

**DATE:** October 11, 2017

**FILE:** 3360-20/RZ 2C 17

**TO:** Chair and Directors  
Electoral Areas Services Committee

**FROM:** Russell Dyson  
Chief Administrative Officer

Supported by Russell Dyson  
Chief Administrative Officer

*R. Dyson*

**RE:** Courtenay and District Fish and Game Protective Association  
First and Second Readings and Public Hearing Date - 3780 Colake Rd  
Puntledge – Black Creek (Electoral Area C)  
Lot 1, Sections 32 and 33, Township 10, Comox District, Plan EPP56506, PID 029-762-103; Lot 1, Section 33, Township 10, Comox District, Plan VIP78343 except part in Plan EPP56506, PID 026-200-881

### **Purpose**

To present a bylaw for first and second readings to rezone two of the Courtenay and District's Fish and Game Protective Association's (CDFGPA) properties at Comox Lake and to recommend that a public hearing date be set.

### **Recommendations from the Chief Administrative Officer**

1. THAT the board give first and second readings to Bylaw No. 485, Appendix B to staff report dated October 5, 2017, being the "Comox Valley Zoning Bylaw, 2005, Amendment No. 70" which rezones Lot 1, Sections 32 and 33, Township 10, Comox District, Plan EPP56506, PID 029-762-103; and Lot 1, Section 33, Township 10, Comox District, Plan VIP78343 except part in Plan EPP56506, PID 026-200-881 (3780 and 3786 Colake Road), from Upland Resource 400ha (UR-400ha) and Water Supply and Resource Area (WS-RA) to Upland Resource 400ha exception 7 (UR-400ha-7) and Water Supply and Resource Area (WS-RA);

AND FINALLY THAT pursuant to section 464(1) of the *Local Government Act* (RSBC, 2015, c. 1), the board schedule a public hearing for Bylaw No. 485, being the "Comox Valley Zoning Bylaw, 2005, Amendment No. 70" (RZ 2C 17).

2. THAT prior to a public hearing on Bylaw No. 485, being the "Comox Valley Zoning Bylaw, 2005, Amendment No. 70", the Courtenay and District Fish and Game Protective Association be required to delineate the triangular portion of Lot 1, Sections 32 and 33, Township 10, Comox District, Plan EPP56506, that is zoned Water Supply and Resource Area (WS-RA) using flagging or similar visual marker in order to prevent inadvertent encroachment.

### **Executive Summary**

- The CDFGPA currently operates a 54-site campground, recreational facilities and hosts special events under a temporary use permit (TUP) issued by the board in February 2016;
- The TUP will remain valid until the sooner of either February 3, 2019 (three years from date of issuance) or such time as the CDFGPA and the Comox Valley Regional District (CVRD) agree to cancel it;

- An application to rezone the subject properties was received from the CDFGPA on June 29, 2017. The application included a risk assessment of the campground use on the pre-treatment water quality of Comox Lake (Appendix A);
- Staff has prepared an amendment bylaw that responds to the request of the CDFGPA to enable additional land uses;
- Staff’s recommended zone includes measures to protect Comox Lake as the primary drinking water supply for the Comox Valley;
- CDFGPA representatives were provided CVRD staff’s proposed zone on September 18, 2017 and proposed map change on September 19, 2017. On October 2, 2017 the representatives advised of three requested changes, being the addition of “archery” as a use; the removal of “wood processing” as a use and the removal of the proposed conditions of use (see Appendix G). Staff have not added “archery” as the use is covered in “low impact recreation” and “recreational facilities”. Staff removed “wood processing”, but re-inserted following a subsequent request from the CDFGPA. Staff does not share the CDFGPA’s view that the conditions of use section should be removed;
- Staff recommends first and second readings of the bylaw (Appendix B) and setting a date for the statutory public hearing.

Prepared by:

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 Manager of Planning Services

Concurrence:

**A. MacDonald**

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Ann MacDonald, MCIP RPP  
 General Manager of Planning and  
 Development Services Branch

**Stakeholder Distribution (Upon Agenda Publication)**

Courtenay and District Fish and Game Protective Association	✓
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**Background/Current Situation**

The applicant is a registered non-profit society with a mandate “to conserve, enhance and promote the management and utilization of natural resources in an ecologically sound manner.” Since assuming the subject properties in 1999, the applicant has undertaken a range of remedial works on the properties transitioning them from historic industrial use to sport and leisure use. Since 2010, staff has met with various representatives of the CDFGPA regarding rezoning and use of the subject properties (Figure 1). In 2014, an application to rezone was made, external agency referrals were undertaken and a draft zone was prepared (as an exception to the Upland Resource zone). The application was withdrawn relating to concerns from the CDFGPA as well as external agencies. In February 2016, the board issued a TUP to enable the continued operation of 54 campsites, recreational facilities, and hosting of special events (related to a principal use). The TUP required the applicant to commission a risk assessment of the campground use on Comox Lake, as a primary drinking water supply and a *Riparian Areas Regulation* (RAR) assessment, as well as obtain a development permit to implement the findings of the RAR, for a portion of the campground use adjacent to Comox Lake. The TUP will remain valid until the sooner of either February 3, 2019 (three years from date of issuance) or such time as the CDFGPA and the CVRD agree to cancel it.

Earlier in 2017, the applicant submitted a risk assessment and obtained a development permit for an approximate 100m length (0.14ha) of shoreline east of the existing boat launch (including submission of a RAR assessment to the province) (Appendices A and C, respectively). The development permit works included removing approximately seven campsites from within the 15m

streamside protection and enhancement area; re-planting; installation of signage and fencing to restrict access and identify the sensitive area; and consolidation of pedestrian access to the lakeshore.

A new application to rezone the subject properties was received from the CDFGPA on June 29, 2017. The CDFGPA applied for a site-specific exception to allow the following uses:

- Campground
- Interpretive/cultural centre
- Boat launch, docks and wharves
- Special events – “including facility rental to CDFGPA members for social events”
- Recreational facilities related to principal uses (Appendix D)

Staff has prepared an exception to the Upland Resource 400ha (UR-400ha) zone (Appendix E) that responds to the request of the CDFGPA for additional land uses and considers the sensitive nature of the properties given their proximity to Comox Lake as a drinking water supply area (Appendix B). Staff recommends that the proposed bylaw be granted first and second readings and that a public hearing date be set.

#### Official Community Plan

The subject properties are designated resource areas in the Official Community Plan (OCP). The portion of the properties that includes Comox Lake is designated fresh water.

Key objectives of the resource designation include protection of resource areas from encroachment by non-resource uses (i.e. creation of interface issues) and protection of the water quality and quantity of Comox Lake as a drinking water supply. Recreational trails and supporting infrastructure, but not including “commercial structures”, are permitted. Note that the majority of the existing buildings on the property that were constructed with a permit were granted approvals, as “accessory buildings”, prior to adoption of the Regional Growth Strategy (RGS) and current OCP.

The key objective of the fresh water designation in this context is the protection of the drinking water supply while enabling access to freshwater for public enjoyment. OCP policy concerning watershed protection requires that an applicant retain a qualified professional to assess the impact of proposed development on water quality and quantity. The applicant has submitted a riparian area assessment pursuant to the provincial RAR for a 0.14ha area adjacent to Comox Lake and a risk assessment of the campground use, including the boat launch, on the pre-treatment water quality of Comox Lake (Appendices C and A, respectively). Staff has factored the findings of these studies into the proposed exception to the UR-400ha zone. A drainage plan was not requested as part of the rezoning application. A drainage plan will be required as part of future development permit application(s) for site alterations and/or construction of any buildings within a development permit area.

The CVRD primarily implements the natural environment and sensitive ecosystem policies of the OCP, as well as the objectives and policies of the resource and freshwater land use designations, using development permit area guidelines. Any land alteration or construction within 30m of a watercourse triggers the requirement to obtain a development permit. Further, the proposed zone identifies a minimum setback of 30m to Comox Lake and 15m to any other watercourse in an effort to protect some of the sensitive riparian ecosystems as defined in the CVRD’s sensitive ecosystem inventory.

#### Zoning Bylaw

The subject properties are zoned UR-400ha and WS-RA (Figure 2). No changes are proposed to the WS-RA zoned lands held by the applicant. The intent of the UR-400ha zone is to retain large tracts

of rural land to permit resource extraction (and harvesting) and to maintain long-term viability of renewable resource industries.

Staff has drafted a site specific exception to the UR-400ha zone (Appendix B) that:

- Recognizes the sensitive location of the subject properties relative to the Comox Valley’s primary drinking water supply;
- Enables compatible recreational uses;
- Maintains a buffer between the recreational uses and resource use of adjacent lands;
- Enables the uses currently permitted via temporary use permit; and
- Responds to the requested land uses of the applicant.

As a supplement to the UR-400ha zone, the proposed site specific zone will allow the following:

Principal Uses (in addition to UR-400ha principal uses)	Accessory Uses (only these uses)
<ul style="list-style-type: none"> <li>• Recreational facilities</li> <li>• Dock</li> <li>• Boat launch</li> <li>• Interpretive/cultural centre</li> <li>• Campground</li> </ul>	<ul style="list-style-type: none"> <li>• Special events related to a principal use</li> <li>• Wood processing</li> </ul>

Figure 3 illustrates the comparison among the land uses enabled under the existing zoning, the TUP, and the proposed zone. Both the TUP and staff’s proposed zone include “special events” as an accessory use. This means that special events (defined in Bylaw No. 395, as outdoor events where more than 400 attendants are anticipated) must be related to a principal use. By definition, “special events” do not include any indoor event or any outdoor event with fewer than 400 attendants.

The proposed bylaw supplements the underlying UR-400ha provisions and accomplishes the above, in part, via a minimum 30m setback for all buildings (excluding utility uses), structures, and campsites. The intent of the 30m setback is to:

- Promote revegetation of disturbed areas adjacent to the Lake;
- Promote bank stabilization by reducing erosion related to human activity;
- Enable establishment of a permeable surface buffer to reduce the potential for point source (e.g. fuel leak) and non-point source (e.g. run-off from impervious surfaces) pollution to the Lake; and
- Reduce risk of damage to infrastructure from fluctuating lake levels.

A 30m setback to a major watercourse is a typical best management practice in B.C. relating to both riparian area protection and flood protection. In this case, a 30m setback is also supported relative to the objectives of watershed protection by the Comox Lake Watershed Protection Plan (i.e. Plan recommends a 30m buffer between designated campsites and the Lake). Further, “lock blocks” have been installed on the property adjacent to the Lake (staff understands that this was undertaken as a joint initiative between BC Hydro and the applicant in response to flooding). The campground area lands have historically been subject to flooding, it is therefore reasonable to keep structures and campsites out of the 30m setback.

As the campground does not have lawful non-conforming status (and therefore the campsites do not have lawful non-conforming siting status except as provided for by TUP 2C 15), the proposed 30m setback of the campsites to Comox Lake will require the applicant to re-locate 15 of their 54

campsites (N.B. 15 sites adjacent to Comox Lake were identified by the applicant in 2015). No electrical or sewage hook-ups are provided to these sites. Eight of the campsites that are setback 15m of Comox Lake can remain until the TUP expires (February 3, 2019). This will give the applicants time to transition the campsites out of the 30m setback in preparation for the 2019 spring/summer camping season.

The proposal to retain a portion of one of the parcels in its current zoning of WS-RA (Appendix F) is to ensure maintenance of a buffer between the subject property and the adjacent resource lands (e.g. forestry logging road). This report recommends that the split zone be delineated on the ground by the applicant to establish a visual marker to protect against inadvertent encroachment of the UR-400ha-7 uses and the permitted uses of the WS-RA zone.

### **Policy Analysis**

Section 479 of the *Local Government Act* (RSBC, 2015, c. 1) (LGA) authorizes a local government to regulate land use, density, the size and shape of land, buildings and structures. “Land” for the purpose of zoning authority includes the surface of the water. Section 464 states that a local government must hold a public hearing before adopting a zoning bylaw.

### **Options**

At this time, the board has the following options:

1. Approve first and second readings of proposed Bylaw No. 485 and set a date for the public hearing;
2. Refer proposed Bylaw No. 485 back to staff for revision with direction on next steps; or
3. Deny the application to rezone.

Based on the discussion contained within this report, staff recommends option 1.

### **Financial Factors**

Application fees have been levied in accordance with Bylaw No. 328, being the “Comox Valley Regional District Planning Procedures and Fees Bylaw No. 328, 2014”. If the board concurs with staff’s recommendation to schedule a public hearing, a \$1500 fee is required prior to the hearing. This fee covers the costs of the newspaper advertisement and direct mailing to property owners and tenants within 500m of the subject property, as well as the costs related to hosting the hearing. The owner is required to install a notice sign on the property, in accordance with Bylaw No. 328’s specifications. The costs of the sign and its installation are not included in the public hearing fee and are the responsibility of the applicant. Future development application fees (e.g. development permit) are not covered by the rezoning or public hearing fees.

### **Legal Factors**

Local government can zone the surface of the water, including water surfaces that may be under provincial crown license or lease. Local zoning is applicable to the extent that it does not directly conflict with provincial or federal regulation. The recommendations and discussion within this report have been prepared in accordance with the LGA and applicable CVRD bylaws.

### **Regional Growth Strategy Implications**

The Comox Valley RGS, Bylaw No. 120, being the “Comox Valley Regional District Regional Growth Strategy Bylaw No. 120, 2010”, designates the subject properties as Resource Areas. The growth management framework for this designation is to maintain the working landscape for resource extraction and resource harvesting. Development is to be managed on the basis of precautionary principles. The proposed zone exception is predicated on the precautionary principle

pertaining to protection of the Comox Lake drinking water supply and the properties' ecosystem features and function.

Supporting Policy 5B-4 states that the CVRD should formally consult jurisdictions receiving water from Comox Lake regarding the rezoning application. To that end, both the City of Courtenay and Town of Comox were previously circulated on the CDFGPA's 2014 rezoning application which was subsequently withdrawn, in part because of feedback from RGS partners regarding the need for a risk assessment of the campground use on the water quality of Comox Lake. As discussed above, that risk assessment was completed earlier in 2017 and the applicant has taken steps to implement recommendations of the assessment. Staff is not recommending any additional formal agency referral.

### **Intergovernmental Factors**

Since the first rezoning application was received in 2014, two referrals have been sent to external agencies and First Nations. Comments to date have included requests for additional impact information pertaining to campground use relative to the pre-treatment water quality of Comox Lake. The applicant's risk assessment found that risk to pre-treatment water quality of Comox Lake arising from the campground use can be mitigated (Appendix A). This is consistent with the assessment of abatement measures in the Comox Watershed Protection Plan to reduce the risk rating of designated campsites from "very high" risk to "moderate" risk. Additional formal referral is not recommended at this time, however, staff will notify external agency staff and K'ómoks First Nation staff to advise of the proposed bylaw and the date of the public hearing. Any individual or agency can provide comment up until the close of the public hearing.

### **Interdepartmental Involvement**

Planning staff has consulted engineering services and fire services staff in preparation of the proposed bylaw. Through a separate exercise, fire and legislative services staff are reviewing the Rural Cumberland Fire Protection Service boundaries and will review opportunities to include the entirety of the subject properties in the service area.

### **Citizen/Public Relations**

If the board concurs with staff's recommendations, statutory notice requirements including direct mailing, newspaper advertisement and statutory public hearing will be addressed according to the LGA. Pursuant to Bylaw No. 328, the applicant will need to erect a development proposal notice sign at a highly visible location on the subject properties prior to the public hearing.

Attachments: Appendix A – "Risk Assessment"  
Appendix B – "Bylaw No. 485"  
Appendix C – "RAR Assessment"  
Appendix D – "Application Cover"  
Appendix E – "UR-400ha zone, Comox Valley Zoning Bylaw, 2005"  
Appendix F - "WS-RA zone, Comox Valley Zoning Bylaw, 2005"  
Appendix G – "Letter from CDFGPA, October 2, 2017"

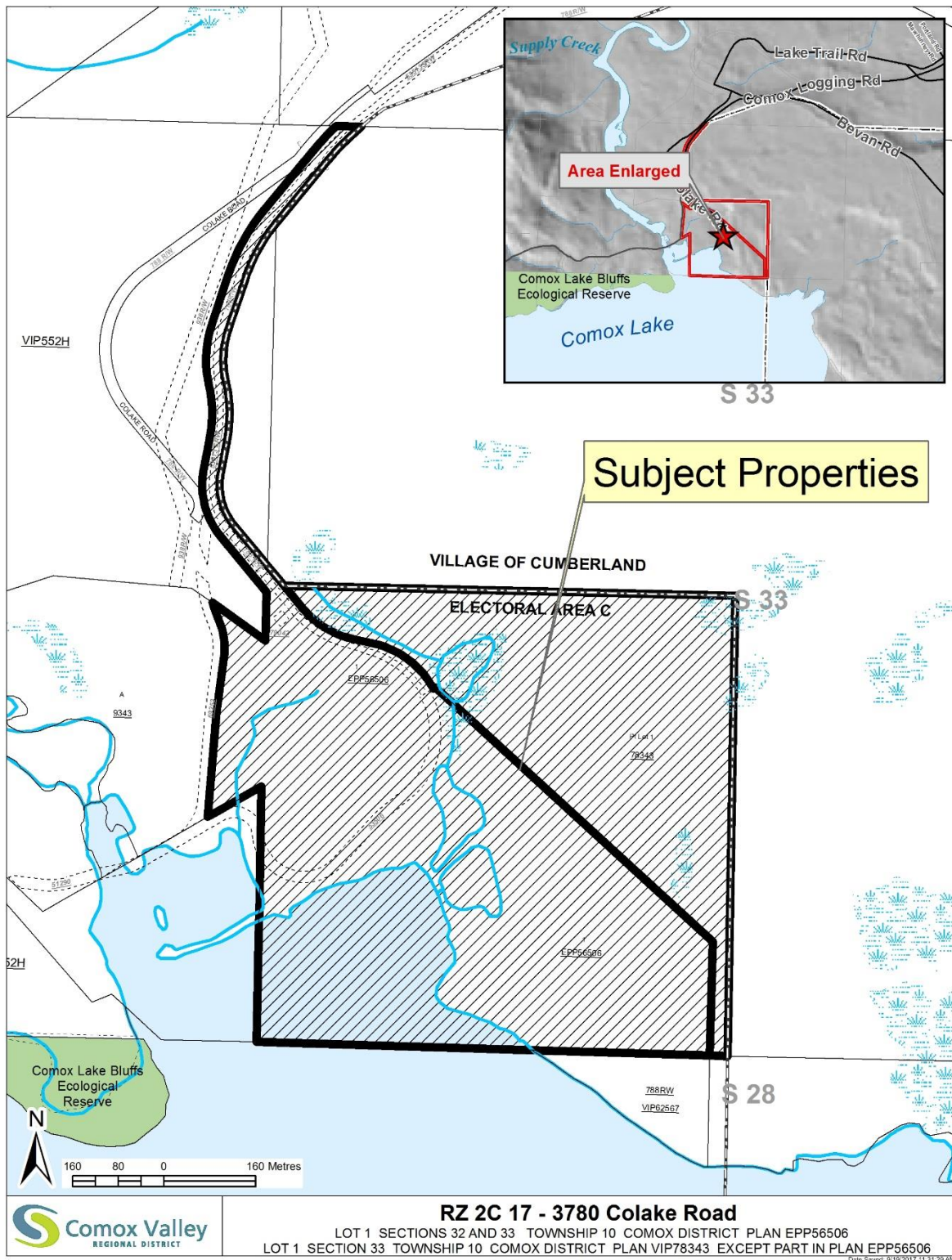


Figure 1: Subject Properties

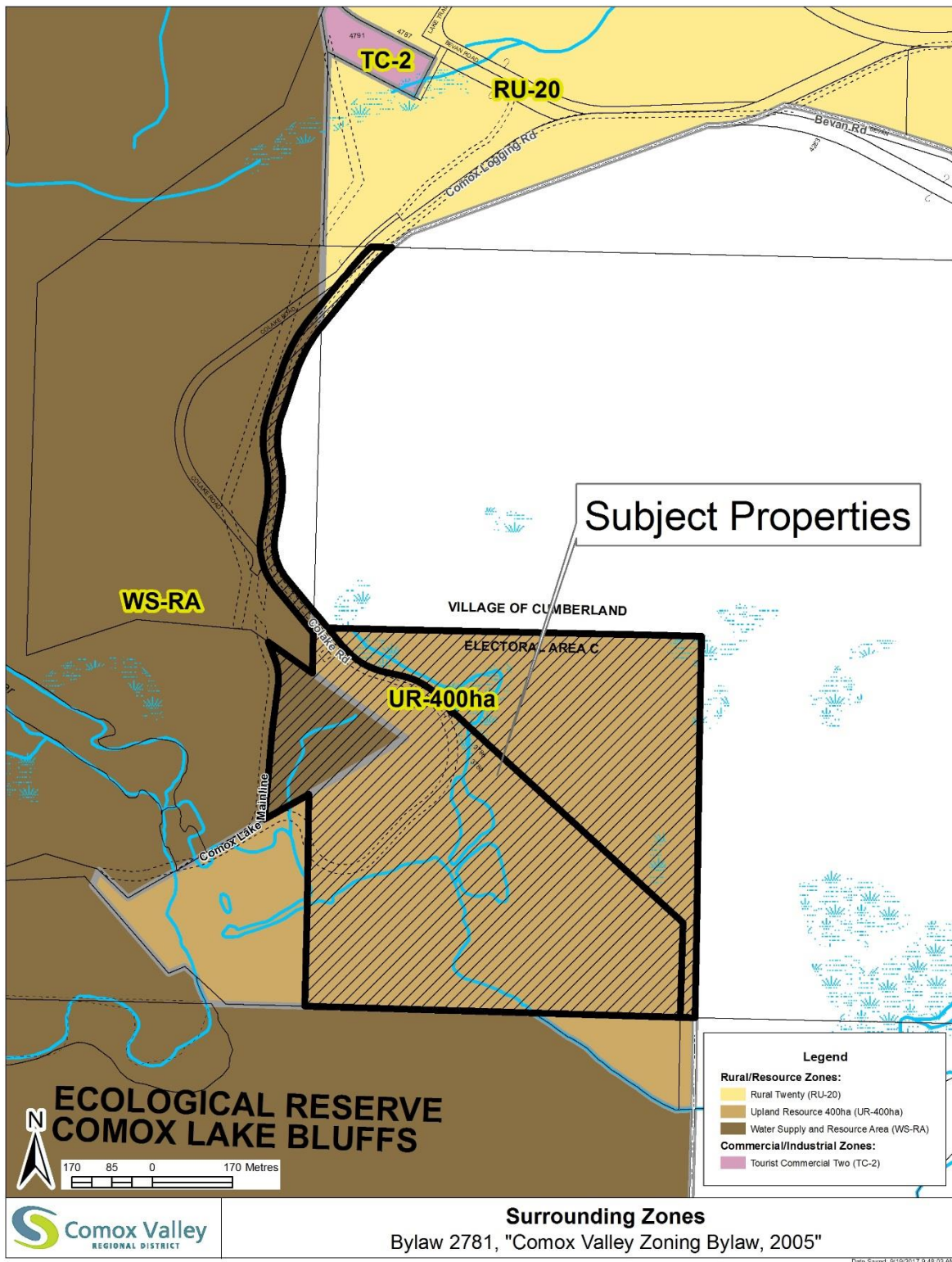


Figure 2: Zoning Map



Current Fish and Game Zoning (Upland Resource 400ha (UR-400 ha) and Water Supply/Resource Area (WS-RA))	Current Fish and Game Temporary Use Permit (valid to February 2019)	Proposed UR-400ha-7 Zone (supplements UR-400ha)
<p>Principal Uses:</p> <ul style="list-style-type: none"> <li>• Residential (one single detached)</li> <li>• Silviculture</li> <li>• Agriculture</li> <li>• Fish hatchery</li> <li>• Explosives sales, storage, manufacturing and distribution</li> <li>• Firearm range</li> </ul> <p>Accessory Uses:</p> <ul style="list-style-type: none"> <li>• Accessory buildings and structures</li> <li>• Wood processing</li> </ul> <p>N.B. “low impact recreation” and “utility” permitted in all zones. Low impact recreation includes camping, hiking, hunting, fishing, snowshoeing, skiing, canoeing, kayaking, and windsurfing – not including use of motorized vehicles or construction of buildings/structures.</p>	<p>Accessory Uses:</p> <ul style="list-style-type: none"> <li>• Campground (54 sites)</li> <li>• Special events directly related to a principal use</li> <li>• Recreational facilities directly related to a principal use</li> <li>• Boat launch (limited to one), docks and swimming floats</li> </ul> <p>N.B. Upland Resource 400ha uses still apply. Accessory uses defined in TUP are in addition to UR-400 uses.</p>	<p>Principal Uses:</p> <ul style="list-style-type: none"> <li>• Recreational facilities</li> <li>• Dock</li> <li>• Boat launch</li> <li>• Campground</li> <li>• Interpretive/cultural centre</li> </ul> <p>Accessory Uses (only these):</p> <ul style="list-style-type: none"> <li>• Special events related to a principal use</li> <li>• Wood processing</li> </ul> <p>Setbacks:</p> <ul style="list-style-type: none"> <li>• Buildings, structures, waste containers and campsites 30m to Comox Lake and 15m to any other watercourse (does not include utility buildings or structures)</li> </ul>

Figure 3: Comparison Table



**COURTENAY AND DISTRICT  
FISH AND GAME PROTECTIVE ASSOCIATION**

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# Appendix C

# Risk Assessment

Comox Valley Regional District  
**RECEIVED**

File:

JUN 29 2017

To:

cc:

**Technical Memorandum**



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To: Alana Mullaly, CVRD Mgr. Planning  
 From: Rupert Wong, R.P.Bio  
 Dusty Silvester, R.B.Tech.  
 Cc: Wayne White, F & G

Date: May 12, 2017  
 Pages: 24 + Appendices  
 Project: TUP 2C 15

Comox Valley Regional District  
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JUN 29 2017

RE: CAMPGROUND USE PRELIMINARY RISK ASSESSMENT ON COMOX LAKE PRE-TREATMENT  
 SOURCE WATER QUALITY  
 COURTENAY AND DISTRICT FISH AND GAME PROTECTIVE ASSOCIATION (F&G) - CVRD TUP 2C 15

To:

cc:

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## Technical Memorandum



### 1.0 INTRODUCTION

This technical memorandum is provided under a requirement set out by the Comox Valley Regional District (CVRD) for the renewal of TUP 2C 15 which requires the provision of a risk assessment of Courtenay and District Fish and Game Protective Association (F&G) campground use on pre-treatment source water quality in Comox Lake, and may be used to support a future re-zoning application.

The CVRD *Regional Growth Strategy Bylaw No. 120, 2010*<sup>1</sup> Objective 5-B recognizes that drinking water is vulnerable to contaminants derived from numerous watershed uses including those related to the recreational character and specific F&G campground uses. As a result, this report is intended to actualize the precautionary principle within the CVRD drinking water supply watershed by discussing potential impacts on water quality for continued campsite use under TUP 2C 15 and future re-zoning.

Specific objectives of this risk assessment include identifying:

1. potential contaminants to Comox Lake related to campground use, including boat launch;
2. spatial and temporal risk to Comox Lake pre-treatment water supply intake; and
3. measures to protect Comox Lake from potential contamination related to campground use.

The effort expended in this risk assessment is consistent with a Preliminary Site Investigation level of assessment; where single grab samples were obtained at four sites over two time periods and their results used to indicate whether a more detailed water quality investigation was warranted. A discussion of water quality sample results is provided in Section 8.0 and conclusions on present and future site use strategies are in Section 9.0.

### 2.0 RAR STUDY AREA

Boundaries of the Riparian Areas Regulation (RAR) study area were defined in collaboration with CVRD staff and were set along with those defining the area of study for a detailed RAR assessment<sup>2</sup> on the subject shoreline of Comox Lake (Figures 1-3). The subject property is recovering from its use as an industrial logging site for almost 100 years until the 1990's (Photos 1 & 2). The F&G undertook large scale site remediation, installation of wetlands, and establishment of a fish hatchery after taking control of the site in 1997.

The study area encompasses an approximate 100 m length of Lake shoreline located immediately east of the primary F&G boat launch and associated parking area near the southwestern property boundary (Figures 2 & 3). The study area has been used to support a section of waterfront campsites and a day use area since 2005<sup>3</sup>. Based on the recent application of RAR setbacks, defined in a report from CEL (dated Nov. 24, 2016), on the subject shoreline the campsites have been re-configured and riparian planting was completed in spring 2017 to restore the 15 m setback area (Figure 3; Photos 3 & 4).

<sup>1</sup> CVRD Regional Growth Strategy Bylaw No. 120, 2010 was accessed from <http://www.comoxvalleyrd.ca/EN/main/community/regional-strategies/regional-growth-strategy.html>.

<sup>2</sup> Detailed RAR Assessment #4347 uploaded to RARNS on Nov. 24, 2016.

<sup>3</sup> Based on historical aerial photographs accessed from CVRD iMap

## Technical Memorandum



### 3.0 DEEP WATER INTAKE

Upgrades to the existing CVRD drinking water system have been commissioned to respond to Vancouver Island Health Authority's (VIHA) requirement to provide filtration as part of their water treatment system to comply with the provincial *Drinking Water Protection Act*. This decision by VIHA follows elevated turbidity events in 2014 and 2015 which prompted the CVRD to issue Boil Water Notices under the direction of VIHA for a period of 10 days and 47 days, respectively.

All of the proposed design concepts for the new CVRD drinking water conveyance and treatment system include a deep water intake in Comox Lake. Preliminary designs indicate that the intake will be located approximately 1 km southwest of the F&G property at an approximate elevation of 106.5 meters (asl). The water quality station closest to the proposed intake is Site #059 located just offshore from the Comox Lake Bluffs Ecological Reserve (Figure 1).

It has been identified by the BC MOE (2011) *Water Quality Assessment and Objectives: Comox Lake*<sup>10</sup> that an effort to locate the CVRD drinking water intake further from shore and below the water surface will minimize the exposure of bacteriological contamination to consumers. Accordingly, any potential influence that the F&G shoreline may exert upon the water quality of the existing Comox Valley drinking water system, with its current intake located in the Puntledge River downstream of the F&G, can be expected to change with the modified deep water intake location. As shown in Figure 1, the general near-shore water movement from the F&G shoreline is down the Puntledge River and out of Comox Lake (north). With the proposed location of the new drinking water intake located upstream, and at depth, it is expected that any influences or risks on water quality from the F&G property will be diminished.

## Technical Memorandum

### 4.0 MITIGATION MEASURES IN PLACE

The CVRD commissioned a Watershed Protection Plan<sup>4</sup> (WPP) to guide management of the Comox Lake watershed for the long-term protection of drinking water. The WPP includes a risk assessment of both natural and human caused risks. The F&G are acknowledged as contributors to the WPP and key watershed stakeholders.

The WPP contains 54 recommendations to reduce risk by helping to prevent contamination in the watershed. The F&G have taken steps to mitigate their impact on the watershed, including measures that pre-date the WPP, since the creation of and according to recommendations made in the WPP. The following table summarizes WPP recommendations and F&G mitigation measures to date (Table 1).

**Table 1. WPP Recommendations with relevance to F&G property activities and existing management initiatives.**

WPP #	WPP Recommendation	F&G Measure
4	<i>No new development should occur in the Comox Lake Watershed</i>	F&G is engaging in a re-zoning process with the CVRD to legalize their existing uses and is not proposing "new development".
5	<i>Land within the Comox Lake Watershed should not be re-zoned to permit further residential, commercial, recreational, agricultural or industrial development.</i>	The F&G Rezoning application is not intended to permit further development - No new development is being sought.
10	<i>All activities, current and proposed, must recognize the need for toilet facilities that are properly maintained to avoid contamination of Comox Lake.</i>	The F&G recognizes the need for properly maintained and fully contained toilet facilities - The F&G have only allowed fully contained RVs or vault toilets with effluent being disposed of off-site at approved facilities. See Section 4.1 below.
12, 13	<i>-The CVRD should dedicate the resources required to support implementation of the WPP. -The WAG should meet at least semi-annually and continue to advise and support the implementation and adaptation of the WPP.</i>	The F&G has been part of the watershed planning process since 2008 and remain strong advocates for the WPP and a deep water intake. The F&G have taken steps to implement on-site improvements in the spirit of the WPP since that time.
14	<i>Member agencies of the WAG should commit to abiding by the objective, vision and principles of the WPP.</i>	The F&G has, since the time of property purchase, sought to remediate the impacts identified on site and have taken precautionary steps to minimize impacts from onsite camping. The F&G has never allowed disposal of domestic waste from campers. Fully contained vault toilets were installed for tenters and RV's do not dispose of waste onsite. Caretakers and F&G executives enforce the rules established by the club to protect the watershed.
24	<i>The Emergency Management Plan should be expanded to include watershed emergencies. It should be reviewed annually and updated periodically.</i>	The F&G has been part of an action group from the WAG to provide response to spills on the lake and the river. Internal development of emergency plans have been implemented and external coordination is desired to assist in planning and response to watershed emergencies. The F&G provides year round onsite caretaker and a seasonal campsite caretaker for consistent surveillance over their portion of the watershed. Caretakers have been trained by Western Canada Marine Response in spill response protocols.
26	<i>A trail management plan should be developed for all existing trails.</i>	The F&G supports a limited number of sporting trails and are willing to review trail building standards as determined by the WPP. F&G trails are intended for walking, not mountain biking or ATV use.

## Technical Memorandum



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Table 1. Cont.		
WPP #	WPP Recommendation	F&G Measure
28, 29	<p><i>-Camping outside of designated campgrounds should not be permitted in the watershed. In addition to garbage and human waste posing a health risk, wildfire risk is a concern</i></p> <p><i>-Campfires outside of designated campgrounds should not be permitted in the watershed.</i></p>	The F&G campground was designated under the WPP. The F&G are seeking to legitimize campground use through a re-zoning process with the CVRD.
30	<i>ATV use should be limited to maintained logging roads and subject to code of conduct, enforcement and user agreements with landowners.</i>	ATV's are not allowed on F&G property. Two vehicles owned by the F&G that could be categorized as ATV's are only used on F&G roads or to provide handicapped users access to facilities. (General property Reg. 4 - Appendix B)
31	<i>Dog waste stations and wildlife-proof garbage cans should be installed and maintained at high use sites (trail heads, campgrounds).</i>	At the request of F&G membership, a dog waste policy was established and has provided collection facilities for several years. (General property Reg. 5 - Appendix B).
32	<i>TimberWest should require proof that sewerage and septic facilities for all licensed cabins on its private lands in the Comox Lake Watershed are properly located, constructed and annually inspected as a requirement for renewing each licence.</i>	All sewage disposal facilities are approved by Island Health. See section 4.1 for details.
34	<i>Designated boat cleaning stations should be developed away from the lake to prevent the spread of invasive species.</i>	F&G does not have a boat cleaning station; however, they have indicated that they are willing to research the issue. The majority of boats launching from the F&G are small fishing vessels that do not contain bilges for transport of invasives. Boat launch Reg. 5 (Appendix B) states that boat and trailer should be free of organic debris before launching, especially when coming from another body of water.
35	<i>All motorized boats must be fuelled at designated stations away from the lakeshore. Offenders and spills should be reported to the CVRD.</i>	The F&G does not allow refueling on or near the lake. See Section 4.2. Boat launch Reg. 6 stipulates no refuelling or motor work shall be done within 100 metres of the lake, Boat launch Reg. 7 stipulates that no holding tanks shall be emptied and bilge plugs shall not be pulled on the Association's property (Appendix B).
36	<i>The CVRD should ensure its bylaws regulate the size/type of boat allowed on the lake (e.g. no houseboats). Bylaw enforcement is also required.</i>	The F&G has a bylaw enforced ban on house boats, jet skis/skidoos being launched from their boat ramp (Boat Launch Reg. 4). Changes to their bylaws require a special resolution with a 75% majority.
37	<i>Designated sani-dump facilities for bilge and holding tanks should be established outside the watershed; boat users and campers should be directed to these stations.</i>	F&G campground RVs users are directed to local, off-site, sani-stations and the F&G's pump out contractors have access to the municipal sewage treatment plant (Section 4.1).

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WPP #	WPP Recommendation	F&G Measure
44	<i>Pesticide and herbicide use should be eliminated wherever possible. All pesticides or herbicides intended for use in the watershed should be reviewed for safety in and around aquatic habitat and for potential human health impacts. Pesticides should not be stored in the watershed.</i>	No pesticides have been used on the F&G property and only small amounts of lime for moss control have been applied.
49	<i>The CVRD should develop a comprehensive water quality monitoring program for all major tributaries to Comox Lake as well as a more comprehensive and longterm monitoring program for the lake itself. This is a high priority.</i>	F&G has requested to be fully involved in the water quality monitoring program under the WPP. The F&G have helped MoE with the last two water quality assessments of Comox Lake and provide the CVRD with access for their monitoring program. The F&G is willing to participate with any monitoring program the CVRD and the Water Advisory Group propose under the WPP.

### 4.1 SANITARY

As described in the Watershed Protection Plan<sup>4</sup>, risks to CVRDs water supply are rated as moderate, in part due to the presence of mitigation measures in place, including the following.

- All sewage from the F&G campground is collected in sealed vault toilets and is hauled off the property for disposal at the sewage treatment plant.
- Sewage generated by the RV campers must be held in their holding tanks and disposed of at suitable facilities off-site.
- As the F&G campground has no septic disposal fields near the shoreline there are no risks associated with such features.
- The permanent F&G facilities sited on other parts of the property set back from the shoreline do have disposal fields, which meet Island Health requirements.
- Campsite Reg. 19 (Appendix B) stipulates "Health regulations will be enforced – release of gray or black water is not permitted on Association property. Emptying of holding tanks should be at proper discharge locations in town. No bathing or washing of hair, dishes or laundry in the lake. Swimmers should follow Health Canada and Center for Disease Control guidelines for infants in diapers and individuals with diarrhoea illness".
- As per F&G Constitution and Association Rules governing conduct, all pets are kept on leash and pet waste is collected and deposited at designated receptacles that are regularly maintained by a contractor and disposed of at a suitable facility off-site.

Risk from the F&G campground is expected to be further reduced by the installation of a new deep water intake, as described in Section 3.0, as the general near shore water movement is down the Puntledge River and out of Comox Lake.



## Technical Memorandum



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### 4.2 HAZARDOUS MATERIAL SPILLS

In 2013 F&G became part of a Watershed Action Group (WAG) under the Watershed Protection Plan<sup>4</sup> with TimberWest, BC Hydro and the CVRD for emergency spill response in Comox Lake and the Puntledge River. The WAG was created in response to the concern of hydrocarbon fuel spills at the Puntledge Bridge. The emergency spill kit contains sufficient quantity of readily deployable sorbent material and isolation booms for a small scale spill (Table 2). TerraWest Environmental Inc. was retained by TimberWest to develop a spill response plan, which contains sufficient boom systems to span Puntledge River and required equipment to clean-up a potential spill before it reaches the Hydro intake at the Diversion Dam. The emergency spill kit is located at the F&G boat launch and is regularly maintained by TimberWest.

Cumberland Fire Department is the lead agency for spill response and both of the F&G caretakers and the seasonal campsite caretaker are trained in emergency spill response, and have access to the spill equipment. All F&G members are required to read and sign Constitution and Association Rules governing conduct including no re-fueling or engine repairs within 30 m of the shoreline.

**Table 2. Contents of the Emergency Spill Kit located near the F&G boat launch (adapted from TerraWest, 2013).**

**Comox Bin Content List - replace items as needed.**

Qty	Item #	Item Description
10	KI-1200	Heavy Weight Oil Absorbent Pads (100 per bundle) - White
4	KI-UNIV-H	Heavy Weight Universal Absorbent Pads (100 per bundle) - Grey
2	KI-1200H	Heavy Weight Hazmat Absorbent Pads (100 per bundle) - Yellow
8	KI-510	5" x 10' Linkable Oil Absorbent Boom (4 per bundle)
4	KI-810	8" x 10' Linkable Oil Absorbent Boom (4 per bundle)
1	KI-O348	3" x 48" Oil Absorbent Socks (40 per box)
1	KI-O396	3" x 96" Oil Absorbent Socks (20 per box)
5	KI-1-PMPA	Plug n' Dike, Premix w/ Antifreeze (1 lb. Jar)
10	KI-OG30	Oil Gator Premium Bioremedial Absorbent (30 lb. Bag)
12	KI-A8141	PVC Gloves, Neoprene Rubber, Green, 14 inch (Various sizes)
12	KI-NITGLO	Nitrile Gloves (Pair, Various sizes)
12	KI-GOGG	Plastic Safety Goggles
12	KI-TYVEK	Tyvek Coveralls with Hood (Various sizes)
2	KI-DBAG	HD Yellow Hazmat Disposal Bags (33" x 45" x 6 mil, 50 per roll)
3	KI-FB-364	Mini-Berm - 36" x 36" x 4" in Chem Shield fabric
1	KI-FB-486	Mini-Berm - 48" x 48" x 6" in Chem Shield fabric
1	KI-0500	UltraTech 95 gallon yellow poly overpack
1		Plastic Biohazard Bin (32 gallon)
1		Roll of Polyethylene
1		Flashlight (plus extra batteries)
2		Shovel
2		Pulaski
1		Level I First Aid Kit
1		Drinking water (flat)
1		Fire Extinguisher (40 BC Marine FE)
2		Hardhats
4		Cones
2		Vests
1		Decontamination Kit (water, towels, disinfectant soap)

<sup>4</sup> Aqua-Tex Scientific Consulting Ltd. (2016). *Comox Lake Watershed Protection Plan*. Prepared for the Comox Valley Regional District. 106 pp. (56 pp. + Appendices).

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### 5.0 SAMPLING PROTOCOLS

Study program design protocols were guided in part by the Resource Information Standards Committee (RISC) *Guidelines for Designing and Implementing a Water Quality Monitoring Program in British Columbia* (MELP, 1998)<sup>5</sup>. Study sample collection methods were guided by *Sampling Procedures for Water from Guidelines for Canadian Recreational Water*<sup>6</sup>, and the *Protocols Manual for Water Quality Sampling in Canada* (CCME, 2011)<sup>7</sup>, with additional QA/QC and surface water sample collection methods derived from the *Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment* (CCME, 2016)<sup>8</sup>.

Samples were collected by hand (Photo 5) from surface waters where the bottles were inverted and plunged downward to a depth of 15-30 cm, oriented towards the current when present, and upturned to fill. Samples were collected from the upstream side of the boat. Duplicates were collected from each site and placed on ice in a cooler for overnight transport to the laboratory.

The program design for this preliminary site investigation included a single surface water sample (with duplicate) collected from four sites over two time periods, for a total of eight samples acquired for laboratory analysis. The level of sampling program detail was selected based on the objective to assess whether the current land use regime of the F&G campsite poses a risk to the Comox Lake drinking (untreated) water source and to identify whether more detailed study is warranted.

Temporal sample comparison is provided by sample collections being undertaken in the early spring (April 29, 2016) and again in the late summer (Aug. 30, 2016) to show temporal differences linked to campground use. In April the campsite was largely empty following a period of disuse over the winter months. This time period is expected to exemplify a period of time where inputs from campground users on the surrounding environment are negligible. Conversely, water quality samples collected during late summer high season campsite use -following a period of sustained use over the preceding summer months- is expected to show the status of possible environmental contaminants during the period of maximum use.

Spatial comparison is provided by proximity of sample sites to high use campground facilities (such as the campsite study area #056) and successive locations radiating downstream with the direction of flow at the campground boat launch (#057) located 125 m to the southwest, and towards the head of the Puntledge River with Site #058 located an additional 200 m southwest (Figure 3). The existing Comox Lake drinking water supply intake resides within the Puntledge River at a BC Hydro diversion dam located approximately 4 km downstream from the study area of the subject property (Figure 1). A "reference site", used to provide comparative background water quality, was selected on the west bank of the inflow stream into the Puntledge River adjacent to the Comox Bluffs Ecological Reserve approximately 400 m southwest of #056 (Figure 2) at a location where samples are not influenced by

<sup>5</sup> Resource Information Standards Committee. *Guidelines for Designing and Implementing a Water Quality Monitoring Program in British Columbia*. Accessed from: <https://www.for.gov.bc.ca/hts/risc/pubs/aquatic/design/>.

<sup>6</sup> Public Health Agency of Canada (2012). *Guidelines for Canadian Recreational Water quality -3rd Ed*. Accessed from: <https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidelines-canadian-recreational-water-quality-third-edition/guidelines-canadian-recreational-water-quality-third-edition-page-18.html#b1>

<sup>7</sup> Canadian Council of Ministers of the Environment (2011). *Protocols Manual for Water Quality Sampling in Canada*. Accessed from: [http://www.ccme.ca/files/Resourcess/water/water\\_quality/protocols\\_document\\_e\\_final\\_101.pdf](http://www.ccme.ca/files/Resourcess/water/water_quality/protocols_document_e_final_101.pdf)

<sup>8</sup> Canadian Council of Ministers of the Environment (2016). *Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment: Volume 1 Guidance Manual*. Accessed from: [http://www.ccme.ca/en/files/Resourcess/csm/Volume%201-Guidance%20Manual-Environmental%20Site%20Characterization\\_e%20PN%201551.pdf](http://www.ccme.ca/en/files/Resourcess/csm/Volume%201-Guidance%20Manual-Environmental%20Site%20Characterization_e%20PN%201551.pdf)

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campground activity but that is exposed to similar environmental conditions such as fetch, aspect, prevailing winds, water depth, and wildlife use.

### 6.0 POTENTIAL CONTAMINANTS OF CONCERN

It is important to recognize that the Comox Lake "outlet basin", within which the F&G study area is situated, is also inhabited by full time residential properties, an additional seasonal campground on the Lake's south shore, and is regularly exposed to boat traffic and Lake-wide seasonal recreational activities that include swimming, canoeing, camping, etc.

It is recognized that the CVRD conducts regular water quality analyses for bacteriological indicators to ensure that raw and post-treatment water is in compliance with regulated standards for drinking water for the protection of consumers. By no means should the presence of any contaminants in the samples acquired during this preliminary risk assessment be misconstrued as possibly being present in post-treatment drinking water.

Background review of campground site uses, facilities, and trends were considered in order to establish a list of potential contaminants of concern that could be mobilized from the campground into the surrounding aquatic environment of Comox Lake. The potential contaminants and their rationales are also based in part on by *RISC Guidelines for Interpreting Water Quality Data*<sup>9</sup> and included:

1. **Total Coliform:** A microbiological parameter used as an indicator of fecal contamination in water. Coliforms are used as a surrogate for pathogenic microorganisms with an inherent level of uncertainty of indicating pathogen presence -which limits their use as an indicator of fecal contamination.<sup>10</sup> Based on total coliform's limited reliability as an indicator its presence will not be used to show fecal contamination where *E. coli* is the preferred indicator (see 2. below).
2. ***Escherichia coli* ("*E. coli*"):** A thermotolerant coliform, *Escherichia coli*, is understood to originate specifically from mammalian or avian fecal contamination (i.e. human, other mammal, bird). A common indicator of fecal contamination in water sources limited by the inability to differentiate human from other mammalian wildlife sources. Source differentiation is possible in Microbial Source Tracking but was not undertaken as part of this study.
3. **Surfactants:** Non-ionic surfactants (such as detergents or foaming agents) are the primary component of hand dishwashing liquids<sup>11</sup> that may be expected to be present in the environment where campground users dispose of their dishwater near the lake edge. This parameter is expected to indicate whether this contaminant is migrating, and if so at what distance, from the campground.
4. **LEPH/HEPH:** Light and Heavy Extractable Petroleum Hydrocarbons are residual hydrocarbon fractions of Extractable Petroleum Hydrocarbons (EPH) after the PAHs listed under the Provincial *Contaminated Sites Regulation* (CSR) are separated. LEPH/and HEPH can be used to indicate the

<sup>9</sup> Resource Information Standards Committee. *Guidelines for Interpreting Water Quality Data*. Accessed from <https://www.for.gov.bc.ca/hts/risc/pubs/aquatic/interp/interp.htm>.

<sup>10</sup> Ministry of Environment. (2011). *Water Quality Assessment and Objectives for Comox Lake*. Environmental Protection Division. Environmental Sustainability Division. Pp. 74.

<sup>11</sup> Handbook of Detergents. (2009). Ed. Zoller, U. Taylor and Francis Group, Boca Raton, FL.

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presence of certain petroleum based products related to vehicle use such as diesel fuel and motor oil. The presence of LEPH/HEPH in surface waters may indicate migration of petroleum based contaminants released from RVs, trucks, boats, etc. used in and around the campsite; however, source tracking is severely limited by other known recreational uses on the Lake such as wide-spread boat traffic.

5. **PAHs:** Polycyclic Aromatic Hydrocarbons are the hydrocarbon fraction of EPH that are listed specifically, and regulated separately in the BC CSR as mentioned above. As with LEPH/HEPH, PAHs can be used to indicate the presence of petroleum based products related to vehicle use and also suffers from the same source tracking limitations.

## 7.0 LITERATURE REVIEW

According to a report prepared by Clayton (2005)<sup>12</sup> for the Comox-Strathcona Regional District which tracked the microbial source of fecal coliforms near the lake outlet, it was determined that the predominant sources were attributable to deer, dogs, and seagulls. Furthermore, this study used two alternate methodologies to confirm microbial source tracking and both of them were negative for human sources of fecal contamination throughout. All observed fecal sources were determined to be from non-human animal sources.

A 2011 study of Comox Lake water quality released by MOE<sup>10</sup> undertook a water quality sampling/analysis program of seven sites with one set of five samples collected from each site in both summer and fall 2005 and 2007, resulting in 30 samples per site. Those samples were analyzed for fecal coliforms and *E. coli*, whereas the samples in this preliminary risk assessment include total coliforms and *E. coli*. The MOE study sampled four sites around the Comox Lake "outlet basin" including "Site 4" nearest the study area (Figure 4). Of those four sites, geometric mean sample results for *E. coli* at Site 4 ranged from below detection limits to 12.0 CFU/100ml (Table 3). Comparatively, the highest concentration of *E. coli* observed from 2005-2007 in the outlet basin was 53.9 CFU/100ml (Table 3) near the shoreline of the south shore campsite across the Lake from the F&G study area ("Site 6"; Figure 4).

In addition to MOE's 2011 report<sup>10</sup>, unpublished data from 2015 has been made available to the F&G by MOE that is useful in describing the trends over time as well as spatially across the lake from sampling sites in the far west via inputs from Cruickshank River and the upper Puntledge River ("inlet"), through the central reach of the lake ("mid-basin"), and the west end in White's Bay ("outlet") near the subject study area (Table 3; Figure 4).

<sup>12</sup> Clayton, W.E.L. (2005). Microbial Source Tracking Study. IEC International. Prepared for Comox-Strathcona Regional District, Courtenay, BC. Accessed from: [http://agendaminutes.comoxvalleyrd.ca/Agenda\\_minutes/CVRDCommittees%5CCVW%5C10-Nov-15%5C8%5CIEC%5CInternational%5CMicrobial%5CSource%5CTracking%5CStudy%5CFinal%5Creport.pdf](http://agendaminutes.comoxvalleyrd.ca/Agenda_minutes/CVRDCommittees%5CCVW%5C10-Nov-15%5C8%5CIEC%5CInternational%5CMicrobial%5CSource%5CTracking%5CStudy%5CFinal%5Creport.pdf).

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**Table 3. Summary of Comox Lake inlet and outlet basins geometric mean *E. coli* concentrations (CFU/100 ml) for groups of five samples collected within a 30-day period from BC MOE (2011)<sup>10</sup> and unpublished data (2015).**

Location Basin	Inlet			Outlet				Lake Average
	Sample Site	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7
Date	MOE Published Data (2011)							
Aug 11 - Sept 9, 2005	< 1.0	< 1.0	< 1.0	< 1.0	1.6	< 1.0	1.0	< 1.0
Oct 14 - Nov 10, 2005	1.5	2.1	1.4	1.5	1.3	1.6	6.2	2.2
Aug 30 - Sep 13, 2006	< 1.0	< 1.0	1.0	1.3	2.7	2.5	4.3	2.4
Oct 17 - Nov 22, 2006	1.6	1.6	1.3	6.1	4.5	2.1	1.4	2.7
Aug 9 - Sept 13, 2007	1.6	2.2	1.4	9.5	4.0	53.9	2.2	10.7
Oct 23 - Nov 22, 2007	2.3	1.2	1.2	12.0	4.1	3.8	3.1	4.0
	MOE Unpublished Data (2015)							
Aug 5 - Sept 1, 2015	< 1.0	< 1.0	< 1.0	< 1.0	3.7	2.1	< 1.0	1.1
Oct 13 - Nov 9, 2015	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

## 8.0 WATER QUALITY STANDARDS

Water quality standards for the assessed parameters are derived from provincial and federal sources where available and can be categorized as drinking water, aquatic life, or recreational water quality (Table 4).

Drinking water quality guidelines provided for total coliforms and *E. coli* are included because this assessment is ultimately in aid of determining whether the study area poses a risk to the Comox Lake drinking water source; however, as mentioned, the CVRD operates a disinfection plant that treats for this parameter and removes bacteriological pathogens to the 0/100 mL count level.

The BC MOE (2011) stipulates water quality objectives for Comox Lake that are intended to provide an extra level of protection to the treated drinking water supply and for recreational users that may acquire water directly from the lake. The objectives include prescribed guidelines for *E. coli* at 10 CFU/100 ml (30 day period) at all sites within Comox Lake (Table 4). Based on historical data, this objective was exceeded nearest the study area (Site 4) during a single sampling period coinciding with 2007 fall freshet, but not in 2015 according to unpublished data (Table 3). The grab samples collected in 2016 in support of this assessment do not exceed this objective.

Aquatic life water quality guidelines for surfactants are provided where there is no standard available for human health risk.

The BC CSR regulates acceptable limits for petroleum hydrocarbons in water standards for aquatic life in both LEPH/HEPH and PAH.

As the study area and much of the Lake's outlet basin is frequently used for recreation the guidelines for Canadian recreational water quality are included for *E. coli*.

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**Table 4. Water quality standards for the assessed parameters from provincial and federal sources of drinking water, aquatic life, or recreational water quality.**

Parameter	Canadian Drinking Water Quality Guideline	BC Working Water Quality Guidelines <sup>13</sup> Fresh water aquatic life	Contaminated Sites Regulation Schedule 6 Water Standards for Aquatic Life <sup>14</sup>	Guidelines for Canadian Recreational Water Quality <sup>15,16</sup>	BC MOE Comox Lake Water Quality Objective <sup>10</sup>
<b>Total Coliform</b>	0/100 ml <sup>17</sup>	-	-	-	
<b>E. coli</b>	0/100 ml <sup>17</sup>	-	-	≤ 77/100 ml <sup>18</sup> ≤ 400/100 ml <sup>19</sup>	10/100 ml
<b>Surfactant (LAS)<sup>20</sup></b>	-	65 µg/L <sup>21</sup>	-	-	
<b>LEPH/HEPH</b>	-	-	500 µg/L	-	
<b>PAHs:</b>					
acenaphthene	-	-	60 µg/L	-	
acridine	-	-	0.5 µg/L	-	
anthracene	-	-	1.0 µg/L	-	
benzo[a]anthracene	-	-	1.0 µg/L	-	
benzo[a]pyrene	-	-	0.1 µg/L	-	
chrysene	-	-	1.0 µg/L	-	
fluoranthene	-	-	2.0 µg/L	-	
fluorene	-	-	120 µg/L	-	
naphthalene	-	-	10 µg/L	-	
phenanthrene	-	-	3.0 µg/L	-	
pyrene	-	-	0.2 µg/L	-	
quinoline	-	-	34 µg/L	-	

<sup>13</sup> [http://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/wqgs-wqos/bc\\_env\\_working\\_water\\_quality\\_guidelines.pdf](http://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/wqgs-wqos/bc_env_working_water_quality_guidelines.pdf)

<sup>14</sup> [http://www.bclaws.ca/civix/document/LOC/complete/statreg/--%20E%20--/Environmental%20Management%20Act%20\[SBC%202003\]%20c.%2053/05\\_Regulations/19\\_375\\_96%20-%20Contaminated%20Sites%20Regulation/375\\_96\\_08.xml#Schedule6](http://www.bclaws.ca/civix/document/LOC/complete/statreg/--%20E%20--/Environmental%20Management%20Act%20[SBC%202003]%20c.%2053/05_Regulations/19_375_96%20-%20Contaminated%20Sites%20Regulation/375_96_08.xml#Schedule6)

<sup>15</sup> <https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidelines-canadian-recreational-water-quality-third-edition/guidelines-canadian-recreational-water-quality-third-edition-page-9.html#a411>

<sup>16</sup> <http://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/wqgs-wqos/approved-wqgs/microindicators-or.pdf>

<sup>17</sup> Maximum Acceptable Concentration for water leaving a treatment plant.

<sup>18</sup> Geometric mean of 5 samples collected within a 30-day period.

<sup>19</sup> Single-sample maximum concentration.

<sup>20</sup> Linear alkylbenzene sulphonate (LAS) -The most common surfactant type in hand dishwashing liquid products<sup>11</sup>.

<sup>21</sup> 99% (species) level of protection.

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### 9.0 RESULTS

Lab analysis results of samples collected in the early spring (April 29, 2016) and again in the late summer (Aug. 30, 2016) are provided in Appendix A. A summary of the results are provided for each of the studied parameters, detailed in Section 4.0, according to sampling date with site locations provided in Figure 2:

#### 9.3 APRIL 29, 2016

1. **Total coliform:** Reported in CFU (colony forming units)/100mL this value represents a count of colonies formed on agar media. The highest concentration was observed near the campsite study area shoreline 40 CFU/100mL for Site #056, with fluctuating concentrations moving westward towards the outlet of the basin towards the Puntledge River with 4 CFU/100mL for #057, and 8 CFU/100mL for #058. The reference site, #059, near the Comox Bluffs Ecological Reserve shoreline, showed 3 CFU/100mL.
2. ***E. coli*:** Result below detectable limits.
3. **Surfactants:** With the exception of water quality site #058 (see Figure 2) which showed a concentration of 0.07 mg/L (70 µg/L); all other sites were below detectable limits. The BC Working Water Quality Guideline for LAS Surfactants at the 99% (species) level of protection is 65 µg/L while the 95 % level is 280 µg/L (Table 4). Sample site #058, located furthest from campground study area (with the exception of the reference site #059), showed a 5.0 µg/L exceedance of the BC standard for freshwater aquatic life.
4. **LEPH/HEPH:** All parameters below detectable limits.
5. **PAH:** All parameters below detectable limits.

#### 9.4 AUGUST 30, 2016

The lab returned August sample results for total coliform and *E. coli* using Most Probable Number (MPN/100mL). MPN uses the multiple tube fermentation method of analysis and the result is a statistical estimation based on 95% confidence limits. As the lab elected to utilize a different analysis technique than that applied to April 29<sup>th</sup> samples the results cannot be reliably compared against each other. According to a study by Cho et al. (2010) enumerated *E. coli* concentrations in MPN can be greater than those in CFU by up to one order of magnitude.<sup>22</sup>

1. **Total coliform:** The highest concentration was observed near the campsite study area shoreline at >200.5 MPN/100mL for Site #056, with decreasing concentrations moving westward towards the outlet of the basin towards the Puntledge River with 144.5 MPN/100mL for #057, and 47.8 MPN/100mL for #058. The reference site, #059, near the Comox Bluffs Ecological Reserve shoreline, showed 42.9 MPN/100mL.

<sup>22</sup> Cho, K., Han, D., Park, Y., Lee, S., Cha, S., Kang, J., and Kim, J. (2010). Evaluation of the relationship between two different methods for enumeration fecal indicator bacteria: colony-forming unit and most probable number. Journal of Environmental Science (China). 22(6):846-50.

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During sampling effort an observation of bird down floating on the water surface was recorded at all four sample locations.

2. ***E. coli***: Sites #056 and #057 both showed 2.0 MPN/100mL counts. These sites are located near the campground study area shoreline and boat launch, respectively. Site #058 nearest the Lake outlet towards the Puntledge River, and Site #059 near the Comox Bluffs Ecological Reserve shoreline showed 0 MPN/100mL.
3. **Surfactants**: Similarly to April 29<sup>th</sup> samples, all other sites showed concentrations below detectable limits with the exception of water quality site #058 which showed a concentration of 0.11 mg/L (110 µg/L), a 45 µg/L exceedance over the BC standard for freshwater aquatic life.
4. **LEPH/HEPH**: All parameters below detectable limits.
5. **PAH**: All parameters below detectable limits.

## 10.0 DISCUSSION

It is important to recognize that total coliform are a group of bacteria that, with few exceptions, are not harmful to humans.<sup>23</sup> Total coliforms can be widely distributed in water, soil, and vegetation<sup>15</sup> and do not alone represent fecal coliform concentrations. In the BC MOE *Water Quality Assessment and Objectives for Comox Lake*<sup>10</sup> total coliforms do not have a set objective concentration. Most often, measuring total coliforms is a useful tool for drinking water managers to identify potential post-treatment contamination in water distribution systems.

Total coliform counts from all sample sites, during both April & August 2016 sampling efforts exceed treated drinking water standards (0/100mL) but are generally lower than coliform counts from both Clayton (2005) and MOE (2011). Earlier reports by Clayton and MOE are relevant to the temporal context of Comox Lake where sampling data shows that total coliforms appear to be consistently present throughout the Lake from 2005-2007.

As total coliforms can be derived from numerous non-human sources it is noteworthy that during the August 30, 2016 sampling effort, when coliform concentrations were highest, an observation of bird down floating on the water surface was recorded at all four sample locations. According to MOE (2011) "high numbers of birds (generally seagulls) were observed at and near the sampling stations (e.g. sitting on log booms adjacent to docks)", indicating a potential source of coliforms. For fecal contamination, the presence of *E. coli* is a much more reliable indicator than total coliforms.

The only *E. coli* counts above detectable limits for 2016 sampling occurred on August 30<sup>th</sup> at Sites #056 and #057 located at the campground study area and boat launch, respectively. The presence of two *E. coli* colony counts in each sample near the shoreline but not evident downstream at Site #058 suggests that whatever the source of the contaminant it did not appear to be transported from near the campsite study area towards the Lake outlet into the Puntledge River. In addition, the source of the *E. coli* is

<sup>23</sup> United States Environmental Protection Agency (2017). Revised Total Coliform Rule and Total Coliform Rule. Drinking Water Requirements for States and Public Water Systems. Accessed from <<https://www.epa.gov/dwreginfo/revised-total-coliform-rule-and-total-coliform-rule>>.



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unknown but based on a previous study by Clayton (2005)<sup>12</sup> it was most likely derived from a non-human source (i.e. dog or deer). The temporal difference between April 29<sup>th</sup> and August 30<sup>th</sup> sampling events showed an increase above detectable limits only in August, the high use campground season, which could possibly be linked to increased shoreline use by pets at the campground.

The 2016 grab samples collected in support of this assessment did not exceed the MOE objective for *E. coli*, and are well below recreational standards for maximum concentration in a single sample (Tables 3 & 4). BC MOE (2011) water quality objectives for all sites in Comox Lake are prescribed for *E. coli* at 10 CFU/100 ml (30 day period). Based on historical data (2005-2007), this objective was exceeded nearest the study area ("Site 4") during a single sampling period coinciding with the 2007 fall freshet, but according to unpublished data the objective was not exceeded during 2015 sampling (Table 3).

The BC Working Water Quality Guideline for LAS Surfactants at the 99% (species) level of protection is 65 µg/L while the 95 % level is 280 µg/L. The only surfactant concentration above detectable limits was observed at water quality Site #058 during both April 29<sup>th</sup> and August 30<sup>th</sup> sampling efforts that exceeded the 99% species standard but not the 95 % level. That is, the concentration observed at Site #058 has the potential to negatively affect within 4% more aquatic species types. The lack of presence at sample sites closest to the study area (i.e. Sites #056 & 057) suggest that the F&G campground is not the source of the surfactant observed at Site #058.

LEPH/HEPH & PAH were below detectable limits at all sample locations for both April 29<sup>th</sup> and August 30<sup>th</sup> efforts, suggesting that there is no release of petroleum hydrocarbon based products from the F&G study area or surrounding environs outside of the study area.

## 11.0 CONCLUSIONS

Management of potential sources of pollution and implementation of mitigation measures (Table 1) in and around the F&G Campground and Boatramp appear to be functioning as intended for the following reasons:

1. Surfactant concentrations near the F&G study area were below detectable levels while exceedances of BC Working Water Quality Guidelines for fresh water aquatic life were observed only at Site #058 and cannot reliably be linked to F&G campsite activity.
2. LEPH/HEPH and PAH were below detectable limits for all sample sites and are not a cause of concern for petroleum hydrocarbon contamination as it relates to the F&G campsite, or other site uses, including the boat launch.
3. The presence of *E. coli* shown in 2016 grab samples is only present in low concentrations (maximum 2 CFU/100 ml) that are below the MOE *E. coli* objective threshold and well under the Guidelines for Canadian Recreational Water Quality. Observed 2016 *E. coli* concentrations appear consistent with background concentrations measured by MOE at "inlet basin" Sites 1-3 (Table 3) and based on existing information is likely linked to non-human sources<sup>12</sup>.

The F&G has been part of the watershed planning process since 2008 and remain strong advocates for the WPP and a deep water intake. The F&G have taken steps to implement on-site improvements in the spirit of the WPP since that time (Table 1). According to MOE data (Table 3), the Site 4 water quality

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station (nearest the study area; Figure 4), as well as the three 2016 sites selected for this preliminary risk assessment (Figure 2), have not exceeded the MOE *E. coli* objective (10 CFU/100 ml over 30 day period) since the time when many of the mitigation measures described in Section 3 (Table 1) have been implemented -in part to meet WPP recommendations.

These results indicate that no additional or modified waste containment/treatment methods appear necessary at the F&G campsite at this time. It is, however, recommended that the F&G continue to participate with any water quality monitoring program the CVRD and the Water Advisory Group propose under the WPP.

In addition to the measures already implemented to meet WPP recommendations, contamination risks are expected to be further reduced by:

1. The 2017 re-configuration of F&G campsites and rehabilitation of the Comox Lake Streamside Protection and Enhancement Area (SPEA) prescribed in detailed Riparian Areas Assessment<sup>2</sup> (Figure 3; Photos 3-4). Re-configuration and enhancement efforts are expected to increase the containment and retention of potential contaminants by shoreline vegetation.
2. Implementation of the CVRD deep drinking water intake project approximately 1 km upstream of the F&G property and at depth is expected to minimize the exposure of bacteriological contamination to consumers.

Based on the results of this preliminary risk assessment there is no conclusive indication that the F&G's use of the study area shoreline as a campsite poses a risk to the water supply or human health, and no additional study appears warranted at this time. It is expected, however, that the F&G will remain active members of the WAG and will participate in the ongoing water quality program in cooperation with the CVRD under the WPP. Furthermore, based on the results of this preliminary assessment it is anticipated that the proposed continued use of the study area as a campsite, assuming no significant alteration, will not negatively impact drinking water in the future.

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### 12.0 CLOSURE

We trust the conclusions of this report meet the anticipated requirements of a Risk Assessment of Courtenay and District Fish and Game Protective Association (F&G) campground use on pre-treatment source water quality in Comox Lake in support of the renewal of CVRD TUP 2C 15 and a future re-zoning application. If any additional information is required please contact the undersigned.

Prepared by:

A handwritten signature in black ink, appearing to read "Dusty Silvester".

Dusty Silvester, R.B.Tech. 58

Reviewed by:



Rupert Wong, R.P.Bio. 705

CURRENT ENVIRONMENTAL LTD.

### 13.0 DISCLAIMER

This report was prepared exclusively for Courtenay and District Fish and Game Protective Association for use by the Comox Valley Regional District by Current Environmental Ltd. The quality of information, conclusions and estimates contained herein is consistent with the level of effort expended and is based on: i) information available at the time of preparation; ii) data collected by the authors and/or supplied by outside sources; and iii) the assumptions, conditions and qualifications set forth in this report. This report is intended to be used by Courtenay and District Fish and Game Protective Association for use by the Comox Valley Regional District only, subject to the terms and conditions of its contract or understanding with Current Environmental Ltd. Other use or reliance on this report by any third party is at that party's sole risk.

## Technical Memorandum

### 14.0 FIGURES

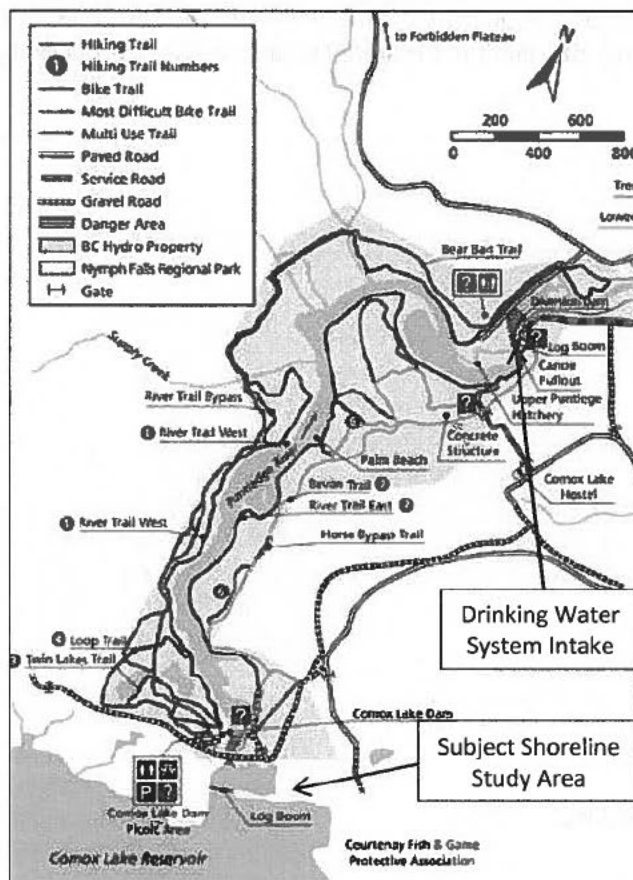


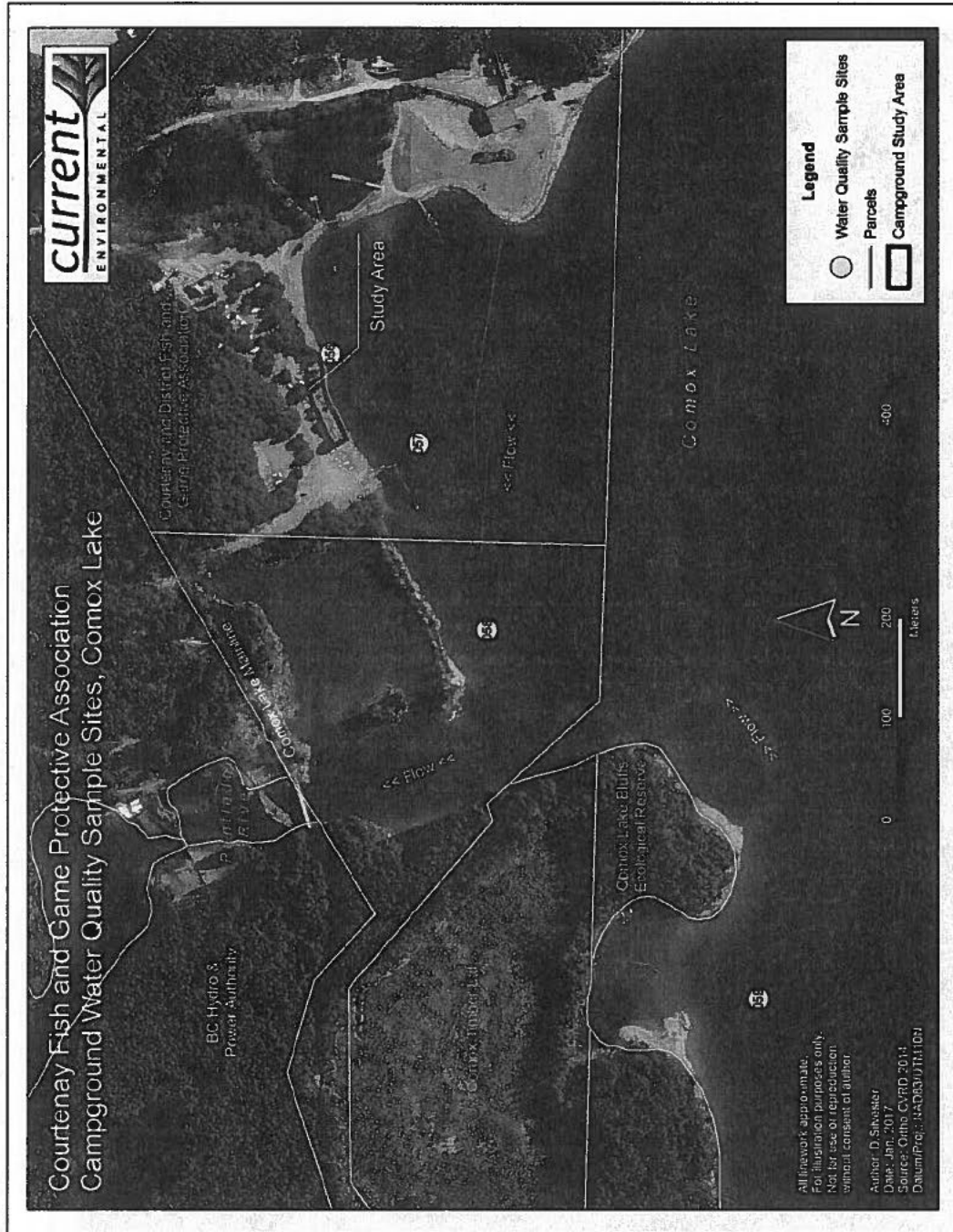
Figure 1. Regional setting of subject shoreline study area relative to the Puntledge River drinking water system intake located approximately 4 km downstream.

Source: <https://www.bchydro.com/content/dam/hydro/medialib/internet/images/graphics/maps/map-puntledge.gif>

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**Figure 2. Site plan of water quality sampling sites relative to campground study area and flow directions towards the Comox Drinking Water Intake approximately 4 km downstream.**



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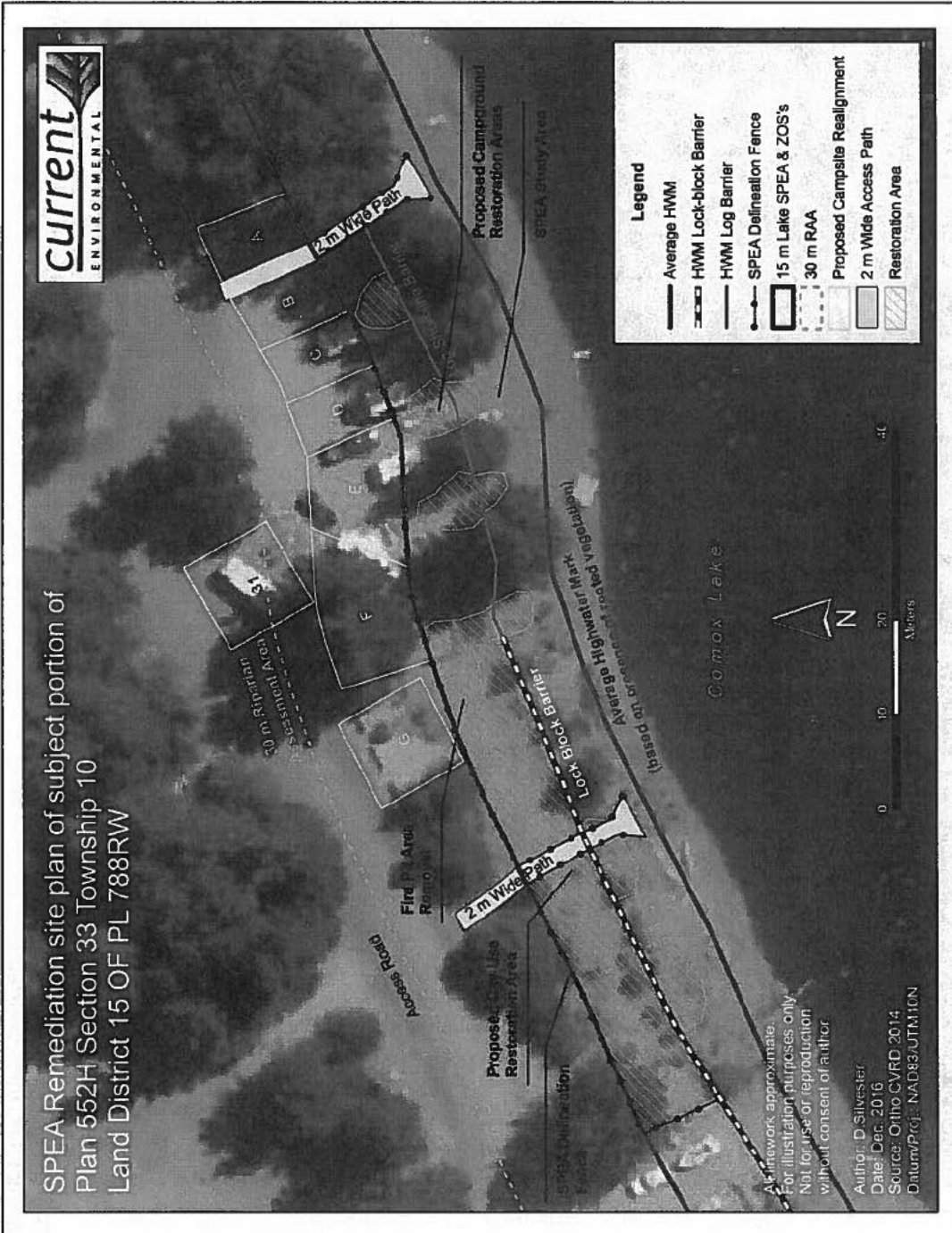


Figure 3. Site plan of the study area showing detailed Riparian Areas Regulation assessment remediation plan and campsite reconfiguration.

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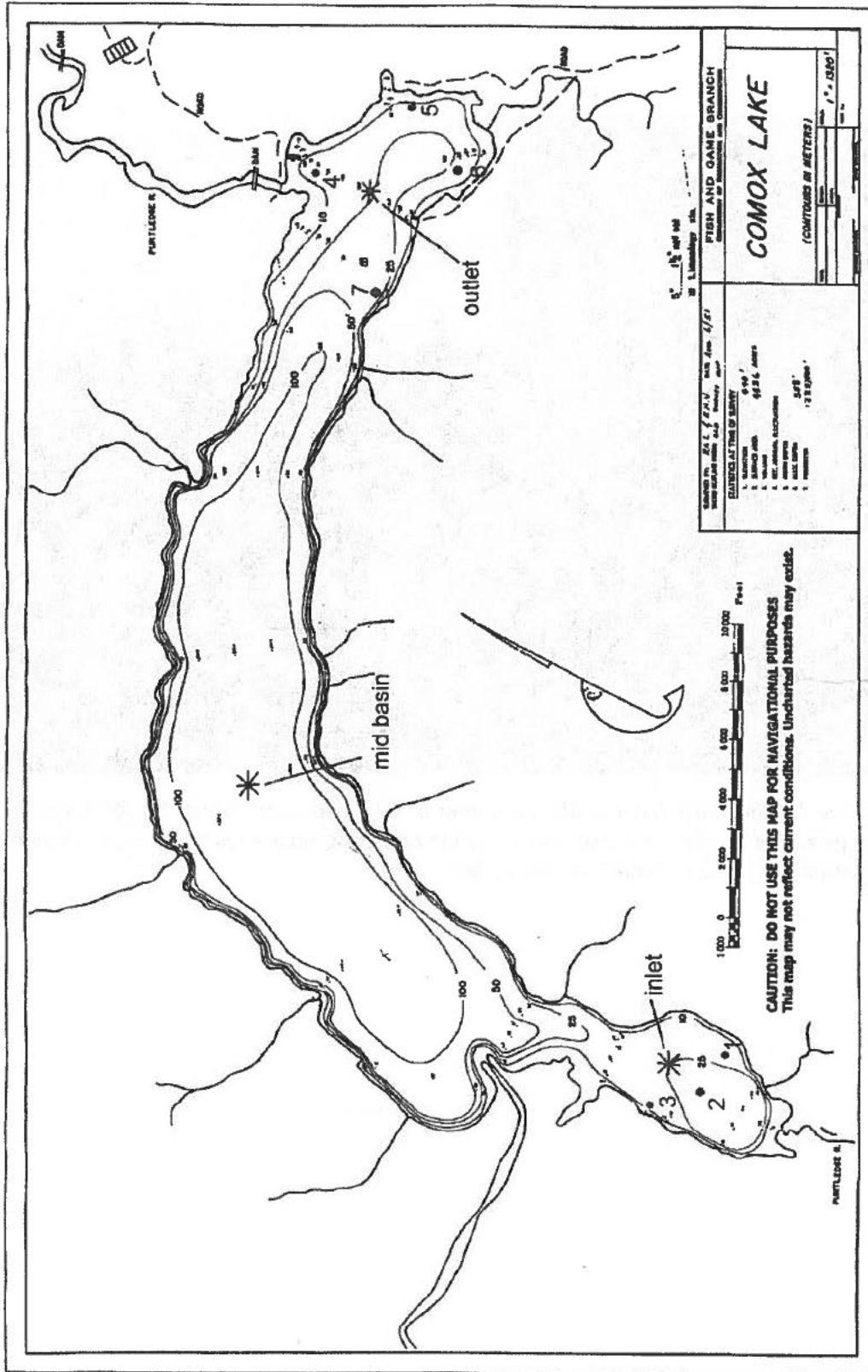


Figure 3. BC MOE Water Quality Assessment<sup>10</sup> map showing sites where surface water samples were collected during 2011 and 2015 programs.

## Technical Memorandum

### 15.0 PHOTOS



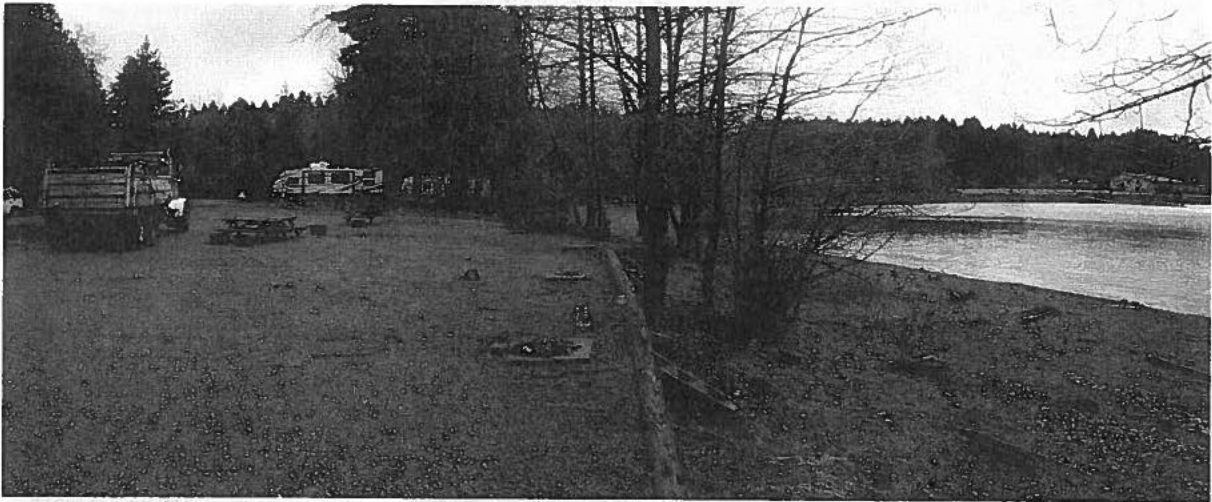
Photos 1 & 2. View looking north from southwest corner of subject property about 50 years ago during logging tenure (left) and present day after site remediation during recreation/conservation tenure by Courtenay & District Fish & Game Protective Association (right).



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Photos 3 & 4. Before (top) and after (above) views of SPEA restoration efforts that includes relocating campsites and establishing native vegetation within a 15 m setback from the lake shoreline (Mar. 2017).

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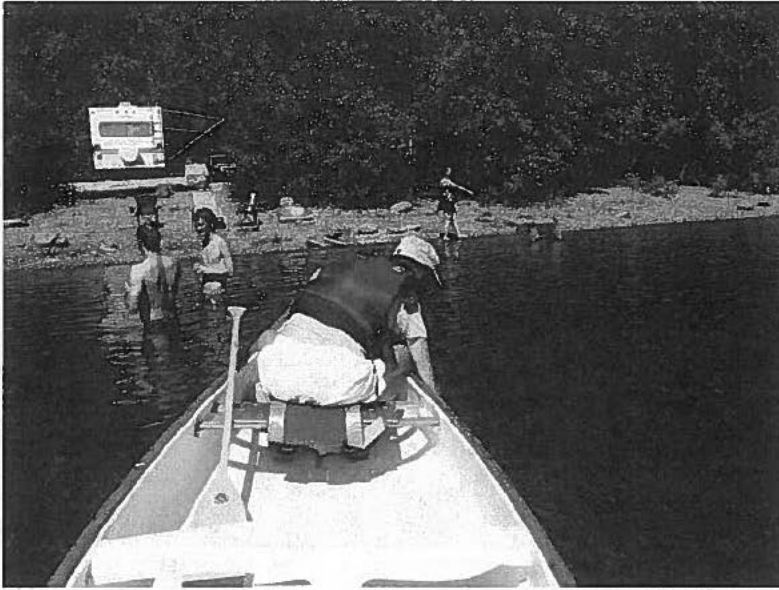


Photo 5. Surface water quality sample collected from Site #056 on August 30th 2016 showing high-season campsite use.

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## APPENDIX A – WATER QUALITY SAMPLE LABORATORY ANALYSIS RESULTS



Your Project #: F AND G  
 Site Location: COMOX LAKE  
 Your C.O.C. #: G114457

**Attention:Dusty Silvester**

Current Environmental  
 244 - 4th Street  
 Courtenay, BC  
 Canada V9N 1G6

**Report Date: 2016/05/06**  
 Report #: R2175193  
 Version: 1 - Final

**CERTIFICATE OF ANALYSIS****MAXXAM JOB #: B632396****Received: 2016/04/29, 11:15**

Sample Matrix: Water  
 # Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Coliform by membrane filtration (1)	4	N/A	2016/04/29	BBY4SOP-00001	SM 22 9222 m
E.coli by membrane filtration in Water (1)	4	N/A	2016/04/29	BBY4SOP-00001	SM 22 9222 m
EPH in Water when PAH required (1)	4	2016/05/05	2016/05/05	BBY8SOP-00029	BCMOE EPH w 12/00 m
PAH in Water by GC/MS (SIM) (1)	4	2016/05/05	2016/05/05	BBY8SOP-00021	EPA 8270d R4 m
Total LMW, HMW, Total PAH Calc (1)	4	N/A	2016/05/06	BBY WI-00033	Auto Calc
EPH less PAH in Water by GC/FID (1)	4	N/A	2016/05/06	BBY WI-00033	Auto Calc
MBAS Surfactants Subcontract (2)	4	2016/05/06	2016/05/06		

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

\* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Vancouver

(2) This test was performed by Sub Vancouver to Exova BC

**Encryption Key**

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Shanaz Akbar, Project Manager

Email: SAkbar@maxxam.ca

Phone# (604)639-2618

=====  
 Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



Maxxam Job #: B632396  
Report Date: 2016/05/06

Current Environmental  
Client Project #: F AND G  
Site Location: COMOX LAKE

### RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		ON6562	ON6563	ON6564	ON6565	
Sampling Date		2016/04/29 10:00	2016/04/29 10:05	2016/04/29 10:10	2016/04/29 10:15	
COC Number		G114457	G114457	G114457	G114457	
	UNITS	G056	G057	G058	G059	QC Batch
Parameter						
Subcontract Parameter	N/A	ATTACHED	ATTACHED	ATTACHED	ATTACHED	8262897



Maxxam Job #: B632396  
Report Date: 2016/05/06

Current Environmental  
Client Project #: F AND G  
Site Location: COMOX LAKE

### MICROBIOLOGY (WATER)

Maxxam ID		ON6562	ON6563	ON6564	ON6565		
Sampling Date		2016/04/29 10:00	2016/04/29 10:05	2016/04/29 10:10	2016/04/29 10:15		
COC Number		G114457	G114457	G114457	G114457		
	<b>UNITS</b>	<b>G056</b>	<b>G057</b>	<b>G058</b>	<b>G059</b>	<b>RDL</b>	<b>QC Batch</b>
<b>Microbiological Param.</b>							
E. coli	CFU/100mL	<1	<1	<1	<1	1	8256425
Total Coliforms	CFU/100mL	40	4	8	3	1	8256424
RDL = Reportable Detection Limit							

Maxxam Job #: B632396  
 Report Date: 2016/05/06

 Current Environmental  
 Client Project #: F AND G  
 Site Location: COMOX LAKE

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)**

Maxxam ID		ON6562	ON6563	ON6564	ON6565		
Sampling Date		2016/04/29 10:00	2016/04/29 10:05	2016/04/29 10:10	2016/04/29 10:15		
COC Number		G114457	G114457	G114457	G114457		
	UNITS	G056	G057	G058	G059	RDL	QC Batch
<b>Polycyclic Aromatics</b>							
Low Molecular Weight PAH's	ug/L	<0.24	<0.24	<0.24	<0.24	0.24	8255513
High Molecular Weight PAH's	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	8255513
Total PAH	ug/L	<0.24	<0.24	<0.24	<0.24	0.24	8255513
Naphthalene	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	8260964
2-Methylnaphthalene	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	8260964
Quinoline	ug/L	<0.24	<0.24	<0.24	<0.24	0.24	8260964
Acenaphthylene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	8260964
Acenaphthene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	8260964
Fluorene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	8260964
Phenanthrene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	8260964
Anthracene	ug/L	<0.010	<0.010	<0.010	<0.010	0.010	8260964
Acridine	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	8260964
Fluoranthene	ug/L	<0.020	<0.020	<0.020	<0.020	0.020	8260964
Pyrene	ug/L	<0.020	<0.020	<0.020	<0.020	0.020	8260964
Benzo(a)anthracene	ug/L	<0.010	<0.010	<0.010	<0.010	0.010	8260964
Chrysene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	8260964
Benzo(b&j)fluoranthene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	8260964
Benzo(k)fluoranthene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	8260964
Benzo(a)pyrene	ug/L	<0.0090	<0.0090	<0.0090	<0.0090	0.0090	8260964
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	8260964
Dibenz(a,h)anthracene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	8260964
Benzo(g,h,i)perylene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	8260964
<b>Calculated Parameters</b>							
LEPH (C10-C19 less PAH)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	8255514
HEPH (C19-C32 less PAH)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	8255514
<b>Ext. Pet. Hydrocarbon</b>							
EPH (C10-C19)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	8260978
EPH (C19-C32)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	8260978
<b>Surrogate Recovery (%)</b>							
O-TERPHENYL (sur.)	%	95	94	94	93		8260978
D10-ANTHRACENE (sur.)	%	93	106	99	100		8260964
D8-ACENAPHTHYLENE (sur.)	%	95	105	100	102		8260964
RDL = Reportable Detection Limit							



Maxxam Job #: B632396  
Report Date: 2016/05/06

Current Environmental  
Client Project #: F AND G  
Site Location: COMOX LAKE

### QUALITY ASSURANCE REPORT

QA/QC				Date					
Batch	Init	QC Type	Parameter	Analyzed	Value	Recovery	UNITS	QC Limits	
8260964	JC9	Matrix Spike	D10-ANTHRACENE (sur.)	2016/05/05		102	%	60 - 130	
			D8-ACENAPHTHYLENE (sur.)	2016/05/05		100	%	50 - 130	
			D8-NAPHTHALENE (sur.)	2016/05/05		78	%	50 - 130	
			D9-Acridine	2016/05/05		96	%	50 - 130	
			TERPHENYL-D14 (sur.)	2016/05/05		110	%	60 - 130	
			Naphthalene	2016/05/05		NC	%	50 - 130	
			2-Methylnaphthalene	2016/05/05		88	%	50 - 130	
			Quinoline	2016/05/05		108	%	50 - 130	
			Acenaphthylene	2016/05/05		97	%	50 - 130	
			Acenaphthene	2016/05/05		NC	%	50 - 130	
			Fluorene	2016/05/05		NC	%	50 - 130	
			Phenanthrene	2016/05/05		NC	%	60 - 130	
			Anthracene	2016/05/05		90	%	60 - 130	
			Acridine	2016/05/05		91	%	50 - 130	
			Fluoranthene	2016/05/05		NC	%	60 - 130	
			Pyrene	2016/05/05		102	%	60 - 130	
			Benzo(a)anthracene	2016/05/05		96	%	60 - 130	
			Chrysene	2016/05/05		97	%	60 - 130	
			Benzo(b&j)fluoranthene	2016/05/05		94	%	60 - 130	
			Benzo(k)fluoranthene	2016/05/05		99	%	60 - 130	
			Benzo(a)pyrene	2016/05/05		105	%	60 - 130	
			Indeno(1,2,3-cd)pyrene	2016/05/05		65	%	60 - 130	
			Dibenz(a,h)anthracene	2016/05/05		62	%	60 - 130	
			Benzo(g,h,i)perylene	2016/05/05		59 (1)	%	60 - 130	
8260964	JC9	Spiked Blank	D10-ANTHRACENE (sur.)	2016/05/05		107	%	60 - 130	
			D8-ACENAPHTHYLENE (sur.)	2016/05/05		104	%	50 - 130	
			D8-NAPHTHALENE (sur.)	2016/05/05		86	%	50 - 130	
			D9-Acridine	2016/05/05		99	%	50 - 130	
			TERPHENYL-D14 (sur.)	2016/05/05		117	%	60 - 130	
			Naphthalene	2016/05/05		79	%	50 - 130	
			2-Methylnaphthalene	2016/05/05		86	%	50 - 130	
			Quinoline	2016/05/05		99	%	50 - 130	
			Acenaphthylene	2016/05/05		95	%	50 - 130	
			Acenaphthene	2016/05/05		93	%	50 - 130	
			Fluorene	2016/05/05		86	%	50 - 130	
			Phenanthrene	2016/05/05		97	%	60 - 130	
			Anthracene	2016/05/05		96	%	60 - 130	
			Acridine	2016/05/05		89	%	50 - 130	
			Fluoranthene	2016/05/05		99	%	60 - 130	
			Pyrene	2016/05/05		101	%	60 - 130	
			Benzo(a)anthracene	2016/05/05		88	%	60 - 130	
			Chrysene	2016/05/05		90	%	60 - 130	
			Benzo(b&j)fluoranthene	2016/05/05		94	%	60 - 130	
			Benzo(k)fluoranthene	2016/05/05		90	%	60 - 130	
			Benzo(a)pyrene	2016/05/05		101	%	60 - 130	
			Indeno(1,2,3-cd)pyrene	2016/05/05		91	%	60 - 130	
			Dibenz(a,h)anthracene	2016/05/05		90	%	60 - 130	
			Benzo(g,h,i)perylene	2016/05/05		85	%	60 - 130	
8260964	JC9	Method Blank	D10-ANTHRACENE (sur.)	2016/05/05		95	%	60 - 130	
			D8-ACENAPHTHYLENE (sur.)	2016/05/05		97	%	50 - 130	
			D8-NAPHTHALENE (sur.)	2016/05/05		86	%	50 - 130	
			D9-Acridine	2016/05/05		88	%	50 - 130	
			TERPHENYL-D14 (sur.)	2016/05/05		97	%	60 - 130	
			Naphthalene	2016/05/05	<0.10		ug/L		





Maxxam Job #: B632396  
Report Date: 2016/05/06

Current Environmental  
Client Project #: F AND G  
Site Location: COMOX LAKE

## QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			2-Methylnaphthalene	2016/05/05	<0.10		ug/L	
			Quinoline	2016/05/05	<0.24		ug/L	
			Acenaphthylene	2016/05/05	<0.050		ug/L	
			Acenaphthene	2016/05/05	<0.050		ug/L	
			Fluorene	2016/05/05	<0.050		ug/L	
			Phenanthrene	2016/05/05	<0.050		ug/L	
			Anthracene	2016/05/05	<0.010		ug/L	
			Acridine	2016/05/05	<0.050		ug/L	
			Fluoranthene	2016/05/05	<0.020		ug/L	
			Pyrene	2016/05/05	<0.020		ug/L	
			Benzo(a)anthracene	2016/05/05	<0.010		ug/L	
			Chrysene	2016/05/05	<0.050		ug/L	
			Benzo(b&j)fluoranthene	2016/05/05	<0.050		ug/L	
			Benzo(k)fluoranthene	2016/05/05	<0.050		ug/L	
			Benzo(a)pyrene	2016/05/05	<0.0090		ug/L	
			Indeno(1,2,3-cd)pyrene	2016/05/05	<0.050		ug/L	
			Dibenz(a,h)anthracene	2016/05/05	<0.050		ug/L	
			Benzo(g,h,i)perylene	2016/05/05	<0.050		ug/L	
8260964	JC9	RPD	Naphthalene	2016/05/05	5.8		%	40
			2-Methylnaphthalene	2016/05/05	NC		%	40
			Quinoline	2016/05/05	NC		%	40
			Acenaphthylene	2016/05/05	3.1		%	40
			Acenaphthene	2016/05/05	9.0		%	40
			Fluorene	2016/05/05	5.2		%	40
			Phenanthrene	2016/05/05	13		%	40
			Anthracene	2016/05/05	9.7		%	40
			Acridine	2016/05/05	22		%	40
			Fluoranthene	2016/05/05	4.0		%	40
			Pyrene	2016/05/05	3.4		%	40
			Benzo(a)anthracene	2016/05/05	NC		%	40
			Chrysene	2016/05/05	NC		%	40
			Benzo(b&j)fluoranthene	2016/05/05	NC		%	40
			Benzo(k)fluoranthene	2016/05/05	NC		%	40
			Benzo(a)pyrene	2016/05/05	NC		%	40
			Indeno(1,2,3-cd)pyrene	2016/05/05	NC		%	40
			Dibenz(a,h)anthracene	2016/05/05	NC		%	40
			Benzo(g,h,i)perylene	2016/05/05	NC		%	40
8260978	IT1	Matrix Spike	O-TERPHENYL (sur.)	2016/05/05		96	%	50 - 130
			EPH (C10-C19)	2016/05/05		119	%	50 - 130
			EPH (C19-C32)	2016/05/05		106	%	50 - 130
8260978	IT1	Spiked Blank	O-TERPHENYL (sur.)	2016/05/05		95	%	50 - 130
			EPH (C10-C19)	2016/05/05		101	%	50 - 130
			EPH (C19-C32)	2016/05/05		100	%	50 - 130
8260978	IT1	Method Blank	O-TERPHENYL (sur.)	2016/05/05		99	%	50 - 130
			EPH (C10-C19)	2016/05/05	<0.20		mg/L	
			EPH (C19-C32)	2016/05/05	<0.20		mg/L	
8260978	IT1	RPD	EPH (C10-C19)	2016/05/05	1.7		%	30



Maxxam Job #: B632396  
Report Date: 2016/05/06

Current Environmental  
Client Project #: F AND G  
Site Location: COMOX LAKE

### QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			EPH (C19-C32)	2016/05/05	NC		%	30
<p>Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.</p> <p>Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.</p> <p>Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.</p> <p>Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.</p> <p>Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.</p> <p>NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).</p> <p>NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples &lt; 5x RDL).</p> <p>(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.</p>								

Maxxam Job #: B632396  
Report Date: 2016/05/06

Current Environmental  
Client Project #: F AND G  
Site Location: COMOX LAKE

**VALIDATION SIGNATURE PAGE**

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Rob Reinert, B.Sc., Scientific Specialist

---

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



G0114457

CHAIN OF CUSTODY RECORD

BBY FCO-0007705 Page 1 of 1

Barcode: 4606... Report Information (if different than specified)

Customer Information Form: Company Name (CURRENT ENVIRONMENTAL), Contact Name (DESSY SILVESTER), Address (744 4th St, Coalinga, CA), etc.

Project Information (if more applicable): Project Name (FOND G), Site Location (CONTRA LAKE)

Chain of Custody Table: Table with columns for Name, Title, Signature, Date, and Remarks.

Special Instructions: AC Off Soil, AC Water, Drinking Water, etc.

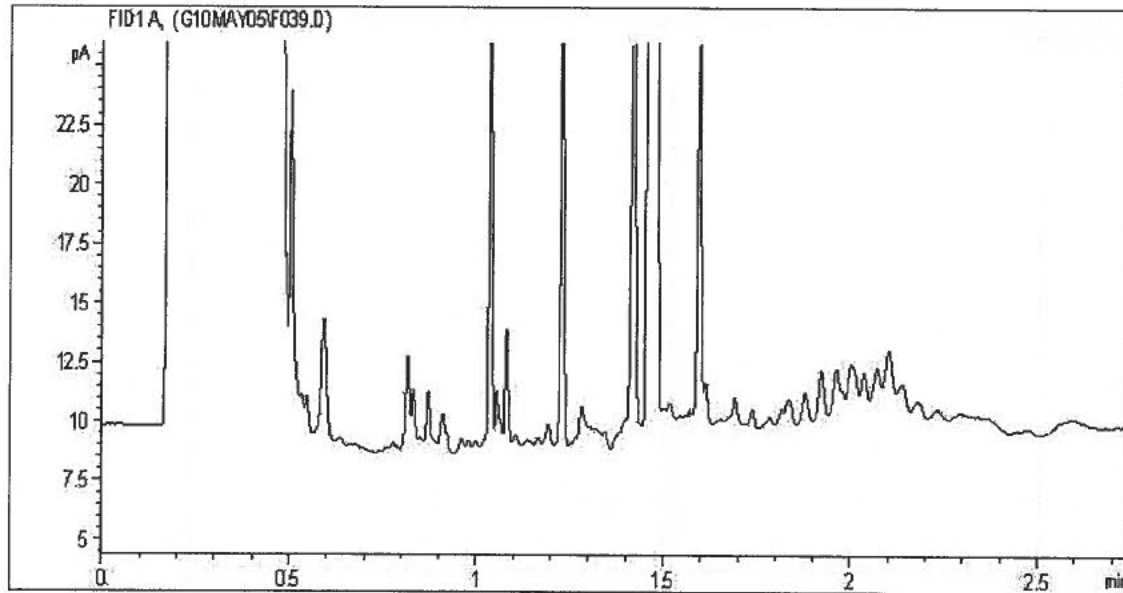
Main Chain of Custody Table: Columns include Sample ID (G056-G059), Date Sampled, Sampled (Yes/No), and Remarks (All Surfactants).

Final Summary and Signatures: Date (29-Apr-16 11:15), Analyst (Shamoz Akbar), Signature, and Company Name (MBU).

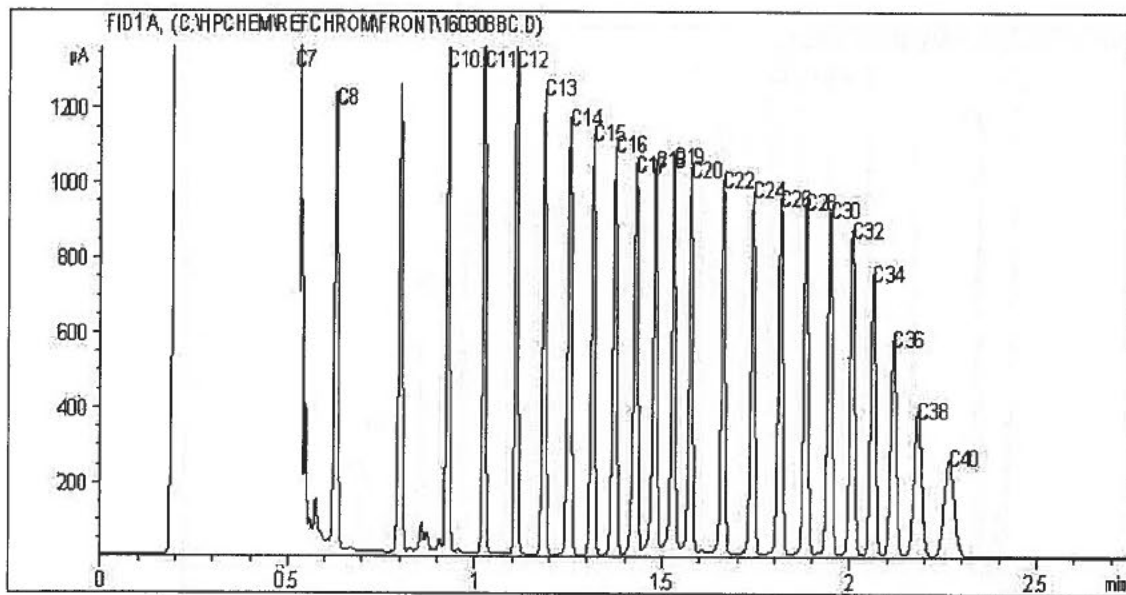
Maxxam Job #: B632396  
 Report Date: 2016/05/06  
 Maxxam Sample: ON6562

Current Environmental  
 Client Project #: F AND G  
 Site Reference: COMOX LAKE  
 Client ID: G056

EPH in Water when PAH required Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

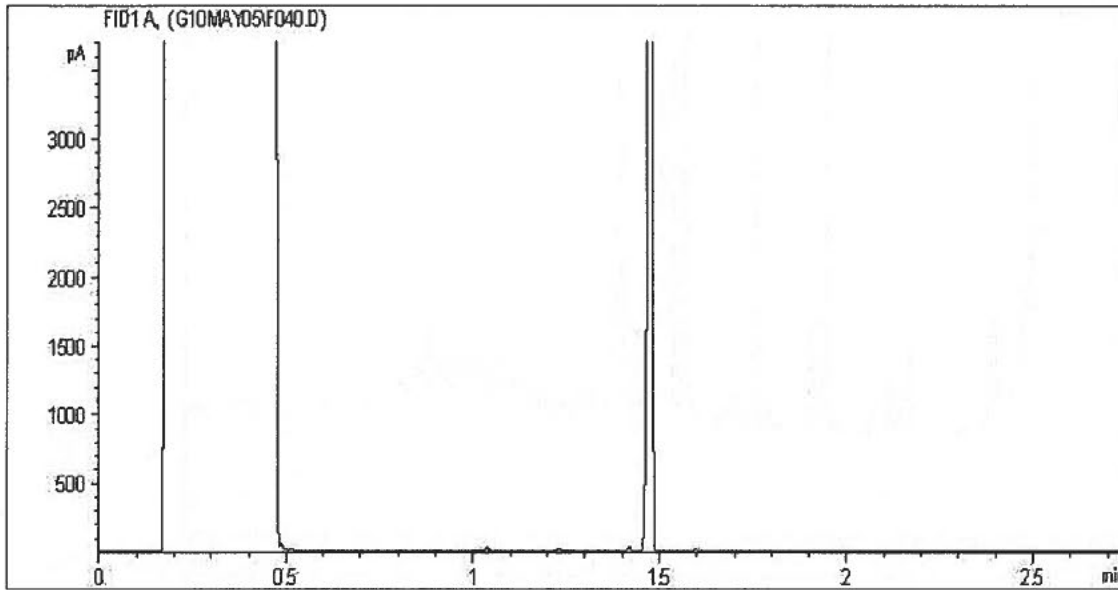
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

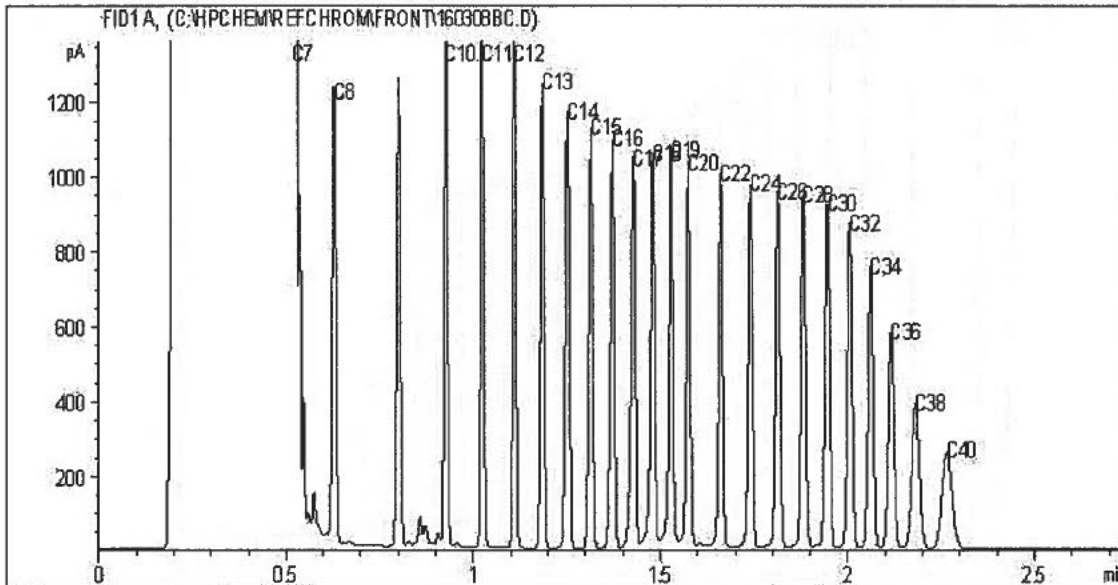
Maxxam Job #: B632396  
 Report Date: 2016/05/06  
 Maxxam Sample: ON6563

Current Environmental  
 Client Project #: F AND G  
 Site Reference: COMOX LAKE  
 Client ID: G057

EPH in Water when PAH required Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

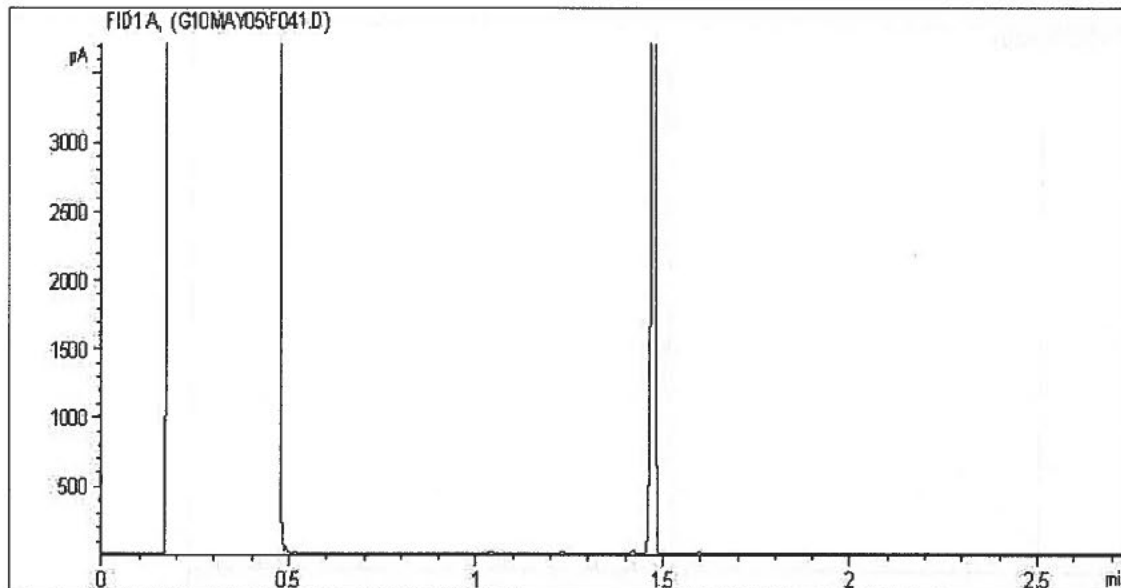
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

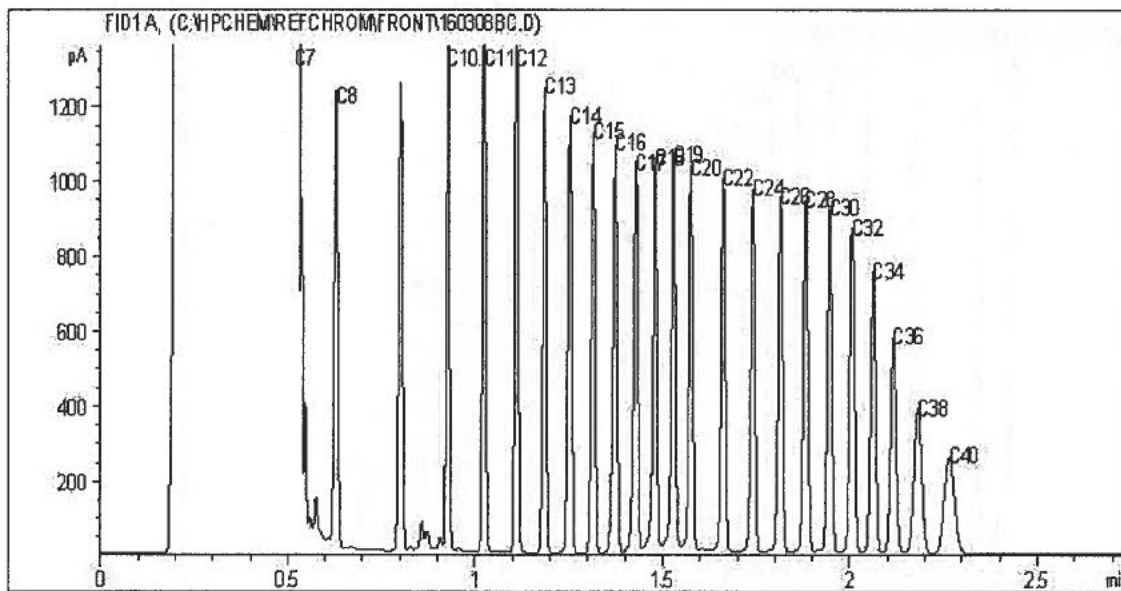
Maxxam Job #: B632396  
 Report Date: 2016/05/06  
 Maxxam Sample: ON6564

Current Environmental  
 Client Project #: F AND G  
 Site Reference: COMOX LAKE  
 Client ID: G058

EPH in Water when PAH required Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

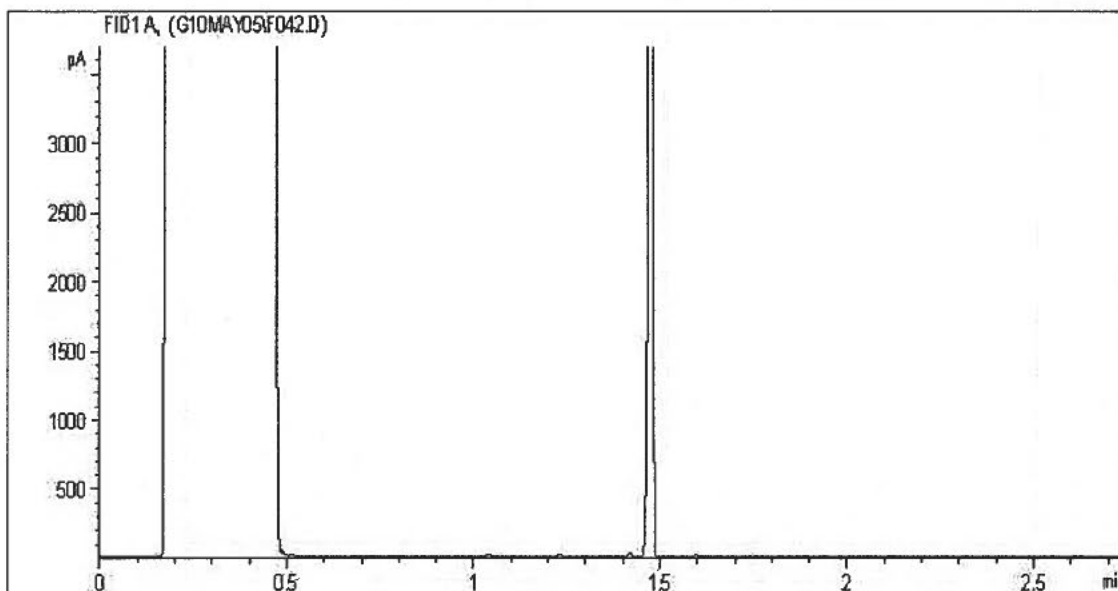
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating oils:	C20 - C40

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

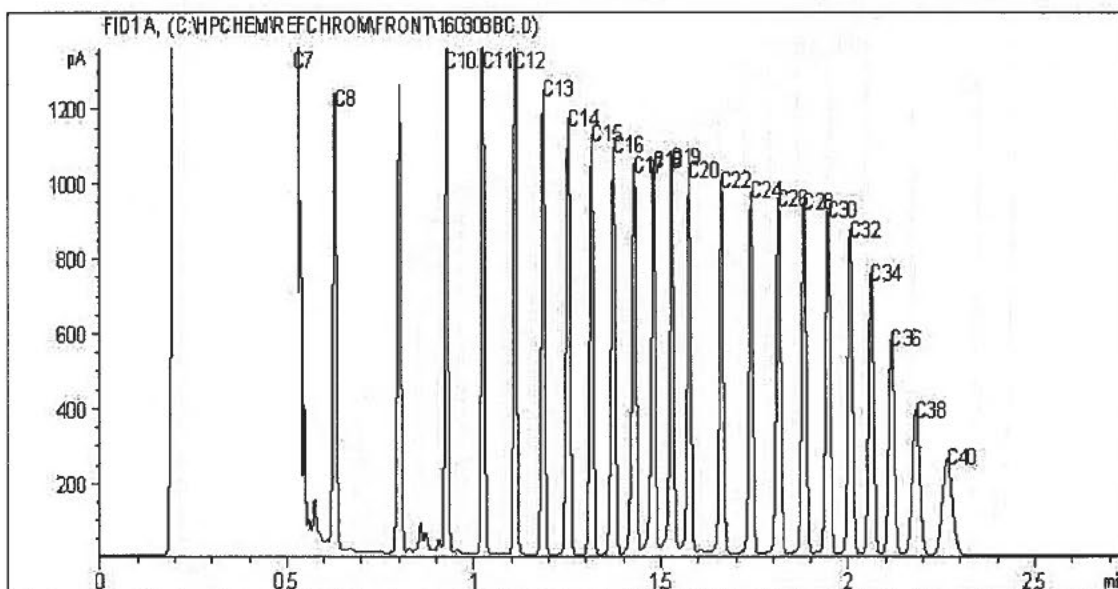
Maxxam Job #: B632396  
 Report Date: 2016/05/06  
 Maxxam Sample: ON6565

Current Environmental  
 Client Project #: F AND G  
 Site Reference: COMOX LAKE  
 Client ID: G059

EPH in Water when PAH required Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.



Exova  
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 V3S 8P8, Canada

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 F: +1 (604) 514-3323  
 E: Surrey@exova.com  
 W: www.exova.com



## Report Transmission Cover Page

Bill To: Maxxam Analytics	Project:	Lot ID: <b>1135145</b>
Report To: Maxxam Analytics	ID: Job#B632396	Control Number:
4606 Canada Way	Name:	Date Received: May 2, 2016
Burnaby, BC, Canada	Location:	Date Reported: May 6, 2016
V5G 1K5	LSD:	Report Number: 2100159
Attn: Customer Service	P.O.:	
Sampled By:	Acct code:	
Company:		

Contact & Affiliation	Address	Delivery Commitments
Accounts Payable Maxxam Analytics	#500 1919 Minnesota Court, Mississauga, Ontario L5N 0C9 Phone: (866) 611-1118 Fax: (905) 288-2169 Email: accountspayablebc@maxxam.ca	On [Lot Approval and Final Test Report Approval] send (Invoice) by Email - Single Report
Customer Service Maxxam Analytics	4606 Canada Way Burnaby, British Columbia V5G 1K5 Phone: (604) 734-7276 Fax: (604) 731-2386 Email: customerservicebc@maxxam.ca	On [Lot Verification] send (COA) by Email - Single Report On [Report Approval] send (COC, Test Report) by Email - Merge Reports
Shanaz Akbar Maxxam Analytics	4606 Canada Way Burnaby, British Columbia V5G 1K5 Phone: (604) 734-7276 Fax: (604) 731-2386 Email: sakbar@maxxam.ca	On [Lot Verification] send (COA) by Email - Single Report On [Report Approval] send (Test Report, COC) by Email - Merge Reports

### Notes To Clients:

- Analysis was performed on sample # 1135145-1 that exceeded the recommended holding time for surfactants analysis.

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## Analytical Report

Bill To: Maxxam Analytics	Project:	Lot ID: <b>1135145</b>
Report To: Maxxam Analytics	ID: Job#B632396	Control Number:
4606 Canada Way	Name:	Date Received: May 2, 2016
Burnaby, BC, Canada	Location:	Date Reported: May 6, 2016
V5G 1K5	LSD:	Report Number: 2100159
Attn: Customer Service	P.O.:	
Sampled By:	Acct code:	
Company:		

	Reference Number	1135145-1	1135145-2	1135145-3	
	Sample Date	Apr 29, 2016	Apr 29, 2016	Apr 29, 2016	
	Sample Time	10:00	10:05	10:10	
	Sample Location				
	Sample Description	ON6562-01\G056	ON6563-01\G057	ON6564-01\G058	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
<b>Aggregate Organic Constituents</b>					
Surfactants	Methylene Blue Active	mg/L	<0.05	<0.05	0.07
					0.05

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**Analytical Report**

Bill To: Maxxam Analytics  
Report To: Maxxam Analytics  
4606 Canada Way  
Burnaby, BC, Canada  
V5G 1K5  
Attn: Customer Service  
Sampled By:  
Company:

Project:  
ID: Job#B632396  
Name:  
Location:  
LSD:  
P.O.:  
Acct code:

Lot ID: **1135145**  
Control Number:  
Date Received: May 2, 2016  
Date Reported: May 6, 2016  
Report Number: 2100159

Reference Number 1135145-4  
Sample Date Apr 29, 2016  
Sample Time 10:15  
Sample Location  
Sample Description ON6565-01\G059  
Matrix Water

Analyte	Units	Results	Results	Results	Nominal Detection Limit
<b>Aggregate Organic Constituents</b>					
Surfactants	Methylene Blue Active	mg/L	<0.05		0.05

Approved by:

Carol Nam, Dipl. T.  
Quality Officer

Data have been validated by Analytical Quality Control and Exova's Integrated Data Validation System (IDVS).  
Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

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**Exova****Methodology and Notes**

Bill To: Maxxam Analytics	Project:	Lot ID: <b>1135145</b>
Report To: Maxxam Analytics	ID: Job#B632396	Control Number:
4606 Canada Way	Name:	Date Received: May 2, 2016
Burnaby, BC, Canada	Location:	Date Reported: May 6, 2016
V5G 1K5	LSD:	Report Number: 2100159
Attn: Customer Service	P.O.:	
Sampled By:	Acct code:	
Company:		

**Method of Analysis**

Method Name	Reference	Method	Date Analysis Started	Location
Surfactants in water - anionic (Surrey)	APHA	* Anionic Surfactants as MBAS, 5540 C	04-May-16	Exova Surrey

\* Reference Method Modified

**References**

APHA	Standard Methods for the Examination of Water and Wastewater
------	--

**Comments:**

- Analysis was performed on sample # 1135145-1 that exceeded the recommended holding time for surfactants analysis.

Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.

Maxxam Analytics  
2755-B Moray Avenue  
Courtenay, British Columbia, V9N 8M9  
(250) 338 7786  
(250) 338 7553



Maxxam PM Shanaz Akbar

SUBCONTRACTING REQUEST FORM

To: **Sub Vancouver to Exova BC**

Job# **B632396**

- Yes  No Charge us Rush charge (If rush charges are required to meet due date and Yes box is not checked, please call us)
- Yes  No International Sample/BioHazard (if yes, add copy of Movement Cert., heat treat is required prior to disposal)
- Yes  No Special Protocol (if yes, Protocol \_\_\_\_\_)

Sample ID	Matrix	Test(s) Required	Container	Date Sampled	Date Required
ON6562-01R\G056	WATER	MBAS Surfactants Subcontract	1-1LAG	2016/04/29 10:00	2016/05/13
ON6563-01R\G057	WATER	MBAS Surfactants Subcontract	1-1LAG	2016/04/29 10:05	2016/05/13
ON6564-01R\G058	WATER	MBAS Surfactants Subcontract	1-1LAG	2016/04/29 10:10	2016/05/13
ON6565-01R\G059	WATER	MBAS Surfactants Subcontract	1-1LAG	2016/04/29 10:15	2016/05/13

	Temp. 1	Temp. 2	Temp. 3			
Cooler #1	9	8	9	Custody Seal Present	YES	NO
				Custody Seal Intact	YES	NO
				Ice Present Upon Receipt	YES	NO
Cooler #2				Custody Seal Present	YES	NO
				Custody Seal Intact	YES	NO
				Ice Present Upon Receipt	YES	NO
Cooler #3				Custody Seal Present	YES	NO
				Custody Seal Intact	YES	NO
				Ice Present Upon Receipt	YES	NO

Receiving Maxxam Location: **Sub Vancouver to Exova BC**

JOB # \_\_\_\_\_

Relinquished by (Sign) *M. Intosh* (print) MIC Intosh

Date and Time Apr. 29/16

Received by (Sign) *[Signature]* (print) KEVIN CHONG

Date and Time 2016/04/29  
17:20

NOTES:

- Please call us if due date cannot be met. Please reference Sample ID on your report.
- Include copy of this completed form, Client COC & signed final report to [CustomerServiceBc@MaxxamAnalytics.com](mailto:CustomerServiceBc@MaxxamAnalytics.com) and to [SAkbar@maxxam.ca](mailto:SAkbar@maxxam.ca)

Reporting Requirements:

Lot: **1135145** COC

RECEIVED

National:

MAY 02 2016

Regional:



*JC*

Shipping Instructions

- Ship Immediately (highlight Yellow)
- Requires 9am
- Requires Sat. Delivery
- Regular Ship next available day
- Sender (Print) \_\_\_\_\_ Initial \_\_\_\_\_

- Ship Cold
- Ship Room Temp
- Ship Frozen

Shipping Department Checklist

- Correct Shipping location
- Correct Sample Ids (Paperwork vs Bottles)
- Yes  No Special-Cooler, Ice, Tape-custody seal, Date&Sign
- Date Shipped \_\_\_\_\_ Number of coolers \_\_\_\_\_
- Shipper (Print) \_\_\_\_\_ Initial \_\_\_\_\_



Your Project #: F AND G  
 Site Location: COMOX LAKE  
 Your C.O.C. #: G114689

**Attention: Dusty Silvester**

Current Environmental  
 244 - 4th Street  
 Courtenay, BC  
 Canada V9N 1G6

**Report Date: 2016/09/19**

Report #: R2263641

Version: 1 - Final

**CERTIFICATE OF ANALYSIS****MAXXAM JOB #: B672774**

Received: 2016/08/25, 16:30

Sample Matrix: Water  
 # Samples Received: 4

Analyses	Quantity	Date		Laboratory Method	Analytical Method
		Extracted	Analyzed		
Coliforms & E.coli by Quantitray (MPN)	4	N/A	2016/08/25	CTYSOP-00002	Based on SM-9223
EPH in Water when PAH required (1)	4	2016/08/29	2016/09/02	BBY8SOP-00029	BCMOE EPH w 12/00 m
PAH in Water by GC/MS (SIM) (1)	4	2016/08/29	2016/08/29	BBY8SOP-00021	EPA 8270d R4 m
Total LMW, HMW, Total PAH Calc (1)	4	N/A	2016/08/30	BBY WI-00033	Auto Calc
EPH less PAH in Water by GC/FID (1)	4	N/A	2016/09/02	BBY WI-00033	Auto Calc
MBAS Surfactants Subcontract (2)	4	2016/09/19	2016/09/19		

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

\* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Vancouver

(2) This test was performed by Sub Vancouver to Exova BC

**Encryption Key**

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

BC Env Customer Service, BC Environmental Customer Service

Email: Enviro.CS.BC@maxxam.ca

Phone# (250) 338 7786

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Maxxam Job #: B672774  
Report Date: 2016/09/19

Current Environmental  
Client Project #: F AND G  
Site Location: COMOX LAKE

### RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		PJ0859	PJ0860	PJ0861	PJ0862	
Sampling Date		2016/08/25 13:30	2016/08/25 13:30	2016/08/25 13:35	2016/08/25 13:40	
COC Number		G114689	G114689	G114689	G114689	
	UNITS	G056-2	G057-2	G058-2	G059-2	QC Batch
<b>Parameter</b>						
Subcontract Parameter	N/A	ATTACHED	ATTACHED	ATTACHED	ATTACHED	8403287



Maxxam Job #: B672774  
Report Date: 2016/09/19

Current Environmental  
Client Project #: F AND G  
Site Location: COMOX LAKE

### MICROBIOLOGY (WATER)

Maxxam ID		PJ0859	PJ0860	PJ0861	PJ0862		
Sampling Date		2016/08/25 13:30	2016/08/25 13:30	2016/08/25 13:35	2016/08/25 13:40		
COC Number		G114689	G114689	G114689	G114689		
	UNITS	G056-2	G057-2	G058-2	G059-2	RDL	QC Batch
<b>Microbiological Param.</b>							
Total Coliforms	MPN/100mL	>200.5	144.5	47.8	42.9	1	8378212
E. coli	MPN/100mL	2.0	2.0	<1	<1	1	8378212
RDL = Reportable Detection Limit							





Maxxam Job #: B672774  
Report Date: 2016/09/19

Current Environmental  
Client Project #: F AND G  
Site Location: COMOX LAKE

### LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)

Maxxam ID		PJ0859	PJ0860	PJ0861	PJ0862		
Sampling Date		2016/08/25 13:30	2016/08/25 13:30	2016/08/25 13:35	2016/08/25 13:40		
COC Number		G114689	G114689	G114689	G114689		
	UNITS	G056-2	G057-2	G058-2	G059-2	RDL	QC Batch
<b>Polycyclic Aromatics</b>							
Low Molecular Weight PAH's	ug/L	<0.24	<0.24	<0.24	<0.24	0.24	8375992
High Molecular Weight PAH's	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	8375992
Total PAH	ug/L	<0.24	<0.24	<0.24	<0.24	0.24	8375992
Naphthalene	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	8380243
2-Methylnaphthalene	ug/L	<0.10	<0.10	<0.10	<0.10	0.10	8380243
Quinoline	ug/L	<0.24	<0.24	<0.24	<0.24	0.24	8380243
Acenaphthylene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	8380243
Acenaphthene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	8380243
Fluorene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	8380243
Phenanthrene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	8380243
Anthracene	ug/L	<0.010	<0.010	<0.010	<0.010	0.010	8380243
Acridine	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	8380243
Fluoranthene	ug/L	<0.020	<0.020	<0.020	<0.020	0.020	8380243
Pyrene	ug/L	<0.020	<0.020	<0.020	<0.020	0.020	8380243
Benzo(a)anthracene	ug/L	<0.010	<0.010	<0.010	<0.010	0.010	8380243
Chrysene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	8380243
Benzo(b&j)fluoranthene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	8380243
Benzo(k)fluoranthene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	8380243
Benzo(a)pyrene	ug/L	<0.0090	<0.0090	<0.0090	<0.0090	0.0090	8380243
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	8380243
Dibenz(a,h)anthracene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	8380243
Benzo(g,h,i)perylene	ug/L	<0.050	<0.050	<0.050	<0.050	0.050	8380243
<b>Calculated Parameters</b>							
LEPH (C10-C19 less PAH)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	8375993
HEPH (C19-C32 less PAH)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	8375993
<b>Ext. Pet. Hydrocarbon</b>							
EPH (C10-C19)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	8380259
EPH (C19-C32)	mg/L	<0.20	<0.20	<0.20	<0.20	0.20	8380259
<b>Surrogate Recovery (%)</b>							
O-TERPHENYL (sur.)	%	92	94	93	96		8380259
D10-ANTHRACENE (sur.)	%	107	110	112	111		8380243
D8-ACENAPHTHYLENE (sur.)	%	107	111	111	110		8380243
RDL = Reportable Detection Limit							



Maxxam Job #: B672774  
Report Date: 2016/09/19

Current Environmental  
Client Project #: F AND G  
Site Location: COMOX LAKE

**LEPH & HEPH WITH CSR/CCME PAH IN WATER (WATER)**

Maxxam ID		PJ0859	PJ0860	PJ0861	PJ0862		
Sampling Date		2016/08/25 13:30	2016/08/25 13:30	2016/08/25 13:35	2016/08/25 13:40		
COC Number		G114689	G114689	G114689	G114689		
	<b>UNITS</b>	<b>G056-2</b>	<b>G057-2</b>	<b>G058-2</b>	<b>G059-2</b>	<b>RDL</b>	<b>QC Batch</b>
D8-NAPHTHALENE (sur.)	%	94	98	100	106		8380243
D9-Acridine	%	82	83	84	85		8380243
TERPHENYL-D14 (sur.)	%	102	102	104	106		8380243
RDL = Reportable Detection Limit							



Maxxam Job #: B672774  
Report Date: 2016/09/19

Current Environmental  
Client Project #: F AND G  
Site Location: COMOX LAKE

**GENERAL COMMENTS**

Results relate only to the items tested.



Maxxam Job #: B672774  
Report Date: 2016/09/19

Current Environmental  
Client Project #: F AND G  
Site Location: COMOX LAKE

### QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits			
8378212	MVS	RPD	Total Coliforms	2016/08/25	NC		%	N/A			
			E. coli	2016/08/25	NC		%	N/A			
			Total Coliforms	2016/08/25	NC		%	N/A			
			E. coli	2016/08/25	NC		%	N/A			
			Total Coliforms	2016/08/25	NC		%	N/A			
			E. coli	2016/08/25	NC		%	N/A			
			Total Coliforms	2016/08/25	NC		%	N/A			
8380243	LS2	Matrix Spike	E. coli	2016/08/25	39		%	N/A			
			D10-ANTHRACENE (sur.)	2016/08/29		110	%	60 - 130			
			D8-ACENAPHTHYLENE (sur.)	2016/08/29		117	%	50 - 130			
			D8-NAPHTHALENE (sur.)	2016/08/29		77	%	50 - 130			
			D9-Acridine	2016/08/29		98	%	50 - 130			
			TERPHENYL-D14 (sur.)	2016/08/29		94	%	60 - 130			
			Naphthalene	2016/08/29		NC	%	50 - 130			
			2-Methylnaphthalene	2016/08/29		NC	%	50 - 130			
			Quinoline	2016/08/29		NC	%	50 - 130			
			Acenaphthylene	2016/08/29		135 (1)	%	50 - 130			
			Acenaphthene	2016/08/29		NC	%	50 - 130			
			Fluorene	2016/08/29		NC	%	50 - 130			
			Phenanthrene	2016/08/29		NC	%	60 - 130			
			Anthracene	2016/08/29		104	%	60 - 130			
			Acridine	2016/08/29		93	%	50 - 130			
			Fluoranthene	2016/08/29		96	%	60 - 130			
			Pyrene	2016/08/29		95	%	60 - 130			
			Benzo(a)anthracene	2016/08/29		102	%	60 - 130			
			Chrysene	2016/08/29		97	%	60 - 130			
			Benzo(b&j)fluoranthene	2016/08/29		97	%	60 - 130			
			Benzo(k)fluoranthene	2016/08/29		90	%	60 - 130			
			Benzo(a)pyrene	2016/08/29		89	%	60 - 130			
			Indeno(1,2,3-cd)pyrene	2016/08/29		74	%	60 - 130			
			Dibenzo(a,h)anthracene	2016/08/29		75	%	60 - 130			
			Benzo(g,h,i)perylene	2016/08/29		70	%	60 - 130			
			8380243	LS2	Spiked Blank	D10-ANTHRACENE (sur.)	2016/08/29		115	%	60 - 130
						D8-ACENAPHTHYLENE (sur.)	2016/08/29		114	%	50 - 130
						D8-NAPHTHALENE (sur.)	2016/08/29		107	%	50 - 130
D9-Acridine	2016/08/29					103	%	50 - 130			
TERPHENYL-D14 (sur.)	2016/08/29					111	%	60 - 130			
Naphthalene	2016/08/29					102	%	50 - 130			
2-Methylnaphthalene	2016/08/29					108	%	50 - 130			
Quinoline	2016/08/29					114	%	50 - 130			
Acenaphthylene	2016/08/29					108	%	50 - 130			
Acenaphthene	2016/08/29					109	%	50 - 130			
Fluorene	2016/08/29					106	%	50 - 130			
Phenanthrene	2016/08/29					107	%	60 - 130			
Anthracene	2016/08/29					112	%	60 - 130			
Acridine	2016/08/29					106	%	50 - 130			
Fluoranthene	2016/08/29					106	%	60 - 130			
Pyrene	2016/08/29					105	%	60 - 130			
Benzo(a)anthracene	2016/08/29					116	%	60 - 130			
Chrysene	2016/08/29					113	%	60 - 130			
Benzo(b&j)fluoranthene	2016/08/29					122	%	60 - 130			
Benzo(k)fluoranthene	2016/08/29					120	%	60 - 130			
Benzo(a)pyrene	2016/08/29					117	%	60 - 130			
Indeno(1,2,3-cd)pyrene	2016/08/29					116	%	60 - 130			



Maxxam Job #: B672774  
Report Date: 2016/09/19

Current Environmental  
Client Project #: F AND G  
Site Location: COMOX LAKE

## QUALITY ASSURANCE REPORT(CONT'D)

QA/QC			Parameter	Date	Value	Recovery	UNITS	QC Limits
Batch	Init	QC Type		Analyzed				
8380243	LS2	Method Blank	Dibenz(a,h)anthracene	2016/08/29		117	%	60 - 130
			Benzo(g,h,i)perylene	2016/08/29		111	%	60 - 130
			D10-ANTHRACENE (sur.)	2016/08/29		115	%	60 - 130
			D8-ACENAPHTHYLENE (sur.)	2016/08/29		113	%	50 - 130
			D8-NAPHTHALENE (sur.)	2016/08/29		107	%	50 - 130
			D9-Acridine	2016/08/29		90	%	50 - 130
			TERPHENYL-D14 (sur.)	2016/08/29		112	%	60 - 130
			Naphthalene	2016/08/29	<0.10		ug/L	
			2-Methylnaphthalene	2016/08/29	<0.10		ug/L	
			Quinoline	2016/08/29	<0.24		ug/L	
			Acenaphthylene	2016/08/29	<0.050		ug/L	
			Acenaphthene	2016/08/29	<0.050		ug/L	
			Fluorene	2016/08/29	<0.050		ug/L	
			Phenanthrene	2016/08/29	<0.050		ug/L	
			Anthracene	2016/08/29	<0.010		ug/L	
			Acridine	2016/08/29	<0.050		ug/L	
			Fluoranthene	2016/08/29	<0.020		ug/L	
			Pyrene	2016/08/29	<0.020		ug/L	
			Benzo(a)anthracene	2016/08/29	<0.010		ug/L	
			Chrysene	2016/08/29	<0.050		ug/L	
			Benzo(b&j)fluoranthene	2016/08/29	<0.050		ug/L	
			Benzo(k)fluoranthene	2016/08/29	<0.050		ug/L	
			Benzo(a)pyrene	2016/08/29	<0.0090		ug/L	
			Indeno(1,2,3-cd)pyrene	2016/08/29	<0.050		ug/L	
			Dibenz(a,h)anthracene	2016/08/29	<0.050		ug/L	
			Benzo(g,h,i)perylene	2016/08/29	<0.050		ug/L	
			8380243	LS2	RPD	Naphthalene	2016/08/30	5.5
2-Methylnaphthalene	2016/08/30	6.1					%	40
Quinoline	2016/08/30	NC (2)					%	40
Acenaphthylene	2016/08/30	NC					%	40
Acenaphthene	2016/08/30	7.1					%	40
Fluorene	2016/08/30	6.6					%	40
Phenanthrene	2016/08/30	4.9					%	40
Anthracene	2016/08/30	9.6					%	40
Acridine	2016/08/30	NC					%	40
Fluoranthene	2016/08/30	NC					%	40
Pyrene	2016/08/30	NC					%	40
Benzo(a)anthracene	2016/08/30	NC					%	40
Chrysene	2016/08/30	NC					%	40
Benzo(b&j)fluoranthene	2016/08/30	NC					%	40
Benzo(k)fluoranthene	2016/08/30	NC					%	40
Benzo(a)pyrene	2016/08/30	NC					%	40
Indeno(1,2,3-cd)pyrene	2016/08/30	NC					%	40
Dibenz(a,h)anthracene	2016/08/30	NC					%	40
Benzo(g,h,i)perylene	2016/08/30	NC					%	40
8380259	IT1	Matrix Spike				O-TERPHENYL (sur.)	2016/09/02	
			EPH (C10-C19)	2016/09/02		94	%	50 - 130
			EPH (C19-C32)	2016/09/02		93	%	50 - 130
8380259	IT1	Spiked Blank	O-TERPHENYL (sur.)	2016/09/02		95	%	50 - 130
			EPH (C10-C19)	2016/09/02		94	%	50 - 130
			EPH (C19-C32)	2016/09/02		92	%	50 - 130
8380259	IT1	Method Blank	O-TERPHENYL (sur.)	2016/09/02		98	%	50 - 130
			EPH (C10-C19)	2016/09/02	<0.20		mg/L	
			EPH (C19-C32)	2016/09/02	<0.20		mg/L	



Maxxam Job #: B672774  
Report Date: 2016/09/19

Current Environmental  
Client Project #: F AND G  
Site Location: COMOX LAKE

### QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8380259	IT1	RPD	EPH (C10-C19)	2016/09/02	2.6		%	30
			EPH (C19-C32)	2016/09/02	NC		%	30

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) Detection limits raised due to matrix interference.

Maxxam Job #: B672774  
Report Date: 2016/09/19

Current Environmental  
Client Project #: F AND G  
Site Location: COMOX LAKE

**VALIDATION SIGNATURE PAGE**

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Rob Reinert, B.Sc., Scientific Specialist

---

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

G 114689

BBY FCO-00077/05

Page 1 of 1

CALL ROBERT WONG for CC  
250 703 1196

CHAIN OF CUSTODY RECORD

**Maxxam**  
A Bureau Veritas Group Company

Burnaby: 4606 Canada Way, Burnaby, BC, V5G 1L5, Toll Free (800) 665-8565

**Company Name:** CURRENT ENVIRONMENTAL  
**Contact Name:** DUSTY SILVESTER  
**Address:** 518 ENGLAND AVE  
 COULTERNAVA BC  
**Phone:** 250 871 1944  
**Email:** current.environmental@maxxam.com

**Company Name:**  
**Contact Name:**  
**Address:**  
**Phone:**  
**Email:**

**Project Information (where applicable)**  
**Quantity #:**  
**PC #/ APE:** F and G  
**Project #:** COMOR LAKE  
**Site Location:** DS & DW  
**Site #:**

**Turnaround Time (TAT) Required**  
 Regular TAT (5 days (weekends/ holidays))  
 Rush TAT (Same Day)  
 2 Days  
 3 Days

**Date Required:**  
**Rush Confirmation #:**

Sample Identification	Lab Identification	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Analysis Requested		# OF CONTAINERS SUBMITTED	HOLD - DO NOT ANALYZE	COMMENTS
				Regulatory Criteria	Special Instructions			
1 G056-2		2016/08/25	1330	<input checked="" type="checkbox"/> BAC	<input type="checkbox"/> BAC/CFU			TH Coliforms/EC
2 G057-2		u	1330	<input type="checkbox"/> BAC	<input type="checkbox"/> BAC/CFU			X X X X
3 G058-2		u	1335	<input type="checkbox"/> BAC	<input type="checkbox"/> BAC/CFU			X X X X
4 G059-2		u	1340	<input type="checkbox"/> BAC	<input type="checkbox"/> BAC/CFU			X X X X
5								
6								
7								
8								
9								
10								

**Regulatory Criteria:**  
 BAC  
 BAC/CFU  
 CFU (Specify)  
 Drinking Water  
 BC CWI Water  
 Other (Specify)  
 BC Water Quality

**Special Instructions:**  
 Return Cooler  
 Skip Sample Bottles (Please Specify)

**Signature/Print:** [Signature]  
**DATE:** 2016/08/25  
**TIME:** 16:15

**Signature/Print:** [Signature]  
**DATE:** 2016/08/25  
**TIME:** 16:30

**RECEIVED BY:** [Signature]  
**DATE:** 2016/08/25  
**TIME:** 16:30

B672774

MBU

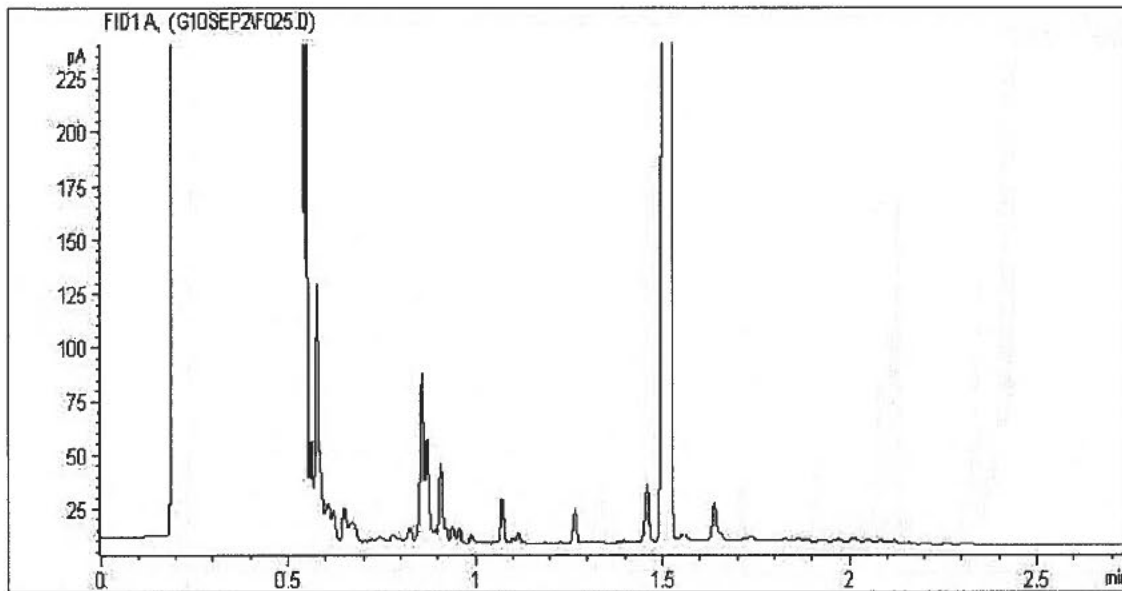
COC-1020



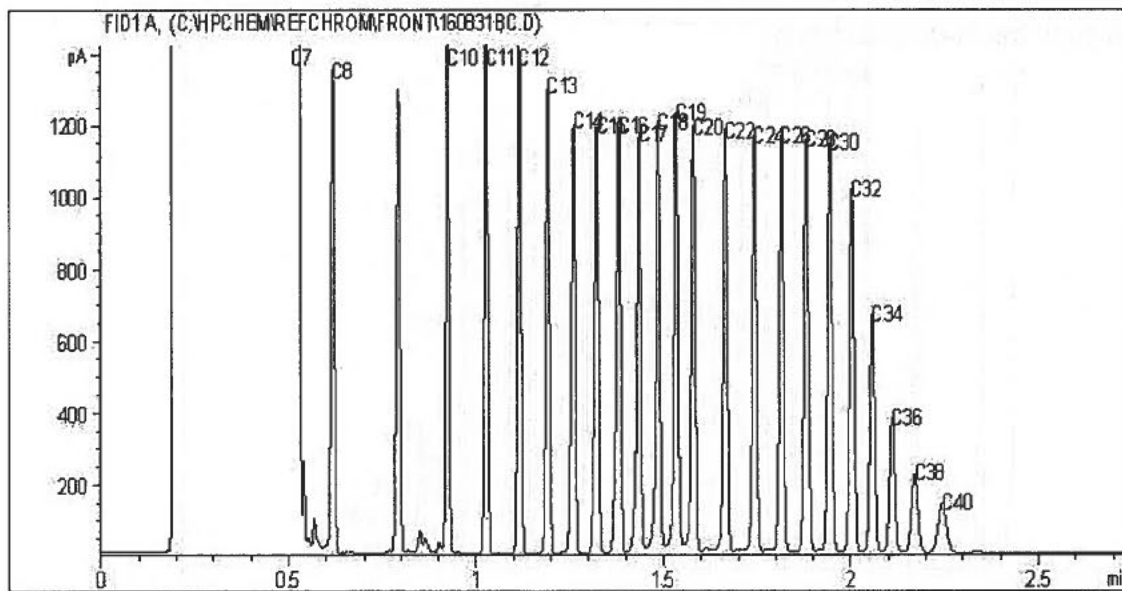
Maxxam Job #: B672774  
 Report Date: 2016/09/19  
 Maxxam Sample: PJ0859

Current Environmental  
 Client Project #: F AND G  
 Site Reference: COMOX LAKE  
 Client ID: G056-2

EPH in Water when PAH required Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

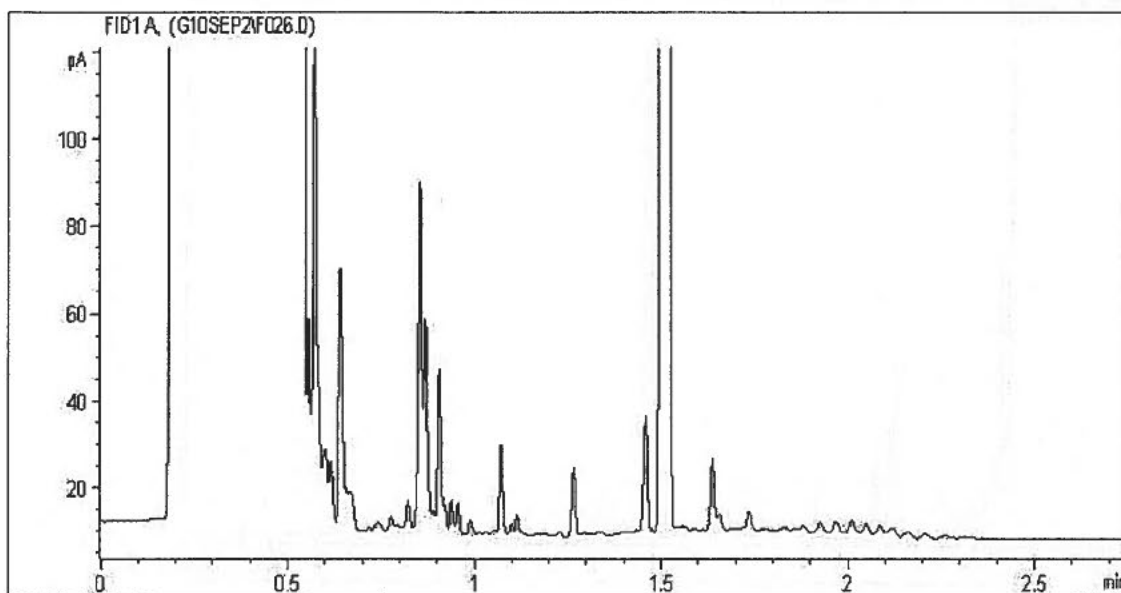
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating oils:	C20 - C40

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

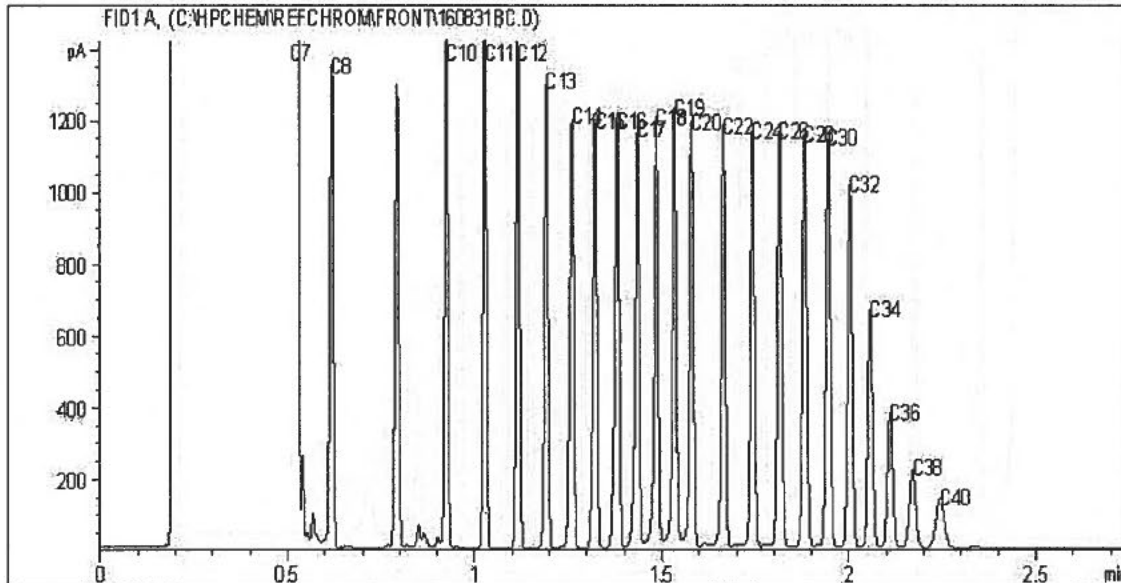
Maxxam Job #: B672774  
 Report Date: 2016/09/19  
 Maxxam Sample: PJ0860

Current Environmental  
 Client Project #: F AND G  
 Site Reference: COMOX LAKE  
 Client ID: G057-2

EPH in Water when PAH required Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: C4 - C12

Diesel: C8 - C22

Varsol: C8 - C12

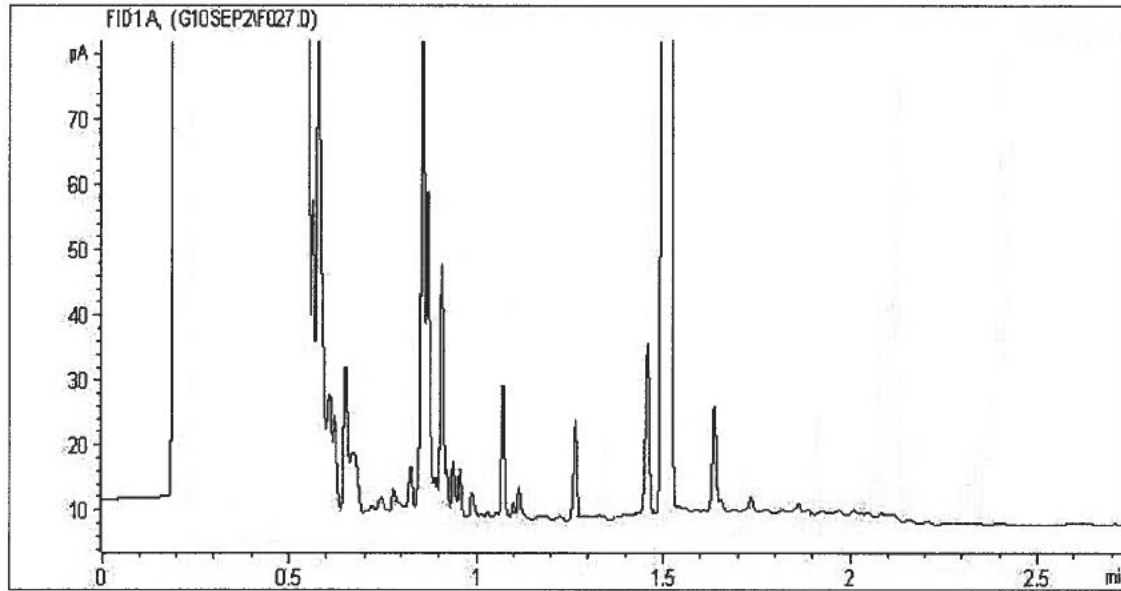
Lubricating Oils: C20 - C40

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

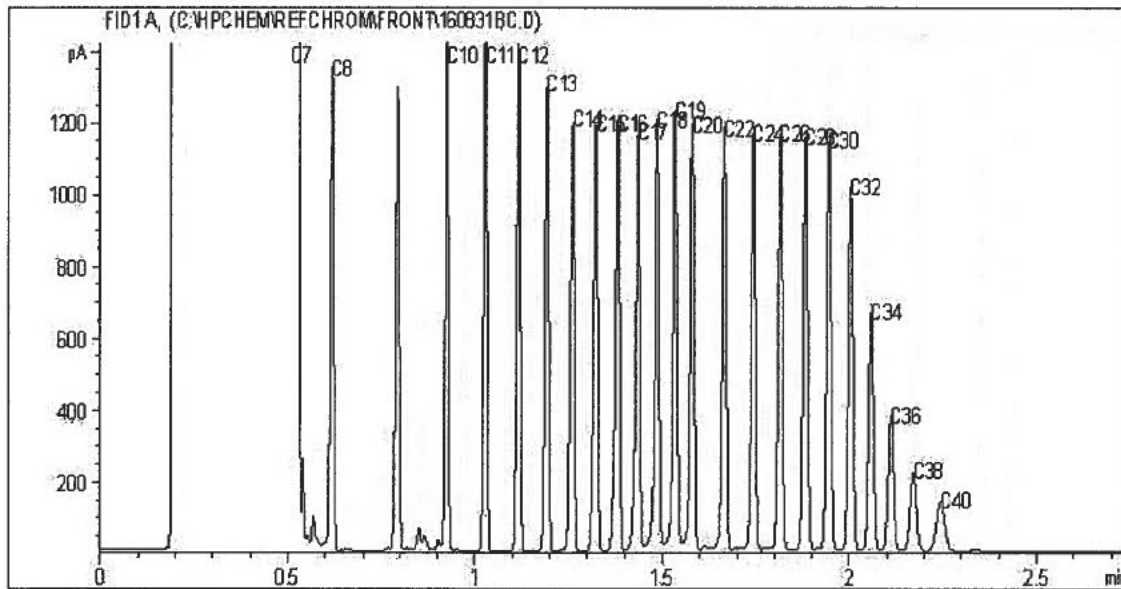
Maxxam Job #: B672774  
 Report Date: 2016/09/19  
 Maxxam Sample: PJ0861

Current Environmental  
 Client Project #: F AND G  
 Site Reference: COMOX LAKE  
 Client ID: G058-2

EPH in Water when PAH required Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

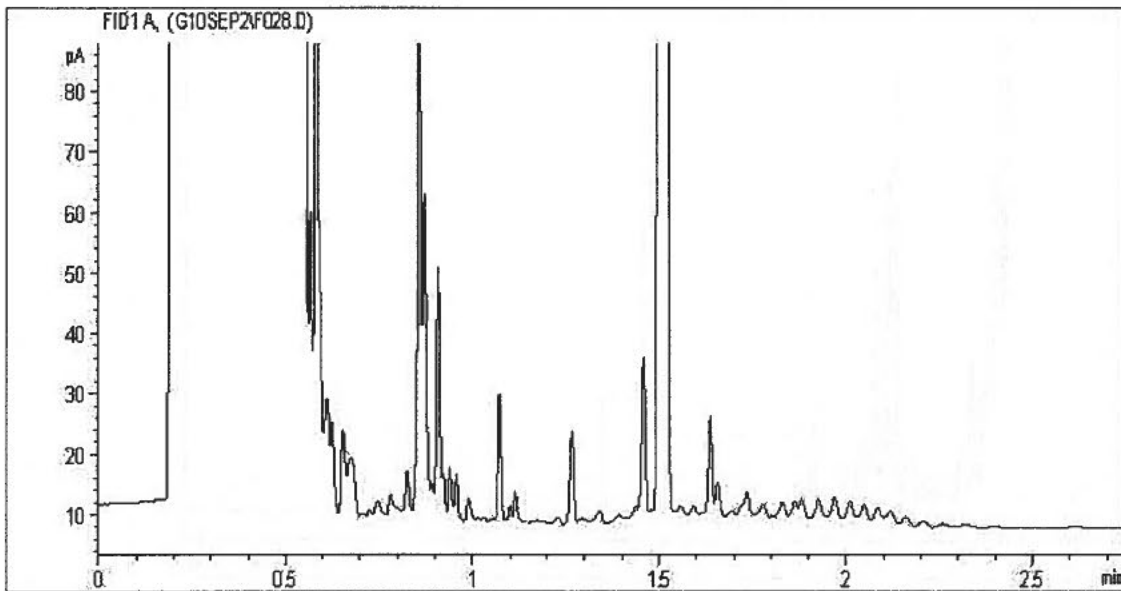
Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

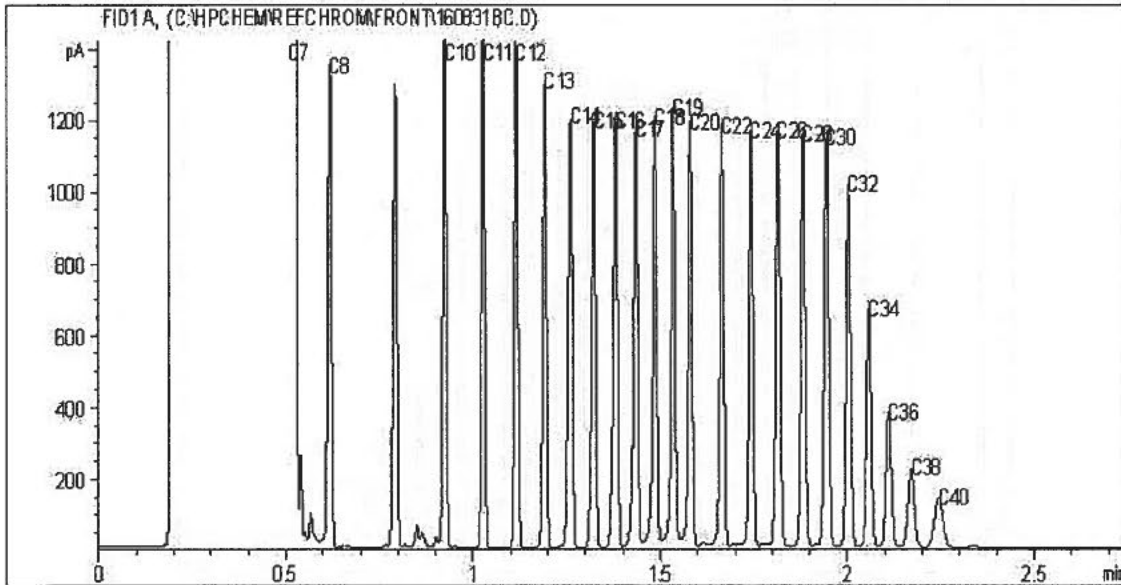
Maxxam Job #: B672774  
 Report Date: 2016/09/19  
 Maxxam Sample: PJ0862

Current Environmental  
 Client Project #: F AND G  
 Site Reference: COMOX LAKE  
 Client ID: G059-2

EPH in Water when PAH required Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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## Report Transmission Cover Page

Bill To: Maxxam Analytics	Project:	Lot ID: <b>1157742</b>
Report To: Maxxam Analytics	ID: Job#B672774	Control Number:
4606 Canada Way	Name:	Date Received: Aug 29, 2016
Burnaby, BC, Canada	Location:	Date Reported: Sep 2, 2016
V5G 1K5	LSD:	Report Number: 2128425
Attn: Customer Service	P.O.:	
Sampled By:	Acct code:	
Company:		

Contact & Affiliation	Address	Delivery Commitments
Accounts Payable Maxxam Analytics	#500 1919 Minnesota Court, Mississauga, Ontario L5N 0C9 Phone: (866) 611-1118 Fax: (905) 288-2169 Email: accountspayablebc@maxxam.ca	On [Lot Approval and Final Test Report Approval] send (Invoice) by Email - Single Report
Customer Service Maxxam Analytics	4606 Canada Way Burnaby, British Columbia V5G 1K5 Phone: (604) 734-7276 Fax: (604) 731-2386 Email: customerservicebc@maxxam.ca	On [Lot Verification] send (COA) by Email - Single Report On [Report Approval] send (COC, Test Report) by Email - Merge Reports
Enviro Maxxam Analytics	4606 Canada Way Burnaby, British Columbia V5G 1K5 Phone: (604) 734-7276 Fax: (604) 731-2386 Email: enviro.cs.bc@maxxam.ca	On [Lot Verification] send (COA) by Email - Single Report On [Report Approval] send (Test Report, COC) by Email - Merge Reports

### Notes To Clients:

- Analysis was performed on sample # 1157742-1-4 that exceeded the recommended holding time for surfactants analysis.

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## Analytical Report

Bill To: Maxxam Analytics	Project:	Lot ID: <b>1157742</b>
Report To: Maxxam Analytics	ID: Job#B672774	Control Number:
4606 Canada Way	Name:	Date Received: Aug 29, 2016
Burnaby, BC, Canada	Location:	Date Reported: Sep 2, 2016
V5G 1K5	LSD:	Report Number: 2128425
Attn: Customer Service	P.O.:	
Sampled By:	Acct code:	
Company:		

	Reference Number	1157742-1	1157742-2	1157742-3	
	Sample Date	Aug 25, 2016	Aug 25, 2016	Aug 25, 2016	
	Sample Time	13:30	13:30	13:35	
	Sample Location				
	Sample Description	PJ0859-01R\G056-2	PJ0860-01R\G057-2	PJ0861-01R\G058-2	
	Matrix	Water	Water	Water	
Analyte	Units	Results	Results	Results	Nominal Detection Limit
<b>Aggregate Organic Constituents</b>					
Surfactants	Methylene Blue Active	mg/L	<0.05	<0.05	0.11
					0.05

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**Analytical Report**

Bill To: Maxxam Analytics	Project:	Lot ID: <b>1157742</b>
Report To: Maxxam Analytics	ID: Job#B672774	Control Number:
4606 Canada Way	Name:	Date Received: Aug 29, 2016
Burnaby, BC, Canada	Location:	Date Reported: Sep 2, 2016
V5G 1K5	LSD:	Report Number: 2128425
Attn: Customer Service	P.O.:	
Sampled By:	Acct code:	
Company:		

Reference Number 1157742-4  
Sample Date Aug 25, 2016  
Sample Time 13:40  
Sample Location  
Sample Description PJ0862-01R\G059-2

Matrix Water

Analyte	Units	Results	Results	Results	Nominal Detection Limit
<b>Aggregate Organic Constituents</b>					
Surfactants	Methylene Blue Active	mg/L	<0.05		0.05

Approved by:

Carol Nam, Dipl. T.  
Quality Officer

Data have been validated by Analytical Quality Control and Exova's Integrated Data Validation System (IDVS).  
Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

Exova  
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## Methodology and Notes

Bill To: Maxxam Analytics	Project:	Lot ID: <b>1157742</b>
Report To: Maxxam Analytics	ID: Job#B672774	Control Number:
4606 Canada Way	Name:	Date Received: Aug 29, 2016
Burnaby, BC, Canada	Location:	Date Reported: Sep 2, 2016
V5G 1K5	LSD:	Report Number: 2128425
Attn: Customer Service	P.O.:	
Sampled By:	Acct code:	
Company:		

## Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Surfactants in water - anionic (Surrey)	APHA	* Anionic Surfactants as MBAS, 5540 C	02-Sep-16	Exova Surrey

*\* Reference Method Modified*

## References

APHA Standard Methods for the Examination of Water and Wastewater

## Comments:

- Analysis was performed on sample # 1157742-1-4 that exceeded the recommended holding time for surfactants analysis.

Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.



**Maxxam Analytics**  
 2755-B Moray Avenue  
 Courtenay, British Columbia, V9N 8M9  
 (250) 338 7786  
 (250) 338 7553

**Lot: 1157742** COC



Maxxam PM BC Env Customer Service

**To: Sub Vancouver to Exova BC**

**Job# B672774**

- Yes  No Charge us Rush charge (If rush charges are required to meet due date and Yes box is not checked, please call us)  
 Yes  No International Sample/BioHazard (if yes, add copy of Movement Cert., heat treat is required prior to disposal)  
 Yes  No Special Protocol (if yes, Protocol \_\_\_\_\_)

Sample ID	Matrix	Test(s) Required	Container	Date Sampled	Date Required
PJ0859-01R\G056-2	WATER	MBAS Surfactants Subcontract	1-1LP	2016/08/25 13:30	2016/09/09
PJ0860-01R\G057-2	WATER	MBAS Surfactants Subcontract	1-1LP	2016/08/25 13:30	2016/09/09
PJ0861-01R\G058-2	WATER	MBAS Surfactants Subcontract	1-1LP	2016/08/25 13:35	2016/09/09
PJ0862-01R\G059-2	WATER	MBAS Surfactants Subcontract	1-1LP	2016/08/25 13:40	2016/09/09

	Temp. 1	Temp. 2	Temp. 3		YES	NO
Cooler #1				Custody Seal Present	YES	NO
				Custody Seal Intact	YES	NO
				Ice Present Upon Receipt	YES	NO
Cooler #2				Custody Seal Present	YES	NO
				Custody Seal Intact	YES	NO
				Ice Present Upon Receipt	YES	NO
Cooler #3				Custody Seal Present	YES	NO
				Custody Seal Intact	YES	NO
				Ice Present Upon Receipt	YES	NO

RECEIVED  
 AUG 29 2016  
 S.Y.C

Receiving Maxxam Location: Sub Vancouver to Exova BC JOB # \_\_\_\_\_  
 Relinquished by (Sign) [Signature] (print) [Name] Date and Time Aug, 25 / 16  
 Received by (Sign) \_\_\_\_\_ (print) \_\_\_\_\_ Date and Time \_\_\_\_\_

**NOTES:**

- Please call us if due date cannot be met. Please reference Sample ID on your report.
- Include copy of this completed form, Client COC & signed final report to CustomerServiceBc@MaxxamAnalytics.com and to Enviro.CS.BC@maxxam.ca

**Reporting Requirements:**

National:  
 Regional:

**Shipping Instructions**

- Ship Immediately (highlight Yellow)  Ship Cold  
 Requires 9am  Ship Room Temp  
 Requires Sat. Delivery  Ship Frozen  
 Regular Ship next available day  
 Sender (Print) \_\_\_\_\_ Initial \_\_\_\_\_

**Shipping Department Checklist**

- Correct Shipping location  
 Correct Sample Ids (Paperwork vs Bottles)  
 Yes  No Special-Cooler, Ice, Tape-custody seal, Date&Sign  
 Date Shipped \_\_\_\_\_ Number of coolers \_\_\_\_\_  
 Shipper (Print) \_\_\_\_\_ Initial \_\_\_\_\_

## Technical Memorandum



558 England Ave  
Courtenay, BC V9N 2N3  
p: 250.871.1944  
w: currentenvironmental.ca

### APPENDIX B - COURTENAY AND DISTRICT FISH AND GAME PROTECTIVE ASSOCIATION - PROPERTY, CAMPGROUND, AND BOAT LAUNCH REGULATIONS

MARCH 21, 2016

COURTENAY AND DISTRICT FISH & GAME PROTECTIVE ASSOCIATIONGENERAL PROPERTY REGULATIONS

1. Members are responsible for acceptable, considerate, quiet and non-abusive behaviour from themselves, their family and guests at all time while on Association property. Abuse of rules could result in an Ethics Committee appearance and/or loss of membership.
2. Members are not to loan their gate key or membership cards at any time. Random gate checks are held to enforce this.
3. Speed limits on Association property are to be followed for the safety of members and families.
4. No ATVs, dirt/trail bikes, mini bikes, etc. are to be used on property with the exception of use by the Association for special events and or work projects.
5. All pets must be kept on leash, quiet and under control at all times. Droppings must be promptly cleaned up, bagged and disposed of in garbage containers. No dogs are allowed in the swimming area.
6. All members, family and their guests are to stay off main grounds and clubhouse area across the walk bridge when a private function is taking place.
7. Archery range trails and gun ranges (Including Cowboy Action Range and Boomtown) are strictly out of bounds to non-users. No unsupervised minors are to be within archery trails, fish hatchery and tank area, or gun ranges at any time.
8. Absolutely NO USE OF ILLEGAL DRUGS on Association property.
9. No consumption of alcohol in the swimming area or while walking around the campground. COMMON SENSE AND DISCRETION TO BE USED; do not carry OPEN alcoholic beverages while moving from one campsite to another. That is the law. Consumption of alcohol at the main hall is in designated areas only and not on the grounds. Absolutely no consumption of alcohol on any shooting ranges including archery.
10. No bicycles, skateboards, roller blades, long boards etc. outside campground without adult supervision.

CAMPGROUND REGULATIONS

1. Camping rules and privileges are for all members. The campground caretaker has the authority to evict campers from campsite and the Association reserves the right to have a member come before the Ethics Committee for discipline or revocation of membership for flagrant disregard for other members and/or the regulations. Members are responsible for their guests at all times.
2. Check in time is 12:30PM and check out time is 11:30AM.
3. All campers (members and guests) are to stop at office upon arrival for registration and to stop at office when checking out as well.
4. Campers are to sign ledger acknowledging they will read and abide by the rules (handed out at sign in).
5. Campground caretaker has authority for site assignment and occupancy. Rates are \$15 per day per unit for each site and shall be paid in advance for the full stay. Campers wishing to book additional nights must let the caretaker know by BPM on the evening before the scheduled departure. Failure to do so means that you may lose your site the next morning and you have to vacate by the 11:30AM checkout time. Some sites can accommodate more than one unit, please park accordingly to keep within your site area. Remember all units, vehicles and trailers, must be parked on your site.
6. If a site is booked for 10 days and another member joins their site part way through, that site is to be vacated at the end of the original 10 day booking. The new member cannot continue to occupy that site.
7. If a member leaves the evening before checkout, the site will remain vacant until 12:30 check-in the next day.
8. Members may bring one guest unit (\$20 more per night) to SHARE a site with the occupying member for the length of their stay. Guests will not be given their own site. Waterfront sites A-G are for self-contained units only.
9. First come, first served. However, you can PAY for and temporarily hold that site as long as you return with your unit within that same day/evening. Also, a member can pay for a site for one other extra member (must provide name and membership #). Out of town members may call ahead to find out if there are any vacant sites available, but the site cannot be reserved.
10. Guests must be accompanied at all times by a member. A spouse/partner that does not hold a Spousal membership is considered a guest as well and must also be accompanied by a member. Children and minors are also considered as guests and must have adult supervision at all times.
11. Maximum stay is ten (10) days per month and encompasses one weekend only. Campsite must be vacated for 5 days to allow other campers the use of the campground. Your stay could be extended if multiple vacancies exist but only on a nightly basis.
12. All fires must be in the assigned campsite rings and must be extinguished before retiring for the evening or leaving the campsite. At no time are they permitted on the beach regardless of water levels. Campsite rings are not to be moved to the beach area. No cutting of live trees or burning of wet or dirty garbage.
13. Leave your area cleaner than you found it. Please dispose of cigarette butts properly and pick up and dispose of any garbage, bottle caps, glass, nails, etc. Garbage and recycle containers are provided. It is critical that no plastic bags or disposable diapers be put in the outhouses as they will plug up the sewage disposal trucks. Smoking is permitted in the campsites only.
14. "Quiet time" is 10PM. No loud music, partying or other noise after 10PM. All music should be turned down to a low level at all times for courtesy to your neighbours.
15. Generators, if required, are to run only between 12:30PM until 4:30PM. Courtesy and consideration of other campers is expected.
16. Vehicles including boat trailers, are only to be parked within the site, not on the road or outside the campground gate. Vehicles from waterfront sites and Geritol Heights are to be parked perpendicular to the lake unless approval granted by campground caretaker.
17. For safety reasons, there will be no riding of bikes or swimming after dark.
18. Hard shell water recreation, all floating objects/toys such as canoes, kayaks, boards, etc. are NOT permitted in the swimming area for the safety of swimmers.
19. Health regulations will be enforced – release of gray or black water is not permitted on Association property. Emptying of holding tanks should be at proper discharge locations in town. No bathing or washing of hair, dishes or laundry in the lake. Swimmers should follow Health Canada and Center for Disease Control guidelines for infants in diapers and individuals with diarrhoea illness.
20. The entire campground or certain camp sites and/or the boat launch may be closed to members on occasion for special events authorized by the Board. Notice will be given through email, website calendar and announced at General Meetings.
21. CDFGPA will not be held responsible for any lost, stolen or damaged items or equipment brought onto property.


BOAT LAUNCH REGULATIONS

1. All motorized boats must be launched from the boat ramp only.
2. No motorized boats, kayaks or canoes are to be within the swimming area.
3. Boats are to be beached with a stern/bow line attached to shore in posted areas only and shall not remain moored, beached or unattended overnight. All boats shall be removed from the water by sunset with the exception of boats used in special events and with the approval of the Board.
4. No jet-ski/seadoo type watercraft will be launched or operated from or within the Association's property.
5. All boats and trailers shall be free of any organic material before launching into Comox Lake, especially when coming from another body of water.
6. No fuelling, maintenance or repairs of boats and motors while on the lake or within 100 feet (30 meters) of the shoreline.
7. Holding tanks are not to be emptied on the lake or on Association property. Bilge drain plugs will not be pulled while on the Association property. Both should only be emptied at approved sites.
8. All Provincial and Federal boating safety regulations must be followed.
9. Whatever is taken on the lake is to be taken off the lake.
10. No rafting of unattended power boats will be permitted while on Association property.
11. Speed limit of 5 KPH or trolling (idle) speed only within log boom sticks inner area. No wake please.
12. If the member has a boat, a guest boat will not be permitted to launch or operate on Association property. If the member does not have a boat, his or her guest's boat is permitted with a daily launch fee of \$10.
13. Boats may be on the property for use while camping or fishing. Boats are not to be left parked on the property for any other purpose including For Sale purposes.

General Property, Boat Launch and Campground rules apply to everyone using any and ALL parts of Association property. The Courtenay and District Fish & Game Protective Association or the Caretakers are not responsible or liable for any personal injury, theft or damage of personal property while on the Association property at any time. Launching, boating, and camping are at your own risk. Remember that as an Association member, you are a steward of the land and the lake and as such, we all share ownership and responsibility for this property. Responsible, considerate behaviour and common courtesy to others is expected from all members at all times and it is up to members to police it. Don't be afraid to speak to those who appear to be breaking rules. Sometimes talking will solve the issue. If necessary, report any problems to the campground caretaker, club caretaker or any Board member. Abuse of rules could result in loss of membership.

Bylaw No. 485  
Comox Valley Regional District

## STATUS

Title:	Comox Valley Zoning Bylaw, 2005, Amendment No. 70	
Applicant:	Courtenay and District Fish and Game Protective Association	
Electoral Area:	<b>Area C Puntledge – Black Creek</b>	
File No.:	3360-20/RZ 2C 17	
Purpose:		
Participants:	All Electoral Areas	
		
Application Received:	<b>Date:</b>	June 29, 2017
Electoral Areas Services Committee:	<b>Date:</b>	
	<b>Recommendation:</b>	
Comox Valley Regional District Board:	<b>Date:</b>	
	<b>Decision:</b>	
Comox Valley Regional District Board	<b>Date:</b>	
	<b>Decision:</b>	
Public hearing:	<b>Date:</b>	
Comox Valley Regional District Board:	<b>Date:</b>	
	<b>Decision:</b>	
Ministry of Transportation and Infrastructure	<b>Required:</b>	No
	<b>Date Sent:</b>	
	<b>Date Approved:</b>	
Comox Valley Regional District Board:	<b>Date:</b>	
Decision:		

**Comox Valley Regional District**  
**Bylaw No. 485**

**A Bylaw to Amend the “Comox Valley Zoning Bylaw, 2005”  
being Bylaw No. 2781**

The board of the Comox Valley Regional District, in open meeting assembled, enacts the following amendments to the “Comox Valley Zoning Bylaw, 2005,” being Bylaw No. 2781:

**Section One Text Amendment**

- 1) Bylaw No. 2781, being the “Comox Valley Zoning Bylaw, 2005,” is hereby amended as set out in Schedule A attached to and forming part of this bylaw.

**Section Two Title**

- 1) This Bylaw No. 485 may be cited as the “Comox Valley Zoning Bylaw, 2005, Amendment No. 70.”

<b>Read a first time this</b>	<b>day of</b>	<b>201X.</b>
<b>Read a second time this</b>	<b>day of</b>	<b>201X.</b>
<b>Public hearing held this</b>	<b>day of</b>	<b>201X.</b>
<b>Read a third time this</b>	<b>day of</b>	<b>201X.</b>

I hereby certify the foregoing to be a true and correct copy of Bylaw No. 485, being the “Comox Valley Zoning Bylaw, 2005, Amendment No. 70,” as read a third time by the board of the Comox Valley Regional District on the **XX** day of **XX** 201**X**.

\_\_\_\_\_  
Corporate Legislative Officer

<b>Approved by the Ministry of Transportation and Infrastructure this</b>	<b>day of</b>	<b>201X.</b>
<b>Adopted this</b>	<b>day of</b>	<b>201X.</b>

\_\_\_\_\_  
Chair

\_\_\_\_\_  
Corporate Legislative Officer

I hereby certify the foregoing to be a true and correct copy of Bylaw No. 485, being the “Comox Valley Zoning Bylaw, 2005, Amendment No. 70,” as adopted by the board of the Comox Valley Regional District on the **XX** day of **XX** 20**XX**.

\_\_\_\_\_  
Corporate Legislative Officer

## Schedule A

### Section One Text Amendments

1. Bylaw No. 2781, being the “Comox Valley Zoning Bylaw, 2005”, is hereby amended by:
  - a. Rezoning the properties legally described as:  
 Lot 1, Sections 32 and 33, Township 10, Comox District, Plan EPP56506; and  
 Lot 1, Section 33, Township 10, Comox District, Plan VIP78343 except part in Plan EPP56506  
 from Upland Resource 400ha and Water Supply and Resource Area to Upland Resource 400ha exception 7 (UR-400ha-7) and Water Supply and Resource Area (WS-RA); and
  - b. Inserting the following zoning exception in Part 1200 “Exceptions to Zone Designations”

“Exception 7

Exception	Zone	Map	Amendment	Enacted
7	UR-400ha	Map A-7	Amendment No. 70	

#### 1. Principal Uses

In addition to the principal uses of the UR-400ha zone, the following principal uses are permitted:

- i. Recreational facilities
- ii. Dock
- iii. Boat launch
- iv. Interpretive/cultural centre
- v. Campground

#### 2. Accessory Uses

Only the following accessory uses are permitted:

- i. Special events related to a principal use
- ii. Wood processing

#### 3. Setbacks

- i. Notwithstanding any other setback provision of this bylaw, the minimum setback for structures, except structures containing or related to utility use, to Comox Lake is 30m and to any other watercourse is 15m.
- ii. Notwithstanding any other setback provision of this bylaw, the minimum setback of a campsite (including RV and tent sites) to Comox Lake is 30m and to any other watercourse is 15m.

**4. Conditions of Use**

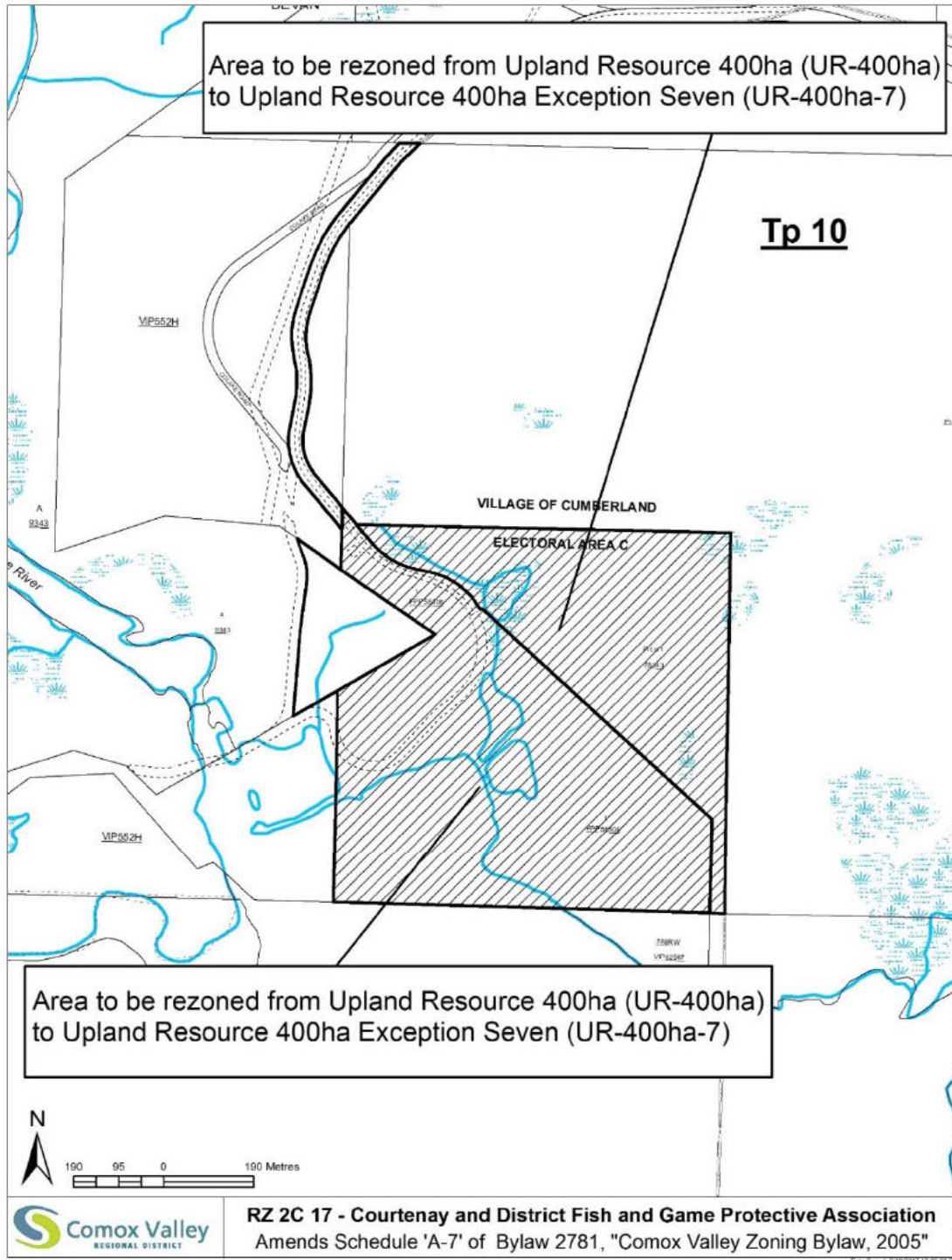
- i. All recycling/compost/waste shall be stored in a centralized and contained location(s). No recycling/compost/waste shall be stored within 30m of a watercourse.
- ii. Each campsite shall have a minimum area of 110m<sup>2</sup>.
- iii. Centralized wash station(s) (i.e. facility for dishwashing, showering) shall be provided for patrons of the campground. Wash station(s) shall adhere to the requirements of the health authority (i.e. discharge).

Except as amended herein, all other provisions of this bylaw as amended, shall apply.

*End • UR-400ha exception 7”*

**Section Two Map Amendment**

Map A-7 of Bylaw No. 2781, being the “Comox Valley Zoning Bylaw, 2005”, is hereby amended by rezoning property legally described as Lot 1, Sections 32 and 33, Township 10, Comox District, Plan EPP56506; and Lot 1, Section 33, Township 10, Comox District, Plan VIP78343 except part in Plan EPP56506 from Upland Resource 400ha and Water Supply and Resource Area to Upland Resource 400ha exception 7 (UR-400ha-7) and Water Supply and Resource Area (WS-RA) as shown on Appendix 1.



**Appendix 1**

Part of Schedule A to Bylaw No. 485 being the "Comox Valley Zoning Bylaw, Amendment No. 70".

Amends Schedule Map A-7 to Bylaw No. 2781, being the "Comox Valley Zoning Bylaw, 2005".





**COURTENAY AND DISTRICT  
FISH AND GAME PROTECTIVE ASSOCIATION**

Phone: (250) 338-9122

Mail: P.O. Box 3177 Courtenay, BC V9N 5N4

Comox Valley Regional District  
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File:

 JUN 29 2017

To:

cc:

# Appendix B

# Riparian Area Assessment

## FORM 1

Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

**Riparian Areas Regulation: Assessment Report**

Please refer to submission instructions and assessment report guidelines when completing this report.

Date **Nov. 24, 2016****I. Primary QEP Information**

First Name	Rupert	Middle Name	
Last Name	Wong		
Designation	RPBio	Company	Current Environmental Ltd
Registration #	705	Email	rwong338@gmail.com
Address	244 4 <sup>th</sup> St. Unit H		
City	Courtenay	Postal/Zip	V9N1G6
Prov/state	BC	Country	Canada
		Phone #	250-871-1944

**II. Secondary QEP Information (use Form 2 for other QEPs)**

First Name		Middle Name	
Last Name			
Designation		Company	
Registration #		Email	
Address			
City		Postal/Zip	
Prov/state		Country	
		Phone #	

**III. Developer Information**

First Name	Wayne	Middle Name	
Last Name	White (Conservation Chair)		
Company	Courtenay Fish & Game Protective Association		
Phone #	250-338-6964	Email	gwww@shaw.ca
Address	3780 Colake Road		
City	Cumberland	Postal/Zip	V0R1S0
Prov/state	BC	Country	Canada

**IV. Development Information**

Development Type	Recreational	Riparian Length (m)	100
Area of Development (ha)	0.14	Nature of Development	Re-development
Lot Area (ha)	34.6	Proposed Start Date	May 1, 2016
Proposed Start Date	May 1, 2016	Proposed End Date	Apr 30, 2017

**V. Location of Proposed Development**

Street Address (or nearest town)	3780 Colake Road, Cumberland, BC		
Local Government	Comox Valley Regional District	City	Courtenay
Stream Name	Comox Lake		
Legal Description (PID)	000-863-840	Region	Vancouver Island
Stream/River Type	Lake	DFO Area	South Coast
Watershed Code	920-553200-94200		
Latitude	49	38	33
Longitude	125	05	23

Comox Valley Regional District  
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**JUN 29 2017**

To:

cc:

FORM 1  
Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

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JUN 24 2017

## FORM 1

Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

**Section 1. Description of Fisheries Resources Values and a Description of the Development proposal****Background**

The subject property was used as an industrial logging site for almost 100 years until 1990's (Photo 1 & 2). Site remediation, installation wetlands and a fish hatchery took place after the Courtenay & District Fish & Game Protective Association took control of the site in 2000. Comox Lake was developed into a reservoir in 1912 to provide water for the Puntledge Hydroelectric Project. Water levels on Comox Lake and release of water into Puntledge River are governed by the Puntledge River Water Use Plan (BC Hydro 2004)<sup>1</sup> that balances the aquatic resource amongst various stakeholders, including regional water supply, recreation, generation of electricity, and fish habitat.

**Description of Fisheries Resource Values**

Comox Lake (WC: 920-553200-94200) is a large body of freshwater with a surface area of ~2,100 ha, a maximum depth of 109 m and a mean depth of 61 m. Lake reservoir levels fluctuate with dam releases, evaporation, and inflow from precipitation and snow/glacier melt. The Lake system is known to support numerous fish species including rainbow trout, brook trout, cutthroat trout, steelhead, Dolly Varden, kokanee, and coho and chinook salmon<sup>2</sup>.

Fisheries habitat zones with particular importance to the subject property include the aquatic littoral zone and terrestrial backshore. The littoral zone extends from the water's edge towards deeper water in the near shore area where light can penetrate and aquatic plants are typically present. The littoral zone provides critical habitat and food sources for a variety of lake organisms, including fish, amphibians, larger zooplankton and insects. Similarly the backshore zone is instrumental for providing shade and microclimates; shoreline stabilization; pollutant removal; and litter fall, LWD recruitment, and insect drop for food production

On the subject property, specifically within the confines of the campground study area (Figure 1), the littoral zone is characterized by a lack of aquatic vegetation (Photo 3): an apparent result of artificially fluctuating reservoir water levels causing upper littoral zone desiccation. Terrestrial vegetation in the backshore zone has been disturbed by land-use activities on the property including its ongoing use as a campground. Terrestrial riparian species in evidence along the subject shoreline are dominated by deciduous species including red alder, cottonwood, and willow spp.; while the backshore area along the access road edge is populated by a small number of conifers dominated by Douglas fir with subdominant shore pine.

**Description of Development Proposal**

The subject shoreline has been identified for review by the Comox Valley Regional District in order to meet a criterion of a Temporary Use Permit (TUP 2C 15) for continued accessory uses of the site, including that of a campground operated by the Courtenay Fish & Game Protective Association. There is no additional development planned on the site; however, the existing campsites are recommended to be reconfigured to account for the establishment of a 15 m Streamside Protection and Enhancement Area that would include reclaiming disturbed land within the setback by re-siting the campsites landward, planting native backshore vegetation, while maintaining pedestrian access to the lakeshore via formalized access points (Table 1; Figure 1). Since lake water levels are

<sup>1</sup> BC Hydro. 2004. Puntledge River Project Water Use Plan.

<http://www.11bc.leg.bc.ca/public/PubDocs/bcdocs/404112/environment30828.pdf>. Accessed on April 29, 2016.

<sup>2</sup> <http://a100.gov.bc.ca/pub/fidq/infoSingleWaterbody.do>

## FORM 1

Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

continually in flux it is recommended that plant species in the lower elevation portion of the site be able to withstand periods of flooding and drought, while drought resistant backshore species be planted in the higher elevation terrestrial portion of the Streamside Protection and Enhancement Area.

The following remediation measures are recommended within the 15 m wide Streamside Protection and Enhancement Area.

- Reinststate riparian habitat within the 15 m SPEA of the active campground area (Figure 1) to offset historical impacts to vegetation (Photo 5).
- Existing campsites encroaching the Streamside Protection and Enhancement Area will be re-aligned.
- Delineate the Streamside Protection and Enhancement Area with permanent fencing such as the example in shown in Photo 2 that will also serve to delineate boundaries between campsites.
- Day-use area west of active campsites (Photo 6) will be planted with native species throughout and marked with signage to limit access and inform users about sensitivities of the restoration area (Figure 1).
- Planting treatment areas should be dressed with coarse woody debris placements that will dissuade pedestrian access and provide additional habitat for insects and return nutrients into nearby soils.

In order to provide the highest likely percent survival for planted stock the plants should be installed during the autumn, after the campground's high season and prior to overnight frosts and the onset of heavy winter storm activity.

As the majority of the high traffic areas within the SPEA are composed of hard packed gravel and fines, soil amendments will likely be required to support survival and long-term success of the plantings in this area. The soil surrounding planted stock installations should be amended with the addition of top-soil, bone meal, fertilizer, and mulch as dictated by site conditions. Soil amendments should extend out a minimum of 3x the diameter of the root ball and 2 x the depth. The use of a mini-hoe to excavate the plantings in hard packed areas may help improve the success of the planted stock by loosening compacted soils and possibly reaching native soils below the fill. A hoe will also reduce the amount of hand labour needed to install the plant stock. Soil amendments could be a mix of well degraded bark mulch with a high organic content mixed with nutrient compost (i.e. fish-compost). Depending on the composition of the bark mulch mixture an additional layer of bark mulch may be required to cover the final planting to help reduce desiccation through the summer months.

Planted stock should also be watered in following installation. All riparian restoration activity should be overseen by a Qualified Environmental Professional (QEP). A list of recommended plants and densities is provide in Table 1 on the following page.

## FORM 1

Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

**Table 1. Proposed list of riparian plants/numbers for shoreline restoration along the north bank of Comox Lake study area at the Courtenay & District Fish and Game Protective Association's Campground.**

Common Name	Scientific Name	Distance from HWM (m)	Plant Spacing	Plant Size	Approximate Number
Pacific willow	<i>Salix lucida</i>	5-10	Cluster & 2 x 2 m*	1 gal.	20
Red alder	<i>Alnus rubra</i>	0-5	Cluster & 2 x 2 m	1 gal.	20
Red Osier Dogwood	<i>Cornus stolonifera</i>	0-5	Cluster & 2 x 2 m	1 gal.	20
Oceanspray	<i>Holodiscus discolor</i>	5-15	Cluster & 2 x 2 m	1 gal.	20
Nootka rose	<i>Rosa nutkana</i>	5-15	Cluster & 2 x 2 m	1 gal.	20
Salmonberry	<i>Rubus spectabilis</i>	5-15	Cluster & 2 x 2 m	1 gal.	20
Dull Oregon grape	<i>Mahonia nervosa</i>	5-15	Cluster & 2 x 2 m	1 gal.	20
Salal	<i>Gaultheria shallon</i>	5-15	Cluster & 2 x 2 m	1 gal.	20
Western red cedar	<i>Thuja plicata</i>	5-15	6 x 6 m	1 gal.	25
Douglas fir	<i>Pseudotsuga menziesii</i>	5-15	6 x 6 m	1 gal.	29
Grand fir	<i>Abies grandis</i>	5-15	6 x 6 m	1 gal.	30
Western hemlock	<i>Tsuga heterophylla</i>	5-15	6 x 6 m	1 gal.	21
Sitka spruce	<i>Picea sitchensis</i>	5-15	6 x 6 m	1 gal.	9
Western white pine	<i>Pinus monticola</i>	5-15	6 x 6 m	1 gal.	8
Willow spp. & Red Osier Dogwood	<i>Salix spp. &amp; Cornus stolonifera</i>	0-5 m	Cluster & 2 x 2 m*	Stakes	80

\* Cluster planting will be targeted within delineated pedestrian exclusion areas within the existing campground area while 2 x 2 m spacing would be applied to the day use restoration area (Figure 1).

**FORM 1**  
Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

**2. Results of Detailed Riparian Assessment**

Refer to Chapter 3 of Assessment Methodology

Date: Nov. 24, 2016

Description of Water bodies involved (number, type)

Stream	
Wetland	
Lake	1
Ditch	
Number of reaches	1
Reach #	1

1

**Channel width and slope and Channel Type (use only if water body is a stream or a ditch, and only provide widths if a ditch)**

	Channel Width(m)	Gradient (%)	I, <u>Rupert Wong</u> ( <i>name of qualified environmental professional</i> ), hereby certify that: a) I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the <i>Fish Protection Act</i> ; b) I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Bob McClure</u> ( <i>name of developer</i> ); c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and d) In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation.
starting point upstream	n/a	n/a	
downstream			
Total: minus high /low mean			
	R/P	C/P	
Channel Type			

**Site Potential Vegetation Type (SPVT)**

	Yes	No	Tick yes only if multiple polygons, if No then fill in one set of SPVT data boxes  I, <u>Rupert Wong</u> ( <i>name of qualified environmental professional</i> ), hereby certify that: a) I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the <i>Fish Protection Act</i> ; b) I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Bob McClure</u> ( <i>name of developer</i> ); c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and d) In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation.
SPVT Polygons		X	
Polygon No:	<span style="border: 1px solid black; padding: 2px;">1</span>		Method employed if other than TR
SPVT Type	LC	SH	
			X

**Zone of Sensitivity (ZOS) and resultant SPEA**

Segment No:	<span style="border: 1px solid black; padding: 2px;">1</span>	If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons
LWD, Bank and Channel Stability ZOS (m)	<span style="border: 1px solid black; padding: 2px;">15</span>	

FORM 1

Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

Litter fall and insect drop ZOS (m)	15					
Shade ZOS (m) max	15	South bank	Yes		No	X
Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)				n/a	
Ditch Fish Bearing	Yes		No		If non-fish bearing insert no fish bearing status report	n/a
<b>SPEA minimum</b>	<b>15</b>	<b>(For ditch use table3-7)</b>				

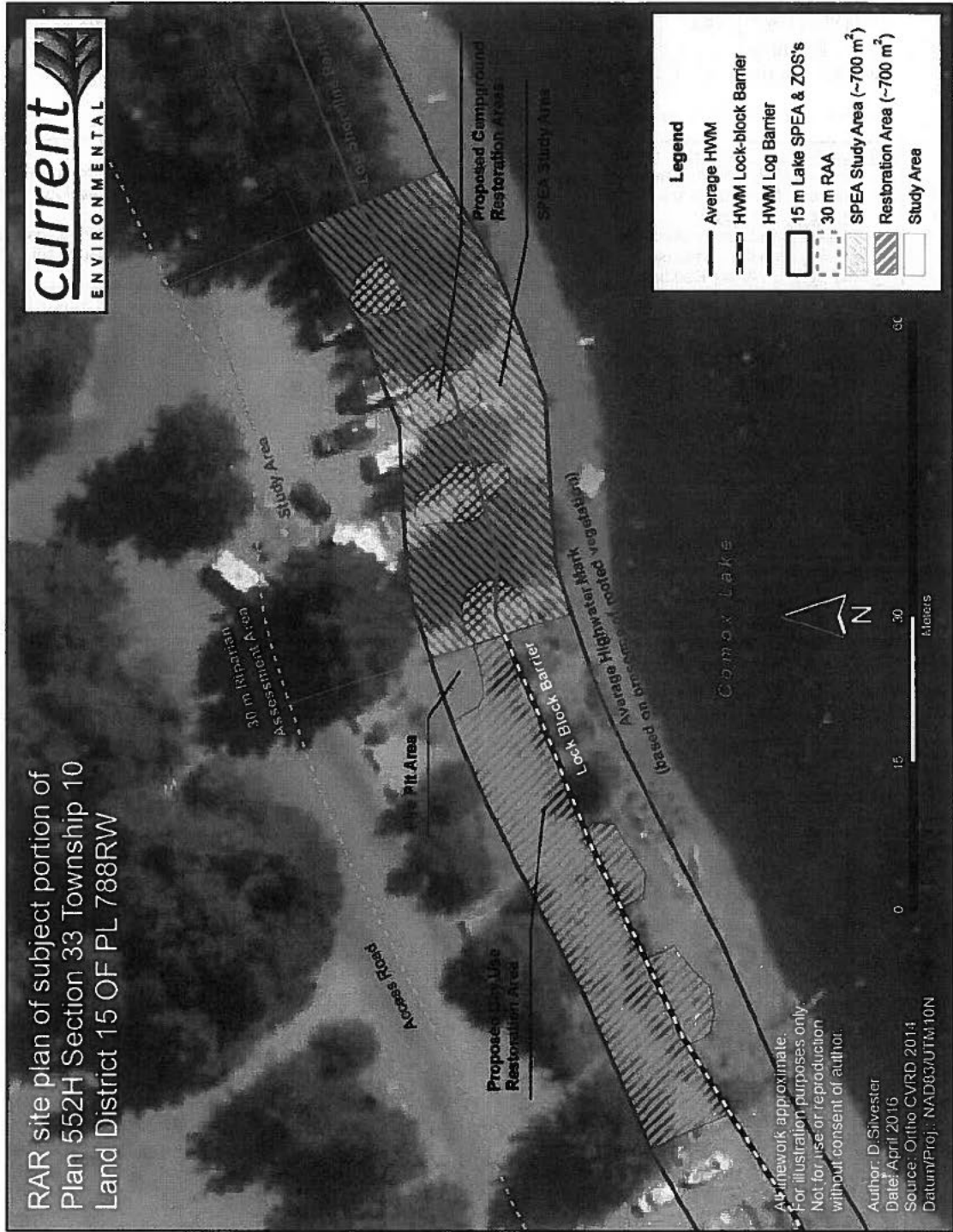
I, Rupert Wong (*name of qualified environmental professional*), hereby certify that:

- I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the *Fish Protection Act*;
- I am qualified to carry out this part of the assessment of the development proposal made by the developer Bob McClure (*name of developer*);
- I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and
- In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation.



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Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

Section 3. Site Plan



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**Section 4. Measures to Protect and Maintain the SPEA**

1. Danger Trees	This assessment is in support of the proponent's requirement to apply for a Temporary Use Permit (TUP) with the Comox Valley Regional District. As there is no proposed construction within the 30 m Riparian Assessment Area, a danger tree survey was not completed as part of this assessment. However, once minor disturbances from campground realignment and restoration planting have taken place it is <u>recommend that a qualified danger tree assessor be retained to assess any potential danger tree issues</u> that may affect the study area at that time.
<p>I, <u>Rupert Wong</u> (<i>name of qualified environmental professional</i>), hereby certify that:</p> <p>e) I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the <i>Fish Protection Act</i>;</p> <p>f) I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Bob McClure</u> (<i>name of developer</i>);</p> <p>g) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation</p>	
2. Windthrow	This assessment is in support of the proponent's requirement to apply for a Temporary Use Permit (TUP) with the Comox Valley Regional District. As there is no proposed construction within the 30 m Riparian Assessment Area, a windthrow survey was not completed as part of this assessment. However, once minor disturbances from campground realignment and restoration planting have taken place it is <u>recommend that a qualified danger tree assessor be retained to assess any potential windthrow issues</u> that may affect the study area at that time.
<p>I, <u>Rupert Wong</u> (<i>name of qualified environmental professional</i>), hereby certify that:</p> <p>a. I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the <i>Fish Protection Act</i>;</p> <p>b. I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Bob McClure</u> (<i>name of developer</i>);</p> <p>c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation</p>	
3. Slope Stability	No triggers for slope stability were found in the study area during the field assessment as per Section 3.7.3 (Slope Stability) of the RAR Assessment Methods.
<p>I, <u>Rupert Wong</u> (<i>name of qualified environmental professional</i>), hereby certify that:</p> <p>a. I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the <i>Fish Protection Act</i>;</p> <p>b. I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Bob McClure</u> (<i>name of developer</i>);</p> <p>c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation</p>	
4. Protection of Trees	All of the vegetation, including trees and undergrowth, within the 15 m SPEA that does not currently pose a risk as assessed by a qualified danger tree assessor shall not be

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Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

	<p>impacted in any way by future activities or campsite development on the subject property. This includes protection from mechanical damage, soil disturbance, or soil compaction to prevent destabilizing trees or causing tree or other vegetation mortality. Other measures will include the following:</p> <ol style="list-style-type: none"> <li>1. Formalize shoreline pedestrian access routes that avoid impacting tree roots and undergrowth;</li> <li>2. Protect vegetation established in designated SPEA restoration areas from damage either by establishing exclusion fencing or signage.</li> <li>3. Establish root protection zones around significant, larger trees in the 30 m Riparian Assessment Areas. Root protection zones should be calculated by multiplying the diameter of the tree by 18. This value is the radius of the area of land surrounding the trunk of a tree that is to be avoided.</li> <li>4. With the exception of riparian vegetation restoration, no soil disturbing activities will be permitted within the lakeshore SPEA.</li> </ol>
<p>I, <u>Rupert Wong</u> (<i>name of qualified environmental professional</i>), hereby certify that:</p> <ol style="list-style-type: none"> <li>a. I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the <i>Fish Protection Act</i>;</li> <li>b. I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Bob McClure</u> (<i>name of developer</i>);</li> <li>c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation</li> </ol>	
<p>5. Encroachment</p>	<p>As mentioned, pedestrian access within the 15 m SPEA will be managed through the establishment of formalized shoreline access routes, and protection of existing and proposed riparian vegetation restoration areas with exclusion fencing/signage.</p> <p>If future development should be proposed on the property within the 30 m RAA the 15 m SPEA setback area will be clearly delineated using flagged stakes prior to the commencement of work and no encroachment within the SPEA will be permitted including machinery, foot traffic, or spoilage material. A QEP must be notified 7 days prior to the commencement of any construction to delineate the SPEA and ensure other measures to protect the SPEAs are in place.</p>
<p>I, <u>Rupert Wong</u> (<i>name of qualified environmental professional</i>), hereby certify that:</p> <ol style="list-style-type: none"> <li>a. I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the <i>Fish Protection Act</i>;</li> <li>b. I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Bob McClure</u> (<i>name of developer</i>);</li> <li>c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation</li> </ol>	
<p>6. Sediment and Erosion Control</p>	<p>General measures to control sediment during any earth disturbing works will include:</p> <ol style="list-style-type: none"> <li>a) The SPEA is to be clearly delineated using stakes and/or flagging;</li> <li>b) Maintain/do not disturb all existing vegetation within</li> </ol>

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Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

	<p>SPEA;</p> <p>c) No machinery is to enter the SPEA at any time without consent/oversight of a QEP;</p> <p>d) Where there is a potential for silt runoff in proximity to waterbodies, control devices will be installed prior to construction activities commencing;</p> <p>e) Filter fabric dams, rock check dams, and silt fencing will be used as needed on a site-specific basis to control erosion. Silt fencing is not an acceptable mitigation technique to control erosion in flowing watercourses; however, it is useful for containing slumping areas and for use as baffles to slow water velocities.</p> <p>f) Excavation will be stopped during intense rainfall events or whenever surface erosion occurs affecting the watercourse.</p> <p>g) Watercourses are not to be traversed by machinery at any time.</p> <p>h) Soil stockpiles will be placed a minimum of 30 m from any waterbody and in a location where erosion back into the waterbody cannot occur and will not impede drainage.</p> <p>i) Soil stockpiles with the potential to erode into waterbodies are to be covered with poly sheeting. Other techniques, such as terracing or surface roughening can greatly reduce surface erosion on steeper slopes.</p> <p>j) Permanent exposed soil areas and erosion-prone slopes that may potentially erode into the watercourse are to be seeded immediately, or covered with geotextile.</p> <p>k) Clearing will take place immediately prior to excavation and earthworks to minimize the length of time that soils are exposed. Vegetation in adjoining areas will not be disturbed.</p> <p>l) Site re-vegetation measures are required to stabilize soils and stream banks and reduce erosion. The measures, including hydroseeding, are to be implemented as directed by the biologist as construction is completed.</p>
<p>I, <u>Rupert Wong</u> (<i>name of qualified environmental professional</i>), hereby certify that:</p> <p>a. I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the <i>Fish Protection Act</i>;</p> <p>b. I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Bob McClure</u> (<i>name of developer</i>);</p> <p>c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation</p>	
<p>7. Stormwater Management</p>	<p>All non-vegetated ground near the subject property will be maintained with permeable surfaces such as gravel to maintain rainwater infiltration. There is no development proposed within the 30 m RAA that will cause stormwater related impacts. The implementation of riparian vegetation planting within the 15 m lakeshore SPEA will function to reduce the impacts of stormwater flowing off the subject property.</p>
<p>I, <u>Rupert Wong</u> (<i>name of qualified environmental professional</i>), hereby certify that:</p> <p>a. I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the <i>Fish Protection Act</i>;</p> <p>b. I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Bob McClure</u> (<i>name of developer</i>);</p>	

## FORM 1

## Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation	
8. Floodplain Concerns (highly mobile channel)	Floodplain concerns are not a concern due to water levels in the lake reservoir being managed by BC Hydro.
I, <u>Rupert Wong</u> ( <i>name of qualified environmental professional</i> ), hereby certify that:	
a. I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the <i>Fish Protection Act</i> ;	
b. I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>Bob McClure</u> ( <i>name of developer</i> );	
c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation	

9. Fuels and Hazardous Materials

The accidental release of petroleum, oils, hydraulic fluids, lubricants, concrete additives, anti-freeze or other hazardous materials onto land surfaces or into waterbodies is an offence under the Federal *Fisheries Act* and may result in degradation of habitat quality and could be a threat to human health.

Environmental protection procedures for handling and storage of fuels and hazardous materials shall include the following items:

- a) A spill kit of appropriate capacity will be on hand at all times during land modifying work that requires the use or machinery.
- b) All identified spills will be cleaned up immediately, and contaminated soils and vegetation will be removed for appropriate disposal.
- c) Refuelling of equipment is to occur only at designated fuelling stations and located at least 30 m from all waterbodies.
- d) All fuel, chemicals, and hazardous materials will be clearly marked.
- e) Pumps and jerry cans are to be placed on poly sheeting and sorbent pads to contain spills.
- f) All equipment maintenance with the potential for accidental spills (e.g., oil changes, lubrications) will be done on a designated area at least 30 m from any watercourses. Tarps should be laid down prior commencement of work to facilitate clean up.
- g) In the event of a spill, the following guidelines should be followed:
  - Spills need to be immediately reported to the biologist. Spills to the receiving environment are to be reported to the BC Provincial Emergency Program (1-800-663-3456) if they exceed the reportable limits (e.g. 100 litres of fuel or oil).
  - Apply sorbent pads and booms as necessary.
  - Dispose of all contaminated debris, cleaning materials, and absorbent material by placing in an approved disposal site.

## FORM 1

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**Section 5. Environmental Monitoring**

This assessment is in support of the proponent's requirement to meet the criteria set out in the CVRD's TUP, rather than proposing construction within the 30 m riparian assessment area. The proponent may, however, initiate SPEA vegetation restoration within close proximity to the sensitive environment of the lakeshore. The following tasks would then be completed prior to those works:

- A QEP should be present on site to oversee layout and planting of riparian vegetation plantings;
- Ensure the setback area is clearly delineated;
- Review work plan;
- Ensure appropriate mitigation measures are/will be in place;
- Review all Measures to Protect the SPEA stated in this report and ensure appropriate equipment to satisfy the measures are on-site or available;
- Review emergency spill response plan (see above);
- Set up a contact system should a biologist be required on site in the event of sediment/erosion issues or some other type of risk to aquatic habitats that may arise during construction.

Immediately upon completion of the construction work, the proponent is to contact a Qualified Environmental Professional (QEP) for a post-construction site inspection. Any deficiencies noted by the QEP are to be addressed by the proponent. A final post-construction report is to be submitted by the QEP to the BC RAR Notification System.

As per Item 10 of Temporary Use Permit 2C 15, an annual report will be submitted to CVRD that confirms compliance to mitigation measures outlined in this report.

**Section 6. Photos**

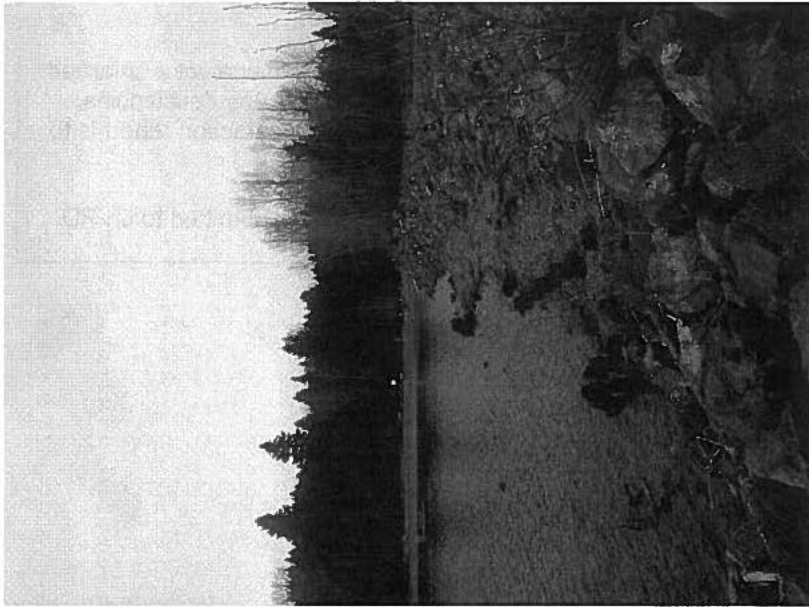


Photo 1 & 2. View looking north from southwest corner of subject property about 50 years ago during logging tenure (left) and present day after site remediation during recreation/conservation tenure by Courtenay & District Fish & Game Protective Association (right).

**FORM 1**  
Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report



Photo 3. Example of shoreline riparian cluster planting exclusion fencing in a park/campground setting.



Photo 4. View east taken from the western edge of the campground study area shoreline showing exposed lake littoral area characterized by a lack of aquatic vegetation and sparse terrestrial vegetation growth in gravel beach substrates. Note "HWM Log Barrier" at left of image also shown in Figure 1.



**FORM 1**  
Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

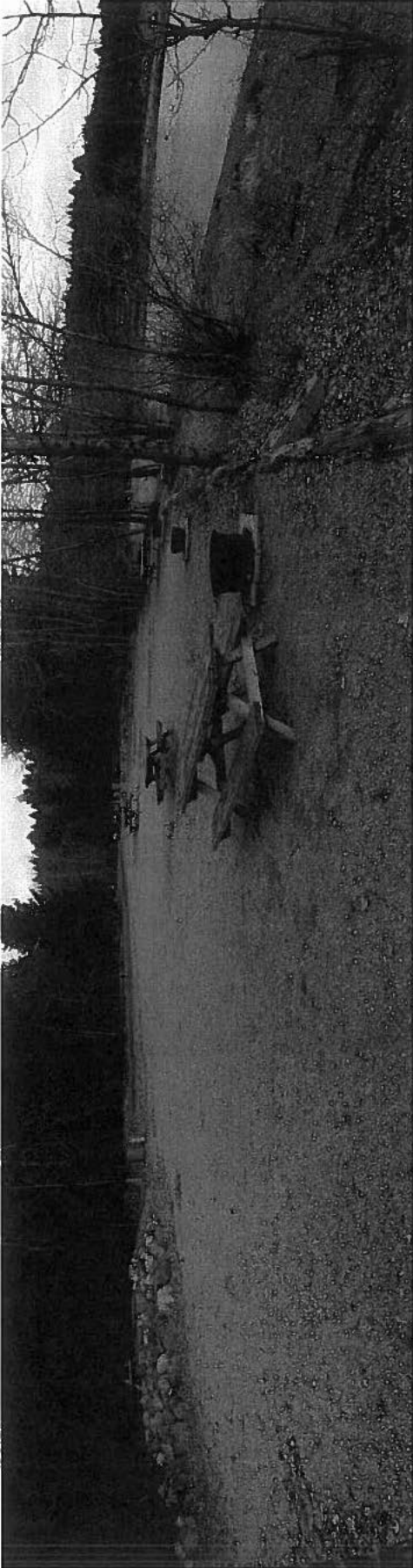


Photo 5. View east taken from the western edge of the campground study area showing open campsites that are recommended for partial re-vegetation.

FORM 1

Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report



Photo 6. View west taken from the western edge of the campground study area showing day-use area that has been identified for riparian restoration plantings.

## FORM 1

Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

**Section 7. Professional Opinion****Assessment Report Professional Opinion on the Development Proposal's riparian area.**Date 1. I/We Rupert WongPlease list name(s) of qualified environmental professional(s) and their professional designation that are involved in assessment.)

hereby certify that:

- a) I am/We are qualified environmental professional(s), as defined in the Riparian Areas Regulation made under the *Fish Protection Act*;
- b) I am/We are qualified to carry out the assessment of the proposal made by the developer Bob McClure (*name of developer*), which proposal is described in section 3 of this Assessment Report (the "development proposal");
- c) I have/We have carried out an assessment of the development proposal and my/our assessment is set out in this Assessment Report; and
- d) In carrying out my/our assessment of the development proposal, I have/We have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation; AND

2. As qualified environmental professional(s), I/we hereby provide my/our professional opinion that:

- a)  if the development is implemented as proposed by the development proposal there will be no harmful alteration, disruption or destruction of natural features, functions and conditions that support fish life processes in the riparian assessment area in which the development is proposed, **OR**

(Note: include local government flex letter, DFO Letter of Advice, or description of how DFO local variance protocol is being addressed)

- b)  if the streamside protection and enhancement areas identified in this Assessment Report are protected from the development proposed by the development proposal and the measures identified in this Assessment Report as necessary to protect the integrity of those areas from the effects of the development are implemented by the developer, there will be no harmful alteration, disruption or destruction of natural features, functions and conditions that support fish life processes in the riparian assessment area in which the development is proposed.

**[NOTE: "qualified environmental professional" means an applied scientist or technologist, acting alone or together with another qualified environmental professional, if**

- (a) the individual is registered and in good standing in British Columbia with an appropriate professional organization constituted under an Act, acting under that association's code of ethics and subject to disciplinary action by that association,
- (b) the individual's area of expertise is recognized in the assessment methods as one that is acceptable for the purpose of providing all or part of an assessment report in respect of that development proposal, and
- (c) the individual is acting within that individual's area of expertise.]

JUN 29 2017

**Property information** (Refer to your tax assessment notice or certificate of title.)

Legal description	To:
Civic address 3780 Col Lake Road	CC:
PID 029-762-103 026-200-881	BC Assessment roll No. 771 05 838.050 771 05 838-100

**Application type** (If more than one application is needed, check the additional applicable boxes.)

<b>Bylaw amendment</b>		
<input type="checkbox"/> Official community plan	<input checked="" type="checkbox"/> Zoning bylaw (i.e., rezoning)	
<b>Development permit</b>		
<input type="checkbox"/> DPA #1: Aquatic (watercourse / foreshore)	<input type="checkbox"/> DPA #2: Eagles Drive	<input type="checkbox"/> DPA #3: Eagle nest trees
<input type="checkbox"/> DPA #4: Heron nest sites	<input type="checkbox"/> DPA #5: Back Road	<input type="checkbox"/> DPA #6: Commercial / industrial development
<input type="checkbox"/> DPA #7: Resort tourism	<input type="checkbox"/> DPA #8: Steep slopes	<input type="checkbox"/> DPA #9: Buffer for agricultural land
<input type="checkbox"/> DPA #10: Union Bay: tourist highway commercial	<input type="checkbox"/> DPA #11: Royston: village core	<input type="checkbox"/> DPA #12: Royston: residential conservation design
<input type="checkbox"/> Mount Washington mixed use	<input type="checkbox"/> DPA #17: Kensington comp. development	<input type="checkbox"/> DPA #18: Shoreline protection devices
<b>Variance</b>		
<input type="checkbox"/> Development variance permit	<input type="checkbox"/> Board of variance	
<b>Others</b>		
<input type="checkbox"/> Temporary use permit	<input type="checkbox"/> Site specific amendment to floodplain	<input type="checkbox"/> Strata conversion
<input type="checkbox"/> Home occupation, bed and breakfast...	<input type="checkbox"/> Temporary occup. of additional dwelling	<input type="checkbox"/> Property information request

**Owner information**

Name(s) Courtenay & District Fish and Game Protective Association	Company
Mailing address P.O. Box 3177	City Courtenay
	Province BC Postal code V9N 5N4
Phone(s) 250-338-9122	Email

**Applicant information** (If the applicant is not the owner(s), complete this and the agent authorization sections. All communication will be forwarded to the applicant only.)

Name(s) LINDSEY DOUGLAS	Company CDFGPA
Mailing address As above	City
	Province Postal code
Phone(s)	Email @

**Agent authorization** (Complete only if the applicant is not the owner(s).)

I/we, (owner's name) COURTENAY & DISTRICT FISH & GAME PROTECTIVE ASSOCIATION	
declare that I am/we are the property owner(s) noted on this form, and hereby authorize	
(agent's name) LINDSEY DOUGLAS	to act as agent in the matter of this/these application(s).

Owner's name 1 TERRY W KIRTON	Signature
Owner's name 2	Signature

All owners shown on the certificate of title must sign. Attach a separate page with additional signatures.

Comox Valley Regional District

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**Development proposal** (Describe the present and intended uses, and reasons for proposal. Attach additional pages if needed.)

See Attached proposal.

**Provincial site profile**

Section 40(1) of the *Environmental Management Act* requires a site profile to be completed with an application when the applicant knows, or reasonably should know, that a site has been used or is being used for commercial or industrial purposes. If any activities found in Schedule 2 of the *Contaminated Sites Regulation* apply to the subject property, the applicant is required to complete a site profile. Schedule 2 and the site profile application form are available in the "land remediation" section of the BC Government web site ([www.gov.bc.ca](http://www.gov.bc.ca)), as well as at the Comox Valley Regional District (CVRD). If any of the listed activities in Schedule 2 applies, contact the CVRD. If any of the listed activities in Schedule 2 does not apply, complete the following declaration:

I hereby declare that, based upon my current knowledge of the subject property, no Schedule 2 activities have been carried out.

Signature	Date
-----------	------

**Notice of collection of personal information**

Personal information on this application form is collected for the administration, enforcement and processing of this application. The personal information is collected under the authority of the *Freedom of Information and Protection of Privacy Act* (FIPPA), *Local Government Act* and CVRD bylaws. All documentation, drawings, plans and information submitted in support of this application can be made available for public inspection pursuant to the FIPPA. For questions about the collection of personal information, please contact the corporate legislative officer at 600 Comox Road, Courtenay, BC or at 250-334-6007.

**Declaration**

I, the undersigned, have attached the required documentation, as noted on the submission checklist, along with the required application fee and hereby agree to submit further information deemed necessary for processing this application. I hereby certify that the documentation and information provided with respect to this application is full and complete<sup>1</sup> and is, to the best of my knowledge, a true statement of the facts related to this application. Lastly, I hereby acknowledge that an incomplete application will not be processed and will be returned to me, and that any fees paid are non-refundable except as noted in the Planning Procedures and Fees Bylaw.

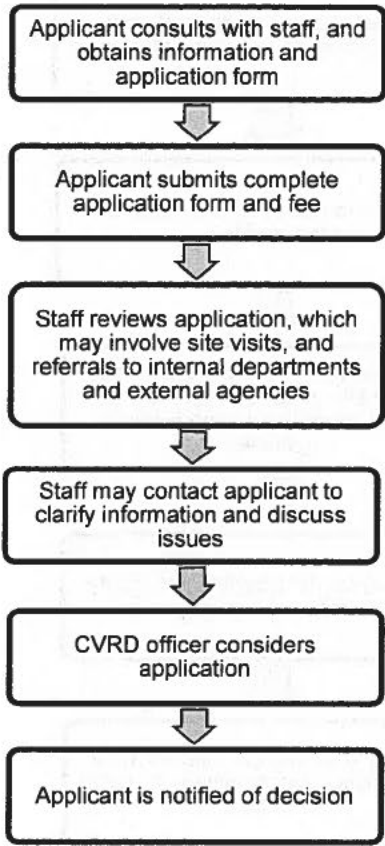
Signature	Date
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<sup>1</sup> A complete application includes: application form properly filled out and all fees paid; plans and supporting information compiled by applicant into a complete, required set; compliance with existing development agreements on certificates of title and conditions of previous planning approvals; identification of existing easements and rights-of-way. Incomplete applications will not be processed and will be returned.

**Office use**

PSR	Date received	Received by
	June 29, 2017	dm
Planning staff	Fee \$	Security deposit \$
	2000.00	n/a
	Date assigned	Assigned to
	June 29, 2017	Alana Mullaly

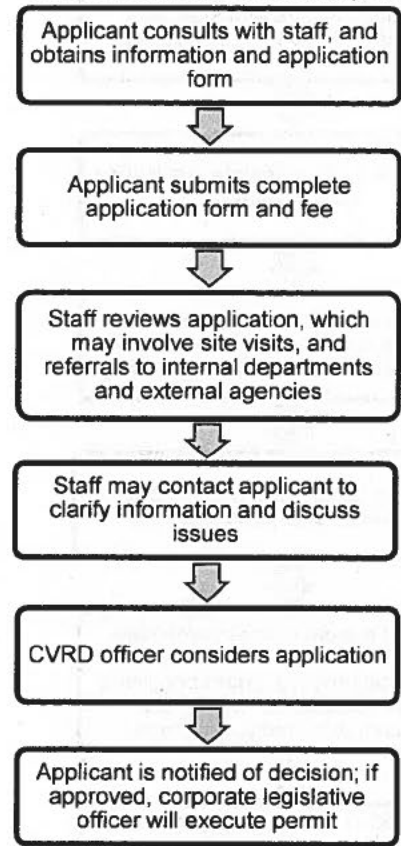
**Generalized process for a home occupation / domestic industrial use application<sup>2</sup>**



Allow approximately one to two weeks for processing

**Generalized process for a DP application that requires CVRD officer consideration**

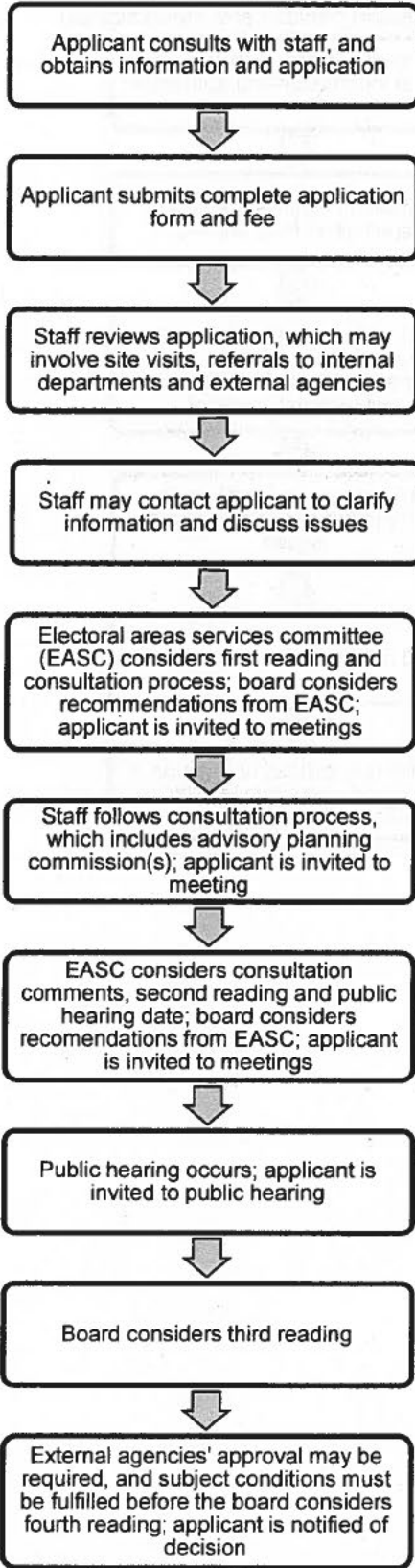
(e.g., aquatic, eagle nest trees, heron nest sites, shoreline protection devices and steep slopes)<sup>2</sup>



Allow approximately four weeks for processing

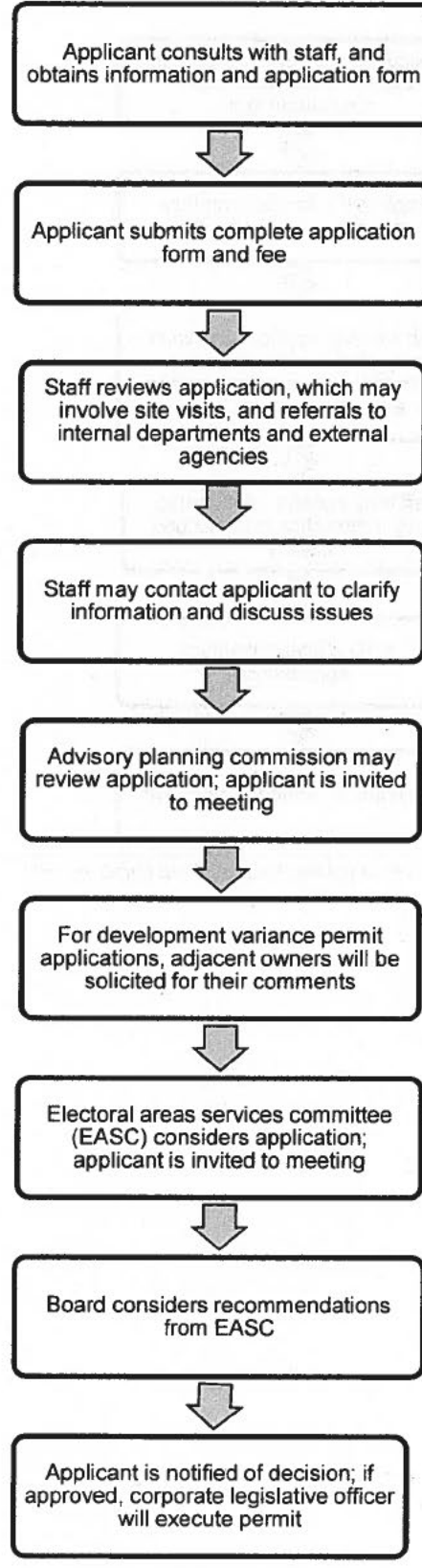
<sup>2</sup> These processes are simplified for illustrative purposes only.

**Generalized process for an OCP amendment or zoning bylaw amendment application<sup>2</sup>**



Allow approximately six to 12 months for processing an OCP amendment or zoning bylaw amendment application

**Generalized process for a DP application that requires board consideration or a development variance permit application<sup>2</sup>**



Allow approximately six weeks for processing a DP application that requires board consideration or a development variance permit application

<sup>2</sup> These processes are simplified for illustrative purposes only.

Comox Valley Regional District  
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COURTENAY AND DISTRICT  
FISH AND GAME PROTECTIVE ASSOCIATION

Phone: (250) 338-9122      Mail: P.O. Box 3177 Courtenay, BC V9N 5N4

File:



JUN 29 2017

To:

cc:

June 27, 2017

To: Alana Mullalay, MCIP RPP  
Manager of Planning Services, Planning and Development Services Branch

Proposal

The Courtenay and District Fish and Game Protective Association (CDFGPA) is now applying to restart the rezoning for the Property located at 3780 and 3786 Colake Road, Courtenay, BC. (PID's 026-762-103 and 126-200-883)

CDFGPA is not planning any additional activities on the property (other than the proposed Fish Hatchery which is allowed under the existing zoning), we would like the zoning to reflect the existing uses of the Property. **The specific additional uses include:**

- **A campground - the maximum number of camping spaces within 250 metres of Comox Lake, including one caretaker's space, is limited to 54**
- **an interpretive or cultural centre**
- **boat launch, docks and wharfs**
- **special events - including facility rental to CDFGPA members for social events**
- **recreational facilities directly related to a principle use**

The Purposes of the CDFGPA, as per the Constitution (Appendix E) are the following:

- a) To conserve, enhance, and promote the wise use of all natural resources;
- b) To raise monies to restore fish and wildlife populations and their habitat;
- c) To support scientifically sound conservation;
- d) To practice and promote safe and ethical sportsmanship;
- e) To promote hunting and fishing as rights to be enjoyed by all Canadians and to affiliate and work with like-minded organizations;
- f) To provide education, training, skills, and social development relating to conservation, hunting, fishing, shooting sports, and associated outdoor activities; and,
- g) To provide facilities for pursuing these purposes for Association members.

The CDFGPA is not seeking to commercialize our Property, we are a non-profit organization. We are seeking the additions to the zoning in order to assist in covering our costs and providing our members with the opportunities listed in our Purposes. All of



our activities, including camping and hall rental, are for our members and guests only and not for the public. We do invite the public on to the property for events such as Family Fishing, Fishing Forever, our Outdoor Show, and open events at the venues.

## History

A proposal to rezone the properties owned by the CDFGPA was submitted in November 2014. The subject properties are used by the CDFGPA members for a range of conservation and leisure activities. Some of these uses do not comply with the property's zoning; the CDFGPA would like to bring the use of the properties into compliance.

The subject properties are split zoned: upland resource 400 hectares (UR-400ha) and water supply resource area (WS-RA). The applicant is proposing a site-specific amendment to the UR-400ha portion of the properties in order to permit the following uses:

- o Public assembly (for special events in the clubhouse and outdoors);
- o Archery ranges (in addition to firearm ranges, which are currently permitted); and
- o RV camping in which wastewater, such as sewage and grey water, must be hauled out.

There were no development plans associated with this application. However, two major concerns were raised during the consultation process:

1. The shoreline vegetation along Comox Lake be re-established. And:
2. A report assessing the risk of the camping and boat launching activity on the drinking water quality from Comox Lake.

The rezoning application above resulted in the issuance of a Temporary Use Permit in order to address some issues raised during the consultation process. The Courtenay & District Fish and Game Protective Association (CDFGPA) has been operating under TUP 2C 15 since February 3, 2016. The terms of the TUP are:

1. This temporary use permit (TUP 2C 15) is issued subject to compliance with all of the bylaws of the regional district applicable thereto, except as specifically varied or supplemented by this permit for the following proposed accessory uses:
  - o campground;
  - o special events directly related to a principal use;
  - o recreational facilities directly related to a principal use; and
  - o boat launch, docks, and swimming floats.

And,

4. The land described herein shall be developed strictly in accordance with the following terms and conditions and provisions of this permit:

Land Use:

- i. the subject properties can have, as accessory uses, one boat launch, docks, swimming floats, a campground, special events directly related to a principal use, and recreational facilities directly related to a principal use;
- ii. no buildings or structures, except for utility buildings or structures, are permitted within 30m of the present natural boundary/high water mark of Comox Lake;
- iii. wastewater associated with recreational vehicle (RV) campers, such as sewage and grey water, must be hauled out and properly disposed; and
- iv. the maximum number of camping spaces (tent spaces and RV spaces), including one caretaker's space, is limited to 54.

The TUP also required:

1. An assessment under the Riparian Area Regulation and any subsequent restoration work and recommendations which this assessment identifies. The RAR identified a 15 metre Comox Lake Streamside protection and Enhancement Area in a portion of the campsite where the vegetation had been removed down to the lake shore which required restoration. And:
2. A risk assessment of the campground use on the water quality of Comox Lake has been submitted to the Comox Valley Regional District. The risk assessment must be prepared by a qualified professional and address the following:
  - o identify potential contaminants to Comox Lake related to campground use;
  - o identify spatial and temporal risk to Comox Lake water supply intake; and
  - o identify measures to protect Comox Lake from contamination related to campground use.

The CDFGPA has contracted Current Environmental to conduct both a Riparian Area Assessment (see Appendix B) and a Risk Assessment (see Appendix C) of our camping and boat launching activities in relation to the present drinking water intakes and the planned new deep water intake.

The RAR Assessment recommended reestablishment of the riparian and the creation of a 15 metres Comox Lake Streamside Protection and Enhancement Area (SPEA). The riparian area was planted in March 2017 and the fencing and signage were completed in May 2017. At the same time 15 campsite were relocated out of the SPEA, so now no campsite is within 15 metres of Comox Lake.

The Risk Assessment, completed on May 12, 2017, summarizes recommendations from the Watershed Protection Plan (WPP) and the mitigation measures CDFGPA has implemented to date. The WPP contains 54 recommendations to reduce risk by helping to prevent contamination in the watershed. The CDFGPA has taken many steps to mitigate their impact on Comox Lake, including measures that pre-date the WPP (see Table 1 in the Risk Assessment). The WPP acknowledges that the mitigation measure put in place up by the CDFGPA at the time of the writing of the WPP had reduced the risk of its activities from very high down to moderate risk.

The Risk Assessment concludes management of potential sources of pollution and implementation of mitigation measure appear to be functioning as intended and monitoring data show that water quality objectives are being maintained. The report recommends, and the CDFGPA supports, continued participation with any water quality monitoring effort by the CVRD under the WPP and to maintain our active role in the Watershed Advisory Group.

Riparian planting and consequent re-location or re-configuration of 8 campsites out of the riparian area will further reduce the risk through the increased infiltration in the SPEA and greater separation between the lake and the campsites.

The previous statements were made in relation to the risk at the existing BC Hydro penstock intake. In addressing the risk in relation to the proposed deep water intake the Risk Assessment notes that the general near-shore water movement from the CDFGPA's shoreline is down the Puntledge River, out of Comox Lake. The proposed deep water intake is in effect upstream of the CDGFPA and it is expected that the risk will be further reduced.

We work with all stake holders in the Comox Valley Watershed and are committed to ensure safe drinking water for all residents of the Comox Valley. The CDFGPA sees ourselves as first line of defense stewards of Comox Lake, and have been a member of the Watershed Advisory Group since its inception and were participants in all of previous processes leading to the Watershed Protection Plan.

### Concerns and Mitigation Strategies

The following documentation is intended to provide those without a working knowledge of the CDFGPA, information about our organization and to provide supporting documents to assist in developing appropriate amendments to our current UR-400ha and WS-RA zoning.

Concerns	Mitigation Strategies
<p>Water quality and watershed protection from RV camping; public assembly; and boat ramps and docks</p>	<ul style="list-style-type: none"> <li>◦ 8 campsites have been relocated outside of the riparian area as per the attached Riparian Area assessment and the Risk Assessment. (see Appendices B and C)</li> <li>◦ As per the SPEA, no campsites are located within 15m of Comox Lake or any other watercourse.</li> <li>◦ CDFGPA has prohibited any additional campsites within 250m of Comox Lake</li> <li>◦ Onsite disposal from RV camping (grey and black waste water) have always been prohibited on the Property, (see Appendix F Campground Regulations #22)</li> <li>◦ The CDFGPA supports outdoor ethics and the wise use of natural resources and our members are the first to report any illegal dumping of RV wastewater in the area surrounding our property. We have never found evidence of illegal dump during our annual clean-up of the access roads to our site.</li> <li>◦ Contained vaulted toilets are located in the campground and are regularly maintained and pumped out as needed by a certified waste water maintenance company.</li> <li>◦ To reduce potential erosion designated pathways have been established and the restored riparian area is a fenced 'no access' area, (see Campground Regulation #10)</li> <li>◦ A Risk Assessment of the campground use, relative to the protection of water quality in Comox Lake has been completed and is attached.(see Appendix C)</li> <li>◦ The CDFGPA has taken measures to meet the recommendations of the WPP. Summarized in Table 1 in the Risk Assessment (see Appendix C).</li> <li>◦ CDFGPA Boat Launch Regulations #3, 4, 5, 6, 7, 8 and 9 highlight our desire to be good stewards to Comox Lake to minimize our impact on the Lake. We regulate type of watercraft, cleanliness of boats and trailers, as well as not allowing fueling, maintenance or repair of boats and motors on the lake or within 30m of the shoreline. No holding tanks may be emptied or bilge drain plugs pulled on the Property. Failure to comply may result in loss of membership and access to the facilities (see Appendix F and G).</li> <li>◦ Members with boats are identified by a sticker each year to prevent public from using our facilities and require access through two locked gates.</li> </ul>

Concerns	Mitigation Strategies
Riparian area impacts of non-compliant RV camping	<ul style="list-style-type: none"> <li>◦ The riparian area adjacent to Comox Lake has been restored and campsites have been relocated 15 from the natural boundaries of Comox Lake. (See attached Risk Assessment Appendix C). The width of the SPEA was determined by the Riparian Area Regulation by a Qualified Environmental Professional.(see RAR Report - Appendix B)</li> </ul>
Broad scope of public assembly definition	<ul style="list-style-type: none"> <li>◦ As per our “Courtenay and District Fish &amp; Game Club Information” sheet, the meeting hall may only be used by members in good standing for private social activities. The “rental regulations” and “Bar Rules &amp; Regulations” further restricts and regulates the type of assembly on our property.</li> <li>◦ Public assembly only occurs during special events, such as the Outdoor Show. The CDFGPA has followed best practices such as those outlined in the new Special Events Bylaw for the last 25 years and has done so without incident.</li> <li>◦ RCMP, Cumberland Fire Department, and VIHA have all approved the systems in place to support our Special Events (specifically the Outdoor Recreation Show).</li> <li>◦ CDFGPA cooperates with other event organizers such a Snow To Surf and Mind Over Mountain race event and consider them like minded outdoor recreationalists.</li> </ul>
Consistency with the regional growth strategy with respect to watershed protection and resource area policies	<ul style="list-style-type: none"> <li>◦ CDFGPA supports the Western Canada Marine Response Corporation Oil-spill response training by providing our campsite and boat launch for their Beach Supervisor Training. We are hoping to arrange for a club representative to audit this activity to provide hands on training on spill response.</li> <li>◦ CDFGPA participates in the Spill Response Planning Group from the Watershed Advisory Committee and hosts Spill Response Workshops, organized by TimberWest. The workshops include gate access, bin access and contents review and spill curtain deployment at Puntledge bridge.</li> <li>◦ CDFGPA monitors use of Comox Lake areas adjacent to the club. We assist the Cumberland Fire Department and the Ministry of Forests by checking on locally reported smoke in the area.</li> <li>◦ CDFGPA has worked with CVRD and MOE to monitor water quality of Comox Lake and will continue to monitor potential impacts from pour activities.</li> </ul>

Concerns	Mitigation Strategies
	<ul style="list-style-type: none"> <li>◦ Our Caretaker provides on the scene first responder/reporter of potential negative impacts on Comox Lake to the proper authority.</li> <li>◦ CDFGPA is a participant in a Mutual Agreement with Comox Valley Emergency Response that our hall would be used for an evacuation holding center for the community of Cumberland if ever necessary.</li> </ul>
<p>Assess the zoning change in terms of the Drinking Water Protection Act, Sewerage System Regulation and Food Premises Regulation</p>	<ul style="list-style-type: none"> <li>◦ The CDFGPA is working with the Island Health Authority (IHA) to ensure we continue to be following the Drinking Water Protection Act</li> <li>◦ CDFGPA is not seeking to expand or build additional facilities on the Property (other than the fish hatchery).</li> <li>◦ All septic fields are in compliance with VIHA and all vault toilets are pumped out regularly by certified waste disposal company</li> <li>◦ A shower facility, on approved septic is available to campers at the Archery venue. (#22 of Campground regulations - Appendix F).</li> <li>◦ The kitchen is permitted, CDFGPA follows best practices when the kitchen is being used and have certified "Food Safe" volunteers overseeing work done in the Kitchen.</li> </ul>
<p>Lack of guidance as what constitutes a resort development. RGS MG-3A-1</p>	<ul style="list-style-type: none"> <li>◦ The campsite is not for the "traveling public", as stated in the definition of a campsite, but is rather for the use of our members and their guests.</li> <li>◦ CDFGPA is willing to include the following modified land use conditions included in the Temporary use permit (TUP 2C 15): <ul style="list-style-type: none"> <li>i) the subject properties can have, as accessory uses, one boat launch, docks, swimming floats, a campground, special events directly related to a principal use, and recreational facilities directly related to a principal use;</li> <li>ii) no buildings or structures, except for utility buildings or structures, are permitted within 15m of the present natural boundary/high water mark of Comox Lake;</li> <li>iii) wastewater associated with recreational vehicle (RV campers, such as sewage and grey water, must be hauled out and properly disposed; and,</li> <li>iv) the maximum number of camping spaces (tent spaces and RV spaces), including one caretaker's</li> </ul> </li> </ul>

Concerns	Mitigation Strategies
	<p>space, is limited to 54 within 250m of Comox Lake.</p> <ul style="list-style-type: none"> <li>◦ The campground regulation #2 states sites are non-reservable and #7 and 8 limit the occupancy time of sites (Appendix F).</li> <li>◦ There are no living quarters located in the clubhouse or ancillary buildings. The caretaker is the only resident and the campground manager is on site May until Sept.</li> <li>◦ CDFGPA is not seeking additional uses other than what already exists on the Property as of May 2017, it is a private member Protective Association as per the purposes in the Constitution (Appendix E), .</li> </ul>

### Appendices

Appendix A - Site Plan

Appendix B - SPEA Report/RAR

Appendix C - Risk Assessment

Appendix D - Site Profile

Appendix E - CDFGPA Constitution and Bylaws

Appendix F - Campground Regulations

Appendix G - General Property Regulations and Boat Launch Regulations

Appendix H - Courtenay and District Fish & Game Club Information sheet

Appendix I - Rental regulations

Appendix J - Bar Rules & Regulations

Appendix K - CDFGPA membership Declaration

Appendix L - Letter from Ministry of Environment (2014)



**804****Upland Resource (UR)****1. PRINCIPAL USE****i) On any lot:**

- a) Residential use;
- b) Silviculture;
- c) Agricultural use;
- d) Fish hatcheries;
- e) Explosives sales, storage manufacturing and distribution; and
- f) Firearm ranges
- g) On any lot in the Agriculture Land Reserve any other use specifically permitted by the Agricultural Land Commission under the *Agricultural Land Reserve Act*, regulations and orders

**2. ACCESSORY USES****On any lot:**

- i) Accessory buildings and structures;
- ii) Wood processing.

**3. CONDITIONS OF USE**

- i) Any conditions imposed on applications made to the Provincial Land Reserve Commission under the *Agricultural Land Reserve Act*.

**4. DENSITY:****Residential Use is limited to:**

- i) **On any lot:** One single detached dwelling.

**5. LOT COVERAGE**

- i) The maximum lot coverage on existing lots of all buildings and structures shall be 35% of the total lot area to a maximum of 1000.0 metres<sup>2</sup> (10,764.3 feet<sup>2</sup>).

## 6. SITING OF BUILDINGS AND STRUCTURES

The setbacks required for buildings and structures within the Upland Resource zone shall be as set out in the table below.

Type of Structure	Heights	Required Setback				
		Front yard	Rear yard	Side yard		Side yard abutting road
				Frontage <31m	Frontage >31m	
Principal	10.0m (32.8ft)	7.5m (24.6ft)	7.5m (24.6ft)	1.75m (5.8ft)	3.5m (11.5ft)	7.5m (24.6ft)
Accessory	4.5m-or less (14.8ft)	7.5m (24.6ft)	1.0m (3.3ft)	1.0m (3.3ft)	1.0m (3.3ft)	7.5m (24.6ft)
Accessory	6.0m-4.6m (19.7ft)	7.5m (24.6ft)	7.5m (24.6ft)	1.75m (5.8ft)	3.5m (11.5ft)	7.5m (24.6ft)

Except where otherwise specified in this bylaw, no building or structure shall be located in any required front and side yard setback area. [Note: Part 400, Siting Exceptions, of this bylaw and Bylaw No. 1836 being the “Floodplain Management Bylaw, 1997” may affect the siting of structures adjacent to major roads and the natural boundaries of watercourses and the sea, respectively.]

## 7. SUBDIVISION REQUIREMENTS

- i) The minimum lot area for subdivision shall be as follows:
  - a) 40.0 hectares (98.8 acres) for the area east of the most westerly boundary of the BC Hydro transmission right-of-way Plans 509, 510, 511, 512, 914, 932, 933 and 934;
  - b) 40.0 hectares (98.8 acres) for the area within 1.0 kilometre (0.6 miles) west of the most westerly boundary of the said rights-of-ways, with measurement made perpendicular to the said right-of-ways boundary, except as modified in Clause (e) below;
  - c) 40.0 hectares (98.8 acres) for the areas approximately 1.0 kilometre (0.6 miles) east, south, and west of the Village of Cumberland, except as modified in Clause (e);
  - d) 400.0 hectares (988.3 acres) for the area more than 1.0 kilometre (0.6 miles) west of the most westerly boundary of the said right-of-ways, with measurement made perpendicular to the said right-of-ways boundary except as modified in Clause (e) below;
  - e) Notwithstanding the above, where a lot is subject to both the 40.0 and 400.0 hectare minimum lot area, the minimum lot area which applies to the greatest portion of the lot shall be the minimum lot area for subdivision. Where a lot is divided into portions of equal area by a line one kilometre west of the most westerly boundary of the said rights-of-way, with measurement made perpendicular to the said right-of-way’s boundary, the minimum lot area in respect of the entire lot shall be 40 hectares.
- ii) The minimum permitted road frontage for lots created by subdivision shall be 100.0 metres (328.1 feet).

*End • UR*

**805****Water Supply and Resource Area (WS-RA)****1. PRINCIPAL USE****On any lot:**

- i) Residential use;
- ii) Silviculture use;
- iii) Explosives sales, storage manufacturing and distribution;

**2. ACCESSORY USES****On any lot:**

- i) Accessory buildings and structures.

**3. DENSITY****Residential Use is limited to:**

- i) **On any lot:** One single detached dwelling.

**4. LOT COVERAGE**

- i) The maximum lot coverage on existing lots of all buildings and structures shall be 35% of the total lot area to a maximum of 1000.0 square metres (10,764.3 square feet).

**5. SITING OF BUILDINGS AND STRUCTURES**

The setbacks required for buildings and structures within the Community Watershed zone shall be as set out in the table below.

Type of Structure	Height	Required Setback			
		Front yard	Rear yard	Side yard	Side yard abutting road
Principal	10.0m (32.8 ft)	7.5m (24.6ft)	7.5m (24.6ft)	7.5m (24.6ft)	7.5m (24.6ft)
Accessory	4.5m-or less (14.8ft)	7.5m (24.6ft)	1.0m (3.3ft)	7.5m (24.6ft)	7.5m (24.6ft)
Accessory	6.0m-4.6m (19.7t)	7.5m (24.6ft)	7.5m (24.6ft)	7.5m (24.6ft)	7.5m (24.6ft)

Except where otherwise specified in this bylaw, no building or structure shall be located in any required front and side yard setback area. [Note: Part 400, Siting Exceptions, of this bylaw and Bylaw No. 1836 being the "Floodplain Management Bylaw, 1997" may affect the siting of structures adjacent to major roads and the natural boundaries of watercourses and the sea, respectively.]

**6. SUBDIVISION REQUIREMENTS**

- i) The minimum lot area for subdivision shall be 400.0 hectares (988.8 acres).
- ii) The minimum permitted road frontage for lots created by subdivision shall be 100.0 metres (328.1 feet).

*End • WS-RA*



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3360-20 / RZ 2C 17  
A. Mullaly  
Dir. E. Grieve  
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A. MacDonald  
T. Warnes

October 2, 2017

Alanna Mullaly, MCIP RPP  
Comox Valley Regional District  
600 Comox Road  
Courtenay, BC V9N 3P6

Re: CDFGPA Zoning

In response to the draft revised zoning proposal, the Courtenay and District Fish & Game Protective Association (CDFGPA) Board of Directors have reviewed the proposal and have the following comments.

We would like these comments to be included in the draft zoning proposal prior to having the bylaw brought forward at an EASC meeting. We would also like to view the final staff report in order to make comments that may be added to our documentation prior to the EASC meeting. As this is a volunteer board we require a minimum of one week's notice in order to convene.

In Schedule A Exception 7, we have the following comments:

1. Principal Uses: we request the inclusion of "Archery range."
2. Accessory Uses ii. Wood Processing may be removed as it is redundant, present in the original UR zoning.
3. Setbacks, and 4. Condition of Use: we request both sections to be removed as there are already regulations that enforce this type of conditions and; therefore these do not appear to be relevant in a zoning document.

When it is time to put this forward to an EASC meeting, please ensure that our original application and supporting documentation are included in the package for the benefit of the elected officials.

We are eager to see this process move ahead and look forward to working with the CVRD Staff and Elected officials. Many thanks for the hours put into this project.

Yours in Conservation,

Lyndsey Douglas, Director, Zoning Committee Member

On behalf of the CDFGPA Board of Directors