Regional District of Central Kootenay

JOINT RESOURCE RECOVERY COMMITTEE

Open Meeting Agenda

Date: Wednesday, October 16, 2024

Time: 1:00 pm

Location: Hybrid Model - In-person and Remote

Directors will have the opportunity to participate in the meeting electronically. Proceedings are open to the public.

Pages

1. ZOOM REMOTE MEETING INFO

To promote openness, transparency and provide accessibility to the public we provide the ability to attend all RDCK meetings in-person or remote.

Meeting Time:

1:00 p.m.

Join by Video:

https://rdck-bc-ca.zoom.us/j/94912516710?pwd=q1P0nRbHDzk5d5kbNalkGo4IGWyymO.1&from=addon

Join by Phone:

- +1 778 907 2071 Canada
- 833 955 1088 Canada Toll-free

Meeting ID: 949 1251 6710
Passcode: 384772

2. CALL TO ORDER & WELCOME

Chair Popoff to call the meeting to order at 1:00 p.m.

2.1 TRADITIONAL LANDS ACKNOWLEDGEMENT STATEMENT

We acknowledge and respect the Indigenous peoples within whose traditional lands we are meeting today.

2.2 ADOPTION OF THE AGENDA

RECOMMENDATION:
The agenda for the October 16, 2024 Joint Resource Recovery meeting be adopted as circulated.

2.3 RECEIPT OF MINUTES

6 - 10

The August 14, 2024 Joint Resource Recovery minutes, have been received.

3. PURCHASE OF LOADER FOR CENTRAL SUB-REGION [Central Sub-Region]

11 - 15

The October 11, 2024 Committee Report from Larry Brown, Resource Recovery Operations Supervisor seeking direction to purchase a new rubber tire wheel loader to be deployed within the Central Sub-region, has been received.

RECOMMENDATION:
That the Board authorize staff to purchase a Case 621G XT loader from Inland Truck and Equipment up to a total cost of $303,009.64 (excluding taxes);

AND FURTHER that the Chair and Corporate Officer be authorized to sign the necessary documents;

AND FURTHER that the costs be paid from Service S187 Central Waste.

4. NAKUSP LANDFILL HYDROGEOLOGY & HYDROLOGY CHARACTERIZATION REPORT [West Sub-Region]

16 - 166

The September 27, 2024 Committee Report from Heidi Bench, Resource Recovery Projects Advisor presenting the findings of the Hydrogeology and Hydrology Characterization Report for the Nakusp Landfill, has been received.

5. NAKUSP CLOSURE PLAN – CONSULTING CONTRACT INSURANCE MODIFICATION [West Sub-Region]

167 - 170

The October 2, 2024 Committee Report from Nathan Schilman, Environmental Technologist proposing an insurance modification for Sperling Hansen Associates Inc. for the Nakusp Closure Planning Project, has been received.

RECOMMENDATION:
That the Board accept the insurance modification to the Professional Liability (Errors and Omissions) coverage for Sperling Hansen Associates Inc. for the Nakusp Landfill Closure Planning Project to reduce the in aggregate amount from $10,000,000 to $5,000,000.

6. CRESTON LANDFILL & COMPOST FACILITY OPERATING CONTRACTS [East Sub-Region]

171 - 175

The September 25, 2024 Committee Report from Nathan Schilman,

Environmental Technologist regarding the Creston Landfill and Creston Compost operations and maintenance contracts, has been received.

RECOMMENDATION #1:
That the Board direct Staff to issue a single Request for Proposal to combine the Creston Landfill and Creston Compost Facility operations contracts, with costs to be paid from Services S186 East Resource Recovery and A120 East Compost, respectively.

RECOMMENDATION #2:
That the Board approve the RDCK enter into a Service Agreement with GFL Environmental Ltd. for the operations and maintenance of the Creston Landfill for a six (6) month term starting April 1, 2025, at a total cost of up to $218,034 not including GST;

AND FURTHER that the Chair and Corporate Officer be authorized to sign the necessary documents;

AND FURTHER that the costs be paid from Service S186 East Sub-Region Resource Recovery Service.

RECOMMENDATION #3:
That the Board approve the RDCK extend the Service Agreement with GFL Environmental Ltd. for the operations and maintenance of the Creston Compost Facility for a five (5) month and twenty (20) day term starting April 10, 2025, at a total cost of up to $86,659 not including GST;

AND FURTHER that the Chair and Corporate Officer be authorized to sign the necessary documents;

AND FURTHER that the costs be paid from Service A119 East Compost.

7. HB TAILINGS FACILITY ENVIRONMENTAL MONITORING AND ENGINEERING CONSULTING CONTRACTS & REGULATORY UPDATE [Central Sub-Region]

176 - 236

The September 17, 2024 Committee Report from Alayne Hamilton, Environmental Projects Lead outlining a regulatory update and proposing two direct award Consulting Service Agreements for environmental monitoring and engineering services for the HB Tailings Facility, has been received.

RECOMMENDATION #1:
That the Board approve the RDCK enter into a Consulting Services Agreement with SLR Consulting (Canada) Inc. for works associated with environmental support for the HB Tailings Facility for a three year term starting January 1, 2025, at a total cost of up to $359,800 not including GST;

AND FURTHER that the Consulting Services Agreement provide two optional one year extensions upon mutual agreement of both parties;

AND FURTHER that the Chair and Corporate Officer be authorized to sign the necessary documents;

AND FURTHER that the costs be paid from Service S187 Central Sub-Region Resource Recovery Service.

RECOMMENDATION #2:
That the Board approve the RDCK enter into a Consulting Services Agreement with SRK Consulting (Canada) Ltd. for works associated with engineering consulting for the HB Tailings Facility for a two year term starting November 17, 2024, at a total cost of up to $513,021 not including GST;

AND FURTHER that the Consulting Services Agreement provide three optional one year extensions upon mutual agreement of both parties;

AND FURTHER That the Board accept an insurance deductible modification for Professional Errors and Omissions Liability insurance to increase the deductible from $50,000 to $500,000;

AND FURTHER, that the Board accept a modification to the Professional Errors and Omissions Liability coverage to reduce the in aggregate amount from $10,000,000 to $5,000,000;

AND FURTHER that the Chair and Corporate Officer be authorized to sign the necessary documents;

AND FURTHER that the costs be paid from Service S187 Central Sub-Region Resource Recovery Service.

8. LAKESIDE RECYCLING DEPOT LICENSE OF OCCUPATION [Central Sub-Region]

237 - 243

Akane Norimatsu, Resource Recovery Technician will provide a verbal report regarding the Lakeside Recycling Depot License of Occupation.

The following has been received:

- Draft License of Occupation between City of Nelson and RDCK

RECOMMENDATION:
That the Board authorize the renewal of the License of Occupation with the City of Nelson for Nelson Lakeside Recycling Depot for the term of January 1, 2024 to December 31, 2025 at the fees of $58,308.27 per year;

AND FURTHER, that the costs be paid from Service No. A117 – Central Sub-region Recycling.

9. SALMO RECYCLING DEPOT LICENSE OF OCCUPATION [Central Sub-Region]

Akane Norimatsu, Resource Recovery Technician will provide a verbal report regarding the Salmo Recycling Depot License of Occupation.

RECOMMENDATION:
That the resolution 68/24 being:

That the Board authorize the renewal of the Lease Contract with the Village of Salmo for the Salmo Recycling Depot for the term of July 1, 2020 to June 30, 2025 with proposed rental fees of $566.80 (plus GST) per month; subject to renewal of insurance requirements;

AND FURTHER, that the costs be paid from Service No. A117 – Central Sub-region Recycling.

Be amended to read:

That the Board authorize the renewal of the License of Occupation with the Village of Salmo for the Salmo Recycling Depot for the term of July 1, 2020 to June 30, 2025 with proposed rental fees of $566.80 (plus GST) per month; subject to renewal of insurance requirements;

AND FURTHER, that the costs be paid from Service No. A117 – Central Sub-region Recycling.

10. PUBLIC TIME

The Chair will call for questions from the public and members of the media at ___ _ p.m.

11. ADJOURNMENT

RECOMMENDATION:

The Joint Resource Recovery Committee meeting adjourn at _____ p.m.

File: 01-0515-20-JRRC

Regional District of Central Kootenay
JOINT RESOURCE RECOVERY COMMITTEE MEETING
Open Meeting Minutes

A Joint Resource Recovery Committee meeting was held on Wednesday, August 14, 2024 1:00 pm through a hybrid meeting model.

ELECTED OFFICIALS PRESENT	**Director G. Jackman**	**Electoral Area A (Chair)**	In-person
	Director R. Tierney	Electoral Area B	In-person
	Director K. Vandenberghe	Electoral Area C	In-person
	Director A. Watson	Electoral Area D	In-person
	Alt. Director J. Smienk	Electoral Area E	In-person
	Director T. Newell	Electoral Area F	In-person
	Director H. Cunningham	Electoral Area G	In-person
	Director W. Popoff	Electoral Area H	
	Director H. Hanegraaf	Electoral Area J	In-person
	Director T. Weatherhead	Electoral Area K	
	Director M. McFadden	City of Castlegar	In-person
	Director. A. DeBoon	Town of Creston	
	Director S. Hewat	Village of Kaslo	
	Director T. Zeleznik	Village of Nakusp	
	Director K. Page	City of Nelson	In-person
	Alt. Director J. Fyke	Village of New Denver	
	Director D. Lockwood	Village of Salmo	In-person
	Director L. Main	Village of Silverton	In-person
	Director E. Buller	Village of Slocan	
ELECTED OFFICIALS ABSENT			
	Director A. Davidoff	Electoral Area I	
STAFF PRESENT	Y. Malloff	General Manager – Finance, ED, IT	
	U. Wolf	General Manager – Environmental Services	
	A. Wilson	Resource Recovery Manager	
	J. Bradley	Project Manager – Environment Services	
	N. Schilman	Environmental Technologist	
	T. Johnson	Environmental Technologist	
	N. Metz	Alt. Meeting Coordinator	

1. WEBEX REMOTE MEETING INFO

Join by Meeting Link:
https://rdck-bc-ca.zoom.us/j/94704262288?pwd=h2JwBANvOVMLEjX8bSQcCthMUAjLAo.1&from=addon

Meeting Code: 947 0426 2288
Meeting Passcode: 731144

Join by Phone:
+1 778 907 2071 Canada
833 703 8985 Canada Toll-free

In-Person Meeting Location for Hybrid Meeting Model
The following location was determined to hold the in-person meetings for the Joint Resource Recovery Committee:

Location Name: RDCK Board Room
Location Address: 202 Lakeside Drive, Nelson, BC

2. CALL TO ORDER & WELCOME

Chair Jackman called the meeting to order at 1:00 pm.

2.1 Traditional Lands Acknowledgement Statement

We acknowledge and respect the indigenous peoples within whose traditional lands we are meeting today.

2.2 Adoption of the Agenda

Moved and seconded,
And resolved:

That Item INSTITUTIONAL, COMMERCIAL AND INDUSTRIAL (ICI) RECYCLING CONTRACT be added as a late item to the agenda.

Carried

Adoption of the Agenda
Moved and seconded,
And resolved:

The Agenda for the August 14, 2024 Joint Resource Recovery Committee meeting be adopted as amended.

Carried

2.3 Receipt of Minutes

The July 14, 2024 Joint Resource Recovery Committee Minutes have been received.

3. TOWN OF CRESTON SEPTAGE RECEIVING FACILITY SERVICE

The August 7, 2024 Committee Report from Todd Johnson, Environmental Coordinator regarding the Town of Creston Septage Receiving Facility Service, has been received.

4. EXTENDED PRODUCER RESPONSIBILITY PROGRAM CONCERNS

Amy Wilson, Resource Recovery Manager provided an update on the letter currently being drafted to the Province to address Extended Producer Responsibility (EPR) program concerns. The following item has been received:

- Draft letter regarding Extended Producer Responsibility Programs in the RDCK.

Moved and seconded,
And resolved that it be **recommended** to the Board:

That the Board send the letter as drafted to the Ministry of Environment and Climate Change Strategy regarding the Extended Producer Responsibility Programs in the RDCK.

Carried

RECESS / RECONVENE The meeting recessed at 2:25pm for a break and reconvened at 2:36pm.

5. GROHMAN NARROWS TRANSFER STATION EXPANSION CONTRACT AWARD

The August 7, 2024 Committee Report from Jeannine Bradley, Project Manager on the award of the Grohman Narrows Transfer Station Expansion Contract Award, has been received.

Moved and seconded,
And resolved that it be **recommended** to the Board:

That Resolution #351/24 being:

That the Board approve the RDCK enter into a Consulting Services Agreement with Ward Engineering and Land Surveying Ltd. for the Grohman Narrows Transfer Station Expansion Project and that the Chair and Corporate Officer be authorized to sign the necessary documents to a maximum value of $88,275.00 plus GST with the fund of the project coming from Service A11& Recycling Program – Central Subregion.

BE RESCINDED.

Carried

Moved and seconded,
And resolved that it be **recommended** to the Board:

That the Board approve the RDCK enter into a Consulting Services Agreement with Ottoted Engineering Corporation for the Grohman Narrows Transfer Station Expansion project, and that the Chair and Corporate Office be authorize to sign the necessary documents to a maximum value of $60,609.00 plus GST;

AND FURTHER, that the costs be paid from Service A117 Recycling Program – Central Subregion.

Carried

6. INSTITUTIONAL, COMMERCIAL AND INDUSTRIAL (ICI) RECYCLING CONTRACT

Amy Wilson, Resource Recovery Manager will provide verbal report on the proposed ICI Recycling Contract with Waste Management (WM) of Canada.

Moved, seconded
And resolved that it be **recommended** to the Board:

That the Board approve the indemnification provisions included within Agreement No. 23-2023 ENV (Provision of collection, transportation and marketing of Industrial, Commercial and Institutional Old Corrugated Cardboard) to the effect of indemnifying Waste Management of Canada against losses that may result from the actions of the RDCK.

Carried

7. PUBLIC TIME

The Chair called for questions from the public and members of the media 2:52 pm.

No questions from the media or the public.

8. ADJOURNMENT

Moved and seconded,
And resolved:

The Joint Resource Recovery Committee meeting adjourned at 2:53 pm.

Carried

CERTIFIED CORRECT

Director G. Jackman, Chair
August 14, 2024
Joint Resource Recovery Committee Meeting

BOARD RESOLUTIONS AS ADOPTED AT THE AUGUST 14, 2024 JOINT RESOURCE RECOVERY COMMITTEE MEETING

RECOMMENDATION #1
That Resolution #351/24:

That the Board approve the RDCK enter into a Consulting Services Agreement with Ward Engineering and Land Surveying Ltd. for the Grohman Narrows Transfer Station Expansion Project and that the Chair and Corporate Officer be authorized to sign the necessary documents to a maximum value of $88,275.00 plus GST with the fund of the project coming from Service A11& Recycling Program – Central Subregion.

BE RESCINDED.

RECOMMENDATION #2
That the Board approve the RDCK enter into a Consulting Services Agreement with Ottoted Engineering Corporation for the Grohman Narrows Transfer Station Expansion project, and that the Chair and Corporate Office be authorize to sign the necessary documents to a maximum value of $60,609.00 plus GST;

AND FURTHER, that the costs be paid from Service A117 Recycling Program – Central Subregion.

RECOMMENDATION #3
That the Board approve the indemnification provisions included within Agreement No. 23-2023 ENV (Provision of collection, transportation and marketing of Industrial, Commercial and Institutional Old Corrugated Cardboard) to the effect of indemnifying Waste Management of Canada against losses that may result from the actions of the RDCK.

RECOMMENDATION #4
That the Board send the letter as drafted to the Ministry of Environment and Climate Change Strategy regarding the Extended Producer Responsibility Programs in the RDCK.

Committee Report

Date of Report: October 11, 2024
Date & Type of Meeting: October 16, 2024; Joint Resource Recovery Committee
Author: Larry Brown, Resource Recovery Operations Supervisor
Subject: Purchase of Loader
File: 06-2230-15-2024-101 ENV LOADER
Electoral Area/Municipality: CENTRAL SUB-REGION

SECTION 1: EXECUTIVE SUMMARY

The purpose of this report is seek Board direction to purchase of a new rubber tire wheel loader to be deployed within the Central Subregion.

SECTION 2: BACKGROUND/ANALYSIS

A request through Canoe to loader suppliers was sent out in late July and closed on August 15, 2024.

The criteria upon which the suppliers were to base their submissions on was as follows:

"The RDCK is requesting quotes from Canoe suppliers for the procurement of one (1) wheel loader; suitable for solid waste and recycling transfer station uses such as pushing up garbage or recycling piles, transporting, arranging, and loading "super sacks" (~ 1 tonne capacity woven sacks) filled with recycling material, loading and moving pallets, and moving snow. The following general specification has being provided:

1) *The machine MUST be new and be the current production model, provide details. Demo units with low hours (i.e. <250hrs) are acceptable provided comparable details are provided.*
2) *Minimum operating weight: 30,000lbs.*
3) *Self-leveling bucket*
4) *Bucket size: 3 – 3.5 cubic yards.*
5) *Quick change mechanism to allow for ease in changing the attachments.*
6) *Required attachments: adjustable forks."*

Six separate submissions were received from dealers located in the south-east region of BC. Staff reviewed the submissions based on the following criteria:

The RDCK will be making its purchase decision based on the evaluation criteria listed below.

- *Quote specifies that Canoe member pricing is provided, reference the RDCK's Canoe member number and the supplier's Canoe contract number. (Pass/Fail)*
- *Quote is provided in Canadian currency*
- *Price*
- *Terms of warranty*

- *Shipping fees*
- *Insurance terms during shipping*
- *Return policy and any return shipping fees*
- *Expected delivery date (delivery lead time)*
- *Service availability, location and operating hours*
- *Local parts availability*
- *Provision of operation and service manuals*
- *Operating hours for service*
- *Sustainability*

Staff met on several occasions over the course of a month following the closure date to review all information received and solicit feedback from staff. Several submissions were incomplete and required clarification. The evaluation score, overall ranking, and price are presented in the table below and the evaluation matrix is included as Attachment A.

Unit	Evaluation Score	Overall Ranking	Price
John Deere – 524P	75.32 %	4	$303,000
Case – 621G XT	**80.56 %**	**1**	**$303,010**
Hyundai – HL940A	80.55 %	2	$265,790
Komatsu – WA-270-8	78.48 %	3	$283,000
Volvo – L70H	71.97 %	6	$319,272
Caterpillar – AR 926M	72.35 %	5	$288,950

Evaluation Rating	Details
100%	Outstanding Proposal that Substantially Exceed Requirements
85%	Above Average Fulfilling Requirements
70%	Fully Meets Requirements
50%	Meets Minimum Requirements
25%	Does Not Meet Minimum Requirements in All Areas
0%	Unsatisfactory

Based on the evaluation staff recommend purchasing the Case 621G XT unit. The Case unit specifications meet operational needs, was the highest ranked, and the price is within the budgeted value. It also includes a 2000 hour Comprehensive Maintenance Plan, a 3000 hour warranty, and a service & repair technician is located in Castlegar.

SECTION 3: DETAILED ANALYSIS

3.1 Financial Considerations – Cost and Resource Allocations:

Included in Financial Plan:	☒Yes	☐ No	**Financial Plan Amendment:**	☐Yes	☒ No
Debt Bylaw Required:	☐Yes	☒ No	**Public/Gov't Approvals Required:**	☐Yes	☒ No

The RDCK 2024 Financial Plan for Service S187 Central Waste includes $325,000 for a rubber-tired loader. The Case unit recommended by staff is $303,010, with provincial tax applied is $324,221, is within the budget.

3.2 Legislative Considerations (Applicable Policies and/or Bylaws):

Board approval is required for this purchase.

3.3 Environmental Considerations

None at this time.

3.4 Social Considerations:

None at this time.

3.5 Economic Considerations:

None at this time.

3.6 Communication Considerations:

None at this time

3.7 Staffing/Departmental Workplan Considerations:

With support from the Procurement Coordinator, the Resource Recovery Operations Supervisor will lead the purchase of the selected loader and oversee the deployment of the unit into operations.

3.8 Board Strategic Plan/Priorities Considerations:

The purchase of a new loader aligns with the RDCK Strategic Plan focuses on developing more cost effective and practical approach to asset management.

SECTION 4: OPTIONS & PROS / CONS

Option 1: That the Board authorize staff to purchase a Case 621G XT from Inland Truck and Equipment up to a total cost of $303,010 (excluding taxes).

Pros:

- The purchase price is within the budget of $325,000.
- The Case loader scored 80.56 points which is the highest of all loaders on the evaluation scale.
- The unit comes with one of the best overall warranties (3 year 3000 hour). Only Case and Hyundai included a 3000 hour warranty. All other suppliers provided only one year.
- Included in the purchase price is a comprehensive scheduled 2000 hour Maintenance Service Plan which includes all labour and material (not including travel). The estimated value of this plan is $20,000. The benefit of this plan is not incorporated into the technical score of the evaluation. The overall score of the Case would increase to 82.42 if the value of the plan is deducted from the purchase price.
- Repair costs and potential down time over the anticipated life cycle for the Case loader will be lower than the next highest rated loader (Hyundai) due to the location of the dealership and service technician in Castlegar. This difference is included in the value adds section of the technical evaluation.

Cons:

- The purchase price is $37,220 (excluding taxes and environmental fees) higher the next highest rated loader (Hyundai).

Option 2: That the Board authorize staff to purchase a Hyundai HL940A loader from Woodland Equipment Inc. up to a total cost of $265,790 (excluding taxes).

Pros:

- The purchase price is within the budget of $325,000.
- The Hyundai loader scored very high on the evaluation scale. (80.55 points),
- The purchase price is $37,220 (excluding taxes and environmental fees) lower than the highest rated loader (Case loader).
- The unit comes with one of the best overall warranties (3 year 3000 hour).

Cons:

- The submission for the Hyundai was 0.01 points below the Case.
- Repair costs and potential down time over the anticipated life cycle for the Hyundai loader will be higher due to the location of the dealership and service technician in Kamloops.
- A 2000 hour comprehensive Maintenance Service Plan matching that of the Case for this loader is an additional $22,612.

SECTION 5: RECOMMENDATIONS

That the Board authorize staff to purchase a Case 621G XT loader from Inland Truck and Equipment up to a total cost of $303,010 (excluding taxes);

AND FURTHER that the Chair and Corporate Officer be authorized to sign the necessary documents;

AND FURTHER that the costs be paid from Service S187 Central Waste.

Respectfully submitted,

Larry Brown
Resource Recovery, Operations Supervisor

CONCURRENCE

Resource Recovery Manager – Amy Wilson

ATTACHMENTS:
Attachment A – Evaluation Matrix

Canoe Quote - Wheel Loader **ATTACHMENT - A**

SUMMARY, PRICE AND OVERALL SCORES

Technical Evaluation	Weighting Factors	JOHN DEERE 524P	CASE 621G XT	HYUNDAI HL940A	KOMATSU WA270-8	VOLVO L70H	CATERPILLAR 926M
Compliance to the quote	2.00%	1.40	1.40	1.40	1.40	1.40	1.40
Specifications	30.00%	21.00	21.00	21.00	21.00	21.00	20.75
Lead Time	10.00%	10.00	10.00	8.50	10.00	7.00	5.00
Warranty	5.00%	2.50	4.25	4.25	2.50	2.50	2.50
Safety and Ergonomics	10.00%	5.00	8.50	8.50	8.50	7.00	7.00
Value Adds	13.00%	9.10	9.10	6.90	6.90	8.10	8.10
Total Technical Score	70.00%	**49.00**	**54.25**	**50.55**	**50.30**	**47.00**	**44.75**
Vendor Price		$303,000.00	$303,009.64	$265,789.75	$283,000.00	$319,272.00	$288,950.00
NORMALIZED PRICE SCORE		**87.72%**	**87.72%**	**100.00%**	**93.92%**	**83.25%**	**91.98%**
Total Price Score	30.00%	**26.32**	**26.31**	**30.00**	**28.18**	**24.97**	**27.60**
Total Technical Score	70.00%	**49.00**	**54.25**	**50.55**	**50.30**	**47.00**	**44.75**
OVERALL SCORE	100.00%	**75.32**	**80.56**	**80.55**	**78.48**	**71.97**	**72.35**
OVERALL RANKING		**4**	**1**	**2**	**3**	**6**	**5**

Committee Report

Date of Report:	September 27, 2024
Date & Type of Meeting:	October 16, 2024; Joint Resource Recovery Committee
Author:	Heidi Bench, Resource Recovery Projects Advisor
Subject:	NAKUSP LANDFILL HYDROGEOLOGY & HYDROLOGY CHARACTERIZATION REPORT
File:	12-6300-NAK-30
Electoral Area/Municipality	West sub-region

SECTION 1: EXECUTIVE SUMMARY

The purpose of this report is to present the findings of the Hydrogeology and Hydrology Characterization Report for the Nakusp Landfill.

SECTION 2: BACKGROUND/ANALYSIS

Background

The Nakusp Landfill is currently operated as a natural attenuation landfill, receiving an estimated 65,000 tonnes of waste between 1977 and 2023. The Operational Certificate (MR-16521) was issued in 2000 and updated in 2014. The 2014 update to the Operational Certificate for Nakusp Landfill requires that, in addition to an Annual Report, a Five Year Report that includes a detailed Hydrogeological Assessment and updated Design and Operations Plan be submitted to the Director of the Ministry of Environment and Climate Change Strategy (the Ministry) on or before April 30 on the five year anniversary of the last submission.

To satisfy this regulatory requirement, a hydrogeological assessment was completed by Amec Foster Wheeler Environment & Infrastructure (Amec) in 2016 and a Design and Operations Plan Update was drafted by Wood Environment & Infrastructure Solutions (Wood, formerly Amec) in 2018; however the Design and Operations Plan was not finalized and a formal Five Year Report was not submitted to the Ministry. On September 17, 2019, the Ministry issued a Non-Compliance Advisory Letter noting non-compliance with both the Annual and the Five Year Report requirements.

Due to significant staffing shortages, the regulatory reporting requirements were not able to be met in 2019. Upon the hiring of the Environmental Technologist and Resource Recovery Projects Advisor in early 2023, Staff have worked to bring this landfill back into compliance with its regulatory reporting requirements by completing the following:

- In 2023, Annual Reports for operational years 2019 to 2022 were completed by Staff and submitted to the Ministry. The 2023 Annual Report was completed in 2024 and also submitted to the Ministry.
- In spring 2024, SLR Consulting (Canada) Ltd. (SLR) was retained to complete a detailed Hydrogeological and Hydrological Characterization Report (HHCR) in accordance with Section 10.1 of the 2016 *Landfill Criteria for Municipal Solid Waste* (the Landfill Criteria).
- In summer 2024, Sperling Hansen and Associates (SHA) was retained to complete both a Fill-to-Closure Plan and Final Closure Plan.

The HHCR and Fill-to-Closure Plan (in place of a Design and Operations Plan) will be submitted to the Ministry as part of the 2024 Annual and Five Year Report. As this landfill is anticipated to close in 2025, it is anticipated that the results and recommendations in these reports will guide the Final Closure Plan and subsequent Operational Certificate Amendment Application that will be required for the landfill.

Summary of the 2024 HHCR

The HHCR characterized the physical hydrogeologic and hydrologic setting of the landfill, determined the applicable performance criteria, evaluated the environmental conditions and attenuation capacity of the site, and provided recommendations.

Similar to other RDCK landfills, the compliance criteria referenced in the Operational Certificate for Nakusp Landfill are outdated and are not supported based on the setting and receptors at and downstream of the site. Section 4.1 of the Landfill Criteria states that a Qualified Professional must recommend the appropriate water quality criteria to ensure adequate protection of human health and environment. As the Qualified Professional, SLR evaluated the current and potential future land uses of groundwater and surface water within a one kilometer radius of the site and determined that the following water quality criteria were applicable:

- *Schedule 3.2 Generic Numerical Water Standards for the protection of Aquatic Life and Drinking Water, BC Contaminated Sites Regulation (CSR); and*
- *Health Canada Guidelines for Drinking Water Quality (Health Canada).*

To maintain alignment with the Operational Certificate, SLR compared groundwater results to the current specified compliance criteria (*British Columbia Approved and Working Water Quality Guidelines [BC WQG] for source drinking water and freshwater aquatic life);* however they noted that these water quality standards are designed to be protective of surface water, not groundwater. As there is no surface water at the site, only groundwater, SLR also applied the CSR and Health Canada criteria specified above and recommended that the requirement to compare to BC WQG be removed from the Operational Certificate when next amended.

The HHCR identified that groundwater at the site is impacted by leachate in the immediate vicinity of the landfill, where there appears to be a general trend of slightly increasing leachate potency over time. Water quality improves with distance from the landfill, indicating that natural attenuation is largely effective at mitigating impacts to receptors down-gradient of the landfill. The primary contaminants of concern near the site boundary are barium and lithium, which are present in exceedance of background levels and the BC CSR Drinking Water criteria at the site boundary. Concentrations of both parameters meet the compliance criteria at the farthest down-gradient monitoring well, which is technically off-site but on RDCK property.

To ensure the landfill maintains compliance with the Operational Certificate requirement to ensure that water quality does not exceed the applicable criteria at the site boundary, SLR recommends a re-definition of the site boundary to include the RDCK-owned District Lot 13034 and the farthest down-gradient monitoring well. Additionally, SLR recommended groundwater monitoring and sampling of three water supply wells located down-gradient of the site, subject to owner permission.

The HHCR has been forwarded to the SHA team who is in the process of completing the Fill-to-Closure Plan and Final Closure Plan such that the evaluation and recommendations can be incorporated into updates to the Environmental Monitoring Program in these and the eventual Operational Certificate Amendment Application.

SECTION 3: DETAILED ANALYSIS

3.1 Financial Considerations – Cost and Resource Allocations:

Included in Financial Plan:	☐ Yes ☐ No	**Financial Plan Amendment:**	☐ Yes ☐ No
Debt Bylaw Required:	☐ Yes ☐ No	**Public/Gov't Approvals Required:**	☐ Yes ☐ No

$65,000 was included in Service S188 West Resource Recovery 2024 budget for this HHCR. SLR completed the assessment and report extremely efficiently. The total to be invoiced is expected to be just under $24,000, for a cost savings of $41,000 from what was budgeted. No other financial considerations at this time.

3.2 Legislative Considerations (Applicable Policies and/or Bylaws):

The HHCR was completed to satisfy the regulatory requirements of the Operational Certificate for Nakusp Landfill. It will be submitted to the Ministry as part of the 2024 Annual and Five Year Report in early 2025.

Recommendations to update the applicable compliance criteria and re-define the site boundary should be incorporated in the next Operational Certificate Amendment Application, likely once the landfill closure has occurred.

3.3 Environmental Considerations

While landfill-related impacts to groundwater have been identified at the current site boundary, concentrations meet the applicable compliance criteria prior to leaving RDCK property and therefore there are no anticipated impacts to off-site receptors. As mentioned above, the site boundary should be re-defined to ensure that the landfill is in compliance with the water quality requirements in the Operational Certificate.

As placement of waste in the landfill is expected to stop when the landfill closes in 2025, it is expected that generation of leachate and any associated impacts to groundwater will likely start to decline in coming years; however water quality will continue to be monitored as per the site's environmental monitoring program to ensure regulatory compliance.

3.4 Social Considerations:

None at this time.

3.5 Economic Considerations:

None at this time.

3.6 Communication Considerations:

None at this time.

3.7 Staffing/Departmental Workplace Considerations:

The Environmental Technologist will submit the HHCR to the Ministry as part of regulatory reporting in 2025 and will ensure that recommendations from the HHCR are incorporated in the Fill-to-Closure and Final Closure Plans. No additional workplace considerations at this time.

3.8 Board Strategic Plan/Priorities Considerations:

This project aligns with the RDCK's strategic objective of environmental responsibility, ensuring that our watershed are protected and well-governed.

SECTION 4: OPTIONS & PROS / CONS

None at this time.

SECTION 5: RECOMMENDATIONS

For information only.

Respectfully submitted,
Heidi Bench, Resource Recovery Projects Advisor

CONCURRENCE

Resource Recovery Manager – Amy Wilson
General Manager of Environmental Services – Uli Wolf
Corporate Administrative Officer – Stuart Horn

ATTACHMENTS:
Attachment A – Hydrogeology and Hydrology Characterization Report, Nakusp Landfill

Hydrogeology and Hydrology Characterization Report

Nakusp Landfill

Regional District of Central Kootenay

Box 590, 202 Lakeside Drive
Nelson, BC V1L 5R4

Prepared by:

SLR Consulting (Canada) Ltd.

107 - 1726 Dolphin Avenue, Kelowna, BC V1Y 9R9

SLR Project No.: 219.030089.00001

Client Reference No: OPR302-100

September 27, 2024

Revision: 0

Revision Record

Revision	Date	Prepared By	Checked By	Authorized By
0	September 27, 2024	Megann Sullivan, Devin Hannan	Ben Foulger	Erin Robson

Statement of Limitations

This report has been prepared by SLR Consulting (Canada) Ltd. (SLR) for the Regional District of Central Kootenay (Client) in accordance with the scope of work and all other terms and conditions of the agreement between such parties. SLR acknowledges and agrees that the Client may provide this report to government agencies, interest holders, and/or Indigenous communities as part of project planning or regulatory approval processes. Copying or distribution of this report, in whole or in part, for any other purpose other than as aforementioned is not permitted without the prior written consent of SLR.

Any findings, conclusions, recommendations, or designs provided in this report are based on conditions and criteria that existed at the time work was completed and the assumptions and qualifications set forth herein.

This report may contain data or information provided by third party sources on which SLR is entitled to rely without verification and SLR does not warranty the accuracy of any such data or information.

Nothing in this report constitutes a legal opinion nor does SLR make any representation as to compliance with any laws, rules, regulations, or policies established by federal, provincial territorial, or local government bodies, other than as specifically set forth in this report. Revisions to legislative or regulatory standards referred to in this report may be expected over time and, as a result, modifications to the findings, conclusions, or recommendations may be necessary.

Executive Summary

SLR completed a Hydrogeology and Hydrology Characterization Report for the Nakusp Landfill in accordance with the reporting requirements described in the site's Operational Certificate (OC) and Section 10.1 of *Landfill Criteria for Municipal Solid Waste*. This report focuses on the period since the last five-year hydrogeology report (Amec Foster Wheeler, 2017), and includes data from 2016 through 2023.

The site currently operates as a natural attenuation landfill using the area fill method of landfilling. The site receives approximately 2,350 tonnes of waste each year, of which 1,900 tonnes are landfilled and 450 tonnes are diverted. The site also has two septage drying beds, which receive an average of approximately 440 m^3 of septage per year.

Topography surrounding the site slopes in a westerly direction towards Upper Arrow Lake and a southerly direction towards Kuskanax Creek. Surface water drainage in the vicinity of the landfill is controlled by topography and perimeter ditching, although little runoff leaves the site as most surplus infiltrates into the ground.

Upon infiltration, water travels vertically through a thick (30+ m) unsaturated zone consisting of cobbles and boulders followed by sandy soils. Eventually, the infiltrated water reaches saturated conditions within a deep unconfined sand aquifer. Groundwater then flows in a southwest to south direction at rate of up to 3 m/day, eventually discharging at Upper Arrow Lake or Kuskanax Creek.

The monitoring network consists of six groundwater monitoring wells. The wells are screened within the deep, unconfined sand aquifer underlying the site. Water quality results from monitoring well samples are currently compared to BC Water Quality Guidelines (WQG), per the OC. SLR notes that the BC WQG are designed to be protective of surface water receiving environments, whereas the Environmental Monitoring Plan (EMP) is groundwater-based and there are no surface water features onsite. Although perhaps conservative in certain context(s), the use of these guidelines is not supported by the site setting and water receptors of concern. In SLR's opinion, the BC CSR DW and BC CSR AW criteria are most appropriate for assessing water quality compliance at the site.

Sampling results at 'source well' MW4-06 continue to confirm the production of leachate and associated water quality impairment in the immediate vicinity of the landfill, as evidenced by water quality criteria exceedances and/or relatively high levels of ammonia, chloride, sodium, sulphate, total organic carbon, cobalt, iron, manganese, and lithium. There appears to be a general trend towards increasing leachate potency.

Despite relatively poor water quality at the landfill, sampling results downgradient near the site boundary at MW1-95 generally indicate improvement in water quality, and it appears that natural attenuation is largely effective at mitigating impacts to downgradient receptors. Nonetheless, there remain some water quality concerns with regards to downgradient receptors, particularly water supply wells southwest of the site boundary. A residual barium plume appears to extend downgradient of the landfill, resulting in an exceedance of BC CSR DW criteria just beyond the site boundary at MW1-95, and elevated levels (relative to background) found further downgradient at MW17-7. It is further noted that, after years of relatively low concentrations at MW4-06, barium recently 'spiked' at the source well to concentrations that are above BC CSR DW criteria. In addition, lithium concentrations exceed BC CSR DW criteria just beyond the site boundary at MW1-95, with elevated levels (relative to background) found further southwest at downgradient monitoring location MW17-7. Lithium concentrations in excess of BC CSR DW remain undelineated to the west, south and southeast of the monitoring well network.

The following is recommended:

- The EMP sampling regimen should continue to be performed while the landfill is in operation.
- Groundwater levels should be collected during a single day, as opposed to over multiple days.
- Historic monitoring well reference elevations should be compared to the recent April 2023 drone survey elevations. If large-scale discrepancies exist, RDCK may wish to re-evaluate or re-survey the monitoring wells using a professional land surveyor.
- Site water quality results and associated compliance should be evaluated relative to BC CSR DW and BC CSR AW criteria, while the Health Canada GCDWG should be used to evaluate downgradient drinking water quality (at the point of consumption).
- Site water quality compliance should not be evaluated relative to BC WQG. However, SLR acknowledges this would require an amendment to the OC, which may not be practical given site closure is scheduled for 2025.
- Should BC WQG continue to be used at the site, then the Schedule A parameter listing should include dissolved organic carbon (DOC) for accurate use of the Biotic Ligand Model (BLM) calculation, where applicable.
- Microbiological analysis should be included in the Schedule A parameters listing.
- Water quantity and quality at downgradient water supply wells WTN 119552, 97434, and 88273 could be confirmed via a formal water well survey and addition to the biannual Schedule A sampling regimen, subject to owner permission. Sampling may include both dissolved and total metals. Microbiological analysis could also be added for further due diligence. The water supply results should be compared to both BC CSR DW (particularly dissolved metals) and GCDWG (particularly total metals) criteria.
- As the site moves towards closure, a re-definition of the site boundary and compliance framework to include Lot 10134 and MW17-7, respectively, warrants additional examination; however, this would also require amendment to the OC.

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1.0 Introduction

SLR Consulting (Canada) Ltd. (SLR) was retained by the Regional District of Central Kootenay (RDCK) to complete this Hydrogeology and Hydrology Characterization Report (HHCR) for the Nakusp Landfill, located near the Village of Nakusp, BC (the "site" – Figure 1).

The purpose of this HHCR is to meet the reporting requirements described in the site's Operational Certificate (OC), which requires a detailed hydrogeological assessment every five years. This current report focuses on the period since the last five-year hydrogeology report (Amec Foster Wheeler, 2017), and includes data from 2016 through 2023 (the "reporting period").

This HHCR has been prepared in general accordance with Section 10.1 'Hydrogeology and Hydrology Characterization Report' of the BC Ministry of Environment and Climate Change Strategy (ENV) document *Landfill Criteria for Municipal Solid Waste* (ENV, 2016). This HHCR includes the following main sections: Site Background; Land and Water Use; Physical Setting; Water Quality; Conceptual Model, Impact Assessment, and Attenuative Capacity; Environmental Monitoring Plan; Conclusions; and Recommendations.

2.0 Site Background

2.1 Location

The site is located approximately two kilometres (km) north of the Village of Nakusp (Figure 1). The property is associated with civic address 1420 Hot Springs Road, has a PID of 018-521-720, and has a legal description of "Unsurveyed Portion of DL [District Lot] 863", Kootenay District (RDCK, 2024). A portion of the fenced landfill area extends south of District Lot (DL) 863 into PID 025-679-562 DL 13034, and east into Crown land (no PID or Lot number) (Figure 2).

As defined in the OC, the site boundary is rectangular in shape, covering approximately 11.6 hectares (ha) (Figure 2), including a 7.2 ha waste discharge area and a 4.4 ha designated buffer zone (CRA, 2008a). The site resides on Crown land leased to the RDCK. The rationale for the established site boundary is not entirely clear, as it does not align with the landfill footprint nor the current legal boundaries and is likely based on historic lot delineations that have since changed, which is further discussed in the Environmental Monitoring Plan (EMP) and Recommendations sections of this report.

2.2 Operations

Site landfill operations began in 1977 under Permit PR-04308 (Permit). This Permit was eventually superseded with OC MR-16521 on November 29, 2000, under the *Environmental Management Act* (formerly the *Waste Management Act*). The OC was amended on August 8, 2014, and thereafter titled simply "16521" (Appendix A).

The site currently operates as a natural attenuation landfill using the area fill method of landfilling. The site receives approximately 2,350 tonnes of waste each year, of which 1,900 tonnes are landfilled and 450 tonnes are diverted (RDCK, 2024). The estimated cumulative waste tonnage at the end of 2023 was 65,000 tonnes (RDCK, 2024). The site also has two septage drying beds, which receive an average of approximately 440 m^3 of septage per year (RDCK, 2019 – 2022). Authorized waste includes municipal solid waste and commercial and light industrial refuse. Storage of recyclable materials is also permitted.

Under certain conditions outlined in the OC, the site may receive waste asbestos and soil that contains contaminants in concentrations less than “hazardous waste” as defined by the Hazardous Waste Regulation.

Prohibited wastes include hazardous wastes, biomedical wastes, bulk liquids and semi-solid wastes, and release of ozone depleting substances.

The RDCK plans to cease active daily fill operations at the landfill, and transfer waste to the Ootischenia Landfill near Castelgar, BC. Construction of a transfer station at the site was completed in August 2024, and RDCK has now commenced closure planning activities.

2.3 Environmental Monitoring Plan

Environmental monitoring at the site is governed by an EMP, updated in 2017 by Amec Foster Wheeler (Appendix B).

The monitoring network consists of six groundwater monitoring wells (Figure 2). All wells are screened within a deep, unconfined sand aquifer underlying the site.

A summary of monitoring well construction details is tabled below, with borehole logs provided in Appendix C.

Table A: Monitoring Well Summary

Monitoring Well	EMP Purpose	Year Drilled	Ground Elevation (masl)[2]	Depth (mbgs)[1]	Screened Interval (mbgs)[1]	Primary Screened Material
MW1-95	Downgradient Compliance	1995	515.16	35.37	32.32 - 35.37	Fine Sand
MW2-95	Cross gradient Background	1995	517.31	35.37	32.32 - 35.37	Coarse Sand
MW3-95	Cross gradient Background	1995	519.39	36.59	33.54 – 36.59	Medium Sand
MW4-06	Source Characterization	2006	519.50	35.98	32.93 – 35.98	Fine Sand
MW5-06	Upgradient Background	2006	520.50	38.72	35.67 – 38.72	Gravel
MW17-7	Downgradient	2017	504.36	32.00	27.76 – 30.81	Fine to Coarse Sand

Notes:
[1] mbgs = metres below ground surface.
[2] masl = metres above sea level.

The EMP requires the monitoring wells to undergo water level monitoring, headspace gas monitoring, and water quality sampling on a biannual basis. Each biannual event includes measurement of specific field parameters and laboratory analysis of general chemistry, nutrient, and metals parameters. Laboratory analysis of volatile organic compounds (VOCs) occurs every second sampling event at select wells.

SLR understands that monitoring is currently undertaken by Masse Environmental Consultants Ltd. on behalf of RDCK, with laboratory analysis conducted by ALS Canada Ltd.

2.4 Previous Environmental Reports

RDCK supplied SLR with the following documents for consideration in the development of this current report:

- *Landfill Study at Nakusp, BC* (EBA, 1996)
- *Design and Operations Plan, Nakusp Landfill Site, Nakusp, British Columbia* (CRA, 2008a);
- *Hydrogeological Assessment, Nakusp Landfill, Nakusp, British Columbia* (CRA, 2008b)
- *Nakusp Landfill Five Year Hydrogeology Review* (Amec Foster Wheeler, 2017)
- *Nakusp Landfill 2019 Annual Operations & Monitoring Report* (RDCK, 2019)
- *Nakusp Landfill 2020 Annual Operations & Monitoring Report* (RDCK, 2020)
- *Nakusp Landfill 2021 Annual Operations & Monitoring Report* (RDCK, 2021)
- *Nakusp Landfill 2022 Annual Operations & Monitoring Report* (RDCK, 2022)
- *Annual Environmental Monitoring Program, Nakusp Landfill* (Masse Environmental, 2024)

In addition to the above reports, RDCK supplied SLR with a .csv flat-file database of water quality results from 2006 through 2023, although, as mentioned previously, this current report focuses on the period since the last five-year hydrogeology report (Amec Foster Wheeler, 2017), and includes data from 2016 through 2023.

2.5 Site Visit

Prior to undertaking this report, SLR was given a tour of the site by RDCK representatives on May 3, 2024. The purpose of this site visit was to further acquaint SLR with the site's physical setting, infrastructure, operations, and monitoring well network.

SLR staff made general notes and took photos of key features; however, no environmental monitoring activities took place. Site photos are provided in Appendix D.

3.0 Land and Water Use

3.1 Land Use

Site land use is zoned as heavy industrial (M3) (Figure 3). Surrounding land use zoning designations include agricultural (AG2) to the northwest, west, and heavy industrial (M3) to the south, although land use to the south remains mostly undeveloped forest. Lands to the northeast and east do not have a specific zoning designation but are mostly undeveloped forest.

3.2 Groundwater Use

There are eight water supply wells mapped within a one-kilometre radius of the landfill boundary (iMapBC, 2024) (Figure 3). Three of the wells, Well Tag Number (WTN) 119552, 97434, and 88273, are located within 500 m southwest of, and potentially downgradient from, the landfill. The remaining five wells are located southeast across Kuskanax Creek. Well details are summarized in Table B and well records are included in Appendix D.

Table B: Water Supply Well Summary

WTN	Year Drilled	Drill Method	Use	Depth (mbgs)[1]	Screen Interval (mbgs)	Screened Primary Lithology	Static Water Level (mbgs)
119552	2019	Air Rotary	Domestic	102.44	N/A	Fine-Coarse Sand[2]	30.49
88273	2007	Air Rotary	Unknown	90.85	80.18 – 83.38	Fine Sand	28.05
97434	2008	Air Rotary	Work Camp	72.56	69.51 – 71.95	Med-Fine Sand	54.88
127196	2000	N/A	Domestic	60.37	N/A	N/A	43.29
66234	1997	Air Rotary	Domestic	54.27	53.05 – 54.27	Sand & Gravel	41.16
100488	1989	Air Rotary	Domestic	53.96	52.74 – 53.96	Sand & Gravel	41.77
48938	1981	Rotary	Domestic	51.22	50.00 – 51.22	Sand & Gravel	22.87
80484	1998	Air Rotary	Domestic	164.63	41.16 – 164.63	Shale	N/A

Notes:
[1] mbgs = metres below ground surface.
[2] Screened lithology assumed based on well depth and geologic log.

3.3 Surface Water Use

There are two points of diversion (PODs) mapped within a one-kilometre radius of the landfill boundary (iMapBC, 2024) (Figure 3):

- PD25671, located approximately 320 m north of the landfill boundary, is associated with Chambord Spring and is permitted under license number C111944 to divert 36.369 m^3/day of water for the purposes of 'Camps and Public Facilities' supply and 2.273 m^3/day for the purposes of domestic supply.
- PD25676, located approximately 930 m southeast of the landfill boundary, is associated with Spoor Spring and is permitted under license C116522 to divert 3,083.7 m^3/year for the purposes of private irrigation and 4.546 m^3/day of water for the purposes of domestic supply.

4.0 Physical Setting

4.1 Climate

Climate station "Nakusp" (ID 1145300), located approximately 500 metres (m) west of the site, was operational from 1912 to 1995. Based on Government of Canada climate normals data, the average annual temperature in Nakusp is 7.4°C, with an average daily maximum of 25.4°C (July) and an average daily minimum of -5.7 °C (January). Mean annual precipitation is 842 mm, with 650 mm of rain and 192 cm of snowfall.

4.2 Topography

The site is situated on a plateau within the foothills of the Selkirk Mountains, which rise prominently to the north and east. Topography surrounding the site slopes in a westerly direction towards Upper Arrow Lake and southerly towards Kuskanax Creek (Figure 4).

Onsite ground elevation slopes in a generally south to southwest fashion, ranging from approximately 546 metres above sea level (masl) in the north to 513 masl in the southwest (Figure 2). Surface grade across the fenced portion of the site sits at approximately 516 masl, with the landfilled portion of the site mounded in a roughly rectangular footprint, reaching an elevation of 526 masl or greater. Several smaller discrete mounds, some associated with wood waste piles, are also present.

4.3 Drainage

The site lies within the Kuskanax Creek subwatershed. Kuskanax Creek itself lies approximately 440 m southeast of the site at its closest point (Figure 4). The creek drains an area of over 330 km^2 before discharging to Upper Arrow Lake. Hydrometric station “Kuskanax Creek Near Nakusp” (08NE006), located over 3 km upstream of the site, has an average daily flow of approximately 14 m^3/s (WSC, 2024). Typically, the largest flows at this station occur during the spring/early summer freshet, with the month of June recording the largest average flow of 52 m^3/s. The lowest flows occur during the winter, with the months of January, February and March all averaging roughly 3 m^3/s.

Onsite drainage in the vicinity of the landfill appears to be contained via perimeter ditching. While SLR did observe standing water within portions of these ditches during the site visit (Appendix D), flowing conditions were not present. Previous reports have indicated that flowing surface water into, within, or out of the site is minimal or nonexistent (CRA, 2008b, Amec Foster Wheeler, 2017). Given the relatively coarse nature of the surficial material and the deep position of the water table, any surface water run-off intercepted is expected to readily infiltrate directly into the ground.

4.4 Geology

4.4.1 Bedrock

Regional bedrock geology mapping indicates the site vicinity is underlain by sedimentary rock composed of limestone, slate, siltstone and/or argillite belonging to the Slocan Group (Hoy et. al, 1994) (Figure 5). Prior onsite drilling did not encounter bedrock up to a depth of 39 mbgs (Appendix D).

4.4.2 Overburden

Regional surficial geology mapping (Wittneben, 1980) indicates that shallow native soils within most of the site and its surrounds are part of the Fruitvale Association (Figure 6). Fruitvale soils have developed from fluvial fan deposits and vary in texture depending on proximity to the fan apex (coarser) versus apron (finer). To the northwest of the site where the topography rises, surficial soils are mapped as part of the Kaslo Association. Kaslo soils have developed from glaciofluvial deposits, commonly occurring as terraces along valley sides, and, while generally moderately coarse textured, may include finer textured, compact layers.

Site cross-sections have been prepared to illustrate overburden geology in the vicinity of the site (Figure 7 and Figure 8). The sections were developed based on the borehole logs from prior subsurface investigations (Appendix D). The logs generally indicate native overburden materials in the vicinity of the landfill exhibiting a ‘fining downwards’ sequence. Primary shallow materials are often noted as sand with cobbles and boulders, potentially of alluvial origin (EBA, 1996), eventually transitioning to predominately sandy soils at depths ranging from 6 to 12 mgbs. This deeper sandy unit continues to at least 39 mbgs.

Meanwhile, shallow test pits along the slope in the northwest of the site boundary generally indicated the presence of dense silty and sandy layers, possibly of glaciofluvial origin (EBA, 1996). This material was notable for the absence of cobbles and boulders that are present within the relatively flat-lying area in the south and east of the site. The demarcation of these two soil zones (slope versus flatland) are consistent with the surficial geology mapping.

4.5 Hydrogeology

4.5.1 Aquifers

According to provincial mapping, the approximate southwestern half of the site is underlain by regional Aquifer 1128 (iMapBC, 2024). This aquifer, which spans 8 km^2 and underlies much of the Village of Nakusp up to the shore of Upper Arrow Lake, is described as an unconfined deltaic sand and gravel deposit of moderate productivity and high vulnerability to contamination (Lowen Hydrogeology Consulting, 2016).

At least 27 wells, almost all domestic water supply, draw water from this aquifer (Lowen Hydrogeology Consulting, 2016). The well depths have a median of 43 mbgs and a geometric mean of 34 mbgs (Lowen Hydrogeology Consulting, 2016). It is inferred that the deep sandy unit underlying the site correlates to this aquifer.

4.5.2 Hydraulic Conductivity

The six monitoring wells are screened within the deep, unconfined sand aquifer. Five of the wells underwent multiple single well hydraulic response (slug) tests to infer the hydraulic conductivity of the aquifer material (CRA, 2008b). The tests were analyzed in AQTESOLV software using either the Bouwer and Rice or Hvorslev solutions for unconfined aquifers.

A summary of test results is provided in Table C.

Table C: Hydraulic Conductivity Testing Summary

Monitoring Well	Primary Screened Material	Hydraulic Conductivity (m/s)1
MW1-95	Fine Sand	5×10^{-4}
MW2-95	Coarse Sand	9×10^{-4}
MW3-95	Medium Sand	3×10^{-4}
MW4-06	Fine Sand	4×10^{-4}
MW5-06	Gravel	3×10^{-4}
MW17-7	Fine to Coarse Sand	Not Tested
Note 1: The listed hydraulic conductivity is the geometric mean of individual test results at each well (per CRAb, 2008).		

The hydraulic conductivity results range from 3×10^{-4} to 9×10^{-4} m/s with an overall geometric mean of 5×10^{-4} m/s. These results are within the expected range for fine to coarse sand material (Heath, 1983).

4.5.3 Groundwater Levels and Flow

Regionally, groundwater recharge occurs in upslope areas from direct precipitation; this water infiltrates through the overburden to the unconfined sand aquifer, with a portion of this flow ultimately discharging as baseflow to Upper Arrow Lake or Kuskanax Creek (Lowen Hydrogeology Consulting, 2016).

Groundwater levels from the six monitoring wells measured from 2016 to 2023 are provided in Table 1, and groundwater elevation hydrographs are illustrated on Figure 9.

The following trends are noted:

- The average depth to water ranges from 36.2 mbgs (MW5-06) to 30.2 mbgs (MW17-7).
- Excluding MW17-7, which lies approximately 190 m southwest (downgradient) of the landfill site boundary, groundwater levels generally range between 485 masl and 482 masl. There is a weak overall trend towards declining groundwater elevations since perhaps 2016, although this trend becomes more apparent by 2020.
- Site groundwater elevation lows are generally recorded in spring whereas highs are generally recorded in fall. Based on the timing of the freshet (see Section 4.3), it is possible that actual groundwater elevation maxima occur prior to the fall, in the late spring or early summer. This is supported by the lone June measurement in 2016, which included some of the highest measured groundwater elevations.
- Hydraulic gradients between site wells are generally consistent event to event. One notable exception is MW5-06, the most northeast well. There are instances where this well exhibits the highest groundwater elevation and thus demarcates the upgradient condition at the site; however, during most events, groundwater levels at this well are lower than those to the southwest at MW3-95, and occasionally also MW04-06, which is directly adjacent to the landfill. Likely because of this, Amec Foster Wheeler previously characterized the site flow direction as “indeterminate” (Amec Foster Wheeler, 2017). It is noted that groundwater levels were collected over several days during some events, which could lead to a less accurate portrayal of groundwater gradients than would otherwise be provided by a singular ‘snapshot’ in time. However, with the subsequent addition of MW17-7, on a broader scale, groundwater flow in the site vicinity appears likely to proceed in an overall southwest to south direction.

Groundwater elevation contour plots are provided for May 2022 (Figure 10) and October 2022 (Figure 11) monitoring events. The more recent 2023 monitoring data was not used to produce these figures as dry conditions were encountered in 2023 resulting in not all wells intersecting the water table; specifically, MW4-06 was dry in April 2023.

The May 2022 event is inferred to have occurred during a seasonal groundwater low whereas the October 2022 is considered to adequately represent seasonal groundwater highs. During both events, onsite groundwater gradients were relatively flat, while flow between the site and MW17-7, is inferred to be towards the southwest to south with a relatively steep gradient.

4.5.4 Groundwater Velocity

Average linear groundwater velocity for the saturated groundwater system is estimated via Darcy's Law using the following equation:

$$V = K\, i / n$$

Where:

V = average linear groundwater velocity

K = hydraulic conductivity

i = hydraulic gradient (dh/dl)

n = effective porosity

For the site, the input parameters include the geometric mean of site hydraulic conductivity ($K = 5 \times 10^{-4}$ m/s), the average hydraulic gradient between upgradient MW5-06 and downgradient MW17-7 for the period of 2018 through 2023 (0.018 m/m), and an assumed effective porosity for sand (n = 0.25), resulting in an average linear groundwater velocity of 4.4×10^{-5} m/s, or 3.0 m/day, or 1,100 m/year.

This result is considered conservative for two reasons: 1) the gradient towards MW17-7 is relatively steep compared to other downgradient wells (for example MW1-95); and 2) the porosity of sand can range from 0.25 to 0.35 (Heath, 1983, and Freeze and Cherry, 1979), so choosing an effective porosity at the low end of this range will serve to increase velocity.

5.0 Water Quality

5.1 Regulatory Criteria

The regulatory criteria described in this report is considered current to July 31, 2024.

5.1.1 BC Water Quality Guidelines

According to the Operational Certificate (Appendix A):

> *"The landfill must be operated in a manner such that ground or surface water quality does not decrease beyond that specified by the British Columbia Water Quality Guidelines, or other appropriate criteria as may be specified by the Director, at or beyond the landfill property boundary."*

In alignment with the Operational Certificate, and to maintain consistency with previous site reporting (Section 2.4), this report compares site water quality results to British Columbia Approved and Working Water Quality Guidelines (BC WQG) for source drinking water (BC SDWQG) and freshwater aquatic life (BC WQG AWF).

However, similar to previous authors (Amec Foster Wheeler, 2017 and Masse, 2024), SLR notes that the BC WQG are designed to be protective of surface water receiving environments, whereas the EMP is groundwater-based and there are no surface water features onsite. Although perhaps conservative in certain context(s), the use of BC WQG is not supported by the site setting and water receptors of concern.

Recommendations regarding the future use of BC WQG at the site are discussed in Section 9.0.

5.1.2 BC Contaminated Sites Regulation

Evaluating site water quality under the BC Contaminated Sites Regulation (CSR) (ENV, 2024a) and the *Environmental Management Act* (EMA) (ENV, 2024b) has been discussed and suggested in site reporting as early as 2017 (Amec Foster Wheeler). SLR agrees that examination of the applicability of the BC CSR standards to site water quality deserves further consideration. At the very least, it is SLR's expectation that site water quality under the forthcoming site closure process will be evaluated under the BC CSR.

Schedule 3.2 of the CSR includes four numerical standards for substances in water: 1) Drinking Water; 2) Aquatic Life; 3) Irrigation; and 4) Livestock. A brief discussion of each with regards to their applicability to the site is provided below:

Drinking Water (BC CSR DW)

Drinking water use applies where groundwater or surface water at or within 500 m of a site is currently used for drinking water. If the groundwater flow direction has been reliably determined, nearby current uses may be limited to include drinking water wells located 100 m upgradient and 500 m cross-gradient and downgradient of the site property boundary or outer extent of the groundwater contamination source where it extends beyond the property boundary.

As noted previously, three water supply wells are located downgradient of the site within 500 m of the landfill. As such, DW standards are included in this assessment for comparison to site groundwater quality results. Recommendations regarding the future use of BC CSR DW guidelines at the site are discussed in Section 9.0.

Aquatic Life (BC CSR AW)

Aquatic life water use applies to all groundwater located within 500 metres of an aquatic receiving environment unless it can be demonstrated that the groundwater does not flow to that receiving environment.

The nearest freshwater surface water receptor is Kuskanax Creek, located approximately 440 m southeast of the site at its closest point. As such, AW standards are included in this assessment for comparison to site groundwater quality results.

Recommendations regarding the future use of BC CSR AW guidelines at the site are discussed in Section 9.0.

Irrigation (BC CSR IW) and Livestock (BC CSR LW)

Irrigation or livestock water use applies where the groundwater or surface water at or within 500 m of a site is currently used for irrigation or livestock watering. If the groundwater flow direction has been reliably determined, nearby current uses may be limited to include irrigation and livestock watering wells or surface water intakes located within 100 m upgradient and 500 m cross gradient or downgradient of the site property boundary or outer extent of the groundwater contamination source where it extends beyond the property boundary.

As indicated in Section 3.0 and Figure 3, agricultural land use occurs west and northwest of the site, with a portion of the lands inferred as upgradient and a portion being cross-gradient. However, there are no groundwater wells or surface water intakes mapped within these lands that would indicate current irrigation or livestock water use. As such, IW and LW standards are not included in this assessment for comparison to site groundwater quality results.

5.1.3 Health Canada

The Health Canada Guidelines for Drinking Water Quality (GCDWG) (Health Canada, 2024) are also considered in the water quality assessment given the presence of water supply wells downgradient of the landfill and to align with previous reporting (Amec Foster Wheeler, 2017, RDCK 2018 – 2022, Masse, 2024). Recommendations regarding the future use of Health Canada guidelines at the site are discussed in Section 9.0.

5.2 Groundwater Quality

Groundwater quality results for the reporting period of 2016 to 2023 are presented in the following tables:

- Table 2: Field Parameters
- Table 3: General Parameters in Groundwater
- Table 4: Carbon in Groundwater
- Table 5: Petroleum Hydrocarbons in Groundwater
- Table 6: Volatile Organic Compounds (VOCs) in Groundwater
- Table 7: Inorganics in Groundwater
- Table 8: Metals in Groundwater

Concentration over time plots for select parameters are included in Appendix E.

This HHCR evaluates site groundwater quality trends from the approach of: 1) establishing a subset of leachate indicator parameters and associated near-source water quality; 2) characterizing upgradient (background) water quality; and 3) evaluating landfill impacts by examining the concentration of leachate indicator parameters at downgradient wells relative to both source and background water quality over time.

5.2.1 Leachate Indicator Parameters

Leachate monitoring is required to establish site-specific leachate chemistry and to identify indicator parameters for evaluation of impacts surrounding the landfill. Monitoring well MW4-06, located immediately adjacent to the septage area and downgradient of the active landfill face, consistently displays the highest concentrations of landfill indicator parameters and, although not screened within the landfill itself, has been previously used to identify leachate impacts as a de facto ‘source’ well (Amec Foster Wheeler, 2017, RDCK 2018 – 2022, Masse, 2024). Previously identified parameters associated with leachate impacts at MW4-06 (but not necessarily site-wide) have included chloride, sodium, sulphate, total organic carbon, beryllium, boron, cobalt, iron, manganese, and lithium. Microbiological parameters are not part of the sampling regimen at the site, although the presence of septage beds could suggest the potential for bacteriological contamination of groundwater. This matter is discussed later in the report.

In this report, **chloride, sodium,** and **lithium** are selected as leachate impact indicators for the site. These parameters have been chosen based on historical sampling results at source well MW4-06 and consideration of general characteristics described in the BC Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills (ENV, 2024c), including: the selection of parameters that are commonly present in municipal solid waste leachate; resist decomposition; are present at concentrations well above laboratory detection limits; and are present at higher concentrations downgradient of the landfill compared to upgradient (or background).

Ammonia has been used as a site-wide leachate indicator in previous reporting. However, ammonia concentrations during the reporting period have not exceeded any water quality criteria and, with the exception of source well MW4-06, are frequently below detection limits. For these reasons, ammonia is not included as an indicator of site-wide leachate impact.

Iron and manganese have also been used as site-wide leachate indicators in previous reporting. SLR concurs that both are elevated at source well MW4-06 in such a manner that would suggest localized leachate impacts. However, downgradient concentrations of iron and manganese are typically *lower* than upgradient (background) concentrations and, in the case of iron, are frequently below detection limits in downgradient wells. For these reasons, iron and manganese are not included within the leachate indicator parameter group in this report, although they are discussed further below.

There are several other parameters that have been previously identified as indicators of leachate impact that, while still exhibiting elevated concentrations in downgradient monitoring wells, have had relatively low concentrations at source well MW4-06 in recent years. These include nitrate, barium, beryllium and chromium. It is speculated that plumes of these parameters were present historically as the result of a particular composition of historic waste that is either no longer discharged at the landfill or has been effectively 'flushed out'.

Finally, it is noted that there are parameters at source well MW4-06 that exhibit elevated concentrations indicative of leachate impacts but are typically not found to be elevated in downgradient wells relative to upgradient wells (for example cobalt, nickel, nitrate, nitrite, and sulphate).

Lithium was not identified as a leachate indicator in the previous HHCR (Amec Foster Wheeler, 2017), perhaps because that report did not consider BC CSR criteria which would have otherwise highlighted potential exceedances of this parameter. The discarding of lithium-ion batteries within municipal waste landfills can lead to associated groundwater contamination, and, because of the relatively high concentrations of lithium and CSR DW exceedances at MW4-06 and downgradient wells, this parameter has been included as a leachate indicator.

5.2.2 Source Well

Leachate indicator trends at source well MW4-06 were reviewed with respect to concentrations over time (Appendix E). Chloride, sodium, and lithium concentrations display similar behaviour, including:

- Mar. 2016 – Oct. 2017: Fluctuation within a roughly consistent upper and lower bound. However, in a broader context, it is noted that concentrations from 2016 onward are part of a longer term rise in concentration beginning around 2013.
- Apr. 2018 – Oct. 2019: A singular 'spike', followed by a steady (or near steady) decline.
- Apr. 2020 – Oct. 2022: A steady (or near steady) increase. The most recently measured concentration (Oct. 2022) reflects the greatest concentration measured during the reporting period.
    - Note: no samples were collected at MW04-6 in 2023 as the well was observed to be dry in April 2023 and SLR has inferred based on the measured water level that there was insufficient water for sampling in Sep 2023.

Whereas the similarity in behaviour between these parameters is not necessarily unexpected (especially for chloride and sodium), the driver(s) causing the prominent spike, steady decline, and subsequent steady rise are not entirely clear based on the available information.

There is perhaps some correlation between wetter months and concentration increases, as large amounts of moisture surplus could drive increased leachate production.

Although iron and manganese are not considered as site-wide leachate indicators in this report, the concentration over time trends (Appendix E) are worth further comment. Both parameters have exhibited a fluctuating but overall increasing trend at MW4-06 since October 2017. Unlike the leachate indicators described above, a strong correlation between iron and manganese levels and seasonality is apparent. Greater iron and manganese concentrations are consistently measured during spring and lower concentrations are measured during fall.

Under chemically reducing (anoxic) conditions – for example in landfills where anaerobic decomposition is prevalent – iron and manganese readily dissolve in water and may be mobilized from waste as a component of leachate. Thus, a persistently reducing environment would promote a steady rise in iron and manganese concentrations. However, the periodic introduction of oxygenated water – for example from freshet recharge – creates oxidizing conditions that may lead to dissolved iron and manganese precipitating out of solution.

It is suspected that this interchange of reducing and oxidizing conditions is behind the iron and manganese fluctuations observed at MW4-06. That the greatest concentrations occur in spring may reflect a temporal offset between the freshet-driven generation of leachate within the landfill and its eventual vertical migration downward through the unsaturated zone to the aquifer wherein MW4-06 is screened.

5.2.3 Upgradient Monitoring Well

Groundwater is inferred to flow in a southwest to south direction from the landfill. Based on this flow direction, MW5-06, located in the northeast of the site, is considered a background well.

Correspondingly, groundwater quality at MW5-06 is comparatively good, with concentrations of chloride, sodium, and lithium being relatively low (Appendix E), and no indications of leachate-derived impact from other parameters.

Nonetheless, it is notable that iron and manganese concentrations are typically elevated at MW5-06 relative to downgradient wells. However, given the upgradient position of MW5-06, and the lack of iron and manganese impacts at downgradient wells, this finding is likely reflective of localized background conditions rather than landfill impacts.

Iron and manganese concentrations also exhibit a seasonal fluctuation at MW5-06 that, while much more dampened than observed at MW4-06, are still more pronounced than the other monitoring wells. The comparative strength of this pattern may be related to the relatively coarser materials at MW5-06 (Appendix C) which could more easily facilitate the influx of oxygenated recharge water from upgradient sources.

5.2.4 Downgradient Monitoring Wells

MW1-95 and MW17-7, located southwest of the site boundary, are considered downgradient from the landfill, with the former considered the site ‘compliance’ well. Previous reporting varies as to whether MW2-95 and MW3-95 characterize background (CRA, 2008b), cross-gradient (RDCK 2018 – 2022, Masse, 2023), or downgradient conditions (AMEC, 2017).

Based on a review of groundwater levels and water quality, it is SLR’s opinion that MW2-95 is also downgradient of the landfill. MW3-95 is generally cross-gradient, and although groundwater levels at this well are indicated to be slightly greater than MW4-06 (i.e., indicating MW3-95 may be upgradient of MW04-6), certain water quality results are occasionally suggestive of leachate impacts.

For the purposes of this report, MW3-95 has been excluded from the following discussion of downgradient wells but acknowledges that this well may have been subject to leachate impacts during certain periods. The lateral distribution of leachate indicator trends at downgradient monitoring wells MW1-95, MW2-95, and MW17-7 were reviewed with respect to concentrations over time (Appendix E). The following is noted:

- Leachate indicator parameter concentrations appear correlated to downgradient distance from the landfill, with concentrations typically greatest at MW1-95 (20 m southwest of site boundary) and lowest at MW17-7 (190 m southwest of site boundary). MW2-95 is closer to the waste deposition than MW1-95 but may be more at the flank of a plume than at the leading front.
- Chloride concentrations at MW1-95 and MW17-7 have shown a slightly rising trend since 2016; however, concentrations are still relatively low at all three downgradient wells <10 mg/L) compared to source well MW4-06 (typically >20 mg/L).
- Sodium concentrations at all downgradient wells have remained within a consistent range since 2016. Concentrations are significantly lower at all three downgradient wells (typically <10 mg/L) compared to source well MW4-06 (typically >20 mg/L).
- Lithium concentrations at all downgradient wells have also remained within a consistent range since 2016. It is notable that, unlike the other leachate indicator parameters, lithium concentrations at MW2-95 are frequently greater than those at MW1-95. Furthermore, although concentrations are usually lower at all three downgradient wells compared to source well MW4-06, there have been periods in 2019 through 2022 where lithium concentrations at MW1-95 and MW2-95 were greater than those at MW4-06.

5.3 Water Quality Criteria Exceedances

Groundwater quality results for the reporting period of 2016 to 2023 are presented in appended Table 2 through Table 8. Water quality criteria exceedances for a given well, sampling event, and parameter are flagged via cell formatting unique to each applicable criterion. A listing of the exceedances is tabled below (Table D). Of note:

- The majority of criteria exceedances occurred at source well MW4-06 (362), followed by MW1-95 (219), MW3-95 (169), MW2-95 (155), MW5-06 (109), then MW17-7 (100).
- The majority of exceedances related to BC WQG. Furthermore, most parameters that had exceedances were non-compliant exclusively with respect to BC WQG, including: pH, temperature, total organic carbon, nitrite, sulphate, beryllium, chromium, copper, mercury, nickel, phosphorus, uranium, and zinc. As mentioned previously, the BC WQG are designed to be protective of surface water receiving environments, whereas the EMP is groundwater-based and there are no surface water features onsite. Although perhaps conservative in certain context(s), the use of BC WQG is not supported by the site setting and water receptors of concern.
- There were several parameter exceedances of BC CSR DW, including nitrate, barium, cobalt, and lithium. The nitrate and cobalt exceedances relate exclusively to source well MW4-06. However, multiple barium and lithium exceedances have occurred at downgradient or cross-gradient wells, including compliance well MW1-95.
- There were no exceedances of BC CSR AW.

- The only parameter exceedance of Health Canada GCDWQ, MAC was for manganese at MW4-06 (8), and MW17-7 (1), with the latter exceedance apparently a singular anomalous result.
- There were several parameter exceedances of Health Canada GCDWG aesthetic objectives at multiple wells, including: turbidity, iron, manganese and sodium, although such aesthetic objectives have little direct relevance to the monitoring wells.

Table D: Water Quality Criteria Exceedances Summary (2016 – 2023)

Parameter	Criteria Exceeded	Monitoring Well [Number of Exceedances]
pH (Field) [pH (Lab) not considered given field results]	BC WQG AWF, Long-Term BC WQG AWF, Short-Term	MW17-7 [3] MW1-95 [11] MW2-95 [10] MW3-95 [8] MW4-06 [9] MW5-06 [1]
Temperature (Field)	BC WQG AWF, Long-Term BC WQG AWF, Short-Term	MW4-06 [1]
Turbidity (Field)	BC SDWQG - MAC	MW17-7 [12] MW1-95 [16] MW2-95 [13] MW3-95 [14] MW4-06 [18] MW5-06 [17]
	BC WQG (Approved) AWF, Long-term	MW17-7 [12] MW1-95 [15] MW2-95 [13] MW3-95 [14] MW4-06 [18] MW5-06 [17]
	BC WQG (Approved) AWF, Short-term	MW17-7 [12] MW1-95 [8] MW2-95 [10] MW3-95 [12] MW4-06 [16] MW5-06 [17]
	Health Canada GCDWG, AO/Other	MW17-7 [12] MW1-95 [16] MW2-95 [13] MW3-95 [14] MW4-06 [18] MW5-06 [17]
Total Organic Carbon (TOC)	BC SDWQG - MAC	MW2-95 [1] MW3-95 [3] MW4-06 [11] MW5-06 [1]
Nitrate (as N)	BC CSR DW	MW4-06 [1]
Nitrite (as N)	BC WQG AWF, Long-Term BC WQG AWF, Short-Term	MW4-06 [4]
Sulphate	BC WQG AWF, Long-Term	MW4-06 [1]
Barium	BC CSR DW BC WQG (Approved) AWF, Long-Term	MW1-95 [15] MW3-95 [3] MW4-06 [2]
Beryllium	BC WQG (Approved) AWF, Long-Term	MW2-95 [2] MW3-95 [5]
Chromium (III+VI)	BC WQG (Approved) AWF, Long-Term	MW17-7 [17] MW1-95 [24] MW2-95 [16] MW3-95 [14] MW4-06 [11]
Cobalt	BC CSR DW BC SDWQG - MAC	MW4-06 [16]
Copper	BC WQG (Approved) AWF, Short-Term BC WQG (Approved) AWF, Long-Term	MW1-95 [5] MW2-95 [6] MW3-95 [7] MW4-06 [12] MW5-06 [1]
Iron	BC WQG (Approved) AWF, Short-Term	MW4-06 [11]
	BC SDWQG – AO Health Canada GCDWQ, AO/Other	MW4-06 [11]

Parameter	Criteria Exceeded	Monitoring Well [Number of Exceedances]
Lithium	BC CSR DW	MW1-95 [24] MW2-95 [16] MW3-95 [16] MW4-06 [23]
Manganese	BC SDWQG - AO Health Canada GCDWQ, AO/Other	MW17-7 [1] MW4-06 [15] MW5-06 [3]
	BC SDWQG – MAC Health Canada GCDWQ, MAC	MW17-7 [1] MW4-06 [8]
Mercury	BC WQG (Approved) AWF, Long-Term	MW4-06 [4]
Nickel	BC WQG (Working) AWF, Long-term	MW4-06 [1]
	BC WQG (Approved) AWF, Long-Term	MW17-7 [1] MW1-95 [24] MW2-95 [16] MW3-95 [17] MW4-06 [23] MW5-06 [1]
Phosphorus	BC SDWQG - AO	MW17-7 [16] MW1-95 [6] MW2-95 [4] MW3-95 [8] MW4-06 [10] MW5-06 [17]
	BC WQG (Approved) AWF, Short-Term & BC WQG (Approved) AWF, Long-Term	MW1-95 [10] MW2-95 [10] MW3-95 [8] MW4-06 [11] MW5-06 [2]
Sodium	Health Canada GCDWG, AO/Other	MW4-06 [15]
Uranium	BC WQG (Working) AWF, Long-term	MW4-06 [3]
Zinc	BC WQG (Approved) AWF, Long-term	MW17-7 [2] MW1-95 [5] MW2-95 [3] MW3-95 [4] MW4-06 [3]

6.0 Conceptual Model, Impact Assessment and Attenuative Capacity

A conceptual hydrogeologic model synthesizes physiographic, geologic, hydraulic, and geochemical information into a wholistic description of general system behaviour.

The following text describes a conceptual model for the site:

The site is situated on a small plateau within mountainous terrain. Topography surrounding the site slopes in a westerly direction towards Upper Arrow Lake or a southerly direction towards Kuskanax Creek. Surface water drainage in the vicinity of the landfill is controlled by topography and perimeter ditching, although little runoff leaves the site as most surplus infiltrates into the ground.

Upon infiltration, water travels vertically through a thick (30+ m) unsaturated zone consisting of cobbles and boulders followed by sandy soils. Eventually, the infiltrated water reaches saturated conditions within an unconfined sand aquifer. Groundwater then flows in southwest to south direction at rate of up to 3 m/day, eventually discharging at Upper Arrow Lake or Kuskanax Creek.

During transport from infiltration to eventual discharge, the chemistry of natural groundwater originating at the site may change as a result of physiochemical processes such as mixing, weathering, adsorption, desorption, precipitation, dissolution, ion exchange, reduction, and oxidation. Infiltration water that has encountered landfill waste may extract dissolved or suspended solids to become leachate.

The quantity and quality of leachate may change over time due to a variety of factors, including varying climatic conditions, evolving waste composition, changes to landfilling practices, and the

presence of aerobic versus anaerobic conditions. While leachate may undergo similar physical processes as natural groundwater, it is subject to more complex chemical and biological processes owing to its unique inorganic and organic composition.

As leachate is transported within the groundwater flow system over time and space, it may undergo natural attenuation processes that will lessen its impact to receiving environments, including dilution, dispersion, adsorption, chemical reactions and biological degradation.

A review of the monitoring data allows for the following over-arching statements regarding landfill leachate transport, water quality impacts, and attenuation at the site:

Sampling results at ‘source well’ MW4-06 continue to confirm the production of leachate and associated water quality impairment in the immediate vicinity of the landfill, as evidenced by water quality criteria exceedances and/or relatively high levels of ammonia, chloride, sodium, sulphate, total organic carbon, cobalt, iron, manganese, and lithium. There appears to be a general trend towards increasing leachate potency, and, in several instances, recent sampling results from 2022 indicated historically high concentrations of leachate indicator parameters.

Despite poor water quality at the landfill, sampling results downgradient near the site boundary at MW1-95 generally indicate improvement in water quality. Comparison of sampling results at MW1-95 and MW4-06 from 2016 through 2022 indicates an average percent reduction in concentration for the following parameters: ammonia (68%), chloride (93%), sodium (68%), sulphate (73%), total organic carbon (66%), cobalt (93%), iron (99%), manganese (82%), and lithium (88%) [reductions may be greater in instances where parameter was non-detect at MW1-95]. In a general sense, this large-scale improvement in water quality suggest that a natural attenuation is occurring within the site. In the context of water quality criteria exceedance (Section 5.3), it can be further stated that natural attenuation is largely effective at mitigating impacts to downgradient receptors.

Nonetheless, there remain some water quality concerns with regards to downgradient receptors, particularly water supply wells southwest of the site boundary. A residual barium plume appears to be moving downgradient of the landfill, resulting in an exceedance of BC CSR DW criteria just beyond the site boundary at MW1-95, and elevated levels (relative to background) found further downgradient at MW17-7. It is further noted that, after years of relatively low concentrations at MW4-06, barium recently ‘spiked’ at the source well above BC CSR DW criteria. In addition, lithium concentrations exceed BC CSR DW criteria just beyond the site boundary at MW1-95, with elevated levels (relative to background) found further downgradient at MW17-7.

7.0 Environmental Monitoring Plan

SLR reviewed the Environmental Monitoring Plan considering the 2016 to 2023 monitoring results. Given that the site is expected to undergo closure in 2025, major changes to the current EMP may not be worthwhile at this stage. Nonetheless, the following considerations are provided for RDCK review:

- The use of BC WQG to evaluate site water quality is not supported by the site setting or water receptors of concern. Monitoring well water quality results should be compared to BC CSR DW and BC CSR AW criteria.
- Should BC WQG continue to be used at the site, then the Schedule A parameter listing should include dissolved organic carbon (DOC) for accurate use of the Biotic Ligand Model (BLM) calculation, where applicable.

- Given the presence of the landfill septage beds, and the downgradient water supply wells, microbiological analysis should be included in the Schedule A parameters listing.
- Water quantity and quality at downgradient water supply wells WTN 119552, 97434, and 88273 could be confirmed via a formal water well survey and addition to the biannual Schedule A sampling regimen, subject to owner permission. Sampling may include both dissolved and total metals. Microbiological analysis could also be added for further due diligence. The water supply results should be compared to both BC CSR DW (particularly dissolved metals) and GCDWG (particularly total metals) criteria.
- Although perhaps not directly part of the EMP, consideration should be given to re-defining a site boundary on the basis of landfill operational limits or RDCK property boundaries. To SLR's knowledge, there is no historic or current justification for the layout of the current site boundary, and it is somewhat problematic that EMP 'compliance' well MW1-95 is located offsite. It is understood from communications with RDCK that DL 13034, which is located to the south of the landfill and includes MW1-95 and MW17-7, is RDCK property. As the site moves towards closure, a re-definition of the site boundary and compliance framework to include DL 13034 and MW17-7, respectively, warrants additional examination.

8.0 Conclusions

SLR completed a Hydrogeology and Hydrology Characterization Report for the Nakusp Landfill in accordance with the reporting requirements described in the site's Operational Certificate and Section 10.1 of *Landfill Criteria for Municipal Solid Waste* (ENV, 2016). The report focused on the monitoring data collected during the period of 2016 through 2023. The following key conclusions are made:

- Local surface water drainage in the vicinity of the landfill is controlled by west to south-sloping topography and perimeter ditching, although most surplus infiltrates into the ground.
- Site overburden geology is characterized by a shallow sand unit with cobbles and boulders, eventually transitioning with depth to predominately sandy soils.
- An unconfined sand aquifer is encountered at a depth of 30 mbgs or greater.
- Groundwater flows in a south to southwest direction at rate of up to 3 m/day, eventually discharging at Upper Arrow Lake or Kuskanax Creek.
- Water quality results from monitoring well samples are currently compared to BC WQG, per the OC. Although perhaps conservative in certain context(s), the use of these guidelines is not supported by the site setting and water receptors of concern. In SLR's opinion, the BC CSR DW and BC CSR AW standards are the appropriate criteria for assessing water quality compliance at the site, while the Health Canada GCDWG are most appropriate for the protection of downgradient drinking water users (at the point of consumption).
- Sampling results at 'source' well MW4-06 continue to confirm the production of leachate and associated water quality impairment in the immediate vicinity of the landfill. There appears to be a general trend towards increasing leachate potency, and, in several instances, the most recent sampling results from 2022 indicated historically high concentrations of leachate indicator parameters.

- Previously identified parameters associated with leachate impact at source well MW4-06 (but not necessarily site-wide) have included chloride, sodium, sulphate, total organic carbon, beryllium, boron, iron, manganese, and lithium. Currently, potential impacts of leachate migration are best assessed by evaluating the behaviour of chloride, sodium, and lithium. Other leachate parameters are of lesser utility in examining current site-wide impacts, as downgradient concentrations are either below detection limits, less than upgradient (background) levels, or reflect remnant plumes that are no longer being actively sourced from the landfill.
- Sampling results downgradient near the site boundary at compliance well MW1-95 generally indicate large-scale improvement in water quality, suggesting that natural attenuation is occurring within the site. In the context of water quality criteria exceedances, it can be further stated that natural attenuation is largely effective at mitigating impacts to downgradient receptors.
- However, the persistence of relatively high barium and lithium concentrations offsite are of concern with regards to downgradient water supply wells.

9.0 Recommendations

Based on the above conclusions, the following is recommended:

- The EMP sampling regimen should continue to be performed while the landfill is in operation.
- Groundwater levels should be collected during a single day, as opposed to over multiple days.
- Historic monitoring well reference elevations should be compared to the recent April 2023 drone survey elevations. If large-scale discrepancies exist, RDCK may wish to re-evaluate or re-survey the monitoring wells using a professional land surveyor.
- Site water quality results and associated compliance should be evaluated relative to BC CSR DW and BC CSR AW criteria, while the Health Canada GCDWG should be used to evaluate downgradient drinking water quality (at the point of consumption).
- Site water quality compliance should not be evaluated relative to BC WQG. However, SLR acknowledges this would require an amendment to the OC, which may not be practical given site closure is scheduled for 2025.
- Should BC WQG continue to be used at the site, then the Schedule A parameter listing should include dissolved organic carbon (DOC) for accurate use of the Biotic Ligand Model (BLM) calculation, where applicable.
- Microbiological analysis should be included in the Schedule A parameters listing.
- Water quantity and quality at downgradient water supply wells WTN 119552, 97434, and 88273 could be confirmed via a formal water well survey and addition to the biannual Schedule A sampling regimen, subject to owner permission. Sampling may include both dissolved and total metals. Microbiological analysis could also be added for further due diligence. The water supply results should be compared to both BC CSR DW (particularly dissolved metals) and GCDWG (particularly total metals) criteria.
- As the site moves towards closure, a re-definition of the site boundary and compliance framework to include Lot 10134 and MW17-7, respectively, warrants additional examination, however this would also require amendment to the OC.

10.0 Closure

SLR trusts this document meets RDCK's current requirements. Should you have any questions, please contact the undersigned.

Regards,

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Tables

Hydrogeology and Hydrology Characterization Report

Nakusp Landfill

Regional District of Central Kootenay

SLR Project No.: 219.030089.00001

September 27, 2024

Table 1: Groundwater Elevations

Well ID:	MW1-95		MW2-95		MW3-95		MW4-06		MW5-06		MW17-7	
Reference Elev (masl):	515.16		517.31		519.31		519.50		520.50		504.36	
Date	Water Depth (mbgs)	Water Elevation (masl)	Water Depth (mbgs)	Water Elevation (masl)	Water Depth (mbgs)	Water Elevation (masl)	Water Depth (mbgs)	Water Elevation (masl)	Water Depth (mbgs)	Water Elevation (masl)	Water Depth (mbgs)	Water Elevation (masl)
23-Mar-2016	32.03	483.14	33.15	484.16	35.03	484.28	35.32	484.19	36.12	484.38	-	-
20-Jun-2016	31.43	483.73	32.08	485.23	33.87	485.44	34.24	485.26	35.19	485.31	-	-
23-Sep-2016	31.35	483.82	32.44	484.87	34.24	485.08	34.53	484.97	35.59	484.92	-	-
21-Nov-2016	31.61	483.56	32.81	484.50	34.64	484.67	34.96	484.55	36.10	484.40	-	-
1-Mar-2017	31.66	483.50	32.68	484.63	34.54	484.77	34.76	484.74	35.72	484.78	-	-
24-Apr-2018	32.05	483.12	34.35	482.97	35.16	484.15	35.44	484.06	36.21	484.30	30.02	474.34
16-Oct-2018	31.35	483.82	32.46	484.85	34.25	485.06	34.60	484.90	35.60	484.90	29.37	474.99
16-Apr-2019	31.94	483.22	33.14	484.17	34.93	484.38	35.25	484.25	-	-	-	-
17-Apr-2019	-	-	-	-	-	-	-	-	36.19	484.31	30.95	473.41
9-Oct-2019	-	-	32.89	484.421	34.69	484.62	-	-	36.05	484.45	29.70	474.66
10-Oct-2019	31.71	483.455	-	-	-	-	34.96	484.54	-	-	-	-
23-Apr-2020	-	-	33.44	483.88	35.23	484.08	-	-	36.33	484.17	-	-
24-Apr-2020	32.30	482.862	-	-	-	-	35.58	483.93	-	-	30.21	474.15
20-Oct-2020	-	-	-	-	34.44	484.87	-	-	35.78	484.72	-	-
21-Oct-2020	31.43	483.731	32.63	484.68	-	-	34.76	484.74	-	-	29.50	474.86
19-May-2021	-	-	33.21	484.11	35.03	484.28	-	-	36.34	484.16	30.07	474.29
20-May-2021	32.17	482.995	-	-	-	-	35.38	484.12	-	-	-	-
20-Oct-2021	-	-	33.33	483.98	35.16	484.15	-	-	36.52	483.98	30.06	474.30
21-Oct-2021	32.03	483.127	-	-	-	-	35.53	483.98	-	-	-	-
4-May-2022	32.48	482.685	33.77	483.54	35.57	483.74	35.84	483.66	36.76	483.74	30.34	474.02
17-Oct-2022	31.77	483.391	33.01	484.30	34.81	484.50	35.18	484.32	36.15	484.35	29.79	474.57
24-Apr-2023	33.03	482.13	34.64	482.67	36.49	482.82	DRY	DRY	37.87	482.63	31.07	473.29
26-Sep-2023	-	-	34.32	482.99	36.16	483.15	-	-	37.53	482.97	-	-
27-Sep-2023	32.91	482.25	-	-	-	-	36.45	483.05	-	-	30.90	473.46

Notes:
-mbgs is metres below ground surface.
-masl is metres above sea level.

Table 2: Field Parameters

	Field					
	pH (field)	temp (field)	EC (field)	ORP (field)	DO (field)	turbidity (field)
	pH	deg C	µS/cm	mV	mg/L	NTU
BC SDWQG - AO	ns	15	ns	ns	ns	ns
BC SDWQG - MAC	ns	ns	ns	ns	ns	1
BC WQG (Approved) AWF, Long-term	**6.5-9**	**10**	**ns**	**ns**	**ns**	**2**
BC WQG (Approved) AWF, Short-term	**6.5-9**	**10**	**ns**	**ns**	**ns**	**5**
Health Canada GCDWQ, AO/Other	**ng**	**15**	**ng**	**ng**	**ng**	**0.1**

Location Groups	Sample Location	Well Screen Depth (mbg)	Sample Date	Sample Name						
Locations	MW17-07	27.80 - 30.80	2017-Jun-14	20170614_E309170	6.76	8	119	46.9	11.7	678
			2017-Oct-5	20171005_E309170	6.99	8.1	117	85	8.7	67.9
			2018-Apr-23	MW17-07 E309170	6.95	6.1	86.3	70	6.3	54
			2018-Oct-15	MW17-07 (E309170)	7.3	7.8	87	41.3	8.5	28.4
			2019-Apr-17	MW17-07 (E309170)	6.57	7.7	73.8	20	8.2	43.7
			2019-Oct-9	MW17-07 (E309170)	9.08	7.4	89.2	-45.2	9.9	29.9
			2020-Apr-24	MW17-07	8.24	7.9	78.6	40.7	8.41	24.9
			2020-Oct-21	MW17-07 (E309170)	10.4	7.5	70.5	-9.8	15.5	32.1
			2021-May-19	MW17-07 (E309170)	6.88	8	77.9	79.9	16.2	5.18
			2021-Oct-20	MW17-07 (E309170)	6.84	7.5	142	-	-	15.1
			2022-May-4	MW17-7 (E309170)	6.75	7.7	94.8	115.9	11.1	25
			2022-Oct-17	MW17-7 (E309170)	6.2	8	80.4	115.2	10.32	12.2
	MW1-95	32.61 - 34.25	2016-Mar-23	MW1-95_20160323	6.56	8	212	192	-	8.49
			2016-Jun-20	20160620_E225548	6.16	8.9	207	149	7.2	6.07
			2016-Sep-13	20160913_E225548	6.39	8.4	194	113	8.6	6.65
			2016-Nov-21	20161121_E225548	6.27	7.8	203	118	7.2	3.91
			2017-Mar-22	20170322_E225548	6.1	7.2	226	159	8.4	12
			2017-Jun-14	20170614_E225548	6.45	8.4	221	92.7	7.4	4.94
			2017-Oct-5	20171005_E225548	6.41	7.7	191	103	7.2	4.81
			2018-Apr-24	M1-95 E225548	6.51	8	228	86.8	7.1	2.49
			2018-Oct-16	MW1-95 (E225548)	7.15	7.8	204	60.4	5.7	**0.97**
			2019-Apr-16	MW1-95 (E225548)	6.14	8.3	241	38.1	5.4	2.27
			2019-Oct-10	MW1-95 (E225548)	7.17	8	207	7.9	7.4	1.24
			2020-Apr-24	MW1-95	6.92	8.2	202	79.9	5.88	2.89
			2020-Oct-21	MW1-95 (E225548)	11.2	8.1	173	-12.5	11.5	10.7
			2021-May-20	MW1-95 (E225548)	5.86	8.1	200	118	11.4	6.1
			2021-Oct-21	MW1-95 (E225548)	6.63	7.7	346	-	-	4.52
			2022-May-5	MW1-95 (E225548)	6.45	8	217.9	113.8	8.9	7.07
			2022-Oct-18	MW1-95 (E225548)	6	7.9	213.8	109.3	12.92	6.44
	MW2-95	33.28 - 35.63	2016-Mar-22	MW2-95_20160322	< 6.32	< 8.6	< 204	< 173	-	< 2.35
			2016-Sep-13	20160913_E225549	6.19	8.3	176	99.3	7.3	7.1
			2017-Mar-22	20170322_E225549	6.36	7.9	188	175	6	32
			2017-Apr-10	20171004_E225549	6.31	8.3	176	101	5.7	3.54
			2018-Apr-23	MW2-95 E225549	6.37	8.4	192	114	6.9	7.84
			2018-Oct-15	MW2-95 (E225549)	7.85	8.4	177	35.9	5.7	9.02
			2019-Apr-16	MW2-95 (E225549)	6.16	8	188	45.6	5.2	11.6
			2019-Sep-10	MW2-95 (E225549)	7.44	8.3	174	18.5	6.6	5.47
			2020-Apr-23	MW2-95	6.67	8.5	152	101	5.54	4.68
			2020-Oct-21	MW2-95 (E225549)	9.58	8.1	164	-2	9.47	7.6
			2021-May-19	MW2-95 (E225549)	6.05	9	189	92	11.2	2.62
			2021-Oct-20	MW2-95 (E225549)	6.4	8	321	-	-	5.16
			2022-May-4	MW2-95 (E225549)	6.34	8.2	148.8	121.6	7.44	5.4
			2022-Oct-17	MW2-95 (E225549)	5.74	8.6	195.6	81.3	7.3	4.26
	MW3-95	34.91 - 37.91	2016-Mar-23	MW3-95_20160323	6.39	8.1	189	203	-	7.7
			2016-Sep-13	20160913_E225550	6.84	8.8	195	107	6.1	12.7
			2017-Mar-22	20170322_E225550	6.5	7.7	174	174	4.4	20
			2017-Oct-4	20171004_E225550	6.39	8.4	166	95.6	5.1	5.47
			2018-Apr-23	MW3-95 E225550	6.6	8.5	179	90.4	2.8	11.3
			2018-Oct-15	MW3-95 (E225550)	7.61	8.4	171	12.5	4.9	7.29
			2019-Apr-16	MW3-95 (E225550)	6.04	8.6	190	42.9	3.8	12.2
			2019-Oct-9	MW3-95 (E225550)	8.94	8.5	185	-31.2	4.5	11.7
			2020-Apr-23	MW3-95	6.3	8.5	171	108	4.53	11.3
			2020-Oct-20	MW3-95 (E225550)	8.84	8.2	182	33.4	8.2	25.1
			2021-May-19	MW3-95 (E225550)	6.18	8.5	179	104	10.1	5.12
			2021-Oct-20	MW3-95 (E225550)	6.36	8.1	341	-	-	11.1
			2022-May-4	MW3-95 (E225550)	6.14	8.3	175.8	120.1	4.65	4.32
			2022-Oct-17	MW3-95 (E225550)	5.76	8.5	192.5	100.7	3.96	4.11
	MW4-06	33.60 - 36.60	2016-Mar-23	MW4-06_20160323	6.5	9.2	653	83.3	-	11.1
			2016-Jun-20	20160620_E265109	6.3	10.4	337	93.2	6.1	10.8
			2016-Sep-13	20160913_E265109	6.46	9.1	392	102	5.9	4.51
				20160913_E265109DUP	6.46	9.1	392	102	5.9	4.51
			2016-Nov-21	20161121_E265109	6.39	9.1	452	99.9	4.6	46.4
			2017-Mar-22	20170322_E265109	6.39	8.9	628	48.3	4.4	16
			2017-Jun-14	20170614_E265109	6.55	9.6	413	43.8	5.6	14.2
			2017-Oct-5	20171005_E265109	6.46	9.6	348	92.3	3.8	21.7
			2018-Apr-24	MW4-06 E265109	6.76	9.5	884	-40.2	3.2	74.5
			2018-Oct-16	MW4-06 (E265109)	7.33	9.3	576	5.6	2.8	11.9
			2019-Apr-16	MW4-06 (E265109)	6.53	9.3	392	18.4	1.7	18.2
			2019-Oct-10	MW4-06 (E265109)	7.25	9	253	-20.8	2.6	6.49
			2020-Apr-24	MW4-06	8.09	9.6	398	-25	2.2	10.6
			2020-Oct-21	MW4-06 (E265109)	8.96	9.2	500	-16.4	4.01	20.2
			2021-May-20	MW4-06 (E265109)	6.06	9.1	613	-7.6	4.9	9.37
			2021-Oct-21	MW4-06 (E265109)	6.9	9.1	692	-	-	13.7
			2022-May-5	MW4-06 (E265109)	6.45	9.1	455.4	4.8	1.57	12
			2022-Oct-18	MW4-06 (E265109)	6.17	9.1	908	41.5	2.22	9

Table 2: Field Parameters

	Field					
	pH (field)	temp (field)	EC (field)	ORP (field)	DO (field)	turbidity (field)
	pH	deg C	µS/cm	mV	mg/L	NTU
BC SDWQG - AO	ns	15	ns	ns	ns	ns
BC SDWQG - MAC	ns	ns	ns	ns	ns	1
BC WQG (Approved) AWF, Long-term	**6.5-9**	**10**	**ns**	**ns**	**ns**	**2**
BC WQG (Approved) AWF, Short-term	**6.5-9**	**10**	**ns**	**ns**	**ns**	**5**
Health Canada GCDWQ, AO/Other	**ng**	**15**	**ng**	**ng**	**ng**	**0.1**

Location Groups	Sample Location	Well Screen Depth (mbg)	Sample Date	Sample Name						
Locations	MW5-06	36.37 - 39.37	2016-Mar-23	MW5-06_20160323	7.24	6.9	227	147	-	28.9
			2016-Jun-20	20160620_E265110	6.75	8.8	216	106	5.2	53
			2016-Sep-14	20160914_E265110	6.83	6.9	185	47.3	4.7	17.6
			2016-Nov-21	20161121_E265110	6.91	6.8	185	77.6	4.7	27.8
			2017-Mar-22	20170322_E265110	6.94	5.9	204	52.4	4.1	27
			2017-Jun-14	20170614_E265110	6.85	7.4	169	34.9	5.3	48.2
			2017-Oct-5	20171005_E265110	7	6.7	153	30.3	5.7	26.6
			2018-Apr-23	MW5-06 E265110	7.52	6.7	198	-4.4	6.7	55.2
			2018-Oct-15	MW5-06 (E265110)	8.58	6.5	162	25.8	6.5	38
			2019-Apr-17	MW5-06 (E265110)	7	6.9	240	-4.4	4.3	36.1
			2019-Sep-10	MW5-06 (E265110)	7.67	6.4	207	-11.9	5.7	28.2
			2020-Apr-23	MW5-06	7.06	6.8	219	59.9	5.12	26.1
			2020-Oct-20	MW5-06 (E265110)	10.2	6.8	184	17.6	9.08	31.4
			2021-May-19	MW5-06 (E265110)	6.7	6.3	203	101	9.79	33.6
			2021-Oct-20	MW5-06 (E265110)	7.14	6.3	362	-	-	44.1
			2022-May-4	MW5-06 (E265110)	6.93	6.6	217.3	74.4	6.44	977
			2022-Oct-17	MW5-06 (E265110)	6.76	7.1	173	77.2	6.82	19.2

Notes:

•	samples collected at the same location and date are blind field duplicate/parent pairs
'-'	sample not analyzed for parameter indicated
<	less than reported detection limit
Sample Type	N (Normal)
Sample Type	FD (Duplicate)
mbg	metres below grade
ns	no standard listed
ng	no guideline listed
%	percent
µS/cm	microsiemens per centimetre
deg C	degree Celsius
meq/L	milliequivalents per litre
mg/L	milligram per litre
mV	millivolts
NTU	nephelometric turbidity unit
pH	potential of hydrogen
BC SDWQG - AO	BC Source Drinking Water Quality Guidelines, aesthetic objective
BC SDWQG - MAC	BC Source Drinking Water Quality Guidelines, maximum allowable concentration
BC WQG (Approved) AWF, Long-term	BC Approved Water Quality Guidelines, Freshwater Aquatic Life, Long-term
BC WQG (Approved) AWF, Short-term	BC Approved Water Quality Guidelines, Freshwater Aquatic Life, Short-term
Health Canada GCDWQ, AO/Other	Health Canada Guidelines for Canadian Drinking Water Quality, Aesthetic Objectives
VPH (C6-C10)	VPH – volatile petroleum hydrocarbons

Table 3: General Parameters in Groundwater

					General Parameters					
					alkalinity (carbonate)	alkalinity (hydroxide)	alkalinity (bicarbonate)	alkalinity (P)	alkalinity (total)	electrical conductivity (lab)
				RDL	1	1		1 - 2		
					mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
Location Groups	Sample Location	Well Screen Depth (mbg)	Sample Date	Sample Name						
Locations	MW17-07	27.80 - 30.80	2017-Jun-14	20170614_E309170	< 1	< 1	91.4	-	91.4	174
			2017-Oct-5	20171005_E309170	< 1	< 1	88	-	88	163
				20171005_E309170DUP	< 1	< 1	88.2	-	88.2	161
			2018-Apr-23	MW17-07 E309170	-	-	-	-	67	127
			2018-Oct-15	MW17-07 (E309170)	-	-	-	-	66.7	126
			2019-Apr-17	MW17-07 (E309170)	-	-	-	-	53.1	109
				DUPLICATE	-	-	-	-	51.9	108
			2019-Oct-9	MW17-07 (E309170)	-	-	-	-	63.6	131
			2020-Apr-24	MW17-07	< 1	< 1	56.9	< 1	56.9	121
			2020-Oct-21	MW17-07 (E309170)	-	-	-	-	51.3	112
			2021-May-19	MW17-07 (E309170)	-	-	-	-	54.9	118
				DUPLICATE	-	-	-	-	54.2	120
			2021-Oct-20	MW17-07 (E309170)	< 1	< 1	55.7	< 1	55.7	122
				DUPLICATE	< 1	< 1	56.6	< 1	56.6	124
			2022-May-4	MW17-7 (E309170)	< 1	< 1	62.1	< 1	62.1	138
			2022-Oct-17	MW17-7 (E309170)	-	-	-	-	52.4	115
			2023-Apr-25	MW17-7	-	-	-	-	31.6	110
			2023-Sep-27	MW17-7	-	-	-	-	62.8	137
	MW1-95	32.61 - 34.25	2016-Mar-23	MW1-95_20160323	< 1	< 1	144	-	144	322
				MW1-95QC_20160323	< 1	< 1	149	-	149	323
			2016-Jun-20	20160620_E225548	< 1	< 1	139	< 2	139	297
			2016-Sep-13	20160913_E225548	< 1	< 1	142	-	142	279
			2016-Nov-21	20161121_E225548	< 1	< 1	142	-	142	297
				20161121_E225548DUP	< 1	< 1	143	-	143	292
			2017-Mar-22	20170322_E225548	< 1	< 1	151	-	151	341
				20170322_E225548DUP	< 1	< 1	130	-	130	276
			2017-Jun-14	20170614_E225548	< 1	< 1	145	-	145	311
			2017-Oct-5	20171005_E225548	< 1	< 1	130	-	130	269
			2018-Apr-24	M1-95 E225548	-	-	-	-	152	327
				DUPLICATE	-	-	-	-	169	336
			2018-Oct-16	MW1-95 (E225548)	-	-	-	-	137	287
			2019-Apr-16	MW1-95 (E225548)	-	-	-	-	148	348
			2019-Oct-10	MW1-95 (E225548)	-	-	-	-	131	298
				DUPLICATE	-	-	-	-	130	295
			2020-Apr-24	MW1-95	< 1	< 1	142	< 1	142	300
			2020-Oct-21	MW1-95 (E225548)	-	-	-	-	119	262
			2021-May-20	MW1-95 (E225548)	-	-	-	-	143	300
			2021-Oct-21	MW1-95 (E225548)	< 1	< 1	126	< 1	126	289
			2022-May-5	MW1-95 (E225548)	< 1	< 1	148	< 1	148	326
			2022-Oct-18	MW1-95 (E225548)	-	-	-	-	131	307
			2023-Apr-25	MW1-95	-	-	-	-	153	342
			2023-Sep-27	MW1-95	-	-	-	-	154	347
	MW2-95	33.28 - 35.63	2016-Mar-22	MW2-95_20160322	< 1	< 1	135	-	135	298
			2016-Sep-13	20160913_E225549	< 1	< 1	125	-	125	258
			2017-Mar-22	20170322_E225549	< 1	< 1	129	-	129	270
			2017-Apr-10	20171004_E225549	< 1	< 1	123	-	123	248
			2018-Apr-23	MW2-95 E225549	-	-	-	-	134	275
			2018-Oct-15	MW2-95 (E225549)	-	-	-	-	125	246
			2019-Apr-16	MW2-95 (E225549)	-	-	-	-	133	271
			2019-Sep-10	MW2-95 (E225549)	-	-	-	-	115	239
			2020-Apr-23	MW2-95	< 1	< 1	115	< 1	115	225
			2020-Oct-21	MW2-95 (E225549)	-	-	-	-	118	251
			2021-May-19	MW2-95 (E225549)	-	-	-	-	134	278
			2021-Oct-20	MW2-95 (E225549)	< 1	< 1	121	< 1	121	271
			2022-May-4	MW2-95 (E225549)	< 1	< 1	111	< 1	111	214
			2022-Oct-17	MW2-95 (E225549)	-	-	-	-	126	272
			2023-Apr-24	MW2-95	-	-	-	-	140	272
			2023-Sep-26	MW2-95	-	-	-	-	139	274
	MW3-95	34.91 - 37.91	2016-Mar-23	MW3-95_20160323	< 1	< 1	145	-	145	282
			2016-Sep-13	20160913_E225550	< 1	< 1	156	-	156	277
			2017-Mar-22	20170322_E225550	< 1	< 1	137	-	137	258
			2017-Oct-4	20171004_E225550	< 1	< 1	131	-	131	230
			2018-Apr-23	MW3-95 E225550	-	-	-	-	145	255
			2018-Oct-15	MW3-95 (E225550)	-	-	-	-	140	242
			2019-Apr-16	MW3-95 (E225550)	-	-	-	-	143	269
			2019-Oct-9	MW3-95 (E225550)	-	-	-	-	138	249
			2020-Apr-23	MW3-95	< 1	< 1	151	< 1	151	255
			2020-Oct-20	MW3-95 (E225550)	-	-	-	-	150	279
				Duplicate	-	-	-	-	152	280
			2021-May-19	MW3-95 (E225550)	-	-	-	-	141	266
			2021-Oct-20	MW3-95 (E225550)	< 1	< 1	153	< 1	153	290
			2022-May-4	MW3-95 (E225550)	< 1	< 1	139	< 1	139	252
			2022-Oct-17	MW3-95 (E225550)	-	-	-	-	145	269
			2023-Apr-24	MW3-95	-	-	-	-	154	283
			2023-Sep-26	MW3-95	-	-	-	-	151	280

Table 3: General Parameters in Groundwater

					General Parameters					
					alkalinity (carbonate)	alkalinity (hydroxide)	alkalinity (bicarbonate)	alkalinity (P)	alkalinity (total)	electrical conductivity (lab)
				RDL	1	1		1 - 2		
					mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
Location Groups	Sample Location	Well Screen Depth (mbg)	Sample Date	Sample Name						
Locations	MW4-06	33.60 - 36.60	2016-Mar-23	MW4-06_20160323	< 1	< 1	288	-	288	943
			2016-Jun-20	20160620_E265109	< 1	< 1	167	< 2	167	457
			2016-Sep-13	20160913_E265109	< 1	< 1	186	-	186	530
				20160913_E265109DUP	< 1	< 1	185	-	185	529
			2016-Nov-21	20161121_E265109	< 1	< 1	205	-	205	628
			2017-Mar-22	20170322_E265109	< 1	< 1	247	-	247	894
			2017-Jun-14	20170614_E265109	< 1	< 1	218	-	218	568
				20170614_E265109DUP	< 1	< 1	221	-	221	566
			2017-Oct-5	20171005_E265109	< 1	< 1	167	-	167	467
			2018-Apr-24	MW4-06 E265109	-	-	-	-	335	1210
			2018-Oct-16	MW4-06 (E265109)	-	-	-	-	277	801
				DUPLICATE	-	-	-	-	277	800
			2019-Apr-16	MW4-06 (E265109)	-	-	-	-	223	553
			2019-Oct-10	MW4-06 (E265109)	-	-	-	-	138	350
			2020-Apr-24	MW4-06	< 1	< 1	244	< 1	244	556
				Duplicate	< 1	< 1	266	< 1	266	560
			2020-Oct-21	MW4-06 (E265109)	-	-	-	-	272	733
			2021-May-20	MW4-06 (E265109)	-	-	-	-	327	865
			2021-Oct-21	MW4-06 (E265109)	< 1	< 1	225	< 1	225	583
			2022-May-5	MW4-06 (E265109)	5	< 1	237	2.5	242	594
				Duplicate (MW4-06)	< 1	< 1	147	< 1	147	324
			2022-Oct-18	MW4-06 (E265109)	-	-	-	-	441	1220
				Duplicate (MW4-06)	-	-	-	-	130	305
	MW5-06	36.37 - 39.37	2016-Mar-23	MW5-06_20160323	< 1	< 1	161	-	161	352
			2016-Jun-20	20160620_E265110	< 1	< 1	146	< 2	146	307
				20160620_E265110DUP	< 1	< 1	147	< 2	147	308
			2016-Sep-14	20160914_E265110	< 1	< 1	136	-	136	275
			2016-Nov-21	20161121_E265110	< 1	< 1	135	-	135	276
			2017-Mar-22	20170322_E265110	< 1	< 1	144	-	144	310
			2017-Oct-5	20171005_E265110	< 1	< 1	110	-	110	222
			2017-Jun-14	20170614_E265110	< 1	< 1	118	-	118	245
			2018-Apr-23	MW5-06 E265110	-	-	-	-	148	290
			2018-Oct-15	MW5-06 (E265110)	-	-	-	-	116	237
			2019-Apr-17	MW5-06 (E265110)	-	-	-	-	173	363
			2019-Sep-10	MW5-06 (E265110)	-	-	-	-	148	299
			2020-Apr-23	MW5-06	< 1	< 1	176	< 1	176	338
			2020-Oct-20	MW5-06 (E265110)	-	-	-	-	140	295
			2021-May-19	MW5-06 (E265110)	-	-	-	-	155	322
			2021-Oct-20	MW5-06 (E265110)	< 1	< 1	144	< 1	144	302
			2022-May-4	MW5-06 (E265110)	4	< 1	158	2	162	315
			2022-Oct-17	MW5-06 (E265110)	-	-	-	-	120	250
			2023-Apr-24	MW5-06	-	-	-	-	141	279
			2023-Sep-26	MW5-06	-	-	-	-	171	333

Notes:

•	samples collected at the same location and date are blind field duplicate/parent pairs
'-'	sample not analyzed for parameter indicated
<	less than reported detection limit
Sample Type	N (Normal)
Sample Type	FD (Duplicate)
mbg	metres below grade
µS/cm	microsiemens per centimetre
mg/L	milligram per litre

Table 4: Carbon in Groundwater

		Carbon	
		total organic carbon	total inorganic carbon
	RDL	0.5	
		mg/L	mg/L
	BC SDWQG - MAC	4	ns
	BC WQG (Approved) AWF, Long-term	**See notes**	**ns**
Location Groups	**Sample Location**	**Well Screen Depth (mbg)**	**Sample Date**	**Sample Name**		
Locations	MW17-07	27.80 - 30.80	2017-Jun-14	20170614_E309170	2.96	-
			2017-Oct-5	20171005_E309170	1.69	23.9
				20171005_E309170DUP	1.13	22.1
			2018-Apr-23	MW17-07 E309170	1.65	22
			2018-Oct-15	MW17-07 (E309170)	1.23	23.6
			2019-Apr-17	MW17-07 (E309170)	1.41	18.1
				DUPLICATE	0.77	17.1
			2019-Oct-9	MW17-07 (E309170)	1.44	18.3
			2020-Apr-24	MW17-07	0.73	20.8
			2020-Oct-21	MW17-07 (E309170)	1.92	20.1
			2021-May-19	MW17-07 (E309170)	0.6	18.5
				DUPLICATE	0.92	19.2
			2021-Oct-20	MW17-07 (E309170)	0.69	20.8
				DUPLICATE	0.65	19.3
			2022-May-4	MW17-7 (E309170)	1.6	16
			2022-Oct-17	MW17-7 (E309170)	1.05	23
			2023-Apr-25	MW17-7	1.14	19.4
			2023-Sep-27	MW17-7	1	26.5
	MW1-95	32.61 - 34.25	2016-Mar-23	MW1-95_20160323	1.59	-
				MW1-95QC_20160323	1.6	-
			2016-Jun-20	20160620_E225548	1	-
			2016-Sep-13	20160913_E225548	1.17	-
			2016-Nov-21	20161121_E225548	0.73	-
				20161121_E225548DUP	0.75	-
			2017-Mar-22	20170322_E225548	3.6	-
				20170322_E225548DUP	3.83	-
			2017-Jun-14	20170614_E225548	2.27	-
			2017-Oct-5	20171005_E225548	1.41	42.7
			2018-Apr-24	M1-95 E225548	1.61	52.9
				DUPLICATE	1.4	53.5
			2018-Oct-16	MW1-95 (E225548)	1.25	47.9
			2019-Apr-16	MW1-95 (E225548)	1.11	50.4
			2019-Oct-10	MW1-95 (E225548)	2.45	42.7
				DUPLICATE	2.37	43.7
			2020-Apr-24	MW1-95	1	53.7
			2020-Oct-21	MW1-95 (E225548)	3.75	41.7
			2021-May-20	MW1-95 (E225548)	1.15	41
			2021-Oct-21	MW1-95 (E225548)	1.16	44.2
			2022-May-5	MW1-95 (E225548)	2	39.6
			2022-Oct-18	MW1-95 (E225548)	2.02	48.3
			2023-Apr-25	MW1-95	2.4	48
			2023-Sep-27	MW1-95	1.36	43.6
	MW2-95	33.28 - 35.63	2016-Mar-22	MW2-95_20160322	1.03	-
			2016-Sep-13	20160913_E225549	1.17	-
			2017-Mar-22	20170322_E225549	3.9	-
			2017-Apr-10	20171004_E225549	1.3	39.8
			2018-Apr-23	MW2-95 E225549	1.35	51.6
			2018-Oct-15	MW2-95 (E225549)	2.64	51.2
			2019-Apr-16	MW2-95 (E225549)	1.55	45.7
			2019-Sep-10	MW2-95 (E225549)	3.99	40.7
			2020-Apr-23	MW2-95	0.6	45.8
			2020-Oct-21	MW2-95 (E225549)	4.04	43.9
			2021-May-19	MW2-95 (E225549)	1.16	49.7
			2021-Oct-20	MW2-95 (E225549)	1.23	49.1
			2022-May-4	MW2-95 (E225549)	0.86	31.6
			2022-Oct-17	MW2-95 (E225549)	1.24	48.9
			2023-Apr-24	MW2-95	1.48	53.4
			2023-Sep-26	MW2-95	1.64	59.9
	MW3-95	34.91 - 37.91	2016-Mar-23	MW3-95_20160323	1.34	-
			2016-Sep-13	20160913_E225550	1.11	-
			2017-Mar-22	20170322_E225550	4.68	-
			2017-Oct-4	20171004_E225550	1.07	41.8
			2018-Apr-23	MW3-95 E225550	0.99	55.8
			2018-Oct-15	MW3-95 (E225550)	1.01	50.8
			2019-Apr-16	MW3-95 (E225550)	1.17	50.6
			2019-Oct-9	MW3-95 (E225550)	0.69	46.2
			2020-Apr-23	MW3-95	0.83	59.6
			2020-Oct-20	MW3-95 (E225550)	9.56	53.9
				Duplicate	10.2	52.8
			2021-May-19	MW3-95 (E225550)	0.69	47.5
			2021-Oct-20	MW3-95 (E225550)	0.83	61.2
			2022-May-4	MW3-95 (E225550)	0.94	40.8
			2022-Oct-17	MW3-95 (E225550)	0.83	63
			2023-Apr-24	MW3-95	1.05	60.2
			2023-Sep-26	MW3-95	1.32	66.8

Table 4: Carbon in Groundwater

		Carbon	
		total organic carbon	total inorganic carbon
	RDL	0.5	
		mg/L	mg/L
	BC SDWQG - MAC	4	ns
	BC WQG (Approved) AWF, Long-term	**See notes**	**ns**
Location Groups	**Sample Location**	**Well Screen Depth (mbg)**	**Sample Date**	**Sample Name**		
Locations	MW4-06	33.60 - 36.60	2016-Mar-23	MW4-06_20160323	6.73	-
			2016-Jun-20	20160620_E265109	2.97	-
			2016-Sep-13	20160913_E265109	3.76	-
				20160913_E265109DUP	3.73	-
			2016-Nov-21	20161121_E265109	3.69	-
			2017-Mar-22	20170322_E265109	7.52	-
			2017-Jun-14	20170614_E265109	3.62	-
				20170614_E265109DUP	4.2	-
			2017-Oct-5	20171005_E265109	2.42	49.1
			2018-Apr-24	MW4-06 E265109	9.39	121
			2018-Oct-16	MW4-06 (E265109)	5.94	85.3
				DUPLICATE	5.98	83.2
			2019-Apr-16	MW4-06 (E265109)	5.26	65.8
			2019-Oct-10	MW4-06 (E265109)	2.11	39.3
			2020-Apr-24	MW4-06	3.18	71.8
				Duplicate	3.13	71.9
			2020-Oct-21	MW4-06 (E265109)	6.36	78.9
			2021-May-20	MW4-06 (E265109)	7.31	98.9
			2021-Oct-21	MW4-06 (E265109)	3.92	72.7
			2022-May-5	MW4-06 (E265109)	5.4	73.7
				Duplicate (MW4-06)	2.51	43.7
			2022-Oct-18	MW4-06 (E265109)	14.4	140
				Duplicate (MW4-06)	1.78	45.7
	MW5-06	36.37 - 39.37	2016-Mar-23	MW5-06_20160323	1.48	-
			2016-Jun-20	20160620_E265110	1.22	-
				20160620_E265110DUP	1.16	-
			2016-Sep-14	20160914_E265110	1.08	-
			2016-Nov-21	20161121_E265110	1	-
			2017-Mar-22	20170322_E265110	2.78	-
			2017-Jun-14	20170614_E265110	1.52	-
			2017-Oct-5	20171005_E265110	1.55	27.7
			2018-Apr-23	MW5-06 E265110	1.26	39.1
			2018-Oct-15	MW5-06 (E265110)	1.52	34.9
			2019-Apr-17	MW5-06 (E265110)	1.11	49.9
			2019-Sep-10	MW5-06 (E265110)	7.05	41.4
			2020-Apr-23	MW5-06	1.13	43.7
			2020-Oct-20	MW5-06 (E265110)	3.55	39.3
			2021-May-19	MW5-06 (E265110)	1.07	40.1
			2021-Oct-20	MW5-06 (E265110)	1.18	45.5
			2022-May-4	MW5-06 (E265110)	2	42.6
			2022-Oct-17	MW5-06 (E265110)	1.36	35.4
			2023-Apr-24	MW5-06	2.34	36.6
			2023-Sep-26	MW5-06	2.35	45.9

Notes:

•	samples collected at the same location and date are blind field duplicate/parent pairs
'-'	sample not analyzed for parameter indicated
<	less than reported detection limit
Sample Type	N (Normal)
Sample Type	FD (Duplicate)
mbg	metres below grade
ns	no standard listed
mg/L	milligram per litre
BC SDWQG - MAC	BC Source Drinking Water Quality Guidelines, maximum allowable concentration
BC WQG (Approved) AWF, Long-term	BC Approved Water Quality Guidelines, Freshwater Aquatic Life, Long-term

Table 5: Petroleum Hydrocarbons in Groundwater

	Petroleum Hydrocarbons									
	benzene	toluene	ethylbenzene	xylene (m)	xylene (o)	xylene (m & p)	total xylenes	styrene	methyl tert-butyl ether (MTBE)	VPH (C6-C10)
RDL	**0.5**	**0.4 - 0.5**	**0.5**	**0.5**	**0.3 - 0.5**	**0.4 - 0.5**	**0.5 - 0.75**	**0.5**	**0.5**	**100**
	µg/L	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**
BC CSR DW	**5**	**60**	**140**	**ns**	**ns**	**ns**	**90**	**800**	**95**	**ns**
BC CSR AWF	**400**	**5**	**2000**	**ns**	**ns**	**ns**	**300**	**720**	**34000**	**1500**
BC SDWQG - AO	ns	24	1.6	ns	ns	ns	20	ns	15	ns
BC SDWQG - MAC	5	60	140	ns	ns	ns	90	ns	ns	ns
BC WQG (Approved) AWF, Long-term	**40**	**0.5**	**200**	**ns**	**ns**	**ns**	**30**	**ns**	**ns**	**ns**
BC WQG (Approved) AWF, Short-term	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**3400**	**ns**
BC WQG (Working) AWF, Long-term	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**72**	**ns**	**ns**
Health Canada GCDWQ, MAC	**5**	**60**	**140**	**ng**	**ng**	**ng**	**90**	**ng**	**ng**	**ng**
Health Canada GCDWQ, AO/Other	**ng**	**24**	**1.6**	**ng**	**ng**	**ng**	**20**	**ng**	**15**	**ng**

Location Groups	Sample Location	Well Screen Depth (mbg)	Sample Date	Sample Name									
Locations	MW17-07	27.80 - 30.80	2017-Jun-14	20170614_E309170	< 0.5	< 0.45	< 0.5	< 0.5	< 0.5	-	< 0.75	< 0.5	< 0.5	-
			2018-Oct-15	MW17-07 (E309170)	< 0.5	< 0.45	< 0.5	< 0.5	< 0.5	-	< 0.75	< 0.5	< 0.5	-
			2019-Sep-10	MW17-07 (E309170)	< 0.5	< 0.45	< 0.5	< 0.5	< 0.5	-	< 0.75	< 0.5	< 0.5	-
			2020-Oct-21	MW17-07 (E309170)	< 0.5	< 0.4	< 0.5	-	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5	-
			2021-Oct-20	MW17-07 (E309170)	< 0.5	< 0.4	< 0.5	-	< 0.3	< 0.4	< 0.5	< 0.5	< 0.5	-
				DUPLICATE	< 0.5	< 0.4	< 0.5	-	< 0.3	< 0.4	< 0.5	< 0.5	< 0.5	-
			2022-Oct-17	MW17-7 (E309170)	< 0.5	< 0.4	< 0.5	-	< 0.3	< 0.4	< 0.5	< 0.5	< 0.5	-
			2023-Sep-27	MW17-7	< 0.5	< 0.4	< 0.5	-	< 0.3	< 0.4	< 0.5	< 0.5	< 0.5	-
	MW1-95	32.61 - 34.25	2016-Jun-20	20160620_E225548	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.75	< 0.5	< 0.5	< 100
			2017-Jun-14	20170614_E225548	< 0.5	< 0.45	< 0.5	< 0.5	< 0.5	-	< 0.75	< 0.5	< 0.5	-
			2018-Oct-16	MW1-95 (E225548)	< 0.5	< 0.45	< 0.5	< 0.5	< 0.5	-	< 0.75	< 0.5	< 0.5	-
			2019-Oct-10	MW1-95 (E225548)	< 0.5	< 0.45	< 0.5	< 0.5	< 0.5	-	< 0.75	< 0.5	< 0.5	-
				DUPLICATE	< 0.5	< 0.45	< 0.5	< 0.5	< 0.5	-	< 0.75	< 0.5	< 0.5	-
			2020-Oct-21	MW1-95 (E225548)	< 0.5	< 0.4	< 0.5	-	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5	-
			2021-Oct-21	MW1-95 (E225548)	< 0.5	< 0.4	< 0.5	-	< 0.3	< 0.4	< 0.5	< 0.5	< 0.5	-
			2022-Oct-18	MW1-95 (E225548)	< 0.5	< 0.4	< 0.5	-	< 0.3	< 0.4	< 0.5	< 0.5	< 0.5	-
			2023-Sep-27	MW1-95	< 0.5	< 0.4	< 0.5	-	< 0.3	< 0.4	< 0.5	< 0.5	< 0.5	-
	MW4-06	33.60 - 36.60	2016-Jun-20	20160620_E265109	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.75	< 0.5	< 0.5	< 100
			2017-Jun-14	20170614_E265109	< 0.5	< 0.45	< 0.5	< 0.5	< 0.5	-	< 0.75	< 0.5	< 0.5	-
				20170614_E265109DUP	< 0.5	< 0.45	< 0.5	< 0.5	< 0.5	-	< 0.75	< 0.5	< 0.5	-
			2018-Oct-16	MW4-06 (E265109)	< 0.5	< 0.45	< 0.5	< 0.5	< 0.5	-	< 0.75	< 0.5	< 0.5	-
				DUPLICATE	< 0.5	< 0.45	< 0.5	< 0.5	< 0.5	-	< 0.75	< 0.5	< 0.5	-
			2019-Oct-10	MW4-06 (E265109)	< 0.5	< 0.45	< 0.5	< 0.5	< 0.5	-	< 0.75	< 0.5	< 0.5	-
			2020-Oct-21	MW4-06 (E265109)	< 0.5	< 0.4	< 0.5	-	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5	-
			2021-Oct-21	MW4-06 (E265109)	< 0.5	< 0.4	< 0.5	-	< 0.3	< 0.4	< 0.5	< 0.5	< 0.5	-
			2022-Oct-18	MW4-06 (E265109)	< 0.5	< 0.4	< 0.5	-	< 0.3	< 0.4	< 0.5	< 0.5	< 0.5	-

Notes:

•	samples collected at the same location and date are blind field duplicate/parent pairs
'-'	sample not analyzed for parameter indicated
<	less than reported detection limit
mbg	metres below grade
ns	no standard listed
ng	no guideline listed
µg/L	microgram per litre
BC CSR DW	BC Contaminated Sites Regulation, Schedule 3.2 Generic Numerical Water Standards, Drinking Water
BC CSR AWF	BC Contaminated Sites Regulation, Schedule 3.2 Generic Numerical Water Standards, Freshwater Aquatic Life
BC SDWQG - AO	BC Source Drinking Water Quality Guidelines, aesthetic objective
BC SDWQG - MAC	BC Source Drinking Water Quality Guidelines, maximum allowable concentration
BC WQG (Approved) AWF, Long-term	BC Approved Water Quality Guidelines, Freshwater Aquatic Life, Long-term
BC WQG (Approved) AWF, Short-term	BC Approved Water Quality Guidelines, Freshwater Aquatic Life, Short-term
BC WQG (Working) AWF, Long-term	BC Working Water Quality Guidelines, Freshwater Aquatic Life, Long-term
Health Canada GCDWQ, MAC	Health Canada Guidelines for Canadian Drinking Water Quality, Maximum Acceptable Concentrations
Health Canada GCDWQ, AO/Other	Health Canada Guidelines for Canadian Drinking Water Quality, Aesthetic Objectives
VPH (C6-C10)	VPH – volatile petroleum hydrocarbons

Table 6: Volatile Organic Compounds (VOCs) in Groundwater

					Volatile Organic Compounds (VOCs)																														
					bromodichloromethane	bromoform	carbon tetrachloride	chlorobenzene	chloroethane	chloroform	chloromethane	dibromochloromethane (DBCM)	dichlorobenzene, 1,2-	dichlorobenzene, 1,3	dichlorobenzene, 1,4-	dichloroethane, 1,1-	dichloroethane, 1,2-	dichloroethylene, 1,1-	dichloroethylene, 1,2-cis-	dichloroethylene, 1,2-trans-	dichloromethane	dichloropropane, 1,2-	dichloropropene, 1,3- (cis + trans	dichloropropene, cis-1,3-	dichloropropene, trans-1,3-	tetrachloroethane, 1,1,1,2-	tetrachloroethane, 1,1,2,2-	tetrachloroethylene	trichloroethane, 1,1,1-	trichloroethane, 1,1,2-	trichloroethylene	trichlorofluoromethane	vinyl chloride
	RDL				0.5 - 1	0.5 - 1	0.5	0.5 - 1	0.5 - 1	0.5 - 1	0.5 - 5	0.5 - 1	0.5 - 0.7	0.5 - 1	0.5 - 1	0.5 - 1	0.5 - 1	0.5 - 1	0.5 - 1	0.5 - 1	0.5 - 50	0.5 - 1	0.75 - 1.41	0.5 - 1	0.5 - 1	0.5 - 1	0.2 - 1	0.5 - 1	0.5 - 1	0.5 - 1	0.5 - 1	0.5 - 1	0.5 - 1	0.4 - 1
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
	BC CSR DW				100	100	2	80	ns	100	ns	100	200	ns	5	30	5	14	8	80	50	4.5	1.5	1.5	1.5	6	0.8	30	8000	3	5	1000	2
	BC CSR AWF				ns	ns	130	13	ns	20	ns	ns	7	1500	260	ns	1000	ns	ns	ns	980	ns	ns	ns	ns	ns	ns	1100	ns	ns	200	ns	ns
	BC SDWQG - AO				ns	ns	ns	30	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	BC SDWQG - MAC				ns	ns	2	80	ns	ns	ns	ns	200	ns	5	ns	5	14	ns	ns	50	ns	ns	ns	ns	ns	ns	10	ns	ns	5	ns	2
	BC WQG (Working) AWF, Long-term				**ns**	**ns**	**13.3**	**1.3**	**ns**	**1.8**	**13.3**	**ns**	**0.7**	**150**	**26**	**ns**	**100**	**ns**	**ns**	**ns**	**98.1**	**ns**	**ns**	**ns**	**ns**	**ns**	**110**	**ns**	**ns**	**ns**	**21**	**ns**	**ns**
	Health Canada GCDWQ, MAC				**ng**	**ng**	**2**	**80**	**ng**	**ng**	**ng**	**ng**	**200**	**ng**	**5**	**ng**	**5**	**14**	**ng**	**ng**	**50**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**10**	**ng**	**ng**	**5**	**ng**	**2**
	Health Canada GCDWQ, AO/Other				**ng**	**ng**	**ng**	**30**	**ng**	**ng**	**ng**	**ng**	**3**	**ng**	**1**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**
Location Groups	**Sample Location**	**Well Screen Depth (mbg)**	**Sample Date**	**Sample Name**																														
Locations	MW17-07	27.80 - 30.80	2017-Jun-14	20170614_E309170	< 1	< 1	< 0.5	< 1	< 1	< 1	< 5	< 1	< 0.5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 5	< 1	< 1	< 0.5	< 0.5	< 1	< 0.2	< 1	< 1	< 0.5	< 1	< 1	< 0.4
			2018-Oct-15	MW17-07 (E309170)	< 1	< 1	< 0.5	< 1	< 1	< 1	< 5	< 1	< 0.5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 5	< 1	< 1	< 0.5	< 0.5	< 1	< 0.2	< 1	< 1	< 0.5	< 1	< 1	< 0.4
			2019-Oct-9	MW17-07 (E309170)	< 1	< 1	< 0.5	< 1	< 1	< 1	< 5	< 1	< 0.5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 5	< 1	< 1	< 0.5	< 0.5	< 1	< 0.2	< 1	< 1	< 0.5	< 1	< 1	< 0.4
			2020-Oct-21	MW17-07 (E309170)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5	< 0.5	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.4
			2021-Oct-20	MW17-07 (E309170)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 0.75	< 0.5	< 0.5	< 0.5	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.4
				DUPLICATE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 0.75	< 0.5	< 0.5	< 0.5	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.4
			2022-Oct-17	MW17-7 (E309170)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 0.75	< 0.5	< 0.5	< 0.5	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.4
			2023-Sep-27	MW17-7	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 0.75	< 0.5	< 0.5	< 0.5	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.4
	MW1-95	32.61 - 34.25	2016-Jun-20	20160620_E225548	< 1	< 1	< 0.5	< 1	< 1	< 1	< 5	< 1	< 0.7	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 5	< 1	< 1.41	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
			2017-Jun-14	20170614_E225548	< 1	< 1	< 0.5	< 1	< 1	< 1	< 5	< 1	< 0.5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 5	< 1	< 1	< 0.5	< 0.5	< 1	< 0.2	< 1	< 1	< 0.5	< 1	< 1	< 0.4
			2018-Oct-16	MW1-95 (E225548)	< 1	< 1	< 0.5	< 1	< 1	< 1	< 5	< 1	< 0.5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 5	< 1	< 1	< 0.5	< 0.5	< 1	< 0.2	< 1	< 1	< 0.5	< 1	< 1	< 0.4
			2019-Oct-10	MW1-95 (E225548)	< 1	< 1	< 0.5	< 1	< 1	< 1	< 5	< 1	< 0.5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 5	< 1	< 1	< 0.5	< 0.5	< 1	< 0.2	< 1	< 1	< 0.5	< 1	< 1	< 0.4
				DUPLICATE	< 1	< 1	< 0.5	< 1	< 1	< 1	< 5	< 1	< 0.5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 5	< 1	< 1	< 0.5	< 0.5	< 1	< 0.2	< 1	< 1	< 0.5	< 1	< 1	< 0.4
			2020-Oct-21	MW1-95 (E225548)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5	< 0.5	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.4
			2021-Oct-21	MW1-95 (E225548)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 0.75	< 0.5	< 0.5	< 0.5	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.4
			2022-Oct-18	MW1-95 (E225548)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 0.75	< 0.5	< 0.5	< 0.5	< 0.2	1.28	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.4
			2023-Sep-27	MW1-95	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 50	< 0.5	< 0.75	< 0.5	< 0.5	< 0.5	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.4
	MW4-06	33.60 - 36.60	2016-Jun-20	20160620_E265109	< 1	< 1	< 0.5	< 1	< 1	< 1	< 5	< 1	< 0.7	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 5	< 1	< 1.41	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
			2017-Jun-14	20170614_E265109	< 1	< 1	< 0.5	< 1	< 1	< 1	< 5	< 1	< 0.5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 5	< 1	< 1	< 0.5	< 0.5	< 1	< 0.2	< 1	< 1	< 0.5	< 1	< 1	< 0.4
				20170614_E265109DUP	< 1	< 1	< 0.5	< 1	< 1	< 1	< 5	< 1	< 0.5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 5	< 1	< 1	< 0.5	< 0.5	< 1	< 0.2	< 1	< 1	< 0.5	< 1	< 1	< 0.4
			2018-Oct-16	MW4-06 (E265109)	< 1	< 1	< 0.5	< 1	< 1	< 1	< 5	< 1	< 0.5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 5	< 1	< 1	< 0.5	< 0.5	< 1	< 0.2	< 1	< 1	< 0.5	< 1	< 1	< 0.4
				DUPLICATE	< 1	< 1	< 0.5	< 1	< 1	< 1	< 5	< 1	< 0.5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 5	< 1	< 1	< 0.5	< 0.5	< 1	< 0.2	< 1	< 1	< 0.5	< 1	< 1	< 0.4
			2019-Oct-10	MW4-06 (E265109)	< 1	< 1	< 0.5	< 1	< 1	< 1	< 5	< 1	< 0.5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 5	< 1	< 1	< 0.5	< 0.5	< 1	< 0.2	< 1	< 1	< 0.5	< 1	< 1	< 0.4
			2020-Oct-21	MW4-06 (E265109)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.75	< 0.5	< 0.5	< 0.5	< 0.2	0.52	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.4
			2021-Oct-21	MW4-06 (E265109)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5	< 0.5	< 0.5	< 0.5	< 0.5	0.65	< 0.5	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 0.75	< 0.5	< 0.5	< 0.5	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.4
			2022-Oct-18	MW4-06 (E265109)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5	< 0.5	< 0.5	< 0.5	< 0.5	1.54	< 0.5	< 0.5	< 0.5	1.01	< 0.5	< 1	< 0.5	< 0.75	< 0.5	< 0.5	< 0.5	< 0.2	1.48	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.4

Notes:

•	samples collected at the same location and date are blind field duplicate/parent pairs
'-'	sample not analyzed for parameter indicated
<	less than reported detection limit
mbg	metres below grade
ns	no standard listed
ng	no guideline listed
mbg	metres below grade
µg/L	microgram per litre
BC CSR DW	BC Contaminated Sites Regulation, Schedule 3.2 Generic Numerical Water Standards, Drinking Water
BC CSR AWF	BC Contaminated Sites Regulation, Schedule 3.2 Generic Numerical Water Standards, Freshwater Aquatic Life
BC SDWQG - AO	BC Source Drinking Water Quality Guidelines, aesthetic objective
BC SDWQG - MAC	BC Source Drinking Water Quality Guidelines, maximum allowable concentration
BC WQG (Working) AWF, Long-term	BC Working Water Quality Guidelines, Freshwater Aquatic Life, Long-term
Health Canada GCDWQ, MAC	Health Canada Guidelines for Canadian Drinking Water Quality, Maximum Acceptable Concentrations
Health Canada GCDWQ, AO/Other	Health Canada Guidelines for Canadian Drinking Water Quality, Aesthetic Objectives
VPH (C6-C10)	VPH – volatile petroleum hydrocarbons

Table 7: Inorganics in Groundwater

					Field			Metals		Inorganics																				
					pH (field)	temp (field)	EC (field)	pH (lab)	hardness as CaCO3	ammonia (as N)	cations total	anions total	COD	dissolved oxygen (lab)	bromide	calcium carbonate	chloride ion	fluoride	ion balance	cation - anion balance	kjeldahl nitrogen total	nitrate (as N)	nitrite (as N)	phosphorus (total)	silicon	silicon	sulphate	sulphate	sulfur as S	sulfur as S
				Filtered or Total	T	T	T	T	F	T	T	T	T	F	F	T	F	T	T	T	F	F	T	F	T	F	T	F	T
				RDL	6.32	8.6	204			0.005			10 - 20	3.8 - 7.7	50 - 250		0.5	20 - 100		0.01		0.005	0.001 - 0.005	50			0.005		0.5	
					pH	deg C	µS/cm	pH	mg/L	mg/L	meq/L	meq/L	mg/L	mg/L	µg/L	mg/L	mg/L	µg/L	%	%	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L
				BC CSR DW	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	250	1500	ns	ns	ns	10	1	ns	ns	ns	500	500	ns	ns
				BC CSR AWF	ns	ns	ns	ns	ns	1.3-19	ns	ns	ns	ns	ns	ns	1500	2000-3000	ns	ns	ns	400	0.20-2.0	ns	ns	ns	3100-4300	3100-4300	ns	ns
				BC SDWQG - AO	ns	15	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	250	ns	ns	ns	ns	ns	ns	ns	ns	ns	500	ns	ns
				BC SDWQG - MAC	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	1500	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
				BC WQG (Approved) AWF, Long-term	6.5-9	10	ns	ns	ns	100 - 1900	ns	ns	ns	ns	ns	ns	150	ns	ns	ns	ns	ns	0.020	ns	ns	ns	130	ns	ns
				BC WQG (Approved) AWF, Short-term	6.5-9	10	ns	ns	ns	680 - 26000	ns	ns	ns	ns	ns	ns	600	1000 - 2000	ns	ns	ns	ns	0.060	ns	ns	ns	ns	ns	ns	ns
				BC WQG (Working) AWF, Long-term	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns		ns	ns	ns	1000	1000	ns	ns
				Health Canada GCDWQ, MAC	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	1500	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng
				Health Canada GCDWQ, AO/Other	ng	15	ng	7-10.5	ng	ng	ng	ng	ng	ng	ng	ng	250	ng	ng	ng	ng	ng	ng	ng	ng	ng	500	500	ng	ng
Location Groups	Sample Location	Well Screen Depth (mbg)	Sample Date	Sample Name																										
Locations	MW17-07	27.80 - 30.80	2017-Jun-14	20170614_E309170	6.76	8	119	7.16	80.9	< 0.005	1.75	1.93	25	-	-	-	0.64	-	-	-5	-	0.296	< 0.001	249	-	-	-	3.22	-	-
			2017-Oct-5	20171005_E309170	6.99	8.1	117	7.96	81.5	< 0.005	1.74	1.86	< 20	-	-	-	0.52	-	-	-3.6	-	0.397	< 0.001	53.8	-	-	-	3.04	-	-
				20171005_E309170DUP	-	-	-	7.96	83.9	< 0.005	1.79	1.87	< 20	-	-	-	0.53	-	-	-2.2	-	0.396	< 0.001	44.7	-	-	-	3.06	-	-
			2018-Apr-23	MW17-07 E309170	6.95	6.1	86.3	8.01	62.6	0.0053	1.37	1.41	< 20	-	-	-	< 0.5	-	-	-1.6	-	0.256	< 0.001	3.9	17400	-	-	2.51	0.63	-
			2018-Oct-15	MW17-07 (E309170)	7.3	7.8	87	7.64	58.2	< 0.005	1.28	1.4	< 20	-	< 50	-	< 0.5	71	-	-4.6	-	0.266	< 0.001	40.5	17800	-	-	2.2	< 0.5	-
			2019-Apr-17	MW17-07 (E309170)	6.57	7.7	73.8	7.23	51.7	< 0.005	1.15	1.14	< 20	-	< 50	-	< 0.5	95	-	0.5	-	0.225	< 0.001	36.5	16900	-	-	2.66	0.73	-
				DUPLICATE	-	-	-	7.34	51.4	0.0169	1.15	1.11	< 20	-	< 50	-	< 0.5	96	-	1.4	-	0.22	< 0.001	37.6	17000	-	-	2.66	0.69	-
			2019-Oct-9	MW17-07 (E309170)	**9.08**	7.4	89.2	7.97	61.3	< 0.005	1.35	1.36	< 20	-	< 50	-	0.72	63	-	-0.3	-	0.259	< 0.001	40.6	17700	-	-	2.31	0.74	-
			2020-Apr-24	MW17-07	8.24	7.9	78.6	7.98	56.8	< 0.005	1.25	1.24	< 20	-	< 50	-	0.76	94	-	0.402	-	0.256	< 0.001	33.1	16800	-	-	2.61	0.97	-
			2020-Oct-21	MW17-07 (E309170)	**10.4**	7.5	70.5	7.38	52.1	< 0.005	1.15	1.14	< 20	-	< 50	-	1.08	76	-	0.437	-	0.254	< 0.001	36.1	17600	-	-	2.88	0.88	-
			2021-May-19	MW17-07 (E309170)	6.88	8	77.9	7.15	55.5	< 0.005	1.23	1.22	< 20	-	< 50	-	1.27	82	-	0.408	-	0.375	< 0.001	12	17300	-	-	2.81	0.73	-
				DUPLICATE	-	-	-	7.17	54.3	< 0.005	1.2	1.21	< 20	-	< 50	-	1.27	85	-	0.415	-	0.372	< 0.001	11.2	17100	-	-	2.84	0.73	-
			2021-Oct-20	MW17-07 (E309170)	6.84	7.5	142	7.32	54.6	< 0.005	1.21	1.26	< 20	-	< 50	-	1.66	73	-	2.02	-	0.517	< 0.001	23.4	17600	-	-	2.7	0.76	-
				DUPLICATE	-	-	-	7.29	56.5	< 0.005	1.24	1.27	< 20	-	< 50	-	1.66	73	-	1.2	-	0.514	< 0.001	26.5	17800	-	-	2.71	0.79	-
			2022-May-4	MW17-7 (E309170)	6.75	7.7	94.8	7.91	67.8	< 0.005	1.49	1.45	< 10	-	< 50	-	3.18	83	-	1.36	0.113	0.752	< 0.001	56.8	18500	-	-	2.91	0.59	-
			2022-Oct-17	MW17-7 (E309170)	**6.2**	8	80.4	7.84	55.6	< 0.005	1.24	1.21	< 10	-	-	-	2.47	-	-	1.22	-	0.531	0.0017	26.8	18800	-	-	2.58	0.55	-
			2023-Apr-25	MW17-7	-	-	-	**6.47**	49	< 0.005	1.08	0.77	18	-	< 50	-	2.93	72	140	16.8	-	0.312	< 0.001	25	18600	-	-	1.42	0.64	-
			2023-Sep-27	MW17-7	-	-	-	**6.83**	62.2	< 0.005	1.36	1.42	< 10	-	< 50	-	2.44	58	95.8	-2.16	-	0.785	0.0012	-	19200	-	-	1.95	0.72	-
	MW1-95	32.61 - 34.25	2016-Mar-23	MW1-95_20160323	6.56	8	212	**6.72**	149	< 0.005	-	-	< 20	< 7.3	-	-	1.81	-	-	-	-	2.66	< 0.001	11.1	-	-	8.11	-	-	-
				MW1-95QC_20160323	-	-	-	7.18	148	< 0.005	-	-	< 20	-	-	-	1.81	-	-	-	-	2.65	< 0.001	11.3	-	-	8.12	-	-	-
			2016-Jun-20	20160620_E225548	**6.16**	8.9	207	**6.68**	150	< 0.005	3.41	3.16	< 20	-	-	-	1.81	-	-	3.8	-	2.48	< 0.001	10.5	-	-	-	7.82	-	-
			2016-Sep-13	20160913_E225548	**6.39**	8.4	194	**6.92**	131	< 0.005	2.97	3.2	< 20	-	-	-	1.61	-	-	-3.8	-	2.22	< 0.001	4.7	-	-	-	7.4	-	-
			2016-Nov-21	20161121_E225548	**6.27**	7.8	203	7.06	141	< 0.005	3.18	3.26	< 20	-	-	-	1.91	-	-	-1.3	-	2.6	< 0.001	5.5	-	-	-	8.6	-	-
				20161121_E225548DUP	-	-	-	7.02	138	< 0.005	3.12	3.27	< 20	-	-	-	1.9	-	-	-2.3	-	2.6	< 0.001	5.4	-	-	-	8.6	-	-
			2017-Mar-22	20170322_E225548	**6.1**	7.2	226	**6.72**	150	< 0.005	3.38	3.62	21	-	-	-	3	-	-	-3.4	-	3.71	< 0.001	9	-	-	-	12.4	-	-
				20170322_E225548DUP	-	-	-	**6.6**	128	< 0.005	2.77	2.91	34	-	-	-	2.66	-	-	-2.4	-	1.33	< 0.001	22.3	-	-	-	6.51	-	-
			2017-Jun-14	20170614_E225548	**6.45**	8.4	221	**6.83**	142	< 0.005	3.18	3.45	< 20	-	-	-	2.68	-	-	-4	-	3.21	< 0.001	7.5	-	-	-	11.4	-	-
			2017-Oct-5	20171005_E225548	**6.41**	7.7	191	7.93	128	< 0.005	2.92	3.05	< 20	-	-	-	2.41	-	-	-2.1	-	2.53	< 0.001	4.4	-	-	-	9.59	-	-
			2018-Apr-24	M1-95 E225548	6.51	8	228	8.36	151	0.0058	3.47	3.65	< 20	-	-	-	3.53	-	-	-2.5	-	3.36	< 0.001	7.2	19000	-	-	12.7	3.35	-
				DUPLICATE	-	-	-	7.8	150	< 0.005	3.44	3.96	< 20	-	-	-	3.23	-	-	-7	-	3.26	< 0.001	6.8	19100	-	-	12.2	3.67	-
			2018-Oct-16	MW1-95 (E225548)	7.15	7.8	204	7.42	129	< 0.005	3	3.24	< 20	-	< 50	-	2.92	21	-	-3.8	-	2.87	< 0.001	3.3	20800	-	-	10.3	3.04	-
			2019-Apr-16	MW1-95 (E225548)	**6.14**	8.3	241	**6.98**	171	< 0.005	3.9	3.67	< 20	-	< 50	-	4.57	25	-	3.1	-	3.7	< 0.001	4.5	19800	-	-	14.8	4.78	-
			2019-Oct-10	MW1-95 (E225548)	7.17	8	207	8.15	132	< 0.005	3.06	3.13	< 20	-	< 50	-	3.48	20	-	-1.2	-	2.58	0.001	4.4	20600	-	-	11.1	4.02	-
				DUPLICATE	-	-	-	8.14	134	< 0.005	3.11	3.12	< 20	-	< 50	-	3.48	22	-	-0.2	-	2.58	< 0.001	4.7	20700	-	-	11.1	3.84	-
			2020-Apr-24	MW1-95	6.92	8.2	202	7.73	138	< 0.005	3.18	3.33	< 20	-	< 50	-	3.4	25	-	2.3	-	2.42	< 0.001	3.7	20500	-	-	10.6	4.1	-
			2020-Oct-21	MW1-95 (E225548)	**11.2**	8.1	173	7.21	114	0.0094	2.67	2.78	30	-	< 50	-	2.99	22	-	2.02	-	1.79	< 0.001	13.7	20600	-	-	9.6	3.32	-
			2021-May-20	MW1-95 (E225548)	**5.86**	8.1	200	7.04	141	0.0067	3.2	3.38	< 20	-	< 50	-	3.83	26	-	2.74	-	2.33	< 0.001	8.9	21100	-	-	11.8	4.04	-
			2021-Oct-21	MW1-95 (E225548)	6.63	7.7	346	7.2	130	< 0.005	2.97	3.01	< 20	-	< 50	-	3.75	23	-	0.669	-	2.12	< 0.001	5.2	20800	-	-	11.4	3.42	-
			2022-May-5	MW1-95 (E225548)	**6.45**	8	217.9	8.25	161	0.0053	3.62	3.56	12	-	< 50	-	4.75	< 20	-	0.836	0.338	2.7	< 0.001	14.1	22500	-	-	13.3	4.38	-
			2022-Oct-18	MW1-95 (E225548)	**6**	7.9	213.8	8.05	147	0.0073	3.36	3.24	13	-	-	-	5.3	-	-	1.82	-	2.65	0.0023	9.5	21400	-	-	13.7	4.69	-
			2023-Apr-25	MW1-95	-	-	-	7.32	157	< 0.005	3.54	3.74	30	-	< 50	-	6.24	21	94.6	-2.75	-	2.92	< 0.001	5.9	20700	-	-	14.3	4.85	-
			2023-Sep-27	MW1-95	-	-	-	**6.65**	152	< 0.005	3.46	3.74	< 10	-	< 50	-	5.71	24	92.5	-3.89	-	2.93	< 0.001	-	21400	-	-	14	5.33	-
	MW2-95	33.28 - 35.63	2016-Mar-22	MW2-95_20160322	< 6.32	< 8.6	< 204	**6.41**	150	< 0.005	-	-	< 20	< 7.7	-	-	4.58	-	-	-	-	1.33	< 0.001	5.6	-	-	5.84	-	-	-
			2016-Sep-13	20160913_E225549	**6.19**	8.3	176	**6.8**	124	< 0.005	2.7	2.82	< 20	-	-	-	2.97	-	-	-2.1	-	1.11	< 0.001	5.6	-	-	-	7.11	-	-
			2017-Mar-22	20170322_E225549	**6.36**	7.9	188	**6.89**	129	< 0.005	2.8	2.88	32	-	-	-	2.66	-	-	-1.5	-	1.33	< 0.001	27.7	-	-	-	6.5	-	-
			2017-Apr-10	20171004_E225549	**6.31**	8.3	176	7.79	122	< 0.005	2.64	2.78	< 20	-	-	-	3.88	-	-	-2.6	-	0.855	< 0.001	5.6	-	-	-	7.86	-	-
			2018-Apr-23	MW2-95 E225549	**6.37**	8.4	192	8.32	137	0.0053	2.99	3.06	< 20	-	-	-	2.92	-	-	-1.3	-	1.6	< 0.001	6.6	21200	-	-	8.87	2.44	-
			2018-Oct-15	MW2-95 (E225549)	7.85	8.4	177	7.17	120	< 0.005	2.6	2.77	< 20	-	< 50	-	2.97	36	-	-3.2	-	0.838	< 0.001	11.1	21500	-	-	6	1.58	-
			2019-Apr-16	MW2-95 (E225549)	**6.16**	8	188	**6.89**	144	< 0.005	3.13	2.94	< 20	-	< 50	-	2.97	38	-	3.1	-	0.841	< 0.001	8	21000	-	-	6.98	2.22	-
			2019-Sep-10	MW2-95 (E225549)	7.44	8.3	174	8.21	119	< 0.005	2.61	2.59	26	-	< 50	-	2.65	33	-	0.4	-	0.991	0.0031	9.4	20600	-	-	6.77	2.38	-
			2020-Apr-23	MW2-95	6.67	8.5	152	8.02	111	< 0.005	2.41	2.48	< 20	-	< 50	-	1.46	40	-	1.43	-	0.842	< 0.001	5	19700	-	-	4.14	1.64	-
			2020-Oct-21	MW2-95 (E225549)	**9.58**	8.1	164	7.05	119	< 0.005	2.62	2.67	< 20	-	< 50	-	3.54	30	-	0.945	-	0.849	< 0.001	8.5	21100	-	-	7.51	2.66	-
			2021-May-19	MW2-95 (E225549)	**6.05**	9	189	**6.86**	135	0.0064	2.96	3	< 20	-	< 50	-	3.93	32	-	0.671	-	1.11	< 0.001	6.7	21800	-	-	6.46	2.48	-
			2021-Oct-20	MW2-95 (E225549)	**6.4**	8	321	**6.95**	128	< 0.005	2.81	2.76	< 20	-	< 50	-	4.42	30	-	0.898	-	0.762	< 0.001	6.5	21800	-	-	7.51	2.33	-
			2022-May-4	MW2-95 (E225549)	**6.34**	8.2	148.8	8.16	107	< 0.005	2.34	2.37	< 10	-	< 50	-	1.5	41	-	0.637	0.067	0.526	< 0.001	10.9	22500	-	-	3.27	0.83	-
			2022-Oct-17	MW2-95 (E225549)	**5.74**	8.6	195.6	7.95	132	0.009	2.94	2.92	< 10	-	-	-	5.53	-	-	0.341	-	0.893	0.0028	6.1	21900	-	-	8.75	3.09	-
			2023-Apr-24	MW2-95	-	-	-	7.29	131	< 0.005	2.8	3.02	33	-	< 50	-	2.44	32	92.7	-3.78	-	1.01	0.0011	21.8	22600	-	-	4.05	1.7	-
			2023-Sep-26	MW2-95	-	-	-	**6.62**	129	< 0.005	2.79	3	< 10	-	< 50	-	1.95	33	93	-3.63	-	1.02	< 0.001	-	22000	-	-	4.67	1.77	-
	MW3-95	34.91 - 37.91	2016-Mar-23	MW3-95_20160323	**6.39**	8.1	189	**6.49**	149	< 0.005	-	-	< 20	< 5.2	-	-	0.62	-	-	-	-	0.18	< 0.001	12.2	-	-	1.19	-	-	-
			2016-Sep-13	20160913_E225550	6.84	8.8	195	**6.81**	142	< 0.005	3	3.17	< 20	-	-	-	0.51	-	-	-2.6	-	0.104	< 0.001	10.9	-	-	-	1.1	-	-
			2017-Mar-22	20170322_E225550	6.5	7.7	174	**6.84**	126	0.0058	2.67	2.77	22	-	-	-	< 0.5	-	-	-1.9	-	0.117	< 0.001	42	-	-	-	1.23	-	-
			2017-Oct-4	20171004_E225550	**6.39**	8.4	166	7.86	118	< 0.005	2.52	2.68	< 20	-	-	-	0.61	-	-	-3	-	0.0909	< 0.001	8.4	-	-	-	1.7	-	-
			2018-Apr-23	MW3-95 E225550	6.6	8.5	179	8.12	129	0.0053	2.75	2.95	< 20	-	-	-	0.56	-	-	-3.5	-	0.15	< 0.001	8	18800	-	-	1.46	< 0.5	-
			2018-Oct-15	MW3-95 (E225550)	7.61	8.4	171	7.4	52.6	< 0.005	1.12	2.85	< 20	-	< 50	-	0.53	43	-	-43.4	-	0.0778	< 0.001	7.1	7800	-	-	1.05	< 0.5	-
			2019-Apr-16	MW3-95 (E225550)	**6.04**	8.6	190	**6.81**	145	< 0.005	3.1	2.94	< 20	-	< 50	-	0.52	36	-	2.6	-	0.405	0.0013	9.9	20000	-	-	2.24	0.57	-
			2019-Oct-9	MW3-95 (E225550)	8.94	8.5	185	8.27	130	< 0.005	2.79	2.82	< 20	-	< 50	-	0.72	34	-	-0.6	-	0.122	0.0022	7.6	19500	-	-	1.5	0.64	-
			2020-Apr-23	MW3-95	**6.3**	8.5	171	7.99	131	< 0.005	2.82	3.07	< 20	-	< 50	-	0.6	34	-	4.24	-	0.049	< 0.001	9.6	20100	-	-	1.01	< 0.5	-
			2020-Oct-20	MW3-95 (E225550)	8.84	8.2	182	7.13	140	0.0131	2.99	3.05	58	-	< 50	-	0.75	34	-	0.993	-	0.0504	< 0.001	18.8	19600	-	-	1.56	< 0.5	-
				Duplicate	-	-	-	7.14	133	0.0149	2.85	3.1	65	-	< 50	-	0.75	34	-	4.2	-	0.0496	< 0.001	20.5	20200	-	-	1.54	0.68	-
			2021-May-19	MW3-95 (E225550)	**6.18**	8.5	179	**6.69**	138	< 0.005	2.94	2.89	< 20	-	< 50	-	1.08	38	-	0.858	-	0.0256	< 0.001	11.4	21000	-	-	1.73	< 0.5	-
			2021-Oct-20	MW3-95 (E225550)	**6.36**	8.1	341	7.06	144	< 0.005	3.07	3.13	< 20	-	< 50	-	0.98	29	-	0.968	-	0.0556	< 0.001	12.9	22000	-	-	2.03	< 0.5	-
			2022-May-4	MW3-95 (E225550)	**6.14**	8.3	175.8	8.13	132	< 0.005	2.82	2.84	< 10	-	< 50	-	0.8	26	-	0.353	0.053	0.0377	< 0.001	10.5	23400	-	-	1.62	< 0.5	-
			2022-Oct-17	MW3-95 (E225550)	**5.76**	8.5	192.5	7.83	112	< 0.005	2.39	2.97	< 10	-	-	-	1.12	-	-	10.8	-	0.0286	< 0.001	7.6	15400	-	-	1.91	< 0.5	-
			2023-Apr-24	MW3-95	-	-	-	**6.84**	138	< 0.005	2.96	3.19	18	-	< 50	-	2.32	22	92.8	-3.74	-	0.0092	< 0.001	5.9	22500	-	-	2.22	1.02	-
			2023-Sep-26	MW3-95	-	-	-	**6.38**	131	< 0.005	2.81	3.09	< 10	-	< 50	-	1.31	29	90.9	-4.74	-	< 0.005	< 0.001	-	22300	-	-	1.76	0.73	-

Table 7: Inorganics in Groundwater

						Field			Metals		Inorganics																					
						pH (field)	temp (field)	EC (field)	pH (lab)	hardness as CaCO3	ammonia (as N)	cations total	anions total	COD	dissolved oxygen (lab)	bromide	calcium carbonate	chloride ion	fluoride	ion balance	cation - anion balance	kjeldahl nitrogen total	nitrate (as N)	nitrite (as N)	phosphorus (total)	silicon	silicon	sulphate	sulphate	sulfur as S	sulfur as S
					Filtered or Total	T	T	T	T	F	T	T	T	T	F	F	T	F	T	T	T	F	F	T	F	T	F	T	F	T
					RDL	6.32	8.6	204			0.005			10 - 20	3.8 - 7.7	50 - 250		0.5	20 - 100		0.01		0.005	0.001 - 0.005	50					0.5	
						pH	deg C	µS/cm	pH	mg/L	mg/L	meq/L	meq/L	mg/L	mg/L	µg/L	mg/L	mg/L	µg/L	%	%	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L
					BC CSR DW	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	250	1500	ns	ns	ns	10	1	ns	ns	ns	500	500	ns	ns
					BC CSR AWF	ns	ns	ns	ns	ns	1.3-19	ns	ns	ns	ns	ns	ns	1500	2000-3000	ns	ns	ns	400	0.20-2.0	ns	ns	ns	3100-4300	3100-4300	ns	ns
					BC SDWQG - AO	ns	15	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	250	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	500	ns	ns
					BC SDWQG - MAC	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	1500	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
					BC WQG (Approved) AWF, Long-term	6.5-9	10	ns	ns	ns	100 - 1900	ns	ns	ns	ns	ns	ns	150	ns	ns	ns	ns	ns	0.020	ns	ns	ns	ns	130	ns	ns
					BC WQG (Approved) AWF, Short-term	6.5-9	10	ns	ns	ns	680 - 26000	ns	ns	ns	ns	ns	ns	600	1000 - 2000	ns	ns	ns	ns	0.060	ns	ns	ns	ns	ns	ns	ns
					BC WQG (Working) AWF, Long-term	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns		ns	ns	ns	ns	1000	1000	ns	ns
					Health Canada GCDWQ, MAC	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	1500	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng
					Health Canada GCDWQ, AO/Other	ng	15	ng	7-10.5	ng	ng	ng	ng	ng	ng	ng	ng	250	ng	ng	ng	ng	ng	ng	ng	ng	ng	500	500	ng	ng
Location Groups	Sample Location	Well Screen Depth (mbg)	Sample Date	Sample Name																											
Locations	MW4-06	33.60 - 36.60	2016-Mar-23	MW4-06_20160323	6.5	9.2	653	**6.78**	434	0.0222	-	-	< 20	< 4.1	-	-	72	-	-	-	-	6.37	0.0095	8	-	-	75.7	-	-	-
			2016-Jun-20	20160620_E265109	**6.3**	**10.4**	337	**6.64**	207	0.0056	5.15	4.76	< 20	-	-	-	25.8	-	-	4	-	1.86	0.0013	6.9	-	-	-	27.2	-	-
			2016-Sep-13	20160913_E265109	**6.46**	9.1	392	**6.97**	240	< 0.005	5.68	5.7	27	-	-	-	36.6	-	-	-0.2	-	3.03	< 0.001	4.5	-	-	-	35.1	-	-
				20160913_E265109DUP	**6.46**	9.1	392	7.01	235	< 0.005	5.55	5.69	< 20	-	-	-	36.8	-	-	-1.2	-	3.04	< 0.001	4.1	-	-	-	35.3	-	-
			2016-Nov-21	20161121_E265109	**6.39**	9.1	452	7.15	284	0.0097	6.64	6.76	< 20	-	-	-	47.7	-	-	-1	-	4.83	< 0.005	16.2	-	-	-	47.3	-	-
			2017-Mar-22	20170322_E265109	**6.39**	8.9	628	**6.81**	403	0.0218	9.26	9.22	31	-	-	-	73	-	-	0.2	-	9.65	< 0.005	9.9	-	-	-	74	-	-
			2017-Jun-14	20170614_E265109	6.55	9.6	413	7.03	244	0.0152	5.82	6.16	< 20	-	-	-	34.1	-	-	-2.8	-	3.33	< 0.005	9.4	-	-	-	28.7	-	-
				20170614_E265109DUP	-	-	-	7.11	243	0.0153	5.8	6.26	< 20	-	-	-	34.8	-	-	-3.8	-	3.36	0.0026	10.3	-	-	-	29.6	-	-
			2017-Oct-5	20171005_E265109	**6.46**	9.6	348	8.08	208	0.005	4.9	5.03	< 20	-	-	-	25.2	-	-	-1.3	-	5.32	< 0.001	6.4	-	-	-	28.6	-	-
			2018-Apr-24	MW4-06 E265109	6.76	9.5	884	7.49	547	0.0472	13.4	13.1	23	-	-	-	96.1	-	-	1.3	-	12.3	0.0065	19.3	16900	-	-	**134**	43.7	-
			2018-Oct-16	MW4-06 (E265109)	7.33	9.3	576	7.66	325	0.0231	7.92	8.85	21	-	< 250	-	58.4	< 100	-	-5.5	-	6.98	< 0.005	13.7	20200	-	-	56.3	19.5	-
				DUPLICATE	-	-	-	7.58	326	0.0231	7.93	9.05	< 20	-	< 250	-	61.5	< 100	-	-6.6	-	7.46	< 0.005	11.5	20400	-	-	60.1	19.4	-
			2019-Apr-16	MW4-06 (E265109)	6.53	9.3	392	7.4	216	0.0313	6.22	5.77	< 20	-	72	-	29.1	166	-	3.8	-	0.259	0.0145	9	14000	-	-	22.6	7.68	-
			2019-Oct-10	MW4-06 (E265109)	7.25	9	253	8.26	130	0.0097	3.63	3.61	< 20	-	< 50	-	13.4	130	-	0.4	-	0.642	< 0.001	6.5	14500	-	-	19.6	6.84	-
			2020-Apr-24	MW4-06	8.09	9.6	398	8.12	250	0.014	6.24	6.12	< 20	-	52	-	28.9	253	-	0.971	-	0.741	0.0015	6	13700	-	-	17.7	6.96	-
				Duplicate	-	-	-	7.8	249	0.0159	6.21	6.58	23	-	58	-	28.9	250	-	2.89	-	0.741	0.0018	6.2	13500	-	-	17.9	6.74	-
			2020-Oct-21	MW4-06 (E265109)	8.96	9.2	500	7.41	332	0.0109	7.82	7.76	20	-	< 250	-	50.4	152	-	0.385	-	0.55	**0.0779**	31.5	16500	-	-	40.8	14.6	-
			2021-May-20	MW4-06 (E265109)	**6.06**	9.1	613	7.07	375	0.0176	9.63	9.27	< 20	-	< 250	-	71.2	203	-	1.9	-	0.906	**0.0772**	11.5	15900	-	-	30.9	11.9	-
			2021-Oct-21	MW4-06 (E265109)	6.9	9.1	692	7.56	254	0.0107	6.04	6.03	< 20	-	85	-	39.8	279	-	0.083	-	0.308	0.0032	9	13200	-	-	18	6.03	-
			2022-May-5	MW4-06 (E265109)	**6.45**	9.1	455.4	8.31	269	0.0196	6.99	6.54	22	-	92	-	45.5	233	-	3.32	0.374	0.509	**0.0754**	16.8	15700	-	-	17.4	6.2	-
				Duplicate (MW4-06)	-	-	-	8.23	159	< 0.005	3.59	3.54	< 10	-	< 50	-	4.74	< 20	-	0.701	0.243	2.7	< 0.001	14	22500	-	-	13.3	4.3	-
			2022-Oct-18	MW4-06 (E265109)	**6.17**	9.1	908	8.11	585	0.0234	14	13.4	48	-	-	-	125	-	-	2.19	-	0.501	**0.11**	21.7	18000	-	-	51.5	20	-
				Duplicate (MW4-06)	-	-	-	8.11	157	0.0066	3.54	3.22	< 10	-	-	-	5.29	-	-	4.73	-	2.65	0.003	8.6	20500	-	-	13.8	4.63	-
	MW5-06	36.37 - 39.37	2016-Mar-23	MW5-06_20160323	7.24	6.9	227	7.37	188	< 0.005	-	-	< 20	< 3.8	-	-	2.74	-	-	-	-	0.135	< 0.001	12.8	-	-	12.9	-	-	-
			2016-Jun-20	20160620_E265110	6.75	8.8	216	7	168	< 0.005	3.53	3.24	< 20	-	-	-	2.39	-	-	4.3	-	0.208	< 0.001	21.6	-	-	-	11.9	-	-
				20160620_E265110DUP	-	-	-	7.18	166	< 0.005	3.48	3.26	< 20	-	-	-	2.4	-	-	3.2	-	0.21	< 0.001	18.4	-	-	-	11.9	-	-
			2016-Sep-14	20160914_E265110	6.83	6.9	185	7.37	139	0.0053	2.93	3.07	< 20	-	-	-	2.71	-	-	-2.3	-	0.103	< 0.001	6.2	-	-	-	12.7	-	-
			2016-Nov-21	20161121_E265110	6.91	6.8	185	7.54	140	< 0.005	2.95	3.04	< 20	-	-	-	2.9	-	-	-1.6	-	0.0904	< 0.001	16.5	-	-	-	12.1	-	-
			2017-Mar-22	20170322_E265110	6.94	5.9	204	7.59	149	0.0054	3.13	3.23	< 20	-	-	-	2.98	-	-	-1.6	-	0.0819	< 0.001	15.4	-	-	-	12.2	-	-
			2017-Jun-14	20170614_E265110	6.85	7.4	169	7.61	118	< 0.005	2.51	2.65	< 20	-	-	-	1.73	-	-	-2.7	-	0.144	< 0.001	17.3	-	-	-	11.5	-	-
			2017-Oct-5	20171005_E265110	7	6.7	153	8.12	111	< 0.005	2.35	2.48	< 20	-	-	-	1.75	-	-	-2.7	-	0.0654	< 0.001	9.5	-	-	-	11.3	-	-
			2018-Apr-23	MW5-06 E265110	7.52	6.7	198	8.4	149	0.0058	3.17	3.26	< 20	-	-	-	2.16	-	-	-1.5	-	0.0365	< 0.001	25.5	7030	-	-	11.6	3.4	-
			2018-Oct-15	MW5-06 (E265110)	8.58	6.5	162	7.92	45.6	< 0.005	0.98	2.65	< 20	-	< 50	-	1.23	689	-	-46.1	-	0.0541	< 0.001	22.1	3100	-	-	12.6	1.26	-
			2019-Apr-17	MW5-06 (E265110)	7	6.9	240	7.75	197	< 0.005	4.16	3.85	< 20	-	< 50	-	1.43	869	-	3.9	-	0.0764	< 0.001	12.2	7470	-	-	14.7	4.93	-
			2019-Sep-10	MW5-06 (E265110)	7.67	6.4	207	8.34	151	< 0.005	3.22	3.28	48	-	< 50	-	1.16	634	-	-0.9	-	0.073	0.0016	16.6	8790	-	-	12	4.46	-
			2020-Apr-23	MW5-06	7.06	6.8	219	8.34	175	< 0.005	3.7	3.89	28	-	< 50	-	1.47	664	-	2.5	-	0.188	< 0.001	12.8	8720	-	-	13.4	5.34	-
			2020-Oct-20	MW5-06 (E265110)	**10.2**	6.8	184	7.79	134	< 0.005	2.86	3.11	33	-	< 50	-	1.01	674	-	4.19	-	0.023	< 0.001	12.3	8570	-	-	11.9	4.12	-
			2021-May-19	MW5-06 (E265110)	6.7	6.3	203	7.48	164	< 0.005	3.47	3.47	< 20	-	< 50	-	1.15	655	-	< 0.01	-	0.0861	< 0.001	18.3	8520	-	-	14.3	4.9	-
			2021-Oct-20	MW5-06 (E265110)	7.14	6.3	362	7.72	151	< 0.005	3.19	3.22	21	-	< 50	-	0.99	619	-	0.468	-	0.0955	< 0.001	15.1	8910	-	-	13.3	4.02	-
			2022-May-4	MW5-06 (E265110)	6.93	6.6	217.3	8.32	172	< 0.005	3.62	3.6	< 10	-	< 50	-	1.04	591	-	0.277	0.268	0.378	< 0.001	107	9960	-	-	13.4	4.5	-
			2022-Oct-17	MW5-06 (E265110)	6.76	7.1	173	8.15	122	< 0.005	2.61	2.68	< 10	-	-	-	1.04	-	-	1.32	-	0.0827	< 0.001	20.3	9460	-	-	11.7	4.22	-
			2023-Apr-24	MW5-06	-	-	-	7.81	137	< 0.005	2.9	3.16	22	-	< 50	-	0.97	674	91.8	-4.29	-	0.0529	< 0.001	107	8840	-	-	13.2	4.42	-
			2023-Sep-26	MW5-06	-	-	-	7.14	170	< 0.005	3.59	3.76	< 10	-	< 50	-	1.14	671	95.5	-2.31	-	0.0552	< 0.001	-	8750	-	-	13.2	4.87	-

Notes:

•	samples collected at the same location and date are blind field duplicate/parent pairs
'-'	sample not analyzed for parameter indicated
<	less than reported detection limit
Fraction	T (total)
Fraction	F (filtered/dissolved)
mbg	metres below grade
ns	no standard listed
ng	no guideline listed
%	percent
µg/L	microgram per litre
µS/cm	microsiemens per centimetre
deg C	degree Celsius
meq/L	milliequivalents per litre
mg/L	milligram per litre
pH	potential of hydrogen
BC CSR DW	BC Contaminated Sites Regulation, Schedule 3.2 Generic Numerical Water Standards, Drinking Water
BC CSR AWF	BC Contaminated Sites Regulation, Schedule 3.2 Generic Numerical Water Standards, Freshwater Aquatic Life
BC SDWQG - AO	BC Source Drinking Water Quality Guidelines, aesthetic objective
BC SDWQG - MAC	BC Source Drinking Water Quality Guidelines, maximum allowable concentration
BC WQG (Approved) AWF, Long-term	BC Approved Water Quality Guidelines, Freshwater Aquatic Life, Long-term
BC WQG (Approved) AWF, Short-term	BC Approved Water Quality Guidelines, Freshwater Aquatic Life, Short-term
BC WQG (Working) AWF, Long-term	BC Working Water Quality Guidelines, Freshwater Aquatic Life, Long-term
Health Canada GCDWQ, MAC	Health Canada Guidelines for Canadian Drinking Water Quality, Maximum Acceptable Concentrations
Health Canada GCDWQ, AO/Other	Health Canada Guidelines for Canadian Drinking Water Quality, Aesthetic Objectives

Table 8: Metals In Groundwater

					Metals		Metals (Dissolved)																																						
Location Groups	Sample Location	Well Screen Depth (mbg)	Sample Date	Sample Name	pH (lab)	hardness as CaCO3	hardness as CaCO3 (dissolved)	aluminum (dissolved)	antimony (dissolved)	arsenic (dissolved)	barium (dissolved)	beryllium (dissolved)	bismuth (dissolved)	boron (dissolved)	cadmium (dissolved)	calcium (dissolved)	cesium (dissolved)	chromium (III+VI) (dissolved)	cobalt (dissolved)	copper (dissolved)	iron (dissolved)	lead (dissolved)	lithium (dissolved)	magnesium (dissolved)	manganese (dissolved)	mercury (dissolved)	molybdenum (dissolved)	nickel (dissolved)	phosphorus (dissolved)	potassium (dissolved)	rubidium (dissolved)	selenium (dissolved)	silver (dissolved)	sodium (dissolved)	strontium (dissolved)	tellurium (dissolved)	thallium (dissolved)	thorium (dissolved)	tin (dissolved)	titanium (dissolved)	tungsten (dissolved)	uranium (dissolved)	vanadium (dissolved)	zinc (dissolved)	zirconium (dissolved)
				RDL				1 - 5	0.1 - 0.5	0.1 - 0.5		0.1 - 1	0.05	10 - 100	0.005		0.01	0.5 - 1	0.1 - 0.3	0.2 - 1	10 - 30	0.05 - 0.5				0.005	0.05 - 1	0.5 - 1	50	2000	0.2	0.05	0.01 - 0.02			0.2	0.01 - 0.2	0.1	0.1 - 0.5	0.3 - 10	0.1	0.2	0.5	1 - 5	0.06 - 0.2
					pH	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
				BC CSR DW	ns	ns	ns	9500	6	10	1000	8	ns	5000	5	ns	ns	50	1	1500	na	10	8	ns	na	1	250	80	ns	ns	ns	10	20	200	2500	ns	ns	ns	2500	ns	3	20	20	3000	ns
				BC CSR AWF	ns	ns	ns	ns	90	50	10000	1.5	ns	12000	1.5-4.0	ns	ns	10	40	20-90	ns	40-160	ns	ns	ns	0.25	10000	250-1500	ns	ns	ns	20	0.50-15	ns	ns	ns	3	ns	ns	1000	ns	85	ns	75-3200	ns
				BC SDWQG - AO	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	1000	300	ns	ns	ns	20	ns	ns	ns	10	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	5000	ns
				BC SDWQG - MAC	ns	ns	ns	9500	6	10	ns	ns	ns	5000	5	ns	ns	50	1	2000	ns	5	ns	ns	120	1	88	80	ns	ns	ns	10	ns	ns	7000	ns	ns	ns	ns	ns	ns	20	ns	3000	ns
				BC WQG (Approved) AWF, Long-term	ns	ns	ns	61 - 290	74	5	ns	ns	ns	1200	0.12 - 0.46	ns	ns	ns	4	0.2 - 1.9	ns	8.9	ns	ns	810 - 3200	0.00125	7600	0.8 - 7.1	5	ns	ns	2	0.050	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	4.2 - 84	ns
				BC WQG (Approved) AWF, Short-term	ns	ns	ns	ns	250	ns	ns	ns	ns	ns	0.26 - 2.8	ns	ns	ns	110	0.45 - 11	350	30 - 770	ns	ns	1000 - 7000	ns	46000	13 - 140	5	ns	ns	2	0.10	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	25 - 100	ns
				BC WQG (Working) AWF, Long-term	ns	ns	ns	ns	9	ns	1000	0.13	ns	ns	ns	ns	ns	1	ns	ns	ns	ns	ns	ns	ns	ns	ns	25	ns	ns	ns	ns	ns	ns	ns	ns	0.8	ns	ns	ns	ns	8.5	ns	ns	ns
				Health Canada GCDWQ, MAC	ng	ng	ng	2900	6	10	2000	ng	ng	5000	7	ng	ng	50	ng	2000	ng	5	ng	ng	120	1	ng	ng	ng	ng	ng	50	ng	ng	7000	ng	ng	ng	ng	ng	ng	20	ng	ng	ng
				Health Canada GCDWQ, AO/Other	7-10.5	ng	ng	100	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	ng	1000	300	ng	ng	ng	20	ng	ng	ng	ng	ng	ng	ng	ng	20	ng	ng	ng	ng	ng	ng	ng	ng	ng	5000	ng
Locations	MW17-07	27.80 - 30.80	2017-Jun-14	20170614_E309170	7.16	80.9	80.9	15.5	< 0.5	< 0.5	294	< 0.1	-	< 100	0.0432	23.6	-	< 1	0.95	< 1	61	< 0.5	6.3	5.32	150	< 0.005	< 1	4.1	-	< 2000	-	0.093	< 0.02	2.8	-	-	< 0.2	-	< 0.5	< 10	-	< 0.2	< 0.5	< 5	-
			2017-Oct-05	20171005_E309170	7.96	81.5	81.5	< 5	< 0.5	< 0.5	490	< 0.1	-	< 100	0.0173	23.4	-	2.2	< 0.3	< 1	< 30	< 0.5	6.4	5.61	13.8	< 0.005	< 1	1.2	-	< 2000	-	< 0.05	< 0.02	2.5	-	-	< 0.2	-	< 0.5	< 10	-	0.25	0.65	< 5	-
				20171005_E309170DUP	7.96	83.9	83.9	5.9	< 0.5	< 0.5	511	< 0.1	-	< 100	0.0173	23.8	-	2.4	< 0.3	< 1	< 30	< 0.5	6.5	5.95	14.3	< 0.005	< 1	1.3	-	< 2000	-	< 0.05	< 0.02	2.6	-	-	< 0.2	-	< 0.5	< 10	-	0.24	0.69	< 5	-
			2018-Apr-23	MW17-07 E309170	8.01	62.6	62.6	3.2	< 0.1	< 0.1	388	< 0.1	< 0.05	< 10	0.0143	17.1	< 0.01	3.4	< 0.1	< 0.2	15	< 0.05	6.2	4.8	6.51	< 0.005	< 0.05	0.88	< 50	542	1.16	< 0.05	< 0.01	2.28	300	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	< 0.1	0.149	0.77	4.7	< 0.06
			2018-Oct-15	MW17-07 (E309170)	7.64	58.2	58.2	3.6	< 0.1	< 0.1	436	< 0.1	< 0.05	< 10	0.0151	15.8	< 0.01	2.89	< 0.1	< 0.2	< 10	< 0.05	5.6	4.51	3.53	< 0.005	< 0.05	0.76	< 50	532	1.08	< 0.05	< 0.01	2.34	401	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	< 0.1	0.181	0.87	4.8	< 0.06
			2019-Apr-17	MW17-07 (E309170)	7.23	51.7	51.7	2.8	< 0.1	< 0.1	398	< 0.1	< 0.05	< 10	0.0091	13.7	< 0.01	3.96	< 0.1	< 0.2	13	< 0.05	5.1	4.23	2.39	< 0.005	< 0.05	0.61	< 50	526	0.99	< 0.05	< 0.01	2.34	338	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	< 0.1	0.127	1.02	3.3	< 0.06
				DUPLICATE	7.34	51.4	51.4	3.3	< 0.1	< 0.1	397	< 0.1	< 0.05	< 10	0.0075	13.8	< 0.01	3.93	< 0.1	< 0.2	13	< 0.05	5.1	4.12	2.34	< 0.005	< 0.05	0.57	< 50	518	0.96	< 0.05	< 0.01	2.34	346	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	< 0.1	0.119	1.06	3.4	< 0.06
			2019-Oct-09	MW17-07 (E309170)	7.97	61.3	61.3	3.5	< 0.1	< 0.1	463	< 0.1	< 0.05	< 10	0.0103	16.5	< 0.01	3.14	< 0.1	< 0.2	< 10	< 0.05	6	4.87	2.12	< 0.005	< 0.05	0.79	< 50	615	1.09	< 0.05	< 0.01	2.58	400	< 0.2	< 0.01	< 0.1	0.12	< 0.3	< 0.1	0.172	0.95	6.3	< 0.2
			2020-Apr-24	MW17-07	7.98	56.8	56.8	2.6	< 0.1	< 0.1	422	< 0.1	< 0.05	< 10	< 0.005	16.4	< 0.01	3.59	< 0.1	< 0.2	11	< 0.05	5.5	3.86	1.36	< 0.005	< 0.05	0.62	< 50	538	0.99	< 0.05	< 0.01	2.33	400	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	-	0.174	0.93	4.8	< 0.2
			2020-Oct-21	MW17-07 (E309170)	7.38	52.1	52.1	4	0.12	< 0.1	387	< 0.1	< 0.05	< 10	0.0094	14.3	< 0.01	3.17	< 0.1	0.38	< 10	< 0.05	5.7	3.99	1.56	< 0.005	< 0.05	0.74	< 50	560	0.95	< 0.05	< 0.01	2.24	341	< 0.2	< 0.01	< 0.1	0.14	< 0.3	-	0.143	0.95	7.8	< 0.2
			2021-May-19	MW17-07 (E309170)	7.15	55.5	55.5	2.4	< 0.1	< 0.1	404	< 0.1	< 0.05	< 10	0.0126	15.6	< 0.01	3.68	< 0.1	0.26	< 10	0.091	5	4.01	2.56	< 0.005	< 0.05	0.68	< 50	549	1.03	< 0.05	< 0.01	2.38	437	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	-	0.177	0.88	7.2	< 0.2
				DUPLICATE	7.17	54.3	54.3	2.5	< 0.1	< 0.1	414	< 0.1	< 0.05	< 10	0.0094	15.2	< 0.01	3.53	< 0.1	0.26	< 10	0.091	5	3.98	2.53	< 0.005	< 0.05	0.66	< 50	540	0.92	< 0.05	< 0.01	2.37	443	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	-	0.166	0.92	7	< 0.2
			2021-Oct-20	MW17-07 (E309170)	7.32	54.6	54.6	2.6	< 0.1	< 0.1	409	< 0.1	< 0.05	< 10	0.0095	15.5	< 0.01	2.98	< 0.1	0.26	< 10	< 0.05	5.8	3.87	1.54	< 0.005	< 0.05	0.73	< 50	533	0.92	< 0.05	< 0.01	2.36	404	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	-	0.159	0.97	4	< 0.2
				DUPLICATE	7.29	56.5	56.5	2	< 0.1	< 0.1	405	< 0.1	< 0.05	< 10	0.0085	16.4	< 0.01	3.03	< 0.1	0.26	< 10	< 0.05	6.1	3.77	1.46	< 0.005	< 0.05	0.7	< 50	529	0.94	< 0.05	< 0.01	2.29	403	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	-	0.158	0.95	4.1	< 0.2
			2022-May-04	MW17-7 (E309170)	7.91	67.8	67.8	17.5	< 0.1	< 0.1	465	< 0.1	< 0.05	< 10	0.0082	19	< 0.01	3.62	< 0.1	0.22	< 10	< 0.05	5.9	4.95	1.32	< 0.005	< 0.05	0.82	< 50	609	1.14	< 0.05	< 0.01	2.67	522	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	-	0.217	1.14	3.8	< 0.2
			2022-Oct-17	MW17-7 (E309170)	7.84	55.6	55.6	2.5	< 0.1	< 0.1	396	< 0.1	< 0.05	< 10	0.0087	15.3	< 0.01	2.98	< 0.1	< 0.2	< 10	< 0.05	5.8	4.22	1.49	< 0.005	< 0.05	0.79	< 50	553	1	< 0.05	< 0.01	2.58	390	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	-	0.133	1	3.2	< 0.2
			2023-Apr-25	MW17-7	6.47	49	49	2.4	< 0.1	< 0.1	356	< 0.1	< 0.05	< 10	0.0077	14.2	< 0.01	2.87	< 0.1	< 0.2	< 10	< 0.05	5.3	3.3	1.3	< 0.005	< 0.05	0.74	< 50	486	0.89	< 0.05	< 0.01	2.12	416	< 0.2	< 0.01	< 0.1	0.11	< 0.3	-	0.126	1.08	2.7	< 0.2
			2023-Sep-27	MW17-7	6.83	62.2	62.2	3.5	< 0.1	< 0.1	456	< 0.1	< 0.05	< 10	0.0086	17.6	< 0.01	2.72	< 0.1	< 0.2	< 10	< 0.05	6.1	4.43	1.43	< 0.005	< 0.05	0.89	< 50	566	1	< 0.05	< 0.01	2.42	525	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	-	0.195	0.94	4.4	< 0.2
	MW1-95	32.61 - 34.25	2016-Mar-23	MW1-95_20160323	6.72	149	149	< 5	< 0.5	< 0.5	984	< 1	-	140	0.0349	40.7	-	2.5	< 0.3	< 1	< 30	< 0.5	11.7	11.4	3.83	-	< 1	3.2	-	< 2000	-	< 0.05	< 0.02	8.9	-	-	< 0.2	-	< 0.5	< 10	-	0.62	1.08	6.2	-
				MW1-95QC_20160323	7.18	148	148	< 5	< 0.5	< 0.5	974	< 1	-	150	0.0361	40.4	-	2.5	< 0.3	< 1	< 30	< 0.5	11.4	11.3	3.9	-	< 1	3.4	-	< 2000	-	< 0.05	< 0.02	8.8	-	-	< 0.2	-	< 0.5	< 10	-	0.62	1.09	5.9	-
			2016-Jun-20	20160620_E225548	6.68	150	150	< 5	< 0.5	< 0.5	1030	< 1	-	120	0.0294	40	-	2.8	< 0.3	< 1	< 30	< 0.5	11.1	12.1	1.46	< 0.005	< 1	2.8	-	< 2000	-	< 0.05	< 0.02	9.7	-	-	< 0.2	-	< 0.5	< 10	-	0.58	1.08	9.6	-
			2016-Sep-13	20160913_E225548	6.92	131	131	< 5	< 0.5	< 0.5	899	< 1	-	110	0.03	35	-	2.5	< 0.3	< 1	< 30	< 0.5	12.2	10.5	0.88	< 0.005	< 1	2.4	-	< 2000	-	< 0.05	< 0.02	8.1	-	-	< 0.2	-	< 0.5	< 10	-	0.51	1.01	6.8	-
			2016-Nov-21	20161121_E225548	7.06	141	141	< 5	< 0.5	< 0.5	1030	< 1	-	120	0.0306	38	-	2.5	< 0.3	< 1	< 30	< 0.5	12.9	11.2	1.12	< 0.005	< 1	2.8	-	< 2000	-	< 0.05	< 0.02	8.2	-	-	< 0.2	-	< 0.5	< 10	-	0.58	1.06	9.7	-
				20161121_E225548DUP	7.02	138	138	< 5	< 0.5	< 0.5	1090	< 1	-	120	0.0323	36.6	-	2.6	< 0.3	< 1	< 30	< 0.5	12.4	11.4	1.16	< 0.005	< 1	2.9	-	< 2000	-	< 0.05	< 0.02	8.4	-	-	< 0.2	-	< 0.5	< 10	-	0.56	1.07	10.1	-
			2017-Mar-22	20170322_E225548	6.72	150	150	9.1	< 0.5	< 0.5	1060	< 0.1	-	150	0.038	39.4	-	2.4	< 0.3	< 1	< 30	< 0.5	11.6	12.6	1.32	-	< 1	2.7	-	< 2000	-	< 0.05	< 0.02	8.7	-	-	< 0.2	-	< 0.5	< 10	-	0.65	1.01	12.3	-
				20170322_E225548DUP	6.6	128	128	25.7	< 0.5	< 0.5	738	< 0.1	-	< 100	0.0572	33.3	-	2.5	< 0.3	< 1	< 30	< 0.5	11.1	10.9	3.67	-	< 1	3.4	-	< 2000	-	< 0.05	< 0.02	4.8	-	-	< 0.2	-	< 0.5	< 10	-	0.48	1.25	15.8	-
			2017-Jun-14	20170614_E225548	6.83	142	142	< 5	< 0.5	< 0.5	1020	< 0.1	-	140	0.0341	37.3	-	2.6	< 0.3	< 1	< 30	< 0.5	12.7	11.7	2.37	< 0.005	< 1	3.7	-	< 2000	-	< 0.05	< 0.02	8.2	-	-	< 0.2	-	< 0.5	< 10	-	0.6	1.03	15.4	-
			2017-Oct-05	20171005_E225548	7.93	128	128	< 5	< 0.5	< 0.5	960	< 0.1	-	140	0.0265	33.7	-	2.5	< 0.3	< 1	< 30	< 0.5	11.7	10.6	0.96	< 0.005	< 1	2.9	-	< 2000	-	< 0.05	< 0.02	8.4	-	-	< 0.2	-	< 0.5	< 10	-	0.5	1.1	8.7	-
			2018-Apr-24	M1-95 E225548	8.36	151	151	1.3	< 0.1	< 0.1	1130	< 0.1	< 0.05	164	0.0242	39.8	< 0.01	2.3	0.12	0.22	< 10	< 0.05	13.1	12.4	0.6	< 0.005	< 0.05	2.59	< 50	1570	1.75	< 0.05	< 0.01	9.48	546	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	< 0.1	0.736	1.02	8.4	< 0.06
				DUPLICATE	7.8	150	150	1.3	< 0.1	< 0.1	1110	< 0.1	< 0.05	163	0.0264	39.4	< 0.01	2.32	0.12	0.23	< 10	< 0.05	12.4	12.5	0.57	< 0.005	< 0.05	2.62	< 50	1570	1.8	< 0.05	< 0.01	9.34	540	< 0.2	< 0.01	< 0.1	0.1	< 0.3	< 0.1	0.719	1.07	8.1	< 0.06
			2018-Oct-16	MW1-95 (E225548)	7.42	129	129	2.3	< 0.1	< 0.1	1020	< 0.1	< 0.05	139	0.0293	34	< 0.01	2.19	0.11	0.25	< 10	< 0.05	11.1	10.8	0.65	< 0.005	< 0.05	2.53	< 50	1410	1.6	< 0.05	< 0.01	8.81	503	< 0.2	< 0.01	< 0.1	0.14	< 0.3	< 0.1	0.584	1.05	10.6	< 0.06
			2019-Apr-16	MW1-95 (E225548)	6.98	171	171	< 1	< 0.1	< 0.1	1250	< 0.1	< 0.05	188	0.0257	44.9	< 0.01	2.37	0.12	0.35	< 10	< 0.05	12.3	14.2	0.59	< 0.005	< 0.05	2.91	< 50	1690	1.94	< 0.05	< 0.01	10.3	608	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	< 0.1	0.72	1.14	8.3	< 0.06
			2019-Oct-10	MW1-95 (E225548)	8.15	132	132	2.4	< 0.1	< 0.1	996	< 0.1	< 0.05	143	0.0286	34.4	< 0.01	2.35	< 0.1	0.42	< 10	< 0.05	11.7	11.3	0.8	< 0.005	< 0.05	2.53	< 50	1500	1.68	< 0.05	< 0.01	8.68	494	< 0.2	< 0.01	< 0.1	0.24	< 0.3	< 0.1	0.501	1.03	13.3	< 0.2
				DUPLICATE	8.14	134	134	2.8	< 0.1	< 0.1	1000	< 0.1	< 0.05	145	0.0247	34.6	< 0.01	2.41	< 0.1	0.42	< 10	< 0.05	11.8	11.6	0.84	< 0.005	< 0.05	2.65	< 50	1490	1.61	< 0.05	< 0.01	8.84	496	< 0.2	< 0.01	< 0.1	0.26	0.33	< 0.1	0.517	1.1	13.4	< 0.2
			2020-Apr-24	MW1-95	7.73	138	138	1.2	< 0.1	< 0.1	1010	< 0.1	< 0.05	138	0.0222	37.4	< 0.01	2.08	< 0.1	0.29	< 10	< 0.05	12.2	10.8	0.51	< 0.005	< 0.05	2.31	< 50	1440	1.54	< 0.05	< 0.01	8.77	500	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	-	0.517	0.94	11.6	< 0.2
			2020-Oct-21	MW1-95 (E225548)	7.21	114	114	10.2	0.7	< 0.1	853	< 0.1	< 0.05	98	0.033	29.8	< 0.01	2.52	< 0.1	2.65	16	0.141	10.9	9.69	2.14	< 0.005	< 0.05	2.48	< 50	1500	1.54	< 0.05	0.024	7.92	413	< 0.2	< 0.01	< 0.1	0.54	0.96	-	0.393	1.04	24.3	< 0.2
			2021-May-20	MW1-95 (E225548)	7.04	141	141	3.2	< 0.1	< 0.1	1050	< 0.1	< 0.05	124	0.0493	37.9	< 0.01	2.31	0.1	0.95	< 10	0.086	10.9	11.2	9.9	< 0.005	< 0.05	2.65	< 50	1440	1.53	< 0.05	< 0.01	7.96	530	< 0.2	< 0.01	< 0.1	0.29	0.34	-	0.535	0.94	17	< 0.2
			2021-Oct-21	MW1-95 (E225548)	7.2	130	130	1.6	< 0.1	< 0.1	982	< 0.1	< 0.05	95	0.0281	35.2	< 0.01	2.18	< 0.1	0.64	< 10	< 0.05	11.9	10.2	1.88	< 0.005	< 0.05	2.91	< 50	1420	1.57	< 0.05	< 0.01	7.87	464	< 0.2	< 0.01	< 0.1	0.1	< 0.3	-	0.457	1.04	8.1	< 0.2
			2022-May-05	MW1-95 (E225548)	8.25	161	161	2.6	< 0.1	< 0.1	1150	< 0.1	< 0.05	142	0.0558	42.4	< 0.01	2.27	< 0.1	0.96	< 10	< 0.05	12.3	13.3	3.64	< 0.005	< 0.05	2.93	< 50	1620	1.76	< 0.05	< 0.01	8.5	574	< 0.2	< 0.01	< 0.1	0.28	< 0.3	-	0.707	1.14	15.8	< 0.2
			2022-Oct-18	MW1-95 (E225548)	8.05	147	147	3.3	< 0.1	< 0.1	1050	< 0.1	< 0.05	148	0.0522	37.9	< 0.01	2.2	< 0.1	0.93	< 10	0.063	12	12.7	6.33	< 0.005	< 0.05	2.98	< 50	1440	1.58	< 0.05	< 0.01	8.76	530	< 0.2	< 0.01	< 0.1	0.31	< 0.3	-	0.514	1.08	12.7	< 0.2
			2023-Apr-25	MW1-95	7.32	157	157	1.6	< 0.1	< 0.1	1140	< 0.1	< 0.05	172	0.0332	42	< 0.01	1.84	< 0.1	1.54	< 10	< 0.05	12.3	12.6	2.69	< 0.005	< 0.05	2.82	< 50	1490	1.72	< 0.05	< 0.01	8.48	586	< 0.2	< 0.01	< 0.1	0.21	< 0.3	-	0.647	1.08	8.9	< 0.2
			2023-Sep-27	MW1-95	6.65	152	152	1.8	< 0.1	< 0.1	1120	< 0.1	< 0.05	167	0.0359	40.5	< 0.01	2.01	0.1	0.47	< 10	< 0.05	13	12.3	2.16	< 0.005	< 0.05	3.09	< 50	1600	1.64	< 0.05	< 0.01	9	577	< 0.2	< 0.01	< 0.1	0.24	< 0.3	-	0.679	1.03	10.9	< 0.2
	MW2-95	33.28 - 35.63	2016-Mar-22	MW2-95_20160322	6.41	150	150	< 5	< 0.5	< 0.5	915	< 1	-	< 100	0.0411	40.7	-	2.1	< 0.3	< 1	< 30	< 0.5	11.7	11.7	6.35	-	< 1	4.8	-	< 2000	-	< 0.05	< 0.02	4.9	-	-	< 0.2	-	< 0.5	< 10	-	0.6	1.14	5.3	-
			2016-Sep-13	20160913_E225549	6.8	124	124	< 5	< 0.5	< 0.5	670	< 1	-	< 100	0.0352	33.2	-	2.2	< 0.3	< 1	< 30	< 0.5	12.9	10.1	2	< 0.005	< 1	3.4	-	< 2000	-	< 0.05	< 0.02	4.9	-	-	< 0.2	-	< 0.5	< 10	-	0.43	1.16	10	-
			2017-Mar-22	20170322_E225549	6.89	129	129	25	< 0.5	< 0.5	745	0.1	-	< 100	0.0581	33.4	-	2.5	< 0.3	< 1	< 30	< 0.5	11	11.1	3.62	-	< 1	3.4	-	< 2000	-	< 0.05	< 0.02	4.9	-	-	< 0.2	-	< 0.5	< 10	-	0.45	1.24	15.5	-
			2017-Apr-10	20171004_E225549	7.79	122	122	< 5	< 0.5	< 0.5	703	0.12	-	< 100	0.0357	31.9	-	2.4	< 0.3	< 1	< 30	< 0.5	12.4	10.3	1.85	< 0.005	< 1	3.5	-	< 2000	-	< 0.05	< 0.02	4.6	-	-	< 0.2	-	< 0.5	< 10	-	0.4	1.2	9.5	-
			2018-Apr-23	MW2-95 E225549	8.32	137	137	2.2	< 0.1	< 0.1	858	0.13	< 0.05	43	0.0411	35.5	< 0.01	2.19	< 0.1	0.23	< 10	< 0.05	13	11.8	2.19	< 0.005	< 0.05	3.85	< 50	996	1.22	< 0.05	< 0.01	4.95	508	< 0.2	< 0.01	< 0.1	0.15	< 0.3	< 0.1	0.483	1.14	9.9	< 0.06
			2018-Oct-15	MW2-95 (E225549)	7.17	120	120	2.9	< 0.1	< 0.1	647	0.1	< 0.05	38	0.047	31.4	< 0.01	2.18	< 0.1	0.45	< 10	< 0.05	11.5	9.98	3.48	< 0.005	< 0.05	3.48	< 50	869	1.03	< 0.05	< 0.01	4.27	482	< 0.2	< 0.01	< 0.1	0.21	< 0.3	< 0.1	0.47	1.16	13.4	0.149
			2019-Apr-16	MW2-95 (E225549)	6.89	144	144	1.6	< 0.1	< 0.1	751	0.13	< 0.05	43	0.0392	37.7	< 0.01	2.27	< 0.1	0.84	< 10	< 0.05	12.5	12	3.74	< 0.005	< 0.05	4.02	< 50	1040	1.08	< 0.05	< 0.01	5.38	513	< 0.2	< 0.01	< 0.1	0.17	< 0.3	< 0.1	0.517	1.26	15.5	< 0.06
			2019-Sep-10	MW2-95 (E225549)	8.21	119	119	8.6	0.5	< 0.1	598	0.11	< 0.05	48	0.0414	30.7	< 0.01	2.83	< 0.1	0.48	25	0.11	11.7	10.2	3.07	< 0.005	< 0.05	3.92	< 50	951	1.03	< 0.05	< 0.01	4.75	439	< 0.2	< 0.01	< 0.1	0.45	< 1.2	< 0.1	0.37	1.24	22	< 0.2
			2020-Apr-23	MW2-95	8.02	111	111	1.4	< 0.1	< 0.1	629	< 0.1	< 0.05	26	0.0206	29.9	< 0.01	2.66	< 0.1	0.22	< 10	< 0.05	10.7	8.91	1.4	< 0.005	< 0.05	2.82	< 50	765	0.85	< 0.05	< 0.01	3.67	412	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	-	0.348	1.21	9.7	< 0.2
			2020-Oct-21	MW2-95 (E225549)	7.05	119	119	4.5	0.61	< 0.1	590	0.131	< 0.05	46	0.0439	30.5	< 0.01	2.31	< 0.1	1.35	< 10	0.061	12	10.3	3.44	< 0.005	< 0.05	4.09	< 50	1060	1.07	< 0.05	0.011	4.9	442	< 0.2	< 0.01	< 0.1	0.36	0.38	-	0.401	1.25	22.7	< 0.2
			2021-May-19	MW2-95 (E225549)	6.86	135	135	2.4	0.1	< 0.1	762	0.114	< 0.05	39	0.0592	35.6	< 0.01	1.96	< 0.1	0.92	< 10	0.102	11.6	11.3	9.1	< 0.005	< 0.05	3.9	< 50	1030	1.16	< 0.05	< 0.01	5.11	542	< 0.2	< 0.01	< 0.1	0.33	< 0.3	-	0.491	1.11	17.6	< 0.2
			2021-Oct-20	MW2-95 (E225549)	6.95	128	128	2	< 0.1	< 0.1	600	0.14	< 0.05	46	0.0485	34.7	< 0.01	1.91	< 0.1	0.76	< 10	< 0.05	12.9	10	6.44	< 0.005	< 0.05	4.03	< 50	999	1.12	< 0.05	< 0.01	5.28	463	< 0.2	< 0.01	< 0.1	0.17	< 0.3	-	0.43	1.18	13.4	< 0.2
			2022-May-04	MW2-95 (E225549)	8.16	107	107	3.8	< 0.1	< 0.1	665	< 0.1	< 0.05	19	0.0288	28	< 0.01	2.67	< 0.1	0.43	< 10	< 0.05	10.4	9.06	2.04	< 0.005	< 0.05	2.64	< 50	837	1	< 0.05	< 0.01	4.02	421	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	-	0.332	1.45	5.2	< 0.2
			2022-Oct-17	MW2-95 (E225549)	7.95	132	132	2.3	< 0.1	< 0.1	578	0.124	< 0.05	60	0.0526	33.6	< 0.01	1.84	< 0.1	0.62	< 10	< 0.05	12.6	11.6	6.74	< 0.005	< 0.05	4.35	< 50	1220	1.15	< 0.05	< 0.01	6.32	493	< 0.2	< 0.01	< 0.1	0.16	< 0.3	-	0.512	1.22	8.1	< 0.2
			2023-Apr-24	MW2-95	7.29	131	131	2	< 0.1	< 0.1	922	0.107	< 0.05	22	0.0319	35.2	< 0.01	1.88	< 0.1	0.31	< 10	< 0.05	11.7	10.5	1.15	< 0.005	< 0.05	2.78	< 50	809	1.05	< 0.05	< 0.01	3.72	515	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	-	0.435	1.27	5	< 0.2
			2023-Sep-26	MW2-95	6.62	129	129	3	< 0.1	< 0.1	930	0.108	< 0.05	26	0.0349	34.7	< 0.01	2.11	< 0.1	0.34	< 10	< 0.05	12.6	10.4	2.1	< 0.005	< 0.05	3.23	< 50	884	1.13	< 0.05	< 0.01	4.07	531	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	-	0.5	1.12	11.4	< 0.2
	MW3-95	34.91 - 37.91	2016-Mar-23	MW3-95_20160323	6.49	149	149	< 5	< 0.5	< 0.5	906	< 1	-	< 100	0.0486	40.8	-	2.3	< 0.3	< 1	< 30	< 0.5	10.5	11.4	2.33	-	< 1	3.6	-	< 2000	-	< 0.05	< 0.02	3.7	-	-	< 0.2	-	< 0.5	< 10	-	0.57	0.87	7.7	-
			2016-Sep-13	20160913_E225550	6.81	142	142	< 5	< 0.5	< 0.5	888	< 1	-	< 100	0.036	38.1	-	2.3	< 0.3	< 1	< 30	< 0.5	12	11.5	0.75	< 0.005	< 1	3.1	-	< 2000	-	< 0.05	< 0.02	3.7	-	-	< 0.2	-	< 0.5	< 10	-	0.58	0.87	9.1	-
			2017-Mar-22	20170322_E225550	6.84	126	126	20.7	< 0.5	< 0.5	832	0.11	-	< 100	0.0545	32.8	-	2.2	< 0.3	< 1	< 30	< 0.5	10.2	10.7	3.42	-	< 1	3.2	-	< 2000	-	< 0.05	< 0.02	3.5	-	-	< 0.2	-	< 0.5	< 10	-	0.45	0.91	15.6	-
			2017-Oct-04	20171004_E225550	7.86	118	118	< 5	< 0.5	< 0.5	841	< 0.1	-	< 100	0.0295	30.8	-	2.6	< 0.3	< 1	< 30	< 0.5	10.6	10.1	0.84	< 0.005	< 1	3	-	< 2000	-	< 0.05	< 0.02	3.6	-	-	< 0.2	-	< 0.5	< 10	-	0.43	1	9.7	-
			2018-Apr-23	MW3-95 E225550	8.12	129	129	2.4	< 0.1	< 0.1	884	0.11	< 0.05	< 10	0.0339	34.1	< 0.01	2.1	< 0.1	< 0.2	< 10	< 0.05	11.3	10.6	1.16	< 0.005	< 0.05	2.99	< 50	904	0.97	< 0.05	< 0.01	3.68	449	< 0.2	< 0.01	< 0.1	0.15	< 0.3	< 0.1	0.515	0.93	9.7	< 0.06
			2018-Oct-15	MW3-95 (E225550)	7.4	52.6	52.6	1	< 0.1	< 0.1	364	< 0.1	< 0.05	< 10	0.0143	13.6	< 0.01	0.96	< 0.1	< 0.2	< 10	< 0.05	4.1	4.5	0.35	< 0.005	< 0.05	1.09	< 50	316	0.37	< 0.05	< 0.01	1.49	189	< 0.2	< 0.01	< 0.1	0.11	< 0.3	< 0.1	0.232	< 0.5	4	< 0.06
			2019-Apr-16	MW3-95 (E225550)	6.81	145	145	2	0.13	< 0.1	982	0.13	< 0.05	< 10	0.0469	37.2	< 0.01	2.2	< 0.1	0.32	< 10	< 0.05	11.2	12.5	1.44	< 0.005	< 0.05	3.71	< 50	974	0.91	< 0.05	< 0.01	4.21	499	< 0.2	< 0.01	< 0.1	0.2	< 0.3	< 0.1	0.519	1.01	13.5	< 0.06
			2019-Oct-09	MW3-95 (E225550)	8.27	130	130	4.8	< 0.1	< 0.1	894	0.13	< 0.05	< 10	0.0344	33.8	< 0.01	2.41	< 0.1	0.37	< 10	0.051	11.4	11	0.99	< 0.005	< 0.05	3.44	< 50	956	0.98	< 0.05	< 0.01	3.98	451	< 0.2	< 0.01	< 0.1	1.12	0.36	< 0.1	0.476	0.93	14.7	< 0.2
			2020-Apr-23	MW3-95	7.99	131	131	1.9	< 0.1	< 0.1	948	0.121	< 0.05	< 10	0.034	34.9	< 0.01	2.09	< 0.1	0.4	< 10	< 0.05	11.8	10.8	0.95	< 0.005	< 0.05	2.97	< 50	889	0.9	< 0.05	< 0.01	3.71	455	< 0.2	< 0.01	< 0.1	0.14	< 0.3	-	0.446	0.94	13.4	< 0.2
			2020-Oct-20	MW3-95 (E225550)	7.13	140	140	9.5	1.96	< 0.1	955	0.119	< 0.05	< 10	0.0559	36	< 0.01	2.26	< 0.1	2.26	22	0.154	11.7	12	1.9	< 0.005	< 0.05	3.66	< 50	1110	1.01	< 0.05	0.022	3.96	505	< 0.2	< 0.01	< 0.1	0.54	1.25	-	0.581	0.94	37.2	< 0.2
				Duplicate	7.14	133	133	10.2	1.87	< 0.1	907	0.117	< 0.05	< 10	0.0566	34.2	< 0.01	2.32	< 0.1	2.18	22	0.14	11.2	11.5	1.78	< 0.005	< 0.05	3.54	< 50	1070	1.03	< 0.05	0.023	3.83	458	< 0.2	< 0.01	< 0.1	0.5	1.2	-	0.551	0.94	35	< 0.2
			2021-May-19	MW3-95 (E225550)	6.69	138	138	2.3	< 0.1	< 0.1	959	0.117	< 0.05	< 10	0.0489	36.6	< 0.01	2.06	< 0.1	0.88	< 10	0.064	10.8	11.3	5.96	< 0.005	< 0.05	3.31	< 50	965	0.93	< 0.05	< 0.01	3.74	488	< 0.2	< 0.01	< 0.1	0.24	< 0.3	-	0.491	0.93	19.4	< 0.2
			2021-Oct-20	MW3-95 (E225550)	7.06	144	144	2.4	< 0.1	< 0.1	1020	0.173	< 0.05	< 10	0.0546	38.9	< 0.01	1.62	< 0.1	0.9	< 10	0.062	13.2	11.4	3.48	< 0.005	< 0.05	4.2	< 50	974	0.97	< 0.05	< 0.01	3.9	499	< 0.2	< 0.01	< 0.1	0.17	< 0.3	-	0.525	0.89	12.9	< 0.2
			2022-May-04	MW3-95 (E225550)	8.13	132	132	2.4	< 0.1	< 0.1	989	0.144	< 0.05	< 10	0.0428	34.1	< 0.01	2.04	< 0.1	0.49	< 10	< 0.05	11.9	11.3	2.53	< 0.005	< 0.05	3.54	< 50	958	1.03	< 0.05	< 0.01	3.83	463	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	-	0.426	1.1	9	< 0.2
			2022-Oct-17	MW3-95 (E225550)	7.83	112	112	1.3	< 0.1	< 0.1	834	0.139	< 0.05	< 10	0.0482	27.8	< 0.01	1.24	< 0.1	0.27	< 10	< 0.05	9.3	10.3	2.32	< 0.005	< 0.05	3.58	< 50	704	0.65	< 0.05	< 0.01	3.12	399	< 0.2	< 0.01	< 0.1	0.14	< 0.3	-	0.424	0.79	8.1	< 0.2
			2023-Apr-24	MW3-95	6.84	138	138	1.7	< 0.1	< 0.1	1050	0.193	< 0.05	< 10	0.0575	36.7	< 0.01	0.69	< 0.1	0.45	< 10	< 0.05	12.9	11.4	6.35	< 0.005	< 0.05	4.71	< 50	928	0.94	< 0.05	< 0.01	3.74	499	< 0.2	< 0.01	< 0.1	0.14	< 0.3	-	0.496	0.9	9.5	< 0.2
			2023-Sep-26	MW3-95	6.38	131	131	1.8	< 0.1	< 0.1	1020	0.168	< 0.05	< 10	0.0588	35.2	< 0.01	0.79	< 0.1	0.46	< 10	< 0.05	13.1	10.5	7.09	< 0.005	< 0.05	4.6	< 50	946	1.04	< 0.05	< 0.01	3.76	493	< 0.2	< 0.01	< 0.1	0.23	< 0.3	-	0.508	0.83	15.1	< 0.2

Table 8: Metals In Groundwater

Location Groups	Sample Location	Well Screen Depth (mbg)	Sample Date	Sample Name	pH (lab)	hardness as CaCO3	hardness as CaCO3 (dissolved)	aluminum (dissolved)	antimony (dissolved)	arsenic (dissolved)	barium (dissolved)	beryllium (dissolved)	bismuth (dissolved)	boron (dissolved)	cadmium (dissolved)	calcium (dissolved)	cesium (dissolved)	chromium (III+VI) (dissolved)	cobalt (dissolved)	copper (dissolved)	iron (dissolved)	lead (dissolved)	lithium (dissolved)	magnesium (dissolved)	manganese (dissolved)	mercury (dissolved)	molybdenum (dissolved)	nickel (dissolved)	phosphorus (dissolved)	potassium (dissolved)	calcium (dissolved)	selenium (dissolved)	silver (dissolved)	sodium (dissolved)	strontium (dissolved)	sulfur (dissolved)	thallium (dissolved)	thorium (dissolved)	tin (dissolved)	titanium (dissolved)	tungsten (dissolved)	uranium (dissolved)	vanadium (dissolved)	zinc (dissolved)	zirconium (dissolved)
				RDL			1 - 5	0.1 - 0.5	0.1 - 0.5		0.1 - 1	0.05	10 - 100	0.005		0.01	0.1 - 1	0.1 - 0.3	0.2 - 1	10 - 30	0.05 - 0.5						0.005	0.05 - 1	0.5 - 1	50	2000	0.2	0.05	0.01 - 0.02		0.2	0.01 - 0.2	0.1	0.1 - 0.5	0.3 - 10	0.1	0.2	0.5	1 - 5	0.06 - 0.2
					pH	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
				BC CSR DW	ns	ns	ns	9500	6	10	1000	8	ns	5000	5	ns	ns	50	1	1500	na	10	8	ns	na	1	250	80	ns	ns	ns	10	20	200	2500	ns	ns	ns	2500	ns	3	20	20	3000	ns
				BC CSR AWF	ns	ns	ns	ns	80	50	10000	1.5	ns	12000	1.5-4.0	ns	ns	10	40	20-90	na	40-160	ns	ns	ns	0.25	10000	250-1500	ns	ns	ns	20	0.50-15	ns	ns	ns	ns	3	ns	ns	1000	ns	85	ns	75-3200	ns
				BC SDWQG - AO	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	1000	300	ns	ns	ns	ns	20	ns	ns	ns	10	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	5000	ns
				BC SDWQG - MAC	ns	ns	ns	9500	6	10	ns	ns	ns	5000	5	ns	ns	50	1	2000	ns	5	ns	ns	ns	120	1	88	80	ns	ns	ns	10	ns	ns	7000	ns	ns	ns	ns	ns	ns	20	ns	3000	ns
				BC WQG (Approved) AWF, Long-term	**ns**	**ns**	**ns**	**61 - 290**	**74**	**5**	**ns**	**ns**	**ns**	**1200**	**0.12 - 0.46**	**ns**	**ns**	**ns**	**4**	**0.2 - 1.9**	**ns**	**8.9**	**ns**	**ns**	**810 - 3200**	**0.00125**	**7600**	**0.8 - 7.1**	**5**	**ns**	**ns**	**2**	**0.050**	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**4.2 - 84**	**ns**
				BC WQG (Approved) AWF, Short-term	**ns**	**ns**	**ns**	**ns**	**250**	**ns**	**ns**	**ns**	**ns**	**ns**	**0.26 - 2.8**	**ns**	**ns**	**ns**	**110**	**0.45 - 11**	**350**	**30 - 770**	**ns**	**ns**	**1000 - 7000**	**ns**	**46000**	**13 - 140**	**5**	**ns**	**ns**	**2**	**0.10**	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**25 - 100**	**ns**
				BC WQG (Working) AWF, Long-term	**ns**	**ns**	**ns**	**ns**	**9**	**ns**	**1000**	**0.13**	**ns**	**ns**	**ns**	**ns**	**ns**	**1**	**ns**	**ns**	**25**	**ns**	**ns**	**ns**	**ns**	**ns**	**25**	**ns**	**ns**	**ns**	**ns**	**ns**	**0.5**	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**8.5**	**ns**	**ns**	**ns**
				Health Canada GCDWQ, MAC	**ng**	**ng**	**ng**	**2900**	**6**	**10**	**2000**	**ng**	**ng**	**5000**	**7**	**ng**	**ng**	**50**	**ng**	**2000**	**ng**	**5**	**ng**	**ng**	**120**	**1**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**50**	**ng**	**ng**	**7000**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**20**	**ng**	**ng**	**ng**
				Health Canada GCDWQ, AO/Other	**7-10.5**	**ng**	**ng**	**100**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**1000**	**300**	**ng**	**ng**	**ng**	**ng**	**20**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**20**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**	**ng**
Locations	MW4-06	33.60 - 36.60	2016-Mar-23	MW4-06_20160323	**6.78**	434	434	< 5	< 0.5	< 0.5	224	< 0.1	-	290	0.11	120	-	< 0.1	**1.69**	**1.5**	**3430**	< 0.5	**16.3**	32.7	**153**	-	< 0.1	**13.5**	-	3600	-	< 0.05	< 0.02	**27.6**	-	-	< 0.2	-	< 0.5	13	-	5.13	0.57	6	-
			2016-Jun-20	20160620_E265109	**6.64**	207	207	< 5	< 0.5	< 0.5	219	< 0.1	-	120	0.0271	55.8	-	**1.3**	0.96	< 1	**921**	< 0.5	**12.7**	16.5	**26**	< 0.005	< 1	**5.5**	-	2600	-	0.087	< 0.02	**20.6**	-	-	< 0.2	-	< 0.5	< 10	-	1.64	0.92	6.2	-
			2016-Sep-13	20160913_E265109	**6.97**	240	240	< 5	< 0.5	< 0.5	232	< 0.1	-	150	0.0378	64.1	-	**1.5**	0.92	< 1	< 30	< 0.5	**15.9**	19.5	4.4	**0.007**	< 1	**6.6**	-	2500	-	< 0.05	< 0.02	18.5	-	-	< 0.2	-	< 0.5	< 10	-	1.35	0.8	6.9	-
				20160913_E265109DUP	7.01	235	235	< 5	< 0.5	< 0.5	229	< 0.1	-	140	0.0408	62.3	-	**1.5**	0.93	< 1	< 30	< 0.5	**15.9**	19.2	4.39	**0.0069**	< 1	**6.8**	-	2500	-	< 0.05	< 0.02	18.4	-	-	< 0.2	-	< 0.5	< 10	-	1.32	0.83	5.5	-
			2016-Nov-21	20161121_E265109	7.15	284	284	< 5	< 0.5	< 0.5	169	< 0.1	-	170	0.0537	75.7	-	**1.4**	**1.01**	< 1	36	< 0.5	**16.2**	23.1	11.7	**0.0063**	< 1	**9.5**	-	2900	-	< 0.05	< 0.02	**20.3**	-	-	< 0.2	-	< 0.5	< 10	-	2.36	0.64	8.8	-
			2017-Mar-22	20170322_E265109	**6.81**	403	403	< 5	< 0.5	< 0.5	202	< 0.1	-	260	0.112	107	-	**1.2**	**1.54**	**1.4**	**1290**	< 0.5	**14.3**	32.7	**110**	-	< 0.1	**11.6**	-	3600	-	< 0.05	< 0.02	**23.8**	-	-	< 0.2	-	< 0.5	< 10	-	5.15	0.72	14.8	-
			2017-Jun-14	20170614_E265109	7.03	244	244	< 5	< 0.5	< 0.5	207	< 0.1	-	130	0.05	64.8	-	**1.8**	**1.15**	**1.1**	132	< 0.5	**13.9**	19.9	**23.5**	< 0.005	< 1	**7.2**	-	2800	-	0.069	< 0.02	19.9	-	-	< 0.2	-	< 0.5	< 10	-	3.38	0.99	14.8	-
				20170614_E265109DUP	7.11	243	243	< 5	< 0.5	< 0.5	206	< 0.1	-	130	0.0463	64.5	-	**1.8**	**1.16**	**1.1**	134	< 0.5	**14**	19.8	**23.3**	< 0.005	< 1	**7.2**	-	2800	-	0.071	< 0.02	19.9	-	-	< 0.2	-	< 0.5	< 10	-	3.38	1.02	14.9	-
			2017-Oct-05	20171005_E265109	8.08	208	208	< 5	< 0.5	< 0.5	163	< 0.1	-	110	0.0348	54.9	-	**2.1**	0.62	< 1	< 30	< 0.5	**13.8**	17.4	3.94	< 0.005	< 1	**5.3**	-	2300	-	0.075	< 0.02	15.7	-	-	< 0.2	-	< 0.5	< 10	-	1.29	1.02	7.7	-
			2018-Apr-24	MW4-06 E265109	7.49	547	547	**1.2**	< 0.1	0.21	210	< 0.1	< 0.05	518	0.133	159	< 0.01	0.66	**2.46**	**1.56**	**4180**	< 0.05	**17.3**	41.5	**173**	< 0.005	0.075	**14.3**	< 50	5000	1.87	0.063	< 0.01	**48.7**	951	< 0.2	< 0.01	< 0.1	< 0.5	< 10	< 0.1	**14.8**	0.53	9.9	< 0.06
			2018-Oct-16	MW4-06 (E265109)	7.66	325	325	< 1	< 0.1	0.14	116	< 0.1	< 0.05	312	0.0749	85.7	< 0.01	0.69	**2.85**	**1.82**	< 10	< 0.05	**15.5**	26.9	5.67	< 0.005	0.063	**12.5**	< 50	3410	1.35	0.068	0.014	**31**	618	< 0.2	< 0.01	< 0.1	0.11	< 0.3	< 0.1	6.71	1.1	11.6	< 0.06
				DUPLICATE	7.58	326	326	< 1	< 0.1	0.15	116	< 0.1	< 0.05	306	0.068	85.5	< 0.01	0.72	**2.85**	**1.78**	< 10	< 0.05	**15.6**	27.4	5.77	< 0.005	0.061	**12.4**	< 50	3340	1.37	< 0.05	0.014	**30.3**	618	< 0.2	< 0.01	< 0.1	0.11	< 0.3	< 0.1	6.77	1.05	12.3	< 0.06
			2019-Apr-16	MW4-06 (E265109)	7.4	216	216	< 1	< 0.1	0.14	114	< 0.1	< 0.05	294	0.0991	58.1	< 0.01	0.27	**3.47**	**2.77**	**404**	< 0.05	**10.9**	17.2	**194**	< 0.005	0.166	**12.9**	< 50	3680	0.99	0.09	< 0.01	**41**	402	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	< 0.1	3.99	0.95	7.2	< 0.06
			2019-Oct-10	MW4-06 (E265109)	8.26	130	130	1.7	< 0.1	< 0.1	105	< 0.1	< 0.05	77	0.0369	34.5	< 0.01	**1.55**	0.76	1.41	< 10	< 0.05	**9**	10.7	**39.3**	< 0.005	0.14	**6.44**	< 50	2500	0.84	0.095	< 0.01	**22.3**	255	< 0.2	< 0.01	< 0.1	0.17	< 0.3	< 0.1	1.69	0.87	6.1	< 0.2
			2020-Apr-24	MW4-06	8.12	250	250	< 1	< 0.1	< 0.1	228	< 0.1	< 0.05	181	0.0764	71.7	< 0.01	0.38	**1.58**	0.83	**4760**	< 0.05	**10**	17.3	**205**	< 0.005	0.072	**8.68**	< 50	2680	0.52	0.057	< 0.01	**20.7**	567	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	-	4.22	< 0.5	4.8	< 0.2
				Duplicate	7.8	249	249	1.1	< 0.1	< 0.1	224	< 0.1	< 0.05	174	0.0706	71.2	< 0.01	0.37	**1.58**	0.86	**4790**	< 0.05	**10**	17.4	**206**	< 0.005	0.084	**8.89**	< 50	2690	0.55	< 0.05	< 0.01	**20.6**	574	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	-	4.13	< 0.5	5.4	< 0.2
			2020-Oct-21	MW4-06 (E265109)	7.41	332	332	1.6	< 0.1	0.16	244	< 0.1	< 0.05	257	0.0659	87.7	< 0.01	0.82	**1.39**	**1.79**	183	< 0.05	**13.7**	27.5	**28.4**	< 0.005	0.102	**12.8**	< 50	3150	1.2	0.059	0.012	**25.1**	693	< 0.2	< 0.01	< 0.1	0.13	< 0.3	-	7.34	0.96	10.8	< 0.2
			2021-May-20	MW4-06 (E265109)	7.07	375	375	1.8	< 0.1	0.18	400	< 0.1	< 0.05	400	0.0952	107	< 0.01	< 0.5	**2.59**	**2.36**	**8530**	< 0.05	**11.8**	26.2	**350**	< 0.005	0.082	**14.9**	< 50	4000	0.83	0.058	< 0.01	**39.5**	996	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	-	**12.7**	0.59	12.3	< 0.2
			2021-Oct-21	MW4-06 (E265109)	7.56	254	254	1.1	< 0.1	< 0.1	233	< 0.1	< 0.05	150	0.0399	72.1	< 0.01	< 0.5	**1.63**	**1.09**	**2860**	< 0.05	**9.5**	17.9	**91.5**	< 0.005	0.066	**7.74**	< 50	2370	0.63	0.078	< 0.01	18.4	610	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	-	5.48	< 0.5	4.8	< 0.2
			2022-May-05	MW4-06 (E265109)	8.31	269	269	1.7	< 0.1	< 0.1	332	< 0.1	< 0.05	176	0.0932	77	< 0.01	< 0.5	**1.22**	1.09	**10600**	< 0.05	**9.6**	18.7	**230**	< 0.005	0.078	**7.28**	< 50	3150	0.71	0.054	< 0.01	**26.2**	680	< 0.2	< 0.01	< 0.1	0.24	< 0.3	-	3.99	< 0.5	**37.9**	< 0.2
				Duplicate (MW4-06)	8.23	159	159	2.3	< 0.1	< 0.1	**1160**	< 0.1	< 0.05	144	0.0522	42.2	< 0.01	**2.2**	< 0.1	0.93	< 10	< 0.05	**12.4**	13.1	3.57	< 0.005	< 0.05	**2.83**	< 50	1580	1.62	< 0.05	< 0.01	8.46	581	< 0.2	< 0.01	< 0.1	0.28	< 0.3	-	0.685	1.11	**16**	< 0.2
			2022-Oct-18	MW4-06 (E265109)	8.11	585	585	1.6	< 0.1	0.27	274	< 0.1	< 0.05	481	0.177	153	< 0.01	< 0.5	**3.09**	**3.86**	**586**	< 0.05	**17.3**	49.4	**152**	**0.005**	0.142	**32.5**	< 50	4950	1.61	0.089	0.017	**50.5**	1160	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	-	**18.5**	1.07	9.7	< 0.2
				Duplicate (MW4-06)	8.11	157	157	2.7	< 0.1	< 0.1	**1120**	< 0.1	< 0.05	154	0.0476	41.5	< 0.01	**2.15**	< 0.1	0.98	< 10	0.066	**12**	12.9	6.54	< 0.005	< 0.05	**2.75**	< 50	1460	1.58	< 0.05	< 0.01	8.47	575	< 0.2	< 0.01	< 0.1	0.32	< 0.3	-	0.502	1.04	**12.6**	< 0.2
	MW5-06	36.37 - 39.37	2016-Mar-23	MW5-06_20160323	7.37	188	188	< 5	< 0.5	< 0.5	66	< 0.1	-	< 100	0.0235	69.1	-	< 1	< 0.3	< 1	272	< 0.5	4.3	3.7	**20.9**	-	< 1	1.5	-	< 2000	-	0.137	< 0.02	3.5	-	-	< 0.2	-	< 0.5	< 10	-	0.7	< 0.5	< 5	-
			2016-Jun-20	20160620_E265110	7	168	168	< 5	< 0.5	< 0.5	70	< 0.1	-	< 100	0.027	61.6	< 0.01	< 0.3	< 0.3	< 1	85	< 0.5	4.2	3.54	12.2	< 0.005	< 1	**9.9**	-	< 2000	-	0.077	< 0.02	3.7	-	-	< 0.2	-	< 0.5	< 10	-	0.46	< 0.5	7.9	-
				20160620_E265110DUP	7.18	166	166	< 5	< 0.5	< 0.5	69	< 1	-	< 100	0.0242	60.8	-	< 1	< 0.3	< 1	86	< 0.5	4.3	3.47	11.3	< 0.005	< 1	1.3	-	< 2000	-	0.078	< 0.02	3.6	-	-	< 0.2	-	< 0.5	< 10	-	0.47	< 0.5	6.9	-
			2016-Sep-14	20160914_E265110	7.37	139	139	< 5	< 0.5	< 0.5	56	< 1	-	< 100	0.0201	50.9	-	< 1	< 0.3	< 1	149	< 0.5	4.8	2.98	7.19	< 0.005	< 1	1	-	< 2000	-	0.095	< 0.02	3.1	-	-	< 0.2	-	< 0.5	< 10	-	0.4	< 0.5	< 5	-
			2016-Nov-21	20161121_E265110	7.54	140	140	< 5	< 0.5	< 0.5	61	< 1	-	< 100	0.0215	51.2	-	< 1	< 0.3	< 1	115	< 0.5	4.6	3.02	10	< 0.005	< 1	< 1	-	< 2000	-	0.139	< 0.02	3.1	-	-	< 0.2	-	< 0.5	< 10	-	0.45	< 0.5	< 5	-
			2017-Mar-22	20170322_E265110	7.59	149	149	23	< 0.5	< 0.5	62	< 0.1	-	< 100	0.0306	53.9	-	< 1	< 0.3	< 1	162	< 0.5	4.2	3.45	14.7	-	< 1	< 1	-	< 2000	-	0.112	< 0.02	3.2	-	-	< 0.2	-	< 0.5	< 10	-	0.56	< 0.5	8.8	-
			2017-Jun-14	20170614_E265110	7.61	118	118	< 5	< 0.5	< 0.5	56	< 0.1	-	< 100	0.0187	43	-	< 1	< 0.3	< 1	146	< 0.5	4.5	2.58	7.96	< 0.005	< 1	1.1	-	< 2000	-	0.062	< 0.02	3.2	-	-	< 0.2	-	< 0.5	< 10	-	0.3	< 0.5	7.5	-
			2017-Oct-05	20171005_E265110	8.12	111	111	< 5	< 0.5	< 0.5	51	< 0.1	-	< 100	0.0152	40.2	-	< 1	< 0.3	< 1	142	< 0.5	3.9	2.45	5.92	< 0.005	< 1	< 1	-	< 2000	-	0.127	< 0.02	3.1	-	-	< 0.2	-	< 0.5	< 10	-	0.28	< 0.5	< 5	-
			2018-Apr-23	MW5-06 E265110	8.4	149	149	2.3	< 0.1	< 0.1	62.6	< 0.1	< 0.05	< 10	0.0225	54.1	< 0.01	0.43	< 0.1	**0.3**	141	< 0.05	4.2	3.34	**29.8**	< 0.005	0.444	0.81	< 50	1200	0.29	0.105	< 0.01	3.54	695	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	< 0.1	0.7	< 0.5	3.8	< 0.06
			2018-Oct-15	MW5-06 (E265110)	7.92	45.6	45.6	< 1	< 0.1	< 0.1	19.7	< 0.1	< 0.05	< 10	0.0088	16.5	< 0.01	0.12	< 0.1	0.2	40	< 0.05	1.5	1.06	4.01	< 0.005	0.11	< 0.5	< 50	373	< 0.2	< 0.05	< 0.01	1.24	225	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	< 0.1	0.153	< 0.5	3	< 0.06
			2019-Apr-17	MW5-06 (E265110)	7.75	197	197	1.9	< 0.1	< 0.1	71.7	< 0.1	< 0.05	< 10	0.0274	71.4	< 0.01	0.23	< 0.1	0.52	141	< 0.05	4.4	4.68	16.4	< 0.005	0.432	0.8	< 50	1330	0.3	0.131	< 0.01	3.98	857	< 0.2	< 0.01	< 0.1	0.17	< 0.3	< 0.1	0.947	< 0.5	4.4	< 0.06
			2019-Sep-10	MW5-06 (E265110)	8.34	151	151	5.9	0.88	< 0.1	62	< 0.1	< 0.05	< 10	0.0211	54.7	< 0.01	0.42	< 0.1	0.47	74	< 0.05	4.6	3.52	5.11	< 0.005	0.336	0.87	< 50	1260	0.33	0.109	< 0.01	3.66	709	< 0.2	< 0.01	< 0.1	0.32	< 0.6	< 0.1	0.573	< 0.5	10.8	< 0.2
			2020-Apr-23	MW5-06	8.34	175	175	2.6	< 0.1	< 0.1	68.5	< 0.1	< 0.05	< 10	0.0185	64.1	< 0.01	0.25	< 0.1	0.67	99	< 0.05	5	3.66	14.6	< 0.005	0.388	0.91	< 50	1240	0.33	0.161	< 0.01	3.7	793	< 0.2	< 0.01	< 0.1	0.1	< 0.3	-	0.769	< 0.5	7.4	< 0.2
			2020-Oct-20	MW5-06 (E265110)	7.79	134	134	4.1	0.87	< 0.1	60.7	< 0.1	< 0.05	< 10	0.026	48.6	< 0.01	0.36	< 0.1	**1.12**	37	< 0.05	4.4	3.19	3.44	< 0.005	0.296	0.89	< 50	1190	0.33	0.108	< 0.01	3.22	651	< 0.2	< 0.01	< 0.1	0.22	< 0.3	-	0.495	< 0.5	9	< 0.2
			2021-May-19	MW5-06 (E265110)	7.48	164	164	2.3	< 0.1	< 0.1	61.1	< 0.1	< 0.05	< 10	0.0331	60.2	< 0.01	< 0.5	0.11	0.5	57	< 0.05	4.2	3.46	14.2	< 0.005	0.299	0.93	< 50	1180	0.35	0.133	< 0.01	3.35	791	< 0.2	< 0.01	< 0.1	0.16	< 0.3	-	0.623	< 0.5	8.2	< 0.2
			2021-Oct-20	MW5-06 (E265110)	7.72	151	151	3.3	< 0.1	< 0.1	62	< 0.1	< 0.05	< 10	0.0348	55.1	< 0.01	< 0.5	< 0.1	0.64	18	< 0.05	4.8	3.23	3.82	< 0.005	0.277	0.88	< 50	1110	0.31	0.13	< 0.01	3.27	665	< 0.2	< 0.01	< 0.1	0.12	< 0.3	-	0.467	< 0.5	4.9	< 0.2
			2022-May-04	MW5-06 (E265110)	8.32	172	172	2.3	< 0.1	< 0.1	69.5	< 0.1	< 0.05	< 10	0.012	62.2	< 0.01	< 0.5	0.48	0.32	94	< 0.05	5	3.95	**34.5**	< 0.005	0.339	0.83	< 50	1290	0.34	0.107	< 0.01	3.62	801	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	-	0.546	< 0.5	< 1	< 0.2
			2022-Oct-17	MW5-06 (E265110)	8.15	122	122	4.1	< 0.1	< 0.1	53.4	< 0.1	< 0.05	< 10	0.0259	43.8	< 0.01	< 0.5	< 0.1	0.53	34	< 0.05	4.3	3.04	4.06	< 0.005	0.217	1.04	< 50	1100	0.3	0.128	< 0.01	3.43	593	< 0.2	< 0.01	< 0.1	0.11	< 0.3	-	0.287	< 0.5	3.3	< 0.2
			2023-Apr-24	MW5-06	7.81	137	137	2	< 0.1	< 0.1	60	< 0.1	< 0.05	< 10	0.0145	49.7	0.028	< 0.5	0.39	0.24	89	< 0.05	4.4	3.11	16.4	< 0.005	0.307	0.95	< 50	1090	0.31	0.116	< 0.01	3.07	652	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	-	0.366	< 0.5	1.2	< 0.2
			2023-Sep-26	MW5-06	7.14	170	170	4.1	< 0.1	< 0.1	69.7	< 0.1	< 0.05	< 10	0.0202	62.2	< 0.01	< 0.5	< 0.1	0.24	51	< 0.05	5.1	3.66	5.79	< 0.005	0.331	0.95	< 50	1220	0.32	0.151	< 0.01	3.43	824	< 0.2	< 0.01	< 0.1	< 0.1	< 0.3	-	0.709	< 0.5	2.2	< 0.2

Notes:

•	samples collected at the same location and date are blind field duplicate/parent pairs
-.-	sample not analyzed for parameter indicated
<	less than reported detection limit
Sample Type	N (Normal)
Sample Type	FD (Duplicate)
Fraction	F (filtered/dissolved)
Fraction	T (total)
mbg	metres below grade
ns	no standard listed
ng	no guideline listed
na	standard not applicable
µg/L	microgram per litre
mg/L	milligram per litre
pH	potential of hydrogen
BC CSR DW	BC Contaminated Sites Regulation, Schedule 3.2 Generic Numerical Water Standards, Drinking Water
BC CSR AWF	BC Contaminated Sites Regulation, Schedule 3.2 Generic Numerical Water Standards, Freshwater Aquatic Life
BC SDWQG - AO	BC Source Drinking Water Quality Guidelines, aesthetic objective
BC SDWQG - MAC	BC Source Drinking Water Quality Guidelines, maximum allowable concentration
BC WQG (Approved) AWF, Long-term	BC Approved Water Quality Guidelines, Freshwater Aquatic Life, Long-term
BC WQG (Approved) AWF, Short-term	BC Approved Water Quality Guidelines, Freshwater Aquatic Life, Short-term
BC WQG (Working) AWF, Long-term	BC Working Water Quality Guidelines, Freshwater Aquatic Life, Long-term
Health Canada GCDWQ, MAC	Health Canada Guidelines for Canadian Drinking Water Quality, Maximum Acceptable Concentrations
Health Canada GCDWQ, AO/Other	Health Canada Guidelines for Canadian Drinking Water Quality, Aesthetic Objectives

Figures

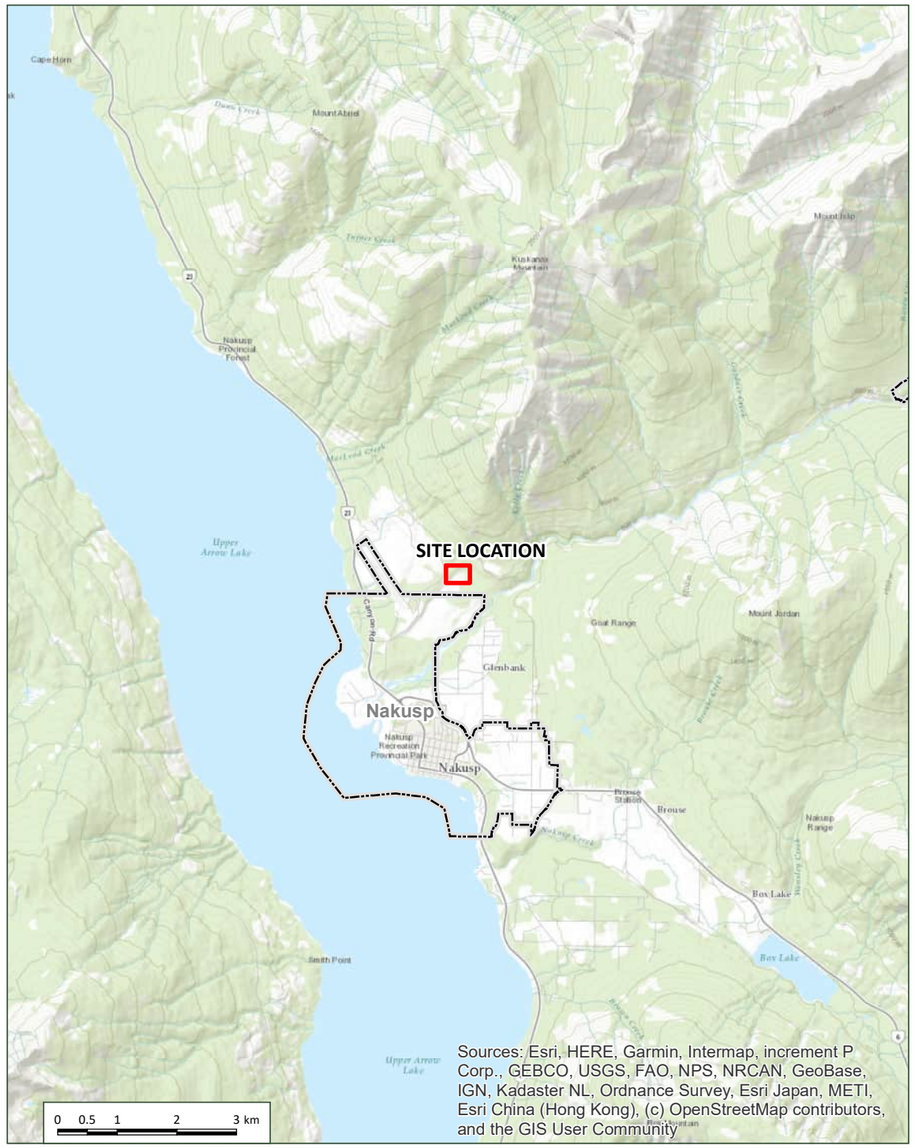
Hydrogeology and Hydrology Characterization Report

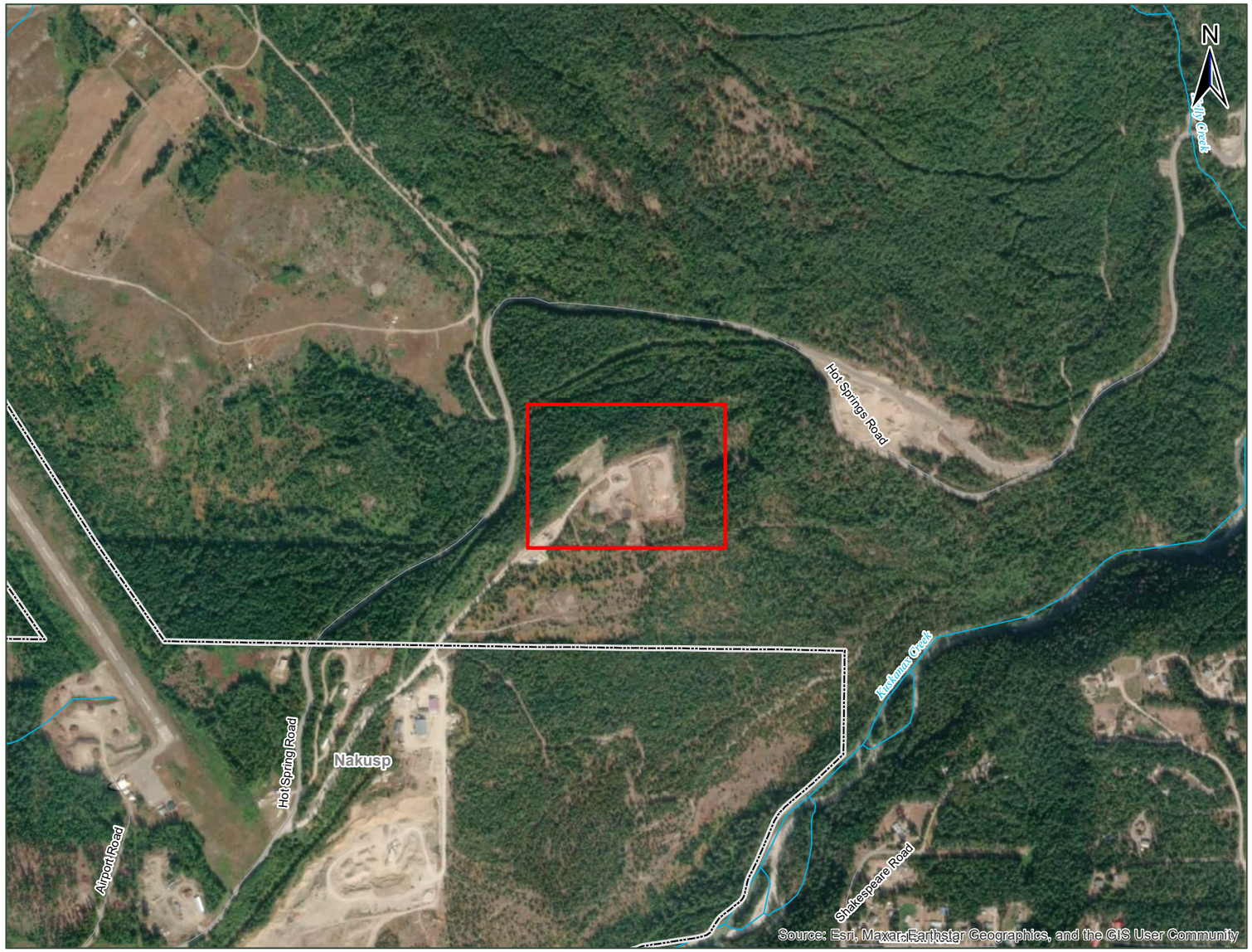
Nakusp Landfill

Regional District of Central Kootenay

SLR Project No.: 219.030089.00001

September 27, 2024





NOTES:
BASEDATA:
- FRESHWATER ATLAS
GOVERNMENT OF BRITISH COLUMBIA

LEGEND:
- SITE BOUNDARY
- MUNICIPAL BOUNDARIES
- WATERCOURSE

0 50 100 200 300 m

SCALE 1:10,000
PAGE SIZE 11 x 17
NAD 1983 UTM Zone 11N

THIS MAP IS FOR CONCEPTUAL PURPOSES ONLY
AND SHOULD NOT BE USED FOR NAVIGATION

REGIONAL DISTRICT OF CENTRAL KOOTENAY
NAKUSP LANDFILL
NAKUSP, BC

HYDROGEOLOGY AND
HYDROLOGY CHARACTERIZATION REPORT

SITE LOCATION

SLR

FIGURE NO:
1

DATE: September 24, 2024

PROJECT NO: 219.030089.00001

LEGEND:

- PROPERTY BOUNDARY
- SITE BOUNDARY
- GROUND ELEVATION CONTOURS (masl)
- FENCE
- MONITORING WELL
- CROSS SECTION A-A' (REFER TO FIGURE 7)
- CROSS SECTION B-B' (REFER TO FIGURE 8)

NOTES:

NOT A LEGAL SURVEY. DO NOT USE FOR CONSTRUCTION.

REFERENCED FROM: REGIONAL DISTRICT OF CENTRAL KOOTENAY DATA TITLED FIG1_SITE_MAP.DWG AND SITE RECONNAISSANCE INFORMATION.
ParcelPolygon from ArcGIS: LAND TITLE AND SURVEY AUTHORITY OF BRITISH COLUMBIA (PARCELMAP BC)

IMAGERY: AERIAL IMAGERY SUPPLIED TO SLR BY RDCK IN MARCH 2024 AND ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY (IMAGE DATE: 2022)

0 20 40 80 120 m

SCALE 1:2,000
WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT
NAD 1983 UTM Zone 11 U

REGIONAL DISTRICT OF CENTRAL KOOTENAY
NAKUSP LANDFILL
NAKUSP, BC

HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

SITE PLAN

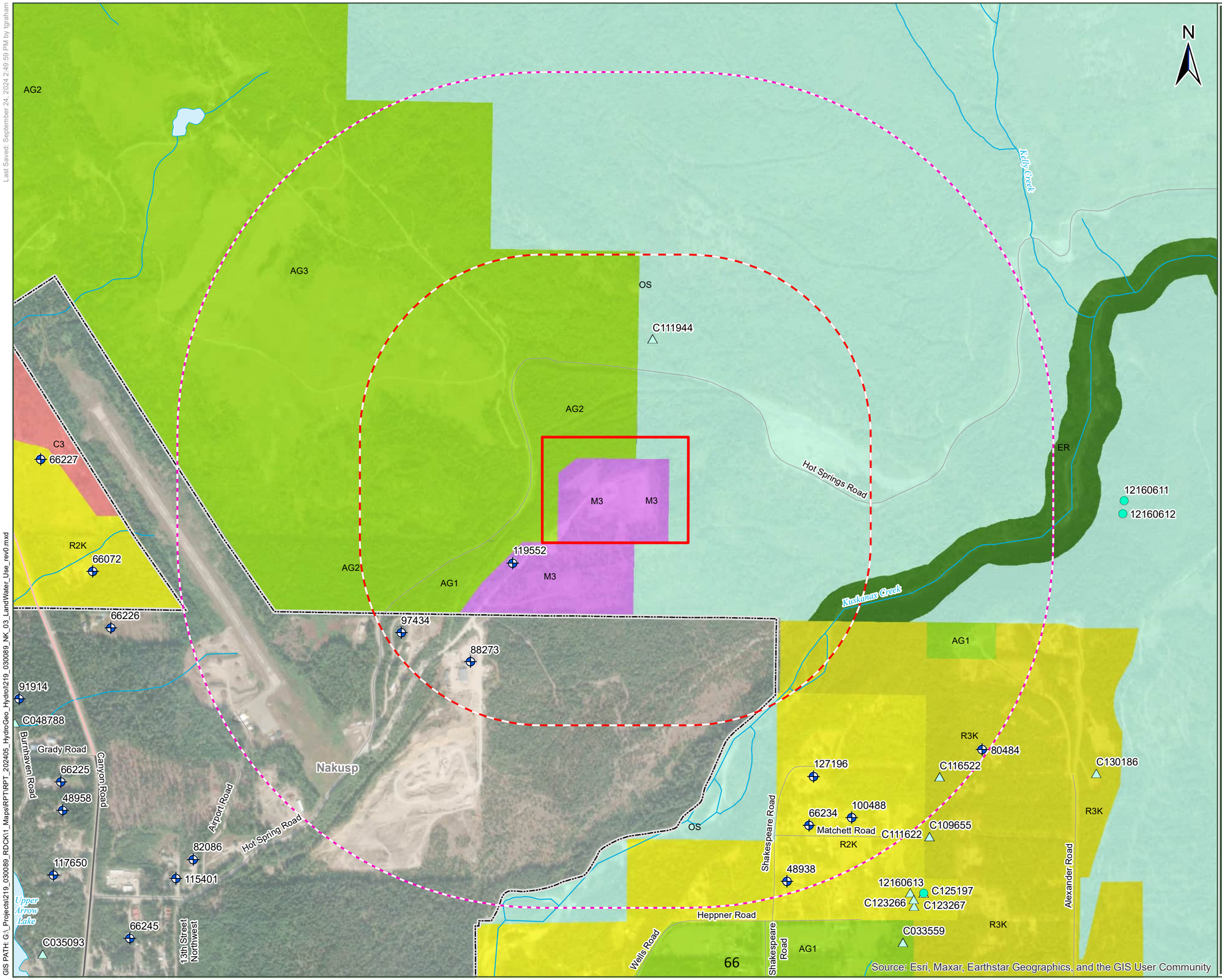
SLR

FIGURE NO:
2

DATE: September 26, 2024

PROJECT NO: 219.030089.00001

Cadfile name: S_219-030089-00001-A1.dwg



LEGEND:

- SITE BOUNDARY
- SITE BUFFER (500M)
- SITE BUFFER (1000M)
- MUNICIPAL BOUNDARIES

LAND USE

- AGRICULTURE
- COMMERCIAL
- ENVIRONMENTAL RESERVE
- INDUSTRIAL
- OPEN SPACE
- RESIDENTIAL 2
- RESIDENTIAL 3
- DRINKING WATER SOURCES (SURFACE WATER PODS)
- LICENSED SPRINGS
- GROUND WATER WELLS
- WATERCOURSE

NOTES:
BASEDATA:
- FRESHWATER ATLAS
  GOVERNMENT OF BRITISH COLUMBIA
LAND USE DATA: REGIONAL DISTRICT OF CENTRAL KOOTENAY

0 75 150 300 450 m

SCALE 1:10,000
PAGE SIZE 11 x 17
NAD 1983 UTM Zone 11N

THIS MAP IS FOR CONCEPTUAL PURPOSES ONLY AND SHOULD NOT BE USED FOR NAVIGATION

REGIONAL DISTRICT OF CENTRAL KOOTENAY
NAKUSP LANDFILL
NAKUSP, BC

HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

LAND AND WATER USE

SLR

FIGURE NO: **3**

DATE: September 24, 2024

PROJECT NO: 219.030089.00001

LEGEND:

- SITE BOUNDARY
- MUNICIPAL BOUNDARIES
- GROUND ELEVATION CONTOURS - MASL (10 M INTERVAL)
- WATERCOURSE
- DIRECTION OF SURFACE WATER FLOW

NOTES:

BASEDATA:
- FRESHWATER ATLAS
  GOVERNMENT OF BRITISH COLUMBIA

CONTOUR SOURCES:
- SITE VICINITY TOPOGRAPHIC CONTOURS PROVIDED BY RDCK IN FIG1_SITE_MAP.DWG, RECEIVED BY SLR IN MARCH 2024.
- REGIONAL CONTOURS GENERATED FROM CANADIAN DIGITAL ELEVATION DATA (CDED)

0 75 150 300 450 m

SCALE 1:12,000
PAGE SIZE 11 x 17
NAD 1983 UTM Zone 11N

THIS MAP IS FOR CONCEPTUAL PURPOSES ONLY AND SHOULD NOT BE USED FOR NAVIGATION

REGIONAL DISTRICT OF CENTRAL KOOTENAY
NAKUSP LANDFILL
NAKUSP, BC

HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

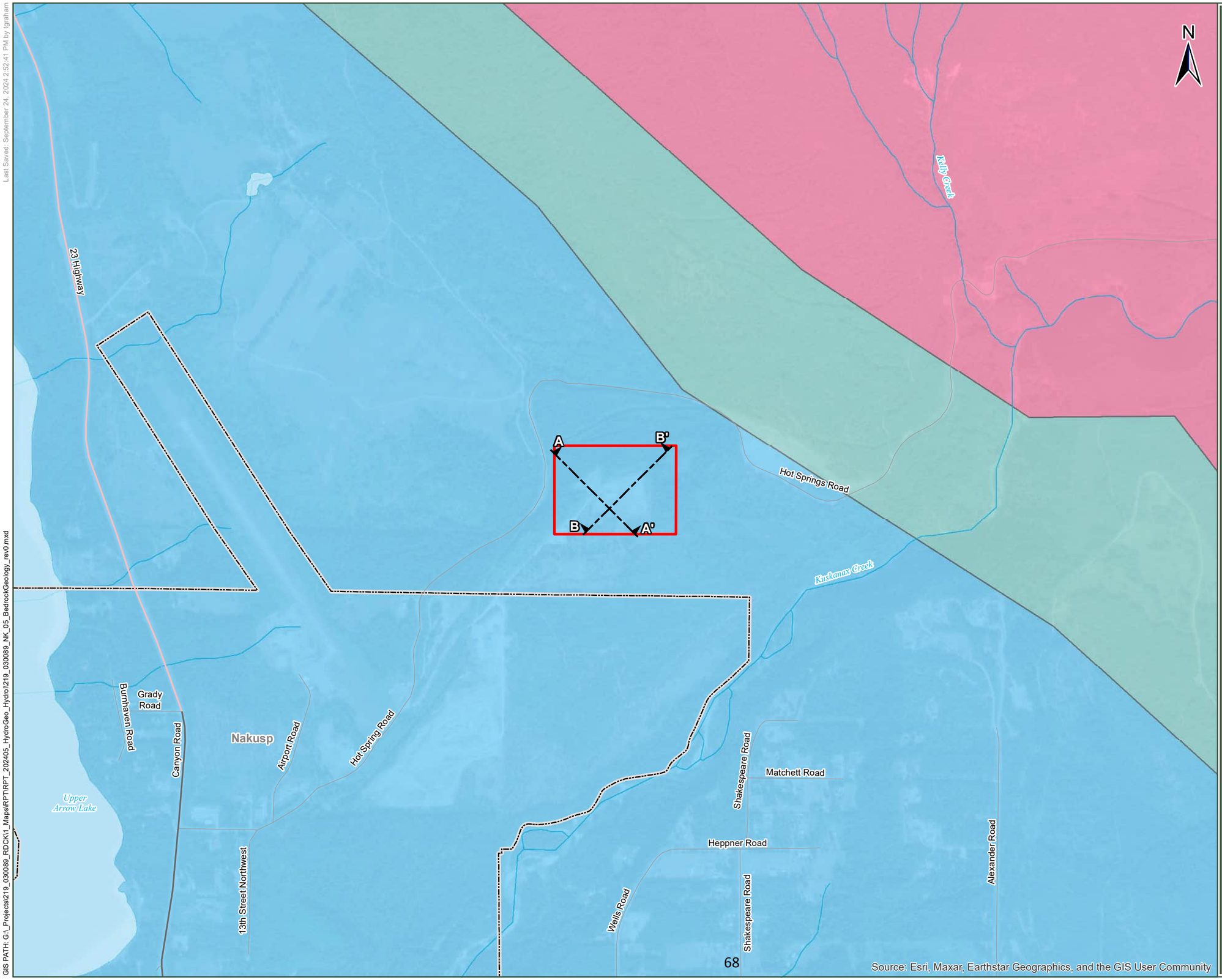
TOPOGRAPHY AND DRAINAGE

SLR

FIGURE NO: **4**

DATE: September 24, 2024

PROJECT NO: 219.030089.00001



LEGEND:

- SITE BOUNDARY
- MUNICIPAL BOUNDARIES
- CROSS SECTION
- WATERCOURSE

GEOLOGICAL UNITS

- CPKa - Kaslo Group (basaltic volcanic rocks)
- MJKx - Kuskanax Batholith (quartz monzonitic to monzogranitic intrusive rocks)
- TrSlc - Slocan Group (limestone, slate, siltstone, argillite)

NOTES:

BASEDATA:
- FRESHWATER ATLAS
  GOVERNMENT OF BRITISH COLUMBIA

BEDROCK GEOLOGY:
CUI, Y., MILLER, D., SCHIARIZZA, P., AND DIAKOW, L.J., 2017. BRITISH COLUMBIA DIGITAL GEOLOGY. BRITISH COLUMBIA MINISTRY OF ENERGY, MINES AND PETROLEUM RESOURCES, BRITISH COLUMBIA GEOLOGICAL SURVEY OPEN FILE 2017-8, 9P. DATA VERSION 2019-12-19.

0 75 150 300 450 m

SCALE 1:12,000
PAGE SIZE 11 x 17
NAD 1983 UTM Zone 11N

THIS MAP IS FOR CONCEPTUAL PURPOSES ONLY AND SHOULD NOT BE USED FOR NAVIGATION

REGIONAL DISTRICT OF CENTRAL KOOTENAY
NAKUSP LANDFILL
NAKUSP, BC

HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

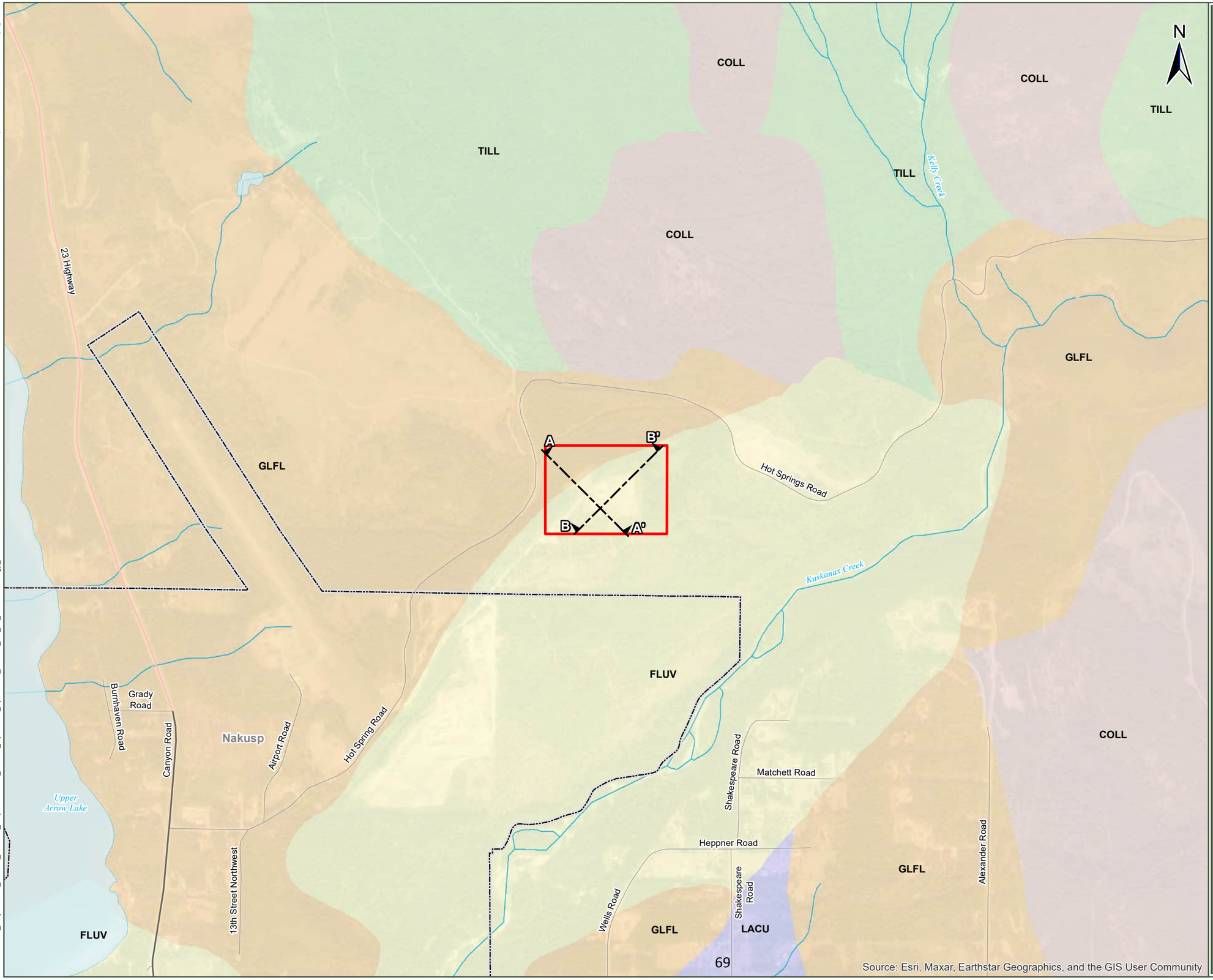
BEDROCK GEOLOGY

SLR

FIGURE NO: **5**

DATE: September 24, 2024

PROJECT NO: 219.030089.00001



LEGEND:

- SITE BOUNDARY
- MUNICIPAL BOUNDARIES
- CROSS SECTION
- WATERCOURSE

PARENT MATERIAL

- COLL (Colluvial)
- FLUV (Fluvial)
- GLFL (Glaciofluvial)
- LACU (Lacustrine)
- TILL (Till)

NOTES:

BASEDATA:
- FRESHWATER ATLAS
  GOVERNMENT OF BRITISH COLUMBIA

SURFICIAL GEOLOGY:
- PROVINCE OF BRITISH COLUMBIA, 2015,
BRITISH COLUMBIA SOIL MAPPING SPATIAL DATA
(A COMPILATION OF DIGITAL SOIL MAPPING DATASETS).
DATA AVAILABLE FROM THE BRITISH COLUMBIA MINISTRY OF ENVIRONMENT,
ECOSYSTEM INFORMATION SECTION AT:
HTTP://WWW.ENV.GOV.BC.CA/ESD/DISTDATA/ECOSYSTEMS/SOIL_DATA/SOIL_DATA_FGDB/
[ACCESSED JUNE 5, 2024]

0 75 150 300 450 m

SCALE 1:12,000
PAGE SIZE 11 x 17
NAD 1983 UTM Zone 11N

THIS MAP IS FOR CONCEPTUAL PURPOSES ONLY
AND SHOULD NOT BE USED FOR NAVIGATION

REGIONAL DISTRICT OF CENTRAL KOOTENAY
NAKUSP LANDFILL
NAKUSP, BC

HYDROGEOLOGY AND
HYDROLOGY CHARACTERIZATION REPORT

SURFICIAL GEOLOGY

SLR

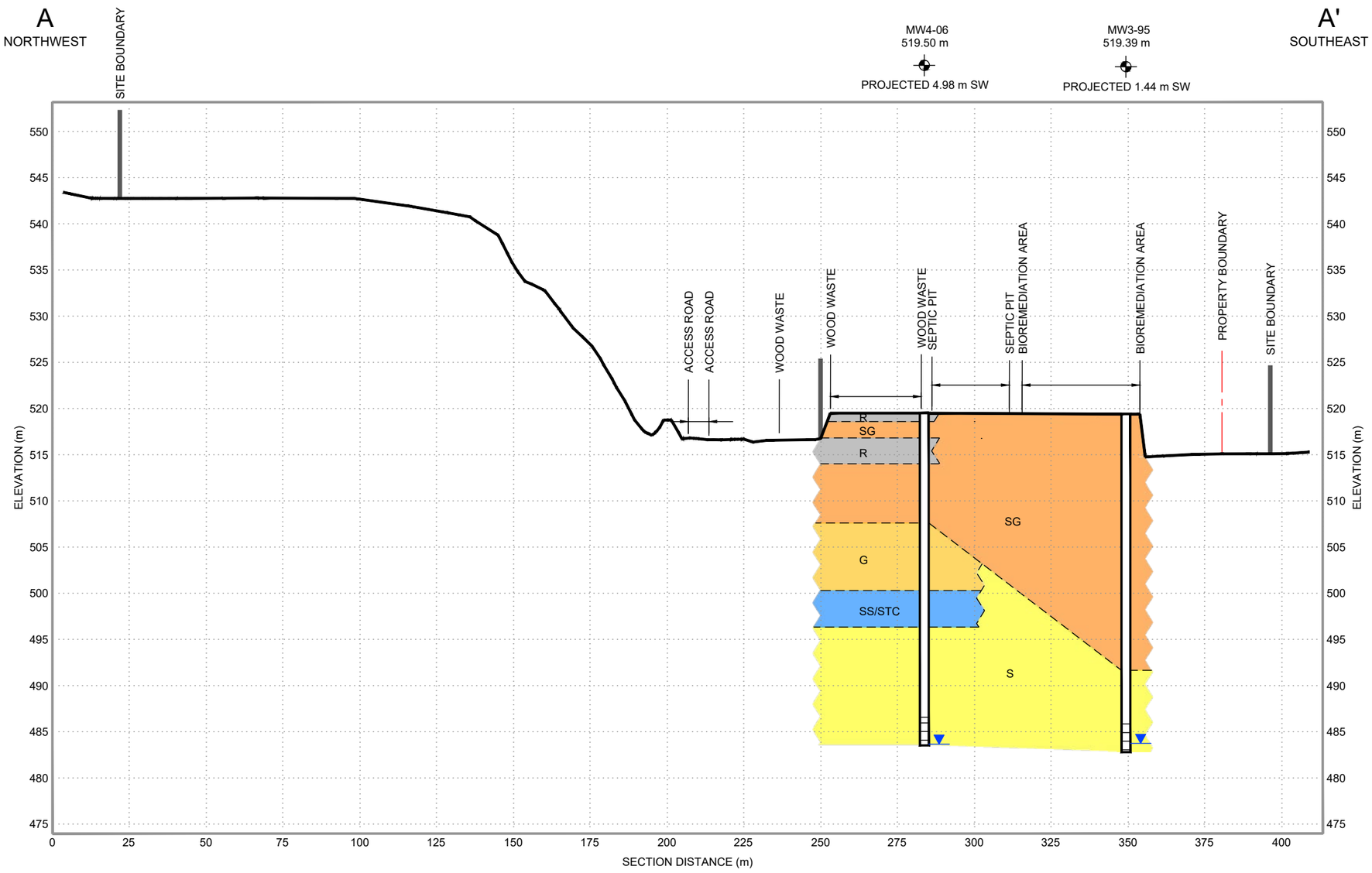
FIGURE NO:
6

DATE: September 24, 2024

PROJECT NO: 219.030089.00001

A
NORTHWEST

A'
SOUTHEAST



LEGEND:

- PROPERTY BOUNDARY
- SITE BOUNDARY
- MONITORING WELL
- WATER LEVEL (MAY 4, 2022)
- S/G — SAND / GRAVEL (WITH COBBLES)
- G — GRAVEL (WITH SAND OR SILTY)
- SS/STC — SILTY SAND / SILT AND CLAY
- S — SAND (FINE TO COARSE)
- R — REFUSE

- WELL
- SCREENED INTERVAL
- BOREHOLE OR TESTPIT
- END OF HOLE

NOTES:

NOT A LEGAL SURVEY. DO NOT USE FOR CONSTRUCTION.

REFERENCED FROM: REGIONAL DISTRICT OF CENTRAL KOOTENAY DATA TITLED FIG1_SITE_MAP.DWG AND SITE RECONNAISSANCE INFORMATION.
ParcelPolygon from ArcGIS: LAND TITLE AND SURVEY AUTHORITY OF BRITISH COLUMBIA (PARCELMAP BC)

LIMIT OF REFUSE, SEPTIC PITS, AND BIOREMEDIATION AREA SECTION LOCATIONS ARE APPROXIMATE GUIDES BASED ON REVIEW OF AERIAL IMAGERY

0 5 10 20 30 m
VERTICAL SCALE 1:500
0 25 50 100 m
HORIZONTAL SCALE 1:1,500

REGIONAL DISTRICT OF CENTRAL KOOTENAY
NAKUSP LANDFILL

NAKUSP, BC

HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

CROSS SECTION A-A'

SLR

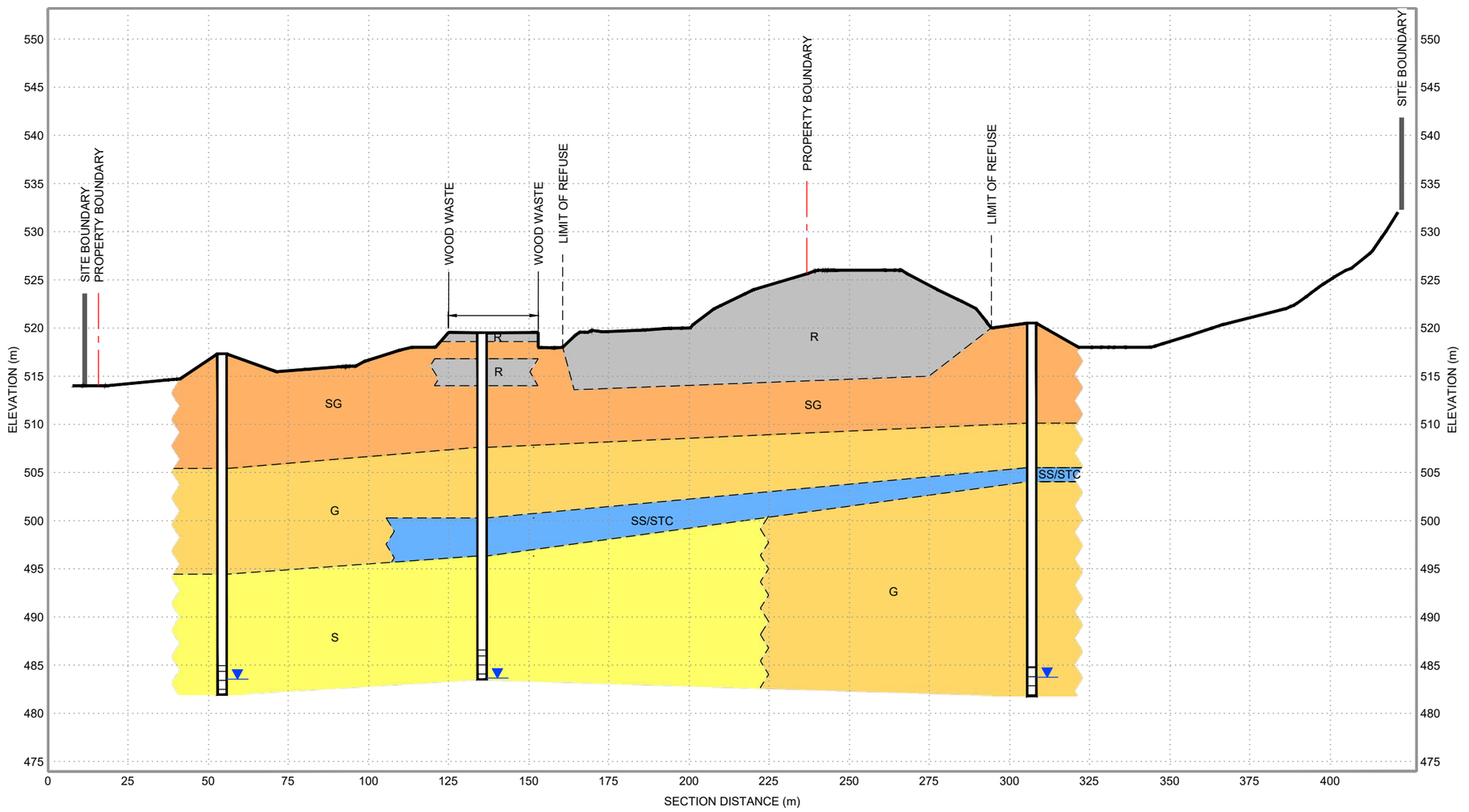
FIGURE NO:
7

DATE: September 26, 2024 PROJECT NO: 219.030089.00001

Cadfile name: S_219-030089-00001-A1.dwg

B
SOUTHWEST

B'
NORTHEAST



LEGEND:

- PROPERTY BOUNDARY
- SITE BOUNDARY
- MONITORING WELL
- WATER LEVEL (MAY 4, 2022)
- S/G — SAND / GRAVEL (WITH COBBLES)
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VERTICAL SCALE 1:500
0 25 50 100 m
HORIZONTAL SCALE 1:1,500

REGIONAL DISTRICT OF CENTRAL KOOTENAY
NAKUSP LANDFILL

NAKUSP, BC

HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

CROSS SECTION B-B'

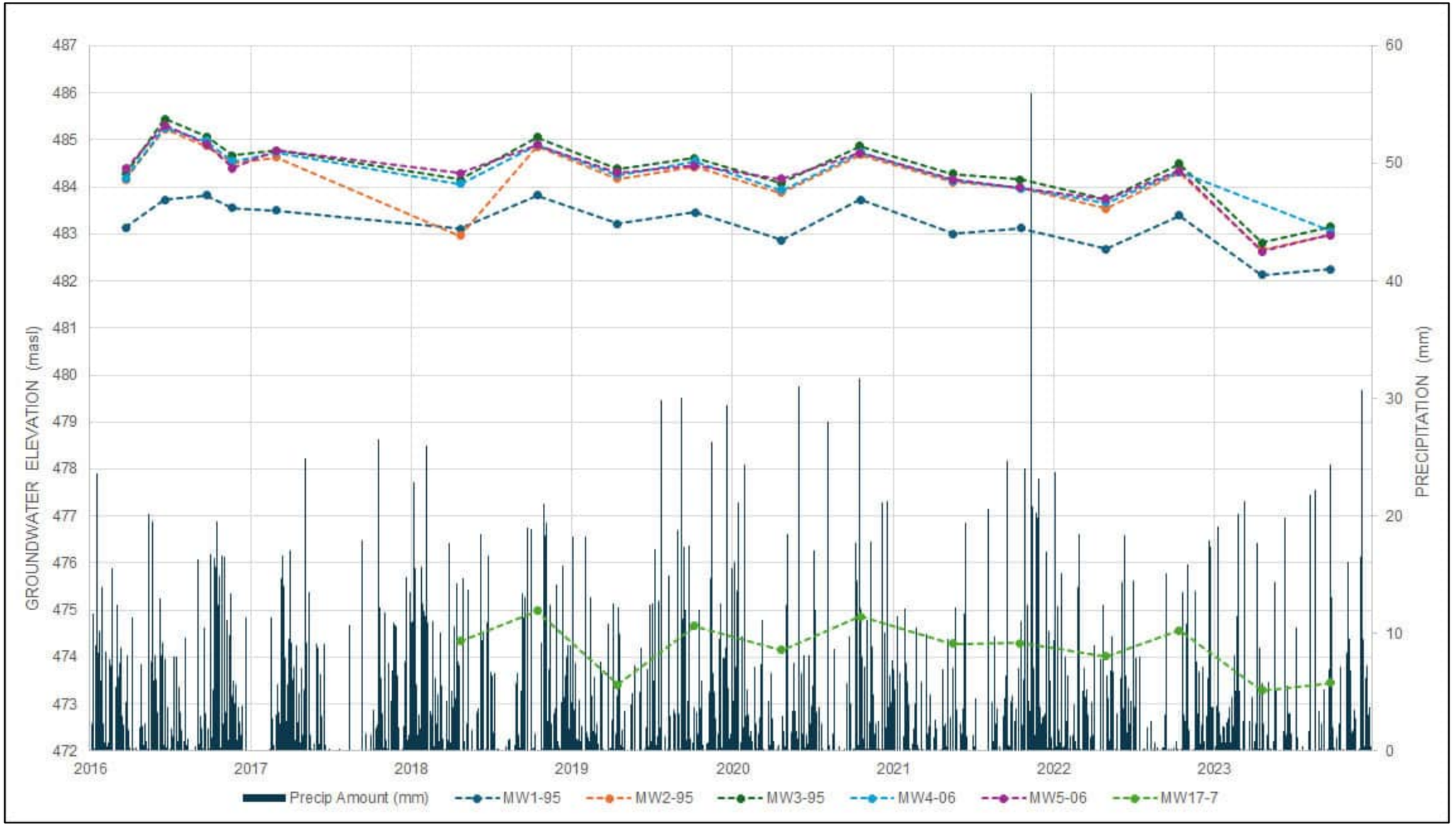
SLR

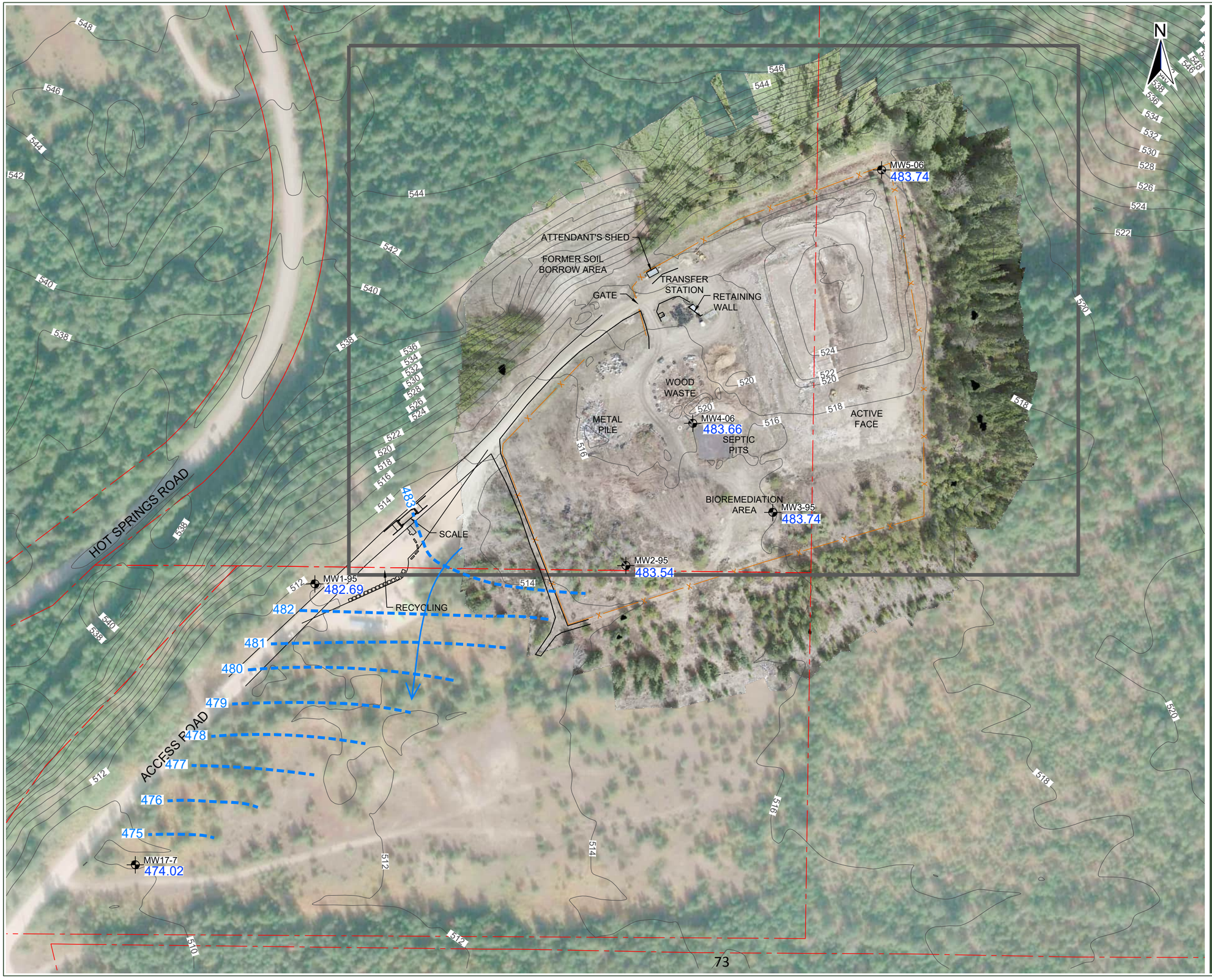
FIGURE NO:
8

DATE: September 26, 2024
PROJECT NO: 219.030089.00001

Cadfile name: S_219-030089-00001-A1.dwg

FIGURE 9: GROUNDWATER HYDROGRAPHS





LEGEND:

- PROPERTY BOUNDARY
- SITE BOUNDARY
- GROUND ELEVATION CONTOURS (masl)
- FENCE
- MONITORING WELL

GROUNDWATER MONITORING RESULTS

483.66 GROUNDWATER ELEVATION (m)

480 INFERRED GROUNDWATER ELEVATION CONTOUR (INTERVAL 1.0 m)

INFERRED GROUNDWATER FLOW DIRECTION

NOTES:

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ParcelPolygon from ArcGIS: LAND TITLE AND SURVEY AUTHORITY OF BRITISH COLUMBIA (PARCELMAP BC)

IMAGERY: AERIAL IMAGERY SUPPLIED TO SLR BY RDCK IN MARCH 2024 AND ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY (IMAGE DATE: 2022)

GROUNDWATER ELEVATION CONTOURS AND GROUNDWATER FLOW DIRECTIONS ARE BASED ON INTERPRETATION AND INTERPOLATION BETWEEN THE MEASURED ELEVATIONS AT THE MONITORING WELLS SHOWN AND ARE SPECIFIC TO THE DATE NOTED; THEREFORE, ACTUAL GROUNDWATER ELEVATIONS AND FLOW DIRECTIONS COULD VARY FROM THOSE SHOWN.

ALL GROUNDWATER ELEVATIONS RELATIVE TO AN ARBITRARY DATUM OF 100.00 m

0 20 40 80 120 m

SCALE 1:2,000
WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT
NAD 1983 UTM Zone 11 U

REGIONAL DISTRICT OF CENTRAL KOOTENAY
NAKUSP LANDFILL
NAKUSP, BC

HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

INFERRED SHALLOW GROUNDWATER FLOW - MAY 4, 2022

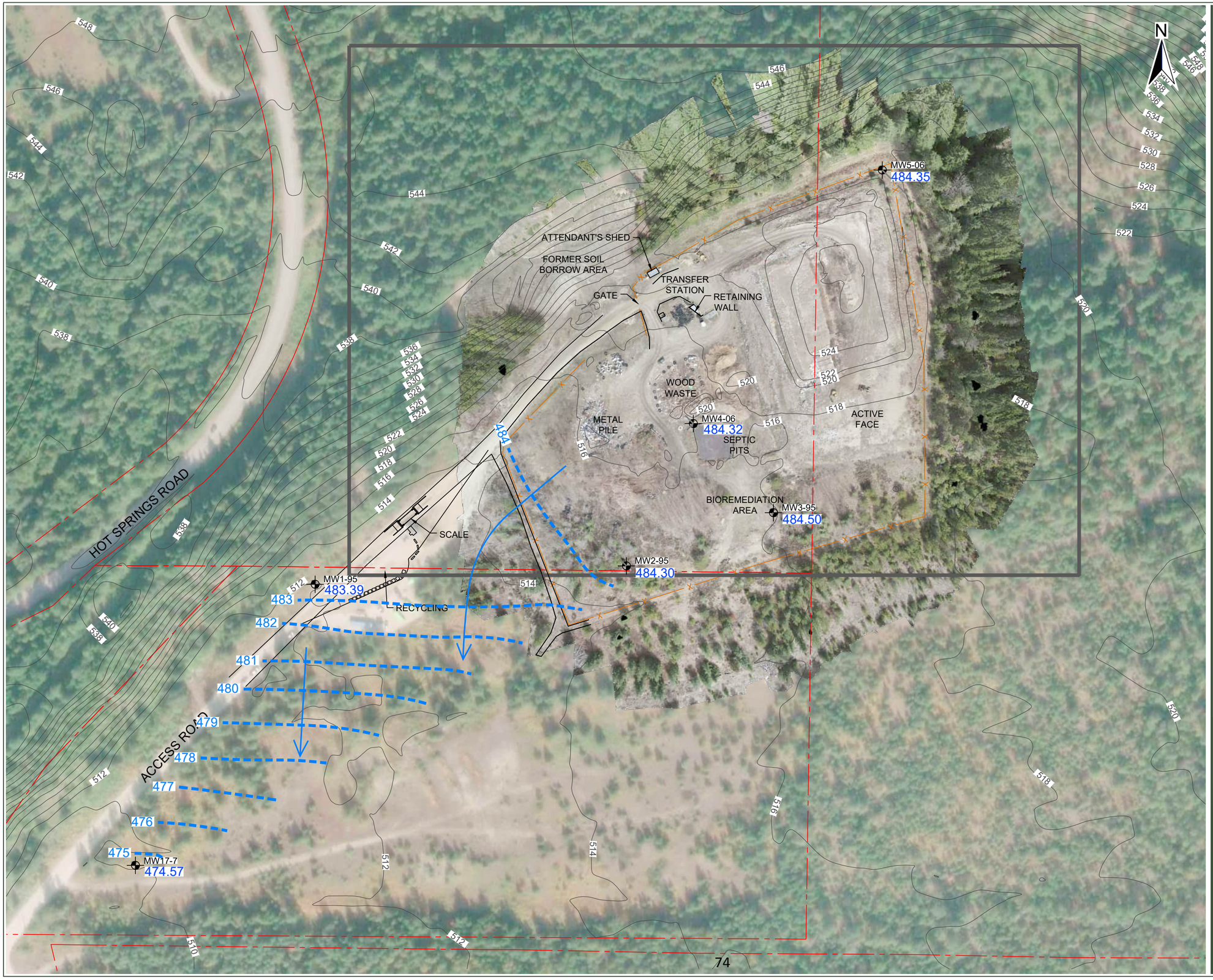
SLR

FIGURE NO:
10

DATE: September 26, 2024

PROJECT NO: 219.030089.00001

Cadfile name: S_219-030089-00001-A1.dwg



LEGEND:

- PROPERTY BOUNDARY
- SITE BOUNDARY
- GROUND ELEVATION CONTOURS (masl)
- FENCE
- MONITORING WELL
- **GROUNDWATER MONITORING RESULTS**
- 483.66 GROUNDWATER ELEVATION (m)
- 480 INFERRED GROUNDWATER ELEVATION CONTOUR (INTERVAL 1.0 m)
- INFERRED GROUNDWATER FLOW DIRECTION

NOTES:

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IMAGERY: AERIAL IMAGERY SUPPLIED TO SLR BY RDCK IN MARCH 2024 AND ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY (IMAGE DATE: 2022)

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ALL GROUNDWATER ELEVATIONS RELATIVE TO AN ARBITRARY DATUM OF 100.00 m

0 20 40 80 120 m

SCALE 1:2,000
WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT
NAD 1983 UTM Zone 11 U

REGIONAL DISTRICT OF CENTRAL KOOTENAY
NAKUSP LANDFILL
NAKUSP, BC

HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

INFERRED SHALLOW GROUNDWATER FLOW - OCTOBER 17, 2022

SLR

FIGURE NO:
11

DATE: September 26, 2024 PROJECT NO: 219.030089.00001

Cadfile name: S_219-030089-00001-A1.dwg

Appendix A Operational Certificate

Hydrogeology and Hydrology Characterization Report

Nakusp Landfill

Regional District of Central Kootenay

SLR Project No.: 219.030089.00001

September 27, 2024

August 12, 2014

Tracking Number: 279056
Authorization Number: 16521

REGISTERED MAIL

Regional District Of Central Kootenay
Box 590
202 Lakeside Drive
Nelson BC V1L 5R4

Dear Operational Certificate Holder:

Enclosed is Amended Operational Certificate 16521 issued under the provisions of the *Environmental Management Act*. Your attention is respectfully directed to the terms and conditions outlined in the operational certificate. An annual fee will be determined according to the Permit Fees Regulation.

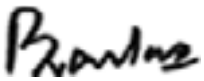
This operational certificate does not authorize entry upon, crossing over, or use for any purpose of private or Crown lands or works, unless and except as authorized by the owner of such lands or works. The responsibility for obtaining such authority rests with the operational certificate holder. It is also the responsibility of the operational certificate holder to ensure that all activities conducted under this authorization are carried out with regard to the rights of third parties, and comply with other applicable legislation that may be in force.

This decision may be appealed to the Environmental Appeal Board in accordance with Part 8 of the *Environmental Management Act*. An appeal must be delivered within 30 days from the date that notice of this decision is given. For further information, please contact the Environmental Appeal Board at (250) 387-3464.

Ministry of Environment
Environmental Protection Division
401 - 333 Victoria St.
Nelson, BC V1L 4K3
Southern Interior Region - Kootenay
Telephone: (250) 354-6333
Facsimile: (250) 354-6332

Administration of this operational certificate will be carried out by staff from the Southern Interior Region - Kootenay. Plans, data and reports pertinent to the operational certificate are to be submitted to the Regional Manager, Environmental Protection, at Ministry of Environment, Regional Operations, Southern Interior Region - Kootenay, 401 - 333 Victoria St., Nelson, BC V1L 4K3.

Yours truly,



Sajid A. Barlas, Ph.D., P.Ag.
for Director, *Environmental Management Act*
Southern Interior Region - Kootenay

Enclosure

cc: Environment Canada

MINISTRY OF
ENVIRONMENT

OPERATIONAL CERTIFICATE

16521

Under the Provisions of the Environmental Management Act

REGIONAL DISTRICT OF CENTRAL KOOTENAY
BOX 590
202 LAKESIDE DRIVE
NELSON, BRITISH COLUMBVIA
V1L 5R4

is authorized to manage waste and recyclable material from the Regional District of Central Kootenay and environs at the Nakusp landfill located near Nakusp, British Columbia, subject to the conditions listed below. Contravention of any of these conditions is a violation of the *Environmental Management Act* and may result in prosecution.

This Operational Certificate supersedes all previous versions of the Operational Certificate MR-16521 issued under the authority of the *Environmental Management Act*.

1. **AUTHORIZED DISCHARGES**

This authorization applies to the discharge of municipal solid waste, commercial and light industrial refuse to a sanitary landfill known as the Nakusp landfill. The site reference number for this discharge is E211814.

1.1 The authorized works are a sanitary landfill and related appurtenances approximately located as shown on Site Plan A.

1.2 The maximum quantity of waste discharges must not exceed the design capacity of the landfill as specified in the approved Design and Operations Plan. The final footprint and profile of the discharges waste must be within that specified in the Design and Operations Plan, and roughly as shown on th attached Site Plan A.

Date issued: November 29, 2000
Date amended: August 8, 2014
(most recent)

Sajid A. Barlas, Ph.D., P.Ag.
for Director, *Environmental Management Act*
Southern Interior Region - Kootenay

1.3 The authorized discharge is municipal solid waste as defined in the *Environmental Management Act* and other waste as may be authorized by the Director.

1.4 The legal description of the location of the authorized landfill facility is an unsurveyed part of District Lot 863, Kootenay District.

1.5 The site is located approximately 1.2 km northeast of the Nakusp Municipal Airport.

2. DESIGN AND PERFORMANCE REQUIREMENTS

2.1 Design and Operating Plan

The Operational Certificate holder must prepare and maintain a current Design and Operations Plan prepared by a qualified professional. The Plan must be reviewed and updated as needed at least once every five years. The Plan must address, but not be limited to, each of the subsections in the Landfill Criteria for Municipal Solid Waste including performance, siting, design, operational, closure and post-closure criteria. The facilities must be developed, operated and closed in accordance with the Plan. Should there be any inconsistency between this Operational Certificate and the Plan, this Operational Certificate must take precedence.

Written authorization from the Director must be obtained prior to implementing any changes to the approved plans. Based on any information obtained in connection with this facility, the Director may require revision of, or addition to, the design, operating and closure plans.

2.2 Qualified Professionals

All facilities and information, including works, plans, assessments, investigations, surveys, programs and reports, must be certified by Qualified Professionals.

2.3 Maintenance of Works and Emergency Procedures

The authorized works must be inspected regularly and maintained in good working order. In the event of an emergency or condition beyond the control of the Regional District of Central Kootenay including, but not limited to, unauthorized fires arising from spontaneous combustion or other causes, or

detection of leachate on the property, the Regional District of Central Kootenay must take appropriate remedial action and notify the Director immediately. The Director may reduce or suspend operations to protect the environment until the authorized works has been restored, and/or corrective steps taken to prevent unauthorized discharges.

2.4 **Additional Facilities or Works**

The Director may require investigations, surveys, and the construction of additional facilities or works. The Director may also amend any information requirements of this Operational Certificate including plans, programs, assessments and reports.

2.5 **Public Health, Safety and Nuisance**

The landfill must be operated in a manner such that it will not create a public nuisance or become a significant threat to public health or safety with respect to landfill gas, unauthorized access, roads, traffic, airport activity, noise, dust, litter, vectors, or wildlife attraction.

2.6 **Ground and Surface Water Quality Impairment**

The landfill must be operated in a manner such that ground or surface water quality does not decrease beyond that specified by the British Columbia Water Quality Guidelines, or other appropriate criteria as may be specified by the Director, at or beyond the landfill property boundary.

These measures include but are not limited to:

a) Prohibiting the discharge of municipal solid waste into water.

b) Ensuring that no new waste is landfilled within 1.2 m of the highest groundwater level.

c) Ensuring that adequate surface water and groundwater diversion works are constructed and maintained to minimize surface water run-off and groundwater seepage from entering the landfill.

d) Ensuring that the management systems for surface water that has not come in contact with waste are hydraulically separate from those for managing impacted surface water.

Date issued: November 29, 2000
Date amended: August 8, 2014
(most recent)

Sajid A. Barlas, Ph.D., P.Ag.
for Director, *Environmental Management Act*
Southern Interior Region - Kootenay

e) Ensuring that the landfill is operated in a manner that prevents the exceedance in surface water and groundwater of anticipated leachate indicators or parameters distinctive of leachate or those specified by the Director at the landfill boundary.

f) Ensuring that the indicators in e) above, at specified groundwater monitoring wells within the property boundary are in accordance with those predicted by design and that suitable measures are taken to address the cause of any exceedances.

g) Ensuring that the landfill is operated in accordance with a Design & Operations Plan which specifies measures to prevent decreases in groundwater and surface water quality at and beyond the property boundary.

If exceedances to the specified water quality criteria occur as a result of landfill operations, the Director may require that leachate management control measures or works be undertaken. Terms of reference for any leachate management study and/or design work must be submitted to the Director for review prior to conducting the work.

2.7 Landfill Gas Management

The Landfill must not cause combustible gas concentrations to exceed the lower explosive limit in soils at the property boundary or 25% of the lower explosive limit at or in on-site or off-site structures.

The Operational Certificate holder must ensure that the facility is in compliance with the requirements of the Landfill Gas Management Regulation under the Greenhouse Gas Reduction (Emissions Standards) Statutes Amendment Act, 2008 on or before applicable dates specified in the regulation. The requirements of the regulation and its guideline documents must be incorporated by the Operational Certificate holder into the Design and Operation Plan revisions as they come into effect and as applicable.

2.8 Buffer Zone

No material must be landfilled within 50 metres of the property boundary. Any new facilities or extension of the landfill will be subject to this revised buffer requirement.

3. OPERATIONAL REQUIREMENTS

3.1 Waste Compaction and Coverage

The Operational Certificate holder must ensure that waste deposition and compaction meets or exceeds the requirements of the BC Landfill Criteria or its most current version for daily, intermediate and final cover. Control must be exercised to ensure keeping freshly deposited refuse in a well defined and small / manageable working face.

3.2 Prohibited Wastes

The disposal of the following types of wastes is strictly prohibited:

(a) Hazardous Wastes other than those specifically approved for disposal to authorized landfills in the Hazardous Waste Regulation under the Environmental Management Act.

(b) Biomedical wastes as defined in the Guidelines for the Management of Biomedical Wastes in Canada (Canadian Council of Ministers of the Environment, February 1992),

(c) Bulk liquids and semi-solid wastes, which contain free liquids, as determined by US EPA Method 90954 Paint Filter Liquids Test, Test Methods for Evaluating Solid Wastes-Physical/Chemical Methods (EPA Publication No. Sw-846),

(d) Release of ozone depleting substances from the storage, handling and disposal of used appliances, equipment, or any material containing ozone depleting substances is prohibited in accordance with the requirements of the Ozone Depleting Substances Regulation. Onsite

removal or evacuation of Ozone Depleting Substances (ODS) from appliances and the subsequent storage of appliances on site is permitted subject to both activities being in compliance with the Ozone Depleting Substances Regulation

(e) Additional waste types may be deposited with the Director's approval.

3.3 Waste Asbestos

Waste asbestos is authorized for disposal subject to compliance with the requirements of section 40 of the Hazardous Waste Regulation and the following conditions:

(a) The asbestos waste may not be mixed with any other hazardous waste.

(b) The Regional District must approve the disposal before disposal takes place.

(c) All other applicable requirements of the Hazardous Waste Regulation, including but limited to manifesting and waste record keeping, must also be complied with.

3.4 Contaminated Soil

Soil that contains contaminants in concentrations less than "hazardous waste" as defined by the Hazardous Waste Regulation may be disposed of at the landfill site. Disposal includes monofilling, co-disposal with other wastes, use as a refuse cell berm material and use as a refuse cell cover material. Disposal does not include use as final cover material.

3.5 Wildlife and Vector Control

Vectors (carriers capable of transmitting a pathogen from one organism to another including, but not limited to flies and other insects, rodents, and birds) must be controlled by the application of cover material at the required frequency or by such additional methods as specified by the Director. Wildlife control fencing must be maintained around the perimeter of the landfill site and must be electrified for at least the active bear season of each year.

This landfill must be operated so as to minimize the attraction of wildlife such as bears and birds by applying cover at required frequencies and instituting a good housekeeping program.

3.6 Site Access and Supervision

A landfill operator that has received BC Qualified Landfill Operator training, is familiar with the requirements of the Operational Certificate and the specifications of the Design and Operations Plan, must be present at all times during operating hours.

Locking gates must be maintained at all access routes to the landfill site. Gates, perimeter fencing and/or barriers must be installed where necessary to prevent unauthorized access to the site by vehicles. Gates must be locked during non-operating hours.

3.7 Dust Control

Dust created within the landfill property must be controlled, using methods and materials acceptable to the Director, such that it does not cause a public nuisance.

3.8 Litter Control

The best practical means must be used to prevent the scatter of litter. Any litter scattered into the neighbouring property, along access roads, in drainage ditches, along litter-control fences, into surrounding trees or elsewhere on the landfill site must be cleaned up. The frequency of clean-up and other additional requirements for refuse scatter control must be determined by the Director.

3.9 Waste Reduction and Alternate Disposal

The Provincial Government has developed policies to promote the reduction, reuse and recycling of wastes. The Operational Certificate holder is encouraged to segregate for recycling and reuse, where possible, materials destined for disposal at this site.

Public scavenging must not be permitted at the landfill. The controlled salvaging of waste by the landfill operator or persons authorized by the Operational Certificate holder is encouraged if areas or facilities for separation and storage of recyclable or reusable materials are provided.

Date issued: November 29, 2000
Date amended: August 8, 2014
(most recent)

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for Director, *Environmental Management Act*
Southern Interior Region - Kootenay

In certain landfill environments, some construction and demolition debris or other wastes may create specific air and water quality concerns. If problems arise at this site that is attributable to specific wastes, the Director may require that alternate disposal/storage procedures be implemented

3.10 Fire Prevention & Control

The Operational Certificate holder must take all reasonable measures to prevent fires from occurring at the site and is responsible for complying with all local fire safety requirements. The Operational Certificate holder must provide and maintain firefighting equipment and materials as required for the site.

In the event of a landfill fire the following must be notified immediately:

- The Fire Department
- Provincial Emergency Program (PEP)
- The Regional Manager Environmental Protection

3.11 Operations and Maintenance Manual

The Operational Certificate holder must prepare an Operations and Maintenance
Manual to be reviewed and updated annually.

3.12 Sign Requirements

A sign must be posted at each entrance gate with the following current information;

a. Site name;
b. Contact phone number and address for owner;
c. Phone number in case of emergency;
d. Hours and days of operation;
e. Materials/waste accepted for landfill; and
f. Tipping fees.

Additional signs which clearly indicate the directions to the active tipping face, public disposal area, recycling and waste separation areas, etc. should also be displayed within the landfill site as deemed necessary.

4. MONITORING AND REPORTING REQUIREMENTS

Date issued: November 29, 2000
Date amended: August 8, 2014
(most recent)

Sajid A. Barlas, Ph.D., P.Ag.
for Director, *Environmental Management Act*
Southern Interior Region - Kootenay

4.1 Landfill Monitoring

A monitoring program must be developed by a Qualified Professional and identify potential environmental impacts of the authorized facility and must address but not be limited to the Landfill Criteria for Municipal Solid Waste and Guidelines for Environmental Monitoring. The monitoring program must be submitted to the satisfaction of the Director. Monitoring must be conducted in accordance with the monitoring program.

The program must be designed to assess and identify:

- The design performance of the landfill as per the Design & Operations Plan including but not limited to compliance with water quality performance standards at the landfill boundary.
- Landfill leachate as a contaminant source.
- Residential well water quality.
- Surface water quality.

The Environmental Monitoring Program must take into consideration results from previous monitoring programs and any other investigations conducted at the site to ensure that early detection of potential impacts is possible.

4.2 Sampling Techniques

Sampling must be carried out in accordance with the procedures described in the most recent edition of the "British Columbia Field Sampling Manual for Continuous Monitoring Plus the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples", or by suitable alternative procedures as authorized by the Director. A copy of the above manual may be purchased from the Queen's Printer Publications Centre, P.O. Box 9452, Stn. Prov. Gov't., Victoria, British Columbia, V8W 9V7.

4.3 Analysis

Analyses are to be carried out in accordance with procedures described in the most recent edition of the "British Columbia Environmental Laboratory Manual for the Analysis of Water, Wastewater, Sediment and Biological Materials", or by suitable alternative procedures as authorized by the Director. A copy of the above manual may be purchased from the Queen's Printer Publication Centre, P.O. Box 9452, Stn. Prov. Govt., Victoria, British Columbia, V8W 9V7 (1-800-663-6105 or (250) 387-6409).

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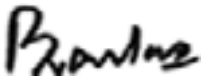

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for Director, *Environmental Management Act*
Southern Interior Region - Kootenay

4.4 Quality Assurance

The Operational Certificate holder must produce, within 60 days on the request of the Regional Manager Environmental Protection, 'Field and Laboratory Quality Protocols and Quality Assurance Criteria' acceptable to the Director. The 'Laboratory Quality Protocols' must include the procedures used to assess precision, accuracy and blank quality, including frequency of application of those procedures, the procedures for sampling, handling (e.g. preservation, hold times) and corrective measures to be initiated when deficiencies are indicated. The 'Quality Assurance Criteria' must include the acceptance criteria for accuracy (based on recoveries for reference samples/spikes), for precision (based on deviation in field and lab duplicates) and method blanks (designed to indicate false positives).

5. LANDFILL REPORTING

5.1 Annual Report

The Operation Certificate holder must submit an Annual Report to the Director on or before April 30th each year for the previous calendar year. The report must contain at least the following information:

(a) an executive summary;

(b) the type and tonnage of waste received, recycled, stored on-site and discharged / landfilled for the year;

(c) Any proposed changes to the Design and Operations Plan and the environmental monitoring program (EMP), with rationale for the changes; a description of unanticipated occurrences and any changes to the closure or post-closure plans and funds;

(d) A review of the preceding year of operation or an operations update which summarizes landfill development work completed in the subject reporting year and work planned for the subsequent year. A summary of any new information or changes to the facilities and plans, assessments, surveys, programs and reports;

(e) Occurrences or observations of wildlife (medium and large carnivores) at the facility;

Date issued: November 29, 2000
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(most recent)

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for Director, *Environmental Management Act*
Southern Interior Region - Kootenay

(f) A statement regarding the facility's progress in reducing the regional solid waste stream being landfilled and the objectives of the Regional Solid Waste Management Plan;

(g) An outline of the current Environmental Monitoring Program and a compendium of all environmental monitoring data in accordance with requirements specified in the most recent version of Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills and Landfill Criteria for Municipal Solid Waste. The annual report must document any effect of the discharge on the quality of the receiving environment using appropriate statistical and graphical analysis. Trend analyses, as well as an evaluation of the impacts of the discharges on the receiving environment must be included;

(h) A list of training programs completed for landfill operators during the previous year; and

(i) Any additional information requested by the Director.

All reports must be submitted, suitably formatted and tabulated in both print and electronic format (portable document format).

5.2 **Five Year Report**

The Operation Certificate holder must submit a Five Year Report to the Director on or before April 30th on the five year anniversary of the last submission. The report must contain at least the following information:

(a) An executive summary;

(b) An updated Design and Operations Plan;

(c) A detailed hydrogeological assessment;

(d) The type and tonnage of waste received, recycled, stored on-site and discharged / landfilled for the year;

(e) A current topographic map detailing airspace consumption, on-site borrow
pit changes and future developments;

(f) Volume and density analysis or an in-place material summary, updated estimates for the remaining capacity, site life, revised closure date (for the current phase or sequence and revised closure date for the current landfill footprint);

(g) An outline of the current Environmental Monitoring Program and a compendium of all environmental monitoring data in accordance with requirements specified in the most recent version of Guidelines for Environmental Monitoring at Municipal Solid Waste Landfills and Landfill Criteria for Municipal Solid Waste. The annual report must document any effect of the discharge on the quality of the receiving environment using appropriate statistical and graphical analysis. Trend analyses, as well as an evaluation of the impacts of the discharges on the receiving environment must be included;

(h) An update on the financial assurance mechanism including a statement of the current dollar value of the Closure Fund and the amount earmarked for the Landfill site; and

(i) Any additional information requested by the Director.

6. LANDFILL CLOSURE PLAN

6.1 Closure Plan and Post Closure

The Operational Certificate holder must perform closure and post-closure care in accordance with all applicable requirements of the BC Landfill Criteria for Municipal Solid Waste. This Operational Certificate is issued on the condition that a Closure Plan and Final Cover Design that meets or exceeds the requirements of the criteria will be submitted to the Director during the operating life of the landfill. The Closure Plan must be reviewed every five years throughout the operating life of the landfill.

A certification by a Qualified Professional attesting that all closure works have been completed in accordance with the Closure Plan and Final Cover Design is to be submitted to the Director no later than 60 days after the implementation of the Final Cover Design.

Date issued: November 29, 2000
Date amended: August 8, 2014
(most recent)

Sajid A. Barlas, Ph.D., P.Ag.
for Director, *Environmental Management Act*
Southern Interior Region - Kootenay

The Operational Certificate Holder must submit a Post Closure or Aftercare Plan to the Ministry at least one year prior to the anticipated closure date of the landfill.

6.2 Closure Fund

The Operational Certificate holder must provide for the funding of progressive closure operations, final closure and operations beyond closure by maintaining a closure fund. The value of the closure fund must meet or exceed the estimated closure and post-closure costs as established in the approved Design and Operations Plan and updated in the annual report, plus a reasonable contingency for any remediation which may be required. Reported costs must be adjusted for inflation annually. Alternately, a closure and post-closure financial security acceptable to the Director may be built over time.

The Operational Certificate holder must determine and ensure that the closure fund is adequate by preparing annually a financial statement of the fund which must be made available to the Director upon request. The financial statement must report the accrued capital, interest and additions to the fund for the previous year and review the sufficiency of the fund and the rate of accrual in consideration of the projected costs of closure and post-closure obligations.

6.3 Site Decommissioning

In accordance with Section 40 of the Environmental Management Act and Part 2 of the Contaminated Sites Regulation, the Operational Certificate holder must submit a site profile to the manager at least ten days prior to decommissioning the facilities authorized in Section 1.

6.4 Declaration of Landfill

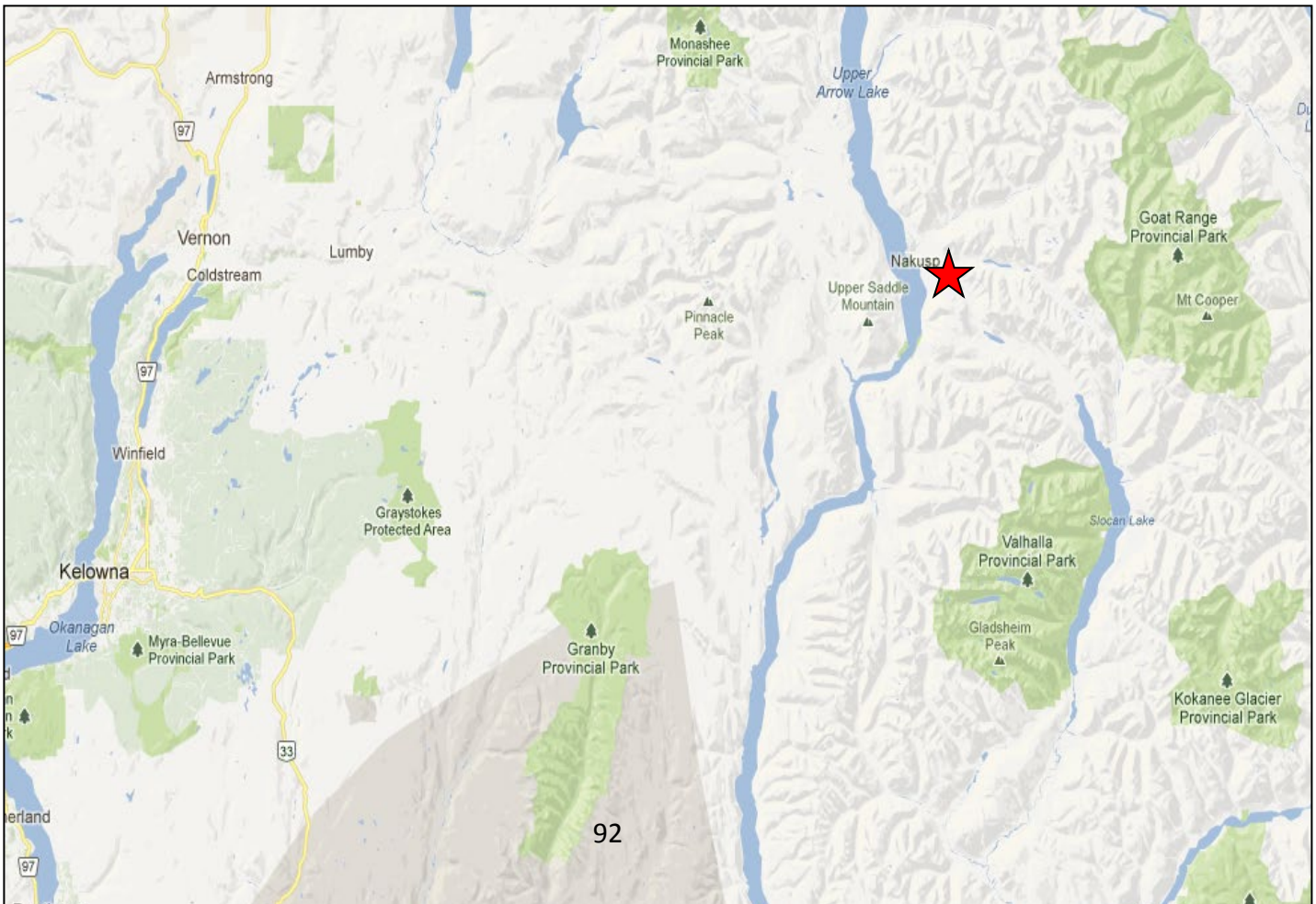
Landfills sited on titled land must register a covenant that the property was used for the purpose of waste disposal as a charge against the title to the property as

provided for under Section 215.1 of the Land Title Act. Landfills located on crown land are to have a "notation on file" registered that the property was used for the purpose of waste disposal.

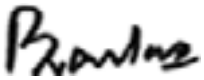
The Operational Certificate holder must, upon closure of the landfill, register a charge against the property title, or provide other legal notification acceptable to the Director that the property described in Section 1 was used for the purpose of waste disposal. The Director must be notified of the charge or legal notification.

Site Plan A

Location Map



Date issued: November 29, 2000
Date amended: August 8, 2014
(most recent)



Sajid A. Barlas, Ph.D., P.Ag.
for Director, *Environmental Management Act*
Southern Interior Region - Kootenay

Appendix B Environmental Monitoring Plan

Hydrogeology and Hydrology Characterization Report

Nakusp Landfill

Regional District of Central Kootenay

SLR Project No.: 219.030089.00001

September 27, 2024

Environmental Monitoring Program

Nakusp Landfill

Field Designation	EMS Number	Matrix	Well Depth (m bgs)	Purpose	Location	Q1	Q2	Q3	Q4
MW1-95	E225548	groundwater	34.6	compliance	Adjacent to southern property	A		A & B	
MW2-95	E225549	groundwater	36.71	background	Adjacent to southern property	A		A	
MW3-95	E225550	groundwater	39.68	background	Adjacent to southern property	A		A	
MW4-06	E265109	groundwater	35.63	source concentration	Located centrally on landfill	A		A & B	
MW5-06	E265110	groundwater	37	background	Located in northeast quadrant of property	A		A	
MW17-7		groundwater	~40	background	within adjacent southern property	A		A & B	

Note: Water depth is measured and recorded at each well during each sampling event.
Gases in monitoring well headspace to be measured with a landfill gas meter (e.g. Gem 3000) prior to water level measurement.

Schedule A

Field Parameters
pH
Specific Conductance
Reduction-Oxidation Potential (ORP)
Temperature
Total Dissolved Solids
Turbidity

General Chemistry
Alkalinity
Chloride
Sulphate
Hardness (Dissolved)
pH
Specific Conductance
Total Organic Carbon (TOC)
Total Inorganic Carbon (TIC)
Chemical Oxygen Demand (COD)

Nutrients
Ammonia
Nitrate
Nitrite
Phosphorus (Total)

Metals (Dissolved)
Aluminum
Antimony
Arsenic
Barium
Beryllium
Boron
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead
Magnesium
Manganese
Molybdenum
Nickel
Potassium
Selenium
Silver
Sodium
Thallium
Vanadium
Zinc

QA/QC
Ion Balance

Schedule B

Volatile Organic Compounds (VOCs)
1,1,1-Trichloroethane
1,1,2,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1-Dichloroethane
1,1-Dichloroethene
1,2-Dichlorobenzene
1,2-Dichloroethane
1,2-Dichloropropane
1,3-Dichlorobenzene
1,4-Dichlorobenzene
2-Chloroethyl vinyl ether
Bromodichloromethane
Bromoform
Bromomethane (Methyl Bromide)
Carbon tetrachloride
Chlorobenzene
Chloroethane
Chloroform (Trichloromethane)
Chloromethane (Methyl Chloride)
cis-1,2-Dichloroethene
cis-1,3-Dichloropropene
Dibromochloromethane
Methylene chloride
Tetrachloroethene
trans-1,2-Dichloroethene
trans-1,3-Dichloropropene
Trichloroethene
Trichlorofluoromethane (CFC-11)
Vinyl chloride

Volatile Organic Compounds (BTEX)
Benzene
Ethylbenzene
Toluene
Xylene (total)

Appendix C Borehole & Test Pit Logs

Hydrogeology and Hydrology Characterization Report

Nakusp Landfill

Regional District of Central Kootenay

SLR Project No.: 219.030089.00001

September 27, 2024

MONITORING WELLS	NAKUSP LANDFILL	BOREHOLE No: MW-1N
REGIONAL DISTRICT OF CENTRAL KOOTENAY		Project No: 0810-90020
		ELEVATION: 0.0 (ft)

SAMPLE TYPE ■ DISTURBED

DEPTH (ft)	SAMPLE TYPE	SAMPLE NO	SPT(N)	SOIL DESCRIPTION
0.0				SAND – some gravel, some cobbles and boulders, trace silt, well-graded, light brown, damp.
10.0	■	1		– cobbles/boulders – rock chips in return – slow penetration with drill.
20.0	■	2		
25.0	■	3		
35.0				– cobble/boulder content decreases to some
40.0	■	4		
50.0	■	5		
60.0	■	6		– gravelly zones.
70.0	■	7		
75.0				

WELL INSTALLATION

PLASTIC — M.C. — LIQUID

4 8 12 16

DEPTH (ft): 0.0, 5.0, 10.0, 15.0, 20.0, 25.0, 30.0, 35.0, 40.0, 45.0, 50.0, 55.0, 60.0, 65.0, 70.0, 75.0

EBA Engineering Consultants Ltd.

LOGGED BY: RB/TO

REVIEWED BY:

COMPLETION DEPTH: 116.0 ft

COMPLETE: 23/08/95

MONITORING WELLS	NAKUSP LANDFILL	BOREHOLE No: MW-1N
REGIONAL DISTRICT OF CENTRAL KOOTENAY		Project No: 0810-90020
		ELEVATION: 0.0 (ft)

SAMPLE TYPE ■ DISTURBED

DEPTH (ft)	SAMPLE TYPE	SAMPLE NO	SPT(N)	SOIL DESCRIPTION
75.0				SAND (con't)
80.0	■	8		– trace fine gravel, fine to medium grained.
85.0				
90.0	■	9		– increase in moisture content to 'moist'.
95.0				
100.0	■	10		– fine grained.
105.0				
110.0	■	11		
115.0				END OF HOLE AT 116 feet.
120.0				
125.0				
130.0				
135.0				
140.0				
145.0				
150.0				

WELL INSTALLATION

PLASTIC M.C. LIQUID

4 8 12 16

DEPTH (ft) 75 80 85 90 95 100 105 110

EBA Engineering Consultants Ltd.

LOGGED BY: RB/TO COMPLETION DEPTH: 116.0

REVIEWED BY: COMPLETE: 23/08/95

Page

MONITORING WELLS	NAKUSP LANDFILL	BOREHOLE No: MW-2N
REGIONAL DISTRICT OF CENTRAL KOOTENAY		Project No: 0810-90020
		ELEVATION: 0.0 (ft)

SAMPLE TYPE ■ DISTURBED

DEPTH (ft)	SAMPLE TYPE	SAMPLE NO	SPT(N)	SOIL DESCRIPTION
0.0				SAND and GRAVEL – some cobbles and boulders, trace silt, well-graded, light brown/grey, damp.
10.0	■	1		– boulders/cobbles – rock chips in return.
20.0	■	2		– traces cobbles & boulders, brown, damp.
30.0	■	3		
40.0	■	4		– gravelly.
50.0	■	5		– increase in moisture content to 'moist'. – some gravel.
60.0	■	6		
70.0	■	7		
75.0				

WELL INSTALLATION

PLASTIC M.C. LIQUID
4 8 12 16

DEPTH (ft): 0.0, 5.0, 10.0, 15.0, 20.0, 25.0, 30.0, 35.0, 40.0, 45.0, 50.0, 55.0, 60.0, 65.0, 70.0, 75.0

EBA Engineering Consultants Ltd.

LOGGED BY: RB/TO
REVIEWED BY:
File No: N-1

COMPLETION DEPTH: 116.0 ft
COMPLETE: 23/08/95

MONITORING WELLS | NAKUSP LANDFILL | BOREHOLE No: MW-2N
REGIONAL DISTRICT OF CENTRAL KOOTENAY | Project No: 0810-90020
ELEVATION: 0.0 (ft)

SAMPLE TYPE ■ DISTURBED

DEPTH (ft)	SAMPLE TYPE	SAMPLE NO	SPT(N)	SOIL DESCRIPTION	WELL INSTALLATION
75.0				SAND (con't)	
80.0	■	8			
85.0					
90.0	■	9		– medium to coarse grained, grey-brown.	
95.0					
100.0	■	10			
105.0 ▼				– wet below 106 ft.	
110.0	■	11			
115.0				END OF HOLE AT 116 feet.	
120.0					
125.0					
130.0					
135.0					
140.0					
145.0					
150.0					

PLASTIC — N.C. — LIQUID
4 8 12 16

DEPTH (ft): 75.0, 80.0, 85.0, 90.0, 95.0, 100.0, 105.0 ▼, 110.0, 115.0, 120.0, 125.0, 130.0, 135.0, 140.0, 145.0, 150

EBA Engineering Consultants Ltd.

LOGGED BY: RB/TO
REVIEWED BY:
Fig. No: N-1

COMPLETION DEPTH: 116.0 ft
COMPLETE: 23/08/95
Page 2 of

MONITORING WELLS	NAKUSP LANDFILL	BOREHOLE No: MW-3N
REGIONAL DISTRICT OF CENTRAL KOOTENAY		Project No: 0810-90020
		ELEVATION: 0.0 (ft)

SAMPLE TYPE ■ DISTURBED

DEPTH (ft)	SAMPLE TYPE	SAMPLE NO	SPT(N)	SOIL DESCRIPTION
0.0				SAND gravelly, cobbles and boulders, trace silt, well-graded, light brown, damp.
10.0	■	1		
15.0				– boulders/cobbles – rock chips in return.
20.0	■	2		– traces cobbles & boulders, brown, damp.
25.0				
30.0	■	3		
35.0				– some silt, fine to medium grained, trace cobbles and boulders, grey-brown.
40.0	■	4		– trace silt, some gravel, cobbles and boulders, well-graded, light brown.
45.0				– gravelly.
50.0	■	5		– some gravel, traces cobbles and boulders
55.0				– gravelly.
60.0	■	6		– trace gravel, trace silt, well-graded, light brown, moist.
65.0				– some gravel, cobbles and boulders.
70.0	■	7		
75.0				

WELL INSTALLATION

PLASTIC — M.C. — LIQUID

4 8 12 16

DEPTH (ft): 0.0, 5.0, 10.0, 15.0, 20.0, 25.0, 30.0, 35.0, 40.0, 45.0, 50.0, 55.0, 60.0, 65.0, 70.0, 75.0

EBA Engineering Consultants Ltd.

LOGGED BY: RB/TO
REVIEWED BY:

COMPLETION DEPTH: 120.0 ft
COMPLETE: 24/08/95

MONITORING WELLS	NAKUSP LANDFILL	BOREHOLE No: MW-3N
REGIONAL DISTRICT OF CENTRAL KOOTENAY		Project No: 0810-90020
		ELEVATION: 0.0 (ft)

SAMPLE TYPE ■ DISTURBED

DEPTH (ft)	SAMPLE TYPE	SAMPLE NO	SPT(N)	SOIL DESCRIPTION
75.0				SAND (con't)
80.0		8		– some gravel, traces cobbles and boulders, fine to medium grained, grey–brown, moist.
85.0				– gravelly.
90.0		9		– medium to coarse grained, grey–brown.
95.0				
100.0		10		– some gravel, traces cobbles and boulders
105.0				– increase in moisture content.
110.0		11		
115.0				– gravelly, medium grained, grey, moist. – wet below 116 ft.
120.0		12		END OF HOLE AT 120 feet.
125.0				
130.0				
135.0				
140.0				
145.0				
150.0				

WELL INSTALLATION

PLASTIC N.C. LIQUID
4 8 12 16

DEPTH (ft)
75.0 80.0 85.0 90.0 95.0 100.0 105.0 110.0 115.0 120.0 125.0 130.0 135.0 140.0 145.0 150.0

EBA Engineering Consultants Ltd.

LOGGED BY: RB/TD
REVIEWED BY:
COMPLETION DEPTH: 120.0 ft
COMPLETE: 24/08/95
Page 2 of 2

THORMAN DRILLING LTD

WATER WELLS AND ENVIRONMENTAL DRILLING

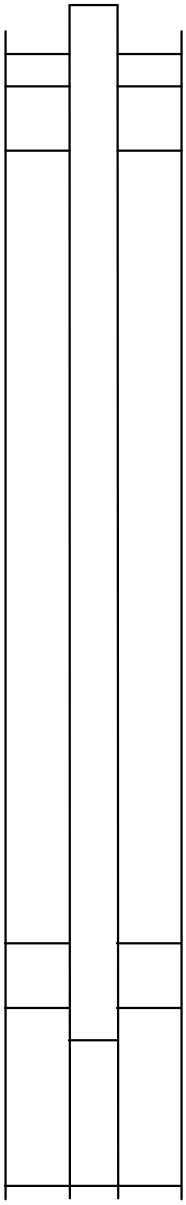
Nelson: 250-354-1333
Toll Free: 1-888-354-1333
Fax: 250-354-1331
Cell: 250-354-8337
e:mail: thorman@shaw.ca

P.O. Box 986,
(111 Cottonwood Road)
Nelson, B.C.,
V1L 6A5

October 25, 2006

RE: MW04-06 Nakusp Landfill

Description	Depth		Depth	
Surface				Top of Concrete
Garbage	0 ft.		0 ft.	Top of Bentonite Chips
			1.5 ft.	
Gravel with Cobbles	3 ft.			Top of Grout
			4 ft.	
Garbage	9 ft.			
	18 ft.			
Sandy Gravel with Cobbles				
	24 ft.			
Boulders with Cobbles and hard packed gravel with Fine Sand				
	39 ft.			
Course Gravel with Coarse to Medium Sand				
Orange Silty Sand	63 ft.			
Orange Silt with Clay Layers	71 ft.			
	76 ft.			Bentonite Chips 104' – 98'
			98 ft.	
				Top of Sand
Fine Sand			104 ft.	Top of Screen
			108 ft.	
				Frac Sand 104' – 118'
				Bottom of Screen
	118 ft.		118 ft.	



Note: Revised by CRA, ZF December 12, 2007
Checked by J.Isfeld, RDCK
4" diameter borehole, 2" PVC

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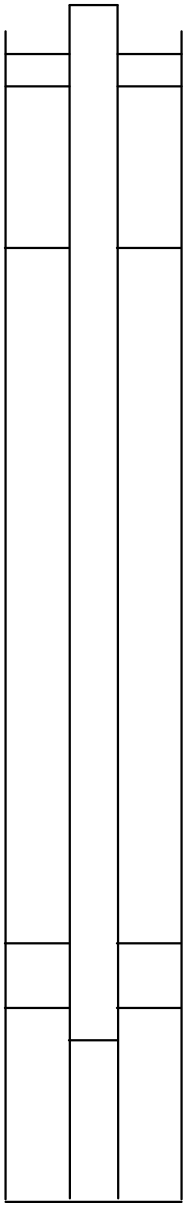
P.O. Box 986,
(111 Cottonwood Road)
Nelson, B.C.,
V1L 6A5

October 26, 2006

RE: MW05-06 Nakusp Landfill



Description	Depth	Depth	
Surface			Top of Concrete
	0 ft.	0 ft.	Top of Bentonite Chips
		1.5 ft.	
			Top of Backfill
Cobbles with Sandy Gravel		16 ft.	
	34 ft.		
Grey Silty Gravel			
Orange Silt with Clay Layers	48 ft.		
	54 ft.		
			Bentonite Chips 113' – 98'
		98 ft.	
Sandy Gravel			Top of Sand
		113 ft.	
			Top of Screen
		117 ft.	
			Frac Sand 113' – 127'
			Bottom of Screen
	127 ft.	127 ft.	

Note: Revised by CRA, ZF December 12, 2007
Checked by J.Isfeld, RDCK
4" diameter borehole, 2" PVC

NAKUSP LANDFILL - AUGUST 1995

Test Pits - Summary

Test pits - TP-1 and TP-2 were located along the southern property line of the landfill site.

Test pits - TP-3 and Tp-4 were located along the cut slope on the northwest side of the active landfill pit. Access to the entire face of the slope was not possible with the backhoe due to its steepness and height.

Test Pit: TP-1

COBBLES & BOULDERS - sandy and gravelly, trace silt, well-graded, rounded, compact/dense, light brown, damp/moist.

End of Hole at 2.5 m

Test Pit: TP-2

COBBLES & BOULDERS - sandy, gravelly, trace silt, well-graded, rounded compact/dense, light brown, damp/moist.
- boulders sizes observed - up to 0.8 m diameter
- difficult digging due to boulder/cobble content - pit sidewalls sloughing
- no seepage observed in pit

End of Hole at 3.0 m

Test Pit: TP-3

0.0 - 0.3 SAND - gravelly, some silt, well-graded, compact, brown, damp.
- likely sloughed material

0.3 - 1.2 SAND - trace gravel, trace silt, medium grained, dense light brown, moist.

1.2 - 2.3 SILT - some sand, trace clay, trace fine gravel, stiff, low plasticity, grey-brown, damp.
- sample obtained at 2.0 m depth

2.3 - 3.0 SAND - trace silt, trace gravel, medium to coarse grained, dense grey-brown, moist.

End of Hole at 3.0 m
No seepage observed in test pit.

Test Pit: TP-4

0.0 - 0.6	SAND/SILT	-	some gravel, trace organics, well-graded, compact, brown, damp. • sloughed material
0.6 - 3.2	SAND	-	gravelly, some silt, trace cobbles, fine to medium grained, dense, brown, moist. - boulder encountered at 2.7 m depth - at least 1 m in diameter.

End of Hole at 3.2 m.
No seepage observed in test pit.

TEST PIT STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: Nakusp Landfill
PROJECT NUMBER: 19325-10-300
CLIENT: Regional District of Central Kootenay
LOCATION: Nakusp, B.C.

HOLE DESIGNATION: TP10-07
DATE COMPLETED: July 25, 2007
TEST PIT METHOD: Excavator
FIELD PERSONNEL: Z.F, R.S

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	NORTHING: 5568650 EASTING: 443320 GROUND SURFACE	520.00				
0.5	COBBLES and BOULDERS, f. grained sand, tr. gravel, brown, dry					
1.0	END OF BOREHOLE @ 1.00m BGS	519.00				
1.5						
2.0						
2.5						
3.0						
3.5						
4.0						
4.5						
5.0						
5.5						
6.0						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 19325 TEST PIT.GPJ CRA_CORP.GDT 11/19/07

TEST PIT STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: Nakusp Landfill
PROJECT NUMBER: 19325-10-300
CLIENT: Regional District of Central Kootenay
LOCATION: Nakusp, B.C.

HOLE DESIGNATION: TP11-07
DATE COMPLETED: July 25, 2007
TEST PIT METHOD: Excavator
FIELD PERSONNEL: Z.F, R.S

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	NORTHING: 5568650 EASTING: 443285 GROUND SURFACE	520.00				
0.5	Fill- primarily sawdust with cobbles and gravel					
	Refuse -plastics, bags, glass	519.50				
1.0						
1.5						
2.0	Sandy and gravelly COBBLES and BOULDERS, greyish brown	518.00				
	END OF BOREHOLE @ 2.00m BGS	517.90				
2.5						
3.0						
3.5						
4.0						
4.5						
5.0						
5.5						
6.0						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 19325 TEST PIT.GPJ CRA_CORP.GDT 11/19/07

TEST PIT STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: Nakusp Landfill
PROJECT NUMBER: 19325-10-300
CLIENT: Regional District of Central Kootenay
LOCATION: Nakusp, B.C.

HOLE DESIGNATION: TP12-07
DATE COMPLETED: July 25, 2007
TEST PIT METHOD: Excavator
FIELD PERSONNEL: Z.F, R.S

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	NORTHING: 5568654 EASTING: 443275 GROUND SURFACE	513.00				
0.5	Fill- BOULDERS, COBBLES, and SAND mixed with topsoil					
1.0	END OF BOREHOLE @ 1.00m BGS	512.00				
1.5						
2.0						
2.5						
3.0						
3.5						
4.0						
4.5						
5.0						
5.5						
6.0						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 19325 TEST PIT.GPJ CRA_CORP.GDT 11/19/07

TEST PIT STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: Nakusp Landfill
PROJECT NUMBER: 19325-10-300
CLIENT: Regional District of Central Kootenay
LOCATION: Nakusp, B.C.

HOLE DESIGNATION: TP13-07
DATE COMPLETED: July 25, 2007
TEST PIT METHOD: Excavator
FIELD PERSONNEL: Z.F, R.S

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	NORTHING: 5568643 EASTING: 443220 GROUND SURFACE	513.00				
0.5	COBBLES, BOULDERS, and SAND					
1.0	END OF BOREHOLE @ 1.00m BGS	512.00				
1.5						
2.0						
2.5						
3.0						
3.5						
4.0						
4.5						
5.0						
5.5						
6.0						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 19325 TEST PIT.GPJ CRA_CORP.GDT 11/19/07

TEST PIT STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: Nakusp Landfill
PROJECT NUMBER: 19325-10-300
CLIENT: Regional District of Central Kootenay
LOCATION: Nakusp, B.C.

HOLE DESIGNATION: TP5-07
DATE COMPLETED: July 25, 2007
TEST PIT METHOD: Excavator
FIELD PERSONNEL: Z.F, R.S

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	NORTHING: 5568605 EASTING: 443174 GROUND SURFACE	508.00				
	Sandy, gravelly COBBLES and BOULDERS, brown -thin organic top layer (approx. 0.1 m) -boulder size observed up to 0.7 m	507.90				
3.0	- evidence of moisture at 3.00m BGS					
4.0	- evidence of oxidation at 4.00m BGS		1			
5.5	END OF BOREHOLE @ 5.50m BGS	502.50	2			

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ⬭ GRAIN SIZE ANALYSIS ▭

OVERBURDEN LOG 19325 TEST PIT.GPJ CRA_CORP.GDT 11/19/07

TEST PIT STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: Nakusp Landfill
PROJECT NUMBER: 19325-10-300
CLIENT: Regional District of Central Kootenay
LOCATION: Nakusp, B.C.

HOLE DESIGNATION: TP6-07
DATE COMPLETED: July 25, 2007
TEST PIT METHOD: Excavator
FIELD PERSONNEL: Z.F, R.S

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	NORTHING: 5568693 EASTING: 443255 GROUND SURFACE	517.00				
	Gravelly and sandy COBBLES and BOULDERS, c. grained sand, brown - wood chips (approx. 0.05m) at surface	516.95				
0.5						
1.0						
1.5						
2.0	- layer of oxidation at 2.00m BGS					
2.5						
3.0						
3.5						
4.0	- evidence of moisture at 4.00m BGS		1			
4.5						
5.0						
5.5						
6.0	END OF BOREHOLE @ 6.00m BGS	511.00	2			

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (oval) GRAIN SIZE ANALYSIS (rectangle)

OVERBURDEN LOG 19325 TEST PIT.GPJ CRA_CORP.GDT 11/19/07

TEST PIT STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: Nakusp Landfill
PROJECT NUMBER: 19325-10-300
CLIENT: Regional District of Central Kootenay
LOCATION: Nakusp, B.C.

HOLE DESIGNATION: TP7-07
DATE COMPLETED: July 25, 2007
TEST PIT METHOD: Excavator
FIELD PERSONNEL: Z.F, R.S

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	NORTHING: 5568814 EASTING: 443239 GROUND SURFACE	528.00				
0.5	Fill- SAND, poorly graded, f. grained					
	REFUSE, saturated	527.50				
1.0						
1.5						
2.0	Clayey SILT, grey	526.00	1			
2.5						
3.0						
3.5	SAND, tr. silt, gravel and cobbles, poorly graded, f.grained,	524.50	2			
4.0	END OF BOREHOLE @ 4.00m BGS	524.00				
4.5						
5.0						
5.5						
6.0						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS ☐

OVERBURDEN LOG 19325 TEST PIT.GPJ CRA_CORP.GDT 11/19/07

TEST PIT STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: Nakusp Landfill
PROJECT NUMBER: 19325-10-300
CLIENT: Regional District of Central Kootenay
LOCATION: Nakusp, B.C.

HOLE DESIGNATION: TP8-07
DATE COMPLETED: July 25, 2007
TEST PIT METHOD: Excavator
FIELD PERSONNEL: Z.F, R.S

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	NORTHING: 5568735 EASTING: 443340 GROUND SURFACE	520.00				
0.0	Gravelly and sandy COBBLES and BOULDERS, brown					
2.5	END OF BOREHOLE @ 2.50m BGS	517.50				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 19325 TEST PIT.GPJ CRA_CORP.GDT 11/19/07

TEST PIT STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: Nakusp Landfill
PROJECT NUMBER: 19325-10-300
CLIENT: Regional District of Central Kootenay
LOCATION: Nakusp, B.C.

HOLE DESIGNATION: TP9-07
DATE COMPLETED: July 25, 2007
TEST PIT METHOD: Excavator
FIELD PERSONNEL: Z.F, R.S

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	NORTHING: 5568842 EASTING: 443290 GROUND SURFACE	532.00				
0.5	Clayey SILT		1			
1.0	Gravelly SAND with cobbles, poorly graded, f. grained, brown, moist	531.00				
1.5						
2.0						
2.5						
3.0	END OF BOREHOLE @ 3.00m BGS	529.00	2			
3.5						
4.0						
4.5						
5.0						
5.5						
6.0						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 19325 TEST PIT.GPJ CRA_CORP.GDT 11/19/07

TEST PIT STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: Nakusp Landfill
PROJECT NUMBER: 19325-10-300
CLIENT: Regional District of Central Kootenay
LOCATION: Nakusp, B.C.

HOLE DESIGNATION: TP10-07
DATE COMPLETED: July 25, 2007
TEST PIT METHOD: Excavator
FIELD PERSONNEL: Z.F, R.S

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	NORTHING: 5568650 EASTING: 443320 GROUND SURFACE	520.00				
0.5	COBBLES and BOULDERS, f. grained sand, tr. gravel, brown, dry					
1.0	END OF BOREHOLE @ 1.00m BGS	519.00				
1.5						
2.0						
2.5						
3.0						
3.5						
4.0						
4.5						
5.0						
5.5						
6.0						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 19325 TEST PIT.GPJ CRA_CORP.GDT 11/19/07

TEST PIT STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: Nakusp Landfill
PROJECT NUMBER: 19325-10-300
CLIENT: Regional District of Central Kootenay
LOCATION: Nakusp, B.C.

HOLE DESIGNATION: TP11-07
DATE COMPLETED: July 25, 2007
TEST PIT METHOD: Excavator
FIELD PERSONNEL: Z.F, R.S

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	NORTHING: 5568650 EASTING: 443285 GROUND SURFACE	520.00				
0.5	Fill- primarily sawdust with cobbles and gravel					
	Refuse -plastics, bags, glass	519.50				
1.0						
1.5						
2.0	Sandy and gravelly COBBLES and BOULDERS, greyish brown	518.00				
	END OF BOREHOLE @ 2.00m BGS	517.90				
2.5						
3.0						
3.5						
4.0						
4.5						
5.0						
5.5						
6.0						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 19325 TEST PIT.GPJ CRA_CORP.GDT 11/19/07

TEST PIT STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: Nakusp Landfill
PROJECT NUMBER: 19325-10-300
CLIENT: Regional District of Central Kootenay
LOCATION: Nakusp, B.C.

HOLE DESIGNATION: TP12-07
DATE COMPLETED: July 25, 2007
TEST PIT METHOD: Excavator
FIELD PERSONNEL: Z.F, R.S

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	NORTHING: 5568654 EASTING: 443275 GROUND SURFACE	513.00				
0.5	Fill- BOULDERS, COBBLES, and SAND mixed with topsoil					
1.0	END OF BOREHOLE @ 1.00m BGS	512.00				
1.5						
2.0						
2.5						
3.0						
3.5						
4.0						
4.5						
5.0						
5.5						
6.0						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 19325 TEST PIT.GPJ CRA_CORP.GDT 11/19/07

TEST PIT STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: Nakusp Landfill
PROJECT NUMBER: 19325-10-300
CLIENT: Regional District of Central Kootenay
LOCATION: Nakusp, B.C.

HOLE DESIGNATION: TP13-07
DATE COMPLETED: July 25, 2007
TEST PIT METHOD: Excavator
FIELD PERSONNEL: Z.F, R.S

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	NORTHING: 5568643 EASTING: 443220 GROUND SURFACE	513.00				
0.5	COBBLES, BOULDERS, and SAND					
1.0	END OF BOREHOLE @ 1.00m BGS	512.00				
1.5						
2.0						
2.5						
3.0						
3.5						
4.0						
4.5						
5.0						
5.5						
6.0						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 19325 TEST PIT.GPJ CRA_CORP.GDT 11/19/07

TEST PIT STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: Nakusp Landfill
PROJECT NUMBER: 19325-10-300
CLIENT: Regional District of Central Kootenay
LOCATION: Nakusp, B.C.

HOLE DESIGNATION: TP5-07
DATE COMPLETED: July 25, 2007
TEST PIT METHOD: Excavator
FIELD PERSONNEL: Z.F, R.S

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	NORTHING: 5568605 EASTING: 443174 GROUND SURFACE	508.00				
	Sandy, gravelly COBBLES and BOULDERS, brown -thin organic top layer (approx. 0.1 m) -boulder size observed up to 0.7 m	507.90				
3.0	- evidence of moisture at 3.00m BGS					
4.0	- evidence of oxidation at 4.00m BGS		1			
5.5	END OF BOREHOLE @ 5.50m BGS	502.50	2			

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (oval) GRAIN SIZE ANALYSIS (rectangle)

OVERBURDEN LOG 19325 TEST PIT.GPJ CRA_CORP.GDT 11/19/07

TEST PIT STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: Nakusp Landfill
PROJECT NUMBER: 19325-10-300
CLIENT: Regional District of Central Kootenay
LOCATION: Nakusp, B.C.

HOLE DESIGNATION: TP6-07
DATE COMPLETED: July 25, 2007
TEST PIT METHOD: Excavator
FIELD PERSONNEL: Z.F, R.S

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	NORTHING: 5568693 EASTING: 443255 GROUND SURFACE	517.00				
	Gravelly and sandy COBBLES and BOULDERS, c. grained sand, brown - wood chips (approx. 0.05m) at surface	516.95				
0.5						
1.0						
1.5						
2.0	- layer of oxidation at 2.00m BGS					
2.5						
3.0						
3.5						
4.0	- evidence of moisture at 4.00m BGS		1			
4.5						
5.0						
5.5						
6.0	END OF BOREHOLE @ 6.00m BGS	511.00	2			

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (oval) GRAIN SIZE ANALYSIS (rectangle)

OVERBURDEN LOG 19325 TEST PIT.GPJ CRA_CORP.GDT 11/19/07

TEST PIT STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: Nakusp Landfill
PROJECT NUMBER: 19325-10-300
CLIENT: Regional District of Central Kootenay
LOCATION: Nakusp, B.C.

HOLE DESIGNATION: TP7-07
DATE COMPLETED: July 25, 2007
TEST PIT METHOD: Excavator
FIELD PERSONNEL: Z.F, R.S

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	NORTHING: 5568814 EASTING: 443239 GROUND SURFACE	528.00				
0.5	Fill- SAND, poorly graded, f. grained					
	REFUSE, saturated	527.50				
1.0						
1.5						
2.0	Clayey SILT, grey	526.00	1			
2.5						
3.0						
3.5	SAND, tr. silt, gravel and cobbles, poorly graded, f.grained,	524.50	2			
4.0	END OF BOREHOLE @ 4.00m BGS	524.00				
4.5						
5.0						
5.5						
6.0						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS ☐

OVERBURDEN LOG 19325 TEST PIT.GPJ CRA_CORP.GDT 11/19/07

TEST PIT STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: Nakusp Landfill
PROJECT NUMBER: 19325-10-300
CLIENT: Regional District of Central Kootenay
LOCATION: Nakusp, B.C.

HOLE DESIGNATION: TP8-07
DATE COMPLETED: July 25, 2007
TEST PIT METHOD: Excavator
FIELD PERSONNEL: Z.F, R.S

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	NORTHING: 5568735 EASTING: 443340 GROUND SURFACE	520.00				
0.5	Gravelly and sandy COBBLES and BOULDERS, brown					
1.0						
1.5						
2.0						
2.5	END OF BOREHOLE @ 2.50m BGS	517.50				
3.0						
3.5						
4.0						
4.5						
5.0						
5.5						
6.0						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 19325 TEST PIT.GPJ CRA_CORP.GDT 11/19/07

TEST PIT STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: Nakusp Landfill
PROJECT NUMBER: 19325-10-300
CLIENT: Regional District of Central Kootenay
LOCATION: Nakusp, B.C.

HOLE DESIGNATION: TP9-07
DATE COMPLETED: July 25, 2007
TEST PIT METHOD: Excavator
FIELD PERSONNEL: Z.F, R.S

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	NORTHING: 5568842 EASTING: 443290 GROUND SURFACE	532.00				
0.5	Clayey SILT		1			
1.0	Gravelly SAND with cobbles, poorly graded, f. grained, brown, moist	531.00				
3.0	END OF BOREHOLE @ 3.00m BGS	529.00	2			

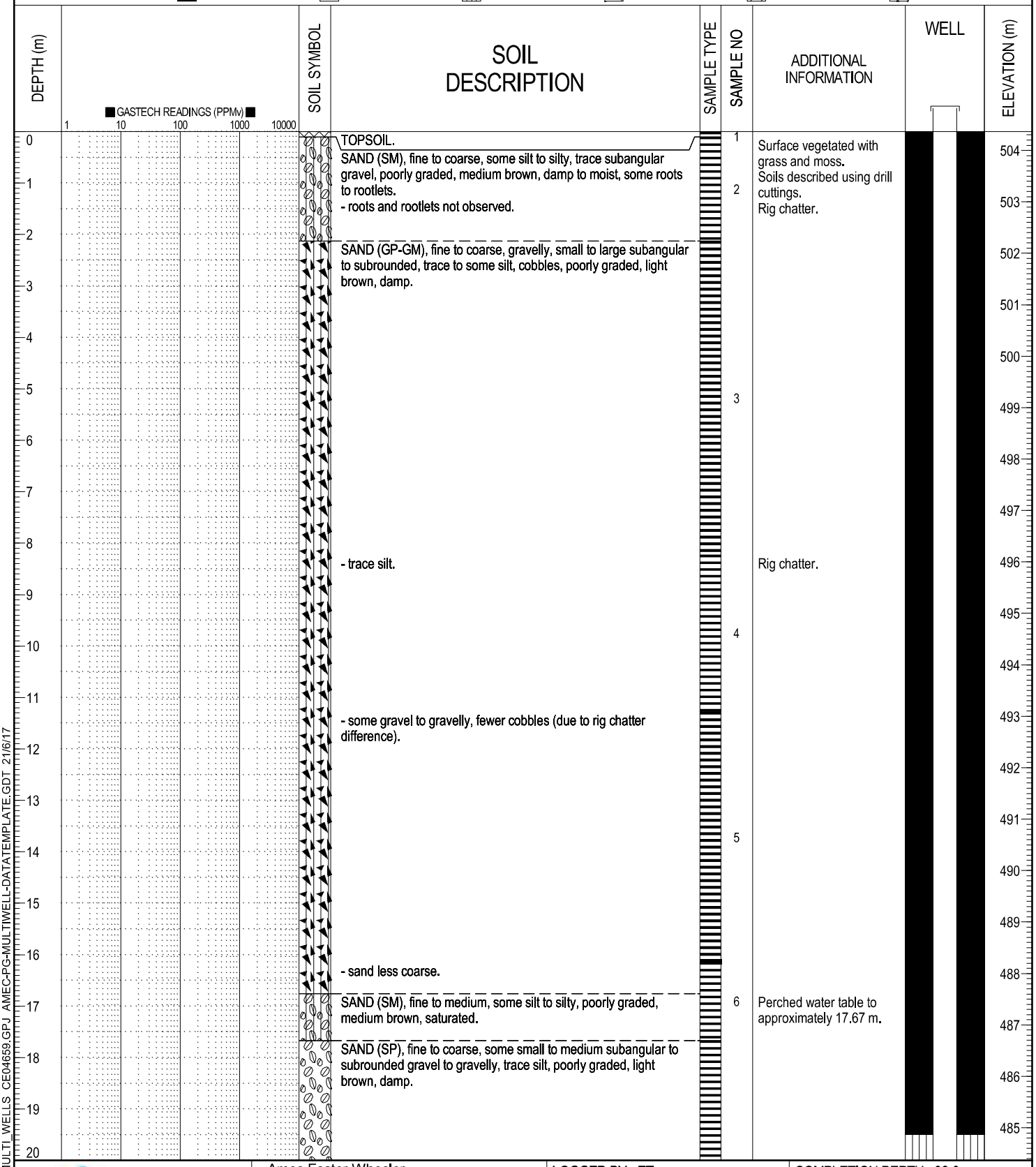
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 19325 TEST PIT.GPJ CRA_CORP.GDT 11/19/07

CLIENT: Regional District of Central Kootenay	PROJECT: Nakusp Landfill Hydrogeological Review	BOREHOLE NO: **MW17-07**
DRILLER: JR Drilling Ltd	1420 Hotsprings Road, Nakusp, BC	PROJECT NO: CE04659.C
DRILL TYPE/METHOD: Truck/Air Rotary	NORTHING: 5568456.779 EASTING: 442909.7936	ELEVATION: 504.36 m

SAMPLE TYPE: TUBE | NO RECOVERY | SPLIT SPOON | GRAB | MUD RETURN | CORE RETURN

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND



ENVIRO_MULTI_WELLS CE04659.GPJ AMEC-PG-MULTIWELL-DATATEMPLATE.GDT 21/6/17

Amec Foster Wheeler
913 Laval Crescent
Kamloops, British Columbia
Canada V2C 5P4

LOGGED BY: ET	COMPLETION DEPTH: 32.0 m
ENTERED BY: ET	COMPLETION DATE: 22/5/17
REVIEWED BY: DW	Page 1 of 2

CLIENT: Regional District of Central Kootenay	PROJECT: Nakusp Landfill Hydrogeological Review	BOREHOLE NO: **MW17-07**
DRILLER: JR Drilling Ltd	1420 Hotsprings Road, Nakusp, BC	PROJECT NO: CE04659.C
DRILL TYPE/METHOD: Truck/Air Rotary	NORTHING: 5568456.779 EASTING: 442909.7936	ELEVATION: 504.36 m

SAMPLE TYPE: TUBE | NO RECOVERY | SPLIT SPOON | GRAB | MUD RETURN | CORE RETURN

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

DEPTH (m)	GASTECH READINGS (PPMv) 1 10 100 1000 10000	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	ADDITIONAL INFORMATION	WELL	ELEVATION (m)
20			SAND (SP), fine to coarse, some small to medium subangular to subrounded gravel to gravelly, trace silt, poorly graded, light brown, damp. *(continued)*		7			484
21								483
22								482
23			- gravelly, cobbles.			Rig chatter.		481
24								480
25					8			479
26								478
27								477
28						Rig chatter.		476
29			- some gravel, moist to wet.			Water Level observed at 28.6m below ground surface on 22 May 2017		475
30					9			474
31								473
32			End of Borehole 32.00 m. Monitoring Well Installed.					472
33								471
34								470
35								469
36								468
37								467
38								466
39								465
40								

ENVIRO_MULTI_WELLS CE04659.GPJ AMEC-PG-MULTIWELL-DATATEMPLATE.GDT 21/6/17

Amec Foster Wheeler
913 Laval Crescent
Kamloops, British Columbia
Canada V2C 5P4

LOGGED BY: ET	COMPLETION DEPTH: 32.0 m
ENTERED BY: ET	COMPLETION DATE: 22/5/17
REVIEWED BY: DW	Page 2 of 2

BRITISH COLUMBIA

Well Summary

Well Tag Number: 119552
Well Status: New
Observation Well Number:
Well Identification Plate Number: 43310
Well Class: Water Supply
Observation Well Status:
Owner Name: Regional District of Central Kootenay
Well Subclass: Not Applicable
Environmental Monitoring System (EMS) ID:
Intended Water Use: Private Domestic
Aquifer Number:
Alternative specs submitted: No
Artesian Condition: No
Technical Report: N/A
Drinking Water Area Indicator: No

Licensing Information

Licensed Status: Unlicensed
Licence Number:

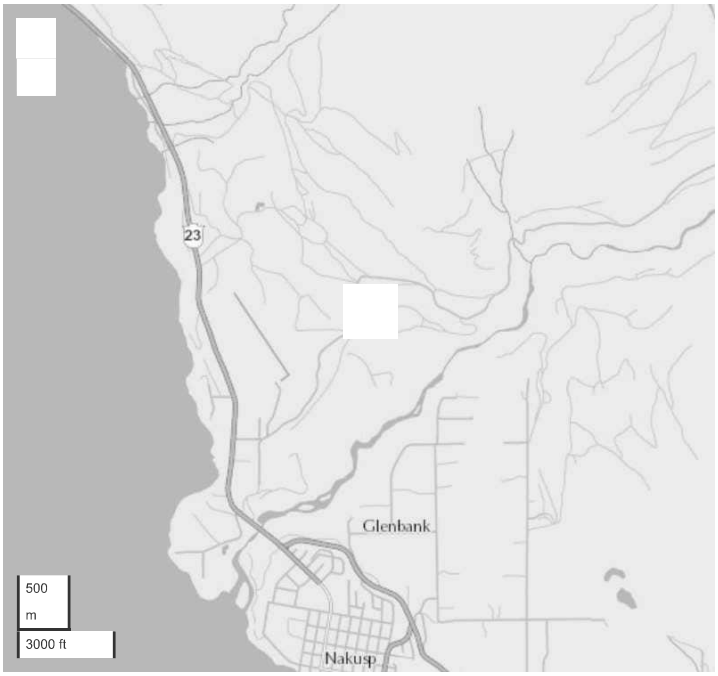
Location Information

Street Address: Hot Springs Road
Town/City: Nakusp

Legal Description:

Lot	3
Plan	NEP 73519
District Lot	13034
Block	
Section	
Township	
Range	
Land District	26
Property Identification Description (PID)	025679562

Description of Well Location: Lot 3 Hot Springs Road Nakusp BC



MapBox | Government of British Columbia, DataBC, GeoBC

Geographic Coordinates - North American Datum of 1983 (NAD 83)
Latitude: 50.26643
Longitude: -117.80054
UTM Easting: 442946
UTM Northing: 5568561
Zone: 11
Coordinate Acquisition Code: (10 m accuracy) Handheld GPS with accuracy of +/- 10 metres

Well Activity

Activity	Work Start Date	Work End Date	Drilling Company	Date Entered
Construction report	2019-12-11	2019-12-13	Owen's Drilling Ltd.	January 8th 2020 at 12:44 PM

Well Work Dates

Start Date of Construction	End Date of Construction	Start Date of Alteration	End Date of Alteration	Start Date of Decommission	End Date of Decommission
2019-12-11	2019-12-13				

Well Completion Data

Total Depth Drilled: 336 ft bgl
Estimated Well Yield: 100 USgpm
Static Water Level (BTOC): 100 feet btoc
Finished Well Depth: 332 ft bgl
Well Cap: Bolt On
Artesian Flow:
Final Casing Stick Up: 14 inches
Well Disinfected Status:
Artesian Pressure (head):
Depth to Bedrock:
Drilling Method: Air Rotary
Artesian Pressure (PSI):
Ground elevation: 1730 feet
Method of determining elevation: GPS
Orientation of Well: VERTICAL

Lithology

From (ft bgl)	To (ft bgl)	Raw Data	Description	Moisture	Colour	Hardness	Observations	Water Bearing Flow Estimate (USGPM)
0	4	fine sand, silt, organic	loose	Dry	rust-coloured	Loose		
4	12	fine sand & gravel	loose	Dry	brown	Loose		
12	110	fine coarse sand, gravel, cobbles	dense	Dry	tan	Dense		
110	212	fine sand, silt	loose	Wet	brown	Loose		
212	226	clay with silt, fine sand some gravel	hard	Wet	grey	Hard		
226	280	silty fine sand, clay layers	loose	Wet	brown	Loose		
280	314	clay with silt, fine sand	hard	Wet	grey	Hard		
314	336	fine sand, coarse sand with gravel	dense	Wet	grey	Dense		100

Casing Details

From	To	Casing Type	Casing Material	Diameter	Wall Thickness	Drive Shoe
0	323	Surface casing	Steel	6	219	Installed

Surface Seal and Backfill Details

Surface Seal Material: Bentonite clay
Backfill Material Above Surface Seal:
Surface Seal Installation Method: Poured
Backfill Depth: 1 feet
Surface Seal Thickness: 1 inches
Surface Seal Depth: 18 feet

Liner Details

Liner Material:
Liner Diameter:
Liner Thickness:
Liner from:
Liner to:
Liner perforations

From	To
There are no records to show	

Screen Details

Intake Method:
Type:
Material:
Opening:
Bottom:
Installed Screens

From	To	Diameter	Assembly Type	Slot Size
There are no records to show				

Well Development

Developed by: Air lifting
Development Total Duration: 4 hours

Well Yield

Estimation Method: Air Lifting
Estimation Rate: 100 USgpm
Estimation Duration: 4 hours
Static Water Level Before Test: 100 ft (btoc)
Drawdown:
Hydrofracturing Performed: No
Increase in Yield Due to Hydrofracturing:

Well Decommission Information

Reason for Decommission:
Method of Decommission:
Sealant Material:
Backfill Material:
Decommission Details:

Pumping Test Information and Aquifer Parameters

Start Date	Description	Test Duration (min)	Boundary Effect	Storativity	Transmissivity (m^2/day)	Hydraulic Conductivity (m/day)	Specific Yield	Specific Capacity (L/s/m)	Analysis Method	Comments
There are no records to show										

Comments

No comments submitted

Documents

Well Number	Document Type	Date Of Upload	Document Status	Uploaded Document

Disclaimer

Zone 11 5568290 N 442830 E

BRITISH COLUMBIA
Ministry of Environment

☑ Well Construction Report
☐ Well Closure Report
☐ Well Alteration Report

082K 021 424

THORMAN DRILLING LTD.
PO Box 986
Nelson, B.C.
V1L 6A5
Stamp company name/address/ phone/fax/e-mail if desired.

Ministry Well ID Plate Number: 17695
Ministry Well Tag Number: 88273
☐ Confirmation/alternative specs. attached
☐ Original well construction report attached

Red lettering indicates minimum mandatory information. See reverse for notes & definitions of abbreviations.

Owner name: Arrow Lakes Redi-Mix
Mailing address: Box 1091 Town NAKUSP Prov. BC Postal Code V0G1R0
Well Location: Address: Street no. 1500 Street name Hot Springs Rd. Town NAKUSP
(or) **Legal description:** Lot Plan D.L. 397 Block D Sec. Twp. Rg. Land District WLD
(or) **PID:** 025-142-3 (and) **Description of well location (attach sketch, if nec.):**

NAD 83: Zone: (see note 2) (and) **UTM Northing:** 50° 15.839 m **UTM Easting:** 117° 48.127 m (or) **Latitude (see note 3):** **Longitude:**

Method of drilling: ☑ air rotary ☐ cable tool ☐ mud rotary ☐ auger ☐ driving ☐ jetting ☐ excavating ☐ other (specify):
Orientation of well: ☑ vertical ☐ horizontal Ground elevation: 1672 ft (asl) Method (see note 4):
Class of well (see note 5): Water Supply **Sub-class of well:**
Water supply wells: indicate intended water use: ☐ private domestic ☐ water supply system ☐ irrigation ☐ commercial or industrial ☐ other (specify):

Lithologic description (see notes 7-14) or closure description (see notes 15 and 16)

From ft (bgl)	To ft (bgl)	Relative Hardness	Colour	Material Description (Use recommended terms on reverse. List in order of decreasing amount, if applicable)	Water-bearing Estimated Flow (USgpm)	Observations (e.g., fractured, weathered, well sorted, silty wash), closure details
0	130	H	Br	Cobbles - Coarse Sand/Gravel		Wet @ 92
130	135	D	Br	Gravel with Fine Sand and Silt		Water Bearing
135	202	D	Br	Fine Silty Sand		throughout hole.
202	248	D	Br	Fine Clean Sand		
248	258	H	Gy	Clay Seams with Silt & Fine Sand		
258	275	D	Br	Clean Fine Sand		
275	298	D	Br-Gy	Fine Sand Seams with Clay Seams		

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material / Open Hole	Wall Thickness in	Drive Shoe
0		8 5/8	Steel	.330	Ring

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size
273.5	263'	8	Schlum	.008
263	262.5	8	Packer	.008

Surface seal: Type: Bentonite Grout over Chips Depth: 18 ft
Method of installation: ☑ Poured ☐ Pumped Thickness: 11" x 8 5/8 in
Backfill: Type: Depth: ft
Liner: ☐ PVC ☐ Other (specify):
Diameter: in Thickness: in
From: ft (bgl) To: ft (bgl) Perforated: From: ft (bgl) To: ft (bgl)

Intake: ☑ Screen ☐ Open bottom ☐ Uncased hole
Screen type: ☑ Telescope ☐ Pipe size
Screen material: ☑ Stainless steel ☐ Plastic ☐ Other (specify):
Screen opening: ☑ Continuous slot ☐ Slotted ☐ Perforated pipe
Screen bottom: ☑ Bail ☐ Plug ☐ Plate ☐ Other (specify):
Filter pack: From: ft To: ft Thickness: in
Type and size of material: Natural

Developed by:

☑ Air lifting ☐ Surging ☑ Jetting ☐ Pumping ☐ Bailing
☐ Other (specify): Total duration: 4.5 hrs
Notes:

Well yield estimated by:

☐ Pumping ☑ Air lifting ☐ Bailing ☐ Other (specify):
Rate: 120 USgpm Duration: 4.5 hrs
SWL before test: 92 ft (btoc) Pumping water level: ft (btoc)

Obvious water quality characteristics:

☐ Fresh ☐ Salty ☑ Clear ☐ Cloudy ☐ Sediment ☐ Gas
Colour/odour: NO Water sample collected: ☐

Well driller (print clearly):

Name (first, last) (see note 19): Carl Mackenzie
Registration no. (see note 20): 04121501
Consultant (if applicable; name and company):

DECLARATION: Well construction, well alteration or well closure, as the case may be, has been done in accordance with the requirements in the *Water Act* and the Ground Water Protection Regulation.
Signature of Driller Responsible

Final well completion data:

Total depth drilled: 298 ft Finished well depth: 273.5 ft (bgl)
Final stick up: 32 in Depth to bedrock: ft (bgl)
SWL: 92 ft (btoc) Estimated well yield: 120+ USgpm
Artesian flow: USgpm, or Artesian pressure: ft
Type of well cap: Welded Plate Well disinfected: ☐ Yes ☐ No
Where well ID plate is attached: 6" from top of Pipe

Well closure information:

Reason for closure:
Method of closure: ☐ Poured ☐ Pumped
Sealant material: Backfill material:
Details of closure (see note 17):

Date of work (YYYY/MM/DD):

Started: 07 02 21 Completed: 07,03,01
Comments:

PLEASE NOTE: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the work, which may change over time.

white: Customer copy
canary: Driller copy
pink: Ministry copy

Sheet ____ of ____

General

1. Requirements for well construction and well closure reports are found in Part 5 of the *Water Act* and the Ground Water Protection Regulation. Part 5 of the act and regulation are available at: http://www.env.gov.bc.ca/wat/gws/index.html.
2. The current Ministry standard datum for mapping and geodetic use is the North American Datum of 1983 (NAD 83). To determine GPS coordinates using a Global Positioning System (GPS), set the datum to NAD 83.
3. For latitude and longitude coordinates, provide coordinates either in degree, minutes and seconds (e.g., 50° 2' 21.037") or decimal degrees (e.g., 50.039175°).
4. For the method of determining ground elevation, enter: GPS, differential GPS, level, altimeter, 1:50,000 map, 1:20,000 map, 1:10,000 map or 1:5,000 map.
5. The classes and sub-classes of wells are shown below:

Class	**Sub-class** (if applicable)
Water supply	Domestic; Non-domestic
Monitoring	Temporary; Permanent
Recharge or injection	
Dewatering or drainage	Temporary; Permanent
Remediation	Temporary; Permanent
Geotechnical	Borehole; Test pit; Special type of hole; Closed loop geothermal

6. Well reports submitted to the Deputy Comptroller, or retained by the person responsible, as required under the *Water Act* and the Ground Water Protection Regulation, shall be considered part of the Provincial Government records and is subject to the *Freedom of Information and Protection of Privacy Act*.

How to Fill Out the Lithologic Description Table

7. Each row in the lithologic description table represents either a depth interval or depth in the well.
8. A row could represent a depth interval (e.g., from 0 feet to 12 feet), such as for a geologic stratum or a specific depth (e.g., 120 feet), such as for a depth location of a water-bearing fracture.
9. For a depth interval, enter the relative hardness of the material in the column "Relative Hardness," if applicable: Very Hard (VH), Hard (H), Dense (D), Stiff (ST), Medium (M), Loose (L), Soft (S), Very Soft (VS).
10. For a depth interval, enter the letter for the overall colour of the geologic material in the column "Colour," if applicable: White (W), Grey (Gy), Blue (Bl), Green (G), Yellow (Y), Brown (Br), Red (R), Tan (T), Black (Bk).
11. For each depth interval, enter the description of the geologic materials encountered during drilling in the column "Material Description." Material descriptions should be chosen from the following recommended list of materials:

Surficial materials (approximate range of particle size)	**Bedrock materials**
boulders (greater than 10 inches)	conglomerate
cobbles (2 1/2 inches to 10 inches)	sandstone
gravel (80 slot to 2 1/2 inches)	shale
coarse sand (25 slot to 80 slot)	siltstone
medium sand (10 slot to 25 slot)	limestone
fine sand (2 slot to 10 slot)	crystalline
silt (less than 2 slot)	granite
clay (much less than 2 slot)	basalt
till (variable particle size)	volcanic
organics (e.g., top soil, wood, peat)	bedrock

12. In describing the material, list the material in order from greatest to least and indicate what materials occur in trace (less than 5%) amounts. The word "and" means both materials occur in approximately equal amounts (e.g., "gravel and coarse sand, trace silt").
13. Under the column "Water-bearing Estimated Flow (USgpm)," use "D" for "dry," "W" for "wet," or enter the estimated flow in USgpm.
14. If a water-bearing fracture is encountered, the depth of the fracture should be recorded in a row and the estimated flow of water in the fracture can be entered in the column "Water-bearing Estimated Flow (USgpm)."

How to Fill Out the Closure Description Table and the Well Closure Information Section

15. Each row in the closure description table represents either a depth interval (e.g., from 0 feet to 12 feet) or depth (e.g., 120 feet) in the well.
16. For a depth interval, enter the type of backfill or sealant material(s) in the column "Material Description."
17. Indicate in "Details of closure" whether casing(s) or screen(s) were pulled or left in place. If casing(s) were left in place, indicate whether it was perforated or ripped.

Screen Details

18. "Type" includes riser pipe, K-packer, screen, screen blank, or tail pipe.

Well Driller

19. Fill in the name of the driller who constructed the well.

Registration Number of Driller Responsible

20. Fill in the registration number on the Qualified Well Driller identification card. If the work was completed by a driller who is not registered as a Qualified Well Driller, the Qualified Well Driller who is directly supervising the work should fill in their registration number on their Qualified Well Driller identification card. The Qualified Well Driller signs the form.

Definitions of Abbreviations

asl .....above sea level
bgl .....below ground level
btoc .....below top of casing
Dia .....Diameter
D.L. .....District Lot
ft .....feet
hrs .....hours
in .....inches
NAD 83 ..North American Datum (1983)
PID .....Parcel Identifier
Rg. .....Range
Sec. .....Section
SWL .....static water level
Twp. .....Township
USgpm ...US gallons per minute
UTM .....Universal Transverse Mercator Grid

updated: Feb. 7, 2006

BCGS MAP 082K.021.4.2.4 WTN 88273 WELL NO. 001

PID 025-142-348 **WATER WELL RECORD** Well ID plate 17695

MINISTRY OF WATER, LAND AND AIR PROTECTION VICTORIA, BRITISH COLUMBIA

LEGAL DESCRIPTION: LOT ____ SEC. ____ TP. ____ R. ____ D.L. 397 LAND DISTRICT KLD PLAN ____

DESCRIPTIVE LOCATION 1500 Hot Springs Road Nakusp LICENCE NO. ____ DATE ____

Z ____ WELL NO. ____

____ E

____ N

Z X Y NO.

OWNER'S NAME Arrow Lakes Redimix ADDRESS Box 100 Nakusp BC

DRILLER'S NAME Thorman Drilling ADDRESS ____ DATE COMPLETED 7/8/

DEPTH 298 ft ELEVATION OF ____ ☐ ESTIMATED ☐ SURVEYED CASING DIAM. 8 5/8 LENGTH ____

NAT. TOPO. SHEET NO. ____

METHOD OF CONSTRUCTION ____ CASING DIAM ____ LENGTH ____

SCREEN LOCATION ____ SCREEN ☐ SIZE ____ LENGTH ____ TYPE ____

SANITARY SEAL YES ☐ NO ☐ SCREEN ☐ SIZE ____ LENGTH ____ TYPE ____

PERFORATED CASING ☐ LENGTH ____ PERFORATIONS FROM ____ TO ____

GRAVEL PACK ☐ LENGTH ____ DIAM. ____ SIZE GRAVEL, ETC. ____

DISTANCE TO WATER ____ ☐ ESTIMATED WATER LEVEL

FROM ____ ☐ MEASURED ELEVATION ____ ARTESIAN PRESSURE ____

DATE OF WATER LEVEL MEASUREMENT ____ WATER USE Domestic

PRODUCTION TEST SUMMARY

DATE ____

TEST BY ____

BAIL TEST ☐ PUMP TEST ☐ DURATION OF TEST ____

RATE ____ DRAWDOWN ____

WATER LEVEL AT COMPLETION OF TEST ____

AVAILABLE DRAWDOWN ____ SPECIFIC CAPACITY ____

PERMEABILITY ____ STORAGE COEFF. ____

TRANSMISSIVITY ____

ESTIMATED WELL YIELD ____

RECOMMENDED PUMPING RATE ____

RECOMMENDED PUMP SETTING ____

CHEMISTRY

TEST BY ____ DATE ____

TOTAL DISSOLVED SOLIDS ____ mg/l TEMPERATURE ____ °C pH ____ SILICA (SiO_2) ____ mg/l

CONDUCTANCE ____ μmhos/cm AT 25°C TOTAL IRON (Fe) ____ mg/l TOTAL HARDNESS ($CaCO_3$) ____ mg/l

TOTAL ALKALINITY ($CaCO_3$) ____ mg/l PHEN. ALKALINITY ($Ca\ CO_3$) ____ mg/l MANGANESE (Mn) ____ mg/l

COLOUR ____ ODOUR ____ TURBIDITY ____

ANIONS	mg/l	epm	CATIONS	mg/l	epm
CARBONATE (CO_3)			CALCIUM (Ca)		
BICARBONATE (HCO_3)			MAGNESIUM (Mg)		
SULPHATE (SO_4)			SODIUM (Na)		
CHLORIDE (Cl)			POTASSIUM (K)		
$NO_2 + NO_3$ (NITROGEN)			IRON (DISSOLVED)		
* TKN. (NITROGEN)					
PHOSPHORUS (P)					

* TKN = TOTAL KJELDAHL NITROGEN CHEMISTRY SITE NO. ____

NO_2 = NITRITE NO_3 = NITRATE

CHEMISTRY FIELD TESTS

TEST BY ____ DATE ____ EQUIPMENT USED ____

LITHOLOGY

FROM	TO	DESCRIPTION

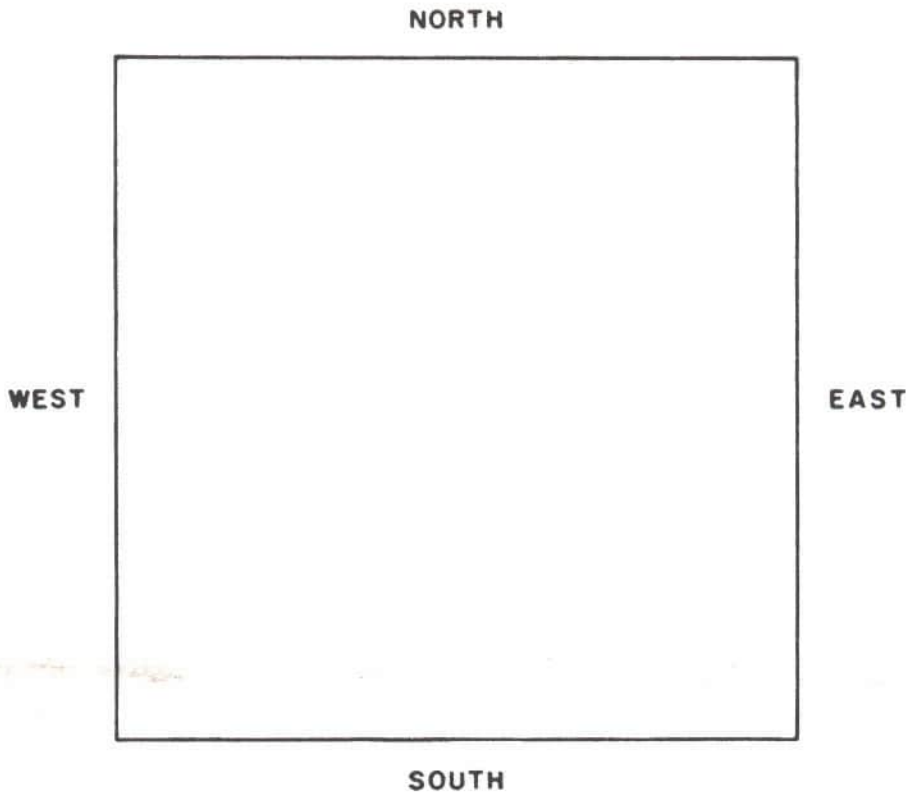
CONTENTS OF FOLDER

☐ DRILL LOG ☐ PUMP TEST DATA ☐ CHEMICAL ANALYSIS

☐ SIEVE ANALYSIS ☐ GEOPHYSICAL LOGS ☐ REPORT

OTHER ____

SOURCES OF INFORMATION ____



CARD BY_____ DATE_____

ADDITIONAL DATA ADDED BY_____

REMARKS

97941

ENV 1995

WTN 97434

BRITISH COLUMBIA The Best Place on Earth — Ministry of Environment

☑ Well Construction Report ☐ Well Closure Report ☐ Well Alteration Report

THORMAN DRILLING LTD
PO Box 986
Nelson, B.C.
V1L 6A5
Stamp company name/address/ phone/fax/e-mail here, if desired.

Ministry Well ID Plate Number: 26153
Ministry Well Tag Number: _____
☐ Confirmation/alternative specs. attached
☐ Original well construction report attached

Red lettering indicates minimum mandatory information. See reverse for notes & definitions of abbreviations.

Owner name: Ministry of Forests, Protection Branch Nakusp Fire Base
Mailing address: 2100 Hot Springs Rd. Town Nakusp Prov. BC Postal Code V0G 1R0
Well Location: Address: Street no. 2100 Street name Hot Springs Rd Town Nakusp
(or) **Legal description:** Lot _____ Plan _____ D.L. 397 Block _____ Sec. _____ Twp. _____ Rg. _____ Land District KD.
(or) **PID:** _____ (and) **Description of well location (attach sketch, if nec.):** Blocks C, E, F, G except ROW Plan 1366

NAD 83: Zone: 11 (see note 2) (and) **UTM Easting:** 442641 m **UTM Northing:** 5568370 m (or) **Latitude (see note 3):** _____ **Longitude:** _____

Method of drilling: ☑ air rotary ☐ cable tool ☐ mud rotary ☐ auger ☐ driving ☐ jetting ☐ excavating ☐ other (specify): _____
Orientation of well: ☑ vertical ☐ horizontal Ground elevation: 1898 ft (asl) Method (see note 4): _____
Class of well (see note 5): Water Supply **Sub-class of well:** Non Domestic
Water supply wells: indicate intended water use: ☐ private domestic ☐ water supply system ☐ irrigation ☐ commercial or industrial ☑ other (specify): Work Camp

Lithologic description (see notes 7-14) or closure description (see notes 15 and 16)

From ft (bgl)	To ft (bgl)	Relative Hardness	Colour	Material Description (Use recommended terms on reverse. List in order of decreasing amount, if applicable)	Water-bearing Estimated Flow (USgpm)	Observations (e.g., fractured, weathered, well sorted, silty wash), closure details
0	23	D	BL	Silty clay		
23	67	VH	GY	Clay till with Cobbles.		
67	230	VH	BL	Boulders, Cobbles. Coarse. Gravel with Silty Sand.		
230	237	L	T	med-Fine Sand.		

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material / Open Hole	Wall Thickness in	Drive Shoe
0	228	6	Steel	.219	Slotted

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size
236	228	5	Screen	.020
228	227.5	6	K Packer	

Surface seal: Type: Bentonite Grout. Depth: 18 ft
Method of installation: ☐ Poured ☑ Pumped Thickness: 1.65 in
Backfill: Type: _____ Depth: _____ ft
Liner: ☐ PVC ☐ Other (specify): _____
Diameter: _____ in Thickness: _____ in
From: ____ ft (bgl) To: ____ ft (bgl) Perforated: From: ____ ft (bgl) To: ____ ft (bgl)

Intake: ☑ Screen ☐ Open bottom ☐ Uncased hole
Screen type: ☐ Telescope ☑ Pipe size
Screen material: ☑ Stainless steel ☐ Plastic ☐ Other (specify): _____
Screen opening: ☑ Continuous slot ☐ Slotted ☐ Perforated pipe
Screen bottom: ☑ Bail ☐ Plug ☐ Plate ☐ Other (specify): _____
Filter pack: From: ____ ft To: ____ ft Thickness: _____ in
Type and size of material: Natural

Developed by:

☑ Air lifting ☐ Surging ☑ Jetting ☐ Pumping ☐ Bailing
☐ Other (specify): _____ Total duration: 3 hrs
Notes: _____

Well yield estimated by:

☐ Pumping ☑ Air lifting ☐ Bailing ☐ Other (specify): _____
Rate: 50 USgpm Duration: 3 hrs
SWL before test: 180 ft (btoc) Pumping water level: _____ ft (btoc)

Obvious water quality characteristics:

☑ Fresh ☐ Salty ☑ Clear ☐ Cloudy ☐ Sediment ☐ Gas
Colour/odour: _____ Water sample collected: ☐

Well driller (print clearly):

Name (first, last) (see note 19): Carl MacKenzie
Registration no. (see note 20): 0412150
Consultant (if applicable; name and company): _____

DECLARATION: Well construction, well alteration or well closure, as the case may be, has been done in accordance with the requirements in the *Water Act* and the Ground Water Protection Regulation.
Signature of Driller Responsible Carl MacKenzie

Final well completion data:

Total depth drilled: 238 ft Finished well depth: 236 ft (bgl)
Final stick up: 36 in Depth to bedrock: _____ ft (bgl)
SWL: 180 ft (btoc) Estimated well yield: 50 USgpm
Artesian flow: _____ USgpm, or Artesian pressure: _____ ft
Type of well cap: welded plate Well disinfected: ☐ Yes ☑ No
Where well ID plate is attached: Top

Well closure information:

Reason for closure: _____
Method of closure: ☐ Poured ☐ Pumped
Sealant material: _____ Backfill material: _____
Details of closure (see note 17): _____

Date of work (YYYY/MM/DD):

Started: 08 07 17 **Completed:** 08, 07, 22
Comments: _____

PLEASE NOTE: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the works, which may change over time.

white: Customer copy
canary: Driller copy
pink: Ministry copy

Sheet ____ of ____

082K.021.404

BRITISH COLUMBIA

Well Summary

Well Tag Number: 127196
Well Status: New
Observation Well Number:
Well Identification Plate Number:
Well Class: Water Supply
Observation Well Status:
Owner Name: John Hamling
Well Subclass: Not Applicable
Environmental Monitoring System (EMS) ID:
Intended Water Use: Private Domestic
Aquifer Number:
Alternative specs submitted: No
Artesian Condition: No
Technical Report: N/A
Drinking Water Area Indicator: No

Licensing Information

Licensed Status: Unlicensed
Licence Number:

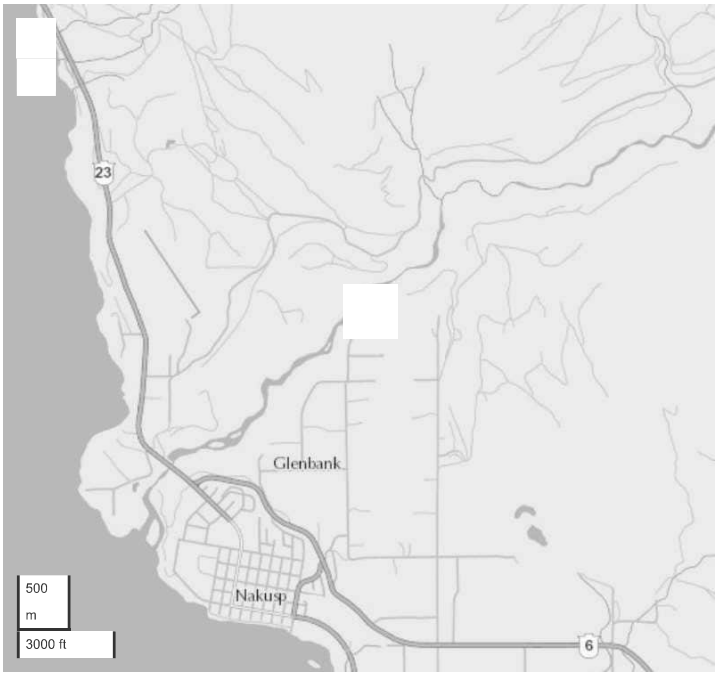
Location Information

Street Address: 755 Shakespeare Road
Town/City: Nakusp

Legal Description:

Lot	101
Plan	NEP980
District Lot	397
Block	
Section	
Township	
Range	
Land District	26
Property Identification Description (PID)	015952142

Description of Well Location: PLAN 980 EXCEPT PART INCLUDED IN PLAN NEP23613



MapBox | Government of British Columbia, DataBC, GeoBC

Geographic Coordinates - North American Datum of 1983 (NAD 83)
Latitude: 50.26125
Longitude: -117.78889
UTM Easting: 443770
UTM Northing: 5567976
Zone: 11
Coordinate Acquisition Code: (10 m accuracy) ICF cadastre and good location sketch

Well Activity

Activity	Work Start Date	Work End Date	Drilling Company	Date Entered
Construction report	2000-05-04	2000-05-04	Tri-City Pumps & Power (2007) Ltd.	December 14th 2022 at 10:35 AM

Well Work Dates

Start Date of Construction	End Date of Construction	Start Date of Alteration	End Date of Alteration	Start Date of Decommission	End Date of Decommission
2000-05-04	2000-05-04				

Well Completion Data

Total Depth Drilled:
Estimated Well Yield:
Static Water Level (BTOC): 142 feet btoc
Finished Well Depth: 198 ft bgl
Well Cap: Seal
Artesian Flow:
Final Casing Stick Up:
Well Disinfected Status:
Artesian Pressure (head):
Depth to Bedrock:
Drilling Method:
Artesian Pressure (PSI):
Ground elevation:
Method of determining elevation:
Orientation of Well: VERTICAL

Lithology

From (ft bgl)	To (ft bgl)	Raw Data	Description	Moisture	Colour	Hardness	Observations	Water Bearing Flow Estimate (USGPM)
There are no records to show								

Casing Details

From	To	Casing Type	Casing Material	Diameter	Wall Thickness	Drive Shoe
				6		

Surface Seal and Backfill Details

Surface Seal Material:
Backfill Material Above Surface Seal:
Surface Seal Installation Method:
Backfill Depth:
Surface Seal Thickness:
Surface Seal Depth:

Liner Details

Liner Material:
Liner Diameter:
Liner Thickness:
Liner from:
Liner to:
Liner perforations

From	To
There are no records to show	

Screen Details

Intake Method: Screen
Type:
Material:
Opening:
Bottom:
Installed Screens

From	To	Diameter	Assembly Type	Slot Size
There are no records to show				

Well Development

Developed by:
Development Total Duration:

Well Yield

Estimation Method:
Estimation Rate:
Estimation Duration:
Static Water Level Before Test: 142 ft (btoc)
Drawdown:
Hydrofracturing Performed: No
Increase in Yield Due to Hydrofracturing:

Well Decommission Information

Reason for Decommission:
Method of Decommission:
Sealant Material:
Backfill Material:
Decommission Details:

Pumping Test Information and Aquifer Parameters

Start Date	Description	Test Duration (min)	Boundary Effect	Storativity	Transmissivity (m^2/day)	Hydraulic Conductivity (m/day)	Specific Yield	Specific Capacity (L/s/m)	Analysis Method	Comments
There are no records to show										

Comments

Well x-ref'd and associated with DWR form.

Documents

Well Number	Document Type	Date Of Upload	Document Status	Uploaded Document
127196	Unknown	Date Unknown	Public Document	WTN 127196_Map.pdf
127196	Unknown	Date Unknown	Public Document	WTN 127196_Well Report.pdf

Disclaimer

Province of British Columbia

BC Environment

Water Management Division

WATER WELL RECORD

Date 94 07 04 (YR MO DY)

NTS MAP | WELL No. | ELEV | Location Accuracy

UTM Z E N | Date 19 | Well Type

002885

Owners Name & Address: GORDON MATCHETT

Legal Description & Address: LOT 100 DIST. Lot 397 PLAN. 980

Descriptive Location: LOT 1 OF NEW SUBDIVISION ON SHAKESPEAR RD. NAKUSP

1. TYPE OF WORK: 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD: 1 ☐ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☑ Rotary a ☐ mud b ☑ air c ☐ reverse ☐ Other

3. WATER WELL USE: 1 ☑ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm. & Ind. ☐ Other

4. DRILLING ADDITIVES: —

5. MEASUREMENTS from 1 ☑ ground level 2 ☐ top of casing

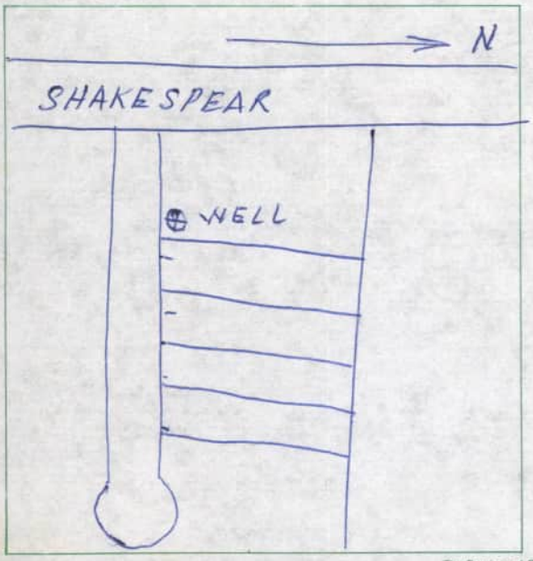
casing height above ground level _____ ft.

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
0	18	BROWN SAND, GRAVEL & BOULDERS	
18	55	BROWN SAND WITH SOME ROCKS	
55	178	BROWN SAND & GRAVEL (FINE TO COARSE)	135

7. CONSULTANT _____

Address _____

8. WELL LOCATION SKETCH



9. CASING: Materials 1 ☑ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other _____

							units
Hole Diameter							ins
Diameter	6						ins
from	0						ft
to	178						ft
Thickness	.188						ins
Weight	12.92						lb/ft

Pitless unit _____ ft 1 ☐ above 2 ☐ below ground level

1 ☑ Welded 2 ☐ Cemented 3 ☐ Threaded | 1 ☐ New 2 ☐ Used

Perforations: _____

Shoe(s): YES

Open hole, from _____ to _____ ft Diameter _____ ins

Grout: _____

10. SCREEN: 1 ☑ Nominal (Telescope) 2 ☐ Pipe Size

Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other _____

Material 1 ☑ Stainless Steel 2 ☐ Plastic ☐ Other _____

Set from 174 to 178 ft below ground level

RISER, SCREEN & BLANKS							units
Length	4						ft
Diam. I D	5						ins
Slot Size	.030						ins
from	174						ft
to	178						ft

Fittings, top K PACKER bottom PLATE

Gravel Pack _____

11. DEVELOPED BY: 1 ☐ Surging 2 ☐ Jetting 3 ☑ Air 4 ☐ Bailing 5 ☐ Pumping ☐ Other _____

12. TEST 1 ☐ Pump 2 ☐ Bail 3 ☑ Air Date 94 07 04 (YR MO DY)

Rate 30 USgpm Temp _____ °C SWL before test 135 ft

Water Level 135 ft after test of 12 hrs

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13.

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
SUBMERSIBLE	170 ft	APROX. 30 USgpm

14. WATER TYPE: 1 ☑ fresh 2 ☐ salty 3 ☑ clear 4 ☐ cloudy

colour _____ smell _____ ; gas 1 ☐ yes 2 ☑ no

15. WATER ANALYSIS: 1 Hardness _____ mg/L

2 Iron _____ mg/L 3 Chloride _____ mg/L

4 pH _____ Field Date _____

Lab Date _____ (YR MO DY)

SITE I D No _____

16. FINAL WELL COMPLETION DATA

Well Depth 178 ft Well Yield 30 US gpm

Static Water Level 135 ft Artesian Flow _____ US gpm Pressure Head _____ ft

Back filled _____

Well Head Completion CAPPED

17. DRILLER (PLEASE PRINT) SURNAME: SCHIBLI FIRST NAME: MAX

Signature Max Schibli

18. CONTRACTOR, Address M. SCHIBLI DRILLING R.R. #2 LUMBY B.C. V0E 2G0

Member, WWDA ☑ yes ☐ no ; _____

BCGS MAP 082K.022.3.1.1

WTN 66234

WELL NO. 005

WATER WELL RECORD

PID 018949843

MINISTRY OF ENVIRONMENT WATER MANAGEMENT DIVISION

VICTORIA, BRITISH COLUMBIA

Z 11 WELL NO.

443758 E

5567841 N

Z X Y NO.

LEGAL DESCRIPTION Rx LOT ~~100~~ now L1 PL NEP 21639 SEC. TP. R. D.L. 397 LAND DISTRICT Kootenay PLAN ~~980~~

DESCRIPTIVE LOCATION 310 Matchett Rd Shakespeare Rd LICENCE NO. DATE

OWNER'S NAME Gordon Matchett ADDRESS Nakusp

DRILLER'S NAME M-Schibli ADDRESS DATE COMPLETED

NAT. TOPO. SHEET NO.

DEPTH 178 ELEVATION OF ☐ ESTIMATED ☐ SURVEYED CASING DIAM. LENGTH

METHOD OF CONSTRUCTION CASING DIAM LENGTH

SCREEN LOCATION SCREEN ☐ SIZE LENGTH TYPE

SANITARY SEAL YES ☐ NO ☐ SCREEN ☐ SIZE LENGTH TYPE

PERFORATED CASING ☐ LENGTH PERFORATIONS FROM TO

GRAVEL PACK ☐ LENGTH DIAM. SIZE GRAVEL, ETC.

DISTANCE TO WATER ☐ ESTIMATED WATER LEVEL

FROM ☐ MEASURED ELEVATION ARTESIAN PRESSURE

DATE OF WATER LEVEL MEASUREMENT WATER USE

PRODUCTION TEST SUMMARY

DATE

TEST BY

BAIL TEST ☐ PUMP TEST ☐ DURATION OF TEST

RATE DRAWDOWN

WATER LEVEL AT COMPLETION OF TEST

AVAILABLE DRAWDOWN SPECIFIC CAPACITY

PERMEABILITY STORAGE COEFF.

TRANSMISSIVITY

ESTIMATED WELL YIELD

RECOMMENDED PUMPING RATE

RECOMMENDED PUMP SETTING

CHEMISTRY

TEST BY DATE

TOTAL DISSOLVED SOLIDS mg/l TEMPERATURE °C pH SILICA (SiO_2) mg/l

CONDUCTANCE μmhos/cm AT 25°C TOTAL IRON (Fe) mg/l TOTAL HARDNESS ($CaCO_3$) mg/l

TOTAL ALKALINITY ($CaCO_3$) mg/l PHEN. ALKALINITY ($Ca\ CO_3$) mg/l MANGANESE (Mn) mg/l

COLOUR ODOUR TURBIDITY

ANIONS	mg/l	epm
CARBONATE (CO_3)		
BICARBONATE (HCO_3)		
SULPHATE (SO_4)		
CHLORIDE (Cl)		
$NO_2 + NO_3$ (NITROGEN)		
* TKN. (NITROGEN)		
PHOSPHORUS (P)		

CATIONS	mg/l	epm
CALCIUM (Ca)		
MAGNESIUM (Mg)		
SODIUM (Na)		
POTASSIUM (K)		
IRON (DISSOLVED)		

* TKN = TOTAL KJELDAHL NITROGEN CHEMISTRY SITE NO.

NO_2 = NITRITE NO_3 = NITRATE

CHEMISTRY FIELD TESTS

TEST BY DATE EQUIPMENT USED

LITHOLOGY

FROM	TO	DESCRIPTION

CONTENTS OF FOLDER

☐ DRILL LOG ☐ PUMP TEST DATA ☐ CHEMICAL ANALYSIS

☐ SIEVE ANALYSIS ☐ GEOPHYSICAL LOGS ☐ REPORT

OTHER

SOURCES OF INFORMATION

NORTH

WEST

EAST

SOUTH

CARD BY_____ DATE_____

ADDITIONAL DATA ADDED BY_____

REMARKS

M28—191

ENV 1995

Province of British Columbia Ministry of Environment Water Management Branch

Kootenays

WATER WELL RECORD

Date 89/1/12/2 (YR/MO/DY)

NTS MAP | WELL No. | ELEV | Location Accuracy

UTM Z | E | N | UTM Date 19__ | Well Type

Owners Name & Address MR. GORDON MATCHETT BOX 976 NAKUSP

Legal Description & Address LOT 100 DISTRICT LOT 397 KOOTENAY DIST. PLAN 980

Descriptive Location

1. TYPE OF WORK: 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD: 1 ☐ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☑ Rotary a ☐ mud b ☑ air c ☐ reverse ☐ Other

3. WATER WELL USE: 1 ☑ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm. & Ind. ☐ Other

4. DRILLING ADDITIVES —

5. MEASUREMENTS from 1 ☑ ground level 2 ☐ top of casing

casing height above ground level ____ ft.

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
0	15	BROWN SAND, GRAVEL AND BOULDERS	
15	36	BROWN SAND (FINE TO MED)	
36	95	BROWN TIGHT SAND AND GRAVEL (FINE TO MED.)	
95	177	GREY SAND AND GRAVEL FINE TO COARSE (LOOSE)	137

7. CONSULTANT

Address

8. WELL LOCATION SKETCH

9. CASING: Materials 1 ☑ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other

							units
Hole Diameter							ins
Diameter	5						ins
from	0						ft
to	177						ft
Thickness	.244						ins
Weight	13.70						lb/ft

Pitless unit ____ ft 1 ☐ above 2 ☐ below ground level

1 ☑ Welded 2 ☐ Cemented 3 ☐ Threaded | 1 ☑ New 2 ☐ Used

Perforations:

Shoe(s): YES

Open hole, from ____ to ____ ft Diameter ____ ins

Grout:

10. SCREEN: 1 ☑ Nominal (Telescope) 2 ☐ Pipe Size

Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other

Material 1 ☑ Stainless Steel 2 ☐ Plastic ☐ Other

Set from 173 to 177 ft below ground level

RISER, SCREEN & BLANKS							units
Length							ft
Diam. I D	4						ins
Slot Size	.010						ins
from	173						ft
to	177						ft

Fittings, top K PACKER bottom BAIL

Gravel Pack

11. DEVELOPED BY: 1 ☐ Surging 2 ☐ Jetting 3 ☑ Air 4 ☐ Bailing 5 ☐ Pumping ☐ Other

12. TEST 1 ☐ Pump 2 ☐ Bail 3 ☑ Air Date 89/1/12/2 (YR/MO/DY)

Rate 15 USgpm Temp ____ °C SWL before test ____ ft

Water Level 137 ft after test of 1 hrs

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13. | RECOMMENDED PUMP TYPE | RECOMMENDED PUMP SETTING | RECOMMENDED PUMPING RATE |
|---|---|---|
| SUBMERSIBLE | 170 ft | APROX. 15 USgpm |

14. WATER TYPE: 1 ☑ fresh 2 ☐ salty 3 ☑ clear 4 ☐ cloudy

colour ____ smell ____ ; gas 1 ☐ yes 2 ☑ no

15. WATER ANALYSIS: 1 Hardness ____ mg/L 2 Iron ____ mg/L 3 Chloride ____ mg/L 4 pH ____ Field Date ____ Lab Date ____ (YR/MO/DY)

SITE I D No ____

16. FINAL WELL COMPLETION DATA

Well Depth 177 ft Well Yield 15 US gpm

Static Water Level 137 ft Artesian Flow ____ US gpm Pressure Head ____ ft

Back filled

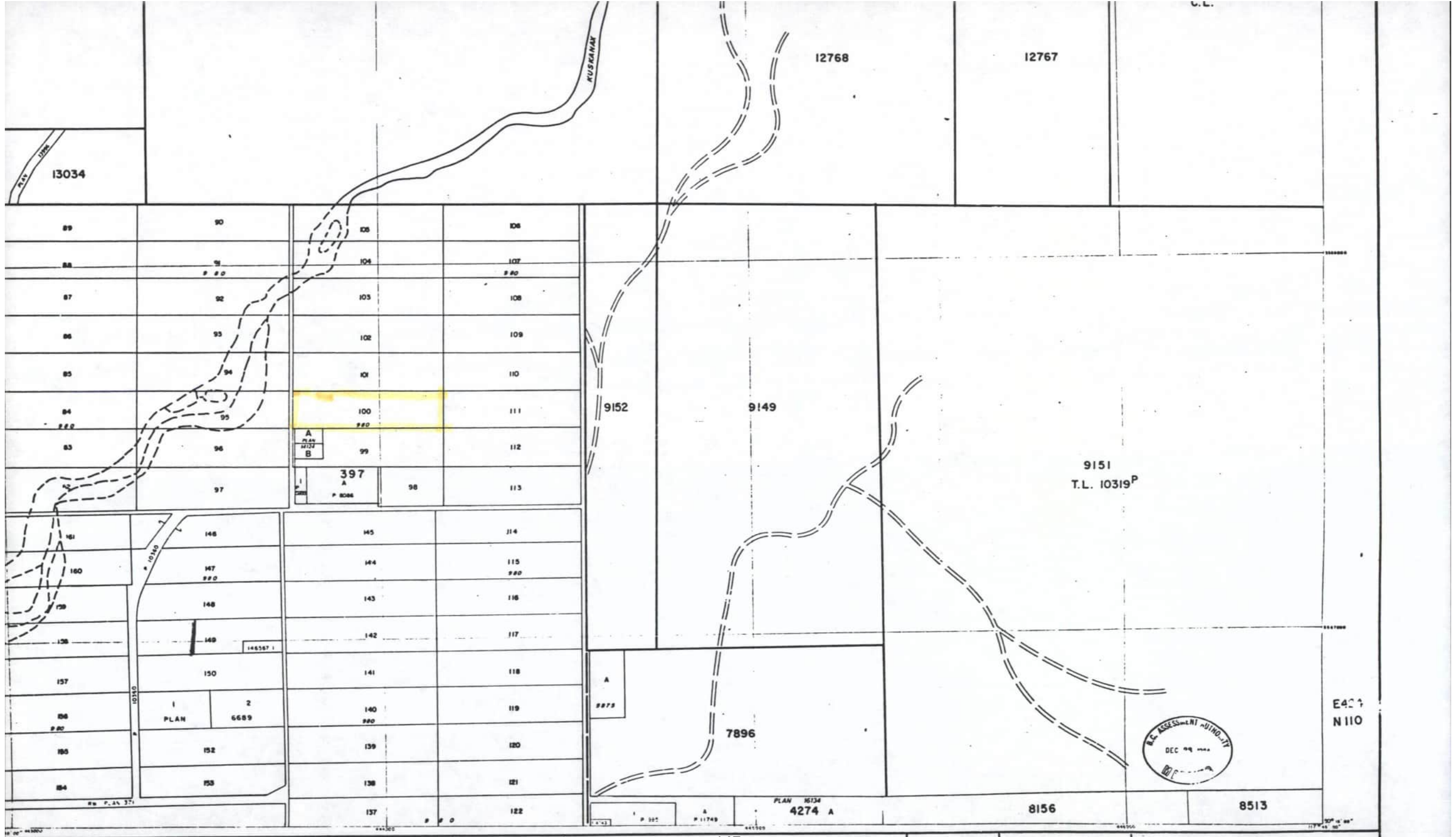
Well Head Completion CAPPED

17. DRILLER (PLEASE PRINT) SURNAME: SCHIBLI FIRST NAME: MAX

Signature Max Schibli

18. CONTRACTOR, Address M. SCHIBLI DRILLING RR 4 2 LUMBY B.C. V0E 2G0

Member, B.C.W.W.D.A. ☑ yes ☐ no ;



S AND MAPPING BRANCH
STRY OF THE ENVIRONMENT
VICTORIA B C

Copies of this map are available from
MAP PRODUCTION DIVISION
No 109-1959 E Trans-Canada Hwy
Kamloops B C V2C-4A3 Tel 372-8321

U T M GRID ZONE 11 (1975)
BASE
SEE INDEX FOR ADDITIONAL INFORMATION

LATEST PLAN
REVISION DATE

LAND DISTRICT
LAND REGISTRATION DISTRICT

CADASTRAL

82·K·022·3·1

082K022311 WSN 100488 082K-022-3-1-1

WATER WELL RECORD

PID 014 140 187

MINISTRY OF ENVIRONMENT AND PARKS, WATER MANAGEMENT BRANCH VICTORIA, BRITISH COLUMBIA

Z 11 WELL NO. 006

443874 E

5516782 N

Z X Y NO.

LEGAL DESCRIPTION: LOT 100 SEC. ___ TP. ___ R. ___ D.L. 397 LAND DISTRICT Kootenay PLAN 980

DESCRIPTIVE LOCATION ___ LICENCE NO. ___ DATE ___

OWNER'S NAME GORDON MATCHETT ADDRESS Box 976 NAKUSP.

DRILLER'S NAME ___ ADDRESS ___ DATE COMPLETED ___

NAT. TOPO. SHEET NO. ___

DEPTH 177 ELEVATION OF ___ ☐ ESTIMATED ☐ SURVEYED CASING DIAM. ___ LENGTH ___

METHOD OF CONSTRUCTION ___ CASING DIAM ___ LENGTH ___

SCREEN LOCATION ___ SCREEN ☐ SIZE ___ LENGTH ___ TYPE ___

SANITARY SEAL YES ☐ NO ☐ SCREEN ☐ SIZE ___ LENGTH ___ TYPE ___

PERFORATED CASING ☐ LENGTH ___ PERFORATIONS FROM ___ TO ___

GRAVEL PACK ☐ LENGTH ___ DIAM. ___ SIZE GRAVEL, ETC. ___

DISTANCE TO WATER ___ ☐ ESTIMATED WATER LEVEL

FROM ___ ☐ MEASURED ELEVATION ___ ARTESIAN PRESSURE ___

DATE OF WATER LEVEL MEASUREMENT ___ WATER USE ___

PRODUCTION TEST SUMMARY

DATE ___

TEST BY ___

BAIL TEST ☐ PUMP TEST ☐ DURATION OF TEST ___

RATE ___ DRAWDOWN ___

WATER LEVEL AT COMPLETION OF TEST ___

AVAILABLE DRAWDOWN ___ SPECIFIC CAPACITY ___

PERMEABILITY ___ STORAGE COEFF. ___

TRANSMISSIVITY ___

ESTIMATED WELL YIELD ___

RECOMMENDED PUMPING RATE ___

RECOMMENDED PUMP SETTING ___

CHEMISTRY

TEST BY ___ DATE ___

TOTAL DISSOLVED SOLIDS ___ mg/l TEMPERATURE ___ °C pH ___ SILICA (SiO_2) ___ mg/l

CONDUCTANCE ___ µmhos/cm AT 25°C TOTAL IRON (Fe) ___ mg/l TOTAL HARDNESS ($CaCO_3$) ___ mg/l

TOTAL ALKALINITY ($CaCO_3$) ___ mg/l PHEN. ALKALINITY ($Ca\ CO_3$) ___ mg/l MANGANESE (Mn) ___ mg/l

COLOUR ___ ODOUR ___ TURBIDITY ___

ANIONS	mg/l	epm	CATIONS	mg/l	epm
CARBONATE (CO_3)			CALCIUM (Ca)		
BICARBONATE (HCO_3)			MAGNESIUM (Mg)		
SULPHATE (SO_4)			SODIUM (Na)		
CHLORIDE (Cl)			POTASSIUM (K)		
$NO_2 + NO_3$ (NITROGEN)			IRON (DISSOLVED)		
* TKN. (NITROGEN)					
PHOSPHORUS (P)					

* TKN = TOTAL KJELDAHL NITROGEN CHEMISTRY SITE NO. ___

NO_2 = NITRITE NO_3 = NITRATE

CHEMISTRY FIELD TESTS

TEST BY ___ DATE ___ EQUIPMENT USED ___

LITHOLOGY

FROM	TO	DESCRIPTION
		Roll # 01340-000 02602-200
		9.75 Ac
		Sub by
		NEP21639
		(0189495 43)

CONTENTS OF FOLDER

☐ DRILL LOG ☐ PUMP TEST DATA ☐ CHEMICAL ANALYSIS

☐ SIEVE ANALYSIS ☐ GEOPHYSICAL LOGS ☐ REPORT

OTHER ___

SOURCES OF INFORMATION ___

NORTH

WEST

EAST

SOUTH

CARD BY_____ DATE_____

ADDITIONAL DATA ADDED BY_____

REMARKS

M28-1179

ENV 1995

Province of British Columbia Ministry of Environment Water Investigations Branch

WATER WELL RECORD

Date 81 / 8 / 28 (YR / MO / DY)

Legal Description & Address

Descriptive Location Shakespear Rd. Nakusp

Owners Name & Address Gordon Marshall Box 40 Nakusp B.C.

NTS MAP ELEV WELL No.

UTM Z E N UTM Date 19__

1. TYPE OF WORK 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD 1 ☐ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☑ Rotary a ☐ mud b ☐ air c ☐ reverse 5 ☐ Other

3. WATER WELL USE 1 ☑ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Commercial & Industrial 5 ☐ Other

4. DRILLING ADDITIVES

5. MEASUREMENTS from 1 ☐ ground level 2 ☐ top of casing

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
0	20	Sand and Gravel	
20	50	Fine sand	
50	135	Sand and gravel and rocks	
135	160	Fine water bearing sand	
160	168	Water bearing sand and gravel	

7. CONSULTANT

Address

8. WELL LOCATION SKETCH

9. CASING: Materials 1 ☑ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete 6 ☐ Other

							units
Hole Diameter							ins
Diameter	6						ins
from	0						ft
to	168						ft
Thickness							ins
Weight							lb/ft

Pitless unit ft 1 ☐ above 2 ☐ below ground level

1 ☑ Welded 2 ☐ Cemented 3 ☐ Threaded 4 ☑ New 5 ☐ Used

Perforations:

Shoe(s): ✓

Open hole, from to ft Diameter ins

Grout:

10. SCREEN: 1 ☑ Nominal 2 ☐ Pipe Size

Type 1 ☑ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre 4 ☐ Other

Material 1 ☑ Stainless Steel 2 ☐ Plastic 3 ☐ Other

Set from 164 to 168 ft below ground level

SCREEN & BLANKS							units
Length	4						ft
Diam. I D	6						ins
Slot Size	20						ins
from	164						ft
to							ft

Fittings, top Packer bottom Bail

Gravel Pack

11. DEVELOPED BY: 1 ☐ Surging 2 ☐ Jetting 3 ☐ Air 4 ☑ Bailing 5 ☐ Pumping 6 ☐ Other

12. TEST 1 ☐ Pump 2 ☑ Bail Date (YR / MO / DY)

Rate 1 USgpm Temp °C SWL before test ft

ft after test of hrs mins

TIME in mins & DRAWDOWN in ft				TIME in mins & RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13.

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
Submersible	160 ft	20 USgpm

14. WATER TYPE: 1 ☐ fresh 2 ☐ salty 3 ☑ clear 4 ☐ cloudy

colour smell ; gas 1 ☐ yes 2 ☐ no

15. WATER ANALYSIS: 1 ☐ Hardness mg/ℓ

2 ☐ Iron mg/ℓ 3 ☐ Chloride mg/ℓ

4 ☐ pH Field Date

SITE I D No Lab Date (YR / MO / DY)

16. FINAL WELL COMPLETION DATA

Well Depth 168 ft Water Flowing US gpm

Static Water Level 75 ft Pressure Head ft

Back filled

Well Head Completion Capped

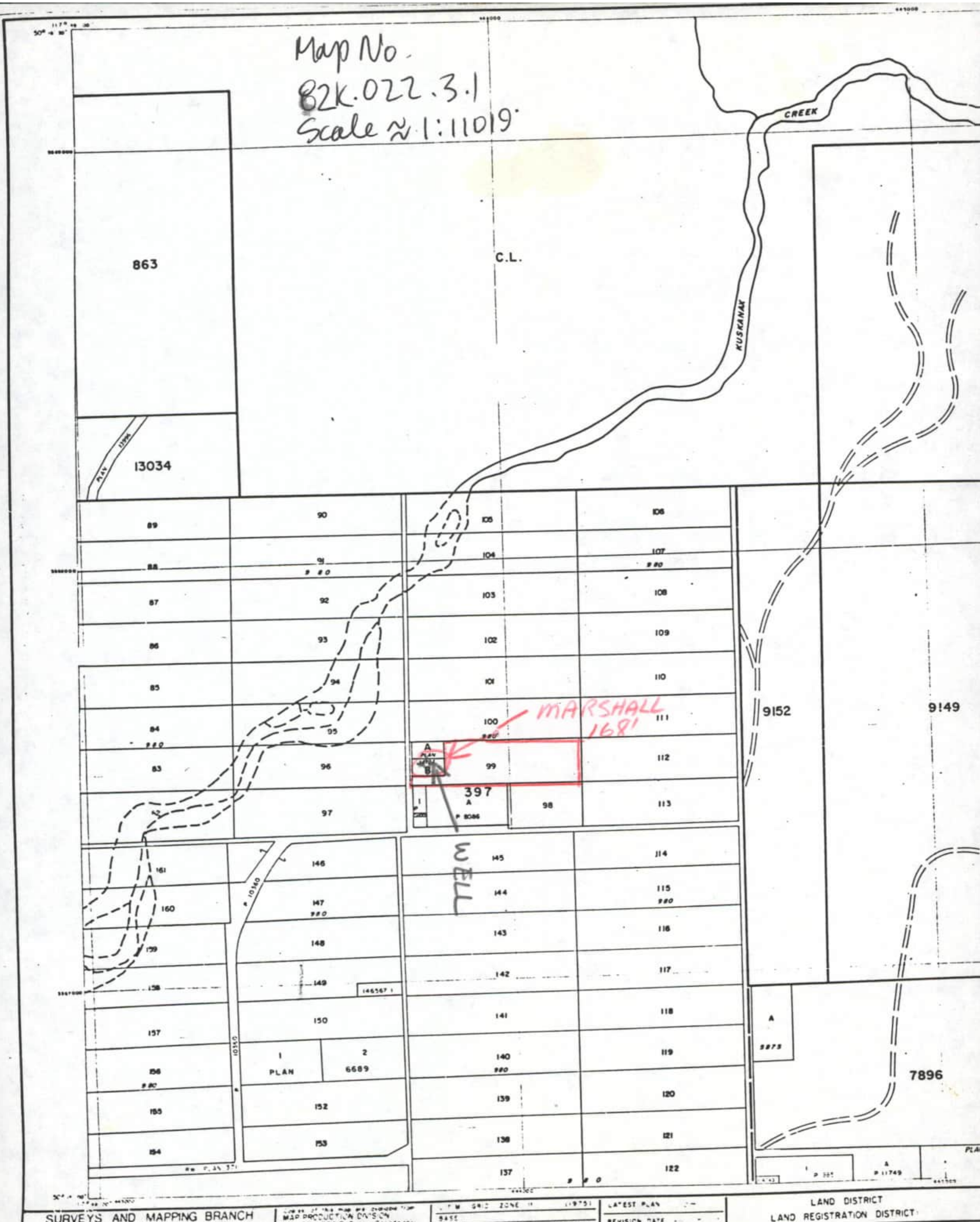
17. DRILLER PLEASE PRINT SURNAME THOMAS FIRST NAME CARL

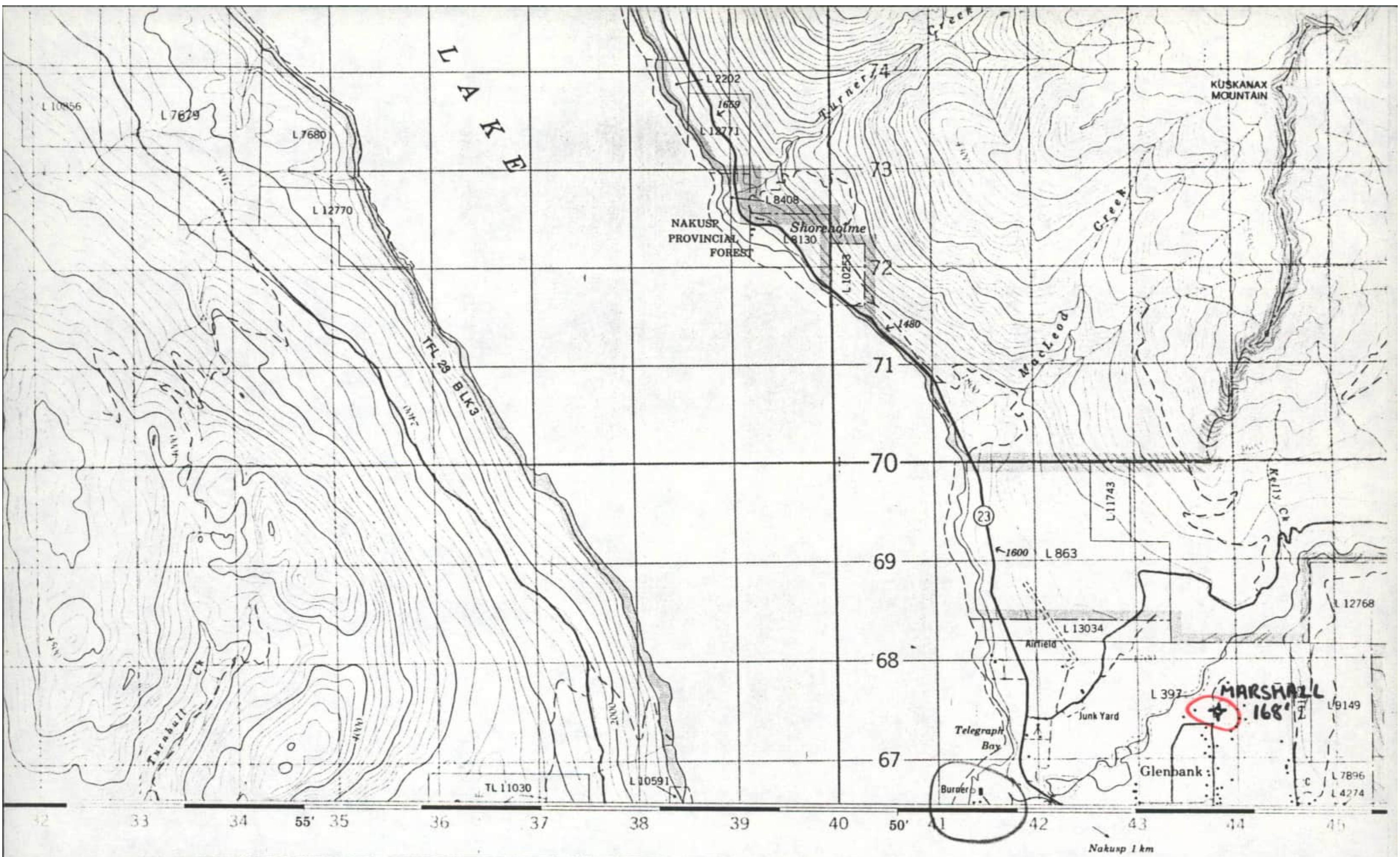
Signature Carl Thomas

18. CONTRACTOR, Address

THOMAS WELL DRILLING
BOX 404 LUMBY B.C.

Member BCWWDA ☑ yes ☐ no ;


Map No.
82K.022.3.1
Scale ≈ 1:11019
863
C.L.
13034
KUSKANAK
CREEK
MARSHALL
168'
WELL
397
9152
9!49
7896
SURVEYS AND MAPPING BRANCH
MINISTRY OF THE ENVIRONMENT
VICTORIA B.C.
LATEST PLAN
REVISION DATE
LAND DISTRICT
LAND REGISTRATION DISTRICT



Roads	Routes:		
hard surface, all weather	pavée, toute saison	dual highway / 2 chaussées séparées	more than 2 lanes / plus de 2 voies
hard surface, all weather	pavée, toute saison	2 lanes / 2 voies	less than 2 lanes / moins de 2 voies
loose or stabilized surface, all weather	gravier, aggloméré, toute saison	2 lanes or more / 2 voies ou plus	less than 2 lanes / moins de 2 voies
loose surface, dry weather	de gravier, temps sec		
unclassified streets	rues hors classe		
cart track	de terre		
trail, cut line or portage	sentier, percée ou portage		

FOR COMPLETE REFERENCE SEE REVERSE SIDE POUR UNE LISTE COMPLÈTE DES SIGNES, VOIR AU VERSO

TOPO 82K/5
1:50,000

ST

Miles 1 0
Metres 1000 0
Yards 1000 0

82 K/5

WTN 48938 unplotted - 4

1

082K·022·3·1·1 WATER WELL RECORD

DEPT. OF ENVIRONMENT, WATER RESOURCES SERVICE, WATER INVESTIGATIONS BRANCH VICTORIA, BRITISH COLUMBIA

Z ___ WELL NO. ___ E ___ N ___

Z X Y NO.

NAT. TOPO. SHEET NO. ___

LEGAL DESCRIPTION: LOT PARCEL B SEC. ___ TP. ___ R. ___ D.L. 397 LAND DISTRICT KOOTENAY PLAN 14124

DESCRIPTIVE LOCATION Shakespeare Rd. NAKUSP LICENCE NO. ___ DATE ___

OWNER'S NAME GORDON MARSHALL ADDRESS BOX 40 NAKUSP B.C.

DRILLER'S NAME Whomas ADDRESS Lumby DATE COMPLETED 28/8/81

DEPTH 168' ELEVATION OF 136 ☐ ESTIMATED ☐ SURVEYED CASING DIAM. 6" LENGTH 168'

METHOD OF CONSTRUCTION rotary CASING DIAM ___ LENGTH ___

SCREEN LOCATION 164'-168' SCREEN ☐ SIZE 20 slot LENGTH 4' TYPE C.S. S.S.

SANITARY SEAL YES ☐ NO ☐ SCREEN ☐ SIZE ___ LENGTH ___ TYPE ___

PERFORATED CASING ☐ LENGTH ___ PERFORATIONS FROM ___ TO ___

GRAVEL PACK ☐ LENGTH ___ DIAM. ___ SIZE GRAVEL, ETC. ___

DISTANCE TO WATER 75' ☐ ESTIMATED WATER LEVEL

FROM ___ ☐ MEASURED ELEVATION ___ ARTESIAN PRESSURE ___

DATE OF WATER LEVEL MEASUREMENT ___ WATER USE domestic

PRODUCTION TEST SUMMARY

DATE ___

TEST BY ___

BAIL TEST ☐ PUMP TEST ☐ DURATION OF TEST ___

RATE ___ DRAWDOWN ___

WATER LEVEL AT COMPLETION OF TEST ___

AVAILABLE DRAWDOWN ___ SPECIFIC CAPACITY ___

PERMEABILITY ___ STORAGE COEFF. ___

TRANSMISSIVITY ___

RECOMMENDED PUMPING RATE 20gpm

RECOMMENDED PUMP SETTING 160'

CHEMISTRY

TEST BY ___ DATE ___

TOTAL DISSOLVED SOLIDS ___ mg/l TEMPERATURE ___ °C pH ___ SILICA (SiO_2) ___ mg/l

CONDUCTANCE ___ μmhos/cm AT 25°C TOTAL IRON (Fe) ___ mg/l TOTAL HARDNESS ($CaCO_3$) ___ mg/l

TOTAL ALKALINITY ($CaCO_3$) ___ mg/l PHEN. ALKALINITY ($Ca\ CO_3$) ___ mg/l MANGANESE (Mn) ___ mg/l

COLOUR ___ ODOUR ___ TURBIDITY ___

ANIONS	mg/l	epm	CATIONS	mg/l	epm
CARBONATE (CO_3)			CALCIUM (Ca)		
BICARBONATE (HCO_3)			MAGNESIUM (Mg)		
SULPHATE (SO_4)			SODIUM (Na)		
CHLORIDE (Cl)			POTASSIUM (K)		
$NO_2 + NO_3$ (NITROGEN)			IRON (DISSOLVED)		
• TKN. (NITROGEN)					
PHOSPHORUS (P)					

• TKN = TOTAL KJELDAHL NITROGEN CHEMISTRY SITE NO. ___

NO_2 = NITRITE NO_3 = NITRATE

CHEMISTRY FIELD TESTS

TEST BY ___ DATE ___ EQUIPMENT USED ___

LITHOLOGY

FROM	TO	DESCRIPTION
0	20	sand + gravel
20	50	fine sand
50	135	sand, gravel + rocks
135	160	fine, water bearing sand
160	168	water bearing sand + gravel
NOV	1985	LOCATED TALK TO MRS
		MARSHALL THE WELL WAS DRILLED
		TO SERVICE PARCEL A + B WHICH
		WERE SUBDIVIDED OFF OF LOT 99
		THE CURRENT OWNER OF PARCEL
		B MRS EWING CONFIRM THE
		HIGH PRODUCTION OF THE WELL
		AND GOOD QUALITY OF THE WATER
		SEE PLAN INSIDE AND SKETCH
		ON BACK
81	MER	AA21 JD710 5010
		01339.000
		Blk. 99 Pl. 980 DL. 397
		9.90 acres Kootenay L.D.
82	2h. 66	G. Marshall Glenbank
82	" "	265-3326
85	MER	NOW 1339.010
		DL 99 PL 980 DL 397
		10.26 EX PT INCL IN
		PL 14124

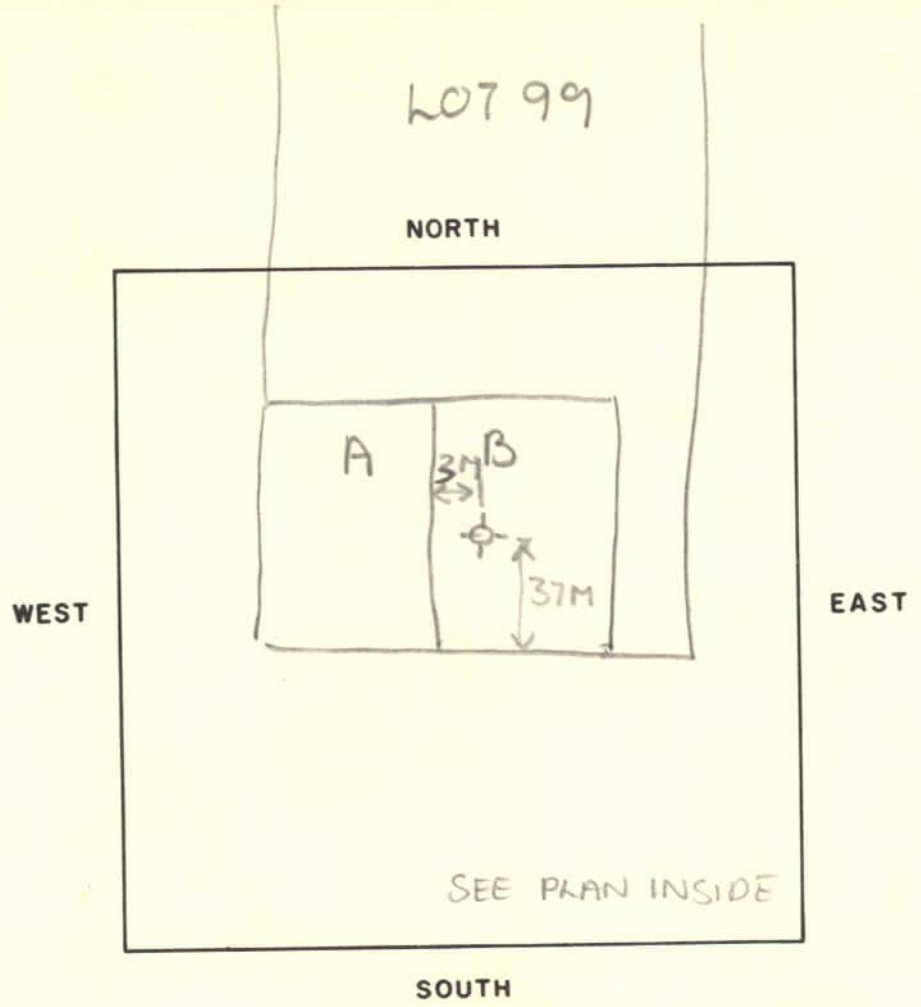
CONTENTS OF FOLDER

☑ DRILL LOG ☐ PUMP TEST DATA ☐ CHEMICAL ANALYSIS

☐ SIEVE ANALYSIS ☐ GEOPHYSICAL LOGS ☐ REPORT

OTHER ___

SOURCES OF INFORMATION driller



CARD BY MORAVCIK 82 DATE

ADDITIONAL DATA ADDED BY

REMARKS

NO WELL LOG MAP COMPLETED

082k021422 #5 WTN 80484 199

BRITISH COLUMBIA

BC Environment — Water Management Division

WATER WELL RECORD

Date 98 10 28 (YR MO DY)

NTS MAP | WELL No. | ELEV | Location Accuracy

UTM Z | E | N | UTM Date 19__ | Well Type

Owners Name & Address: MR. PAUL WHALEN 798 ALEXANDER RD. P.O. BOX 366 NAKUSP

Legal Description & Address: BL. 110 DIST. LOT 397 PLAN 980 KOOTENAY DIST. V0G 1R0

Descriptive Location:

1. TYPE OF WORK: 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD: 1 ☐ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☑ Rotary a ☐ mud b ☑ air c ☐ reverse ☐ Other

3. WATER WELL USE: 1 ☑ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Comm. & Ind. ☐ Other

4. DRILLING ADDITIVES: —

5. MEASUREMENTS from 1 ☑ ground level 2 ☐ top of casing; casing height above ground level ____ ft.

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
0	45	BROWN SAND, GRAVEL & BOULDERS	
45	66	BROWN SAND WITH STONES	
66	84	" " " CLAY LENSES	
84	105	BROWN CLAY WITH SILTY SAND LENSES	
105	125	BROWN SAND, GRAVEL & COBBLES	
125	540	BLACK SHALE ROCK WITH QUARTZ SEAMS	

7. CONSULTANT ____

Address ____

8. WELL LOCATION SKETCH

9. CASING: Materials 1 ☑ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete ☐ Other ____

							units
Hole Diameter							ins
Diameter	6						ins
from	0						ft
to	135						ft
Thickness	.188						ins
Weight	12.92						lb/ft

Pitless unit ____ ft 1 ☐ above 2 ☐ below ground level

1 ☑ Welded 2 ☐ Cemented 3 ☐ Threaded | 1 ☑ New 2 ☐ Used

Perforations: ____

Shoe(s): YES

Open hole, from 135 to 540 ft Diameter 6 ins

Grout: ____

10. SCREEN: 1 ☐ Nominal (Telescope) 2 ☐ Pipe Size

Type 1 ☐ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre ☐ Other ____

Material 1 ☐ Stainless Steel 2 ☐ Plastic ☐ Other ____

Set from ____ to ____ ft below ground level

RISER, SCREEN & BLANKS							units
Length							ft
Diam. I D							ins
Slot Size							ins
from							ft
to							ft

Fittings, top ____ bottom ____

Gravel Pack ____

11. DEVELOPED BY: 1 ☐ Surging 2 ☐ Jetting 3 ☑ Air 4 ☐ Bailing 5 ☐ Pumping ☐ Other ____

12. TEST 1 ☐ Pump 2 ☐ Bail 3 ☑ Air Date 98 10 23 (YR MO DY)

Rate 1/2 USgpm Temp ____ °C SWL before test ____ ft

Water Level ____ ft after test of 1 hrs

☐ DRAWDOWN in ft				☐ RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13.

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
SUBMERSIBLE	520 ft	APROX. 1/2 USgpm

14. WATER TYPE: 1 ☑ fresh 2 ☐ salty 3 ☑ clear 4 ☐ cloudy

colour ____ smell ____ ; gas 1 ☐ yes 2 ☑ no

15. WATER ANALYSIS: 1 Hardness ____ mg/L 2 Iron ____ mg/L 3 Chloride ____ mg/L 4 pH ____ Field Date ____ Lab Date ____ (YR MO DY)

SITE I D No ____

16. FINAL WELL COMPLETION DATA

Well Depth 540 ft Well Yield 5 US gpm

Static Water Level ____ ft Artesian Flow ____ US gpm Pressure Head ____ ft

Back filled ____

Well Head Completion CAPPED

17. DRILLER (PLEASE PRINT) SURNAME: SCHIBLI FIRST NAME: DAVID

Signature David Schibli

18. CONTRACTOR, Address

SCHIBLI DRILLING
1038 Mabel Lake Road R.R. #2
Lumby, B.C. V0E 2G0

Member, W W D A ☑ yes ☐ no ; ____

BCGS MAP 082K·022·3·1·1 WTN 0000080484 WELL NO. 007

WATER WELL RECORD

MINISTRY OF WATER, LAND AND AIR PROTECTION

VICTORIA, BRITISH COLUMBIA

LEGAL DESCRIPTION: LOT ____ SEC. Blk 10 TP. ____ R. ____ D.L. 397 LAND DISTRICT Kootenay PLAN 980

DESCRIPTIVE LOCATION 798 Alexander Road, Nakusp LICENCE NO. ____ DATE ____

Z ____ WELL NO. ____ E ____ N ____

Z X Y NO.

OWNER'S NAME ____ ADDRESS ____

DRILLER'S NAME ____ ADDRESS ____ DATE COMPLETED ____

NAT. TOPO. SHEET NO. ____

DEPTH ____ ELEVATION OF ____ ☐ ESTIMATED ☐ SURVEYED CASING DIAM. ____ LENGTH ____

METHOD OF CONSTRUCTION ____ CASING DIAM ____ LENGTH ____

SCREEN LOCATION ____ SCREEN ☐ SIZE ____ LENGTH ____ TYPE ____

SANITARY SEAL YES ☐ NO ☐ SCREEN ☐ SIZE ____ LENGTH ____ TYPE ____

PERFORATED CASING ☐ LENGTH ____ PERFORATIONS FROM ____ TO ____

GRAVEL PACK ☐ LENGTH ____ DIAM. ____ SIZE GRAVEL, ETC. ____

DISTANCE TO WATER FROM ____ ☐ ESTIMATED ☐ MEASURED WATER LEVEL ELEVATION ____ ARTESIAN PRESSURE ____

DATE OF WATER LEVEL MEASUREMENT ____ WATER USE ____

PRODUCTION TEST SUMMARY

DATE ____
TEST BY ____
BAIL TEST ☐ PUMP TEST ☐ DURATION OF TEST ____
RATE ____ DRAWDOWN ____
WATER LEVEL AT COMPLETION OF TEST ____
AVAILABLE DRAWDOWN ____ SPECIFIC CAPACITY ____
PERMEABILITY ____ STORAGE COEFF. ____
TRANSMISSIVITY ____
ESTIMATED WELL YIELD ____
RECOMMENDED PUMPING RATE ____
RECOMMENDED PUMP SETTING ____

CHEMISTRY

TEST BY ____ DATE ____

TOTAL DISSOLVED SOLIDS ____ mg/l TEMPERATURE ____ °C pH ____ SILICA (SiO_2) ____ mg/l

CONDUCTANCE ____ µmhos/cm AT 25°C TOTAL IRON (Fe) ____ mg/l TOTAL HARDNESS ($CaCO_3$) ____ mg/l

TOTAL ALKALINITY ($CaCO_3$) ____ mg/l PHEN. ALKALINITY ($CaCO_3$) ____ mg/l MANGANESE (Mn) ____ mg/l

COLOUR ____ ODOUR ____ TURBIDITY ____

ANIONS	mg/l	epm
CARBONATE (CO_3)		
BICARBONATE (HCO_3)		
SULPHATE (SO_4)		
CHLORIDE (Cl)		
$NO_2 + NO_3$ (NITROGEN)		
• TKN. (NITROGEN)		
PHOSPHORUS (P)		

CATIONS	mg/l	epm
CALCIUM (Ca)		
MAGNESIUM (Mg)		
SODIUM (Na)		
POTASSIUM (K)		
IRON (DISSOLVED)		

• TKN = TOTAL KJELDAHL NITROGEN

NO_2 = NITRITE NO_3 = NITRATE

CHEMISTRY SITE NO. ____

CHEMISTRY FIELD TESTS

TEST BY ____ DATE ____ EQUIPMENT USED ____

LITHOLOGY

FROM	TO	DESCRIPTION

CONTENTS OF FOLDER

☐ DRILL LOG ☐ PUMP TEST DATA ☐ CHEMICAL ANALYSIS

☐ SIEVE ANALYSIS ☐ GEOPHYSICAL LOGS ☐ REPORT

OTHER ____

SOURCES OF INFORMATION ____

NORTH

WEST

EAST

SOUTH

CARD BY_____ DATE_____

ADDITIONAL DATA ADDED BY_____

REMARKS

97941

ENV 1995

Appendix D Site Photographs

Hydrogeology and Hydrology Characterization Report

Nakusp Landfill

Regional District of Central Kootenay

SLR Project No.: 219.030089.00001

September 27, 2024

Site Photographs

Photo 1: Landfill entrance and weigh scale (May 3, 2024)

Photo 2: Main road from weigh scale to landfill (May 3, 2024)

Photo 3: Landfill boundary fence (May 3, 2024)

Photo 4: Waste bins in entrance area (May 3, 2024)

Photo 5: Recycling area (May 3, 2024)

Photo 6: Top of active landfill face (May 3, 2024)

Photo 7: Active landfill face (May 3, 2024)	Photo 8: Septic bed area (May 3, 2024)	Photo 9: View looking at main road (May 3, 2024)
		
Photo 10: Waste bins in entrance area (May 3, 2024)	**Photo 11: Former material gathering area (May 3, 2024)**	**Photo 12: Drainage ditch along main pile (NE) (May 3, 2024)**
		

Photo 13: Drainage ditch running between main face and wood pile ends (N) (May 3, 2024)

Photo 14: Drainage area along outside of fence (May 3, 2024)

Photo 15: Drainage ditch running along main pile with standing water present (NE) (May 3, 2024)

Photo 16: Drainage ditch running between Main pile and wood pile with standing water present (May 3, 2024)

Photo 17: MW5-06 (May 3, 2024)

Photo 18: MW1-95 (May 3, 2024)

Photo 19: MW17-7 (May 3, 2024)	Photo 20: MW4-06 (May 3, 2024)	Photo 21: MW2-95 (May 3, 2024)
		
Photo 22: MW3-95 (May 3, 2024)		
		

Appendix E Parameter Concentrations Over Time

Hydrogeology and Hydrology Characterization Report

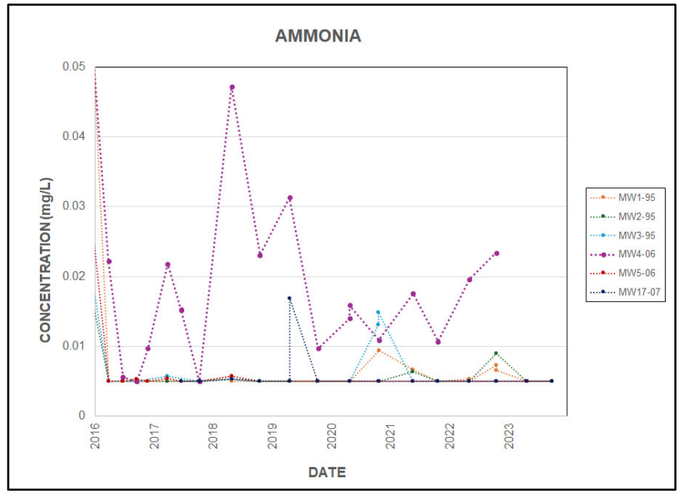
Nakusp Landfill

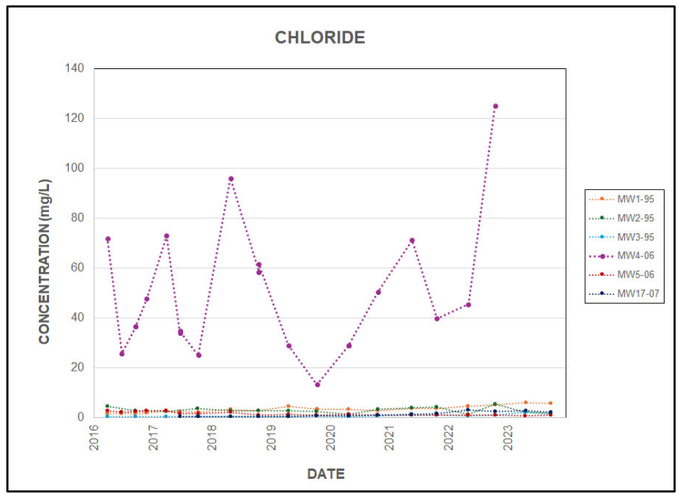
Regional District of Central Kootenay

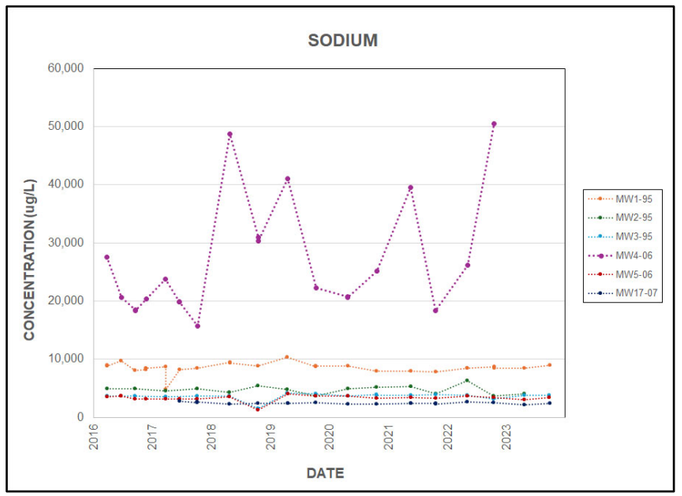
SLR Project No.: 219.030089.00001

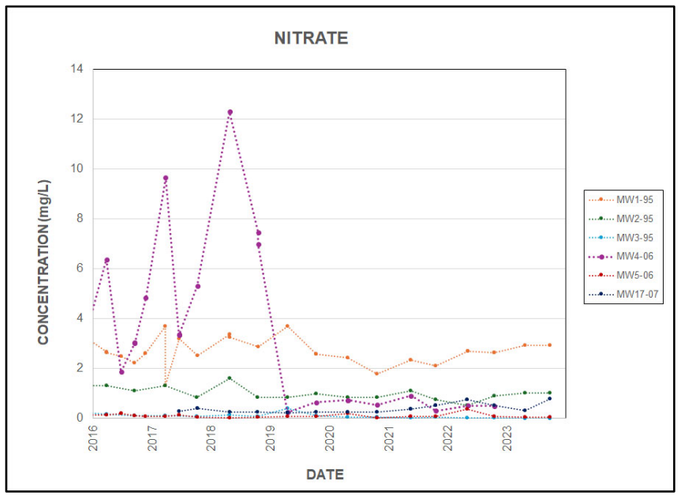
September 27, 2024

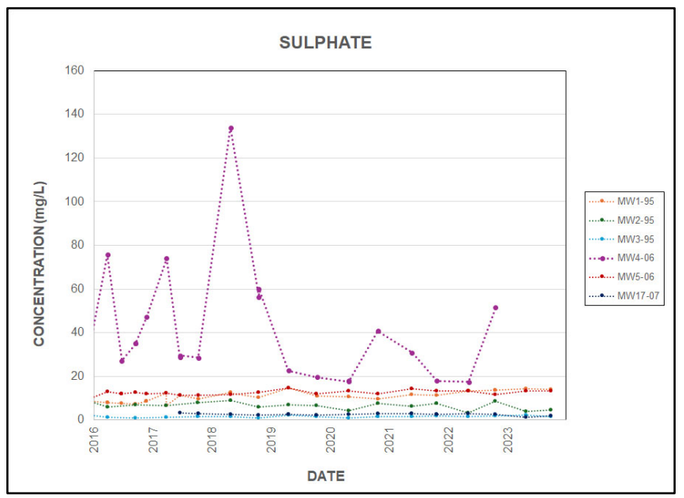
CONCENTRATION VERSUS TIME

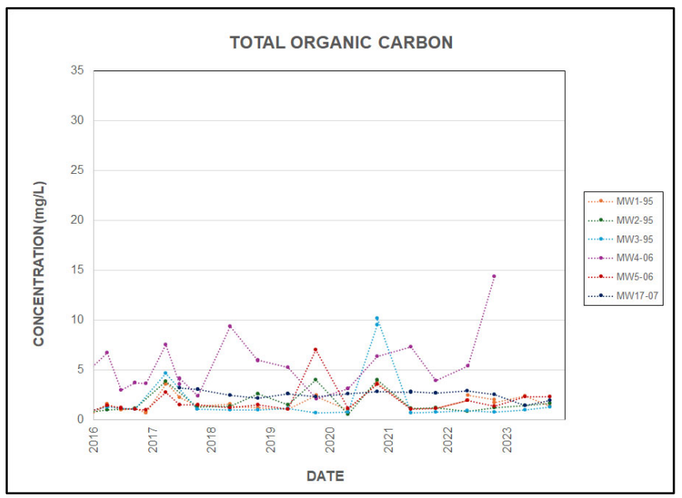




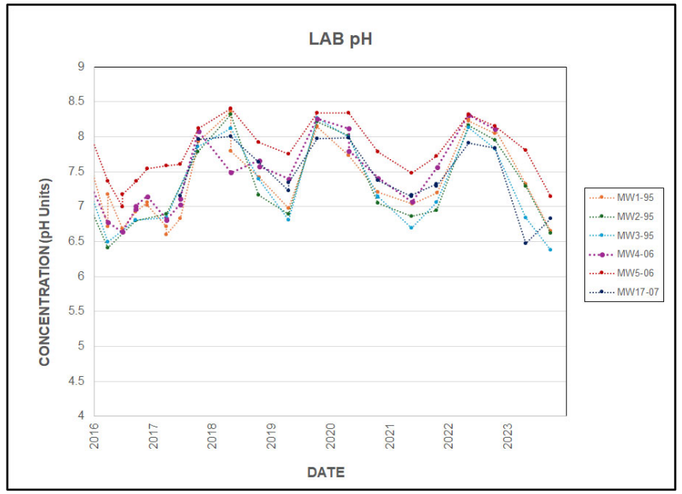


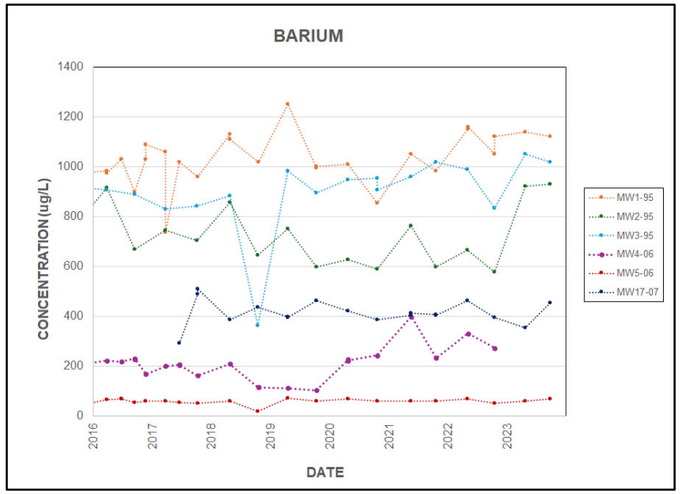


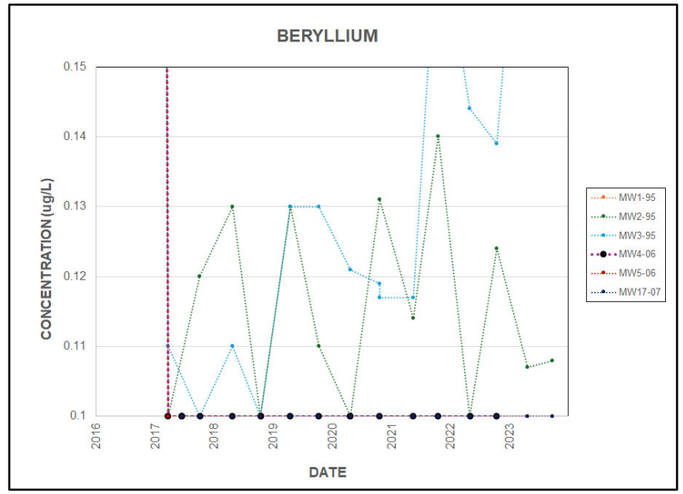


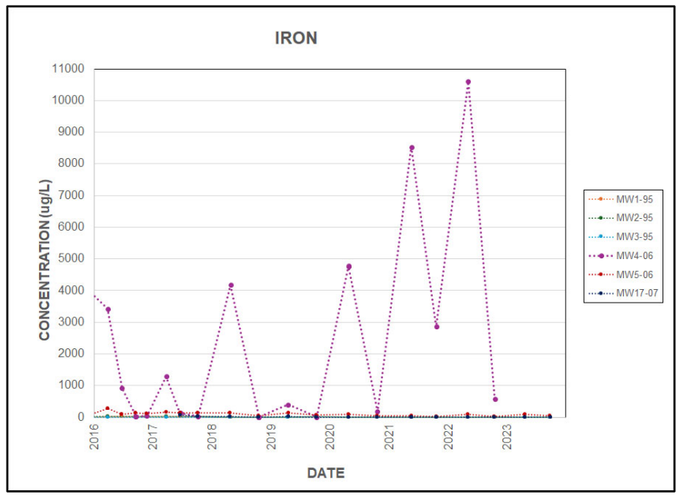


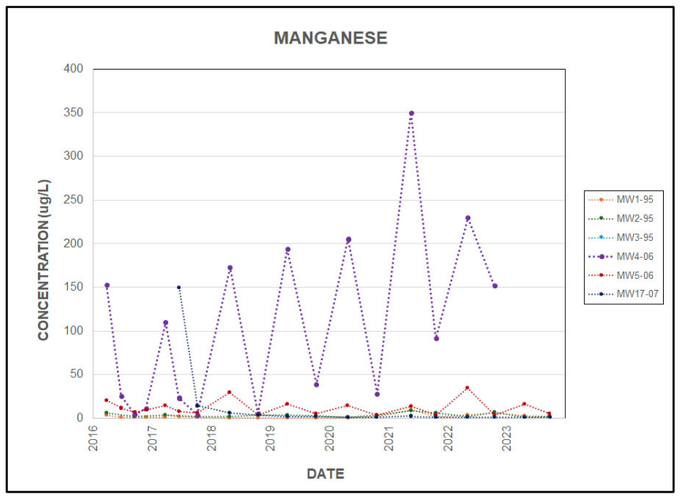
CONCENTRATION VERSUS TIME

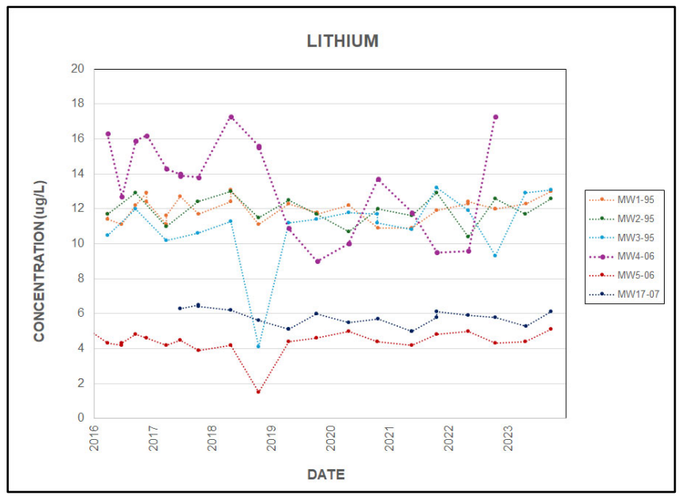


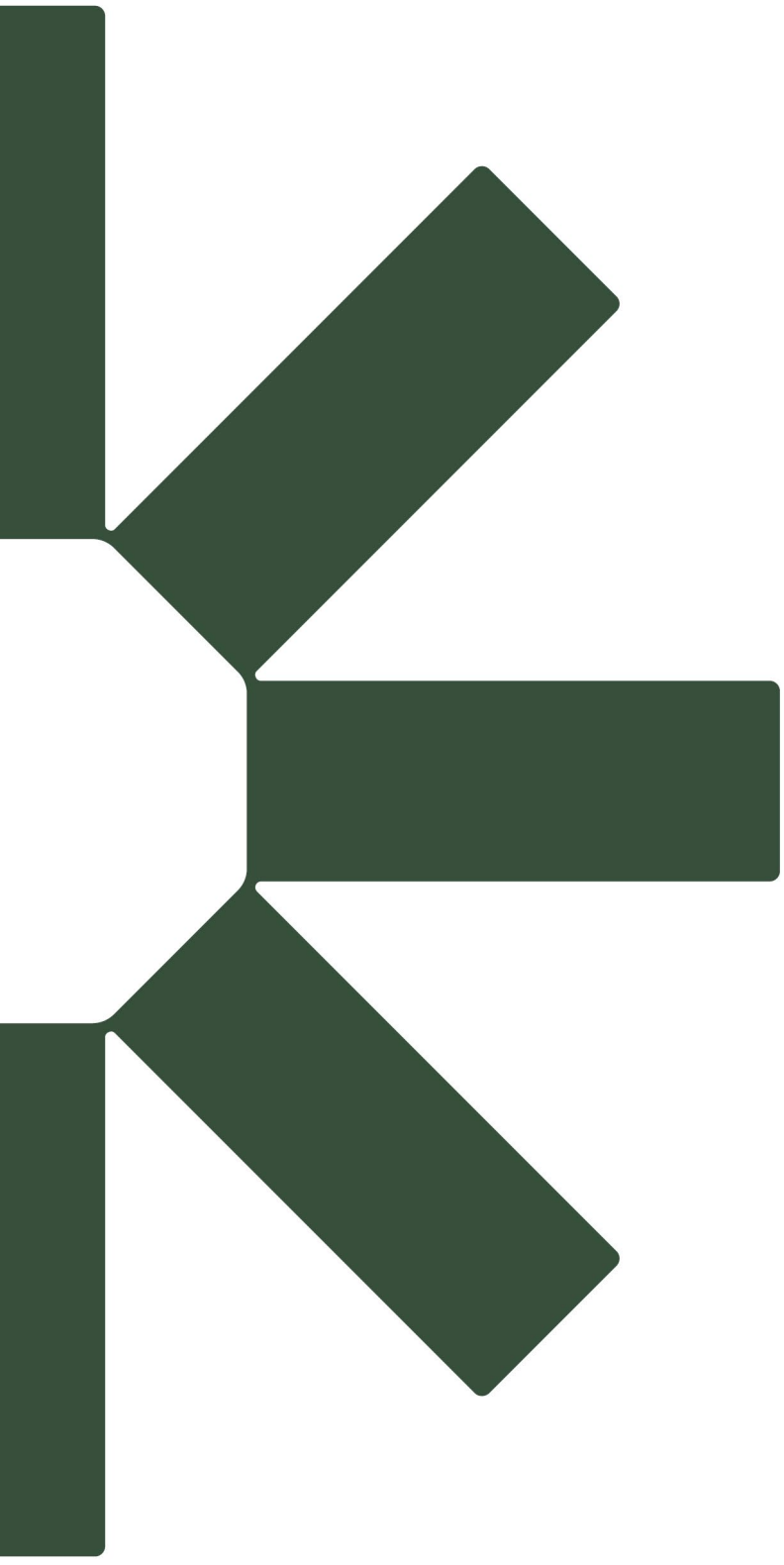












Committee Report

Date of Report:	October 2, 2024
Date & Type of Meeting:	October 16, 2024, Joint Resource Recovery Committee
Author:	Nathan Schilman, Environmental Technologist
Subject:	NAKUSP CLOSURE PLAN – CONSULTING CONTRACT INSURANCE MODIFICATION REQUEST
File:	12-6300-NAK-01
Electoral Area/Municipality	West Sub-Region

SECTION 1: EXECUTIVE SUMMARY

The purpose of this report is to outline a proposed insurance modification for Sperling Hansen Associates Inc. (SHA) for the Nakusp Closure Planning project.

SECTION 2: BACKGROUND/ANALYSIS

Under the BC Ministry of Environment and Climate Change Strategy's Landfill Criteria for Municipal Solid Waste regulation a Qualified Professional (QP) is required to design and develop a Closure Plan when a permitted landfill is nearing the end of its operational lifespan.

The closure of the Nakusp Landfill was outlined in the RDCK's approved 2021 Resource Recovery Plan. The RDCK plans to cease active daily fill operations at the Landfill, and transfer the waste to the Ootischenia Landfill, near Castlegar. The timing for closure was dependent on the construction of transfer station infrastructure at the site to ensure capacity for accepting the volumes of waste normally landfilled for transfer to the Ootischenia Landfill. The transfer station has now been constructed and is anticipated to start accepting waste in the near future.

A Request for Proposal (RFP) was issued to the RDCK Resource Recovery Standing Offer group in July 2024 and SHA was selected as the consulting firm to complete the closure planning, based on their extensive experience working with the RDCK on landfill projects, and also based on substantially lower pricing as compared to the other proponents. The cost proposal for SHA to complete the project was valued at $29,981 not including GST. The next lowest cost and highest ranked proposal was valued at $88,861 not including GST.

While executing the Agreement Amendment for the project, an issue with SHA's insurance was noted.

As per the RDCK Insurance Policy, Landfill Design is classified as a 'High Risk' activity, and the Policy requires $2,000,000 of Commercial General Liability (CGL) coverage, and Professional Liability (Errors & Omissions) (PLEO) coverage of $5,000,000 per claim and a $10,000,000 aggregate. In the original 2022 Request for Standing Offer to secure consultants for upcoming landfill engineering and environmental projects, the required level of insurance coverage for 'High Risk' category projects was not identified within the potential scopes of work. As it was determined that the scope of work for this Nakusp Closure Planning project would trigger the 'High Risk' insurance requirements, the appropriate coverage amounts were outlined in the RFP. It was described within the RFP that the successful Proponent for this project must provide the RDCK with a Certificate of Insurance that meets these requirements upon execution of this Agreement Amendment.

SHA currently holds CGL coverage in the amount of $5,000,000 per claim, and $10,000,000 aggregate coverage, with a $1,000 deductible, which meets the RDCK requirement.

SHA currently holds PLEO coverage in the amount of $5,000,000 per claim, but only $5,000,000 in aggregate coverage, which does not meet the Insurance Policy requirement for coverage amounts. The deductible amount is $50,000 which does meet the RDCK requirement.

When asked if SHA could increase their PLEO coverage to a $10,000,000 aggregate, it was determined that this would come at a cost of over $15,000 to the consulting firm, which is about 50% of the total project cost. As a result, if SHA was required to meet this level of insurance without the RDCK covering the additional cost, they would not accept this project, requiring RDCK to seek another proponent to take on the project at a higher cost. It is possible, however, other proponents may be in a similar situation, where acquiring the required $10,000,000 in aggregate coverage would have a negative financial impact on their proposal.

As this project is considered High Risk under the RDCK's Insurance Policy, Board approval of an insurance modification or direction to cover the increased cost of the insurance is required. The modification request is to reduce the PLEO in aggregate coverage amount from $10,000,000 to $5,000,000.

Under the Municipal Insurance Association of BC (MIABC) recommended insurance coverage guidance document, high risk activities should meet all or a majority of the following conditions:

- A large number of members of the public are present or will utilize the end product;
- New construction over $3 million in project costs; and/or
- High risk of bodily injury to others, damage to, destruction or loss of property, or loss of income or additional expenses anticipated or likely.

As this project is focused on the closure of the Nakusp landfill (i.e. not a high value construction project), is conceptual in design, and therefore does not meet a majority of the above criteria, Staff proposes that the reduction of PLEO in aggregate coverage is reasonable, and that the RDCK does not need to proceed with paying for the increased insurance cost for SHA.

Staff proposes that RDCK business interests are best served by decreasing the PLEO aggregate requirements in SHA's agreement, and are a requesting that the Board support the modification of the PLEO aggregate coverage amount from $10,000,000 to $5,000,000 to more closely align with the risks of this Closure Planning design project.

Should the Board not approve the insurance coverage modification, the RDCK will either need to cover the increased cost of the additional insurance for SHA or the project will need to be put on hold until a suitable Proponent can be secured, which will result in a delay in the closure work and likely increase project costs.

SECTION 3: DETAILED ANALYSIS

3.1 Financial Considerations – Cost and Resource Allocations:

Included in Financial Plan:	☒ Yes ☐ No	**Financial Plan Amendment:**	☐ Yes ☒ No
Debt Bylaw Required:	☐ Yes ☒ No	**Public/Gov't Approvals Required:**	☐ Yes ☒ No

Should the Board approve the insurance modification, there is no additional cost to the RDCK.

If the insurance modification is not approved, the RDCK would need to pay an additional approximately $15,000 to cover the costs of the additional insurance for SHA, bringing the total contract value to approximately $45,000 not including GST. The $15,000 is currently an estimate as SHA has not gone out to insurers to secure a formal quote.

Approving the insurance modification for SHA is the best value option for the RDCK, with the total contract value being up to $29,981 not including GST.

Alternatively, Staff could investigate awarding the contract to the Proponent with the next lowest cost and highest ranked proposal at a total cost of up to $88,861 not including GST. However, discussions around insurance coverage amounts and pricing holds through to the end of November (greater than 3 months after the procurement closed), when Staff could return to Committee with a new recommendation to award, would need to occur.

There is $100,000 in the 2024 budget for Service S188 West Resource Recovery to cover the cost of landfill closure planning for the Nakusp Landfill.

3.2 Legislative Considerations (Applicable Policies and/or Bylaws):

None at this time.

3.3 Environmental Considerations

None at this time.

3.4 Social Considerations:

None at this time.

3.5 Economic Considerations:

None at this time.

3.6 Communication Considerations:

None at this time.

3.7 Staffing/Departmental Workplace Considerations:

The Nakusp Landfill Closure project will continue to be led by the Environmental Technologist with support from the Environmental Projects Lead and Resource Recovery Manager.

3.8 Board Strategic Plan/Priorities Considerations:

None at this time.

SECTION 4: OPTIONS & PROS / CONS

Option 1: **That the Board accept the insurance modification to the Professional Liability (Errors and Omissions) coverage for Sperling Hansen Associates Inc. for the Nakusp Landfill Closure Planning Project to reduce the aggregate amount from $10,000,000 to $5,000,000.**

PROS:

- Allows the project to continue on schedule.
- Allows the RDCK to continue their strong working relationship with SHA.
- Project cost would remain low.

CONS:

- None noted

Option 2: **That the Board does not approve the insurance modification for Sperling Hansen Associates Inc's Professional Liability (Errors and Omissions) in aggregate insurance coverage, and instead directs Staff to include the additional cost of increasing the insurance coverage amounts in the payment terms of the Agreement Amendment for the Nakusp Landfill Closure Planning Project.**

PROS:

- Allows the RDCK to continue their strong working relationship with SHA.
- Project cost would still remain well below the next lowest cost and highest ranked proposal.

CONS:

- The project schedule would be slightly delayed to revise the Agreement Amendment, have SHA secure the increased insurance coverage, and provide the revised COI before starting any work.
- Increases overall cost to the RDCK by approximately $15,000.

SECTION 5: RECOMMENDATIONS

That the Board accept the insurance modification to the Professional Liability (Errors and Omissions) coverage for Sperling Hansen Associates Inc. for the Nakusp Landfill Closure Planning Project to reduce the in aggregate amount from $10,000,000 to $5,000,000.

Respectfully submitted,

Nathan Schilman – Environmental Technologist

CONCURRENCE

Resource Recovery Manager – Amy Wilson
Chief Administrative Officer - Stuart Horn

ATTACHMENTS: None

Committee Report

Date of Report:	September 25, 2024
Date & Type of Meeting:	October 16, 2024, Joint Resource Recovery Committee meeting
Author:	Nathan Schilman, Environmental Technologist
Subject:	CRESTON LANDFILL AND COMPOST FACILITY OPERATIONS & MAINTENANCE CONTRACT RFP
File:	6300-CRE-01
Electoral Area/Municipality	East Sub-Region

SECTION 1: EXECUTIVE SUMMARY

The purpose of this report is to seek approval to issue a Request for Proposal (RFP) for the Creston Landfill Operations and the Creston Compost Operations and Maintenance, which will combine these contracts under a single Service Agreement. Staff are also requesting approval of a new short-term contract for the Landfill operations, and a contract extension for the Compost Facility operations, both for GFL Environmental Ltd, in order to provide additional time for the combined operations RFP process.

SECTION 2: BACKGROUND/ANALYSIS

The Creston Landfill and Creston Compost Facility sites are currently operated under two separate contracts, both held by GFL Environmental Ltd. (GFL).

The Landfill contract expires on March 31, 2025, and has no remaining optional extensions. The Compost Facility contract expires on April 9, 2025, with two optional 1-year extensions still available. The contract terms were designed to expire around the same time, so they could eventually be combined under a single operations contract. Staff are seeking approval to issue an RFP for the single combined contract to operate both the Landfill and Compost Facility.

Staff are proposing that the combined contract include a new 3-year term, with two optional 1-year extensions. Within the RFP, Staff will be including 5% of the total available points in the evaluation criteria for Indigenous owned or affiliated companies. If issuing the combined RFP is approved, Staff intend to issue the RFP in late October, with the procurement to close in late November and the intent to take a report back to Committee in December or January to seek approval for the contract award.

To provide adequate time for a potential new contractor to secure staffing and equipment after contract award and prior to a new contract start date, Staff are also requesting approval to direct-award a 6-month new contract with GFL for the Landfill operations, with the new contract expiry being September 30, 2025. GFL are open to using the same terms and conditions, including the annual adjustment for labor and fuel indices from the current contract in the new contract, with no other changes. Staff are also seeking approval to provide GFL with a Compost Facility contract extension to September 30, 2025 (a 5 month and 20 day extension), with no changes to the existing terms and conditions. The two separate contracts would then expire on the same date, and the new combined contract would start on October 1, 2025.

Staff have observed that securing staff in the Creston valley can be very difficult, and often new equipment orders can take longer than 6 months before delivery. If this 6 month additional contract period for GFL is not provided, it is likely that the RDCK would limit the number of proposals received for the RFP. A very short time-frame between the closing date of the procurement and the new contract start date would be a barrier to participation, especially for smaller companies that may not have an existing staffing pool or available equipment to draw from. Ensuring that bidders do not face unnecessary barriers should expand the pool of eligible proponents and maximize competition.

As the Creston Landfill contract is out of allowable extensions, the award of a 6 month new contract to GFL would need to be completed under the Non-Competitive Procurement Method under the RDCK's Purchasing Policy. Staff feel this is a reasonable in that it is very a short-term contract, and providing a longer period between the combined operations contract RFP closing date and the new contract start date will ensure a more fair procurement process, likely resulting in more competitive bids and a lower overall cost to the RDCK.

SECTION 3: DETAILED ANALYSIS

3.1 Financial Considerations – Cost and Resource Allocations:

Included in Financial Plan:	☒ Yes	☐ No	**Financial Plan Amendment:**	☐ Yes	☒ No
Debt Bylaw Required:	☐ Yes	☒ No	**Public/Gov't Approvals Required:**	☐ Yes	☒ No

Costs for both the Creston Landfill and Compost Facility Operations & Maintenance contracts are included in the 2024 to 2028 Financial Plan in Service S186 East Resource Recovery, and Service A119 East Compost, respectively, although there may need to be some amendments based on recent Annual Adjustment calculations that were higher than anticipated. Staff will assess if there will need to be a Financial Plan amendment, and if needed, will bring a request to the November Committee meeting.

If issuing the RFP for the combined contract is approved, it will include the need for splitting invoices accordingly so that appropriate costs can go to each service. The RDCK may see minor cost reductions with combining the contracts as there may be opportunities for equipment sharing between the two sites. There may also be additional contractor staffing cost reductions as the Compost Facility operator does not need to be a full-time position so there may be opportunities for splitting that role to assist with Landfill duties as well. Staff will bring a report to the December or January Committee meeting with the results of the procurement, and detailed costing information for the new contract.

If the new direct award for a 6 month Landfill contract is provided to GFL, the associated cost of that new contract is estimated to be $36,339 per month, or $218,034 not including GST for the 6 month term. This cost is based on the current 2024 rates after the annual adjustment. The most recent labor and fuel indices supplied by Stats Canada up to the end of the August were reviewed by RDCK finance staff to estimate if the contract value would be projected to increase significantly at the start of the new term, and so far trends through 2024 remain stable.

If the contract extension is provided to GFL for the Compost Facility contract the associated cost is estimated to be $15,229 per month, or $86,659 not including GST for the 5 month and 20 day period. This estimate is also based on 2024 rates after the annual adjustment and finance review of Stats Canada available information.

Staff are recommending that the Board approve issuing the RFP for the combined Creston Landfill and Compost Facility contract. Staff are also recommending awarding a 6 month contract to GFL for the Creston Landfill

Operations at a total costs of $218,034 not including GST, with costs to be paid from Service S186 East Resource Recovery, and extending the Creston Compost Facility contract for 5 months and 20 days at a total cost of $86,659 not including GST, with costs to be paid from Service A119 East Compost.

3.2 Legislative Considerations (Applicable Policies and/or Bylaws):

None

3.3 Environmental Considerations

None

3.4 Social Considerations:

None

3.5 Economic Considerations:

Combining the contracts allows for a larger contract which may attract more proponents.

3.6 Communication Considerations:

None

3.7 Staffing/Departmental Workplace Considerations:

Oversight of the Landfill portion of the contract will be the responsibility of the Environmental Technologist. Oversight of the Compost Facility portion of the contract will be the responsibility of the Environmental Projects Lead.

3.8 Board Strategic Plan/Priorities Considerations:

Organics diversion is a major component of advancing the RDCK Board's priority of Innovating to reduce the impact of waste.

SECTION 4: OPTIONS & PROS / CONS

Request for Proposal for Combined Contract

Option 1.1: That the Board direct Staff to issue a single Request for Proposal to combine the Creston Landfill and Creston Compost Facility operations contracts, with costs to be paid from Services S186 East Resource Recovery and A120 East Compost, respectively.

Pros:

- A single contractor overseeing both operations will be a simpler process in terms of Prime Contractor designations and safety considerations associated with that process, and for contract oversight and management for Staff.
- There may potentially be cost savings by combining the contracts.

Cons:

- None noted.

Option 1.2: That the Board direct staff to issue separate Requests for Proposals for the Creston Landfill operations and the Creston Compost Facility Compost operations.

Pros:

- None noted.

Cons:

- Additional time to prepare/execute separate RFPs.
- If different companies are awarded the contracts, there is potential for logistical problems.
- Potentially paying a higher cost to have separate contracts as there will be no equipment or staffing sharing.
- Having two separate Prime Contractors on a site, with some overlapping work areas requires some additional safety considerations.

Creston Landfill Operations Contract Direct-Award

Option 2.1: That the Board approve the RDCK enter into a Service Agreement with GFL Environmental Ltd. for the operations and maintenance of the Creston Landfill for a six (6) month term starting April 1, 2025, at a total cost of up to $218,034 not including GST; AND FURTHER that the Chair and Corporate Officer be authorized to sign the necessary documents; AND FURTHER that the costs be paid from Service S186 East Sub-Region Resource Recovery Service.

Pros:

- Provides additional buffer time to ensure staff can run a fair and open procurement process for the combined Landfill and Compost Facility operations RFP, and allow a potential new contractor time to secure staff and equipment.
- Continue with the longstanding relationship with GFL for Creston Landfill operations.

Cons:

- Does not follow the competitive procurement method.

Option 2.2: That the Board does not support entering into a new Service Agreement with GFL Environmental Ltd. for the operations and maintenance of the Creston Landfill, and instead directs staff to expedite the combined Creston Landfill and Compost Facility operations and maintenance Request for Proposal contract to ensure a new contract is in place by April 1, 2025.

Pros:

- Does not require a direct award.

Cons:

- Would result in a procurement process that would likely exclude smaller companies that do not have already available equipment and a staffing pool, which could result in less competition and increased prices.

Creston Compost Facility Contract Extension

Option 3.1: That the Board approve the RDCK extend the Service Agreement with GFL Environmental Ltd. for the operations and maintenance of the Creston Compost Facility for a five (5) month and twenty (20) day term starting April 10, 2025, at a total cost of up to $86,659 not including GST; AND FURTHER that the Chair and Corporate Officer be authorized to sign the necessary documents; AND FURTHER that the costs be paid from Service A119 East Compost.

Pros:

- Provides additional buffer time to ensure staff can run a fair and open procurement process for the combined Landfill and Compost Facility operations RFP, and allow a potential new contractor time to secure staff and equipment.
- Continue with the longstanding relationship with GFL for Creston compost facility operations.

Cons:

- Does not follow the competitive procurement method.

Option 3.2: That the Board does not support entering into a new Service Agreement with GFL Environmental Ltd. for the operations and maintenance of the Creston Landfill, and instead directs staff to expedite the combined Creston Landfill and Compost Facility operations and maintenance Request for Proposal contract to ensure a new contract is in place by April 1, 2025.

Pros:

- Does not require a direct award.

Cons:

- Would result in a procurement process that would likely exclude smaller companies that do not have already available equipment and a staffing pool, which could result in less competition and increased prices.

SECTION 5: RECOMMENDATIONS

RECOMMENDATION #1

That the Board direct Staff to issue a single Request for Proposal to combine the Creston Landfill and Creston Compost Facility operations contracts, with costs to be paid from Services S186 East Resource Recovery and A120 East Compost, respectively.

RECOMMENDATION #2

That the Board approve the RDCK enter into a Service Agreement with GFL Environmental Ltd. for the operations and maintenance of the Creston Landfill for a six (6) month term starting April 1, 2025, at a total cost of up to $218,034 not including GST;

AND FURTHER that the Chair and Corporate Officer be authorized to sign the necessary documents;

AND FURTHER that the costs be paid from Service S186 East Sub-Region Resource Recovery Service.

RECOMMENDATION #3

That the Board approve the RDCK extend the Service Agreement with GFL Environmental Ltd. for the operations and maintenance of the Creston Compost Facility for a five (5) month and twenty (20) day term starting April 10, 2025, at a total cost of up to $86,659 not including GST;

AND FURTHER that the Chair and Corporate Officer be authorized to sign the necessary documents;

AND FURTHER that the costs be paid from Service A119 East Compost.

Respectfully submitted,

Nathan Schilman – Environmental Technologist

CONCURRENCE

Amy Wilson – Resource Recovery Manager
Stuart Horn – Chief Administrative Officer

ATTACHMENTS: None

Committee Report

Date of Report:	September 17, 2024
Date & Type of Meeting:	October 16, 2024 Joint Resource Recovery Committee
Author:	Alayne Hamilton, Environmental Projects Lead
Subject:	DIRECT AWARDS FOR ENVIRONMENTAL MONITORING AND ENGINEERING CONSULTING AGREEMENTS FOR HB TAILINGS FACILITY, AND REGULATORY UPDATE
File:	12-6300-HBD
Electoral Area/Municipality	Central Sub-Region

SECTION 1: EXECUTIVE SUMMARY

The purpose of this report is to outline a regulatory update under the *Mines Act,* and two proposed direct-awards for Consulting Services Agreements for environmental monitoring and engineering services for the HB Tailings Facility.

SECTION 2: BACKGROUND/ANALYSIS

Health, Safety, and Reclamation Code for Mines in British Columbia Updates

On April 29th, 2024, a new version of the Health, Safety, and Reclamation Code for Mines in British Columbia (Code) was published with major changes affecting tailings facilities.

Within the updated Code, there are now 16 sections that require First Nations engagement, and six new detailed reports that are required for closed facilities. Of these six new required reports, Staff will need to complete early engagement and incorporate Indigenous knowledge into four of the reports. This process may be a significant undertaking for Staff, depending on the number of Bands or Nations that wish to share information on their unique cultures, languages, spiritual teachings, values, history, governance, legal systems, experiences and observations within their traditional territories with the RDCK. There are currently 13 Bands or Nations that come up in the Consultative Areas Database search for the exact site location, and Staff feel spending time on meaningful relationship building and engagement is an important step in the completion of these reports. Without an RDCK Policy around First Nations engagement, and needing to move forward on these engagement activities in order to meet reporting deadlines within the Code, Staff will need to initiate this process in the coming months.

On emergency preparedness for the Facility, the Code has been updated to require increased testing of the Emergency Preparedness and Response Plan (EPRP) with a formal facilitated test of the full plan required every 3 years, and a partial test every year, as well as general content updates to that plan. There are also requirements within the Code to make reasonable efforts to engage with potentially affected First Nations on warning and notification systems in the event of a suspected or actual dam safety issue, and to make reasonable efforts to include potentially affected First Nations in the annual testing of the plan.

Other Code changes may be a benefit to the longer-term management of the HB Facility, as the Code now has clauses around closed facilities being eligible for a reduction of post-closure monitoring requirements, even before a steady state (passive-closure) has been achieved, with the possibility of a full release of permit obligations under the *Mines Act* after passive-closure is reached. Additional discussions with the Ministry are needed to determine if

the lower portion of the spillway can achieve passive-closure in its current state. Staff will be investigating permit applications for decreased monitoring prior to achieving passive-closure as part of the 2025 work plan.

Engineering and Environmental Consulting Services Agreements

The HB Tailings Facility is currently 2 years into a 4 to 5+ year post-closure process where increased monitoring and oversight are needed to confirm that the facility is performing as intended, and that it has achieved physical, geochemical, and environmental stability. Prior to closure construction works, it was estimated that passive-closure could theoretically be achieved in 3 years post-closure, but some minor setbacks such as more stringent permit requirements being applied before construction, significant drought causing slow vegetation growth, and extreme rain events that caused damage have added additional time to that estimate.

SLR Consulting (Canada) Inc. (SLR) has been the leading the multi-year post-closure environmental projects that are required under the Facility's *Mines Act* Permit. SRK Consulting (Canada) Ltd. (SRK) acts as the Facility's Engineer of Record (EOR) and provides additional engineering and design supports. Both consultants have Consulting Services Agreements (contract) that are expiring before the end of 2024, and both are in the middle of several high priority multi-year projects that are required to meet important permit obligations.

To support the successful implementation of the passive-closure process, and to provide continuity through these important multi-year projects, Staff are recommending awarding new Consulting Services Agreements to SLR and SRK, under the Non-Competitive Purchase Model in the RDCK's Purchasing Policy. The possibility of follow-on contracts was not identified in the original bid solicitation, but much of the scopes of work in these proposed new contracts are carry-on tasks from the previous contracts.

Descriptions of the scopes of work, insurance modifications, and applicability of the Purchasing Policy requirements for the Non-Competitive Purchasing Model are described for each consultant in the sub-sections below.

SLR's Consulting (Canada) Ltd.

SLR's 2023 Consulting Services Agreement for environmental consulting support for the HB Tailings Facility expires on December 31, 2024, with no additional extensions remaining.

SLR has a team of qualified professionals that can be drawn on for the variety of complex projects at the Facility in the coming years, and has completed excellent work on all projects over the past contract period.

Although the closure construction works were completed in September, 2022, Staff feel that having another consultant come into the project in the middle of the active-care phase could increase costs, complicate permit requirements and the environmental management of the site, and extend the timeline for which the RDCK can apply for a permit amendment to formally enter the passive-closure phase and reduce monitoring frequencies. Additionally, SLR is providing important expert environmental opinions in the negotiations with Teck which are expected to continue through portions of a new contract term.

Staff are proposing a direct award to SLR for a 3-year Consulting Services Agreement, with two optional 1-year extensions upon mutual agreement of both parties, so that the remaining portions of the active care phase monitoring, legal, and permitting work can be completed by the same consulting firm. SLR has provided a detailed proposal including scopes of work and a cost estimate, which is included in Attachment A. Should a new 3-year contract be approved, the high-level scopes of work for the contract term would include the tasks outlined below. Scopes of work that are a continuation of tasks started after closure construction are italicized:

- Event-driven environmental monitoring and sampling.

- *Revegetation monitoring once per year in 2025/2026 at twenty-six 1x1 m plots*.
- *One wildlife monitoring event per year.*
- Annual flume line and downstream channel inspections.
- *Woody vegetation metals uptake study, building on results of 2024 uptake study.*
- Report summary memos or reports for all above monitoring work, signed off by Qualified Environmental Professional (QEP).
- Guidance on repair works or seeding that may be required post-freshet.
- *Reclamation Research Program – monitoring, annual update report, final report.*
- Annual review and updates to Environmental Management System.
- Environmental monitoring visits twice during piezometer drilling program, expected in 2025.
- Support for Closure Management Manual development.
- Attending ITRB meetings, as needed.
- Participating in EPRP annual test.
- Dam Safety Review report review of environmental components of draft report.
- *Final Closure Report, updates to existing environmental sections from other reports.*
- Technical guidance on environmental sections for new Code required reports.
- Participating in Provincial inspections of the site.
- *Technical review and guidance of Water and Load Balance and Water Quality Prediction Model update in 2025.*
- *Permit amendment applications – borrow removal, and possibly lands process with subdivision of TSF, reduction in monitoring frequencies, removal of Mines Act requirements.*
- *Updating the 5 Year Reclamation and Closure Plan.*
- *Providing expert opinions and support through legal negotiations with Teck.*

Staff see significant value in having SLR continue their environmental work at the HB Tailings Facility due to the following reasons:

- Since SLR developed many of the monitoring programs, plans, and reports completed to date for the site and have signed off on them as QEP's they should continue to oversee and sign-off on those works.
- SLRs Contaminated Sites Approved Professionals have provided valuable expert opinions as part of the legal negotiations with Teck, and that process is still in progress.
- SLR should participate in the Dam Safety Review process as they have significant historical environmental knowledge that a new consultant would not have.
- The Facility's environmental monitor and SLR's Project Manager, is local and is available to respond rapidly to the site should an event-driven (heavy precipitation) inspection be needed, and is incredibly knowledgeable about the Facility and its associated environmental risks. It would be detrimental to the proper environmental management of the facility to lose his expertise at this point in the active-care phase of closure.
- Bringing on a new consulting company at this time during closure would require significant RDCK Staff time and carry a large cost to get that consultant up to speed on the complexities of the site.

Staff believe providing SLR with a 3-year Consulting Services Agreement meets the requirement of the Non-Competitive Procurement Method under the RDCK's Purchasing Policy in that:

- Due to the complex nature of the HB tailings facility active-care phase, Staff believe that only SLR is able to meet the requirements of the tasks for the upcoming several years.
- There will be cost savings by keeping SLR in place during this critical portion of the project.

Staff are recommending that the Board approve a 3-year Consulting Services Agreement for SLR from January 1, 2025 until December 31, 2027, with two optional 1-year extensions upon mutual agreement of both parties. The draft contract for SLR is included in Attachment B.

SRK Consulting (Canada) Inc.
SRK has been acting as the EOR and engineering and design consultant for the Facility since 2016.

SRKs contract is set to expire on November 16, 2024. SRK has provided a proposal that includes the scopes of work and costs for a 2-year term, which is included in Attachment C. SRK has proposed a 2-year term instead of a 3-year term due to a business preference. Should a new 2-year contract be approved, the high-level scopes of work for the contract term would include the tasks outlined below. Scopes of work that are a continuation of tasks started after closure construction are italicized:

- Annual EOR Routine Tasks
    - Dam Safety Inspections
    - Routine data and inspection reviews
    - Operations, Maintenance and Surveillance Manual and EPRP reviews and updates
    - *Risk Register review*
    - Independent Tailings Review Board meetings
    - On-call events, exceedances, or incident supports
    - As-needed Stakeholder Meetings (Teck, Province, Legal etc.)
- New Code reports
    - Site Characterization Report
    - Design Basis Summary Report
    - Dam Breach Assessment Report Update
    - Management System Support
    - Change Register Development
    - Climate Change Assessment
- *Dam Safety Review Support*
- Piezometer Installation
    - Instrumentation design
    - Field program planning and coordination
    - Field program execution
    - As-built Reporting
- *Stability Analysis Update*
    - *Geometry review*
    - *Seepage analysis*
    - *Stability analysis*
    - *Reporting and Trigger Action Response Plan update*
- *Metal Leaching and Acid Rock Drainage Report reviews*
- *Water Quality Prediction Model update*
- *Tailings Geochemistry Assessment updates*
- Closure Management Manual
- Reclamation and Closure Plan Update
- Regulatory support
- Project management
- Monthly client meetings

There are no more allowable extensions under the 2021 Consulting Services Agreement. Staff see significant value in keeping SRK on as EOR and engineering consultant for several more years for the following reasons:

- There are several multi-year geotechnical and geochemical projects required under the *Mines Act* permit that SRK has been working. SRK developed models used in the initial site evaluation and should continue to lead those tasks. The final results of these projects are due to the Ministry in 2026.
- Staff feel it is important that SRK lead the Facility through the active-care phase as detailed oversight during this phase should limit the length of time of this phase which will reduce costs.
- If any issues arise during this active-care phase, it would be valuable to have the design engineers still under contract so issues could be quickly remedied.
- The EOR with SRK is incredibly knowledgeable about the Facility and its associated risks. It would be detrimental to the safe operation of the facility to lose his expertise at a critical time in facility closure.
- A dam safety review (DSR) is currently underway with Tetra Tech. The DSR is due to the Ministry by March 31, 2025 and the EORs participation in the draft review process is incredibly important.
- Bringing on a new consulting company at this time during closure would carry a large cost to get that consultant up to speed on the complexities of the site.
- SRK has been involved in the legal negotiation process with Teck, and it would be beneficial to continue that process with SRK's support.
- Final closure confirmation reports are due to the Ministry in 2026, unless an extension is needed. After Ministry confirmation of closure acceptance, possibly in 2026, a process to modify permit conditions begins, which may require additional supports, stakeholder meetings, First Nations engagement, and reporting through 2027 which could be completed under an extension with SRK.

This project is very complex as it was one of the first transition to passive-closure projects in the province. The RDCK requires SRK's expertise in tailings facility closures to continue moving the project forward through the active-care phase, as well as continuation of an EOR with site experience.

Staff believe providing SRK with a Consulting Services Agreement without going through a competitive procurement process meets the requirement of the Non-Competitive Procurement Method under the RDCK's purchasing policy in that:

- Staff believe that only SRK is able to meet the requirements of the tasks for the upcoming several years.
- It is not in the interest of dam safety, and therefore the safety of the public and the environment, to change consultants at this critical phase of closure.
- There will be cost savings by keeping SRK in place, and not needing a new consultant to spend significant time reviewing historical documents and design files to get up to speed.

The new Code guidance document, which was released on August 1, 2024, outlines that succession plans should be developed for the EOR to provide continuity and minimize gaps in the event of a change. Succession plans for EORs are also a requirement of the Global Industry Standards on Tailings Management. Staff have not had the capacity to develop succession plans in 2024, but it is in the work plan for 2025. If the Board does not approve a direct award for SRK, as there are no more allowable extensions within the existing contract, Staff will need to negotiate a short 6 month contract with SRK to assist with development of the succession plan, which would then form the basis of a RFP for an EOR. Staff would need to return to the Committee in November with the results of a negotiation with SRK, with request for approval of a short-term contract.

In regards to insurance requirements for a new contract for SRK, at the April 18th, 2024 Regular Open Board Meeting, the Board passed the following resolution:

212/24 *That the Board accept the insurance deductible modification for SRK Consulting (Canada) Ltd.'s Professional Errors and Omissions Liability insurance to increase the deductible from $50,000 to $500,000;*

AND FURTHER, that the Board also accept the modification to the Professional Errors and Omissions Liability coverage to reduce the in aggregate amount from $10,000,000 to $5,000,000.

Staff are requesting that the Board award a new 2-year Consulting Services Agreement to SRK, and that the insurance modification that was passed in resolution 212/24 be duplicated for the new contract. The draft contract for SRK is included in Attachment D.

SECTION 3: DETAILED ANALYSIS

3.1 Financial Considerations – Cost and Resource Allocations:

Included in Financial Plan:	☐ Yes	☒ No	**Financial Plan Amendment:**	☐ Yes	☒ No
Debt Bylaw Required:	☐ Yes	☒ No	**Public/Gov't Approvals Required:**	☐ Yes	☒ No

Most of the costs associated with the proposed new agreements have been included in the 2024-2028 Financial Plan for Service S187 Central Sub-Region Resource Recovery. Costs that are newly identified or have increased since the development of the 2024-2028 Financial Plan are described in the sections below. All costs will be included in the draft 2025-2029 Financial Plan.

SLR Consulting (Canada) Ltd.

If the Board supports a 3-year Consulting Services Agreement for SLR, the total contract value is $359,800 not including GST. The annual cost breakdown for the contract term is:

- 2025 - $133,700
- 2026 - $135,700
- 2027 - $90,400

Between 2023 and 2024, SLR was successful in obtaining $44,000 in Research and Innovation grant funding to reduce costs for the RDCK, and will continue to explore other funding opportunities or project efficiencies to further reduce costs. Overall, SLR's contract costs for the proposed contract term are lower than anticipated as environmental monitoring frequencies are being reduced on recommendation from a QEP. Staff are recommending the RDCK direct-award a 3-year Consulting Services Agreement to SLR, to start January 1, 2025, at a total costs of up to $359,800 not included GST.

SRK Consulting (Canada) Inc.

SRK has provided an updated proposal, including a detailed cost estimate, which is included in Attachment C. The total contract value for a 2-year term for SRK is $513,021 not including GST for works associated with the HB Facility, to be paid from Service S187 Central Sub-Region Resource Recovery.

Within SRK's proposal for the hourly rates for staff, SRK has defined the rates to account for annual CPI increases plus an additional 2% for promotions. The rate increases proposed by SRK are reasonable, given rate increases for promotions that can be expected over the contract term, as well as increased business costs and inflation. The cost split outlined by SRK, which includes a weighted average to calculate an overall rate, assumes that 75% of the work is completed in 2025, and 25% of the work is completed in 2026.

The estimated cost annual breakdown of costs for the proposed 2-year agreement term is:

- 2025 - $383,283
- 2026 - $129,738

The 2025 annual estimate above includes the following modifications which have increased costs for 2025 as compared to what was included in the 2024-2028 Financial Plan:

- $87,848 of new costs related to the April 29th changes to the Code, and the new reporting requirements.
- $121,625 for the piezometer drilling program, which was in the budget for 2024 but has been deferred to 2025.

Early conservative 2024 year-end projections indicate that there may be $146,000 remaining in the S187 budget for the HB Facility that can be rolled over into the 2025 budget. Staff will also be engaging with the Ministry to request clarification of deadlines for the new Code reports. It is possible that the new Code reporting requirements, or a portion of, could be moved to 2026 to alleviate some of the higher costs in 2025.

Staff feel that SRK is the best organization to lead the HB Facility through the active-closure phase, and are recommending the RDCK direct-award a 2 year Consulting Services Agreement with SRK, to start November 17, 2024, at a total costs of $533,790 not including GST, with the funds to be paid from Service S187 Central Resource Recovery.

3.2 Legislative Considerations (Applicable Policies and/or Bylaws):

Several new conditions in the Code have increased reporting and First Nations engagement requirements at the HB Facility.

3.3 Environmental Considerations

Having SRK and SLR lead the project through active-care will reduce the risk of environmental releases of sediment laden water or tailings as the Facility will have a high level of oversight.

3.4 Social Considerations:

None at this time.

3.5 Economic Considerations:

None at this time.

3.6 Communication Considerations:

None at this time.

3.7 Staffing/Departmental Workplace Considerations:

Ongoing oversight of the post-closure period at the HB Facility will continue to be a focus of the Environmental Projects Lead. Additional scopes of work for RDCK Staff related to First Nations engagement will be added to work plans for the Resource Recovery Manager and Environmental Projects Lead. With increasing First Nations consultation across many areas of the Regional District's work, Staff recommend the Board consider a First Nations Relations Advisor for the organization to guide engagement practises.

3.8 Board Strategic Plan/Priorities Considerations:

Developing relationships and partnerships with Indigenous communities will be a focus of upcoming new reporting works for the HB Tailings Facility. Awarding contracts to existing consultants will reduce overall costs, which aligns with the Board Strategic Priority of managing our service delivery in a fiscally responsible manner.

SECTION 4: OPTIONS & PROS / CONS

SLR CONSULTING (CANADA) LTD.

Option 1.1: **That the Board approve the RDCK enter into a Consulting Services Agreement with SLR Consulting (Canada) Inc. for works associated with environmental support for the HB Tailings Facility for a three year term starting January 1, 2025, at a total cost of up to $359,800 not including GST; AND FURTHER that the Consulting Services Agreement provide two optional one year extensions upon mutual agreement of both parties; AND FURTHER that the Chair and Corporate Officer be authorized to sign the necessary documents; AND FURTHER that the costs be paid from Service S187 Central Sub-Region Resource Recovery Service.**

PROS:

- HB project continues with same consultant lead and industry experts.
- Does not require an RFP and possibly bringing on new consultant team during the critical active-care phase.
- Provide 3 years for completion of high-priority permitting tasks and studies that need to happen in collaboration with the EOR.
- Maintains rates through to the end of a 3-year term.

CONS:

- Does not follow competitive procurement process.

OPTION 1.2: **That the Board direct Staff to commence a Request for Proposal process to initiate a new Agreement January 1, 2025 for works associated with environmental support for the HB Mine Tailings Facility.**

PROS:

- May receive better consulting service rates.
- Follows the competitive procurement process.

CONS:

- Would lose SLR's expertise during an important time in tailings facility closure and legal negotiations.
- May not receive better bids.
- Switching consultants in the middle of multi-year projects would result in loss of knowledge.
- Likely result in higher cost since a new consultant would have to familiarize themselves with the project and site.

SRK CONSULTING (CANADA) INC.

OPTION 2.1: **That the Board approve the RDCK enter into a Consulting Services Agreement with SRK Consulting (Canada) Ltd. for works associated with engineering consulting for the HB Tailings Facility for a two year term starting November 17, 2024, at a total cost of up to $513,021 not including GST; AND FURTHER that the Consulting Services Agreement provide three optional one year extensions upon mutual agreement of both parties; AND FURTHER That the Board accept**

an insurance deductible modification for Professional Errors and Omissions Liability insurance to increase the deductible from $50,000 to $500,000; AND FURTHER, that the Board accept a modification to the Professional Errors and Omissions Liability coverage to reduce the in aggregate amount from $10,000,000 to $5,000,000; AND FURTHER that the Chair and Corporate Officer be authorized to sign the necessary documents; AND FURTHER that the costs be paid from Service S187 Central Sub-Region Resource Recovery Service.

PROS:

- HB project continues with same consultant lead, Engineer-of-Record, and industry experts through possible completion of the active-care phase.
- Staff resources are not needed to proceed with RFP to procure other consulting services.
- A direct award to SRK aligns with RDCK's purchasing policy for non-competitive procurement process.

CONS:

- No competitive procurement process.

OPTION 2.2: **That the Board direct Staff to commence a Request for Proposal process to initiate a new Agreement for works associated with engineering consulting for the HB Tailings Facility.**

PROS:

- May receive better consulting service rates.
- Follows competitive procurement process.

CONS:

- Would require a likely 3-6 month direct award to SRK's existing agreement with the RDCK to develop a succession plan for a new EOR while the procurement process proceeds. This would require negotiations with the SRK to set up a short-term contract, and for Staff to return to Committee with details.
- May not receive better bids.
- Switching consultants in the middle of multi-year projects would result in loss of knowledge.
- Likely result in higher cost since a new consultant would have to familiarize themselves with the project and site.

SECTION 5: RECOMMENDATIONS

RECOMMENDATION #1 (SLR Consulting (Canada) Inc.)

That the Board approve the RDCK enter into a Consulting Services Agreement with SLR Consulting (Canada) Inc. for works associated with environmental support for the HB Tailings Facility for a three year term starting January 1, 2025, at a total cost of up to $359,800 not including GST;

AND FURTHER that the Consulting Services Agreement provide two optional one year extensions upon mutual agreement of both parties;

AND FURTHER that the Chair and Corporate Officer be authorized to sign the necessary documents;

AND FURTHER that the costs be paid from Service S187 Central Sub-Region Resource Recovery Service.

RECOMMENDATION #2 (SRK Consulting (Canada) Ltd.)

That the Board approve the RDCK enter into a Consulting Services Agreement with SRK Consulting (Canada) Ltd. for works associated with engineering consulting for the HB Tailings Facility for a two year term starting November 17, 2024, at a total cost of up to $513,021 not including GST;

AND FURTHER that the Consulting Services Agreement provide three optional one year extensions upon mutual agreement of both parties;

AND FURTHER That the Board accept an insurance deductible modification for Professional Errors and Omissions Liability insurance to increase the deductible from $50,000 to $500,000;

AND FURTHER, that the Board accept a modification to the Professional Errors and Omissions Liability coverage to reduce the in aggregate amount from $10,000,000 to $5,000,000;

AND FURTHER that the Chair and Corporate Officer be authorized to sign the necessary documents;

AND FURTHER that the costs be paid from Service S187 Central Sub-Region Resource Recovery Service.

Respectfully submitted,

Alayne Hamilton – Environmental Projects Lead

CONCURRENCE

Resource Recovery Manager – Amy Wilson
Chief Administrative Officer – Stuart Horn

ATTACHMENTS:
Attachment A: SLR Consulting (Canada) Ltd. Scope of Work and Cost Estimate
Attachment B: Draft Consulting Services Agreement – 2024-230-ENV
Attachment C: SRK Consulting (Canada) Inc. Scope of Work and Cost Estimate
Attachment D: Draft Consulting Services Agreement – 2024-229-ENV

SLR Consulting (Canada) Ltd.
8 St. Paul Street W, Kamloops, BC V2C 1G1

September 13, 2024

Attention: Alayne Hamilton – Environmental Projects Lead
Regional District of Central Kootenay
Box 590 Lakeside Drive
Nelson, BC V1L 5R4

SLR Proposal No.: 204.03242.00011

RE: Proposal for 2025-2027 Environmental Services
HB Tailings Management Facility, Salmo, BC

1.0 Introduction

SLR Consulting (Canada) Ltd. (SLR) is pleased to provide this scope and cost estimate for environmental services to the Regional District of Central Kootenay (RDCK) for a three year contract at the HB Tailings Management Facility (TMF) near Salmo, British Columbia (BC) for the period of January 1, 2025 to December 31, 2027 in response to a request provided to SLR by the RDCK.

1.1 Project Understanding

The HB TMF is located approximately six kilometers (km) south of the Village of Salmo, BC. The TMF stores tailings from Cominco Limited's (Teck Resources Limited) and various private mining companies' historic operations at the nearby HB mine. The TMF has been under the care of the RDCK since 1998. The site details and location are provided on Figures 1 and 2.

A comprehensive Remediation and Closure Plan (RCP) for the TMF was prepared by the RDCK (RDCK 2020a) and submitted to the Ministry of Energy, Mines and Low Carbon Innovation (EMLCI) in August 2020. The TMF RCP was prepared in accordance with Section 10 of the *Mines Act* and the Health, Safety and Reclamation Code for Mines in BC, and was designed to meet the requirements of applicable provincial and federal legislation.

The TMF RCP was prepared as part of an application to amend Permit No. M-218, in which the RDCK applied to complete closure construction works, remediate and reclaim the areas formerly disturbed by historical tailings storage operations, and transition the facility through the closure active care phase to the passive-closure phase, as defined by the Canadian Dam Association (CDA). The focus of the RCP was to ensure the long-term physical and chemical stability of the facility, remediate and control tailings erosion and transport, maintain acceptable water quality, protect public health and safety, minimize environmental risk of the escape of fine tailings contamination, and restore productive end land use.

Site construction works occurred at the TMF from 2021 through 2022. Construction works completed in 2021 included lowering and rebuilding the spillway, construction of the dam toe berm and upstream beach, placement of surface cover, landform stockpiling, as well as dewatering and backfilling of the tailings pond.

Construction works completed in 2022 included dewatering of the remaining portions of the tailings pond, tailing surface and landform cover placement, construction of the surface water conveyance channels, as well as hydroseeding areas of exposed soils in the tailing, dam, and borrow pit areas.

Facility closure construction objectives were completed in late 2022 and post construction environmental monitoring commenced in 2023. Post construction environmental monitoring conducted by SLR included monitoring of sediment and erosion control measures, facility repair construction works, and monitoring and sampling of surface water discharge.

Surface water management and erosion control measures were installed in the till borrow pit and facility repairs were made to the spillway and conveyance channels in 2023. Upper till borrow pit drainage construction was completed in 2024.

SLR is currently working on a multi-year reclamation research program to determine the most cost effective surface cover vegetation while supporting native species growth and has secured approximately $75,000 in research grant funding to complete this portion of the work in 2023 and 2024. The research program is a requirement of Permit M-218 and it is anticipated that additional grant funding will be available to complete the research program. As outlined in the RCP post-closure environmental monitoring program, inspections and reporting will continue at the TMF through 2027, which is summarized in the scope of work below.

2.0 Scope of 2025 – 2027 Environmental Services

2.1 Description of Services

SLR is proposing to conduct the following environmental services at the TMF:

1 Event-Driven Environmental Monitoring (EM)
   - EM will be completed during freshet, after significant rain events with greater than 30 mm of precipitation within a 24-hour period, or if sediment laden water is observed.
   - Budget includes up to 12 EM events (four per year).
   - Budget includes up to six EM sampling events (two per year) including collection of up to 20 surface water/effluent samples (three samples per event and two field duplicates) to be collected from the TMF effluent and Salmo River upstream and downstream locations and analyzed for total and dissolved metals, dissolved organic carbon (DOC) and total suspended solids (TSS).

2 Revegetation Monitoring
   - Monitoring once per year, at 26 1x1 m plots and one control plot.
   - Revegetation monitoring for two years.
   - Assumes vegetation monitoring will not be required in year three (i.e., TMF will achieve targeted vegetation cover percentages by 2026).

3 Wildlife Monitoring
   - Frequency reduced to one event per year (conducted in the late summer to early fall period) including maintenance of game cameras, and review of photos.

4 Downstream Channel Inspections
   - Annual inspections to be completed between the spillway and Highway 3 culvert, post-freshet.

5 Flume Line Inspections
   - Annual historical flume line inspections to be completed in the forested area north of the TMF, post freshet.

6 Woody Vegetation Metals Uptake Study
   - Woody vegetation metals uptake assessment will be completed in 2027 pending favourable results of the 2024 metals uptake study.

7 Report Summary Technical Memorandums and Reports
   - Technical memorandums and reports will be completed for environmental services and signed-off by Qualified Environmental Professional (QEP).
   - Annual report components, due by February 15th of the following year.
   - One-time assessments, due three months after study completion.

8 Technical EM Guidance
   - Provide technical guidance on repair works and/or seeding that may be required post-freshet.
   - Assumes TMF repair works will be minimal with anticipated increased vegetation cover and current surface water management measures currently in place.

9 Reclamation Research Program
   - Implementation of research program including annual monitoring of research plots until vegetation has reached targeted goals.
   - Annual report to be submitted prior to February 15th of the following year.

10 Environmental Management Systems (EMS)
   - EMS report will be reviewed and updated annually.
   - Annual report to be submitted prior to Feb 15th of the following year.

11 Drilling EM Inspections
   - EM inspections will be completed by SLR twice during piezometer drilling program conducted by SRK/RDCK.
   - Piezometer drilling expected to occur in 2025.

12 Closure Management Manual Development
   - SLR will assist RDCK with development of a Closure Manual for the TMF site.
   - Assumes SLR will provide technical review and guidance.

13 Independent Tailings Review Board (ITRB) Meetings
   - SLR project manager or project director will attend three virtual ITRB meetings (one per year).
   - Each meeting is assumed to be no longer than four hours including preparation and follow-up.

14 Emergency Preparedness and Response Plan (EPRP) Annual Tests
   - SLR project manager or project director will attend two one-hour virtual EPRP review meetings (annual meeting years one and two).
   - SLR project manager will attend one full-day onsite EPRP response scenario (year three - 2027).

15 Dam Safety Review

- SLR will review and provide comment on a final draft report (prepared by Tetra Tech).
- Assumes SLR will provide technical review and guidance on environmental components of the report.

16 Final Closure Report

- SLR will provide updates to the Final Closure Report (per Section D.1.(b) of the *Mines Act* permit M-218) with assistance from RDCK and Engineering Consultant including a summary of monitoring compliance.
- Report is due December 31, 2026.
- Assumes SLR will be responsible for completing EM and water quality compliance sections of the report.

17 New Code Items

- SLR will assist RDCK and the Engineering Consultant in the development of a Site Characterization Report (as per Health, Safety and Reclamation Code for Mines in BC: Code 10.5.2), including updating and repurposing environmental sections from the Reclamation and Closure Plan into a new stand-alone report.
- SLR will provide technical guidance on Climate Change (as per Health, Safety and Reclamation Code for Mines in BC: Code 10.6.11), requirements and review Engineering Consultant updated climate change model.

18 Provincial Site Inspections

- SLR will attend three onsite Ministry of Environment and Climate Change Strategy (ENV) and/or Ministry of Energy, Mines and Low Carbon Innovation (EMLI) inspections (one site visit per year) and provide follow-up responses and communications.

19 Water Load Balance and Water Quality Prediction Model update

- SLR will provide technical review and guidance on Engineering Consultant updated Climate Change Model in 2025.

20 Permit Amendment Applications

- SLR will provide technical guidance to assist RDCK in meeting regulatory requirements for borrow removal from the *Mines Act* Permit M218 and other permit amendments in 2025.

21 Updating the Five Year Reclamation and Closure Plan.

- SLR will assist RDCK and Engineering Consultant in the development of a collaborative reclamation and closure report, including a summary of works completed to date, results, and planned monitoring and assessments. Report will be due March 31, 2026.
- SLR to attend up to five virtual meetings with EMLI staff, Engineering Consultant, and RDCK.
- Assumes SLR will provide input on Environmental and Water Quality sections of the report.

22 Legal Expert Opinions with Teck Resources Limited

- SLR will provide expert opinions and technical support and guidance to RDCK to facilitate negotiations with Teck Resources Limited including review of historical and current site investigations completed at the TMF and on the adjacent downstream properties.
- SLR to attend up to two virtual meetings with Teck Resources Limited /RDCK.

3.0 Schedule

It is anticipated that the above scope or work will be completed during a three year term from January 31, 2025 through December 31, 2027. SLR will provide regular progress updates to confirm the schedule as work is completed.

4.0 Fees

SLR submits this proposal on the basis of the fee structure set forth below.

4.1 Capped Time and Expenses

SLR will provide the services under capped time and expenses, the total of which will not exceed $359,800, plus applicable taxes. This estimated total cost is based on SLR's current understanding of the required services.

Actual costs may vary depending on site conditions. If the services differ from this proposal, site conditions vary from SLR's current understanding, or additional expenses are incurred by SLR in providing the services, SLR will contact you for authorization to proceed.

The following table provides a cost estimate detailing the breakdown of SLR's fees, expenses and disbursements, as well subcontractor costs (including laboratory fees) if applicable.

Table 1: Cost Estimate

Project Phases	SLR Fees (w/ 7% FGD)	Expenses (w/ 10% markup)	Lab Fees (w/ 10% markup)	Third Party Costs	Project Phase Subtotals
1: Event Driven Environmental Monitoring	$46,100.	$3,700.	$3,500.	-	**$53,300.**
2: 2 x Annual Revegetation Monitoring	$24,800.	$3,000.	-	-	**$27,800.**
3: Annual Wildlife Monitoring	$17,300.	$7,400.	-	-	**$24,700.**
4: Annual Downstream Channel Inspections	$4,200.	$500.	-	-	**$4,700.**
5: Annual Flume Line Inspections	$4,200.	$500.	-	-	**$4,700.**
6: Woody Vegetation Metals Uptake Study	$11,700.	$1,400.	$4,300.	-	**$17,400.**
7: Annual QEP Reporting	$35,500.	-	-	-	**$35,500.**
8: Technical EM Guidance	$3,600.	-	-	-	**$3,600.**
9: Reclamation Research and Reporting	$55,800.	$4,200.	-	-	**$60,000.**
10: Annual EMS updates	$11,200.	-	-	-	**$11,200.**
11: 2 x EM Inspections (During Drilling)	$4,300.	$300.	-	-	**$4,600.**
12: Assist RDCK with Closure Manual	$4,900.	-	-	-	**$4,900.**

Project Phases	SLR Fees (w/ 7% FGD)	Expenses (w/ 10% markup)	Lab Fees (w/ 10% markup)	Third Party Costs	Project Phase Subtotals
13: Annual ITRB Meeting	$2,300.	-	-	-	**$2,300.**
14: Annual EPRP testing	$4,000.	$100.	-	-	**$4,100.**
15: Review Dam Safety Draft Report	$7,400.	-	-	-	**$7,400.**
16: Assist with Final Closure Report	$19,400.	-	-	-	**$19,400.**
17: Assist with Site Characterization and Climate Change Reports	$14,400.	-	-	-	**$14,400.**
18: Annual ENV Site Inspections	$5,500.	$400.	-	-	**$5,900.**
19: Technical Review of SRK's Water Load and Quality Reports	$9,500.	-	-	-	**$9,500.**
20: Assist with Borrow Pit Permit Amendments	$5,000.	-	-	-	**$5,000.**
21: Assist with Five year Reclamation and Closure Plan Update	$29,400.	-	-	-	**$29,400.**
22: Legal Expert Opinions with Teck	$10,000.	-	-	-	**$10,000.**
Fixed General Disbursements (FGD) & Markups (included in Category Subtotals):	*$21,621.50*	*$35.01*	*$709.09*	-	***$22,365.60***
Category Subtotals:	**$330,500.00**	**$21,500.00**	**$7,800.00**	**-**	
Total Estimate (excluding taxes):			**$359,800.00**		

Costs are based on rates for key personnel and SLR-owned equipment. SLR's fees are subject to a 7% fixed general disbursement (FGD) and subcontractor costs (excluding laboratory fees) are subject to a 10% markup. SLR reserves the right to reallocate costs within these categories as the services progress so long as the total does not exceed the amount set forth above. Please note that project closing costs may be included on the final invoice.

5.0 Assumptions

In addition to any other assumptions identified above, the following apply to this proposal:

- This proposal is costed based on SLR 2024 rates which will be valid from January 1, 2025-December 31, 2027. In the event that the work extends beyond 2027, SLR will submit a revised annual rate sheet for approval by RDCK.
- Prior to commencement of services, SLR and RDCK will execute terms and conditions under RDCK's standard contracting process.
- RDCK will assume the role of prime contractor for the project and will be responsible for overall site work and safety.
- Costs for up to 12 event driven inspections (four per year) have been included in this proposal with six requiring collection of surface water and effluent samples. In the event that additional environmental monitoring events are required, SLR will provide a change order for approval by RDCK.
- One set of comments will be considered on draft reports and submissions for consideration and completion of edits.

- SLR reserves the right to reallocate funds between tasks, fees, expenses, and disbursements and the right to reallocate staff and roles within the project team.

6.0 Closure

This proposal has been prepared for your exclusive use and is not to be copied or distributed without the prior consent of SLR. It is open for acceptance for 12 months after the date first written above after which it will expire and no longer be valid.

If you would like to proceed with the services on the basis of this proposal, please provide an RDCK contract service agreement to the attention of one of the individuals named below prior to the expiry hereof.

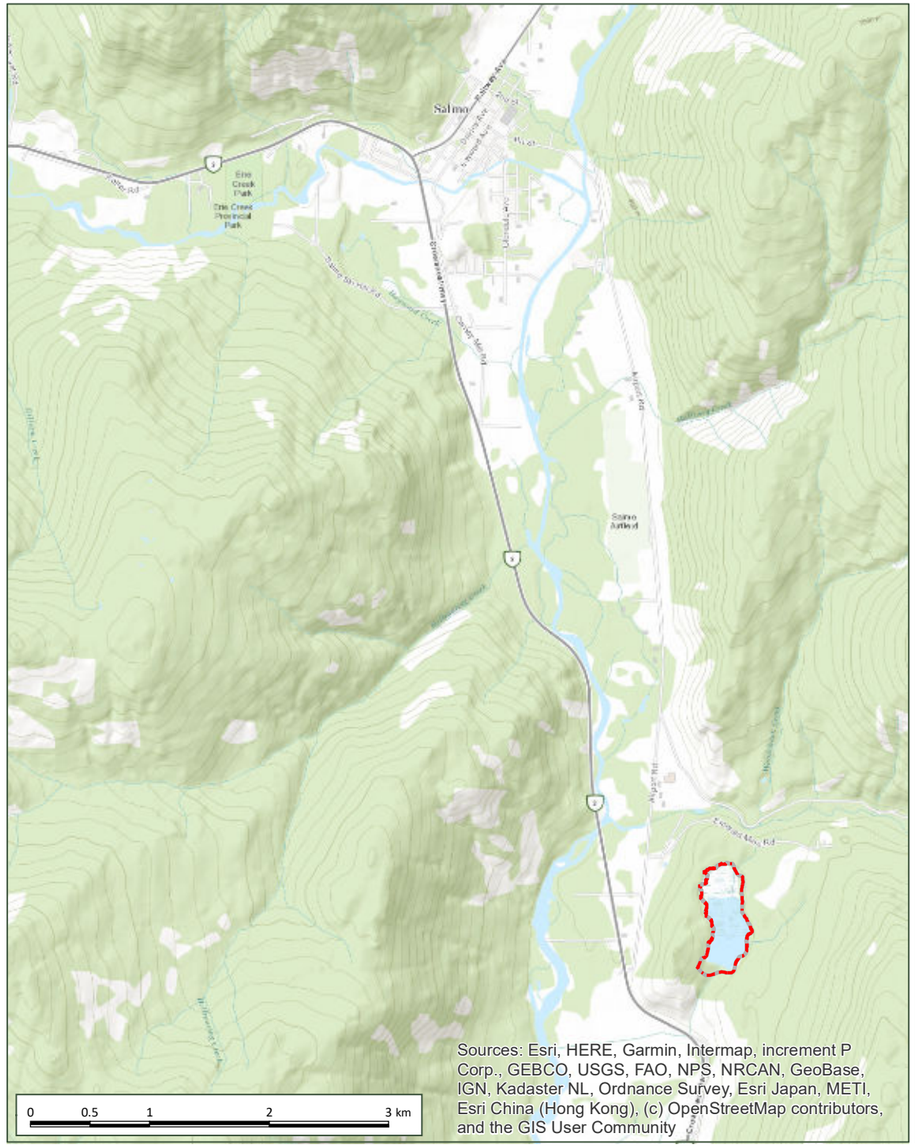
Regards,

SLR Consulting (Canada) Ltd.

Benjamin Foulger, P.Ag.
Senior Project Manager
bfoulger@slrconsulting.com

David McKeown, B.Sc., R.P.Bio
Senior Project Manager
dmckeown@slrconsulting.com

Attachments: Figures 1 & 2



NOTES:
1. SATELLITE IMAGERY - 20 SEPTEMBER 2022, MAXAR
2. PARCEL BOUNDARIES FROM BC PARCEL MAP FABRIC, LTSA

LEGEND:
- SITE BOUNDARY - HB TAILINGS MANAGEMENT FACILITY
- PARCEL BOUNDARY
- BORROW PIT

0 50 100 200 300 m

SCALE 1:10,000
PAGE SIZE 11 x 17
NAD 1983 UTM Zone 11N

THIS MAP IS FOR CONCEPTUAL PURPOSES ONLY AND SHOULD NOT BE USED FOR NAVIGATION

REGIONAL DISTRICT OF CENTRAL KOOTENAY
HB MINE TAILINGS MANAGEMENT FACILITY
SALMO, BC

ENVIRONMENTAL SERVICES
2025-2027

SITE LOCATION

SLR

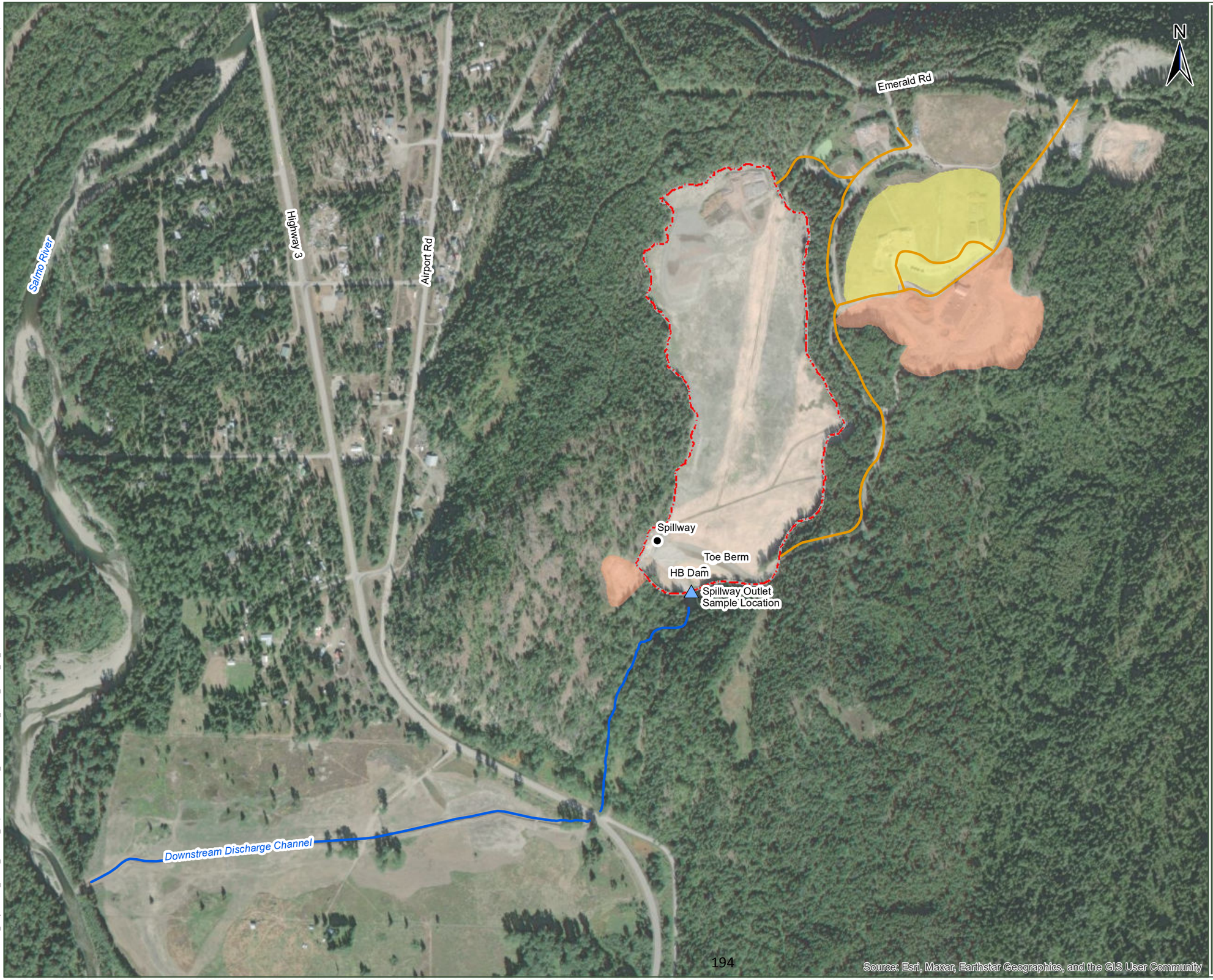
FIGURE NO:
1

DATE: January 8, 2024

PROJECT NO: 204.03242.00009

Last Saved: January 08, 2024 11:10:27 AM by alewall

GIS PATH: G:_Projects\204_03242_RDCK\1_Maps\RPT\202401_EMSR2023\204_03242_EMSR_02_SitePlan.mxd



LEGEND:

- SITE FEATURE
- SURFACE WATER SAMPLE
- ACCESS ROAD
- DOWNSTREAM DRAINAGE CHANNEL
- CENTRAL LANDFILL
- SITE BOUNDARY - HB TAILINGS MANAGEMENT FACILITY
- BORROW PIT

NOTES:
1. SATELLITE IMAGERY - 20 SEPTEMBER 2022, MAXAR

0 50 100 200 300 m

SCALE 1:8,000
PAGE SIZE 11 x 17
NAD 1983 UTM Zone 11N

THIS MAP IS FOR CONCEPTUAL PURPOSES ONLY AND SHOULD NOT BE USED FOR NAVIGATION

REGIONAL DISTRICT OF CENTRAL KOOTENAY
HB MINE TAILINGS MANAGEMENT FACILITY
SALMO, BC

ENVIRONMENTAL SERVICES
2025-2027

SITE PLAN

SLR

FIGURE NO:
2

DATE: January 8, 2024

PROJECT NO: 204.03242.00009

Consulting Services

Agreement

Contract #: 2024-230-ENV
Project: Environmental Consulting Services for HB Tailings Facility
GL Code: See Schedule B

THIS AGREEMENT executed and dated for reference the:

_____ day of _____, 2024
(Day) (Month) (Year)

BETWEEN

REGIONAL DISTRICT OF CENTRAL KOOTENAY
(hereinafter called the "RDCK")
at the following address:
Box 590, 202 Lakeside Drive
Nelson, BC V1L 5R4

AND

SLR CONSULTING (CANADA) LTD.
(hereinafter called the "Consultant")
at the following address:
1620 - 8th Avenue West, Suite 200
Vancouver, BC V6J 1V4

Agreement Administrator: Alayne Hamilton
Telephone #: 250.352.1519
Email: ahamilton@rdck.bc.ca

Agreement Administrator: Benjamin Foulger
Telephone: 250.352.1388
Email: bfoulger@slrconsulting.com

FOR GOOD AND VALUABLE CONSIDERATION, THE RECEIPT OF WHICH IS CONFIRMED, THE REGIONAL DISTRICT OF CENTRAL KOOTENAY AND THE CONSULTANT AGREE AS FOLLOWS:

(a) **SERVICES:** The Consultant shall provide the services which are set out in the Consultant's proposal dated September 13, 2024 (the "Proposal") which forms part of this Agreement and as detailed in Schedule "A" of this Agreement (the "Services"). It is agreed that Services may also include any additional services authorized and agreed to by the Consultant and the RDCK by written agreement after the Agreement has commenced ("Additional Services").

(b) **CHANGES TO SERVICES:** The RDCK and the Consultant acknowledge that it may be necessary to modify the Services, the Project schedule and/or the Budget in order to complete the Project. In the event that the RDCK or the Consultant wishes to make a change or changes to the Services, the Project schedule and/or the Budget it shall notify the other of the proposed change and reason(s) therefore. The party receiving the notification shall review and consider the proposal for change and shall as soon as is reasonably possible and no longer than within five (5) working days, advise in writing the party proposing the change whether it agrees to the change. Where the parties agree to the change, such agreement will form part of this Agreement and be formalized by means of a Scope Change Letter or an Agreement Amendment.

Any RDCK authorized services required of the Consultant beyond those Services set out in the Proposal shall be considered Additional Services. The Consultant shall be compensated for all Additional Services on an

hourly or per diem basis, as agreed upon by the RDCK and the Consultant in writing by means of a Scope Change Letter prior to the Consultant performing the Additional Services.

(c) **TERM:** Notwithstanding the date of execution of this Agreement the Consultant shall provide the Services described in Schedule A hereof commencing on **January 1, 2025** (Start Date) and ending on **December 31, 2027** (End Date) (the "Term").

(d) **LOCATION:** The location for delivery of the Services shall be the HB Tailings Facility located at 550 Emerald Road, Salmo, BC.

(e) **PAYMENT:** The total budget for the Services, as specified in the Proposal is **$359,800** (excluding GST) and on the terms set out in Schedule B. The budget for the Services is broken into tasks in the Proposal. The Consultant agrees to complete all of the tasks specified in the Proposal at a cost that will not exceed the budget amount for each task. The Consultant shall submit an invoice to the RDCK for payment, together with supporting documents, in respect of the hours worked and disbursements made on or before the last day of each month, for the RDCK's approval and due processing.

(f) Schedules A, B and C are incorporated into, and form part of this Agreement.

(g) The following terms and conditions are incorporated into, and form part of this Agreement.

THE CONSULTANT' OBLIGATIONS

1 The Consultant shall:

(a) Undertake all work and supply all materials necessary to perform the Services, unless stipulated otherwise in Schedule A.

(b) In performing the Services, at all times, act in the best interests of the Regional District of Central Kootenay (herein after called the **"RDCK"**). Also, the Consultant shall exercise that degree of professional care, skill and diligence required according to generally accepted professional standards current as of the date that the Services are rendered.

(c) Engage the services of staff, sub-consultants and sub-contractors who have the education, training, skill and experience necessary to perform the Services, and shall cause them to perform the Services on behalf of the Consultant.

(d) Employ only those sub-consultants and sub-contractors identified in the Proposal to supply the Services. The Consultant agrees that it has the responsibility for the coordination of all professional Services rendered to the RDCK by the Consultant or by its sub-consultants or sub-contractors on the Project. The Consultant may, with the written approval of the RDCK, such approval not to be unreasonably withheld, replace any of the identified project team members described in the Proposal with other professional staff possessing equivalent knowledge, ability and skills.

(e) Ensure that all personnel hired by the Consultant to perform the Services will be the employees of the Consultant and not to the RDCK with the Consultant being solely responsible for the arrangement of reliefs and substitutions pay supervision, discipline, employment insurance, workers compensation, leave and all other matters arising out of the relationship of employer and employee.

(f) Upon the request of the RDCK fully inform the RDCK of the work done by the Consultant in connection with the provision of the Services and permit the RDCK at all reasonable times to inspect, review and copy all works, productions, buildings, accounting records, findings, data, specifications, drawings, working papers,

reports, documents and materials, whether complete or otherwise, that have been produced, received or acquired by the Consultant as a result of this Agreement.

(g) Comply with all applicable municipal, provincial and federal legislation and regulations.

(h) At its own expense, obtain all permits and licenses necessary for the performance of the Services, and on request provide the RDCK with proof of having obtained such licenses or permits.

(i) Promptly pay all persons employed by it.

(j) Not assign this Agreement, not subcontract any of its obligations under this Agreement, to any person, firm or corporation without the prior written consent of the RDCK.

(k) At all times, exercise the standard of care, skill and diligence normally exercised and observed by persons engaged in the performance of services similar to the Services.

(l) Not perform any service for any other person, firm or corporation which, in the reasonable opinion of the RDCK, may give rise to a conflict of interest.

(m) Be an independent Consultant and not the servant, employee or agent of the RDCK. The Consultant and the RDCK acknowledge and agree that this Agreement does not create a partnership or joint venture between them.

(n) Accept instructions from the RDCK, provided that the Consultant shall not be subject to the control of the RDCK in respect of the manner in which such instructions are carried out.

(o) At its own expense, obtain Workers Compensation Board coverage for itself, all workers and any shareholders, directors, partners or other individuals employed or engaged in the execution of the Work. Upon request, the Consultant shall provide the RDCK with proof of such compliance.

(p) Be responsible for all fines, levies, penalties and assessments made or imposed under the *Worker's Compensation Act* and regulations relating in any way to the Services, and indemnify and save harmless fines, levies, penalties and assessments.

(q) Not in any manner whatsoever commit or purport to commit the RDCK to the payment of any money.

(r) Establish and maintain time records and books of account, invoices, receipts, and vouchers of all expenses incurred.

(s) Notwithstanding the provision of any insurance coverage by the RDCK, indemnify and save harmless the RDCK, its successor(s), assign(s) and authorized representative(s) and each of them from and against losses, claims, damages, actions, and causes of action (collectively referred to as "Claims"), that the RDCK may sustain, incur, suffer or be put to at any time either before or after the expiration or termination of this Agreement, that arise out of errors, omissions or negligent acts of the Consultant or its subconsultant(s), subcontractor(s), servant(s), agent(s) or employee(s) under this Agreement, excepting always that this indemnity does not apply to the extent, if any, to which the Claims are caused by errors, omissions or the negligent acts of the RDCK its other consultant(s), contractor(s), assign(s) and authorized representative(s) or any other persons.

(t) Use due care that no person or property is injured and no rights infringed in the performance of the Services, and shall be solely responsible for all losses, damages, costs and expenses in respect to any damage or injury, including death, to persons or property incurred in providing the Services or in any other respect whatsoever.

(u) The Consultant must provide the RDCK with a certificate of insurance upon execution of this Agreement in a form acceptable to the Chief Financial Officer of the Regional District and shall, during the Term of this Agreement, take out and maintain the following insurance coverage:

(i) Automobile Liability (third party) insurance with a minimum limit of $5,000,000.

(ii) comprehensive commercial general liability insurance against claims for bodily injury, death or property damage arising out of this Agreement or the provision of the Services in the amount of **$ 2,000,000 dollars per occurrence** with a **maximum deductible of $5,000**;

Such insurance will:

(A) name the Regional District, its elected officials, employees, officers, agents and others as an additional insured;

(B) include the Consultant's Blanket contractual liability;

(C) include a Cross Liability clause;

(D) include occurrence property damage;

(E) include personal injury;

(F) include a Waiver of Subrogation clause in favor of the RDCK whereby the insurer, upon payment of any claim(s), waives its right to subrogate against the RDCK for any property loss or damage claim(s);

(G) be primary in respect to the operation of the named insured pursuant to the contract with the RDCK. Any insurance or self-insurance maintained by the RDCK will be in excess of such insurance policy (policies) and will not contribute to it;

(H) require the insurer not cancel or materially change the insurance without first giving the RDCK thirty days' prior written notice; provided that if the Consultant does not provide or maintain in force the insurance required by this Agreement, the Consultant agrees that the RDCK may take out the necessary insurance and the Consultant shall pay to the RDCK the amount of the premium immediately on demand.

(iii) professional liability coverage in the amount of **$ 2,000,000 dollars per claim** and **$ 5,000,000 dollars aggregate,** with a **maximum deductible of $50,000;**

(v) Keep confidential for an unlimited period of time all communications, plans, specifications, reports or other information used in connection with the Project except:

(i) those requiring disclosure by operation of law; and
(ii) any disclosure authorized in writing by the RDCK.

CONSTRUCTION SUPERVISION

(w) Inspect the site where the Services are to be performed (the **"Site"**) and become familiar with all conditions pertaining thereto prior to commencement of the Services.

(x) Where materials and supplies are to be provided by the Consultant, use only the best quality available.

(y) Where samples of materials or supplies are requested by the RDCK, submit them to the RDCK for the RDCK's approval prior to their use.

(z) Not cover up any works without the prior approval or consent of the RDCK and, if so required by the RDCK, uncover such works at the Consultant's expense.

(aa) Keep the Site free of accumulated waste material and rubbish caused by it or the Services and, on the completion of the Services, leave the Site in a safe, clean and sanitary condition.

(bb) At all times, treat as confidential all information and material supplied to or obtained by the Consultant or subconsultant as a result of this Agreement and not permit the publication, release or disclosure of the same without the prior written consent of the RDCK.

STANDARD OF CARE

(cc) The RDCK recognizes that sub-surface conditions may vary from those encountered where samplings, borings, surveys or explorations are located by the Consultant and that the data, interpretations and recommendations of the Consultant are based solely on the information available to it.

UNDERGROUND UTILITIES

(dd) The Consultant shall be responsible for locating all underground utilities prior to commencing subterranean work and provide proof of such to the RDCK.

SAFETY

(ee) The Consultant shall be responsible for its activity and that of its employees on the job site. This shall not be construed to relieve the RDCK or any other contractor of their obligation to maintain a safe job site. Neither the presence of the Consultant nor of its employees, sub-consultants, sub-contractors and agents shall be understood to imply control of the operations of others, nor shall it be construed to be an acceptance of responsibility for job site safety.

THE REGIONAL DISTRICT OF CENTRAL KOOTENAY'S OBLIGATIONS

2 The RDCK shall:

(a) Retain the Consultant to provide the Services as set out in this Agreement.

(b) Subject to the provisions of this Agreement, pay the Consultant, in full payment for the Services which in the opinion of the RDCK at the times set out is Schedule "B" of this Agreement (herein called **"Agreement Price"**), and the Consultant shall accept such payment as full payment for the Services.

~~(i) Notwithstanding Subsection 2(b), not be under any obligation to advance to the Consultant more than 90% of the Agreement Price for Services rendered in accordance with Schedule "A" to the satisfaction of the RDCK. The 10% holdback shall be retained and paid back in accordance with the *Builder Lien Act*.~~

~~(ii) providing that it is not in breach of any of its obligations under this Agreement, holdback from the Agreement Price in addition to the 10% holdback contemplated in Subsection 2(b)(i), sufficient monies to indemnify the RDCK completely against any lien or claim of lien arising in connection with the provision of the Services.~~

(c) Provide the Consultant with all reports, data, studies, plans, specifications, documents and information available to the RDCK and relevant to the Project. The Consultant shall be entitled to rely on the reports,

data studies, plans, specifications, documents and other information provided by the RDCK.

(d) Provide access to any site or adjacent properties as required to complete the Project. The Consultant shall be liable for any and all injury or damage which may occur to persons or to property due to any act, omission, neglect or default of the Consultant, or of his employees, sub-consultants, sub-contractors or agents.

(e) Give the Consultant reasonable notice of anything the RDCK considers likely to materially affect the provision of the Services.

(f) Examine all studies, reports, sketches, proposals and documents provided by the Consultant under this Agreement, and render decisions pertaining thereto within a reasonable time.

TERMINATION OF AGREEMENT

3 Should the Consultant neglect to complete the Services properly or fail to perform any of its obligations under this Agreement, the RDCK may notify the Consultant in writing that it is in default of its contractual obligations and instruct it to correct the default within fourteen (14) working days of receiving the notice. Failure to comply with the default request extends to the RDCK the option, without any other right or remedy, of suspending the Consultant's performance of the Services or immediately terminating this Agreement. The RDCK shall pay the Consultant for all Services performed and all disbursements incurred pursuant to this Agreement and remaining unpaid as of the effective date of such suspension or termination.

4 Other than for reasons set forth in section 3 the RDCK may suspend or terminate this Agreement for any reason by giving thirty (30) calendar days' prior written notice to the Consultant. Upon receipt of such written notice, the Consultant shall perform no further Services other than those reasonably necessary to close out the Project. In such an event, the Consultant will be paid by the RDCK pursuant to this Agreement, for the completed tasks according to the Project schedule of tasks remaining unpaid as of the effective date of such suspension or termination.

5 Should the RDCK fail to perform any of its obligations under this Agreement, the Consultant may notify the RDCK in writing that it is in default of its contractual obligations and instruct it to correct the default within fourteen (14) working days of receiving the notice. Failure to comply with the default request extends to the Consultant the option, without limiting any other right or remedy the Consultant may have, of immediately terminating this Agreement and requesting settlement for all Services performed and for all disbursements incurred pursuant to this Agreement and remaining unpaid as of the effective date of such termination.

6 Should the Consultant's Services be suspended by the RDCK at any time for more than thirty (30) calendar days in any calendar year through no fault of the Consultant, the Consultant shall have the right until such suspension is lifted by the RDCK, to terminate this Agreement upon giving seven (7) working days' written notice to the RDCK. In such an event, the Consultant will be paid by the RDCK pursuant to this Agreement, for the completed tasks as per the Schedule of Tasks that remain unpaid as of the effective date of such termination.

GENERAL TERMS

7 The RDCK shall be the sole judge of the work, material and the standards of workmanship in respect of both quality and quantity of the Services, and their decision on all questions in dispute with regard thereto, or as to the meaning and intentions of this Agreement, and as to the meaning or interpretation of the plans, drawings and specifications, shall be final, and no Services shall be deemed to have been performed as to entitle the Consultant to payment therefrom, until the RDCK is satisfied therewith.

8 The RDCK certifies that the Service purchased pursuant to this Agreement are for the use of and are being purchased by the RDCK and are therefore SUBJECT TO THE FEDERAL GOODS AND SERVICES TAX.

9 This Agreement shall be governed by and construed in accordance with the laws of the Province of British Columbia.

10 Time shall be of the essence of this Agreement.

11 Any notice required to be given hereunder shall be delivered or mailed by prepaid certified or registered mail to the addresses above (or at such other address as either party may from time to time designate by notice in writing to the other), and any such notice shall be deemed to be received 72 hours after mailing.

12 This Agreement shall be binding upon the parties and their respective successors, heirs and permitted assigns.

13 A waiver of any provision or breach by the Consultant of any provision of this Agreement shall be effective only if it is in writing and signed by the RDCK.

14 A waiver under Section 13 shall not be deemed to be a waiver of any subsequent breach of the same or any other provision of this Agreement.

15 Everything produced, received or acquired (the **"Material"**) by the Consultant or subcontractor as a result of this Agreement, including any property provided by the RDCK to the Consultant or sub-consultant, shall:

(a) be the exclusive property of the RDCK; and
(b) be delivered by the Consultant to the RDCK immediately upon the RDCK giving notice of such request to the Consultant.

16 The copyright in the Material belongs to the RDCK.

17 The RDCK may, at its discretion, notify the Consultant that the terms, amounts and types of insurance required to be obtained by the Consultant hereunder be changed.

18 Where the Consultant is a corporation, it does hereby covenant that the signatory hereto has been duly authorized by the requisite proceedings to enter into and execute this Agreement on behalf of the Consultant.

19 Where the Consultant is a partnership, all partners are to execute this Agreement.

20 Sections 1 f), l), m), s), and 18 of this Agreement will, notwithstanding the expiration or earlier termination of the Term, remain and continue in full force and effect.

21 The ideas, processes, or other information contained in the Consultant's Proposal is proprietary and, until the Consultant's Proposal is accepted, shall not be disclosed to any parties outside of the RDCK's staff or be duplicated by any means or used in whole or in part for any purpose. Should the Consultant's Proposal be accepted, the RDCK shall have the right to duplicate, use or disclose the information contained therein.

22 Neither the RDCK nor the Consultant will be considered in default of this Agreement for non-performance due to strikes, labour disputes, riots, civil insurrection, mechanical breakdowns, war, floods, or acts of God or for other reasons beyond the reasonable control of the RDCK or the Consultant.

23 Unbudgeted disbursements incurred by the Consultant due to delays caused by weather conditions and/or poor site access shall be for the RDCK's account.

24 The parties shall make all reasonable efforts to resolve a dispute by amicable negotiations and agree to provide, on a without prejudice basis, frank, candid and timely disclosure of relevant facts, information and documents to facilitate these negotiations.

25 All matters in dispute, which cannot be settled by the RDCK and the Consultant, may, with the concurrence of both the RDCK and the Consultant, be submitted to final and binding arbitration to a single arbitrator appointed jointly by them.

26 No person shall be nominated to act as arbitrator who is in any way financially interested in the Project or in the affairs of either the RDCK or the Consultant.

27 In the event that the RDCK and the Consultant cannot agree to an arbitrator, such arbitrator shall be chosen by reference to a Judge of the Supreme Court of British Columbia.

28 If any portion of this Agreement is held to be illegal or invalid by a court of competent jurisdiction, the illegal or invalid portion shall be severed and the decision that it is illegal or invalid does not affect the validity of this Agreement.

29 This Agreement constitutes the sole and entire Agreement between the RDCK and the Consultant relating to the Project and completely supersedes and abrogates any prior agreements existing between the RDCK and the Consultant, whether written or oral.

30 The headings in this Agreement are for convenience of reference only and shall not affect the interpretation or construction of this Agreement.

31 ~~Parts 2, 3 and 4 of the Choose Document Type of the RDCK dated [Enter Date] and the Contractor's Choose Document Type provided in response are hereby incorporated into and forms part of this Agreement~~.

32 Except as expressly set out in this Agreement, nothing herein shall prejudice or affect the rights and powers of the RDCK in the exercise of its powers, duties or functions under the *Community Charter* or the *Local Government Act* or any of its bylaws, all of which may be fully and effectively exercised as if this Agreement had not been executed or delivered.

IN WITNESS WHEREOF the parties hereto have duly executed this Agreement as of the day and year first above written.

REGIONAL DISTRICT OF CENTRAL KOOTENAY	**SLR CONSULTING (CANADA) LTD.**
(Signature of Authorized Signatory)	(Signature of Authorized Signatory)
(Name and Title of Authorized Signatory)	(Name and Title of Authorized Signatory)
(Signature of Authorized Signatory)	(Signature of Authorized Signatory)
(Name and Title of Authorized Signatory)	(Name and Title of Authorized Signatory)

SCHEDULE A - SERVICES

The Scope of Work for the Agreement Term shall include, but is not limited to:

- Event-driven environmental monitoring and sampling during freshet, after any rain event with greater than 15mm rain, or if sediment-laden water is observed leaving the site.
- Revegetation monitoring once per year at twenty-six 1x1 m plots across the tailings surface.
- Two wildlife monitoring events per year plus maintenance of game cameras, and review of photos.
- Annual downstream channel inspection between the spillway and highway 3 culvert, post-freshet.
- Annual flume line inspection of the historical flume alignment in the forested area north of the tailings facility, post-freshet
- Reclamation Research Program implementation and annual monitoring.
- Annual report summary memos or reports for all above monitoring work, signed off by a Qualified Environmental Professional.
- Assistance with the Annual Reclamation Reports – reviewing report template, and commenting on water quality components prepared by other consultants.
- Annual review and updates to the Water Quality Monitoring and Management Plan and the Environmental Monitoring System.
- Participating in the Independent Tailings Review Board meetings, as needed.
- Participating in the annual Emergency Preparedness and Response Plan test.
- Review and assistance with the Operations, Maintenance and Surveillance Manual annual updates.
- Guidance on repair works or seeding that may be required post-freshet.
- Participating in any Provincial reclamation inspections of the site.
- Review of SRK Consulting Ltd's (SRK) (the Facility's engineer of record) Global Industry Standard on Tailings Management Compliance Audit Report, the Tailings Geochemistry Monitoring and Assessment Report, any Metal Leachate Acid Rock Drainage reports, and the Closure Management Manual.
- Participating in the Dam Safety Review (DSR) interviews, if needed.
- Assisting RDCK and SRK with the 5 year Reclamation Plan, due by January 31, 2025.
- Assisting with permit amendment applications to remove the *Mines Act* permitted area from the till borrow around the Central Composting Facility.
- Providing expert legal opinions and support through negotiations with Teck.

SCHEDULE B – CONTRACT PAYMENT TERMS

1 Total budget shall not exceed $359,800.00 (excluding GST).

2 Invoices to be submitted monthly.

The following contract number and GL code(s) **must** be quoted on the invoice(s):

Contract Number: **2024-230-ENV**

GL Code: **60000 / CAP809-100**
54040 / OPR417-301

Invoices should be emailed to ap@rdck.bc.ca, with the contract administrator identified on the first page of this contract in cc.

3 Invoices to be paid on net 30 day term.

4 GST (if applicable) shall be listed as a separate line item on all invoices.

5 Invoices for work performed in the calendar year shall be emailed to ap@rdck.bc.ca, with the contract administrator identified on the first page of this contract in cc, no later than January 15th of the following year.

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Alayne Hamilton
HB Mine Tailings Facility Technologist
Regional District of Central Kootenay
Box 590, 202 Lakeside Drive
Nelson, BC V1L 5R4

Project Number: CAPR 003031
October 3, 2024

Subject Proposal for HB Mine Tailings Facility Engineer of Record Services – 2025 and 2026

SRK Consulting (Canada) Inc. is pleased to submit this proposal outlining the scope of work to provide Engineer of Record (EOR) services for the HB Mine Tailings Facility for the period from November 17, 2024, though November 16, 2026. SRK's current Consulting Services Agreement (2021-79-ENV) dated September 3, 2021, expires on November 16, 2024. This letter presents SRK's scope of work plan, team, schedule, and cost estimate for a proposed two-year term.

1 Statement of Work

The proposed work will require the tasks described in this section. Each task is represented in the cost estimate (Section 3).

1.1 Task 100: Annual EOR Routine Tasks

Each subtask described in this section is to be completed on an annual basis for the two-year contract period.

1.1.1 Subtask 110 – Annual Facility Performance Report

This task allows for the following:

- Prior to the site visit, a review will be completed of routine dam inspection forms, climatic data, monitoring data and other monitoring events from the past reporting period to identify a list of features or issues to be investigated during the site visit.
- Site inspection of the dam by the EOR and interviews with RDCK staff to flag performance issues or observations since the last inspection.
- Preparation of the Annual Facility Performance Report (previously called DSIs).

Should any geotechnical concerns be noted during the site inspection that should be addressed prior to winter, SRK will notify the RDCK immediately and will prepare a summary memo within one week of the inspection for RDCK and ITRB review.

The DSI report will conform to Canadian Dam Association and EMLI guidelines for annual DSI reports. The draft report will be submitted for review in Word format and finalized following receipt of RDCK comments.

1.1.2 Subtask 120 – Routine Data and Inspection Reviews

This task allows for general facility oversight, periodic review of TSF monitoring and climate data, consultation, and any additional monitoring or inspections that may arise throughout the year. This task assumes an average of 4 hours per month is needed for the EOR.

As part of this task, SRK will review the annual survey hub readings at the dam. Costs to complete the survey are excluded from the scope of work and assumed to be contracted directly to the RDCK.

1.1.3 Subtask 130 – OMS and EPRP Reviews

This task allows for annual reviews of the Operations, Maintenance and Surveillance (OMS) manual and the Emergency Preparedness and Response Plan for the site to update contact information, document any needed changes in surveillance and monitoring procedures, and to document any construction works or changes in condition.

1.1.4 Subtask 140 – Risk Register Review

An updated risk register is to be completed as part of the 2024 EOR scope of work. This task allows for an annual review of the risk register and to document any changes to the register based on any change in performance or improved site understanding.

1.1.5 Subtask 150 – ITRB Meetings

This task allows for SRK to participate in meetings with the Internal Tailings Review Board (ITRB). Costs for this task assume one ITRB meeting (4-hrs) is held per year via web-conference call and includes time to prepare PowerPoint Presentations and address ITRB review comments.

1.1.6 Subtask 160 – On-call Events, Exceedances, or Incident Supports

This task allows SRK to provide on-call support, as and when needed, in the event of instrumentation exceedances, unusual events/observations or incidents. This may include:

- Provide input to event or incident response.
- Providing recommendation for course of action.
- Completing duties identified in the TARP and/or MERP.
- Review of event-driven inspections.

Based on experience, an annual budget of $5,300 has been allocated, which is approximately 20 hours of engineering support.

1.1.7 Subtask 170 – As-needed Stakeholder Meetings

This task allows SRK to participate in various stakeholder meetings with Teck, SLR Consulting, and/or BC Ministry of Energy, Mines and Low Carbon Innovation (EMLI). Costs for this task assume two meetings are held each year. One meeting is assumed to occur on site (8 hours) and the other by web-conference that includes 8 total hours to allow for the preparation of a PowerPoint presentation.

1.2 Task 200: HSRC Change Requirements

Each subtask described in this section is to support compliance with the changes to the Health, Safety and Reclamation Code revised in April 2024.

1.2.1 Subtask 210 – Site Characterization Report

Section 10.5.2 of the HSRC requires the Engineer of Record develops a site characterization report for the TSF that supports the TSF design, and includes the following:

- Climate, hydrology and climate change
- Summary of environmental setting
- Site geology, geomorphology and geohazards
- Bedrock geology, geotechnical conditions, hydrogeology, and seismotectonic conditions

In general, all the above information is available in the 2020 Reclamation and Closure Plan. This task allows for SRK to prepare a site characterization report using readily available information and that also conforms with the EGBC guidance document for characterization of dam foundations.

1.2.2 Subtask 220 – Design Basis Summary Report

Section 10.5.4 of the HSRC requires a design summary document, to be developed by the Engineer of Record, that summarizes the key design constraints, design criteria, critical assumptions and design intents. It provides a concise summary of current design assessments and reports.

This task allows for SRK to develop the Design Basis Summary Report that meets the requirement of HSRC. The report will also include an evaluation of the consequences of potential failure scenarios based on Table 10-3 of the HSRC.

Budgeting for the consequence assessment assumes that the environmental consequence rating does not require input from a qualified professional.

1.2.3 Subtask 230 – Dam Breach Assessment Report Update

Section 10.5.5 of the HSRC outlines requirements for dam breach assessments for TSF. The current dam breach assessment report (SRK 2018) meets all requirements of the HSRC except for “an analysis of the failure modes and expected results of each failure mode”.

This task allows SRK to update the dam breach assessment report with a new section that provides a description of the failure modes and potential impacts. No new dam breach modeling is required for the report update.

1.2.4 Subtask 240 – Management System Support

Section 10.6.1 of the HSRC requires the development and maintenance of a management system for the TSF with HSRC Part 10 Code Guidance (June 2024) provides guidance.

This task allows SRK to support the RDCK in the further development of their management system to meet the HSRC requirements and is expected to consist of an update to the OMS Manual and the development of a RDCK Tailings Management Framework and Policy document.

1.2.5 Subtask 250 – Change Register Development

Section 10.6.9 of the HSRC requires that the manager develops and maintains the change register, in consultation with the Engineer of Record, that tracks material changes to the design, construction, operation and closure of the TSF. (This item is also known as a Deviance Accountability Report)

This task allows for SRK to develop and populate a change register spreadsheet that will include all deviations from the design or expected conditions since the 2021-2022 Remediation works were completed.

1.2.6 Subtask 260 – Climate Change Assessment

Section 10.6.11 requires a climate change assessment for each TSF to be completed every 5 years. The previous climate change assessment was completed by SRK in 2019.

This task allows SRK to update the 2019 climate change assessment. The objectives of the assessment will be to update the climate change projections for the site that will consider the recent sixth assessment report by IPCC (2020, 2021). The results of the assessment will be documented in a standalone report that will be similar in scope to the previous hydrological assessment (SRK 2019.

1.3 Task 300: DSR Support

This task allows for SRK to continue to support the Dam Safety Review (DSR) currently under preparation by an independent engineer contracted directly to the RDCK. This task assumes that 8 hours are required to review the DSR recommendations, and if required, propose an alternate course of action.

1.4 Task 400: Piezometer Installation

Additional piezometers have been recommended to be installed to monitor the performance of the dam at the following locations:

1. Two piezometers installed in a single borehole located on the dam crest west of the existing piezometers along a cross-section that passes through existing piezometer P3. (Estimated drilling depth = 25 m).
2. A single piezometer installed in the tailings pond backfill area along a cross-section that passes through existing piezometers P1, P2, P5 and P6. The purpose of this piezometer is to measure the water level in the tailings upstream of the dam. (Estimated drilling depth = 10 m)
3. Three piezometers installed in two boreholes located along a cross-section at the east end of the toe berm. One borehole will be located at the dam crest with two piezometers and one borehole with a single piezometer at the dam toe. (Estimated drilling depth = 30 m each)

The piezometers are to consist of vibrating wire piezometers that will be connected to data loggers. Additional piezometers will be procured to be installed in the existing stand-pipe piezometers. SRK will co-ordinate the instrumentation design with RST Instrumentation and will supply the needed piezometers, dataloggers, and enclosures.

Given that drilling is required to install the instrumentation, geotechnical data is recommended to be collected to improve the understanding of the dam and foundation materials. The field investigation is recommended to be completed with a sonic drill rig with Standard Penetration Testing (SPT) capabilities. The drilling contractor and material costs will be incurred directly by the RDCK while fees for engineering support, reporting and laboratory costs will be invoiced by SRK.

Disturbed soil samples will be collected for geotechnical testing. At this time, the laboratory program is assumed to consist of basic soil index tests to confirm the interpretation of the soils in the borehole logs developed by the SRK field engineer. The sample analysis requirements will depend on field/site conditions and adjustments will be made to the laboratory program following drilling.

For budgeting purposes, the drilling program assumes:

- Six days of drilling (12 hours/day)
- A total of 12 hours of travel time for a SRK junior-level engineer based in Vancouver.
- One day site visit by the EOR during the drilling kick-off
- A $28,000 allowance for the piezometer installation based on a quote provided by RST in April 2024. (see Attachment 3).
- Estimated laboratory testing costs are based on recent quotes for up to the following:
  - 12 particle size distributions and moisture contents
  - 8 Atterberg limits.

1.5 Task 500: Stability Analysis Update

This task allows SRK to update the seepage and stability analyses and to develop updated trigger criteria for all the dam piezometers as part of the Trigger Action Response Plan (TARP). This task includes the following:

- **Subtask 510: Dam Cross Sections** - Dam cross-sections along the piezometer instrumentation will be reviewed and updated based on the borehole logs from the new piezometer installations (Task 400).
- **Subtask 520: Seepage Analysis** - A two-dimension (2D) finite element seepage model will be developed at each of the three instrumented dam cross sections that will be calibrated with the piezometer instrumentation results and used as an input for the stability analyses update.
- **Subtask 530: Stability and Pore Pressure Trigger Analysis** - An update to the 2019 2D limit equilibrium stability analyses will be completed using the as-built surface and updated dam geometries. TARP triggers for the piezometers will be determined based on the 2D stability modelling and historic performance of the facility. A sensitivity analyses will be completed that varies the pore pressures in the embankment and foundation to achieve various target Factors of Safety (FOS). For each target FOS, the resulting pore pressures at each piezometer will then form the trigger criteria.
- **Subtask 540: Reporting** - A stand-alone report will be prepared that presents the work completed and outlines the TARP for each instrument, as well as the roles and responsibilities of SRK and the RDCK related to surveillance. The resulting TARP will then be updated in the OMS Manual.

1.6 Task 600: ML/ARD Report Review

This task allows for SRK to review the annual ML/ARD report that is to be prepared by SLR Consulting and assumes two hours is required of the EOR, and six hours by senior-level geochemist.

1.7 Task 700: Water Quality Prediction Model Update

Mine Permit Condition C.6 requires un Updated Water Quality Prediction Model to be submitted to the Chief Inspector that incorporates updated groundwater modelling, the mine water balance, and the result of the tailings geochemical assessment.

This task allows SRK to update the Water Quality Prediction Model (SRK 2019) that was included in the 2020 RCP. The model update is intended to evaluate the flow and quality of water stored on site as well as the anticipated water quality in the downstream environment post-closure.

The model update will include a review of the existing source terms and geochemical characterization work completed since the last model in 2019. The water quality model predictions will be used to evaluate the effectiveness of the completed closure measures in compliance with BC Water Quality Guidelines and Contaminated Sites Regulations. The model update and results will be documented in a stand-alone report that will also form an appendix to the Reclamation and Closure Plan update (Task 600). Key results will be summarized in the RCP.

1.8 Task 800: Tailings Geochemistry Assessment Updates

The 2023 Tailings Geochemistry Monitoring Program Update (SRK 2024) recommended continued monitoring of water levels within the tailings impoundment and the collection of additional tailings

samples for porewater sampling if water levels in the tailings impoundment lower by at least 0.3 m (compared to pre-2021 levels).

Costs for this task assume that collection of additional samples are not required to be collected in the next two years. This task allows for SRK to annually prepare a brief memorandum that compiles water level information and evaluates if tailings samples are to be collected the following June. If it is determined that tailings samples are to be collected, SRK will request a change order.

1.9 Task 900: Closure Management Manual

This task allows for SRK to lead and co-ordinate the development of a Closure Management Manual (CMM) as required by Condition D.8(g) of the Mine Act Permit. Section 10.6.9 of the Health, Safety and Reclamation Code (HSRC) requires CMMs to:

1. Describe and document key aspects of the ongoing mitigation, monitoring, and maintenance requirements; and
2. Track significant changes to components of the system that affect long-term mitigation, monitoring, and maintenance requirements.

Most of the information required for the CMM is already contained in the RCP, OMS Manual OMS and environmental monitoring plans for the site. The CMM will be prepared as a stand-alone document with the OMS Manual and environmental monitoring plans included as appendices. As part of the CMM development, the OMS Manual will also be revised to remove duplication of text between the two documents.

1.10 Task 1000: Reclamation and Closure Plan Update

1.10.1 Subtask 1010 – Reporting

The RCP update is proposed to be organized in a comparable manner as the 2020 RCP. Accordingly, the following components of the plan and supporting studies will be reviewed and updated (as required):

- The regulatory framework that governs the environmental monitoring and management programs.
- Reclamation approach for of the tailings facility and revegetation strategy.
- Updates to the geochemical characteristics of the tailings (summary from the Geochemical Assessment Report due to be submitted to EMLI on March 31, 2023).
- Water balance and quality model results
- Current or planned reclamation and maintenance activities.
- Post-closure monitoring plans.

SRK will rely on RDCK personnel to help compile all relevant documentation required to inform updates to the sections listed above such as monitoring data, study reports, etc.

1.10.2 Subtask 1020 – Reclamation Liability Estimate Update

The 2020 reclamation liability cost estimate will be used as the starting basis for updating the reclamation liability cost estimate, to the extent practical. The major updates to the costs are anticipated to consist of the following:

- Removal of completed closure and reclamation tasks.
- Update of post-closure monitoring and maintenance measures to match changes to the RCP.
- Update of unit rates to current dollars. Where possible, post-closure monitoring and study costs will be updated based on actual site costs from previous studies completed in the past 5 years (RDCK to provide).

A cost estimate basis report will be prepared that provides a summary of the costs and documents the estimate basis.

1.11 Task 1100: Regulatory Support

This task provides an allowance for SRK to support:

- The regulatory review of the updated RCP (Task 700) includes supporting regulatory engagement and responses to EMLI and stakeholder review comments.
- Applications for potential reduction in regulatory requirements (ex. EPRP testing, ITRB meetings, Dam Safety Reviews, etc.). An 8-hour allowance is included for this item.

1.12 Task 1200: Project Management

This task allows for the day-to-day project management activities of the project. This includes budget and cost control, progress updates, as well as non-technical, task related client meetings. Month progress meetings are assumed to be held throughout the contract period.

2 Project Team, Deliverables and Schedule

The Project Manager (PM) and client contact for the project will be Peter Mikes, P.Eng. He will be fully accountable for the entire project, including quality, schedule, and cost, and will be responsible for the execution of the project tasks. Peter will also act as the Project Principal and will ensure that the quality requirements are clearly defined and followed during the entire execution of the project.

Trevor Podaima, PEng, will be the overall Project Reviewer (PR). Trevor will assist the PM in selecting the project team, assign personnel to review the project as it progresses, and review final deliverables.

The core team identified to complete this scope of work is shown in Table 1.

Table 1: Proposed Core SRK Team Members

Professional	Staff Category	Responsibility
Peter Mikes	Principal Consultant	Project Manager, Engineer-of-Record, and SRK lead for the RCP update including cost estimate and Closure Management Manual.
Trevor Podaima	Practice Leader	Project Reviewer (Geotechnical Engineer)
Christina James	Principal Consultant	Lead for the Water Quality Prediction Model Update
Stephen Day	Principal Consultant	Senior reviewer for tailings geochemistry.
Rob Klein	Senior Consultant	Water Quality Prediction Model Update support
Jonathan Doherty	Senior Consultant	Tailings geochemistry lead.
Jeff Clarke	Senior Consultant	As-needed support for ML/ARD issues
Stuart McPhee	Senior Consultant	Geotechnical engineering and closure plan support

Table 2 provides a summary of the deliverables described in the statement of work, along with the expected authors and reviewers for each deliverable and expected deliverable schedule.

Upon receipt of written comments from the RDCK, the task leads will either make changes to the draft documents or schedule a conference call to discuss the changes with the RDCK. Where the changes are substantial or significant, the RDCK will be given the opportunity to review and comment on the revised Final Draft.

Table 2: Project Deliverables and Milestone Schedule

Task No.	Deliverable	Lead and Contributing Authors	Reviewers	Schedule
110	AFPR Reports (2025 and 2026)	Peter Mikes	Trevor Podaima	▪ Drafts: November 1. ▪ Final: Two weeks following receipt of review comments.
130	Annual OMS Manual and EPRP Reviews	Peter Mikes	Trevor Podaima	▪ Recommended changes to be provided to RDCK by March of each year.
140	Annual Risk Register Reviews	Peter Mikes	Trevor Podaima	▪ Draft: March 31 ▪
150	Annual ITRB Presentations	Lead: Peter Mikes Contributors: Various.	Trevor Podaima	▪ Timing to be determined.
210	Site Characterization Report	Lead: To Be Determined (TBD)	Peter Mikes	▪ Draft: September 1, 2025. ▪ Final: Two weeks following receipt of review comments.
220	Design Basis Summary Report	Peter Mikes	n/a	▪ Draft: April 30, 2025. ▪ Final: Two weeks following receipt of review comments.
230	Dam Breach Assessment Report	Lead: Peter Mikes Contributors: Holly Williams	Trevor Podaima	▪ Draft: September 1, 2025. ▪ Final: Two weeks following receipt of review comments.
240	Management System Support	Peter Mikes	Trevor Podaima	▪ Draft: September 1, 2025. ▪ Final: Two weeks following receipt of review comments.
250	Change Register Report	Peter Mikes	Trevor Podaima	▪ Draft: April 30, 2025. ▪ Final: Two weeks following receipt of review comments.
260	Climate Change Assessment	Mark Sumka	Victor Munoz	▪ Draft: September 1, 2025. ▪ Final: Two weeks following receipt of review comments.
410	Piezometer Design Revisions	TBD	Peter Mikes	▪ Draft: January 2025. ▪ Final: Two weeks following receipt of review comments.
440	Piezometer Installation As-built Report	TBD	Peter Mikes	▪ Draft: 8 weeks after completion of the drilling program. ▪ Final: Two weeks following receipt of review comments.
540	Seepage and Stability Analysis Update	TBD	Peter Mikes, Trevor Podaima	▪ TBD: Work to start after completion of the drilling program with an estimated two-month duration.
600	Annual ML/ARD Reviews	Jeff Clarke	Stephen Day (if needed)	▪ Timing to be determined.
720	Water Quality Prediction Model Update	Lead: Christina James. Contributors: Rob Klein.	Stephen Day	▪ Draft: September 1, 2025. ▪ Final: Appendix to RCP that must be submitted to EMLI by March 31, 2026.

Task No.	Deliverable	Lead and Contributing Authors	Reviewers	Schedule
800	Annual Tailings Geochemistry Monitoring Updates (2025 and 2026)	Lead: Peter Mikes Contributors: Jonathon Doherty.	Stephen Day (if needed)	▪ Drafts: November 1 ▪ Final: Two weeks following receipt of review comments.
900	Closure Management Manual	Lead: Stu McPhee Contributors: Peter Mikes, Christina James	Trevor Podaima	▪ Draft: June 30, 2025. ▪ Final: Appendix to RCP that must be submitted to EMLI by March 31, 2026.
1010	Reclamation and Closure Plan Update	Lead: Peter Mikes Contributors: Christina James, Jeff Clark, Jonathon Doherty.	Trevor Podaima, Steve Day, Christina James, Peter Mikes	▪ Draft: October 1, 2025. ▪ Final: Must be submitted to EMLI by March 31, 2026.
1020	Reclamation Liability Estimate	Stu McPhee	Peter Mikes	▪ Draft: October 1, 2025. ▪ Final: Must be submitted to EMLI by March 31, 2026.

3 Cost Estimate

Table 3 provides a summary of the costs for completing the tasks outlined in this proposal. A detailed cost estimate is provided in Attachment 1.

Table 3: Summary of Project Costs by Task

Task No.	Description	Totals (C$)
100	Annual EOR Routine Tasks	$119,668
200	HSRC Change Requirements	$87,848
300	DSR Support	$5,045
400	Piezometer Installations	$91,352
500	Stability Analysis Update	$30,300
600	ML/ARD Report Reviews	$3,877
700	Water Quality Prediction Model Update	$42,656
800	Tailings Geochemistry Assessment Updates	$9,902
900	Closure Management Manual	$29,710
1000	Reclamation and Closure Plan Update	$37,112
1100	RCP Regulatory Support	$19,357
1300	Project Management and Client Meetings	$36,194
	Total Cost	**$513,021**

Professional fees and expenses are invoiced monthly. Hourly rates between November 2024 through December 2025 will be billed as per the 2025 standard rate sheet provided in Attachment 2. 2026 hourly rates will be calculated based on the CPI plus 2% (to consider promotions within company). For

the budget, a weighted average was used to calculate an overall rate that assumed 75% of the work was completed in 2025, and 25% of the work completed in 2026.

Field, office, and travel time are charged according to our standard hourly fee structure for actual hours engaged. Eligible expenses are billed at cost plus 10%, except for the piezometer instrumentation that will be billed at cost. Miscellaneous office and administrative expenses are billed at 5% of professional fees. Document assembly, document shipping, and conference call expenses may be billed separately. Should the work scope change significantly, SRK will communicate associated fee and expense changes before proceeding with any work.

4 Health and Safety

SRK has an internal Health and Safety Program that addresses the completion of work by SRK personnel including travel to and from the project site. While on-site, SRK personnel will conform to health and safety policies governing the project site including attending required site-specific safety training, and participating in safety shares with each individual being responsible for the safe completion of the project work in which he or she is engaged. At a minimum, Jurisdictional Regulation and/or laws will be followed.

5 Statutory and Regulatory Requirements

All work will be completed in a manner consistent with accepted standards of professional practice. The completed work products will be reviewed by a senior reviewer and submitted under the seal of a Professional Engineer registered in the province of British Columbia.

6 Contracting

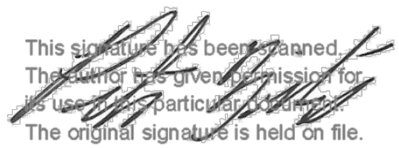
The work outlined in this proposal will be conducted in accordance with a mutually agreeable Consulting Services Agreement to be negotiated between RDCK and SRK.

The project will be deemed to be complete by SRK following the expiration of the EOR Service term (from November 17, 2024, to November 16, 2026), once the final report has been accepted by RDCK project lead, and the final invoice paid.

7 Closure

We trust this proposal meets with your approval. Please contact Peter Mikes at (604) 681-4196 (or at pmikes@srk.com), if you have any questions or concerns.

Regards,
SRK Consulting (Canada) Inc.



Peter Mikes
Principal Consultant

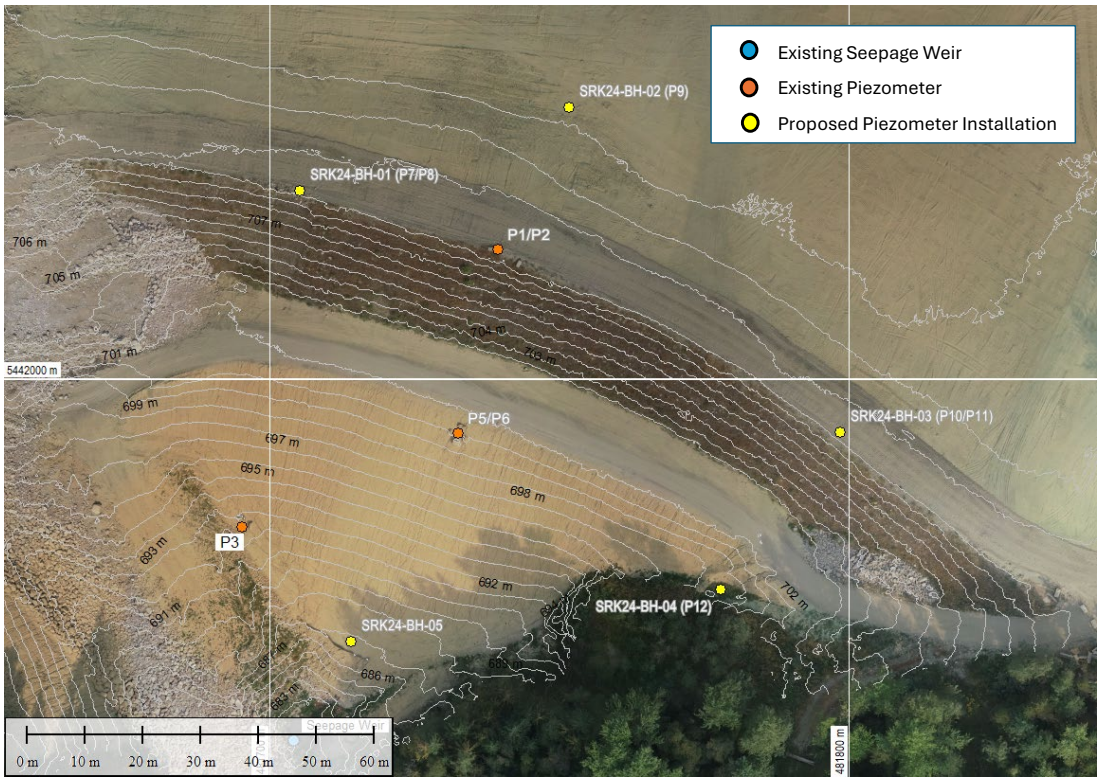
Attachments:

Attachment 1	Detailed Cost Estimate
Attachment 2	Unit Rate Sheet
Attachment 3	Piezometer Instrumentation Budgetary Quote (RST)

Attachment 1 Detailed Cost Estimate

Attachment 2 Unit Rate Sheet

Attachment 3 Piezometer Instrumentation Budgetary Quote (RST)



Option	Description	Instrumentation Cost	
1	Install VWPs and dataloggers in new instrumentation only.	$15,847	
2	Install VWPs and dataloggers at all locations	$25,810	

Value to use: **$28,000** (assumes 5% inflation to 2025).

Piezometer Instrumentation

Borehole	Piezo ID.	Item	Description	Qty	Unit	Rate	Cost
SRK24-BH-01	P7	VWP	0.35 MPa, 20 m cable	1	ea.	$629.00	$629.00
	P8	VWP	0.35 MPa, 20 m cable	1	ea.	$629.00	$629.00
		Data Logger	Affinity logger VW-TH X2	1	ea.	$1,660.00	$1,660.00
		Enclosure	Secondary Enclosure	1	ea.	$245.00	$245.00
SRK24-BH-02	P9	VWP	0.35 MPa, 20 m cable	1	ea.	$629.00	$629.00
		Data Logger	Affinity logger VW-TH X1	1	ea.	$1,420.00	$1,420.00
		Enclosure	Secondary Enclosure	1	ea.	$245.00	$245.00
SRK24-BH-03	P10	VWP	0.70 MPa, 30 m cable	1	ea.	$665.00	$665.00
	P11	VWP	0.35 MPa, 20 m cable	1	ea.	$629.00	$629.00
		Data Logger	Affinity logger VW-TH X2	1	ea.	$1,660.00	$1,660.00
		Enclosure	Secondary Enclosure	1	ea.	$245.00	$245.00
SRK24-BH-04	P12	VWP	0.35 MPa, 30 m cable	1	ea.	$665.00	$665.00
		Data Logger	Affinity logger VW-TH X1	1	ea.	$1,420.00	$1,420.00
		Enclosure	Secondary Enclosure	1	ea.	$245.00	$245.00
SRK24-BH-05	P13	VWP	0.35 MPa, 20 m cable	1	ea.	$629.00	$629.00
	P14	VWP	0.35 MPa, 20 m cable	1	ea.	$629.00	$629.00
		Data Logger	Affinity logger VW-TH X2	1	ea.	$1,660.00	$1,660.00
		Enclosure	Secondary Enclosure	1	ea.	$245.00	$245.00
						Subtotal:	$14,149
						Taxes:	$1,698
						Total:	**$15,847**

Optional: Install Piezos in existing standpipes

Borehole	Piezo ID.	Item	Description	Qty	Unit	Rate	Cost
BGC-BH-00-01	P1	VWP	0.35 MPa, 30 m cable	1	ea.	$665.00	$665.00
	P2	VWP	0.35 MPa, 20 m cable	1	ea.	$629.00	$629.00
		Data Logger	Affinity logger VW-TH X2	1	ea.	$1,660.00	$1,660.00
		Enclosure	Secondary Enclosure	1	ea.	$245.00	$245.00
BGC-BH-00-02	P3	VWP	0.35 MPa, 20 m cable	1	ea.	$629.00	$629.00
		Data Logger	Affinity logger VW-TH X1	1	ea.	$1,660.00	$1,660.00
		Enclosure	Secondary Enclosure	1	ea.	$245.00	$245.00
BGC-BH-05-01	P5	VWP	0.35 MPa, 20 m cable	1	ea.	$629.00	$629.00
	P6	VWP	0.35 MPa, 20 m cable	1		$629.00	$629.00
		Data Logger	Affinity logger VW-TH X2	1		$1,660.00	$1,660.00
		Enclosure	Secondary Enclosure	1		$245.00	$245.00
						Subtotal:	$8,896
						Taxes:	$1,068
						Total:	**$9,964**

Option 3: install Affinity Gateway

Item	Description	Qty	Unit	Rate	Cost
Affinity Gateway	Affinity gateway	1	ea.	$11,300.00	$11,300.00
				Subtotal:	$11,300
				Taxes:	$1,356
				Total:	**$12,656**

R.S.T INSTRUMENTS LTD.
11545 Kingston Street
Maple Ridge BC V2X 0Z5 Canada
Tel: 604-540-1100
Fax: 604-540-1005
www.rstinstruments.com
HST/GST No 729367102RT0001, PST No PST-1472-0589
VAT# 260 9284 93

ISO 9001

SRK Consulting (Canada) Inc.
Ignacio Cartes Melo
320 Granville St #2600
Vancouver BC V6C 1S9 CANADA

QUOTE

No:	155825
Date	2024-04-03
Customer ID:	14473
Contact:	Thiago Arruda
Email:	tarruda@terrainsights.com

Email: icmelo@srk.com **Telephone:** (778) 814-3346

Deliver to: SRK Consulting (Canada) Inc.
320 Granville St #2600
Vancouver BC
V6C 1S9 CANADA

Reference: 155825 - HB Mine

Pos	Item Description	Qty	Price CAD	Value CAD
1	VW2100-0.35-L20 VIBRATING WIRE PIEZOMETER 0.35 MPa; STOCKED W/ 20M EL380004 CABLE	10.00 EA	629.00	6,290.00
2	VW2100-0.35-L30 VIBRATING WIRE PIEZOMETER 0.35 MPa; STOCKED W/ 30M EL380004 CABLE	2.00 EA	665.50	1,331.00
3	VW2100-0.7-L30 VIBRATING WIRE PIEZOMETER 0.7 MPa; STOCKED W/ 30M EL380004 CABLE	1.00 EA	665.50	665.50
4	AFFINITY LOGGER-10-00-00-00-00-3-11-0 Affinity Logger, VW-TH x 1, 3 Batteries (D-Cell), LoRaWAN US915 (NA/SA) with Antenna, No Mount / SE	3.00 EA	1,420.00	4,260.00

SRK Consulting (Canada) Inc.

Quote No. 155825
Quote Date 2024-04-03
Page : 2 of 2

Pos	Item Description	Qty		Price CAD	Value CAD
5	AFFINITY LOGGER-10-10-00-00-00-3-11-0 Affinity Logger, VW-TH x 2, 3 Batteries (D-Cell), LoRaWAN US915 (NA/SA) with Antenna, No Mount / SE	5.00	EA	1,660.00	8,300.00
6	AFFINITY GATEWAY-30GA-00GG-11LG-1P-0R-Q155825-6 Affinity Gateway, Satellite & Wi-Fi, LoRaWAN US915 (NA/SA), Solar + Battery	1.00	EA	11,300.00	11,300.00
7	AFFINITY DATA VIS (ANNUAL) RSTAR AFFINITY DATA VISUALIZATION AND REPORTING - ANNUAL SOFTWARE SUBSCRIPTION Annual subscription fee is determined by integrated instruments. Price is for 13 Piezos	1.00	YEAR	3,120.00	3,120.00
8	DATA LOGGER-SE DATA LOGGER SECONDARY ENCLOSURE - COMES WITH: (1) RST UNIVERSAL MOUNTING PLATE, MOUNTING HARDWARE, AND (1) GROUND STAKE	8.00	EA	245.00	1,960.00

Lines Total	37,226.50
BC GST 5% PST 7%Total Taxes	4,467.19
Quote Total	**CAD 41,693.69**

Terms of Payment Net 30 days **Terms of Delivery** Free Carrier **Valid Until :** 2024-05-03

Subject to RST Instruments Sales Terms and Conditions
https://rstinstruments.com/company/standard-terms-and-conditions

Consulting Services

Agreement

Contract #: 2024-229-ENV
Project: Engineering Consulting Services for the HB Tailings Facility
GL Code: See Schedule B

THIS AGREEMENT executed and dated for reference the:

_____ day of _____, 2024
(Day) (Month) (Year)

BETWEEN

REGIONAL DISTRICT OF CENTRAL KOOTENAY
(hereinafter called the "RDCK")
at the following address:
Box 590, 202 Lakeside Drive
Nelson, BC V1L 5R4

Agreement Administrator: Alayne Hamilton
Telephone #: 250.352.1519
Email: ahamilton@rdck.bc.ca

AND

SRK CONSULTING (CANADA) INC.
(hereinafter called the "Consultant")
at the following address:
2200 – 1066 West Hastings Street
Vancouver, BC V6E 3X2

Agreement Administrator: Peter Mikes
Telephone: 640.681.4196
Email: pmikes@srk.com

FOR GOOD AND VALUABLE CONSIDERATION, THE RECEIPT OF WHICH IS CONFIRMED, THE REGIONAL DISTRICT OF CENTRAL KOOTENAY AND THE CONSULTANT AGREE AS FOLLOWS:

(a) **SERVICES:** The Consultant shall provide the services which are set out in the Consultant's proposal dated September 16, 2024 (the "Proposal") which forms part of this Agreement and as detailed in Schedule "A" of this Agreement (the "Services"). It is agreed that Services may also include any additional services authorized and agreed to by the Consultant and the RDCK by written agreement after the Agreement has commenced ("Additional Services").

(b) **CHANGES TO SERVICES:** The RDCK and the Consultant acknowledge that it may be necessary to modify the Services, the Project schedule and/or the Budget in order to complete the Project. In the event that the RDCK or the Consultant wishes to make a change or changes to the Services, the Project schedule and/or the Budget it shall notify the other of the proposed change and reason(s) therefore. The party receiving the notification shall review and consider the proposal for change and shall as soon as is reasonably possible and no longer than within five (5) working days, advise in writing the party proposing the change whether it agrees to the change. Where the parties agree to the change, such agreement will form part of this Agreement and be formalized by means of a Scope Change Letter or an Agreement Amendment.

Any RDCK authorized services required of the Consultant beyond those Services set out in the Proposal shall

be considered Additional Services. The Consultant shall be compensated for all Additional Services on an hourly or per diem basis, as agreed upon by the RDCK and the Consultant in writing by means of a Scope Change Letter prior to the Consultant performing the Additional Services.

(c) **TERM:** Notwithstanding the date of execution of this Agreement the Consultant shall provide the Services described in Schedule A hereof commencing on **November 17, 2024** (Start Date) and ending on **November 16, 2027** (End Date) (the "Term").

(d) **LOCATION:** The location for delivery of the Services shall be the HB Mine Tailings Facility located at 550 Emerald Road, Salmo, BC.

(e) **PAYMENT:** The total budget for the Services, as specified in the Proposal is **$533,790.00** (excluding GST) and on the terms set out in Schedule B. The budget for the Services is broken into tasks in the Proposal. The Consultant agrees to complete all of the tasks specified in the Proposal at a cost that will not exceed the budget amount for each task. The Consultant shall submit an invoice to the RDCK for payment, together with supporting documents, in respect of the hours worked and disbursements made on or before the last day of each month, for the RDCK's approval and due processing.

(f) Schedules A, B and C are incorporated into, and form part of this Agreement.

(g) The following terms and conditions are incorporated into, and form part of this Agreement.

THE CONSULTANT' OBLIGATIONS

1 The Consultant shall:

(a) Undertake all work and supply all materials necessary to perform the Services, unless stipulated otherwise in Schedule A.

(b) In performing the Services, at all times, act in the best interests of the Regional District of Central Kootenay (herein after called the **"RDCK"**). Also, the Consultant shall exercise that degree of professional care, skill and diligence required according to generally accepted professional standards current as of the date that the Services are rendered.

(c) Engage the services of staff, sub-consultants and sub-contractors who have the education, training, skill and experience necessary to perform the Services, and shall cause them to perform the Services on behalf of the Consultant.

(d) Employ only those sub-consultants and sub-contractors identified in the Proposal to supply the Services. The Consultant agrees that it has the responsibility for the coordination of all professional Services rendered to the RDCK by the Consultant or by its sub-consultants or sub-contractors on the Project. The Consultant may, with the written approval of the RDCK, such approval not to be unreasonably withheld, replace any of the identified project team members described in the Proposal with other professional staff possessing equivalent knowledge, ability and skills.

(e) Ensure that all personnel hired by the Consultant to perform the Services will be the employees of the Consultant and not to the RDCK with the Consultant being solely responsible for the arrangement of reliefs and substitutions pay supervision, discipline, employment insurance, workers compensation, leave and all other matters arising out of the relationship of employer and employee.

(f) Upon the request of the RDCK fully inform the RDCK of the work done by the Consultant in connection with the provision of the Services and permit the RDCK at all reasonable times to inspect, review and copy all

works, productions, buildings, accounting records, findings, data, specifications, drawings, working papers, reports, documents and materials, whether complete or otherwise, that have been produced, received or acquired by the Consultant as a result of this Agreement.

(g) Comply with all applicable municipal, provincial and federal legislation and regulations.

(h) At its own expense, obtain all permits and licenses necessary for the performance of the Services, and on request provide the RDCK with proof of having obtained such licenses or permits.

(i) Promptly pay all persons employed by it.

(j) Not assign this Agreement, not subcontract any of its obligations under this Agreement, to any person, firm or corporation without the prior written consent of the RDCK.

(k) At all times, exercise the standard of care, skill and diligence normally exercised and observed by persons engaged in the performance of services similar to the Services.

(l) Not perform any service for any other person, firm or corporation which, in the reasonable opinion of the RDCK, may give rise to a conflict of interest.

(m) Be an independent Consultant and not the servant, employee or agent of the RDCK. The Consultant and the RDCK acknowledge and agree that this Agreement does not create a partnership or joint venture between them.

(n) Accept instructions from the RDCK, provided that the Consultant shall not be subject to the control of the RDCK in respect of the manner in which such instructions are carried out.

(o) At its own expense, obtain Workers Compensation Board coverage for itself, all workers and any shareholders, directors, partners or other individuals employed or engaged in the execution of the Work. Upon request, the Consultant shall provide the RDCK with proof of such compliance.

(p) Be responsible for all fines, levies, penalties and assessments made or imposed under the *Worker's Compensation Act* and regulations relating in any way to the Services, and indemnify and save harmless fines, levies, penalties and assessments.

(q) Not in any manner whatsoever commit or purport to commit the RDCK to the payment of any money.

(r) Establish and maintain time records and books of account, invoices, receipts, and vouchers of all expenses incurred.

(s) Notwithstanding the provision of any insurance coverage by the RDCK, indemnify and save harmless the RDCK, its successor(s), assign(s) and authorized representative(s) and each of them from and against losses, claims, damages, actions, and causes of action (collectively referred to as "Claims"), that the RDCK may sustain, incur, suffer or be put to at any time either before or after the expiration or termination of this Agreement, that arise out of errors, omissions or negligent acts of the Consultant or its subconsultant(s), subcontractor(s), servant(s), agent(s) or employee(s) under this Agreement, excepting always that this indemnity does not apply to the extent, if any, to which the Claims are caused by errors, omissions or the negligent acts of the RDCK its other consultant(s), contractor(s), assign(s) and authorized representative(s) or any other persons.

(t) Use due care that no person or property is injured and no rights infringed in the performance of the Services, and shall be solely responsible for all losses, damages, costs and expenses in respect to any damage or injury, including death, to persons or property incurred in providing the Services or in any other respect

whatsoever.

(u) The Consultant must provide the RDCK with a certificate of insurance upon execution of this Agreement in a form acceptable to the Chief Financial Officer of the Regional District and shall, during the Term of this Agreement, take out and maintain the following insurance coverage:

(i) Automobile Liability (third party) insurance with a minimum limit of $5,000,000.

(ii) comprehensive commercial general liability insurance against claims for bodily injury, death or property damage arising out of this Agreement or the provision of the Services in the amount of **$2,000,000 dollars per occurrence** with a **maximum deductible of $5,000**;

Such insurance will:

(A) name the Regional District, its elected officials, employees, officers, agents and others as an additional insured;

(B) include the Consultant's Blanket contractual liability;

(C) include a Cross Liability clause;

(D) include occurrence property damage;

(E) include personal injury;

(F) include a Waiver of Subrogation clause in favor of the RDCK whereby the insurer, upon payment of any claim(s), waives its right to subrogate against the RDCK for any property loss or damage claim(s);

(G) be primary in respect to the operation of the named insured pursuant to the contract with the RDCK. Any insurance or self-insurance maintained by the RDCK will be in excess of such insurance policy (policies) and will not contribute to it;

(H) require the insurer not cancel or materially change the insurance without first giving the RDCK thirty days' prior written notice; provided that if the Consultant does not provide or maintain in force the insurance required by this Agreement, the Consultant agrees that the RDCK may take out the necessary insurance and the Consultant shall pay to the RDCK the amount of the premium immediately on demand.

(iii) professional liability coverage in the amount of **$ 5,000,000 dollars per claim** and **$ $5,000,000 dollars aggregate,** with a **maximum deductible of $500,000;**

(v) Keep confidential for an unlimited period of time all communications, plans, specifications, reports or other information used in connection with the Project except:

(i) those requiring disclosure by operation of law; and
(ii) any disclosure authorized in writing by the RDCK.

CONSTRUCTION SUPERVISION

(w) Inspect the site where the Services are to be performed (the **"Site"**) and become familiar with all conditions pertaining thereto prior to commencement of the Services.

(x) Where materials and supplies are to be provided by the Consultant, use only the best quality available.

(y) Where samples of materials or supplies are requested by the RDCK, submit them to the RDCK for the RDCK's approval prior to their use.

(z) Not cover up any works without the prior approval or consent of the RDCK and, if so required by the RDCK, uncover such works at the Consultant's expense.

(aa) Keep the Site free of accumulated waste material and rubbish caused by it or the Services and, on the completion of the Services, leave the Site in a safe, clean and sanitary condition.

(bb) At all times, treat as confidential all information and material supplied to or obtained by the Consultant or subconsultant as a result of this Agreement and not permit the publication, release or disclosure of the same without the prior written consent of the RDCK.

STANDARD OF CARE

(cc) The RDCK recognizes that sub-surface conditions may vary from those encountered where samplings, borings, surveys or explorations are located by the Consultant and that the data, interpretations and recommendations of the Consultant are based solely on the information available to it.

UNDERGROUND UTILITIES

(dd) The Consultant shall be responsible for locating all underground utilities prior to commencing subterranean work and provide proof of such to the RDCK.

SAFETY

(ee) The Consultant shall be responsible for its activity and that of its employees on the job site. This shall not be construed to relieve the RDCK or any other contractor of their obligation to maintain a safe job site. Neither the presence of the Consultant nor of its employees, sub-consultants, sub-contractors and agents shall be understood to imply control of the operations of others, nor shall it be construed to be an acceptance of responsibility for job site safety.

THE REGIONAL DISTRICT OF CENTRAL KOOTENAY'S OBLIGATIONS

2 The RDCK shall:

(a) Retain the Consultant to provide the Services as set out in this Agreement.

(b) Subject to the provisions of this Agreement, pay the Consultant, in full payment for the Services which in the opinion of the RDCK at the times set out is Schedule "B" of this Agreement (herein called **"Agreement Price"**), and the Consultant shall accept such payment as full payment for the Services.

(i) Notwithstanding Subsection 2(b), not be under any obligation to advance to the Consultant more than 90% of the Agreement Price for Services rendered in accordance with Schedule "A" to the satisfaction of the RDCK. The 10% holdback shall be retained and paid back in accordance with the *Builder Lien Act*.

(ii) providing that it is not in breach of any of its obligations under this Agreement, holdback from the Agreement Price in addition to the 10% holdback contemplated in Subsection 2(b)(i), sufficient monies to indemnify the RDCK completely against any lien or claim of lien arising in connection with the provision of the Services.

(c) Provide the Consultant with all reports, data, studies, plans, specifications, documents and information available to the RDCK and relevant to the Project. The Consultant shall be entitled to rely on the reports, data studies, plans, specifications, documents and other information provided by the RDCK.

(d) Provide access to any site or adjacent properties as required to complete the Project. The Consultant shall be liable for any and all injury or damage which may occur to persons or to property due to any act, omission, neglect or default of the Consultant, or of his employees, sub-consultants, sub-contractors or agents.

(e) Give the Consultant reasonable notice of anything the RDCK considers likely to materially affect the provision of the Services.

(f) Examine all studies, reports, sketches, proposals and documents provided by the Consultant under this Agreement, and render decisions pertaining thereto within a reasonable time.

TERMINATION OF AGREEMENT

3 Should the Consultant neglect to complete the Services properly or fail to perform any of its obligations under this Agreement, the RDCK may notify the Consultant in writing that it is in default of its contractual obligations and instruct it to correct the default within fourteen (14) working days of receiving the notice. Failure to comply with the default request extends to the RDCK the option, without any other right or remedy, of suspending the Consultant's performance of the Services or immediately terminating this Agreement. The RDCK shall pay the Consultant for all Services performed and all disbursements incurred pursuant to this Agreement and remaining unpaid as of the effective date of such suspension or termination.

4 Other than for reasons set forth in section 3 the RDCK may suspend or terminate this Agreement for any reason by giving thirty (30) calendar days' prior written notice to the Consultant. Upon receipt of such written notice, the Consultant shall perform no further Services other than those reasonably necessary to close out the Project. In such an event, the Consultant will be paid by the RDCK pursuant to this Agreement, for the completed tasks according to the Project schedule of tasks remaining unpaid as of the effective date of such suspension or termination.

5 Should the RDCK fail to perform any of its obligations under this Agreement, the Consultant may notify the RDCK in writing that it is in default of its contractual obligations and instruct it to correct the default within fourteen (14) working days of receiving the notice. Failure to comply with the default request extends to the Consultant the option, without limiting any other right or remedy the Consultant may have, of immediately terminating this Agreement and requesting settlement for all Services performed and for all disbursements incurred pursuant to this Agreement and remaining unpaid as of the effective date of such termination.

6 Should the Consultant's Services be suspended by the RDCK at any time for more than thirty (30) calendar days in any calendar year through no fault of the Consultant, the Consultant shall have the right until such suspension is lifted by the RDCK, to terminate this Agreement upon giving seven (7) working days' written notice to the RDCK. In such an event, the Consultant will be paid by the RDCK pursuant to this Agreement, for the completed tasks as per the Schedule of Tasks that remain unpaid as of the effective date of such termination.

GENERAL TERMS

7 The RDCK shall be the sole judge of the work, material and the standards of workmanship in respect of both quality and quantity of the Services, and their decision on all questions in dispute with regard thereto, or as to the meaning and intentions of this Agreement, and as to the meaning or interpretation of the plans, drawings and specifications, shall be final, and no Services shall be deemed to have been performed as to

entitle the Consultant to payment therefrom, until the RDCK is satisfied therewith.

8 The RDCK certifies that the Service purchased pursuant to this Agreement are for the use of and are being purchased by the RDCK and are therefore SUBJECT TO THE FEDERAL GOODS AND SERVICES TAX.

9 This Agreement shall be governed by and construed in accordance with the laws of the Province of British Columbia.

10 Time shall be of the essence of this Agreement.

11 Any notice required to be given hereunder shall be delivered or mailed by prepaid certified or registered mail to the addresses above (or at such other address as either party may from time to time designate by notice in writing to the other), and any such notice shall be deemed to be received 72 hours after mailing.

12 This Agreement shall be binding upon the parties and their respective successors, heirs and permitted assigns.

13 A waiver of any provision or breach by the Consultant of any provision of this Agreement shall be effective only if it is in writing and signed by the RDCK.

14 A waiver under Section 13 shall not be deemed to be a waiver of any subsequent breach of the same or any other provision of this Agreement.

15 Everything produced, received or acquired (the **"Material"**) by the Consultant or subcontractor as a result of this Agreement, including any property provided by the RDCK to the Consultant or sub-consultant, shall:

(a) be the exclusive property of the RDCK; and
(b) be delivered by the Consultant to the RDCK immediately upon the RDCK giving notice of such request to the Consultant.

16 The copyright in the Material belongs to the RDCK.

17 The RDCK may, at its discretion, notify the Consultant that the terms, amounts and types of insurance required to be obtained by the Consultant hereunder be changed.

18 Where the Consultant is a corporation, it does hereby covenant that the signatory hereto has been duly authorized by the requisite proceedings to enter into and execute this Agreement on behalf of the Consultant.

19 Where the Consultant is a partnership, all partners are to execute this Agreement.

20 Sections 1 f), l), m), s), and 18 of this Agreement will, notwithstanding the expiration or earlier termination of the Term, remain and continue in full force and effect.

21 The ideas, processes, or other information contained in the Consultant's Proposal is proprietary and, until the Consultant's Proposal is accepted, shall not be disclosed to any parties outside of the RDCK's staff or be duplicated by any means or used in whole or in part for any purpose. Should the Consultant's Proposal be accepted, the RDCK shall have the right to duplicate, use or disclose the information contained therein.

22 Neither the RDCK nor the Consultant will be considered in default of this Agreement for non-performance due to strikes, labour disputes, riots, civil insurrection, mechanical breakdowns, war, floods, or acts of God or for other reasons beyond the reasonable control of the RDCK or the Consultant.

23 Unbudgeted disbursements incurred by the Consultant due to delays caused by weather conditions and/or poor site access shall be for the RDCK's account.

24 The parties shall make all reasonable efforts to resolve a dispute by amicable negotiations and agree to provide, on a without prejudice basis, frank, candid and timely disclosure of relevant facts, information and documents to facilitate these negotiations.

25 All matters in dispute, which cannot be settled by the RDCK and the Consultant, may, with the concurrence of both the RDCK and the Consultant, be submitted to final and binding arbitration to a single arbitrator appointed jointly by them.

26 No person shall be nominated to act as arbitrator who is in any way financially interested in the Project or in the affairs of either the RDCK or the Consultant.

27 In the event that the RDCK and the Consultant cannot agree to an arbitrator, such arbitrator shall be chosen by reference to a Judge of the Supreme Court of British Columbia.

28 If any portion of this Agreement is held to be illegal or invalid by a court of competent jurisdiction, the illegal or invalid portion shall be severed and the decision that it is illegal or invalid does not affect the validity of this Agreement.

29 This Agreement constitutes the sole and entire Agreement between the RDCK and the Consultant relating to the Project and completely supersedes and abrogates any prior agreements existing between the RDCK and the Consultant, whether written or oral.

30 The headings in this Agreement are for convenience of reference only and shall not affect the interpretation or construction of this Agreement.

~~**31** Parts 2, 3 and 4 of the Choose Document Type of the RDCK dated [Enter Date] and the Contractor's Choose Document Type provided in response are hereby incorporated into and forms part of this Agreement.~~

32 Except as expressly set out in this Agreement, nothing herein shall prejudice or affect the rights and powers of the RDCK in the exercise of its powers, duties or functions under the *Community Charter* or the *Local Government Act* or any of its bylaws, all of which may be fully and effectively exercised as if this Agreement had not been executed or delivered.

IN WITNESS WHEREOF the parties hereto have duly executed this Agreement as of the day and year first above written.

REGIONAL DISTRICT OF CENTRAL KOOTENAY	SRK CONSULTING (CANADA) INC.
(Signature of Authorized Signatory)	(Signature of Authorized Signatory)
(Name and Title of Authorized Signatory)	(Name and Title of Authorized Signatory)
(Signature of Authorized Signatory)	(Signature of Authorized Signatory)

(Name and Title of Authorized Signatory)	(Name and Title of Authorized Signatory)

SCHEDULE A - SERVICES

The Consultant shall provide Engineer of Record services and professional engineering and environmental consulting services for the remediation and closure of the HB Mine Tailings Facility.

Task #1 - Engineer of Record Services for the HB Tailings Storage Facility

The *Mines Act* and Health, Safety and Reclamation Code for Mines in British Columbia (the Code) specifies several key roles to manage, design, build, operate, and close a failings storage facility (TSF) including: a Mine Manager, a TSF Qualified Person, an Engineer of Record, and an Independent Tailings Review Board. Under this task, the Consultant is to provide Engineer of Record services, as required by the Code. The RDCK will be responsible for fulfilling the 'Mine Manager and TSF Qualified Person' roles as defined by the Code.

The scope of such services to be determined by the RDCK may include, but are not limited to:

- Responsibility for the design and performance of the facility in accordance with applicable guidelines, standards, and regulations.
- Responsible for ascertaining that changes made to the design continue to meet the applicable design standards, criteria, and guidelines
- Duty to report safety issues.
- Inspect and report on annual Dam Safety Inspections.
- Participate in Dam Safety Reviews.
- Participate in risk assessments.
- Determine and review Quantitative Performance Objectives.
- Review Operations, Maintenance and Surveillance manual.
- Provide on-going facility inspection and monitoring oversight.
- Provide support for safety concerns or emergency conditions.
- Assist in the development of the Terms of Reference for the mandated Independent Tailings Review Board.
- The design and performance of the facility are to conform to the following guidelines, standards, and regulations:
  - *BC Mines Act* and Health, Safety and Reclamation Code for Mines in British Columbia.
  - *BC Water Sustainability Act* - Dam Safety Regulations.
  - Canadian Dam Association Dam Safety Guidelines (2013) and associated technical bulletins (most notably the 2014 Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams).
  - BC MEM Guidelines for Annual Dam Safety Inspection Reports.
  - APEGBC Legislated Dam Safety Reviews in BC.
  - APEGBC Site Characterization for Dam Foundations in BC.
  - Mining Association of Canada Guidelines

Task #2 - Engineering Services for the HB Tailings Storage Facility

Provide professional consulting services for upcoming Remediation and Closure works at the Facility and other consulting services, as requested by the RDCK.

SCHEDULE B – CONTRACT PAYMENT TERMS

1 Total budget shall not exceed $533,790 (excluding GST).

2 Invoices to be submitted monthly.

The following contract number and GL code(s) **must** be quoted on the invoice(s):

Contract Number: **2024-229-ENV**

GL Code: **60000 / CAP809-100**
54040 / OPR417-301

Invoices should be emailed to ap@rdck.bc.ca, with the contract administrator identified on the first page of this contract in cc.

3 Invoices to be paid on net 30 day term.

4 GST (if applicable) shall be listed as a separate line item on all invoices.

5 Invoices for work performed in the calendar year shall be emailed to ap@rdck.bc.ca, with the contract administrator identified on the first page of this contract in cc, no later than January 15th of the following year.

SCHEDULE C – CONSULTANT'S PROPOSAL

LICENCE OF OCCUPATION

THIS AGREEMENT dated for reference the _____day of January 2024.

BETWEEN:

THE CORPORATION OF THE CITY OF NELSON, a municipal corporation having its office at
#101 – 310 Ward Street
Nelson, BC
V1L 5S4

(the "City")

OF THE FIRST PART

AND:

THE REGIONAL DISTRICT OF CENTRAL KOOTENAY
Box 590, 202 Lakeside Drive
Nelson, BC
V1L 5R4

(the "Licensee")

OF THE SECOND PART

WHEREAS:

A. The Licensee is the owner of the property in the City of Nelson legally described as:

Parcel Identifier 012-711-292
LOT A DISTRICT LOT 2627 KOOTENAY DISTRICT PLAN 11613 EXCEPT PART INCLUDED IN PLAN 18679

(the "Property");

B. The Licensee wishes to house recycling bins on the Property (the "Works") which will create an encroachment onto City-owned property (known as the "Licenced Area");

C. The City is prepared to grant the Licensee a Licence of Occupation pursuant to Section 35(11) of the *Community Charter*, S.B.C. 2003, c.26 for a term of three (3) years over the Licenced Area to enable the Licensee to house recycling bins.

NOW THEREFORE in consideration of the payment of the fees as stated in this agreement, from the Licensee to the City, the receipt and sufficiency is hereby acknowledged, the City and the Licensee covenant and agree as follows:

1. **Grant** – The City grants to the Licensee the exclusive right and licence to enter onto and use that portion of the Licenced Area shown in bold on Schedule "A" which is attached hereto for the purpose of housing recycling bins.

2. **Additional Rights** – For the purposes outlined in Section 1, the Licensee shall have the right to bring onto the Licence Area all necessary materials, vehicles, machinery and equipment.

3. **Fees** – The parties negotiated a rate of $2.80 per square foot in 2020 based on 1638 square meters of Licenced Area. By applying inflationary increases each year to the 2020 rate, the Licence shall pay to the City the following:

   a) **2024 -** The Licensee shall pay to the City an annual fee of $58,308.27 to be paid in quarterly installments of $14,577.07.

   b) **2025 -** The Licensee shall pay to the City an annual fee of $60,057.52 to be paid in quarterly installments of $15,014.38.

   c) **2026 -** The Licensee shall pay to the City an annual fee of $61,859.26 to be paid in quarterly installments of $15,464.82.

   All fees are subject to applicable taxes and the fees will not be prorated due to changes in the length of operation.

4. **Term** – The duration of this Agreement and Licence herein granted shall be for a term of three (3) years commencing on January 1, 2024 and continuing on until the 31st day of December 2026, unless earlier terminated in accordance with Sections 18 or 19.

5. **State of Licence Area at Termination** – In the event that this Agreement terminates or expires for any reason, the Licensee will cease all occupation of the Licence Area and will remove all equipment, chattels, fixtures, buildings and other improvements from the Licence Area. The Licensee will leave the Licence Area in a safe, clean and tidy condition and clear of contamination. In the event that the Licensee fails to remove any equipment or chattels upon termination of this Agreement then the City may do so and recover the expense thereof from the Licensee. All buildings, improvements and fixtures remaining on the Licence Area become the sole property of the City upon termination of this Agreement, without any compensation whatsoever to the Licensee.

6. **Exclusive Use –** The Licensee agrees that:
   (a) the rights granted under this Agreement do not constitute any interest in the Licence Area; and
   (b) the Licensee's rights under this Agreement are at all times subject to the rights and interest of the City as owner and possessor of the Licence Area.

7. **No Waste or Nuisance** – The Licensee will not do or permit anything that may become a nuisance to occupiers or invitees on adjoining lands.

8. **Terms and Conditions** – The Licensee will comply with all the terms, conditions, rules or regulations that the City may from time to time impose in respect of the use and administration of the Licence Area. The Licensee acknowledges that the fact that the Licence is granted by the City does not excuse the Licensee from obtaining building permits, development permits, business licences and other required permissions.

9. **Maintenance** – The Licensee will at its own expense keep the Licence Area in a safe, clean and tidy condition, and will erect boarding and fencing around the Licence Area prior to any construction.

10. **Compliance with Laws** – The Licensee will comply with all laws and regulations pertaining to its use and occupation of the Licence Area.

11. **Inspection by the City** – The City may review and inspect the Licence Area and the work which the Licensee is undertaking pursuant to this Agreement to determine if the Licensee is in compliance with the terms of this Agreement.

12. **No Transfer** – The rights granted to the Licensee under this Agreement may not be sub-licensed, assigned or otherwise transferred.

13. **Risk** – The Licensee accepts the Licence Area on an as-is basis and agrees that it will use the Licence Area at its own risk, and the City will not be liable in respect of any loss of life, personal injury, damage to property, loss of property or other loss or damage suffered by the Licensee, its contractors, subcontractors, agents, invitees, employees or any other person arising out of this Agreement or the use and occupation of the Licence Area except in the case of negligence or wilful act or omission by the City, its employees, agents or invitees.

14. **Indemnification of City** – The Licensee releases, indemnifies and saves harmless the City and its elected officials, officers, employees and agents from and against all claims, demands, actions, suits, loss, damage, costs (including legal costs), charges and expenses, including bodily injury or death (collectively Claims) which the City may incur, suffer or be put to arising out of or in connection with this Agreement, directly or indirectly, arising from any negligence, act or omission of the Licensee or any breach by the Licensee of any of its obligations, representations, warranties or covenants under this Agreement, unless such Claims arise in whole in part by any negligence, act or omission of the City or any breach by the City of any of its obligations, representations, warranties or covenants under this Agreement.

15. **Indemnification of Licensee** – The City releases, indemnifies and saves harmless the Licensee and its elected officials, officers, employees and agents from and against all Claims which the Licensee may incur, suffer or be put to arising out of or in connection with this Agreement, directly or indirectly, arising from any negligence, act or omission of the City or any breach by the City of any of its obligations, representations, warranties or covenants under this Agreement, unless such Claims arise in whole or in part by any negligence, act or omission of the Licensee or any breach by the Licensee of any of its obligations, representations, warranties or covenants under this Agreement.

16. **Release** – The Licensee hereby releases and forever discharges the City, its elected officials, officers, employees, agents and invitees, of and from any claim, causes of action, suit, demand, expense, cost, legal fees and compensation of whatever kind, whether known or unknown, at law or in equity, including without limitation any claim under the *Property Law Act* (collectively "Claims"), which the Licensee may have, sustain or suffer, as the case may be, now or in the future arising from the Works, other improvements in the Licence Area, the expiry or termination of this Licence, the exercise by the City of any of its rights under this Licence or from or in any way connected with the Licensee's use of the Licence Area, except claims arising from the exclusive negligence of the City.

17. **Insurance** – During the term of this Agreement, the Licensee will carry commercial general liability insurance, in a form and with an insurer acceptable to the City, insuring the Licensee and the City under this Agreement in an amount not less than

$5,000,000.00 per occurrence, and any other type of insurance that the City may reasonably require. The City is to be added as an additional insured under this policy and be provided with a copy of the insurance certificate.

18. **Termination** – The City reserves the right to terminate this Agreement if the Licensee breaches any of its obligations under this Agreement and fails to remedy the breach within thirty (30) business days of receiving written notice from the City. The City will not be liable to compensate the Licensee for damages, costs or losses resulting from the exercise of this right of termination or any termination of this Licence.

19. **Termination by Either Party** – The City or the Licensee may terminate this agreement at any time by providing the other party One Hundred and Eighty (180) Days' notice, in writing to be delivered to the addresses contained in this agreement. The parties are at liberty to change the amount of notice required, as mutually agreed upon. Termination of this agreement under this article does not involve any compensation or entitle either party to any compensation, with the exception of monies owing under the terms of this agreement for rent and other charges which shall become due and payable prior to the Licensee vacating the Licensed Area.

20. **Notices** – Any notice given pursuant to this Agreement will be sufficiently given if it is in writing and delivered by hand or mailed by prepaid registered mail or sent by facsimile transmission to the intended party at its address set out on page 1 of this Agreement or to such other address as either party may provide in writing to the other pursuant to the provisions of this paragraph.

    A notice will be deemed to be received on the day it is delivered, if delivered by hand, on the day of transmission, if sent by facsimile, or 3 days after the date it was mailed or if that day is not a business day, the next day that is a business day. If mailed, should there be at the time of mailing or between the time of mailing and the deemed receipt of the notice, a mail strike or slowdown, labour or other dispute which might affect the delivery of such notice by the mails, then such notice will only be effective if delivered by hand or sent by facsimile transmission.

21. **No Effect on Laws or Powers** – Nothing contained or implied herein prejudices or affects the City's rights and powers in the exercise of its functions pursuant to the *Local Government Act* or its rights and powers under any enactment to the extent the same are applicable to the Licence Area, all of which may be fully and effectively exercised in relation to the Licence Area as if this Agreement had not been fully executed and delivered.

22. **Severance** – If any portion of this Agreement is held invalid by a Court of competent jurisdiction, the invalid portion shall be severed and the decision that it is invalid must not affect the validity of the remainder of the Agreement.

23. **Further Actions** – Each of the parties hereto shall from time to time hereafter and upon any reasonable request of the other, execute and deliver, make or cause to be made all such further acts, deeds, assurances and things as may be required or necessary to more effectually implement and carry out the true intent and meaning of this Agreement.

24. **Waiver or Non-action** – Waiver by the City of any breach of any term, covenant or condition of this Agreement by the Licensee must not be deemed to be a waiver of any subsequent default by the Licensee. Failure by the City to take any action in respect of

any breach of any term, covenant or condition of this Agreement by the Licensee must not be deemed to be a waiver of such term, covenant or condition.

25. **Reference** – Every reference to a party is deemed to include the heirs, executors, administrators, successors, servants, employees, agents, contractors and officers of such party wherever the context so requires or allows.

26. **General** –

(a) This Agreement will bind and benefit each party to this Agreement, and its respective corporate successors;

(b) The Schedules attached to this Agreement form part of this Agreement;

(c) This Agreement constitutes the entire agreement between the parties and may not be amended except by agreement in writing signed by all parties to this Agreement;

(d) Time is of the essence of this Agreement;

(e) This Agreement must be construed according to the laws of the Province of British Columbia.

As evidence of their agreement to be bound by the above terms and conditions, the parties have executed this Agreement below.

SIGNED, SEALED & DELIVERED by the **CITY OF NELSON**, in the presence of:

_____
Signature of Witness

_____
Print Name

_____
Address

_____
Occupation

CITY OF NELSON by its authorized signatory:

_____
Sarah Winton, Corporate Officer

SIGNED, SEALED & DELIVERED by the **REGIONAL DISTRICT OF CENTRAL KOOTENAY**, in the presence of:

_____
Signature of Witness

_____
Print Name

_____
Address

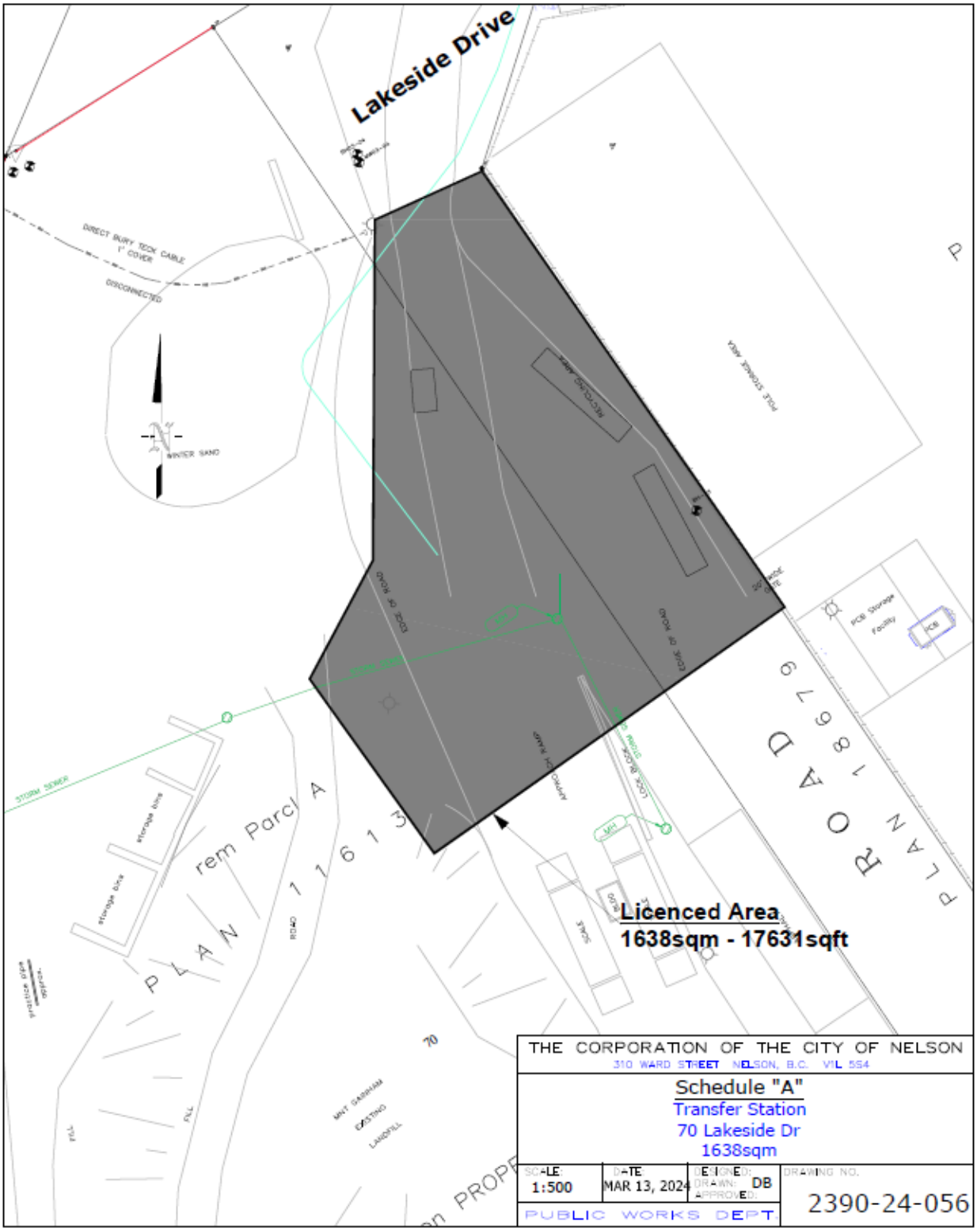
_____
Occupation

REGIONA DISTRICT OF CENTRAL KOOTENAY by its authorized signatory:

_____
Print Name:

_____
Signature:

Schedule “A”


Lakeside Drive
Licenced Area
1638sqm - 17631sqft
THE CORPORATION OF THE CITY OF NELSON
310 WARD STREET NELSON, B.C. V1L 5S4
Schedule "A"
Transfer Station
70 Lakeside Dr
1638sqm
SCALE 1:500
DATE MAR 13, 2024
DESIGNED:
DRAWN: DB
APPROVED:
DRAWING NO. 2390-24-056
PUBLIC WORKS DEPT