ANNUAL WATER REPORT

VILLAGE OF NAKUSP

2016

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1.0 Introduction:

Under the terms of the Village of Nakusp Operating Permit for the Nakusp Water System, Facility #0211995, as per Section 8 of the *Drinking Water Protection Act*, the Village is required to provide an annual report to the public and users of the water system. This report is to provide a summary of the water system operation, maintenance, upgrades and testing procedures and is submitted to Interior Health. With the completion of the Village Source Protection Plan in October 2016, (see Appendix F), the Village is proud to be in total compliance with its Operating Permit for the first time ever.

2.0 Water Collection, Treatment & Distribution System:

The Village water system is comprised of 756 residential connections, 103 Commercial services and 27 Institutional/Industrial services. Currently, the distribution system runs approximately 26.7 kms and has both surface source water and ground well water.

2.1 Surface Source Water:

Surface water sources consist of Halfway Creek, Upper Brouse Creek and Lower Brouse Creek. The piping network consists of 3.5 kms of pipe to the Upper Brouse intake and an additional 3.5 kms to the Halfway intake.

Surface water undergoes course filtration in the Filter Sock Chamber, which houses six perforated PVC pipes covered with mesh filter media (socks). Each pipe is approximately 12" in diameter and 8' long.

Course filtration removes large debris, such as leaves, sticks, pine needles, frogs, etc. These filter socks become clogged, especially during the freshet and require monitoring and cleaning.

Figure 1 Filter Sock Chamber

Figure 2 Micro Hydro Generation Station

Course filtration is not technically considered a treatment process, as fine materials and micro-organisms are not removed, therefore, water from here runs through the micro-hydro generation station to the new water treatment facility.

High pressure in the water main turns the generator, which creates hydro electricity. This is sold to BC Hydro and is fed back into their power grid. The Village is licensed to produce 50 kilowatts of power.

The treatment process consists of: membrane ultra-filtration, UV light and chlorine injection. This is classified as a Level II Water Treatment. With the commissioning of the new plant come new "Conditions on Operating Permit", which require much more monitoring and reporting to the province. Once treated, the water is stored in the million gallon reservoir.

Figure 3 Upper Brouse Rd Water Treatment Plant

The Million Gallon Reservoir is covered by a polyvinyl chloride cover to keep out debris and wildlife. Towers and weights around the perimeter allow the cover to move with the water level, Rainfall and precipitation is pumped off the cover regularly to prevent contamination.
The reservoir is 14' deep.

Figure 4 Million Gallon Reservoir

The Village also has a 200,000 gallon reservoir, which stores treated water for the lower grid.

2.2 Groundwater Sources:

The Village currently has two established production wells - Well#1 and Well#2. Both wells are located adjacent to the sports complex and are drawn from the same aquifer. A small amount of chlorine is injected into the discharge line, in order to maintain a residual in the distribution system.

Well#1 (8") takes the demand off the surface water system in summer and operating up to 24 hours/day. This flow, combined with the 70 L/s from the surface system (during peak daily demand), provides 95 L/s summer flows, and is adequate for the present Village needs. A single well, however, is at risk to mechanical breakdown.

Well#2 (12"), drilled for redundancy and to provide further flows for growth. This well was commissioned with the same pump and motor as Well #1 and, therefore, has the same capacity.

3.0 Monitoring & Maintenance:

In addition to the daily facility checks that are conducted by Utility Operators, the Village has the benefit of a Supervisory Control and Data Acquisition (SCADA) system. This system allows the various facilities to communicate remotely through wireless modem radios, and sensing equipment, enabling the Public Works operators to log onto the system remotely to view and/or manipulate reservoir levels, well pump operations, turbidity and chlorine levels, and system flows. The system also logs this data into an archive, for reporting purposes. The system is very valuable for allowing operators to manage the water supplies, and view problems on a color graphics screen.

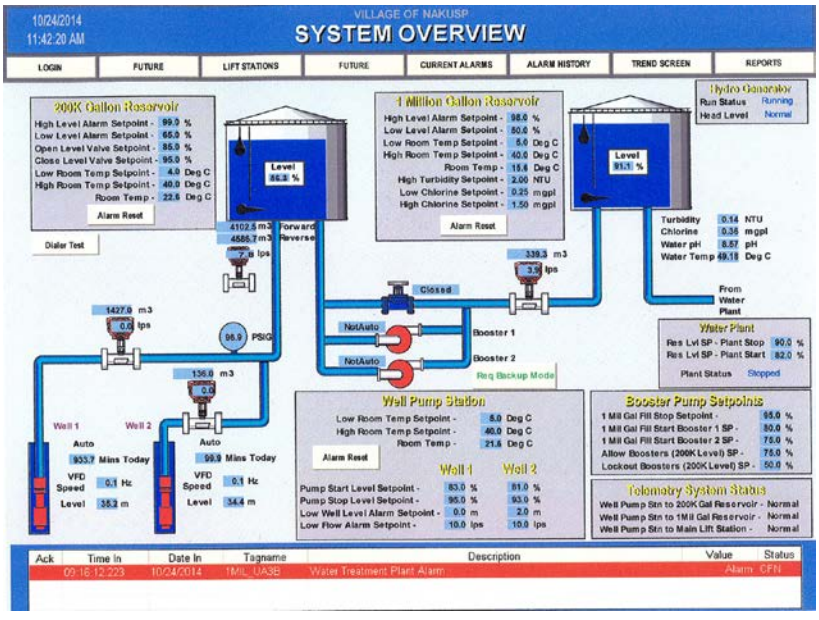


Figure 5 Supervisory Control and Data Acquisition Monitoring System

3.1 Water Sampling & Testing:

The Village Operating Permit requires that water samples be collected weekly and submitted for E. Coli and Total Coliform testing. These tests indicate if contamination of the water system may be present. Samples are collected from several different sites, on a rotational basis.

See Appendix A, pg 12, for 2016 results.

Quarterly samples are also submitted for trihalomethane (THM) levels. Trihalomethanes are bi-products of the reaction between chlorine and organic materials.

See Appendix C, pg 16, for 2016 results.

Haloacetic Acid (HAA) testing is performed quarterly. They are another by-product of chlorination. Together, THMs and HAAs provide an indication of the presence of all other disinfection by-products.

See Appendix C, pg 16, for 2016 results.

Monitoring Schedule:

WEEKLY	• **Microbiological testing at various test sites throughout the distribution system**
MONTHLY	• **Microbiological results reporting;** • **Daily water consumption data;** • **Turbidity monitoring data;** • **UV data** • **Chlorine monitoring data** • **UV sensor reference checks** • **Reporting of source, treatment & distribution system events;** • **Reporting of customer complaints & responses;** • **Outlining major operational activities;** • **Recording of calibration of the chlorine residual analyzer**
QUARTERLY	• **Holoacetic acids testing and reporting;** • **THM testing on a rotational basis throughout the distribution system**
ANNUALLY	• **Full comprehensive raw water analysis of each water source** • **Comprehensive Annual Report** ***See Appendix B, pg 15 for 2016 Results***

3.2 Operator Certification:

Utilities and Utility Operators are certified through the Environmental Operators Certification Program (EOCP). The new Village WTP is classified as a Water Treatment Level II and Water Distribution Level II Facility, which requires Level II Operators to run it.

At this time, our staff is certified to the following levels:

Employee	Water Treatment	Water Distribution
Warren Leigh	WT-I	WD - II
Gilbert Battersby	-	WD - II
Wesley Coleman	-	WD - I
Terry Flamond	-	WD - I
Bobby Gresiuk	WT-I	WD - III
Rachel George	Operator in Training	Operator in Training

As a Condition on Operator Permit, IHA is requiring that the Village provide Operators that are certified to the level of the plant. Until that time, the Village has retained Glen Walker to oversee operations of the water treatment plant.

3.3 Routine Maintenance:

Daily: Visual checks are conducted of the various facilities to ensure that the equipment is functioning properly and no problems are evident. Filter Sock cleaning is done, as required. The system is also monitored 24/7 by the SCADA system, which can be accessed remotely by Operators. The system is monitored for: Flow Rate; Total Flow; Free chlorine; chlorine pump settings, pH, temperature; well levels & turbidity.

Weekly: Every Tuesday the Village conducts facility inspections and bacteriological water sample testing at various end-line locations throughout the municipality.

Monthly: Flow rate information is compiled for the Million Gallon Reservoir and the wells.

Quarterly: A water sample is collected to monitor for Haloacetic Acids & Trihalomethanes. Sample results are reported to IHA.

Annually: Waterlines are flushed in the Spring and Fall. This removes debris and stale water that may have accumulated in the piping network.

Fire hydrants are also flushed and inspected. Any repairs necessary are made and two new hydrants have been installed each year. All obsolete hydrants have now been replaced.

A valve exercising program is conducted each year to ensure that valves remain in good working order.

Halfway water intake is back-flushed each year or two to remove settled debris and improve flow.

As part of the Village's Cross Connection Control Program, Backflow prevention devices are inspected and tested to prevent any cross contamination of the potable water system.

An annual report is submitted to the Interior Health Authority summarizing the conditions of the Operating Permit.

On-going: Data is constantly monitored to assist with identifying leaks in the system. Repairs are made immediately.

The Million Gallon Reservoir cover is pumped off regularly, to remove any precipitation and debris.

4.0 Projects & Improvements – 2016:

Water Main Replacement

The Village of Nakusp contracted out a project to replace 175 meters of aged galvanized water main on Nelson Avenue with PVC C900 water main. The Tender was awarded to Brenton Industries Ltd, who completed the project on time and on budget ($39,790.80). The scope of work also included the installation of one gate valve, six service connections, one hydrant and two thrust blocks.

Surface Water Protection Plan & Up-dated Emergency Response Plan

A Request for Quotes was awarded to Austin Engineering Ltd, in the amount of $16,400, for the preparation of a Surface Water Protection Plan and Emergency Response Plan. Completion of these Plans place the Village in full compliance of its IHA Conditions on Permit for the first time in history and provides clear direction for required action in the case of an emergency.

Completion of the Sleepy Hollow PRV Upgrade

In 2015, the Village was awarded a New Building Canada Fund Grant for 2/3 of the cost to install a Pressure Reducing Valve (PRV) Station in the Sleepy Hollow area of town. This station was required to address long-standing issues with excessively high water pressures, which contributed to the premature degradation of water lines in the Shakespeare Rd area. The project consisted of replacing six hundred feet of four inch asbestos/concrete pipe with new six inch PVC; and, the construction of an above-ground PRV station.

The project was completed in early 2016 for a total cost of $250,000. 2/3 of the costs were paid for by the grant in the amount of $165,000.

Columbia Basin Trust (CBT) WaterSmart Program:

In 2011 the Village of Nakusp was one of 22 municipalities to sign the Columbia Basin Water Smart Charter. Collectively, the Water Smart communities desired to achieve an overall water usage consumption reduction of 20% by 2015. Nakusp set its own target of 15% reduction, and established their Water Smart Action Plan to outline the path to attaining this goal. Unfortunately, consumption has actually increased by 1% over a five-year period.

In an effort to reduce peak water consumption, the Village participated in the CBT WaterSmart Ambassador program for the first time this summer. Matt Fry from New Denver did a splendid job of communicating the Village's watering regulations and goals for water reduction. He distributed dozens of hose timers, composters, etc. This program did seem to positively impact peak water usage by reducing the number of watering infractions.

GIS Mapping Project:

The Village has begun a GIS Mapping Project that will capture the digital mapping of water and sewer infrastructure. The project is being facilitated by a company called LandInfo Technologies Inc. (Geographic Information and Management System Consultants). With their assistance, the Village will obtain

maps that are comprised of many layers (water mains, services, sewer mains, manholes, storm drains, fire hydrants, roadways, house points, Zoning designations, etc). This mapping will be maintained in-house. LandInfo Technologies Inc. has also agreed to use Nakusp as a pilot community to implement Capital Asset Management applications to the mapping, free of charge.

Clean Water and Wastewater Fund Grant Application:
An application has been prepared in the amount of $615,817 for the complete replacement of all remaining galvanized water lines. Announcements will be made in the spring as to the successful applicants.

5.0 Challenges & Difficulties – 2016:

PRV Failure on 2nd Avenue NE

On October 28th residents of 2nd Avenue NE complained of problems with the water system that were affecting their indoor plumbing. Crews attended immediately to find water pressures of 190 psi. There is a Pressure Reducing Valve Station at the end of 2nd Avenue that obviously had failed. Crews bypassed the PRV by supplying residents with water from the lower grid. Repairs were completed and regular water service restored.

Color Events

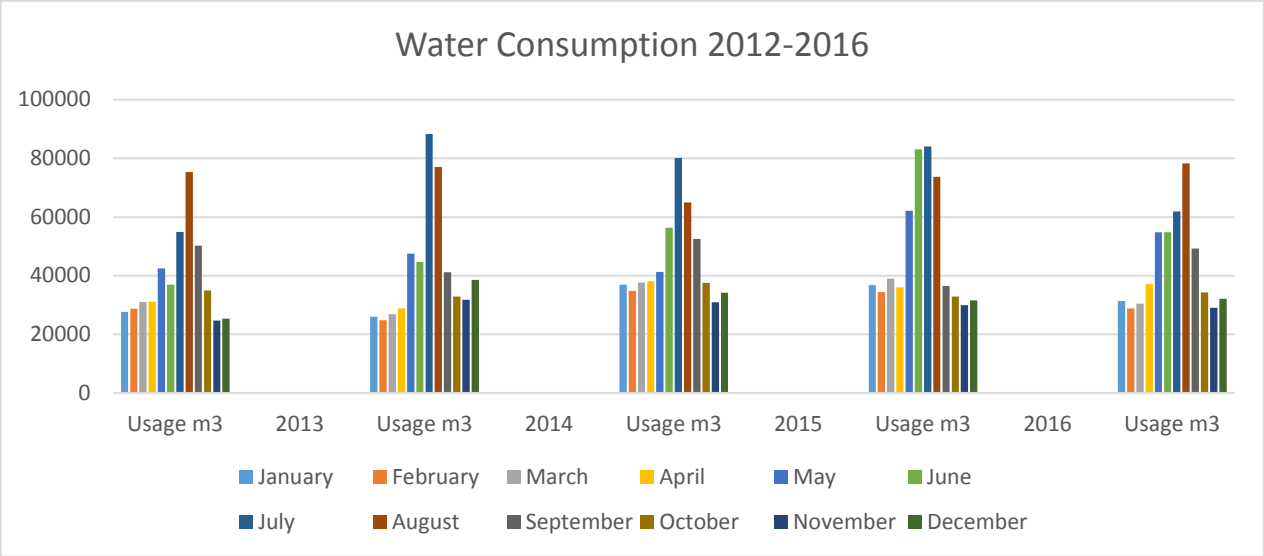
Excessive rainfall played havoc with the UV Reactors at the Water Treatment Plant, causing the plant to alarm frequently during Spring and Fall. During this time the plant's log removal values are closely monitored to ensure that the plant is meeting IHA requirements.

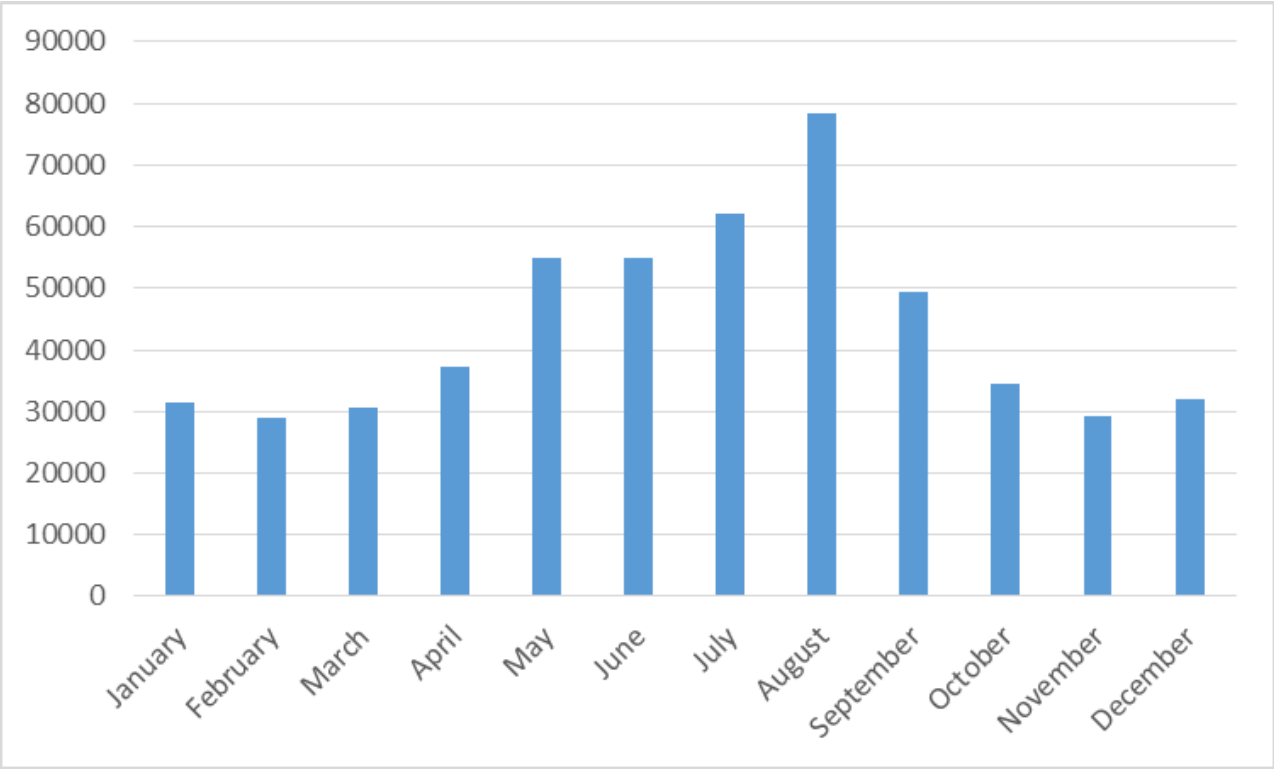
Water Treatment Plant Communication Issues:
In September the Water Treatment Plant experienced a communication failure, whereby remote access to the system was not possible through the SCADA (Supervisory Control & Data Acquisition) Program. A technician came from Vancouver on September 29th to correct the issue. Hardware upgrades were required to correct the issue and were completed by January 2017.

6.0 Water Consumption:

This year some improvements were seen on the outdoor water usage front. Following our first year of using a WaterSmart Ambassador, water consumption decreased from the previous year. This was an encouraging result, as the upward trend was not sustainable.

See Appendix D, pg 17, for 2016 results.





7.0 Cross Connection Control Program:

The Village of Nakusp has developed a Cross Connection Control Program, as required by the Drinking Water Protection Act. The purpose of this program is to protect public health, by preventing potential non-potable water sources from cross-contaminating the domestic water supply. This is achieved through the installation, maintenance and inspection of back-flow prevention devices.

Warren Leigh is currently our certified Cross Connection Control Administrator /Inspector and Wes Coleman is our certified Backflow Assembly Tester. Testing of backflow prevention devices is done annually.

8.0 Emergency Response Plan (ERP):

The Village has an up-dated Emergency Response Plan for the domestic water system, that was recently drafted with the Surface Water Protection Plan. The ERP identifies a number of potential emergency situations and sets out guidelines and procedures on how to deal with each issue.

The contact information is updated annually – see Appendix E, pg 19.

9.0 Proposed Capital Works/Improvements for 2017:

Council is currently considering the following Capital Expenditures for 2016:

- **Water Main Replacement, annual $ 150,000**
- **Replacement of remaining Galvanized Mains**

  1,055 meters along 4th, 5th & 6th Streets (lanes & Nelson Ave S.), including 42 service connections, 15 valves, tees and appurtenances. To be funded partially by the Clean Water & Wastewater Fund Grant (83%, to a maximum of $511,127) $ 615,815

Appendix A – Bacteriological Testing Results

SITE	DATE	Residual Cl2	TC Count	EC Count /100 ML
Carson's Corner	January 19/16	0.88	L1	L1
	March 1/16	1.09	L1	L1
	April 12/16	0.45	L1	L1
	May 24/16	0.46	L1	L1
	July 5/16	0.79	L1	L1
	August 16/16	0.72	L1	L1
	September 27/16	0.61	L1	L1
	November 8/16	0.61	L1	L1
	December 20/16	0.75	L1	L1
Sports Complex	February 2/16	0.41	L1	L1
	March 15/16	0.48	L1	L1
	April 26/16	0.41	L1	L1
	June 7/16	0.29	L1	L1
	July 29/16	0.64	L1	L1
	August 30/16	0.45	L1	L1
	October 11/16	0.27	L1	L1
	November 22/16	0.45	L1	L1
Crescent Bay Const.	February 9/16	0.68	no courier p/u	
	March 22/16	0.41	L1	L1
	May 3/16	0.5	L1	L1
	June 14/16	0.35	L1	L1
	July 26/16	0.5	too long in transit	

	Aug. 2/16	0.45	L1	L1
	Sept. 6/16	0.26	L1	L1
	Oct. 18/16	0.34	L1	L1
	Nov. 29/16	0.31	L1	L1
852 Alexander Rd.	January 26/16	0.66	L1	L1
	March 8/16	0.69	L1	L1
	April 19/16	0.36	L1	L1
	May 31/16	0.24	L1	L1
	July 12/16	0.76	L1	L1
	August 23/16	0.73	L1	L1
	October 4/16	0.4	L1	L1
	November 15/16	0.31	L1	L1
Overwaitea	January 5/16	0.84	L1	L1
	February 16/16	0.46	L1	L1
	March 29/16	0.65	L1	L1
	May 10/16	0.46	L1	L1
	June 21/16	0.1	L1	L1
	Aug. 2/16	0.52	L1	L1
	Sept. 13/16	0.34	L1	L1
	October 25/16	0.46	L1	L1
	December 6/16	0.5	L1	L1
Esso Station	January 12/16	0.5	L1	L1
	February 23/16	0.38	L1	L1

	April 5/16	0.22	L1	L1
	May 17/16	0.51	3	L1
	May 24/16	0.42	L1	L1
	June 28/16	0.53	L1	L1
	August 9/16	0.45	L1	L1
	September 20/16	0.47	L1	L1
	November 1/16	0.31	L1	L1
	December 13/16	0.89	L1	L1
Nelson Ave Water Main	October 11/16		L1	L1
Downtown Campground	April 26/16	0.44	L1	L1

Appendix B – Annual Comprehensive Source Water Analysis

CERTIFICATE OF ANALYSIS

REPORTED TO	Nakusp, Village of Box 280 Nakusp, BC V0G 1R0	**TEL** **FAX**	1-250-265-3689 (250) 265-3788
ATTENTION	Accounts Payable	**WORK ORDER**	6121000
PO NUMBER		**RECEIVED / TEMP**	2016-12-14 09:30 / 1°C
PROJECT	IH General Potability	**REPORTED**	2016-12-21
PROJECT INFO		**COC NUMBER**	B49815

General Comments:

CARO Analytical Services employs methods which are conducted according to procedures accepted by appropriate regulatory agencies, and/or are conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts, except where otherwise agreed to by the client.

The results in this report apply to the samples analyzed in accordance with the Chain of Custody or Sample Requisition document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Samples will be disposed of 30 days after the test report has been issued unless otherwise agreed to in writing.

Authorized By: **Ed Hoppe, B.Sc., P.Chem.**
Division Manager, Kelowna

If you have any questions or concerns, please contact your Account Manager:
Kristin McKeown (kmckeown@caro.ca)

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#110 4011 Viking Way
Richmond, BC V6V 2K9
Tel: 604-279-1499 Fax: 604-279-1599

#102 3677 Highway 97N
Kelowna, BC V1X 5C3
Tel: 250-765-9646 Fax: 250-765-3893

17225 109 Avenue
Edmonton, AB T5S 1H7
Tel: 780-489-9100 Fax: 780-489-9700

www.caro.ca

ANALYSIS INFORMATION

REPORTED TO	Nakusp, Village of	**WORK ORDER**	6121000
PROJECT	IH General Potability	**REPORTED**	2016-12-21

Analysis Description	Method Reference	Technique	Location
Alkalinity in Water	APHA 2320 B*	Titration with H2SO4	Kelowna
Ammonia, Total in Water	APHA 4500-NH3 G*	Automated Colorimetry (Phenate)	Kelowna
Anions by IC in Water	APHA 4110 B	Ion Chromatography with Chemical Suppression of Eluent Conductivity	Kelowna
Background Colonies (MF) in Water	APHA 9222	Membrane Filtration / Membrane Filtration	Kelowna
Carbon, Total Organic in Water	APHA 5310 B	High Temperature Combustion, Infrared CO2 Detection	Kelowna
Coliforms, Total (MF-CCA) in Water	APHA 9222*	Membrane Filtration / Incubation on Chromocult Agar	Kelowna
Colour, True in Water	APHA 2120 C	Spectrophotometry (456 nm)	Kelowna
Conductivity in Water	APHA 2510 B	Conductivity Meter	Kelowna
Cyanide, SAD in Water	ASTM D7511-12	Flow Injection Analysis with In-Line Ultraviolet Digestion and Amperometric Detection	Kelowna
E. coli (MF-CCA) in Water	APHA 9222*	Membrane Filtration / Incubation on Chromocult Agar	Kelowna
Hardness (as CaCO3) in Water	APHA 2340 B*	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Estimated)	N/A
Langelier Index in Water	APHA 2330 B	Calculation	N/A
Mercury, total by CVAFS in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	Richmond
Nitrogen, Total Kjeldahl in Water	APHA 4500-Norg D*	Block Digestion and Flow Injection Analysis	Kelowna
pH in Water	APHA 4500-H+ B	Electrometry	Kelowna
Solids, Total Dissolved (calc) in Water	APHA 1030 E	Calculation: 100 x ([Cations]-[Anions])/ ([Cations]+[Anions])	N/A
Sulfide, Total in Water	Sulfide (Colorimetric) / APHA 4500-S2 D*	Sulfide (Colorimetric) / Colorimetry (Methylene Blue)	Edmonton
Temperature (lab) in Water	APHA 2550 B	Thermometer	Kelowna
Total Metals by ICPMS in Water	APHA 3030E* / APHA 3125 B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma Mass Spectrometry (ICP-MS)	Richmond
Transmissivity at 254 nm in Water	APHA 5910 B*	Ultraviolet Absorption	Kelowna
Turbidity in Water	APHA 2130 B	Nephelometry	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Method Reference Descriptions:

APHA	Standard Methods for the Examination of Water and Wastewater, 22nd Edition, American Public Health Association/American Water Works Association/Water Environment Federation
ASTM	ASTM International Test Methods
EPA	United States Environmental Protection Agency Test Methods

ANALYSIS INFORMATION

REPORTED TO	Nakusp, Village of	**WORK ORDER**	6121000
PROJECT	IH General Potability	**REPORTED**	2016-12-21

Glossary of Terms:

MRL	Method Reporting Limit
<	Less than the Reported Detection Limit (RDL) - the RDL may be higher than the MRL due to various factors such as dilutions, limited sample volume, high moisture, or interferences
AO	Aesthetic objective
MAC	Maximum acceptable concentration (health based)
OG	Operational guideline (treated water)
% T	Percent Transmittance
°C	Degrees Celcius
CFU/100 mL	Colony Forming Units per 100 millilitres
CU	Colour Units (referenced against a platinum cobalt standard)
mg/L	Milligrams per litre
NTU	Nephelometric Turbidity Units
pH units	pH < 7 = acidic, ph > 7 = basic
µS/cm	Microsiemens per centimetre

Standards / Guidelines Referenced in this Report:

Guidelines for Canadian Drinking Water Quality (Oct 2014)

Website: http://www.hc-sc.gc.ca/ewh-semt/alt_formats/pdf/pubs/water-eau/sum_guide-res_recom/sum_guide-res_recom-eng.pdf

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user

SAMPLE ANALYTICAL DATA

REPORTED TO Nakusp, Village of
PROJECT IH General Potability

WORK ORDER 6121000
REPORTED 2016-12-21

Analyte	Result / *Recovery*	Standard / Guideline	MRL / *Limits*	Units	Prepared	Analyzed	Notes
Sample ID: Water Treatment Plant (6121000-01) [Water] Sampled: 2016-12-13 07:43							
Anions							
Chloride	< 0.10	AO ≤ 250	0.10	mg/L	N/A	2016-12-16	
Fluoride	**0.50**	MAC = 1.5	0.10	mg/L	N/A	2016-12-16	
Nitrate (as N)	< 0.010	MAC = 10	0.010	mg/L	N/A	2016-12-16	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	N/A	2016-12-16	
Sulfate	**12.1**	AO ≤ 500	1.0	mg/L	N/A	2016-12-16	
General Parameters							
Alkalinity, Total (as CaCO3)	**47**	N/A	2	mg/L	N/A	2016-12-15	
Alkalinity, Phenolphthalein (as CaCO3)	< 1	N/A	2	mg/L	N/A	2016-12-15	
Alkalinity, Bicarbonate (as CaCO3)	**47**	N/A	2	mg/L	N/A	2016-12-15	
Alkalinity, Carbonate (as CaCO3)	< 1	N/A	2	mg/L	N/A	2016-12-15	
Alkalinity, Hydroxide (as CaCO3)	< 1	N/A	2	mg/L	N/A	2016-12-15	
Ammonia, Total (as N)	< 0.020	N/A	0.020	mg/L	N/A	2016-12-15	
Carbon, Total Organic	**1.0**	N/A	0.5	mg/L	N/A	2016-12-15	
Colour, True	< 5	AO ≤ 15	5	CU	N/A	2016-12-16	
Conductivity (EC)	**118**	N/A	2	µS/cm	N/A	2016-12-15	
Cyanide, Total	< 0.0020	MAC = 0.2	0.0020	mg/L	N/A	2016-12-16	
Nitrogen, Total Kjeldahl	< 0.05	N/A	0.05	mg/L	2016-12-15	2016-12-16	
pH	**7.57**	6.5-8.5	0.01	pH units	N/A	2016-12-15	HT2
Sulfide, Total	< 0.05	AO ≤ 0.05	0.05	mg/L	2016-12-16	2016-12-16	
Temperature	**21**	N/A		°C	N/A	2016-12-15	HT2
Turbidity	**0.23**	OG < 0.1	0.10	NTU	N/A	2016-12-15	
UV Transmittance @ 254nm	**95.6**	N/A	0.1	% T	N/A	2016-12-15	
Calculated Parameters							
Hardness, Total (as CaCO3)	**55.2**	N/A	0.50	mg/L	N/A	N/A	
Langelier Index	**-0.9**	N/A	-5.0	-	N/A	2016-12-21	
Nitrogen, Organic	< 0.050	N/A	0.050	mg/L	N/A	N/A	
Solids, Total Dissolved (calc)	**64.1**	N/A	1.00	mg/L	N/A	N/A	
Total Metals							
Aluminum, total	**0.010**	OG < 0.1	0.005	mg/L	2016-12-15	2016-12-16	
Antimony, total	< 0.0001	MAC = 0.006	0.0001	mg/L	2016-12-15	2016-12-16	
Arsenic, total	< 0.0005	MAC = 0.01	0.0005	mg/L	2016-12-15	2016-12-16	
Barium, total	**0.043**	MAC = 1	0.005	mg/L	2016-12-15	2016-12-16	
Boron, total	**0.026**	MAC = 5	0.004	mg/L	2016-12-15	2016-12-16	
Cadmium, total	**0.00001**	MAC = 0.005	0.00001	mg/L	2016-12-15	2016-12-16	
Calcium, total	**19.0**	N/A	0.2	mg/L	2016-12-15	2016-12-16	
Chromium, total	**0.0007**	MAC = 0.05	0.0005	mg/L	2016-12-15	2016-12-16	
Cobalt, total	< 0.00005	N/A	0.00005	mg/L	2016-12-15	2016-12-16	
Copper, total	**0.0035**	AO ≤ 1	0.0002	mg/L	2016-12-15	2016-12-16	
Iron, total	< 0.01	AO ≤ 0.3	0.01	mg/L	2016-12-15	2016-12-16	
Lead, total	**0.0004**	MAC = 0.01	0.0001	mg/L	2016-12-15	2016-12-16	
Magnesium, total	**1.88**	N/A	0.01	mg/L	2016-12-15	2016-12-16	
Manganese, total	**0.0006**	AO ≤ 0.05	0.0002	mg/L	2016-12-15	2016-12-16	
Mercury, total	< 0.00002	MAC = 0.001	0.00002	mg/L	2016-12-18	2016-12-19	
Molybdenum, total	**0.0013**	N/A	0.0001	mg/L	2016-12-15	2016-12-16	

REPORTED TO Nakusp, Village of
PROJECT IH General Potability

WORK ORDER 6121000
REPORTED 2016-12-21

Analyte	Result / *Recovery*	Standard / Guideline	MRL / *Limits*	Units	Prepared	Analyzed	Notes
Sample ID: Water Treatment Plant (6121000-01) [Water] Sampled: 2016-12-13 07:43, Continued							
Total Metals, Continued							
Nickel, total	< 0.0002	N/A	0.0002	mg/L	2016-12-15	2016-12-16	
Phosphorus, total	< 0.02	N/A	0.02	mg/L	2016-12-15	2016-12-16	
Potassium, total	**0.80**	N/A	0.02	mg/L	2016-12-15	2016-12-16	
Selenium, total	< 0.0005	MAC = 0.05	0.0005	mg/L	2016-12-15	2016-12-16	
Sodium, total	**1.79**	AO ≤ 200	0.02	mg/L	2016-12-15	2016-12-16	
Uranium, total	**0.00107**	MAC = 0.02	0.00002	mg/L	2016-12-15	2016-12-16	
Zinc, total	**0.008**	AO ≤ 5	0.004	mg/L	2016-12-15	2016-12-16	
Microbiological Parameters							
Coliforms, Total	9	MAC = None Detected	1	CFU/100 mL	N/A	2016-12-14	HT3
Background Colonies	**15**	N/A	1	CFU/100 mL	N/A	2016-12-14	HT3
E. coli	< 1	MAC = None Detected	1	CFU/100 mL	N/A	2016-12-14	HT3
Sample ID: Well #1 (6121000-02) [Water] Sampled: 2016-12-13 08:25							
Anions							
Chloride	**5.58**	AO ≤ 250	0.10	mg/L	N/A	2016-12-16	
Fluoride	**0.11**	MAC = 1.5	0.10	mg/L	N/A	2016-12-16	
Nitrate (as N)	**0.928**	MAC = 10	0.010	mg/L	N/A	2016-12-16	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	N/A	2016-12-16	
Sulfate	**5.9**	AO ≤ 500	1.0	mg/L	N/A	2016-12-16	
General Parameters							
Alkalinity, Total (as CaCO3)	**147**	N/A	2	mg/L	N/A	2016-12-15	
Alkalinity, Phenolphthalein (as CaCO3)	< 1	N/A	2	mg/L	N/A	2016-12-15	
Alkalinity, Bicarbonate (as CaCO3)	**147**	N/A	2	mg/L	N/A	2016-12-15	
Alkalinity, Carbonate (as CaCO3)	< 1	N/A	2	mg/L	N/A	2016-12-15	
Alkalinity, Hydroxide (as CaCO3)	< 1	N/A	2	mg/L	N/A	2016-12-15	
Ammonia, Total (as N)	< 0.020	N/A	0.020	mg/L	N/A	2016-12-15	
Carbon, Total Organic	**0.7**	N/A	0.5	mg/L	N/A	2016-12-15	
Colour, True	< 5	AO ≤ 15	5	CU	N/A	2016-12-16	
Conductivity (EC)	**315**	N/A	2	µS/cm	N/A	2016-12-15	
Cyanide, Total	< 0.0020	MAC = 0.2	0.0020	mg/L	N/A	2016-12-16	
Nitrogen, Total Kjeldahl	< 0.05	N/A	0.05	mg/L	2016-12-15	2016-12-16	
pH	**7.64**	6.5-8.5	0.01	pH units	N/A	2016-12-15	HT2
Sulfide, Total	< 0.05	AO ≤ 0.05	0.05	mg/L	2016-12-16	2016-12-16	
Temperature	**21**	N/A		°C	N/A	2016-12-15	HT2
Turbidity	**0.25**	OG < 0.1	0.10	NTU	N/A	2016-12-15	
UV Transmittance @ 254nm	**98.8**	N/A	0.1	% T	N/A	2016-12-15	
Calculated Parameters							
Hardness, Total (as CaCO3)	**154**	N/A	0.50	mg/L	N/A	N/A	
Langelier Index	**0.03**	N/A	-5.0	-	N/A	2016-12-21	
Nitrogen, Organic	< 0.050	N/A	0.050	mg/L	N/A	N/A	
Solids, Total Dissolved (calc)	**167**	N/A	1.00	mg/L	N/A	N/A	

REPORTED TO Nakusp, Village of
PROJECT IH General Potability

WORK ORDER 6121000
REPORTED 2016-12-21

Analyte	Result / *Recovery*	Standard / Guideline	MRL / *Limits*	Units	Prepared	Analyzed	Notes
Sample ID: Well #1 (6121000-02) [Water] Sampled: 2016-12-13 08:25, Continued							
Total Metals							
Aluminum, total	**0.006**	OG < 0.1	0.005	mg/L	2016-12-15	2016-12-16	
Antimony, total	< 0.0001	MAC = 0.006	0.0001	mg/L	2016-12-15	2016-12-16	
Arsenic, total	< 0.0005	MAC = 0.01	0.0005	mg/L	2016-12-15	2016-12-16	
Barium, total	**0.430**	MAC = 1	0.005	mg/L	2016-12-15	2016-12-16	
Boron, total	**0.012**	MAC = 5	0.004	mg/L	2016-12-15	2016-12-16	
Cadmium, total	< 0.00001	MAC = 0.005	0.00001	mg/L	2016-12-15	2016-12-16	
Calcium, total	**48.7**	N/A	0.2	mg/L	2016-12-15	2016-12-16	
Chromium, total	**0.0033**	MAC = 0.05	0.0005	mg/L	2016-12-15	2016-12-16	
Cobalt, total	< 0.00005	N/A	0.00005	mg/L	2016-12-15	2016-12-16	
Copper, total	**0.0006**	AO ≤ 1	0.0002	mg/L	2016-12-15	2016-12-16	
Iron, total	**0.04**	AO ≤ 0.3	0.01	mg/L	2016-12-15	2016-12-16	
Lead, total	**0.0002**	MAC = 0.01	0.0001	mg/L	2016-12-15	2016-12-16	
Magnesium, total	**7.76**	N/A	0.01	mg/L	2016-12-15	2016-12-16	
Manganese, total	**0.0032**	AO ≤ 0.05	0.0002	mg/L	2016-12-15	2016-12-16	
Mercury, total	< 0.00002	MAC = 0.001	0.00002	mg/L	2016-12-18	2016-12-19	
Molybdenum, total	**0.0002**	N/A	0.0001	mg/L	2016-12-15	2016-12-16	
Nickel, total	**0.0003**	N/A	0.0002	mg/L	2016-12-15	2016-12-16	
Phosphorus, total	< 0.02	N/A	0.02	mg/L	2016-12-15	2016-12-16	
Potassium, total	**1.39**	N/A	0.02	mg/L	2016-12-15	2016-12-16	
Selenium, total	< 0.0005	MAC = 0.05	0.0005	mg/L	2016-12-15	2016-12-16	
Sodium, total	**4.51**	AO ≤ 200	0.02	mg/L	2016-12-15	2016-12-16	
Uranium, total	**0.00185**	MAC = 0.02	0.00002	mg/L	2016-12-15	2016-12-16	
Zinc, total	**0.028**	AO ≤ 5	0.004	mg/L	2016-12-15	2016-12-16	
Microbiological Parameters							
Coliforms, Total	< 1	MAC = None Detected	1	CFU/100 mL	N/A	2016-12-14	HT3
Background Colonies	< 1	N/A	1	CFU/100 mL	N/A	2016-12-14	HT3
E. coli	< 1	MAC = None Detected	1	CFU/100 mL	N/A	2016-12-14	HT3
Sample ID: Well #2 (6121000-03) [Water] Sampled: 2016-12-13 08:15							
Anions							
Chloride	**6.47**	AO ≤ 250	0.10	mg/L	N/A	2016-12-16	
Fluoride	< 0.10	MAC = 1.5	0.10	mg/L	N/A	2016-12-16	
Nitrate (as N)	**0.960**	MAC = 10	0.010	mg/L	N/A	2016-12-16	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	N/A	2016-12-16	
Sulfate	**5.1**	AO ≤ 500	1.0	mg/L	N/A	2016-12-16	
General Parameters							
Alkalinity, Total (as CaCO3)	**113**	N/A	2	mg/L	N/A	2016-12-15	
Alkalinity, Phenolphthalein (as CaCO3)	< 1	N/A	2	mg/L	N/A	2016-12-15	
Alkalinity, Bicarbonate (as CaCO3)	**113**	N/A	2	mg/L	N/A	2016-12-15	
Alkalinity, Carbonate (as CaCO3)	< 1	N/A	2	mg/L	N/A	2016-12-15	
Alkalinity, Hydroxide (as CaCO3)	< 1	N/A	2	mg/L	N/A	2016-12-15	
Ammonia, Total (as N)	< 0.020	N/A	0.020	mg/L	N/A	2016-12-15	

REPORTED TO Nakusp, Village of
PROJECT IH General Potability

WORK ORDER 6121000
REPORTED 2016-12-21

Analyte	Result / *Recovery*	Standard / Guideline	MRL / *Limits*	Units	Prepared	Analyzed	Notes
Sample ID: Well #2 (6121000-03) [Water] Sampled: 2016-12-13 08:15, Continued							
General Parameters, Continued							
Carbon, Total Organic	**0.7**	N/A	0.5	mg/L	N/A	2016-12-15	
Colour, True	< 5	AO ≤ 15	5	CU	N/A	2016-12-16	
Conductivity (EC)	**255**	N/A	2	µS/cm	N/A	2016-12-15	
Cyanide, Total	< 0.0020	MAC = 0.2	0.0020	mg/L	N/A	2016-12-16	
Nitrogen, Total Kjeldahl	< 0.05	N/A	0.05	mg/L	2016-12-15	2016-12-16	
pH	**7.52**	6.5-8.5	0.01	pH units	N/A	2016-12-15	HT2
Sulfide, Total	< 0.05	AO ≤ 0.05	0.05	mg/L	2016-12-16	2016-12-16	
Temperature	**20**	N/A		°C	N/A	2016-12-15	HT2
Turbidity	< 0.10	OG < 0.1	0.10	NTU	N/A	2016-12-15	
UV Transmittance @ 254nm	**98.8**	N/A	0.1	% T	N/A	2016-12-15	
Calculated Parameters							
Hardness, Total (as CaCO3)	**121**	N/A	0.50	mg/L	N/A	N/A	
Langelier Index	**-0.3**	N/A	-5.0	-	N/A	2016-12-21	
Nitrogen, Organic	< 0.050	N/A	0.050	mg/L	N/A	N/A	
Solids, Total Dissolved (calc)	**135**	N/A	1.00	mg/L	N/A	N/A	
Total Metals							
Aluminum, total	< 0.005	OG < 0.1	0.005	mg/L	2016-12-15	2016-12-16	
Antimony, total	< 0.0001	MAC = 0.006	0.0001	mg/L	2016-12-15	2016-12-16	
Arsenic, total	< 0.0005	MAC = 0.01	0.0005	mg/L	2016-12-15	2016-12-16	
Barium, total	**0.322**	MAC = 1	0.005	mg/L	2016-12-15	2016-12-16	
Boron, total	**0.010**	MAC = 5	0.004	mg/L	2016-12-15	2016-12-16	
Cadmium, total	< 0.00001	MAC = 0.005	0.00001	mg/L	2016-12-15	2016-12-16	
Calcium, total	**38.8**	N/A	0.2	mg/L	2016-12-15	2016-12-16	
Chromium, total	**0.0033**	MAC = 0.05	0.0005	mg/L	2016-12-15	2016-12-16	
Cobalt, total	< 0.00005	N/A	0.00005	mg/L	2016-12-15	2016-12-16	
Copper, total	**0.0007**	AO ≤ 1	0.0002	mg/L	2016-12-15	2016-12-16	
Iron, total	< 0.01	AO ≤ 0.3	0.01	mg/L	2016-12-15	2016-12-16	
Lead, total	**0.0003**	MAC = 0.01	0.0001	mg/L	2016-12-15	2016-12-16	
Magnesium, total	**5.83**	N/A	0.01	mg/L	2016-12-15	2016-12-16	
Manganese, total	**0.0002**	AO ≤ 0.05	0.0002	mg/L	2016-12-15	2016-12-16	
Mercury, total	< 0.00002	MAC = 0.001	0.00002	mg/L	2016-12-18	2016-12-19	
Molybdenum, total	**0.0002**	N/A	0.0001	mg/L	2016-12-15	2016-12-16	
Nickel, total	**0.0003**	N/A	0.0002	mg/L	2016-12-15	2016-12-16	
Phosphorus, total	< 0.02	N/A	0.02	mg/L	2016-12-15	2016-12-16	
Potassium, total	**1.45**	N/A	0.02	mg/L	2016-12-15	2016-12-16	
Selenium, total	< 0.0005	MAC = 0.05	0.0005	mg/L	2016-12-15	2016-12-16	
Sodium, total	**4.23**	AO ≤ 200	0.02	mg/L	2016-12-15	2016-12-16	
Uranium, total	**0.00070**	MAC = 0.02	0.00002	mg/L	2016-12-15	2016-12-16	
Zinc, total	< 0.004	AO ≤ 5	0.004	mg/L	2016-12-15	2016-12-16	
Microbiological Parameters							
Coliforms, Total	< 1	MAC = None Detected	1	CFU/100 mL	N/A	2016-12-14	HT3
Background Colonies	< 1	N/A	1	CFU/100 mL	N/A	2016-12-14	HT3

SAMPLE ANALYTICAL DATA

REPORTED TO	Nakusp, Village of	**WORK ORDER**	6121000
PROJECT	IH General Potability	**REPORTED**	2016-12-21

Analyte	Result / *Recovery*	Standard / Guideline	MRL / *Limits*	Units	Prepared	Analyzed	Notes
Sample ID: Well #2 (6121000-03) [Water] Sampled: 2016-12-13 08:15, Continued							
Microbiological Parameters, Continued							
E. coli	< 1	MAC = None Detected	1	CFU/100 mL	N/A	2016-12-14	HT3

Sample / Analysis Qualifiers:

HT2 The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.

HT3 Microbiological analysis was initiated beyond the maximum holding time of 30 hours. Results may not be valid.

Appendix C – 2016 Trihalomethane (THM) Results

Each water sample is tested for: Bromodichloromethane; Bromoform; Chloroform; and Dibromochloromethane. Results are reported in mg/L. The method reporting limit for each compound is less than 0.001 mg/L. Only results exceeding 0.001 mg/L are shown below:

DATE	SITE	BROMO DICHLOROMETHANE	BROMOFORM	CHLOROFORM	DIBROMO-CHLOROMETHANE	TOTAL THM
Jan. 5/16	Overwaitea Foods	<0.001	<0.001	<0.001	<0.001	**<0.004**
Feb. 2/16	Sports Complex	<0.001	<0.001	<0.001	<0.001	**<0.004**
Apr5/16	Esso Station	<0.001	<0.001	**0.024**	<0.001	**0.024**
July 5/16	Carson's Corner	<0.001	<0.001	**0.03**	<0.001	**0.03**
Oct 4/16	Alexander Road	0.002	<0.001	**0.004**	0.001	**0.007**
Dec.6/16	Overwaitea Foods	<0.001	<0.001	**0.023**	<0.001	**0.023**

Appendix C - 2016 Haloacetic Acid (HAA) Results

Another major group of chlorinated disinfection by-products found in drinking water, besides Trihalomethanes, are Haloacetic Acids. Together they can be used as indicators for the presence of all chlorinated disinfection by-products. The Maximum Allowable Concentration of HAAs is 80 micrograms/Litre.

DATE	SITE	Monochloroacetic acid (MCA)	Dichloroacetic acid (DCA)	Trichloroacetic acid (TCA)	Monobromoacetic Acid (MBA)	Dibromoacetic Acid (DBA)	Total HAA5
Jan. 5/16	Overwaitea Foods	0.003	<0.002	0.003	<0.002	<0.002	0.006
Apr. 5/16	Esso Station	<0.002	**0.013**	**0.018**	<0.002	<0.002	0.031
July 5/16	Carson's Corner	<0.002	**0.02**	**0.024**	<0.002	<0.002	**0.044**
Oct4/16	Alexander Road	<0.002	<0.002	0.002	<0.002	<0.002	0.002

Appendix D – Water Consumption Data

2016		GRAVITY SYSTEM							
MO/YR	DAYS/ MO	MAX DAY	DAY OF MO	MIN DAY	DAY OF MO	READING @ START OF MO	READING @ END OF MO	READING FOR MONTH M3	DAILY AVG
January	31	711	17	329	30	926,412	941,092	14,680	474
February	29	533	7	363	1	941,092	953,831	12,739	439
March	31	579	30	335	29	953,831	966,462	12,631	407
April	30	550	17	334	14	966,462	979,274	12,812	427
May	31	752	17	340	25	979,274	995,703	16,429	530
June	30	965	30	357	1	995,703	1,013,836	18,133	604
July	31	1,339	29	505	14	1,013,836	1,039,968	26,132	843
August	31	1,685	17	317	28	1,039,968	1,069,726	29,758	960
Sept	30	1,204	2	90	27	1,069,726	1,089,287	19,561	652
Oct	31	1,167	8	10	15	1,089,287	1,105,359	16,072	518
Nov	30	1,076	22	131	16	105,359	125,894	20,535	685
Dec	31	1,142	4	312	28	125,894	144,982	19,088	616
	366							218,570	596

WELL #1 SYSTEM								
DAYS RUNNING	MAX DAY	DAY OF MO	MIN DAY	DAY OF MO	READING @ START OF MO	READING @ START OF NEXT MO	READING FOR MONTH M3	DAILY AVG
31	738	31	432	5	816,370	833,082	16,712	539
29	768	4	427	28	833,082	849,196	16,114	556
2	672	1	8	2	849,196	849,876	680	340
3	559	17	29	8	849,876	850,509	633	211
2	6	11	6	18	850,509	850,521	12	6
20	1418	30	29	23	850,521	868,003	17,482	874
15	242	1	3	15	868,003	869,477	1,474	98
8	333	24	2	10	869,477	870,608	1,131	141
3	1134	1	1	17	870,608	870,616	8	3
1	6	17	0	1	870,616	870,622	6	6
0					870,622	870,622	0	0
2	26	14	3	13	870622	870,651	29	15
116							54281	232

WELL #2 SYSTEM									SYSTEMS COMBINED	SYSTEMS COMBINED
DAYS RUNNING	MAX DAY	DAY OF MO	MIN DAY	DAY OF MO	READING @ START OF MO	READING @ START OF NEXT MO	READING FOR MONTH M3	DAILY AVG	GRAVITY PLUS WELLS (DAILY AVG)	COMBINED FLOWS 2016
2	13	23	9	2	321,625	321,647	22	11	1024	31414
0					321,647	321,647	0	0	995	28853
30	788	30	396	31	321,647	338,829	17,182	573	1320	30493
30	1382	28	542	3	338,829	362,534	23,705	790	1428	37150
31	1708	10	674	23	362,534	400,927	38,393	1238	1774	54834
19	2044	8	3	14	400,927	420,123	19,196	1010	2489	54811
31	1636	2	539	20	420,123	454,484	34,361	1108	2050	61967
31	2634	29	659	5	454,484	501,906	47,422	1530	2631	78311
30	1779	27	209	18	501,906	531,627	29,721	991	1645	49290
31	1179	29	4	27	531,627	549,901	18,274	589	1114	34352
30	1216	7	1	9	549,901	558,473	8,572	286	970	29107
29	879	31	3	11	558473	571,488	13,015	449	1079	32132
294							249863	715	1,543	522714

Appendix E – ERP Contact Information

Up-dated June 2016

Emergency Agency	Contact Person	Phone # (250)	Cell No. (250)	Emerg. # (250)	Fax # (250)
Fire Dept/Police/Ambulance	Emergencies Only			9-1-1	
Village of Nakusp: Main Office	Laurie Taylor, CAO	265-3689	265-1727		265-3788
Public Works Yard	Warren Leigh, Ops Director	265-3556	265-1725	265-3861	265-3262
Fire Chief	Terry Warren	265-3563	265-1756	9-1-1	265-3571
** Emergency Coordinator	Terry Warren	265-0230	265-1920		265-3571
Drinking Water Officer	Dan Byron	420-2240	421-3471	866-457-5648	426-3022
Well Pump Installation & Repair	Mearls – Greg Anderson	763-0109	212-4806		763-5466
BC Hydro	Power Outage: 1-888-769-3766	Emergency: 1-877-520-1355			
Bottled Water Supplier	Crystal Clear Water	265-1874			
Bulk Water Hauler - Kamloops	Diamond C Ventures Ltd.	374-1314			
Environmental Protection Service		354-6333	1-800-663-3456		
Excavation Services	Arrow Lakes Ready Mix	265-4615	265-1146		
Extended Care Facility (Halcyon)	Robin Hicks, Site Mgr.	265-3692	265-8546	265-1187	265-4141
Health Clinic	Linda Nero	265-3608 ext 2			265-3104
Nelson Health Unit Office	1-877-221-3388	505-7200			505-7211
Medical Health Officer, office hrs	250-420-2240	Drinking Water Specialist – Dan Byron			
Medical Health Officer, After Hrs	1-866-457-5648				
Municipal Project Manager					
Newspaper	Arrow Lakes News	265-3841			
Plumbing Services	Dave's Plumbing	265-2113	265-1760		
Public Health Engineer	Marianne Crowe	505-7200		866-457-5648	505-7211
Radio Station	Easy Rock	352-5510			352-9189
RCMP – Nakusp Detachment	Debra McCoy	265-3677 or 265-3678		9-1-1	265-4292
School District No. 10	Art Olson, Ops. Manager	265-3638 ext.3331	265-1075		265-3701
Arrowtarian Rotary Villa	Trish Cannon	265-2020	265-4652 Earl	265-1886	265-4355
Spill Reporting for BC	1-800-663-3456	Environmental Protection: Veron Novosad			
TV Station	Local Channel 13	265-3733			837-2900
Water Stewardship Office	354-6333 Thomas Cummings				

Austin Engineering Ltd.
875 Farwell St. Trail, BC
V1R 3T9
250-448-7525
austinengineeering.ca

THE VILLAGE OF
NAKUSP

Village of Nakusp Water System Source Protection Plan

October 2016

Revision 0

1					
0	31 Oct 2016	RK	HH	Final Issued to Client	RK
P	17 Oct, 2016	RK	HH	Draft Issued to Client for Review	RK
Rev.	Date	By	Chk	Description	Approved

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Contents

Introduction

Austin Engineering Ltd. (AEL) has developed this Source Protection Plan (SPP) which covers the surface water sources of the Village of Nakusp water system and follows Modules 1, 2, 7 and 8 of the BC Comprehensive Drinking Water Source-to-Tap Assessment Guideline (MHLS 2010) as required under the BC Drinking Water Protection Act.

The Village of Nakusp water system is comprised of both surface and groundwater sources however Golder Associates Ltd. (Golder) has previously completed a Groundwater Protection Plan (GWPP) for Well 1 and Well 2.

In conjunction with this SPP, AEL have also developed an updated Water System Emergency Response Plan for the Village of Nakusp.

Modules 1, 2, 7 and 8 of the BC Comprehensive Drinking Water Source-to-Tap Assessment Guideline (MHLS 2010) are summarized as follows:

- Module 1 – Delineate and characterize drinking water sources
- Module 2 – Conduct contaminant source inventory
- Module 7 – Characterize risks from source to tap
- Module 8 – Recommend actions to improve drinking water protection

The Village of Nakusp reports to Interior Health regarding drinking water protection. Interior Health is responsible for regulating and monitoring public facilities and aspects of the environment that have a direct impact on public health. Interior Health has developed the Drinking Water Quality Improvement Program (DWQIP) and a portion of the “Conditions on Operating Permit Handout” pertaining to source protection plan requirements is included in Appendix A.

Objectives

The objective of this Source Protection Plan is to identify and assess all risks to the Village of Nakusp surface water sources (as per Modules 1, 2 and 7) and develop prioritized recommendations to improve drinking water protection (as per Module 8).

Comprehensive Drinking Water Source-To-Tap Assessment Guideline

The BC Comprehensive Drinking Water Source-to-Tap Assessment Guideline (MHLS 2010) provides guidance to water system owners and operations on how to apply the concept of the multi-barrier approach from source to tap to improve drinking water safety and sustainability. A multiple-barrier approach to source water protection is optimal so that if one barrier under-performs others can compensate.

Village of Nakusp Water System Description

Figure 1 provides a schematic overview of the entire Village of Nakusp water system and shows how the surface water sources of Halfway Creek and Upper Brouse Creek fit into the water system. AEL Civil and Environmental Engineers Ruth Keyes and Heather Hordowick performed a site visit of the Upper Brouse and Halfway Creek Intake Structures, WTP, Well Pump and Chlorine Injection House and reservoirs on June 14th, 2016 accompanied by Warren Leigh, Director of Operations from the Village of Nakusp.

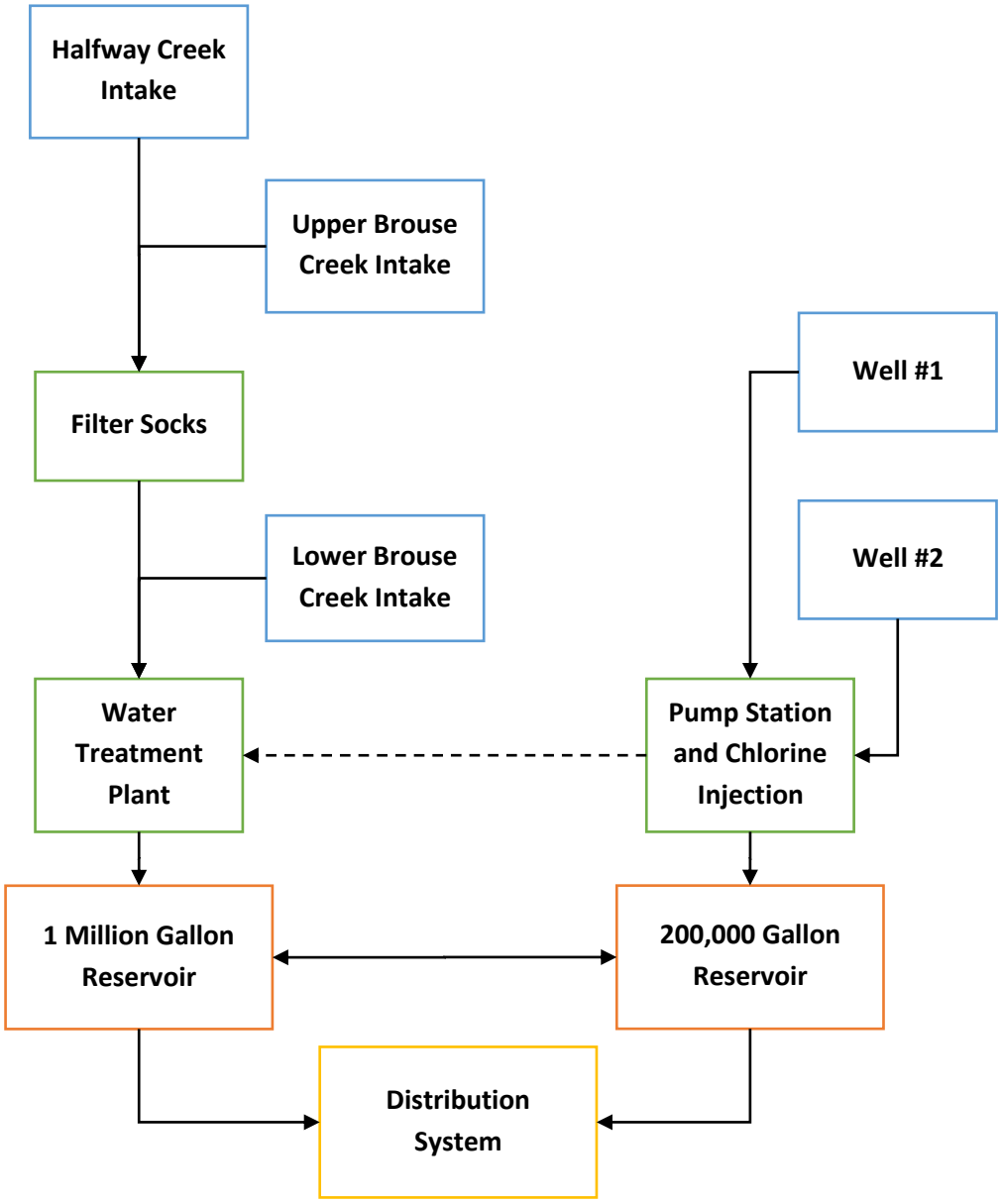

Figure 1 - Nakusp Water System Schematic Overview

Module 1 – Delineate and Characterize Drinking Water Sources

Source Area Delineation

The three surface water intakes that provide raw water to the water treatment plant are all located within the same watershed area. The total watershed area upstream of the three intakes is approximately 4.75 km^2.

Watershed Area

In accordance with Module 1 of the Source-To-Tap Guideline, the assessment area for the surface water sources will be the contributing watershed for Halfway and Brouse Creeks as well as a protection zone with a 100 m radius around each intake location. The contributing watershed area and intake protection zones are illustrated in the figure provided in Appendix B.

The watershed area is characterized as temperate forest and consists of mainly undeveloped, mountainous, densely vegetated areas containing a variety of evergreen tree species including pine, spruce, hemlock, cedar, Western balsam and fir. Deciduous vegetation consists of alder, cottonwood, aspen, ample and birth species.

A review of the Geological Survey of Canada Map covering the Nakusp area indicates that the watershed area includes the following geological compositions:

- politic to silty phyllite and slate;
- amphibole-metavolcanics rocks; and
- Kuskanax batholith aegirine-augite leucogranite syenite and leucoquartz monzonite.

Surface Water Intake Description

The surface water system consists of three (3) intakes:

- Halfway Creek Intake – see Figure 2;
- Upper Brouse Creek Intake – see Figure 3; and
- Lower Brouse Creek Intake.

Raw water is drawn from a combination of these intakes to supply the Water Treatment Plant (WTP) which is classified as a Level II Water Treatment. The demand supplied by each intake is dependant on the external conditions including seasonal quality and quantity variations. Preference is generally given to Halfway Creek intake, then Upper Brouse Creek intake, followed by the Lower Brouse Creek intake due to decreasing raw water quality at the lower levels of the creek. Note that for the purposes of this study Kuskanax intake was not considered as part of the system as AEL understands that it has never reached an operational state.

Before reaching the WTP, the surface water passes through a Filter Sock Chamber comprised of six perforated 12" diameter and 8 ft long PVC pipes covered with mesh filter media (sock). This filtration system is designed to remove debris such as coarse organic matter rather than fines and micro-organisms.

During the site visit, the Halfway and Upper Brouse intake structures were inspected for structural integrity and hydraulic conveyance capacity. AEL notes these structures appeared to be well maintained, free of debris and in good condition at the time of inspection, however all three structures lack protection from wildlife and vandalism. No vegetation growth or excessive sediment build-up was observed on any of the intake structures. Table 1 provides a summary of the intake structures including locations and descriptions.

Table 1 – Surface Water Source Intake Structure Summary

	Halfway Intake	Upper Brouse Intake	Lower Brouse Intake
Description	Located in Halfway Creek. Concrete broad crested weir with side intake. Intake fed from Halfway Creek via gravity.	Located in Brouse Creek. Concrete broad crested weir with side intake. Intake fed from Brouse Creek via gravity.	Located in Brouse Creek. Not used as much as Upper Brouse and Halfway Creek.
Intake Location - Coordinates provided by the Village of Nakusp NAD83 (U11)	N50 degrees 14.764' W117 degrees 42.365' N 5566229 E 449656	N50 degrees 14.661' W117 degrees 43.965' N 5566056 E 447753	N50 degrees 14.647 W117 degrees 43.965 N 5566031 E 447753
Intake Invert Elevation (m)	Not verified	Not verified	Not verified

Surface Water Quality

A full comprehensive raw water analysis of the surface source water is conducted annually. Surface source raw water quality data from the 2015 Annual Water Report was reviewed to provide insight into source water characteristics. The sample analytical data (Caro Analytical Services – 5120175-01 Dec-18-15) indicate the presence of calcium, magnesium and potassium although these parameters do not have Maximum Allowable Concentrations (MACs) according to the Guidelines for Canadian Drinking Water Quality. In addition, the surface source raw water sample analysis data revealed the presence of coliforms and E.coli in concentrations exceeding the MACs provided in the Guidelines for Canadian Drinking Water Quality.

Figure 2 – Halfway Creek Intake Structure (Top: Weir and Intake on Side, Bottom Left: Weir and Intake, Bottom Right: Intake from Above)

Figure 3 – Upper Brouse Intake Structure (Top: Intake Off Brouse Creek and Covered Filter Sock Chamber, Bottom Left: Intake Off Brouse Creek, Bottom Right: Filter Sock Chamber Partially Uncovered)

Groundwater Sources

The Village of Nakusp's groundwater sources include two (2) wells, referred to as Well #1 and Well #2. Both wells are located north of the arena in the Nakusp Recreation Park, and supply groundwater from the same aquifer. A summary of well characteristics can is outlined in Table 2 below. A Groundwater Protection Plan (GWPP) for Well #1 and Well #2 was completed by Golder Associates in 2014.

Table 2 – Well Summary (Golder Associates, 2014 and the Village of Nakusp)

	Well #1 (Golder Associates, 2014)	Well #2 (Golder Associates, 2014 & Village of Nakusp)
BC Ministry of Environment Well Tag Number	88581	104165
Installation Year	2004	2015
Total Depth	84.0 m	124.4 m
Capacity* (Limited Based on Current Pump)	46.6 L/s (675 US gpm)	81 L/s** (1,270 US gpm)
Current Pump	50 hp variable frequency drive	75 hp
Typical Pump Flowrate at Maximum Power	25 L/s 396 US gpm)	34.6 L/s (548 US gpm)

***Capacity is limited due to the current pump installed in the wells**

****Limited to a maximum of 63 L/s (1,000 US gpm) as an environmental assessment has not been completed under the *BC Environmental Assessment Act*.**

Supply versus Demand

According to the Village of Nakusp Water Master Plan (Delterra, 2010), the current water licenses on Brouse and Halfway Creek allow the Village of Nakusp to draw up to approximately 2,100 m^3/day.

Based on data provided in the 2015 Annual Water Report, the average daily water volume supplied from all the surface (gravity) sources was 641 m^3/day. The average daily consumption is 2015 was 1,783 m^3/day with Well#1 suppling an average of 441 m^3/day and Well#2 supplying an average of 702 m^3/day. The 2015 Annual Water Report stated that managing the demand versus supply in 2015 was a challenge due to increasing demands attributed to hot weather conditions, increased out-door water usage (lawn watering) and continued/increased leakage.

The average daily demand for 2015 was approximately 1000 L/person/day which is higher than the rate recommended in the Master Municipal Construction Design Guidelines of 800 L/person/day for use when no actual recorded data exists.

From a review of the data it appears that currently supply is matching demand with both the groundwater and surface water sources supplying water simultaneously. However, if either of the

sources (groundwater or surface) was unable to be used, meeting demands with the remaining sources could be a challenge given that challenges currently exist meeting demands with both surface and groundwater sources in use.

Climate

Table 3 provides a summary of the Nakusp Climate Station and Table 4 provides a summary of average daily temperatures and precipitation data collected from the Nakusp Climate Station. Climate data can be used to predict watershed runoff volumes and flow rates in water bodies which can be used to assess the ability of a source to meet demands.

Table 3 – Nakusp Climate Station

Station Name	Nakusp
Climate ID	1145300
Latitude	50° 15' N
Longitude	117° 48' W
Elevation:	457.20 m

Table 4 – Canadian Climate Normals Station Data for Nakusp (1971-2000)

Average Daily Temperature (Annual)	7.4 °C
Average Daily Temperature (August)	17.9 °C
Average Daily Temperature (January)	-3 °C
Average Annual Precipitation (Rain)	65 cm
Average Annual Precipitation (Snow)	192.1 cm
Average Annual Precipitation (Total)	257.1 cm

Module 2 – Contaminant Source Inventory

Contaminants of Concern

Drinking water contaminants of concern can be grouped into four broad categories:

- Biological (Microbes and Pathogens): living organisms such as bacteria, enzymes, fungi and viruses or their products that if ingested or absorbed into the body can pose a health risk.
- Chemical: Many natural and manmade chemicals are known to pose a risk to human health when present at concentrations of concern. These chemicals have regulated concentration thresholds for the protection of human health and environmental receptors. Chemical categories include metals and ions, petroleum hydrocarbons, pesticides, volatile organic compounds and other non-volatile organic compounds. Common sources of these chemicals include natural processes, commercial and industrial activity, consumer products, and other hazardous materials.
- Radiological: radiological contaminants are naturally occurring radioactive particles of uranium and radium deposits and occur in waste from man-made nuclear reactive processes. Even in small concentrations, radiological contaminants can pose a health risk.
- Turbidity: Turbidity is the measure of the relative clarity of a liquid (typically water) and the degree of water transparency due to the presence of suspended particulates.

Contaminant Source Inventory

Contaminant sources may be anthropogenic or naturally occurring and exist as point sources, linear sources, or cumulative effect (nonpoint) sources. Linear sources may represent either point sources where leaks or spills may occur, or nonpoint sources from general impacts.

To determine the contaminant source inventory AEL reviewed maps, historical aerial photos, contaminant database records and local knowledge of historical and existing land uses in the area.

A contaminant database search was completed by Environmental Risk Information Services (ERIS) for the watershed areas above all intake infrastructure, extending to the WTP location. The inventory includes 44 Federal, Provincial and private database sources. The ERIS Database Reports for the watershed areas containing results of the inventory search can be found in Appendix C.

A review of the ERIS Database search results did not reveal any Areas of Potential Environmental Concern (APECs) within the Brouse or Halfway watershed areas. The results of the database search indicated that there are no Environmental Site Registries within the watershed areas. The search results also had no findings observed upgradient of any raw surface water supply infrastructure. One (1) private water well and one (1) lumber products site were identified slightly outside of and downgradient to the watershed boundary and are not considered APECs to the Brouse or Halfway watershed areas.

AEL Civil and Environmental Engineers Ruth Keyes and Heather Hordowick performed a site visit of the Brouse and Halfway Creek Intake Structures, WTP, Well Pump and Chlorine Injection House and reservoirs on June 14th, 2016 accompanied by Warren Leigh, Director of Operations from the Village of Nakusp. No APECs were observed by AEL Engineers during the site visit.

Contaminant Source Inventory Table

The contaminant source inventory table (see Table 1) describes the contaminant source types, location information, possible contaminants of concern, contaminant transportation mechanisms and additional comments.

Urban Runoff and Common Contaminants on Roadways

The following information is provided on the Ministry of Environment, Environmental Protection Division Website:

Pollutants commonly detected in urban runoff which may be harmful to receiving waters include suspended solids, oxygen demanding substances, toxic metals and trace elements, organic contaminants, nutrients, and pathogenic bacteria. Other constituents and characteristics which may affect the behaviour and fate of the pollutants in urban runoff include major ions such as sodium, chloride, calcium, magnesium and potassium, and the alkalinity, hardness, pH, salinity and temperature of the runoff water (MELP [now WLAP], 1992).

The following is a partial list of contaminants that may be expected in urban runoff:

- asbestos from brake linings and clutch linings;
- bacteria from animals and birds, soils, litter, livestock hauling, livestock waste hauling and onsite sewage tanks and fields;
- bromide from auto exhaust;
- cadmium from tire fillers and insecticides;
- chloride from road salts;
- chromium from moving engine parts and brake linings;
- copper from bearing and bushing wear, moving engine parts, brake linings and radiator repair;
- cyanide from de-icing road salts;
- pesticides (fungicides, herbicides and insecticides) from roadside maintenance;
- iron from autobodies, moving engine parts, bridges, guardrails, overpasses, lamp standards, and other structures;
- lead from gasoline, tire fillers, lubricating oil and grease, bearing wear and automotive and radiator repair;
- manganese from moving engine parts and gasoline additives;
- nickel from diesel fuel, lubricating oil, bushing wear, brake linings and asphalt paving;

- nitrogen from the atmosphere, animal wastes, onsite sewage systems, vegetative matter and fertilizers;
- particulates from pavement wear, vehicles, the atmosphere and road maintenance;
- PAHs from automobiles and pesticides;
- PCBs from pesticides, atmospheric deposition and tire catalyst;
- petroleum from paving, fuels spills, engine blow-by, lubricant leaks, antifreeze and hydraulic fluids;
- phosphorus from the atmosphere, animal wastes, onsite sewage systems, vegetative matter and fertilizers
- potassium from the atmosphere and fertilizers;
- rubber from tire wear;
- sediments from construction sites, stream channel erosion, poorly vegetated lands and motor vehicles;
- sulphate from roadbeds, road salts and fuels; and
- zinc from tire fillers, motor oil additives, automotive and radiator repairs, grease and paint manufacturing".

Table 5 – Contaminant Source Inventory Table

Hazard Reference No.	Contaminant Source Type	Contaminant Location	Distance/Direction to the Source	Owner/Jurisdiction	Contaminants of Potential Concern	Contaminant Transport Mechanism
HID 1	Urban runoff	Upper Brouse Road	100 m	The Village of Nakusp	Biological (Microbes and Pathogens) Chemical Turbidity	Overland flow
HID 2	Flood runoff and landslides	Within watershed area	Surrounding	Not applicable	Biological (Microbes and Pathogens) Turbidity	Erosion/mass wasting leading to entrained sediment in watercourses
HID 3	Radiological deposits	Within watershed area	Surrounding	Not applicable	Radiological	Injection to water source; Sub-surface soil diffusion
HID 4	Wildlife	Within watershed area	Surrounding	The Village of Nakusp	Biological (Microbes and Pathogens)	Overland flow; Direct deposit to water source
HID 5	Agricultural land use	Within watershed area	Surrounding	Various	Biological (Microbes and Pathogens) Chemical Turbidity	Overland flow; Direct discharge to water source
HID 6	Forestry activities	Within watershed area	Surrounding	Ministry of Forests, Lands and Natural Resource Operations Various forestry license holders	Biological (Microbes and Pathogens) Chemical Turbidity	Overland flow Direct discharge to water source
HID 7	Wildfire	Within watershed area	Surrounding	Regional District of Central Kootenay The Village of Nakusp	Biological (Microbes and Pathogens) Chemical Turbidity	Overland flow
HID 8	Parkland and recreational land use	Within watershed area	Surrounding	Regional District of Central Kootenay The Village of Nakusp	Biological (Microbes and Pathogens) Chemical Turbidity	Direct discharge to source waters
HID-9	Sanitary systems	Upper Brouse Road	100 m	The Village of Nakusp/personal residential on-site sanitary system	Biological (Microbes and Pathogens)	Direct discharge to source waters; Sub-surface soil diffusion

Module 7 – Characterize Risks from Source to Tap

Evaluation of Drinking Water Protection Barriers

Barriers which protect the Village of Nakusp surface water sources include:

1. Source protection – there are very few contaminant sources within the watershed areas and there is a low intrinsic source vulnerability;
2. Treatment – the Village have an effective and reliable Water Treatment Plant which treats surface water before distribution and use;
3. Water system maintenance – routine inspections and maintenance programs are carried out;
4. Water monitoring – water quality monitoring is performed routinely and reporting of water quality monitoring results to health authorities and the public are carried out as required under the *Drinking Water Protection Act*;
5. Operator training – Operators are trained to the appropriate level; and
6. Emergency response planning – An Emergency Response Plan exists for the entire water system including the surface water systems (developed by AEL in conjunction with this Source Protection Plan).

Table 6 is the hazard identification table for each of the contaminant sources identified in Module 2.

Table 6 – Hazard Identification Table

Hazard No.	Drinking Water Hazard	Possible Effects	Existing Preventative Measures	Associated Barrier
HID 1	Urban runoff	Surface water impacted by turbidity and contaminants	None	Water treatment Water monitoring
HID 2	Flood runoff and landslides	Surface water impacted with turbidity	None	Water treatment Emergency response planning
HID 3	Radiological deposits	Surface water impacted with	none	Source protection

Hazard No.	Drinking Water Hazard	Possible Effects	Existing Preventative Measures	Associated Barrier
		radioactive elements		
HID 4	Wildlife	Surface water impacted with pathogens	None	Water treatment Water monitoring
		Wildlife scat contamination of open reservoir post treatment	None	None Water monitoring
HID 5	Agricultural land use	Surface water impacted with pesticides, anions (nutrients), microbes, pathogens	Unknown	Water treatment Water monitoring
HID 6	Forestry activities	Surface water impacted by turbidity, spill events	BC Forest and Range Practices Act	Water treatment Water system maintenance
HID 7	Wildfire	Surface water impacted by turbidity and contaminants	None	Water treatment Water system maintenance
HID 8	Parkland and recreational land use	Surface water impacted by turbidity and contaminants	Unknown	Water treatment Water system maintenance
HID 9	Sanitary systems	Surface water impacted with pathogens	None	Water treatment Water monitoring

Risk Characterization

Risk level for any given hazard is based on the relationship between the likelihood of the hazard and consequence of the hazard and is described as:

RISK = Likelihood x Consequence

Where:

Likelihood is the probability that a hazard will pose a threat to water quality or quantity and public health; and

Consequence is the combination of the severity, nature and duration of an event, the proportion of the population affected and type of health consequence.

For each identified hazards a qualitative measure of likelihood and consequence has been assigned using Table 7 and Table 8 respectively. Table 9 defines the overall risk for each scenario based on the likelihood and consequence levels assigned.

The completed risk characterization for each of the hazards is summarized in Table 10.

Table 7 – Qualitative Measures of Likelihood

LEVEL	DESCRIPTOR	DESCRIPTION	PROBABILITY OF OCCURRENCE IN NEXT 10 YEARS
A	Almost Certain	Is expected to occur in most circumstances	>90%
B	Likely	Will probably occur in most circumstances	71-90%
C	Possible	Will probably occur at some time	31-70%
D	Unlikely	Could occur at some time	10-30%
E	Rare	May only occur in exceptional circumstances	<10%

Table 8 – Qualitative Measures of Consequence

LEVEL	DESCRIPTOR	DESCRIPTION
1	Insignificant	Insignificant impact, no illness, little disruption to normal operation, little or no increase in normal operating costs.
2	Minor	Minor impact for small population, mild illness moderately likely, some manageable operation disruption, small increase in operating costs.
3	Moderate	Minor impact for large population, mild to moderate illness probable, significant moderation to normal operation but manageable, operating costs increase, increased monitoring.
4	Major	Major impact for small population, severe illness probable, systems significantly compromised and abnormal operation if at all, high level monitoring required.
5	Catastrophic	Major impact for large population, sever illness probable, complete failure of systems.

Table 9 – Qualitative Risk Analysis Matrix

LIKELIHOOD	CONSEQUENCES				
	1 INSIGNIFICANT	2 MINOR	3 MODERATE	4 MAJOR	5 CATASTROPHIC
A (almost certain)	Moderate	High	Very High	Very High	Very High
B (likely)	Moderate	High	High	Very High	Very High
C (possible)	Low	Moderate	High	Very High	Very High
D (unlikely)	Low	Low	Moderate	High	Very High
E (rare)	Low	Low	Moderate	High	High

Table 10 – Risk Characterization Table

Hazard No.	Hazard Description	Likelihood Level	Consequence Level	Risk Level	Assumptions/Comments
HID 1	Urban runoff	D	2	Low	This is considered an unlikely source of contamination as the small area of urban development at the southern end of the watershed is downgradient/downstream from the Halfway Intake and Upper Brouse Intake structures.
HID 2	Flood runoff and landslides	C	4	Very High	Flood runoff and landslides will probably occur at sometime within the watershed area.
HID 3	Radiological deposits	C	4	Very High	Based on the water quality data supplied in the 2015 Annual Water Report, uranium concentrations are higher than the MRL level. It is very possible the uranium source is naturally occurring within the watershed area.
HID 4	Wildlife	B	4	Very High	Wildlife such as birds, squirrels, bears, wolves, skunks, racoons and many other species are abundant within the watershed area.
HID 5	Agricultural land use	C	2	Moderate	Although specific agricultural sites within the watershed area have not been identified it is possible contaminants from fertilizers could be present in runoff water.
HID 6	Forestry activities	A	4	Very High	Forestry activities are currently known to occur within the watershed area.
HID 7	Wildfire	C	4	Very High	Wildfire could occur particularly during dry periods due to unattended fires started for recreational use, accidental fires caused by mishaps and lightning strikes during storms.
HID 8	Parkland and recreational land use	C	2	Moderate	Public access to the watershed area is not currently restricted and recreational users include motorized vehicle users such as all terrain vehicles, dirt bikes and snow mobiles in winter.
HID 9	Sanitary systems	E	2	Low	This is considered a rare source of contamination as any leaking septic system discharges would be very unlikely to reach the surface water systems up gradient from the small area of urban development.

SWOT (Strengths, Weaknesses, Opportunities, Threats) Analysis

A SWOT analysis has been undertaken to identify the strengths, weaknesses, opportunities and threats faced by the Village of Nakusp water system.

Strengths are major assets of the water supply system, the area where the water supply system is doing well and include the following:

- The Brouse Creek and Halfway Creek Watershed runoff volumes are reliable;
- Treatment system is robust and provides an anthropogenic and non-anthropogenic protective barrier and is able to adequately treat the raw water before distribution based on the existing source water quality;
- Intake infrastructure is robust and requires little maintenance or operation;
- System is monitored via SCADA system;
- Water system is supplied by two independent sources (i.e. surface and groundwater) providing redundancy;
- There are very few identified hazards to the source water quality and quantity.

Weaknesses are fundamental deficiencies in the protective and preventative measures in the water supply system. No fundamental deficiencies in the source water protection were identified by this assessment. Weaknesses were identified that highlight the opportunities for source protection improvements as to guide future efforts in securing the water source.

The primary weakness of the source water supply includes the following:

- Issue with sediment entering the water treatment plant from the surface water system;
- Forestry activities within the watershed areas have the potential to effect source water quality and in particular increase sediment loading and turbidity of the water. Forestry activities within the watershed areas are managed by external parties who may not be aware of impacts of their actions to the surface water sources.
- The Brouse Creek and Halfway Creek Intake volumes may not be sufficient to meet current user peak demands as a singular source i.e. if Well #1 and Well #2 were not available for use.
- Public access to the watersheds cannot be completely restricted.
- Surface water sources cannot be protected from wildlife.
- Limited capacity in the existing system to accommodate increased demand from residential, commercial or industrial growth in Nakusp.

Opportunities are prospects for improvements to the safety or sustainability of the water supply and include the following:

- Exploring opportunities for increasing groundwater and surface water usage or exploring new sources;
- Exploring ways to reduce surface water turbidity by undertaking a surface water sedimentation (turbidity) reduction feasibility assessment. The assessment may consider the feasibility of various options such as:
    - additional filtration;
    - flocculation; and
    - settling out particles before they reach the WTP by using sedimentation ponds. Sedimentation ponds reduce the water velocities and allow the sediment particles to settle to the bottom of the pond.
- Explore opportunities to detect contaminants of concern at the sources;
- Intake structures could be redesigned once they reach the end of their design life. New structures could be designed to capture more water volumes and provide redundancy in the case of Well#1 and Well#2 being offline during peak demand periods.

Threats are major hazards to the safety or sustainability of the drinking water supply. No immediate threats to the water supply were identified by this assessment. The primary threats to the system are from the following:

- drought conditions and reduced water volume availability;
- Contaminants of Concern entering the water system at concentration beyond the capacity of the current water treatment systems.
- Forestry activities causing increased turbidity and reducing water quality.
- Natural disasters such as flooding, landslides and wildfires increasing turbidity and reducing water quality
- Public access to the watershed areas is not restricted leaving the source water quality vulnerable to intentional and unintentional tampering.

Realization of the opportunities above would serve to minimize these threats.

Statement of Water Supply System Performance

AEL believes the Village of Nakusp water system is currently able to reliably provide adequate volumes of water of acceptable quality to all its customers. The Village of Nakusp has recently invested in the WTP which is an effective barrier to most of the hazards to the source water quality within the watershed and is expected to adequately treat the surface source water within the WTP design life. Should the Village of Nakusp water system demand increase due to residential, commercial or industrial

population growth, options for increasing source water volumes will need to be investigated by the Village.

Module 8 – Recommendations to Improve Drinking Water Protection

AEL considers the Village of Nakusp surface water sources to be well managed and maintained with very few high-risk hazards or vulnerabilities.

Based on the outcomes of Modules 1, 2 and 7, AEL recommends that the following be undertaken to improve the protection of the Village of Nakusp surface water sources:

1. Consider locking the access gate on the road leading to the intake structures. Although this won't completely prevent public access to the watersheds it may reduce some of the hazards associated with unrestricted vehicular access. If there are no impediments to the access gate being locked, AEL recommends this be undertaken by first quarter of 2017.
2. Consider undertaking a feasibility assessment to identify options of reducing water turbidity between the intake structures and the WTP to help prevent sediment disrupting the WTP operation and increasing maintenance costs. Completing a turbidity reduction feasibility assessment is the first step in addressing several hazards to water quality including flooding, landslides, wildfire and forestry activities. AEL recommends that the feasibility assessment be completed within the next five years.
3. Consider undertaking an updated assessment of the Brouse and Halfway Watersheds to determine runoff volumes and resulting creek flows for various return periods. This will help determine the feasibility of increasing source contributions from Brouse and Halfway Creeks in the future. AEL recommends the updated drainage assessment of the Brouse and Halfway Watersheds be undertaken within the next three years.

Closure

The assessment has been carried out in accordance with generally accepted engineering practice and the Comprehensive Drinking Water Source-to-Tap Assessment Guideline Modules 1, 2, 7 and 8. Professional judgement has been applied in developing the recommendations in this report.

AEL would like to thank Warren Leigh, Director of Operations with the Village of Nakusp for providing the all the information required to complete this Plan and assisting AEL throughout the project.

AEL trusts this report meets your needs and please do not hesitate to contact me if you have any questions or concerns.

Regards,

Ruth Keyes, P.Eng.
Civil-Environmental Engineer
Austin Engineering Ltd.

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Urban Runoff Quality Control Guidelines for British Columbia, Ministry of Environment, Lands and Parks (MELP) - now Ministry of Water, Land and Air Protection (WLAP), 1992.

Appendix A – Interior Health, Drinking Water Quality Improvement Program, Conditions on Operating Permit Handout

CONDITIONS ON OPERATING PERMITS FOR WATER SUPPLY SYSTEMS

The Drinking Water Quality Improvement Program outlines nine typical conditions on operating permits. It is expected that each participating water supplier will use these conditions as guidance for key areas to focus their water system improvements. This is intended to be a continuing process and for many of the conditions, the first step may be to develop a plan or program reference.

As water suppliers move through stages of improvement, the details associated with each condition will change. This allows for water supply systems to progress through improvements at a pace appropriate to their capacity.

Source Protection

1. **Provide a source protection plan for each water source**

Operation Requirements

2. **Provide a certified operator to operate the system**
3. **Operate according to your Water Quality Sampling Program**
4. **Operate according to your Cross Connection Control Program**

Treatment and Distribution Systems

5. **Provide Turbidity Monitoring Program – including continuous on-line turbidity monitoring**
6. **Provide continuous on-line monitoring of the water disinfection process**
7. **Provide long-term plans for source, treatment and distribution system improvements taking into account the goal of 43210 objectives**

Monitoring and Reporting

8. **Review and update Emergency Response Plan annually**
9. **Provide monthly reports and an annual summary**

#1 SOURCE PROTECTION PLAN FOR EACH WATER SOURCE

The purpose of the source protection plans is to identify areas and activities that could affect the quality, quantity and timing of flow of the drinking water sources. By identifying critical areas and activities, the water supplier can influence planning and measure impacts on their system. Additionally, the source protection plan is to reduce threats to water quality and provide an additional barrier for drinking water protection.

Implementation

The water supplier:

1. Completes the source to tap screening tool and discusses the outcomes with the Drinking Water Officer / Public Health Inspector
2. Completes a comprehensive assessment of the drinking water source including:
    a) formation of a community planning team
    b) definition of the capture zone or watershed
    c) mapping potential sources of threats to drinking water in the study area
3. Completes an assessment response plan including:
    a) development and implementation of protection measures to prevent threats to drinking water
    b) development of a contingency plan against any accidents
    c) monitoring, evaluation and annual reporting

Timelines

Suggested timelines for the completion of the various implementation tools:

1. Screening tool – within two months of the request
2. Comprehensive assessment – within three years of the initial request
3. Comprehensive response plan – an on-going process

Monitoring

Progress should be documented by the water supplier in an annual report.

References

- Source to Tap Screening Tool – http://www.bcwwa.org/source-to-tap/index.php
- Comprehensive S2T Draft doc – http://www.bcwwa.org/source-to-tap/index.php
- Inter Agency Memorandum of Understanding will be supplied when it is finalized
- Well Protection Toolkit – http://www.env.gov.bc.ca/wat/gws/well_protection/wellprotect.html
- Interior Health Direction for Source Water Protection – A Discussion Framework
- Interior Health Source Protection Framework for Establishing Protocols
- Interior Health Drinking Water Protection Act and Source Protection
- Interior Health Investigations of Threats to Drinking Water

Interior Health

Health Protection

SOURCE PROTECTION
Investigation of Threats to Drinking Water

Each water supplier should strive to provide a source protection plan for each water source. Section 29 of the Drinking Water Protection Act is very broad. "If a person considers that there is a threat to their drinking water, the person may request the drinking water officer to investigate the matter". The drinking water officer must review the request and consider whether an investigation is warranted.

There are a number of similar situations that Interior Health anticipates will prompt the request for investigations. These include but are not limited to logging, cattle grazing, and recreational use in watersheds that contribute to water supplies for individuals or communities.

Each case will be considered separately for the need to undertake an investigation. Of key consideration is whether the matter is a health risk to the users of the water source.

It is the provincial government's position that there will be shared use of watersheds.

The DWPA is clear that there is a prohibition against contaminating drinking water. This imposes a duty of care on people conducting activities within watersheds. A multi – barrier approach to drinking water requires minimization of impact in watersheds. Where a drinking water health hazard exists or there is a significant risk of an imminent drinking water health hazard the drinking water officer can order an abatement of the activity. A number of best management practices have been established for activities in watersheds. Stakeholders operating to best management practices are not likely to be seen a posing significant risk to drinking water.

The responsibility to provide potable water lies with water suppliers. They must take actions to supply potable water such as providing treatment to meet the 4 3 2 1 0 drinking water objectives set by Interior Health. Typically for surface water this means filtration and disinfection.

4 3 2 1 0 refers to levels of removal of viruses, Giardia, Cryptosporidium, two treatment processes, level of turbidity, and the absence of *E.coli.*

As an initial step in investigating drinking water health hazards the Drinking Water Officer may order the affected water supply systems to conduct a source-to-tap assessment which may include the development of a hazard remediation plan

A request for an investigation must include the following information: locations and types of water intakes and populations drawing water, water treatment measures in place, nature and evidence of the threat to drinking water.

Interior Health has a policy of addressing risks to larger populations and high risk populations as a priority and will consider this in the decision to conduct an investigation.

HPF10010 May 2006

SOURCE PROTECTION - Legislative Information

The Drinking Water Protection Act and Source Protection

Section 18: A water supplier can be required to conduct an assessment of their drinking water source, including land use and other activities.

Section 22: The drinking water officer can order the preparation of an assessment response plan. Provisions in the plan can include public education, best management plans and input respecting local authority zoning and other land use regulation.

Section 23: A person must not contaminate or tamper with a drinking water source if this will result in a drinking water health hazard in a water supply system. This does not apply where a person is acting under another enactment.

Section 24: Officials under other authority or employed by the public service of BC must report situations that they consider to be a threat to drinking water.

Section 25: Drinking water officers may make an order where they believe there is a drinking water health hazard or the risk or a hazard. Orders may be directed at the person in charge of the thing that caused the hazard or risk and at their cost. The orders can include investigations, abatement, remediation measures or plans. The authority under this section applies despite any other enactment.

Section 29: If a person thinks there is a threat to their drinking water, they can ask for a drinking water officer to investigate. The request must be made in writing.

Refer to the DWPA for complete references and actual legal wording.

While Medical Health Officers have been appointed Drinking Water Officers, and have further appointed or delegated the powers and duties of Drinking Water Officers to Public Health Inspectors, there is still a responsibility of many other Ministries to protect sources of drinking water by reviewing activities that could cause drinking water hazards.

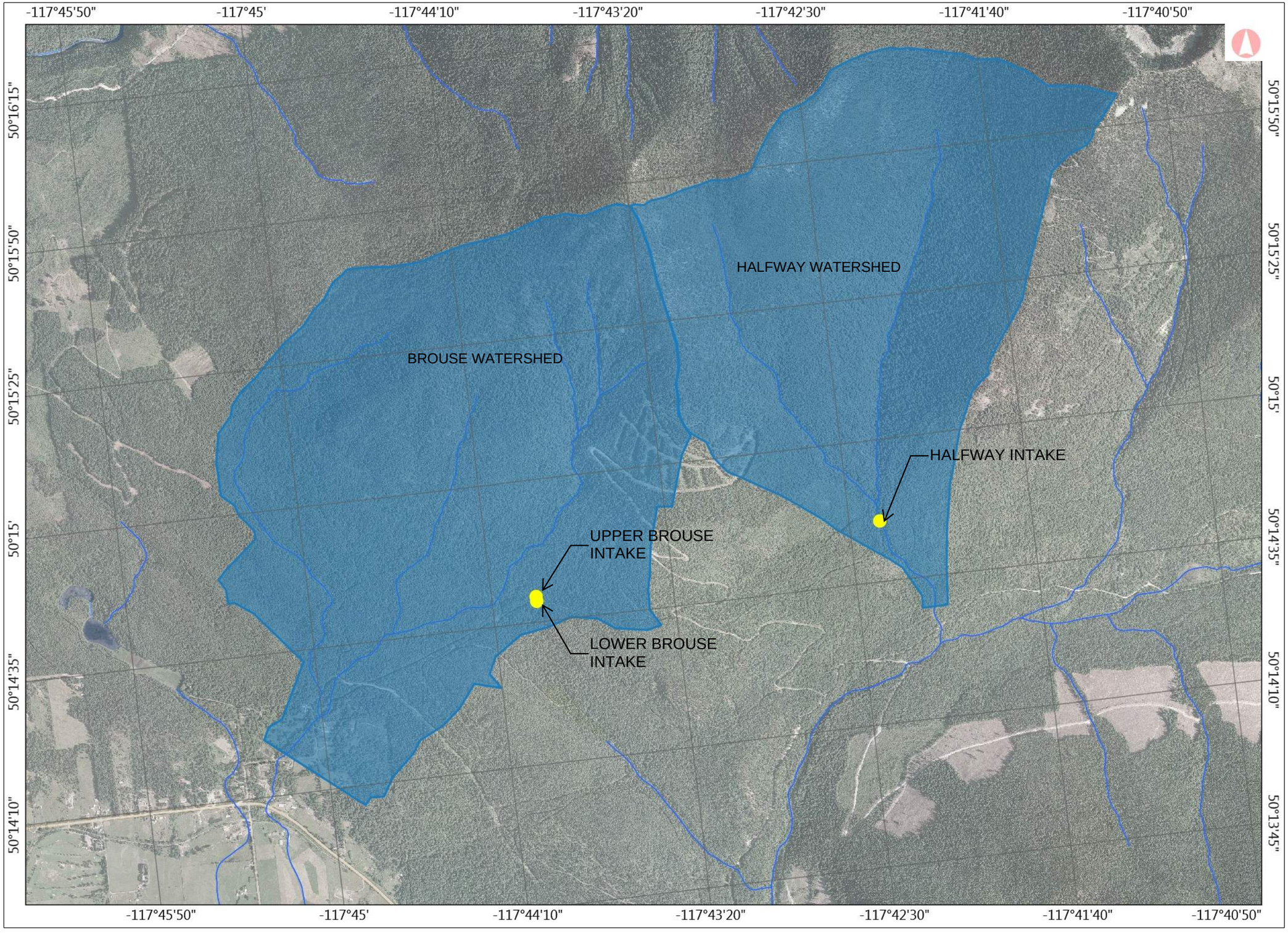
Even with approval of activities, persons conducting activities within watershed source areas still have a responsibility to avoid or remediate drinking water hazards.

Interior Health recommends that issuing officials or approving officers seek an indication that source water protection has been considered and that there will not be a drinking water hazard expected as a result of normal operations.

Proponents of activities within watershed areas should be aware that they may be required to address the costs of remediation of health hazards should they occur.

HPF10020 May 2006

Appendix B – Intake Location Map



NAKUSP WATER SYSTEM WATERSHED AND INTAKE LOCATIONS

Legend

Watershed Atlas Streams (1

TWA_FEATURE_TYPE_NO

- Linear Stream - Definite
- Linear Stream - Indefinite
- Linear Stream - Intermittent
- 4104
- 4105

TileCache

AUSTIN ENGINEERING

INTAKE LOCATION COORDINATES PROVIDED BY THE VILLAGE OF NAKUSP

0 0.41 0.8 km

1: 20,000

Copyright/Disclaimer

Datum:	NAD83
Projection:	NAD_1983_BC_Environment_Albers

Key Map of British Columbia

Appendix C – Database Reports (ERIS)

ENVIRONMENTAL RISK INFORMATION SERVICES

DATABASE REPORT

Project Property:	*quote* *n/a* *Nakusp BC*
Project No:	
Report Type:	*Custom BC Standard Report Plus*
Order No:	*20160914074*
Requested by:	*Austin Engineering Ltd.*
Date Completed:	*September 19, 2016*

Environmental Risk Information Services
A division of Glacier Media Inc.
P: 1.866.517.5204
E: info@erisinfo.com

www.erisinfo.com

Table of Contents

Executive Summary

Property Information:

Project Property: *quote*
n/a Nakusp BC

Project No:

Coordinates:

Latitude:	*50.250902*
Longitude:	*-117.737013*
UTM Northing:	*5,566,787.60*
UTM Easting:	*447,456.13*
UTM Zone:	*UTM Zone 11U*

Elevation: *3,636 FT*
1,108.16 M

Order Information:

Order No:	*20160914074*
Date Requested:	*September 14, 2016*
Requested by:	*Austin Engineering Ltd.*
Report Type:	*Custom BC Standard Report Plus*

Historical/Products:

Executive Summary: Report Summary

Database	Name	Searched	Search Radius	Project Property	Within 0.25 km	0.25 km to 0.50 km	Total
AMS	Authorization Management System (formerly WASTE)	Y	0.25	0	0	-	0
ARIS	Assessment Report Indexing System	Y	0.25	0	0	-	0
AUWR	Automobile Wrecking & Supplies	Y	0.25	0	0	-	0
BOGW	BC Oil and Gas Wells	Y	0.25	0	0	-	0
CHEM	Chemical Register	Y	0.25	0	0	-	0
COAL	Coal Tar Sites	Y	0.25	0	0	-	0
CONV	Compliance and Enforcement Summary	Y	0.25	0	0	-	0
DIS	Wastewater Discharge Inventory	Y	0.25	0	0	-	0
EEM	Environmental Effects Monitoring	Y	0.25	0	0	-	0
EHS	ERIS Historical Searches	Y	0.25	0	0	-	0
EIIS	Environmental Issues Inventory System	Y	0.25	0	0	-	0
FCON	Federal Convictions	Y	0.25	0	0	-	0
FCS	Contaminated Sites on Federal Land	Y	0.25	0	0	-	0
FISH	Commercial Fisheries	Y	0.25	0	0	-	0
FOFT	Fisheries & Oceans Fuel Tanks	Y	0.25	0	0	-	0
GEN	Waste Generators Summary	Y	0.25	0	0	-	0
GHG	Greenhouse Gas Emissions from Large Facilities	Y	0.25	0	0	-	0
IAFT	Indian & Northern Affairs Fuel Tanks	Y	0.25	0	0	-	0
LUM	Lumber Mills	Y	0.25	0	0	-	0
MINE	Canadian Mine Locations	Y	0.25	0	0	-	0
MNR	Minerals Deposits Database	Y	0.25	0	0	-	0
NATE	National Analysis of Trends in Emergencies System (NATES)	Y	0.25	0	0	-	0
NCPL	Non-Compliance Reports	Y	0.25	0	0	-	0
NDFT	National Defense & Canadian Forces Fuel Tanks	Y	0.25	0	0	-	0
NDSP	National Defense & Canadian Forces Spills	Y	0.25	0	0	-	0
NDWD	National Defence & Canadian Forces Waste Disposal Sites	Y	0.25	0	0	-	0
NEBW	National Energy Board Wells	Y	0.25	0	0	-	0
NEES	National Environmental Emergencies System (NEES)	Y	0.25	0	0	-	0
NPCB	National PCB Inventory	Y	0.25	0	0	-	0
NPRI	National Pollutant Release Inventory	Y	0.25	0	0	-	0
OGW	Oil and Gas Wells	Y	0.25	0	0	-	0
PAP	Canadian Pulp and Paper	Y	0.25	0	0	-	0
PCB	Inventory of PCB Storage Sites	Y	0.25	0	0	-	0
PCFT	Parks Canada Fuel Storage Tanks	Y	0.25	0	0	-	0
PES	Pesticide Register	Y	0.25	0	0	-	0

Database	Name	Searched	Search Radius	Project Property	Within 0.25 km	0.25 km to 0.50 km	Total
PRAI	**Private Aggregate Inventory**	Y	0.25	0	0	-	0
PUAI	**Public Aggregate Inventory**	Y	0.25	0	0	-	0
REC	**Waste Receivers Summary**	Y	0.25	0	0	-	0
RST	**Retail Fuel Storage Tanks**	Y	0.25	0	0	-	0
SCT	**Scott's Manufacturing Directory**	Y	0.25	0	0	-	0
SREG	**Site Registry**	Y	0.50	0	0	0	0
TCFT	**Transport Canada Fuel Storage Tanks**	Y	0.25	0	0	-	0
WDS	**Waste Disposal Site Inventory**	Y	0.25	0	0	-	0
WWIS	**Water Well Information System**	Y	0.25	0	1	-	1
	Total:			0	1	0	1

Executive Summary: Site Report Summary - Project Property

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev diff (m)	Page Number

No records found in the selected databases for the project property.

Executive Summary: Site Report Summary - Surrounding Properties

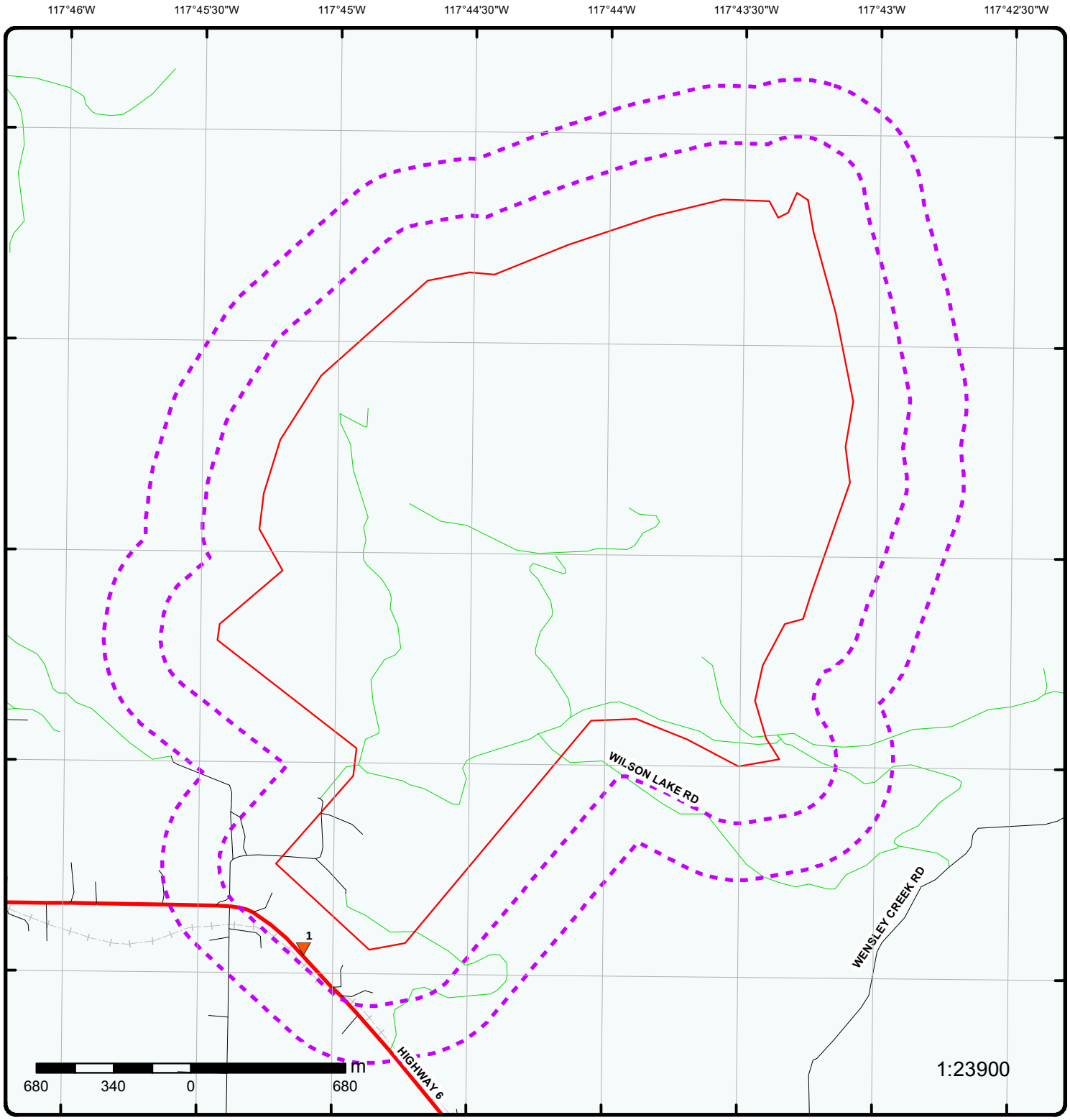
Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
1	WWIS		NAKUSP BC	SSW/194.8	-497.36	11

Executive Summary: Summary By Data Source

WWIS - Water Well Information System

A search of the WWIS database, dated 1880-Sep 2015 has found that there are 1 WWIS site(s) within approximately 0.25 kilometers of the project property.

Lower Elevation	Address	Direction	Distance (m)	Map Key
	NAKUSP BC	SSW	194.83	1



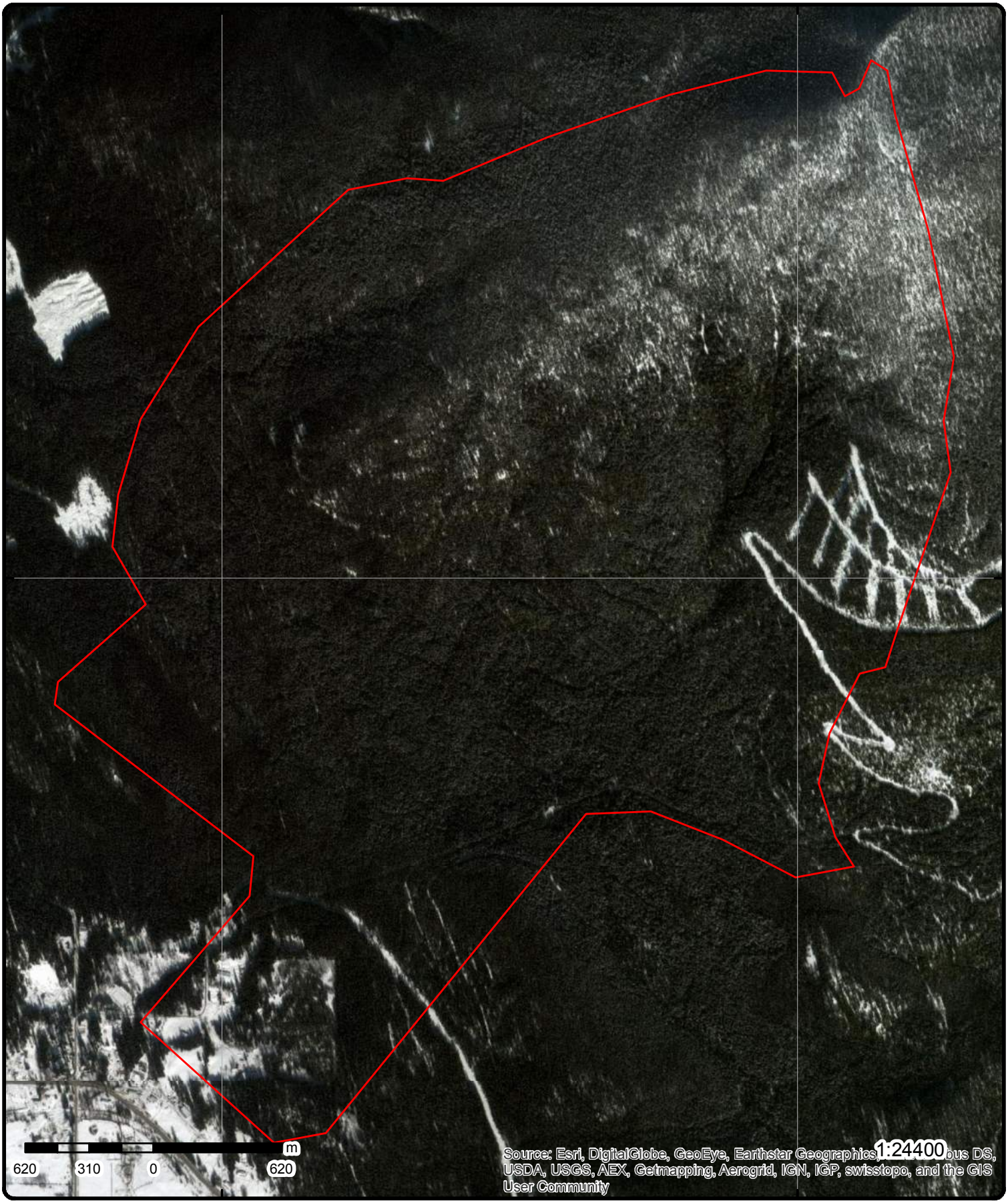
Map

Address: n/a, Nakusp, BC
Order No: 20160914074

ERIS
ENVIRONMENTAL RISK INFORMATION SERVICES

- Project Property
- Buffer Outline
- Eris Sites with Higher Elevation
- Eris Sites with Same Elevation
- Eris Sites with Lower Elevation
- Eris Sites with Unknown Elevation
- Expressway
- Principal Highway
- Secondary Highway
- Major Road
- Local road
- Trail
- Proposed Road
- Ferry Route/Ice Road
- Industrial and Resource - Regions
- Main Line
- Sidetrack
- Transit Line
- Abandoned Line
- National Park
- Provincial or Territorial Park
- Other Park
- Golf Course or Driving Range
- Park or Sports Field
- Other Recreation Area

Source: © 2015 DMTI Spatial Inc.



Aerial

Order No: 20160914074

Address: n/a, Nakusp, BC

Source: ESRI World Imagery

Detail Report

Map Key	Number of Records	Direction/ Distance (m)	Elevation (m)	Site	DB
1	1 of 1	SSW/194.8	610.8	NAKUSP BC	WWIS

Well Tag NO:	55363	**District Lot:**	398
Well Status:	New	**BCGS Mapsheet:**	082K022132
Use:	Private Domestic	**Seq NO:**	2
Class of Well:		**Section:**	
Constr Start Dt:	1985-10-01	**Island:**	
Constr End Dt:		**Latitude:**	50.234281
PID:		**Longitude:**	117.75179
Lot:	A	**Zone:**	11
Plan:	1385	**Easting:**	446384
Orientation of Well:		**Northing:**	5564950
Sub-Class of Well:		**Aquifer Lithology:**	Unconsolidated
Est. Yield:	0	**Legal Misc:**	
Yield Units:		**Construction Mthd:**	DRI
Water Depth:		**Observ. Well No.:**	
Final Well Depth:	155	**Surf Sl Thickness:**	
Surf Seal Flag:		**Depth Well Drilled:**	
Surf Seal Material:		**Aquifer NO:**	
Surf Seal Method:		**General Remarks:**	YIELD: DRY HOLE DOMESTIC
Surf Seal Depth:		**Well Diameter:**	6.0
Chemistry Site ID:		**Artesian Flow:**	
Well Owner:	RON HASCARL	**Artesian Units:**	
Owner's Well NO:		**Artesian Pressure:**	
Land District:	KOOTENAY	**Bedrock Depth:**	5
Range:		**Township:**	
Observ. Well Status:			
Other Chemistry Data:			
Location Accuracy:	D (100 m) Digitized from old Dept. of Lands, Forests and Water Resources maps		

--- Details ---

Depth:	From 0 To 5 Ft.	**Material:**	SILTY CLAY
+			
Depth:	From 5 To 155 Ft.	**Material:**	BEDROCK

Unplottable Summary

Total: 4 Unplottable sites

DB	Company Name/Site Name	Address	City	Postal
SCT	Box Lake Lumber Products Ltd.	1331 Wilson Lake Rd	Nakusp BC	V0G 1R0
SCT	Butch's Woodworking	East Summit Lake Hwy 6	Nakusp BC	V0G 1R0
SCT	BOX LAKE LUMBER PRODUCTS LTD.	Wilson Lake Rd	Nakusp BC	V0G 1R0
SCT	Box Lake Lumber Products Ltd.	1325 Wilson Lake Rd	Nakusp BC	V0G 1R1

Unplottable Report

Site: ***Box Lake Lumber Products Ltd.***
1331 Wilson Lake Rd Nakusp BC V0G 1R0

Database: ***SCT***

Established: 1/1/1996
Plant Size (ft²): 20000
Employment:

--- Details ---
Description: All Other Miscellaneous Wood Product Manufacturing
SIC/NAICS Code: 321999
+
Description: Shingle and Shake Mills
SIC/NAICS Code: 321112
+
Description: All Other Miscellaneous Wood Product Manufacturing
SIC/NAICS Code: 321999

Site: ***Butch's Woodworking***
East Summit Lake Hwy 6 Nakusp BC V0G 1R0

Database: ***SCT***

Established: 1983
Plant Size (ft²):
Employment: 1

--- Details ---
Description: Wood Kitchen Cabinet and Counter Top Manufacturing
SIC/NAICS Code: 337110
+
Description: Other Wood Household Furniture Manufacturing
SIC/NAICS Code: 337123

Site: ***BOX LAKE LUMBER PRODUCTS LTD.***
Wilson Lake Rd Nakusp BC V0G 1R0

Database: ***SCT***

Established: 1996
Plant Size (ft²): 20000
Employment: 20

--- Details ---
Description: Hardwood Dimension and Flooring Mills
SIC/NAICS Code: 2426
+
Description: Wood Products, Not Elsewhere Classified
SIC/NAICS Code: 2499
+
Description: Other Millwork
SIC/NAICS Code: 321919
+
Description: All Other Miscellaneous Wood Product Manufacturing
SIC/NAICS Code: 321999

Site: ***Box Lake Lumber Products Ltd.***
1325 Wilson Lake Rd Nakusp BC V0G 1R1

Database: ***SCT***

Established: 01-JAN-96
Plant Size (ft²): 20000

Employment:

--- Details ---

Description:	Shingle and Shake Mills
SIC/NAICS Code:	321112
+	
Description:	All Other Miscellaneous Wood Product Manufacturing
SIC/NAICS Code:	321999
+	
Description:	All Other Miscellaneous Wood Product Manufacturing
SIC/NAICS Code:	321999

Appendix: Database Descriptions

Environmental Risk Information Services (ERIS) can search the following databases. The extent of historical information varies with each database and current information is determined by what is publicly available to ERIS at the time of update. ***Note:*** *Databases denoted with " * " indicates that the database will no longer be updated. See the individual database description for more information.*

Authorization Management System (formerly WASTE): Provincial AMS

AMS is the Ministry of Environment's waste permit administration system. It maintains data related to the administration of permits issued under the Environmental Management Act and registrations under various regulations where the regulation requires a discharger to register. It will include information such as companies or individuals permitted to discharge waste; type of business and locations at which waste disposal is permitted; the types, amounts and frequency of waste products that are permitted to be discharged at given locations; issue date and more. This was previously referred to as the "WASTE" database.

Government Publication Date: 1957-Jan 2012

Assessment Report Indexing System: Provincial ARIS

Within British Columbia, the "Mineral Tenure Act Regulation", requires that results of mineral exploration and development programs be submitted to the British Columbia Ministry of Employment and Investment, where they are then maintained and housed by the Geological Survey Branch. The assessment reports provided by the Geological Survey Branch contain summary information for reports approved to November 1998; on geology, geophysics, geochemistry, drilling, prospecting and physical work.

Government Publication Date: Dec 31, 2015

Automobile Wrecking & Supplies: Private AUWR

This database provides an inventory of known locations that are involved in the scrap metal, automobile wrecking/recycling, and automobile parts & supplies industry. Information is provided on the company name, location and business type.

Government Publication Date: 2001-Jul 2014

BC Oil and Gas Wells: Provincial BOGW

The BC Oil and Gas Wells database was collected from the BC Oil and Gas Commission and is a comprehensive database that includes information regarding well number, well name, operator name, location, depth, status, as well as drill date and type. Please note that this database will not be updated, information on wells drilled after January 2006 can be found in the Oil and Gas Wells (OGW) database under the 'Private Source Database' section.

Government Publication Date: 1918-Jan 2006*

Chemical Register: Private CHEM

This database includes a listing of locations of facilities within the Province or Territory that either manufacture and/or distributes chemicals.

Government Publication Date: 1999-Jul 2014

Coal Tar Sites: Provincial COAL

This one-time study is an inventory of all known and historical coal tar sites, identifying sites that produced coal tar and other related tars during the mid 1800's to the mid 1900's.

Government Publication Date: 1992*

Compliance and Enforcement Summary: Provincial CONV

This database summarizes orders, tickets and convictions issued by the Ministry of the Environment under applicable ministry and federal legislation. Orders are issued when action is required to prevent or stop actual or potential impact to the environment. Tickets apply to all tickets paid, deemed guilty by non-payment or expiry, or contested in court and found guilty by a judge. Convictions apply to all court convictions of ministry legislation as well as federal legislation where the ministry has taken action. This reporting summary began in January 2006, replacing Non-Compliance Reports by the former Ministry of Water, Land & Air Protection. See the Non-Compliance Reports (NCPL) database below for more information. This database is part of a larger COORS (Conservation Officer On-Line Reporting System) database controlled by the Ministry of Environment in BC.

Government Publication Date: Mar 31, 2015

Wastewater Discharge Inventory: Provincial DIS

This inventory contains information regarding direct dischargers of toxic pollutants for the following operations: Industrial; Commercial; Agricultural; Mining; Municipal; Urban; Aquaculture; and Pulp & Paper, operating under provincial permits. Please note that this program was discontinued and therefore the database will not be updated.

Government Publication Date: 1957-1995*

Environmental Effects Monitoring: Federal EEM

The Environmental Effects Monitoring program assesses the effects of effluent from industrial or other sources on fish, fish habitat and human usage of fisheries resources. Since 1992, pulp and paper mills have been required to conduct EEM studies under the Pulp and Paper Effluent Regulations. This database provides information on the mill name, geographical location and sub-lethal toxicity data.

Government Publication Date: 1992-2007*

ERIS Historical Searches: Private EHS

ERIS has compiled a database of all environmental risk reports completed since March 1999. Available fields for this database include: site location, date of report, type of report, and search radius. As per all other databases, the ERIS database can be referenced on both the map and "Statistical Profile" page.

Government Publication Date: 1999-Aug 2014

Environmental Issues Inventory System: Federal EIIS

The Environmental Issues Inventory System was developed through the implementation of the Environmental Issues and Remediation Plan. This plan was established to determine the location and severity of contaminated sites on inhabited First Nation reserves, and where necessary, to remediate those that posed a risk to health and safety; and to prevent future environmental problems. The EIIS provides information on the reserve under investigation, inventory number, name of site, environmental issue, site action (Remediation, Site Assessment), and date investigation completed.

Government Publication Date: 1992-2001*

Federal Convictions: Federal FCON

Environment Canada maintains a database referred to as the "Environmental Registry" that details prosecutions under the Canadian Environmental Protection Act (CEPA) and the Fisheries Act (FA). Information is provided on the company name, location, charge date, offence and penalty.

Government Publication Date: 1988-Jun 2007*

Contaminated Sites on Federal Land: Federal FCS

The Federal Contaminated Sites Inventory includes information on known federal contaminated sites under the custodianship of departments, agencies and consolidated Crown corporations as well as those that are being or have been investigated to determine whether they have contamination arising from past use that could pose a risk to human health or the environment. The inventory also includes non-federal contaminated sites for which the Government of Canada has accepted some or all financial responsibility. It does not include sites where contamination has been caused by, and which are under the control of, enterprise Crown corporations, private individuals, firms or other levels of government.

Government Publication Date: June 2000-Oct 2015

Commercial Fisheries: Provincial FISH

The Fisheries, Aquaculture & Commercial Fisheries Branch of the Ministry of Water, Land & Air Protection maintains a database of fish processing plant approvals, licenses and activities. Each year, licenses need to be renewed.

Government Publication Date: 1993-2012

Fisheries & Oceans Fuel Tanks: Federal FOFT

Fisheries & Oceans Canada maintains an inventory of aboveground & underground fuel storage tanks located on Fisheries & Oceans property or controlled by DFO. Our inventory provides information on the site name, location, tank owner, tank operator, facility type, storage tank location, tank contents & capacity, and date of tank installation.

Government Publication Date: 1964-Sept 2003

Waste Generators Summary: Provincial GEN

Within British Columbia, the Special Waste Regulation defines a waste generator as any site, equipment and/or operation involved in the production, collection, handling and/or storage of regulated wastes. A generator of regulated waste is required to register the waste generation site and each waste produced, collected, handled, or stored at the site. This database contains the registration number (BCG#), company name and address of registered generators; including the types of hazardous wastes generated and the form of treatment used in the handling of the waste. Some of "Waste Generators Summary" addresses may represent mailing addresses rather than waste/hazardous sites. This information is a summary of all years from June 1993 to September 2010. Please note that a British Columbia Generator number (BCG#) are not unique to a company. This database is part of a larger SWIS (Special Waste Information System) database controlled by the Ministry of Environment in BC. Waste Generators Summary data are historic and no longer being updated.

Government Publication Date: 1993-2010*

Greenhouse Gas Emissions from Large Facilities: Federal GHG

List of greenhouse gas emissions from large facilities made available by Environment Canada. Greenhouse gas emissions in kilotonnes of carbon dioxide equivalents (kt CO2 eq).

Government Publication Date: Dec 31, 2013

Indian & Northern Affairs Fuel Tanks: Federal IAFT

The Department of Indian & Northern Affairs Canada (INAC) maintains an inventory of aboveground & underground fuel storage tanks located on both federal and crown land. Our inventory provides information on the reserve name, location, facility type, site/facility name, tank type, material & ID number, tank contents & capacity, and date of tank installation.

Government Publication Date: 1950-Aug 2003*

Lumber Mills: Provincial LUM

This database provides information regarding the general location and estimated annual output capacity of major timber processing facilities within the province of British Columbia.

Government Publication Date: 1997-2013

Canadian Mine Locations: Private MINE

This information is collected from the Canadian & American Mines Handbook. The Mines database is a national database that provides over 290 listings on mines (listed as public companies) dealing primarily with precious metals and hard rocks. Listed are mines that are currently in operation, closed, suspended, or are still being developed (advanced projects). Their locations are provided as geographic coordinates (x, y and/or longitude, latitude). As of 2002, data pertaining to Canadian smelters and refineries has been appended to this database.

Government Publication Date: 1998-2009*

Minerals Deposits Database: Provincial MNR

The Ministry of Energy and Mines maintains a database of more than 12,000 metallic mineral, industrial mineral and coal deposits and occurrences within British Columbia. Information within our report pertains to primary name, elevation, mining division, commodities, and status. Please note that as of January 27, 1999, information included within this database was divided into 2 categories: released and unreleased areas. Records for unreleased areas may contain incomplete, unedited, and/or inaccurate data.

Government Publication Date: Oct 31, 2014

National Analysis of Trends in Emergencies System (NATES): Federal NATE

In 1974 Environment Canada established the National Analysis of Trends in Emergencies System (NATES) database, for the voluntary reporting of significant spill incidents. The data was to be used to assist in directing the work of the emergencies program. NATES ran from 1974 to 1994. Extensive information is available within this database including company names, place where the spill occurred, date of spill, cause, reason and source of spill, damage incurred, and amount, concentration, and volume of materials released.

Government Publication Date: 1974-1994*

Non-Compliance Reports: Provincial NCPL

From 1990 to March 2001 the Ministry of Water, Land & Air Protection maintained a reporting system that identified any reported concern that pertained to compliance with authorized waste management permits or plans, approvals, orders, operational certificates and regulations, or any other activity under the Waste Management Act. This reporting system was discontinued in April of 2001; therefore there will be no updates to this database. However, beginning in January 2006 the Ministry of the Environment began publishing Compliance and Enforcement Summaries. See the Compliance and Enforcement Summary (CPL) database above for more information.

Government Publication Date: 1990-Mar 2001*

National Defense & Canadian Forces Fuel Tanks: Federal NDFT

The Department of National Defense and the Canadian Forces maintains an inventory of all aboveground & underground fuel storage tanks located on DND lands. Our inventory provides information on the base name, location, tank type & capacity, tank contents, tank class, date of tank installation, date tank last used, and status of tank as of May 2001. This database will no longer be updated due to the new National Security protocols which have prohibited any release of this database.

Government Publication Date: Up to May 2001*

National Defense & Canadian Forces Spills: Federal NDSP

The Department of National Defense and the Canadian Forces maintains an inventory of spills to land and water. All spill sites have been classified under the "Transportation of Dangerous Goods Act - 1992". Our inventory provides information on the facility name, location, spill ID #, spill date, type of spill, as well as the quantity of substance spilled & recovered.

Government Publication Date: Mar 1999-Aug 2010

National Defence & Canadian Forces Waste Disposal Sites: Federal NDWD

The Department of National Defence and the Canadian Forces maintains an inventory of waste disposal sites located on DND lands. Where available, our inventory provides information on the base name, location, type of waste received, area of site, depth of site, year site opened/closed and status.

Government Publication Date: 2001-Apr 2007*

National Energy Board Wells: Federal NEBW

The NEBW database contains information on onshore & offshore oil and gas wells that are outside provincial jurisdiction(s) and are thereby regulated by the National Energy Board. Data is provided regarding the operator, well name, well ID No./UWI, status, classification, well depth, spud and release date.

Government Publication Date: 1920-Feb 2003*

National Environmental Emergencies System (NEES): Federal NEES

In 2000, the Emergencies program implemented NEES, a reporting system for spills of hazardous substances. For the most part, this system only captured data from the Atlantic Provinces, some from Quebec and Ontario and a portion from British Columbia. Data for Alberta, Saskatchewan, Manitoba and the Territories was not captured. However, NEES is also a repository for previous Environment Canada spill datasets. NEES is composed of the historic datasets ' or Trends ' which dates from approximately 1974 to present. NEES Trends is a compilation of historic databases, which were merged and includes data from NATES (National Analysis of Trends in Emergencies System), ARTS (Atlantic Regional Trends System), and NEES. In 2001, the Emergencies Program determined that variations in reporting regimes and requirements between federal and provincial agencies made national spill reporting and trend analysis difficult to achieve. As a consequence, the department has focused efforts on capturing data on spills of substances which fall under its legislative authority only (CEPA and FA). As such, the NEES database will be decommissioned in December 2004.

Government Publication Date: 1974-2003*

National PCB Inventory: Federal NPCB

Environment Canada's National PCB inventory includes information on in-use PCB containing equipment in Canada including federal, provincial and private facilities. Federal out-of-service PCB containing equipment and PCB waste owned by the federal government or by federally regulated industries such as airlines, railway companies, broadcasting companies, telephone and telecommunications companies, pipeline companies, etc. are also listed. Although it is not Environment Canada's mandate to collect data on non-federal PCB waste, the National PCB inventory includes some information on provincial and private PCB waste and storage sites. Some addresses provided may be Head Office addresses and are not necessarily the location of where the waste is being used or stored.

Government Publication Date: 1988-2008*

National Pollutant Release Inventory: Federal NPRI

Environment Canada has defined the National Pollutant Release Inventory ("NPRI") as a federal government initiative designed to collect comprehensive national data regarding releases to air, water, or land, and waste transfers for recycling for more than 300 listed substances.

Government Publication Date: Dec 31, 2014

Oil and Gas Wells: Private OGW

The Nickle's Energy Group (publisher of the Daily Oil Bulletin) collects information on drilling activity including operator and well statistics. The well information database includes name, location, class, status and depth. The main Nickle's database is updated on a daily basis, however, this database is updated on a monthly basis. More information is available at www.nickles.com.

Government Publication Date: 1988-2015

Canadian Pulp and Paper: Private PAP

This information is part of the Pulp and Paper Canada Directory. The Directory provides a comprehensive listing of the locations of pulp and paper mills and the products that they produce.

Government Publication Date: 1999, 2002, 2004, 2005, 2009

Inventory of PCB Storage Sites: Provincial PCB

The Ministry of Water, Land & Air Protection maintains a database of all active Polychlorinated Biphenyls (PCB) waste storage sites within the Special Waste Information System. Please note that there is no requirement to maintain an accurate listing of all inactive PCB waste storage equipment and/or disposal sites. The records within this database provide information regarding site name, location, an inventory of stored wastes and quantities, and status date (when site first active/inactive). Previous to May 1993, data was collected from a different source and is only available for 1989. Inventory of PCB Storage Sites data are historic and no longer being updated.

Government Publication Date: 1989, May 1993-2010*

Parks Canada Fuel Storage Tanks: Federal PCFT

Canadian Heritage maintains an inventory of known fuel storage tanks operated by Parks Canada, in both National Parks and at National Historic Sites. The database details information on site name, location, tank install/removal date, capacity, fuel type, facility type, tank design and owner/operator.

Government Publication Date: 1920-Jan 2005*

Pesticide Register: Provincial PES

This is a database of individuals who apply for a service or vendor license for the use of registered pesticides. A service license is denoted by an "S" in the license number, likewise, a vendor license by a "V" in the license number.

Government Publication Date: 1989-Jun 2013

Private Aggregate Inventory: Provincial PRAI

Within British Columbia, aggregate pits are designated as mines; and as such, the Ministry of Energy and Mines is responsible for their planning, management and regulation, including permitting, health, safety and reclamation. Owners or operators of all private aggregate pits must file Notices of Work as part of the permitting and reclamation process. In 1994, the Geological Survey Branch initiated the Aggregate Program, in order to establish an inventory of natural and crushed aggregate pits. Information about each pit in the database file includes its location, NTS map sheet number, Notice of Work file number and status (active/inactive) and the type of landform hosting the pit. This database was a one-time inventory and will not be updated.

Government Publication Date: 1975-1996*

Public Aggregate Inventory: Provincial PUAI

Information about public aggregate pits in British Columbia is collected and managed by the Ministry of Transportation and Highways. Data has been gathered on more than 2000 pits, in respect to pit name, type and geographical location.

Government Publication Date: 1960-2001*

Waste Receivers Summary: Provincial REC

The Special Waste Regulation defines the disposal of regulated waste through an operating waste management system or a waste disposal site operated or used pursuant to the terms and conditions of a Certificate of Approval or a Provisional Certificate of Approval. A waste receiving location is any site or facility to which waste is transferred through a waste carrier. A receiver of regulated waste is required to register the waste receiving facility. This database represents registered receivers of regulated wastes, identified by registration number, company name and address. Some of "Waste Receivers Summary" addresses may represent mailing addresses rather than waste/hazardous sites. This database is part of a larger SWIS (Special Waste Information System) database controlled by the Ministry of Environment in BC. Waste Receivers Summary data are historic and no longer being updated.

Government Publication Date: 1992-2010*

Retail Fuel Storage Tanks: Private RST

This database includes an inventory of retail fuel outlet locations (including marinas) that have on their property gasoline, oil, waste oil, natural gas and / or propane storage tanks.

Government Publication Date: 1999-Jul 2014

Scott's Manufacturing Directory: Private SCT

Scott's Directories is a data bank containing information on over 200,000 manufacturers across Canada. Even though Scott's listings are voluntary, it is the most comprehensive database of Canadian manufacturers available. Information concerning a company's address, plant size, and main products are included in this database.

Government Publication Date: 1992-Mar 2011*

Site Registry: Provincial SREG

This information is collected from the Ministry of Environment's Site Registry. It is not a registry of contaminated sites, although some sites on the registry are contaminated. Most sites have already been investigated and require minor remediation, or have already been cleaned up to government requirements. The Registry also stores environmentally relevant historic information about sites including: names of participants, legal and administrative notations, references to pertinent documents submitted to the ministry, associations with other sites, and much more.
1. Please note the information provided in the Detail Reports have been updated to the best of our ability as provided by the source, BC Government. For more information, please contact your ERIS sales representative.

Government Publication Date: May 31, 2016; details from Oct 2012

Transport Canada Fuel Storage Tanks: Federal TCFT

List of fuel storage tanks currently or previously owned or operated by Transport Canada. This inventory also includes tanks on The Pickering Lands, which refers to 7,530 hectares (18,600 acres) of land in Pickering, Markham, and Uxbridge owned by the Government of Canada since 1972; properties on this land has been leased by the government since 1975, and falls under the Site Management Policy of Transport Canada, but is administered by Public Works and Government Services Canada. This inventory provides information on the site name, location, tank age, capacity and fuel type.

Government Publication Date: 1970-Mar 2007

Waste Disposal Site Inventory: Provincial WDS

This inventory pertains to active, regulated waste disposal sites within the province of British Columbia. Registered companies may hold a permit or certificate for release of the following waste types: Effluent, Refuse, Air and Special Waste Storage. Information on Waste Disposal Sites after 1998 is contained within the Authorizations (AUTH) database.

Government Publication Date: 1980-1998*

Water Well Information System: Provincial WWIS

This database was collected from the Groundwater Information Center of the Ministry of Water, Land & Air Protection and contains over 90,000 records. Comprehensive information is available for each well including: well location (address/site area), latitude/longitude, legal description (section, lot, plan, district lot, range, township), BCGS Mapsheet No., depth of well, construction dates, well status and lithology. The accuracy of well locations is also provided, as well as the reference source for obtaining geographic coordinates.

Government Publication Date: 1880-Sep 2015

Definitions

Database Descriptions: This section provides a detailed explanation for each database including: source, information available, time coverage, and acronyms used. They are listed in alphabetic order.

Detail Report: This is the section of the report which provides the most detail for each individual record. Records are summarized by location, starting with the project property followed by records in closest proximity.

Distance: The distance value is the distance between plotted points, not necessarily the distance between the sites' boundaries. All values are an approximation.

Direction: The direction value is the compass direction of the site in respect to the project property and/or center point of the report.

Elevation: The elevation value is taken from the location at which the records for the site address have been plotted. All values are an approximation. Source: Google Elevation API.

Executive Summary: This portion of the report is divided into 3 sections:

'Report Summary'- Displays a chart indicating how many records fall on the project property and, within the report search radii.

'Site Report Summary'-Project Property'- This section lists all the records which fall on the project property. For more details, see the 'Detail Report' section.

'Site Report Summary-Surrounding Properties'- This section summarizes all records on adjacent properties, listing them in order of proximity from the project property. For more details, see the 'Detail Report' section.

Map Key: The map key number is assigned according to closest proximity from the project property. Map Key numbers always start at #1. The project property will always have a map key of '1' if records are available. If there is a number in brackets beside the main number, this will indicate the number of records on that specific property. If there is no number in brackets, there is only one record for that property.

The symbol and colour used indicates 'elevation': the red inverted triangle will dictate 'ERIS Sites with Lower Elevation', the yellow triangle will dictate 'ERIS Sites with Higher Elevation' and the orange square will dictate 'ERIS Sites with Same Elevation.'

Unplottables: These are records that could not be mapped due to various reasons, including limited geographic information. These records may or may not be in your study area, and are included as reference.

ENVIRONMENTAL RISK INFORMATION SERVICES

DATABASE REPORT

Project Property:	*Un-named* *n/a* *Nakusp BC*
Project No:	
Report Type:	*Custom BC Standard Report Plus*
Order No:	*20161020136*
Requested by:	*Austin Engineering Ltd.*
Date Completed:	*October 26, 2016*

Environmental Risk Information Services
A division of Glacier Media Inc.
P: 1.866.517.5204
E: info@erisinfo.com

www.erisinfo.com

Table of Contents

Executive Summary

Property Information:

Project Property: *Un-named*
n/a Nakusp BC

Project No:

Coordinates:

Latitude:	*50.257914*
Longitude:	*-117.70483*
UTM Northing:	*5,567,544.99*
UTM Easting:	*449,757.87*
UTM Zone:	*UTM Zone 11U*

Elevation: *4,652 FT*
1,417.79 M

Order Information:

Order No:	*20161020136*
Date Requested:	*October 20, 2016*
Requested by:	*Austin Engineering Ltd.*
Report Type:	*Custom BC Standard Report Plus*

Historical/Products:

Executive Summary: Report Summary

Database	Name	Searched	Search Radius	Project Property	Within 0.25 km	0.25 km to 0.50 km	Total
AMS	Authorization Management System (formerly WASTE)	Y	0.25	0	0	-	0
ARIS	Assessment Report Indexing System	Y	0.25	0	0	-	0
AUWR	Automobile Wrecking & Supplies	Y	0.25	0	0	-	0
BOGW	BC Oil and Gas Wells	Y	0.25	0	0	-	0
CHEM	Chemical Register	Y	0.25	0	0	-	0
COAL	Coal Tar Sites	Y	0.25	0	0	-	0
CONV	Compliance and Enforcement Summary	Y	0.25	0	0	-	0
DIS	Wastewater Discharge Inventory	Y	0.25	0	0	-	0
EEM	Environmental Effects Monitoring	Y	0.25	0	0	-	0
EHS	ERIS Historical Searches	Y	0.25	0	0	-	0
EIIS	Environmental Issues Inventory System	Y	0.25	0	0	-	0
FCON	Federal Convictions	Y	0.25	0	0	-	0
FCS	Contaminated Sites on Federal Land	Y	0.25	0	0	-	0
FISH	Commercial Fisheries	Y	0.25	0	0	-	0
FOFT	Fisheries & Oceans Fuel Tanks	Y	0.25	0	0	-	0
GEN	Waste Generators Summary	Y	0.25	0	0	-	0
GHG	Greenhouse Gas Emissions from Large Facilities	Y	0.25	0	0	-	0
IAFT	Indian & Northern Affairs Fuel Tanks	Y	0.25	0	0	-	0
LUM	Lumber Mills	Y	0.25	0	0	-	0
MINE	Canadian Mine Locations	Y	0.25	0	0	-	0
MNR	Minerals Deposits Database	Y	0.25	0	0	-	0
NATE	National Analysis of Trends in Emergencies System (NATES)	Y	0.25	0	0	-	0
NCPL	Non-Compliance Reports	Y	0.25	0	0	-	0
NDFT	National Defense & Canadian Forces Fuel Tanks	Y	0.25	0	0	-	0
NDSP	National Defense & Canadian Forces Spills	Y	0.25	0	0	-	0
NDWD	National Defence & Canadian Forces Waste Disposal Sites	Y	0.25	0	0	-	0
NEBW	National Energy Board Wells	Y	0.25	0	0	-	0
NEES	National Environmental Emergencies System (NEES)	Y	0.25	0	0	-	0
NPCB	National PCB Inventory	Y	0.25	0	0	-	0
NPRI	National Pollutant Release Inventory	Y	0.25	0	0	-	0
OGW	Oil and Gas Wells	Y	0.25	0	0	-	0
PAP	Canadian Pulp and Paper	Y	0.25	0	0	-	0
PCB	Inventory of PCB Storage Sites	Y	0.25	0	0	-	0
PCFT	Parks Canada Fuel Storage Tanks	Y	0.25	0	0	-	0
PES	Pesticide Register	Y	0.25	0	0	-	0

Database	Name	Searched	Search Radius	Project Property	Within 0.25 km	0.25 km to 0.50 km	Total
PRAI	**Private Aggregate Inventory**	Y	0.25	0	0	-	0
PUAI	**Public Aggregate Inventory**	Y	0.25	0	0	-	0
REC	**Waste Receivers Summary**	Y	0.25	0	0	-	0
RST	**Retail Fuel Storage Tanks**	Y	0.25	0	0	-	0
SCT	**Scott's Manufacturing Directory**	Y	0.25	0	0	-	0
SREG	**Site Registry**	Y	0.50	0	0	0	0
TCFT	**Transport Canada Fuel Storage Tanks**	Y	0.25	0	0	-	0
WDS	**Waste Disposal Site Inventory**	Y	0.25	0	0	-	0
WWIS	**Water Well Information System**	Y	0.25	0	0	-	0
	Total:			0	0	0	0

Executive Summary: Site Report Summary - Project Property

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev diff (m)	Page Number

No records found in the selected databases for the project property.

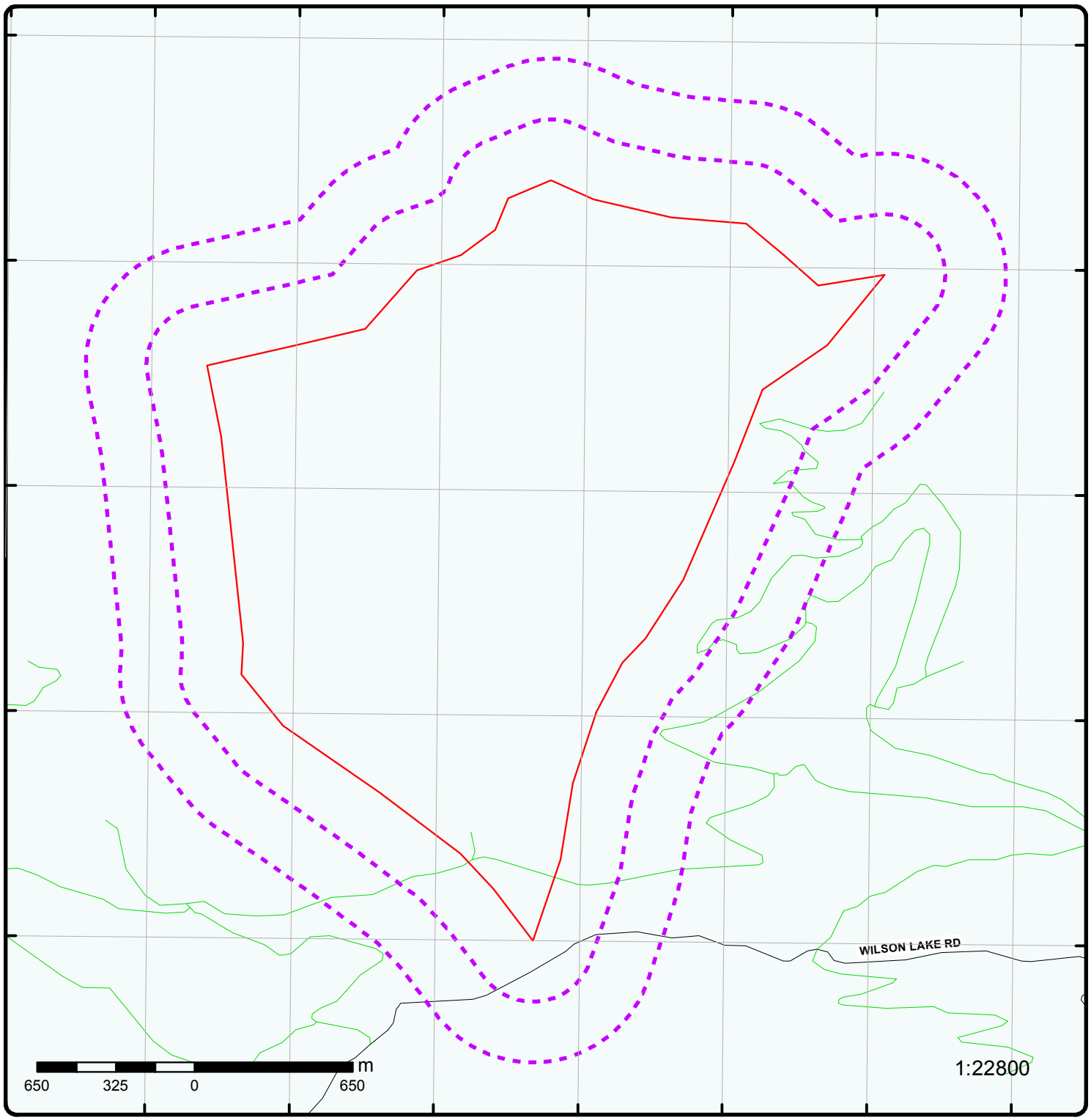
Executive Summary: Site Report Summary - Surrounding Properties

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number

No records found in the selected databases for the surrounding properties.

Executive Summary: Summary By Data Source

No records found in the selected databases for the project property or surrounding properties.



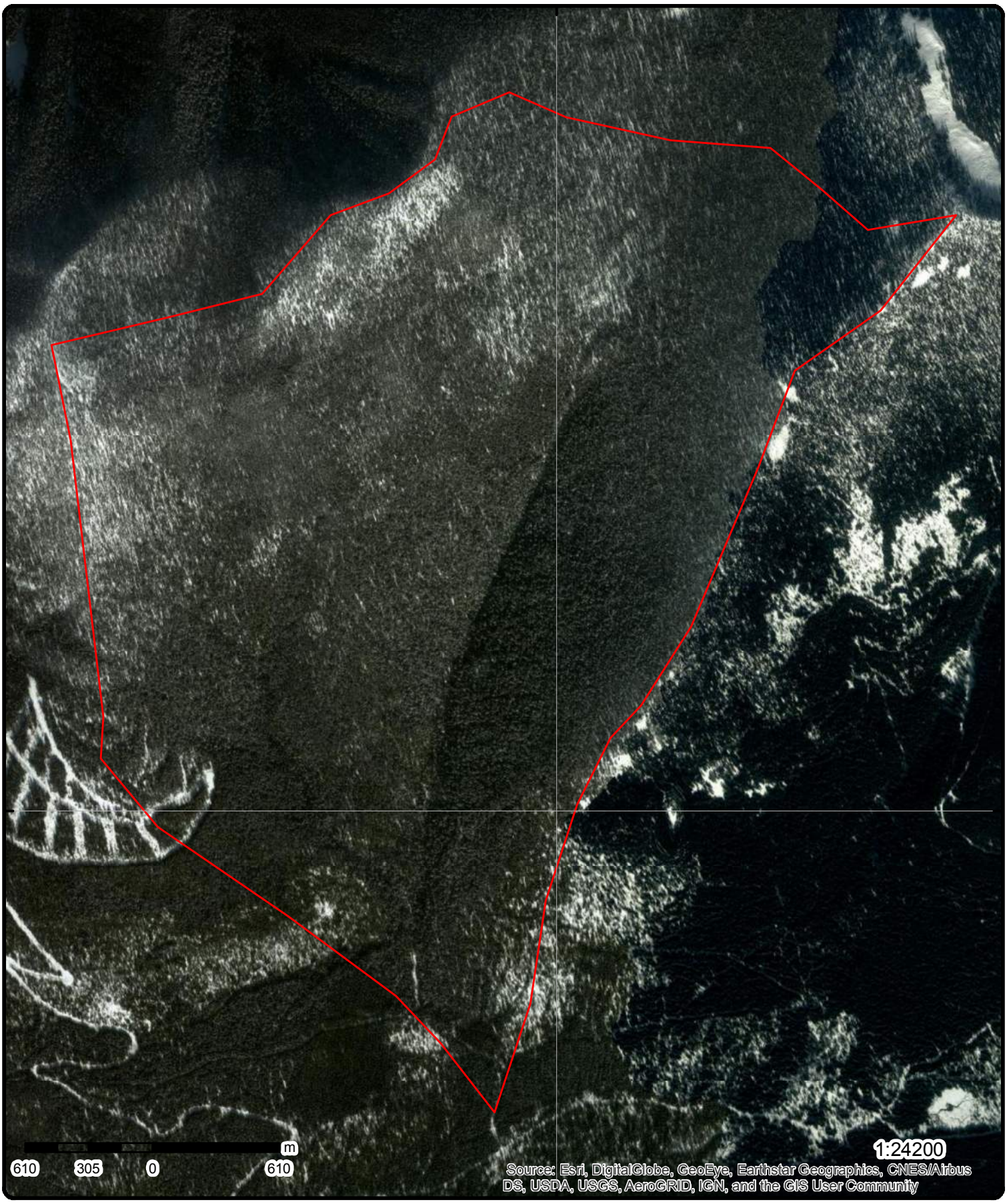
Map : 0.5 Kilometer Radius

Address: n/a, Nakusp, BC
Order No: 20161020136

ERIS
ENVIRONMENTAL RISK INFORMATION SERVICES

- Project Property
- Buffer Outline
- Eris Sites with Higher Elevation
- Eris Sites with Same Elevation
- Eris Sites with Lower Elevation
- Eris Sites with Unknown Elevation
- Expressway
- Principal Highway
- Secondary Highway
- Major Road
- Local road
- Trail
- Proposed Road
- Ferry Route/Ice Road
- Industrial and Resource - Regions
- Main Line
- Sidetrack
- Transit Line
- Abandoned Line
- National Park
- Provincial or Territorial Park
- Other Park
- Golf Course or Driving Range
- Park or Sports Field
- Other Recreation Area

Source: © 2015 DMTI Spatial Inc.



Aerial

Order No: 20161020136

Address: n/a, Nakusp, BC

Source: ESRI World Imagery

Detail Report

Map Key	Number of Records	Direction/ Distance (m)	Elevation (m)	Site	DB

No records found in the selected databases for the project property or surrounding properties.

Unplottable Summary

Total: 1 Unplottable sites

DB	Company Name/Site Name	Address	City	Postal
SCT	BOX LAKE LUMBER PRODUCTS LTD.	Wilson Lake Rd	Nakusp BC	V0G 1R0

Unplottable Report

Site: ***BOX LAKE LUMBER PRODUCTS LTD.***
Wilson Lake Rd Nakusp BC V0G 1R0

Database: ***SCT***

Established:	1996
Plant Size (ft²):	20000
Employment:	20

--- Details ---

Description:	Hardwood Dimension and Flooring Mills
SIC/NAICS Code:	2426
+	
Description:	Wood Products, Not Elsewhere Classified
SIC/NAICS Code:	2499
+	
Description:	Other Millwork
SIC/NAICS Code:	321919
+	
Description:	All Other Miscellaneous Wood Product Manufacturing
SIC/NAICS Code:	321999

Appendix: Database Descriptions

Environmental Risk Information Services (ERIS) can search the following databases. The extent of historical information varies with each database and current information is determined by what is publicly available to ERIS at the time of update. ***Note:*** *Databases denoted with " * " indicates that the database will no longer be updated. See the individual database description for more information.*

Authorization Management System (formerly WASTE): Provincial AMS

AMS is the Ministry of Environment's waste permit administration system. It maintains data related to the administration of permits issued under the Environmental Management Act and registrations under various regulations where the regulation requires a discharger to register. It will include information such as companies or individuals permitted to discharge waste; type of business and locations at which waste disposal is permitted; the types, amounts and frequency of waste products that are permitted to be discharged at given locations; issue date and more. This was previously referred to as the "WASTE" database.

Government Publication Date: 1957-Jan 2012

Assessment Report Indexing System: Provincial ARIS

Within British Columbia, the "Mineral Tenure Act Regulation", requires that results of mineral exploration and development programs be submitted to the British Columbia Ministry of Employment and Investment, where they are then maintained and housed by the Geological Survey Branch. The assessment reports provided by the Geological Survey Branch contain summary information for reports approved to November 1998; on geology, geophysics, geochemistry, drilling, prospecting and physical work.

Government Publication Date: Dec 31, 2015

Automobile Wrecking & Supplies: Private AUWR

This database provides an inventory of known locations that are involved in the scrap metal, automobile wrecking/recycling, and automobile parts & supplies industry. Information is provided on the company name, location and business type.

Government Publication Date: Oct 31, 2015

BC Oil and Gas Wells: Provincial BOGW

The BC Oil and Gas Wells database was collected from the BC Oil and Gas Commission and is a comprehensive database that includes information regarding well number, well name, operator name, location, depth, status, as well as drill date and type. Please note that this database will not be updated, information on wells drilled after January 2006 can be found in the Oil and Gas Wells (OGW) database under the 'Private Source Database' section.

Government Publication Date: 1918-Jan 2006*

Chemical Register: Private CHEM

This database includes a listing of locations of facilities within the Province or Territory that either manufacture and/or distributes chemicals.

Government Publication Date: Oct 31, 2015

Coal Tar Sites: Provincial COAL

This one-time study is an inventory of all known and historical coal tar sites, identifying sites that produced coal tar and other related tars during the mid 1800's to the mid 1900's.

Government Publication Date: 1992*

Compliance and Enforcement Summary: Provincial CONV

This database summarizes orders, tickets and convictions issued by the Ministry of the Environment under applicable ministry and federal legislation. Orders are issued when action is required to prevent or stop actual or potential impact to the environment. Tickets apply to all tickets paid, deemed guilty by non-payment or expiry, or contested in court and found guilty by a judge. Convictions apply to all court convictions of ministry legislation as well as federal legislation where the ministry has taken action. This reporting summary began in January 2006, replacing Non-Compliance Reports by the former Ministry of Water, Land & Air Protection. See the Non-Compliance Reports (NCPL) database below for more information. This database is part of a larger COORS (Conservation Officer On-Line Reporting System) database controlled by the Ministry of Environment in BC.

Government Publication Date: Sep 30, 2015

Wastewater Discharge Inventory: Provincial DIS

This inventory contains information regarding direct dischargers of toxic pollutants for the following operations: Industrial; Commercial; Agricultural; Mining; Municipal; Urban; Aquaculture; and Pulp & Paper, operating under provincial permits. Please note that this program was discontinued and therefore the database will not be updated.

Government Publication Date: 1957-1995*

Environmental Effects Monitoring: Federal EEM

The Environmental Effects Monitoring program assesses the effects of effluent from industrial or other sources on fish, fish habitat and human usage of fisheries resources. Since 1992, pulp and paper mills have been required to conduct EEM studies under the Pulp and Paper Effluent Regulations. This database provides information on the mill name, geographical location and sub-lethal toxicity data.

Government Publication Date: 1992-2007*

ERIS Historical Searches: Private EHS

ERIS has compiled a database of all environmental risk reports completed since March 1999. Available fields for this database include: site location, date of report, type of report, and search radius. As per all other databases, the ERIS database can be referenced on both the map and "Statistical Profile" page.

Government Publication Date: 1999-Aug 2016

Environmental Issues Inventory System: Federal EIIS

The Environmental Issues Inventory System was developed through the implementation of the Environmental Issues and Remediation Plan. This plan was established to determine the location and severity of contaminated sites on inhabited First Nation reserves, and where necessary, to remediate those that posed a risk to health and safety; and to prevent future environmental problems. The EIIS provides information on the reserve under investigation, inventory number, name of site, environmental issue, site action (Remediation, Site Assessment), and date investigation completed.

Government Publication Date: 1992-2001*

Federal Convictions: Federal FCON

Environment Canada maintains a database referred to as the "Environmental Registry" that details prosecutions under the Canadian Environmental Protection Act (CEPA) and the Fisheries Act (FA). Information is provided on the company name, location, charge date, offence and penalty.

Government Publication Date: 1988-Jun 2007*

Contaminated Sites on Federal Land: Federal FCS

The Federal Contaminated Sites Inventory includes information on known federal contaminated sites under the custodianship of departments, agencies and consolidated Crown corporations as well as those that are being or have been investigated to determine whether they have contamination arising from past use that could pose a risk to human health or the environment. The inventory also includes non-federal contaminated sites for which the Government of Canada has accepted some or all financial responsibility. It does not include sites where contamination has been caused by, and which are under the control of, enterprise Crown corporations, private individuals, firms or other levels of government.

Government Publication Date: June 2000-Oct 2015

Commercial Fisheries: Provincial FISH

The Fisheries, Aquaculture & Commercial Fisheries Branch of the Ministry of Water, Land & Air Protection maintains a database of fish processing plant approvals, licenses and activities. Each year, licenses need to be renewed.

Government Publication Date: 1993-2012

Fisheries & Oceans Fuel Tanks: Federal FOFT

Fisheries & Oceans Canada maintains an inventory of aboveground & underground fuel storage tanks located on Fisheries & Oceans property or controlled by DFO. Our inventory provides information on the site name, location, tank owner, tank operator, facility type, storage tank location, tank contents & capacity, and date of tank installation.

Government Publication Date: 1964-Sept 2003

Waste Generators Summary: Provincial GEN

Within British Columbia, the Special Waste Regulation defines a waste generator as any site, equipment and/or operation involved in the production, collection, handling and/or storage of regulated wastes. A generator of regulated waste is required to register the waste generation site and each waste produced, collected, handled, or stored at the site. This database contains the registration number (BCG#), company name and address of registered generators; including the types of hazardous wastes generated and the form of treatment used in the handling of the waste. Some of "Waste Generators Summary" addresses may represent mailing addresses rather than waste/hazardous sites. This information is a summary of all years from June 1993 to September 2010. Please note that a British Columbia Generator number (BCG#) are not unique to a company. This database is part of a larger SWIS (Special Waste Information System) database controlled by the Ministry of Environment in BC. Waste Generators Summary data are historic and no longer being updated.

Government Publication Date: 1993-2010*

Greenhouse Gas Emissions from Large Facilities: Federal GHG

List of greenhouse gas emissions from large facilities made available by Environment Canada. Greenhouse gas emissions in kilotonnes of carbon dioxide equivalents (kt CO2 eq).

Government Publication Date: Dec 31, 2013

Indian & Northern Affairs Fuel Tanks: Federal IAFT

The Department of Indian & Northern Affairs Canada (INAC) maintains an inventory of aboveground & underground fuel storage tanks located on both federal and crown land. Our inventory provides information on the reserve name, location, facility type, site/facility name, tank type, material & ID number, tank contents & capacity, and date of tank installation.

Government Publication Date: 1950-Aug 2003*

Lumber Mills: Provincial LUM

This database provides information regarding the general location and estimated annual output capacity of major timber processing facilities within the province of British Columbia.

Government Publication Date: 1997-2013

Canadian Mine Locations: Private MINE

This information is collected from the Canadian & American Mines Handbook. The Mines database is a national database that provides over 290 listings on mines (listed as public companies) dealing primarily with precious metals and hard rocks. Listed are mines that are currently in operation, closed, suspended, or are still being developed (advanced projects). Their locations are provided as geographic coordinates (x, y and/or longitude, latitude). As of 2002, data pertaining to Canadian smelters and refineries has been appended to this database.

Government Publication Date: 1998-2009*

Minerals Deposits Database: Provincial MNR

The Ministry of Energy and Mines maintains a database of more than 12,000 metallic mineral, industrial mineral and coal deposits and occurrences within British Columbia. Information within our report pertains to primary name, elevation, mining division, commodities, and status. Please note that as of January 27, 1999, information included within this database was divided into 2 categories: released and unreleased areas. Records for unreleased areas may contain incomplete, unedited, and/or inaccurate data.

Government Publication Date: Oct 31, 2014

National Analysis of Trends in Emergencies System (NATES): Federal NATE

In 1974 Environment Canada established the National Analysis of Trends in Emergencies System (NATES) database, for the voluntary reporting of significant spill incidents. The data was to be used to assist in directing the work of the emergencies program. NATES ran from 1974 to 1994. Extensive information is available within this database including company names, place where the spill occurred, date of spill, cause, reason and source of spill, damage incurred, and amount, concentration, and volume of materials released.

Government Publication Date: 1974-1994*

Non-Compliance Reports: Provincial NCPL

From 1990 to March 2001 the Ministry of Water, Land & Air Protection maintained a reporting system that identified any reported concern that pertained to compliance with authorized waste management permits or plans, approvals, orders, operational certificates and regulations, or any other activity under the Waste Management Act. This reporting system was discontinued in April of 2001; therefore there will be no updates to this database. However, beginning in January 2006 the Ministry of the Environment began publishing Compliance and Enforcement Summaries. See the Compliance and Enforcement Summary (CPL) database above for more information.

Government Publication Date: 1990-Mar 2001*

National Defense & Canadian Forces Fuel Tanks: Federal NDFT

The Department of National Defense and the Canadian Forces maintains an inventory of all aboveground & underground fuel storage tanks located on DND lands. Our inventory provides information on the base name, location, tank type & capacity, tank contents, tank class, date of tank installation, date tank last used, and status of tank as of May 2001. This database will no longer be updated due to the new National Security protocols which have prohibited any release of this database.

Government Publication Date: Up to May 2001*

National Defense & Canadian Forces Spills: Federal NDSP

The Department of National Defense and the Canadian Forces maintains an inventory of spills to land and water. All spill sites have been classified under the "Transportation of Dangerous Goods Act - 1992". Our inventory provides information on the facility name, location, spill ID #, spill date, type of spill, as well as the quantity of substance spilled & recovered.

Government Publication Date: Mar 1999-Aug 2010

National Defence & Canadian Forces Waste Disposal Sites: Federal NDWD

The Department of National Defence and the Canadian Forces maintains an inventory of waste disposal sites located on DND lands. Where available, our inventory provides information on the base name, location, type of waste received, area of site, depth of site, year site opened/closed and status.

Government Publication Date: 2001-Apr 2007*

National Energy Board Wells: Federal NEBW

The NEBW database contains information on onshore & offshore oil and gas wells that are outside provincial jurisdiction(s) and are thereby regulated by the National Energy Board. Data is provided regarding the operator, well name, well ID No./UWI, status, classification, well depth, spud and release date.

Government Publication Date: 1920-Feb 2003*

National Environmental Emergencies System (NEES): Federal NEES

In 2000, the Emergencies program implemented NEES, a reporting system for spills of hazardous substances. For the most part, this system only captured data from the Atlantic Provinces, some from Quebec and Ontario and a portion from British Columbia. Data for Alberta, Saskatchewan, Manitoba and the Territories was not captured. However, NEES is also a repository for previous Environment Canada spill datasets. NEES is composed of the historic datasets ' or Trends ' which dates from approximately 1974 to present. NEES Trends is a compilation of historic databases, which were merged and includes data from NATES (National Analysis of Trends in Emergencies System), ARTS (Atlantic Regional Trends System), and NEES. In 2001, the Emergencies Program determined that variations in reporting regimes and requirements between federal and provincial agencies made national spill reporting and trend analysis difficult to achieve. As a consequence, the department has focused efforts on capturing data on spills of substances which fall under its legislative authority only (CEPA and FA). As such, the NEES database will be decommissioned in December 2004.

Government Publication Date: 1974-2003*

National PCB Inventory: Federal NPCB

Environment Canada's National PCB inventory includes information on in-use PCB containing equipment in Canada including federal, provincial and private facilities. Federal out-of-service PCB containing equipment and PCB waste owned by the federal government or by federally regulated industries such as airlines, railway companies, broadcasting companies, telephone and telecommunications companies, pipeline companies, etc. are also listed. Although it is not Environment Canada's mandate to collect data on non-federal PCB waste, the National PCB inventory includes some information on provincial and private PCB waste and storage sites. Some addresses provided may be Head Office addresses and are not necessarily the location of where the waste is being used or stored.

Government Publication Date: 1988-2008*

National Pollutant Release Inventory: Federal NPRI

Environment Canada has defined the National Pollutant Release Inventory ("NPRI") as a federal government initiative designed to collect comprehensive national data regarding releases to air, water, or land, and waste transfers for recycling for more than 300 listed substances.

Government Publication Date: Dec 31, 2014

Oil and Gas Wells: Private OGW

The Nickle's Energy Group (publisher of the Daily Oil Bulletin) collects information on drilling activity including operator and well statistics. The well information database includes name, location, class, status and depth. The main Nickle's database is updated on a daily basis, however, this database is updated on a monthly basis. More information is available at www.nickles.com.

Government Publication Date: 1988-Jun 2016

Canadian Pulp and Paper: Private PAP

This information is part of the Pulp and Paper Canada Directory. The Directory provides a comprehensive listing of the locations of pulp and paper mills and the products that they produce.

Government Publication Date: 1999, 2002, 2004, 2005, 2009

Inventory of PCB Storage Sites: Provincial PCB

The Ministry of Water, Land & Air Protection maintains a database of all active Polychlorinated Biphenyls (PCB) waste storage sites within the Special Waste Information System. Please note that there is no requirement to maintain an accurate listing of all inactive PCB waste storage equipment and/or disposal sites. The records within this database provide information regarding site name, location, an inventory of stored wastes and quantities, and status date (when site first active/inactive). Previous to May 1993, data was collected from a different source and is only available for 1989. Inventory of PCB Storage Sites data are historic and no longer being updated.

Government Publication Date: 1989, May 1993-2010*

Parks Canada Fuel Storage Tanks: Federal PCFT

Canadian Heritage maintains an inventory of known fuel storage tanks operated by Parks Canada, in both National Parks and at National Historic Sites. The database details information on site name, location, tank install/removal date, capacity, fuel type, facility type, tank design and owner/operator.

Government Publication Date: 1920-Jan 2005*

Pesticide Register: Provincial PES

This is a database of individuals who apply for a service or vendor license for the use of registered pesticides. A service license is denoted by an "S" in the license number, likewise, a vendor license by a "V" in the license number.

Government Publication Date: 1989-Jun 2013

Private Aggregate Inventory: Provincial PRAI

Within British Columbia, aggregate pits are designated as mines; and as such, the Ministry of Energy and Mines is responsible for their planning, management and regulation, including permitting, health, safety and reclamation. Owners or operators of all private aggregate pits must file Notices of Work as part of the permitting and reclamation process. In 1994, the Geological Survey Branch initiated the Aggregate Program, in order to establish an inventory of natural and crushed aggregate pits. Information about each pit in the database file includes its location, NTS map sheet number, Notice of Work file number and status (active/inactive) and the type of landform hosting the pit. This database was a one-time inventory and will not be updated.

Government Publication Date: 1975-1996*

Public Aggregate Inventory: Provincial PUAI

Information about public aggregate pits in British Columbia is collected and managed by the Ministry of Transportation and Highways. Data has been gathered on more than 2000 pits, in respect to pit name, type and geographical location.

Government Publication Date: 1960-2001*

Waste Receivers Summary: Provincial REC

The Special Waste Regulation defines the disposal of regulated waste through an operating waste management system or a waste disposal site operated or used pursuant to the terms and conditions of a Certificate of Approval or a Provisional Certificate of Approval. A waste receiving location is any site or facility to which waste is transferred through a waste carrier. A receiver of regulated waste is required to register the waste receiving facility. This database represents registered receivers of regulated wastes, identified by registration number, company name and address. Some of "Waste Receivers Summary" addresses may represent mailing addresses rather than waste/hazardous sites. This database is part of a larger SWIS (Special Waste Information System) database controlled by the Ministry of Environment in BC. Waste Receivers Summary data are historic and no longer being updated.

Government Publication Date: 1992-2010*

Retail Fuel Storage Tanks: Private RST

This database includes an inventory of retail fuel outlet locations (including marinas) that have on their property gasoline, oil, waste oil, natural gas and / or propane storage tanks.

Government Publication Date: Oct 31, 2015

Scott's Manufacturing Directory: Private SCT

Scott's Directories is a data bank containing information on over 200,000 manufacturers across Canada. Even though Scott's listings are voluntary, it is the most comprehensive database of Canadian manufacturers available. Information concerning a company's address, plant size, and main products are included in this database.

Government Publication Date: 1992-Mar 2011*

Site Registry: Provincial SREG

This information is collected from the Ministry of Environment's Site Registry. It is not a registry of contaminated sites, although some sites on the registry are contaminated. Most sites have already been investigated and require minor remediation, or have already been cleaned up to government requirements. The Registry also stores environmentally relevant historic information about sites including: names of participants, legal and administrative notations, references to pertinent documents submitted to the ministry, associations with other sites, and much more.
1. Please note the information provided in the Detail Reports have been updated to the best of our ability as provided by the source, BC Government. For more information, please contact your ERIS sales representative.

Government Publication Date: July 31, 2016; details from Oct 2012

Transport Canada Fuel Storage Tanks: Federal TCFT

List of fuel storage tanks currently or previously owned or operated by Transport Canada. This inventory also includes tanks on The Pickering Lands, which refers to 7,530 hectares (18,600 acres) of land in Pickering, Markham, and Uxbridge owned by the Government of Canada since 1972; properties on this land has been leased by the government since 1975, and falls under the Site Management Policy of Transport Canada, but is administered by Public Works and Government Services Canada. This inventory provides information on the site name, location, tank age, capacity and fuel type.

Government Publication Date: 1970-Mar 2007

Waste Disposal Site Inventory: Provincial WDS

This inventory pertains to active, regulated waste disposal sites within the province of British Columbia. Registered companies may hold a permit or certificate for release of the following waste types: Effluent, Refuse, Air and Special Waste Storage. Information on Waste Disposal Sites after 1998 is contained within the Authorizations (AUTH) database.

Government Publication Date: 1980-1998*

Water Well Information System: Provincial WWIS

This database was collected from the Groundwater Information Center of the Ministry of Water, Land & Air Protection and contains over 90,000 records. Comprehensive information is available for each well including: well location (address/site area), latitude/longitude, legal description (section, lot, plan, district lot, range, township), BCGS Mapsheet No., depth of well, construction dates, well status and lithology. The accuracy of well locations is also provided, as well as the reference source for obtaining geographic coordinates.

Government Publication Date: 1880-Sep 2015

Definitions

Database Descriptions: This section provides a detailed explanation for each database including: source, information available, time coverage, and acronyms used. They are listed in alphabetic order.

Detail Report: This is the section of the report which provides the most detail for each individual record. Records are summarized by location, starting with the project property followed by records in closest proximity.

Distance: The distance value is the distance between plotted points, not necessarily the distance between the sites' boundaries. All values are an approximation.

Direction: The direction value is the compass direction of the site in respect to the project property and/or center point of the report.

Elevation: The elevation value is taken from the location at which the records for the site address have been plotted. All values are an approximation. Source: Google Elevation API.

Executive Summary: This portion of the report is divided into 3 sections:

'Report Summary'- Displays a chart indicating how many records fall on the project property and, within the report search radii.

'Site Report Summary'-Project Property'- This section lists all the records which fall on the project property. For more details, see the 'Detail Report' section.

'Site Report Summary-Surrounding Properties'- This section summarizes all records on adjacent properties, listing them in order of proximity from the project property. For more details, see the 'Detail Report' section.

Map Key: The map key number is assigned according to closest proximity from the project property. Map Key numbers always start at #1. The project property will always have a map key of '1' if records are available. If there is a number in brackets beside the main number, this will indicate the number of records on that specific property. If there is no number in brackets, there is only one record for that property.

The symbol and colour used indicates 'elevation': the red inverted triangle will dictate 'ERIS Sites with Lower Elevation', the yellow triangle will dictate 'ERIS Sites with Higher Elevation' and the orange square will dictate 'ERIS Sites with Same Elevation.'

Unplottables: These are records that could not be mapped due to various reasons, including limited geographic information. These records may or may not be in your study area, and are included as reference.