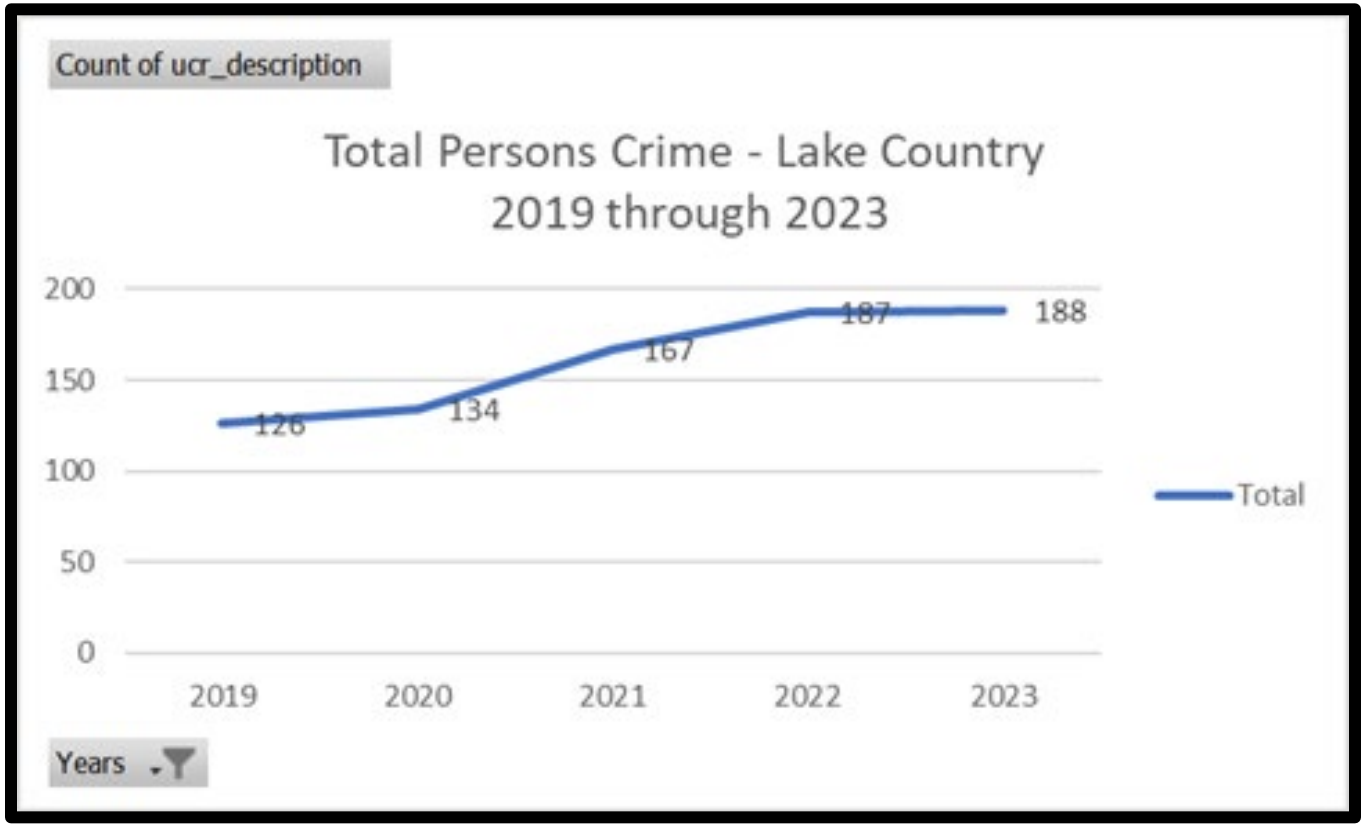

Traffic Statistics

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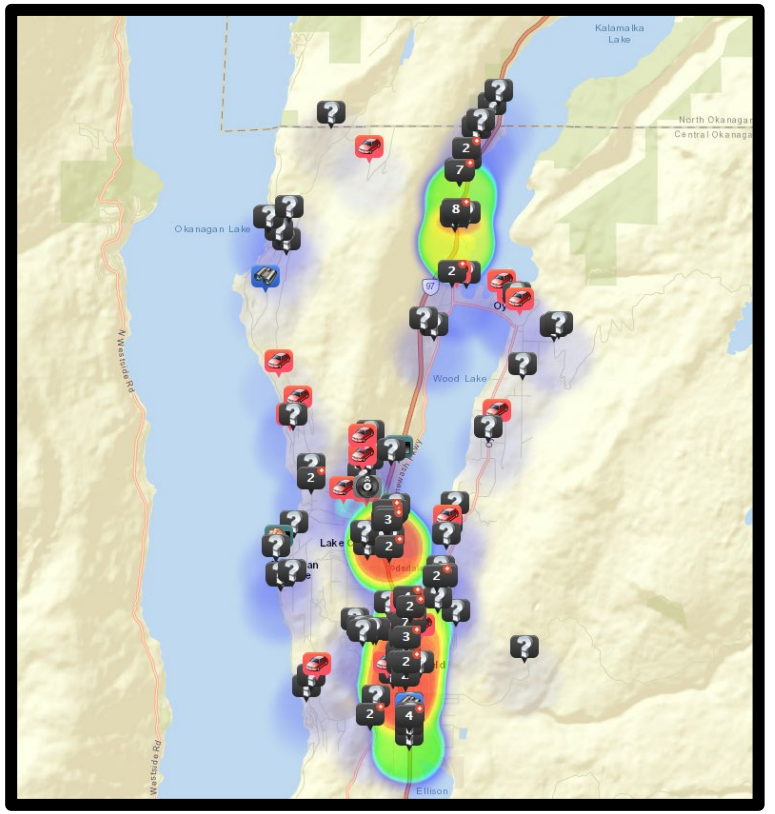
	2019	2020	2021	2022	2023
Violation Tickets	504	581	413	654	672
Notice & Order / Warnings	519	476	421	729	874
Excessive Speed VT	16	10	13	8	14
24 hr / 215	10	12	10	16	22
IRP / Impaired	25	22	24	44	65
M.V.I / Collision	214	195	177	216	185
Fatal M.V.I.	1	0	1	1	0
Prohibited Drivers (Serve, UL, CC)	17	16	19	31	43



Crime Severity Index (CSI)

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	CSI as of Dec 31, 2023 (internally calculated)	Stats Can CSI as of Dec 31, 2022	% Change
CSI	78.27	60.43	**4.45%**
Violent CSI	54.05	45.81	**15.94%**
Non-Violent CSI	88.64	66.79	**1.30%**

2023 CSI Crime Drivers Lake Country
(Internally Calculated)

1. Make/Distribute Child Sexual Abuse Materials (36.50% of 2023 CSI)
2. B & E (9.23% of 2023 CSI)
3. Fraud (7.59% of 2023 CSI)
4. Extortion (3.20% of 2023 CSI)
5. Auto Theft Over (3.06% of 2023 CSI)

	CSI as of April 29, 2024	CSI as of April 29, 2023	% Change
CSI	26.08	31.52	**-17.26**
Violent CSI	13.60	23.08	**-41.07**
Non-Violent CSI	31.29	35.17	**-11.03**

2024 CSI Crime Drivers Lake Country
(Internally Calculated)

1. Make/Distribute Child Sexual Abuse Materials (35.06% of 2024 CSI)
2. Fraud (11.58% of 2024 CSI)
3. B&E (6.06% of 2024 CSI)
4. Flight From Police (3.44% of 2024 CSI)
5. Theft Over (2.83% of 2024 CSI)

Prisoner Count

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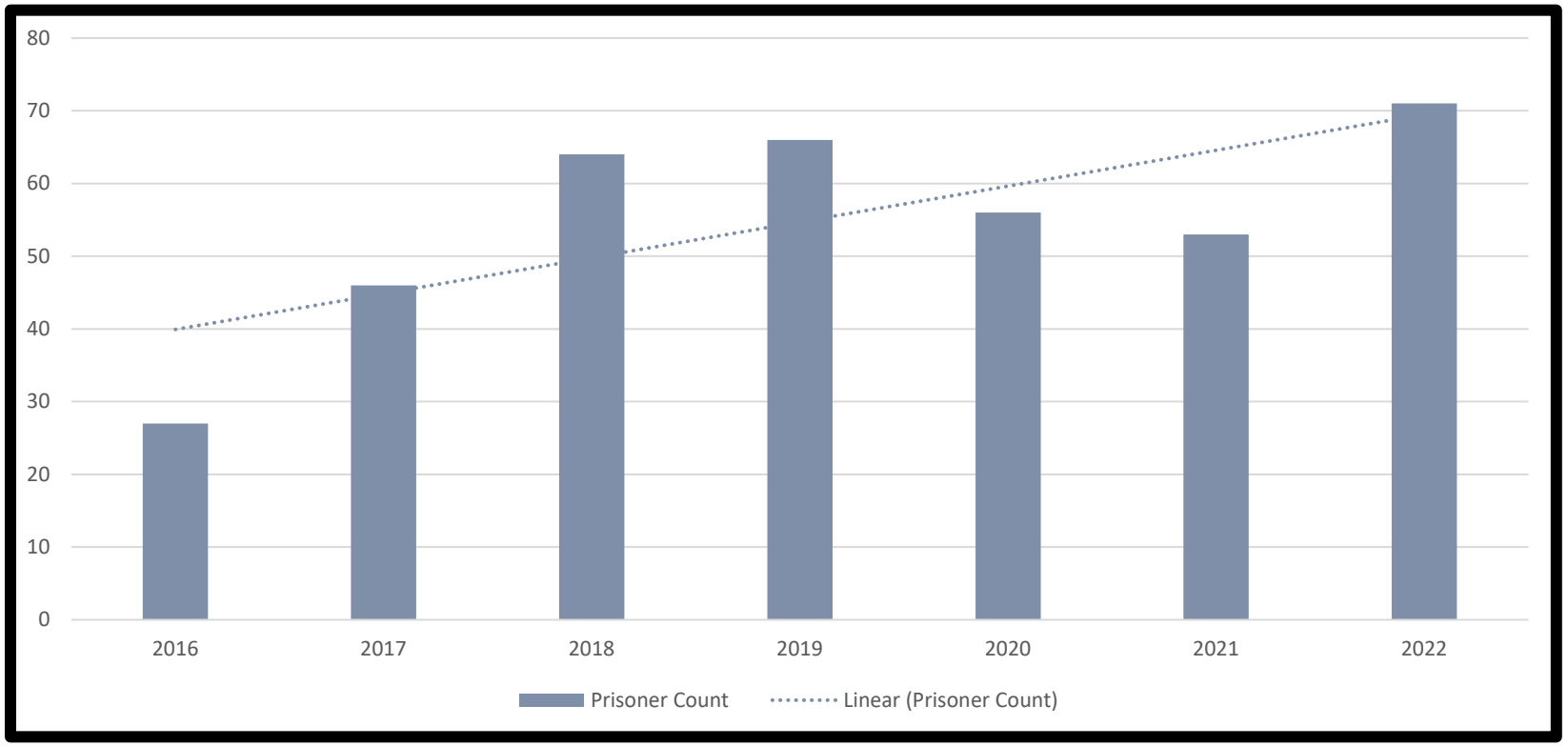
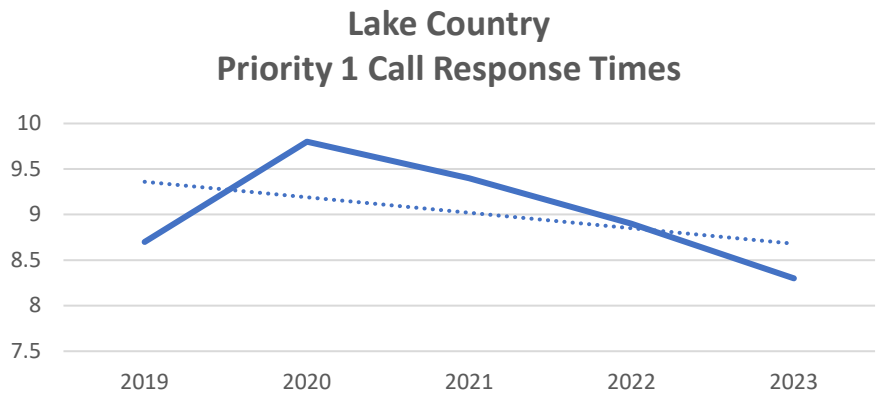
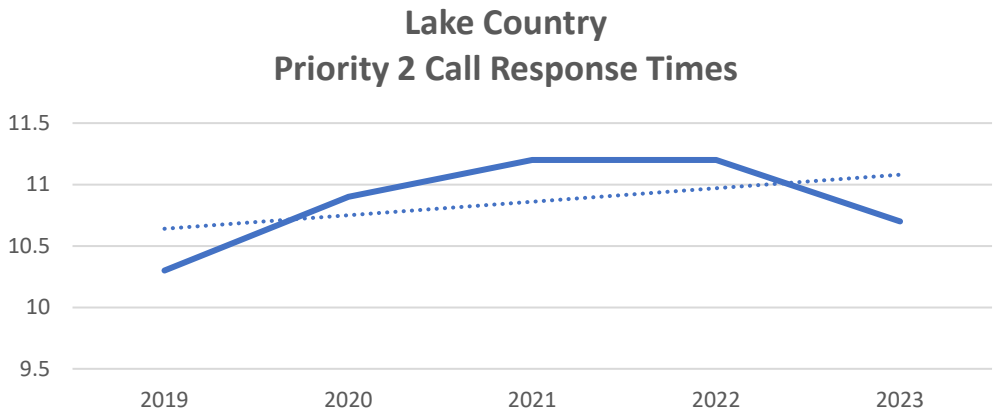
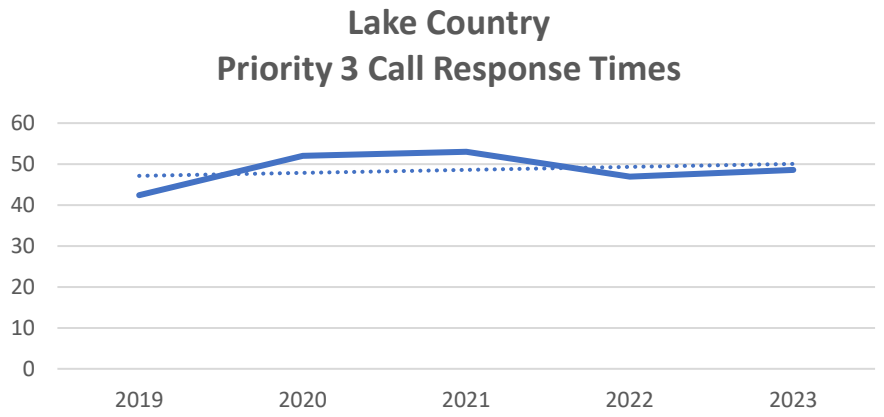


Call Response Time (in minutes)

	2017	2018	2019	2020	2021	2022
Priority 1	8.8	7.8	8.7	9.8	9.4	8.9
Priority 2	10.0	9.9	10.3	10.9	11.2	11.2
Priority 3	46.7	43.8	42.4	52.0	53.0	46.9







In brief…

1. Lake Country population **grew by 40.78 %** 2013-2022 (over double the provincial rate)
2. The cop/pop ratio **rose** year over year 2021/2022 and is the 6th **highest** of all communities with a population of 15,000 or more policed by the RCMP (total of 31 communities)
3. Cost per capital is **the 2nd lowest** of all communities with a population of 15,000 or more
4. The crime rate in Lake Country **is the 2nd lowest** of all communities with a population of 15,000 or more
5. Member case load **rose** from the lowest to the 3rd lowest in 2022 amongst all communities with a population of 15,000 or more
6. Authorized strength **increased by 50%** in 2020 (from 12 to 18)
7. ADD: Comment on calls for service once all data is received
8. Criminal Code Offences show an **upward trend** over the 10 years 2013-2022. Violent Offences remain steady. Property Offences show an upward trend.
9. CSI **remains low** and below the provincial average
10. Prisoner admissions are **rising**
11. **Call response time to priority 1 calls is rising**

Considerations
70:30 vs 90:10 Policing

70:30

The Province assists by providing:

1. Access to specialized units (eg: PDS, FIS)
2. Provincial resources to conduct major investigations (Eg. Homicide; attempt murder)

The Municipality is responsible for:

1. Resources to respond to municipal calls for service
2. Municipal staff to support policing in your jurisdiction
3. Accommodation (detachment)

90:10

The municipality is now responsible, with no support from the Province, for:

1. Specialized Units (PDS, FIS)
2. Major Investigations (Eg: Homicide)
3. Cell Block Usage

In essence, the municipality is now responsible for all policing within the jurisdictional boundaries of Lake Country.

KEY QUESTION:

Do you have the capacity (or capital reserves) to respond to and sustain a major investigation?

Summary

Though the crime rate, member case load and CSI remain low, the extremely high rate of population growth, high cop/pop ratio, low cost per capita, rising call for service numbers, rising criminal occurrence numbers and most noticeably the rising priority 1 call response times speak to the need to remain diligent in addressing resource levels.

Additionally, identification of strategic priorities and the subsequent strategic deployment of resources to address the identified priorities will keep Lake Country safe into the future.

SAFR Carr's Landing Road

SAFETY AWARENESS FRIENDS & RESIDENTS

LAKE COUNTRY

SHARED ROADS

CAMPAIGN

SEPTEMBER 10, 2024

SAFR VISION

Lake Country to become a place where our roads are safe for all road users shared harmoniously by pedestrians, cyclists, motorists and wildlife, contributing to a happier, healthier community.





SAFR MISSION

Create, maintain and promote shared roads where all users, whether pedestrians, cyclists, transport operators, motorists and wildlife, can safely navigate with mutual consideration and respect, in Lake Country.

We believe in the power of community collaboration to foster a culture of shared road awareness to minimize road accidents and prioritize the well-being of all road users.

AIMS & OBJECTIVES

1. Road safety promotion
2. Promote mutual respect among road users
3. Increase awareness and education
4. Reduce road accidents and conflicts involving vulnerable users
5. Empower vulnerable road users
6. Influence positive behavioural change
7. Enhance infrastructure

ROADMAP

March, 2024 to PRESENT & BEYOND

Stage 1

Shared Roads research and model for consideration

Stage 2

Collaboration with District staff , UBCO, IH and other community partners

Stage 3

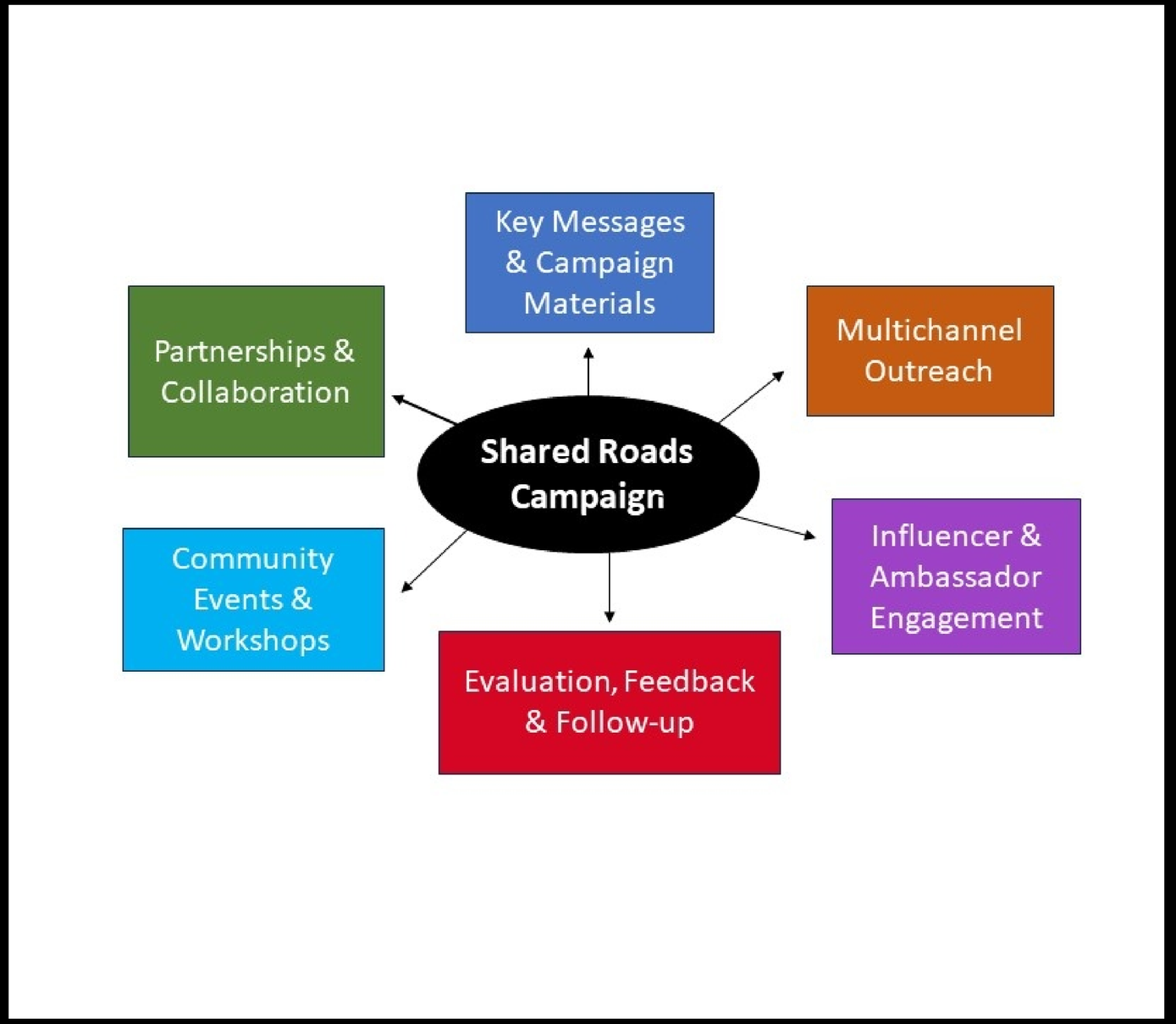
Engagement of community partners and residents:

Idea Generator Workshop on Sept 18th

STAGE 4

Campaign ideas implementation

WHAT SETS AN EFFECTIVE **SHARED ROADS** CAMPAIGN APART



Meet the **SAFR** team

SAFR Carr's Landing Road

SAFETY AWARENESS FRIENDS & RESIDENTS

Johanna & Peter Johner

Janice Larson

Marie Molloy

PARTNERS IN **SHARED ROADS**

Interior Health

RCMP

LAKE COUNTRY HEALTH
lakecountryhealth.ca

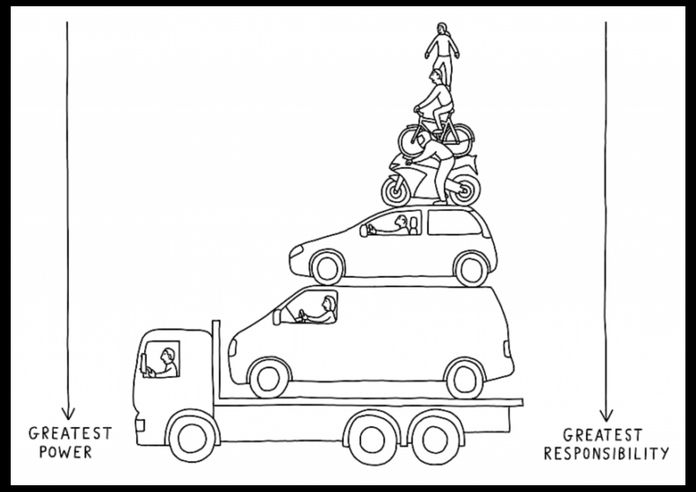
COMMUNITY POLICING

UBC OKANAGAN

THE COMMUNITY OF LAKE COUNTRY

LAKE COUNTRY
Life. The Okanagan Way.

OUR ASK



SAFR (Safety Awareness Friends and Residents) requests Council to continue to embed safer roads for all user types into their strategic priorities to keep road safety top of mind when making decisions within the budget cycle and OCP updates.

Zebra and Quagga Mussels Risk Assessment Mapping Summary Report – Final Draft

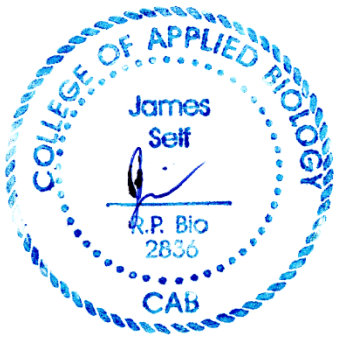
Prepared for District of Lake Country

Larratt Aquatic Consulting Ltd. 105-2081 McDougall Rd. West Kelowna B.C. V1Z 4A2
Phone: 250.769.5444 www.lakebiology.ca

Acknowledgements: Larratt Aquatic would like to thank Patti Meger for their contributions to this project.

Suggested Citation: Self J., 2024. Zebra and Quagga Mussels Risk Assessment Mapping – Summary Report. Prepared for District of Lake Country.

Report prepared by:
Larratt Aquatic Consulting
Senior Aquatic Biologist
Jamie Self H.B.Sc., R.P. Bio.



Background

British Columbia remains one of the few major jurisdictions left in North America that does not have invasive zebra or quagga mussels. The Okanagan Basin Water Board (OBWB) has lead invasive mussel prevention programs for over 10 years and recently developed a risk assessment document for British Columbia (Okanagan Basin Water Board, 2024).

District of Lake Country (DLC) operates multiple reservoir lakes within two upland community watersheds: Oyama Community Watershed (Oyama Creek) and Beaver Lake Community Watershed (Upper Vernon Creek). DLC also operates drinking water intakes in Kalamalka Lake at Oyama and Okanagan Lake at Coral Beach, Lakepine, and Lakestone (primary intake). DLC sought to use the new OBWB guide to assess the risk to these lakes from invasive mussels.

Project Scope

This project used available data to compare against an invasive mussel risk matrix that was used to develop a risk assessment map and guidance document for DLCs intakes (Table 1, Okanagan Basin Water Board, 2024). The report currently identifies only the vulnerability of a site to invasive mussels and does not address potential variations in the level of infestation or secondary factors that might influence both the risk and severity of the infestation.

Table 1: Invasive Mussel Survival Risk Matrix

Parameter	At Risk
Calcium/Alkalinity	>12 mg/L
Alkalinity	> 30 mg/L
pH	7.0 to 9.5
Temperature	0 to 33 °C
Salinity	< 10%
Oxygen limit	> 3 mg/L

Modified from (Okanagan Basin Water Board, 2024)

Data Used

Data used in the generation of this report was obtained from DLCs water sample database. These data were layered upon the existing results from mapping produced for OBWB for the development of their new guide. For this study, data from 2021-2023 were considered to ensure the results were reflective of the current status of each site (Table 2).

Table 2: Number of data points for parameters from Table 1 at each watershed site monitored by DLC, 2021–2023

Parameter	Beaver Lake	Upper Vernon Creek	Oyama Lake	Oyama Creek	Damer Lake	Kal Lake at Oyama	Coral Beach (Okanagan Lake)	Lakepine (Okanagan Lake)	Lakestone (Okanagan Lake)
pH*	many	many	many	many	many	3	3	3	3
Total Calcium	1	6	1	6	2	3	3	3	3
Dissolved Oxygen*	-	-	-	-	-	24	21	21	21
Temperature*	many	many	many	many	many	24	21	21	21
Salinity*	-	-	-	-	-	-	-	-	-

* = Routine monitoring data was not available for these parameters at all sites.
Many = annual averages available from online instrumentation

Methodology
This report follows the OBWB guidance document's recommendations and uses an all or nothing approach such that if any of the parameters were unfavourable, a site will be assessed as being "not at risk" to invasive mussels.

The mean value for each parameter at each site was compared against the particular results range in Table 1 and a risk score (0 or 1) was applied (Table 4, Table 3). The sum of these risk scores was calculated for each site to obtain a site-specific cumulative risk value. A value of 5 for a site would flag it as "at risk" while ≤4 meant that at least one parameter was assessed as "not at risk" and therefore the site would be ranked as unsuitable for mussels (Figure 1).

A number of data assumptions were made in preparing this assessment to fill in data gaps:

- Dissolved oxygen information was obtained from Einarson, 2008 for the DLC upland lakes. While the results presented were for the outflows and may have missed bottom water low-DO zones, they indicated that the epilimnion was well oxygenated and could support mussels.
- For Okanagan and Kalamalka lakes, the extensive BC EMS and Kalamalka Lake Study databases was used to augment
- Temperature and salinity data were inferred based on previous experience at other nearby reservoirs
- Downstream chemistry was applied to the upstream reservoirs when data was unavailable. For example, Vernon Creek at the intake had very low calcium. While there was only limited calcium data for Beaver Lake reservoir, it must also be low because it supplies most of the flow to Vernon Creek at the intake.
- Professional judgement was used to apply rankings to those parameters that did not have data
    - Temperature values in Okanagan valley lakes do not ever exceed 30 °C and would therefore be "at risk" for that parameter at all sites
    - Salinity in freshwater Okanagan lakes is far too low to present a challenge to invasive mussels.

Risk Scores

A clear pattern emerged from the risk assessment with upland reservoirs having low average calcium concentrations (4.4 to 6.9 mg/L) and circumneutral pH (6.8 to 7.5; Table 4). While the other parameters were all highly favourable for mussels, the paucity of available calcium, in particular, means that the upland reservoir lakes monitored within the DLC watersheds were ultimately ranked as "not at risk" (Figure 1, Table 3, Table 4). Conversely, the mainstem lake sites ranked as at risk for all parameters with high calcium that would be very favourable for mussels. Okanagan and Kalamalka Lake, therefore ranked as "at risk" for all infrastructure within each (Figure 1, Table 3, Table 4).

Table 3: Summary of risk ratings for each parameter at each site sampled by DLC

Parameter	Beaver Lake	Upper Vernon Creek	Oyama Lake	Oyama Creek	Damer Lake	Kal Lake at Oyama	Coral Beach (Okanagan Lake)	Lakepine (Okanagan Lake)	Lakestone (Okanagan Lake)
pH	1	1	1	1	1	1	1	1	1
Total Calcium	0	0	0	0	0	1	1	1	1
Dissolved Oxygen	1	1	1	1	1	1	1	1	1
Temperature	1	1	1	1	1	1	1	1	1
Salinity	1	1	1	1	1	1	1	1	1
Risk Score	4	4	4	4	4	5	5	5	5
Risk Assessment	Not at risk	Not at risk	Not at risk	Not at risk	Not at risk	At risk	At risk	At risk	At risk

Table 4: Summary of mean values for each parameter during 2021-2023 at each site sampled by DLC

Parameter	Beaver Lake	Upper Vernon Creek	Oyama Lake	Oyama Creek	Damer Lake	Kal Lake at Oyama	Coral Beach (Okanagan Lake)	Lakepine (Okanagan Lake)	Lakestone (Okanagan Lake)
pH	7.3*	7.3*	7.5*	7.2*	7.2*	8.0	8.1	8.1	8.0
Total Calcium	6.8	6.9	4.4	5.5	6.2	41.1	30.6	33.1	20.7
Dissolved oxygen (min)	-	-	-	-	-	10.6 (8.3)	10.9 (8.2)	10.9 (8.2)	10.9 (8.2)
Temperature (max)	13 (19.3)	10 (23)*	10 (19.3)*	14 (24)*	10.8 (19.3)	10.8 (24.3)	7.9 (23.9)	7.9 (23.9)	7.9 (23.9)
Salinity	-	-	-	-	-	-	-	-	-

* = Average temperature data from DLC online instruments

Risk Assessment Map

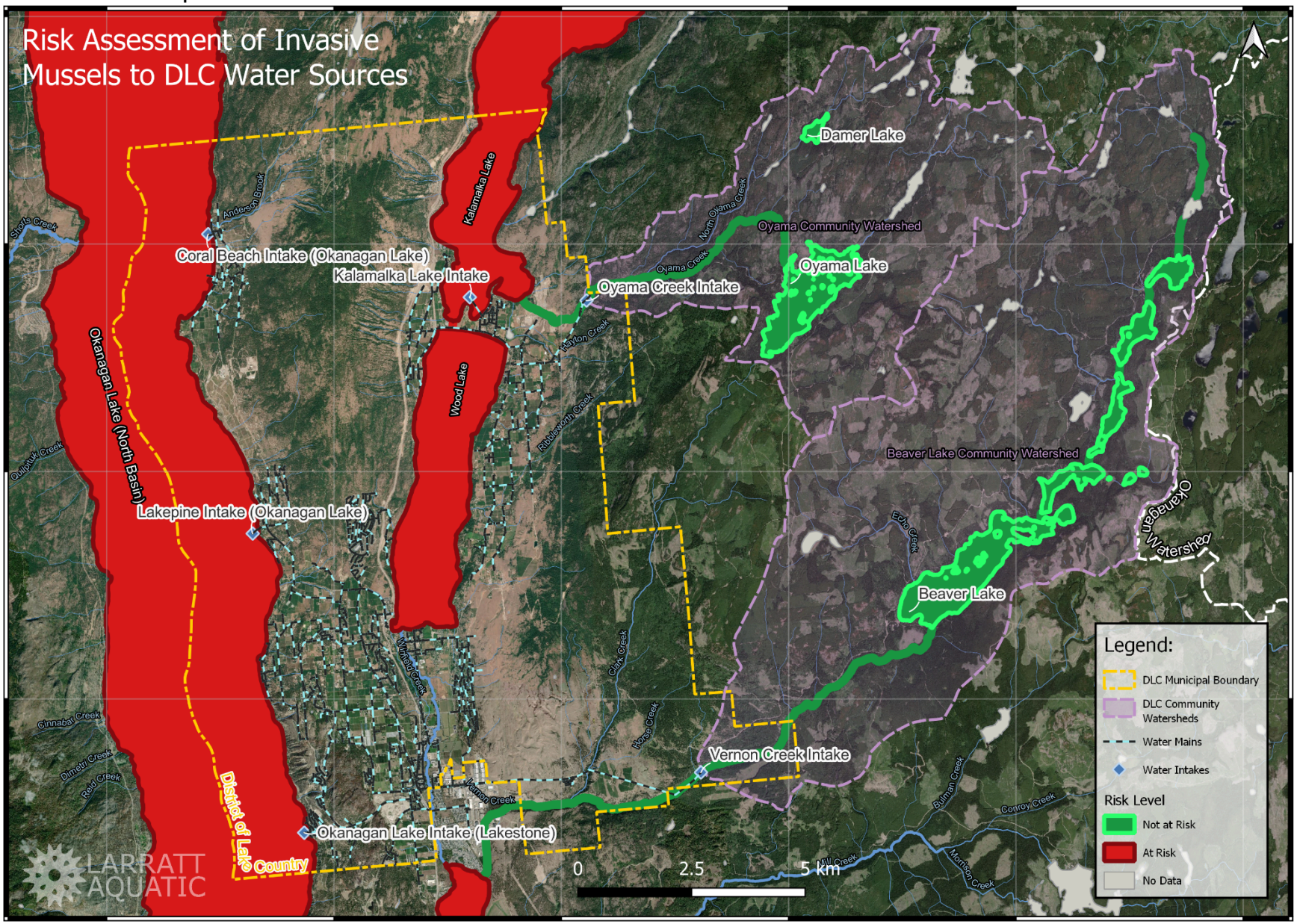


Figure 1: Risk ratings for each lake, colour coded based on the mean risk score

Conclusion

Using the 2024 OBWB risk assessment methodology, the five primary parameters (calcium, pH, dissolved oxygen, temperature, and salinity) were assessed. While temperature, dissolved oxygen, and salinity data all fell within the favourable range for invasive mussels at all sites, the upland storage reservoir lakes had very low calcium that would prevent growth and replication of mussels. Okanagan and Kalamalka lakes, however, ranked as at risk across all parameters with high calcium concentrations that could support intense mussel infestations.

Report prepared by: Larratt Aquatic Consulting Ltd.

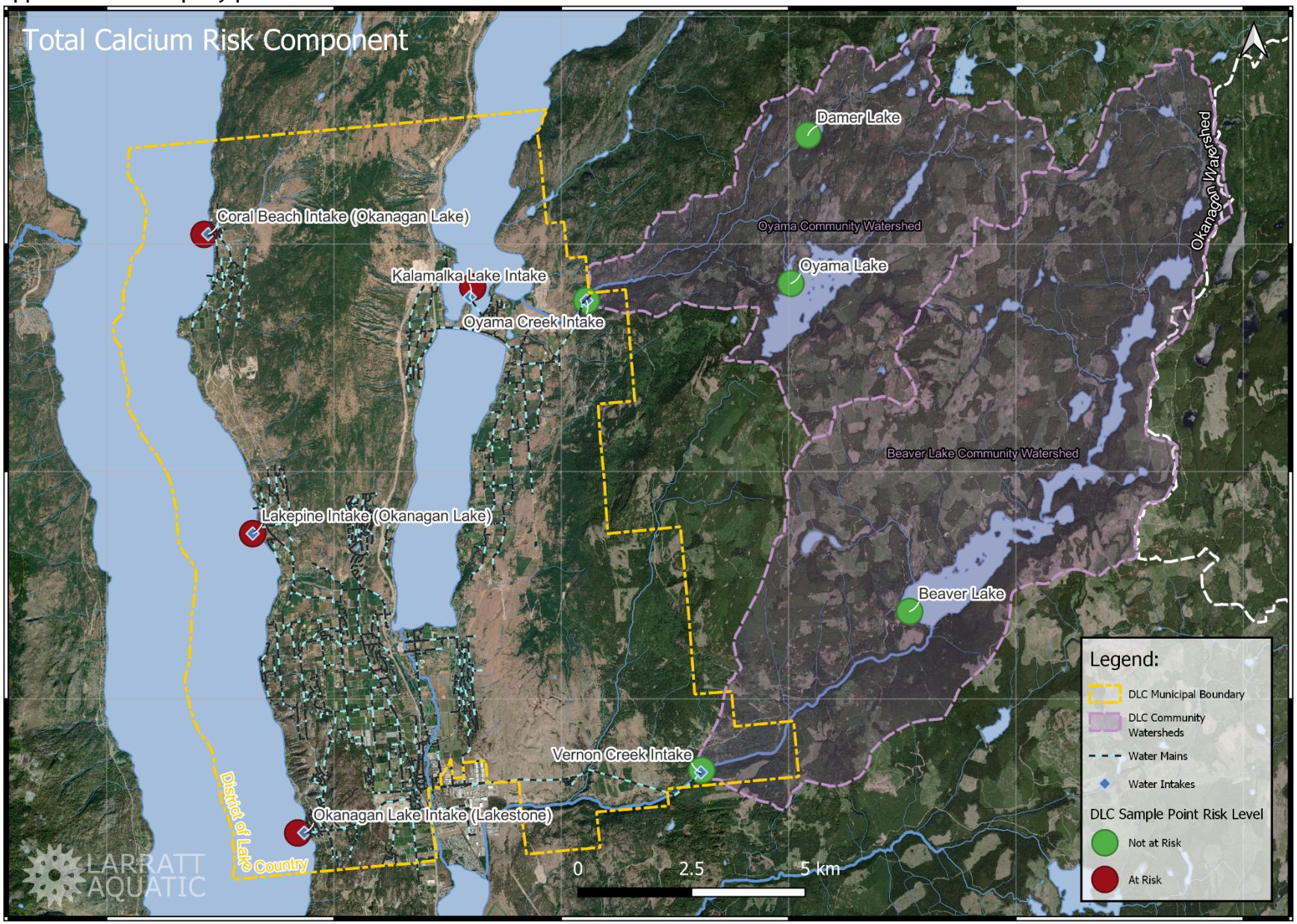
Jamie Self: Senior Aquatic Biologist, R.P.Bio.

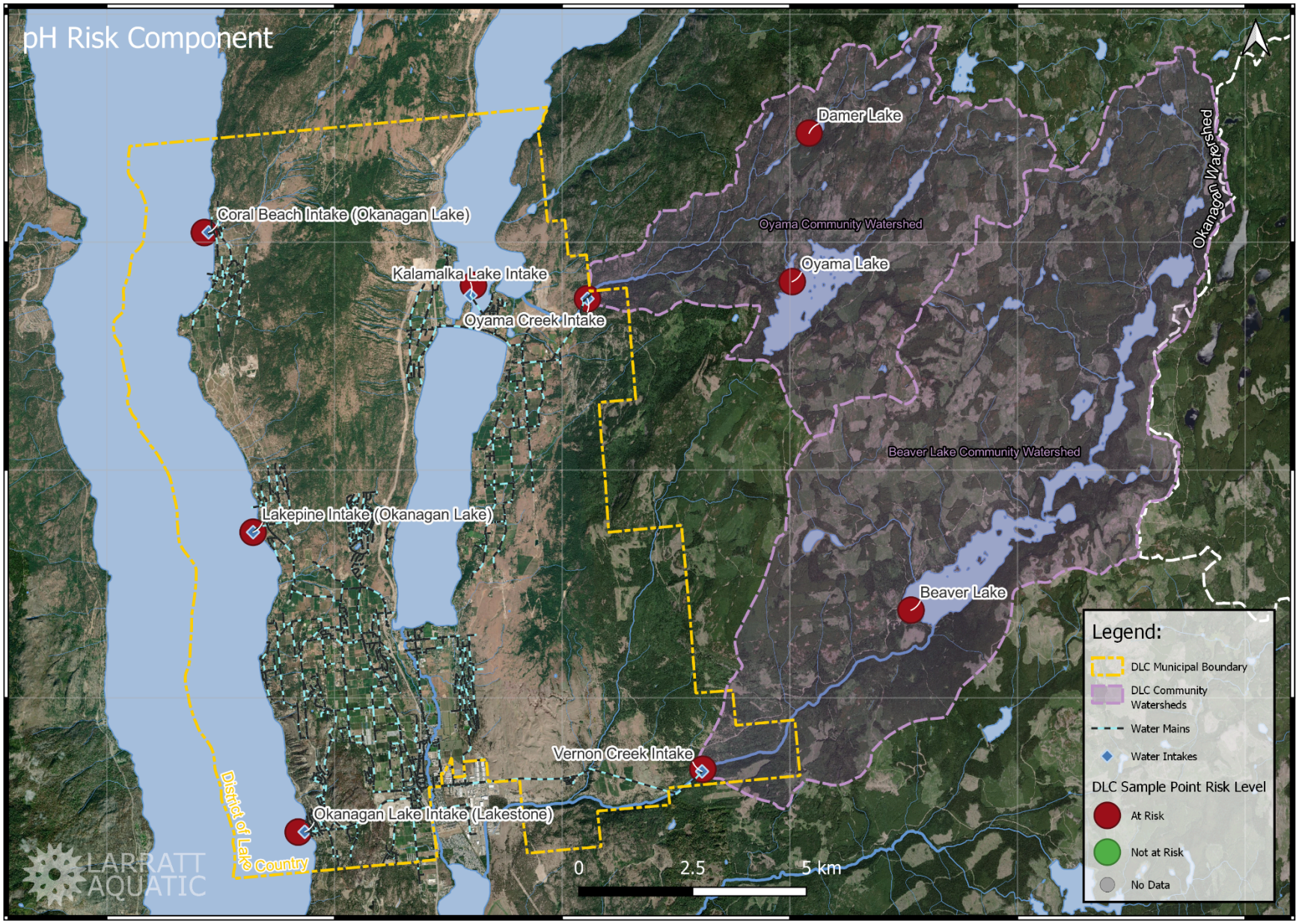
References

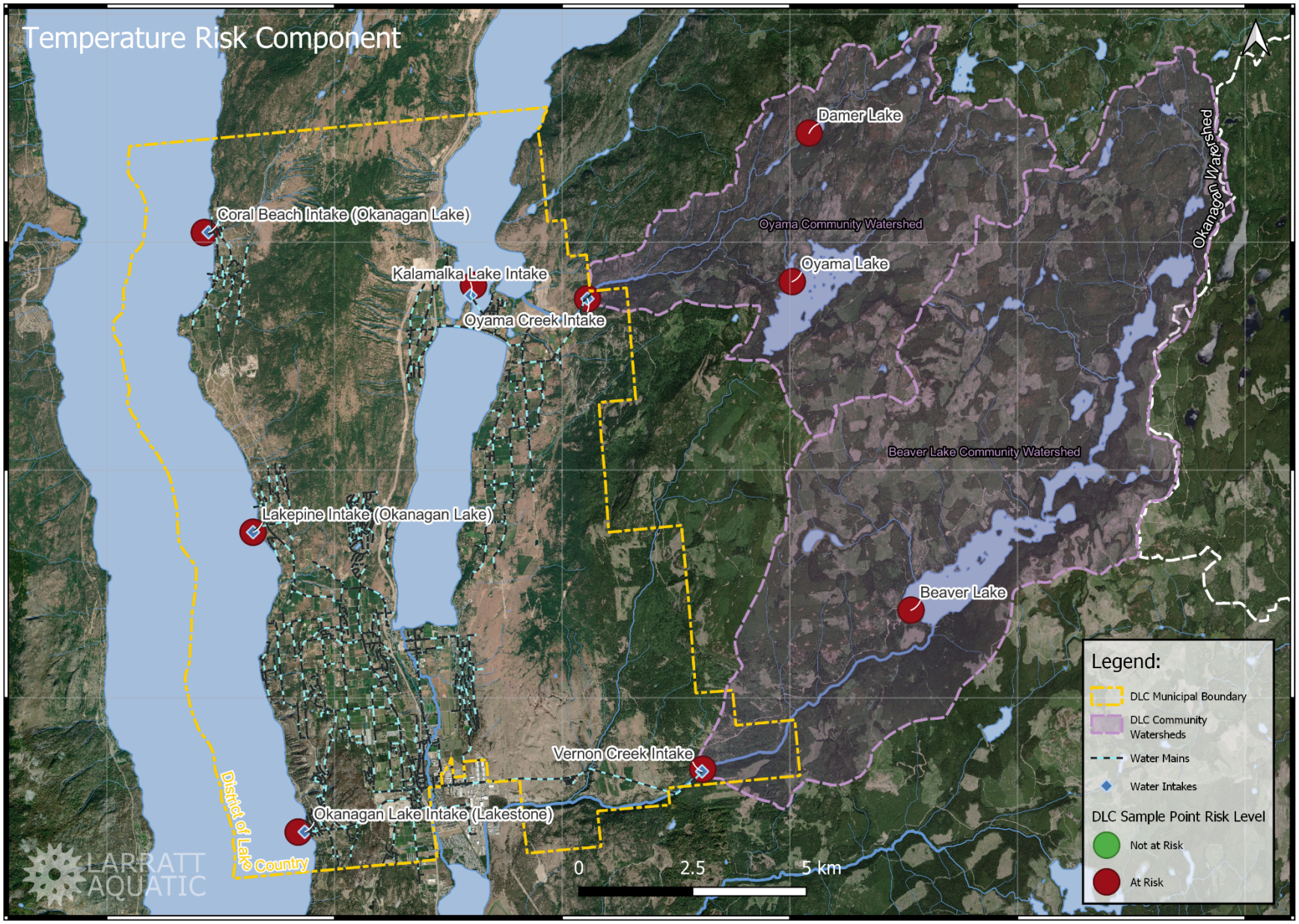
Einarson, E. D. (2008). *WATER STEWARDSHIP DIVISION MINISTRY OF ENVIRONMENT WATER QUALITY ASSESSMENT AND OBJECTIVES FOR UPPER VERNON CREEK COMMUNITY WATERSHED TECHNICAL REPORT – DRAFT*.

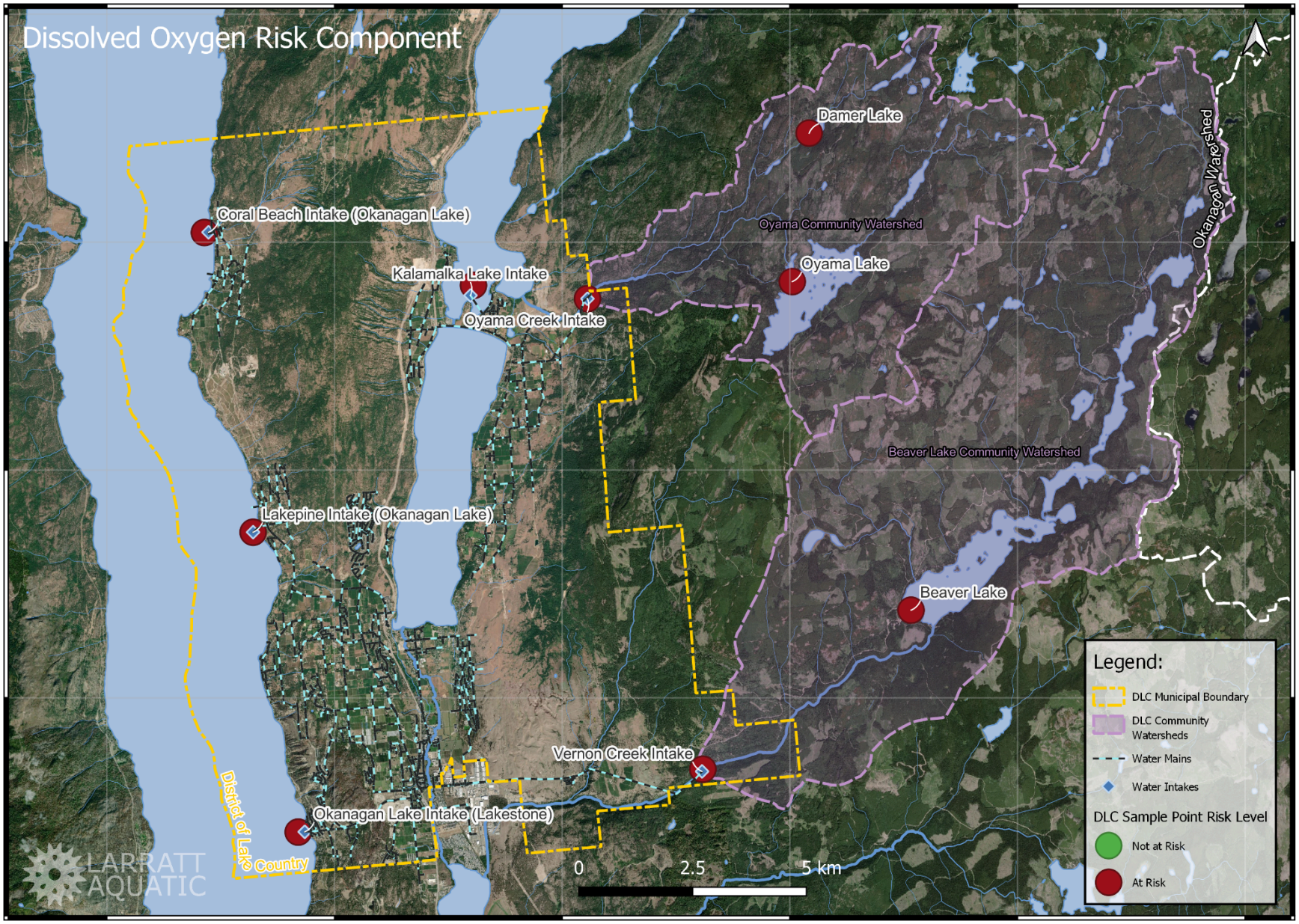
Okanagan Basin Water Board. (2024). *Preparing for Invasive Mussels: Vulnerability Assessment Guide for Raw Water Infrastructure*.

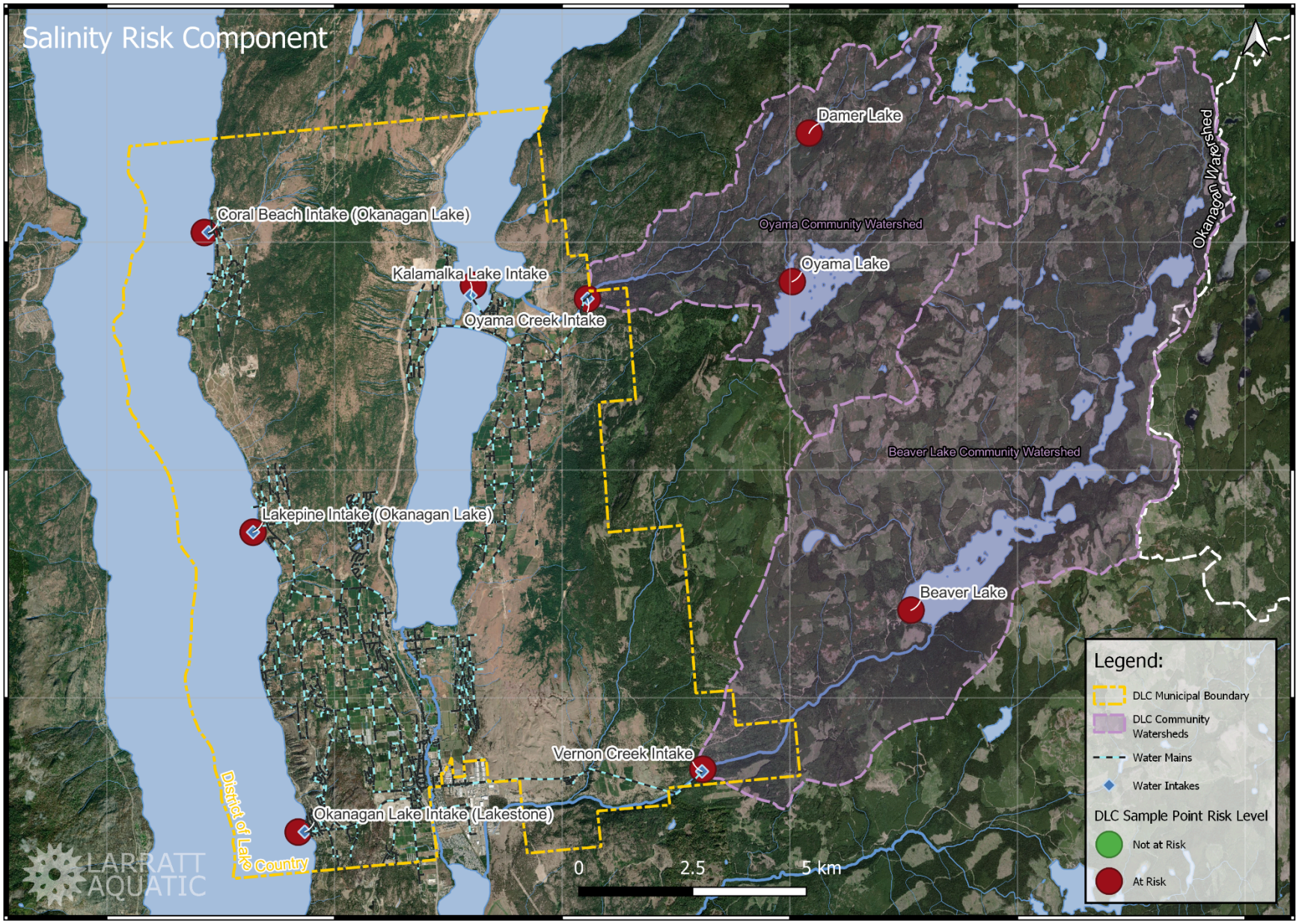
Appendix 1: Risk Maps by parameter




pH Risk Component
Damer Lake
Okanagan Watershed
Coral Beach Intake (Okanagan Lake)
Oyama Community Watershed
Oyama Lake
Kalamalka Lake Intake
Oyama Creek Intake
Beaver Lake Community Watershed
Lakepine Intake (Okanagan Lake)
Beaver Lake
Legend:
DLC Municipal Boundary
DLC Community Watersheds
Water Mains
Water Intakes
DLC Sample Point Risk Level
At Risk
Not at Risk
No Data
Vernon Creek Intake
District of Lake Country
Okanagan Lake Intake (Lakestone)
LARRATT AQUATIC
0
2.5
5 km


Temperature Risk Component
Damer Lake
Okanagan Watershed
Coral Beach Intake (Okanagan Lake)
Oyama Community Watershed
Oyama Lake
Kalamalka Lake Intake
Oyama Creek Intake
Beaver Lake Community Watershed
Lakepine Intake (Okanagan Lake)
Beaver Lake
Vernon Creek Intake
District of Lake Country
Okanagan Lake Intake (Lakestone)
0
2.5
5 km
Legend:
DLC Municipal Boundary
DLC Community Watersheds
Water Mains
Water Intakes
DLC Sample Point Risk Level
Not at Risk
At Risk


Dissolved Oxygen Risk Component
Damer Lake
Okanagan Watershed
Coral Beach Intake (Okanagan Lake)
Oyama Community Watershed
Oyama Lake
Kalamalka Lake Intake
Oyama Creek Intake
Beaver Lake Community Watershed
Lakepine Intake (Okanagan Lake)
Beaver Lake
Vernon Creek Intake
Okanagan Lake Intake (Lakestone)
District of Lake Country
LARRATT AQUATIC
0
2.5
5 km
Legend:
DLC Municipal Boundary
DLC Community Watersheds
Water Mains
Water Intakes
DLC Sample Point Risk Level
Not at Risk
At Risk


Salinity Risk Component
Damer Lake
Okanagan Watershed
Coral Beach Intake (Okanagan Lake)
Oyama Community Watershed
Oyama Lake
Kalamalka Lake Intake
Oyama Creek Intake
Beaver Lake Community Watershed
Lakepine Intake (Okanagan Lake)
Beaver Lake
Vernon Creek Intake
District of Lake Country
Okanagan Lake Intake (Lakestone)
0
2.5
5 km
Legend:
DLC Municipal Boundary
DLC Community Watersheds
Water Mains
Water Intakes
DLC Sample Point Risk Level
Not at Risk
At Risk

------End of Report------

LARRATT AQUATIC

Wood Lake British Columbia
A Review of Historical Conditions, Current Trends, and Recommendations for a Sustainable Future

Prepared for the District of Lake Country

Larratt Aquatic Consulting Ltd. 105-2081 McDougall Rd. West Kelowna B.C. V1Z 4A2
Phone: 250.769.5444 www.lakebiology.ca

Executive summary

Wood Lake is the first and smallest of five mainstem lakes in the Okanagan Valley BC, fed upstream by Middle Vernon Creek and Duck Lake and emptying into Kalamalka Lake. European settlement of the Wood Lake watershed began around 1860 leading to numerous changes in the watershed including orchards, ranches, roads, and other resource extraction. The Oyama canal was created in 1908, permanently linking Kalamalka Lake and Wood Lake water levels.

The goal of this study was to summarize the state of knowledge of Wood Lake and determine if Wood Lake is deteriorating and if so, what practical steps can be taken to restore it. All available data and reports were reviewed and compiled to build a comprehensive database upon which statistical analyses could be performed to address the study's primary questions. This review identified that new sediment cores should be collected and were analyzed for metals and diatoms to build a picture of Wood Lake since European settlement began.

The historical data reveals that Wood Lake has experienced multiple distinct phases depending on the activity within its watershed. The water sampling record goes back to 1970 and captures the high nutrient, high productivity, low water clarity phase that dominated the middle of the twentieth century. Increased flushing from water released by the Hiram-Walker distillery (1971-1992) combined with the introduction of nutrient removal to wastewater treatment (late-1990s) led to a 30-year span of improving water quality in Wood Lake. Conditions appear to have reversed over the past 10 years with declining trends in water clarity and increasing trends in nutrients and productivity.

Sediment cores extend the time frame to the start of European settlement and show that Wood Lake water quality changed significantly around 1940, coinciding with the widespread use of fertilizers and chemical pesticides in agriculture. Sediment chemistry data aligns with water chemistry showing the second shift in water quality around 1970. Diatom community composition within the sediment cores also aligns well with the chemistry data showing three primary phases with large shifts in diatom populations around 1940 and again around 1970. Once again, matching the historical activities within the watershed.

This report sought to address, in detail, the following questions:

Is Wood Lake significantly different from the Indigenous era (pre-1850) in terms of water chemistry and primary productivity?

Yes. Wood Lake has undergone three major phases since European settlement began with the start of a fourth potentially occurring presently.

1) Pre-1940s early settlement
2) 1940s-1970s agriculture dominated activities with effects of fertilizers and pesticides visible in the sediment record
3) Post-1970s was urban dominated with improvements in water quality
4) Post 2010s appears to be a regression caused by climate change and continued disruption of the watershed

Is Wood Lake deteriorating today and why?

Yes. Data from 2010-present catalogue a decline in water clarity, increase in nutrients, increase in the size and intensity of the summer anoxic zones, and increase in productivity. However, current conditions remain better than those from the 1940-1970s period. The current decline is attributed to several factors such as:

- Decline in watershed resiliency
- Nutrient enrichment from the watershed and in-lake activities
- Climate Change
- Accelerating internal nutrient recycling

Are Wood Lake fish safe to eat?

Latest research says that muscle tissue is probably safe for human consumption but that there will still be some cyanotoxins in it. All research is clear that internal organs, particularly the liver, are to be avoided as they can contain potentially harmful concentrations of cyanotoxins. The effect of cyanotoxin exposure to piscivorous birds is not well established. Cyanotoxins are known to persist in fish tissues for weeks after a bloom has ended but there is no strong evidence for biomagnification of cyanotoxins.

What is at stake if Wood Lake deteriorates – an economic analysis

Wood Lake is a very important feature in the region. Wood Lake provides a variety of economic benefits to the community. These include increased property values for lakeside and lake-view residents, tax revenue from real estate and tourism, and support for local businesses like restaurants and shops. The lake is also used for irrigation by agricultural and private landowners, reducing their water treatment costs. Further deterioration of Wood Lake could cost the region millions/year in lost revenue and economic value.

What feasible steps can be taken to lower the scale and frequency of cyanobacteria blooms in Wood Lake?

The issues afflicting Wood Lake are not new and several previous studies made recommendations about potential solutions. A comprehensive list of these proposals was complied and assessed according to several criteria including cost, effectiveness, and the strengths and weaknesses of each approach. The restoration proposals focused on two major categories: improving Wood Lake directly and changing the watershed such that the downstream effects improve Wood Lake. The most achievable options include:

Wood Lake Watershed Options:

- Riparian setbacks and revegetation of tributaries and shoreline
- Educate residents and guests on Wood Lake condition to encourage stewardship
- Greywater reuse programs to reduce pressure on WWTP
- Prescribed burning in watershed to limit wildfire risk

Wood Lake Options

- Engage with Syilx water declaration and processes such as the kɬúsx̌nítk (Okanagan Lake) Watershed Responsibility Planning Initiative

- Boating education programs to encourage responsible boating near shore and around Oyama Canal, wake surfing in 8+ m water depth, Clean Drain Dry, I'm a Wake. Etc.

All these options should be considered in addition to the excellent initiatives by DLC, OKIB, and others to the health of Wood Lake.

Acknowledgements

The LAC team would like to gratefully acknowledge funding from Okanagan Basin Water Board and from District of Lake Country. The assistance District staff including Sarah Graham, Greg Buchholz, and Patti Meger was vital. Concerned long-time resident Jack Allingham helped instigate this study. We are indebted to the previous researchers who have written extensively about Wood Lake for over 100 years. We would also like to acknowledge collaboration with Okanagan Indian Band (OKIB) in whose traditional lands Duck and Wood lakes function.

Preferred Citation

Self, J., Viita, C., Knezevic, S., and Larratt, H. (2024). *Wood Lake British Columbia: A Review of Historical Conditions, Current Trends, and Recommendations for a Sustainable Future*. Prepared by Larratt Aquatic Consulting Ltd. Prepared for the District of Lake Country.

Report prepared by LAC:

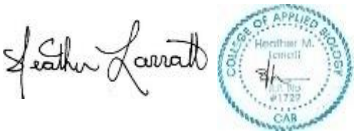
Jamie Self: Senior Aquatic Biologist, H BSc, RP Bio

Cierra Viita: Aquatic Biologist, BSc, BIT

Sara Knezevic: Aquatic Biologist, BSc, RP Bio

Reviewed by:

Heather Larratt: Principal Aquatic Biologist, H BSc, RP Bio



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Figures

Tables

Definitions

Glossary: The following terms are defined as they are used in this report

Term	Definition
Algae bloom	A superabundant growth of algae, a marked increase to >2000 cells/mL
Anaerobic/anoxic	Devoid of oxygen
Benthic	Organisms that dwell in or are associated with the sediments
Cyanobacteria	Bacteria-like algae having cyanochrome as the main photosynthetic pigment
Diatoms	Algae that have hard, silica-based "shells" called frustules
Fall overturn	Surface waters cool and sink, until a fall storm mixes the water column
Epilimnion	Surface layer of lake during stratified periods above the thermocline
Eutrophic	Nutrient-rich, biologically productive water body
Green algae	A large family of algae with chlorophyll as the main photosynthetic pigment
Hypolimnion	Deep layer of lake below the thermocline
Inflow plume	A creek inflow seeks the layer of matching density in a receiving lake, mixing and diffusing as it travels; cold, TSS, and TDS increase water density
Limitation, nutrient	A nutrient that limits or controls the potential growth of organisms e.g. P or N
Mesotrophic	A water body having a moderate amount of dissolved nutrients
Microflora	Sum of algae, bacteria, fungi, *Actinomycetes,* etc., in water or biofilms
Oligotrophic	A water body having low dissolved nutrient concentrations that restrict microflora growth
Periphyton	Algae that are attached to aquatic plants or solid substrates
pH	A numeric value that expresses acidity/alkalinity of water. pH affects solubility of dissolved substances such as metals and nutrients
Phytoplankton	Algae that float, drift or swim in water columns of reservoirs and lakes
Plankton	Those organisms that float or swim in water
Redox	Reduction (-ve) or oxidation (+ve) potential of a solution
Reducing envi	Devoid of oxygen with reducing conditions (-ve redox) e.g. swamp sediments
Residence time	Time for a parcel of water to pass through a reservoir or lake (flushing time)
Riparian	Interface between land and a stream or lake
Secchi depth	Depth where a 20 cm secchi disk can be seen; measures water transparency
Seiche	Wind-driven tipping of lake water layers in the summer, causes oscillations
Stratification	Physical process where lake becomes divided into 2 or more vertical layers
Thermocline	Lake zone of greatest change in water temperature with depth (> 1°C/m); it separates the surface water (epilimnion) from the cold hypolimnion below
Zooplankton	Minute animals that graze algae, bacteria and detritus in water bodies

Acronym	**Definition**
Chl-a	Chlorophyll-a
DLC	District of Lake Country
DO	Dissolved Oxygen
IHA	Interior Health Authority
LAC	Larratt Aquatic Consulting Ltd.
MVC	Middle Vernon Creek
OBWB	Okanagan Basin Water Board
OCCP	Okanagan Collaborative Conservation Program
OKIB	Okanagan Indian Band
ONA	Okanagan Nation Alliance
TEK	Traditional Ecological Knowledge

Lake Classification by Trophic Status Indicators

Trophic Status	Chlorophyll-a ug/L	Total P ug/L	Total N ug/L	Secchi disc m	Primary production mg C/m²/day
Oligotrophic	0 – 2	1 – 10	<100	> 6	50- 300
Mesotrophic	2 – 5	10 – 20	100 – 500	3 – 6	250 – 1000
Eutrophic	>5	> 20	500-1000	< 3	>1000

Nutrient Balance Definitions for Microflora (Dissolved Inorganic N: Dissolved Inorganic P)

Phosphorus Limitation	Co-Limitation of N and P	Nitrogen Limitation
>15 : 1	<15 : 1 – 5 : 1	5 : 1 or less

(Nordin, 1985)

Wood Lake Background and History

Wood Lake is the first and smallest of five mainstem lakes in the Okanagan Valley BC, located in the headwaters of the Columbia River. Wood Lake has a catchment area of 190 km^2, holds 193 million cubic meters of water, averages 22 m in depth, and has an estimated residence time of 30 years (Jensen & Bryan, 2001; ILEC, n.d.; Self & Larratt, 2016; Figure 1). Water flows from Duck Lake through Middle Vernon Creek (MVC) into Wood Lake (average = 15.1 ± 9.1 Mm^3 per year from 2012-2023[1]; BC Gov't data, 2024). Outflows from Wood Lake travel to Kalamalka Lake through the man-made Oyama Canal (Figure 1). Groundwater likely contributes a significant water and nutrient load to Wood and Kalamalka lakes (British Columbia Water Resources Service, 1974).

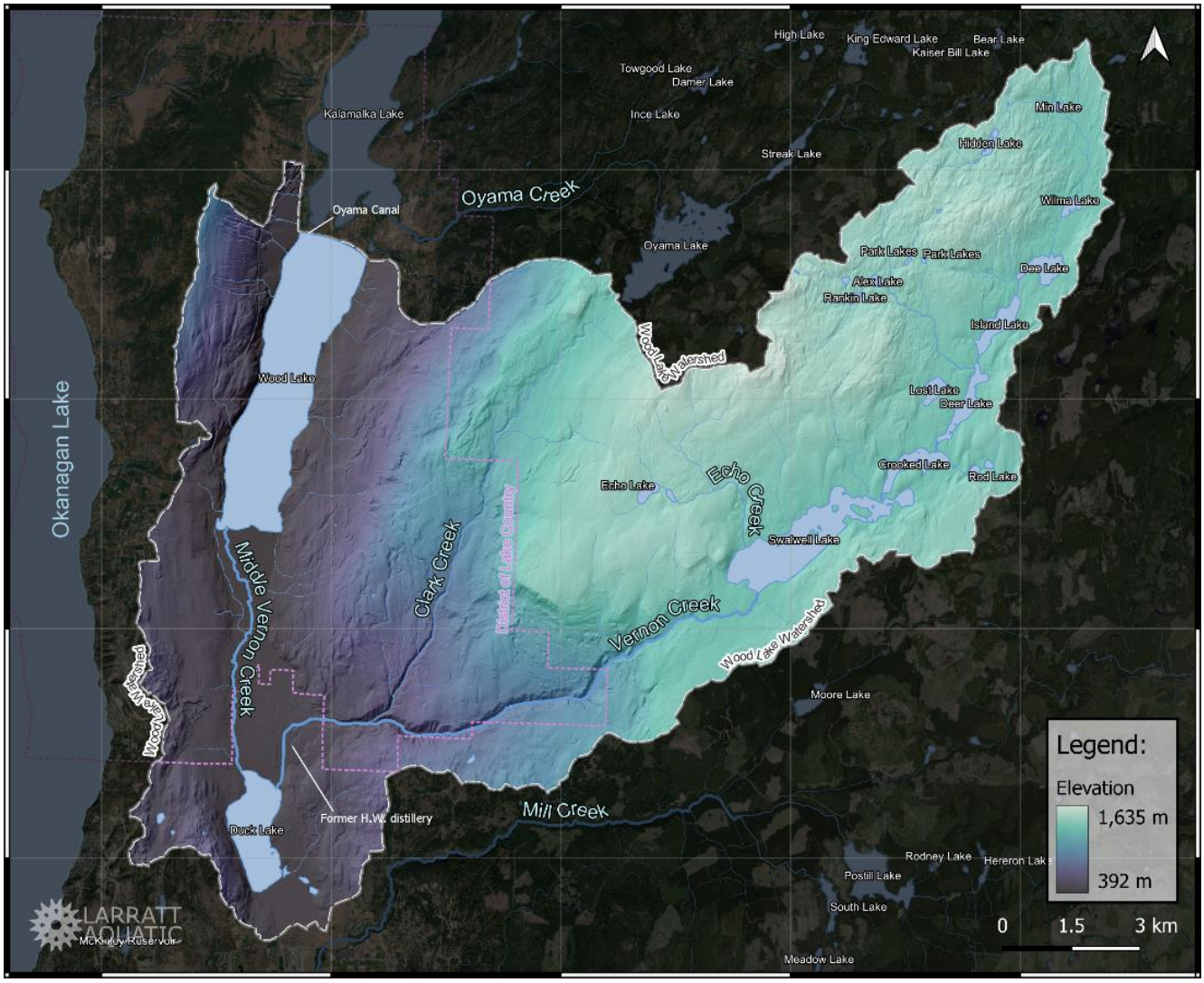

Figure 1: Map of Wood Lake and its watershed

[1] The hydrometric station was damaged during the 2017 freshet flooding and did not operate for most of 2017 and all of 2018

Before colonization, Syilx Okanagan people had little impact on the surrounding watershed and on Wood Lake itself (Stockner & Northcote, 1974). Around the 1860's, European settlers established large ranches, orchards, and built roads along Wood Lake (Figure 4). As of 2021, the Wood Lake watershed, which encompasses most of the District of Lake Country, had a permanent population of approximately 15,000 (Statistics Canada, 2023). Most of the population was focused around the lowland area between Duck and Wood lakes with low population density in the upper elevation areas (Figure 2).

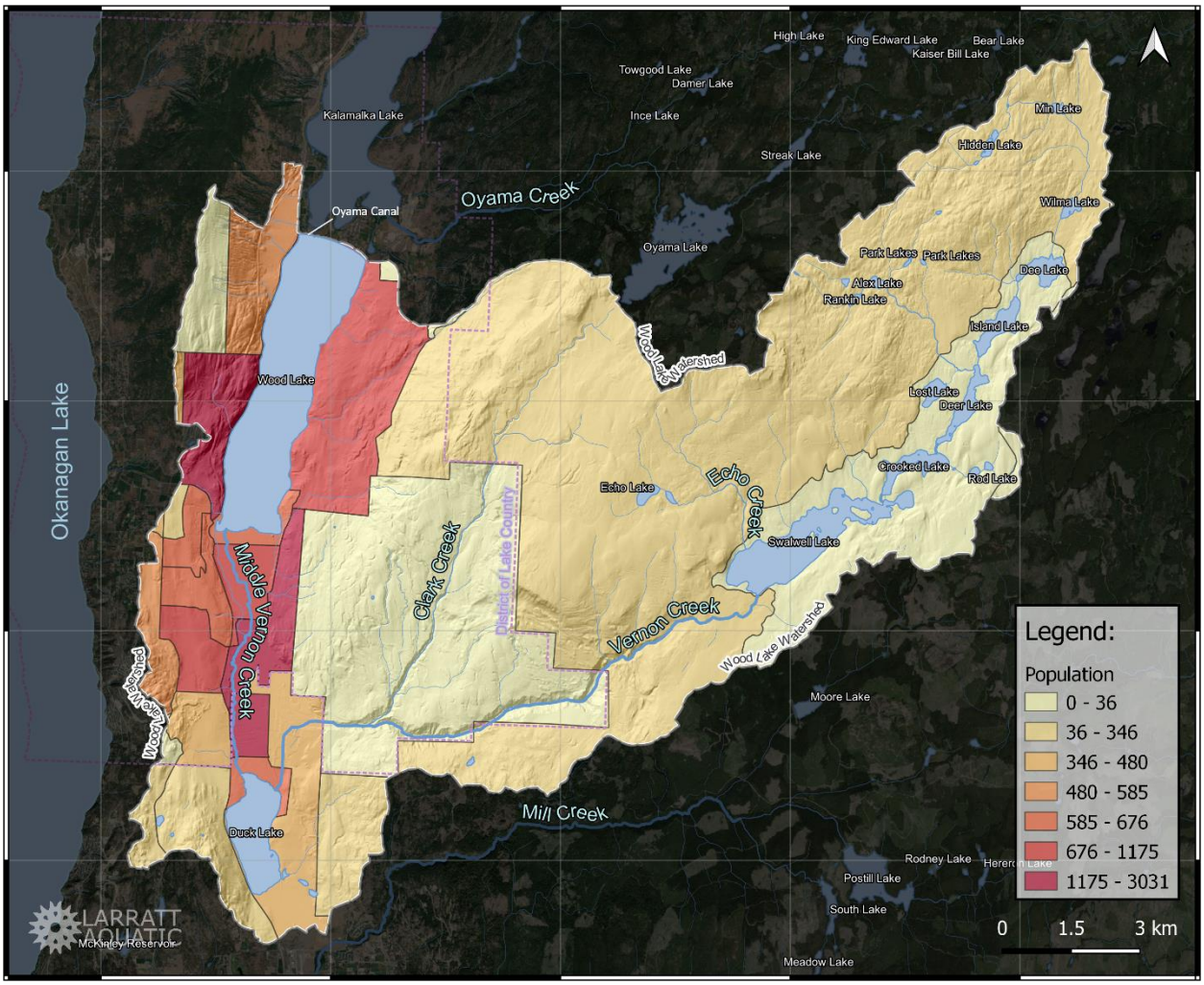

Figure 2: Population density in Wood Lake watershed by 2021 census dissemination area
Source: (Statistics Canada, 2022)

In 1908, settlers excavated the Oyama Canal between Wood and Kalamalka lakes to allow navigation between the two (Jensen & Bryan, 2001; Figure 3). The canal excavation lowered Wood Lake by 0.60 m and raised Kalamalka Lake by 0.25 m. During the 1900's, dam construction in the upper watershed reservoirs altered inflows to Duck and Wood lakes. This increased water residence time and decreased water quality in Wood Lake (Jensen & Bryan, 2001; Bryan, 1990). Vernon Creek was diverted around Duck Lake in 1930 until 1971 when flows were restored to Duck Lake by the Hiram-Walker distillery. Logging also altered the basin hydrology and increased nutrient loads to Wood Lake (Jensen & Bryan, 2001).

Figure 3: Image of Oyama Canal with Wood Lake in the foreground and Kalamalka Lake in the background

As early as the 1930's, Wood Lake had hypolimnetic oxygen depletion, cyanobacteria blooms and black organic substrates (Clemens et al. 1939). More detailed reporting occurred in the 1970's and particularly in the 1980's by the National Water Research Institute (Stein and Couthard 1971; Okanagan Basin Study 1969-1971; Pinsent and Stockner (1974; Gray and Jasper 1982; 1986; Jasper and Gray 1982; Weigand 1984; Weigand and Chamberlain 1987)).

The presence of an unusual, massive cyanobacteria bloom in 1971 prompted detailed limnological studies of Wood Lake (Anon., 1974; Jensen & Bryan, 2001; Figure 4). From 1971 – 1992, Okanagan Lake water was used in the Hiram Walker Distillery (Winfield BC). The distillery discharged 13,600 m^3/day of cooling water from Okanagan Lake into Vernon Creek upstream of Duck Lake while it was operating (Jensen & Bryan, 2001; Figure 1). There remains uncertainty over whether this flushed additional nutrients from Duck Lake into Wood Lake or if the water quality in Wood Lake improved (B.C. Research, 1974; Bryan, 1990; Jensen & Bryan, 2001). Discharges from Hiram Walker Distillery changed Wood Lake's residence time from 30 years to 17 years and transferred nutrient rich Wood Lake water into Kalamalka Lake (Nordin, 1987). Residence time has decreased back to 30 years since the Hiram Walker Distillery closed in 1995 (ILEC, n.d.).

In the decades that followed, the influences on Wood Lake became increasingly complex (Figure 4). Wood Lake may be approaching tipping point that teeters between acceptable and unacceptable water quality for recreational and fishery use. Larratt Aquatic Consulting Ltd. (LAC) was contracted by the District of Lake Country (DLC) to analyze long term changes of water quality.

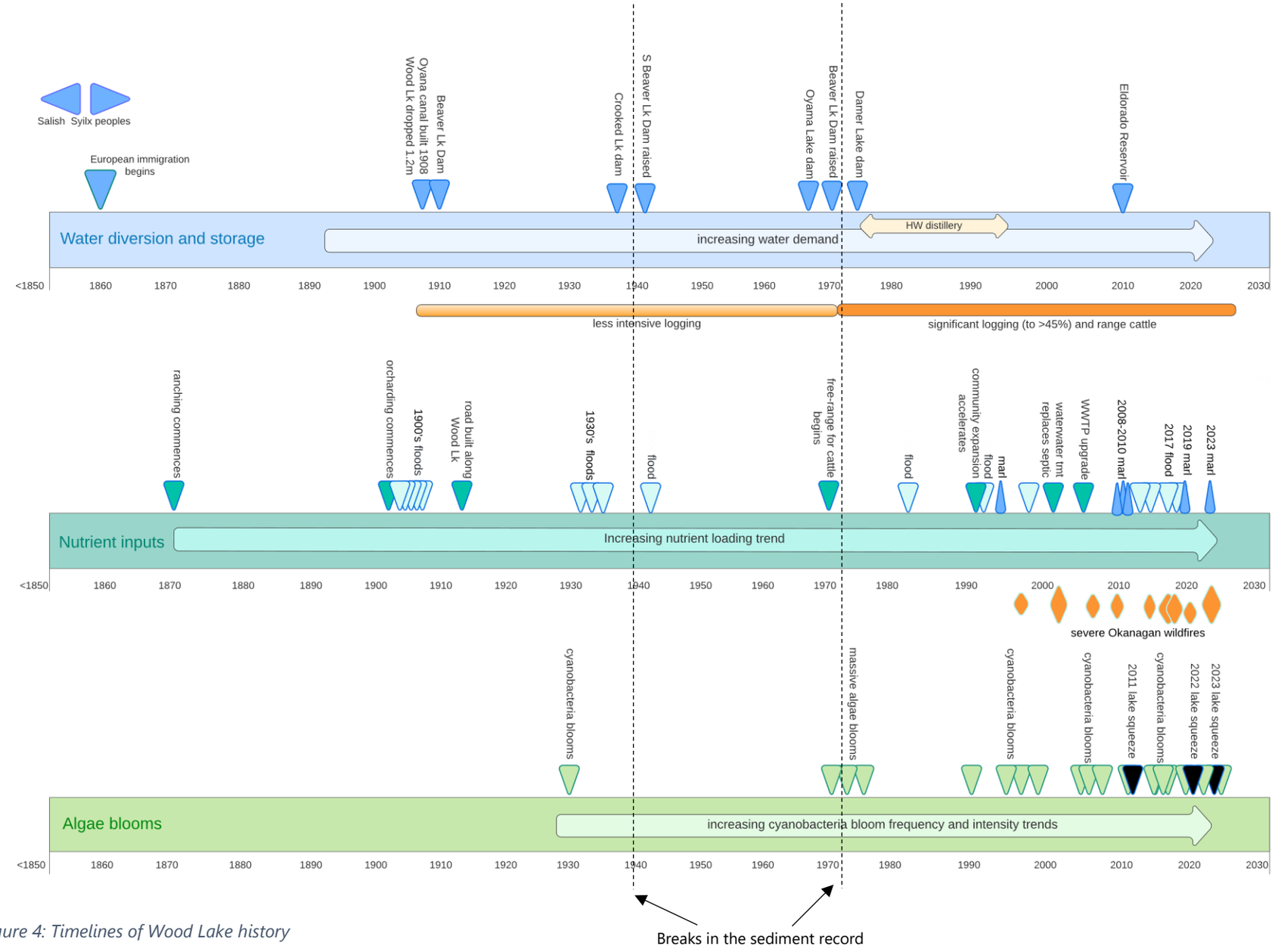

Figure 4: Timelines of Wood Lake history

Methods

Physical, chemical, and biological metrics were analyzed to understand the current and historical state of water quality in Wood Lake. All water-based parameters and algal data used in this study are from ongoing research performed on Kalamalka and Wood lakes by LAC on behalf of RDNO and DLC (Appendix 3: Water Parameters Collected by LAC). Publicly available literature on Wood Lake was also used to supplement historical baselines. Only sediment sampling was performed specifically for this study.

Sediment Cores

Sediment samples were collected using an Ogeechee™ corer with an attached drive hammer. Wood Lake T1 sampling site was 9.6 m deep from the surface and located in the north end of the lake (Figure 6). Sediment corers are designed to collect a vertical profile of sediment. Core length was 0.38 m long and was separated every 2 cm for the first 16 cm and then separated every 4 cm for the remaining core length (13 samples, Figure 5). Nine sediment cores were collected on June 28, 2023, and were combined to create thirteen individual samples (Table 1). The separation of cores into segments (cm intervals) provides insight into Wood Lake's history.

Table 1: Sediment core horizons sampled

Core Increments	Sample Name
0-2 cm	T1 0-2
2-4 cm	T1 2-4
4-6 cm	T1 4-6
6-8 cm	T1 6-8
8-10 cm	T1 8-10
10-12 cm	T1 10-12
12-14 cm	T1 12-14
14-16 cm	T1 14-16
16-20 cm	T1 16-20
20-24 cm	T1 20-24
24-28 cm	T1 24-28
28-32 cm	T1 28-32
32-36 cm	T1 32-36

Samples were analyzed at CARO Analytical Services – Kelowna Office. Analyses included total volatile solids, total metals, and hydrocarbons (PAHS/EPHS/HEPHS).

Figure 5: Photo of sediment core from Wood Lake with deepest (oldest) sediment on the left and shallowest (newest) sediment on the right.

Sediment Traps

Sediment traps were installed May 4 and removed October 31, 2023. One trap was placed in a deep site and the other in a shallow site of Wood Lake (Figure 6). Sediment traps measured sediment accumulation rates over six months. Traps were installed 1 m above the sediment at each site (11 m for shallow, 22.5 m for deep). Samples were analyzed at CARO Analytical Services – Kelowna Office. Analyses included dry weight and total volatile solids. Each trap consisted of two catch basins to allow for replicate comparison.

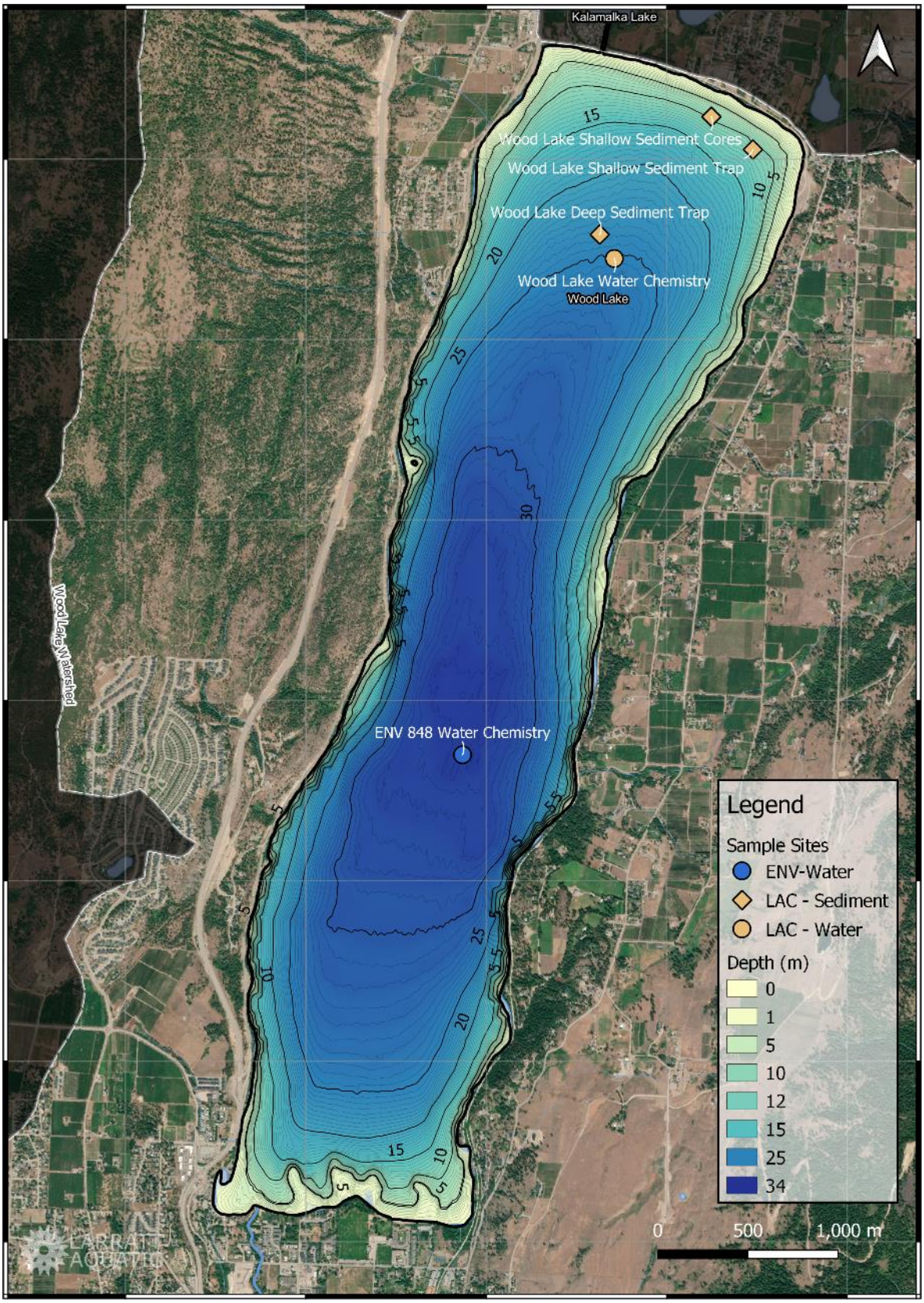

Figure 6: Map of Wood Lake bathymetry with sample sites highlighted

Results

Physical Conditions

Wood Lake has an average depth of 22.6 m with a maximum depth of 34 m in the center (Stockner & Northcote, 1974); Figure 6).

Water Clarity

Water clarity in Wood Lake is poor with an average Secchi depth of 4.8 ± 2.0 m from 1970-2023 (Figure 7). There was a significant declining trend in water clarity over the past ten years that led to the lowest Secchi on record during freshet 2023 (0.7 m on April 28, Mann-Kendall, p <0.001; Figure 7). Current water clarity is similar to what it was back in the 1970's. The oldest secchi depth measurement from Wood Lake was collected during an *Aphanizomenon sp*. cyanobacteria bloom in August 1935, measuring just 2.25 m (Clemens et al. 1939).

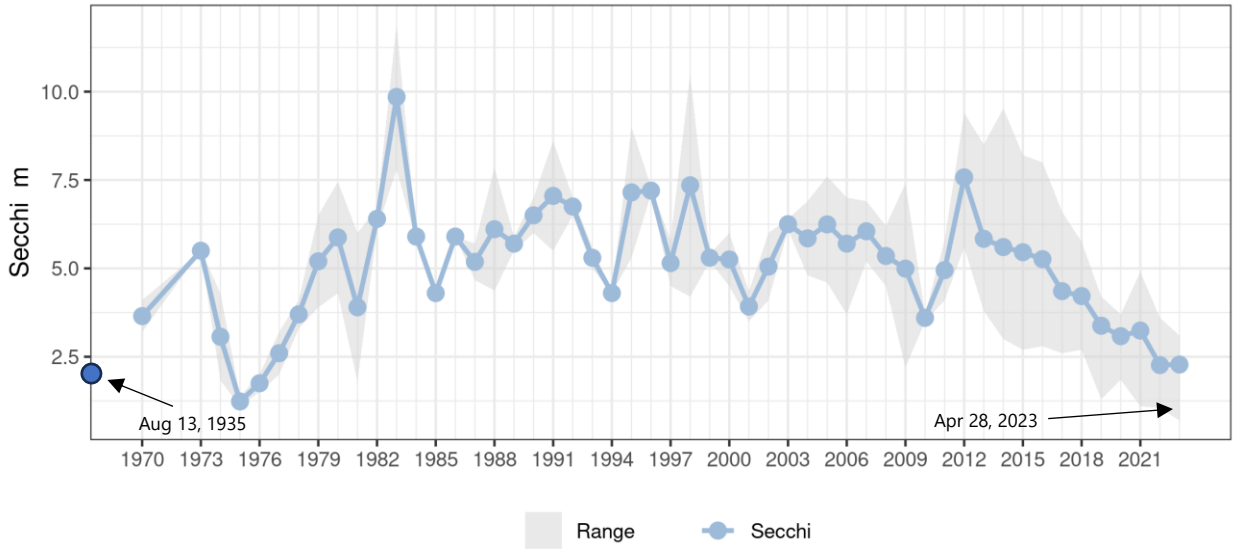

Figure 7: Secchi depth in Wood Lake from 1970-2023, ENV and LAC data

Turbidity in Wood Lake was moderate and often exceeded 1 NTU in the water column (1.53 ± 1.90 NTU from 2005-2023; Figure 8). The BC Recreational Water Quality Guideline for turbidity is 50 NTU based on aesthetics. Wood Lake average results were far below this value but far exceeded the 1 NTU drinking water guideline established by IHA. Turbidity data shows a significant increasing trend in Wood Lake, driven by recent cyanobacteria blooms (2005-2023; Mann-Kendall, p < 0.001, Figure 29).

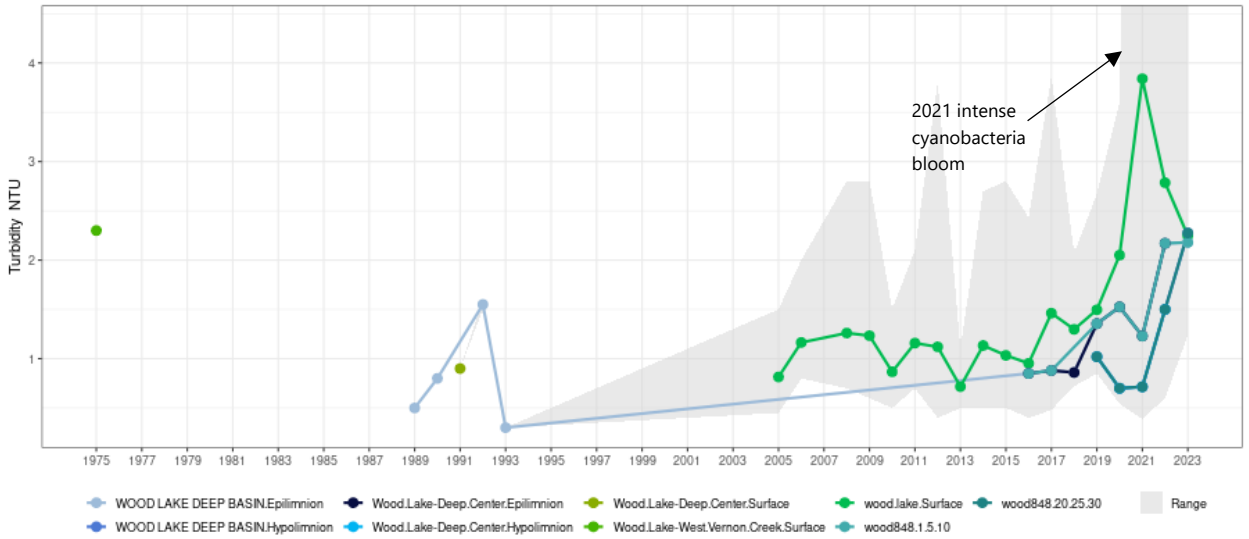

Figure 8: Turbidity in Wood Lake from 1975-2023

Note: During spring freshet, turbidity to spike to 18.2 NTU in April 2021 accounting for the large spike

Sources: Kalamalka Lake study (wood.lake); BC EMS (wood848); Jensen & Bryan, 2001 (Wood.Lake Deep, Wood.Lake West Vernon Creek)

Water Temperature and Dissolved Oxygen

Wood Lake fits the warm monomictic lake category; it thermally stratifies from May to October and mixes completely from November to April (Figure 11). During mixed periods, the water column becomes uniform from the surface to the bottom sediments. During stratified periods, the deep bottom waters (hypolimnion) become isolated from the surface leading to dramatic changes in water conditions.

During the summer, Wood Lake reaches a maximum average surface temperature of 22.9 ± 1.4 °C during July and August (2005-2023, Figure 9). No significant trend in surface maximum water temperatures was detected from 2005-2023.

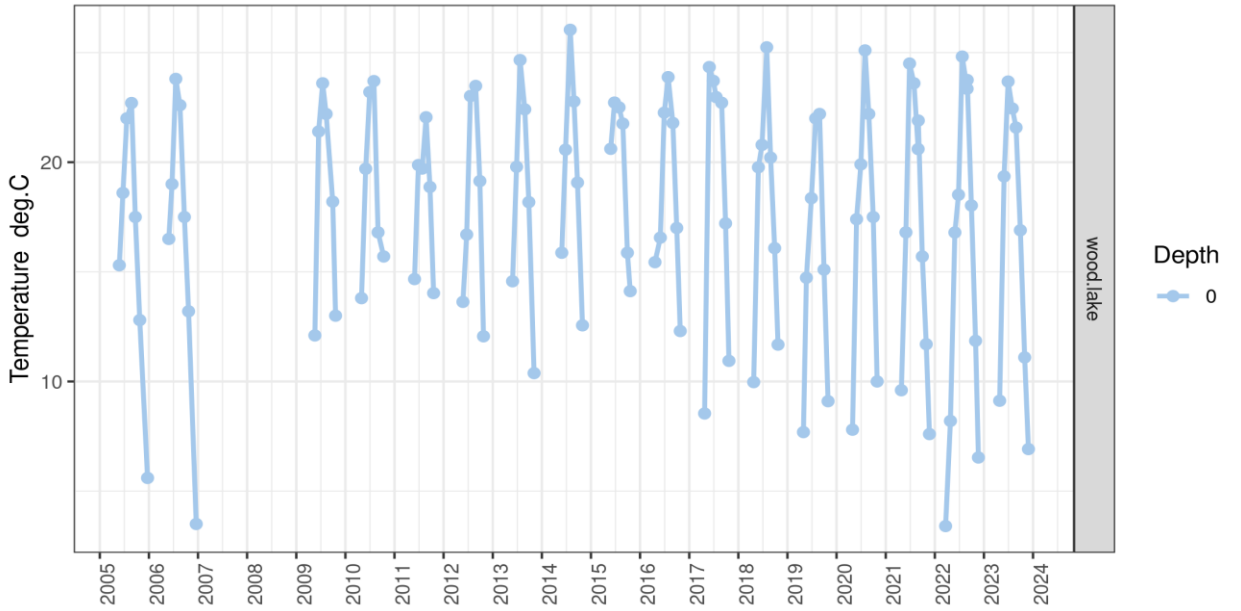

Figure 9: Surface temperature measurements in Wood Lake, 2005-2023

Late ice-off combined with early stratification in spring can lead to incomplete water column mixing and the increased risk of a temperature – dissolved oxygen squeeze. In 2011, the first documented die-off of Kokanee occurred which was attributed to a temperature-DO squeeze (lake-squeeze) in the late summer (Self & Larratt, 2016; Figure 10). Lake-squeezes occurred again during 2021 (minor), 2022, and 2023 that cumulatively led to Kokanee population declines (Figure 10; pers comm, Kristen King).

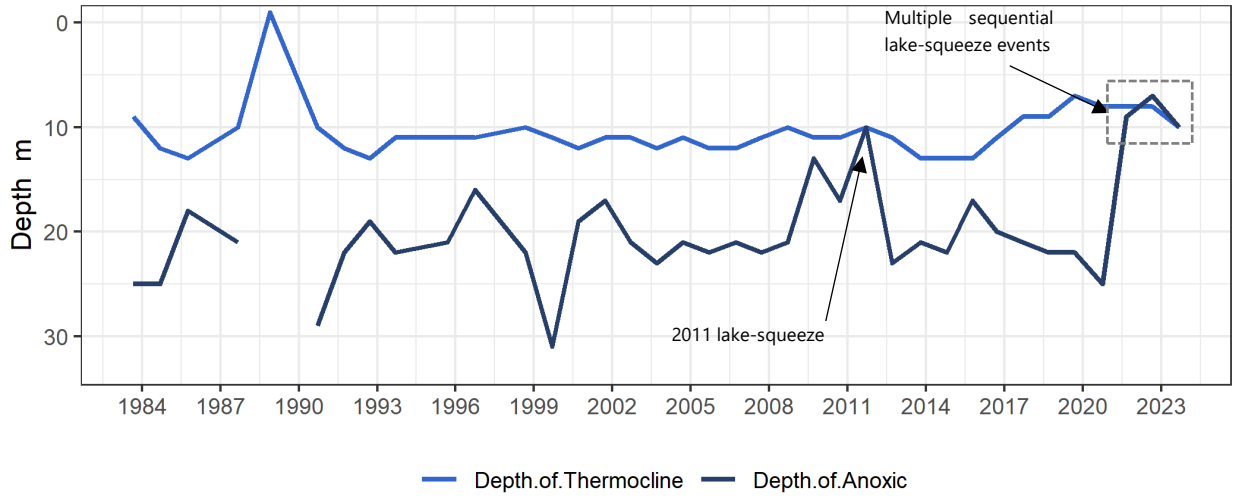

Figure 10: Thermocline vs. anoxic zone position in Wood Lake, 1983-2023

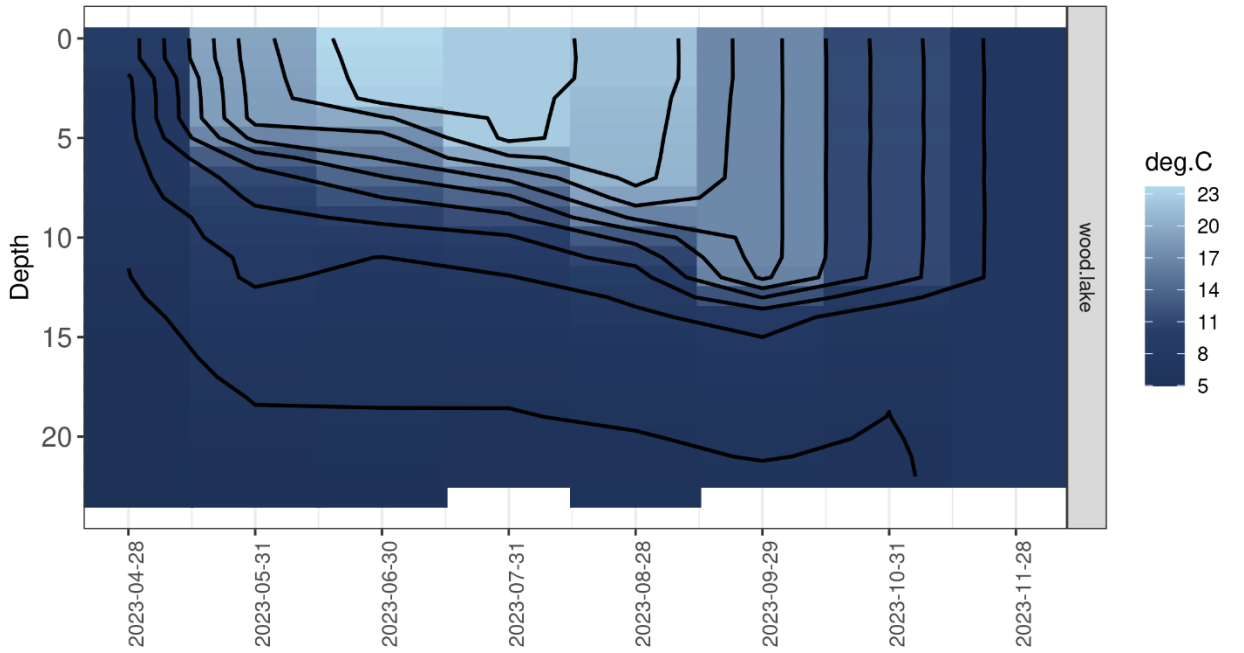

Figure 11: Temperature profile for Wood Lake during 2023

A low dissolved oxygen (DO) zone forms above the sediments in Wood Lake during late summer each year (Figure 12). Wood Lake's productivity creates considerable organic matter (algae and bacteria) that settle into the bottom waters as they decompose. The decomposition of organic material consumes dissolved oxygen from the surrounding water column, generating anoxic conditions in the hypolimnion (Figure 12). Bacteria often congregate along the density differential at the thermocline and, in recent years, this has also led to an unusual situation where the water at the thermocline was profoundly anoxic while dissolved oxygen was available above and below it (Figure 12).

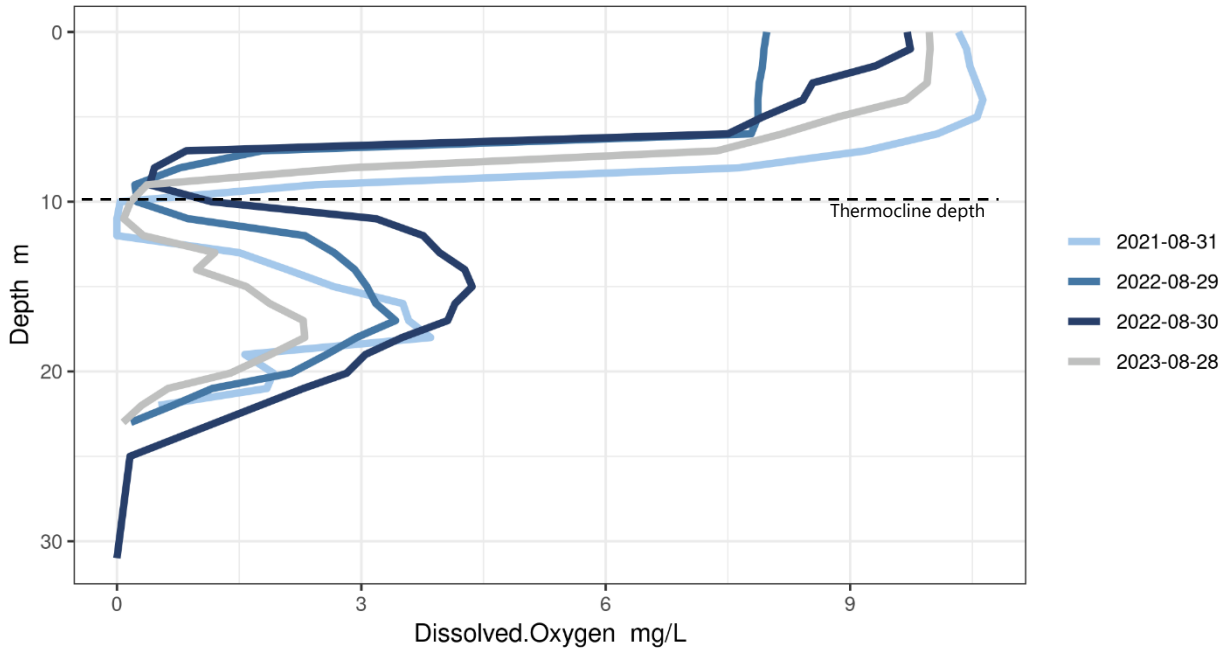

Figure 12: Dissolved oxygen profiles from Wood Lake during August, 2021-2023

Wood Lake has, in recent years, trended towards larger and more intense anoxic zones and higher surface DO, closely matching algae densities (Figure 13). Anoxic conditions in the bottom water layer affect water chemistry by mobilizing nutrients and metals out of the sediments (Figure 22, Figure 21).

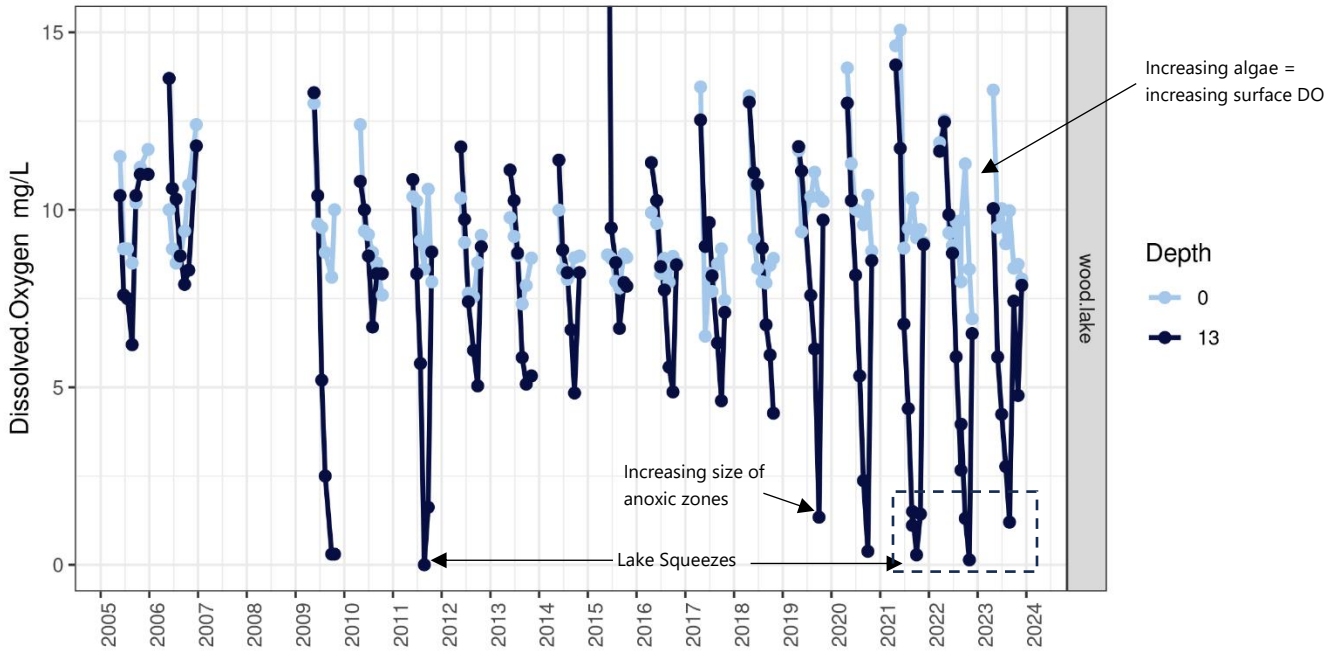

Figure 13: Dissolved oxygen in Wood Lake. 2005-2023

Inflows

Middle Vernon Creek (MVC) is the dominant surface inflow into Wood Lake, averaging 15.1 ± 9.1 Mm^3/year from 2012-2023. Discharge was measured at the inflow to Wood Lake from 1919-1921, 1969-1987, and from 2012-present. When comparing decadal time spans, the influence of the Hiram-Walker plant is clear with a dramatic increase in inflows beginning in the 1970s (Table 2, Figure 14). During those years, flows remained much higher in MVC during the summer and fall (Figure 14). A pattern of increasing maximum inflows during freshet also occurred (Table 2, Figure 14). The low number of years with data in each decade prior to 1970 reduces the strength of this pattern as it is possible that only dry years were captured but the data since 1970 still shows an increase in freshet peak consistent with a watershed that is experiencing ongoing degradation.

Table 2: Annual average inflow (m^3/year) by decade from Middle Vernon Creek into Wood Lake

Decade	# Years from decade captured	Avg Annual Inflow (m^3/year)	SD Annual Inflow (m^3/year)	Min Annual Inflow (m^3/year)	Max Annual Inflow (m^3/year)	Freshet Maximum Flow (m^3/sec)
1910	1	3,252,344	-	3,252,344	3,252,344	1.5
1920	2	5,503,896	523,881	5,133,456	5,874,336	2.1
1960	1	2,989,180	-	2,989,180	2,989,180	1.0
1970	10	13,298,903	7,721,652	1,928,867	26,561,267	7.3
1980	8	16,973,188	10,301,158	4,298,748	31,593,197	8.2
2010	7	12,542,793	5,413,938	3,770,524	18,033,399	15.9
2020	5	14,951,925	13,332,894	2,844,468	34,886,563	15.4

Note: blue shading = HW pumping

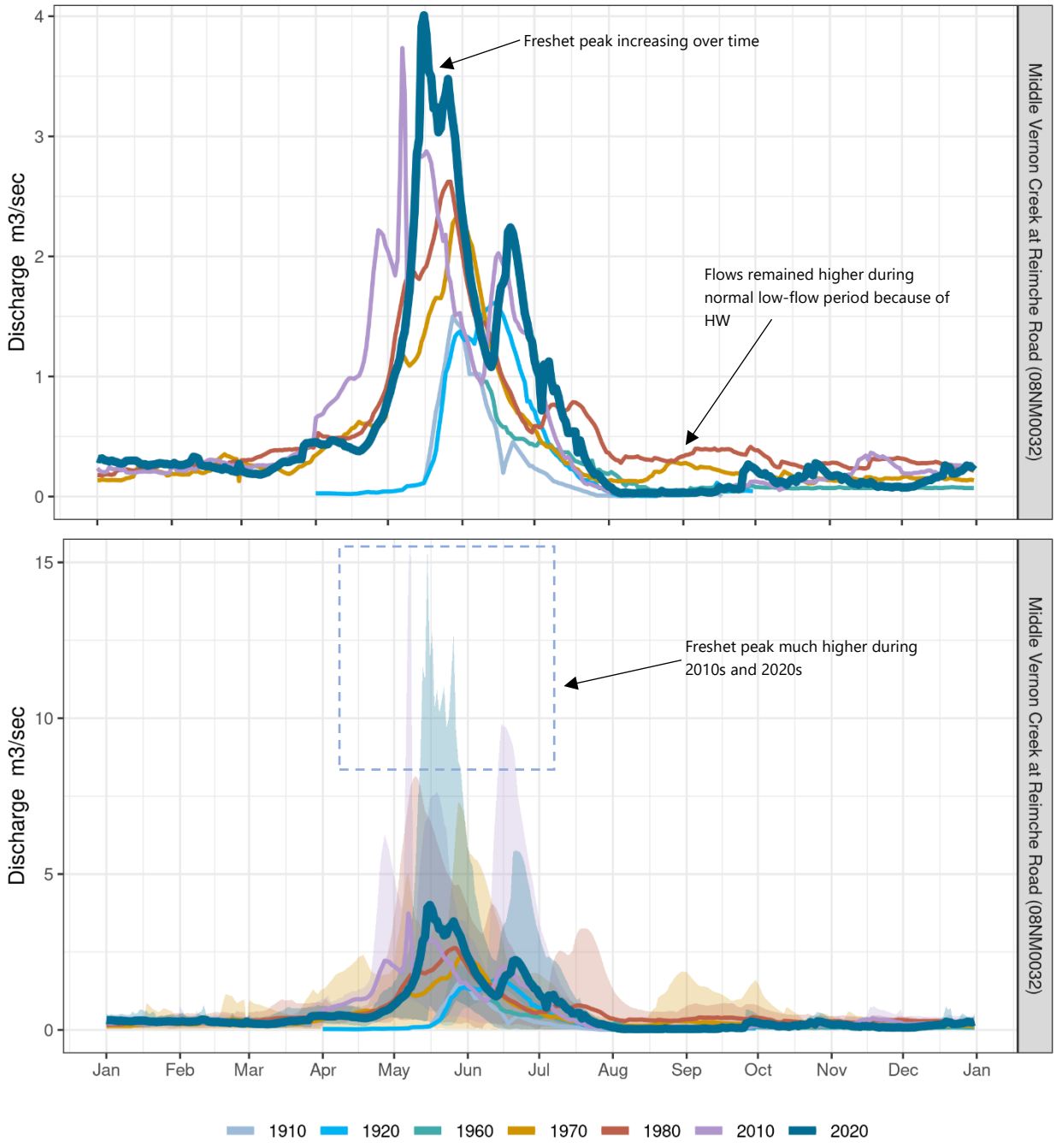

Figure 14: Average daily flow by decade in Middle Vernon Creek upstream of Wood Lake, 1919-2024

Note: Top and bottom figure show the same data with top figure zoomed in focusing on average lines while bottom figure includes ranges for each day by decade to visualize the variability

Water Chemistry

Major influences on water quality in the Okanagan Valley mainstem lakes are attributed to land clearance/logging, agriculture, and waste discharge from settlements in the areas (Canada-British Columbia Consultative Board, 1974; Stockner & Northcote, 1974)

General Water Chemistry

Chloride is naturally low in the Okanagan and its concentration can be used as a marker for human effects on a watershed. The earliest chloride data found for Wood Lake was from July 1971 at 2.8 mg/L (Jensen & Bryan, 2001). A significant increasing trend occurred across all combined data sets leading to an annual average of 20.6 mg/L during 2023 (Kalamalka Lake study data), a greater than 7x increase in 50 years (Mann-Kendall, $p<0.001$; Figure 15). Chloride accumulates in Wood Lake because of its relatively slow residency time of approximately 30 years (ILEC, n.d.). The rate of chloride increase appears to be accelerating in recent years, indicating that the total load from human effects is also increasing.

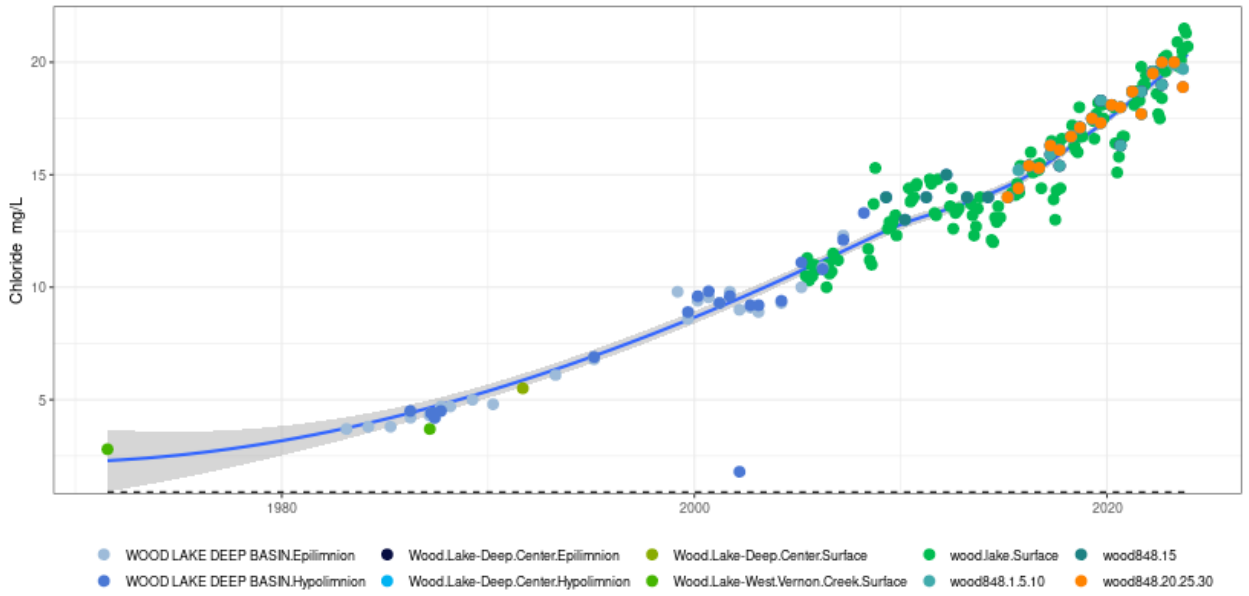

Figure 15: Chloride concentration in Wood Lake, 1971 to 2023
Sources: Kalamalka Lake study (wood.lake); BC EMS (wood848); Jensen & Bryan, 2001 (Wood.Lake Deep, Wood.Lake West Vernon Creek)

Sulphate is an important parameter because of its involvement in marl precipitation. Sulphate decreased significantly over the range of available data declining from 21.9 mg/L in 1983 to 18.7 mg/L during 2023 (Mann-Kendall, $p<0.001$; Figure 16). A distinct increase in sulphate was noted during the late 2000s into 2010. This rise may relate to a corresponding increase in hardness during the same time (Figure 19).

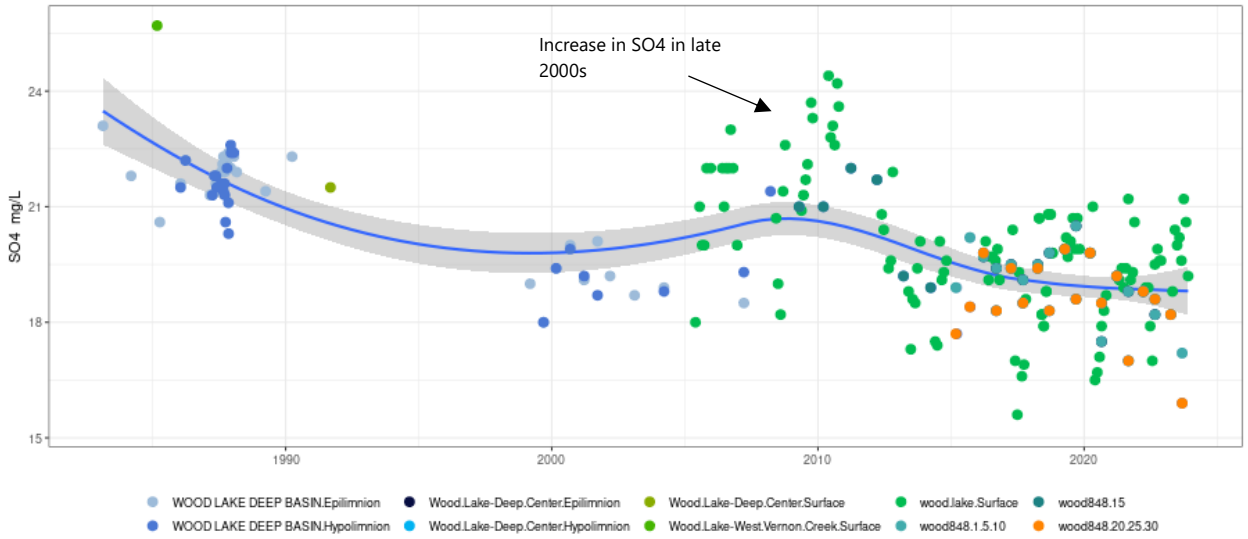

Figure 16: Sulphate concentration in Wood Lake, 1983 to 2023
Sources: Kalamalka Lake study (wood.lake); BC EMS (wood848); Jensen & Bryan, 2001 (Wood.Lake Deep, Wood.Lake West Vernon Creek)

Marl

Hardwater lakes such as Kalamalka (hardness =175 ± 8 mg/L $CaCO_3$ during 2023) and Wood Lakes (hardness = 139 ± 6 mg/L $CaCO_3$ during 2023) exhibit the aquatic phenomenon called marling. Marling occurs in summer when calcium carbonate and, to a lesser degree, calcium sulphate spontaneously precipitate forming microscopic crystals (Wiik et al., 2013). These crystals scatter sunlight giving marl lakes a characteristic teal-blue color, like rock flour in glacial lakes (Figure 18). Marl is induced by a combination of factors including water temperature above 20 °C and pH above 8.5 that reduces calcium carbonate solubility.

Marling occurs sometime during July and August in Kalamalka and Wood lakes and while Kalamalka Lake marls every year, Wood Lake marls only occasionally. Wood Lake marled most recently during 2023, likely induced by increased pH from a large algae bloom that occurred at the same time. Previously recorded marl events are listed in Table 3. There was an unusual abundance of marl events during the 2010s (6 events) compared to previous decades (1 event per decade in 1980s and 1990s). The cause of this high marl frequency is not firmly established but may relate to higher water hardness observed during the 2010s (Figure 19). Previous research identified a marked increase in the accumulation of marl in sediment cores in the 1940s (I.R. Walker, E.D. Reavie, S. Palmer, 1993). This trend was attributed to increased evaporation because of water diversion from irrigation.

A significant increasing trend in calcium concentration in Wood Lake occurred from 1972-2023 (Mann-Kendall, $p<0.001$; Figure 17). This study identified a data gap in the historical data with missing long-term hardness data and a lack of recorded marl events prior to 1987. While it is impossible to look back without sample data, it is important to ensure these events are recorded moving forward (see Table 3).

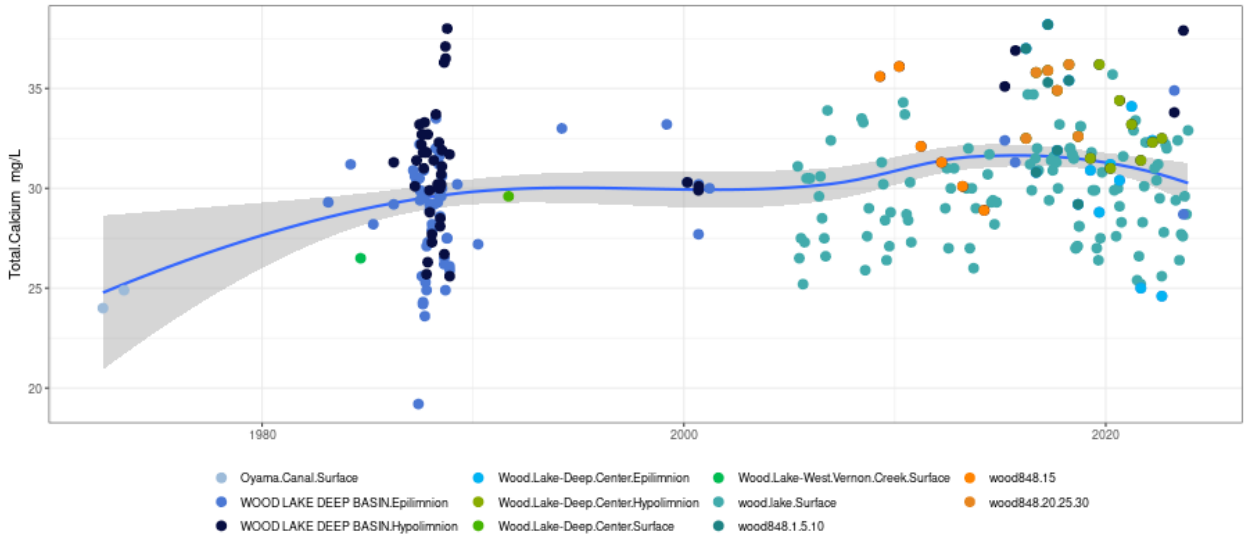

Figure 17: Total calcium concentration in Wood Lake, 1972-2023
Sources: Kalamalka Lake study (wood.lake); BC EMS (wood848, Wood Lake Deep Basin); Jensen & Bryan, 2001 (Wood.Lake Deep, Wood.Lake West Vernon Creek);

Figure 18: Wood Lake experiencing marl during 2023 (top) compared to without marl during 2022 (bottom)

Table 3: Years with recorded marl events in Wood Lake

Year	Researchers
1980	(Gray & Jasper, 1982)
1987?	Anecdotal
1994?	Anecdotal
2010	LAC
2011	LAC
2014	LAC
2015	LAC: Chris Young 2016
2016	LAC
2019	LAC
2023	LAC

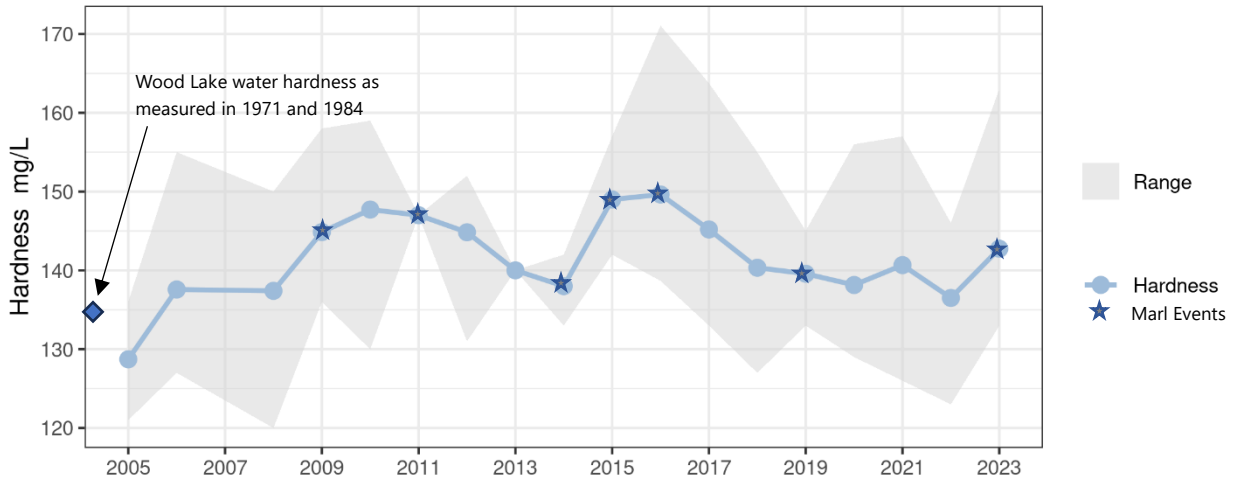

Figure 19: Water hardness in Wood Lake from 2005-2023

Note: Data from LAC and ENV sample sites combined in this figure; Source for 1971 and 1984 data: Jensen & Bryan, 2001

Nutrients

Wood Lake is classified as a meso-eutrophic lake based on the current levels of nutrients, productivity, and water clarity (Table 4, Figure 20). Historically, Wood Lake's nutrient regime was classified as oligo-mesotrophic (Walker et al., 1993). Since regular sampling began in the 1970s, Wood Lake has shifted between mesotrophic, meso-eutrophic, and rarely, eutrophic (Figure 20). A declining trend in eutrophication (improved water quality) occurred from the 1970s through the 1990s that led to a decade of mesotrophic conditions. This aligned with pumping by the Hiram-Walker Distillery (1971-1992) and the introduction of improved wastewater treatment for District of Lake Country (late 1990s). However, there was an increasing trend towards greater eutrophication in Wood Lake since the mid-2000s and 2022 was the first year rated eutrophic since the 1970s. High phosphorus concentrations, a consequence of internal nutrient loading, push Wood Lake towards eutrophication but overall productivity is limited by other factors such as available nitrogen. Nutrient loading during the 1970s was higher for phosphorus than the 2010s (B.C. Research, 1974; Self & Larratt, 2016, Table 5)

Table 4: Lake Classification by Trophic Status Indicators

Trophic Status (score)	Total P µg/L	Total N µg/L	Chlorophyll-a µg/L	Secchi m
Ultra-oligotrophic (0)	<4	<75	<0.95	>10
Oligotrophic (1)	4 –10	75 –100	1 – 2	6 – 10
Mesotrophic (2)	10 – 20	100 – 500	2 – 5	3 – 6
Meso-eutrophic (3)	20 – 35	500 – 900	5 – 7	2 – 3
Eutrophic (4)	35 – 100	900 – 1500	7 –25	1 – 2
Hyper-eutrophic (5)	>100	>1500	>25	<1

Source: (Self & Larratt, 2020b); green shading marks median range for each parameter in Wood Lake, 1970-2023

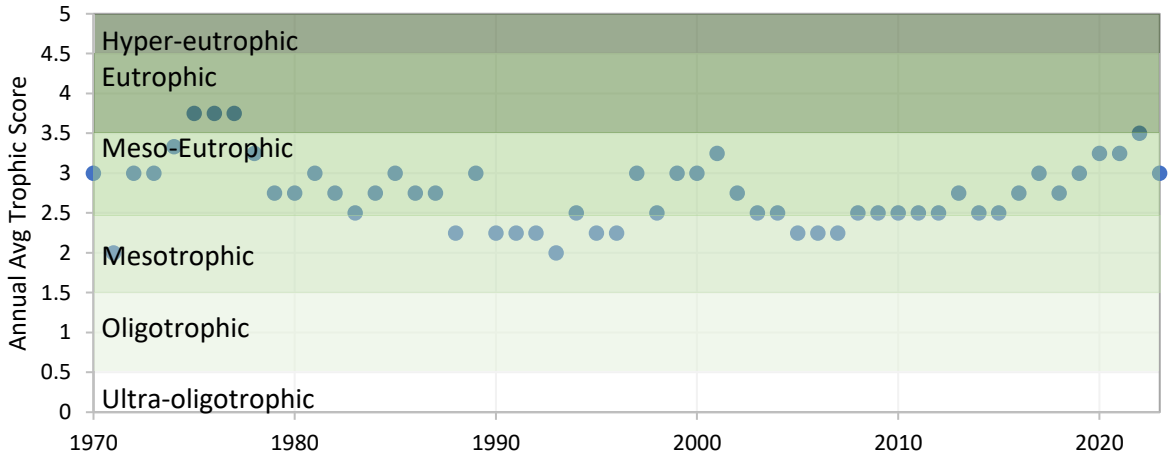

Figure 20: Annual average trophic score for Wood Lake, 1970-2023

Note: Ranks displayed represent mean of each parameter's rank per year using the scores in Table 4

Sources: Kalamalka Lake study (wood.lake); BC EMS (wood848, Wood Lake Deep Basin); Jensen & Bryan, 2001 (Wood.Lake Deep, Wood.Lake West Vernon Creek);

Table 5: Nutrient loading estimates from Vernon Creek into Wood Lake

Param	**1972**	**1973**	**2013**	**2014**	**2015**
TN	16,103	8,346	20,357	15,422	6,499
TP	3,706	898	1,747	1,435	277
TDP	558	331	728	527	82

Sources: (British Columbia Water Resources Service, 1974; Self & Larratt, 2016)

All lakes accumulate nutrients from watershed activities in continuously accumulating sediment layers. Wood Lake experiences intense internal nutrient loading, or recycling of nutrients within the lake that originated in the watershed. Internal loading of nutrients accelerates when anoxic water overlays the sediment. Redox conditions shift and some phosphorus becomes mobilized out of the sediments into the water column. During the stratified periods in Wood Lake, phosphorus accumulates in the hypolimnion leading to very high concentrations by the end of the summer (Figure 21). Nutrients mix upwards during fall overturn, routinely triggering late summer or even winter algae blooms (Figure 28). Most recently, a winter cyanobacteria bloom occurred during December 2023-January 2024 (Figure 31). Internal loading is the primary source of orthophosphate in Wood Lake; orthophosphate is a highly bioavailable form of phosphorus that fuels surface algae blooms (Self & Larratt, 2016).

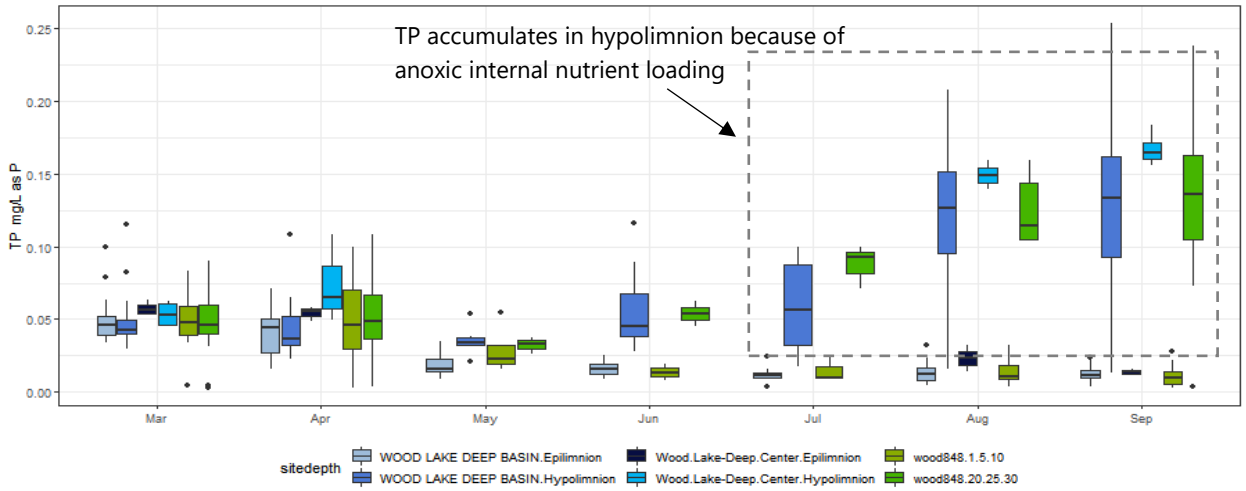

Figure 21: Total phosphorus concentration in Wood Lake by month, 1970-2023
Sources: Kalamalka Lake study (wood.lake); BC EMS (wood848, Wood Lake Deep Basin); Jensen & Bryan, 2001 (Wood.Lake Deep, Wood.Lake West Vernon Creek);

A declining trend in total phosphorus (TP) occurred from the 1970s through the 1990s that aligned with the increased flushing caused by the Hiram Walker discharge upstream and improved wastewater treatment for District of Lake Country (Mann-Kendall, $p<0.001$; Figure 22). The trend reversed in the early 2000s with an increasing TP trend through 2023 (Mann-Kendall, $p<0.001$; Figure 22). TP averaged 0.046 ± 0.029 mg/L as P during 2023 in the epilimnion, the highest annual average since 1983 (Figure 22). Total dissolved phosphorus (TDP) behaved like TP in the hypolimnion but consumption by algae affected the epilimnion TDP values and masked the trends. TDP is rapidly consumed by algae in Wood Lake and an increase in TDP loading is therefore likely to manifest as increased algae production; this relationship was observed through increasing chlorophyll-a and algae densities (Figure 27, Figure 27, Figure 29).

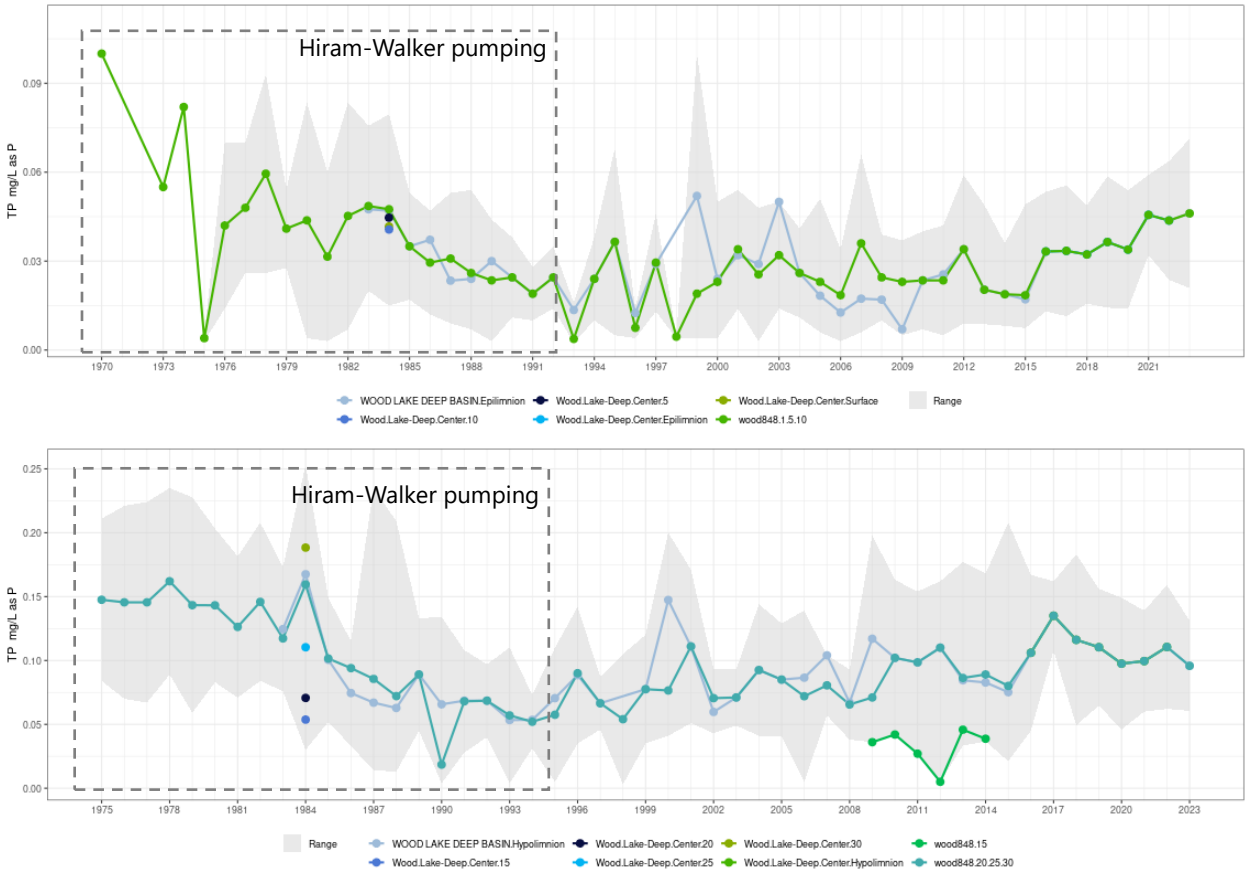

Figure 22: Total Phosphorus (TP) in Wood Lake epilimnion (top) and hypolimnion (bottom), 1975-2023
Sources: Kalamalka Lake study (wood.lake); BC EMS (wood848, Wood Lake Deep Basin); Jensen & Bryan, 2001 (Wood.Lake Deep, Wood.Lake West Vernon Creek);

Wood Lake's total nitrogen concentrations showed a significant declining trend from 1970 to the early 1990`s (Mann-Kendall, $p \leq 0.002$, 1970-1990). TN increased from 2009-2023 in both the epilimnion and hypolimnion (Mann-Kendall, $p \leq 0.01$). Although there was an period of stability from 2012-2018, 2023 had the highest annual average surface TN since 1978 (2023 = 0.665 ± 0.120 mg/L). The four highest surface TN averages since 1981 occurred annually from 2020-2023 (increasing averages year-after-year). Hypolimnion TN was the third highest since 1981 in 2023 (after 2021 and 2012; 2023 average = 0.725 ± 0.077 mg/L). The oldest available TN measurement was from the 1935 study and measured only 0.223 mg/L, 3 times lower than current concentrations.

In most years, dissolved inorganic nitrogen was rapidly consumed by algae in Wood Lake, resulting in inorganic nitrogen limitation in the surface water (Figure 24). As with phosphorus, nitrogen accumulates in the bottom water during the stratified period because of anoxic nutrient recycling. Ammonia becomes the dominant form of inorganic nitrogen each summer in the hypolimnion of Wood Lake. Surface nitrogen limitation favours the proliferation of cyanobacteria because some species can utilize atmospheric nitrogen leading to Wood Lakes common cyanobacteria blooms (Figure 29).

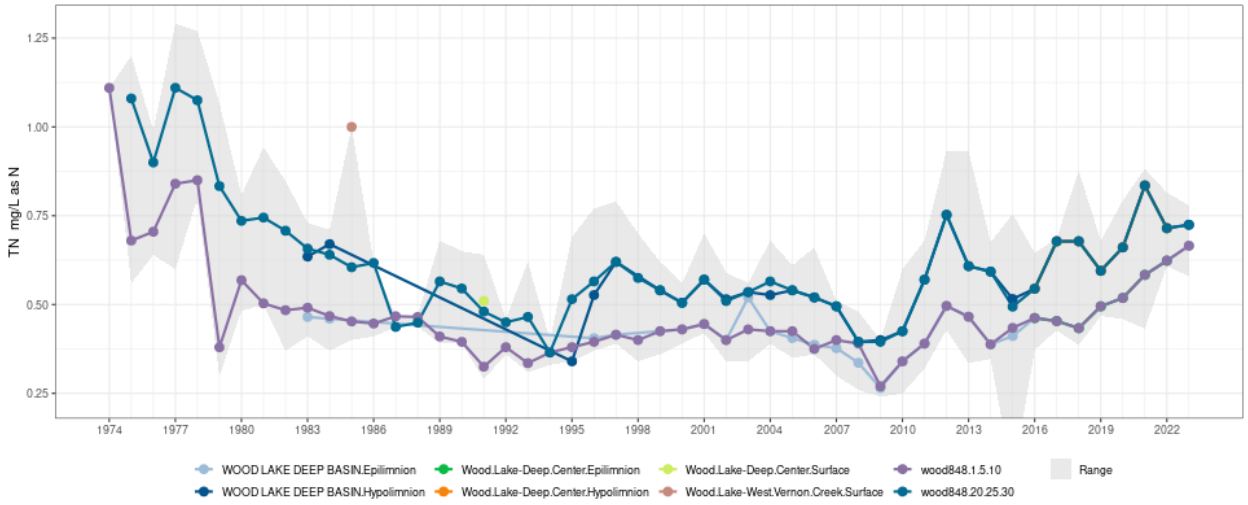

Figure 23: Total nitrogen in Wood Lake, 1974-2023

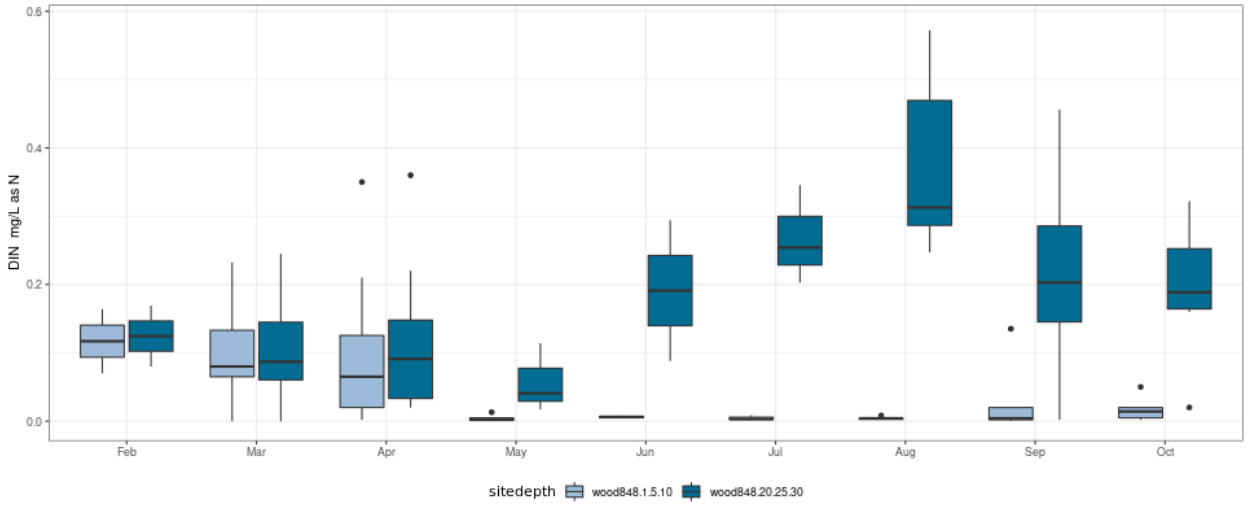

Figure 24: Dissolved inorganic nitrogen in Wood Lake by month, 1970-2023

Duck (Ellison) Lake Comparison

Duck Lake (called Ellison Lake in BC EMS database), is a small, shallow, and very productive lake located upstream of Wood Lake and it feeds Middle Vernon Creek (MVC). The condition of Duck Lake affects Wood Lake directly. The Hiram-Walker distillery discharged its used cooling water into Vernon Creek upstream of Duck Lake, greatly increasing the theoretical flushing rate through Duck Lake while it operated (1971-1992). However, research conducted at the time on the behavior of the Vernon Creek plume showed that it routinely short-circuited Duck Lake and flowed along the north shore directly into MVC (British Columbia Water Resources Service, 1974). This would have reduced flushing of nutrients from Duck Lake into Wood Lake.

TN and TP were 27% and 50% higher, respectively, in Duck Lake compared to the epilimnion samples of Wood Lake across the historical dataset (1969-2023; KW-Tests, $p<0.001$, Figure 25). However, nutrient recycling within the anoxic zone of Wood Lake leads to significantly higher TP in the hypolimnion of Wood Lake than Duck Lake (63% higher in Wood Lake). Nutrients from Duck Lake that reach Wood Lake fuel algae growth which transports those nutrients to the sediment where they can then be recycle within Wood Lake. TN conditions were stable with strong interannual variation in Duck Lake over the past 20 years while TP showed a significant increasing trend since 2008 (Mann-Kendall, $p=0.002$).

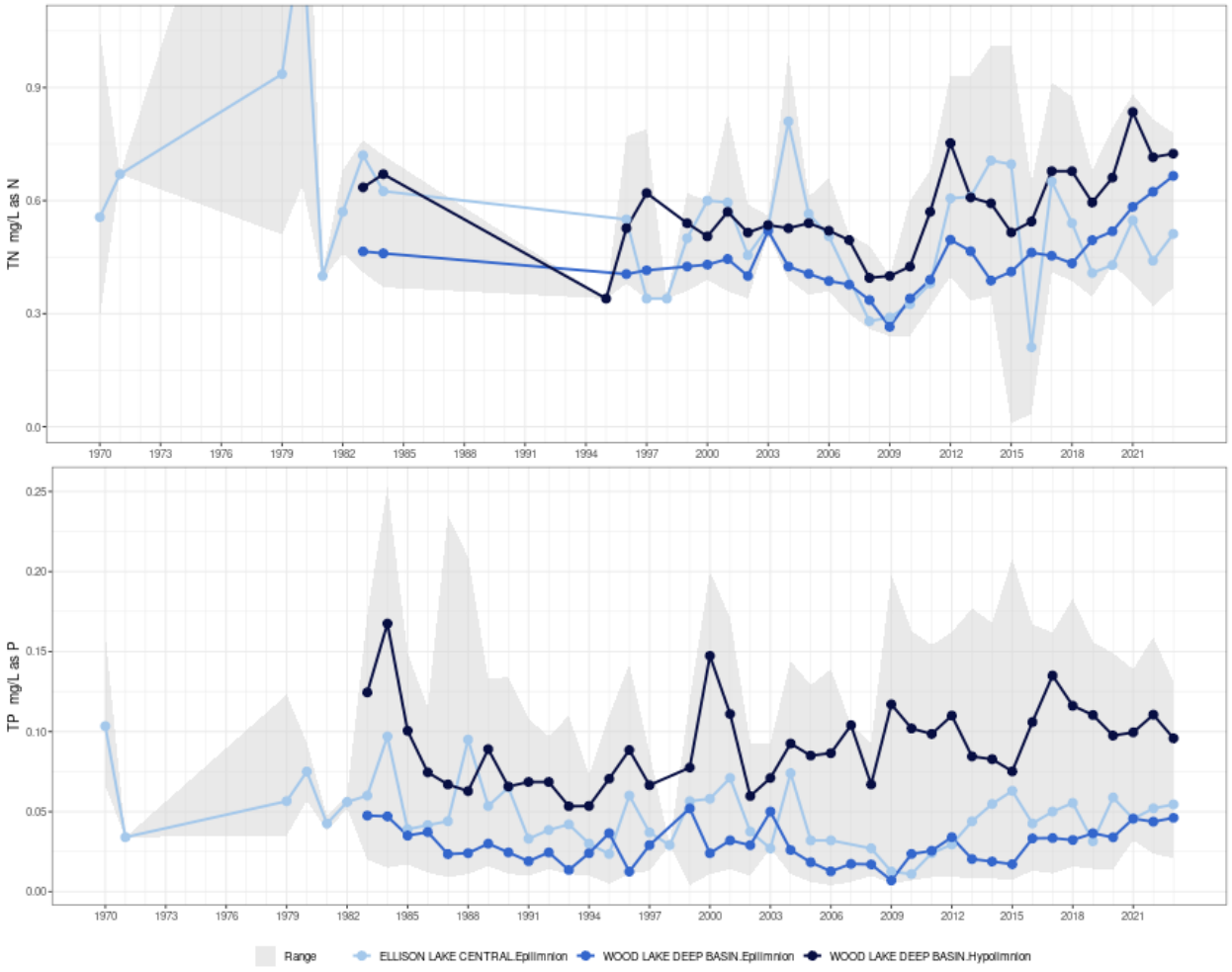

Figure 25: Total nitrogen (top) and total phosphorus (bottom) in Duck and Wood Lakes, 1970-2023

Total nutrients were significantly higher in Duck Lake but, dissolved inorganic nitrogen (DIN = nitrate + ammonia) was higher in Wood Lake surface waters (KW-Test, $p<0.001$; Figure 26). A declining trend in ammonia occurred in Duck Lake with the highest concentrations observed during the 1980s followed a clear decline into the late- 1990s (Mann-Kendall, $p=0.006$). TDP was quite similar between the two lakes and was stable from 1979-2023 (Figure 26).

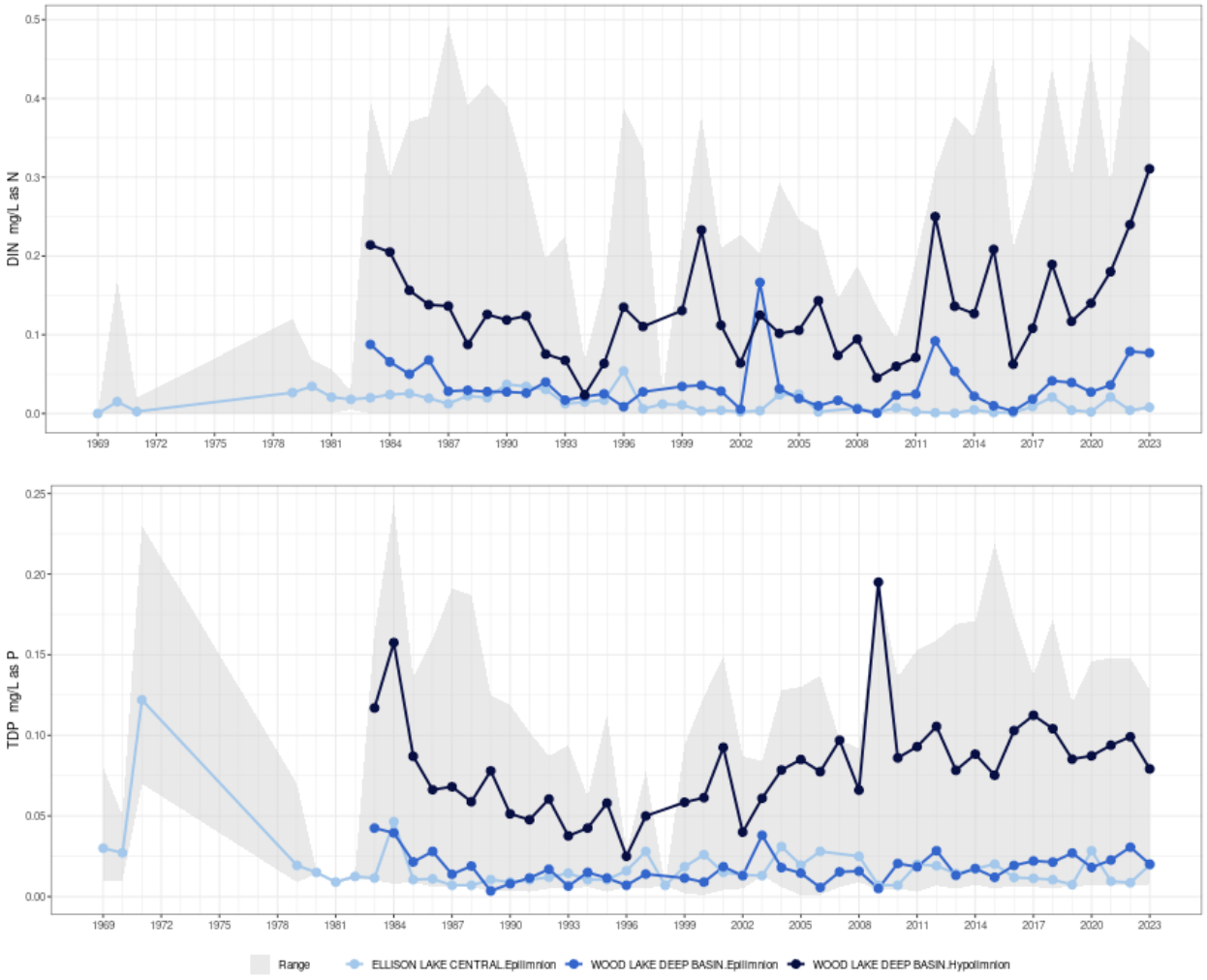

Figure 26: Dissolved inorganic nitrogen (DIN) and total dissolved phosphorus (TDP) in Duck and Wood lakes, 1969-2023

Algae & Bacteria

Since the mid-2000's algae blooms frequency has increased (Pearson's R = 0.52 for annual average TP vs chlorophyll-a at the Wood848 sample site since 2000; Figure 27). This led to large nuisance blooms during some years and a positive feedback loop where decomposition of large algae blooms leads to larger anoxic zones and greater nutrient recycling that fuels larger blooms the following year, repeating the cycle.

Chlorophyll-a

Chlorophyll-a (chl-a) is a major photosynthetic pigment common in many algal types and excessive algal growth leads to higher chl-a concentrations. Wood Lakes surface water averaged 5.7 ± 6.1 µg/L in chl-a from 2005-2023 (7.9 ± 6.0 µg/L in 2023). Chl-a concentrations significantly increased in the surface water of Wood Lake over the past 10 years (Mann-Kendall, p <0.001; Figure 27).

Spikes in chl-a are associated with major bloom events (Figure 27, Figure 29). Climatic variation also affects chl-a; for example, the wet years of the late 1990s led to several years of very high chl-a. A cyanobacteria bloom with >50 µg/L chlorophyll-a can have a cell count approaching 100,000 cells/mL and toxicity to animals drinking the water would be probable (World Health Organization, 1999).

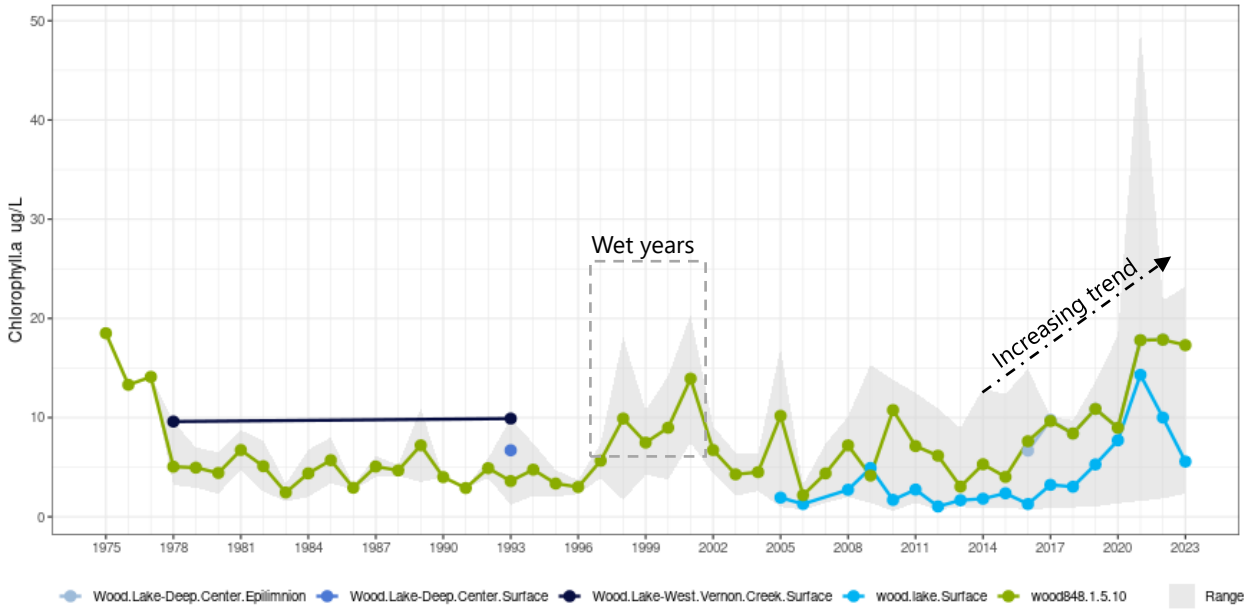

Figure 27: Chlorophyll-a concentrations in Wood Lake, 1975-2023

Chlorophyll-a concentrations demonstrate seasonality in Wood Lake. Each spring algae production increases as day length and water temperature increase, leading to a spring bloom. This bloom is typically dominated by diatoms (Figure 29). Diatom cells are orders of magnitude larger than cyanobacteria cells and produce much more chl-a per cell. This leads to an apparent mismatch highlighted in Figure 28 and Figure 29 where chl-a is very high in the spring, but cell densities appear relatively low. Despite the apparent mismatch, the spring biomass produced is considerable and diatoms will compete against cyanobacteria for nutrients, restricting what is available later in the summer. Cyanobacteria proliferate in Wood Lake during the late summer leading to very high cell densities and a second peak in the chl-a distribution (Figure 28, Figure 29). Nutrient accumulation in the hypolimnion during years with intense anoxic zones, such as 2023, can trigger winter cyanobacteria blooms after the lake mixes in November and those nutrients become available to algae (Figure 31).

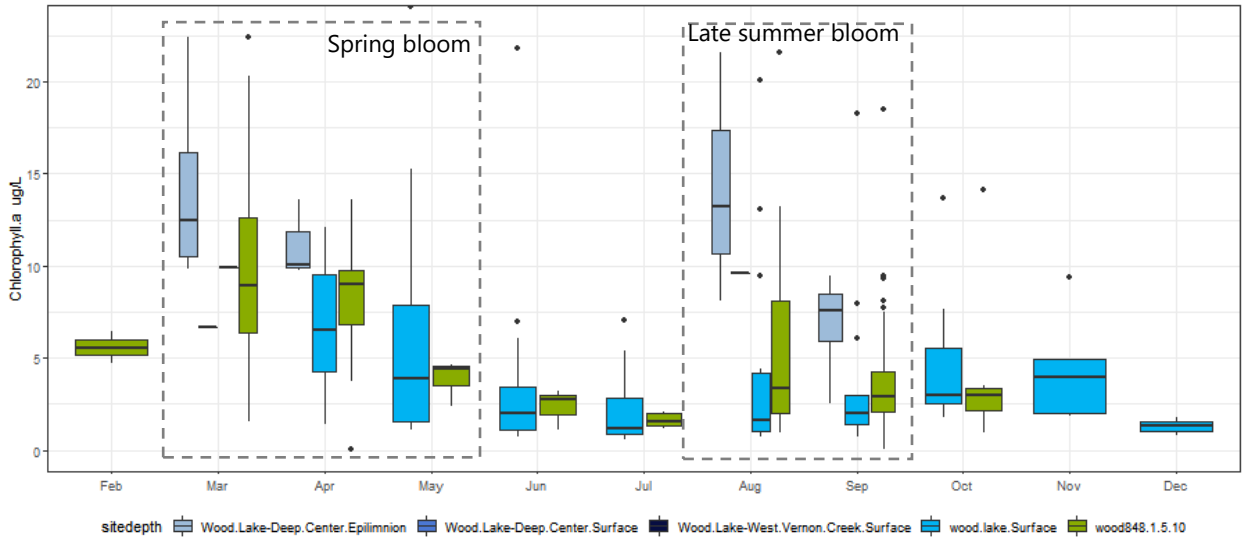

Figure 28: Chlorophyll-a concentration in Wood Lake by month, 1975-2023
Sources: Kalamalka Lake study (wood.lake); BC EMS (wood848, Wood Lake Deep Basin); Jensen & Bryan, 2001 (Wood.Lake Deep, Wood.Lake West Vernon Creek);

Algae Abundance

Wood Lake total cell densities increased significantly since 2005 (Mann-Kendall, $p < 0.001$). This trend is because of increasing trends in diatoms, green algae, cyanobacteria, and flagellate concentrations over the same time frame (Mann-Kendall trend tests), although the increase in cyanobacteria abundance was the largest contributor (Figure 29).

In 2023, the average total cell density for Wood Lake was 8,161 ± 7,328 cells/mL with 5,370 ± 5,643 cell/mL of cyanobacteria. The highest count recorded was 14,930 cells on September 29, 2023. During six of the eight 2023 sampling events, cyanobacteria concentrations exceeded the WHO alert threshold of 2000 cells/mL (Figure 29). Only during the blooms of 2011 and 2021 did cyanobacteria densities exceed the Alert Level 2 threshold (>15,000 cells/mL, Appendix 5: Cyanobacteria Alert Level Boundaries, Figure 30).

Cyanobacteria common to Wood Lake include the bloom-forming genera *Anabaena, Anacystis, and Aphanizomenon* and they can produce a range of cyanotoxins (Appendix 4: Common cyanobacteria in Wood Lake). The other common cyanobacteria taxa, *Planktolyngbya* and *Gomphosphaeria,* while capable of producing cyanotoxins, are not noted for toxicity. The oldest algae taxonomy results reported that *Aphanizomenon sp.* was dominant and forming a nuisance surface bloom on August 13, 1935 (Clemens et al. 1939). Risk of cyanobacterial toxicity in Wood Lake is therefore dependent upon the species present and cell density (Figure 30); 2023 productivity included all three of the problematic taxa: *Anabaena, Anacystis, and Aphanizomenon*. Wood Lake cyanobacterial species involved in the annual blooms vary by year and by season in response to factors including nutrient balances, weather, and zooplankton grazing.

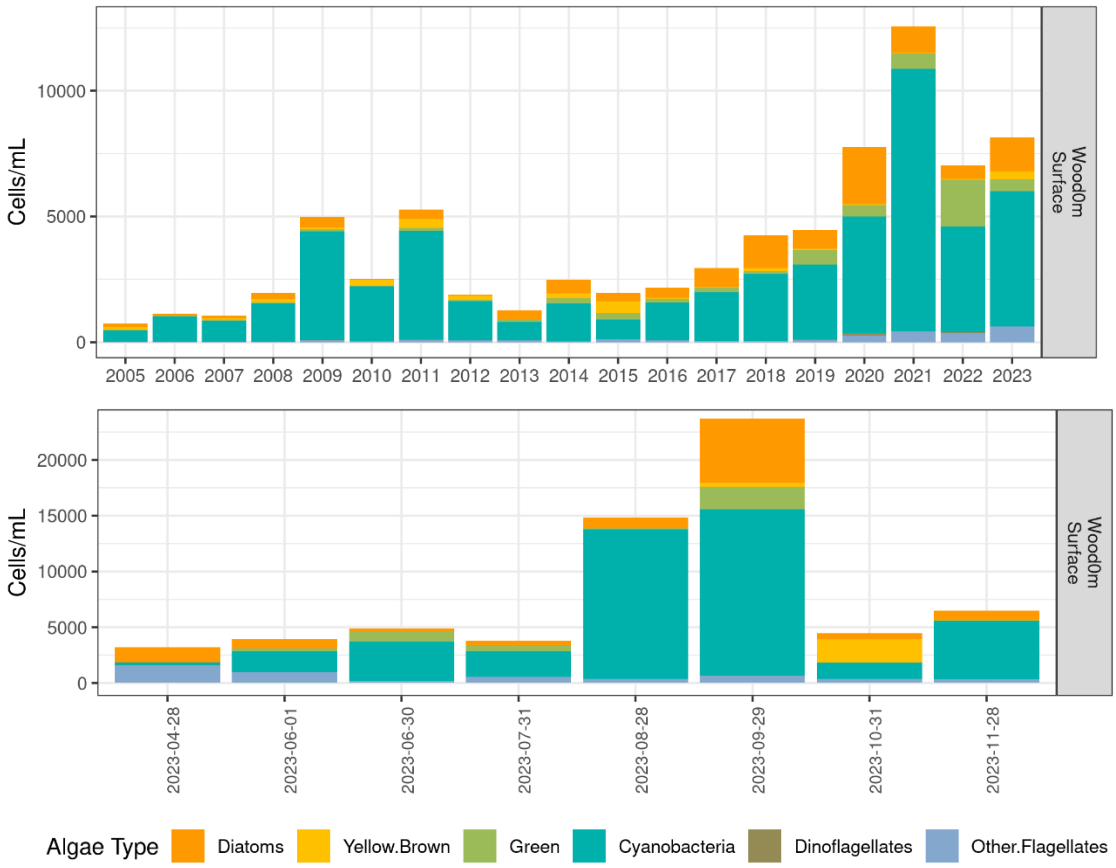

Figure 29: Wood Lake annual average surface algae counts from 2005-2023 (top) and 2023 counts only (bottom)

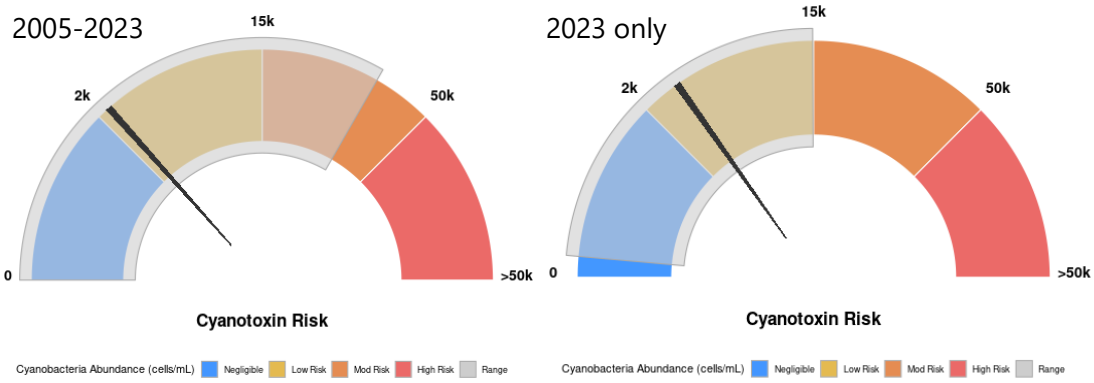

Figure 30: Cyanotoxin production risk scale for Wood Lake

Graph Interpretation:

- Black line indicates mean cyanobacteria abundance within the selected date range
- Gray shaded region indicates range of cyanobacteria abundance values within the selected date range
- Coloured zones mark cyanobacteria abundance ranges that correspond to certain risk levels associated with cyanotoxin production (see Appendix 5: Cyanobacteria Alert Level Boundaries for details on the sources used to define categories)

Figure 31: Cyanobacteria bloom in Wood Lake, January 2, 2024
Source: Mike Soloshy

Bacteria

E. coli is a metric of fecal contamination; Wood Lake surface samples had consistently low *E. coli* counts and were below detection limits in 91% of samples from 2008-2023 with a maximum of only 1 CFU/100mL (Figure 32).

Total coliforms are a group of soil bacteria used for testing water treatment efficacy. They can also serve as a marker for watershed disruption. Concentrations in Wood Lake increased significantly from 2008 to 2023 with the largest increase occurring from 2020 to 2023 (Mann-Kendall, p <0.001). The highest concentration to date measured 1730 CFU/100 mL on August 28, 2023 (Figure 32). These results closely match the total algae densities and indicate a shift in Wood Lake's microbiota in recent years (Figure 29).

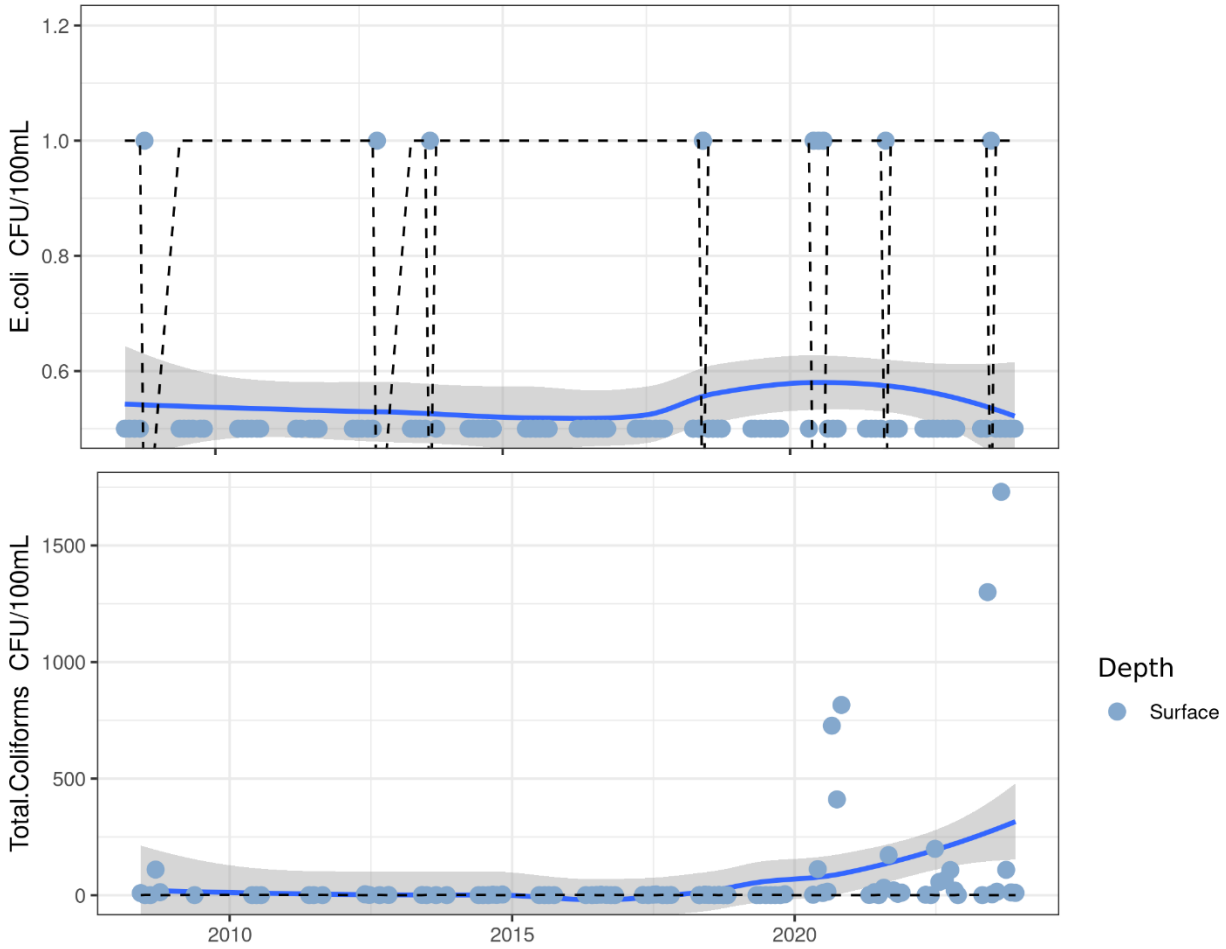

Figure 32: E. coli (top) and Total coliform bacteria (bottom) concentrations in Wood Lake, 2008-2023
Note: Lab detection limit of 1 CFU/100 mL indicated with dash line

Sediment

Sediments continuously accumulate in all lakes. Surface sediments were recently deposited while deep sediments were laid down long ago. Sediments lining the bottom of Wood Lake are fine organic silts: 3.3% sand, 61.7% silt, 35.0% clay, with the most common size averaging 12 microns (St John, 1973a).

Composite sediment cores were taken at one site near the north end of Wood Lake (Figure 6). The maximum depth that could be sampled was limited to 10 m below the surface because of the sediment corer mechanism. Sediment in Wood Lake was soft and dark grey to black in colour. Arsenic concentrations in the core were used as a timestamp based on the method employed by Walker and collaborators (I.R. Walker, E.D. Reavie, S. Palmer, 1993). This method cross references the timing of peak lead-arsenate use in orchards to a distinct peak in sediment arsenic concentrations. This peak was measured at approximately 24 cm deep during the 1993 study while it was observed at 14-20 cm deep in our cores (Figure 33). These depths indicate the expected result that the sediment accumulation rate is higher at the deepest point in Wood Lake compared to the north-end shallows.

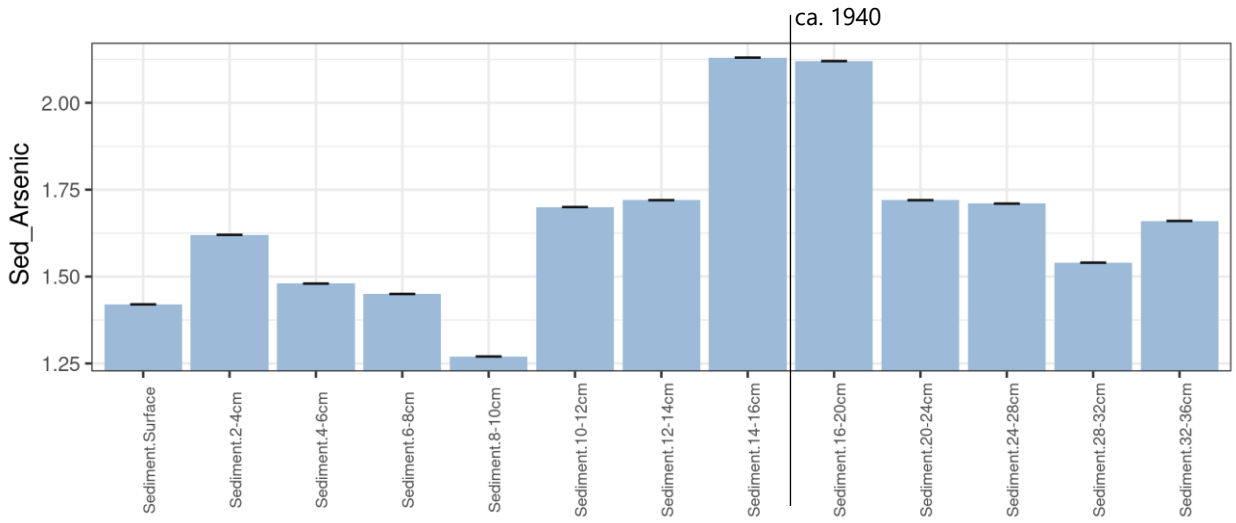

Figure 33: Arsenic concentration (mg/kg) in Wood Lake sediment by depth, illustrating the distinctive arsenic peak that marks the year 1940

Sediment Accumulation Rates

Sediment accumulation rates can vary significantly between lakes and even within the same lake depending on proximity to inflows, sediment disturbances, and position within the lake. Sediment naturally focuses into the deepest point of the lake but this can still be variable (I.R. Walker, E.D. Reavie, S. Palmer, 1993). For example, Walker and collaborators measured accumulation rates as high as 10 mm/year in Wood Lake at the deepest point in 1993 based on sediment core metals. LAC deployed a pair of sediment traps near the north end of the lake that measured average accumulation rates of 0.09 ± 0.03 mm/yr in the shallows (12 m deep) and 0.12 ± 0.04 mm/yr at a deeper location (23 m deep). Using the sediment core approach, based on the arsenic spike, LAC estimated a sediment accumulation rate of 1.9 mm/yr. This closely matches the estimated accumulation rate of 2.0 mm/yr from the 1973 study of the Okanagan Lakes limnogeology (St John, 1973b) but was less than the rate measured in 1993 (I.R. Walker, E.D. Reavie, S. Palmer, 1993). This sediment core dating approach

produced a significantly higher sediment accumulation rate than what was measured by the sediment traps method and suggests that method is either missing a significant fraction of accumulated sediment, or, that the accumulation rate was uncommonly low during 2023. Assuming the sedimentation rate of ~2mm/yr according to the sediment arsenic marker, the 2023 sediment core extends back to the mid-1800s, therefore capturing most the time since European settlement began, but does not include pre-settlement sediment.

Sediment Hydrocarbons

EPHs, HEPHs, LEPHs, and PAHs are hydrocarbons and represent contaminants from petroleum and incomplete combustion. Hydrocarbons are found in and around industrial areas and in road runoff. These compounds can be washed into lakes and contribute hydrocarbons concentrations in sediment. Sediment core samples from 2023 Wood Lake were undetectable for all hydrocarbons, an encouraging result. Other sediment samples taken in a Wood Lake marina reflected hydrocarbon use in power boating (Schleppe et al., 2016; Self & Larratt, 2020a).

Sediment Total Volatile Solids

Volatile solids measure the organic compounds in sediment. Volatiles are materials from both natural and anthropogenic origins including plants, bacteria, and algae (Lu et al., 2021). Wood Lake sediment averaged 3.3 ± 0.53 % with T1 0-2 containing the lowest and T1 4-6 containing the highest concentration of total volatile solids (1.9 % and 4.1 % respectfully, Figure 34). Cores collected in 1973 showed a similar pattern with higher organic carbon content in surface sediments that were recently laid down (St John, 1973b). The arsenic dating timeline indicates that the peak in organic carbon sedimentation was in the late 1990s to early 2000s, aligning to a climatic wet period with high algae production (Figure 28). The current high production period (2020-2023) does not appear to have affected organic sedimentation at the north shallows site.

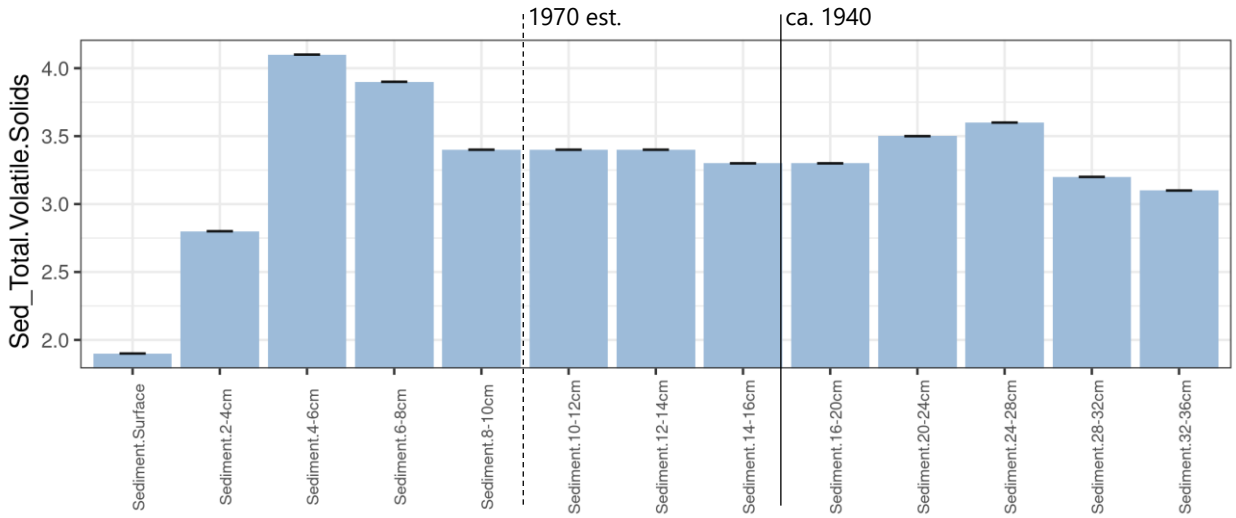

Figure 34: Total volatile solids (%) in Wood Lake sediment, 2023

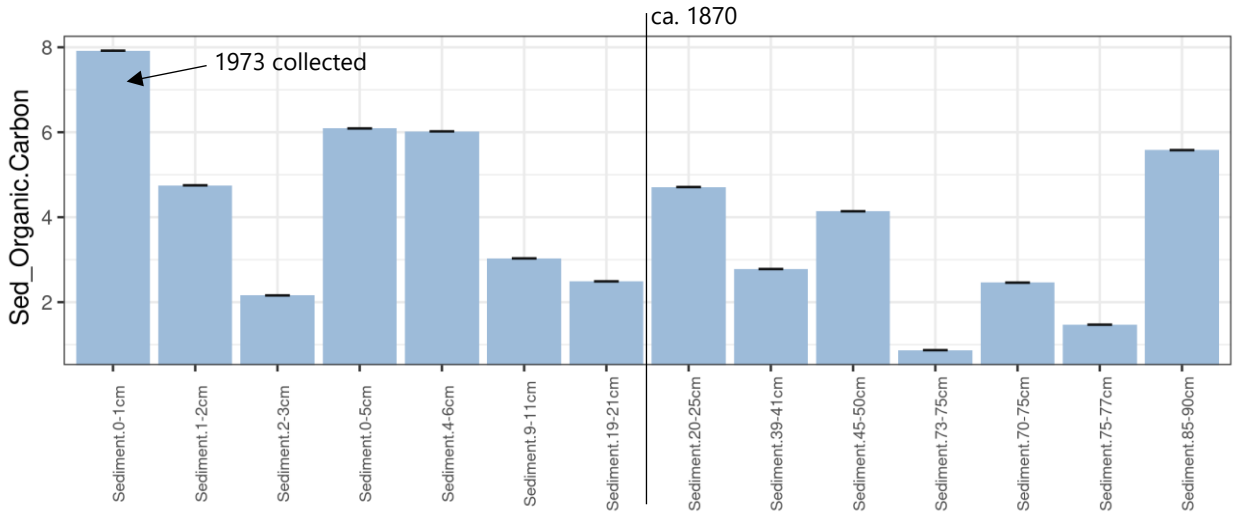

Figure 35: Sediment carbon concentrations at deepest point in Wood Lake as measured in 1973
Note: circa 1870 line is from St John, 1973 | Source: St John, 1973

Sediment Total Metals

Total metals were screened against British Columbia Interim Sediment Quality Guidelines (BC ISQG). All core segments from Wood Lake exceeded two guidelines, manganese (<460 mg/kg) and nickel (<16 mg/kg; Table 6).

Manganese concentrations averaged 996 ± 129 mg/kg in the Wood Lake 2023 sediment core samples. The lowest concentration was 608 mg/kg in T1 0-2 core segment, and the highest concentrations were 1090 mg/kg in segments T1 4-6 and T1 16-20 (Table 6).

Nickel averaged 20.2 ± 2.43 mg/kg with T1 0-2 containing the lowest concentration at 16.1 mg/kg and T1 12-14 measuring the highest nickel concentration of 25.1 mg/kg (Table 6).

Several metal concentrations were correlated, forming distinct clusters in the dendrogram (Figure 36). A group containing calcium, sulfur, and magnesium clustered because of their common relationship in marl and hard water. Moisture and manganese correlated strongly because highly organic sediment retains more water (higher moisture) and is more strongly anoxic which is associated with the movement of manganese in and out of the sediment. Another distinct group included metals commonly associated with historic agricultural activities such as copper, arsenic, and lead (Figure 36).

Non-parametric multidimensional scaling (NMDS) was also performed on the metals results to determine how the different depths grouped across all parameters. The results grouped similarly to the diatom NMDS results with three distinct groupings corresponding to pre-1940s, mid-twentieth century, and the most recent sediments (Figure 37, Figure 43).

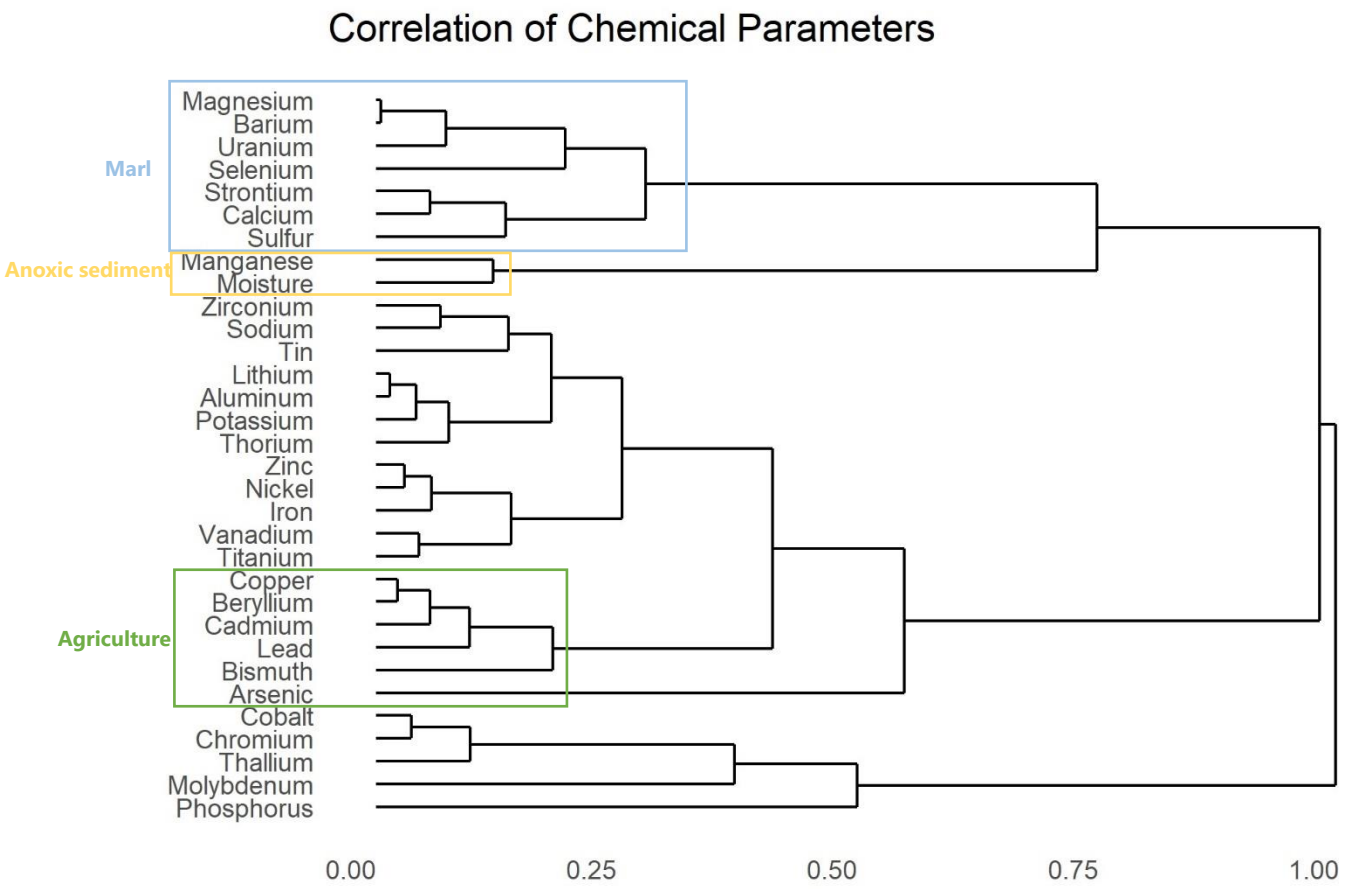

Figure 36: Dissimilarity dendrogram for sediment core metals

Note: dissimilarity matrix calculated Pearson's correlation coefficient

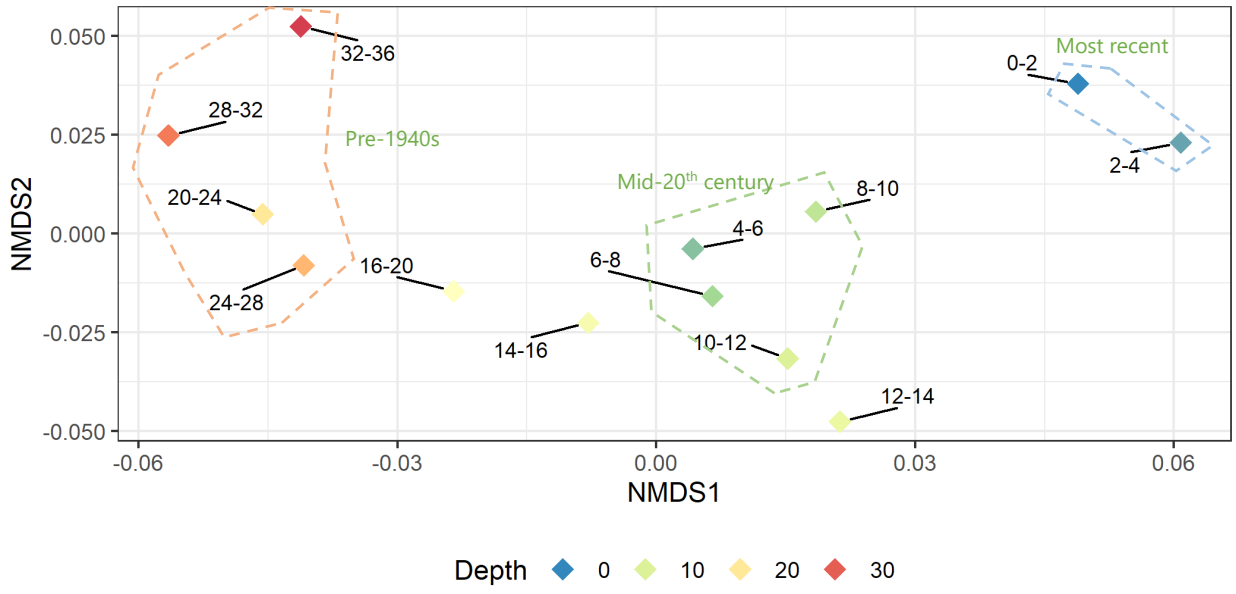

Figure 37: NMDS analysis of sediment core metals

Table 6: Metal exceedances in Wood Lake sediment

Core segment	Metal	Result (mg/kg)	BC ISQG (mg/kg)
T1 0-2 cm	Manganese	608	460
	Nickel	16.1	16
T1 2-4 cm	Manganese	987	460
	Nickel	18.3	16
T1 4-6 cm	Manganese	1090	460
	Nickel	21.1	16
T1 6-8 cm	Manganese	1080	460
	Nickel	21.1	16
T1 8-10 cm	Manganese	1020	460
	Nickel	19.6	16
T1 10-12 cm	Manganese	1070	460
	Nickel	22.6	16
T1 12-14 cm	Manganese	1030	460
	Nickel	25.1	16
T1 14-16 cm	Manganese	1050	460
	Nickel	21.9	16
T1 16-20 cm	Manganese	1090	460
	Nickel	22.1	16
T1 20-24 cm	Manganese	1030	460
	Nickel	19.4	16
T1 24-28 cm	Manganese	1050	460
	Nickel	20.1	16
T1 28-32 cm	Manganese	937	460
	Nickel	17.4	16
T1 32-36 cm	Manganese	906	460
	Nickel	18.2	16

Source: for BC ISQG https://bcgov-env.shinyapps.io/bc_wqg/

Sediment Diatoms

Diatoms are a diverse group of unicellular microscopic photosynthetic organisms with silica cell walls that can be preserved indefinitely in sediments (Burge et al., 2018). They are useful as biological indicators of change in aquatic systems because individual diatom species have specific ecological requirements. Examining diatom abundance and distribution in sediment allows reconstruction of entire lake histories.

The Wood Lake sediment cores were therefore analyzed for diatom abundance from each horizon (1-2 cm thick slices). We used the relative abundance of diatoms in each horizon to track changes in water quality over time using diatom habitat preferences such as high or low nutrient concentrations. The date of the horizons was cross-referenced using the metals dating discussed previously. The results were lumped into several groups depending on the change observed. Across a broad range of taxa, the 1940-1970 period was an inflection point and is marked on the graphs.

Taxa That Show Temporary Changes

The first group of sediment diatom taxa showed temporary changes in abundance. A pattern of relatively high abundance in the oldest sediments followed with a distinct drop and then a reappearance in more recent sediments emerged. The sediment core horizons between 8 and 16 cm deep had markedly lower relative abundances for several common taxa (Figure 38). These five taxa are all generalist algae types that can tolerate mesotrophic and eutrophic conditions; the direct cause of their population shift is not clear. The 1993 sediment diatom study also identified shifts in *Aulacoseira, Fragilaria,* and *Navicula*. This pattern was also observed in *Fragilaria* and *Navicula* during the 1993 study (Walker et al., 1993; Figure 40).

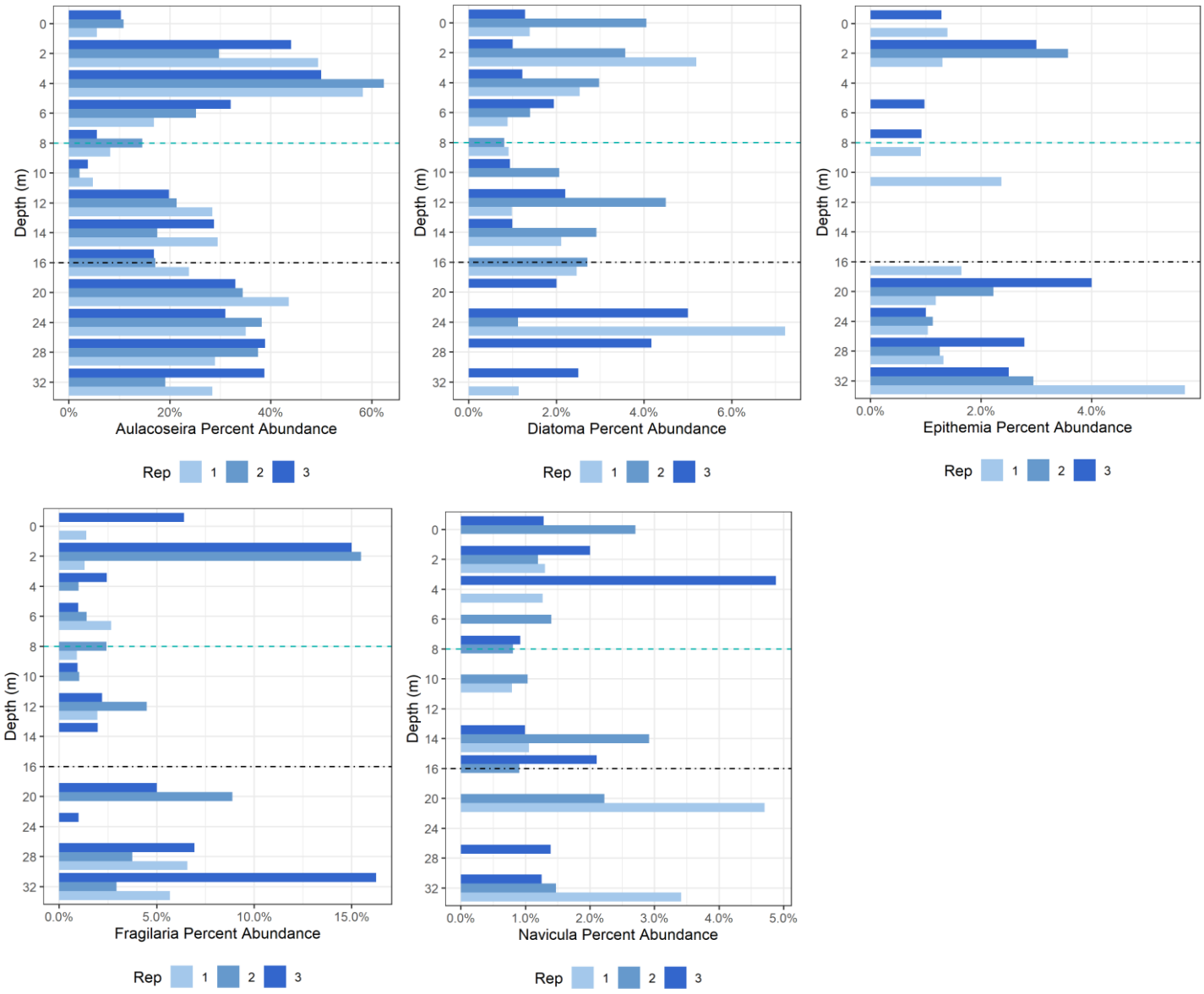

Figure 38: Diatom genera in the taxonomic record that declined temporarily before returning
Note: Teal dashed line =~1970 while black dashed line =~1940 based on metals analysis | 2023 sediment core

Taxa That Decreased or Disappeared

Several taxa were observed that either declined in abundance over time, or suddenly disappeared from the taxonomic record (Figure 39). Of these, *Achnanthidium* is considered sensitive to poor water quality and its decline over the past 100+ years may indicate a long-term decline in Wood Lake water quality. *Discostella,* a close relative and sometimes cross-identified as the common genus *Cyclotella*, was common in the oldest sediments before largely disappearing. The 1993[2] study also noted a shift from *Cyclotella to Stephanodiscus* (I.R. Walker, E.D. Reavie, S. Palmer, 1993; Figure 40, Figure 41). *Platessa* is a type of algae that grows in periphyton of rivers and its disappearance may be linked changes to the upstream watershed such as the Hiram-Walker inflows, urbanization, agricultural pesticide use, etc. *Rhopalodia* is a low-nutrient indicator taxa that was present in only the oldest sediments in both the 1992 and 2023 sediment cores, indicating that nutrients have increased since European settlement began (Figure 40).

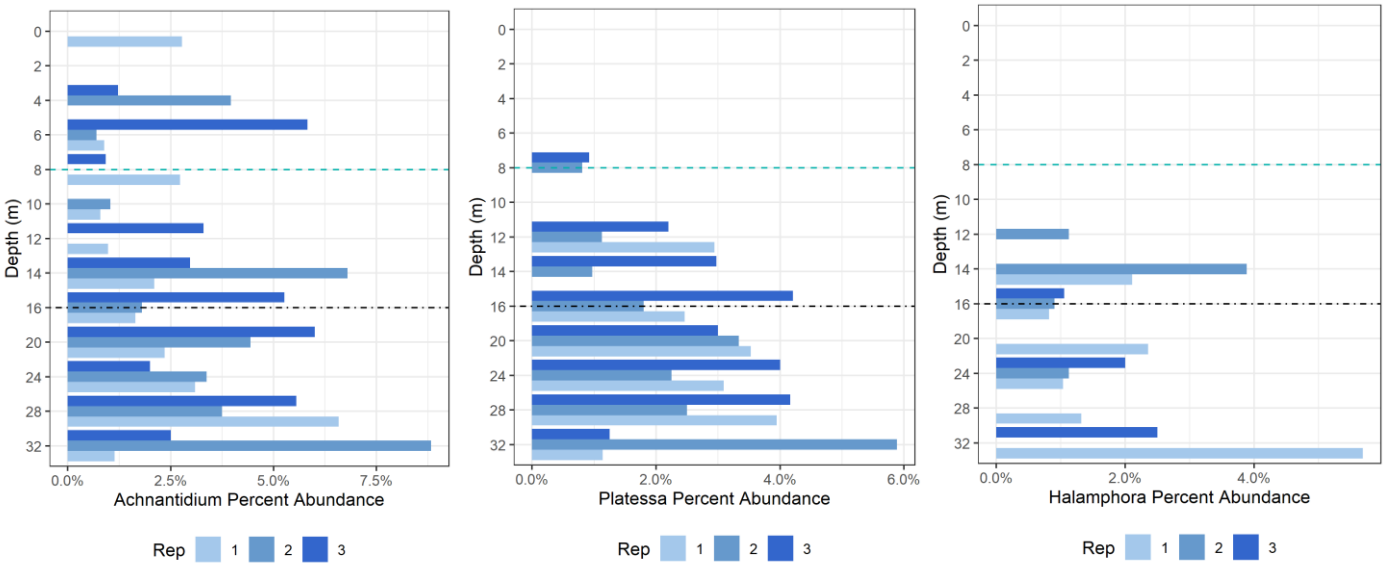

Figure 39: Diatom genera that declined or disappeared from the taxonomic record

Note: Teal dashed line =~1970 while black dashed line =~1940 based on metals analysis | 2023 sediment core

[2] The 1993 Walker study used a sediment core collected in May of 1992 for diatom comparison. Both years are used in this report to refer to this document depending on the context.

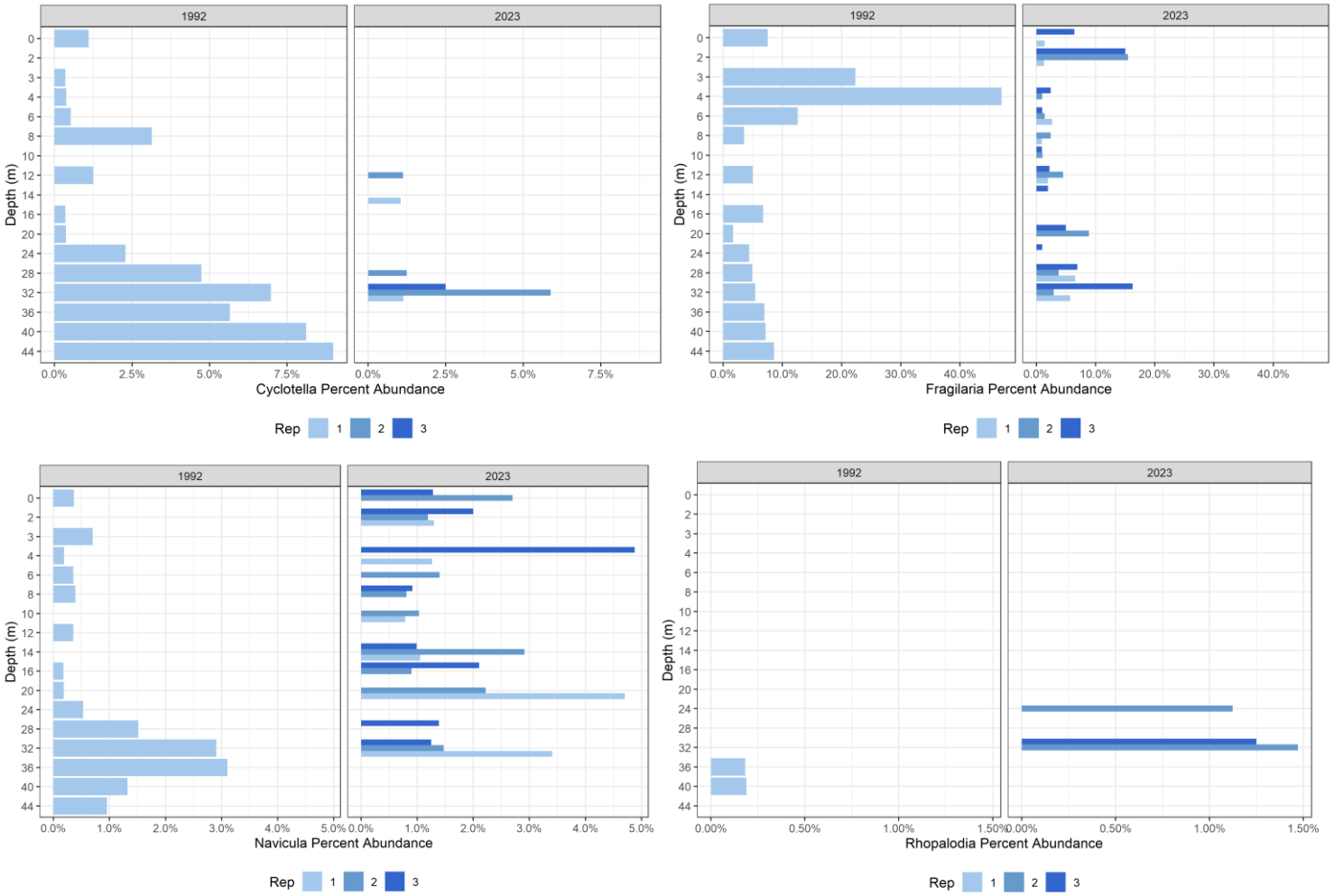

Figure 40: Comparison of Cyclotella, Fragilaria, Navicula, and Rhopalodia percent abundance in 1992 and 2023 sediment cores

Taxa That Increased or Appeared

Some taxa increased in abundance over time or appeared suddenly in the taxonomic record (Figure 41). *Cavinula* is a recently identified split from the very large genus *Navicula*[3][4]and was common throughout the taxonomic record but became the dominant species present in the most recent sediments. *Cavinula* contains several species that range in habitat preferences from generalist to alpine oligotrophic specialists and the cause its surge in the taxonomic record is unclear (Cvetkoska et al., 2014). Two taxa that appeared suddenly in Wood Lake's taxonomic record were *Stephanodiscus* and *Ulnaria*; both genera that include pollution tolerant species. The sudden appearance of *Stephanodiscus* was also noted in the 1993 Wood Lake study as a marker of nutrient enrichment, although the

[3] Fun taxonomy fact: these two taxa are spelled the same except that the n and c are swapped.
[4] The genus *Navicula* currently has over 1000 accepted species according to ITIS.

abundances observed in that study were much higher than was found in the 2023 core and the cause of this disparity is not clear (I.R. Walker, E.D. Reavie, S. Palmer, 1993).

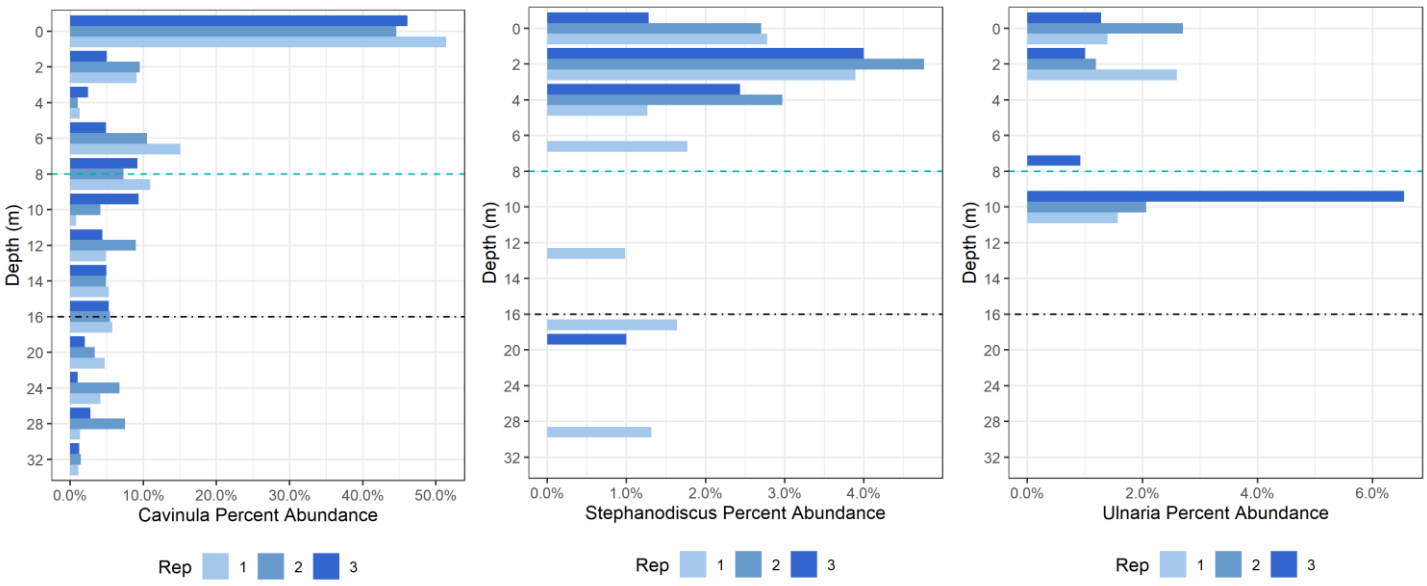

Figure 41: Diatom genera that increased or appeared suddenly in the taxonomic record
Note: Teal dashed line =~1970 while black dashed line =~1940 based on metals analysis | 2023 sediment core

In addition to diatoms, two types of green algae were common in the 2023 sediment cores[5]. *Phacotus* was among the most common taxa in Wood Lake prior to the 1970s based on the 2023 sediment core (Figure 42). It is a marker of warm, high calcite water and may be a marker for the introduction of Okanagan Lake water into Middle Vernon Creek by Hiram-Walker (Schlegel et al., 1998). *Phacotus* abundance was weakly correlated with sediment calcium concentration (Pearson's R=0.38) with both parameters showing a decline in recent years. One of the most common features in the 2023 core were the remnants of filamentous green algae, of the genus *Mougeotia* (Figure 42). This is a very common species in Wood Lake today and is routinely found in water samples collected for the ongoing Kalamalka Lake Study. Interestingly, this taxa is absent in the oldest sediment, and then suddenly becomes a top 3 most abundant taxa in every horizon since around 1940.

[5] The 1993 study focused only on diatoms, preventing a comparison of these algae types.

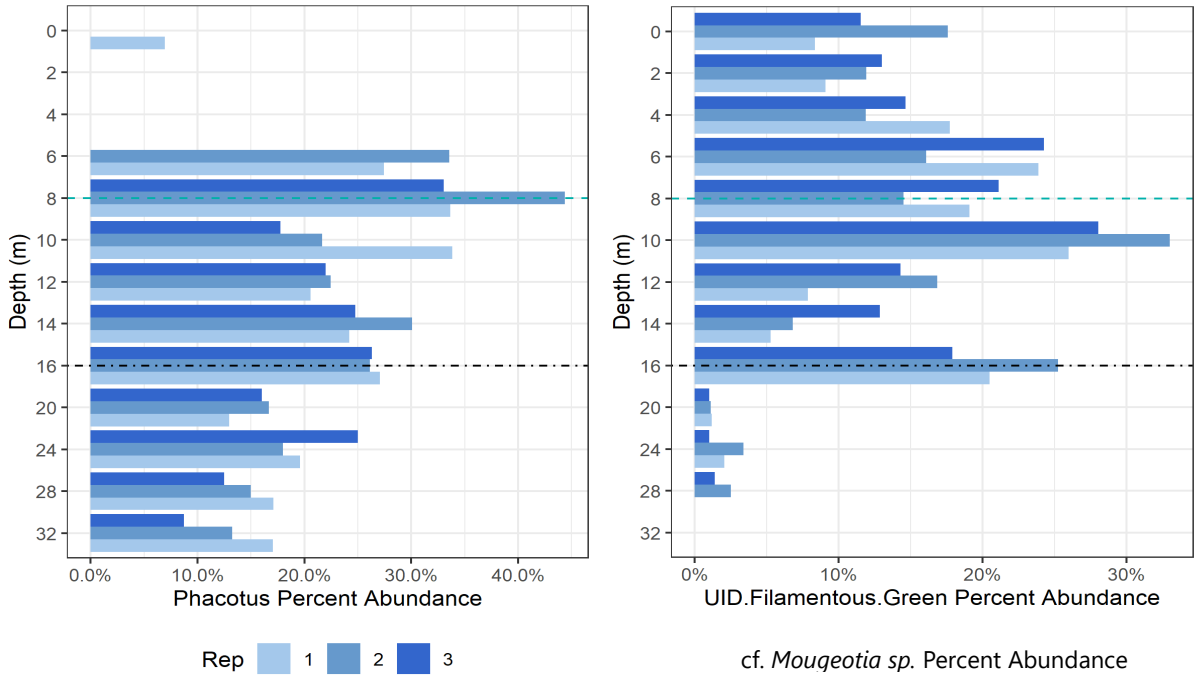

Figure 42: Green algae identified in sediment horizons collected during 2023
Note: Teal dashed line =~1970 while black dashed line =~1940 based on metals analysis

Community Composition

In addition to comparing individual species across time through the sediment cores, it is also possible to compare the community composition across time using non-parametric multidimensional scaling analysis (NMDS). This approach collapses multiple dimensions into 2-dimensions for plotting and visual comparison. The NMDS results indicated that the diatom community compositions were distinct between the 1992 and 2023 sediment cores (Figure 43). The relationship between the depth horizons in the cores is plotted in Figure 43. While there is no overlap between the 1992 and 2023 cores, the same patterns come through as marked by the coloured groupings in Figure 43. Differences in taxonomic approach and re-naming of species could explain some of the differences between the two datasets. The results indicate that Wood Lake has experienced three distinct phases as captured in both the 1992 and 2023 cores that can be summarized by their time-frames and the type of activity in the watershed (I.R. Walker, E.D. Reavie, S. Palmer, 1993); these groupings also aligned with NMDS analysis of the sediment metals (Figure 37).

1. Pre-1940s = Early European settlement, basic agriculture
2. 1940s to 1970s = Intense agriculture with heavy chemical use
3. Post-1970s[6] = Urbanization of the watershed

[6] Water chemistry results indicate that this third group may be splitting into a fourth group post-2010, but these changes have not affected the sediment core.

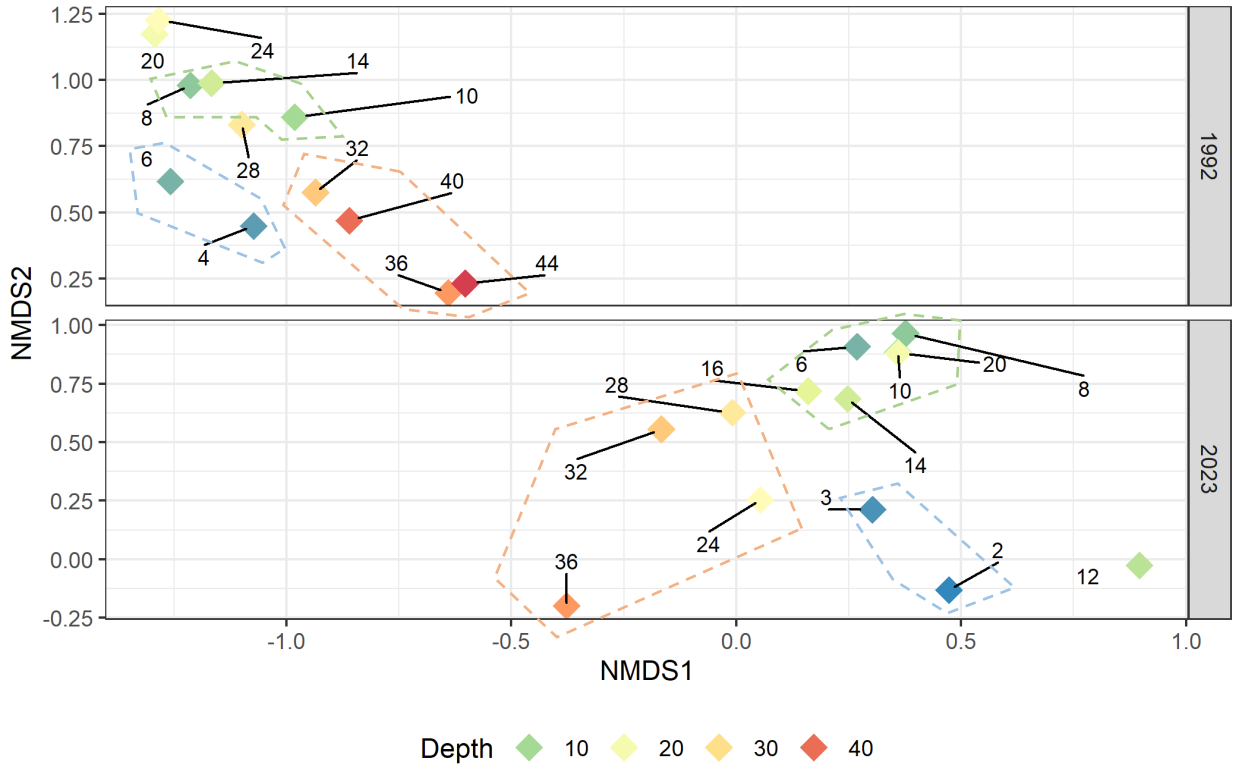

Figure 43: NMDS results comparing 1992 and 2023 sediment core diatom communities

Legend for Groupings:

Oldest Sediments	Mid-twentieth century sediments	Most recent sediments

Discussion

Is Wood Lake significantly different from pre-1850 in terms of water chemistry and primary productivity?

Water Chemistry Data

Water quality data for Wood Lake is limited to 1970-present that indicates a significant improvement from the 1970s through the 2000s followed by a period of regression since 2010 (Figure 7, Figure 20, Figure 27). Higher nutrient levels, frequent algal blooms, reduced water clarity, and expanding anoxic zones characterized periods of poorer water quality (Figure 7, Figure 10, Figure 20, Figure 22, Figure 23). Notably, the intensity and size of anoxic zones have increased in recent years, leading to Kokanee die-offs in 2011, 2022, and 2023 (Figure 10).

Sediment Core Data

Sediment core analysis provides a longer historical record, extending back to the mid-1800s, capturing most of the period following European settlement (Figure 33). A core collected in 1973 potentially reached even further back, but due to limited parameter analysis, it offers little insight into that earlier period (St John, 1973a, Figure 35).

The sediment core data reveals a significant shift in lake chemistry and diatom composition around 1940 and again in the 1970s (Figure 33, Figure 37 - Figure 42). Analysis of diatoms, a type of algae, indicates that the period between 1940 and the 1970s was the most detrimental for the lake's ecosystem, with a decline or disappearance of numerous species. While some species recovered, others did not, and new species emerged, with some filamentous green algae becoming dominant (Figure 38 - Figure 43).

Marling

Marling frequency has increased unusually in the past decade, possibly linked to higher water hardness (Figure 19, Table 3). Previous research suggests that marl accumulation in the sediment intensified after the 1940s, potentially due to water diversion for irrigation (I.R. Walker, E.D. Reavie, S. Palmer, 1993).

Wood Lake Nutrient Budget

A 2016 study by LAC and ENV identified internal loading as the primary source of bioavailable phosphorus in the lake while external loading was more important to the nitrogen balance within the lake (Table 5; Self & Larratt, 2016). Earlier data from the 1970s by MVC suggests higher total phosphorus (TP) levels compared to today, while total nitrogen (TN) remained similar (Table 5; (British Columbia Water Resources Service, 1974).

Changes to Duck Lake

Duck Lake is a small, shallow, and very productive lake located upstream of Wood Lake and it feeds Middle Vernon Creek (MVC). While not the focus of this study, the condition of Duck Lake affects Wood Lake directly. Duck Lake contained significantly higher nutrient concentrations than Wood Lake's

surface waters, that is to say that Duck Lake is a nutrient source to Wood Lake. There was also a significant increasing trend in TP in Duck Lake.

Is Wood Lake deteriorating today and why?

The analysis of water chemistry data and sediment cores reveals a period of significant decline in Wood Lake's health between the 1940s and 1970s. Fortunately, water quality improvements followed, likely due to upgrades in wastewater treatment plants and the flushing effects of Hiram-Walker operations (Figure 20, Figure 22, Figure 23, Figure 27, Figure 33, Figure 37, Figure 43). However, over the past 10 years Wood Lake has exhibited:

- Higher nutrients (Figure 20, Figure 22, Figure 23)
- Higher algae production with more frequent and intense blooms (Figure 27, Figure 29, Figure 31)
- Larger and more intense anoxic zones (Figure 10, Figure 12, Figure 13)
- Multiple kokanee die-offs (pers comm w Kristen King)
- Water quality markers such as chloride[7] show accelerating cumulative effect of human activity on Wood Lake (Figure 15)

These changes in water quality are attributed to several factors including:

- Decline in watershed resiliency: Wood Lake's watershed has experienced decades of logging and resource extraction, agriculture with fertilizer and pesticide application, urbanization and population growth, and wastewater disposal. These lead to a reduction in the capacity of the watershed to buffer against further changes, lowering its resiliency. This can be clearly seen in the hydrometric graph of Middle Vernon Creek where peak freshet flows and total water yield from the watershed have increased dramatically (Figure 14). There is more runoff from the watershed that reports to Wood Lake more quickly because of loss of forest cover and increase increased impermeable surface area.
- Nutrient enrichment from dramatic changes in the watershed. The introduction of advanced nutrient removal technology to the WWTP[8] was part of a decades long period of improved water quality but continued population growth and associated impacts have reversed the trend leading to significant increasing trends for both of the major aquatic nutrients (nitrogen and phosphorus) during the past 10 years.

[7] This is a benign parameter at the concentrations found in Wood Lake, but if it is accumulating from human activity, so are other things that are not quite obvious. For example, nutrients don't stay in solution and may not show up as clearly in chemistry trends (although they still do for Wood Lake, Figure 22, Figure 23), they are consumed by algae and then decomposed at the sediment. This leads to other changes that can be tracked such as phytoplankton production (Figure 27, Figure 29).

[8] DLC WWTP discharges to ground with some portion of the nutrients ultimately reporting to Wood Lake via groundwater.

- Changes to in-lake usage through introduction and widespread use of wake-surf boats. These boats create large wakes that cause shoreline erosion and sediment resuspension, both of which increase nutrient loading to the lake and damage sensitive riparian habitats (Francis et al., 2023; Schleppe et al., 2016, 2017; Sébastien Raymond & Galvez-Cloutier, 2015).
- Climate Change: Overlain upon the increasing nutrient concentrations are the effects of climate change. These include: longer, hotter, and drier summers (Figure 44). These conditions prime Wood Lake for longer stratified periods that lead to greater anoxic nutrient recycling, and warmer, calmer surface water ideal for cyanobacteria blooms (Figure 10, Figure 21, Figure 29).
- Nutrient recycling positive feedback: Nutrients that return to the water column within the anoxic zone fuel algae blooms that, when the die, sink to the sediment and decompose, consuming oxygen. Larger blooms lead to larger and more intense anoxic zones that lead to greater nutrient recycling that fuel larger blooms.

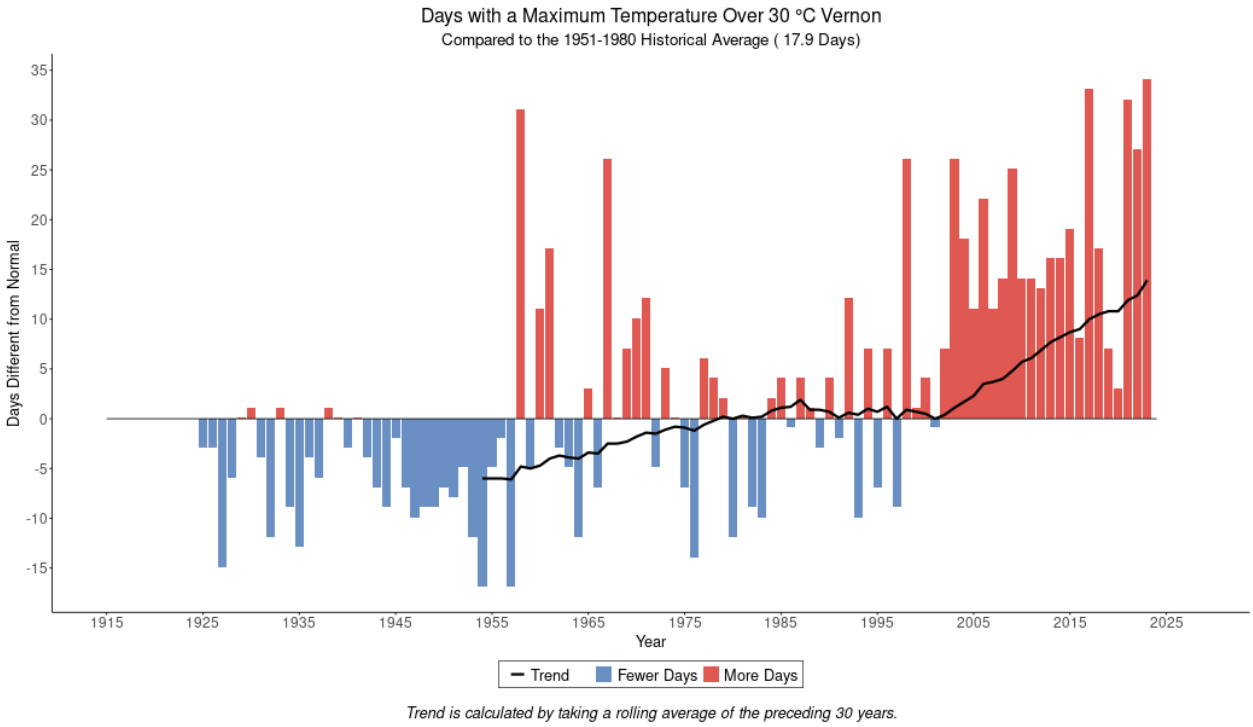

Figure 44: Days with maximum temperature over 30 °C at Vernon (1925-2024)
Source: (Okanagan Basin Water Board, 2024)

Are Wood Lake fish safe to eat?

Wood Lake is prone to harmful algae blooms (HABs) dominated by a few cyanobacteria such as *Anabaena, Anacysits, Aphanizomenon,* and *Microcystis*. These species will, when conditions such as abundant phosphorus and warm stable water columns exist, create surface scums. While the precise

trigger conditions remain poorly understood, these taxa of cyanobacteria are all known to produce a range of toxins (Appendix 4: Common cyanobacteria in Wood Lake). The risk to wildlife and people from these toxins is proportional to the abundance of cyanobacteria in the water (Figure 30).

Acute cyanotoxin exposure has long been associated with respiratory and skin irritation (Berry, 2013). Today, chronic cyanotoxins exposure is now also associated with a number of negative health conditions including neurodegenerative diseases (Mutoti et al., 2022) and liver cancer (Drobac et al., 2017).

The risk of cyanotoxins in the cyanobacteria cells and the surrounding water during blooms is well established but recent research has focused on the potential for biomagnification of these up the food chain, potentially affecting the consumption and use of fish from bloom prone lakes, such as Wood Lake.

Studies within the past few years have confirmed that cyanotoxins do travel through the food chain and have been routinely observed in zooplankton, invertebrates, and fish[9]. Cyanotoxin concentrations within fish were found to be highest in the liver while muscles contained up to 20x lower concentrations[10]. The high liver concentrations suggest that fish are physiologically stressed by blooms, potentially increasing their vulnerability to lake-squeezes that can follow large blooms[11]. Other studies have found that fish tissue cyanotoxin concentrations vary significantly between different individuals and between different species[12]. The risk to piscivorous birds is not well established at this time.

In addition to organisms that live in bloom prone lakes, plants that are irrigated by water from such lakes are also documented to accumulated cyanotoxins within their tissues, up to 27% of the cyanotoxin load from the original water body[13].

Despite the clear evidence for the presence of cyanotoxins within fish, there remains no firm support for the risk of biomagnification. Instead, biodilution is considered to be the mechanism involved (Berry, 2013; Kozlowsky-Suzuki et al., 2012). Biomagnification would see concentrations of cyanotoxins increase with each trophic level up the food chain and is typically observed with fat soluble compounds such as methyl-mercury, and "forever chemicals" (PFAS). Cyanotoxins, conversely, are water soluble and are gradually excreted by exposed organisms. However, through repeated and prolonged exposure, cyanotoxins will build up in the tissues of all animals within a lake.

[9] (Berry, 2013; Chia et al., 2021; Christensen & Khan, 2020; de Almeida et al., 2024; Drobac Backović & Tokodi, 2024; Garita-Alvarado et al., 2023; Kozlowsky-Suzuki et al., 2012; Mutoti et al., 2022; Shahmohamadloo, Bhavsar, Ortiz Almirall, C, et al., 2023; Shahmohamadloo, Bhavsar, Ortiz Almirall, Marklevitz, et al., 2023; Shahmohamadloo et al., 2022; Sundaravadivelu et al., 2022)
[10] (Garita-Alvarado et al., 2023; Mutoti et al., 2022; Shahmohamadloo, Bhavsar, Ortiz Almirall, C, et al., 2023)
[11] (Shahmohamadloo, Bhavsar, Ortiz Almirall, C, et al., 2023; Shahmohamadloo, Bhavsar, Ortiz Almirall, Marklevitz, et al., 2023)
[12] (Shahmohamadloo et al., 2022)
[13] (Drobac Backović & Tokodi, 2024; Mutoti et al., 2022)

Studies of fish tissues from the Great Lakes region have found that fish fillets from lakes prone to blooms can still be safely consumed by people as long as the internal organs are not consumed.

What is at stake if Wood Lake deteriorates – an economic analysis

Wood Lake is an important feature for the District of Lake Country and Central Okanagan for a number of reasons. These include: economic, cultural, recreational, aesthetic, etc. A detailed description of the values Wood Lake provides is given below in Table 7.

Table 7: Economic values provided by Wood Lake

	Item	Estimated Valuation ($)	Description	Change if Wood Lake improves from eutrophic to mesotrophic	Emerging Threats	References
	fishery	0.5 million	cultural benefits far outweigh the fishery revenues | 9471 angler days/yr 2018-2023 @ $50/day on fuel/food/equipment	healthier fish; fewer fish-kills	lake squeeze (fish kills) | low hot creek flows | invasive mussels	Pers comm. Kristen King (BC Fisheries); (Okanagan Basin Water Boa, 2024)
Real Estate	real estate DLC views of Wood Lake	1.8 billion	visual aesthetic of the lakes plays a big role in why people want to live in Lake Country Figure 45	improved value	development pressures on water/sewer	(District of Lake Country, 2023a, 2023b)
	real estate taxation (DLC)	20 million	critical to DLC revenues	increased revenue	deteriorating lake decreases tax revenue	(District of Lake Country, 2022)
Wood Lake Tourism	Local boating	60 million	Est. 3000 boats registered in DLC @20K (wake surf boats 200K)	improved value	may exceed safe carrying capacity of Wood Lk	(BoatDriving.org, n.d.; Schleppe et al., 2016)
	tourism out-of-town boats	unknown	highest risk category for aquatic invasives	improved value	increased invasive mussel risk shore erosion	(InterVistas, 2023)
	tourism-accomodations/shoreline amenities/food/retail	<15 million	tourism is Okanagan's 4th largest industry 2.1 billion 2022 | Wood Lk watershed = 7% of RDCO = $150M if 10% DLC =$15M	increased revenue	relies on lake health, affected by wildfires over-tourism diminishes lake health	(Tourism Kelowna, 2022)
	tourism tax revenue (estimate)	~23 million	Vital industry to DLC	increased revenue		(District of Lake Country, 2022)
Water Supply	agri/private water intakes	~0.5 million	Vital industry to DLC: direct production, fruit stands, wineries, restaurants, etc.	safer water and crops	invasive mussels clog intakes-maintenance	(British Columbia Government, 2024)
	cost of water intake /treatment	3.8 million	400,000 m^3/yr | 96% to agriculture (vital) 4% domestic Figure 46	safer, decreased cost of treatment	invasive mussels clog intakes-maintenance	(British Columbia Government, 2024)
	sewer operations	-2.4 million	critical to lake health with population/tourist pressures	---	DLC must export nutrients out of District	(District of Lake Country, 2022, 2023a; Graham, 2023)

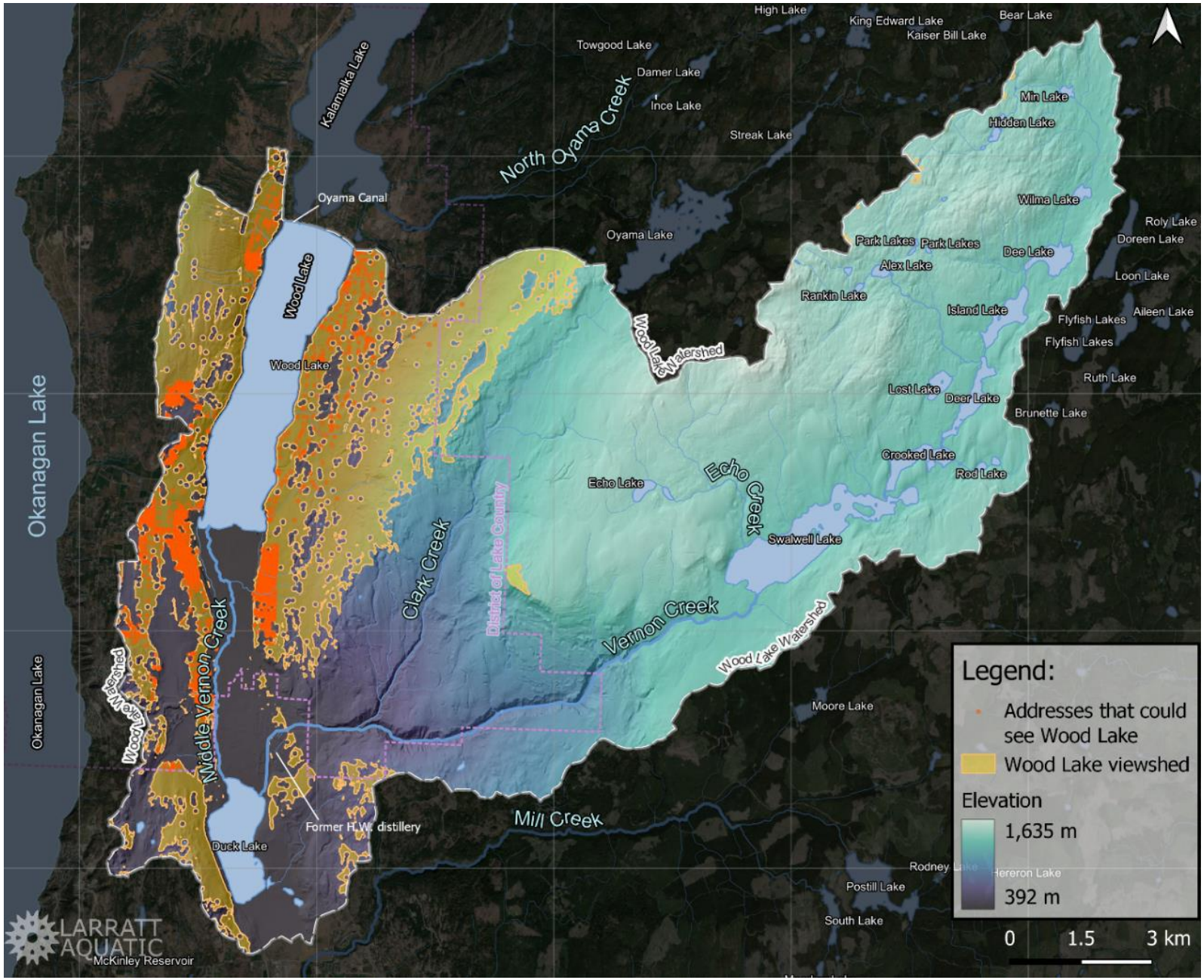

Figure 45: Map of Wood Lake watershed with viewshed of lake highlighted including properties with lake views

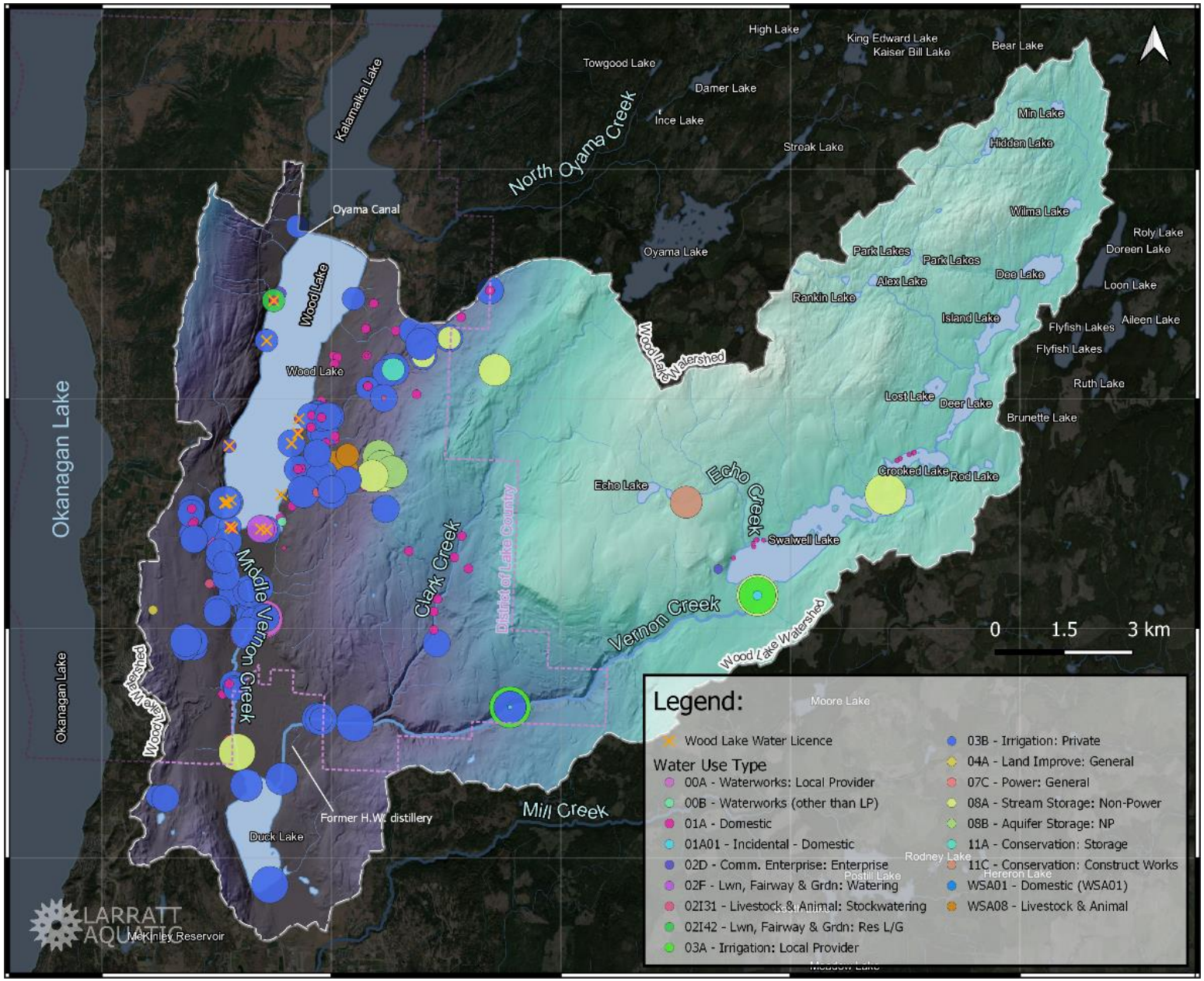

Figure 46: Map of water licences within Wood Lake watershed, coloured by use
Source: (British Columbia Government, 2024)

What feasible steps can be taken to lower the scale and frequency of cyanobacteria blooms in Wood Lake?

Table 8: Techniques that have been proposed or considered for improving water quality in Wood Lake

	Technique	Date	Source	Cost	Premise	Strengths	Weaknesses	Update as of 2024?	Action
aeration /sonic	destratification aeration (spring to fall only)	1974	(British Columbia Water Resources Service, 1974)	$$$	use compressed air to lift bottom water to surface for aeration	low cost localized fish refugia application	• increases heat budget • off gassing • can increase algae by surfacing nutrients from hypolimnion • must operate immediately after ice-off • ideal for localized disruption, would be too energy intensive and costly to destratify the entire lake	water-lifting aerators are large subsurface structures that draw in deep water and lift it to the surface with compressed air - limits sediment lift	**consider further**
	pumping deep water to MV Ck	2023	Novel proposal by LAC	$$$	augments flows with cool water that will quickly aerate	• low cost, fish spawning support • does not require releases from storage	• Wood Lake hypolimnion is profoundly anoxic and aeration baffles/structure would be needed at discharge point and infrastructure required • Potential of harmful off-gassing at the aeration point • recirculating high nutrient hypolimnion water back into photic zone of MVC/Wood Lake during peak growing season = prodigious algae growth • hypolimnion of Wood Lake contains elevated iron and manganese that would precipitate out in MVC • failure of aeration would lead to mortality event of fish in MVC, including juvenile Kokanee • During low-flow period. This could become primary source of flow in MVC	• now commercially available • could be trialled as a fish refugia and then expanded to lake restoration	**consider further**
	oxygen injection	1999	(Ashley & Nordin, 1999)	$$$$$	provides dissolved oxygen nanobubbles to deep water	• proven fish refugia capacity • ideal for localized refugia vs whole lake re-oxygenation • reduces sediment N, P release by 50% in unit's region • keeps stratification	• requires power, intake and discharge lines, etc. • expensive to build and operate • prone to equipment failure • pure oxygen tanks required are a fire/explosion hazard • likely multiple structures would be required throughout the lake to provide adequate refugia • structures could be targets for vandalism	• line diffuser systems are suitable for Wood Lake ~150 m dispersal area in deep water • fish refugia application	**consider further**
	hypolimnetic aeration	1974	(British Columbia Water Resources Service, 1974)	$$$$$($)	aerate the hypolimnion only with ~10 designed units	• increase fish habitat • lower sediment P release	• nitrogen super-saturation can occur • expensive to build and operate • cyanobacteria blooms can persist when high nutrient water is brough up to photic zone • to be effective it would require coverage of the whole lake which would be enormously expensive	numerous full or partial air-lift infrastructure designs available to release air microbubbles - expensive for entire lake so discrete area(s)	**consider further**
	sonic water treatment	2024	King, K.	$$$$$$	sonic waves disrupt the vacuoles of cyanobacteria causing them to sink and lowers bloom intensity	• no disruption of zooplankton or fish • no chemicals	• for a lake the size of Wood Lake, LGSONIC uses 50+ units - a navigation hazard • does not address nutrients, DO etc. • structures could be targets for vandalism	synchronized communication sonic units increases effectiveness but very expensive (>55,000 USD/unit + annual operating fees/repairs)	**X**
land use	riparian set-backs & greenbelts	1974	(British Columbia Water Resources Service, 1974)	$ -$$$	• riparian zones filter nutrients along creeks and lakeshores • a ban on fertilizer use within set-back helps	• aesthetic and habitat gains • lower nutrient loads N~75% P~66% • lower stream shoreline water temp	• none other than potential cost to purchase lands 15-30m on either side of streams • cliffs on east and west side of Wood Lake restrict width of riparian to very narrow band • lakeshore properties along south end of Wood Lake would likely resist to preserve their views • public beaches and road at north end of Wood Lake restrict riparian expansion there	recent research confirms need for >30 -50 m green belts to control nutrients but any interception helps	**implement**
	curtail development	1974	(British Columbia Water Resources Service, 1974)	$$	exceeding the residence carrying capacity of the Wood Lake watershed will damage the lake	less development would lessen the pressure on Wood Lake	• very unpopular politically unless part of a region-wide initiative • could exacerbate housing costs	contradicts BC's 2024 housing initiative	**consider further**

	Technique	Date	Source	Cost	Premise	Strengths	Weaknesses	Update as of 2024?	Action
	land use zoning lakeshore	1974	(British Columbia Water Resources Service, 1974)	$$	restrict shoreline development and preserve natural shoreline function	functioning shorelines benefit shorebirds, spawners, Wood Lake health	difficult to enforce	aerial drone imagery and mapping can help with monitoring of shoreline modification	**underway**
	public education	Ongoing	LAC	$	educating local and tourist population on risks to Wood Lake and how they can operate within its watershed to preserver and improve water quality	public education underpins most other proposed solutions because an informed and engaged public is essential for the acceptance of other solutions	• time consuming for busy staff		**implement**
	marina mooring buoy moratorium	2023	DLC	$	restricts damage to critical littoral sediments	prevents unrestricted use of ecologically important lake shallows	• pressure from developers and boating lobby • complicated jurisdictional issue to enforce this	more municipalities (e.g., DLC, Osoyoos) recognize the need for restrictions on boat proliferation and ad-hoc buoy placement	**consider further**
	agriculture/garden fertilizer use	1974	(British Columbia Water Resources Service, 1974)	$$	lowering fertilizer use on orchards, near-lake gardens, will lower the non-point source load to Wood Lake	fertilizer nutrients can be conserved - not wasted by leaching to Wood Lake; improves lake health	• need to educate land owners • fertilizer/pesticide use is difficult to enforce	sap analysis can determine plant needs for fertilizer - usually lowers the amount applied and improves plant health	**consider further**
	spray irrigation	1980>	(British Columbia Water Resources Service, 1974) | Others	$$$$$($)	use 2nd treated water to irrigate forage or other harvested crops to export nutrients		• more expensive than conventional disposal of treated effluent • nutrients can still report to Wood Lake via groundwater	long-term use of Vernon spray irrigation resulted in increased nutrients reporting to Kalamalka Lake	**X**
	grey water re-use	2017	(British Columbia Ministry of Health, 2017)	$	household/farm re-use of grey water recycles nutrients and lowers water demand	inexpensive, conserves nutrients and water at the household level	• small risk of contaminants from cleaning products, detergents • cannot be allowed to run off property • cannot be stored without treatment	avoid grey-water use if a household member is ill; avoid kitchen grey water with oils and fats	**implement**
	watershed protection	ongoing	TEK OBWB OCCP	$$-$$$$	preserves natural water condition and hydrograph	provides multiple ecological, habitat and economic benefits, including lake health	• Complicated multi-jurisdictional issue with many stakeholders pursuing their own agendas that may be incompatible with each other	Kalamalka Lake study group developing permanent TAC for Wood and Kalamalka Lakes	**consider further**
boating	restrict out of province power boats	2023	OBWB	$$$	large power boats are the primary carrier of aquatic invasives, so a ban slows aquatic invasive species (AIS) spread	a ban would slow or halt the spread of AIS	• will require enforcement • enforcement agency is unclear	as popularity of ever-bigger wake boats increases, so does the risk of introducing invasive mussels	**consider further**
boating	clean drain dry campaign	2000>	OBWB	$	limits the spread of AIS	educates public of risks to moving boats from lake to lake	needs occasional rebranding to maintain interest	proven effective at slowing the spread of AIS	**underway**
boating	wake control	2020>	DLC RDNO Nordin others	$	nutrients are readily released from boat wakes suspending Wood Lake sediments	fewer wakes mean less eutrophication, less habitat and shoreline erosion damage	will require boater buy-in and/or enforcement	education programs are underway, but the number of boats is increasing and may exceed carrying capacity of Wood Lake	**underway**
boating	reconsider canal dredging	1974	(British Columbia Water Resources Service, 1974)	$$	Boat traffic between Kalamalka and Wood Lakes is very high and already causes water quality issues at DLC intake in S-Kal. More and larger boats facilitated by deeper channel would likely lead to greater water quality impacts	• reduces presence of Eurasian milfoil in canal • lowers spread of invasive species	• dredging canal increases cyanobacteria and phosphorus donations from Wood Lake • increases boat traffic • decreases spawning habitat • dredging produces major sediment disturbance that could affect drinking water quality	• potential impact to South Kalamalka Lake from Wood Lake nutrients, algae and increased boating sediment disturbance • dredging has been approved by the province as of May 2024	**consider further**
water management	TEK - Siwlk	ongoing	ONA, OKIB	$$	Syilx siwlk water Declaration and Strategy lay out respectful conservation	• strategy lays out protections for water that are confirmed by Western science • focus on working together	• concerns about water scarcity and water rights need to be worked out • some impacts are almost impossible to reverse	awareness of and implementation of the strategy is ongoing	**implement**
water management	supplementing MV Ck inflow from Okanagan Lake	1974	(British Columbia Water Resources Service, 1974)	$$$$	return volumetric fluxes to pre-industrial rates	increasing flushing rate can lower nutrient concentrations in Wood Lake	will cause increased nutrient enrichment of Kalamalka Lake	South Kalamalka Lake has measurable deterioration from Wood Lake inflows and canal dredging may make this worse	**X**
water management	bypassing Duck Lake	1974	(British Columbia Water Resources Service, 1974)	$$$$$	Duck Lake is a key nutrient source to Wood Lake so bypass should lower Wood Lake nutrients	nutrients and cyanobacteria blooms should decrease in Wood Lake	• Duck Lake will deteriorate to an evaporative lake • fine sediments that currently deposit in Duck Lake will deposit in Wood Lake	• Duck Lake is currently under study by OKIB • Numerous stake holders would need to approve any changes to Duck Lake hydrology	**consider further**
water management	daylight Upper Vernon Ck	2023	King, K	$$$$$	return creek function to Upper Vernon Ck through DLC	• creek function could benefit kokanee spawning • improved aesthetics • moves towards Syilx water values	• would require displacing part of the DLC industrial area • contaminant cleanup possible • functionally similar to bypassing Duck-Lake	some interest by BC ENV but practical barriers	**consider further**
water management	mixing Kal and Wood lakes	1974; 2016	(British Columbia Water Resources Service, 1974); Young, 2016	$$$$	pump hypolimnetic water from Wood Lake to Kal hypolimnion for precipitation	this concept would export Wood Lake nutrients during stratified conditions and would represent a major nutrient injection into Kalamalka Lake	• this concept could exceed marl capacity & increase nutrient regime of South Kal Lake expensive • anoxic hypolimnion would create dead zone around plume	Kalamalka Lake is already showing increasing signs of excess nutrients	**X**

	Technique	Date	Source	Cost	Premise	Strengths	Weaknesses	Update as of 2024?	Action
	tunnel from Okanagan Lk	1974	(British Columbia Water Resources Service, 1974)	$$$$$$	gravity feed high nutrient Wood water into low-nutrient cold Okanagan Lake deep water and pump back clean replacement water	reduce Wood nutrient condition, possibly aid with flood control	• tunnel construction cost-prohibitive • return pumping up 50m very expensive • massive nutrient contribution to Okanagan Lake • anoxic hypolimnion would create dead zone around plume • approvals of this from environmental regulators almost certainly rejected outright	still prohibitively expensive in 2024	X
Phosphorus control	stop-log Oyama Canal	1974	(British Columbia Water Resources Service, 1974)	$$$	restrict importing algae & nutrients (30% of Kal nutrients) from Wood to Kal during cyanobacteria blooms	would lower the measured impact of Wood Lake on South Kal Lake in summer	• prevents boat passage and blooms are now annual • possible fish obstruction	no longer workable due to increased cyanobacteria bloom frequency and duration	X
	alum (aluminum sulfate)	1976	BC Research	$$$$$	~50+% removal and immobilization of water column P with an ice-off application	lower pH and P removal should halt cyanobacteria blooms, intensity of anoxic zone	1100 tons of alum required for Wood Lake (2-5 mg/cm2 dose) must be re-applied every 5-10 years	alum applications have proven more expensive than aeration systems in the long term	X
	hypolimnion iron application	1987	(Nordin, 1987)	$$$$	Fe restricts anoxic P regeneration from low Fe Wood Lake sediments	• Fe from steel treatment injected to anoxic hypolimnion (50 tons Fe binds 5 tons P) • FeCl 50 tons at ~$7000/ton	• needs to be applied every 5 - 10 years initially until Fe accumulates in sediments • H2S inhibits Fe-P removal • public concern	• needs field trial to verify favorable 1987 bench results before full scale treatment • reported field trials had variable results	**consider further**
	ammonium nitrate	1982	(Gray & Jasper, 1982)	$$$$	fertilize hypolimnion in spring with N to disadvantage cyanobacteria, sediment diatoms, accelerate denitrification	can oxidize sediments, lowering net nutrient load returned to the water column	• not widely used so research is sparse • Wood Lake is not N limited in the spring, but rather in the summer after N has been consumed by spring bloom.	not widely used; research is sparse and research results are often negative	X
	Liming CaCO3 addition (marl)	1974	(British Columbia Water Resources Service, 1974)		increasing marl events, phosphorus precipitates down to the bottom and coats sediments	enhances natural processes for marl -P precipitation, could increase the frequency of attractive marl events	• ~ 5000 - 8000 tons required (>500 dumptruck loads) • most of the applications are on acidified lakes which Wood Lake is not	• the amount of lime is prohibitive • effectiveness can be poor in hard water lakes	X
	aeration	see top section of this table							
	TEK prescribed burning	ongoing	Polis Wildfire Project 2024	$$$	TEK prescribed burns limit ashfall P from major wildfires	TEK prescribed burns limit ecological damage while lowering fuel loads	there are narrow weather windows for TEK prescribed burns to manage risks	Polis research strongly concurs with TEK	**underway**
	convert septic fields to secondary treatment	1974	(British Columbia Water Resources Service, 1974)		septic tanks were formerly estimated to contribute 45% N and 62% P of Wood Lake external nutrient budget (Winfield area)	lowers nutrient effluent concentrations and non-point source loading to Wood Lake	• expensive • facilitates developments in Wood Lake watershed - increases total nutrient load	• thoroughly proven to lower non-point source nutrient loading to water bodies. • all urban areas within Lake Country that are within Wood Lake watershed are currently on sewer. • rural east bench of Wood Lake does not have sewer	**Done**
	Deep lake WWTP discharge	Ongoing	many researchers | Urban Systems	$$$$$$	WWTP > ground injection + pipe to Kelowna WWTP or Okanagan Lake	• far lower nutrients to lakes compared to septic field use • exports nutrients away from Wood Lake	facilitates development in Wood Lake watershed - increases pressure	• Environmental impact assessment for deep lake outfall is under consideration by BC ENV • DLC currently pumps excess treated wastewater to City of Kelowna	**underway**

Cost	Legend
$	negligible
$$	< 100,000
$$$	< 500,000
$$$$	< million
$$$$$	few million
$$$$$$	many millions
$$$$$$$	prohibitive

Next Steps

This study identifies a number of next steps for works on and around Wood Lake such as

- Begin to pursue realistically achievable options listed in Table 8 such as:

  Wood Lake Watershed Options:
  - Riparian setbacks and revegetation of tributaries and shoreline
  - Educate residents and guests on Wood Lake condition to encourage stewardship
  - Greywater reuse programs to reduce pressure on WWTP
  - Prescribed burning in watershed to limit wildfire risk

  Wood Lake Options
  - Engage with Syilx water declaration and processes such as the kɬúsx̌nítk (Okanagan Lake) Watershed Responsibility Planning Initiative
  - Boating education programs to encourage responsible boating near shore and around Oyama Canal, wake surfing in 8+ m water depth, Clean Drain Dry, I'm a Wake. Etc.
- Pursue further investigations on viability of other treatment options
  - Localized aeration for fish refugia
  - Trial FeCl removal of P from Wood Lake using bench trials
- Continue to monitor condition of Wood Lake to track further changes
- Repeat sediment coring assessment every 5 years
- Patch data gaps:
  - Wood Lake marl history: publish and maintain archive of marl years

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Appendices

Appendix 1: Sampling Data

See companion document “Appendix 1 - Wood Lake Report 2023 Sampling Data.pdf”

Appendix 2: Water Quality Guidelines

Table A 1: Canadian and British Columbia Drinking Water Guidelines and Aesthetic Objectives

Parameter	CDWG	CDWG Aesthetic Objective	BC Drinking Water	BC Aesthetic Objective
Chloride		250		250
Colour		15		15
E. coli	0/100 mL		< 10 / 100 mL (minimum of 5 samples)	
Enterococci			< 3 / 100 mL	
Enteric Protozoa	Minimum 3 log removal and/or inactivation of cysts and oocysts			
Enteric Viruses	4 log reduction (removal and or inactivation)			
Fluoride	1.5		1.5	
Nitrate	10 Reported as N 45 Reported as Nitrate		10 Reported as N 45 Reported as Nitrate	
Nitrite	1 Reported as N 3 Reported as Nitrite		1 Reported as N 3 Reported as Nitrite	
pH		7-10.5		
SO4		500		500
TDS		500		
Temperature		15		15
TOC			4	
Total Aluminum	2.9		9.5	
Total Antimony*	0.006		0.006	
Total Arsenic*	0.01		0.01	
Total Atrazine*	0.005			
Total Barium	2			
Total Benzene	0.005		0.005	
Total Boron*	5		5	
Total Bromate	0.01			
Total Cadmium	0.007		0.005	
Total Chromium	0.05		0.05	
Total Cobalt			0.001	
Total Coliforms	0/100 mL in water leaving a treatment plant and in			

Parameter	CDWG	CDWG Aesthetic Objective	BC Drinking Water	BC Aesthetic Objective
	non-disinfected groundwater leaving well			
Total Copper	2	1	2	1
Total Cyanide	0.2		0.2	
Total Haloacetic Acids*	0.08 ALARA			
Total Iron*		0.3		0.3
Total Lead	0.005 ALARA		0.005	
Total Manganese	0.12	0.02	0.12	0.02
Total Malathion*	0.19			
Total Mercury	0.001		0.001	
Total Molybdenum			0.088	
Total Nickel			0.08	
Total Phosphorous				0.01
Total Selenium	0.05		0.01	
Total Sodium		200		
Total Strontium	7		7	
Total Sulphide		0.05		
Total Uranium	0.02		0.02	
Total Xylenes	0.09	0.02	0.09	0.02
Total Zinc		5	3	5

Note: * = Health Canada is developing or updating guidelines and guidance over the new few years
Note: Updated 2023

Table A 2: BC water quality guidelines for primary contact recreational uses

Parameter	Recreational Water Quality Guidelines	Guideline Source
Monochlorophenol	0.0001 mg/L	ENV 1997a
Total Dichlorophenols	0.0003 mg/L	ENV 1997a
Total Trichlorophenols	0.002 mg/L	ENV 1997a
Total Tetrachlorophenols	0.001 mg/L	ENV 1997a
Pentachlorophenol	0.03 mg/L	ENV 1997a
Chlorophyll-a	50 mg/m^2 (streams)	ENV 1985
Colour, True	15 TCU (aesthetic Objective); mean (minimum of 5 samples in 30 days)	ENV 1997b
Cyanobacterial toxins: Total cyanobacteria or total microcystins	100 000 cells/mL OR 0.02 mg/L (expressed as microcystin-LR)	Health Canada 2012
Methyl Tertiary Butyl Ether (MTBE)	0.02 mg/L	ENV 2001
Microbial Indicators		
Escherichia Coli	≤ 200 *E. coli* /100 mL; geometric mean concentration (minimum of 5 samples*) or, ≤ 400 *E. coli* /100 mL; single sample maximum concentration (units will depend on whether the multiple-tube fermentation method (MPN/100 mL) or the membrane filtration method (*E. coli*/100 mL) is used).	Health Canada 2012
Enterococci	≤ 35 Enterococci /100 mL; geometric mean concentration (minimum of 5 samples*), or, ≤ 70 Enterococci /100 mL; single sample maximum concentration (units will depend on whether the multiple-tube fermentation method or the membrane filtration method is used).	Health Canada 2012
Nitrate	45 mg/L (nitrate) 10 mg/L (nitrate-N)	ENV 2009
Nitrite	3.0 mg/L (nitrite) 1.0 mg/L (nitrite-N)	ENV 2009
pH	5.0 – 9.0	Health Canada 2012
Phosphorous	0.01 mg/L (lakes)	ENV 1985
Temperature	Should not cause an appreciable increase or decrease in the deep body temperature of swimmers.	Health Canada 2012
Turbidity	50 NTU (aesthetic objective)	Health Canada 2012

Source: https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/approved-wqgs/drinking-water-and-recreation/recreational_water_quality_guidelines_bcenv.pdf

Appendix 3: Water Parameters Collected by LAC

Table A 3: Water parameters collected by LAC

Parameter	Units	Date Range
Algae	cells/mL	2005-2023
Alkalinity	mg/L	2005-2006, 2008-2010, 2012, 2014, 2016-2023
Background Colonies	CFU/100mL	2010, 2012-2019
Chloride	mg/L	2005-2006, 2008-2023
Chlorophyll-a	µg/L	2005-2006, 2008-2023
Conductivity	µS/cm	2005-2006, 2008-2023
Conductivity Adjusted	µS/cm	2011-2023
Density	g/cmÂ³	2022-2023
Dissolved Oxygen	mg/L	2005-2006, 2009-2023
Dissolved Oxygen Percent	%	2011-2023
E. coli	CFU/100mL	2008-2023
Hardness	mg/L	2005-2006, 2008-2010, 2012, 2014, 2016-2023
ORP	mV	2011-2018, 2022-2023
pH	--	2005-2006, 2008-2023
Salinity	PSU	2001, 2013-2023
Secchi	m	2005-2006, 2009-2010, 2012-2023
SO4	mg/L	2005-2006, 2008-2010, 2012-2014, 2016-2023
Temperature	°C	2005-2006, 2009-2023
TDS	mg/L	2011-2023
TOC	mg/L	2005-2006, 2008-2023
Total Aluminum	mg/L	2018-2023
Total Antimony	mg/L	2018-2023
Total Arsenic	mg/L	2018-2023
Total Barium	mg/L	2018-2023
Total Beryllium	mg/L	2018-2023
Total Bismuth	mg/L	2018-2023
Total Boron	mg/L	2018-2023
Total Cadmium	mg/L	2018-2023
Total Calcium	mg/L	2005-2006, 2008-2010, 2012-2014, 2016-2023
Total Chromium	mg/L	2018-2023
Total Cobalt	mg/L	2018-2023
Total Coliforms	CFU/100mL	2008-2023
Total Copper	mg/L	2018-2023
Total Iron	mg/L	2005, 2015-2023
Total Lead	mg/L	2018-2023
Total Lithium	mg/L	2018-2023
Total Magnesium	mg/L	2008-2010, 2012, 2014-2023
Total Manganese	mg/L	2018-2023
Total Molybdenum	mg/L	2018-2023
Total Nickel	mg/L	2018-2023

Parameter	Units	Date Range
Total Potassium	mg/L	2018-2023
Total Selenium	mg/L	2018-2023
Total Silicon	mg/L	2018-2023
Total Silver	mg/L	2005-2006, 2008-2023
Total Sodium	mg/L	2018-2023
Total Strontium	mg/L	2018-2023
Total Sulfur	mg/L	2018-2023
Total Tellurium	mg/L	2018-2023
Total Thallium	mg/L	2018-2023
Total Thorium	mg/L	2018-2023
Total Tin	mg/L	2018-2023
Total Titanium	mg/L	2018-2023
Total Tungsten	mg/L	2018-2023
Total Uranium	mg/L	2018-2023
Total Vanadium	mg/L	2018-2023
Total Zinc	mg/L	2018-2023
Total Zirconium	mg/L	2018-2023
Total Phosphorus	mg/L	2018-2023
TSS	mg/L	2005-2006
Turbidity	NTU	2005-2006, 2008-2023
UVT	%	2005-2006, 2008-2023

Appendix 4: Common cyanobacteria in Wood Lake

Table A 4: Common cyanobacteria found in Wood Lake and associated known toxins

Cyanobacteria	Toxin(s)	Type of toxin(s)
Anabaena sp.	LYN*, LPS, CYN, MC, ATX, STX, and BMAA	Dermal, liver, and nerve toxins
Anacystis sp.	LYN*, LPS, MC, NOD*, ATX, and BMAA	Dermal, liver, and nerve toxins
Aphanizomenon sp.	LYN*, LPS, CYN, MC, NOD, ATX, STX, and BMAA	Dermal, liver, and nerve toxins
Aphanocapsa sp.	LYN*, LPS, MC, and BMAA	Dermal, liver, and nerve toxins
Aphanothece sp.	MC*	Liver toxins
Chroococcus sp.	MC* and BMAA	Liver and nerve toxins
Gloeotrichia sp.	LYN*, MC, and BMAA	Dermal, liver, and nerve toxins
Gomphosphaeria sp.	MC	Liver toxins
Limnothrix sp.	MC, STX, and BMAA	Liver and nerve toxins
Lyngbya sp.	LYN, APL, LPS, CYN, MC, ATX, STX, and BMAA	Dermal, liver, and nerve toxins
Merismopedia sp.	MC and BMAA	Liver and nerve toxins
Microcystis sp.	LYN*, LPS, MC, NOD*, ATX, and BMAA	Dermal, liver, and nerve toxins
Oscillatoria sp.	LYN, APL, LPS, CYN*, MC, ATX, STX, and BMAA	Dermal, liver, and nerve toxins
Phormidium sp.	LYN, LPS, MC, NOD*, ATX, STX, and BMAA	Dermal, liver, and nerve toxins
Planktothrix sp.	LYN, APL, LPS, MC, ATX, STX, and BMAA	Dermal, liver, and nerve toxins
Planktolyngbya sp.	LYN, MC, and BMAA	Dermal, liver, and nerve toxins
Pseudanabaena sp.	LYN*, LPS, MC, ATX*, and BMAA	Dermal, liver, and nerve toxins
Spirulina sp.	MC, ATX*, and BMAA	Liver and nerve toxins
Snowella sp.	LPS, MC, and NOD*	Dermal and liver toxins
Synechococcus sp.	LPS, MC, ATX* and BMAA	Dermal, liver, and nerve toxins

Notes:

LYN = Lyngbyatoxin-a (dermal toxin)
APL = Aplysiatoxin (dermal toxin)
LPS = Lipopolysaccharide(s) (dermal toxin)
CYN = Cylindrospermopsin (liver toxin)
MC = Microcystin (liver toxin, carcinogenic)
NOD = Nodularins (liver toxin, carcinogenic)
ATX = Anatoxin-a (nerve toxin)
STX = Saxitoxin (nerve toxin)
BMAA = β-Methylamino-L-alanine (nerve toxin, carcinogenic)
* = Not all authors list this toxin for the cyanobacteria species

Appendix 5: Cyanobacteria Alert Level Boundaries

Alert Level Boundaries used throughout this report were created by Heather Larratt, the senior biologist of LAC (Figure 47). H. Larratt has more than 40 years' experience in aquatic research and microbiology. The table was created by harmonizing at least 30 sources, including the following references:

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- Wyoming Department of Environmental Quality. (2021). *Harmful Cyanobacterial Bloom (HCB) Action Plan for Publicly Accessible Waterbodies in Wyoming in cooperation with: Wyoming Department of Health Wyoming Livestock Board*.

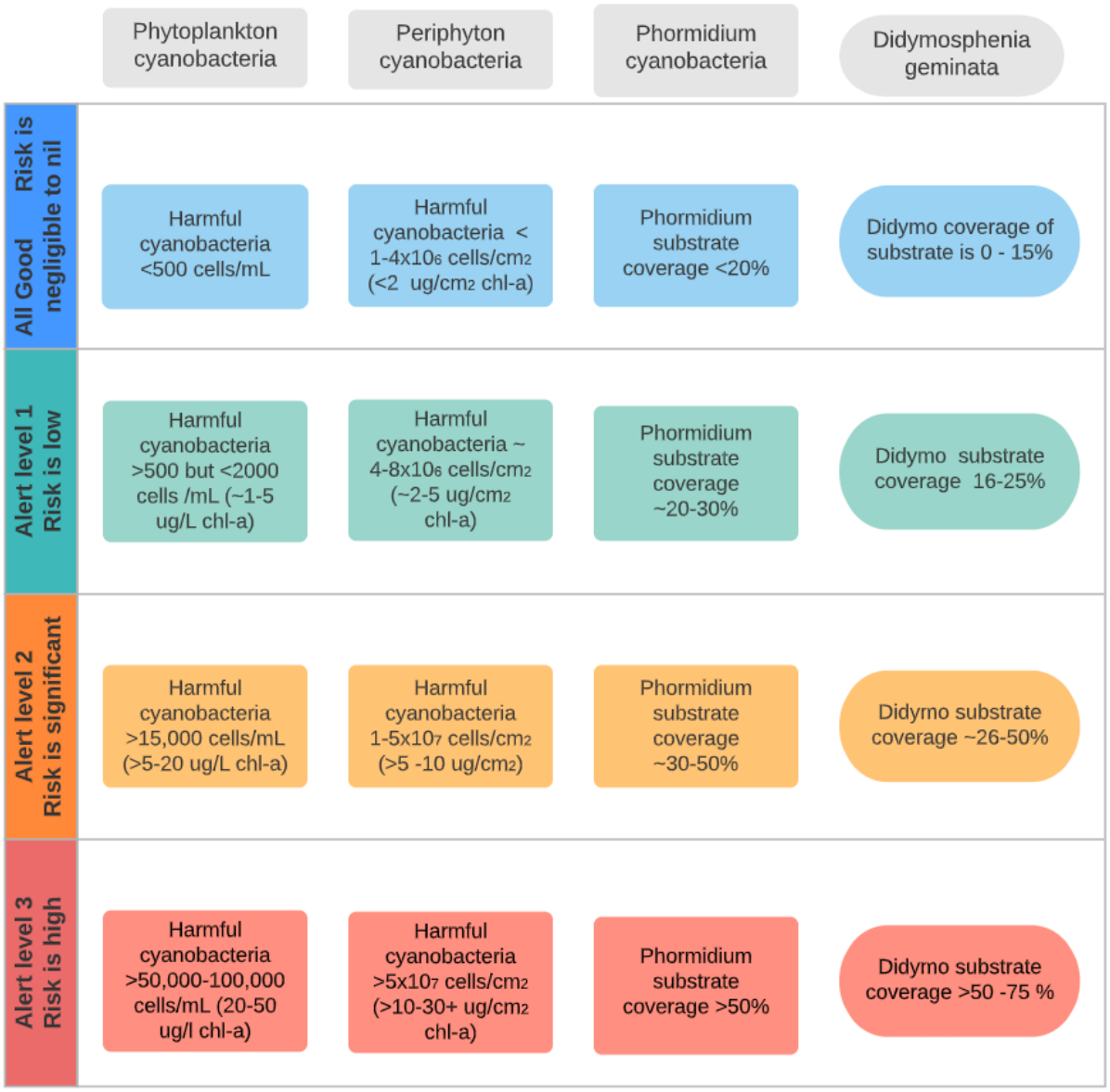


Figure 47: Alert Level Boundaries

Appendix 6: Report Revision History

Revision History				
Version	**Date**	**Prepared By**	**Reviewed By**	**Notes/Revisions**
Draft	May 23 2024	JS/CV/SK	HL	Draft for DLC review
Draft	June 18 2024	S Graham	JS	Draft returned to LAC
Final	June 21 2024	JS		Final Supplied to DLC

----------End of Report----------

Report to Council

District of Lake Country

MEETING TYPE: **Regular Council Meeting**
MEETING DATE: September 10, 2024
AUTHOR: **Sheeja Vimalan**
DEPARTMENT: **Planning and Development**
ITEM TITLE: Development Variance Permit | DVP00389 | 18139 Crystal Waters Road
DESCRIPTION: Development Variance Permit to authorize over-height retaining walls

PURPOSE

To consider a Development Variance Permit to construct over-height retaining walls.

RECOMMENDATION

THAT Development Variance Permit DVP00389 for the property located at 18139 Crystal Waters Road, (Attachment A to the Report to Council dated September 10, 2024) (Roll 2053030; PID: 004-192-761) to allow construction of proposed retaining walls be approved.

EXECUTIVE SUMMARY

Council recently approved a Development Permit to authorize the construction of a single family dwelling on the subject property. The applicant has requested a Zoning Bylaw variance to allow the construction of proposed retaining walls to support an existing driveway. Staff support the requested variance.

BACKGROUND/HISTORY

In 2020, the applicant applied for a Development Permit but did not include this retaining wall variance. Council issued the associated permit DP2020-020-C to authorize the construction of a single family dwelling. The applicant is now proposing a two-tiered retaining wall that would require a variance to construct. The proposed wall would support the existing driveway accessing a garage.

TABLE 1: PROPERTY INFOMRATION

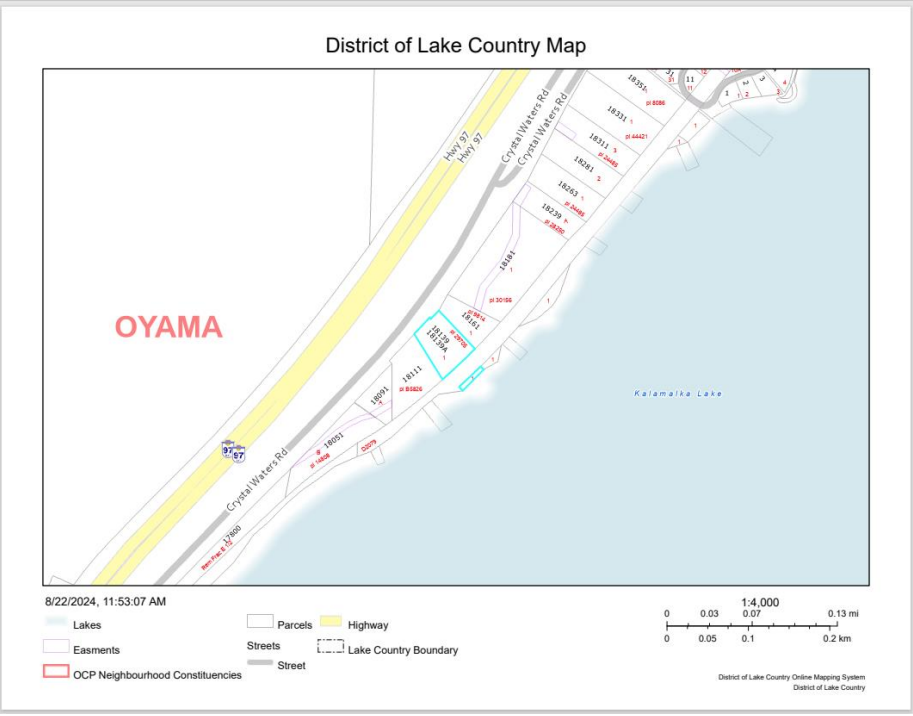
Civic Address:	18139 CRYSTAL WATERS RD		
Roll Number:	2053030		
Legal Description:	PID: 004-192-761; LOT 1 SECTION 24 TOWNSHIP 14 OSOYOOS DIV OF YALE LAND DISTRICT PLAN KAP29705		
Applicant:	Urban Options Planning Corp.	Owner(s):	Rail View Holdings Ltd.
OCP Designation:	Rural Residential		
Existing Zoning Designation:	RR3 – Rural Residential 3		
Proposed Zoning:	N/A		
Land Use Contract:	N/A		
ALR:	N/A		
Parcel Size:	0.34 ha (0.84 ac)		
DP Area(s):	Natural Environment		
Water Supply:	Private		
Sewer:	Private		
Site Context:	Zoning:	Use:	
North:	N/A	Crystal Waters Rd & Highway 97	
East:	RR3 – Rural Residential	Single-family dwelling	

South:	W1 – Recreational Water Use	Kalamalka Lake
West:	RR3 – Rural Residential	Single-family dwelling

SITE CONTEXT

The subject property falls within the Rural Residential Designation of the Official Community Plan (OCP) and is located within the Oyama Ward of the District of Lake Country. The parcel is outside of the District's Urban Containment Boundary. The parcel is bisected by the Rail Trail, with frontage on Kalamalka Lake.

MAP 1: LOCATION MAP



MAP 2: ORTHOPHOTO

FIGURE 1: SITE PLAN

GEOPACIFIC CONSULTANTS

TECHNICAL MEMORANDUM

CLIENT: Bercum Builder Inc.
FILE NO: 19763
PROJECT: Proposed Lock Block Walls
DATE: October 6th, 2022
ADDRESS: 18139 Crystal Waters Road, Lake Country, BC

PURPOSE: SITE CONDITIONS: WEATHER: OBSERVATIONS: CONCLUSIONS: RECOMMENDATIONS: ACTIONS:

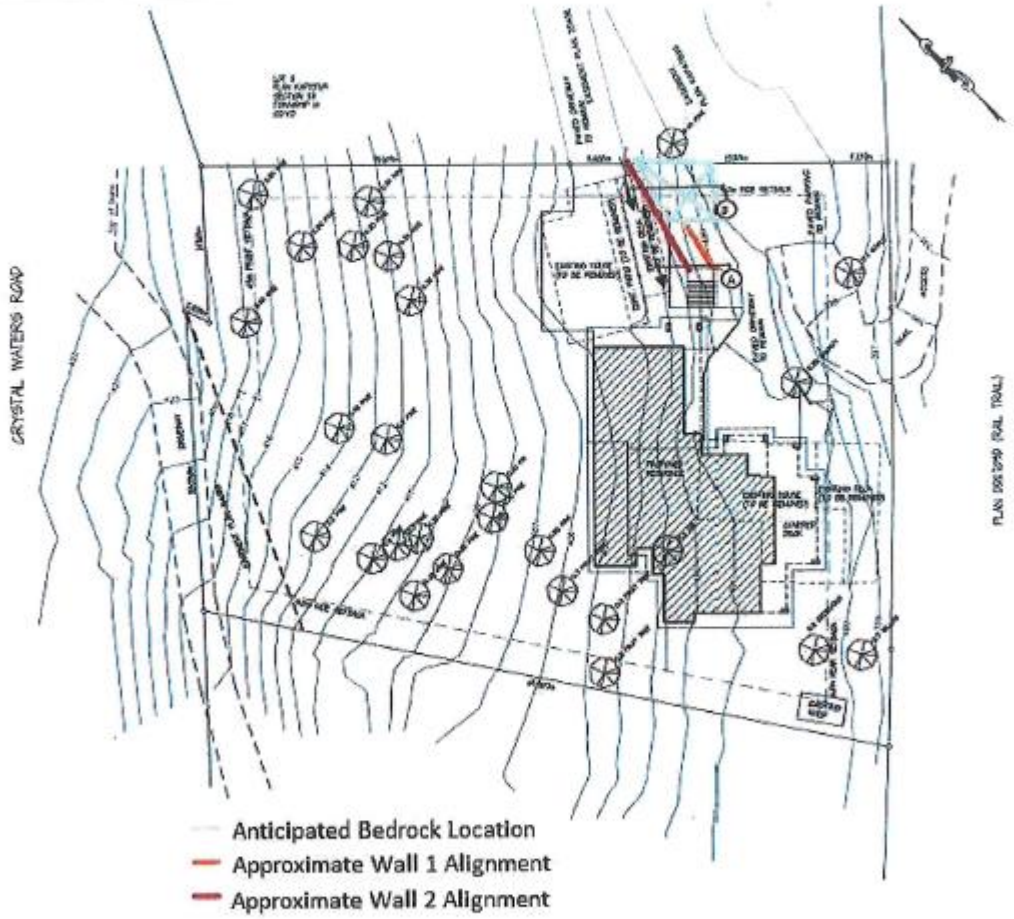
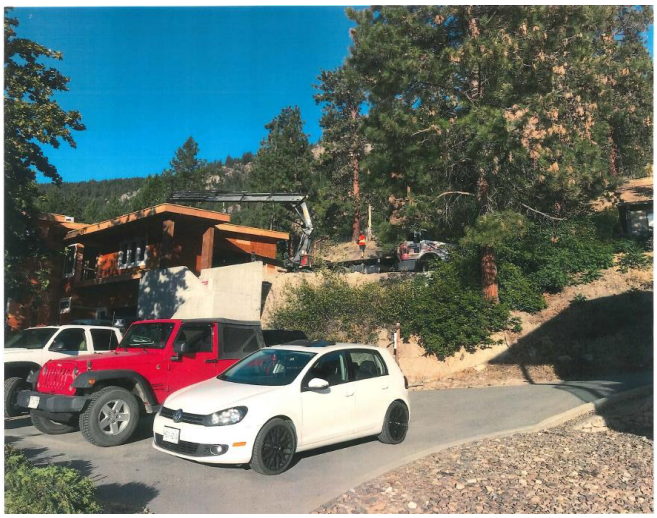


Figure 1: Plan View.

DISTRIBUTION:
PAGE 3 OF 7
Reviewed by: Kevin Bodnar, B.Eng., P.Eng.
Signed:
Prepared by: Beth Millan, B.A.Sc., EIT
Signed:

FIGURE 2: SITE PHOTOS

Northeastern side view



Driveway view

TABLE 2: FILE CHRONOLOGY

Date	Event
2023-03-13	Application Submission
2021-05-18	Development Permit Issued- DC2020-020-C

DISCUSSION/ANALYSIS

The applicant proposes to construct two-tiered retaining walls off the northeast side of the staircase attached to the foundation of the single-family dwelling. The proposed maximum height of the lower wall is 2.4 m (a variance of 0.9 m) and the proposed maximum height of the upper wall is 1.65 m (a variance of 0.15 m).

The construction of the proposed retaining walls would support the existing driveway accessing a garage and comply with other zoning regulations. According to the location and site grading plan of the property, the construction of the proposed retaining wall will not affect the immediate neighbours.

Staff supports the proposed variance.

APPLICABLE LEGISLATION, BYLAWS AND POLICIES

- Local Government Act – Section 498
- Official Community Plan (2018-2038) Bylaw 1065,2 018 – Section 13.2
- Zoning Bylaw 561, 2007 – Section 8.5- Fencing and Retaining Walls

IMPACT ON INFRASTRUCTURE, SERVICES AND STAFF CAPACITY

None noted.

FINANCIAL IMPLICATIONS

☒ None ☐ Budget Previously Approved ☐ Other (see below)

CONSULTATION

Internal were sent out on April 22, 2024. The referral comments came back with no concerns or comments.

COMMUNICATIONS

As per the requirements of the Development Approval Procedure Bylaw 1227, 2024, the applicants completed neighborhood consultation and installed a development notice sign at the property.

ALIGNMENT WITH COUNCIL STRATEGIC PRIORITIES

☒ Create and Support Opportunities for a Healthy, Active and Inclusive Community
☒ Create Infrastructure That Meets Community Needs
☐ Encourage Growth of the Downtown Core
☐ Ensure Sustainable Water Service Delivery for the Community
☐ Explore Opportunities to Engage With Regional Local Governments for the Betterment of the Community
☐ Honour Reconciliation by Strengthening Relationships and Inclusiveness With Our Indigenous Partners
☐ Identify and support improvements to the Development Process
☐ Implement the Agricultural Plan
☐ Preserve, Protect and Enhance Our Natural Environment
☐ Secure long term wastewater service delivery for our community
☐ Support Opportunities to Diversify Lake Country's Tax Base

ALIGNMENT WITH MASTER PLANS

☐ Agricultural Plan
☐ Climate Action Charter
☐ Housing Needs Report
☐ Liquid Waste Management Plan Stage 1/2 Report
☐ McCoubrey Plateau Area Structure Plan
☐ Mobility Master Plan
☒ Official Community Plan
☐ Parks & Recreation Master Plan 2019
☐ Sanitary Sewer System Map
☐ Transit Future Plan-Central Okanagan Region-DRAFT
☐ Transportation for Tomorrow
☐ Water Master Plan

OPTIONS

A. THAT Development Variance Permit DVP00389 for the property located at 18139 Crystal Waters Road, (Attachment A to the Report to Council dated September 10, 2024) (Roll 2053030; PID: 004-192-761) to allow the construction of proposed retaining walls be approved.
B. THAT Development Variance Permit DVP00389 for the property located at 18139 Crystal Waters Road, (Attachment A to the Report to Council dated September 10, 2024) (Roll 2053030; PID: 004-192-761) to allow the construction of proposed retaining walls not be approved.
C. THAT Development Variance Permit DVP00389 for the property located at 18139 Crystal Waters Road, (Attachment A to the Report to Council dated September 10, 2024 (Roll 2053030; PID: 004-192-761) to allow the construction of proposed retaining walls be deferred pending receipt of additional information as identified by the Council.

Respectfully Submitted,
Sheeja Vimalan, Planner

Report Approval Details

Document Title:	Development Variance Permit - DVP00389 (DVP2022-015) - 18139 Crystal Waters Rd.docx
Attachments:	- Attachment A-DVP00389-Draft DVP.pdf - Attachment B-DVP00389- Site Plan and Retaining Wall Drawings.pdf
Final Approval Date:	Sep 5, 2024

This report and all of its attachments were approved and signed as outlined below:

Brian Zurek, Manager of Planning - Sep 4, 2024 - 12:09 PM

No Signature found

Steven Gubbels, Development Engineering Manager - Sep 4, 2024 - 1:03 PM

No Signature found

Matthew Salmon, Infrastructure & Development Engineering Director - Sep 4, 2024 - 1:24 PM

Jeremy Frick, Director of Planning & Development - Sep 4, 2024 - 5:00 PM

Reyna Seabrook, Director of Corporate Services - Sep 5, 2024 - 10:12 AM

Paul Gipps, Chief Administrative Officer - Sep 5, 2024 - 2:08 PM

DEVELOPMENT VARIANCE PERMIT

District of Lake Country
10150 Bottom Wood Lake Road
Lake Country, BC V4V 2M1
t: 250-766-6674 f: 250-766-0200
lakecountry.bc.ca

APPROVED ISSUANCE OF DEVELOPMENT VARIANCE PERMIT *(pursuant to Sec. 498 of the Local Government Act)*

PERMIT #:	DVP00389
FOLIO #:	2053030
ZONING DESIGNATION:	RR3 – Rural Residential 3
ISSUED TO:	Rail View Holdings Ltd.
SITE ADDRESS:	18139 Crystal Waters Rd
LEGAL DESCRIPTION:	LOT 1 SECTION 24 TOWNSHIP 14 OSOYOOS DIV OF YALE LAND DISTRICT PLAN KAP29705
PARCEL IDENTIFIER:	004-192-761

SCOPE OF APPROVAL

This Permit applies to and only to those lands within the Municipality as described above, and any and all buildings, structures and other development thereon.

This Permit is issued subject to compliance with all of the Bylaws of the Municipality applicable thereto, except as specifically varied or supplemented by this Permit, noted in the Terms and Conditions below.

Applicants for Development Permits should be aware that the issuance of a Permit limits the applicant to be in strict compliance with all District bylaws unless specific Variances have been authorized by the Permit. No implied Variances from bylaw provisions shall be granted by virtue of drawing notations which are inconsistent with bylaw provisions and which have not been identified as required Variances by the applicant or Municipal staff.

If any term or condition of this permit is for any reason held to be invalid by a decision of a Court of competent jurisdiction, such decision will not affect the validity of the remaining portions of this permit.

1. TERMS AND CONDITIONS

Development Variance Permit DVP00389 for 18139 Crystal Waters Rd; legally described as LOT 1 SECTION 24 TOWNSHIP 14 OSOYOOS DIV OF YALE LAND DISTRICT PLAN KAP29705 for a retaining wall development, shall be conducted in accordance with the regulations contained in the following documents attached to and forming part of this permit:

a) Amends Zoning Bylaw 561, 2007 as follows:

i) Section 8.5.8 to exceed the height of the proposed retaining walls:

From: 1.5m
To: 2.4m

b) The development of the retaining wall shall be conducted substantially in accordance with the following documents to the satisfaction of the Director of Planning and Development:
   i) **Schedule A**: Site Plan, titled Technical Memorandum-Plan View & Section View, prepared by Beth Millan/Geopacific Consultants, dated October 6, 2022.

2. DEVELOPMENT

The development described herein shall be undertaken strictly in accordance with the terms, conditions and provisions of this Permit and any plans and specifications attached to shall form a part hereof.

The development shall commence within **TWO** YEARS of the date that this permit is issued.

If the Permit Holder does not substantially commence the development permitted by this Permit within **TWO** years of the date of issuance of this permit, this permit shall lapse.

The terms of the permit or any amendment to it are binding on all persons who acquire an interest in the land affected by the permit.

THIS IS NOT A BUILDING PERMIT OR A CERTIFICATE TO COMMENCE CONSTRUCTION

3. APPROVALS

Authorization passed by Council on the ___ day of _____, 2024.

Issued by the Corporate Officer of the District of Lake Country this ___ day of _____, 2024.

_____
Corporate Officer, Reyna Seabrook

GEOPACIFIC CONSULTANTS

TECHNICAL MEMORANDUM

CLIENT:	Bercum Builder Inc.	FILE NO:	19763
PROJECT:	Proposed Lock Block Walls	DATE:	October 6th, 2022
ADDRESS:	18139 Crystal Waters Road, Lake Country, BC		

PURPOSE: SITE CONDITIONS: WEATHER: OBSERVATIONS: CONCLUSIONS: RECOMMENDATIONS: ACTIONS:

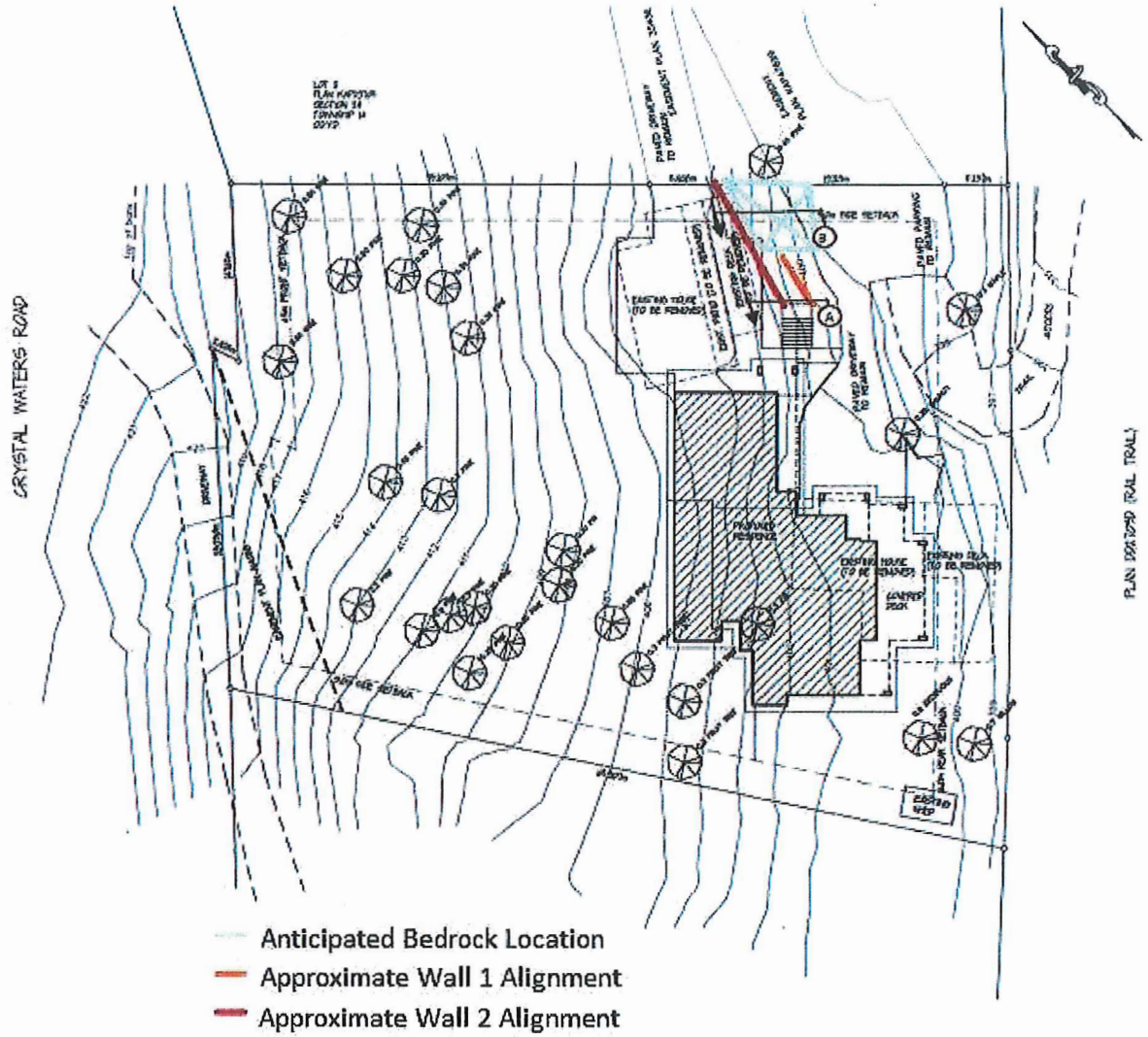


Figure 1: Plan View.

GEOPACIFIC CONSULTANTS

TECHNICAL MEMORANDUM

CLIENT: Bercum Builder Inc.
FILE NO: 19763
PROJECT: Proposed Lock Block Walls
DATE: October 6th, 2022
ADDRESS: 18139 Crystal Waters Road, Lake Country, BC

PURPOSE: SITE CONDITIONS: WEATHER: OBSERVATIONS: CONCLUSIONS: RECOMMENDATIONS: ACTIONS:

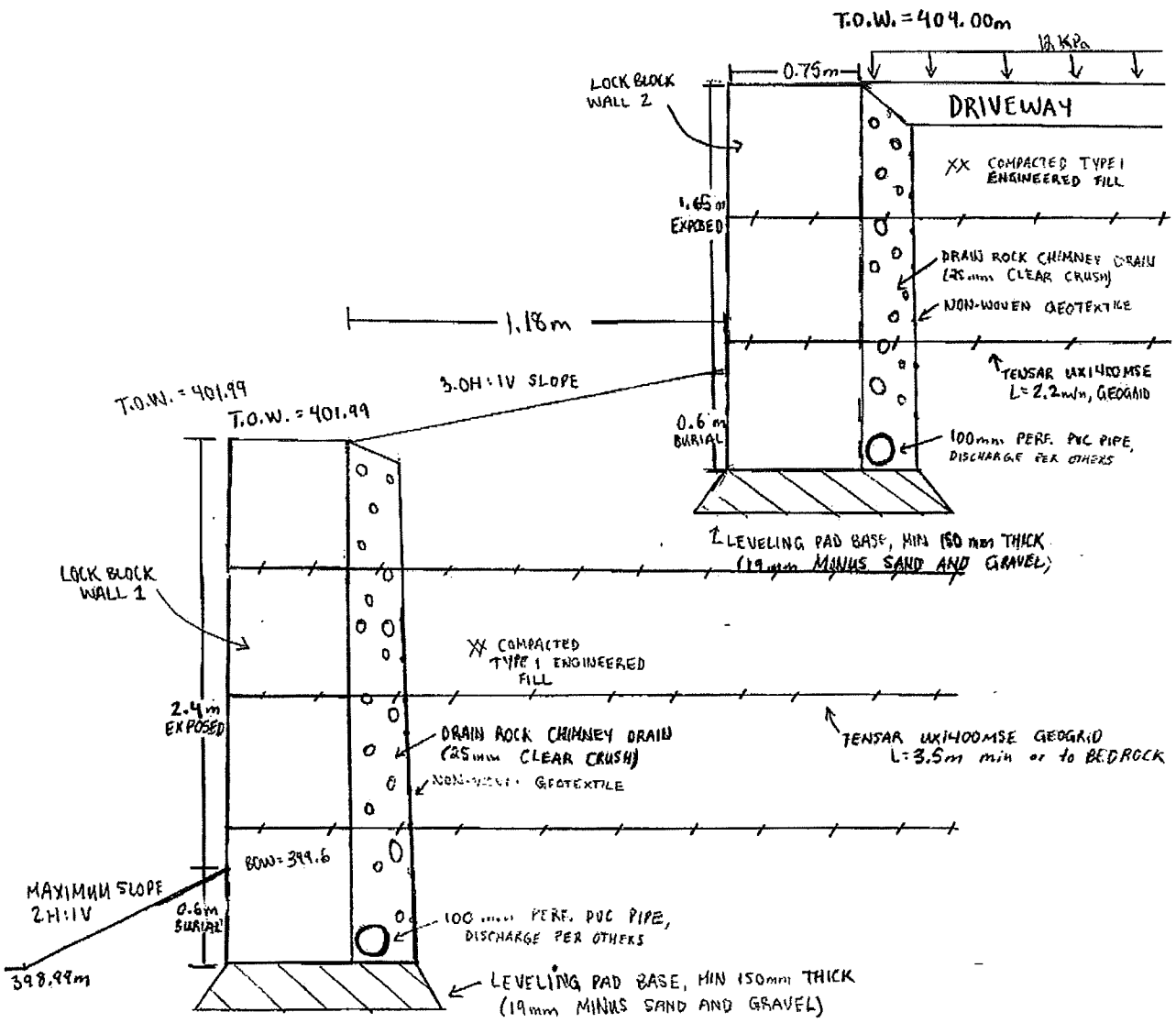


Figure 2: Section View A (not to scale).

GEOPACIFIC CONSULTANTS

TECHNICAL MEMORANDUM

CLIENT: Bercum Builder Inc.
FILE NO: 19763
PROJECT: Proposed Lock Block Walls
DATE: October 6th, 2022
ADDRESS: 18139 Crystal Waters Road, Lake Country, BC

PURPOSE: SITE CONDITIONS: WEATHER: OBSERVATIONS: CONCLUSIONS: RECOMMENDATIONS: ACTIONS:

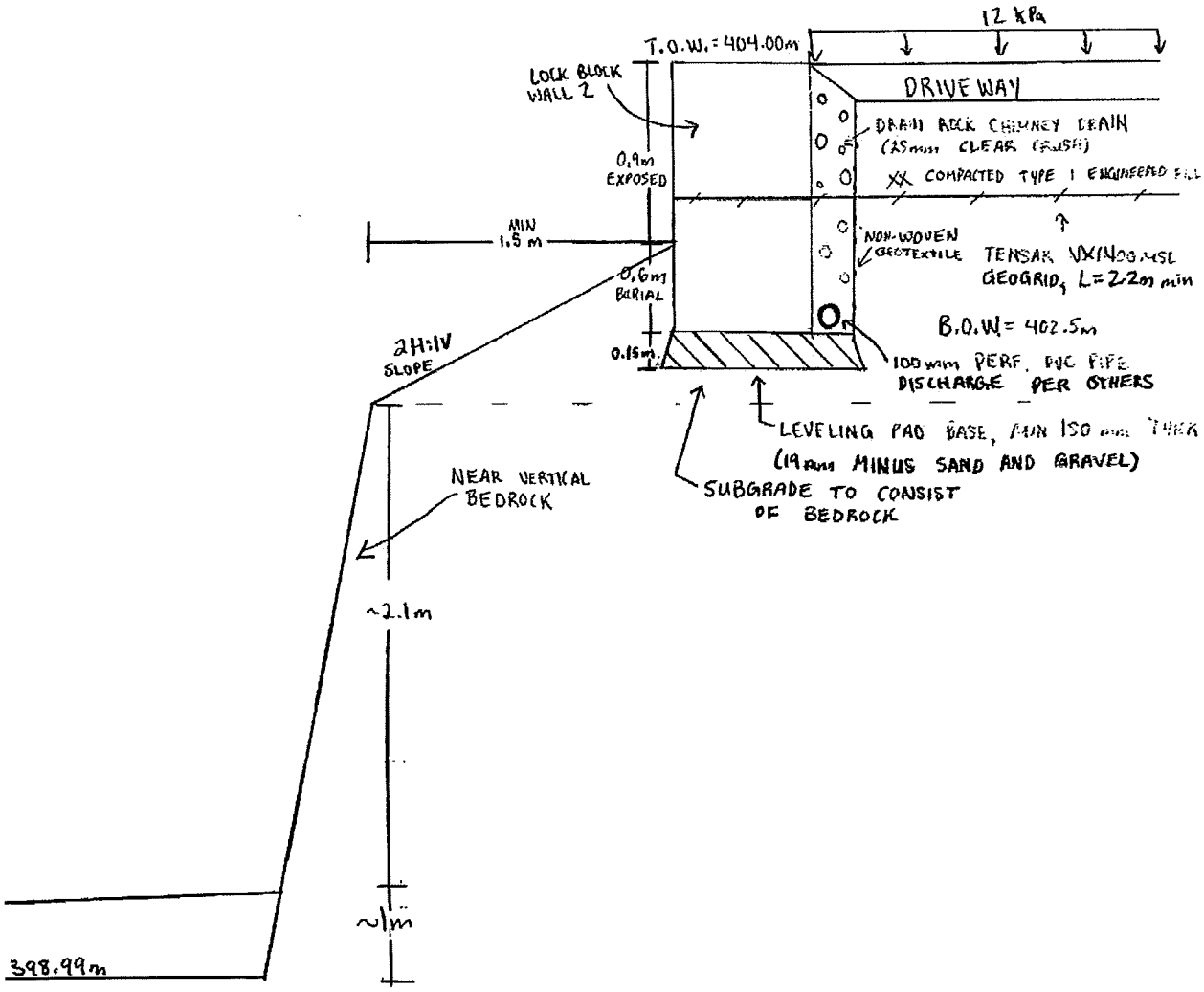


Figure 3: Section View B (not to scale).

Report to Council

District of Lake Country

MEETING TYPE:	**Regular Council Meeting**
MEETING DATE:	September 10, 2024
AUTHOR:	**Jason Tran, Planner**
DEPARTMENT:	**Planning and Development**
ITEM TITLE:	Temporary Use Permit Renewal|TUP00099|9162 Glenmore Road
DESCRIPTION:	To authorize outdoor recreational vehicle and boat storage at 9162 Glenmore Road

PURPOSE

To consider the renewal of a Temporary Use Permit authorizing Outdoor Recreational Vehicle and Boat Storage at 9162 Glenmore Rd.

RECOMMENDATION

THAT Temporary Use Permit Renewal TUP00099 for property located at 9162 Glenmore Road (Roll No. 2141001 and 2140000 PID: 010-477-586 and 005-081-726) to allow the temporary land use of outdoor recreational vehicle and boat storage until August 16, 2026 be approved.

EXECUTIVE SUMMARY

The applicant proposes to renew a Temporary Use Permit authorizing outdoor recreation vehicle and boat storage to allow an existing business to continue on the subject properties. The site is located within the plan area of the future Lake Country Business Park. The District will begin an Area Structure Plan process to guide the future land use and zoning of properties within the plan area.

Until the Area Structure Plan is complete, staff recommend authorizing outdoor recreational vehicle and boat storage on the subject properties through a Temporary Use Permit on the subject properties.

BACKGROUND/HISTORY

The Agricultural Land Commission excluded the subject properties from the Agricultural Land Reserve subject to the rezoning of the site to support industrial uses by August 2026. The District will initiate an Area Structure Plan process in 2024 to guide the future land use of properties within the Lake Country Business Park plan area.

The applicant has applied to rezone the subject properties to I1 – General Industrial to authorize outdoor storage as a permitted use on the site. The District has placed the application on hold pending the completion of the Area Structure Plan process.

Council approved a Temporary Use Permit authorizing outdoor storage of recreational vehicles and boats on September 21, 2021. The permit will expire on September 21, 2024.

Under the Local Government Act, a Temporary Use Permit can only be issued for up to three years, with the possibility of one extension of up to three years. After these terms have expired, a new application is required should the applicant wish to continue the temporary use.

TABLE 1: PROPERTY INFORMATION

Civic Address:	9162 Glenmore Road		
Roll Number:	2141001 and 2140000		
Legal Description:	PID: 010-477-586 Lot 1 Section 3 Township 20 ODYD Plan 4674 and PID: 005-081-726 Lot 1 Section 3 Township 20 ODYD Plan 26595		
Applicant:	MCMILLAN, STUART LARGE, JACKIE	Owners:	LARGE, DOREEN J LARGE, PHILIP L
OCP Designation:	Industrial		
Existing Zoning Designation:	RR1 – Rural Residential 1 & RR3 – Rural Residential 3		
Proposed Zoning:	Unchanged		
Land Use Contract:	No		
ALR:	Lot 1 Plan 4674 Exempt as per ALC Policy P-02		
Parcel Size:	3.58 ha (8.8 ac)		
Water Supply:	Community		
Sewer:	On-site sewage disposal		
Site Context:	Zoning:		Use:
North:	RU1 – Single Family Housing P4 - Utilities		Residential and Industrial
East:	RU1 – Single Family Housing RM4 – Low Density Multiple Housing		Residential
South:	RU1 – Single Family Housing RM4 – Low Density Multiple Housing A1 – Agriculture 1		Residential and Agricultural
West:	I5 – Soil Processing		Industrial

SITE CONTEXT

The property is within the Official Community Plan's (OCP) Urban Containment Boundary and the Winfield Neighbourhood of the District. Gravel extraction occurred previously on the site and on neighboring properties. Current uses on the adjacent properties are dominated by industrial activities. Glenmore Road separates the site from low-density residential developments.

TABLE 2: FILE CHRONOLOGY

Date	Event
2023-05-01	Application Submission
2024-06-11	Internal & External Referrals
2024-09-10	Council Consideration

DISCUSSION/ANALYSIS

As noted previously, the subject properties are located within the area of the proposed Lake Country Business Park. The District's Area Structure Plan process, beginning later in 2024, will evaluate infrastructure requirements, servicing needs, and market demand for business and industrial development to guide the future land use and zoning within the plan area.

Prior to the completion of the Area Structure Plan, staff would not recommend that Council approve the rezoning of properties within the plan area; however, approving a Temporary Use Permit to authorize or renew appropriate development within the plan area, including the subject properties, may be appropriate.

Since Council approved the Temporary Use Permit for the subject properties in 2021, the applicants have developed the site to support an outdoor recreational vehicle and boat storage facility. The existing business is operating as per the terms of the Temporary Use Permit. During the review of the renewal application, staff did not identify any concerns with the proposal to temporarily extend the use of the properties for outdoor recreational vehicle and boat storage.

As noted previously, the subject properties must be rezoned to support industrial land use by August 2026 to comply with the terms of their exclusion from the Agricultural Land Reserve. Staff recommend limiting the term of the Temporary Use Permit to August 2026 to coincide with the above-noted Agricultural Land Reserve exclusion deadline.

Staff support the Temporary Use Permit application to allow outdoor recreational vehicle and boat storage to occur on the subject property until August 16, 2026.

APPLICABLE LEGISLATION, BYLAWS AND POLICIES

Local Government Act
Official Community Plan (2018-2038) Bylaw 1065, 2018
Zoning Bylaw 561, 2007

IMPACT ON INFRASTRUCTURE, SERVICES AND STAFF CAPACITY

There has been no noticeable impact to traffic on Glenmore Road resulting from the business. The District has received complaints regarding the site fencing. Staff have reviewed the location of the fence which is on private property. The fence is acting to slow traffic on the Glenmore and Shanks Road corner. The use has no impact on other municipal infrastructure.

FINANCIAL IMPLICATIONS

☒ None

CONSULTATION

Internal and External referrals were sent out on June 11, 2024. The referral comments came back were no concerns or no comments.

COMMUNICATIONS

As per the requirements of the Development Approval Procedure Bylaw 1227, 2024, the applicants were required to complete Neighborhood Consultation and post Development Notice Signs at the property.

ALIGNMENT WITH COUNCIL STRATEGIC PRIORITIES

☒ Implement the Agricultural Plan
☒ Support Opportunities to Diversify Lake Country's Tax Base

ALIGNMENT WITH MASTER PLANS

☒ Agricultural Plan
☒ Official Community Plan

OPTIONS

A. THAT Temporary Use Permit Renewal TUP00099 for property located at 9162 Glenmore Rd, (Roll No. 2141001 and 2140000 PID: 010-477-586 and 005-081-726) to allow the temporary land use of outdoor recreational vehicle and boat storage until August 16, 2026 be approved.
B. THAT Temporary Use Permit Renewal TUP00099 for property located at 9162 Glenmore Rd., (Roll No. 2141001 and 2140000 PID: 010-477-586 and 005-081-726) to allow the temporary land use of outdoor recreational vehicle and boat storage until August 16, 2026 be denied.
C. THAT Temporary Use Permit Renewal TUP00099 for property located at 9162 Glenmore Rd., (Roll No. 2141001 and 2140000 PID: 010-477-586 and 005-081-726) to allow the temporary land use of outdoor recreational vehicle and boat storage until August 16, 2026 be deferred pending additional information as identified by Council.

Collaborators: *(each individual collaborator to add name and date reviewed)*

Name	**Date Reviewed**
Sid Smith	2024.08.20

Respectfully Submitted,
Jason Tran, Planner

Report Approval Details

Document Title:	Temporary Use Permit Renewal - TUP00099 - 9162 Glenmore Rd.docx
Attachments:	- Attachment A - TUP00099-Draft Temporary Use Permit.pdf - Attachment B - TUP00099-Location Map.pdf - Attachment C - TUP00099-Drone View.pdf - Attachment D - TUP00099-Conceptual Site Plan.pdf - Attachment E - TUP00099 - Photos.pdf - Attachment F - TUP00099 - Notification Map of 100m.pdf
Final Approval Date:	Sep 5, 2024

This report and all of its attachments were approved and signed as outlined below:

Brian Zurek, Manager of Planning - Sep 4, 2024 - 11:54 AM

No Signature found

Steven Gubbels, Development Engineering Manager - Sep 4, 2024 - 12:48 PM

No Signature found

Matthew Salmon, Infrastructure & Development Engineering Director - Sep 4, 2024 - 1:02 PM

Jeremy Frick, Director of Planning & Development - Sep 4, 2024 - 5:00 PM

Reyna Seabrook, Director of Corporate Services - Sep 5, 2024 - 10:15 AM

Paul Gipps, Chief Administrative Officer - Sep 5, 2024 - 2:09 PM

Temporary Use Permit

District of Lake Country
10150 Bottom Wood Lake Road
Lake Country, BC V4V 2M1
t: 250-766-6674 f: 250-766-0200
lakecountry.bc.ca

APPROVED ISSUANCE OF ❑ TEMPORARY USE PERMIT *(pursuant to Sec. 921 of the Local Government Act)*

PERMIT #	TUP00099
FOLIO #	2141000 and 2140001
ZONING DESIGNATION:	RR1 & RR3 – Rural Residential 1 & 3
ISSUED TO:	Stuart McMillan and Jackie Large
SITE ADDRESS:	9162 Glenmore Road
LEGAL DESCRIPTION:	Lot 1 Section 3 Township 20 Osoyoos Division Yale District Plan 4674 and Lot 1 Section 3 Township 20 ODYD Plan 26595
PARCEL IDENTIFIER:	010-477-586 and 005-081-726

SCOPE OF APPROVAL

This Permit applies to and only to those lands within the Municipality as described above, and any and all buildings, structures and other development thereon.

This Permit is issued subject to compliance with all of the Bylaws of the Municipality applicable thereto, except as specifically varied or supplemented by this Permit, noted in the Terms and Conditions below.

Applicants for Temporary Permits should be aware that the issuance of a Permit limits the applicant to be in strict compliance with regulations of all Municipal Bylaws unless specific Variances have been authorized by the Permit. No implied Variances from bylaw provisions shall be granted by virtue of drawing notations which are inconsistent with bylaw provisions and which have not been identified as required Variances by the applicant or Municipal staff.

If any term or condition of this permit is for any reason held to be invalid by a decision or a Court of competent jurisdiction, such decision will not affect the validity of the remaining portions of this permit.

1. TERMS AND CONDITIONS

Temporary Use Permit TUP00099 (9162 Glenmore Road) on Lot 1 Section 3 Township 20 Osoyoos Division Yale District Plan 4674 and Lot 1 Section 3 Township 20 ODYD Plan 26595 is approved allowing Outdoor Recreational Vehicle and Boat Storage subject to the following conditions:

a) Development and business operations shall be conducted in compliance with the provisions of the District's various bylaws including Nuisance Bylaw 857, 2013, Business Licensing Bylaw 1000, 2017, Signage Regulation Bylaw 501, 2004, and Zoning Bylaw 561, 2007 except as explicitly varied or supplemented by the terms of this permit. subsequent permits, amendments(s) and/or development variance permits;

b) Uses allowed under this permit are limited to those uses listed below:
   i) Accessory structures
   ii) Boat Storage
   iii) Outdoor Storage
   iv) Parking Lot
c) That any Recreational Vehicle that is stored which has propane will have the propane removed and stored in accordance with the BC Fire Code;
d) Outdoor Storage is restricted to the area shown on **Schedule 'A'** attached to and forming part of this Permit;
e) Failure to adhere to the conditions contained within this permit can result in the termination of the permit;
f) This permit, issued as per Section 493 of the *Local Government Act*, is valid from the approval date to the expiry dated indicated below;
g) At the end of the term of this permit all uses on this property must revert back to uses permitted under the zoning bylaw of the day (unless a subsequent new permit has been obtained).

2. DEVELOPMENT

The land described herein shall be developed strictly in accordance with the terms, conditions and provisions of this Permit and any plans and specifications attached to shall form a part hereof.

This permit is not transferrable unless specifically permitted by the Municipality. The authorization to transfer the Permit shall, if deemed acceptable, be granted by Council resolution.

THIS IS NOT A BUILDING PERMIT OR A CERTIFICATE TO COMMENCE CONSTRUCTION

3. APPROVALS

Authorizing resolutions passed by the Council on the **____ day of September, 2024.**

Issued by the Corporate Officer of the District of Lake Country this **____ day of September, 2024.**

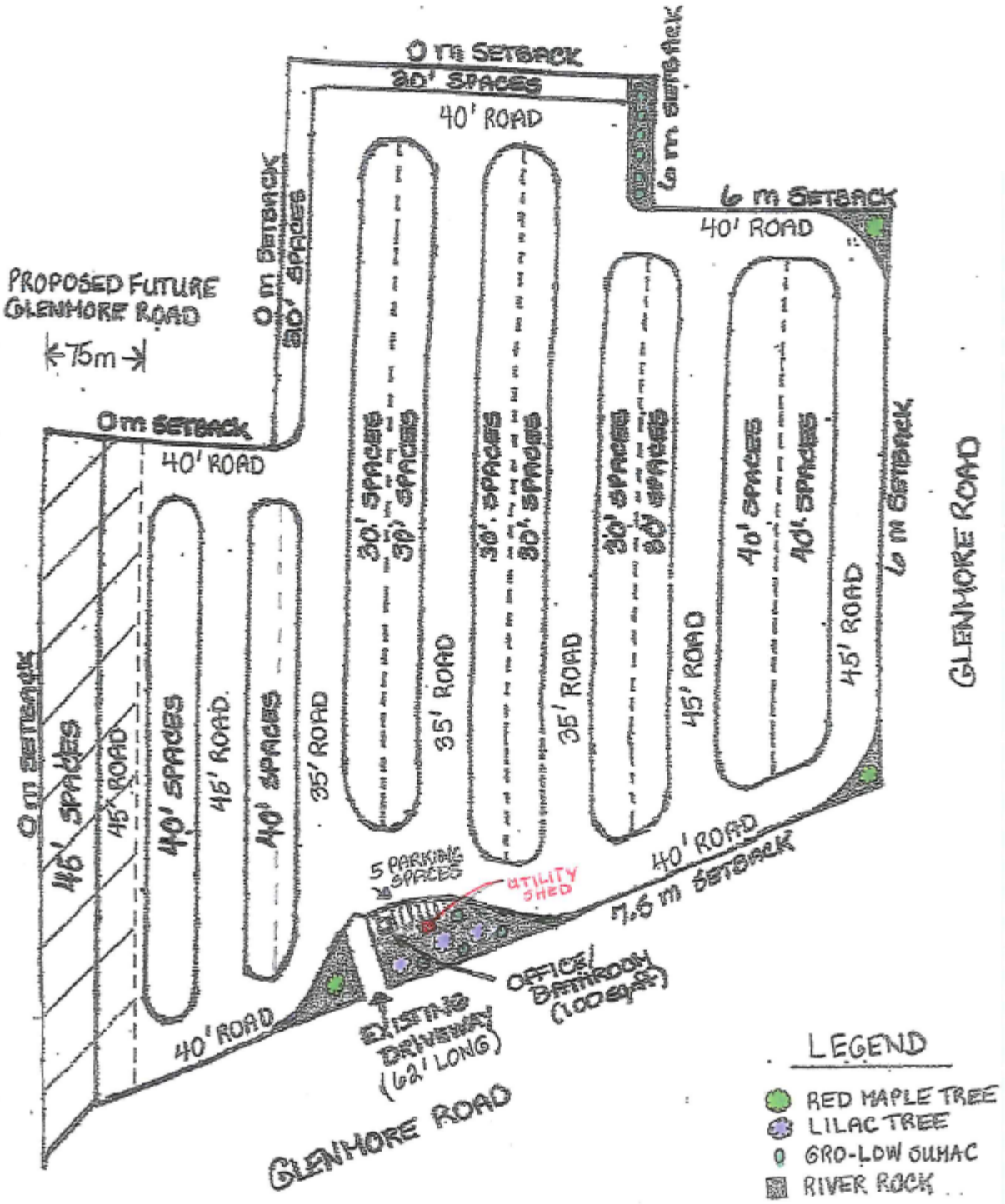
4. EXPIRY

Temporary Permit TUP00099 (9162 Glenmore Road) expires on the _____ **day of September, 2024.**

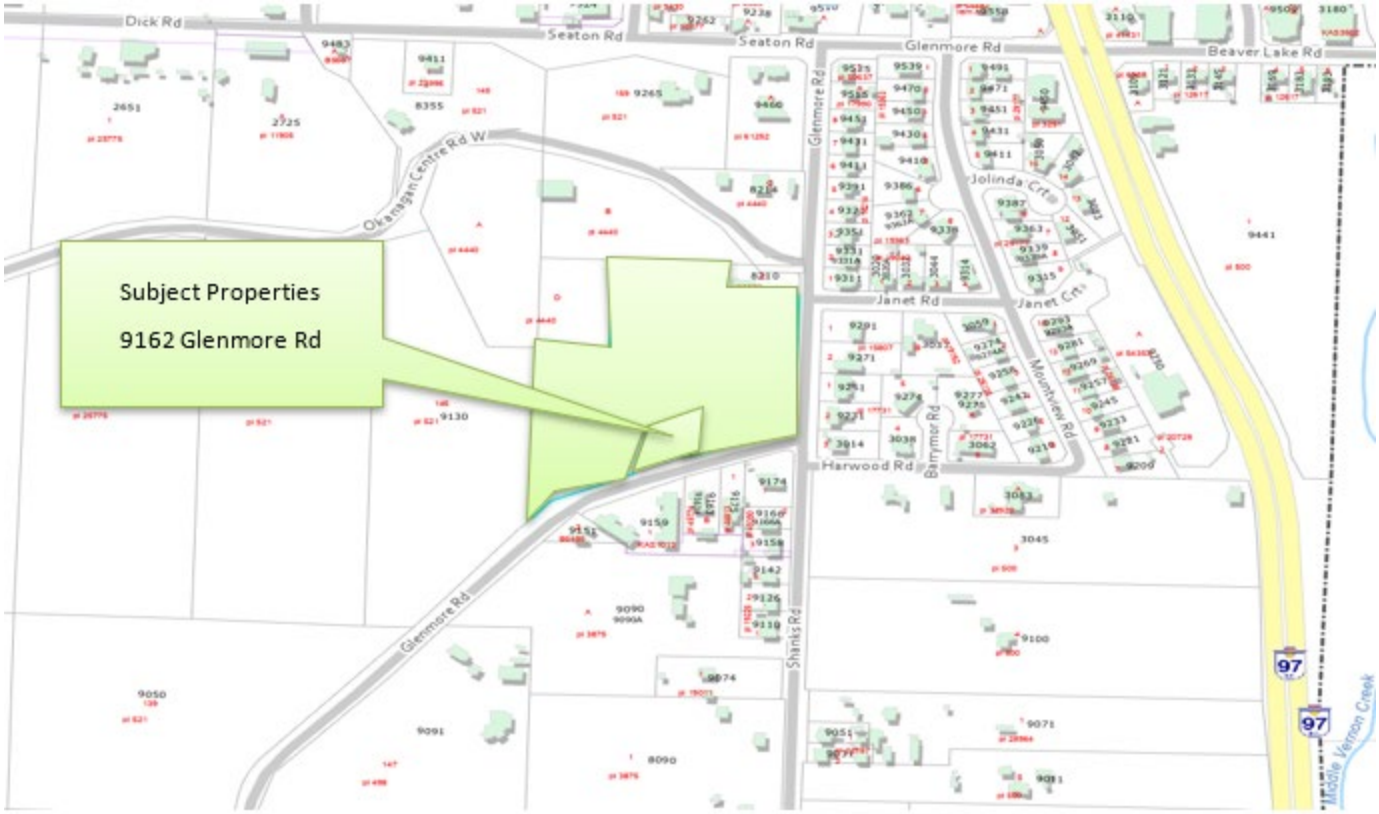
_____
Corporate Officer, Reyna Seabrook

Schedule 'A':

SCHEDULE _____
This forms part of development
Permit # .....
Date .....
Signature .....

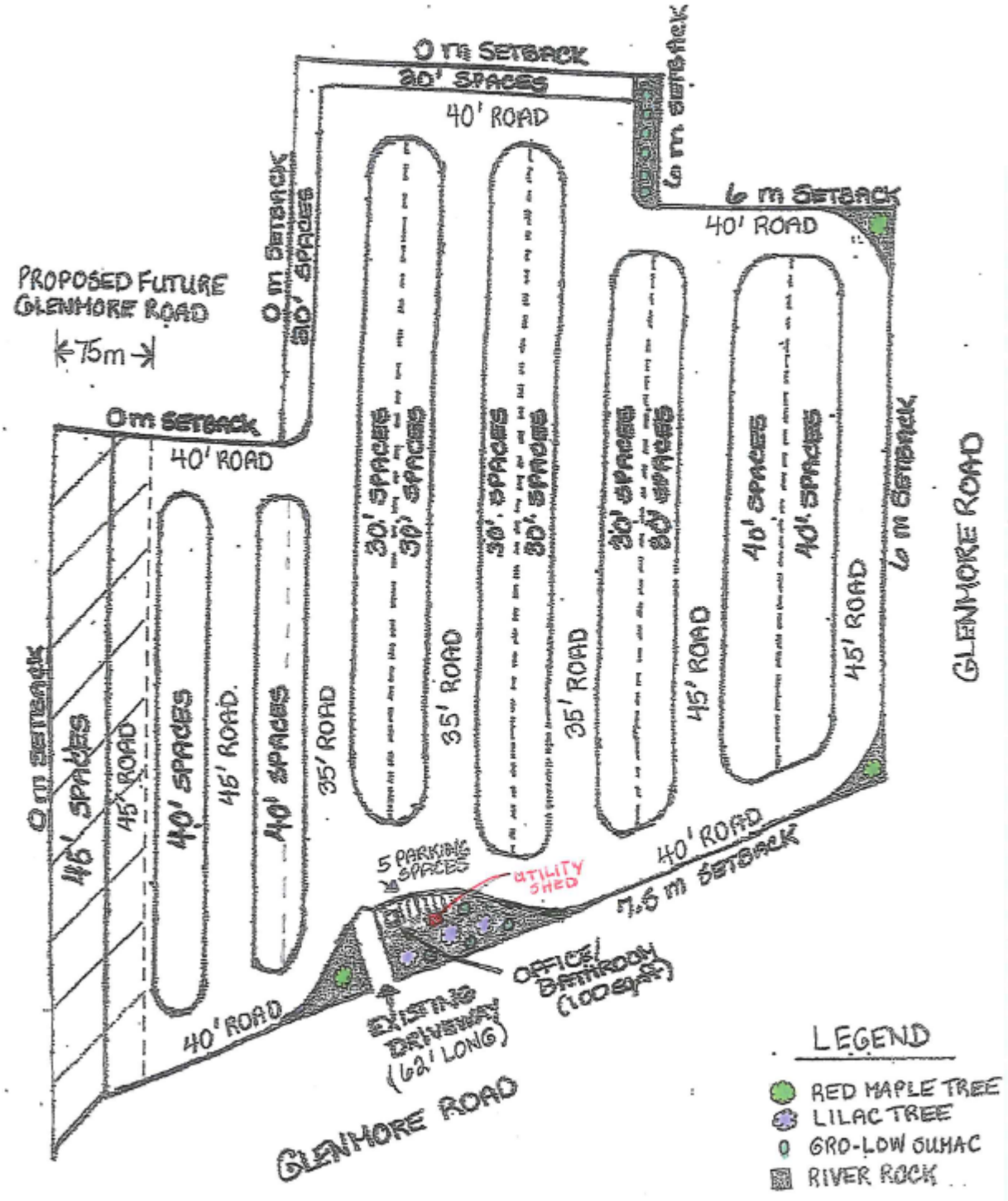


Attachment B – Location Map



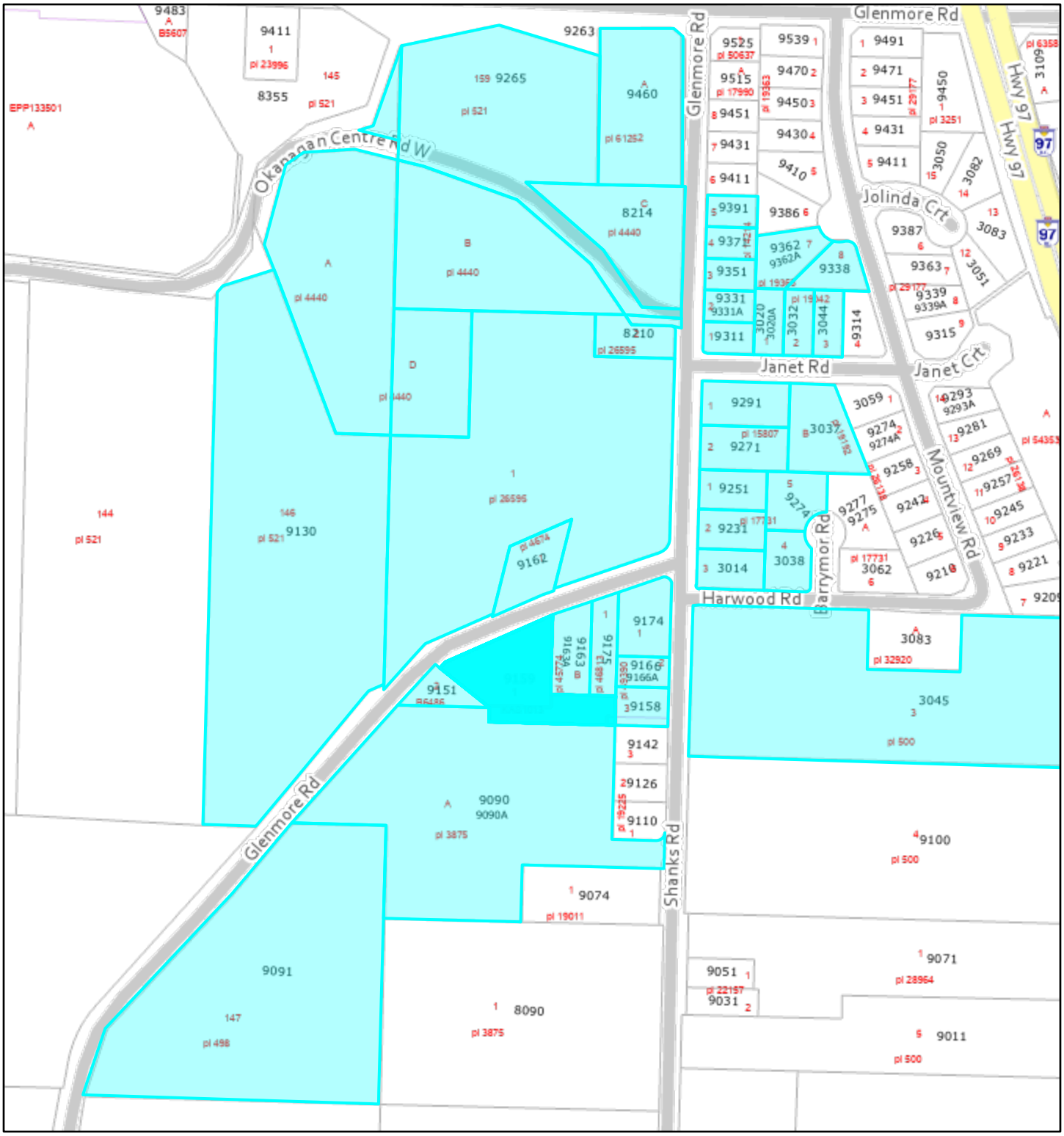
Attachment C – Drone View

Attachment D – Conceptual Site Plan



Attachment E – Photos

District of Lake Country Map - 100 m



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1:4,000

0 0.03 0.07 0.13 mi

0 0.05 0.1 0.2 km

Parcels

Highway

Easments

Lake Country Boundary

Streets

Street

District of Lake Country Online Mapping System
District of Lake Country

Report to Council

District of Lake Country

MEETING TYPE: **Regular Council Meeting**
MEETING DATE: September 3, 2024
AUTHOR: **Jason Tran, Planner**
DEPARTMENT: **Planning and Development**
ITEM TITLE: Request for Feedback |15660 Oyama Road
DESCRIPTION: To seek Council direction on the proposed expansion of commercial uses

PURPOSE

To seek Council direction on a proposed expansion of commercial uses for the property at 15660 Oyama Road.

RECOMMENDATION

THAT staff be directed to work with the owner of the property at 15660 Oyama Road (Roll No. 01878.000 PID: 009-973-656) to process a Zoning Bylaw amendment application to regulate the long-term use of the parcel for boat sales and storage.

EXECUTIVE SUMMARY

Temporary Use Permits authorize the current boat storage and service business on the subject property. The owner would like to continue operating the business and to expand the services offered to include boat sales.

Council would be required to authorize the proposed use on the subject property. Staff are seeking direction from Council on how to proceed. Should Council support the long-term use of the parcel for boat sales and storage, staff recommend that Council direct staff to work with the owner on a Direct Control zone to authorize the proposed development.

BACKGROUND/HISTORY

The subject property is located in the Oyama Ward of the District and contained within the Urban containment Boundary. The Official Community Plan designates the property Mixed-Use Commercial, and the Zoning Bylaw assigns C2 – Neighbourhood Commercial zoning.

Previously, the property functioned as a fruit packing house. To support the adaptive reuse of the existing buildings, the District has issued two temporary use permits to authorize boat storage and service on the subject property. Additionally, Council renewed the second temporary use permit in 2022.

The property is serviced with municipal water and a private on-site sewer. Because Oyama is not currently serviced by municipal sewer, Temporary Use Permits were proposed previously to authorize boat storage on the subject property on a short-term basis due in part to policy (OCP) and regulation (Subdivision Development Servicing Bylaw) directing development to be connected to urban services (municipal water and sanitary sewer).

TABLE 1: TEMPORARY USE PERMIT HISTORY

History of Temporary Use Permits at the subject property		
First TUP	Second TUP	Renewal of the second TUP
TP2017-001	**TP2018-001**	**TP2018-001-REN**
Issued on Sept. 20, 2017	Issued on Oct. 9, 2019	Issued on Aug. 17, 2022
Expired on May 2, 2020	Expired on Sept. 4, 2021	Expired on Sept. 4, 2024

Under the Local Government Act, a Temporary Use Permit can only be issued once for up to 3 years, with the possibility of one extension of up to 3 years. After these terms have expired, a new application is required should the applicant wish to continue the temporary use.

TABLE 2: PROPERTY SUMMARY

Summary Information			
Application Type	Request Council for direction		
File Number:	TP2018-001-REN	Folio/Roll #:	01878.000
Legal Description:	LOT 1 SECTION 11 TOWNSHIP 14 OSOYOOS DIVISION YALE DISTRICT PLAN 3087		
PID	009-973-656		
Civic Address:	15660 Oyama Road		
OCP Designation:	Mixed Use Commercial		
Zoning Designation:	C2 - Neighbour Commercial		
Land Use Contract	No		
ALR:	No		
Parcel Size:	1.4 ha (3.46 acres)		
Development Permit Area(s):	Agricultural and Commercial		
Water Supply:	District		
Sewer:	On-Site		
Number of Building(s) on Site	1		
Site Summary:	Zoning:		Use:
North:	RU1 – Single Family Housing		Residential
East:	P2 & RU1 – Administration, Public Services and Assembly		Fire Hall & Residential
South:	P1 – Public Park & Open Space		Park
West:	Road & P2 – Administration, Public Services and Assembly		Oyama Community Club

DISCUSSION/ANALYSIS

The owner of the subject property operates a boat storage and service business authorized by the existing Temporary Use Permit. The owner proposes to continue operating the business and expand the services to include boat sales. The owner must seek authorization from Council to continue and expand the existing business.

TABLE 3: FUTURE LAND USE AND ZONING OPTIONS

	Option A	Option B	Option C
OCP Future Land Use	Mixed Used Commercial		Service Commercial
Zoning	Direct Control	Temporary Use Permit	Service Commercial
Application requirements	OCP & Zoning Amendment Applications	Temporary Use Permit Application	OCP & Zoning Amendment Applications
Staff Comments	Existing future land use and Direct Control Zone greatest potential for policy and regulatory alignment	Proposed uses are not intended to be temporary	Proposal does not align with OCP Oyama Neighbourhood policy

Option A would retain the existing Mixed Use Commercial land use designation but ask Council to consider a new Direct Control zone to guide the future development of the subject property through targeted regulations. Should Council wish to support the proposed use on the parcel in the long-term, staff recommend a Direct Control zone.

Option B would retain the existing Mixed Use Commercial land use designation but ask Council to consider a new Temporary Use Permit. Staff do not recommend a Temporary Use Permit to continue the pattern of regulating land use through short-term controls; however, should Council not support the owner's proposal to expand the existing

commercial business on the subject property (through a Direct Control zone), Council could consider issuing a Temporary Use Permit for a limited period to allow the owner to relocate the existing business to another location.

Option C was proposed by the owner. Staff do not support amending the OCP and Zoning Bylaw to Service Commercial as the proposal would not be consistent with the OCP.

Staff are seeking direction from Council.

APPLICABLE LEGISLATION, BYLAWS AND POLICY

Local Government Act

Section 493(2) states: "A temporary use permit may do one or more of the following:
(a) allow a use not permitted by a zoning bylaw;
(b) specify conditions under which the temporary use may be carried on;
(c) allow and regulate the construction of buildings or structures in respect of the use for which the permit is issued."

Official Community Plan (OCP):

Section 18.2 contains policies related to Mixed Use Commercial Designation.

Section 18.4 contains policies related to Serviced Commercial Designation.

Section 23.5 contains policies related to Direct Control Zones and Comprehensive Development Zones.

Section 23.6 contains policies related to Temporary Use Permits.

Zoning Bylaw 561, 2007:

The property is zoned C2 – Neighbourhood Commercial.

Subdivision and Development Servicing Bylaw:

The Subdivision and Development Servicing Bylaw would be apply through a Building Permit.

IMPACT ON INFRASTRUCTURE, SERVICES AND STAFF CAPACITY

Impact on infrastructure or municipal services associated with this application would be evaluated through an application process.

FINANCIAL IMPLICATIONS

☒ None ☐ Budget Previously Approved ☐ Other (see below)

CONSULTATION

Staff have not received a formal application for the redevelopment of the subject property. No consultation has been completed.

COMMUNICATIONS

Staff have not received a formal application for the redevelopment of the subject property. No communications have been completed.

ALIGNMENT WITH COUNCIL STRATEGIC PRIORITIES

☐ Support Opportunities to Diversify Lake Country's Tax Base

ALIGNMENT WITH MASTER PLANS

☐ Agricultural Plan
☐ Climate Action Charter
☐ Housing Needs Report
☐ Official Community Plan
☐ Parks & Recreation Master Plan 2019
☐ Sanitary Sewer System Map

☐ Liquid Waste Management Plan Stage 1/2 Report
☐ McCoubrey Plateau Area Structure Plan
☐ Mobility Master Plan
☐ Transit Future Plan-Central Okanagan Region-DRAFT
☐ Transportation for Tomorrow
☐ Water Master Plan

OPTIONS

A. THAT staff be directed to work with the owner of the property at 15660 Oyama Road (Roll No. 01878.000 PID: 009-973-656) to process a Zoning Bylaw amendment application to regulate the long-term use of the parcel for boat sales and storage.
B. THAT staff be directed to work with the owner of the property at 15660 Oyama Road (Roll No. 01878.000 PID: 009-973-656) to process a Temporary Use Permit application for a limited period to allow the owner to relocate the existing business to another location.

Respectfully Submitted,
Jason Tran, Planner

Report Approval Details

Document Title:	Requesting Council Feedback - 15660 Oyama Road - Future Use of the Property.docx
Attachments:	- Attachment A – 15660 Oyama Road- Description of the OCP and Zoning Request.pdf - Attachment B - 15660 Oyama Road - Drone View.pdf - Attachment C - 15660 Oyama Road - Signed Permit TP2018-001-REN.pdf
Final Approval Date:	Aug 29, 2024

This report and all of its attachments were approved and signed as outlined below:

Brian Zurek, Manager of Planning - Aug 28, 2024 - 4:38 PM

Matthew Salmon, Infrastructure & Development Engineering Director - Aug 28, 2024 - 4:48 PM

Jeremy Frick, Director of Planning & Development - Aug 28, 2024 - 4:55 PM

Reyna Seabrook, Director of Corporate Services - Aug 28, 2024 - 7:45 PM

Paul Gipps, Chief Administrative Officer - Aug 29, 2024 - 7:42 AM

Attachment A

Proposed Project

I Request a change to the OCP and zoning as follows:

	Current	Proposed
Official Community Plan	Neighbourhood Commercial	Service commercial
Zoning:	C.2	C.10

Note: these proposed changes match with the Lake Country study that proposes the same future OCP and zoning changes for this area.

Reason for request:

1. This would allow the consolidating of the sales activities of Atlantis Marine Inc., of Kelowna, with the storage and minor boat service business of Oyama Yacht Club, at the Oyama location, under the name Atlantis Marine Inc.
2. This application also includes a request for an extension to the existing TUP # **TP2018-001-REN.** to allow Oyama Yacht Club to continue operations, with the addition of boat sales, until this application is heard by council,
3. Note:
    a. We do not sell or service automobiles, motorcycles, RVs, or snowmobiles.
    b. In the future, we will explore the idea of storing “high value” collector cars, in the three-story building.

Background information:

1. **CURENT OFFICIAL STATUS OF THE BUSINESS:**
    a. **i**n 2018 Oyama Yacht Club received a TUP, **TP2018-001-REN**, from Council;
    b. On August 16, 2022 this TUP was renewed.
    c. The current TUP expires on September 4, 2024.
    d. The operating scope of the current TUP, as approved by Council is as follows:

TP2018-001-REN for property located at 15660 Oyama Road – Roll 1878000 to approved to allow the temporary land use for:

I. outdoor storage of recreational vehicles,

II. indoor storage of recreational vehicles,
III. one residential security operator unit, and
IV. minor service (with restrictions)

2. SITE ANALYSIS:

a. This land was originally developed, in the early 1900's to accommodate a fruit cannery.
b. The property is 4 acres in size (see the attached site plan).
c. The existing building is comprised of three buildings with a total square footage of 75,000 sq ft.
d. No changes to the buildings are contemplated.

3. THE CURRENT BUILDINGS: there are three attached buildings on this site, namely:

a. The single-story building:

i. is the most westerly of the attached buildings;
ii. has 20 ft ceilings;
iii. is fully insulated;
iv. has a fire department approved new sprinkler system that is sufficient to allow for the storage of gasoline powered boats, on trailers with rubber tires;

b. The three-story building:

i. Is the oldest and most easterly of the attached buildings
ii. was built with large "first growth" wood beams; and is considered by the owner as "too unique" to demolish.
iii. has 8-foot-high ceilings on all three floors;
iv. has the structural capability to carry almost any storage load (see the attached the structural report);
v. does not have adequate sprinkler water capacity to accommodate storage of gas-powered products.

c. The two-story building:

i. is a 20-foot by 178-foot space located between the one-story building and the three-story building;
ii. has old cannery offices on the second floor, part of which has been converted, legally, into a caretaker's suite.
iii. Is fully sprinklered with water delivery compliant with its use;
iv. has first floor washrooms that originally serviced the old fruit cannery staff. They have been modernized to serve the staff and public;
v. was surveyed by a structural engineer and brought up to spec in 2024.

4. PREVIOUS SITE IMPROVEMENTS:

a. site has new and attractive chain link fence, with modern gates;
b. The site has three approved, and previously installed, curb cuts;
c. The site has a full asphalt parking lot on the west site of the building;

5. **RECENT SITE IMPROVEMENTS:**

a. In consultation with the Oyama fire department both "on-site" fire hydrants were repaired and tested. Proper access to these fire hydrants was also established. .
b. I had the structure evaluated by Christine Willerton, a structural engineer, and all structural deficiencies have been remedied, and approve. (see Exhibit #8).
c. I had Rick Evans ROWP plan A NEW SEPTIC SYSTEM:
    i. Rick Evans evaluate the current septic system, and found it outdated;
    ii. Rick Evans has engineered a new, level 2, septic system with minimal effluent
    iii. The system has a "safety factor" of 2-times-plus, allowing for any future expansion, or unexpected higher use
    iv. The new septic field will be relocated to the back North-East corner of the property, which puts it an additional 100 meters away from Wood Lake;
d. The newly designed system was submitted to Interior Health in early June. We should have their approval in a few days.
e. Demolition professionals have removed most of the old cannery equipment;
f. The lot has been regraded for proper surface water flow with water retention ponds;
g. The boat storge areas are covered with a "dust free" fractured rock covering and seeded with grass to prevent dust; they are mowed regularly and are of "low-to-no" fire risk (approved for parking boats by the fire department).

6. OPINION OF NEIGHBOURS:

a. All of our neighbours approve of our operations:
    i. We are quiet, dust free, noise free, odor free, and free of unsightly storage.
    ii. We create very little additional traffic in the area.
    iii. We have an appealing "marine" appearance that fits with the neighbourhood and enhances the "beach and boating" ambiance of the neighbourhood.
    iv. Our neighbours know that they are located next to "commercial" land; and, I am sure that they would rather have us next to them than any other business.

7. MY REQUESTS OF COUNCIL:

I am requesting four things from Council, namely that they:

a. **approve the revising of the current Official Community Plan to match the approved "Future Official Community Plan**" and designate this site as "Commercial Service";
b. approve the **rezoning** of this site from the existing C.2 status to C.10 status, as is contemplated in the "Future OCP" (note that the existing C.2 zoning is not an option in the Future OCP);
c. approve a **variance** in the need for us to connect to the community sewer system;
d. if necessary,
    i. extend our current **Temporary Use Permit** until September 2026 to allow Council time to review this application; and
    ii. amend the TUP to allow us to sell boats at this location;

8. IN CONCLUSUION:

I believe that these Applications

a. fit perfectly with the goals of the FUTURE OCP;
b. is a small extension of the operating privileges granted by the existing TUP; and,
c. is within the comfort zone of this Council.

Thankyou for your consideration

Your truly,

Pat Begoray M.B.A., B.Com., PD/AD Ed., B.Sc.

President: Marine Management Services Inc. phone 780 504-5307 email: pat@mmservices.ca

Attachment B: Drone View 2024

LAKE COUNTRY
Life. The Okanagan Way.

Temporary Use Permit

District of Lake Country
10150 Bottom Wood Lake Road
Lake Country, BC V4V 2M1
t: 250-766-6674 f: 250-766-0200
lakecountry.bc.ca

APPROVED ISSUANCE OF ❑ TEMPORARY USE PERMIT *(pursuant to Sec. 493 of the Local Government Act)*

PERMIT #	TP2018-001-REN
FOLIO #	1878000
ZONING DESIGNATION:	C2 – Neighbourhood Commercial
ISSUED TO:	1117479 B.C. Ltd. & INC.NO. BC1117479
SITE ADDRESS:	15660 Oyama Road
LEGAL DESCRIPTION:	Lot 1, Section 11, Township 14, Osoyoos Division Yale District, Plan 3087
PARCEL IDENTIFIER:	009-973-656

SCOPE OF APPROVAL

This Permit applies to and only to those lands within the Municipality as described above, and any and all buildings, structures and other development thereon.

This Permit is issued subject to compliance with all of the Bylaws of the Municipality applicable thereto, except as specifically varied or supplemented by this Permit, noted in the Terms and Conditions below.

Applicants for Temporary Permits should be aware that the issuance of a Permit limits the applicant to be in strict compliance with regulations of all Municipal Bylaws unless specific Variances have been authorized by the Permit. No implied Variances from bylaw provisions shall be granted by virtue of drawing notations which are inconsistent with bylaw provisions and which have not been identified as required Variances by the applicant or Municipal staff.

If any term or condition of this permit is for any reason held to be invalid by a decision or a Court of competent jurisdiction, such decision will not affect the validity of the remaining portions of this permit.

1. TERMS AND CONDITIONS

Temporary Use Permit TP2018-001-REN for 15660 Oyama Road legally described as Lot 1, Section 11, Township 14, Osoyoos Division Yale District, Plan 3087 is approved allowing for **Indoor Storage, Outdoor Storage, One Residential Security Operator Unit and Minor Service (with restrictions)** of recreational vehicles, subject to the following conditions:

a) Development and business operations shall be conducted in compliance with the provisions of the District's various bylaws including Nuisance Bylaw 857, 2013, Business Licensing Bylaw 1000, 2017, Signage Regulation Bylaw 501, 2004, and Zoning Bylaw 561, 2007 except as explicitly varied or supplemented by the terms of this permit. subsequent permits, amendments(s) and/or development variance permits;

b) Minor Service includes: draining of plugs, battery disconnect and reconnect, battery charging, cleaning of interior and exterior, waxing, minor upholstery work and other minor work to ensure that the boats are in safe working order;

c) Outdoor Storage is restricted to the area shown on **Schedule 'A'** attached to and forming part of this Permit;

d) Indoor Storage is restricted to 2,640 lineal feet of Recreational Vehicle. In the case of Recreational Vehicles on a trailer the length of the trailer will be used for the calculation;

e) That any Recreational Vehicle that is stored which has propane will have the propane removed and stored in accordance with the BC Fire Code;

f) The Residential Security Operator Unit is restricted to one Recreational Vehicle on the site;

g) The operator will be required to take the stored Recreational Vehicles to a local boat launch for use. Individual owners of recreational marine vehicles kept in storage are not permitted to take their own recreational marine vehicles from the property for use unless a contract for storage has been cancelled or the service is no longer being provided;

h) That no storage of Recreational Vehicles occurs on the foreshore or on buoys within the lake(s) without prior written approval from the District;

i) Failure to adhere to the conditions contained within this permit can result in the termination of the permit;

j) This permit, issued as per Section 493 of the Local Government Act is valid for one 3 periods and, upon application and subsequent approval by Council, may be extended for only one additional period up to 3 years in duration;

k) At the end of the term of this permit all uses on this property must revert back to uses permitted under the zoning bylaw of the day.

2. DEVELOPMENT

The land described herein shall be developed strictly in accordance with the terms, conditions and provisions of this Permit and any plans and specifications attached to shall form a part hereof.

This permit is not transferrable unless specifically permitted by the Municipality. The authorization to transfer the Permit shall, if deemed acceptable, be granted by Council resolution.

THIS IS NOT A BUILDING PERMIT

3. APPROVALS

Authorizing resolutions passed by the Council on the 16th day of August, 2022.

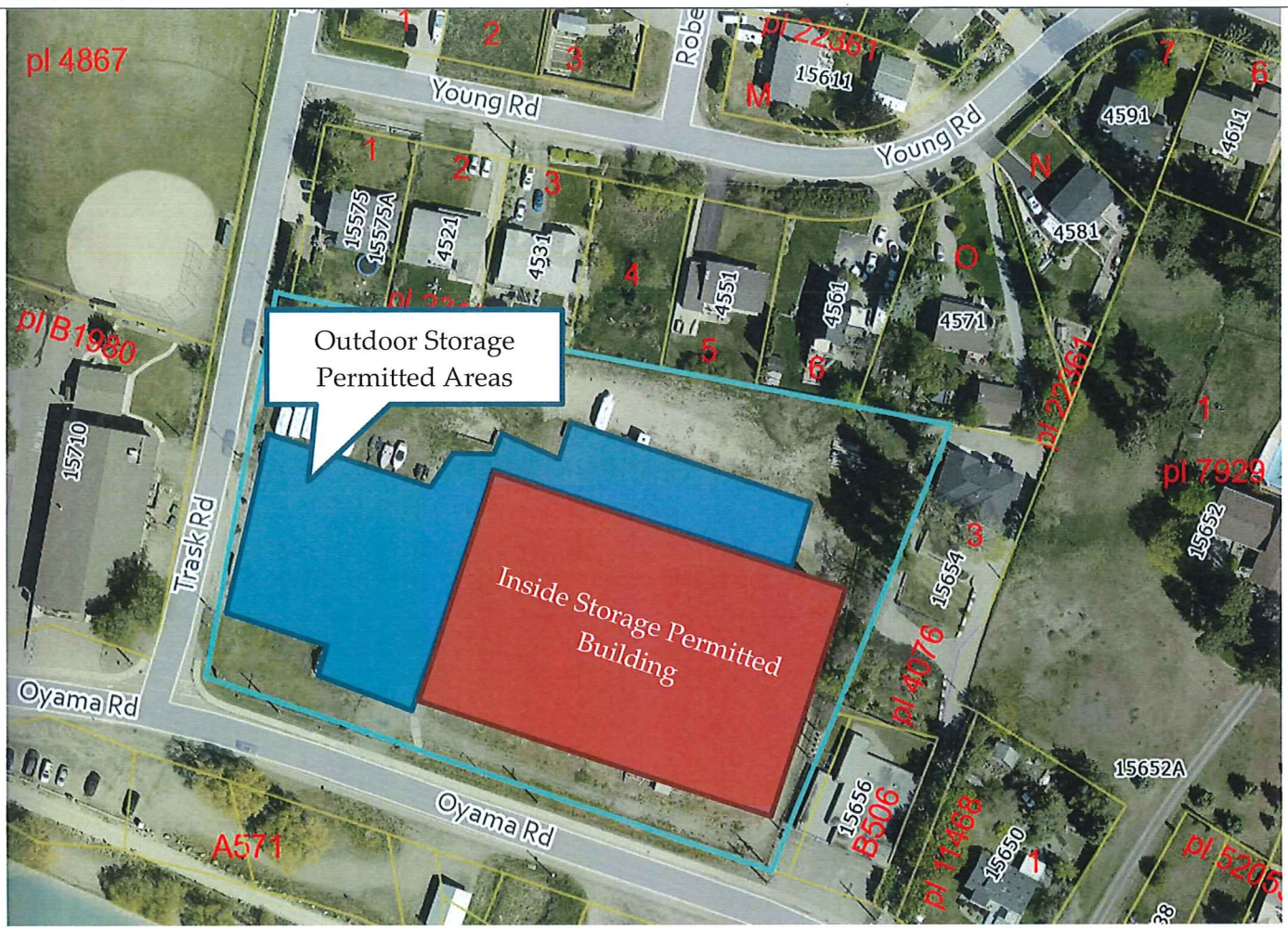
Issued by the Corporate Officer of the District of Lake Country this 17 day of August, 2022.

4. EXPIRY

Temporary Permit TP2018-001-REN expires on the 4th day of September 2024.

R Seabrook

Corporate Officer, Reyna Seabrook



SCHEDULE A

This forms part of development

Permit # TP2018-001-REN

Date Aug. 17, 2022

Signature R Siabrosk

Report to Council

District of Lake Country

MEETING TYPE:	**Regular Council Meeting**
MEETING DATE:	**September 10, 2024**
AUTHOR:	**Darren Lee, Fire Chief**
DEPARTMENT:	**Protective Services**
ITEM TITLE:	UBCM-CEPF Indigenous Cultural Safety and Cultural Humility Training 2024 Grant Intake
DESCRIPTION:	RDCO application to the UBCM-CEPF to support EOC staff training in 2025.

PURPOSE

To seek Councils support for the Regional District of Central Okanagan (RDCO) application to the Union of British Columbia Municipalities (UBCM) Community Emergency Preparedness Fund (CEPF) for Indigenous Cultural Safety and Cultural Humility Training 2024 intake for the development and delivery Emergency Operations Center staff training in 2025.

RECOMMENDATION

THAT the Regional District of Central Okanagan (RDCO) grant application to the Union of British Columbia Municipalities (UBCM) Community Emergency Preparedness Fund (CEPF) for Indigenous Cultural Safety and Cultural Humility Training 2024 intake for the development and delivery Emergency Operations Center staff training in 2025, be supported;

AND THAT the RDCO be authorized to apply for, receive and manage the grant funding on behalf of the District of Lake Country.

EXECUTIVE SUMMARY

The Union of British Columbia Municipalities - Community Emergency Preparedness Fund (UBCM-CEPF) is a suite of funding programs intended to enhance the resiliency of local governments, First Nations, and communities in responding to various emergencies. This funding is provided by the Province of British Columbia and is administered by the Union of British Columbia Municipalities (UBCM). The Regional District of the Central Okanagan (RDCO) Board and staff will be making an application for Indigenous Cultural Safety and Cultural Humility Training stream for the 2024 intake. If awarded, the pooled funding will support the development and delivery of training for staff from all regional Emergency Operations Centre (EOC) partners to enhance cultural safety and humility in the delivery of local emergency management programs and services.

DISCUSSION/ANALYSIS

The intent of the UBCM-CEPF Indigenous Cultural Safety and Cultural Humility Training funding stream is to support eligible applicants to enhance cultural safety and humility in the delivery of local emergency management programs and services. Eligible activities include cultural safety and humility training, adapting emergency management tools to be inclusive of Indigenous peoples, and activities related to partnering with and aiding, Indigenous communities during emergency mitigation, preparedness, response, and recovery. The RDCO application will combine the maximum $40,000 per local government to a combined total of not more than $240,000 to support EOC training and programs in 2025.

APPLICABLE LEGISLATION, BYLAWS AND POLICY

This application supports compliance with the new British Columbia Disaster and Emergency Response Act which was passed into force by the Province of British Columbia in November of 2023. This application is also supports compliance with the RDCO Emergency Management Program Bylaw 1444, 2019 which was last updated in 2019.

IMPACT ON INFRASTRUCTURE, SERVICES AND STAFF CAPACITY (if applicable)

If the RDCO application to the UBCM-CEPF is successful, District of Lake Country staff who work in the RDCO EOC will be provided an opportunity to participate in Indigenous Cultural Safety and Cultural Humility Training.

FINANCIAL IMPLICATIONS

☐ None ☐ Budget Previously Approved ☒ Other (see below)

The total combined value of the RDCO application to the UBCM-CEPF will not exceed $240,000. This estimated total is derived from RDCO Regional Emergency Program staff's financial analysis of eligible grant amounts for the Westbank First Nation, District of Peachland, City of West Kelowna, Regional District of the Central Okanagan, City of Kelowna and District of Lake Country. Combining and coordinating efforts will optimize the impact of EOC staff training.

CONSULTATION (Internal referrals, External Agencies, Committees, Stakeholders)

The application to the UBCM-CRI will require certified resolutions from the RDCO Board as well as supporting certified Council resolutions from each of the First Nations and member Municipalities and within the RDCO Regional Emergency Program.

COMMUNICATIONS (if applicable)

If communications are required for this the application to the UBCM-CEPF, this would be coordinated by RDCO communications staff and RDCO EOC staff.

ALIGNMENT WITH COUNCIL STRATEGIC PRIORITIES

☒ Explore Opportunities to Engage With Regional Local Governments for the Betterment of the Community

☒ Honour Reconciliation by Strengthening Relationships and Inclusiveness With Our Indigenous Partners

OPTIONS

The following options are presented for Council's consideration:

THAT Council refer this matter back to staff to provide additional information in a subsequent report.

Respectfully Submitted,
Darren Lee, Fire Chief

Report Approval Details

Document Title:	UBCM-CEPF Indigenous Cultural Safety and Cultural Humility Training 2024 Intake.docx
Attachments:	
Final Approval Date:	Sep 5, 2024

This report and all of its attachments were approved and signed as outlined below:

No Signature - Task assigned to Matt Vader, Director Parks, Recreation and Culture was completed by workflow administrator Reyna Seabrook, Director of Corporate Services

Matt Vader, Director Parks, Recreation and Culture - Sep 5, 2024 - 2:24 PM

Reyna Seabrook, Director of Corporate Services - Sep 5, 2024 - 2:25 PM

Paul Gipps, Chief Administrative Officer - Sep 5, 2024 - 2:39 PM

DISTRICT OF LAKE COUNTRY

BYLAW 1233

A BYLAW TO AMEND DEVELOPMENT COST CHARGES

The Council of the District of Lake Country, in open meeting assembled, enacts as follows:

1. Development Cost Charge Bylaw 950, 2016 is hereby amended by:

1.1. Adding the following definitions in alphabetical order:

"Accessory Dwelling Units (ADUs)" means an additional residential structure containing **Dwelling Units** separate from the primary dwelling. Examples include; coach houses, garden suites, and accessory garage suites. See **"Secondary Suites"** for additional **Dwelling Units** within the primary dwelling.

"**Secondary Suite**" means a self-contained dwelling unit located within a single detached dwelling. A secondary suite has its own separate cooking, sleeping and bathing facilities. It has direct access to outside without passing through any part of the principal unit. This use does not include duplex housing, semi-detached housing, apartment housing or boarding and lodging houses.

1.2. In Section 3. Exemptions, amending items:

(a) 3.1(b) by replacing "$50,000" with "$100,000" and removing the word "or" at the end of the section;

(b) 3.1(c) adding the word "or" at the end of the section;

(c) 3.1 by adding the following new section (d) immediately following section (c):
"(d) Secondary Suites that are constructed within the principal dwelling."

(d) 3.2 by replacing "$50,000" with "$100,000".

1.3. In Section 4. Calculation of Applicable Charges, amending items:

(a) 4.2(a) by removing the word "sewer";

(b) 4.2(c) by deleting the text "District's Water DCC Sector" and replacing with "District's Sanitary Sewer DCC Sector" and replacing the word "water" at the end of item (c) with the word "sewer";

(c) 4.2 by adding the following new section (d) immediately following section (c):

"(d) those located within the following District Water Service Area Bylaws as amended from time to time:

(i) Lake Country Water Service Area Bylaw 695, 2008

(ii) Coral Beach Water System Specified Area Establishment Bylaw 076, 1996

(iii) Lake Pine Local Service Area Establishment Bylaw 736, 2010"

1.4. Deleting Schedule A in its entirety and replacing it with Schedule A attached hereto.

1.5. Deleting Schedule B in its entirety and replacing it with Schedule B, attached hereto.

1.6. Deleting Schedule C in its entirety and replacing it with Schedule C, attached hereto.

1.7. Adding Schedule D in its entirety, attached hereto.

2. This bylaw may be cited as "Development Cost Charge Amendment (DCC) Bylaw 1233, 2024"

READ A FIRST TIME this 21st day of May, 2024.

READ A SECOND TIME AS AMENDED this 16th day of July, 2024.

READ A THIRD TIME this xx day of xx, 2024.

Certified correct at third reading.

Dated at Lake Country, B.C. Corporate Officer

Approved by the Inspector of Municipalities the xx day of xx, 2024.

Inspector of Municipalities

ADOPTED this xx day of xx, 2024.

Mayor Corporate Officer

Schedule A to Bylaw 1233, 2024

SCHEDULE A
Municipal-Wide DCCs

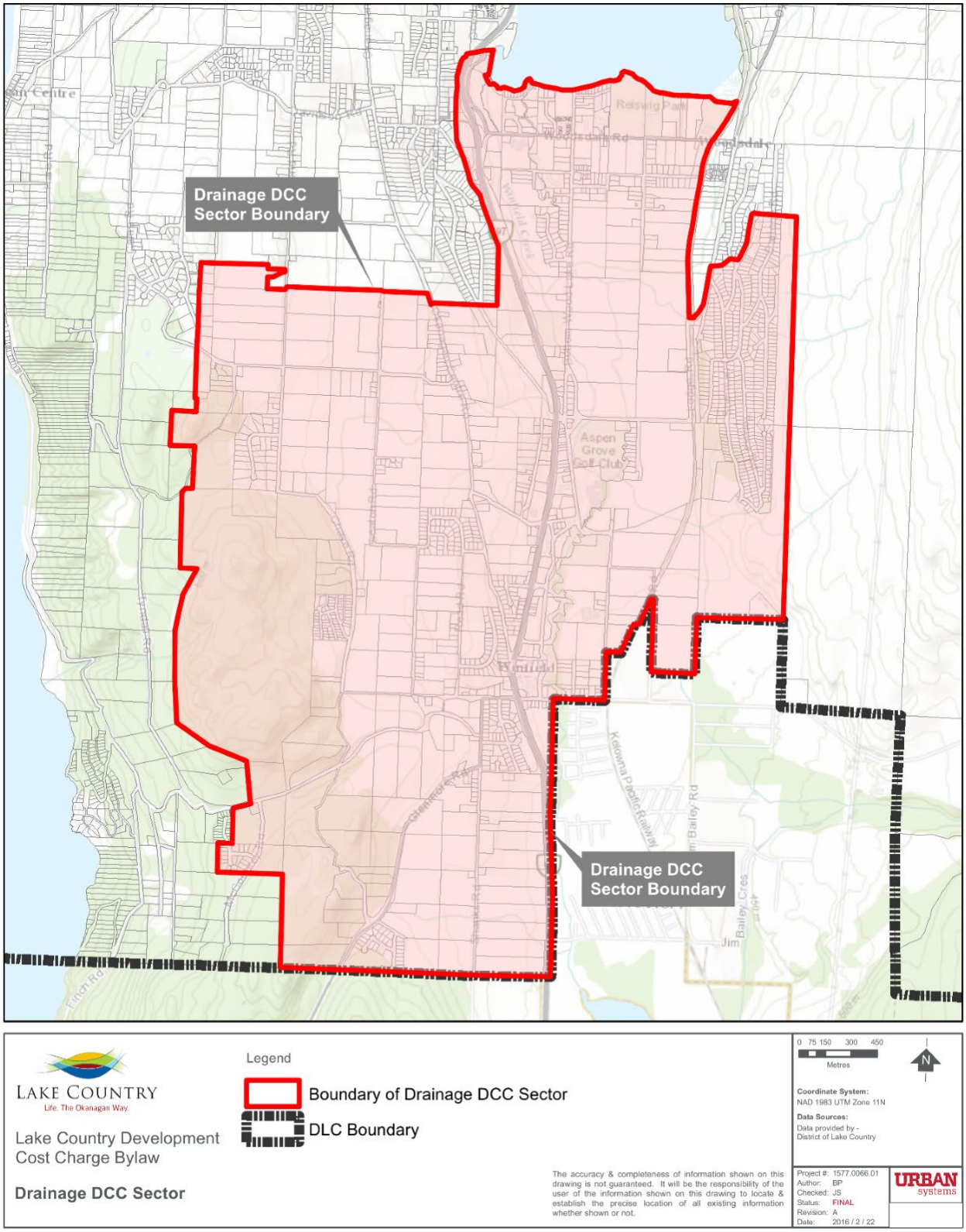
Land Use Category	Collection Basis	Mobility	Water	Sewer	Drainage	Parks	Total
Single Detached Residential	Per Lot	$10,252	$11,953	$11,862	$389	$12,790	$47,246
Multi-Family Residential	Per Unit	$6,664	$7,770	$7,710	$254	$12,790	$35,188
Accessory Dwelling Unit	Per Unit	$3,332	$3,885	$3,855	$127	$0	$11,199
Commercial	Per Gross Floor Area in m^2	$34.45	$40.16	$39.86	$1.31	$22.24	$138.02
Industrial	Per Gross Floor Area in m^2	$34.45	$40.16	$39.86	$1.31	$14.48	$130.26
Institutional	Per Gross Floor Area in m^2	$34.45	$40.16	$39.86	$1.31	$22.24	$138.02

Notes:

1. All development in the District shall pay development cost charges for mobility and parks.
2. Development cost charges for drainage will be paid only by those located in the District's Drainage DCC Sector, as defined by the Drainage DCC Sector map (Schedule "B").
3. Development cost charges for sewer will be paid only by those located within the District's Sewer DCC Sector, as defined by the Sewer DCC Sector map (Schedule "C").
4. Development cost charges for water will be paid only by those located within the District's Water Service Area, as defined by: Water Service Area Bylaw 695, 2008; Coral Beach Water System Specified Area Establishment Bylaw 076, 1996; and Lake Pine Local Service Area Establishment Bylaw 736, 2010, all as amended from time to time.
5. 'Single Detached Residential' includes housing on a single titled lot that contains one single family dwelling unit, this includes mobile or modular homes.
6. 'Multi-family Residential' includes housing on a single lot other than a strata lot that contains three or more dwelling units.
7. 'Accessory Dwelling Unit" includes housing that is separate from the primary dwelling and located on the same lot, including but not limited to: coach houses, garden suites and accessory garage suites.
8. A secondary suite which is located within the principal dwelling (i.e. not in an Accessory Dwelling Unit) has been accounted for in the DCC calculation, and as such no additional DCC will be levied.
9. The charge per square metre for the non-residential categories is based on the gross floor area.
10. The metric conversion rate is 1.0 m^2 to 10.76 ft^2.

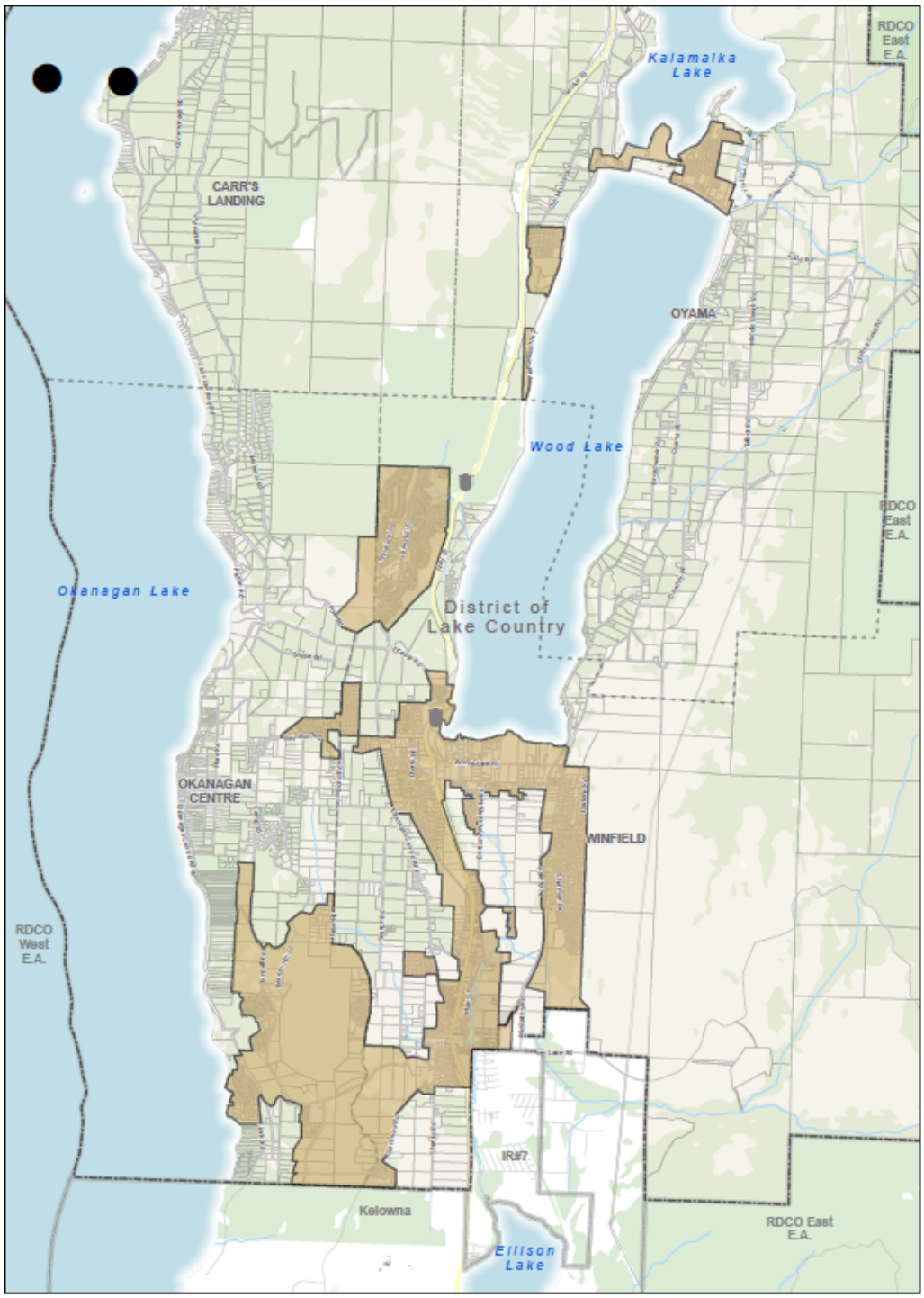
Schedule B to Bylaw 1233, 2024

SCHEDULE B
Drainage DCC Sector



Schedule C to Bylaw 1233, 2024

SCHEDULE C
Sewer DCC Sector



District of Lake Country Sewer DCC Boundary

Legend

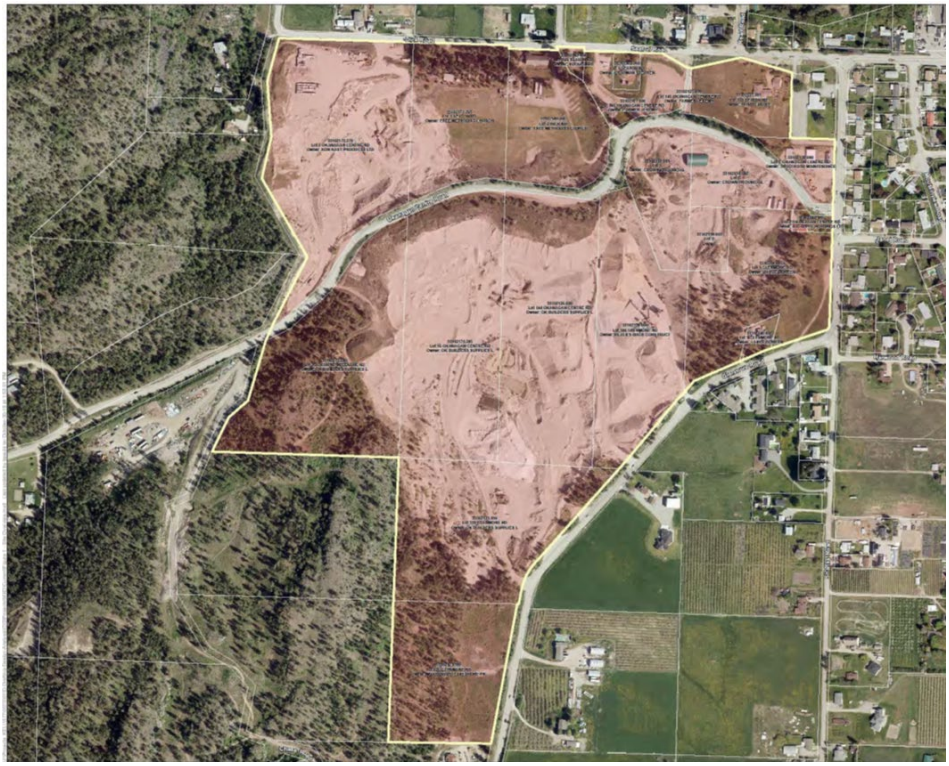
SewerDCCBoundary Lake Country Boundary

LAKE COUNTRY
Life. The Okanagan Way.

Scale: 1:40,000

Schedule D to Bylaw 1233, 2024

SCHEDULE D
Lake Country Business Park
Area-Specific DCCs



Land Use Category	Collection Basis	Mobility	Water	Sewer	Drainage	Parks	Total
Commercial	Per Gross Floor Area in m^2	$45.50	$14.16	$7.41	$0	$0	$67.07
Industrial	Per Gross Floor Area in m^2	$45.50	$14.16	$7.41	$0	$0	$67.07

Notes:

1. All development in the subject area identified above shall pay the Area-Specific development cost charges for mobility, water and sewer as noted in the table above, in addition to the Municipal-Wide development cost charges identified in Schedule A.
2. Development cost charges are payable based on land use category. Where the land use category is not specified, then no area-specific DCCs are levied for development in that land use category, but the municipal-wide DCCs identified in Schedule A are still payable.

Attachment B - Letter from UDI

URBAN
DEVELOPMENT
INSTITUTE
OKANAGAN

SUITE 210
1460 PANDOSY STREET
KELOWNA, BC V1Y 1P3

August 15, 2024

To: District of Lake Country
10150 Bottom Wood Lake Road
Lake Country, BC, V4V 2M1

Attention: Mayor and Council
RE: Request to Address Development Application Backlog Before Implementing New DCC Program

Dear Mayor and Council,

On behalf of UDI Okanagan, representing over 200 Developers and thousands of individuals and business owners whose livelihoods depend on the building and real estate industry, this letter is an appeal to Mayor and Council to express our concerns regarding the District of Lake Country's proposed adoption of a new Development Cost Charges (DCC) program. While we understand and appreciate the need for updated infrastructure funding mechanisms, we strongly urge the Council to address the significant backlog of development applications currently in process before implementing the new DCC framework.

As you are aware, the development community has faced considerable delays due to the historical backlog of applications within the District of Lake Country. These delays have created uncertainty for developers and investors, leading to stalled projects and, in some cases, financial losses. Addressing this backlog is crucial for restoring confidence in the development process and ensuring that our industry can continue to contribute positively to the growth and economic vitality of Lake Country.

The introduction of a new DCC program, while necessary, could further complicate an already strained process. Developers with pending applications have been operating under the assumptions of the current DCC structure, and a sudden shift could result in unforeseen financial implications and further delays. We believe it is in the best interest of all stakeholders—developers, the municipality, and the community at large—to clear the existing backlog before any changes to the DCC program are made.

Thank you for your attention and consideration to this appeal. We have received an extraordinary amount of feedback from our members expressing genuine concern regarding the proposed DCC increase, which is counterproductive considering the existing backlog of applications.

URBAN DEVELOPMENT INSTITUTE OKANAGAN

It is our intention to support a robust future in the number of housing starts and together we can provide many more homes for the citizens of the District of Lake Country.

Sincerely,

Charlene Thomas
Executive Director
Direct: ((250) 212 4488

URBAN DEVELOPMENT INSTITUTE OKANAGAN

DISTRICT OF LAKE COUNTRY
Development Cost Charges Bylaw Update

BACKGROUND REPORT - FINAL
September 2024

CONNECTIONS
Planning Associates Ltd.

LAKE COUNTRY
Life. The Okanagan Way.

District of Lake Country

Development Cost Charges Bylaw Update

BACKGROUND REPORT - FINAL
September 2024

Contact:
Dan Huang, RPP, MCIP
Principal

CONNECTIONS PLANNING ASSOCIATES LTD.
Victoria, British Columbia

250.380.8138
dan@connectionsplanning.ca
https://connectionsplanning.ca

Connecting communities every day, from the traditional territories of the Lək̓ʷəŋən people.

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TABLES

APPENDICES

EXECUTIVE SUMMARY

In 2023, the District of Lake Country initiated the process of updating their Development Cost Charge (DCC) Bylaw for its utility (water, sanitary sewer, drainage) and mobility (transportation and active transportation) programs. Parks DCCs were recently reviewed in 2021 and are not part of this update. The DCC Bylaw was developed based on infrastructure required to service future growth identified through recently completed master plans and technical studies.

The development of this DCC bylaw included the following:

- Review and update residential and non-residential growth estimates in the DCC program;
- Review and update eligible DCC projects, cost estimates and appropriate benefit allocations; and
- Public and stakeholder input, including coordination with the Ministry of Municipal Affairs

Following a number iterations, consultation with the community, and review with Council, the proposed Municipal Wide DCC rates are provided in Table ES-1 and the proposed Area Specific DCC rates for the Lake Country Business Park are provided in Table ES-2.

Table ES 1: Proposed Municipal Wide DCC Rates

Land Use Category	Collection Basis	Mobility	Water	Sewer	Drainage	Parks (unchanged)	Total Municipal-Wide DCC
Single Detached Residential	Per Lot	$10,252	$11,953	$11,862	$389	$12,790	$47,246
Multi-Family Residential	Per Unit	$6,664	$7,770	$7,710	$254	$12,790	$35,188
Accessory Dwelling Unit	Per Unit	$3,332	$3,885	$3,855	$127	$0	$11,199
Commercial	Per Gross Floor Area in m^2	$34.45	$40.16	$39.86	$1.31	$22.24	$138.02
Industrial	Per Gross Floor Area in m^2	$34.45	$40.16	$39.86	$1.31	$14.48	$130.26
Institutional	Per Gross Floor Area in m^2	$34.45	$40.16	$39.86	$1.31	$22.24	$138.02

Table ES 2: Proposed Area Specific DCC Rates (Lake Country Business Park)

Land Use Category	Collection Basis	Mobility	Water	Sewer	Total Area-Specific DCC	Total DCC (within LCBP)
Commercial	Per Gross Floor Area in m^2	$45.50	$14.16	$7.41	$67.07	$205.09
Industrial	Per Gross Floor Area in m^2	$45.50	$14.16	$7.41	$67.07	$197.33

1. INTRODUCTION

Development cost charges (DCCs) are special charges collected by local governments to help pay for infrastructure expenditures required to service new growth and development. The *Local Government Act* (LGA) provides the statutory authority for municipalities to levy DCCs. The purpose of a DCC is to assist the municipality to accommodate development by providing a dedicated source of funding for the capital costs of:

- providing, constructing, altering or expanding transportation, water, sewage and drainage infrastructure; and
- providing and improving parkland.

Municipalities wanting to collect DCCs must adopt a DCC bylaw that specifies the amount of the DCCs that will be collected. The charges may vary with respect to:

- different zones or different defined or specific areas;
- different land uses;
- different capital costs as they relate to different classes of development; and
- different sizes or different numbers of lots or units in a development.

Funds collected through DCCs must be deposited in separate reserve accounts. These funds may only be used to contribute towards the capital costs of the identified DCC works, as well as potential financing costs (with Ministry approval) of a debt incurred for the works identified in the DCC program. The costs for capital works may include not only the actual construction costs and land/rights-of-way required for the works, but also the planning, engineering and legal costs which are directly related to the works.

1.1 Project Background and Scope

The purpose of the study is to review and update the District's DCC Bylaw for the following programs – mobility (roads and active transportation), water, sanitary sewer and drainage. The last major update to these DCC programs was in 2016; provincial best practices recommend a major DCC update every five (5) years, so the timing is somewhat overdue. Development Cost Charges for parks (acquisition and development) were reviewed and updated in 2021, and are not part of this current update.

Since the last update in 2016, the District has completed various DCC projects as well as prepared a number of comprehensive infrastructure master plans and technical studies. These documents provide new information on capital works required to service growth as well as updated cost estimates. In accordance with best practices, the District is now in a strong position to conduct a major update of its DCC Bylaw.

This DCC bylaw update involved the following:

- Review and update residential and non-residential growth estimates in the DCC program;
- Review and update eligible DCC projects, cost estimates and appropriate benefit allocations;
- Conduct public and stakeholder input on the Draft DCC program and rates; and
- Coordinate with the Ministry of Municipal Affairs throughout the process.

It should be noted that the material provided in the background report is meant for information only. Reference should be made to the District's official DCC Bylaws (Bylaw 1140, 2021 for parks and Bylaw 950, 2016 as amended for all other programs) for the specific DCC rates until a new DCC Amendment Bylaw has been adopted.

2. DCC KEY ELEMENTS

DCCs are one of the few municipal bylaws which require approval from the provincial Inspector of Municipalities. To assist in this process, the Ministry of Municipal Affairs has published the *Development Cost Charge Best Practice Guide*, which identifies key elements that should be considered when determining DCC rates. Table 1 outlines those key elements, decisions and supporting rationale used in this update. The table also indicates whether the approach used in this major DCC update aligns with the Best Practices Guide.

Table 1: DCC Key Elements

Key Element	District of Lake Country 2024 DCC Update	Rationale	Aligns with Best Practices Guide?
Time Horizon	20 years (for mobility, water and sewer and drainage)	• Aligns with recent master plans and infrastructure planning studies, coordinated with the timing of the project construction and cash flow requirements.	✓
Municipal-wide or Area Specific charge	Municipal-wide charge (service area) and Area Specific	• DCCs are levied across the municipality for mobility and parks programs, within the respective service areas for water and sanitary sewer programs, and within a specified catchment area for drainage. • A new area-specific DCC is being established for works within the Lake Country Business Park, for mobility, water and sewer capital works that will support growth and development for that area.	✓
Grant Assistance	None	• No identified DCC projects include grant assistance.	✓
Developer Contribution	None	• No identified DCC projects include a separate developer contribution.	✓
Financing	No	• No identified new DCC projects include financing.	✓
Benefit Allocation	42 – 100%	• For projects where both new and existing residents will benefit, benefit has been calculated based on modelling, the ratio of	✓

Key Element	District of Lake Country 2024 DCC Update	Rationale	Aligns with Best Practices Guide?
		new population to total population, or rule of thumb. • 100% benefit is allocated to projects required only to increase capacity due to solely to growth needs.	
Municipal Assist Factor	1%	• In addition to the municipal portion of the Benefit Allocation, the District is providing an additional 1% assist factor to all DCC programs, as required by legislation.	✓
Units of charge	Per lot, per unit and square metre gross floor area	• *Per lot* for single detached residential, at time of subdivision. • *Per unit* for multi-family (e.g. townhouse and apartment) • *Per unit* for accessory dwelling unit (ADU) • *Per square metre of building area* for commercial, light industrial, and institutional, uses as impact on infrastructure is expected to correlate most closely with building area.	✓

3. DCC TIME HORIZON AND GROWTH PROJECTIONS

3.1 DCC Time Horizon

Throughout this project, DCC programs and calculation have been analyzed based on both the initial 20-year time horizon, as as well as a 10-year horizon. On May 21, 2024 District of Lake Country Council gave 1st reading to a DCC Bylaw based on a 10-year horizon. Since that time, additional analysis has been undertaken, with a new recommendation by the consultant to stay with the original 20-year time horizon and establish an area-specific DCC for the Lake Country Business Park.

Keeping to a 20-year time horizon for all infrastructure categories (see Table 2) aligns with the District's Official Community Plan (OCP) and various master planning inputs such as the Liquid Waste Master Plan (LWMP). The projected 20-year growth rate utilized for the DCC program is approximately 2.7%, with a total of 4,300 projected residential units (an average of 215 units per year). This falls within the medium (2.4%) and high (3.1%) growth projections of the OCP, but also does not account for any additional growth occurring on existing lots, where no new DCCS are payable.

Table 2: DCC Time Horizon

DCC Category	Time Horizon
Mobility	20 years
Water	20 years
Sanitary Sewer	20 years
Drainage	20 Years
Parks	N/A (not part of this update)

3.2 DCC applicability

In keeping with best practices, DCCs should be applied where development is both occurring and is also benefitting from. The Mobility (formerly transportation) DCC program is applied on a municipal-wide basis due to its overall community impacts and benefits. Water and Sewer DCCs are applied to those properties within their respective service areas (i.e. parcels that are on private wells and/or septic systems would not be subject to water/sewer DCCs respectively). Drainage DCCs are applied within a specific drainage catchment boundary, which is unchanged from the current 2016 DCC Bylaw.

Since the timing of First Reading of the DCC Bylaw on May 21, 2024, additional review and analysis has identified the justification for an area-specific DCC for the Lake Country Business Park (LCBP) as future growth and development in that area will drive specific infrastructure upgrades to mobility, water and sewer capital programs. A new Area-Specific DCC will be developed for the LCPB, to be layered on top of the applicable municipal-wide DCCs for mobility, water, sewer, drainage, and parks (which is not part of this DCC update).

3.3 Residential Growth Projections

Based on the DCC time frame discussed above, the following table outlines the residential growth projections utilized for this DCC update by residential land use and infrastructure category. For this update, a new residential land use category was created for Accessory Dwelling Units (ADUs), in keeping with the District's infill residential policies and new provincial legislation for Small Scale Multi Unit Housing (SSMUH).

Table 3: Residential Growth Projections

Dwelling Type	Unit of Measurement	Mobility, Water and Sewer Development Projection	Drainage Development Projection
Single Detached Housing	Lots	1,320	1,122
Multi-Family Residential	Units	2,680	2,278
Accessory Dwelling Unit	Units	300	255

3.4 Non-Residential Growth Projections

Growth projections for industrial, commercial, and institutional (ICI) uses are based on the previous DCC program and carried forward over their respective timeframes, as no new ICI projection analysis has been perfomed by the District. Based on their respective DCC time frames, the resulting growth projections are shown below.

Table 4: Non-Residential Growth Projections

Land Use	Unit of Measurement	Mobility, Water and Sewer Development Projection	Drainage Development Projection
Commercial	m^2 gross floor area (GFA)	50,000	42,500

Land Use	Unit of Measurement	Mobility, Water and Sewer Development Projection	Drainage Development Projection
Industrial	m^2 gross floor area (GFA)	241,800	205,530
Institutional	m^2 gross floor area (GFA)	7,500	6,375

3.5 Equivalencies

The population equivalencies used to calculate DCC rates are based on the previous DCC program, and are shown in the table below. It is recommended that a more detailed review of equivalencies be undertaken in advance of, or as part of, the next major DCC update.

Table 5: Equivalencies

Land Use	Equivalency Factor
Single Detached Housing	1.000
Multi-Family Residential	0.6500
Accessory Dwelling Unit	0.3250
Commercial	0.00336
Industrial	0.00336
Institutional	0.00336

4. DCC PROGRAM DEVELOPMENT

4.1 Supporting Documents

In addition to provincial regulations and best practices, the DCC program is informed by a number of District of Lake Country supporting documents, including but not limited to the following:

- District of Lake Country Official Community Plan Bylaw 1065, 2018 (consolidated)
- District of Lake Country Zoning Bylaw 561, 2007 (consolidated)
- District of Lake Country DCC Bylaw 950, 2016 (consolidated)
- District of Lake Country Housing Needs Assessment (2023)
- District of Lake Country Mobility Improvement Program (2022)
- District of Lake Country Mobility Master Plan (2021)
- District of Lake Country Water Master Plan (2023)
- District of Lake Country Liquid Waste Management Plan Stage 1 / 2 Report (2022)
- District of Lake Country Sanitary Sewer Master Plan (2020)
- District of Lake Country Secondary and Accessory Suite Policy 09.104 (2010)

4.2 DCC Projects

The revised DCC programs for mobility, water, sewer and drainage were develop by reviewing the above plans and technical studies and determine which projects were attributable (either entirely or partially) to growth and development. Additionally, the existing DCC programs were reviewed to determine if the projects were still required, and to update their respective cost estimates. The types of projects included in the DCC program are as follows:

- Transportation and mobility improvements – new corridors, renewal or reconstrucdtion
- Water treatment plant upgrades
- Water transmission – new watermains and capacity upgrades
- Sewage treatment plant upgrades
- Sewage collection – new sewer mains/lift stations and capacity upgrades
- Drainage and stormwater improvements – detention ponds and capacity upgrades

A complete list of projects and cost estimates by infrastructure category is provided in Appendix A.

4.3 Carrying Previous DCC Costs Forward

Included in this DCC program are cost required to support previously completed or financed DCC projects included in Bylaw 950, 2016, where all of the funds for the project have not been fully collected yet. The DCC shortfall was made up by either borrowing from other DCC reserves or from other non-DCC capital funds. These projects have been retained on the DCC project list until they are completely funded from appropriate sources.

4.4 Interim Financing and Long-Term Interest

The capital costs for any new projects identified in this DCC update do not include any allowances for interim financing or long-term interest (i.e. debenture).

4.5 Grant Assistance

As per best practices, grants have not been included for any projects where they are not "in hand", and as such there are no grants identified within the DCC project lists. For major infrastructure projects such as water treatment and sewage treatment, the District will be applying for grant assistance from provincial and federal governments in order fo the projects to be viable. If successful, the DCC program will be amended accordingly to reflect any grant assistance provided in the future.

4.6 Allocation of Costs

For each proposed DCC project, the capital costs are allocated between the impact of new growth and the benefit to the existing community, refered to as the "benefit allocation". Projects which only service existing users or do not provide additional capacity should not be included in the DCC program, and should be funded from non-DCC capital sources. The benefit allocation varies for each project (up to 100%) and is determined based on one of three methods as per best practices: technical modeling, population growth allocation, and rule of thumb. The table below idenitifes the range of benefit allocations utilized by infrastructure category, with futher details for each project provided in Appendix A.

Table 6: Benefit Allocation by Infrastructure Category

Category	Benefit Allocation
Mobility	50 to 53%
Water	42% to 100%
Sewer	50% to 100%
Drainage	100%

4.7 Municipal Assist Factor

The Municipal Assist Factor (MAF) is determined by Council and is proposed at 1% for all infrastructure categories, which is the same as the current assist factor under Bylaw 950, 2016.

4.8 DCC Program Costs

Based on the above inputs and policy considerations, the following tables summarize the total capital costs, DCC recoverable costs and municipal contribution over the timeframe of the municipal-wide and area-specific DCC programs.

Table 7: DCC Program Summary – Municipal Wide

Infrastructure Type	Total Capital Program Cost	DCC Recoverable (% of total)	Municipal Responsibility (% of total)
Mobility	$86.4 million	$43.1 million (50%)	$43.3 million (50%)
Water	$116.0 million	$51.7 million (45%)	$64.3 million (55%)
Sewer	$68.4 million	$48.2 million (70%)	$20.2 million (30%)
Drainage	$2.28 million	$2.26 million (99%)	$0.02 million (1%)
TOTAL	**$273.0 million**	**$145.2 million (53%)**	**$127.8 million (47%)**

Table 8: DCC Program Summary – Area Specific

Infrastructure Type	Total Capital Program Cost	DCC Recoverable (% of total)	Municipal Responsibility (% of total)
Mobility	$11.11 million	$11.00 million (99%)	$0.11 million (1%)
Water	$3.45 million	$3.42 million (99%)	$0.03 million (1%)
Sewer	$1.81 million	$1.79 million (99%)	$0.02 million (1%)
TOTAL	**$16.48 million**	**$16.22 million (99%)**	**$0.16 million (1%)**

5. DCC RATES

Based on the DCC Recoverable amounts for each infrastructure category and projected growth, a series of DCC rates has been calculated and shown in the table below.

Table 9: DCC Rates Summary – Municipal Wide

Land Use Category	Collection Basis	Mobility	Water	Sewer	Drainage	Parks (unchanged)	Total Municipal-Wide DCC
Single Detached Residential	Per Lot	$10,252	$11,953	$11,862	$389	$12,790	$47,246
Multi-Family Residential	Per Unit	$6,664	$7,770	$7,710	$254	$12,790	$35,188
Accessory Dwelling Unit	Per Unit	$3,332	$3,885	$3,855	$127	$0	$11,199
Commercial	Per Gross Floor Area in m^2	$34.45	$40.16	$39.86	$1.31	$22.24	$138.02
Industrial	Per Gross Floor Area in m^2	$34.45	$40.16	$39.86	$1.31	$14.48	$130.26
Institutional	Per Gross Floor Area in m^2	$34.45	$40.16	$39.86	$1.31	$22.24	$138.02

Table 10: DCC Rates Summary – Area Specific

Land Use Category	Collection Basis	Mobility	Water	Sewer	Total Area-Specific DCC	Total DCC (within LCBP)
Commercial	Per Gross Floor Area in m^2	$45.50	$14.16	$7.41	$67.07	$205.09
Industrial	Per Gross Floor Area in m^2	$45.50	$14.16	$7.41	$67.07	$197.33

Single detached residential uses will be levied the DCC at the subdivision stage of development, with the DCCs for all other land uses levied at time of building permit. The DCCs for single detached residential will be levied

on a per lot basis, while multi-family and accessory dwelling residential uses will be levied based on the number of dwelling units proposed. Commercial, industrial, and institutional uses will be levied DCCs based on the gross floor area (GFA) in square meetres (m^2) as defined in the building permit application.

A comparison of proposed (municipal-wide) and existing DCC rates is provided in the table below.

Table 11: DCC Rates Comparison – Municipal Wide

Land Use Category	Collection Basis	Existing Rate (incl. parks)	Proposed Rate (incl. parks)	Difference	% Change
Single Detached Residential	Per Lot	$30,663	$47,246	$16,583	54%
Multi-Family Residential	Per Unit	$24,408	$35,188	$10,780	44%
Accessory Dwelling Unit (new category)	Per Unit	N/A	$11,199	$11,199	N/A
Commercial	Per Gross Floor Area in m^2	$82.29	$138.02	$55.73	68%
Industrial	Per Gross Floor Area in m^2	$74.53	$130.26	$55.73	75%
Institutional	Per Gross Floor Area in m^2	$82.29	$138.02	$55.73	68%

6. CONSULTATION AND ENGAGEMENT

Throughout the course of the project, the consultant worked closely with District staff and Council in reviewing the technical and policy considerations of the proposed DCC program. A series of staff workshops were conducted in the Fall of 2023, along with public presentations to Council in November 2023 and March 2024.

The initial Draft DCC program and rates were posted on the District's website engagement portal (Let's Connect) along with a community newsletter, and the public and stakeholders were invited to review the information and provide feedback. On April 4, 2024 a Developer Information Session was hosted at the Lake Country Fire Hall, attended by approximately 20 members of the development community including the Urban Development Institute (UDI) and Canadian Home Builders Association (CHBA). A copy of the presentation is provided in Appendix B.

Through the engagement process, concerns were raised regarding the proposed level of increase of the DCCs, and the need to build out all of the projects over the 20-year horizon. As such, the DCC program timeframe was reviewed and adjusted to 10 years (for mobility, water and sewer), which allowed for potential phasing of the projects and a reduced impact on DCC increases, as shown in the table below. Although DCCs are not a comparison exercise, the revised DCC rates are more in line with neighbouring communities in the Okanagan, and are in keeping with provincial legislation whereby DCCs shall not deter development.

Table 12: Initial (March2024) vs Revised (May 2024) DCC Rates

Land Use Category	Collection Basis	Initial DCC Rate (incl. parks	Revised DCC Rate (incl. parks)	Difference
Single Detached Residential	Per Lot	$56,942	$50,300	($6,642)
Multi-Family Residential	Per Unit	$41,488	$37,172	($4,316)
Accessory Dwelling Unit	Per Unit	$14,349	$12,191	($2,158)
Commercial	Per Gross Floor Area in m^2	$170.59	$148.27	($22.32)
Industrial	Per Gross Floor Area in m^2	$162.83	$140.51	($22.32)
Institutional	Per Gross Floor Area in m^2	$170.59	$148.27	($22.32)

Through further review and feedback from the community and Council, an area-specific DCC was developed in order to align the specific mobility, water and sewer projects directly servicing the Lake Country Business Park with the proposed growth and development in that area. By utilizing the area-specific DCC approach, it reduces the capital costs required to support the municipal-wide program, and as such the proposed municipal-wide DCC is further reduced from that which was presented in May 2024 at First Reading. The revised (July 2024) municipal-wide DCC rates are shown in the table below, highlighting the additional difference from the May 2024 First Reading DCC rates. The revised DCC rates were given Second Reading by Council in July 2024.

Table 13: 1st Reading (May 2024) vs Revised (July 2024) DCC Rates – Municipal Wide

Land Use Category	Collection Basis	May 2024 DCC Rate (incl. parks)	Revised July 2024 DCC Rate (incl. parks)	Difference
Single Detached Residential	Per Lot	$50,300	$47,246	($3,054)
Multi-Family Residential	Per Unit	$37,172	$35,188	($1,984)
Accessory Dwelling Unit	Per Unit	$12,191	$11,199	($ 992)
Commercial	Per Gross Floor Area in m^2	$148.27	$138.02	($10.25)
Industrial	Per Gross Floor Area in m^2	$140.51	$130.26	($10.25)
Institutional	Per Gross Floor Area in m^2	$148.27	$138.02	($10.25)

Following second reading of the Bylaw, an additional opportunity for consultation and input was provided by the District through its website and engagement platform during the remainder of July and throughout August 2024. Additional feedback was provided by the Urban Development Institute (UDI), not about the proposed rates, but about the timing of adoption of the DCC Bylaw in relation to dealing with the current backlog of applications. As such, the Background Report was finalized and is being presented to Council along with Third Reading of the DCC Bylaw in September 2024.

7. DCC POLICY AND IMPLEMENTATION CONSIDERATIONS

In addition to the technical aspects of developing a DCC program, there are a number of regulatory, policy and other implementation aspects for consideration by the District, as outlined below.

7.1 Bylaw Exemptions

The *Local Government Act* (LGA) is clear that a DCC cannot be levied if the proposed development does not impose new capital cost burdens on the municipality, or if a DCC has already been paid in regard to the same development. However, if additional further expansion for the same development creates new capital cost burdens or uses up capacity, the DCCs can be levied for the additional costs.

Moreover, the LGA identifies specific situations which are statutorily exempt from levying DCCs at the time of application for a building permit, if:

- The building permit is for a place of public worship as per the Community Charter;
- The residential unit size is no larger than 29m^2 and only for residential use; and
- The value of the work authorized by a building permit does not exceed $50,000 or a higher amount as prescribed by bylaw; or

Regarding the latter exemption Council may, by Bylaw, increase the value of the building permit to be exempted from DCCs. Through review and discussions with Council, the updated DCC Bylaw proposes increasing the amount to $100,000 of building permit value for a DCC exemption. This is in consideration of construction cost inflation since the last DCC Bylaw, and has also been utilized in a few other communities across the province (e.g. City of Coquitlam, City of Port Alberni).

7.2 DCC Waivers and Reductions

In addition to statutory exemptions above, the LGA also provides local governments the discretionary authority to waive or reduce DCCs for certain types of development to promote affordable housing, rental housing and low impact development. Overall funding of the DCC program must remain whole, and any waivers or reductions provided at Council's discretion must be compensated through other non-DCC revenue sources. Waivers and reductions are typically defined in a DCC Waivers and Reduction Bylaw, separate from the DCC Bylaw. At this time, the District has not identified any waivers or reductions for DCCs for any types of development, and is currently addressing it on a case-by-case basis.

7.3 In-Stream Applications

Once approved by the Inspector of Municipalities and adopted by Council, the new DCC rates will be in force immediately. However, the LGA provides special protection from rate increases for development applications

that are submitted prior to the adoption date. There are two ways a developer can qualify for in-stream protection from the new DCC rates:

1. *Pursuant to section 511 of the LGA (subdivision)*
   If the new DCC Bylaw is adopted after a subdivision application is submitted and the applicable subdivision fee is paid, the new DCC Bylaw has no application to the subdivision for 12 months after the DCC Bylaw is adopted. As such, if the subdivision is approved during the 12 months' in-stream period, the previous DCC rates apply. This only applies in cases where DCCs are levied at subdivision.

2. *Pursuant to section 568 of the LGA (building permit)*
   The new DCC Bylaw is not applicable to a construction, alteration, or extension if: (a) a building permit is issued within 12 months of the new DCC Bylaw adoption, AND (b) either a building permit application, a development permit application or a rezoning application associated with the construction (defined as "precursor application") is in-stream when the new DCC Bylaw is adopted, and the applicable application fee has been paid. The development authorized by the building permit must be entirely within the area subject to the precursor application.

In addition to the statutory in-stream protection provisions, the development community has been made aware of the proposed changes to the DCC program early on, and is now able to submit a completed application prior to the adoption of the new DCC Bylaw. Given all of this, however, developers are still reliant on the resources and capacity of District staff to process subdivision and building permit applications in a timely fashion. Depending on the level of application backlog expereienced by the District, an additional grace period may be provided by holding off Council adoption of the Bylaw, once it has been reviewed and approved by the Ministry of Municipal Affairs.

7.4 Phasing of DCC Rates

Another financial tool which some communities have utilized to help lessen the burden of increased DCC rates is by phasing them in over a period of time. This is done by using the Municipal Assist Factor, and can be built into the DCC Bylaw so that it only has to be adopted once. Any adjustments to the MAF shift that financial portion from the DCC recoverable portion to the municipality's responsibility. This has been discussed with Council, but has not been recommended at this time due to the additional financial impact to the District, and the limited DCC reserves currently in place.

7.5 DCC Rebates and Credits

If part of the DCC program is anticipated to be constructed by individual developers, then the District should consider establishing a policy (or manual) to guide staff in administering potential DCC credits and rebates, as stipulated in the LGA and referenced in the DCC Best Practice Guide. For example, if a developer constructs a project that is on the current DCC project list (e.g. a DCC watermain), then they are eligible for either a DCC

credit against their DCCs payable, or a possible DCC rebate from the District (if there are available funds in the DCC Reserve account). Establishing a set of policies for DCC credits, rebates and other agreements (e.g. DCC front-ender) will be helpful in assisting staff to apply the appropriate DCC financing tools in a consistent manner.

7.6 DCC Monitoring and Regular Updates

The District should enter all the projects contained in the DCC program into some type of tracking system in order to monitor the DCC program over time. The tracking system would monitor the status of the project from the conceptual stage through to its final construction. It would include information about the estimated costs, the actual construction costs, and the funding sources for the projects. The construction costs would be informed by the tender prices received, as well as land acquisition costs where applicable. The tracking system would indicate when projects are completed (or partially completed), their actual costs, and would also include new projects that are added to the program.

To keep the DCC program as current as possible, the District should review its program regularly as recommended in the Best Practices Guide. Major DCC updtaes should be conducted every 5 years, with minor DCC updates every 2-3 years, or whever significant projects/costs change. All major and minor DCC Bylaw amendments require approval from the Inspector of Municipalities. However, as permitted by legislation, the District can apply an annual inflationary increase to its DCC rates, using the applicable Consumer Price Index (CPI) value for the previous year. This can be performed annually up to a maximum of four years, and it does not require approval from the Ministry.

APPENDIX A
DCC Programs and Calculations

District of Lake Country DCC Update 2024
DCC Summary Table
Rev: July 5, 2024

(1) PROPOSED MUNICIPAL-WIDE DCC RATES

Land Use	Unit	Mobility		Water		Sewer		Drainage		Parks		Total Proposed	Total Existing	$ Change	% Change
		Proposed	Existing[1]	Proposed	Existing[1]	Proposed	Existing[1]	Proposed	Existing[1]	Proposed[2]	Existing[2]				
Single Detached Housing	Lot	$10,252	$4,346	$11,953	$7,533	$11,862	$5,256	$389	$738	$12,790	$12,790	**$47,246**	$30,663	$16,583	54%
Multi-Family Residential	Per Unit	$6,664	$2,825	$7,770	$4,897	$7,710	$3,416	$254	$480	$12,790	$12,790	**$35,188**	$24,408	$10,780	44%
Accessory Dwelling Unit[7]	Per Unit	$3,332	$0	$3,885	$0	$3,855	$0	$127	$0	$0	$0	**$11,199**	$0	$11,199	N/A
Commercial	Per GFA in m^2	$34.45	$14.60	$40.16	$25.31	$39.86	$17.66	$1.31	$2.48	$22.24	$22.24	**$138.02**	$82.29	$55.73	68%
Industrial	Per GFA in m^2	$34.45	$14.60	$40.16	$25.31	$39.86	$17.66	$1.31	$2.48	$14.48	$14.48	**$130.26**	$74.53	$55.73	75%
Institutional	Per GFA in m^2	$34.45	$14.60	$40.16	$25.31	$39.86	$17.66	$1.31	$2.48	$22.24	$22.24	**$138.02**	$82.29	$55.73	68%

Notes:
(1) Existing DCCs for Mobility, Water, Sewer and Drainage based on DCC Bylaw No. 950, 2016
(2) Parks DCCs were updated in 2021 (DCC Amendment Bylaw No. 1140) and are not part of this DCC update
(3) Mobility and Parks DCCs are applied throughout the entire District
(4) Drainage DCCs are applied within the Drainage DCC Sector (map provided in DCC Bylaw)
(5) Sewer DCCs are applied within the Sewer DCC Sector (map provided in DCC Bylaw)
(5) Water DCCs are applied within the Water Service Area (separate District establishment bylaws)
(6) Accessory Dwelling Unit (ADU) is a new DCC category for coach houses, garden suites, accessory garage suites

(2) PROPOSED AREA-SPECIFIC DCC RATES[7]

Land Use	Unit	Mobility		Water		Sewer		Total Proposed
		Proposed	Existing	Proposed	Existing	Proposed	Existing	
Commercial	Per GFA in m^2	$45.50	$0.00	$14.16	$0.00	$7.41	$0.00	**$67.07**
Industrial	Per GFA in m^2	$45.50	$0.00	$14.16	$0.00	$7.41	$0.00	**$67.07**

Notes:
(7) This is a new area-specific DCC proposed for the Lake Country Business Park

District of Lake Country DCC Update 2024
Capital Cost Summary
Rev: June 13, 2024

MUNICIPAL-WIDE PROGRAM

Infrastructure Type	Total Capital Program Cost (20 Year)	DCC Recoverable	Municipal Responsibility	Annual DCC Recoverable (20 yrs)	Annual Municipal Responsibility (20 yrs)
Mobility	$86,370,186	$43,075,923 *50%*	$43,294,263 *50%*	$2,153,796	$2,164,713
Water	$115,985,112	$51,737,995 *45%*	$64,247,117 *55%*	$2,586,900	$3,212,356
Sanitary	$68,378,021	$48,151,158 *70%*	$20,226,862 *30%*	$2,407,558	$1,011,343
Drainage	$2,278,337	$2,255,554 *99%*	$22,783 *1%*	$112,778	$1,139
Parks*	N/A	N/A	N/A	N/A	N/A
Total	***$273,011,656***	***$145,220,630*** *53%*	***$127,791,026*** *47%*	***$7,261,031***	***$6,389,551***

Notes:
* Parks DCC not included in this update, as it was reviewed and updated in 2021.

AREA-SPECIFIC PROGRAM

Infrastructure Type	Total Capital Program Cost (20 Year)	DCC Recoverable	Municipal Responsibility	Annual DCC Recoverable (20 yrs)	Annual Municipal Responsibility (20 yrs)
Mobility	$11,113,057	$11,001,926 *99%*	$111,131 *1%*	$550,096	$5,557
Water	$3,457,514	$3,422,939 *99%*	$34,575 *1%*	$171,147	$1,729
Sanitary	$1,810,623	$1,792,517 *99%*	$18,106 *1%*	$89,626	$905
Total	***$16,381,194***	***$16,217,382*** *99%*	***$163,812*** *1%*	***$810,869***	***$8,191***

DCC RESERVE BALANCES

Rev: May 10, 2024

DCC Category	2023 Reserve	
Mobility	$	411,792
Water	$	1,950,192
Sanitary Sewer	$	(1,256,811)
Drainage	$	873,702
Parks	$	1,193,970
TOTAL	**$**	**3,172,845**

Notes:
(1) DCC Reserve Balance as of December 31, 2023

Mobility DCC Program - Municipal Wide

2023 Project Code	MIP Code	Previous Project Code	Project Name	From	To	Project Timing	Category	Classification	Total Capital Cost	Less: Non-DCC Funding			Net Capital Cost	Benefit Allocation		Benefit to New Development	1%	Total Recoverable From DCC	Total Municipal Responsibility
										Developer Contrib.	Provincial Grants	Other		% to New Dev.	% to Existing		Municipal Assist		
M1	-	-	Pelmewash Pkwy Connection	Woodsdale Rd	Pelmewash Pkwy	0-5 Years	New	MUP	$2,000,000				$2,000,000	50%	50%	$1,000,000	$10,000	$990,000	$1,010,000
M2	267	T21	Robinson Rd	Pretty Rd	Okanagan Centre Rd E	0-5 Years	Renewal	D-0	$1,134,000				$1,134,000	50%	50%	$567,000	$5,670	$561,330	$572,670
M3	244	-	Pretty Rd	225m N of Robinson Rd	Middleton Rd	0-5 Years	Reconstruct	D-0	$815,000				$815,000	50%	50%	$407,500	$4,075	$403,425	$411,575
M4	246	-	Pretty Rd	Middleton Rd	Oceola Rd	0-5 Years	Reconstruct	D-0	$403,000				$403,000	50%	50%	$201,500	$2,015	$199,485	$203,515
M5	343	T22	OK Centre Rd E	Berry Rd	Davidson Rd	0-5 Years	Renewal	C-0	$4,958,000				$4,958,000	50%	50%	$2,479,000	$24,790	$2,454,210	$2,503,790
M6	57	-	Chase Rd	Dick Rd	Camp Rd	0-5 Years	Reconstruct	C-1	$4,771,000				$4,771,000	50%	50%	$2,385,500	$23,855	$2,361,645	$2,409,355
M7	11	-	Beaver Lake Rd	Highway 97	Jensen Rd	0-5 Years	Reconstruct	E-0	$699,000				$699,000	50%	50%	$349,500	$3,495	$346,005	$352,995
M8	9	-	Beaver Lake Rd	Jensen Rd	Bottom Wood Lake Rd	0-5 Years	Reconstruct	C-0	$406,000				$406,000	50%	50%	$203,000	$2,030	$200,970	$205,030
M9	180	-	Main St	Roundabout	Pollard Road	0-5 Years	Renewal*	B-0	$174,000				$174,000	50%	50%	$87,000	$870	$86,130	$87,870
M10	181	-	Main St	Pollard Road	Winfield Road	0-5 Years	Renewal*	B-0	$259,000				$259,000	50%	50%	$129,500	$1,295	$128,205	$130,795
M11	182	-	Main St	Winfield Road	Hill Road	0-5 Years	Renewal*	B-0	$109,000				$109,000	50%	50%	$54,500	$545	$53,955	$55,045
M12	183	-	Main St	Hill Road	Beaver Lake Road	0-5 Years	Renewal*	B-0	$190,000				$190,000	50%	50%	$95,000	$950	$94,050	$95,950
M13	223	T38B	OK Centre Rd W	200 m W of McCoubrey Rd	Chase Rd Ext	6-10 Years	Renewal	C-1	$1,502,000				$1,502,000	50%	50%	$751,000	$7,510	$743,490	$758,510
M14	90	-	Dick Rd	Seaton Rd	Chase Rd	6-10 Years	Reconstruct	C-0	$1,600,000				$0	50%	50%	$0	$0	$0	$0
M15	282	-	Seaton Rd	Dick Rd	Glenmore Rd	6-10 Years	Reconstruct	C-0	$1,640,000				$0	50%	50%	$0	$0	$0	$0
M16	111	T7	Glenmore Rd	Highway 97	Seaton Rd	6-10 Years	Renewal	C-0	$558,000				$558,000	50%	50%	$279,000	$2,790	$276,210	$281,790
M17	109	T5	Glenmore Rd	Shanks Rd	Boundary	6-10 Years	Reconstruct	A-0	$5,298,000				$4,455,849	50%	50%	$2,227,924	$22,279	$2,205,645	$2,250,204
M18	233	T31	Oyama Rd	Boat Launch	Sawmill Rd	6-10 Years	Renewal	C-0	$525,660				$525,660	50%	50%	$262,830	$2,628	$260,202	$265,458
M19	234	T32	Oyama Rd	Sawmill Rd	Hebbert Rd	6-10 Years	Rebuild	C-1	$3,839,000				$3,839,000	50%	50%	$1,919,500	$19,195	$1,900,305	$1,938,695
M20	18	T16	Bond Rd	Camp Rd	Davidson Rd	6-10 Years	Renewal	D-1	$2,034,000				$2,034,000	50%	50%	$1,017,000	$10,170	$1,006,830	$1,027,170
M21	46	T24	Camp Rd	Hallam Dr	Tyndall Rd	6-10 Years	Reconstruct	D-0	$2,486,000				$2,486,000	50%	50%	$1,243,000	$12,430	$1,230,570	$1,255,430
M22	47	T17	Camp Rd	Tyndall Rd	Davidson Rd	11-20 Years	Reconstruct	C-0	$1,918,000				$1,918,000	50%	50%	$959,000	$9,590	$949,410	$968,590
M23	48	T10	Camp Rd	110m W Okanagan Centre Rd E	Seaton Rd	11-20 Years	Renewal	D-1	$654,000				$654,000	50%	50%	$327,000	$3,270	$323,730	$330,270
M24	50	-	Camp Rd	Seaton Rd	Bond Rd	11-20 Years	Renewal	D-1	$773,000				$773,000	50%	50%	$386,500	$3,865	$382,635	$390,365
M25	49	T28	Camp Rd	Davidson Rd	OK Centre Rd W	11-20 Years	Renewal	D-1	$1,862,000				$1,862,000	50%	50%	$931,000	$9,310	$921,690	$940,310
M26	221	T20	OK Centre Rd E	Davidson Rd	Oceola Rd	11-20 Years	Renewal	C-0	$3,715,000				$3,715,000	50%	50%	$1,857,500	$18,575	$1,838,925	$1,876,075
M27	225	-	OK Centre Rd W	200m N of Granite Rd	Camp Rd	11-20 Years	Reconstruct	D-1	$5,268,000				$5,268,000	50%	50%	$2,634,000	$26,340	$2,607,660	$2,660,340
M28	224	T45	OK Centre Rd W	Camp Road	Carr's Landing Road	11-20 Years	Reconstruct	D-1	$3,437,000				$3,437,000	50%	50%	$1,718,500	$17,185	$1,701,315	$1,735,685
M29	350	T26	Oyama Rd	Hebbert Rd	Woodsdale Rd	11-20 Years	Renewal	C-1	$3,498,000				$3,498,000	50%	50%	$1,749,000	$17,490	$1,731,510	$1,766,490
M30	52	T18	Carr's Landing Rd	Okanagan Centre Rd E	Commonage Rd S	11-20 Years	Renewal	C-1	$8,470,000				$8,470,000	50%	50%	$4,235,000	$42,350	$4,192,650	$4,277,350
M31	174	T12	Lodge Rd	Sherman Dr	Woodsdale Rd	11-20 Years	Renewal	C-1	$870,000				$870,000	50%	50%	$435,000	$4,350	$430,650	$439,350
M32	344	T15	Carr's Landing Rd	Commonage Rd S	Commonage Rd N	11-20 Years	Renewal	D-1	$5,530,000				$5,530,000	50%	50%	$2,765,000	$27,650	$2,737,350	$2,792,650
M33	314	T41	Trask Rd	Oyama Rd	Trask Rd	11-20 Years	Reconstruct	E-0	$1,256,000				$1,256,000	50%	50%	$628,000	$6,280	$621,720	$634,280
M34	313	T40	Trask Rd	Trask Rd	Kaloya Park	11-20 Years	Reconstruct	E-0	$967,000				$967,000	50%	50%	$483,500	$4,835	$478,665	$488,335
M35	186	-	McCarthy Rd	Bottom Wood Lake Rd	Okanagan Rail Trail	11-20 Years	Reconstruct	D-1	$1,612,000				$1,612,000	50%	50%	$806,000	$8,060	$797,940	$814,060
M36	220	-	OK Centre Rd E	Read Rd	Berry Rd	11-20 Years	Renewal	D-0	$2,707,000				$2,707,000	50%	50%	$1,353,500	$13,535	$1,339,965	$1,367,035
M37	220	-	Commonage Road	15620 Commonage Rd	Barkley Rd	11-20 Years	Renewal	D-0	$1,650,000				$1,650,000	50%	50%	$825,000	$8,250	$816,750	$833,250
LAKE COUNTRY BUSINESS PARK - MOBILITY																			
M37	-	-	Section 1 - Chase Rd Extension South			0-5 Years	New	-	$3,554,888	$ 1,797,532			$1,757,356	53%	47%	$931,399	$9,314	$922,085	$835,271
M38	-	-	Section 2 - Glenmore and Chase Road Roundabout			0-5 Years	New	-	$1,617,000	$ 817,637			$799,363	53%	47%	$423,662	$4,237	$419,426	$379,937
M39	-	-	Section 3 - Glenmore Road Upgrades Southwest			0-5 Years	New	-	$393,097	$ 198,770			$194,327	53%	47%	$102,993	$1,030	$101,964	$92,364
M40	-	-	Section 4 - Glenmore Road Upgrades			0-5 Years	New	-	$1,310,458	$ 662,634			$647,824	53%	47%	$343,347	$3,433	$339,913	$307,911
M41	-	-	Section 5 - Dick and Seaton Road Upgrades			6-10 Years	New	-	$2,930,073	$ 1,481,594			$1,448,480	53%	47%	$767,694	$7,677	$760,017	$688,462
M42	-	-	Section 6 - Seaton and Read Road Roundabout			6-10 Years	New	-	$1,617,000	$ 817,637			$799,363	53%	47%	$423,662	$4,237	$419,426	$379,937
M43	-	-	Section 7 - Chase Road Extension North			6-10 Years	New	-	$4,022,695	$ 2,034,078			$1,988,616	53%	47%	$1,053,967	$10,540	$1,043,427	$945,189
M44	-	-	Section 8 - Okanagan Centre Road West			11-20 Years	New	-	$1,141,958	$ 577,432			$564,526	53%	47%	$299,199	$2,992	$296,207	$268,319
M45	-	-	Section 9 - Chase and OK Centre Road W Roundabout			11-20 Years	New	-	$1,617,000	$ 817,637			$799,363	53%	47%	$423,662	$4,237	$419,426	$379,937
M46	-	-	Section 10 - Read Road Extension			11-20 Years	New	-	$2,946,609	$ 1,489,955			$1,456,654	53%	47%	$772,027	$7,720	$764,306	$692,348
M47	-	-	Section 11 - OK Centre Road W Decommission			11-20 Years	New	-	$826,956	$ 418,151			$408,805	53%	47%	$216,667	$2,167	$214,500	$194,305
								TOTALS	**$101,565,394**	**$11,113,057**	**$0**	**$0**	**$86,370,186**			**$43,511,033**	**$435,110**	**$43,075,923**	**$43,294,263**

NOTES

(1) Project Sources: Mobility Master Plan (2021) and Mobility Improvement Program (2022)
(2) DCC Projects comprised of Improvement Projects (reconstruction or renewal), but does not include Rehabilitation (rebuilding, resurfacing, or interim renewal)
(3) Lake Country Business Park projects from Servicing Plan dated July 14, 2023 (Align Engineering)
(4) Business Park Estimates include 35% Contingency + 12% Enginering = 1.47 Factor 1.47
(5) Business Park Projects M39, M40 and M41 are incorporated into District-Wide Projects M14, M15 and M17

Mobility DCC Calculation - Municipal Wide

Land Use	Col. (1) Estimated New Development	Col. (2) Unit	Col. (3) Weighted Equivalent Units	Col. (4) = (1) x (3) Equivalent Units	
Single Detached Residential	1,320	Per Lot	1.0000	1,320	
Multi-Family Residential	2,680	Per Unit	0.6500	1,742	
Accessory Dwelling Unit	300	Per Unit	0.3250	98	
Commercial	50,000	Per Square Metre	0.0034	168	
Industrial	241,800	Per Square Metre	0.0034	812	
Institutional	7,500	Per Square Metre	0.0034	25	
			Total equivalent units	4,165	(a)
B: Unit Mobility DCC Calculation					
Net Mobility DCC Program Recoverable		$43,075,922.88	(b)		
Existing DCC Reserve Monies		$411,792.00	(c)		
Net Amount to be Paid by DCCs		$42,664,130.88	(d) = (b) - (c)		
DCC per equivalent unit		$10,252.00	(e) = (d) / (a)		
C: Resulting Mobility DCCs					
Single Detached Residential		$10,252	Per Lot		
Multi-Family Residential		$6,664	Per Unit		
Accessory Dwelling Unit		$3,332	Per Unit		
Commercial		$34.45	Per Square Metre		
Industrial		$34.45	Per Square Metre		
Institutional		$34.45	Per Square Metre		

Notes:
(1) Mobility DCCs are based on a 20-year program

Mobility DCC Program - Area Specific

2023 Project Code	MIP Code	Previous Project Code	Project Name	Project Timing	Category	Total Capital Cost	Less: Non-DCC Funding			Net Capital Cost	Benefit Allocation		Benefit to New Development	1%	Total Recoverable From DCC	Total Municipal Responsibility
							Developer Contrib.	Provincial Grants	Other		% to New Dev.	% to Existing		Municipal Assist		
LAKE COUNTRY BUSINESS PARK - MOBILITY																
M37	-	-	Section 1 - Chase Rd Extension South	0-5 Years	New	$3,554,888	$ 1,797,532			$1,797,532	100%	0%	$1,797,532	$17,975	$1,779,556	$17,975
M38	-	-	Section 2 - Glenmore and Chase Road Roundabout	0-5 Years	New	$1,617,000	$ 817,637			$817,637	100%	0%	$817,637	$8,176	$809,461	$8,176
M39	-	-	Section 3 - Glenmore Road Upgrades Southwest	0-5 Years	New	$393,097	$ 198,770			$198,770	100%	0%	$198,770	$1,988	$196,782	$1,988
M40	-	-	Section 4 - Glenmore Road Upgrades	0-5 Years	New	$1,310,458	$ 662,634			$662,634	100%	0%	$662,634	$6,626	$656,008	$6,626
M41	-	-	Section 5 - Dick and Seaton Road Upgrades	6-10 Years	New	$2,930,073	$ 1,481,594			$1,481,594	100%	0%	$1,481,594	$14,816	$1,466,778	$14,816
M42	-	-	Section 6 - Seaton and Read Road Roundabout	6-10 Years	New	$1,617,000	$ 817,637			$817,637	100%	0%	$817,637	$8,176	$809,461	$8,176
M43	-	-	Section 7 - Chase Road Extension North	6-10 Years	New	$4,022,695	$ 2,034,078			$2,034,078	100%	0%	$2,034,078	$20,341	$2,013,738	$20,341
M44	-	-	Section 8 - Okanagan Centre Road West	11-20 Years	New	$1,141,958	$ 577,432			$577,432	100%	0%	$577,432	$5,774	$571,657	$5,774
M45	-	-	Section 9 - Chase and OK Centre Road W Roundabout	11-20 Years	New	$1,617,000	$ 817,637			$817,637	100%	0%	$817,637	$8,176	$809,461	$8,176
M46	-	-	Section 10 - Read Road Extension	11-20 Years	New	$2,946,609	$ 1,489,955			$1,489,955	100%	0%	$1,489,955	$14,900	$1,475,055	$14,900
M47	-	-	Section 11 - OK Centre Road W Decommission	11-20 Years	New	$826,956	$ 418,151			$418,151	100%	0%	$418,151	$4,182	$413,969	$4,182
					TOTALS	**$21,977,733**	**$11,113,057**	**$0**	**$0**	**$11,113,057**			**$11,113,057**	**$111,131**	**$11,001,926**	**$111,131**
															99%	**1%**

NOTES

(1) Project Sources: Mobility Master Plan (2021) and Mobility Improvement Program (2022)
(2) DCC Projects comprised of Improvement Projects (reconstruction or renewal), but does not include Rehabilitation (rebuilding, resurfacing, or interim renewal)
(3) Lake Country Business Park projects from Servicing Plan dated July 14, 2023 (Align Engineering)
(4) Business Park Estimates include 35% Contingency + 12% Enginering = 1.47 Factor
(5) Business Park Projects M39, M40 and M41 are incorporated into District-Wide Projects M14, M15 and M17

Mobility DCC Calculation - Area Specific

Land Use	Col. (1) Estimated New Development	Col. (2) Unit	Col. (3) Weighted Equivalent Units	Col. (4) = (1) x (3) Equivalent Units	
Single Detached Residential	0	Per Lot	1.0000	0	
Multi-Family Residential	0	Per Unit	0.6500	0	
Accessory Dwelling Unit	0	Per Unit	0.3250	0	
Commercial	0	Per Square Metre	0.0034	0	
Industrial	241,800	Per Square Metre	0.0034	812	
Institutional	0	Per Square Metre	0.0034	0	
			Total equivalent units	812	(a)
B: Unit Mobility DCC Calculation					
Net Mobility DCC Program Recoverable		$11,001,926.08	(b)		
Existing DCC Reserve Monies		$0.00	(c)		
Net Amount to be Paid by DCCs		$11,001,926.08	(d) = (b) - (c)		
DCC per equivalent unit		$13,541.70	(e) = (d) / (a)		
C: Resulting Mobility DCCs					
Single Detached Residential		$0	Per Lot		
Multi-Family Residential		$0	Per Unit		
Accessory Dwelling Unit		$0	Per Unit		
Commercial		$45.50	Per Square Metre		
Industrial		$45.50	Per Square Metre		
Institutional		$0.00	Per Square Metre		

Notes:
(1) Mobility DCCs are based on a 20-year program

Water DCC Program - Municipal Wide

Project Code	Project Name	Project Timing	Total Capital Cost	Less: Non-DCC Funding			Net Capital Cost	Benefit Allocation		Benefit to New Development	1%	Total Recoverable From DCC	Total Municipal Responsibility
				Developer Contrib.	Provincial Grants	Other		% to New Dev.	% to Existing		Municipal Assist		
	BEAVER LAKE WATER QUALITY AND SUPPLY												
1.2	Beaver Lake Tower Replacement	1 - 5 years	$2,750,000				$2,750,000	42%	58%	$1,155,000	$11,550	$1,143,450	$1,606,550
1.3a	Treatment Plant at Eldorado Site (50 MLD) - Phase 1	1 - 5 years	$40,000,000				$40,000,000	42%	58%	$16,800,000	$168,000	$16,632,000	$23,368,000
1.3b	Treatment Plant at Eldorado Site (50 MLD) - Phase 2	11-20 years	$40,000,000				$40,000,000	42%	58%	$16,800,000	$168,000	$16,632,000	$23,368,000
	BEAVER / OKANAGAN DISTRIBUTION UPGRADES												
	KALAMALKA WATER QUALITY AND SUPPLY												
3.1	Kalamalka Lake Intake	1 - 5 years	$1,265,000				$1,265,000	50%	50%	$632,500	$6,325	$626,175	$638,825
3.2a	Kalamalka Lake Treatment (12.5 MLD) - Phase 1	6 - 10 years	$0				$0	50%	50%	$0	$0	$0	$0
3.2b	Kalamalka Lake Treatment (12.5 MLD) - Phase 2	11-20 years	$30,000,000				$30,000,000	50%	50%	$15,000,000	$150,000	$14,850,000	$15,150,000
	WATERMAIN UPGRADES												
	Woodsdale Watermain Connection (new watermain)	1 - 5 years	$1,000,000				$1,000,000	100%	0%	$1,000,000	$10,000	$990,000	$10,000
LAKE COUNTRY BUSINESS PARK - WATER													
	Section 1 - Chase Rd Extension South	1 - 5 Years	$1,337,161	$1,337,161			$0	90%	10%	$0	$0	$0	$0
	Section 2 - Glenmore and Chase Road Roundabout	1 - 5 Years	$0	$0			$0	90%	10%	$0	$0	$0	$0
	Section 3 - Glenmore Road Upgrades Southwest	1 - 5 Years	$309,578	$309,578			$0	90%	10%	$0	$0	$0	$0
	Section 4 - Glenmore Road Upgrades	1 - 5 Years	$1,050,731	$1,050,731			$0	90%	10%	$0	$0	$0	$0
	Section 5 - Dick and Seaton Road Upgrades	6 - 10 Years	$0	$0			$0	90%	10%	$0	$0	$0	$0
	Section 6 - Seaton and Read Road Roundabout	6 - 10 Years	$0	$0			$0	90%	10%	$0	$0	$0	$0
	Section 7 - Chase Road Extension North	6 - 10 Years	$681,657	$0			$681,657	90%	10%	$613,491	$6,135	$607,356	$74,301
	Section 8 - Okanagan Centre Road West	11 - 20 Years	$924,358	$635,902			$288,456	90%	10%	$259,610	$2,596	$257,014	$31,442
	Section 9 - Chase and OK Centre Road W Roundabout	11 - 20 Years	$0	$0			$0	90%	10%	$0	$0	$0	$0
	Section 10 - Read Road Extension	11 - 20 Years	$0	$0			$0	90%	10%	$0	$0	$0	$0
	Section 11 - OK Centre Road W Decommission	11 - 20 Years	$124,142	$124,142			$0	90%	10%	$0	$0	$0	$0
		TOTAL	**$119,442,625**	**$3,457,514**	**$0**	**$0**	**$115,985,112**			**$52,260,601**	**$522,606**	**$51,737,995**	**$64,247,117**
										45%		**55%**	

NOTES

(1) Project Sources: Water Master Plan

(2) Lake Country Business Park projects from Servicing Plan dated July 14, 2023 (Align Engineering)

(3) Business Park Estimates include 35% Contingency + 12% Enginering **1.47**

(4) Grant Assumptions: Treatment (50%), System Separation (50%), Annual System Improvement (25%)

(5) Benefit Allocation Assumptions (% to Growth)

- Beaver Lake Water Treatment and Tower Replacement - 42%
- Kalamalka Lake Treatment and Intake - 50%

Water DCC Calculations - Municipal Wide

Land Use	Col. (1) Estimated New Development	Col. (2) Unit	Col. (3) Weighted Equivalent Units	Col. (4) = (1) x (3) Equivalent Units	
Single Detached Residential	1,320	Per Lot	1.0000	1,320	
Multi-Family Residential	2,680	Per Unit	0.6500	1,742	
Accessory Dwelling Unit	300	Per Unit	0.3250	98	
Commercial	50,000	Per Square Metre	0.0034	168	
Industrial	241,800	Per Square Metre	0.0034	812	
Institutional	7,500	Per Square Metre	0.0034	25	
			Total equivalent units	4,165 (a)	
B: Unit Water DCC Calculation					
Net Water DCC Program Recoverable		$51,737,994.61	(b)		
Existing DCC Reserve Monies		$1,950,192.00	(c)		
Net Amount to be Paid by DCCs		$49,787,802.61	(d) = (b) - (c)		
DCC per equivalent unit		$11,953.43	(e) = (d) / (a)		
C: Resulting Water DCCs					
Single Detached Residential		$11,953	Per Lot		
Multi-Family Residential		$7,770	Per Unit		
Accessory Dwelling Unit		$3,885	Per Unit		
Commercial		$40.16	Per Square Metre		
Industrial		$40.16	Per Square Metre		
Institutional		$40.16	Per Square Metre		

Notes:
(1) Water DCCs are based on a 20-year program

Water DCC Program - Area Specific

Project Code	Project Name	Project Timing	Total Capital Cost	Less: Non-DCC Funding			Net Capital Cost	Benefit Allocation		Benefit to New Development	1%	Total Recoverable From DCC	Total Municipal Responsibility
				Developer Contrib.	Provincial Grants	Other		% to New Dev.	% to Existing		Municipal Assist		
LAKE COUNTRY BUSINESS PARK - WATER													
	Section 1 - Chase Rd Extension South	1 - 5 Years	$1,337,161	$1,337,161			$1,337,161	100%	0%	$1,337,161	$13,372	$1,323,789	$13,372
	Section 2 - Glenmore and Chase Road Roundabout	1 - 5 Years	$0	$0			$0	100%	0%	$0	$0	$0	$0
	Section 3 - Glenmore Road Upgrades Southwest	1 - 5 Years	$309,578	$309,578			$309,578	100%	0%	$309,578	$3,096	$306,482	$3,096
	Section 4 - Glenmore Road Upgrades	1 - 5 Years	$1,050,731	$1,050,731			$1,050,731	100%	0%	$1,050,731	$10,507	$1,040,224	$10,507
	Section 5 - Dick and Seaton Road Upgrades	6 - 10 Years	$0	$0			$0	100%	0%	$0	$0	$0	$0
	Section 6 - Seaton and Read Road Roundabout	6 - 10 Years	$0	$0			$0	100%	0%	$0	$0	$0	$0
	Section 7 - Chase Road Extension North	6 - 10 Years	$681,657	$0			$0	100%	0%	$0	$0	$0	$0
	Section 8 - Okanagan Centre Road West	11 - 20 Years	$924,358	$635,902			$635,902	100%	0%	$635,902	$6,359	$629,543	$6,359
	Section 9 - Chase and OK Centre Road W Roundabout	11 - 20 Years	$0	$0			$0	100%	0%	$0	$0	$0	$0
	Section 10 - Read Road Extension	11 - 20 Years	$0	$0			$0	100%	0%	$0	$0	$0	$0
	Section 11 - OK Centre Road W Decommission	11 - 20 Years	$124,142	$124,142			$124,142	100%	0%	$124,142	$1,241	$122,901	$1,241
		TOTAL	**$4,427,625**	**$3,457,514**	**$0**	**$0**	**$3,457,514**			**$3,457,514**	**$34,575**	**$3,422,939**	**$34,575**
												99%	**1%**

NOTES

(1) Project Sources: Water Master Plan

(2) Lake Country Business Park projects from Servicing Plan dated July 14, 2023 (Align Engineering)

(3) Business Park Estimates include 35% Contingency + 12% Enginering **1.47**

(4) Grant Assumptions: Treatment (50%), System Separation (50%), Annual System Improvement (25%)

(5) Benefit Allocation Assumptions (% to Growth)

- Beaver Lake Water Treatment and Tower Replacement - 42%
- Kalamalka Lake Treatment and Intake - 50%

Water DCC Calculations - Area Specific

Land Use	Col. (1) Estimated New Development	Col. (2) Unit	Col. (3) Weighted Equivalent Units	Col. (4) = (1) x (3) Equivalent Units	
Single Detached Residential	0	Per Lot	1.0000	0	
Multi-Family Residential	0	Per Unit	0.6500	0	
Accessory Dwelling Unit	0	Per Unit	0.3250	0	
Commercial	0	Per Square Metre	0.0034	0	
Industrial	241,800	Per Square Metre	0.0034	812	
Institutional	0	Per Square Metre	0.0034	0	
			Total equivalent units	812 (a)	
B: Unit Water DCC Calculation					
Net Water DCC Program Recoverable		$3,422,938.86	(b)		
Existing DCC Reserve Monies		$0.00	(c)		
Net Amount to be Paid by DCCs		$3,422,938.86	(d) = (b) - (c)		
DCC per equivalent unit		$4,213.12	(e) = (d) / (a)		
C: Resulting Water DCCs					
Single Detached Residential		$0	Per Lot		
Multi-Family Residential		$0	Per Unit		
Accessory Dwelling Unit		$0	Per Unit		
Commercial		$14.16	Per Square Metre		
Industrial		$14.16	Per Square Metre		
Institutional		$0.00	Per Square Metre		

Notes:
(1) Water DCCs are based on a 20-year program

Sewer DCC Program - Municipal Wide

SANITARY SEWER SYSTEM CAPITAL COSTS		Project Timing	Total Capital Cost	Less: Non-DCC Funding			Net Capital Cost	Benefit Allocation		Benefit to New Development	1%	Total Recoverable From DCC	Total Municipal Responsibility
Project Code	Project Name			Developer Contrib.	Grants	Other		% to New Dev.	% to Existing		Municipal Assist		
S2	Lodge Road Lift Station Upgrade	Built not paid for	$150,000				$150,000	100%	0%	$150,000	$1,500	$148,500	$1,500
S3	McCarthy Road Lift Station 2023 cost	1 - 5 years	$1,260,000				$1,260,000	80%	20%	$1,008,000	$10,080	$997,920	$262,080
	McCarthy Road Gravity Sewer 2023 cost	6 - 10 years	$345,000				$345,000	80%	20%	$276,000	$2,760	$273,240	$71,760
S4	Seymour Road Lift Station Upgrade 2023 cost	6 - 10 years	$960,000				$960,000	80%	20%	$768,000	$7,680	$760,320	$199,680
	Seymour Forcemain - station to Lodge Road 2023 cost	11 - 20 years	$1,935,000				$1,935,000	80%	20%	$1,548,000	$15,480	$1,532,520	$402,480
S5	Oyama Lift Station and Forcemain 2020 cost with 50% added	11 - 20 years	$11,685,000				$11,685,000	50%	50%	$5,842,500	$58,425	$5,784,075	$5,900,925
S5	Oyama retrofit - collection system	11 - 20 years	$10,152,000				$10,152,000	50%	50%	$5,076,000	$50,760	$5,025,240	$5,126,760
S6	Phase I Trunkmain	Built not paid for	$377,968				$377,968	100%	0%	$377,968	$3,780	$374,188	$3,780
S7	Jensen Road Gravity Sewer 2023 cost	11 - 20 years	$615,000				$615,000	80%	20%	$492,000	$4,920	$487,080	$127,920
S8	Lodge Road Lift Station Upgrade 2023 cost	1 - 5 years	$660,000				$660,000	80%	20%	$528,000	$5,280	$522,720	$137,280
S9	Lodge Road Twin Forcemain 2023 cost	1 - 5 years	$1,050,000				$1,050,000	80%	20%	$840,000	$8,400	$831,600	$218,400
	Lodge Road Gravity sewer 2023 Cost	11 - 20 years	$600,000				$600,000	80%	20%	$480,000	$4,800	$475,200	$124,800
	Clement Lift station 2023 cost	1 - 5 years	$420,000				$420,000	80%	20%	$336,000	$3,360	$332,640	$87,360
	Clement Forcemain 2023 cost	11 - 20 years	$945,000				$945,000	80%	20%	$756,000	$7,560	$748,440	$196,560
S12	Planning and Engineering	1 - 5 years	$200,000				$200,000	100%	0%	$200,000	$2,000	$198,000	$2,000
WASTEWATER TREATMENT													
WWTP3	WWPT Phase 3 Remaining Debenture (to 2032)	1 - 10 years	$876,992				$876,992	100%	0%	$876,992	$8,770	$868,222	$8,770
WWTP4+A24	WWPT Phase 4 Remaining Debenture (to 2042)	1 - 10 years	$6,741,479				$6,741,479	80%	20%	$5,393,183	$53,932	$5,339,251	$1,402,228
WWTP4	WWPT Phase 4 Remaining Debenture (to 2042)	11 - 19 years	$6,067,331				$6,067,331	80%	20%	$4,853,865	$48,539	$4,805,326	$1,262,005
	Pipeline to Okanagan Lake Construction - Phase 1	1 - 10 years	$5,105,000				$5,105,000	80%	20%	$4,084,000	$40,840	$4,043,160	$1,061,840
	Pipeline to Okanagan Lake Construction - Phase 2	11 - 20 years	$5,105,000				$5,105,000	80%	20%	$4,084,000	$40,840	$4,043,160	$1,061,840
WWTP5	Phase 5 Upgrades Construction - Phase 1	1 - 10 years	$5,737,500				$5,737,500	80%	20%	$4,590,000	$45,900	$4,544,100	$1,193,400
WWTP5	Phase 5 Upgrades Construction - Phase 2	11 - 20 years	$5,737,500				$5,737,500	80%	20%	$4,590,000	$45,900	$4,544,100	$1,193,400
LAKE COUNTRY BUSINESS PARK - SEWER													
	Section 1 - Chase Rd Extension South	1 - 5 Years	$835,964	$ 835,964			$0	90%	10%	$0	$0	$0	$0
	Section 2 - Glenmore and Chase Road Roundabout	1 - 5 Years	$0	$ -			$0	90%	10%	$0	$0	$0	$0
	Section 3 - Glenmore Road Upgrades Southwest	1 - 5 Years	$0	$ -			$0	90%	10%	$0	$0	$0	$0
	Section 4 - Glenmore Road Upgrades	1 - 5 Years	$831,554	$ 831,554			$0	90%	10%	$0	$0	$0	$0
	Section 5 - Dick and Seaton Road Upgrades	6 - 10 Years	$866,320	$ -			$866,320	90%	10%	$779,688	$7,797	$771,891	$94,429
	Section 6 - Seaton and Read Road Roundabout	6 - 10 Years	$0	$ -			$0	90%	10%	$0	$0	$0	$0
	Section 7 - Chase Road Extension North	6 - 10 Years	$497,466	$ -			$497,466	90%	10%	$447,719	$4,477	$443,242	$54,224
	Section 8 - Okanagan Centre Road West	11 - 20 Years	$288,465	$ -			$288,465	90%	10%	$259,619	$2,596	$257,023	$31,443
	Section 9 - Chase and OK Centre Road W Roundabout	11 - 20 Years	$0	$ -			$0	90%	10%	$0	$0	$0	$0
	Section 10 - Read Road Extension	11 - 20 Years	$0	$ -			$0	90%	10%	$0	$0	$0	$0
	Section 11 - OK Centre Road W Decommission	11 - 20 Years	$143,105	$ 143,105			$0	90%	10%	$0	$0	$0	$0
	TOTAL		**$70,188,643**	**$1,810,623**	**$0**	**$0**	**$68,378,021**			**$48,637,534**	**$486,375**	**$48,151,158**	**$20,226,862**
												70%	30%

NOTES

(1) Project Sources: Sewer Master Plan

(2) Lake Country Business Park projects from Servicing Plan dated July 14, 2023 (Align Engineering)

(3) Business Park Estimates include 35% Contingency + 12% Enginering = 1.47 Factor **1.47**

Sewer DCC Calculations - Municipal Wide					
Land Use	**Col. (1)**	**Col. (2)**	**Col. (3)**	**Col. (4) = (1) x (3)**	
	Estimated New Development	**Unit**	**Weighted Equivalent Units**	**Equivalent Units**	
Single Detached Residential	1,320	Per Lot	1.0000	1,320	
Multi-Family Residential	2,680	Per Unit	0.6500	1,742	
Accessory Dwelling Unit	300	Per Unit	0.3250	98	
Commercial	50,000	Per Square Metre	0.00336	168	
Industrial	241,800	Per Square Metre	0.00336	812	
Institutional	7,500	Per Square Metre	0.00336	25	
			Total equivalent units	4,165	(a)
B: Unit Sanitary Sewer DCC Calculation					
Net Sanitary Sewer DCC Program Recoverable		$48,151,158.22	(b)		
Existing DCC Reserve Monies		-$1,256,811.00	(c)		
Net Amount to be Paid by DCCs		$49,407,969.22	(d) = (b) - (c)		
DCC per equivalent unit		$11,862.24	(e) = (d) / (a)		
C: Resulting Sanitary Sewer DCCs					
Single Detached Residential		$11,862	Per Lot		
Multi-Family Residential		$7,710	Per Unit		
Accessory Dwelling Unit		$3,855	Per Unit		
Commercial		$39.86	Per Square Metre		
Industrial		$39.86	Per Square Metre		
Institutional		$39.86	Per Square Metre		

Notes:
(1) Sewer DCCs are based on a 20-year program

Sewer DCC Program - Area Specific

SANITARY SEWER SYSTEM CAPITAL COSTS		Project Timing	Total Capital Cost	Less: Non-DCC Funding			Net Capital Cost	Benefit Allocation		Benefit to New Development	1%	Total Recoverable From DCC	Total Municipal Responsibility
Project Code	Project Name			Developer Contrib.	Grants	Other		% to New Dev.	% to Existing		Municipal Assist		
LAKE COUNTRY BUSINESS PARK - SEWER													
	Section 1 - Chase Rd Extension South	1 - 5 Years	$835,964	$ 835,964			$835,964	100%	0%	$835,964	$8,360	$827,604	$8,360
	Section 2 - Glenmore and Chase Road Roundabout	1 - 5 Years	$0	$ -			$0	100%	0%	$0	$0	$0	$0
	Section 3 - Glenmore Road Upgrades Southwest	1 - 5 Years	$0	$ -			$0	100%	0%	$0	$0	$0	$0
	Section 4 - Glenmore Road Upgrades	1 - 5 Years	$831,554	$ 831,554			$831,554	100%	0%	$831,554	$8,316	$823,238	$8,316
	Section 5 - Dick and Seaton Road Upgrades	6 - 10 Years	$866,320	$ -			$0	100%	0%	$0	$0	$0	$0
	Section 6 - Seaton and Read Road Roundabout	6 - 10 Years	$0	$ -			$0	100%	0%	$0	$0	$0	$0
	Section 7 - Chase Road Extension North	6 - 10 Years	$497,466	$ -			$0	100%	0%	$0	$0	$0	$0
	Section 8 - Okanagan Centre Road West	11 - 20 Years	$288,465	$ -			$0	100%	0%	$0	$0	$0	$0
	Section 9 - Chase and OK Centre Road W Roundabout	11 - 20 Years	$0	$ -			$0	100%	0%	$0	$0	$0	$0
	Section 10 - Read Road Extension	11 - 20 Years	$0	$ -			$0	100%	0%	$0	$0	$0	$0
	Section 11 - OK Centre Road W Decommission	11 - 20 Years	$143,105	$ 143,105			$143,105	100%	0%	$143,105	$1,431	$141,674	$1,431
	TOTAL		**$3,462,873**	**$1,810,623**	**$0**	**$0**	**$1,810,623**			**$1,810,623**	**$18,106**	**$1,792,517**	**$18,106**
												99%	1%
		BUSINESS PARK TOTALS	***$3,462,873***	***$1,810,623***			***$1,810,623***			***$1,810,623***	***$18,106***	***$1,792,517***	***$18,106***

NOTES

(1) Project Sources: Sewer Master Plan

(2) Lake Country Business Park projects from Servicing Plan dated July 14, 2023 (Align Engineering)

(3) Business Park Estimates include 35% Contingency + 12% Enginering = 1.47 Factor **1.47**

Sewer DCC Calculations - Area-Specific					
Land Use	**Col. (1)**	**Col. (2)**	**Col. (3)**	**Col. (4) = (1) x (3)**	
	Estimated New Development	**Unit**	**Weighted Equivalent Units**	**Equivalent Units**	
Single Detached Residential	0	Per Lot	1.0000	0	
Multi-Family Residential	0	Per Unit	0.6500	0	
Accessory Dwelling Unit	0	Per Unit	0.3250	0	
Commercial	0	Per Square Metre	0.00336	0	
Industrial	241,800	Per Square Metre	0.00336	812	
Institutional	0	Per Square Metre	0.00336	0	
			Total equivalent units	812	(a)
B: Unit Sanitary Sewer DCC Calculation					
Net Sanitary Sewer DCC Program Recoverable		$1,792,516.77	(b)		
Existing DCC Reserve Monies		$0.00	(c)		
Net Amount to be Paid by DCCs		$1,792,516.77	(d) = (b) - (c)		
DCC per equivalent unit		$2,206.32	(e) = (d) / (a)		
C: Resulting Sanitary Sewer DCCs					
Single Detached Residential		$0	Per Lot		
Multi-Family Residential		$0	Per Unit		
Accessory Dwelling Unit		$0	Per Unit		
Commercial		$7.41	Per Square Metre		
Industrial		$7.41	Per Square Metre		
Institutional		$0.00	Per Square Metre		

Notes:
(1) Sewer DCCs are based on a 20-year program

Drainage DCC Program - Municipal Wide

DRAINAGE SYSTEM CAPITAL COSTS		Project Timing	2016 Capital Costs	2023 Capital Cost using Inflationary Factor[1]	Net Capital Cost	Benefit Allocation		Benefit to New Development	1%	Total Recoverable From DCC	Total Municipal Responsibility
Project Code	Project Name					% to New Dev.	% to Existing		Municipal Assist		
D1	Vernon Creek Swale System	5 - 10 years	$ 165,468	$ 213,454	$ 213,454	100%	0%	$ 213,454	$ 2,135	$ 211,319	$ 2,135
D2	Beasley Detention Pond	5 - 10 years	$ 402,878	$ 519,713	$ 519,713	100%	0%	$ 519,713	$ 5,197	$ 514,515	$ 5,197
D3	Winfield Creek Swale System	5 - 10 years	$ 158,274	$ 204,173	$ 204,173	100%	0%	$ 204,173	$ 2,042	$ 202,132	$ 2,042
D4	Knopf Brook Detention Pond #4	5 - 10 years	$ 143,885	$ 185,612	$ 185,612	100%	0%	$ 185,612	$ 1,856	$ 183,756	$ 1,856
D5	Knopf Brook Detention Pond #3	5 - 10 years	$ 115,108	$ 148,489	$ 148,489	100%	0%	$ 148,489	$ 1,485	$ 147,004	$ 1,485
D6	Various Drainage Upsizing [2]	Ongoing	$ 287,770	$ 371,223	$ 371,223	100%	0%	$ 371,223	$ 3,712	$ 367,511	$ 3,712
D7	Barry Road/ Main Street Storm Detention Pond	5 - 10 years	$ 205,000	$ 264,450	$ 264,450	100%	0%	$ 264,450	$ 2,645	$ 261,806	$ 2,645
D8	Planning and Engineering	Ongoing	$ 287,770	$ 371,223	$ 371,223	100%	0%	$ 371,223	$ 3,712	$ 367,511	$ 3,712
		TOTAL	**$2,278,337**	**$2,278,337**				**$2,278,337**	**$22,783**	**$2,255,554**	**$22,783**

Notes:

(1) Inflation factor (2016 to 2023) = 29% (Engineering News Record) **1.29**

(2) Upsizing Projects List

	2016 Cost Estimate	2023 Cost Estimate
Knopf brook at Chase	$ 10,000	$ 12,900
Knopf brook at Seaton (3 locations)	$ 40,000	$ 51,600
Knopf Brook at Read	$ 10,000	$ 12,900
Robinson at Hwy 97 intake	$ 30,000	$ 38,700
Pretty Rd((4 locations and intake)	$ 50,000	$ 64,500
Clement Rd outfall & 3 locations	$ 50,000	$ 64,500
Glenmore Road (6 locations)	$ 50,000	$ 64,500
Berry Rd Roundabout interconnect	$ 47,770	$ 61,623
TOTAL	**$ 287,770**	**$ 371,223**

Drainage DCC Calculations - Municipal Wide					
Land Use	**Col. (1)**	**Col. (2)**	**Col. (3)**	**Col. (4) = (1) x (3)**	
	Estimated New Development	**Unit**	**Weighted Equivalent Units**	**Equivalent Units**	
Single Detached Residential	1,122	Per Lot	1.0000	1,122	
Multi-Family Residential	2,278	Per Unit	0.6500	1,481	
Accessory Dwelling Unit	255	Per Unit	0.3250	83	
Commercial	42,500	Per Square Metre	0.0034	143	
Industrial	205,530	Per Square Metre	0.0034	691	
Institutional	6,375	Per Square Metre	0.0034	21	
			Total equivalent units	3,540	(a)
B: Unit Drainage DCC Calculation					
Net Drainage DCC Program Recoverable		$2,255,554.00	(b)		
Existing DCC Reserve Monies		$873,702.00	(c)		
Net Amount to be Paid by DCCs		$1,381,852.00	(d) = (b) - (c)		
DCC per equivalent unit		$390.31	(e) = (d) / (a)		
C: Resulting Drainage DCCs					
Single Detached Residential		$389	Per lot		
Multi-Family Residential		$254	Per unit		
Accessory Dwelling Unit		$127	Per unit		
Commercial		$1.31	Per sq.m. GFA		
Industrial		$1.31	Per sq.m. GFA		
Institutional		$1.31	Per sq.m. GFA		

Notes:
(1) Drainage DCCs are based on a 20-year program

APPENDIX B
Developer Information Session

District of Lake Country

DCC Bylaw Update

Developer Session

April 2, 2024

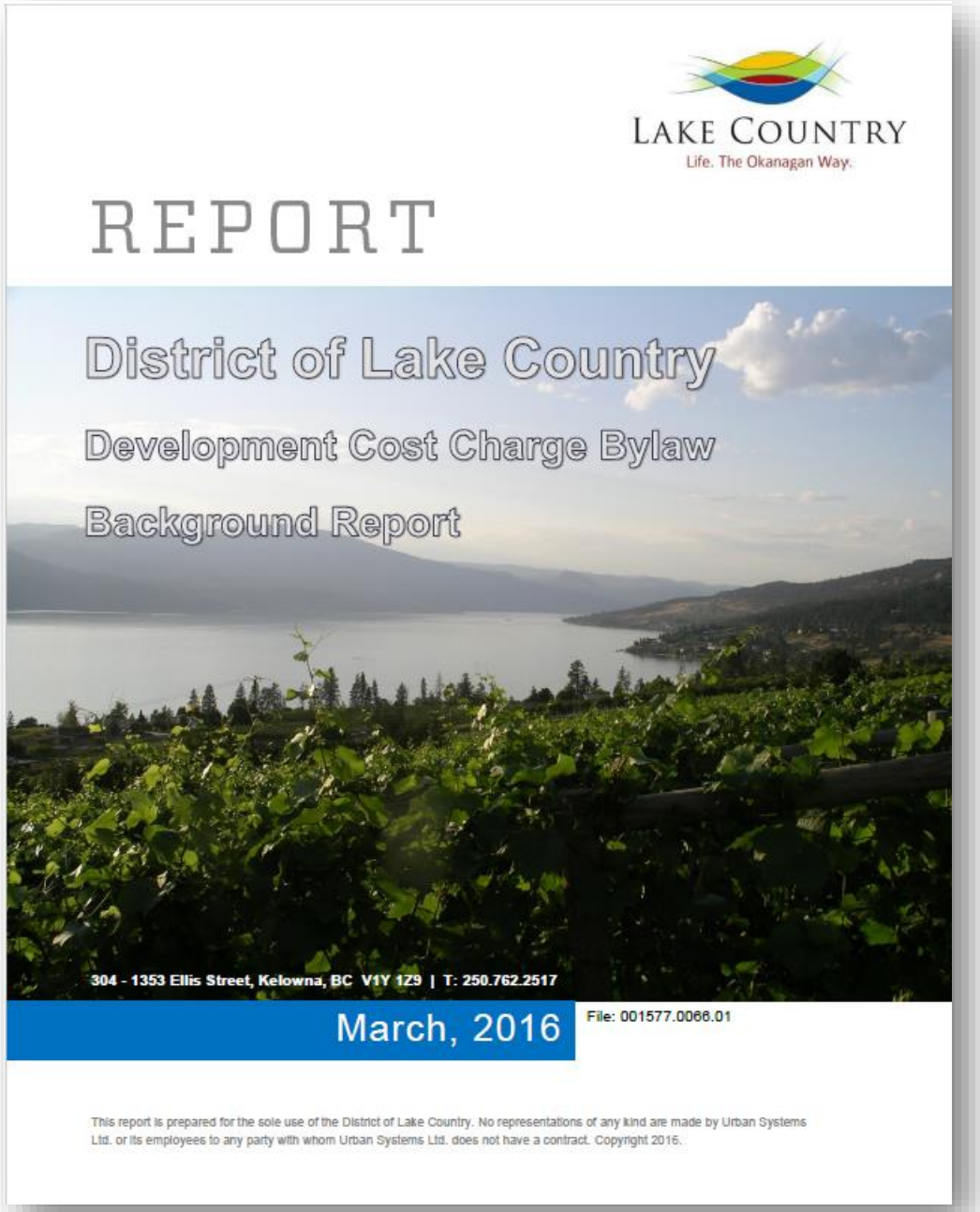
Dan Huang, RPP, MCIP

Principal, Connections Planning Associates Ltd.

Source: District of Lake Country

Agenda

- Welcome / Introductions
- Project Overview
- Current DCC program
- DCC Program Components
- DCC Policy Considerations
- Initial Draft DCC Rates
- Comparison Communities
- Consultation and Engagement
- Bylaw Process / Schedule
- Questions / Discussion

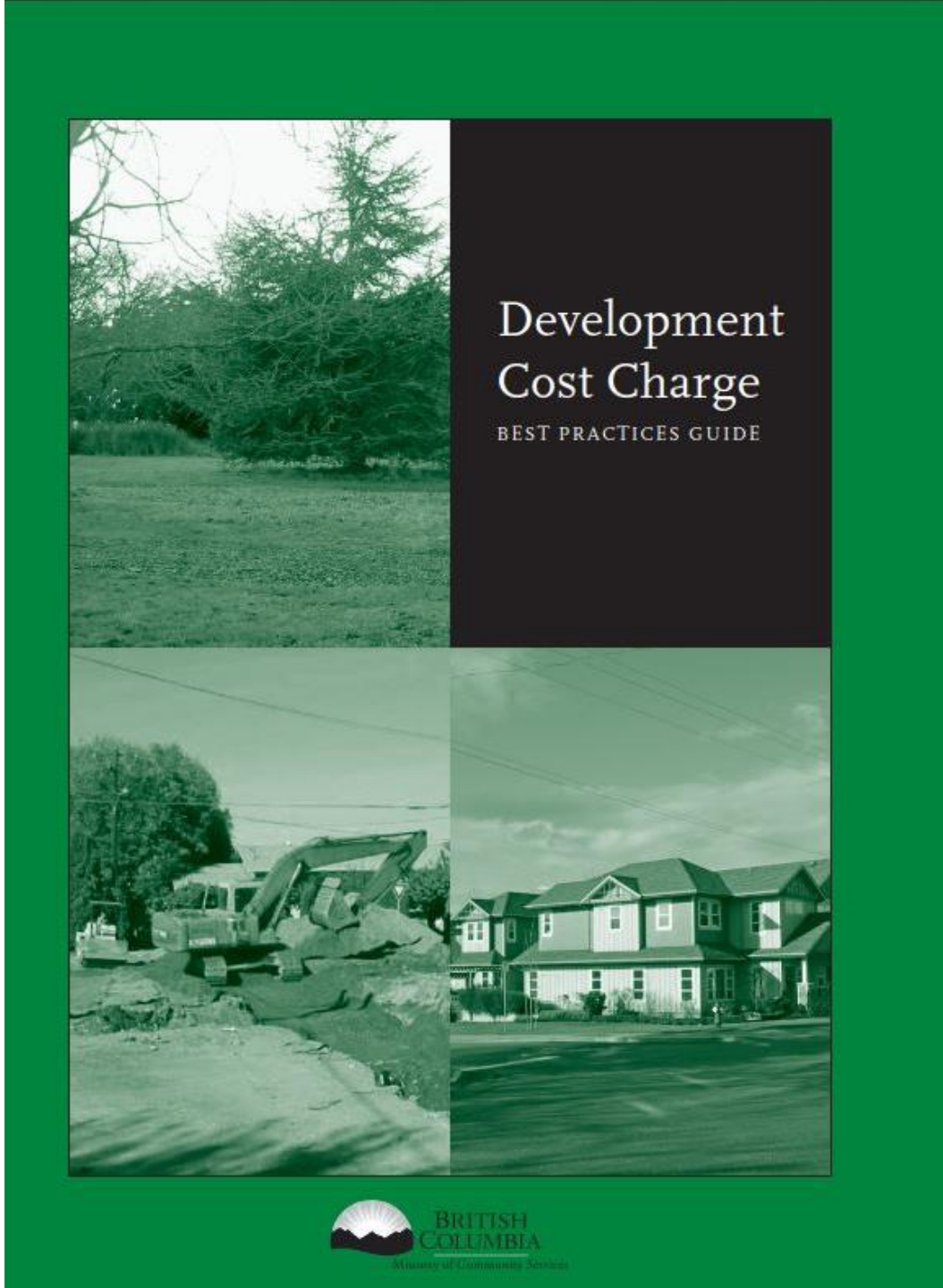


Project Overview

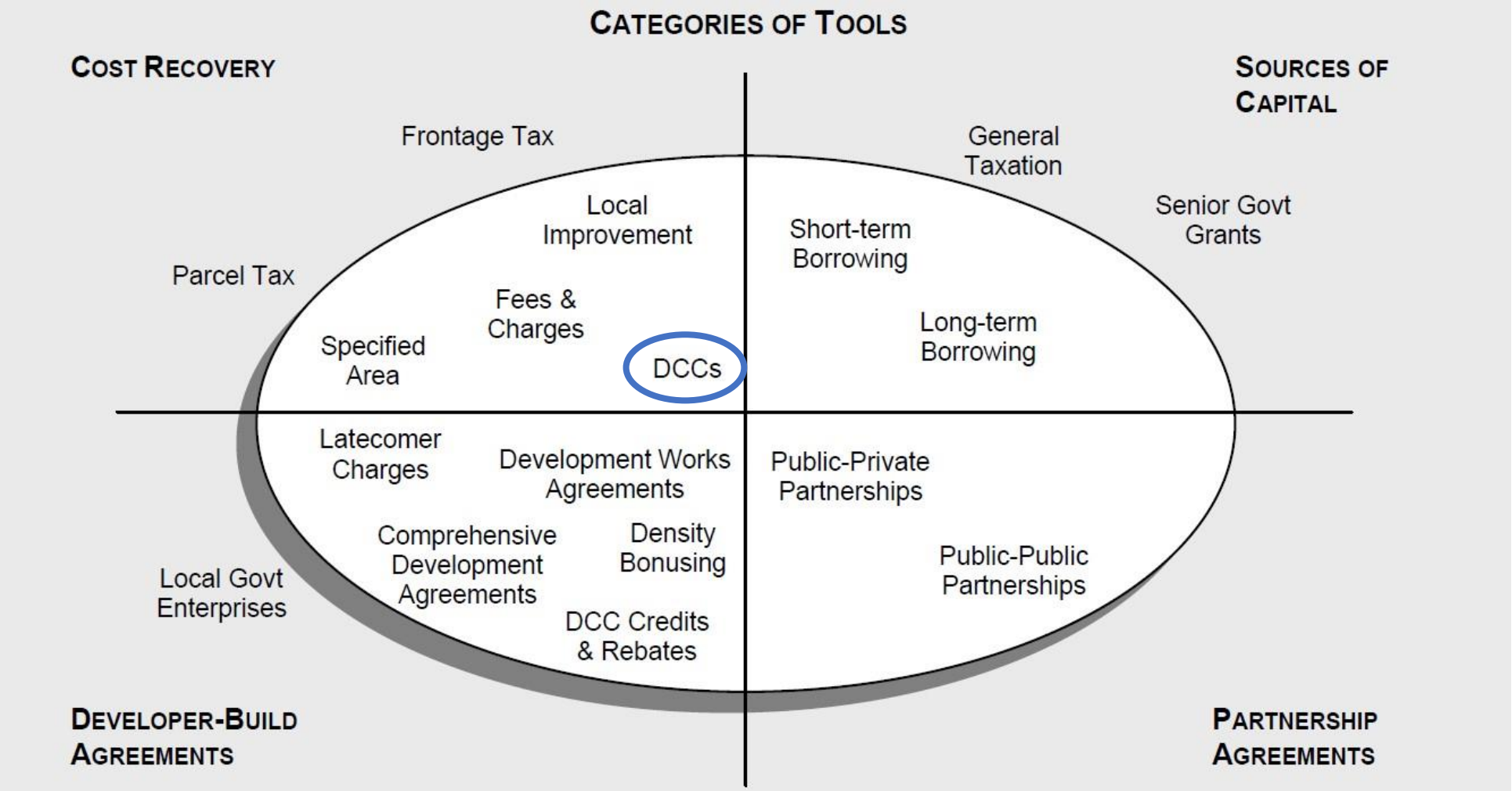
- In Spring 2023, Connections Planning Associates was commissioned by the District to update its 2016 DCC Bylaw for Utilities (water, sewer, stormwater) and Mobility (roads and active transportation).
- Parks DCCs were recently updated in 2021 and are not part of this review.
- Key Drivers for the 2023 DCC update:
  - New OCP (2018) – provides the land use policy framework
  - New Master Plans (2020 to 2023) – identifies significant capital investments to support new growth and existing community development
  - New housing targets – Housing Needs Assessment (2023)
  - DCC Best Practice – recommends major update every 5 years

What are DCCs?

- Fees to help communities recover the capital costs of off-site infrastructure that are needed to support future growth and development
- Based on “benefiter pay” principle
- Transparent and equitable (across land use and infrastructure categories)
- Regulated by the Province (requires sign-off by the Inspector of Municipalities)
  - *Local Government Act*
  - DCC Best Practices Guide



DCCs are one of many Financing Tools that are available to Local Government



Source: Development Finance Choices Guide, Province of BC

What works do DCCs pay for?

- Capital upgrades to infrastructure (water, sewer, stormwater, transportation)
- Park land acquisition and park development (not included in this update)

What works do DCCs not pay for?

- Annual Operations and Maintenance (O+M)
- Works required to service the existing population (e.g. asset renewal)
- Fleet / Transit vehicles
- Various community facilities (e.g. arenas, community halls, libraries)*

**Note: The Province recently amended DCC legislation (Bill 46 - Nov 30, 2023) to include fire halls, policies facilities, and solid waste/recycling facilities, as well as cost-sharing for provincial highways/interchanges.*

Who pays DCCs?

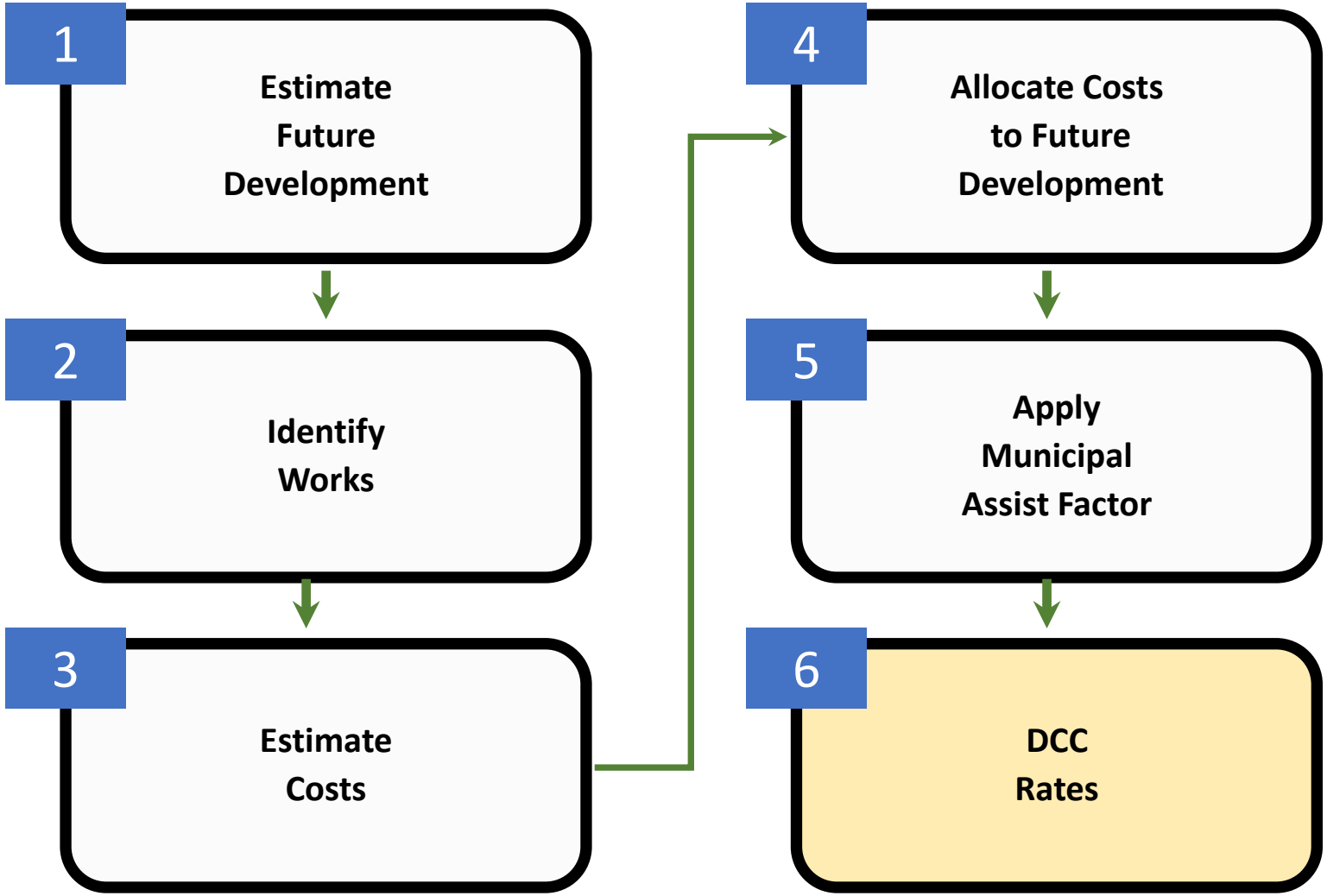
- Applicants at time of **Subdivision** approval to create detached dwelling lots
- Applicants at time of **Building Permit** to construct multi-family residential, commercial, industrial and institutional development

Current DCC Rates (2016 / 2021)

Land Use	Mobility	Water	Sanitary Sewer	Drainage	Park Acquisition / Development*	Total DCCs	
Single Detached Residential	$4,346	$7,533	$5,256	$738	$12,790	**$30,663**	**Per Lot**
Multi-Family Residential	$2,825	$4,897	$3,416	$480	$12,790	**$24,408**	**Per Unit**
Commercial	$14.60	$25.31	$17.66	$2.48	$22.24	**$82.29**	**Per sq.m. GFA**
Industrial	$14.60	$25.31	$17.66	$2.48	$14.48	**$74.53**	**Per sq.m. GFA**
Institutional	$14.60	$25.31	$17.66	$2.48	$22.24	**$82.29**	**Per sq.m. GFA**

** Parks DCCs were updated in 2021 and are not part of this current DCC review.*

How are DCCs Calculated?



Growth Projections

- 20-year projection based on number of new DCC-eligible units in master plans – 4,000 new residential units (additional non-DCC connections not counted)
- New residential category proposed for Accessory Dwelling Unit (ADU) – 300 units
- ICI (industrial, commercial, institutional) based on previous projections

Land Use	Growth Projection	Units of Measure
Single Detached Housing (includes secondary suite)	1,320	Lots
Multi-Family Residential (duplex, triplex, townhouse, apartment)	2,680	Units
Accessory Dwelling Unit – NEW (includes coach houses, garden suites, laneway housing)	300	Units
Commercial	50,000	sq.m. GFA
Industrial	55,000	sq.m. GFA
Institutional	7,500	sq.m. GFA

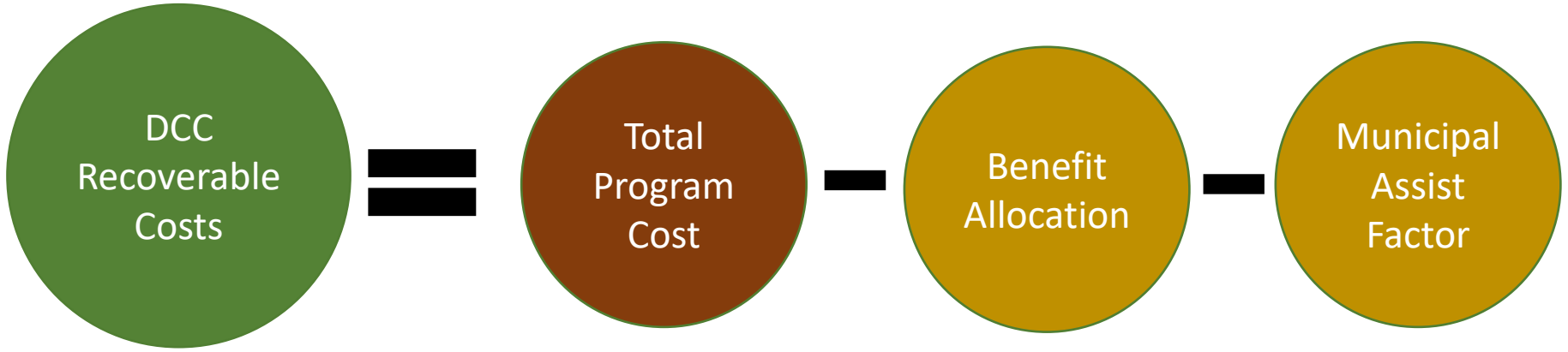
DCCs for Secondary Suites

- Secondary suites that are built within a principal dwelling will generally have a nominal impact on infrastructure capacity (e.g. converting a 4-bedroom house to a 3-bedroom house with a basement suite).
- If a suite is constructed as a renovation to an existing house, then the original DCC would have been paid for at time of subdivision.
- In addition, any building permit value <$50,000 is exempt from paying DCCs.
- In recognition of the above, and to support housing affordability, it is recommended that secondary suites that are constructed within the principal dwelling are not charged additional DCCs, regardless of BP value.

DCCs for Accessory Dwelling Units (ADUs)

- An Accessory Dwelling Unit (ADU) is an additional residential structure separate from the primary dwelling. Examples include coach houses, garden suites, and accessory garage suites.
- There is a rationale that the ADU may add additional impact to infrastructure capacity, and as such DCCs could be attributable. However, the impact is less than a multi-family residential unit, given the potential size of the ADU.
- In proposing a new DCC category for ADUs, a new set of equivalency factors has been developed, based on 50% equivalency of a multi-family residential unit.
- As with other categories, monitor over time to confirm growth projection and equivalencies to other land uses.

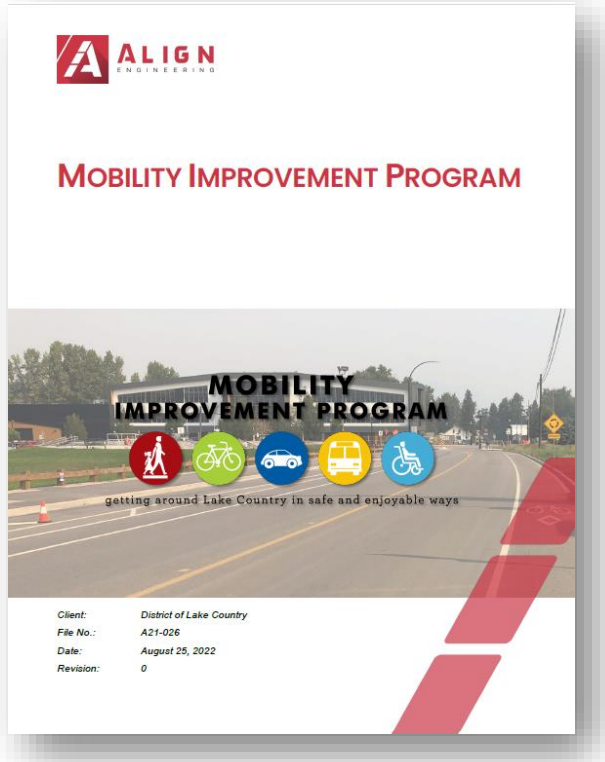
DCC Recoverable Costs (i.e. developer portion)



Benefit Allocation: Proportion of each project that benefits new development vs. the existing community. It varies project by project based on the technical rationale for the allocation.

Municipal Assist Factor (MAF): Required by legislation for municipalities to "assist" development. Typically set at 1% (minimum) for most infrastructure categories but is at Council's discretion. This is in addition to the municipal portion of the total program costs determined above, all coming from **non-DCC revenue sources**.

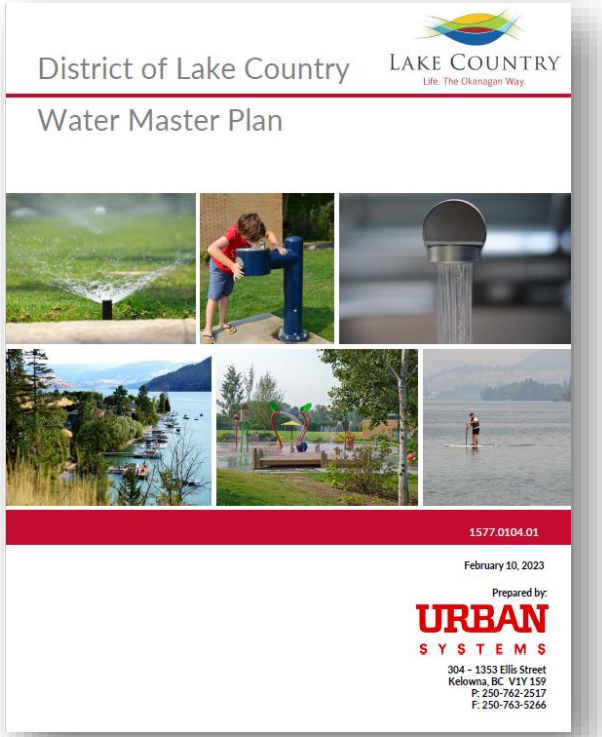
DCC Program Overview - Mobility



- Based on Mobility Master Plan and Mobility Improvement Program
- Majority of program consists of **renewal** and **reconstruction** of existing roads to support new growth, with a 50% benefit to new development.
- New roads to support Lake Country Business Park (capital costs approximately $23.8 million) at 80% benefit to development.
- 1% MAF – consistent with previous DCC program and most other communities

Infrastructure Type	Total Capital Program Cost	DCC Recoverable	Municipal Responsibility
Mobility	$96.2 million	$53.1 million (55%)	$43.2 million (45%)

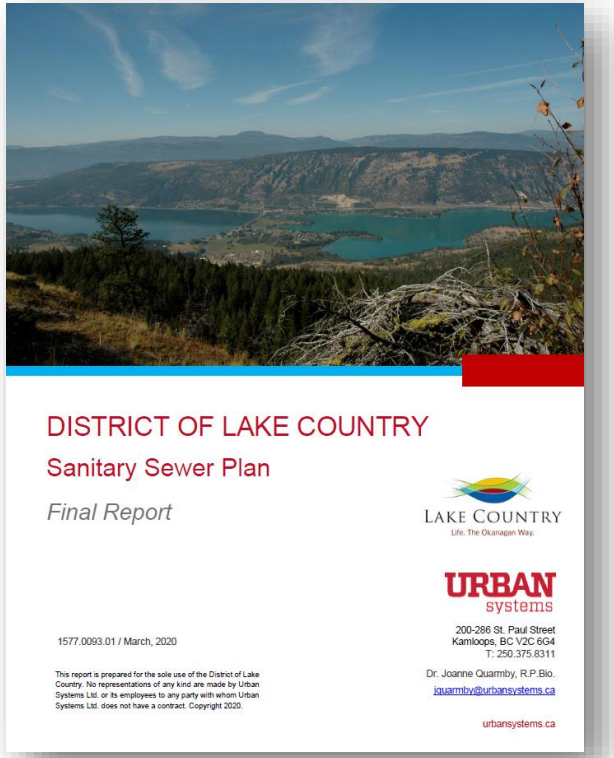
DCC Program Overview - Water



- Based on Water Master Plan and water modelling
- A significant part of the program is for water treatment upgrades at Beaver Lake ($80M) and Kalamalka Lake ($30M) which will benefit existing and new users, with a 42% benefit to new development (new population).
- New watermains to support Lake Country Business Park (capital costs approximately $3.6 million) at 80% benefit to development
- 1% MAF – consistent with previous DCC program and most other communities

Infrastructure Type	Total Capital Program Cost	DCC Recoverable	Municipal Responsibility
Water	$170.2 million	$52.8 million (31%)	$117.5 million (69%)

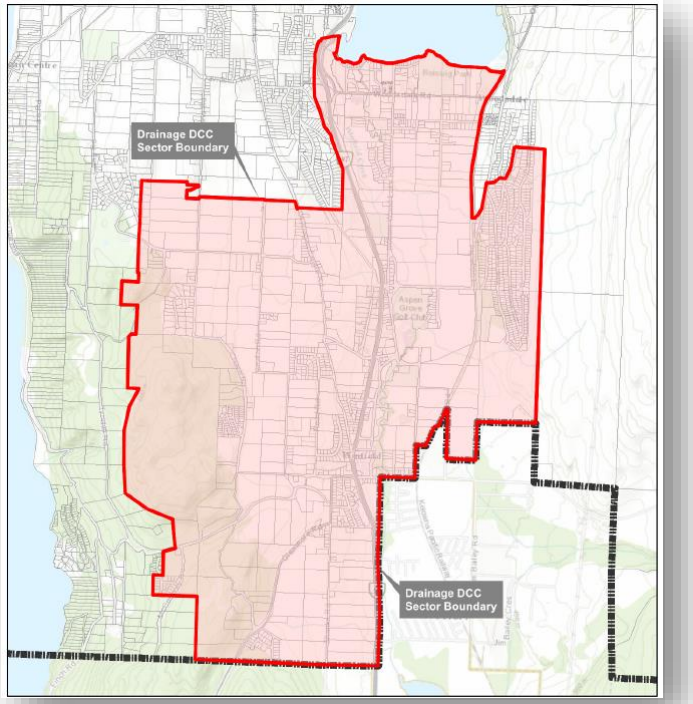
DCC Program Overview - Sewer



- Based on Sewer Master Plan and LWMP.
- A few large costs in the program to accommodate additional wastewater treatment capacity and to fund previous debentures, with various benefit allocations (50%, 80%, 100%) depending on benefit to new development.
- New sewer mains to support Lake Country Business Park (capital costs approximately $2.4 million) at 80% benefit to development
- 1% MAF – consistent with previous DCC program and most other communities

Infrastructure Type	Total Capital Program Cost	DCC Recoverable	Municipal Responsibility
Sewer	$69.9 million	$49.0 million (70%)	$20.9 million (30%)

DCC Program Overview - Drainage



- No Stormwater Master Plan (to be undertaken), DCC program can include the cost of the study.
- Carry over existing program list from 2016, but update costs using Engineering News Record (ENR) inflation factor.
- Benefit allocation from previous program, at 100%.
- New drainage works for Lake Country Business Park are incorporated into the roads/transportation projects.
- 1% MAF – consistent with previous DCC program and most other communities

Infrastructure Type	Total Capital Program Cost	DCC Recoverable	Municipal Responsibility
Drainage	$2.28 million	$2.26 million (99%)	$0.02 million (1%)

DCC Program Overview

Infrastructure Type	Total Capital Program Cost	DCC Recoverable	Municipal Responsibility	Annual DCC Recoverable	Annual Municipal Responsibility
Mobility	$96.2 million	$53.1 million	$43.2 million	$2,653,151	$2,158,118
Water	$170.2 million	$52.8 million	$117.5 million	$2,638,227	$5,873,299
Sewer	$69.9 million	$49.0 million	$20.9 million	$2,449,711	$1,047,290
Drainage	$2.28 million	$2.26 million	$0.02 million	$112,778	$1,139
Parks*	N/A	N/A	N/A	N/A	N/A
TOTAL *(2016 program)*	**$338.7 million** *($130.9 million)*	**$157.1 million** *($77.0 million)*	**$181.6 million** *($52.4 million)*	**$7,853,866** *($3,851,219)*	**$9,079,847** *($2,620,367)*

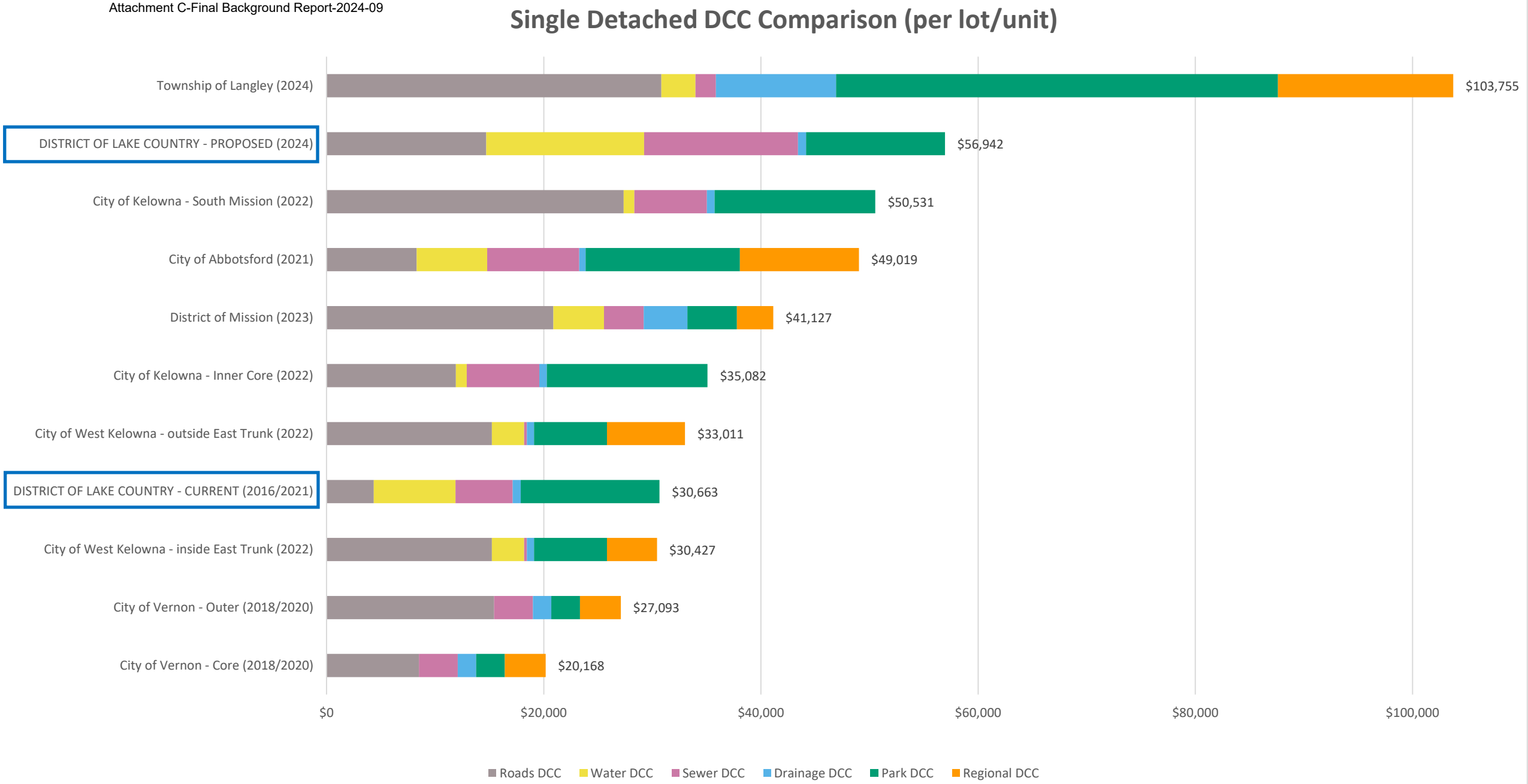
- Program should be reviewed regularly to update costs and incorporate any successful grants (e.g. water / sewer treatment plant).
- Any additional borrowing (including interest) can be incorporated into the DCC program upon approval of the Inspector of Municipalities.

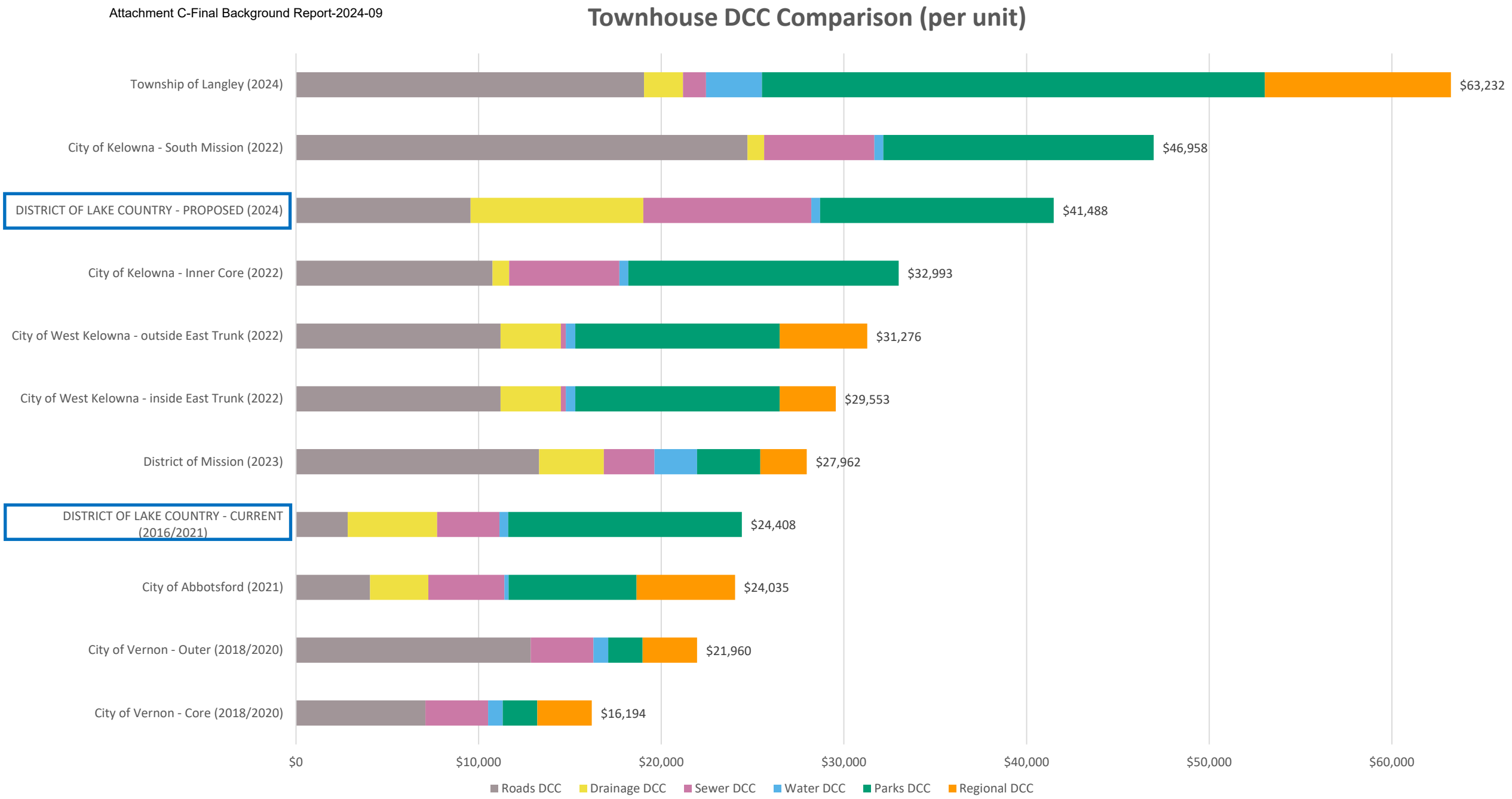
Initial Draft DCC Rates (current DCCs)

Land Use	Mobility	Water	Sanitary Sewer	Drainage	Park Acquisition / Development*	Total Draft DCCs	
Single Detached Residential	$14,700 ($4,346)	$14,547 ($7,533)	$14,166 ($5,256)	$739 ($738)	$12,790 ($12,790)	**$56,942 ($30,663)**	**Per Lot**
Multi-Family Residential	$9,555 ($2,825)	$9,455 ($4,897)	$9,208 ($3,416)	$480 ($480)	$12,790 ($12,790)	**$41,488 ($24,408)**	**Per Unit**
Accessory Dwelling Unit – new category	$4,778 ($0)	$4,728 ($0)	$4,604 ($0)	$240 ($0)	$0 ($0)	**$14,349 ($0)**	**Per Unit**
Commercial	$49.39 ($14.60)	$48.88 ($25.31)	$47.60 ($17.66)	$2.48 ($2.48)	$22.24 ($22.24)	**$170.59 ($82.29)**	**Per sq.m. GFA**
Industrial	$49.39 ($14.60)	$48.88 ($25.31)	$47.60 ($17.66)	$2.48 ($2.48)	$14.48 ($14.48)	**$162.83 ($74.53)**	**Per sq.m. GFA**
Institutional	$49.39 ($14.60)	$48.88 ($25.31)	$47.60 ($17.66)	$2.48 ($2.48)	$22.24 ($22.24)	**$170.59 ($82.29)**	**Per sq.m. GFA**

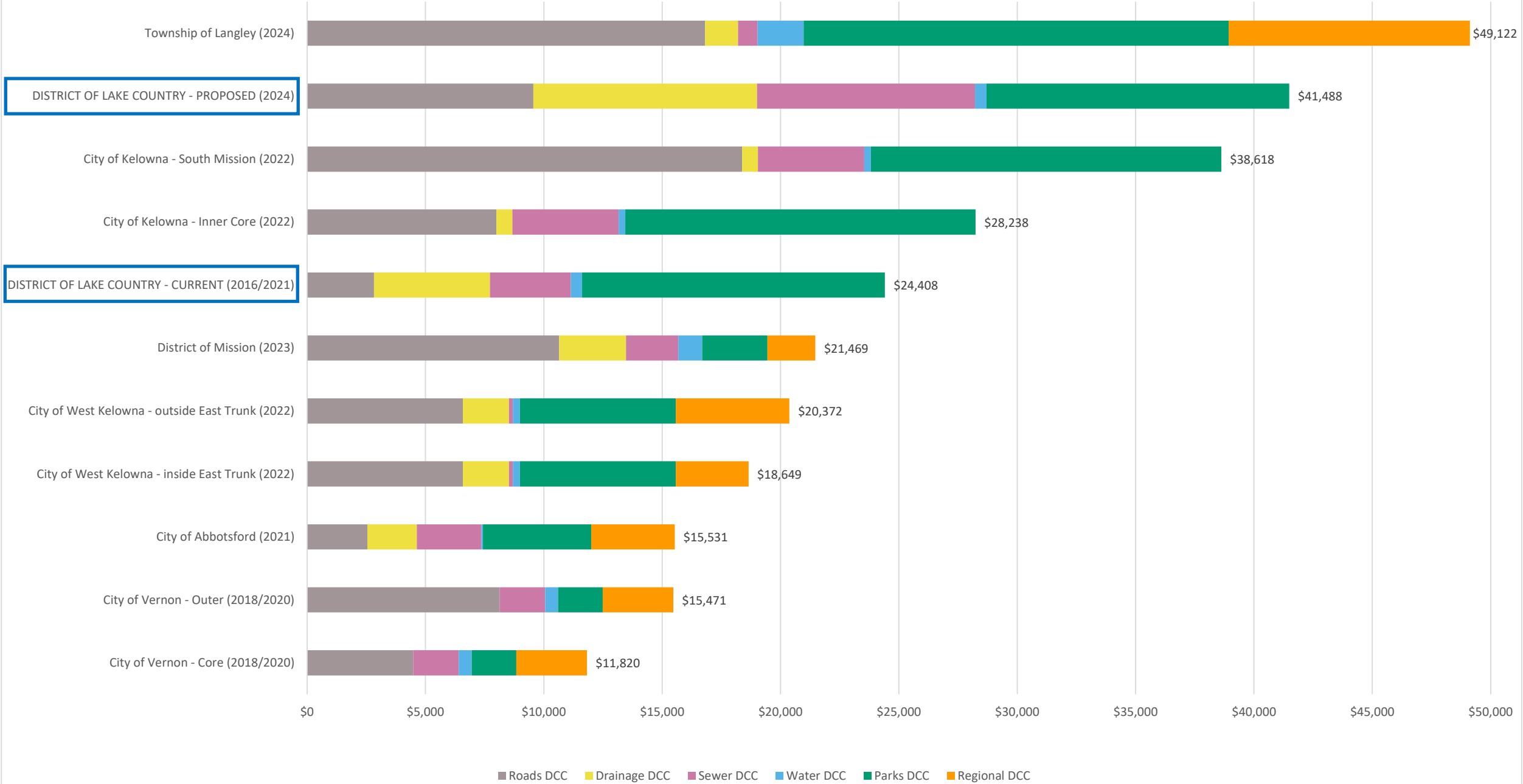
DCC Comparison Communities

- DCCs are a technical exercise, based on each community's growth projections, infrastructure requirements due to growth, and Council policy decisions.
- Every community is different, and as such it is challenging to present an "apples to apples" communities. We have included the following for comparison purposes:
  - Okanagan communities – City of Kelowna, City of West Kelowna, City of Vernon
  - Other high-growth communities – District of Mission, City of Abbotsford, Township of Langley
- Some communities have a two-tiered (e.g. core/outer) DCC rate structure (especially with Transportation DCCs), others have Regional DCCs in addition.
- Township of Langley recently updated their DCC Bylaw (January 2024) with a significant increase, especially for residential DCCs.

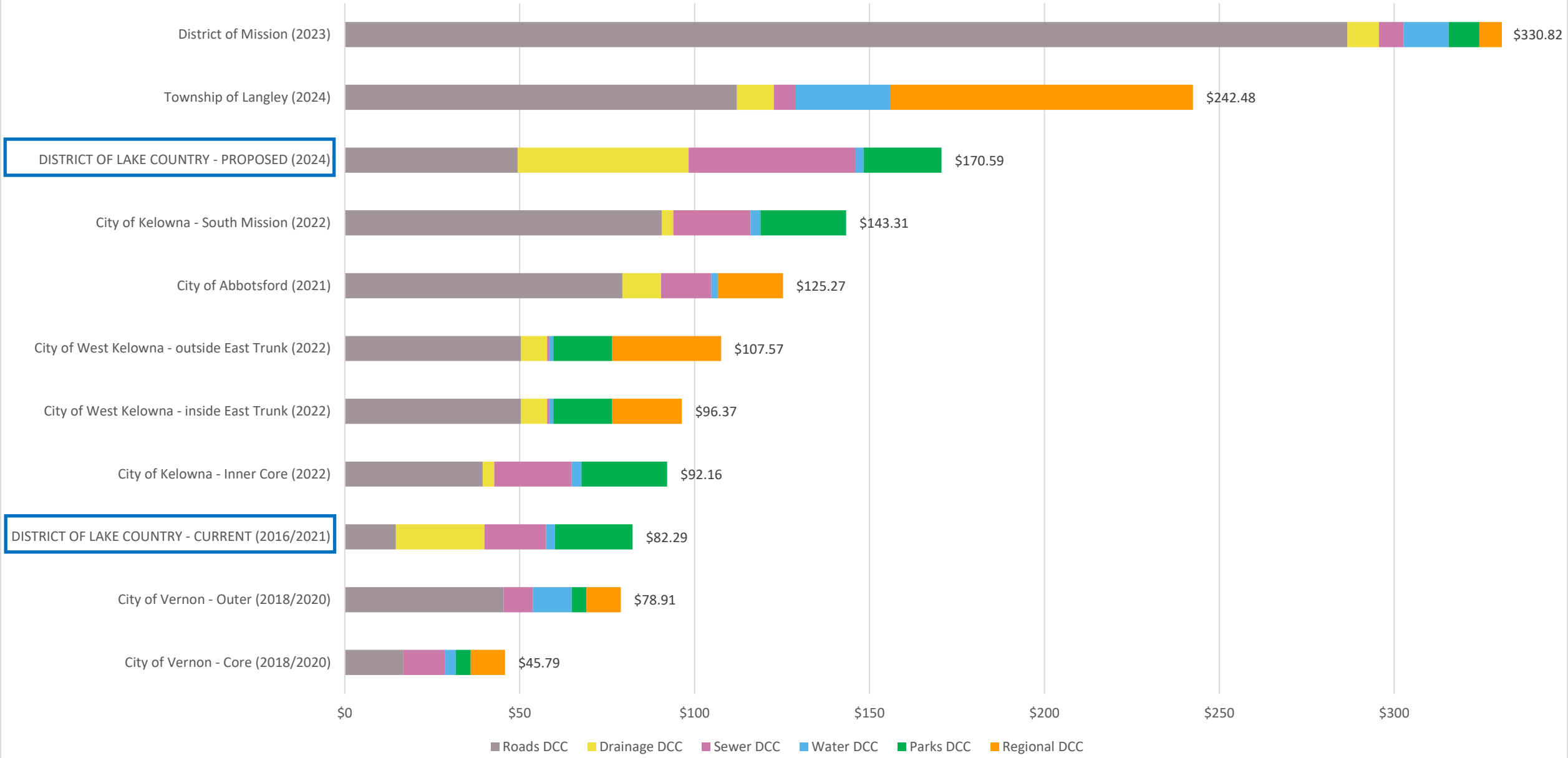

Single Detached DCC Comparison (per lot/unit)
Township of Langley (2024)
$103,755
DISTRICT OF LAKE COUNTRY - PROPOSED (2024)
$56,942
City of Kelowna - South Mission (2022)
$50,531
City of Abbotsford (2021)
$49,019
District of Mission (2023)
$41,127
City of Kelowna - Inner Core (2022)
$35,082
City of West Kelowna - outside East Trunk (2022)
$33,011
DISTRICT OF LAKE COUNTRY - CURRENT (2016/2021)
$30,663
City of West Kelowna - inside East Trunk (2022)
$30,427
City of Vernon - Outer (2018/2020)
$27,093
City of Vernon - Core (2018/2020)
$20,168
$0
$20,000
$40,000
$60,000
$80,000
$100,000
Roads DCC
Water DCC
Sewer DCC
Drainage DCC
Park DCC
Regional DCC

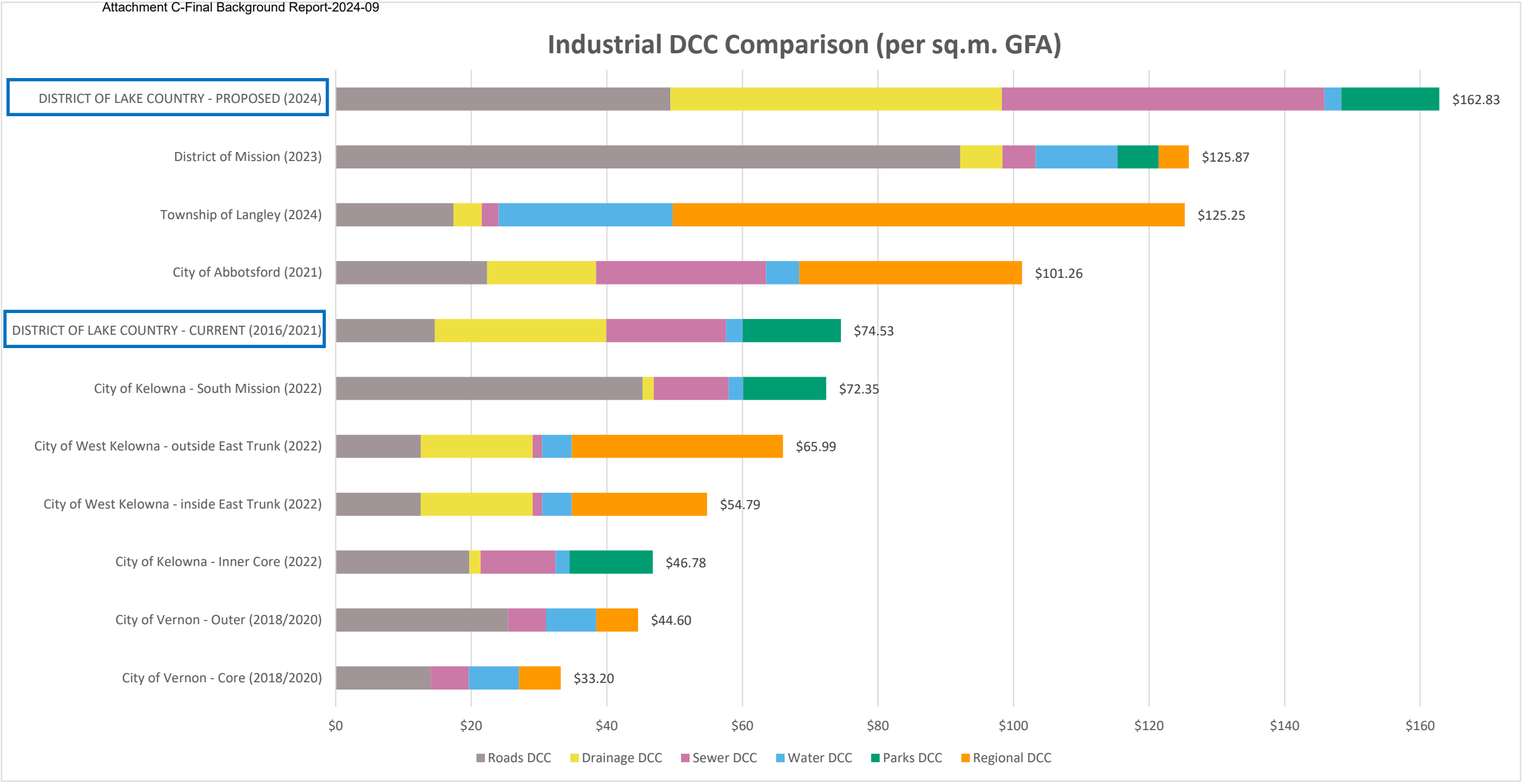

Townhouse DCC Comparison (per unit)
Township of Langley (2024)
$63,232
City of Kelowna - South Mission (2022)
$46,958
DISTRICT OF LAKE COUNTRY - PROPOSED (2024)
$41,488
City of Kelowna - Inner Core (2022)
$32,993
City of West Kelowna - outside East Trunk (2022)
$31,276
City of West Kelowna - inside East Trunk (2022)
$29,553
District of Mission (2023)
$27,962
DISTRICT OF LAKE COUNTRY - CURRENT (2016/2021)
$24,408
City of Abbotsford (2021)
$24,035
City of Vernon - Outer (2018/2020)
$21,960
City of Vernon - Core (2018/2020)
$16,194
$0
$10,000
$20,000
$30,000
$40,000
$50,000
$60,000
Roads DCC
Drainage DCC
Sewer DCC
Water DCC
Parks DCC
Regional DCC

Apartment DCC Comparison (per unit)

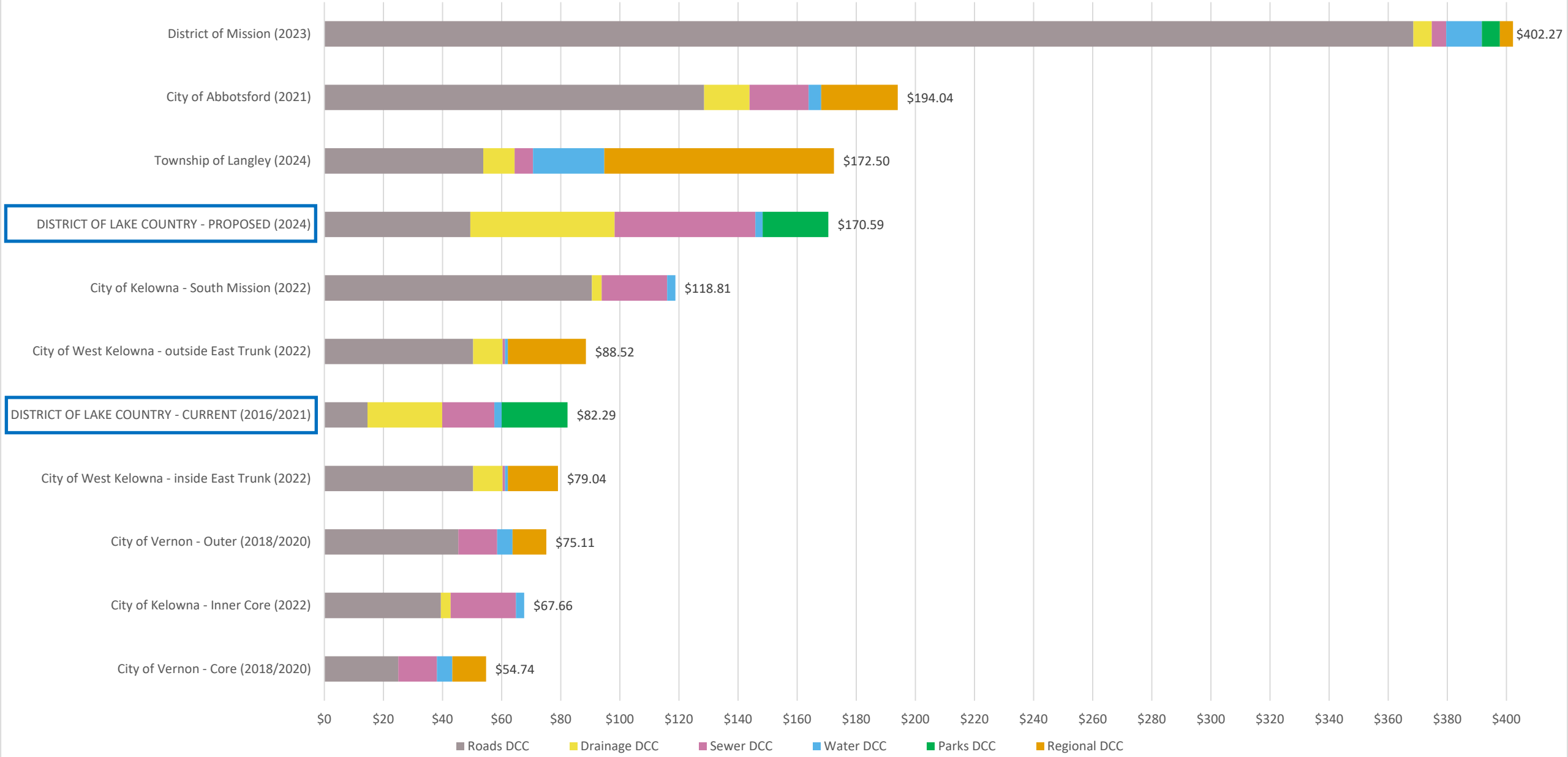


Commercial DCC Comparison (per sq.m. GFA)




Industrial DCC Comparison (per sq.m. GFA)
DISTRICT OF LAKE COUNTRY - PROPOSED (2024)
$162.83
District of Mission (2023)
$125.87
Township of Langley (2024)
$125.25
City of Abbotsford (2021)
$101.26
DISTRICT OF LAKE COUNTRY - CURRENT (2016/2021)
$74.53
City of Kelowna - South Mission (2022)
$72.35
City of West Kelowna - outside East Trunk (2022)
$65.99
City of West Kelowna - inside East Trunk (2022)
$54.79
City of Kelowna - Inner Core (2022)
$46.78
City of Vernon - Outer (2018/2020)
$44.60
City of Vernon - Core (2018/2020)
$33.20
$0
$20
$40
$60
$80
$100
$120
$140
$160
Roads DCC
Drainage DCC
Sewer DCC
Water DCC
Parks DCC
Regional DCC

Institutional DCC Comparison (per sq. m. GFA)



DCC Bylaw Considerations

- DCC Exemptions
  - **Statutory** exemptions in LGA for: places of worship, building permit value < $50,000 (can be increased by Bylaw), residential units < 29 sq.m. (can be increased by Bylaw).
  - No DCCs payable or accounted for in DCC rates.
- DCC Waivers and Reductions
  - **Permissive** relief by Council for specific residential development, i.e. not-for profit affordable housing, for-profit affordable rental, low environmental impact.
  - Typically a percentage reduction of the DCC rates, e.g. 100% waiver for not-for profit affordable housing, 50% reduction for for-profit affordable rental – Bylaw sets out criteria.
  - Can be in separate Bylaw (preferred) which does not require Ministry approval.
  - Any amounts waived by Council should be funded through non-DCC revenue sources (e.g. utility rates, non-DCC reserve funds, affordable housing fund, general taxation).

DCC Bylaw Considerations

- In-Stream Protection
  - LGA provides in-stream protection for any new DCC rates coming into effect, for in-stream subdivision or building permit applications with application fees paid (applies to “precursor applications” as well for Rezoning and/or Development Permit).
  - Must achieve subdivision approval or BP issuance within 12 months of Date of Adoption, or else new DCC rates apply.
- Consultation
  - Following initial Council review of Draft DCC rates, DCC Best Practices usually include consultation with the development community and general public.
  - We have developed a brochure/handout and will work with the development industry (UDI, CHBA, others?) as part of the engagement.
  - Information to be posted to the District’s website for public review and feedback.

DCC Bylaw Process

March 19, 2024 — Initial Review by Council

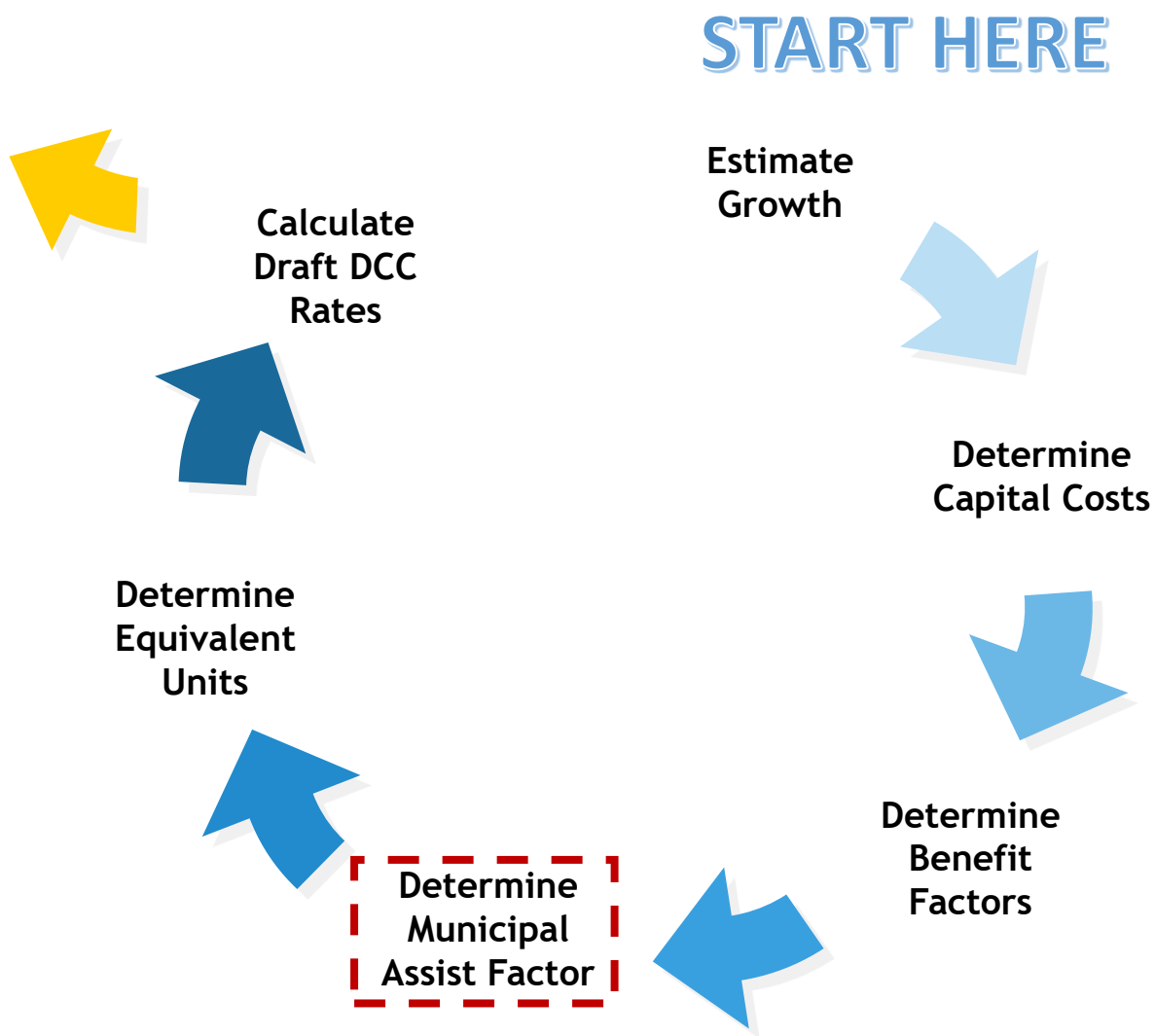
We are Here

April - May 2024 — Consultation with Developers / Community

June 2024 (est.) — Present DCC Rates to Council for Bylaw Readings)

Summer 2024 (est.) — Approval by Province

Fall 2024 (est.) — Bylaw Adoption



District of Lake Country

LAKE COUNTRY
Life. The Okanagan Way.

DCC Bylaw Update

Questions / Discussion

Developer Session

April 2, 2024

Dan Huang, RPP, MCIP

Principal, Connections Planning Associates Ltd.

CONNECTIONS
Planning Associates Ltd.

Source: District of Lake Country

APPENDIX C
Current DCC Bylaw 950, 2016

DISTRICT OF LAKE COUNTRY

BYLAW 950, 2016

CONSOLIDATED VERSION

(Includes amendment as of June 15, 2021)

This is a consolidated copy to be used for convenience only. Users are asked to refer to the Development Cost Charge Bylaw as amended from time to time to verify accuracy and completeness.

Amending Bylaw	Summary of Amendments	Adoption
1140	Delete and replace Schedule A	June 15, 2021

DISTRICT OF LAKE COUNTRY

BYLAW 950

A BYLAW TO IMPOSE DEVELOPMENT COST CHARGES

THE Council of the District of Lake Country, in open meeting assembled, enacts as follows:

1. DEFINITIONS

1.1 For the purpose of this bylaw, the definitions of words and phrases that are not included in this section shall have the meaning assigned to them in the Local Government Act or the Community Charter, as the case may be.

1.2 In this bylaw:

"Building Permit" means any permit required by the District that authorizes the **construction**, alteration or extension of a building or **structure**.

"Commercial" means a **commercial development** in a **commercial zone** used or intended to be used for the carrying on of any business, including an occupation, employment or enterprise that is carried on for gain or monetary profit by any person.

"Construction" includes building, erection, installation, repair, alteration, addition, enlargement, moving, locating, relocating, reconstruction, demolition, removal, excavation, or shoring.

"Development" means the **construction**, alteration, or extension of buildings and/or **structures** for any use authorized by the **Zoning Bylaw** that requires the issuance of a **building permit**, but does not include internal alterations of a building and/or **structure** where the principal use of the building and/or **structure**, or part thereof, is not changing.

"District" means the municipal corporation of the District of Lake Country or the area within the municipal boundaries as the context may require.

"Dwelling Unit" means accommodation providing sleeping rooms, washrooms and a kitchen intended for domestic use, and used, or intended to be used, permanently for a household. This use does not include a room in a hotel or a motel, and does not include recreational vehicles.

"Industrial" means an **industrial development** in a **zone** listed in the **Zoning Bylaw**, or a similar **development** in another **zone** permitted in accordance with the **Zoning Bylaw**, in which the predominant use, as determined by its general purpose and list of permitted uses, is of an **industrial** nature. It includes all **industrial** uses and agricultural uses such as greenhouses, mushroom farms, agricultural dwellings, retail nurseries, and manufacturing & processing plants for agriculture-related products and **commercial** businesses.

"Institutional" means **development** of a public or **institutional** nature in an **institutional zone** listed in the **Zoning Bylaw**.

"**Lot"** means the smallest unit into which land is subdivided as shown on the records of the Land Title Office.

"Multi-family Residential" means housing on a single **lot** other than a strata **lot** that contains three or more **dwelling units**.

"Mobile Home" means a transportable single-family **r**esidential **dwelling unit** meeting minimum Canadian Standards Association Z-240, suitable for long-term occupancy, and designed to be transported on wheels.

"Modular Home" means a factory-built single-family **residential dwelling unit** meeting Canadian Standards Association 277M, suitable for long-term occupancy, and designed to be placed on a permanent foundation.

"Residential" means any **residential development** in all **zones** where **residential development** is permitted in accordance with the **Zoning Bylaw**.

"Sector" means a prescribed geographical portion or area of the **municipality** within which a **development** cost charge is levied.

"Structure" means any **construction** fixed to, supported by or sunk into land or water, excluding asphalt or concrete paving or similar surfacing of a **lot**.

"Single Detached Residential" means housing on a single titled **lot** that contains one single family **dwelling unit**, including **mobile** or **modular homes**.

"Subdivision" means a **subdivision** as defined in the Land Title Act or Strata Property Act.

"Zone" means the **zones** identified and defined in the **District** of Lake Country **Zoning Bylaw** as applicable.

"Zoning Bylaw" means the **District** of Lake Country **Zoning Bylaw** in effect at the time of application of this bylaw.

2. DEVELOPMENT COST CHARGES

2.1 Those **Development** Cost Charges set out in Schedule "A" attached hereto and forming part of this bylaw, are hereby imposed on every person who:

(a) obtains approval of a **subdivision**;

(b) obtains a **building permit** authorizing the **construction**, alteration or extension of a building or **structure**; or

(c) obtains a **building permit** authorizing the **construction**, alteration or extension of a building that will, after the **construction**, alteration or extension, contain fewer than four (4) self-contained **dwelling units** and be put to no other use than the **residential** use in those **dwelling units**;

as outlined in Schedule "A".

3. EXEMPTIONS

3.1 A **development** cost charge is not payable if any of the following applies in relation to a **development** authorized by a **Building Permit**:

(a) the permit authorizes the **construction**, alteration or extension of a building set apart for public worship or part of such a building that is, or will be, after the **construction**, alteration or extension, exempt from taxation under the *Community Charter*;
(b) the value of the work authorized by the permit does not exceed $50,000 ;or
(c) the square footage of the **Dwelling Unit** is no larger than 29m^2.

3.2 A **development** is not exempt from payment of the applicable **development** cost charges if the application for **development** which might otherwise qualify under section 3.1(b) above relates to a single site for which, if more fully developed, the total value of the work possible would exceed $50,000.

4. CALCULATION OF APPLICABLE CHARGES

4.1 The amount of **development** cost charges payable in relation to a particular application shall be calculated using the applicable charges set out in Schedule "A" and applicable number of **development** units.

4.2 **Development** cost charge rates are paid by:
(a) all **development** in the **District** for roads, sewer and parks;
(b) those located in the **District's** Drainage DCC **Sector**, as set out in Schedule "B", attached hereto, for drainage; and,
(c) those located within the **District's** Water DCC **Sector**, as set out on Schedule "C", attached hereto, for water.

4.3 Where a type of **development** is not identified on Schedule "A" the amount of **development** cost charges to be paid to the **District** shall be equal to the **development** cost charges that would have been payable for the most comparable type of **development**.

4.4 The amount of **development** cost charges payable in relation to a mixed-use type of **development** shall be calculated separately for each portion of the **development,** according to the separate use types, which are included in the **building permit** application and shall be the sum of the charges payable for each type.

5. REPEAL

District of Lake Country Development Cost Charge Bylaw 499, 2004 and its amendments are hereby repealed.

6. CITATION

This bylaw may be cited as Development Cost Charge Bylaw 950, 2016.

READ A FIRST TIME this 19th day of April, 2016.
READ A SECOND TIME this 19th day of April, 2016.
READ A THIRD TIME this 19th day of April, 2016.

Certified correct at 3rd reading

Original signed by Reyna Seabrook
Corporate Officer

Approved by the Inspector of Municipalities the 30th day of August, 2016.

Original signed by Liam Edwards
Deputy Inspector of Municipalities

ADOPTED this 6th day of September, 2016.

Original signed by James Baker
Mayor

Original signed by Reyna Seabrook
Corporate Officer

Schedule A deleted and replaced by Bylaw 1140

SCHEDULE A

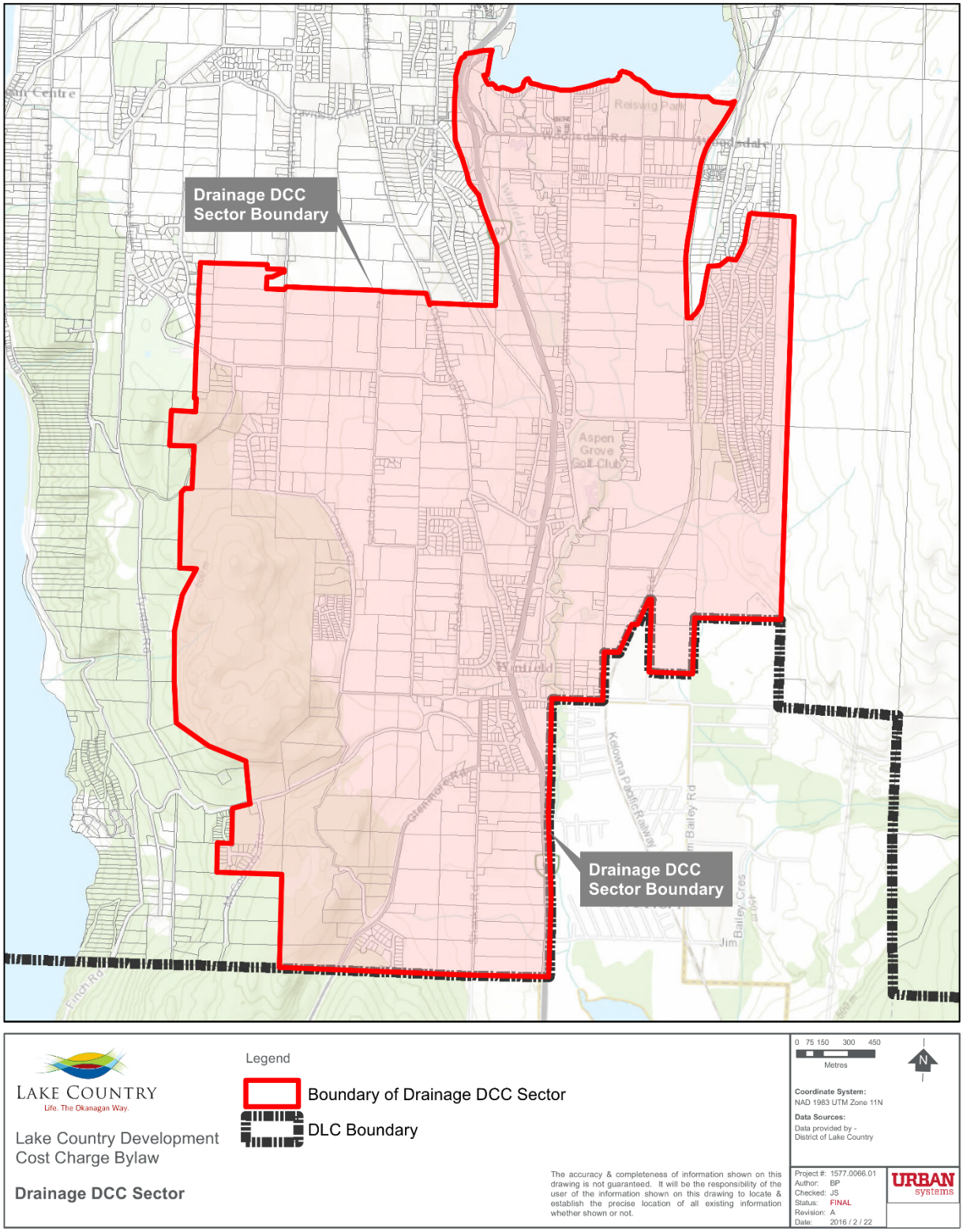
	Collection Basis	Road System	Water System	Drainage System	Sewage System	Parks
Single Detached Residential	Per **Lot**	$4,346	$7,533	$738	$5,256	$12,790
Multi-family Residential	Per Unit	$2,825	$4,897	$480	$3,416	$12,790
Commercial	Per floor area in m^2	$14.60	$25.31	$2.48	$17.66	$22.24
Industrial	Per floor area in m^2	$14.60	$25.31	$2.48	$17.66	$14.48
Institutional	Per floor area in m^2	$14.60	$25.31	$2.48	$17.66	$22.24

Notes:

1. All development in the **District** shall pay development cost charges for roads, sewer and parks.
2. Development cost charges for drainage will be paid only by those located in the **District's** Drainage DCC **Sector**, as defined by the Drainage DCC **Sector** map (Schedule "B").
3. Development cost charges for water will be paid only by those located within the **District's** Water DCC **Sector**, as defined by the Water DCC **Sector** map (Schedule "C").
4. **'Single Detached Residential'** includes housing on a single titled **lot** that contains one single family **dwelling unit**, this includes **mobile** or **modular homes**.
5. **'Multi-family Residential'** includes housing on a single **lot** other than a strata **lot** that contains three or more **dwelling units**.
6. The charge per square metre for the non-**residential** categories is based on the gross floor area.
7. The metric conversion rate is 1.0 m^2 to 10.76 ft^2.

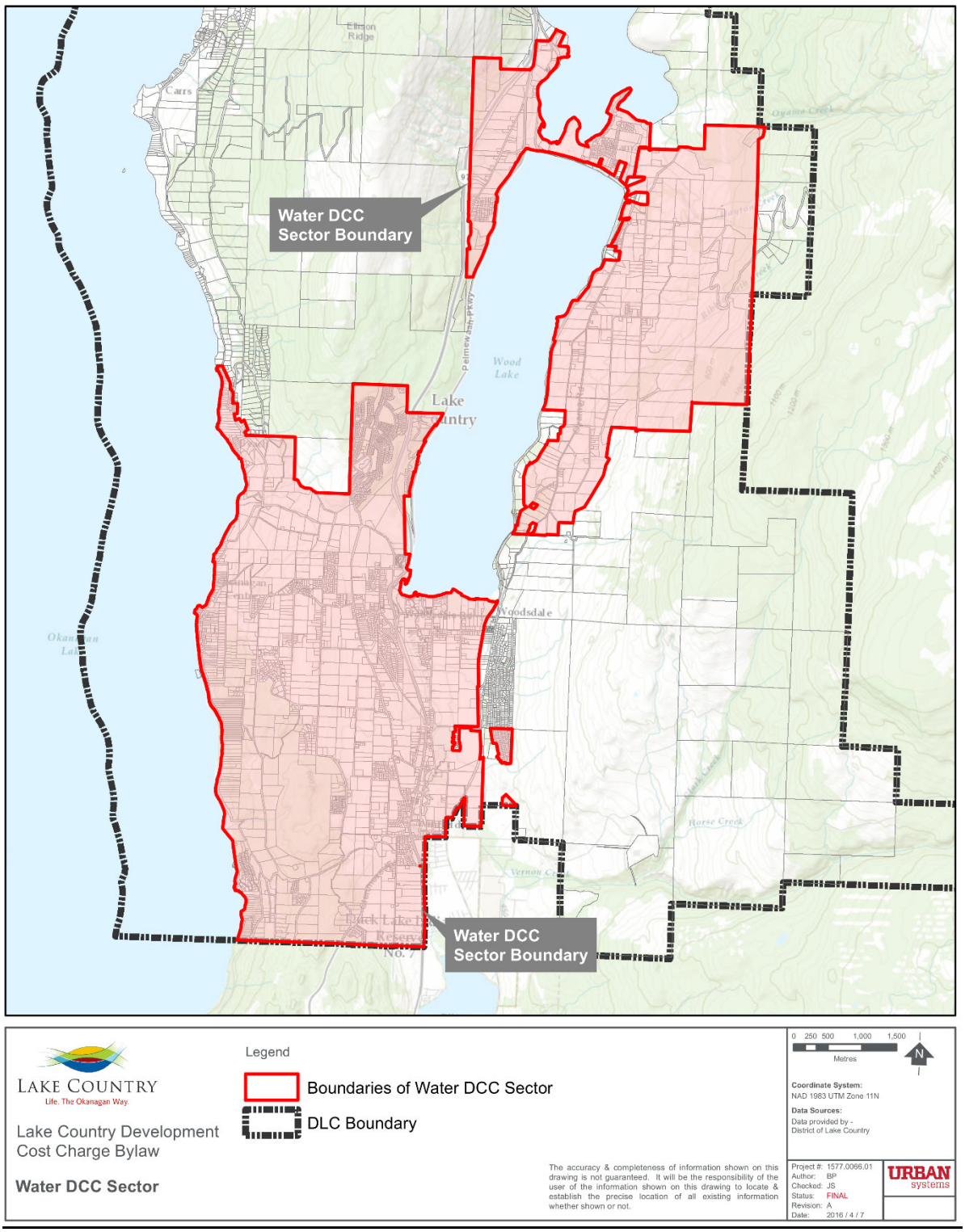
SCHEDULE 'B'

DEVELOPMENT COST CHARGE BYLAW 950, 2016



SCHEDULE 'C'

DEVELOPMENT COST CHARGE BYLAW 950, 2016



APPENDIX D
DCC Amendment Bylaw 1233, 2024

DISTRICT OF LAKE COUNTRY

BYLAW 1233

A BYLAW TO AMEND DEVELOPMENT COST CHARGES

The Council of the District of Lake Country, in open meeting assembled, enacts as follows:

1. Development Cost Charge Bylaw 950, 2016 is hereby amended by:

1.1. Adding the following definitions in alphabetical order:

"Accessory Dwelling Units (ADUs)" means an additional residential structure containing **Dwelling Units** separate from the primary dwelling. Examples include; coach houses, garden suites, and accessory garage suites. See **"Secondary Suites"** for additional **Dwelling Units** within the primary dwelling.

"**Secondary Suite**" means a self-contained dwelling unit located within a single detached dwelling. A secondary suite has its own separate cooking, sleeping and bathing facilities. It has direct access to outside without passing through any part of the principal unit. This use does not include duplex housing, semi-detached housing, apartment housing or boarding and lodging houses.

1.2. In Section 3. Exemptions, amending items:

(a) 3.1(b) by replacing "$50,000" with "$100,000" and removing the word "or" at the end of the section;

(b) 3.1(c) adding the word "or" at the end of the section;

(c) 3.1 by adding the following new section (d) immediately following section (c):
"(d) Secondary Suites that are constructed within the principal dwelling."

(d) 3.2 by replacing "$50,000" with "$100,000".

1.3. In Section 4. Calculation of Applicable Charges, amending items:

(a) 4.2(a) by removing the word "sewer";

(b) 4.2(c) by deleting the text "District's Water DCC Sector" and replacing with "District's Sanitary Sewer DCC Sector" and replacing the word "water" at the end of item (c) with the word "sewer";

(c) 4.2 by adding the following new section (d) immediately following section (c):
"(d) those located within the following District Water Service Area Bylaws as amended from time to time:
(i) Lake Country Water Service Area Bylaw 695, 2008
(ii) Coral Beach Water System Specified Area Establishment Bylaw 076, 1996
(iii) Lake Pine Local Service Area Establishment Bylaw 736, 2010"

1.4. Deleting Schedule A in its entirety and replacing it with Schedule A attached hereto.

1.5. Deleting Schedule B in its entirety and replacing it with Schedule B, attached hereto.

1.6. Deleting Schedule C in its entirety and replacing it with Schedule C, attached hereto.

1.7. Adding Schedule D in its entirety, attached hereto.

2. This bylaw may be cited as "Development Cost Charge Amendment (DCC) Bylaw 1233, 2024"

READ A FIRST TIME this 21st day of May, 2024.

READ A SECOND TIME AS AMENDED this _____day of _, 2024.

READ A THIRD TIME this xx day of xx, 2024.

Certified correct at third reading.

Dated at Lake Country, B.C. Corporate Officer

Approved by the Inspector of Municipalities the xx day of xx, 2024.

Inspector of Municipalities

ADOPTED this xx day of xx, 2024.

Mayor Corporate Officer

Schedule A to Bylaw 1233, 2024

SCHEDULE A
Municipal-Wide DCCs

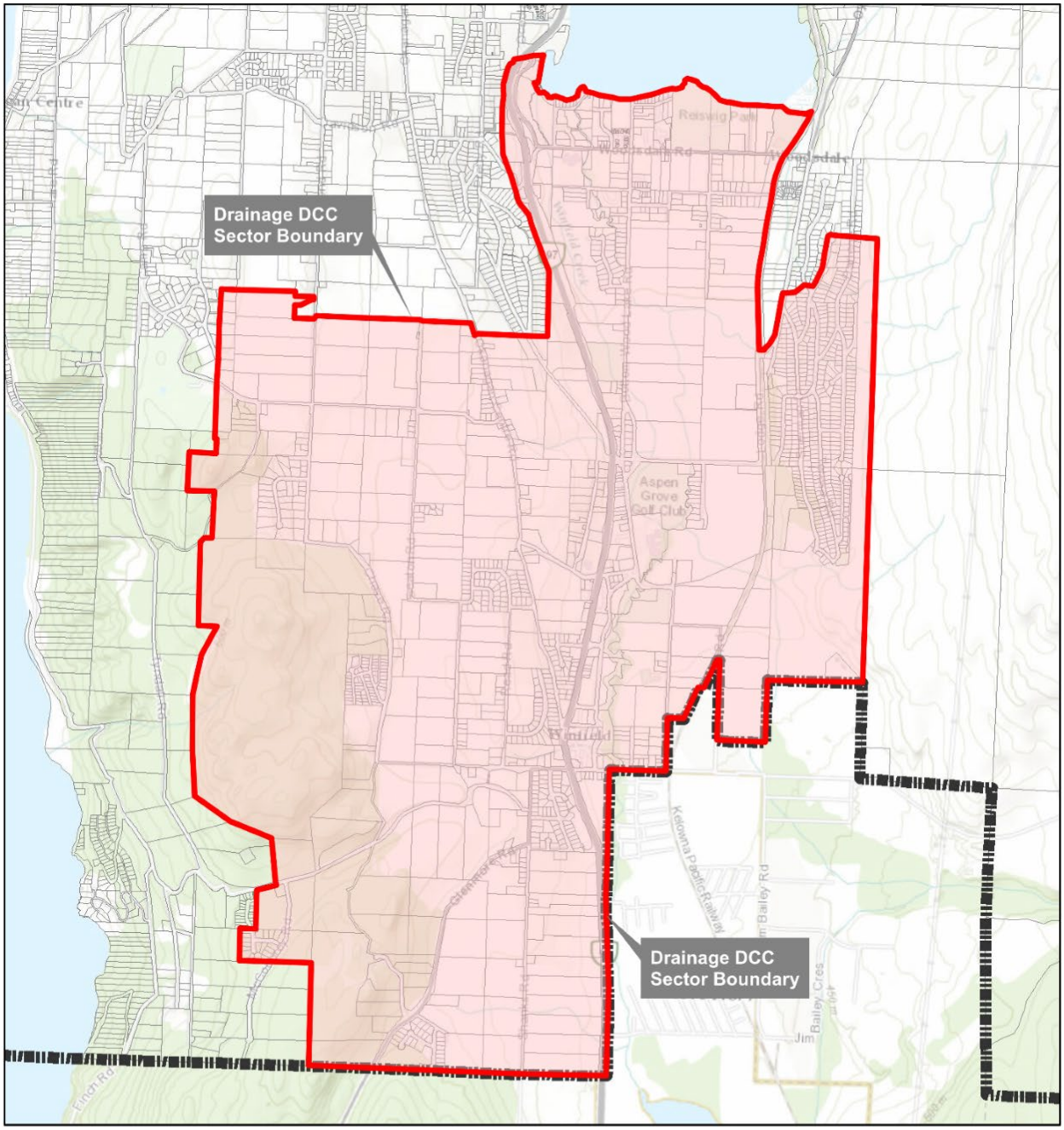
Land Use Category	Collection Basis	Mobility	Water	Sewer	Drainage	Parks	Total
Single Detached Residential	Per Lot	$10,252	$11,953	$11,862	$389	$12,790	$47,246
Multi-Family Residential	Per Unit	$6,664	$7,770	$7,710	$254	$12,790	$35,188
Accessory Dwelling Unit	Per Unit	$3,332	$3,885	$3,855	$127	$0	$11,199
Commercial	Per Gross Floor Area in m^2	$34.45	$40.16	$39.86	$1.31	$22.24	$138.02
Industrial	Per Gross Floor Area in m^2	$34.45	$40.16	$39.86	$1.31	$14.48	$130.26
Institutional	Per Gross Floor Area in m^2	$34.45	$40.16	$39.86	$1.31	$22.24	$138.02

Notes:

1. All development in the District shall pay development cost charges for mobility and parks.
2. Development cost charges for drainage will be paid only by those located in the District's Drainage DCC Sector, as defined by the Drainage DCC Sector map (Schedule "B").
3. Development cost charges for sewer will be paid only by those located within the District's Sewer DCC Sector, as defined by the Sewer DCC Sector map (Schedule "C").
4. Development cost charges for water will be paid only by those located within the District's Water Service Area, as defined by: Water Service Area Bylaw 695, 2008; Coral Beach Water System Specified Area Establishment Bylaw 076, 1996; and Lake Pine Local Service Area Establishment Bylaw 736, 2010, all as amended from time to time.
5. 'Single Detached Residential' includes housing on a single titled lot that contains one single family dwelling unit, this includes mobile or modular homes.
6. 'Multi-family Residential' includes housing on a single lot other than a strata lot that contains three or more dwelling units.
7. 'Accessory Dwelling Unit" includes housing that is separate from the primary dwelling and located on the same lot, including but not limited to: coach houses, garden suites and accessory garage suites.
8. A secondary suite which is located within the principal dwelling (i.e. not in an Accessory Dwelling Unit) has been accounted for in the DCC calculation, and as such no additional DCC will be levied.
9. The charge per square metre for the non-residential categories is based on the gross floor area.
10. The metric conversion rate is 1.0 m^2 to 10.76 ft^2.

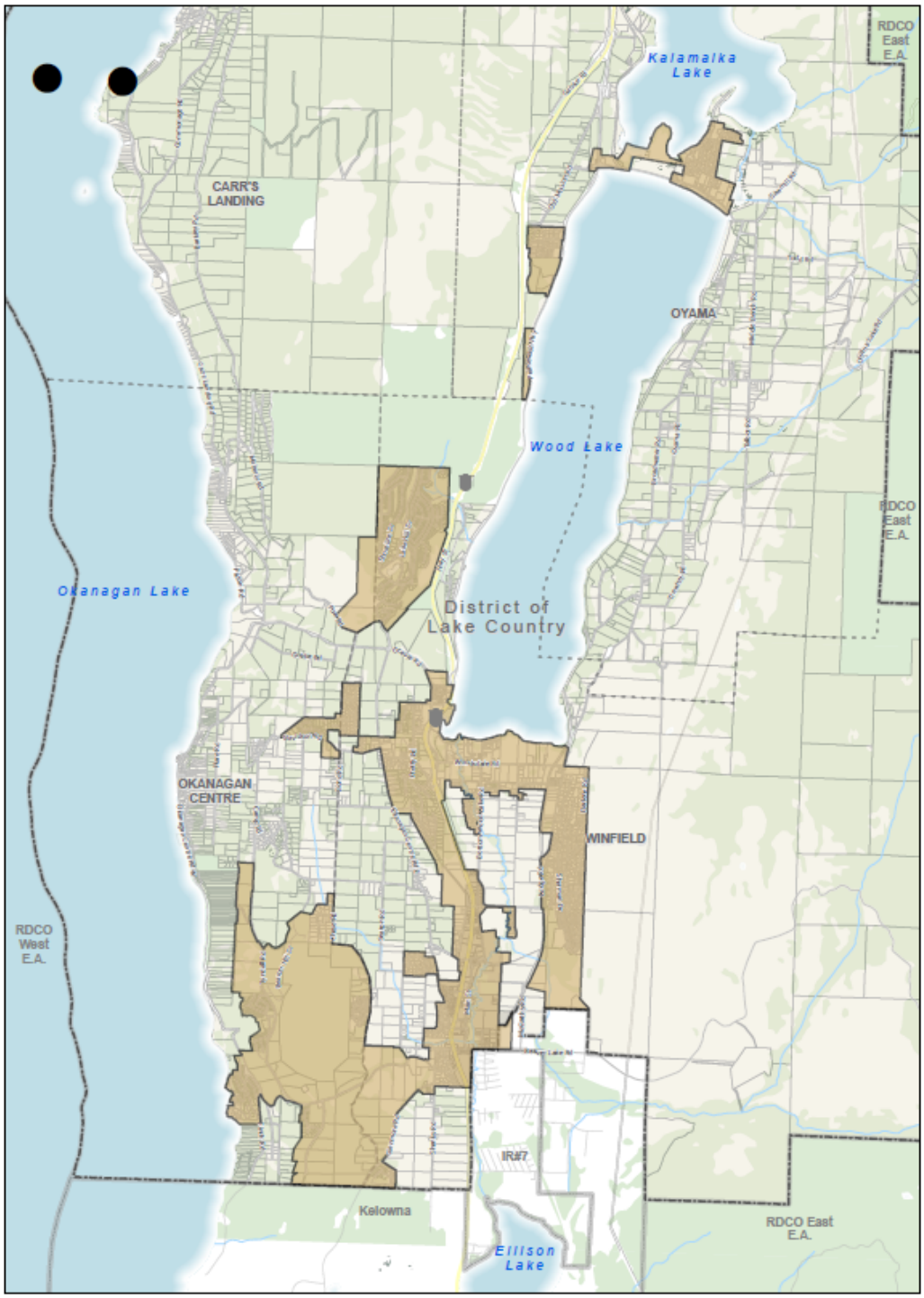
Schedule B to Bylaw 1233, 2024

SCHEDULE B
Drainage DCC Sector



Schedule C to Bylaw 1233, 2024

SCHEDULE C
Sewer DCC Sector



District of Lake Country Sewer DCC Boundary

Legend

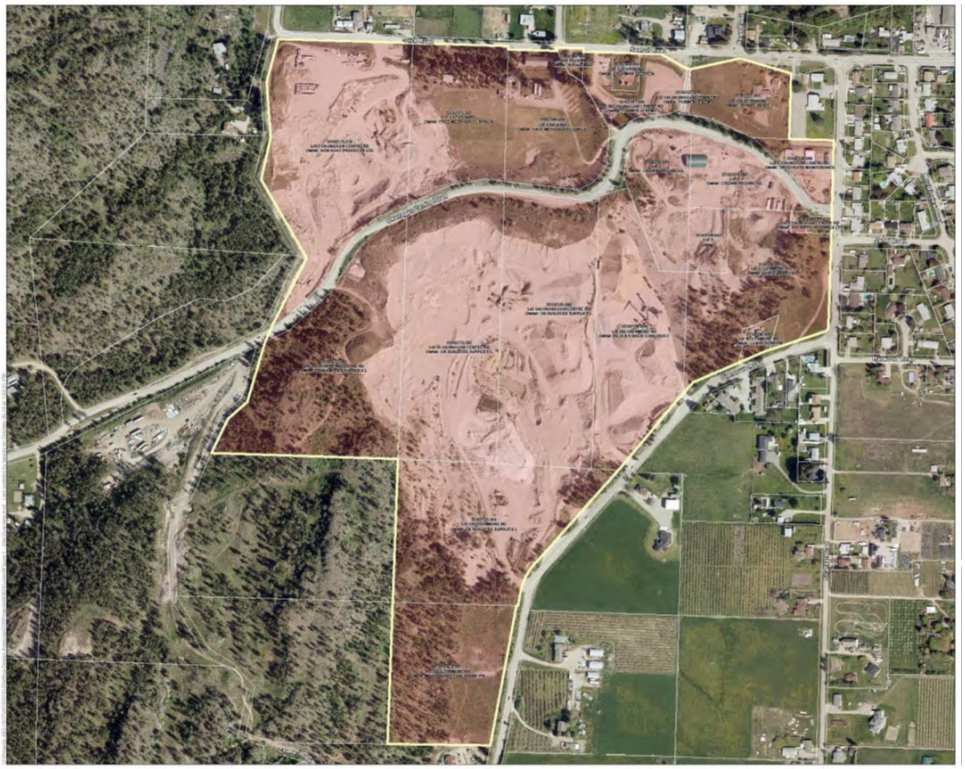
SewerDCCBoundary Lake Country Boundary

LAKE COUNTRY
Life. The Okanagan Way.

Scale: 1:40,000

Schedule D to Bylaw 1233, 2024

SCHEDULE D
Lake Country Business Park
Area-Specific DCCs



Land Use Category	Collection Basis	Mobility	Water	Sewer	Drainage	Parks	Total
Commercial	Per Gross Floor Area in m^2	$45.50	$14.16	$7.41	$0	$0	$67.07
Industrial	Per Gross Floor Area in m^2	$45.50	$14.16	$7.41	$0	$0	$67.07

Notes:

1. All development in the subject area identified above shall pay the Area-Specific development cost charges for mobility, water and sewer as noted in the table above, in addition to the Municipal-Wide development cost charges identified in Schedule A.
2. Development cost charges are payable based on land use category. Where the land use category is not specified, then no area-specific DCCs are levied for development in that land use category, but the municipal-wide DCCs identified in Schedule A are still payable.

Report to Council

District of Lake Country

MEETING TYPE:	**Regular Council Meeting**
MEETING DATE:	September 10, 2024
AUTHOR:	**Steven Gubbels, Development Engineering Manager**
DEPARTMENT:	**Infrastructure & Development Engineering**
ITEM TITLE:	Subdivision | S0000598 | 10474/10472 Taiji Crt
DESCRIPTION:	Building Strata Conversion of Occupied Duplex Building

PURPOSE

To consider a strata conversion of a duplex into two separate strata lots. The building is not currently a rental property.

RECOMMENDATION

THAT Building Strata Conversion Subdivision application S0000598 for the property at 10474/10472 Taiji Court (Roll 10144000; PID 101-552-588) to convert a duplex into two separate strata lots, as shown on Attachment A-S0000598-Site Plan to the Report to Council dated September 10, 2024, be approved in accordance with Section 242 of the Strata Property Act.

EXECUTIVE SUMMARY

Section 242 of the Strata Property Act (SPA) gives municipalities the power to consider whether to approve the stratification of existing residential buildings that have been previously occupied. In the District of Lake Country, the approving authority for this type of application is the Council. The SPA also indicates that Council can delegate this authority to an Approving Officer or other person. District Staff are currently working on a policy which will be brought before Council to delegate this authority at a later date.

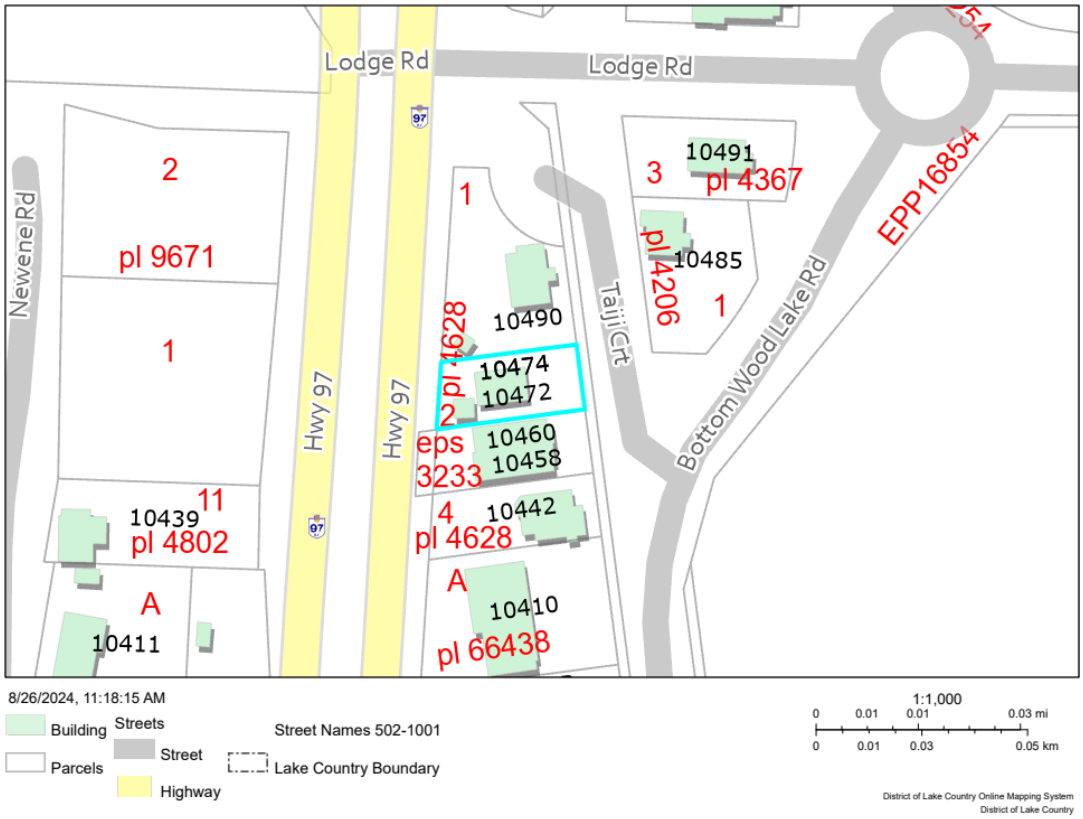
BACKGROUND/HISTORY

Council approved a Development Variance Permit for the subject property in November of 2019 which varied the RM2 zoning bylaw side yard setbacks from 4.5 meters to 2.0 meters. A building permit was then issued in 2020 for the construction of a Duplex dwelling which is now jointly owned and occupied by members of the same family.

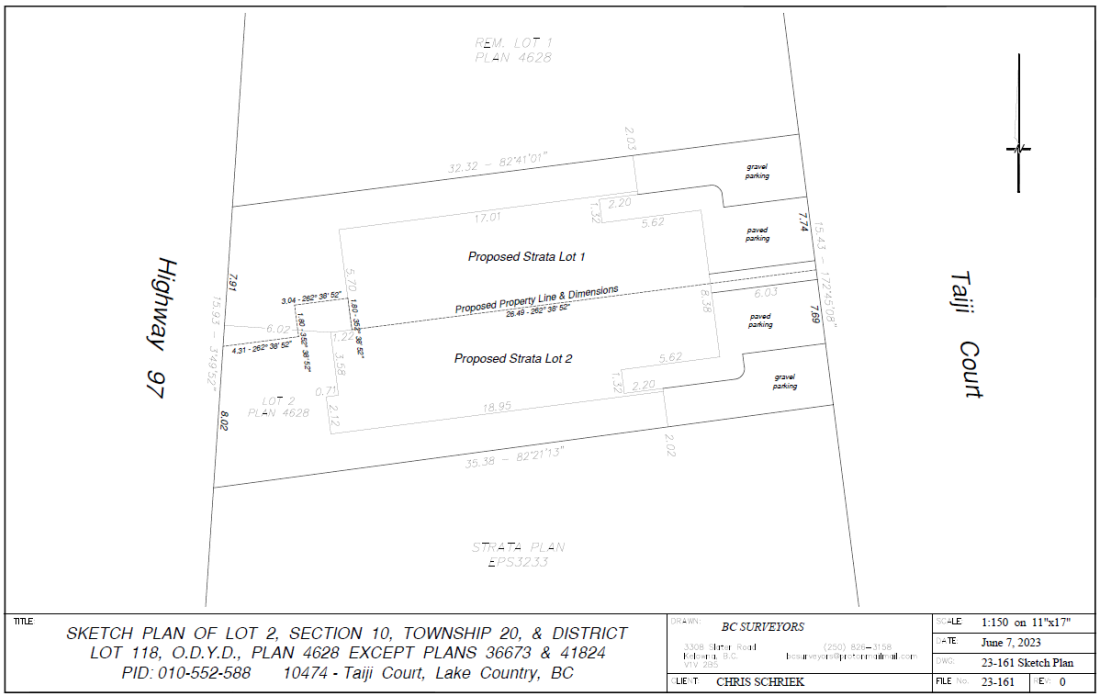
SITE CONTEXT

The subject property is located at 10474/10472 Taiji Crt within the Winfield Ward of the District of Lake Country. The subject property consists of a Duplex dwelling which was granted occupancy in March of 2021. The subject property fronts Taiji Court and backs onto Highway 97, neighboring the property are Duplex and Single-family dwellings.

LOCATION MAP



PROPOSED STRATA PLAN



DISCUSSION/ANALYSIS

The proposal is for the stratification of an existing Duplex at 10474 and 10472 Taiji Court. The property is currently jointly owned by two members of the same family. Stratification of the existing Duplex will allow for each owner to have legal title for their half of the property. This would allow each owner to retain their ownership of the property if the other were to sell their portion, or if one of the joint owners were to pass away.

Section 242 of the SPA says that for this type of stratification the subject building must comply substantially with all District bylaws and the Building Act. In addition, under section 242 the Approving Authority must consider:

- Priority of rental in the area
- Proposals for relocation of residents
- Life expectancy of the building
- Projected increases in maintenance costs
- Any other relevant matters

Additionally, the OCP has guidelines for preserving rental properties:

- OCP objective 7.1.4 protect rental.
- OCP objective 7.1.5 discourage stratification of rental

In this case there are two joint owners occupying the property. This property is not currently being rented, so stratification will not result in the loss of rental accommodation.

A Building Stratification Assessment Report was submitted and reviewed by the DLC Building Department, and no concerns were identified. The report states that the property is in good condition and complies with the standards of the BC Building Code 2016 which was current at the time.

NEXT STEPS

If the Council approves the strata conversion without terms and conditions, the Approving officer must endorse the plan in accordance with the regulations. The Council can also apply conditions to approval, and in this case the Approving Officer would endorse the plan once the terms and conditions have been met.

Conditions will ordinarily require that the building substantially comply with applicable District by-laws, and that the owner provide for the needs of displaced tenants residing in the affected building. The subject property is currently in compliance with all District bylaws and is not currently being rented, therefore the stratification of this property will not result in any displaced tenants.

APPLICABLE LEGISLATION, BYLAWS AND POLICY

Strata Property Act
Official Community Plan

IMPACT ON INFRASTRUCTURE, SERVICES AND STAFF CAPACITY (if applicable)

None

FINANCIAL IMPLICATIONS

☒ None

CONSULTATION (Internal referrals, External Agencies, Committees, Stakeholders)

Internal and External referrals were completed as part of the Subdivision review process. External agencies provided general comments and had no objections to the stratification of the subject property.

OPTIONS

A. THAT a Building Strata Conversion Subdivision S0000598 at 10474/10472 TAIJI CRT (Roll 10144000; PID 101-552-588) in accordance with Section 242 of the Strata Property Act as shown on (Attachment A-S0000598-Site Plan) to the Report to Council from the Infrastructure and Development Engineering, dated September 10, 2024, be approved.

B. THAT a Building Strata Conversion Subdivision S0000598 at 10474/10472 TAIJI CRT (Roll 10144000; PID 101-552-588) in accordance with Section 242 of the Strata Property Act as shown on (Attachment A-S0000598-Site Plan) to the Report to Council from the Infrastructure and Development Engineering, dated September 10, 2024, be approved with conditions.

C. THAT a Building Strata Conversion Subdivision S0000598 at 10474/10472 TAIJI CRT (Roll 10144000; PID 101-552-588) in accordance with Section 242 of the Strata Property Act as shown on (Attachment A-S0000598-Site Plan) to the Report to Council from the Infrastructure and Development Engineering, dated September 10, 2024, not be approved.

Respectfully Submitted,
Steven Gubbels, Development Engineering Manager

Report Approval Details

Document Title:	Strata Conversion 10474 and 10472 TAIJI CRT .docx
Attachments:	- Attachment A - S0000598 - Site Plan .pdf
Final Approval Date:	Sep 4, 2024

This report and all of its attachments were approved and signed as outlined below:

No Signature found

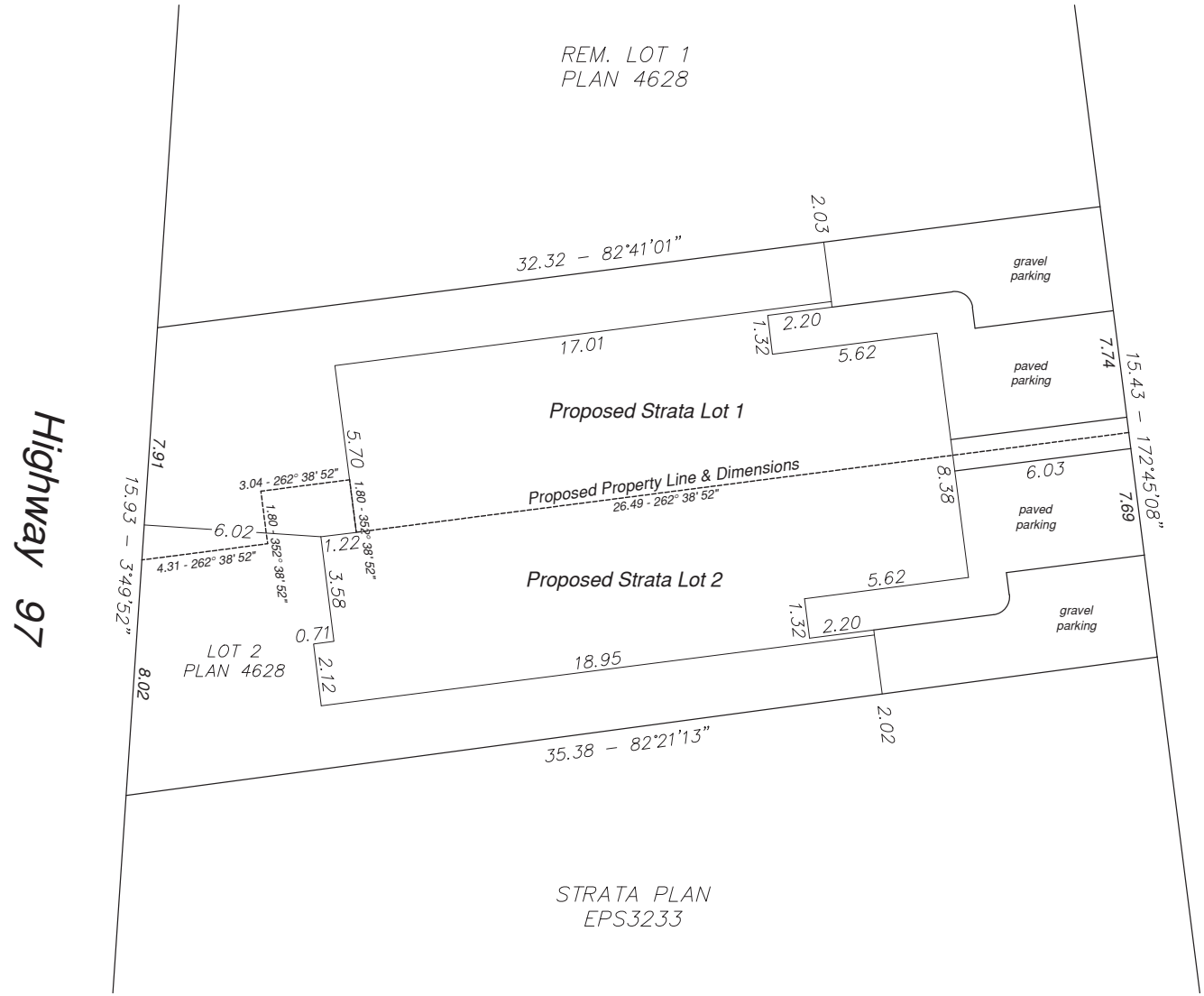
Brian Zurek, Manager of Planning - Sep 4, 2024 - 8:25 AM

No Signature found

Matthew Salmon, Infrastructure & Development Engineering Director - Sep 4, 2024 - 9:51 AM

Reyna Seabrook, Director of Corporate Services - Sep 4, 2024 - 10:07 AM

Paul Gipps, Chief Administrative Officer - Sep 4, 2024 - 12:37 PM



TITLE:

SKETCH PLAN OF LOT 2, SECTION 10, TOWNSHIP 20, & DISTRICT LOT 118, O.D.Y.D., PLAN 4628 EXCEPT PLANS 36673 & 41824
PID: 010-552-588 10474 - Taiji Court, Lake Country, BC

DRAWN: *BC SURVEYORS*

3308 Slater Road
Kelowna, B.C.
V1V 2B5
(250) 826–3158
bcsurveyors@protonmailmail.com

CLIENT: CHRIS SCHRIEK

SCALE:	1:150 on 11"x17"
DATE:	June 7, 2023
DWG:	23-161 Sketch Plan
FILE No.	23-161
REV:	0

LAKE COUNTRY
Life. The Okanagan Way.

COUNCIL'S VALUES, VISION, AND MISSION STATEMENT

VALUES

1. INTEGRITY: We practice honesty by showing a consistent adherence to our shared vision and mission statement and through the truthfulness and accuracy of our actions.
2. ACCOUNTABILITY: We answer to our citizens with the expectation that we acknowledge and assume responsibility for our actions, decisions, and policies at all times.
3. EMPATHY: We make a sincere effort to understand our citizens' perspective and assist them with all our abilities within the boundaries given to us by the law, local regulations and approved policies.

VISION

Lake Country, Living the Okanagan Way. Embracing our Histories and Nurturing our Future

MISSION STATEMENT

To nurture a healthy natural environment, strong rural character and urban core, sustainable infrastructure, economic opportunities, an inclusive community with involved citizens, through respectful, transparent government, focused on balanced strategic decision-making.

THE 5 PILLARS OF OUR VISION AND MISSION STATEMENT

ENVIRONMENT:	Maintaining a healthy and natural environment through responsible use, protection, and sustainable practices.
INFRASTRUCTURE:	Well maintained infrastructure and facilities that meet community needs and allow growth and development for prosperity.
ECONOMY:	Building a strong and vibrant community by attracting, supporting and retaining businesses and residents.
SOCIAL:	Building Social Capital and engaging citizens and partners to improve the well-being and diversity of the community.
GOVERNANCE:	Fiscally sustainable government focused on strategic decision-making, transparency and inclusiveness.