-REGULAR COUNCIL MEETING AGENDA-

Meeting #: **1584**
Date: **Tuesday, May 30, 2023, 9:00 am**
Location: **Council Chambers**
7400 Prospect Street

"*This meeting is being recorded as authorized by the Video Recording & Broadcasting of Open Meetings Policy.*

Pages

1. **CALL TO ORDER**
   In honour of the Lil'wat7ul, the Village of Pemberton acknowledges that we are meeting within the unceded territory of the Lil'wat Nation.

2. **APPROVAL OF AGENDA**
   Recommendation:
   THAT the agenda be approved as presented.

3. **ADOPTION OF MINUTES**

   3.1 **Regular Council Meeting No. 1581, Tuesday May 9, 2023** 4
   Recommendation:
   THAT the minutes from the Regular Council Meeting No. 1581, held Tuesday, May 9, 2023, be adopted as circulated.

   3.2 **Special Council Meeting No. 1582, Thursday May 11, 2023** 10
   Recommendation:
   THAT the minutes from the Regular Council Meeting No. 1582, held Thursday, May 11, 2023, be adopted as circulated.

   3.3 **Special Council Meeting No. 1583, Tuesday May 23, 2023** 12
   Recommendation:
   THAT the minutes from the Special Council Meeting No. 1583, held Tuesday, May 23, 2023, be adopted as circulated.

4. **BUSINESS ARISING FROM THE PREVIOUS REGULAR COUNCIL MEETING**

5. **BUSINESS ARISING FROM THE COMMITTEE OF THE WHOLE**

5.1 Recommendation from the Committee of the Whole Meeting No. 244, Tuesday May 23, 2023

Recommendation:
THAT Staff be directed to consider the following alterations to the draft Nkwúkwma Sub-Area Plan to be considered and reported back at a future Committee of the Whole meeting:

- Explore a set requirement for a percentage of affordable housing units, either on-site or off-site, by each phase of development.
- Review maximum unit count exemption for affordable housing and applicability of housing agreements based on a clear definition of what qualifies as affordable housing.
- Explore Housing diversity options including a mix affordable and diverse housing throughout the development rather than in concentrated locations.
- Include the potential impact of provincial fourplex announcements in consideration of housing diversity.
- Explore more detailed climate action charter Development Permit Area Guidelines for buildings
- Explore Active Transportation options such as shuttles or alternate modes of active transportation.
- Provide additional details and specifics for the proposed improvements to Eagle drive and a safe and appropriate secondary access
- Explore detailed opportunities to promote reconciliation, including Signage and education opportunities
- Explore policy to ensure that the future Phase 3 rezoning direction has the ability to respond to community needs at the time, such as aligning housing needs with a future housing needs assessment and future amenity needs
- Include the potential impact of provincial fourplex announcements in consideration of housing diversity.
- Clarify the greenspace allocation by type and amount

6. COMMITTEE MINUTES - FOR INFORMATION

7. STAFF REPORTS

7.1 Office of the CAO

a. CAO Verbal Report

7.2 Corporate and Legislative Services

a. UBCM Statutory Farm Tax Exemption Resolution 14

Recommendation:
THAT Council provide direction with respect to submitting the resolution to UBCM.

7.3 Operations

a. 2022 Drinking Water System Annual Report 19

Recommendation:
THAT Council receives the 2022 Drinking Water System Annual Report for information.

b. Crown Land Licence of Occupation Application - One Mile Lake Boardwalk 167

Recommendation:
THAT the application for a Crown Land License of Occupation for the One Mile Lake boardwalk be supported.

8. BYLAWS

9. MAYOR'S Report

10. COUNCILLORS' Reports

11. CORRESPONDENCE

11.1 Correspondence for Action

a. Andrea Blaikie, Executive Director, Spel'kúmtn Community Forest, Dated May 23, 2023, Distribution of Funds to Shareholders 170

Recommendation:
THAT the correspondence be referred to staff to draft a policy respecting how the Village will disburse funds received through the Spelkumptn Community Forest Partnership;

AND THAT staff prepare a list of shovel ready projects that might align with the guiding values as provided by the Spelkumtn Community Forest;

AND THAT the draft policy and shovel ready list of projects be brought back to a future Committee of the Whole meeting for discussion.

11.2 Correspondence for Information

a. Ruth Hoyte, Mayor, District of Coldstream, dated May 9, 2023, Homes for People Action Plan Letter to the Minister of Housing 173

12. IN CAMERA (11:00AM)

Recommendation:
THAT the meeting is closed to the public in accordance with the *Community Charter* section 90 (1) (c) employee relations, (d) security of property, (g) litigation, and (k) negotiations and related discussions that in the view of Council could reasonably be expected to harm the interests of the municipality if held in public.

13. RISE WITH REPORT FROM IN CAMERA

14. RECESS REGULAR MEETING

15. RECONVENE REGULAR MEETING FOLLOWING THE COMMITTEE OF THE WHOLE
In honour of the Lil'wat7ul, the Village of Pemberton acknowledges that we are meeting within the unceded territory of the Lil'wat Nation.

16. IN CAMERA, CONTINUED (2:30PM)

Recommendation:
THAT the meeting is closed to the public in accordance with the *Community Charter* section 90 (1) (c) employee relations, (d) security of property, (g) litigation, and (k) negotiations and related discussions that in the view of Council could reasonably be expected to harm the interests of the municipality if held in public.

17. RISE WITH REPORT

18. DECISION ON LATE BUSINESS

19. LATE BUSINESS

20. NOTICE OF MOTION

21. QUESTION PERIOD 175

22. ADJOURNMENT OF REGULAR COUNCIL MEETING

Recommendation:
THAT the meeting be adjourned.

VILLAGE OF PEMBERTON

-REGULAR COUNCIL MEETING MINUTES-

Meeting #:	1581
Date:	Tuesday, May 9, 2023, 5:30 pm
Location:	Council Chambers 7400 Prospect Street
COUNCILLORS:	Mayor Mike Richman Councillor Ted Craddock Councillor Jennie Helmer Councillor Katrina Nightingale Councillor Laura Ramsden
STAFF:	Elizabeth Tracy, Chief Administrative Officer Sheena Fraser, Manager of Corporate & Legislative Services Thomas Sikora, Manager of Finance Tom Csima, Manager of Operations and Projects Ethan Fredeen, Deputy Corporate Officer
PUBLIC:	1
MEDIA:	1

A recording of the meeting was made available to the media and public.

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1. CALL TO ORDER

In honour of the Lil'wat7ul, the Village of Pemberton acknowledges that we are meeting within the unceded territory of the Lil'wat Nation.

At 2:01pm Mayor Richman called the meeting to order.

2. IN CAMERA

Moved/Seconded
THAT the meeting is closed to the public in accordance with the *Community Charter* section 90 (1) (c) employee relations, (e) land, (i) solicitor client privilege, and (k) negotiations and related discussions that in the view of Council could reasonably be expected to harm the interests of the municipality if held in public.

CARRIED

3. RECESS REGULAR MEETING

At 4:19pm Council Rose without Report and the Regular Meeting was recessed.

4. RECONVENE REGULAR MEETING (5:30pm)

At 5:30pm the Regular Meeting reconvened.

DRAFT

5. APPROVAL OF AGENDA

Moved/Seconded
THAT the agenda be adopted as presented.
CARRIED

6. RISE WITH REPORT FROM IN CAMERA

At the In Camera Meeting No. 1580, held Tuesday, April 25, 2023, Council Rose with Report on the following:

6.1 Spel̓kúmtn Community Forest Board – Village of Pemberton Appointments

Council appointed Councillor Katrina Nightingale, Allen McEwan and Ulla Clark to the Spel̓kúmtn Community Forest Board.

6.2 Village of Pemberton/Lil'wat Nation Water Agreement Renewal

The Village of Pemberton and Lil'wat Nation Water Agreement has been extended for a further five years. Through this agreement water service is supplied to the Industrial Park.

7. ADOPTION OF MINUTES

7.1 Regular Council Meeting No. 1580, Tuesday April 25, 2023

Moved/Seconded
THAT the minutes Regular Council Meeting No. 1580, held Tuesday, April 25, 2023, be adopted as circulated.
CARRIED

8. BUSINESS ARISING FROM THE PREVIOUS REGULAR COUNCIL MEETING

8.1 April 25, 2023 Regular Council Meeting Resolution Rescind

The resolution passed during April 25, 2023, Regular Council Meeting due to a clerical error needs to be rescinded. The proposed recommendation brought forward will reflect the wishes of Council and the bylaws that are being presented at the May 9, 2023 Council Meeting.

Moved/Seconded
THAT the following resolution passed by Council at the Regular Meeting No. 1580, held on Tuesday, April 25, 2023 be rescinded:

> **THAT** staff be directed to increase the Sewer and Capital reserves to each reflect $240,000 in the 2023 budget.
> **CARRIED**

8.2 New Recommendation for Consideration

Moved/Seconded
THAT staff be directed to increase the Sewer Reserves by an additional $40,000.
CARRIED

9. BUSINESS ARISING FROM THE COMMITTEE OF THE WHOLE

10. COMMITTEE MINUTES - FOR INFORMATION

DRAFT

11. DELEGATION

12. STAFF REPORTS

12.1 Office of the CAO

a. Projects Priority Update - Verbal Report

The Chief Administrative Officer highlighted the success of the Emergency Preparedness Day where emergency mitigation educators from Search and Rescue, Fire Rescue, and Bylaw Enforcement provided a fun and educational event.

Further, the Chief Administrative Officer reported on the progress of the following project priorities over the first quarter of 2023:

- Daycare Expansion;
- Official Community Plan Review;
- Compensation and Benefits Study;
- Community Wildfire Resiliency;
- Water System Upgrade;
- Municipal Hall / Fire Hall Feasibility Study;
- Retention and Recruitment Strategy;
- Regional Transit;
- One Mile Lake Boardwalk Replacement; and
- Reconciliation.

Additionally, advancements towards strategic priorities are being included as part of quarterly reporting for department heads.

Moved/Seconded
THAT the Chief Administrative Officer's Projects Priority Update be received.
CARRIED

12.2 Corporate and Legislative Services

a. 2023 Union of British Columbia Municipalities Convention & Minister Meetings

Moved/Seconded
THAT Staff coordinate the meetings with the following Ministers:

- *Minister of Finance* to discuss Farm Tax Exemption for farms within the Municipal boundaries;
- *Minister of Municipal Affairs* to discuss funding for a new Fire Hall;
- *Minister of Health* to discuss the potential for a health clinic upgrades, expansion or replacement to respond to the growing population; and

AND THAT the Mayor bring forward to the Squamish–Lillooet Regional District Board the following Minister Meeting request for considerations:

- *Ministry of Transportation and Infrastructure* regarding funding for Regional Transit on the Sea to Sky Highway; and

DRAFT

- *Ministry of Environment* to discuss the Provincial funding for Diking Districts.

CARRIED

Council members also confirmed their intent to attend the UBCM Conference in September

b. Community Enhancement Fund: Lil'wat Nation Rodeo 2023 Sponsorship Request

Moved/Seconded
THAT Council approve a contribution from the Community Enhancement Fund, in the amount of $500, to support the Lil'wat Nation Rodeo PeeWee Barrel Racing event on May 21, 2023.

CARRIED

12.3 Development Services

12.4 Finance

12.5 Operations

a. Operations 2023 First Quarter Report: January – March 2023

Discussion took place respecting crown land tenure application review and approval timelines. Staff were requested to add a request to meet with the Minister of Forests at UBCM to discuss this matter.

Moved/Seconded
THAT the Operations 2023 First Quarter Report be received for information.

CARRIED

12.6 Recreation

12.7 Pemberton Fire Rescue

13. BYLAWS

13.1 Introduction of the 2023 Financial Bylaws

a. 2023 - 2027 Five Year Financial Plan Bylaw No. 943, 2023

Moved/Seconded
THAT the 2023 – 2027 Five-Year Financial Plan Bylaw No. 943, 2023 receive first, second, and third readings.

CARRIED

b. 2023 Annual Tax Rates Bylaw No. 944, 2023

Moved/Seconded
THAT 2023 Annual Tax Rates Bylaw No. 944, 2023 receive first, second, and third readings.

CARRIED

DRAFT

c. Water Regulation Connection and Rates Bylaw No. 232, 1989, Amendment Bylaw No. 945, 2023

Moved/Seconded
THAT Water Regulation Connection and Rates Bylaw No. 232, 1989, Amendment Bylaw No 945, 2023 receive first, second, and third readings.
CARRIED

d. Sanitary Sewer System Rates, Rents and Charges Bylaw No. 946, 2023

Moved/Seconded
THAT the Sanitary Sewer System Rates, Rents and Charges Bylaw No. 946, 2023 receive first, second, and third readings.
CARRIED

14. MAYOR'S Report

Mayor Richman had nothing to report at this time.

15. COUNCILLORS' Reports

Councillor Nightingale and Councillor Ramsden attended and reported on the LMLGA Conference.

16. CORRESPONDENCE

16.1 Correspondence for Action

a. Diane Rothdram, dated April 26, 2023, regarding Kitchen Table Official Community Plan Discussion and the Proposed Nkwúkwma Rezoning Application

Moved/Seconded
THAT the correspondence be referred to staff for response and include information on the Committee of the Whole Nkwúkwma Development workshop to be held on May 23, 2023.
CARRIED

16.2 Correspondence for Information

a. Cathy Peters, Anti Human Trafficking Educator, dated April 24, 2023, regarding Child Sex Trafficking in BC and How to Stop it

b. Krista Walden, Director, Pemberton Red Devils Alumni Association, dated April 25, 2023, regarding the Village's contribution toward The Shaker Fundraiser

Moved/Seconded
THAT the correspondence be received for information.
CARRIED

17. DECISION ON LATE BUSINESS

18. LATE BUSINESS

19. NOTICE OF MOTION

DRAFT

20. QUESTION PERIOD

There were no questions from the public.

21. IN CAMERA, CONTINUED

Moved/Seconded
THAT the meeting is closed to the public in accordance with the *Community Charter* section 90 (1) (c) employee relations, (e) land, (i) solicitor client privilege, and (k) negotiations and related discussions that in the view of Council could reasonably be expected to harm the interests of the municipality if held in public.
CARRIED

At 6:53pm Council moved to In Camera.

22. RISE WITH REPORT

At 6:57pm Council rose without report.

23. ADJOURNMENT OF REGULAR COUNCIL MEETING

At 7:00pm the meeting was adjourned.

Moved/Seconded
THAT the meeting be adjourned.
CARRIED

Mike Richman, Mayor

Sheena Fraser, Corporate Officer

DRAFT

VILLAGE OF PEMBERTON

-SPECIAL COUNCIL MEETING MINUTES-

Minutes of the Special Meeting of Council of the Village of Pemberton.

Meeting #:	1582
Date:	Thursday, May 11, 2023, 9:00 am
Location:	Council Chambers 7400 Prospect Street
COUNCILLORS:	Mayor Mike Richman Councillor Ted Craddock
ELECTRONIC ATTENDANCE:	Councillor Jennie Helmer Councillor Katrina Nightingale Councillor Laura Ramsden
STAFF:	Elizabeth Tracy, Chief Administrative Officer Sheena Fraser, Manager of Corporate & Legislative Services Thomas Sikora, Manager of Finance Ethan Fredeen, Deputy Corporate Officer
PUBLIC:	2
MEDIA:	0

This meeting was held via electronic means by Zoom webinar. A recording of the meeting was made available to the media and the public.

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1. CALL TO ORDER

In honour of the Lil'wat7ul, the Village of Pemberton acknowledges that we are meeting within the unceded territory of the Lil'wat Nation.

At 9:01am Mayor Richman called the Special Meeting to order

2. APPROVAL OF AGENDA

Moved/Seconded
THAT the agenda be approved as presented.
CARRIED

3. DELEGATION

4. STAFF REPORTS

5. BYLAWS

DRAFT

5.1 2023 - 2027 Five Year Financial Plan Bylaw No. 943, 2023

Moved/Seconded
THAT the 2023 – 2027 Five-Year Financial Plan Bylaw No. 943, 2023 be given fourth and final reading.

CARRIED

5.2 2023 Annual Tax Rates Bylaw No. 944, 2023

Moved/Seconded
THAT the 2023 Annual Tax Rates Bylaw No. 944, 2023 be given fourth and final reading.

CARRIED

5.3 Water Regulation Connection and Rates Bylaw No. 232, 1989, Amendment Bylaw No. 945, 2023

Moved/Seconded
THAT the Water Regulation Connection and Rates Bylaw No. 232, 1989, Amendment Bylaw No 945, 2023 be given fourth and final reading.

CARRIED

5.4 Sanitary Sewer System Rates, Rents and Charges Bylaw No. 946, 2023

Moved/Seconded
THAT the Sanitary Sewer System Rates, Rents and Charges Bylaw No. 946, 2023 be given fourth and final reading.

CARRIED

8. ADJOURNMENT

Moved/Seconded
THAT the meeting be adjourned.

CARRIED

At 9:03am the Special Meeting was adjourned.

Mike Richman, Mayor

Sheena Fraser, Corporate Officer

DRAFT

VILLAGE OF PEMBERTON

-SPECIAL COUNCIL MEETING MINUTES-

Minutes of the Special Meeting of Council of the Village of Pemberton.

Meeting #:	1583
Date:	Tuesday, May 23, 2023, 1:00 pm
Location:	Council Chambers & Zoom Webinar 7400 Prospect Street
COUNCILLORS:	Mayor Mike Richman Councillor Ted Craddock Councillor Laura Ramsden
ELECTRONIC ATTENDANCE:	Councillor Katrina Nightingale
REGRETS:	Councillor Jennie Helmer
STAFF:	Elizabeth Tracy, Chief Administrative Officer Sheena Fraser, Manager of Corporate & Legislative Services Renée St-Aubin, Receptionist

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This meeting was held via electronic means by Zoom webinar. A recording of the meeting was made available to the media and the public.

1. CALL TO ORDER

In honour of the Lil'wat7ul, the Village of Pemberton acknowledges that we are meeting within the unceded territory of the Lil'wat Nation.

At 1:00pm Mayor Richman called the special meeting to order.

2. APPROVAL OF AGENDA

Moved/Seconded
THAT the agenda be approved as presented.
CARRIED

3. STAFF REPORTS

3.1 Appointment to the Joint Wellness Committee

Moved/Seconded
THAT Councillor Laura Ramsden be appointed to the Joint Wellness Committee to represent the Village on the selection of the Wellness Bursary recipients each year.
CARRIED

4. IN CAMERA

Moved/Seconded
THAT the meeting is closed to the public in accordance with the *Community Charter* Section 90 (1) (e) Land and related discussions that in the view of Council could reasonably expect to harm the interest of the municipality if they were held in public.
CARRIED

At 1:04pm Council moved In Camera.

5. RISE WITH REPORT

AT 2:05pm Council rose without report.

6. ADJOURNMENT

Moved/Seconded
THAT the meeting be adjourned at 2:05pm.
CARRIED

Mike Richman, Mayor

Sheena Fraser, Corporate Officer

Village of PEMBERTON

REPORT TO COUNCIL

Date: **Tuesday, May 30, 2023**

To: **Elizabeth Tracy, Chief Administrative Officer**

From: **Ethan Fredeen, Deputy Corporate Officer**

Subject: **UBCM Resolution Farm Tax Exemption**

PURPOSE

The purpose of this report is to present to Council for consideration a draft resolution for submission to the 2023 UBCM convention.

BACKGROUND

At the Committee of the Whole Meeting No. 244, held on May 23rd, 2023, staff brought forward back a report with background information on the requested Minister meetings at the 2023 UBCM which had been discussed at the Regular Meeting No. 1582, held on May 9, 2023. Specifically, staff sought direction from Council with respect to meeting with the Minister of Finance to discuss the potential of enabling the Statutory Farm Tax Exemption, currently offered to farms in rural areas, to be applied to farmland that is found within municipal boundaries. This meeting request was in follow up to a meeting held with the Minister of Finance in 2018 on the same topic.

Following discussion at the Committee of the Whole, it was determined that as a tax exemption adjustment of this nature would have little impact on the Village but might support other communities that have a larger farmland base, it would be better suited to submit a resolution for consideration by UBCM.

In this regard, the following resolution was passed:

> *Moved/Seconded*
> ***THAT** a meeting with the Minister of Forests to discuss crown land tenure application wait times not be pursued;*
>
> ***AND THAT** staff prepare a resolution for submission to UBCM for Council's consideration regarding the application of the Statutory Farm Tax Exemption to farm properties within a municipal boundary.*
>
> ***CARRIED***

DISCUSSION & COMMENTS

Local governments are encouraged to submit resolutions through their local area associations, in the Village's case the Lower Mainland Local Government Association (LMLGA), to seek endorsement. If endorsed by the area association the resolution is automatically forwarded to UBCM; if considered but not endorsed the resolution is not conveyed to UBCM. If necessary, a local government may submit a council or board endorsed resolution directly to UBCM by June 30th of each year. Resolutions received after the deadline will be reviewed by the resolutions committee and may or may not be moved forward for consideration at the convention.

Staff have prepared the resolution below for Council's consideration and as this matter is too late for consideration by the LMLGA, if endorsed by Council, it would be submitted directly to UBCM. The resolution and background brief, which is required as part of a submission, is attached as **Appendix A**.

> ***WHEREAS*** *farmland plays a vital role in supporting local food production, promoting agricultural sustainability, and preserving green spaces within municipalities;*
>
> ***WHEREAS*** *farmland located within municipal boundaries faces unique challenges and pressures, such as increased property values, limited space, and proximity to urban development, which can hinder its viability and continuity as productive agricultural land;*
>
> ***WHEREAS*** *equitable tax treatment of farmland, regardless of its location within a municipality, would promote fairness among farmers and reduce barriers to agricultural activity within urbanized areas:*
>
> ***THEREFORE, BE IT RESOLVED*** *that the Union of BC Municipalities requests the Province extend the Statutory Farm Tax Exemption provided to rural area farms to farms located within municipal boundaries.*

As the intention of moving forward with this resolution is to support the local agricultural sector, an important consideration arises regarding the potential for a province-wide tax exemption for farms situated within Municipal boundaries. The tax exemption for farms could significantly impact municipal revenue for some farm-based communities across the province and result in increases to other property classes to make up for lost revenue.

When considering a resolution, it is recommended that the UBCM resolution database be reviewed to determine if the matter has been brought forward to UBCM in the past. Depending on the issue for consideration and how it has been addressed in the past or the outcome of previous consideration the resolution may not be put forward for further consideration.

In this regard, staff did a search and found that in 2003, the Township of Langley submitted a resolution respecting farm class taxation that was endorsed by the UBCM membership at the time. The resolution, provided below for information, requests the provinces review of the farm property class as the exemption was creating an unfair system of taxation and was impacting property tax revenues.

> ***WHEREAS*** *property taxation is stated to be based on market value assessments and the exempting or reducing a portion of a class puts a strain on the other classes and creates an unfair system of taxation;*
>
> ***AND WHEREAS*** *the existing Assessment Act and regulations adopted thereto encourage minimal activities and integrated use as proof of a farming operation and, in some instances, without consideration of municipal land use bylaws:*
>
> ***THEREFORE BE IT RESOLVED*** *that the Union of British Columbia Municipalities petition the Province of British Columbia to make changes to the Assessment Act and regulations adopted thereto to amend the Farm Property class;*
>
> > *1. to include a home and home site provision that would classify the home and land surrounding the home as Residential Class 1;*
> >
> > *2. to ensure that Farm Class would not be permitted on properties where the municipal zoning does not permit agricultural uses;*

3. to ensure that where a Farm Class is granted because of an integrated use, it be so only on the basis that the secondary parcel provides a reasonable contribution to the overall integrated operation; and

4. that the list of qualifying uses for Farm Class be examined due to the generous property tax benefits that Farm Class provides.

***AND BE IT FURTHER RESOLVED** that the Union of BC Municipalities urge the Province to commit to making the requested changes to the Assessment Act.*

The resolution was endorsed at the time and the Provincial Response is as follows:

> **Ministry of Sustainable Resource Management:** The primary concerns regarding current farm classification policies arise in municipalities that have undeveloped areas, and particularly with hobby farms. There appears to be a growing consensus among affected municipalities and bona fide farmers that many hobby farmers are taking advantage of the rules to get farm class and therefore lower taxation. The Ministry of Sustainable Resource Management is reviewing farm classification, along with Finance, Provincial Revenue, CAWS, AFF and BC Assessment. The review will require broad consultation with UBCM, the BC Agriculture Council, the BC Taxpayers Federation and other stakeholders. Preliminary recommendations are not expected before the fall of 2004.

Staff were unable to find any information respecting the review noted above and did not pursue it further as the time to undertake more research would be considerable.

As noted in a previous report, this is a complex matter which Village staff does not have the capacity or expertise to dissect. Given the resolution put forward by the Township of Langley in 2003 and the outcome, which resulted in the provinces commitment to undertake a review of farm classification, it is anticipated that the Village's resolution may not receive support by the UBCM membership especially as the changes requested would have a significant impact on property tax revenue to those municipalities that have a large farming base.

The Village of Pemberton is required to submit resolutions to UBCM by June 30th, 2023.

LEGAL CONSIDERATIONS

There are no legal, legislative or regulatory considerations at this time.

IMPACT ON BUDGET & STAFFING

Research and drafting of the resolution and preparation of the report has been accommodated as part of the day-to-day activities of Corporate & Legislative Services; however, this work was more significant than anticipated.

INTERDEPARTMENTAL IMPACT & APPROVAL

There were no interdepartmental impacts or approvals required.

COMMUNITY CLIMATE ACTION PLAN

This initiative is not applicable to the CCAP strategies.

IMPACT ON THE REGION OR NEIGHBOURING JURISDICTIONS

There are no impacts to the region or neighbouring jurisdictions.

ALTERNATIVE OPTIONS

An alternative option is to not proceed with making submission to UBCM on this matter.

RECOMMENDATIONS

THAT Council provide direction with respect to submitting the resolution to UBCM.

ATTACHMENTS:

Appendix A: UBCM Statutory Farm Tax Exemption with Background

Prepared by:	Ethan Fredeen, Deputy Corporate Officer
Manager Approval:	Sheena Fraser, Manager, Corporate & Legislative Services
CAO Approval by:	Elizabeth Tracy, Chief Administrative Officer

Statutory Farm Tax Exemption

Resolution

WHEREAS farmland plays a vital role in supporting local food production, promoting agricultural sustainability, and preserving green spaces within municipalities;

WHEREAS farmland located within municipal boundaries faces unique challenges and pressures, such as increased property values, limited space, and proximity to urban development, which can hinder its viability and continuity as productive agricultural land;

WHEREAS equitable tax treatment of farmland, regardless of its location within a municipality, would promote fairness among farmers and reduce barriers to agricultural activity within urbanized areas:

THEREFORE, BE IT RESOLVED that the Union of BC Municipalities requests the Province extend the Statutory Farm Tax Exemption provided to rural area farms to farms located within municipal boundaries.

Background

Agriculture is a critical part of the sustainable economy and the overall culture of Pemberton. Historically an agricultural community, the Pemberton Valley is home to over 70 farming units and the Village is committed to supporting the industry and the ability of local farm operators to derive sufficient income from their land.

The Village of Pemberton approached the Minister of Finance during the 2018 Union of BC Municipalities regarding this topic as it was the intent of the Village to move forward with a boundary expansion that would see the incorporation of farmland within the boundaries. Despite not proceeding with the extension, the Village of Pemberton desires to promote this idea as the statutory farm tax exemption would encourage the adoption of environmentally friendly practices, such as organic farming and soil conservation, contributing to the overall sustainability and resilience of the agricultural sector. Ultimately, the Statutory Farm Tax Exemption would serve as a powerful tool to protect and enhance the vitality of Provinces' farming community, fostering a vibrant and sustainable agricultural landscape for future generations. By recognizing the value of farmland within municipal boundaries, supporting local food production, and fostering economic development, this exemption acts as a catalyst for maintaining the agricultural heritage of a community while ensuring a resilient and sustainable future.

Village of PEMBERTON

REPORT TO COUNCIL

Date: **Tuesday, May 30, 2023**

To: **Elizabeth Tracy, Chief Administrative Officer**

From: **Tom Csima, Manager of Operations and Projects**

Subject: **2022 Drinking Water System Annual Report**

PURPOSE

To present to Council the Village of Pemberton 2022 Drinking Water System Annual Report and provide background information on the overall water system, as well as an update on the recommendations of the most recent water treatment investigations.

BACKGROUND

Each year, in the first half of the subsequent year, municipalities are required by the Provincial *Action Plan for Safe Drinking Water in British Columbia (2002)* to prepare a Drinking Water System Annual Report. This report is filed with Vancouver Coastal Health Authority (VCH) and is published on our website, along with previous years: https://www.pemberton.ca/municipal-services/pemberton-water

This report, attached as **Appendix A** outlines the consumption data for the Village of Pemberton water supply, as well as information on various sampling results including chlorination, chemistry, pH, alkalinity, trihalomethane (THM), and bacteriological tests.

In 2020, the Village undertook an internal assessment of the water system using a wide breadth of data and reports from previous years. The Water System Performance Assessment 2020 is included as **Appendix B.** The following is a table of the recommendations made in this Assessment and an update on their status.

	Recommendation	**Status**
1.1	Increase frequency of water quality testing for iron and manganese.	Complete/Ongoing. Results shown in Figure 1
1.2	Perform redevelopments of Wells 2 and 3.	Completed in June and December 2020, respectively
1.3	Initiate study for the treatment of iron and manganese following the newly introduced Maximum Acceptable Concentration (MAC) of Manganese in 2019.	Completed in 2021, see **Appendix C**
1.4	Undertake water feasibility study to determine options for new source.	Not Started, but possibly dependent on treatment capabilities
1.5	Investigate water conservation methods to reduce water consumption	See **Appendix D** for Water Conservation Plan
1.6	Install backup generator for existing well/ treatment facility	Completed in 2021

As per recommendation 1.3, the Village engaged with consulting engineers to investigate and review water treatment options that would provide Village residents with potable water that meets the Canadian Drinking Water Quality (GCDWQ) guidelines. The final draft of the Water Treatment Investigation Report, prepared by Kerr Wood Leidal, is attached as **Appendix C**.

This report concluded that due to the eventual elevated iron and manganese levels observed and predicted in the existing wells, a water treatment plant should be designed using the recommended process of oxidation and catalytic media filtration. The plant should be designed to operate at 60 L/s and include provisions to supply future adjacent developments. Early estimates of the cost of this plant were 8.2 million dollars (which includes 40% contingency), for which the Village applied for a grant through the Canada Infrastructure Program – Environmental Quality stream. The Village anticipates hearing as to whether the grant application was successful soon. This project has been incorporated into the Five-Year Plan.

DISCUSSION & COMMENTS

With regards to recommendation 1.1 and expanding on the historic values presented in the Water System Performance Assessment in 2020, **Figure 1** displays the results of the increased water chemistry sampling regime, specifically the manganese concentrations in each of the active Village Wells.

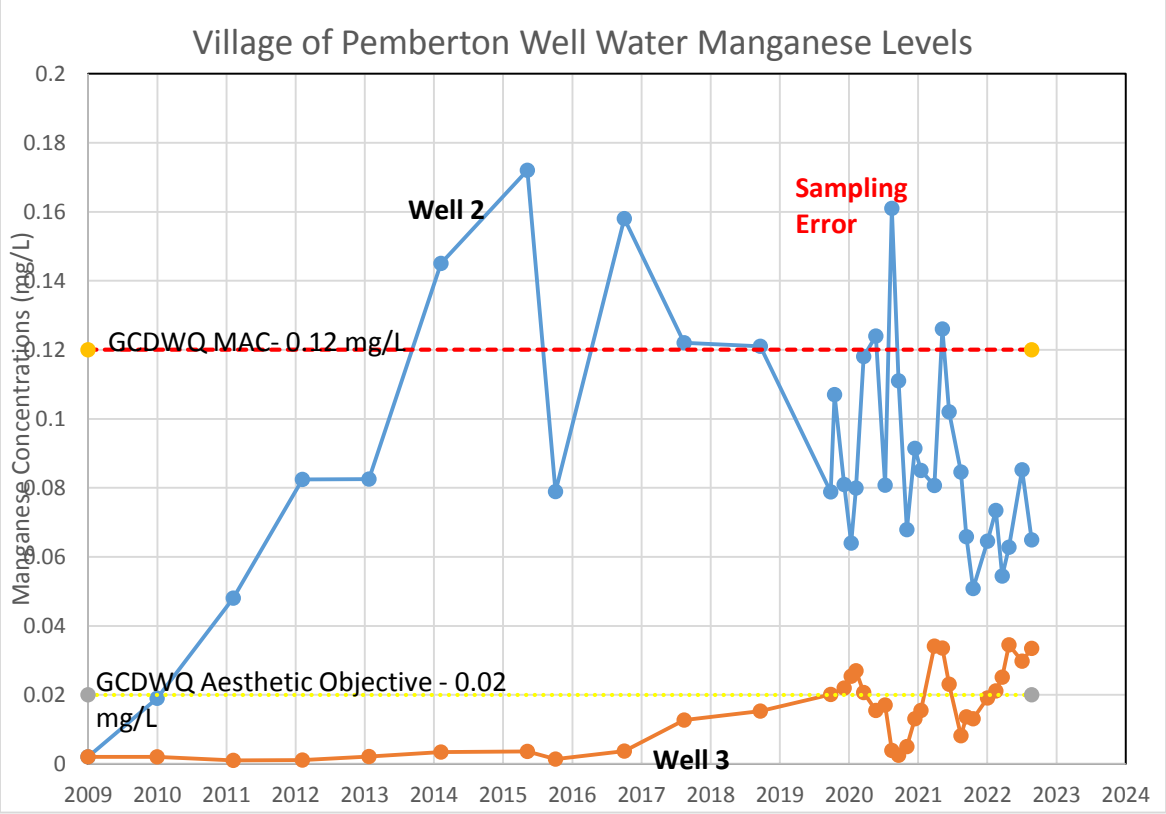

Figure 1 *– Groundwater Chemistry Sample results for Manganese Concentrations*

As shown in **Figure 1**, the manganese levels in the primary duty Well 3 have fluctuated around the Aesthetic Objective (AO), with a general upward trend since 2021. Interestingly, Well 2 levels have decreased to below the MAC, but still exceed the AO.

With regards to Village water consumption, the data presented in the 2020 Water System Performance Assessment was combined with data from the last three (3) years as shown in the 2022 Annual Drinking Water Report and presented in **Table 1**. This table shows the Average Daily demands (based on annual rate of water consumption, divided by the days of the year) as well as the Maximum Day demands for each year from 2016 to 2022.

Table 1 *– Village Consumption by year*

Year	Population (Census)	Average day demand (m^3)		Average Daily Demand (L/s)	Estimated Per Capita Use (L/person/day)		Max day demand (m^3)	
2016	2574	1,847		21.4	717.6		3,696	
2017		1,880	2%	21.8	686.0	-5%	3,579	-3%
2018		1,799	-5%	20.8	618.8	-11%	3,570	0%
2019		1,838	2%	21.3	598.0	-3%	3,527	-1%
2020		1,855	1%	21.5	572.5	-4%	3,774	7%
2021	3407	1915	3%	22.2	562.1	-2%	4264	11%
2022		2057	7%	23.8	575.6	2%	4295	1%

It can be observed that there has been a steady increase in consumption over this period (other than a drop in 2018) with the largest increase coming in the most recent year of 2022. It is difficult to determine the direct relation to population growth, as there is only census data available for 2016 and 2021, however based on these years (as well as proportionate estimations of population), the per capita usage has decreased over this period from 717.6 L person/day to 575 L/person/day. However, this is still much greater than the Canadian average of 427 L/person/day, and far greater than many other modernized countries. Please note this calculation does not include the Pemberton North Water System users but includes residents of the Industrial Park which is on a separate water system.

These results have been plotted in **Figure 2** in L/s and compared to the sustainable Aquifer Recharge rate, as identified in the Water System Performance Assessment and previous studies of 30 L/s. **Figure 2** also demonstrates the potential impact of further water conservation measures, by plotting the theoretical average daily demand based on the approximate population of Pemberton using the Canadian average.

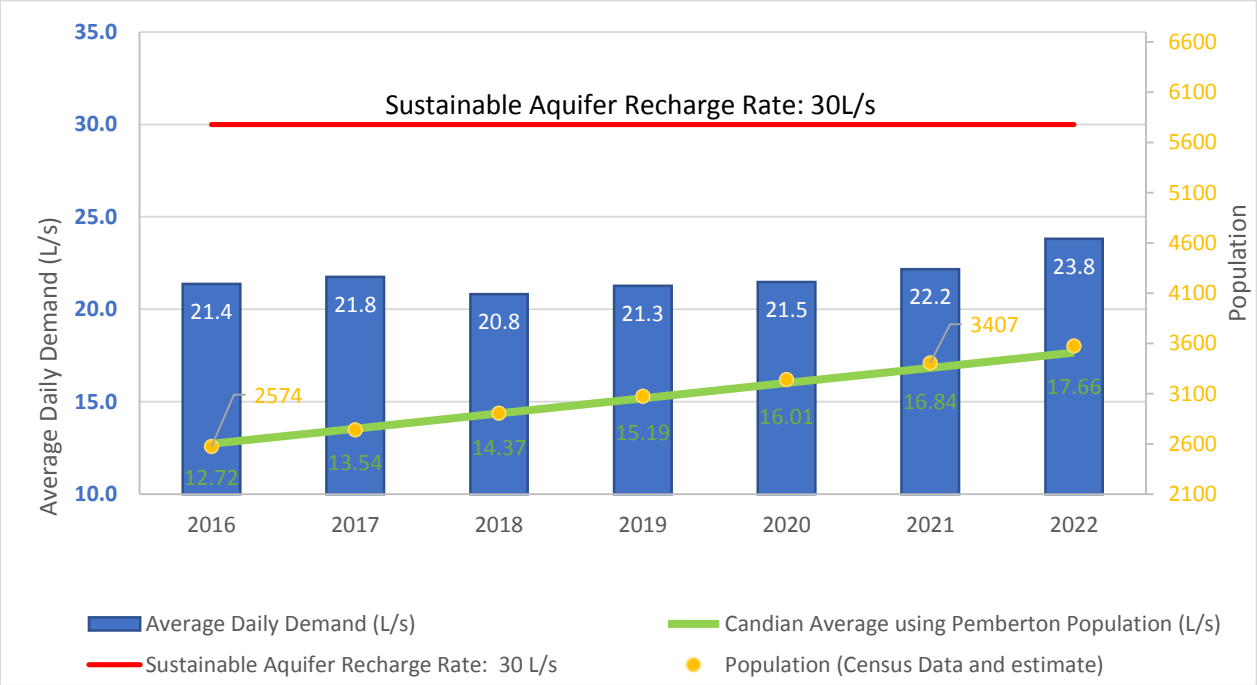

***Figure 2** – Pemberton Water Demands*

COMMUNICATIONS

The Village continues to educate residents on the importance of conserving water through notices and information on the Village website, Facebook Page, ENEWS and signage. Water restriction signage is erected in June each year at the entrance of the Village and in neighbourhoods around the Village which establishes the four water restriction levels with an arrow indicating the current level.

LEGAL CONSIDERATIONS

There are no legal or legislative considerations, however receipt by Council and posting of the 2022 Drinking Water System Annual Report meets with the requirements as set out in the *Action Plan for Safe Drinking Water in British Columbia* and the Vancouver Coastal Health Authority.

IMPACT ON BUDGET & STAFFING

The preparation of the 2022 Drinking Water System Annual Report is an annual task of the Operations Department and has been accommodated in the departmental work plan.

The proposed water treatment plant design and construction mentioned in this report has been included in the 2023 annual budget and Five Year Financial Plan, as well as a number of initiatives around water conservation and water system improvements.

INTERDEPARTMENTAL IMPACT & APPROVAL

There are no interdepartmental impacts resulting from the publishing of the 2022 Drinking Water System Annual Report, however the implications of the Village's water consumption, treatment investigation, and source aquifer will impact other departments including Planning and Development Services, as well as Finance, and the office of the CAO. Further, Bylaw services supports in monitoring for compliance with watering restrictions as they are implemented.

COMMUNITY CLIMATE ACTION PLAN

The results of the 2022 Drinking Water System Annual Report have no impact on the Community Climate Action Plan strategies.

IMPACT ON THE REGION OR NEIGHBOURING JURISDICTIONS

As noted in the 2020 Water System Performance Assessment, the Village of Pemberton, under the authority of Vancouver Coastal Health, operates two water systems: the Village system, and the Industrial Park system and in addition supplies water to the Pemberton North Water System (PNWS) which is owned and maintained by the Squamish-Lillooet Regional District (SLRD). The Industrial Park system is separate from the Village system and is supplied with metered water from the neighboring Lil'wat Nation through a water use agreement, therefore both the SLRD and Lil'wat Nation are impacted by the results of the 2022 Drinking Water System Annual Report.

RECOMMENDATIONS

THAT Council receives the 2022 Drinking Water System Annual Report for information.

ATTACHMENTS:

Appendix A: 2022 Drinking Water System Annual Report, prepared by staff.
Appendix B: 2020 Village of Pemberton Water System Performance Assessment, prepared by staff
Appendix C: Water Treatment Investigation Report, dated January 31st, 2022, prepared by Kerr Wood Leidal
Appendix D: Water Conservation Plan, dated February 14th, 2022, prepared by Kerr Wood Leidal.

Prepared by:	Tom Csima, Manager of Operations and Projects
CAO Approval by:	Elizabeth Tracy, Chief Administrations Officer

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Village of Pemberton Water System
Annual Report - 2022

INTRODUCTION

This report has been prepared for the consumers of the Drinking Water System of the Village of Pemberton to provide basic information on water quality and compliance with health standards. Public feedback and comments are always welcomed and should be directed to Village staff or Vancouver Coastal Health (Squamish) officials.

CONSUMPTION (CUBIC METERS/DAY):

Daily flow is recorded at the Wellhouse located in Pioneer Park. Table 1 displays the maximum, minimum, average, and total water flows for 2022 and includes the previous two years for comparison. The volumes have been consistent over the past three years. Variations can be attributed to population growth, climatic factors, conservation efforts and leak detection and repairs. For daily results, please refer to **Appendix I.**

Table 1 - Overall Water Consumption Summary

	2020 Consumption	2021 Consumption	2022 Consumption
Average Flow/day:	1,855 m^3	1,915 m^3	2,057 m^3
High Flow/day:	3,774 m^3 *(July 29, 2020)*	4,264 m^3 *(August 13, 2021)*	4,295 m^3 *(July 28, 2022)*
Low Flow/day:	1,038 m^3 *(December 17, 2020)*	843 m^3 *(December 4, 2021)*	1129 m^3 *(December 9, 2022)*
Total Annual	676,900 m^3	700,987m^3	748,663 m^3

CHLORINATION:

Chlorination is a condition of the Village of Pemberton's operating permit and has been in effect since March 2009. The objective is to have a positive residual chlorine reading throughout the water distribution system. The Fire Hall chlorine analyzer serves as the central measuring point, where a minimum residual of 0.20 mg/L is desired.

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The chlorine residual is monitored continuously by a dedicated computer and alarm set points ensure consistent dosing. Daily readings of the previous 24 hour minimum residuals are recorded. The annual numbers are shown in Table 2.

Table 2 - 2022 Chlorine Residual Summary

	Residual (mg/L)
Average:	0.32
High:	0.48
Low:	0.18

To ensure that target chlorine residuals are achieved within the distribution system, the Village also carries out manual sampling at 7 sites throughout the distribution system each week.

For daily results, please refer to **Appendix I** and for weekly sample results **Appendix III.**

WATER CHEMISTRY:

The Annual Total Metals, Volatile Organic Compounds and Trihalomethane sampling was performed February 17, 2022. Sampling was conducted on production Wells #2 & #3, Oak St. Sample Station, Ridge Booster Pump and Rechlorination Station and the Industrial Park Sample Station. The test results indicate that all of the items tested, with the exception of Manganese in Backup Well 2, are within Health Canada Maximum Acceptable Concentration (MAC) limits. It has been observed that Manganese levels in Wells 2 fluctuate throughout year with the average of 0.10 mg/L. Recently, the guidelines for manganese were changed to a MAC of 0.12 mg/L (120 µg/L) and an AO of 0.02 mg/L (20 µg/L) for total manganese in drinking water. In 2021, the Village commissioned Kerr Wood Leidal to carry out a preliminary design for a water treatment facility. Early 2022, application was made to Federal and Provincial funding sources for financial support for a water treatment facility. For full water quality test results from 2022, please refer to **Appendix II**.

CORROSION CONTROL:

In June of 2016, the Village of Pemberton undertook a water sampling program to determine the best course of action to mitigate the corrosion of metallic plumbing systems and fixtures. The results indicated a need to adjust the pH and alkalinity of the well water which is considered slightly acidic. A water conditioning plant was designed and constructed in 2016 – 2017 and utilizes Sodium Carbonate (Soda Ash) to increase the pH and Alkalinity of Pemberton's well water, prior to distribution. In October 2017, the Village established a target

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pH of 7 and an (alkalinity) between 40 and 80mg/L as measured as CaCO3 (Calcium Carbonate). In addition to the automated control system, water samples are tested weekly from 7 sample stations throughout the distribution system, and pH and alkalinity are recorded. For results, please refer to **Appendix III**.

Flush Message

In 2015 Vancouver Coastal Health Authority requested that the following message be communicated to residents:

Anytime the water in a particular faucet has not been used for six hours or longer, "flush" your cold-water pipes by running the water until cold and you notice a change in temperature. (This could take as little as five to thirty seconds if there has been recent heavy water use such as showering or toilet flushing. Otherwise, it could take two minutes or longer.) The more time water has been sitting in your home's pipes, the more lead it may contain. Use only water from the cold-tap for drinking, cooking, and especially making baby formula. Hot water is likely to contain higher levels of lead. The two actions recommended above are very important to the health of your family. They will probably be effective in reducing lead levels because most of the lead in household water usually comes from the plumbing in your house, not from the local water supply. Conserving water is still important. Rather than just running the water down the drain you could use the water for things such as watering your plants (Zubel,2014). If residents have any questions, they are encouraged to contact the Vancouver Coastal Health Authorities Drinking Water Officer at 604-892-2293.

CROSS CONNECTION CONTROL

To maintain safe drinking water and remain in compliance with the Vancouver Coastal Health Authority (VCH), the Village of Pemberton has begun a utility-wide Cross Connection Control / Backflow Prevention Program. A cross connection is any actual or potential connection between drinking water and a non-potable substance (contaminant). Backflow is the reverse flow from normal within a piping system. When a cross connection and backflow are combined, often the result is a contaminant entering our drinking water.

In 2018, the Cross Connection Control Bylaw was passed by council and an initial assessment and database was completed for Village infrastructure. The Cross Connection Control program is ongoing.

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BACTERIOLOGICAL ANALYSIS:

Water samples are collected and submitted weekly to the laboratory at Vancouver Coastal Health for Bacteriological analysis. These samples are taken directly from both active sources (Well #2 and #3), as well as the following locations:

- Oak St
- Village Office
- Health Centre
- Treatment Plant
- Ridge Pump Station
- Industrial Park (Mount Currie water source)
- Pemberton Meadows Rd.
- Pemberton Farm Rd (West)

All results for the 2022 period were negative for Escherichia coli.

The individual results are on file at Vancouver Coastal Health (Squamish) and the Village Office, and are posted regularly online at:
www.healthspace.ca/Clients/VCHA/CoastGaribaldi/CoastGaribaldi_Website.nsf

For Sample Range Reports, please refer to **Appendix IV**.

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APPENDIX I

2022 Daily Total Consumption and Chlorine Residual

2019 Daily Total Consumption and Chlorine Residual			2020 Daily Total Consumption and Chlorine		2021 Daily Total Consumption and Chlorine		2022 Daily Total Consumption and Chlorine	
Date	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**
	Cubic metre	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**
January								
1	1,317	0.28	1,313	0.3	1317	0.14	1303	0.30
2	1,286	0.29	1,238	0.34	1286	0.13	1285	0.30
3	1,266	0.27	1,194	0.34	1266	0.15	1199	0.31
4	1,433	0.25	1,321	0.3	1433	0.16	1230	0.30
5	2,470	0.24	1,287	0.3	2470	0.18	1149	0.31
6	2,498	0.28	1,297	0.3	1198	0.16	1281	0.30
7	2,497	0.31	1,139	0.3	2497	0.22	1174	0.30
8	1,698	0.29	1,238	0.3	1698	0.24	1346	0.30
9	1,276	0.28	1,241	0.31	1276	0.25	1286	0.24
10	1,300	0.27	1,121	0.33	1300	0.27	1310	0.18
11	1,087	0.28	1,249	0.33	1087	0.26	1180	0.20
12	1,265	0.28	1,263	0.31	1265	0.26	1192	0.24
13	1,245	0.29	1,142	0.32	1245	0.26	1243	0.28
14	1,264	0.29	1,365	0.32	1264	0.28	1087	0.34
15	1,194	0.28	1,331	0.32	1194	0.28	1435	0.35
16	1,172	0.28	1,287	0.32	1172	0.29	1664	0.34
17	1,238	0.29	1,280	0.32	1238	0.27	1697	0.34
18	1,221	0.30	1,295	0.32	1221	0.26	1629	0.33
19	1,067	0.29	1,306	0.32	1067	0.29	1637	0.35
20	1,245	0.28	1,336	0.32	1245	0.29	1607	0.34
21	1,251	0.30	1,316	0.32	1251	0.27	1573	0.36
22	1,121	0.29	1,202	0.24	1121	0.27	1640	0.34
23	1,143	0.29	1,342	0.26	1143	0.25	1657	0.35
24	1,150	0.30	1,198	0.29	1150	0.24	1706	0.36
25	1,231	0.31	1,211	0.29	1231	0.24	1670	0.36
26	1,250	0.31	1,308	0.29	1250	0.25	1673	0.31
27	1,239	0.31	1,325	0.29	1239	0.24	1725	0.33
28	1,195	0.31	1,337	0.35	1195	0.22	1662	0.33
29	1,211	0.30	1,257	0.29	1211	0.27	1644	0.34
30	1,263	0.30	1,236	0.29	1263	0.22	1626	0.33
31	1,181	0.30	1,308	0.31	1181	0.22	1661	0.34
Monthly Total	42,274		39,284		40,974		45,172	0.31

2019 Daily Total Consumption and Chlorine Residual			2020 Daily Total Consumption and Chlorine		2021 Daily Total Consumption and Chlorine		2022 Daily Total Consumption and Chlorine	
Date	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**
	Cubic metre	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**
February								
1	1,244	0.31	1,319	0.31	1091	0.22	1651	0.33
2	1,128	0.31	1,291	0.31	1149	0.21	1608	0.29
3	1,284	0.29	1,292	0.37	1093	0.19	1584	0.31
4	1,293	0.31	1,270	0.37	1050	0.19	1597	0.33
5	1,243	0.30	1,193	0.34	1280	0.20	1701	0.32
6	1,196	0.29	1,220	0.32	1208	0.21	1670	0.31
7	1,291	0.27	1,287	0.35	1354	0.22	1697	0.31
8	1,254	0.30	1,280	0.35	1310	0.24	1603	0.31
9	1,247	0.30	1,284	0.35	1290	0.24	1673	0.30
10	1,199	0.31	1,310	0.37	1225	0.23	1589	0.33
11	1,266	0.31	1,312	0.37	1372	0.26	1653	0.31
12	1,309	0.30	1,271	0.37	1547	0.24	1677	0.32
13	1,247	0.29	1,517	0.35	1511	0.28	1650	0.32
14	1,152	0.28	1,201	0.3	1704	0.27	1568	0.31
15	1,152	0.27	1,254	0.29	1468	0.27	1744	0.30
16	1,310	0.26	1,299	0.29	1619	0.29	1516	0.30
17	1,310	0.25	1,308	0.29	1592	0.29	1690	0.29
18	1,335	0.27	1,301	0.29	1410	0.29	1542	0.29
19	1,364	0.28	1,319	0.29	1336	0.32	1626	0.30
20	1,330	0.24	1,118	0.29	1436	0.30	1700	0.31
21	1,285	0.27	1,272	0.28	1436	0.30	1678	0.31
22	1,163	0.28	1,328	0.28	1502	0.29	1809	0.31
23	1,312	0.28	1,164	0.28	1458	0.27	1678	0.28
24	1,304	0.29	1,230	0.31	1685	0.30	1681	0.29
25	1,138	0.29	1,253	0.32	1378	0.33	1667	0.29
26	1,284	0.28	1,124	0.33	1889	0.34	1782	0.29
27	1,280	0.28	1,132	0.3	1450	0.35	1656	0.30
28	1,164	0.18	1,074	0.29	1309	0.33	1652	0.31
29			1,237	0.29				
Monthly Total	35,084		36,457		37,792		46,343	0.31

2019 Daily Total Consumption and Chlorine Residual			2020 Daily Total Consumption and Chlorine		2021 Daily Total Consumption and Chlorine		2022 Daily Total Consumption and Chlorine	
Date	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**
	Cubic metre	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**
March								
1	1,273	0.28	1,129	0.29	965	0.32	1730	0.32
2	1,135	0.28	1,235	0.28	1373	0.34	1712	0.26
3	1,320	0.28	1,089	0.29	1730	0.35	1632	0.37
4	1,345	0.27	1,241	0.28	1483	0.32	1668	0.33
5	1,349	0.28	1,285	0.29	1384	0.33	1673	0.37
6	1,338	0.28	1,312	0.29	1259	0.27	1698	0.47
7	1,267	0.27	1,100	0.29	1172	0.28	1609	0.48
8	1,201	0.27	1,271	0.29	1284	0.27	1629	0.29
9	1,203	0.26	1,287	0.29	1285	0.27	1132	0.28
10	1,369	0.26	1,137	0.27	1136	0.26	1611	0.27
11	1,376	0.27	1,200	0.27	1278	0.27	1615	0.33
12	1,431	0.26	1,195	0.27	1212	0.31	1597	0.33
13	1,386	0.26	1,284	0.27	1233	0.32	1941	0.32
14	1,404	0.26	1,207	0.27	1262	0.35	1330	0.30
15	1,364	0.25	1,348	0.28	1327	0.33	1579	0.35
16	1,384	0.25	1,308	0.27	1180	0.37	1677	0.36
17	1,343	0.25	1,212	0.27	1387	0.37	1554	0.36
18	1,420	0.26	1,318	0.27	1368	0.38	1492	0.36
19	1,262	0.24	1,174	0.28	1336	0.33	1648	0.37
20	1,346	0.25	1,291	0.3	1284	0.35	1451	0.40
21	1,314	0.25	1,327	0.3	1177	0.35	1655	0.39
22	1,317	0.26	1,143	0.3	1255	0.34	2075	0.33
23	1,334	0.24	1,314	0.3	1300	0.35	1522	0.32
24	1,323	0.24	1,161	0.26	1274	0.33	1653	0.33
25	1,385	0.22	1,349	0.26	1340	0.33	1652	0.34
26	1,315	0.25	1,234	0.26	1482	0.33	1469	0.32
27	1,192	0.25	1,243	0.27	1302	0.31	1629	0.34
28	1,205	0.25	1,300	0.27	1227	0.25	1761	0.35
29	1,318	0.25	1,315	0.27	1317	0.31	1651	0.33
30	1,281	0.25	1,242	0.27	1235	0.31	1921	0.34
31	1,297	0.25	1,344	0.29	1232	0.29	1581	0.35
Monthly Total	40,797		38,593		40,078		50,547	0.34

2019 Daily Total Consumption and Chlorine Residual			2020 Daily Total Consumption and Chlorine		2021 Daily Total Consumption and Chlorine		2022 Daily Total Consumption and Chlorine	
Date	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**
	Cubic metre	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**
April								
1	1,303	0.26	1,330	0.28	1202	0.32	1962	0.36
2	1,187	0.25	1,155	0.25	1338	0.32	1761	0.36
3	1,351	0.25	1,297	0.26	1342	0.31	1672	0.36
4	1,314	0.24	1,307	0.26	1318	0.30	1687	0.37
5	1,279	0.24	1,131	0.26	1320	0.29	1680	0.37
6	1,302	0.25	1,301	0.26	1374	0.32	1693	0.36
7	2,046	0.25	1,141	0.28	1280	0.29	1929	0.36
8	2,992	0.26	1,381	0.28	1311	0.28	1905	0.36
9	1,860	0.26	1,339	0.3	1275	0.28	1976	0.35
10	1,285	0.25	1,272	0.3	1502	0.24	1612	0.34
11	1,312	0.25	1,351	0.3	1342	0.28	1507	0.34
12	1,274	0.25	1,417	0.3	1384	0.26	2159	0.33
13	1,324	0.26	1,398	0.3	1249	0.23	1811	0.32
14	1,297	0.24	1,430	0.34	1477	0.25	1688	0.31
15	1,317	0.25	1,420	0.34	1340	0.22	1595	0.32
16	1,325	0.23	1,249	0.34	1483	0.36	1616	0.31
17	1,367	0.24	1,357	0.34	1508	0.33	1631	0.31
18	1,378	0.24	1,787	0.34	1416	0.32	1616	0.30
19	1,394	0.24	1,506	0.34	1742	0.31	1664	0.31
20	1,322	0.23	1,647	0.34	1598	0.31	1701	0.30
21	1,301	0.23	1,756	0.31	1569	0.31	1799	0.33
22	1,292	0.23	1,621	0.31	1674	0.30	1768	0.33
23	1,296	0.26	1,560	0.31	1671	0.31	1782	0.33
24	1,326	0.23	1,554	0.31	1588	0.31	1674	0.35
25	1,209	0.26	2,117	0.28	1602	0.31	1891	0.33
26	1,376	0.26	1,840	0.28	1677	0.32	1692	0.34
27	1,455	0.25	1,846	0.3	1731	0.32	1790	0.33
28	1,386	0.27	1,561	0.32	1822	0.33	1872	0.33
29	1,658	0.26	1,685	0.3	1589	0.32	1976	0.35
30	1,407	0.27	1,580	0.29	1648	0.33	1888	0.35
Monthly Total	42,935		44,335		44,374		52,994	0.34

2019 Daily Total Consumption and Chlorine Residual			2020 Daily Total Consumption and Chlorine		2021 Daily Total Consumption and Chlorine		2022 Daily Total Consumption and Chlorine	
Date	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**
	Cubic metre	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**
May								
1	1,556	0.31	1,541	0.25	1764	0.32	1944	0.37
2	1,366	0.30	1,812	0.25	2008	0.33	2108	0.38
3	2,370	0.27	1,623	0.25	1922	0.32	2068	0.33
4	2,143	0.25	1,571	0.25	1907	0.34	1931	0.33
5	2,236	0.25	1,529	0.29	2191	0.35	1969	0.32
6	2,077	0.28	1,956	0.29	1976	0.34	1769	0.33
7	2,077	0.27	2,018	0.28	1991	0.27	2360	0.33
8	2,053	0.26	1,973	0.27	2269	0.26	2098	0.32
9	2,264	0.35	2,275	0.25	1959	0.25	2037	0.33
10	2,501	0.28	2,441	0.28	2370	0.26	1748	0.33
11	2,266	0.28	2,493	0.28	2237	0.27	2031	0.31
12	2,468	0.27	2,409	0.28	2398	0.28	2013	0.31
13	2,644	0.28	2,527	0.3	2078	0.28	1884	0.32
14	2,464	0.26	2,368	0.35	2444	0.29	1772	0.31
15	2,137	0.30	2,470	0.33	2406	0.30	1683	0.31
16	2,423	0.30	2,511	0.4	2540	0.29	1961	0.32
17	2,569	0.34	2,365	0.25	2778	0.29	1594	0.31
18	2,067	0.30	2,343	0.22	2102	0.30	1583	0.31
19	2,368	0.30	2,510	0.25	2087	0.29	1615	0.31
20	2,449	0.28	2,795	0.33	2005	0.28	1573	0.33
21	2,428	0.28	2,452	0.28	2270	0.28	1719	0.32
22	2,426	0.34	2,245	0.28	2610	0.28	1750	0.32
23	2,224	0.32	2,344	0.27	2682	0.29	2006	0.32
24	2,568	0.30	2,440	0.27	2547	0.30	2136	0.34
25	2,477	0.30	2,548	0.27	2579	0.29	1900	0.34
26	2,409	0.28	2,392	0.27	2588	0.31	1868	0.32
27	2,408	0.28	2,573	0.27	2819	0.25	1855	0.32
28	2,547	0.30	2,806	0.32	2291	0.26	1722	0.31
29	2,853	0.27	2,841	0.35	2162	0.26	1881	0.31
30	2,741	0.28	2,911	0.36	2644	0.27	2190	0.31
31	3,006	0.26	2,664	0.33	2711	0.29	2018	0.31
Monthly Total	72,585		71,745		71,333		58,787	0.32

2019 Daily Total Consumption and Chlorine Residual			2020 Daily Total Consumption and Chlorine		2021 Daily Total Consumption and Chlorine		2022 Daily Total Consumption and Chlorine	
Date	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**
	Cubic metre	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**
June								
1	3,025	0.30	2,254	0.44	1743	0.29	1944	0.30
2	3,199	0.30	2,431	0.36	3183	0.29	2135	0.31
3	3,136	0.30	2,376	0.36	3963	0.14	2229	0.33
4	2,774	0.28	2,352	0.39	3043	0.26	2008	0.33
5	2,741	0.28	2,440	0.3	2602	0.27	2000	0.32
6	2,434	0.27	2,163	0.31	2628	0.28	2191	0.31
7	2,584	0.27	2,962	0.34	2444	0.27	2019	0.31
8	2,280	0.26	2,898	0.34	2474	0.27	2233	0.32
9	2,388	0.26	2,483	0.34	2483	0.28	2084	0.33
10	2,980	0.25	2,452	0.34	2464	0.29	2166	0.32
11	2,515	0.25	2,472	0.35	2463	0.30	1988	0.30
12	2,827	0.24	2,364	0.35	2603	0.32	2103	0.32
13	3,028	0.30	2,127	0.35	2589	0.33	2636	0.33
14	3,375	0.31	2,288	0.5	2284	0.32	2314	0.33
15	3,129	0.31	2,388	0.5	2036	0.32	2344	0.32
16	3,130	0.31	2,328	0.32	2135	0.33	2300	0.31
17	3,527	0.33	2,574	0.27	2237	0.31	2319	0.30
18	3,129	0.30	3,096	0.34	2979	0.33	2271	0.29
19	2,911	0.30	2,990	0.36	2803	0.33	2149	0.27
20	2,831	0.27	3,220	0.37	2741	0.34	2314	0.27
21	2,555	0.27	2,573	0.35	3006	0.32	2401	0.35
22	2,745	0.27	2,879	0.3	3464	0.29	2132	0.37
23	2,745	0.27	2,720	0.37	3441	0.33	2098	0.34
24	2,745	0.27	2,944	0.37	3825	0.33	2673	0.37
25	2,935	0.27	2,323	0.35	3543	0.31	2868	0.37
26	2,778	0.28	2,646	0.3	3603	0.32	2898	0.36
27	2,766	0.30	2,836	0.32	3633	0.34	3393	0.37
28	2,620	0.30	2,650	0.32	3846	0.28	3094	0.37
29	2,664	0.30	2,518	0.32	4246	0.28	2655	0.35
30	2,664	0.30	2,700	0.31	3911	0.26	2679	0.33
Monthly Total	85,160		77,450		88,414		70,638	0.33

2019 Daily Total Consumption and Chlorine Residual			2020 Daily Total Consumption and Chlorine		2021 Daily Total Consumption and Chlorine		2022 Daily Total Consumption and Chlorine	
Date	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**
	Cubic metre	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**
July								
1	2,664	0.30	2,254	0.31	4253	0.40	3066	0.35
2	2,664	0.31	2,402	0.31	4208	0.40	3135	0.34
3	2,708	0.31	2,200	0.31	3611	0.37	3007	0.30
4	2,908	0.33	2,262	0.31	3629	0.39	2794	0.31
5	2,792	0.29	2,402	0.31	3768	0.41	2121	0.19
6	2,553	0.29	2,349	0.31	3954	0.41	2185	0.20
7	2,553	0.29	2,718	0.29	3991	0.41	2620	0.24
8	2,314	0.30	2,906	0.31	3747	0.41	2377	0.28
9	2,490	0.27	2,695	0.33	3708	0.41	2428	0.28
10	2,370	0.28	2,585	0.34	3822	0.40	2455	0.29
11	2,303	0.28	2,475	0.34	3757	0.42	2886	0.29
12	2,212	0.27	2,803	0.34	3948	0.44	2717	0.30
13	2,575	0.28	2,354	0.34	3866	0.37	2755	0.30
14	2,444	0.28	2,462	0.24	4111	0.37	3010	0.29
15	2,641	0.27	2,717	0.25	4070	0.35	3265	0.30
16	2,670	0.27	2,730	0.29	4255	0.35	2732	0.31
17	2,402	0.29	2,792	0.3	3920	0.34	2607	0.32
18	2,375	0.26	2,735	0.3	3570	0.30	2727	0.31
19	2,272	0.29	2,889	0.3	3522	0.33	2846	0.30
20	2,577	0.24	2,981	0.33	3748	0.30	2900	0.31
21	2,726	0.28	3,308	0.31	3724	0.34	3277	0.31
22	2,973	0.28	3,485	0.29	3827	0.33	3460	0.38
23	3,104	0.30	3,215	0.27	3797	0.35	3322	0.37
24	2,876	0.27	3,107	0.3	1814	0.31	3181	0.34
25	2,728	0.31	3,406	0.3	3566	0.32	3346	0.34
26	2,916	0.29	2,903	0.3	3509	0.32	3298	0.33
27	2,076	0.25	3,189	0.3	3717	0.34	4111	0.35
28	2,556	0.28	3,731	0.29	3778	0.33	4295	0.37
29	2,920	0.27	3,774	0.32	4127	0.34	4064	0.34
30	3,017	0.30	3,356	0.26	3984	0.34	3952	0.34
31	2,671	0.31	3,360	0.33	3872	0.34	3811	0.35
Monthly Total	81,050		88,547		117,172		94,751	0.31

2019 Daily Total Consumption and Chlorine Residual			2020 Daily Total Consumption and Chlorine		2021 Daily Total Consumption and Chlorine		2022 Daily Total Consumption and Chlorine	
Date	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**
	Cubic metre	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**
August								
1	2,699	0.30	3,127	0.33	3359	0.34	3871	0.35
2	2,671	0.30	3,318	0.33	3087	0.32	3602	0.34
3	2,404	0.27	3,467	0.33	3403	0.33	3643	0.33
4	2,714	0.27	3,473	0.36	3653	0.36	3085	0.33
5	2,998	0.27	3,181	0.34	3917	0.35	2348	0.34
6	3,033	0.30	3,441	0.34	3994	0.36	2621	0.33
7	3,007	0.30	2,659	0.36	3314	0.30	3102	0.33
8	3,119	0.32	2,585	0.36	2785	0.33	3427	0.33
9	3,412	0.32	3,015	0.31	2629	0.35	3477	0.34
10	3,137	0.30	2,769	0.33	2931	0.36	3032	0.34
11	2,928	0.30	3,464	0.33	3125	0.36	3241	0.33
12	2,599	0.28	3,068	0.32	3862	0.37	3350	0.35
13	2,540	0.25	3,045	0.34	4264	0.37	3524	0.34
14	2,702	0.21	3,350	0.37	3753	0.37	3207	0.32
15	2,759	0.26	3,332	0.28	3523	0.37	3723	0.32
16	3,226	0.23	3,688	0.36	3101	0.37	3257	0.31
17	2,973	0.20	3,622	0.39	3061	0.37	3415	0.30
18	2,745	0.24	3,012	0.32	2599	0.35	3538	0.28
19	2,945	0.26	3,290	0.35	2858	0.35	3425	0.33
20	3,033	0.23	3,241	0.34	3460	0.35	3313	0.30
21	2,701	0.21	2,813	0.29	2574	0.35	3325	0.32
22	2,623	0.23	2,660	0.29	2131	0.34	3567	0.35
23	2,972	0.20	2,402	0.29	2455	0.34	3374	0.34
24	2,657	0.19	2,422	0.34	2196	0.32	3287	0.34
25	2,637	0.18	2,598	0.29	2525	0.31	3455	0.32
26	2,965	0.21	2,514	0.34	2741	0.35	3371	0.34
27	2,993	0.22	2,899	0.34	2748	0.34	3377	0.29
28	2,785	0.36	2,780	0.31	2497	0.35	3020	0.28
29	2,782	0.30	2,906	0.31	2644	0.35	3331	0.29
30	3,136	0.30	2,728	0.31	2788	0.34	3125	0.27
31	3,003	0.29	2,586	0.31	2595	0.34	3000	0.27
Monthly Total	88,898		93,457		94,573		102,434	0.32

2019 Daily Total Consumption and Chlorine Residual			2020 Daily Total Consumption and Chlorine		2021 Daily Total Consumption and Chlorine		2022 Daily Total Consumption and Chlorine	
Date	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**
	Cubic metre	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**
September								
1	2,698	0.27	2,500	0.33	2420	0.33	3393	0.27
2	2,837	0.30	2,504	0.33	2502	0.33	3353	0.25
3	3,062	0.30	2,954	0.28	2682	0.33	3505	0.26
4	2,628	0.32	3,031	0.27	2686	0.34	3155	0.24
5	2,480	0.31	2,926	0.27	2317	0.33	3001	0.25
6	2,895	0.28	2,629	0.27	2227	0.33	2657	0.24
7	2,733	0.25	2,642	0.22	2479	0.33	2281	0.28
8	2,609	0.25	2,629	0.25	2499	0.34	3629	0.32
9	2,509	0.29	2,695	0.27	2253	0.34	3358	0.33
10	2,270	0.29	2,737	0.28	2418	0.40	2869	0.32
11	2,262	0.28	2,945	0.28	2302	0.34	3121	0.32
12	2,262	0.27	2,794	0.28	2133	0.33	3011	0.30
13	2,333	0.26	2,566	0.28	2317	0.32	3049	0.32
14	1,877	0.26	2,473	0.28	2222	0.33	2806	0.32
15	1,928	0.26	2,378	0.26	2079	0.32	2826	0.29
16	1,848	0.26	2,062	0.27	1893	0.30	2826	0.30
17	1,782	0.28	2,397	0.28	1863	0.30	2601	0.30
18	1,860	0.27	2,388	0.28	1764	0.30	2387	0.28
19	1,887	0.26	2,447	0.29	1622	0.30	2649	0.29
20	1,868	0.27	1,849	0.27	1474	0.28	2461	0.28
21	1,816	0.27	1,892	0.27	1462	0.28	2614	0.28
22	1,778	0.27	1,816	0.26	1543	0.28	2590	0.30
23	1,649	0.28	1,901	0.29	1589	0.28	2453	0.32
24	1,639	0.27	1,820	0.28	1630	0.27	2362	0.33
25	1,751	0.25	1,799	0.28	1474	0.27	2443	0.33
26	1,637	0.27	1,856	0.28	1600	0.27	2403	0.33
27	1,522	0.28	1,705	0.28	1444	0.26	2380	0.34
28	1,597	0.28	1,509	0.28	1202	0.26	2310	0.33
29	1,555	0.28	1,578	0.26	1324	0.26	2532	0.35
30	1,476	0.34	1,706	0.25	1590	0.27	2083	0.32
Monthly Total	63,048		69,129		59,010		83,111	0.30

2019 Daily Total Consumption and Chlorine Residual			2020 Daily Total Consumption and Chlorine		2021 Daily Total Consumption and Chlorine		2022 Daily Total Consumption and Chlorine	
Date	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**
	Cubic metre	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**
October								
1	1,396	0.31	1,565	0.23	2301	0.29	2279	0.33
2	1,535	0.32	1,653	0.24	1356	0.29	2086	0.32
3	1,492	0.35	1,614	0.25	1320	0.28	2390	0.32
4	1,452	0.33	1,612	0.25	1356	0.27	2160	0.30
5	1,359	0.33	1,628	0.25	1265	0.27	2244	0.30
6	1,324	0.33	1,479	0.25	1301	0.27	2162	0.33
7	1,541	0.33	1,475	0.25	1301	0.26	2171	0.31
8	1,318	0.31	1,462	0.25	1230	0.26	2122	0.31
9	1,334	0.30	1,470	0.25	1382	0.25	2160	0.31
10	1,349	0.30	1,452	0.25	1244	0.26	2133	0.31
11	1,452	0.31	1,444	0.25	1228	0.26	2011	0.32
12	1,398	0.31	1,299	0.25	1279	0.25	2050	0.32
13	1,329	0.29	1,460	0.25	1354	0.33	2093	0.31
14	1,352	0.29	1,488	0.25	1235	0.40	1843	0.31
15	1,374	0.31	1,285	0.22	1163	0.39	1928	0.30
16	1,393	0.34	1,604	0.2	1165	0.37	2135	0.30
17	1,366	0.29	1,429	0.22	1178	0.34	2479	0.29
18	1,349	0.29	1,338	0.23	1170	0.31	1764	0.29
19	1,351	0.29	1,386	0.23	1201	0.31	1677	0.29
20	1,321	0.29	1,368	0.26	1270	0.31	1734	0.29
21	1,321	0.31	1,364	0.28	1226	0.32	1539	0.28
22	1,207	0.30	1,390	0.28	1278	0.31	1541	0.27
23	1,342	0.30	1,619	0.26	1223	0.34	1446	0.22
24	1,378	0.31	1,419	0.26	1130	0.32	1559	0.24
25	1,296	0.33	1,388	0.26	1100	0.32	1507	0.24
26	1,329	0.32	1,288	0.26	1156	0.31	1488	0.27
27	1,301	0.32	1,284	0.22	1434	0.33	1368	0.28
28	1,328	0.32	1,408	0.25	1370	0.31	1338	0.29
29	1,215	0.35	1,174	0.25	1152	0.29	1301	0.30
30	1,284	0.30	1,280	0.25	1231	0.31	1372	0.29
31	1,332	0.30	1,290	0.25	1197	0.27	1258	0.30
Monthly Total	42,118		44,413		39,797.9		57,333	0.30

2019 Daily Total Consumption and Chlorine Residual			2020 Daily Total Consumption and Chlorine		2021 Daily Total Consumption and Chlorine		2022 Daily Total Consumption and Chlorine	
Date	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**
	Cubic metre	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**
November								
1	1,269	0.30	1,324	0.25	1195	0.28	1354	0.29
2	1,312	0.30	1,201	0.26	1381	0.28	1452	0.30
4	1,336	0.31	1,397	0.27	1498	0.29	1366	0.30
5	1,338	0.30	1,212	0.25	1085	0.28	1310	0.30
6	1,712	0.28	1,284	0.22	1049	0.27	1195	0.30
7	1,316	0.33	1,187	0.23	1195	0.27	1358	0.29
8	1,297	0.29	1,374	0.23	1084	0.26	1195	0.29
9	1,265	0.29	1,130	0.23	1212	0.27	1310	0.29
10	1,125	0.29	1,369	0.21	1031	0.34	1666	0.29
11	1,289	0.29	1,264	0.23	1288	0.35	1461	0.29
12	1,201	0.28	1,195	0.26	1090	0.34	1282	0.31
13	1,284	0.29	1,444	0.26	1048	0.35	1352	0.32
14	1,129	0.29	1,154	0.3	1069	0.35	1331	0.32
15	1,131	0.29	1,342	0.3	1109	0.34	1461	0.33
16	1,271	0.29	1,306	0.3	1016	0.32	1370	0.34
17	1,267	0.29	1,213	0.3	1193	0.33	1524	0.34
18	1,116	0.29	1,300	0.3	1072	0.35	1499	0.31
19	1,301	0.30	1,209	0.29	1121	0.33	1338	0.31
20	1,290	0.30	1,230	0.28	1021	0.34	1517	0.31
21	1,178	0.29	1,170	0.31	1051	0.34	1397	0.29
22	1,319	0.30	1,323	0.28	1186	0.32	1415	0.29
23	1,281	0.30	1,292	0.28	1039	0.30	1334	0.38
24	1,303	0.30	1,204	0.29	1084	0.32	1402	0.36
25	1,203	0.32	1,199	0.28	1043	0.31	1436	0.35
26	1,250	0.29	1,253	0.28	963	0.31	1402	0.33
27	1,156	0.29	1,296	0.27	1068	0.31	1571	0.34
28	1,253	0.30	1,145	0.27	995	0.31	1391	0.33
29	1,275	0.27	1,179	0.27	1173	0.32	1439	0.34
30			1,297	0.27	1078	0.32	1402	0.33
Monthly Total	35,467		36,495		33,496		40,529	0.32

2019 Daily Total Consumption and Chlorine Residual			2020 Daily Total Consumption and Chlorine		2021 Daily Total Consumption and Chlorine		2022 Daily Total Consumption and Chlorine	
Date	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**
	Cubic metre	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**
December								
1	1,318	0.26	1,291	0.27	920	0.33	1449	0.34
2	1,319	0.28	1,191	0.27	1051	0.35	1414	0.32
3	1,286	0.28	1,214	0.26	1054	0.34	1402	0.33
4	1,371	0.30	1,144	0.26	843	0.35	1364	0.31
5	1,135	0.30	1,200	0.26	972	0.33	1311	0.29
6	1,253	0.28	1,224	0.26	1032	0.33	1544	0.27
7	1,136	0.29	1,244	0.26	995	0.37	1411	0.29
8	1,279	0.30	1,319	0.24	1148	0.38	1443	0.32
9	1,281	0.30	1,244	0.25	969	0.43	1129	0.31
10	1,113	0.30	1,200	0.25	1042	0.34	1511	0.29
11	1,266	0.33	1,204	0.24	1050	0.35	1394	0.28
12	1,163	0.31	1,342	0.25	1022	0.35	1452	0.29
13	1,250	0.31	1,119	0.25	1015	0.34	1360	0.32
14	1,130	0.30	1,317	0.25	1163	0.39	1539	0.32
15	1,264	0.32	1,069	0.23	1015	0.32	1292	0.31
16	1,220	0.32	1,535	0.21	1046	0.35	1431	0.29
17	1,159	0.33	1,038	0.19	1134	0.34	1462	0.28
18	1,288	0.32	1,063	0.18	1063	0.33	1410	0.27
19	1,126	0.32	1,163	0.19	1054	0.32	1586	0.26
20	1,256	0.31	1,170	0.19	1200	0.32	1435	0.26
21	1,282	0.32	1,048	0.19	1140	0.33	1616	0.27
22	1,121	0.35	1,429	0.19	1145	0.34	1478	0.26
23	1,284	0.34	1,187	0.18	1137	0.35	1505	0.29
24	1,261	0.33	1,071	0.18	1086	0.34	1594	0.29
25	1,178	0.34	1,174	0.18	1287	0.34	1639	0.31
26	1,251	0.34	1,074	0.18	1189	0.32	1526	0.31
27	1,131	0.34	1,074	0.18	1192	0.31	1718	0.31
28	1,264	0.29	1,111	0.14	1250	0.30	1773	0.30
29	1,302	0.16	1,203	0.19	1253	0.30	1572	0.30
30	1,308	0.08	1,172	0.19	1271	0.29	1641	0.31
31	1,316	0.14	1,163	0.14	1235	0.30	1624	0.29
Monthly Total	38,311		36,995		33,972		46,024	0.30

2019 Daily Total Consumption and Chlorine Residual			2020 Daily Total Consumption and Chlorine		2021 Daily Total Consumption and Chlorine		2022 Daily Total Consumption and Chlorine	
Date	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**	**Daily**	**Daily Cl2**
	Cubic metre	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**	**Cubic metre**	**Residual (ppm)**
2019 Total m3	667,727		676,900		700,987		748,663	
Daily Average	1,838	0.28	1,855	0.29	1,915	0.31	2057	0.32
Max Day	3,527	0.36	3,774	0.5	4,264	0.44	4295	0.48
Min Day	1,067	0.08	1,038	0.14	843	0.13	1129	0.18

Box 100 | 7400 Prospect Street
Pemberton, BC V0N 2L0
P: 604.894.6135 | F: 604.894.6136
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APPENDIX II

2022 Annual Chemical Analysis of Drinking Water

Your Project #: Annual Water Sample
Your C.O.C. #: 685113-01-01

Attention: Jeff Westlake

VILLAGE OF PEMBERTON
Box 100
7400 Prospect St
Pemberton, BC
CANADA V0N 2L0

Report Date: 2023/01/27
Report #: R3293219
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C304398
Received: 2023/01/20, 08:00

Sample Matrix: Drinking Water
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	5	N/A	2023/01/21	BBY6SOP-00026	SM 23 2320 B m
Chloride/Sulphate by Auto Colourimetry	5	N/A	2023/01/23	BBY6SOP-00011 / BBY6SOP-00017	SM23-4500-Cl/SO4-E m
Colour (True) by Kone Lab	5	N/A	2023/01/20	BBY6SOP-00057	SM 23 2120 C m
Conductivity @25C	5	N/A	2023/01/21	BBY6SOP-00026	SM 23 2510 B m
Fluoride	5	N/A	2023/01/20	BBY6SOP-00048	SM 23 4500-F C m
Hardness Total (calculated as CaCO3) (1)	5	N/A	2023/01/23	BBY WI-00033	Auto Calc
Mercury (Total) by CV	5	2023/01/24	2023/01/24	AB SOP-00084	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	5	N/A	2023/01/23	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (total)	5	N/A	2023/01/21	BBY7SOP-00003 / BBY7SOP-00002	EPA 6020b R2 m
Nitrate + Nitrite (N)	5	N/A	2023/01/21	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrite (N) by CFA	5	N/A	2023/01/21	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrogen - Nitrate (as N)	5	N/A	2023/01/21	BBY WI-00033	Auto Calc
pH @25°C (2)	5	N/A	2023/01/21	BBY6SOP-00026	SM 23 4500-H+ B m
Total Dissolved Solids (Filt. Residue)	5	2023/01/25	2023/01/26	BBY6SOP-00033	SM 23 2540 C m
Total Trihalomethanes Calculation	3	N/A	2023/01/23	BBY WI-00033	Auto Calc
Turbidity	5	N/A	2023/01/21	BBY6SOP-00027	SM 23 2130 B m
VOCs, VH, F1, LH in Water by HS GC/MS	5	N/A	2023/01/23	BBY8SOP-00009 / BBY8SOP-00011 / BBY8SOP-00012	BCMOE BCLM Jul2017 m
Volatile HC-BTEX (3)	3	N/A	2023/01/23	BBY WI-00033	Auto Calc

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Your Project #: Annual Water Sample
Your C.O.C. #: 685113-01-01

Attention: Jeff Westlake

VILLAGE OF PEMBERTON
Box 100
7400 Prospect St
Pemberton, BC
CANADA V0N 2L0

Report Date: 2023/01/27
Report #: R3293219
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C304398

Received: 2023/01/20, 08:00

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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

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

(1) "Total Hardness" was calculated from Total Ca and Mg concentrations and may be biased high (Hardness, or Dissolved Hardness, calculated from Dissolved Ca and Mg, should be used for compliance if available).
(2) The CCME method requires pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the CCME holding time. Bureau Veritas endeavours to analyze samples as soon as possible after receipt.
(3) VPH = VH - (Benzene + Toluene + Ethylbenzene + m & p-Xylene + o-Xylene + Styrene)

Encryption Key

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas
27 Jan 2023 09:37:02

Please direct all questions regarding this Certificate of Analysis to:
Customer Solutions, Western Canada Customer Experience Team
Email: customersolutionswest@bureauveritas.com
Phone# (604) 734 7276

==========

This report has been generated and distributed using a secure automated process.
Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Raphael Kwan, Senior Manager, BC and Yukon Regions responsible for British Columbia Environmental laboratory operations.

RESULTS OF CHEMICAL ANALYSES OF DRINKING WATER

Bureau Veritas ID					BKN739	BKN740	BKN741		
Sampling Date					2023/01/18 08:30	2023/01/18 08:40	2023/01/18 09:00		
COC Number					685113-01-01	685113-01-01	685113-01-01		
	UNITS	MAC	AO	OG	WELL #2	WELL #3	FARM RO	RDL	QC Batch
ANIONS									
Nitrite (N)	mg/L	1	-	-	<0.0050	<0.0050	<0.0050	0.0050	A860499
Calculated Parameters									
Total Hardness (CaCO3)	mg/L	-	-	-	65.0	29.2	30.2	0.50	A859320
Nitrate (N)	mg/L	10	-	-	0.241	0.112	0.107	0.020	A859358
Misc. Inorganics									
Conductivity	uS/cm	-	-	-	240	100	170	2.0	A861518
pH	pH	-	-	7.0:10.5	**6.70**	**6.58**	7.16	N/A	A861515
Total Dissolved Solids	mg/L	-	500	-	150	60	92	10	A863326
Anions									
Alkalinity (PP as CaCO3)	mg/L	-	-	-	<1.0	<1.0	<1.0	1.0	A861517
Alkalinity (Total as CaCO3)	mg/L	-	-	-	34	16	56	1.0	A861517
Bicarbonate (HCO3)	mg/L	-	-	-	42	20	69	1.0	A861517
Carbonate (CO3)	mg/L	-	-	-	<1.0	<1.0	<1.0	1.0	A861517
Dissolved Fluoride (F)	mg/L	1.5	-	-	<0.050	<0.050	<0.050	0.050	A859880
Hydroxide (OH)	mg/L	-	-	-	<1.0	<1.0	<1.0	1.0	A861517
Chloride (Cl)	mg/L	-	250	-	36	11	12	1.0	A860087
Sulphate (SO4)	mg/L	-	500	-	20	10	11	1.0	A860087
MISCELLANEOUS									
True Colour	Col. Unit	-	15	-	<5.0	<5.0	<5.0	5.0	A859949
Nutrients									
Nitrate plus Nitrite (N)	mg/L	-	-	-	0.241	0.112	0.107	0.020	A860498
Physical Properties									
Turbidity	NTU	see remark	see remark	see remark	0.51	0.31	0.36	0.10	A860474

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
N/A = Not Applicable

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

RESULTS OF CHEMICAL ANALYSES OF DRINKING WATER

Bureau Veritas ID					BKN742		BKN743		
Sampling Date					2023/01/18 09:30		2023/01/18 10:00		
COC Number					685113-01-01		685113-01-01		
	UNITS	MAC	AO	OG	RIDGE PIS	QC Batch	INDUSTRIAL PARK	RDL	QC Batch
ANIONS									
Nitrite (N)	mg/L	1	-	-	<0.0050	A860499	<0.0050	0.0050	A860499
Calculated Parameters									
Total Hardness (CaCO3)	mg/L	-	-	-	30.4	A859320	29.6	0.50	A859320
Nitrate (N)	mg/L	10	-	-	0.105	A859358	0.100	0.020	A859358
Misc. Inorganics									
Conductivity	uS/cm	-	-	-	170	A861518	77	2.0	A861518
pH	pH	-	-	7.0:10.5	7.22	A861515	**6.85**	N/A	A861515
Total Dissolved Solids	mg/L	-	500	-	96	A863326	60	10	A863326
Anions									
Alkalinity (PP as CaCO3)	mg/L	-	-	-	<1.0	A861517	<1.0	1.0	A861517
Alkalinity (Total as CaCO3)	mg/L	-	-	-	57	A861517	25	1.0	A861517
Bicarbonate (HCO3)	mg/L	-	-	-	70	A861517	30	1.0	A861517
Carbonate (CO3)	mg/L	-	-	-	<1.0	A861517	<1.0	1.0	A861517
Dissolved Fluoride (F)	mg/L	1.5	-	-	<0.050	A859880	<0.050	0.050	A859880
Hydroxide (OH)	mg/L	-	-	-	<1.0	A861517	<1.0	1.0	A861517
Chloride (Cl)	mg/L	-	250	-	12	A860091	1.3	1.0	A860091
Sulphate (SO4)	mg/L	-	500	-	11	A860091	10	1.0	A860091
MISCELLANEOUS									
True Colour	Col. Unit	-	15	-	<5.0	A859949	<5.0	5.0	A859957
Nutrients									
Nitrate plus Nitrite (N)	mg/L	-	-	-	0.105	A860498	0.100	0.020	A860498
Physical Properties									
Turbidity	NTU	see remark	see remark	see remark	0.18	A860474	0.18	0.10	A860474

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
N/A = Not Applicable

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

MERCURY BY COLD VAPOR (DRINKING WATER)

Bureau Veritas ID			BKN739	BKN740	BKN741	BKN742	BKN743		
Sampling Date			2023/01/18 08:30	2023/01/18 08:40	2023/01/18 09:00	2023/01/18 09:30	2023/01/18 10:00		
COC Number			685113-01-01	685113-01-01	685113-01-01	685113-01-01	685113-01-01		
	UNITS	MAC	WELL #2	WELL #3	FARM RO	RIDGE PIS	INDUSTRIAL PARK	RDL	QC Batch
Elements									
Total Mercury (Hg)	ug/L	1	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	0.0019	A861894

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

ELEMENTS BY ATOMIC SPECTROSCOPY (DRINKING WATER)

Bureau Veritas ID					BKN739	BKN740	BKN741	BKN742		
Sampling Date					2023/01/18 08:30	2023/01/18 08:40	2023/01/18 09:00	2023/01/18 09:30		
COC Number					685113-01-01	685113-01-01	685113-01-01	685113-01-01		
	UNITS	MAC	AO	OG	WELL #2	WELL #3	FARM RO	RIDGE PIS	RDL	QC Batch
Total Metals by ICPMS										
Total Aluminum (Al)	ug/L	2900	-	100	5.5	7.6	<3.0	<3.0	3.0	A860022
Total Antimony (Sb)	ug/L	6	-	-	<0.50	<0.50	<0.50	<0.50	0.50	A860022
Total Arsenic (As)	ug/L	10	-	-	<0.10	<0.10	<0.10	<0.10	0.10	A860022
Total Barium (Ba)	ug/L	2000	-	-	40.0	17.9	18.3	18.2	1.0	A860022
Total Boron (B)	ug/L	5000	-	-	118	<50	<50	<50	50	A860022
Total Cadmium (Cd)	ug/L	7	-	-	0.010	0.025	<0.010	<0.010	0.010	A860022
Total Chromium (Cr)	ug/L	50	-	-	<1.0	<1.0	<1.0	<1.0	1.0	A860022
Total Cobalt (Co)	ug/L	-	-	-	<0.20	<0.20	<0.20	<0.20	0.20	A860022
Total Copper (Cu)	ug/L	2000	1000	-	3.11	7.89	6.11	4.19	0.20	A860022
Total Iron (Fe)	ug/L	-	300	-	65.7	8.6	6.9	10.6	5.0	A860022
Total Lead (Pb)	ug/L	5	-	-	0.29	<0.20	<0.20	<0.20	0.20	A860022
Total Manganese (Mn)	ug/L	120	20	-	**64.9**	**33.5**	2.6	2.5	1.0	A860022
Total Molybdenum (Mo)	ug/L	-	-	-	2.1	<1.0	<1.0	<1.0	1.0	A860022
Total Nickel (Ni)	ug/L	-	-	-	<1.0	<1.0	<1.0	<1.0	1.0	A860022
Total Selenium (Se)	ug/L	50	-	-	<0.10	<0.10	<0.10	<0.10	0.10	A860022
Total Silver (Ag)	ug/L	-	-	-	<0.020	<0.020	<0.020	<0.020	0.020	A860022
Total Strontium (Sr)	ug/L	7000	-	-	140	59.5	60.2	60.9	1.0	A860022
Total Uranium (U)	ug/L	20	-	-	<0.10	<0.10	<0.10	<0.10	0.10	A860022
Total Vanadium (V)	ug/L	-	-	-	<5.0	<5.0	<5.0	<5.0	5.0	A860022
Total Zinc (Zn)	ug/L	-	5000	-	19.2	<5.0	<5.0	5.6	5.0	A860022
Total Calcium (Ca)	mg/L	-	-	-	23.7	10.6	11.0	11.1	0.050	A859363
Total Magnesium (Mg)	mg/L	-	-	-	1.42	0.631	0.643	0.662	0.050	A859363
Total Potassium (K)	mg/L	-	-	-	2.37	1.00	1.02	1.02	0.050	A859363
Total Sodium (Na)	mg/L	-	200	-	13.7	4.66	21.3	21.0	0.050	A859363
Total Sulphur (S)	mg/L	-	-	-	5.0	<3.0	<3.0	<3.0	3.0	A859363

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

ELEMENTS BY ATOMIC SPECTROSCOPY (DRINKING WATER)

Bureau Veritas ID					BKN743		
Sampling Date					2023/01/18 10:00		
COC Number					685113-01-01		
	UNITS	MAC	AO	OG	INDUSTRIAL PARK	RDL	QC Batch
Total Metals by ICPMS							
Total Aluminum (Al)	ug/L	2900	-	100	<3.0	3.0	A860022
Total Antimony (Sb)	ug/L	6	-	-	<0.50	0.50	A860022
Total Arsenic (As)	ug/L	10	-	-	0.11	0.10	A860022
Total Barium (Ba)	ug/L	2000	-	-	5.8	1.0	A860022
Total Boron (B)	ug/L	5000	-	-	<50	50	A860022
Total Cadmium (Cd)	ug/L	7	-	-	<0.010	0.010	A860022
Total Chromium (Cr)	ug/L	50	-	-	<1.0	1.0	A860022
Total Cobalt (Co)	ug/L	-	-	-	<0.20	0.20	A860022
Total Copper (Cu)	ug/L	2000	1000	-	4.35	0.20	A860022
Total Iron (Fe)	ug/L	-	300	-	10.2	5.0	A860022
Total Lead (Pb)	ug/L	5	-	-	<0.20	0.20	A860022
Total Manganese (Mn)	ug/L	120	20	-	<1.0	1.0	A860022
Total Molybdenum (Mo)	ug/L	-	-	-	<1.0	1.0	A860022
Total Nickel (Ni)	ug/L	-	-	-	<1.0	1.0	A860022
Total Selenium (Se)	ug/L	50	-	-	<0.10	0.10	A860022
Total Silver (Ag)	ug/L	-	-	-	<0.020	0.020	A860022
Total Strontium (Sr)	ug/L	7000	-	-	30.9	1.0	A860022
Total Uranium (U)	ug/L	20	-	-	<0.10	0.10	A860022
Total Vanadium (V)	ug/L	-	-	-	<5.0	5.0	A860022
Total Zinc (Zn)	ug/L	-	5000	-	<5.0	5.0	A860022
Total Calcium (Ca)	mg/L	-	-	-	10.3	0.050	A859363
Total Magnesium (Mg)	mg/L	-	-	-	0.930	0.050	A859363
Total Potassium (K)	mg/L	-	-	-	0.494	0.050	A859363
Total Sodium (Na)	mg/L	-	200	-	1.60	0.050	A859363
Total Sulphur (S)	mg/L	-	-	-	<3.0	3.0	A859363

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

TRIHALOMETHANES (THM) IN WATER

Bureau Veritas ID			BKN741	BKN742			BKN743		
Sampling Date			2023/01/18 09:00	2023/01/18 09:30			2023/01/18 10:00		
COC Number			685113-01-01	685113-01-01			685113-01-01		
	UNITS	**MAC**	**FARM RO**	**RIDGE PIS**	**RDL**	**QC Batch**	**INDUSTRIAL PARK**	**RDL**	**QC Batch**
Volatiles									
Total Trihalomethanes	ug/L	100	3.6	4.0	1.0	A859364	2.1	1.0	A859364
Bromodichloromethane	ug/L	-	<1.0	<1.0	1.0	A859861			
Bromoform	ug/L	-	1.3	1.3	1.0	A859861			
Dibromochloromethane	ug/L	-	2.3	2.7	1.0	A859861			
Chloroform	ug/L	-	<1.0	<1.0	1.0	A859861			
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	-	115	100		A859861			
4-Bromofluorobenzene (sur.)	%	-	84	85		A859861			
D4-1,2-Dichloroethane (sur.)	%	-	127	103		A859861			

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

CSR VOC + VPH IN WATER (DRINKING WATER)

Bureau Veritas ID				BKN739	BKN740	BKN743		
Sampling Date				2023/01/18 08:30	2023/01/18 08:40	2023/01/18 10:00		
COC Number				685113-01-01	685113-01-01	685113-01-01		
	UNITS	MAC	AO	WELL #2	WELL #3	INDUSTRIAL PARK	RDL	QC Batch
Calculated Parameters								
VPH (VH6 to 10 - BTEX)	ug/L	-	-	<300	<300	<300	300	A859310
Volatiles								
VH C6-C10	ug/L	-	-	<300	<300	<300	300	A859861
1,1,1,2-tetrachloroethane	ug/L	-	-	<0.50	<0.50	<0.50	0.50	A859861
1,1,1-trichloroethane	ug/L	-	-	<0.50	<0.50	<0.50	0.50	A859861
1,1,2,2-tetrachloroethane	ug/L	-	-	<0.50	<0.50	<0.50	0.50	A859861
1,1,2Trichloro-1,2,2Trifluoroethane	ug/L	-	-	<2.0	<2.0	<2.0	2.0	A859861
1,1,2-trichloroethane	ug/L	-	-	<0.50	<0.50	<0.50	0.50	A859861
1,1-dichloroethane	ug/L	-	-	<0.50	<0.50	<0.50	0.50	A859861
1,1-dichloroethene	ug/L	14	-	<0.50	<0.50	<0.50	0.50	A859861
1,2-dichlorobenzene	ug/L	200	3	<0.50	<0.50	<0.50	0.50	A859861
1,2-dichloroethane	ug/L	5	-	<0.50	<0.50	<0.50	0.50	A859861
1,2-dichloropropane	ug/L	-	-	<0.50	<0.50	<0.50	0.50	A859861
1,3-Butadiene	ug/L	-	-	<0.50	<0.50	<0.50	0.50	A859861
1,3-dichlorobenzene	ug/L	-	-	<0.50	<0.50	<0.50	0.50	A859861
1,4-dichlorobenzene	ug/L	5	1	<0.50	<0.50	<0.50	0.50	A859861
Benzene	ug/L	5	-	<0.40	<0.40	<0.40	0.40	A859861
Bromobenzene	ug/L	-	-	<2.0	<2.0	<2.0	2.0	A859861
Bromodichloromethane	ug/L	-	-	<1.0	<1.0	<1.0	1.0	A859861
Bromoform	ug/L	-	-	<1.0	<1.0	<1.0	1.0	A859861
Bromomethane	ug/L	-	-	<1.0	<1.0	<1.0	1.0	A859861
Carbon tetrachloride	ug/L	2	-	<0.50	<0.50	<0.50	0.50	A859861
Chlorobenzene	ug/L	80	30	<0.50	<0.50	<0.50	0.50	A859861
Dibromochloromethane	ug/L	-	-	<1.0	<1.0	<1.0	1.0	A859861
Chloroethane	ug/L	-	-	<1.0	<1.0	<1.0	1.0	A859861
Chloroform	ug/L	-	-	<1.0	<1.0	2.1	1.0	A859861
Chloromethane	ug/L	-	-	<1.0	<1.0	<1.0	1.0	A859861
cis-1,2-dichloroethene	ug/L	-	-	<1.0	<1.0	<1.0	1.0	A859861
cis-1,3-dichloropropene	ug/L	-	-	<1.0	<1.0	<1.0	1.0	A859861
Dibromomethane	ug/L	-	-	<0.90	<0.90	<0.90	0.90	A859861
Dichlorodifluoromethane	ug/L	-	-	<2.0	<2.0	<2.0	2.0	A859861
Dichloromethane	ug/L	50	-	<2.0	<2.0	<2.0	2.0	A859861
Ethylbenzene	ug/L	140	1.6	<0.40	<0.40	<0.40	0.40	A859861

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

CSR VOC + VPH IN WATER (DRINKING WATER)

Bureau Veritas ID				BKN739	BKN740	BKN743		
Sampling Date				2023/01/18 08:30	2023/01/18 08:40	2023/01/18 10:00		
COC Number				685113-01-01	685113-01-01	685113-01-01		
	UNITS	MAC	AO	WELL #2	WELL #3	INDUSTRIAL PARK	RDL	QC Batch
Methyl-tert-butylether (MTBE)	ug/L	-	15	<4.0	<4.0	<4.0	4.0	A859861
Styrene	ug/L	-	-	<0.50	<0.50	<0.50	0.50	A859861
Tetrachloroethene	ug/L	10	-	<0.50	<0.50	<0.50	0.50	A859861
Toluene	ug/L	60	24	<0.40	<0.40	<0.40	0.40	A859861
trans-1,2-dichloroethene	ug/L	-	-	<1.0	<1.0	<1.0	1.0	A859861
trans-1,3-dichloropropene	ug/L	-	-	<1.0	<1.0	<1.0	1.0	A859861
Trichloroethene	ug/L	5	-	<0.50	<0.50	<0.50	0.50	A859861
Trichlorofluoromethane	ug/L	-	-	<4.0	<4.0	<4.0	4.0	A859861
Vinyl chloride	ug/L	2	-	<0.50	<0.50	<0.50	0.50	A859861
m & p-Xylene	ug/L	-	-	<0.40	<0.40	<0.40	0.40	A859861
o-Xylene	ug/L	-	-	<0.40	<0.40	<0.40	0.40	A859861
Xylenes (Total)	ug/L	90	20	<0.40	<0.40	<0.40	0.40	A859861
Surrogate Recovery (%)								
1,4-Difluorobenzene (sur.)	%	-	-	100	115	115		A859861
4-Bromofluorobenzene (sur.)	%	-	-	85	84	84		A859861
D4-1,2-Dichloroethane (sur.)	%	-	-	129	102	102		A859861

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

GENERAL COMMENTS

MAC,AO,OG: The guidelines that have been included in this report have been taken from the Canadian Drinking Water Quality Summary Table, September 2020.

Criteria A = Maximum Acceptable Concentration (MAC) / Criteria B = Aesthetic Objectives (AO) / Criteria C = Operational Guidance Values (OG)
It is recommended to consult these guidelines when interpreting your data since there are non-numerical guidelines that are not included on this report.

Turbidity Guidelines:
1. Chemically assisted filtration: less than or equal to 0.3 NTU in 95% of the measurements or 95% of the time each month. Shall not exceed 1.0 NTU at any time.
2. Slow sand / diatomaceous earth filtration: less than or equal to 1.0 NTU in 95% of the measurements or 95% of the time each month. Shall not exceed 3.0 NTU at any time.
3. Membrane filtration: less than or equal to 0.1 NTU in 99% of the measurements made or at least 99% of the time each calendar month. Shall not exceed 0.3 NTU at any time.
4. To ensure effectiveness of disinfection and for good operation of the distribution system, it is recommended that water entering the distribution system have turbidity levels of 1.0 NTU or less.
Measurement of Uncertainty has not been accounted for when stating conformity to the selected criteria, where applicable.

Results relate only to the items tested.

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A859861	1,4-Difluorobenzene (sur.)	2023/01/23	98	50 - 140	97	50 - 140	99	%		
A859861	4-Bromofluorobenzene (sur.)	2023/01/23	101	50 - 140	97	50 - 140	83	%		
A859861	D4-1,2-Dichloroethane (sur.)	2023/01/23	102	50 - 140	96	50 - 140	94	%		
A859861	1,1,1,2-tetrachloroethane	2023/01/23	98	50 - 140	90	60 - 130	<0.50	ug/L	NC	30
A859861	1,1,1-trichloroethane	2023/01/23	101	50 - 140	94	60 - 130	<0.50	ug/L	NC	30
A859861	1,1,2,2-tetrachloroethane	2023/01/23	93	50 - 140	88	60 - 130	<0.50	ug/L	NC	30
A859861	1,1,2Trichloro-1,2,2Trifluoroethane	2023/01/23	104	50 - 140	100	60 - 130	<2.0	ug/L	NC	30
A859861	1,1,2-trichloroethane	2023/01/23	97	50 - 140	88	60 - 130	<0.50	ug/L	NC	30
A859861	1,1-dichloroethane	2023/01/23	119	50 - 140	94	60 - 130	<0.50	ug/L	NC	30
A859861	1,1-dichloroethene	2023/01/23	107	50 - 140	102	60 - 130	<0.50	ug/L	NC	30
A859861	1,2-dichlorobenzene	2023/01/23	101	50 - 140	98	60 - 130	<0.50	ug/L	NC	30
A859861	1,2-dichloroethane	2023/01/23	104	50 - 140	96	60 - 130	<0.50	ug/L	NC	30
A859861	1,2-dichloropropane	2023/01/23	103	50 - 140	96	60 - 130	<0.50	ug/L	NC	30
A859861	1,3-Butadiene	2023/01/23	100	50 - 140	96	50 - 140	<0.50	ug/L	NC	30
A859861	1,3-dichlorobenzene	2023/01/23	104	50 - 140	102	60 - 130	<0.50	ug/L	NC	30
A859861	1,4-dichlorobenzene	2023/01/23	101	50 - 140	99	60 - 130	<0.50	ug/L	NC	30
A859861	Benzene	2023/01/23	128	50 - 140	99	60 - 130	<0.40	ug/L	NC	30
A859861	Bromobenzene	2023/01/23	94	50 - 140	90	60 - 130	<2.0	ug/L	NC	30
A859861	Bromodichloromethane	2023/01/23	110	50 - 140	105	60 - 130	<1.0	ug/L	NC	30
A859861	Bromoform	2023/01/23	86	50 - 140	79	60 - 130	<1.0	ug/L	NC	30
A859861	Bromomethane	2023/01/23	113	50 - 140	92	50 - 140	<1.0	ug/L	NC	30
A859861	Carbon tetrachloride	2023/01/23	104	50 - 140	96	60 - 130	<0.50	ug/L	NC	30
A859861	Chlorobenzene	2023/01/23	94	50 - 140	89	60 - 130	<0.50	ug/L	NC	30
A859861	Chloroethane	2023/01/23	108	50 - 140	106	50 - 140	<1.0	ug/L	NC	30
A859861	Chloroform	2023/01/23	94	50 - 140	87	60 - 130	<1.0	ug/L	NC	30
A859861	Chloromethane	2023/01/23	96	50 - 140	87	50 - 140	<1.0	ug/L	NC	30
A859861	cis-1,2-dichloroethene	2023/01/23	104	50 - 140	96	60 - 130	<1.0	ug/L	NC	30
A859861	cis-1,3-dichloropropene	2023/01/23	98	50 - 140	77	50 - 140	<1.0	ug/L	NC	30
A859861	Dibromochloromethane	2023/01/23	98	50 - 140	89	60 - 130	<1.0	ug/L	NC	30
A859861	Dibromomethane	2023/01/23	100	50 - 140	91	60 - 130	<0.90	ug/L		
A859861	Dichlorodifluoromethane	2023/01/23	95	50 - 140	90	50 - 140	<2.0	ug/L	NC	30
A859861	Dichloromethane	2023/01/23	99	50 - 140	92	60 - 130	<2.0	ug/L	NC	30
A859861	Ethylbenzene	2023/01/23	112	50 - 140	107	60 - 130	<0.40	ug/L	NC	30

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A859861	m & p-Xylene	2023/01/23	92	50 - 140	88	60 - 130	<0.40	ug/L	NC	30
A859861	Methyl-tert-butylether (MTBE)	2023/01/23	101	50 - 140	94	60 - 130	<4.0	ug/L	NC	30
A859861	o-Xylene	2023/01/23	87	50 - 140	83	60 - 130	<0.40	ug/L	NC	30
A859861	Styrene	2023/01/23	89	50 - 140	85	60 - 130	<0.50	ug/L	NC	30
A859861	Tetrachloroethene	2023/01/23	96	50 - 140	92	60 - 130	<0.50	ug/L	1.1	30
A859861	Toluene	2023/01/23	92	50 - 140	94	60 - 130	<0.40	ug/L	2.9	30
A859861	trans-1,2-dichloroethene	2023/01/23	104	50 - 140	99	60 - 130	<1.0	ug/L	NC	30
A859861	trans-1,3-dichloropropene	2023/01/23	99	50 - 140	73	50 - 140	<1.0	ug/L	NC	30
A859861	Trichloroethene	2023/01/23	109	50 - 140	113	60 - 130	<0.50	ug/L	NC	30
A859861	Trichlorofluoromethane	2023/01/23	193 (1)	50 - 140	85	60 - 130	<4.0	ug/L	NC	30
A859861	VH C6-C10	2023/01/23			100	70 - 130	<300	ug/L	NC	30 A
A859861	Vinyl chloride	2023/01/23	84	50 - 140	79	50 - 140	<0.50	ug/L	NC	30
A859861	Xylenes (Total)	2023/01/23					<0.40	ug/L	NC	30
A859880	Dissolved Fluoride (F)	2023/01/20	NC	80 - 120	96	80 - 120	<0.050	mg/L	4.4	20
A859949	True Colour	2023/01/20			98	80 - 120	<5.0	Col. Unit	NC	20
A859957	True Colour	2023/01/20			110	80 - 120	<5.0	Col. Unit	NC	20
A860022	Total Aluminum (Al)	2023/01/21	100	80 - 120	104	80 - 120	<3.0	ug/L	1.1	20
A860022	Total Antimony (Sb)	2023/01/21	101	80 - 120	104	80 - 120	<0.50	ug/L	NC	20
A860022	Total Arsenic (As)	2023/01/21	101	80 - 120	103	80 - 120	<0.10	ug/L	NC	20
A860022	Total Barium (Ba)	2023/01/21	96	80 - 120	101	80 - 120	<1.0	ug/L	1.7	20
A860022	Total Boron (B)	2023/01/21	96	80 - 120	102	80 - 120	<50	ug/L	1.6	20
A860022	Total Cadmium (Cd)	2023/01/21	101	80 - 120	105	80 - 120	<0.010	ug/L	0.76	20
A860022	Total Chromium (Cr)	2023/01/21	99	80 - 120	104	80 - 120	<1.0	ug/L	NC	20
A860022	Total Cobalt (Co)	2023/01/21	98	80 - 120	102	80 - 120	<0.20	ug/L	NC	20
A860022	Total Copper (Cu)	2023/01/21	95	80 - 120	100	80 - 120	<0.20	ug/L	1.9	20
A860022	Total Iron (Fe)	2023/01/21	95	80 - 120	105	80 - 120	<5.0	ug/L	0.76	20
A860022	Total Lead (Pb)	2023/01/21	99	80 - 120	104	80 - 120	<0.20	ug/L	0.49	20
A860022	Total Manganese (Mn)	2023/01/21	NC	80 - 120	103	80 - 120	<1.0	ug/L	1.1	20
A860022	Total Molybdenum (Mo)	2023/01/21	103	80 - 120	103	80 - 120	<1.0	ug/L	3.8	20
A860022	Total Nickel (Ni)	2023/01/21	97	80 - 120	102	80 - 120	<1.0	ug/L	NC	20
A860022	Total Selenium (Se)	2023/01/21	97	80 - 120	102	80 - 120	<0.10	ug/L	NC	20
A860022	Total Silver (Ag)	2023/01/21	101	80 - 120	103	80 - 120	<0.020	ug/L	NC	20
A860022	Total Strontium (Sr)	2023/01/21	NC	80 - 120	102	80 - 120	<1.0	ug/L	0.0021	20

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A860022	Total Uranium (U)	2023/01/21	102	80 - 120	106	80 - 120	<0.10	ug/L	NC	20
A860022	Total Vanadium (V)	2023/01/21	101	80 - 120	104	80 - 120	<5.0	ug/L	NC	20
A860022	Total Zinc (Zn)	2023/01/21	101	80 - 120	106	80 - 120	<5.0	ug/L	0.25	20
A860087	Chloride (Cl)	2023/01/23	103	80 - 120	102	80 - 120	<1.0	mg/L	NC	20
A860087	Sulphate (SO4)	2023/01/23	NC	80 - 120	102	80 - 120	<1.0	mg/L		
A860091	Chloride (Cl)	2023/01/23	102	80 - 120	104	80 - 120	<1.0	mg/L	7.2	20
A860091	Sulphate (SO4)	2023/01/23	96	80 - 120	101	80 - 120	<1.0	mg/L	NC	20
A860474	Turbidity	2023/01/21			103	80 - 120	<0.10	NTU	3.7	20
A860498	Nitrate plus Nitrite (N)	2023/01/21	108	80 - 120	106	80 - 120	<0.020	mg/L	1.4	25
A860499	Nitrite (N)	2023/01/21	106	80 - 120	103	80 - 120	<0.0050	mg/L	NC	20
A861515	pH	2023/01/21			101	97 - 103			0.89	N/A
A861517	Alkalinity (PP as CaCO3)	2023/01/21					<1.0	mg/L		
A861517	Alkalinity (Total as CaCO3)	2023/01/21			97	80 - 120	<1.0	mg/L		
A861517	Bicarbonate (HCO3)	2023/01/21					<1.0	mg/L		
A861517	Carbonate (CO3)	2023/01/21					<1.0	mg/L		
A861517	Hydroxide (OH)	2023/01/21					<1.0	mg/L		
A861518	Conductivity	2023/01/21			102	80 - 120	<2.0	uS/cm	0	10
A861894	Total Mercury (Hg)	2023/01/24	100	80 - 120	116	80 - 120	<0.0019	ug/L	NC	20
A863326	Total Dissolved Solids	2023/01/26	102	80 - 120	95	80 - 120	<10	mg/L	4.1	20

N/A = Not Applicable

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

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

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

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

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

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

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Bureau Veritas
4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel (604) 734 7276 Toll-free 800-563-6266 Fax (604) 731 2386 www.bvna.com

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C304398_COC

Bottle Order #: 685113

Chain Of Custody Record | Project Manager: Customer Solutions

C#685113-01-01

INVOICE TO:		Report Information		Project Information	
Company Name	#99020 VILLAGE OF PEMBERTON	Company Name		Quotation #	C21923
Contact Name	Accounts Payable	Contact Name	Jeff Westlake	P.O. #	
Address	Box 100 7400 Prospect St	Address	Cell 604-905-8924	Project #	Annual Water Sample
	Pemberton BC V0N 2L0			Project Name	
Phone	(604) 894-6811 Fax (604) 894-6855	Phone	(604) 894-6125 Fax	Site #	
Email	accountspayable@pemberton.ca	Email	jwestlake@pemberton.ca	Sampled By	

Regulatory Criteria: CSR ☐ CCME ☐ BC Water Quality ☐ Other ☐

Special Instructions

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT: (will be applied if Rush TAT is not specified) ☐

Standard TAT = 5-7 Working days for most tests.

Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)

1 DAY ☐ 2 Day ☐ 3 Day ☐ Date Required: _____ ☐

Rush Confirmation Number: _____ (call lab for #)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Metals Field Filtered ? (Y / N)	Drinking Water Package w/o Microbiology	Trihalomethanes (THM) in Water	CSR VOC + VPH in Water	# of Bottles	Comments
1		Well # 2	23/01/18	0830			✓		✓		
2		Well # 3	23/01/18	0840			✓		✓		
3		Farm RD	23/01/18	0900			✓	✓			
4		Ridge P/S	23/01/18	0930			✓	✓			
5		Industrial Park	23/01/18	1000			✓	✓	✓		
6											
7											
8											
9											
10											

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Lab Use Only: Time Sensitive ☐	Temperature (°C) on Receipt: 7.7.8	Custody Seal Intact on Cooler? ☐ Yes ☒ No
Jeff Westlake JEFF WESTLAKE	23/01/18	1030	Edelare Cecili	18/01/20	0800				

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/COC-TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Bureau Veritas Yellow: Client

ice pack: yes

Bureau Veritas Canada (2019) Inc.

Box 100 | 7400 Prospect Street
Pemberton, BC V0N 2L0
P: 604.894.6135 | F: 604.894.6136
Email: admin@pemberton.ca
Website: www.pemberton.ca

APPENDIX III

2022 Weekly Water Quality Sampling Results

APPENDIX III

Source	Chlorine Residual	pH	Temperature (C)	Alkalinity
4-Jan-22	0.25	7.01	8.37	61.33
12-Jan-22				
Pemberton				
Health Centre	0.33	7.00	8.80	67.00
Oak St	0.39	6.96	9.00	66.00
Plateau/Ridge	0.33	6.98	8.40	73.00
Village Office	0.39	7.01	7.40	68.00
WWTP	0.08	7.02	8.50	70.00
PNWS - Meadows Rd *				
PNWS - Farm Rd *				
Pemberton Total	**0.30**	**6.99**	**8.42**	**68.80**
Industrial Park **	0.00	7.10	8.10	24.00
17-Jan-22				
Pemberton				
Health Centre	0.43	7.01	9.50	77.00
Oak St	0.47	6.87	13.40	58.00
Plateau/Ridge	0.36	6.99	12.20	56.00
Village Office	0.37	7.01	10.70	71.00
WWTP	0.05	6.87	10.50	78.00
PNWS - Meadows Rd *				
PNWS - Farm Rd *				
Pemberton Total	**0.34**	**6.95**	**11.26**	**68.00**
Industrial Park **	0.16	7.11	8.80	22.00
24-Jan-22				
Pemberton				
Health Centre	0.40	6.97	10.70	63.00
Oak St	0.45	7.05	8.70	66.00
Plateau/Ridge	0.39	7.04	7.60	74.00
Village Office	0.34	7.04	8.70	74.00
WWTP	0.05	7.04	8.20	61.00
PNWS - Meadows Rd *				
PNWS - Farm Rd *	0.41	7.03	9.10	72.00
Pemberton Total	**0.34**	**7.03**	**8.83**	**68.33**
Industrial Park **	0.00	7.05	7.60	20.00
1-Feb-22				
Pemberton				
Health Centre	0.39	7.10	9.80	65.00
Oak St	0.38	7.08	9.20	77.00
Plateau/Ridge	0.40	7.21	8.10	75.00
Village Office	0.36	7.16	7.70	73.00
WWTP	0.05	7.14	7.30	74.00
PNWS - Meadows Rd *				
PNWS - Farm Rd *				
Pemberton Total	**0.32**	**7.14**	**8.42**	**72.80**

* Pemberton North Water Service is a continuation of the Pemberton Water distribution system within Squamish Lilloeet Regional District Area C
** Pemberton Industrial Park is supplied by Lil'wat Nation through a water use agreement

Source	Chlorine Residual	pH	Temperature (C)	Alkalinity
Industrial Park **	0.10	7.14	6.70	21.00
7-Feb-22				
Pemberton				
Health Centre	0.26	7.06	11.20	68.00
Oak St	0.32	7.05	10.90	69.00
Plateau/Ridge	0.31	7.05	9.40	79.00
Village Office	0.33	7.08	8.30	72.00
WWTP	0.05	7.08	9.40	80.00
PNWS - Meadows Rd *				
PNWS - Farm Rd *	0.33	7.05	10.40	68.00
Pemberton Total	**0.27**	**7.06**	**9.93**	**72.67**
Industrial Park **	0.28	7.05	7.40	23.00
15-Feb-22				
Pemberton				
Health Centre	0.38	6.99	11.30	69.00
Oak St	0.37	7.06	10.70	73.00
Plateau/Ridge	0.29	7.03	8.90	69.00
Village Office	0.27	7.00	9.00	68.00
WWTP	0.08	7.01	8.70	68.00
PNWS - Meadows Rd *				
PNWS - Farm Rd *	0.36	6.99	8.90	63.00
Pemberton Total	**0.29**	**7.01**	**9.58**	**68.33**
Industrial Park **	0.10	6.97	7.30	24.00
22-Feb-22				
Pemberton				
Health Centre	0.37	7.09	9.70	76.00
Oak St	0.33	7.10	8.70	78.00
Plateau/Ridge	0.33	7.20	7.50	70.00
Village Office	0.39	7.16	7.60	78.00
WWTP	0.23	7.13	7.20	70.00
PNWS - Meadows Rd *				
PNWS - Farm Rd *				
Pemberton Total	**0.33**	**7.14**	**8.14**	**74.40**
Industrial Park **	0.11	7.07	5.60	25.00
28-Feb-22				
Pemberton				
Health Centre	0.38	9.95	9.20	67.00
Oak St	0.28	7.05	9.40	66.00
Plateau/Ridge	0.33	7.10	9.30	64.00
Village Office	0.32	7.08	8.90	66.00
WWTP	0.02	7.10	9.00	62.00
PNWS - Meadows Rd *				
PNWS - Farm Rd *	0.38	7.04	87.00	60.00
Pemberton Total	**0.29**	**7.55**	**22.13**	**64.17**

* Pemberton North Water Service is a continuation of the Pemberton Water distribution system within Squamish Lilloeet Regional District Area C
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Source	Chlorine Residual	pH	Temperature (C)	Alkalinity
Industrial Park **	0.12	7.06	7.80	24.00
7-Mar-22				
Pemberton				
Health Centre	0.36	6.63	10.60	55.00
Oak St	0.39	6.70	8.10	46.00
Plateau/Ridge	0.32	6.92	8.60	50.00
Village Office	0.38	6.70	8.40	51.00
WWTP	0.26	7.00	8.00	71.00
PNWS - Meadows Rd *				
PNWS - Farm Rd *	0.34	6.70	7.70	55.00
Pemberton Total	**0.34**	**6.78**	**8.57**	**54.67**
Industrial Park **	0.19	6.97	6.70	24.00
14-Mar-22				
Pemberton				
Health Centre	0.36	7.04	10.80	56.00
Oak St	0.25	7.05	8.40	62.00
Plateau/Ridge	0.25	7.13	10.30	60.00
Village Office	0.28	7.07	8.30	56.00
WWTP	0.05	6.96	9.90	66.00
PNWS - Meadows Rd *	0.30	7.06	8.60	69.00
PNWS - Farm Rd *	0.35	7.06	8.40	66.00
Pemberton Total	**0.26**	**7.05**	**9.24**	**62.14**
Industrial Park **	0.12	6.98	8.30	25.00
21-Mar-22				
Pemberton				
Health Centre	0.44	7.01	12.10	56.00
Oak St	0.43	7.02	10.90	56.00
Plateau/Ridge	0.34	7.04	7.60	66.00
Village Office	0.37	7.04	8.20	57.00
WWTP	0.27	7.13	8.10	59.00
PNWS - Meadows Rd *	0.44	7.07	7.40	60.00
PNWS - Farm Rd *	0.38	7.00	7.50	56.00
Pemberton Total	**0.38**	**7.04**	**8.83**	**58.57**
Industrial Park **	0.05	7.07	7.40	22.00
28-Mar-22				
Pemberton				
Health Centre	0.32	7.00	10.40	60.00
Oak St	0.29	7.00	10.80	56.00
Plateau/Ridge	0.29	7.07	11.10	69.00
Village Office	0.26	7.01	9.00	58.00
WWTP	0.08	7.06	10.00	58.00
PNWS - Meadows Rd *	0.29	7.00	10.20	63.00
PNWS - Farm Rd *	0.35	7.05	9.50	61.00
Pemberton Total	**0.27**	**7.03**	**10.14**	**60.71**

* Pemberton North Water Service is a continuation of the Pemberton Water distribution system within Squamish Lilloeet Regional District Area C
** Pemberton Industrial Park is supplied by Lil'wat Nation through a water use agreement

Source	Chlorine Residual	pH	Temperature (C)	Alkalinity
Industrial Park **	0.03	7.05	8.90	28.00
4-Apr-22				
Pemberton				
Health Centre	0.36	6.98	12.60	51.00
Oak St	0.29	7.04	9.70	66.00
Plateau/Ridge	0.20	7.11	10.10	64.00
Village Office	0.29	7.07	10.10	52.00
WWTP	0.10	7.05	8.80	58.00
PNWS - Meadows Rd *	0.32	7.01	10.40	57.00
PNWS - Farm Rd *	0.31	7.03	10.80	53.00
Pemberton Total	**0.27**	**7.04**	**10.36**	**57.29**
Industrial Park **	0.00	7.06	8.40	25.00
11-Apr-22				
Pemberton				
Health Centre	0.38	7.11	9.70	59.00
Oak St	0.35	7.11	7.80	57.00
Plateau/Ridge	0.44	7.11	5.70	71.00
Village Office	0.37	6.98	7.50	59.00
WWTP	0.09	6.98	8.10	57.00
PNWS - Meadows Rd *	0.34	7.04	6.30	54.00
PNWS - Farm Rd *	0.39	7.15	6.00	56.00
Pemberton Total	**0.34**	**7.07**	**7.30**	**59.00**
Industrial Park **	0.12	6.91	7.90	26.00
19-Apr-22				
Pemberton				
Health Centre	0.29	6.90	10.10	60.00
Oak St	0.26	6.99	9.00	53.00
Plateau/Ridge	0.23	7.01	8.90	58.00
Village Office	0.31	7.02	8.50	57.00
WWTP	0.11	7.04	10.00	57.00
PNWS - Meadows Rd *	0.30	6.95	10.50	55.00
PNWS - Farm Rd *	0.29	7.01	9.60	62.00
Pemberton Total	**0.26**	**6.99**	**9.51**	**57.43**
Industrial Park **	0.18	7.02	7.70	28.00
25-Apr-22				
Pemberton				
Health Centre	0.41	7.07	12.50	59.00
Oak St	0.36	7.10	8.80	56.00
Plateau/Ridge	0.27	7.80	10.10	58.00
Village Office	0.28	7.09	10.10	59.00
WWTP	0.16	7.10	10.20	56.00
PNWS - Meadows Rd *	0.30	7.10	9.30	58.00
PNWS - Farm Rd *	0.30	7.09	9.90	63.00
Pemberton Total	**0.30**	**7.19**	**10.13**	**58.43**

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Source	Chlorine Residual	pH	Temperature (C)	Alkalinity
Industrial Park **	0.06	7.09	8.80	25.00
3-May-22				
Pemberton				
Health Centre	0.36	6.94	13.50	57.00
Oak St	0.31	6.95	10.30	56.00
Plateau/Ridge	0.28	6.92	10.60	53.00
Village Office	0.29	6.97	10.40	50.00
WWTP	0.05	6.95	11.90	55.00
PNWS - Meadows Rd *	0.22	6.95	10.70	55.00
PNWS - Farm Rd *	0.27	6.95	9.70	58.00
Pemberton Total	**0.25**	**6.95**	**11.01**	**54.86**
Industrial Park **	0.16	6.91	10.60	29.00
9-May-22				
Pemberton				
Health Centre	0.36	6.95	17.50	45.00
Oak St	0.35	7.00	13.30	50.00
Plateau/Ridge	0.37	7.03	10.60	66.00
Village Office	0.36	7.07	11.70	58.00
WWTP	0.14	7.02	10.40	54.00
PNWS - Meadows Rd *	0.34	7.02	10.80	59.00
PNWS - Farm Rd *	0.34	7.00	11.60	58.00
Pemberton Total	**0.32**	**7.01**	**12.27**	**55.71**
Industrial Park **	0.18	698.00	10.10	26.00
18-May-22				
Pemberton				
Health Centre	0.35	7.00	12.40	52.00
Oak St	0.32	7.00	10.00	61.00
Plateau/Ridge	0.30	6.96	10.00	51.00
Village Office	0.34	6.98	9.00	55.00
WWTP	0.11	7.00	10.20	66.00
PNWS - Meadows Rd *	0.26	6.98	9.20	55.00
PNWS - Farm Rd *	0.26	6.99	10.20	51.00
Pemberton Total	**0.28**	**6.99**	**10.14**	**55.86**
Industrial Park **	0.12	6.97	10.10	27.00
24-May-22				
Pemberton				
Health Centre	0.39	7.01	13.90	50.00
Oak St	0.35	7.06	11.40	55.00
Plateau/Ridge	0.28	7.05	11.30	55.00
Village Office	0.34	7.06	12.60	56.00
WWTP	0.08	7.08	10.30	56.00
PNWS - Meadows Rd *	0.34	7.06	11.10	56.00
PNWS - Farm Rd *	0.34	7.06	11.60	52.00
Pemberton Total	**0.30**	**7.05**	**11.74**	**54.29**

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Source	Chlorine Residual	pH	Temperature (C)	Alkalinity
Industrial Park **	0.12	7.07	10.10	24.00
30-May-22				
Pemberton				
Health Centre	0.28	7.09	15.00	52.00
Oak St	0.27	7.12	10.40	50.00
Plateau/Ridge	0.25	7.06	11.30	54.00
Village Office	0.27	7.09	10.00	54.00
WWTP	0.08	7.12	9.60	56.00
PNWS - Meadows Rd *	0.28	7.10	12.60	50.00
PNWS - Farm Rd *	0.26	7.08	9.60	54.00
Pemberton Total	**0.24**	**7.09**	**11.21**	**52.86**
Industrial Park **	0.09	7.08	11.00	25.00
6-Jun-22				
Pemberton				
Health Centre	0.32	6.97	14.50	58.00
Oak St	0.35	7.09	10.80	57.00
Plateau/Ridge	0.30	7.08	11.90	58.00
Village Office	0.28	7.10	11.40	51.00
WWTP	0.19	7.12	11.40	51.00
PNWS - Meadows Rd *	0.27	7.04	12.20	51.00
PNWS - Farm Rd *	0.33	7.08	10.70	58.00
Pemberton Total	**0.29**	**7.07**	**11.84**	**54.86**
Industrial Park **	0.15	7.10	10.60	19.00
13-Jun-22				
Pemberton				
Health Centre	0.29	6.77	14.20	52.00
Oak St	0.32	6.89	11.40	51.00
Plateau/Ridge	0.31	6.86	13.30	52.00
Village Office	0.35	6.85	12.50	52.00
WWTP	0.19	6.88	11.40	41.00
PNWS - Meadows Rd *	0.34	6.89	11.10	47.00
PNWS - Farm Rd *	0.32	6.88	10.90	47.00
Pemberton Total	**0.30**	**6.86**	**12.11**	**48.86**
Industrial Park **	0.06	6.90	11.10	25.00
20-Jun-22				
Pemberton				
Health Centre	0.26	7.15	14.70	72.00
Oak St	0.22	7.20	14.00	64.00
Plateau/Ridge	0.29	7.25	11.40	57.00
Village Office	0.25	7.22	13.20	57.00
WWTP	0.07	7.19	12.10	58.00
PNWS - Meadows Rd *	0.25	7.24	12.20	62.00
PNWS - Farm Rd *	0.24	7.18	14.00	58.00
Pemberton Total	**0.23**	**7.20**	**13.09**	**61.14**

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Source	Chlorine Residual	pH	Temperature (C)	Alkalinity
Industrial Park **	0.05	7.22	11.10	17.00
27-Jun-22				
Pemberton				
Health Centre	0.29	6.88	17.50	64.00
Oak St	0.29	6.99	12.70	59.00
Plateau/Ridge	0.25	6.97	13.10	59.00
Village Office	0.31	6.97	13.50	58.00
WWTP	0.13	7.02	13.00	62.00
PNWS - Meadows Rd *	0.35	6.94	14.80	60.00
PNWS - Farm Rd *	0.35	7.00	13.00	58.00
Pemberton Total	**0.28**	**6.97**	**13.94**	**60.00**
Industrial Park **	0.25	7.03	12.70	19.00
4-Jul-22				
Pemberton				
Health Centre	0.19	6.95	14.20	48.00
Oak St	0.24	6.92	11.50	45.00
Plateau/Ridge	0.17	6.85	14.80	52.00
Village Office	0.18	6.87	13.10	49.00
WWTP	0.19	6.88	13.30	51.00
PNWS - Meadows Rd *	0.21	6.83	12.20	50.00
PNWS - Farm Rd *	0.20	6.86	13.60	50.00
Pemberton Total	**0.20**	**6.88**	**13.24**	**49.29**
Industrial Park **	0.16	6.89	15.40	21.00
12-Jul-22				
Pemberton				
Health Centre	0.31	6.90	14.10	42.00
Oak St	0.32	6.77	13.60	36.00
Plateau/Ridge	0.29	6.81	14.30	47.00
Village Office	0.29	6.79	14.00	41.00
WWTP	0.11	6.91	15.00	48.00
PNWS - Meadows Rd *	0.28	6.80	13.90	49.00
PNWS - Farm Rd *	0.30	6.79	13.70	48.00
Pemberton Total	**0.27**	**6.82**	**14.09**	**44.43**
Industrial Park **	0.14	6.88	14.00	26.00
18-Jul-22				
Pemberton				
Health Centre	0.23	6.90	15.50	41.00
Oak St	0.34	6.80	11.60	47.00
Plateau/Ridge	0.24	6.87	12.20	47.00
Village Office	0.20	6.90	13.20	54.00
WWTP	0.14	6.94	14.10	48.00
PNWS - Meadows Rd *	0.25	6.83	11.80	51.00
PNWS - Farm Rd *	0.28	6.90	12.20	47.00
Pemberton Total	**0.24**	**6.88**	**12.94**	**47.86**

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Source	Chlorine Residual	pH	Temperature (C)	Alkalinity
Industrial Park **	0.10	6.98	11.80	24.00
26-Jul-22				
Pemberton				
Health Centre	0.26	7.18	19.70	56.00
Oak St	0.27	7.19	15.50	63.00
Plateau/Ridge	0.29	7.14	15.60	58.00
Village Office	0.20	7.18	16.80	66.00
WWTP	0.16	7.22	16.10	53.00
PNWS - Meadows Rd *	0.29	7.16	15.00	62.00
PNWS - Farm Rd *	0.35	7.14	15.00	58.00
Pemberton Total	**0.26**	**7.17**	**16.24**	**59.43**
Industrial Park **	0.00	7.21	15.70	14.00
2-Aug-22				
Pemberton				
Health Centre	0.25	7.10	15.50	55.00
Oak St	0.27	7.05	16.30	61.00
Plateau/Ridge	0.34	7.08	16.00	59.00
Village Office	0.25	7.00	17.00	62.00
WWTP	0.13	7.12	15.90	56.00
PNWS - Meadows Rd *	0.26	7.07	15.10	54.00
PNWS - Farm Rd *	0.35	7.08	15.80	61.00
Pemberton Total	**0.26**	**7.07**	**15.94**	**58.29**
Industrial Park **	0.00	7.22	15.90	20.00
8-Aug-22				
Pemberton				
Health Centre	0.36	7.07	16.20	59.00
Oak St	0.37	7.20	13.70	56.00
Plateau/Ridge	0.36	7.16	15.30	58.00
Village Office	0.33	7.16	14.50	58.00
WWTP	0.15	7.24	13.90	55.00
PNWS - Meadows Rd *	0.41	7.19	13.80	56.00
PNWS - Farm Rd *	0.38	7.18	13.90	54.00
Pemberton Total	**0.34**	**7.17**	**14.47**	**56.57**
Industrial Park **	0.37	7.14	14.40	15.00
15-Aug-22				
Pemberton				
Health Centre	0.31	7.07	15.90	57.00
Oak St	0.29	7.10	15.20	62.00
Plateau/Ridge	0.31	7.15	13.90	66.00
Village Office	0.28	7.17	14.90	62.00
WWTP	0.11	7.22	13.40	59.00
PNWS - Meadows Rd *	0.28	7.05	14.50	63.00
PNWS - Farm Rd *	0.31	7.20	13.00	65.00
Pemberton Total	**0.27**	**7.14**	**14.40**	**62.00**

* Pemberton North Water Service is a continuation of the Pemberton Water distribution system within Squamish Lilloeet Regional District Area C
** Pemberton Industrial Park is supplied by Lil'wat Nation through a water use agreement

Source	Chlorine Residual	pH	Temperature (C)	Alkalinity
Industrial Park **	0.21	7.29	13.50	15.00
24-Aug-22				
Pemberton				
Health Centre	0.30	7.14	15.90	59.00
Oak St	0.31	7.07	16.10	59.00
Plateau/Ridge	0.29	7.09	16.00	58.00
Village Office	0.29	7.12	17.00	57.00
WWTP	0.26	7.18	16.40	59.00
PNWS - Meadows Rd *	0.32	7.07	15.60	63.00
PNWS - Farm Rd *	0.30	7.06	16.10	66.00
Pemberton Total	**0.30**	**7.10**	**16.16**	**60.14**
Industrial Park **	0.08	7.09	16.00	14.00
29-Aug-22				
Pemberton				
Health Centre	0.26	7.11	16.30	56.00
Oak St	0.29	7.09	13.90	59.00
Plateau/Ridge	0.31	7.11	14.10	68.00
Village Office	0.25	7.14	15.90	63.00
WWTP	0.09	7.15	13.90	61.00
PNWS - Meadows Rd *	0.29	7.08	14.10	66.00
PNWS - Farm Rd *	0.26	7.12	15.40	66.00
Pemberton Total	**0.25**	**7.11**	**14.80**	**62.71**
Industrial Park **	0.06	7.14	13.60	14.00
6-Sep-22				
Pemberton				
Health Centre	0.29	7.15	15.30	59.00
Oak St	0.29	7.17	13.20	68.00
Plateau/Ridge	0.24	7.14	11.20	62.00
Village Office	0.28	7.12	12.40	64.00
WWTP	0.18	7.16	12.10	68.00
PNWS - Meadows Rd *	0.34	7.13	10.90	63.00
PNWS - Farm Rd *	0.27	7.16	11.30	64.00
Pemberton Total	**0.27**	**7.15**	**12.34**	**64.00**
Industrial Park **	0.00	7.17	9.90	17.00
12-Sep-22				
Pemberton				
Health Centre	0.29	7.06	15.20	63.00
Oak St	0.32	7.08	13.30	62.00
Plateau/Ridge	0.32	7.09	12.50	66.00
Village Office	0.35	7.14	11.30	58.00
WWTP	0.05	7.18	11.40	65.00
PNWS - Meadows Rd *	0.33	7.05	12.10	60.00
PNWS - Farm Rd *	0.35	7.06	11.20	60.00
Pemberton Total	**0.29**	**7.09**	**12.43**	**62.00**

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Source	Chlorine Residual	pH	Temperature (C)	Alkalinity
Industrial Park **	0.00	7.03	12.10	12.00
20-Sep-22				
Pemberton				
Health Centre	0.29	7.12	15.60	70.00
Oak St	0.36	7.09	11.60	67.00
Plateau/Ridge	0.28	7.14	10.70	71.00
Village Office	0.25	7.14	12.50	71.00
WWTP	0.12	7.11	12.10	72.00
PNWS - Meadows Rd *	0.36	7.10	13.60	71.00
PNWS - Farm Rd *	0.34	7.12	12.20	59.00
Pemberton Total	**0.29**	**7.12**	**12.61**	**68.71**
Industrial Park **	0.23	7.16	12.20	15.00
26-Sep-22				
Pemberton				
Health Centre	0.28	7.05	15.50	65.00
Oak St	0.27	7.05	11.40	63.00
Plateau/Ridge	0.33	7.06	10.90	64.00
Village Office	0.36	7.04	11.90	59.00
WWTP	0.15	7.06	12.00	62.00
PNWS - Meadows Rd *	0.32	7.09	12.80	63.00
PNWS - Farm Rd *	0.32	7.06	12.20	59.00
Pemberton Total	**0.29**	**7.06**	**12.39**	**62.14**
Industrial Park **	0.10	7.14	13.30	13.00
4-Oct-22				
Pemberton				
Health Centre	0.36	7.10	14.20	57.00
Oak St	0.39	7.08	12.60	62.00
Plateau/Ridge	0.36	7.01	13.30	66.00
Village Office	0.29	7.08	12.90	64.00
WWTP	0.15	7.07	13.10	66.00
PNWS - Meadows Rd *	0.35	7.05	11.70	60.00
PNWS - Farm Rd *	0.34	7.05	12.30	70.00
Pemberton Total	**0.32**	**7.06**	**12.87**	**63.57**
Industrial Park **	0.12	7.10	11.80	15.00
12-Oct-22				
Pemberton				
Health Centre	0.34	6.79	17.20	54.00
Oak St	0.36	6.87	11.60	41.00
Plateau/Ridge	0.32	6.84	14.00	52.00
Village Office	0.27	6.86	12.70	41.00
WWTP	0.18	6.79	14.60	50.00
PNWS - Meadows Rd *	0.35	6.88	12.30	53.00
PNWS - Farm Rd *	0.34	6.93	11.90	55.00
Pemberton Total	**0.31**	**6.85**	**13.47**	**49.43**

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Source	Chlorine Residual	pH	Temperature (C)	Alkalinity
Industrial Park **	0.00	7.04	12.20	14.00
18-Oct-22				
Pemberton				
Health Centre	0.32	6.98	15.20	66.00
Oak St	0.32	7.00	12.80	54.00
Plateau/Ridge	0.32	6.98	11.90	64.00
Village Office	0.31	7.00	11.40	58.00
WWTP	0.12	6.96	12.30	62.00
PNWS - Meadows Rd *	0.26	6.97	12.70	60.00
PNWS - Farm Rd *	0.28	7.00	12.20	57.00
Pemberton Total	**0.28**	**6.98**	**12.64**	**60.14**
Industrial Park **	0.24	7.00	11.80	14.00
24-Oct-22				
Pemberton				
Health Centre	0.26	7.17	13.70	75.00
Oak St	0.30	7.16	13.70	71.00
Plateau/Ridge	0.25	7.14	11.80	68.00
Village Office	0.22	7.17	11.80	72.00
WWTP	0.08	7.18	11.00	70.00
PNWS - Meadows Rd *	0.22	7.17	12.40	73.00
PNWS - Farm Rd *	0.22	7.12	11.70	70.00
Pemberton Total	**0.22**	**7.16**	**12.30**	**71.29**
Industrial Park **	0.10	7.25	11.30	21.00
31-Oct-22				
Pemberton				
Health Centre	0.27	7.09	14.70	67.00
Oak St	0.33	7.09	11.40	62.00
Plateau/Ridge	0.34	7.06	11.90	68.00
Village Office	0.31	7.09	13.80	60.00
WWTP	0.08	7.06	11.60	65.00
PNWS - Meadows Rd *	0.32	7.06	11.80	63.00
PNWS - Farm Rd *	0.27	7.07	13.20	71.00
Pemberton Total	**0.27**	**7.07**	**12.63**	**65.14**
Industrial Park **	0.23	7.10	11.80	12.00
8-Nov-22				
Pemberton				
Health Centre	0.29	7.16	13.70	57.00
Oak St	0.34	7.16	11.40	77.00
Plateau/Ridge	0.20	7.16	12.40	62.00
Village Office	0.22	7.16	10.90	69.00
WWTP	0.08	7.18	10.70	80.00
PNWS - Meadows Rd *				
PNWS - Farm Rd *				
Pemberton Total	**0.23**	**7.16**	**11.82**	**69.00**

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Source	Chlorine Residual	pH	Temperature (C)	Alkalinity
Industrial Park **	0.12	7.20	11.00	7.23
14-Nov-22				
Pemberton				
Health Centre	0.25	7.15	14.20	68.00
Oak St	0.40	7.15	11.10	67.00
Plateau/Ridge	0.41	7.15	11.00	74.00
Village Office	0.33	7.20	11.40	72.00
WWTP	0.12	7.15	10.50	78.00
PNWS - Meadows Rd *				
PNWS - Farm Rd *				
Pemberton Total	**0.30**	**7.16**	**11.64**	**71.80**
Industrial Park **	0.19	7.13	9.50	20.00
21-Nov-22				
Pemberton				
Health Centre	0.27	7.04	11.80	67.00
Oak St	0.40	7.09	9.30	66.00
Plateau/Ridge	0.41	7.08	10.80	65.00
Village Office	0.35	7.14	8.90	80.00
WWTP	0.29	7.14	8.00	75.00
PNWS - Meadows Rd *				
PNWS - Farm Rd *				
Pemberton Total	**0.34**	**7.10**	**9.76**	**70.60**
Industrial Park **	0.00	7.13	7.50	15.00
5-Dec-22				
Pemberton				
Health Centre	0.22	7.08	12.00	74.00
Oak St	0.25	7.05	10.50	72.00
Plateau/Ridge	0.34	7.14	10.10	66.00
Village Office	0.28	7.10	9.00	78.00
WWTP	0.20	7.18	9.80	71.00
PNWS - Meadows Rd *				
PNWS - Farm Rd *				
Pemberton Total	**0.26**	**7.11**	**10.28**	**72.20**
Industrial Park **	0.00	7.19	8.70	12.00
12-Dec-22				
Pemberton				
Health Centre	0.31	7.14	11.30	74.00
Oak St	0.37	7.14	7.70	65.00
Plateau/Ridge	0.51	7.13	9.60	61.00
Village Office	0.34	7.17	8.30	69.00
WWTP	0.20	7.14	7.90	75.00
PNWS - Meadows Rd *				
PNWS - Farm Rd *				
Pemberton Total	**0.35**	**7.14**	**8.96**	**68.80**

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Source	Chlorine Residual	pH	Temperature (C)	Alkalinity
Industrial Park **	0.13	7.16	8.00	20.00
20-Dec-22				
Pemberton				
Health Centre	0.25	7.16	9.90	65.00
Oak St	0.30	7.17	8.60	66.00
Plateau/Ridge	0.40	7.14	7.90	60.00
Village Office	0.29	7.19	8.60	61.00
WWTP	0.08	7.17	7.30	68.00
PNWS - Meadows Rd *				
PNWS - Farm Rd *				
Pemberton Total	**0.26**	**7.17**	**8.46**	**64.00**
Industrial Park **	0.19	7.14	6.90	10.00

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Box 100 | 7400 Prospect Street
Pemberton, BC V0N 2L0
P: 604.894.6135 | F: 604.894.6136
Email: admin@pemberton.ca
Website: www.pemberton.ca

APPENDIX IV

2022 Weekly VCH Bacteriological Results

APPENDIX IV

Sample Range Report

Vancouver Coastal Health

Facility Name: Village of Pemberton
Date Range: Jan 1 2022 to Dec 31 2022

Operator Jeff Westlake
P.O. Box 100
Pemberton, BC V0N 2L0

Sampling Site	Date Collected	Total Coliform	E. Coli	Fecal Coliform
Treatment Plant/Airport Rd., Pemberton	1/4/2022 8:30:00 AM	LT1	LT1	
	1/12/2022 8:30:00 AM	LT1	LT1	
	1/17/2022 8:30:00 AM	LT1	LT1	
	1/24/2022 8:30:00 AM	LT1	LT1	
	2/1/2022 8:30:00 AM	LT1	LT1	
	2/7/2022 8:30:00 AM	LT1	LT1	
	2/15/2022 8:30:00 AM	LT1	LT1	
	2/23/2022 8:00:00 AM	LT1	LT1	
	2/28/2022 8:30:00 AM	LT1	LT1	
	3/7/2022 8:31:00 AM	LT1	LT1	
	3/14/2022 8:30:00 AM	LT1	LT1	
	3/21/2022 8:30:00 AM	LT1	LT1	
	3/28/2022 8:30:00 AM	LT1	LT1	
	4/4/2022 8:30:00 AM	LT1	LT1	
	4/11/2022 8:30:00 AM	LT1	LT1	
	4/19/2022 8:30:00 AM	LT1	LT1	
	4/25/2022 8:30:00 AM	LT1	LT1	
	5/3/2022 8:30:00 AM	LT1	LT1	
	5/9/2022 8:30:00 AM	LT1	LT1	
	5/18/2022 8:30:00 AM	LT1	LT1	
	5/24/2022 8:31:00 AM	LT1	LT1	
	5/30/2022 8:30:00 AM	LT1	LT1	
	6/6/2022 8:30:00 AM	LT1	LT1	

6/13/2022 8:30:00 AM	LT1	LT1
6/20/2022 8:40:00 AM	LT1	LT1
6/27/2022 8:30:00 AM	LT1	LT1
7/4/2022 8:00:00 AM	LT1	LT1
7/12/2022 8:00:00 AM	LT1	LT1
7/18/2022 8:30:00 AM	LT1	LT1
7/26/2022 8:32:00 AM	LT1	LT1
8/2/2022 8:30:00 AM	LT1	LT1
8/8/2022 8:30:00 AM	LT1	LT1
8/15/2022 8:35:00 AM	LT1	LT1
8/24/2022 8:30:00 AM	LT1	LT1
8/30/2022 8:30:00 AM	LT1	LT1
9/6/2022 8:31:00 AM	LT1	LT1
9/12/2022 8:30:00 AM	LT1	LT1
9/20/2022 8:30:00 AM	LT1	LT1
9/26/2022 8:30:00 AM	LT1	LT1
10/3/2022 8:30:00 AM	LT1	LT1
10/12/2022 8:30:00 AM	LT1	LT1
10/18/2022 8:30:00 AM	LT1	LT1
10/24/2022 8:30:00 AM	LT1	LT1
10/31/2022 8:30:00 AM	LT1	LT1
11/8/2022 8:30:00 AM	LT1	LT1
11/14/2022 8:30:00 AM	LT1	LT1
11/21/2022 8:30:00 AM	LT1	LT1
11/29/2022 8:30:00 AM	LT1	LT1
12/5/2022 8:30:00 AM	LT1	LT1
12/12/2022 8:30:00 AM	LT1	LT1
12/20/2022 8:30:00 AM	LT1	LT1
Total Positive:	**0**	**0**

Oak Street At High School, Pemberton	1/4/2022 9:30:00 AM	LT1	LT1
	1/12/2022 7:30:00 AM	LT1	LT1
	1/17/2022 9:30:00 AM	LT1	LT1
	1/24/2022 9:50:00 AM	LT1	LT1
	2/1/2022 7:30:00 AM	LT1	LT1
	2/7/2022 9:40:00 AM	LT1	LT1
	2/15/2022 9:40:00 AM	LT1	LT1
	2/23/2022 8:30:00 AM	LT1	LT1
	2/28/2022 9:50:00 AM	LT1	LT1
	3/7/2022 9:40:00 AM	LT1	LT1
	3/14/2022 9:50:00 AM	LT1	LT1
	3/21/2022 10:00:00 AM	LT1	LT1
	3/28/2022 9:50:00 AM	LT1	LT1
	4/4/2022 9:00:00 AM	LT1	LT1
	4/11/2022 9:50:00 AM	LT1	LT1
	4/19/2022 9:50:00 AM	LT1	LT1
	4/25/2022 9:50:00 AM	LT1	LT1
	5/3/2022 9:50:00 AM	LT1	LT1
	5/9/2022 9:50:00 AM	LT1	LT1
	5/18/2022 9:50:00 AM	LT1	LT1
	5/24/2022 9:00:00 AM	LT1	LT1
	5/30/2022 9:50:00 AM	LT1	LT1
	6/6/2022 9:50:00 AM	LT1	LT1
	6/13/2022 9:40:00 AM	LT1	LT1
	6/20/2022 9:00:00 AM	LT1	LT1
	6/27/2022 9:40:00 AM	LT1	LT1
	7/4/2022 8:50:00 AM	LT1	LT1
	7/12/2022 8:50:00 AM	LT1	LT1
	7/18/2022 9:50:00 AM	LT1	LT1
	7/26/2022 9:50:00 AM	LT1	LT1
	8/2/2022 9:50:00 AM	LT1	LT1
	8/8/2022 9:50:00 AM	LT1	LT1

	8/15/2022 9:50:00 AM	LT1	LT1
	8/24/2022 9:50:00 AM	LT1	LT1
	8/30/2022 9:50:00 AM	LT1	LT1
	9/6/2022 9:50:00 AM	LT1	LT1
	9/12/2022 9:50:00 AM	LT1	LT1
	9/20/2022 9:00:00 AM	LT1	LT1
	9/26/2022 7:50:00 AM	LT1	LT1
	10/3/2022 9:50:00 AM	LT1	LT1
	10/12/2022 9:50:00 AM	LT1	LT1
	10/18/2022 8:30:00 AM	LT1	LT1
	10/24/2022 9:50:00 AM	LT1	LT1
	10/31/2022 9:50:00 AM	LT1	LT1
	11/8/2022 9:30:00 AM	LT1	LT1
	11/14/2022 9:30:00 AM	LT1	LT1
	11/21/2022 9:30:00 AM	LT1	LT1
	12/5/2022 7:30:00 AM	LT1	LT1
	12/12/2022 9:20:00 AM	LT1	LT1
	12/20/2022 9:30:00 AM	LT1	LT1
	Total Positive:	**0**	**0**
Ad hoc / miscellaneous site, Pemberton			
	1/4/2022 9:20:00 AM	LT1	LT1
	12/12/2022 9:40:00 AM	LT1	LT1
	Total Positive:	**0**	**0**
Pemberton Health Center, 1403 Portage Road, Pemberton, B.C.			
	1/4/2022 9:40:00 AM	LT1	LT1
	1/12/2022 9:40:00 AM	LT1	LT1
	1/17/2022 9:40:00	LT1	LT1

AM		
1/24/2022 10:00:00 AM	REJCT LKS2	REJCT LKS2
2/1/2022 9:40:00 AM	LT1	LT1
2/7/2022 9:50:00 AM	LT1	LT1
2/15/2022 9:50:00 AM	LT1	LT1
2/23/2022 9:10:00 AM	LT1	LT1
2/28/2022 10:00:00 AM	LT1	LT1
3/7/2022 9:50:00 AM	LT1	LT1
3/14/2022 10:00:00 AM	LT1	LT1
3/21/2022 9:50:00 AM	LT1	LT1
3/28/2022 10:00:00 AM	LT1	LT1
4/4/2022 10:00:00 AM	LT1	LT1
4/11/2022 10:00:00 AM	LT1	LT1
4/19/2022 10:00:00 AM	LT1	LT1
4/25/2022 10:00:00 AM	LT1	LT1
5/3/2022 10:00:00 AM	LT1	LT1
5/9/2022 10:00:00 AM	LT1	LT1
5/18/2022 10:00:00 AM	LT1	LT1
5/24/2022 10:00:00 AM	LT1	LT1
5/30/2022 10:50:00 AM	LT1	LT1
6/6/2022 10:00:00 AM	LT1	LT1
6/13/2022 9:30:00 AM	LT1	LT1
6/20/2022 10:00:00 AM	LT1	LT1
6/27/2022 9:50:00 AM	LT1	LT1
7/4/2022 9:40:00 AM	LT1	LT1
7/12/2022 9:10:00 AM	LT1	LT1
7/18/2022 10:00:00 AM	LT1	LT1
7/26/2022 10:00:00 AM	LT1	LT1
8/2/2022 10:00:00 AM	LT1	LT1
8/8/2022 10:00:00 AM	LT1	LT1

8/15/2022 10:00:00 AM	LT1	LT1
8/24/2022 10:00:00 AM	LT1	LT1
8/30/2022 10:50:00 AM	LT1	LT1
9/6/2022 10:00:00 AM	LT1	LT1
9/12/2022 10:50:00 AM	LT1	LT1
9/20/2022 10:00:00 AM	LT1	LT1
9/26/2022 10:00:00 AM	LT1	LT1
10/3/2022 10:00:00 AM	LT1	LT1
10/12/2022 10:00:00 AM	LT1	LT1
10/18/2022 10:00:00 AM	LT1	LT1
10/24/2022 10:00:00 AM	LT1	LT1
10/31/2022 10:00:00 AM	LT1	LT1
11/8/2022 9:40:00 AM	LT1	LT1
11/14/2022 9:40:00 AM	LT1	LT1
11/21/2022 9:40:00 AM	LT1	LT1
11/29/2022 9:20:00 AM	LT1	LT1
12/5/2022 9:40:00 AM	LT1	LT1
12/12/2022 9:30:00 AM	LT1	LT1
12/20/2022 9:40:00 AM	LT1	LT1
Total Positive:	**0**	**0**

Village Office, 7410 Prospect

1/4/2022 8:50:00 AM	LT1	LT1
1/12/2022 8:50:00 AM	LT1	LT1
1/17/2022 9:00:00 AM	LT1	LT1
1/24/2022 9:00:00 AM	LT1	LT1
2/1/2022 9:00:00 AM	LT1	LT1
2/7/2022 9:00:00 AM	LT1	LT1
2/15/2022 9:00:00 AM	LT1	LT1
2/23/2022 8:40:00	LT1	LT1

AM		
2/28/2022 9:00:00 AM	LT1	LT1
3/7/2022 9:00:00 AM	LT1	LT1
3/14/2022 9:00:00 AM	LT1	LT1
3/21/2022 9:00:00 AM	LT1	LT1
3/28/2022 9:00:00 AM	LT1	LT1
4/4/2022 9:00:00 AM	LT1	LT1
4/11/2022 9:00:00 AM	LT1	LT1
4/19/2022 9:00:00 AM	LT1	LT1
4/25/2022 9:00:00 AM	LT1	LT1
5/3/2022 9:50:00 AM	LT1	LT1
5/9/2022 9:50:00 AM	LT1	LT1
5/18/2022 9:00:00 AM	LT1	LT1
5/24/2022 9:00:00 AM	LT1	LT1
5/30/2022 9:50:00 AM	LT1	LT1
6/6/2022 9:00:00 AM	LT1	LT1
6/13/2022 8:50:00 AM	LT1	LT1
6/20/2022 9:50:00 AM	LT1	LT1
6/27/2022 9:00:00 AM	LT1	LT1
7/4/2022 9:10:00 AM	LT1	LT1
7/12/2022 9:00:00 AM	LT1	LT1
7/18/2022 9:00:00 AM	LT1	LT1
7/26/2022 9:00:00 AM	LT1	LT1
8/2/2022 9:00:00 AM	LT1	LT1
8/8/2022 9:00:00 AM	LT1	LT1
8/15/2022 9:00:00 AM	LT1	LT1
8/24/2022 9:00:00 AM	LT1	LT1
8/30/2022 9:00:00 AM	LT1	LT1
9/6/2022 9:00:00 AM	LT1	LT1
9/12/2022 9:00:00 AM	LT1	LT1
9/20/2022 9:00:00 AM	LT1	LT1
9/26/2022 9:00:00 AM	LT1	LT1
10/3/2022 9:00:00	LT1	LT1

	AM		
	10/12/2022 9:00:00 AM	LT1	LT1
	10/18/2022 9:00:00 AM	LT1	LT1
	10/24/2022 7:00:00 AM	LT1	LT1
	10/31/2022 9:00:00 AM	LT1	LT1
	11/8/2022 9:00:00 AM	LT1	LT1
	11/14/2022 7:00:00 AM	LT1	LT1
	11/21/2022 9:00:00 AM	LT1	LT1
	12/5/2022 9:00:00 AM	LT1	LT1
	12/12/2022 8:50:00 AM	LT1	LT1
	12/20/2022 9:00:00 AM	LT1	LT1
	Total Positive:	**0**	**0**
Pemberton Ridge Pumphouse, Pemberton			
	1/4/2022 8:40:00 AM	LT1	LT1
	1/12/2022 8:40:00 AM	LT1	LT1
	1/17/2022 8:40:00 AM	LT1	LT1
	1/24/2022 8:40:00 AM	LT1	LT1
	2/1/2022 8:40:00 AM	LT1	LT1
	2/7/2022 8:40:00 AM	LT1	LT1
	2/15/2022 8:40:00 AM	LT1	LT1
	2/23/2022 8:20:00 AM	LT1	LT1
	2/28/2022 8:40:00 AM	LT1	LT1
	3/7/2022 8:40:00 AM	LT1	LT1
	3/14/2022 8:40:00 AM	LT1	LT1
	3/21/2022 8:40:00 AM	LT1	LT1
	3/28/2022 8:40:00 AM	LT1	LT1
	4/4/2022 8:40:00 AM	LT1	LT1
	4/11/2022 8:40:00 AM	LT1	LT1
	4/19/2022 8:40:00 AM	LT1	LT1
	4/25/2022 8:40:00	LT1	LT1

AM		
5/3/2022 8:40:00 AM	LT1	LT1
5/9/2022 8:40:00 AM	LT1	LT1
5/18/2022 8:40:00 AM	LT1	LT1
5/24/2022 8:10:00 AM	LT1	LT1
5/30/2022 8:40:00 AM	LT1	LT1
6/6/2022 8:40:00 AM	LT1	LT1
6/13/2022 8:40:00 AM	LT1	LT1
6/20/2022 8:50:00 AM	LT1	LT1
6/27/2022 8:50:00 AM	LT1	LT1
7/4/2022 8:20:00 AM	LT1	LT1
7/12/2022 8:20:00 AM	LT1	LT1
7/18/2022 8:50:00 AM	LT1	LT1
7/26/2022 8:50:00 AM	LT1	LT1
8/2/2022 8:50:00 AM	LT1	LT1
8/8/2022 8:10:00 AM	LT1	LT1
8/15/2022 8:50:00 AM	LT1	LT1
8/24/2022 8:50:00 AM	LT1	LT1
8/30/2022 8:50:00 AM	LT1	LT1
9/6/2022 8:50:00 AM	LT1	LT1
9/12/2022 8:50:00 AM	LT1	LT1
9/20/2022 8:50:00 AM	LT1	LT1
9/26/2022 8:50:00 AM	LT1	LT1
10/3/2022 8:50:00 AM	LT1	LT1
10/12/2022 8:50:00 AM	LT1	LT1
10/18/2022 8:50:00 AM	LT1	LT1
10/24/2022 8:50:00 AM	LT1	LT1
10/31/2022 8:50:00 AM	LT1	LT1
11/8/2022 8:50:00 AM	LT1	LT1
11/14/2022 8:50:00 AM	LT1	LT1
11/21/2022 8:50:00 AM	LT1	LT1
11/29/2022 8:50:00	LT1	LT1

AM		
12/5/2022 8:50:00 AM	LT1	LT1
12/12/2022 8:40:00 AM	LT1	LT1
12/20/2022 8:50:00 AM	LT1	LT1
Total Positive:	**0**	**0**

Result Values: **E - estimated** **L - less than** **G - greater than**

Samples that contain total coliform:	0	0.00% of total
Samples that contain e. coli:	0	0.00% of total
Samples that contain fecal coliform:	0	0.00% of total
Number of consecutive samples that contain total coliform:	0	
Number of samples that contain total coliform in last 30 days:	0/0	
Total number of samples:	255	

Comments:

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Environmental Health Officer
Feb 9 2023

FOR FURTHER INFORMATION PLEASE CALL: Dan Glover (604) 892-2293

Sample Range Report

Vancouver Coastal Health

Facility Name: Pemberton Industrial Park Water System
Date Range: Jan 1 2022 to Dec 31 2022

Operator Jeff Westlake
Attn: Jeff Westlake Box 100
Pemberton, BC V0N 2L0

Sampling Site	Date Collected	Total Coliform	E. Coli	Fecal Coliform
Yard Hydrant, Pemberton Industrial Park	1/12/2022 9:50:00 AM	LT1	LT1	
	1/17/2022 8:50:00 AM	LT1	LT1	
	1/24/2022 8:50:00 AM	LT1	LT1	
	2/1/2022 8:50:00 AM	LT1	LT1	
	2/7/2022 8:50:00 AM	LT1	LT1	
	5/9/2022 6:50:00 AM	LT1	LT1	
	5/18/2022 8:50:00 AM	LT1	LT1	
	5/24/2022 8:50:00 AM	LT1	LT1	
	5/30/2022 8:50:00 AM	LT1	LT1	
	6/6/2022 8:50:00 AM	LT1	LT1	
	6/15/2022 8:30:00 AM	QRWRT	QRWRT	
	6/20/2022 8:30:00 AM	LT1	LT1	
	6/27/2022 8:40:00 AM	LT1	LT1	
	7/18/2022 8:40:00 AM	LT1	LT1	
	7/26/2022 8:40:00 AM	LT1	LT1	
	8/2/2022 8:40:00 AM	LT1	LT1	
	8/8/2022 8:40:00 AM	LT1	LT1	
	8/15/2022 8:40:00 AM	LT1	LT1	
	8/24/2022 8:40:00 AM	LT1	LT1	
	8/30/2022 8:40:00 AM	LT1	LT1	
	9/6/2022 8:20:00 AM	LT1	LT1	
	9/12/2022 8:40:00 AM	LT1	LT1	
	9/20/2022 8:40:00	LT1	LT1	

	AM		
	12/20/2022 8:40:00 AM	LT1	LT1
	Total Positive:	**0**	**0**
Sample Station at Meter Chamber, Pemberton Industrial Park			
	2/15/2022 8:50:00 AM	LT1	LT1
	2/23/2022 8:10:00 AM	LT1	LT1
	2/28/2022 8:50:00 AM	LT1	LT1
	3/7/2022 8:50:00 AM	LT1	LT1
	3/14/2022 8:50:00 AM	LT1	LT1
	3/21/2022 8:50:00 AM	LT1	LT1
	3/28/2022 8:50:00 AM	LT1	LT1
	4/4/2022 8:50:00 AM	LT1	LT1
	4/11/2022 8:52:00 AM	LT1	LT1
	4/19/2022 8:50:00 AM	LT1	LT1
	4/25/2022 8:50:00 AM	LT1	LT1
	5/3/2022 8:50:00 AM	LT1	LT1
	7/4/2022 8:10:00 AM	LT1	LT1
	7/12/2022 8:10:00 AM	LT1	LT1
	9/26/2022 8:40:00 AM	LT1	LT1
	10/3/2022 8:40:00 AM	LT1	LT1
	10/12/2022 8:40:00 AM	LT1	LT1
	10/18/2022 8:40:00 AM	LT1	LT1
	10/24/2022 8:40:00 AM	LT1	LT1
	10/31/2022 8:40:00 AM	LT1	LT1
	11/8/2022 8:40:00 AM	LT1	LT1
	11/14/2022 8:40:00 AM	LT1	LT1
	11/21/2022 8:40:00 AM	LT1	LT1
	11/29/2022 8:40:00 AM	LT1	LT1
	12/5/2022 8:40:00	LT1	LT1

	AM		
Total Positive:	0	0	

Result Values: **E - estimated** **L - less than** **G - greater than**

Samples that contain total coliform:	0	0.00% of total
Samples that contain e. coli:	0	0.00% of total
Samples that contain fecal coliform:	0	0.00% of total
Number of consecutive samples that contain total coliform:	0	
Number of samples that contain total coliform in last 30 days:	0/0	
Total number of samples:	49	

Comments:

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Environmental Health Officer
Feb 9 2023

FOR FURTHER INFORMATION PLEASE CALL: Dan Glover (604) 892-2293

Sample Range Report

Vancouver Coastal Health

Facility Name: Pemberton North Water System
Date Range: Jan 1 2022 to Dec 31 2022

Operator Utilities Department-SLRD
P.O. Box 219
Pemberton, BC V0N 2L0

Sampling Site	Date Collected	Total Coliform	E. Coli	Fecal Coliform
1428 Pemberton Farm Road, Adjacent to 1428 Pemberton Farm Road				
	1/24/2022 9:40:00 AM	LT1	LT1	
	2/7/2022 9:30:00 AM	LT1	LT1	
	2/15/2022 9:30:00 AM	LT1	LT1	
	2/28/2022 9:40:00 AM	LT1	LT1	
	3/7/2022 9:30:00 AM	LT1	LT1	
	3/14/2022 9:40:00 AM	LT1	LT1	
	3/21/2022 9:30:00 AM	LT1	LT1	
	3/28/2022 9:30:00 AM	LT1	LT1	
	4/4/2022 9:40:00 AM	LT1	LT1	
	4/11/2022 9:40:00 AM	LT1	LT1	
	4/19/2022 9:40:00 AM	LT1	LT1	
	4/25/2022 9:40:00 AM	LT1	LT1	
	5/3/2022 9:40:00 AM	LT1	LT1	
	5/9/2022 9:40:00 AM	LT1	LT1	
	5/18/2022 9:40:00 AM	LT1	LT1	
	5/24/2022 9:40:00 AM	LT1	LT1	
	5/30/2022 9:40:00 AM	LT1	LT1	
	6/6/2022 9:40:00 AM	LT1	LT1	
	6/13/2022 9:30:00 AM	LT1	LT1	
	6/20/2022 9:40:00 AM	LT1	LT1	
	7/4/2022 8:40:00 AM	LT1	LT1	
	7/12/2022 8:40:00	LT1	LT1	

	AM		
	7/18/2022 9:40:00 AM	LT1	LT1
	7/26/2022 9:40:00 AM	LT1	LT1
	8/2/2022 9:40:00 AM	LT1	LT1
	8/8/2022 9:40:00 AM	LT1	LT1
	8/15/2022 9:40:00 AM	LT1	LT1
	8/24/2022 9:40:00 AM	LT1	LT1
	8/30/2022 9:40:00 AM	LT1	LT1
	9/6/2022 9:40:00 AM	LT1	LT1
	9/12/2022 9:40:00 AM	LT1	LT1
	9/20/2022 9:40:00 AM	LT1	LT1
	9/26/2022 9:30:00 AM	LT1	LT1
	10/3/2022 9:30:00 AM	LT1	LT1
	10/12/2022 9:30:00 AM	LT1	LT1
	10/18/2022 9:30:00 AM	LT1	LT1
	10/24/2022 9:30:00 AM	LT1	LT1
	10/31/2022 7:30:00 AM	LT1	LT1
	Total Positive:	**0**	**0**
7620 Pemberton Meadows Rd, Opposite 7620 Pemberton Meadows Rd			
	3/14/2022 9:30:00 AM	LT1	LT1
	3/21/2022 9:40:00 AM	LT1	LT1
	3/28/2022 9:40:00 AM	LT1	LT1
	4/4/2022 9:30:00 AM	LT1	LT1
	4/11/2022 9:30:00 AM	LT1	LT1
	4/19/2022 9:30:00 AM	LT1	LT1
	4/25/2022 9:30:00 AM	LT1	LT1
	5/3/2022 9:30:00 AM	LT1	LT1
	5/9/2022 7:30:00 AM	LT1	LT1
	5/18/2022 9:30:00 AM	LT1	LT1

5/24/2022 9:30:00 AM	LT1	LT1
5/30/2022 9:30:00 AM	LT1	LT1
6/6/2022 9:32:00 AM	LT1	LT1
6/13/2022 9:20:00 AM	LT1	LT1
6/20/2022 9:30:00 AM	LT1	LT1
6/27/2022 9:30:00 AM	LT1	LT1
7/4/2022 8:30:00 AM	LT1	LT1
7/12/2022 8:30:00 AM	LT1	LT1
7/18/2022 9:30:00 AM	LT1	LT1
7/26/2022 9:30:00 AM	LT1	LT1
8/2/2022 9:30:00 AM	LT1	LT1
8/8/2022 9:30:00 AM	LT1	LT1
8/15/2022 9:30:00 AM	LT1	LT1
8/24/2022 9:30:00 AM	LT1	LT1
8/30/2022 9:30:00 AM	LT1	LT1
9/6/2022 9:30:00 AM	LT1	LT1
9/12/2022 9:30:00 AM	LT1	LT1
9/20/2022 9:30:00 AM	LT1	LT1
9/26/2022 9:40:00 AM	LT1	LT1
10/3/2022 9:40:00 AM	LT1	LT1
10/12/2022 9:40:00 AM	LT1	LT1
10/18/2022 9:40:00 AM	LT1	LT1
10/24/2022 9:40:00 AM	LT1	LT1
10/31/2022 9:40:00 AM	LT1	LT1
Total Positive:	**0**	**0**

Result Values: **E - estimated** **L - less than** **G - greater than**

Samples that contain total coliform:	0	0.00% of total
Samples that contain e. coli:	0	0.00% of total
Samples that contain fecal coliform:	0	0.00% of total
Number of consecutive samples that contain total coliform:	0	
Number of samples that contain total coliform in last 30 days:	0/0	
Total number of samples:	72	

Comments:

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Environmental Health Officer
Feb 9 2023

FOR FURTHER INFORMATION PLEASE CALL: Dan Glover (604) 892-2293

Sample Range Report

Vancouver Coastal Health

Facility Name: Well # 2
Date Range: Jan 1 2022 to Dec 31 2022

Operator

,

Sampling Site	Date Collected	Total Coliform	E. Coli	Fecal Coliform
Well Site #2, Pemberton Village Water Works, Pemberton	1/4/2022 9:50:00 AM	LT1	LT1	
	1/12/2022 9:00:00 AM	LT1	LT1	
	1/17/2022 9:10:00 AM	LT1	LT1	
	1/24/2022 9:10:00 AM	LT1	LT1	
	2/1/2022 9:10:00 AM	1	LT1	
	2/7/2022 9:10:00 AM	LT1	LT1	
	2/15/2022 9:10:00 AM	5.2	LT1	
	2/23/2022 8:50:00 AM	LT1	LT1	
	2/28/2022 9:10:00 AM	LT1	LT1	
	3/7/2022 9:10:00 AM	LT1	LT1	
	3/14/2022 9:10:00 AM	LT1	LT1	
	3/21/2022 9:10:00 AM	LT1	LT1	
	3/28/2022 9:10:00 AM	LT1	LT1	
	4/4/2022 9:10:00 AM	LT1	LT1	
	4/11/2022 9:10:00 AM	LT1	LT1	
	4/19/2022 9:10:00 AM	LT1	LT1	
	4/25/2022 9:10:00 AM	LT1	LT1	
	5/3/2022 9:12:00 AM	LT1	LT1	
	5/9/2022 9:10:00 AM	LT1	LT1	
	5/18/2022 9:10:00 AM	LT1	LT1	
	5/24/2022 9:10:00 AM	LT1	LT1	
	5/30/2022 9:10:00 AM	LT1	LT1	

6/6/2022 9:10:00 AM	2.0	LT1
6/13/2022 9:00:00 AM	LT1	LT1
6/20/2022 9:10:00 AM	1.0	LT1
6/27/2022 9:10:00 AM	LT1	LT1
7/4/2022 9:30:00 AM	LT1	LT1
7/12/2022 9:10:00 AM	LT1	LT1
7/18/2022 9:10:00 AM	LT1	LT1
7/26/2022 9:10:00 AM	LT1	LT1
8/2/2022 9:10:00 AM	LT1	LT1
8/8/2022 9:10:00 AM	LT1	LT1
8/15/2022 9:10:00 AM	LT1	LT1
8/24/2022 9:10:00 AM	LT1	LT1
8/30/2022 9:10:00 AM	LT1	LT1
9/6/2022 9:10:00 AM	LT1	LT1
9/12/2022 9:10:00 AM	LT1	LT1
9/20/2022 9:10:00 AM	LT1	LT1
9/26/2022 9:10:00 AM	LT1	LT1
10/3/2022 9:10:00 AM	1.0	LT1
10/12/2022 9:10:00 AM	LT1	LT1
10/18/2022 9:10:00 AM	LT1	LT1
10/24/2022 9:10:00 AM	LT1	LT1
10/31/2022 9:10:00 AM	1.0	LT1
11/8/2022 9:10:00 AM	LT1	LT1
11/14/2022 9:10:00 AM	LT1	LT1
11/21/2022 9:10:00 AM	LT1	LT1
11/29/2022 9:00:00 AM	LT1	LT1
12/5/2022 9:10:00 AM	LT1	LT1
12/12/2022 9:00:00 AM	LT1	LT1
12/20/2022 9:10:00 AM	1.0	LT1
Total Positive:	**7**	**0**

Result Values: **E - estimated** **L - less than** **G - greater than**

Samples that contain total coliform:	7	13.73% of total
Samples that contain e. coli:	0	0.00% of total
Samples that contain fecal coliform:	0	0.00% of total
Number of consecutive samples that contain total coliform:	0	
Number of samples that contain total coliform in last 30 days:	0/0	
Total number of samples:	51	

Comments:

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Environmental Health Officer
Feb 9 2023

FOR FURTHER INFORMATION PLEASE CALL: Dan Glover (604) 892-2293

Sample Range Report

Vancouver Coastal Health

Facility Name: Well #3
Date Range: Jan 1 2022 to Dec 31 2022

Operator

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Sampling Site	Date Collected	Total Coliform	E. Coli	Fecal Coliform
Well Site #3, Pemberton				
	1/4/2022 9:10:00 AM	LT1	LT1	
	1/12/2022 9:10:00 AM	LT1	LT1	
	1/17/2022 9:20:00 AM	LT1	LT1	
	1/24/2022 9:20:00 AM	LT1	LT1	
	2/1/2022 9:20:00 AM	LT1	LT1	
	2/7/2022 9:20:00 AM	LT1	LT1	
	2/15/2022 9:20:00 AM	LT1	LT1	
	2/23/2022 9:00:00 AM	LT1	LT1	
	2/28/2022 9:20:00 AM	LT1	LT1	
	3/7/2022 9:20:00 AM	LT1	LT1	
	3/14/2022 9:20:00 AM	LT1	LT1	
	3/21/2022 9:20:00 AM	LT1	LT1	
	3/28/2022 9:20:00 AM	LT1	LT1	
	4/4/2022 9:20:00 AM	LT1	LT1	
	4/11/2022 9:20:00 AM	LT1	LT1	
	4/19/2022 9:20:00 AM	LT1	LT1	
	4/25/2022 9:20:00 AM	LT1	LT1	
	5/3/2022 9:20:00 AM	LT1	LT1	
	5/9/2022 9:20:00 AM	LT1	LT1	
	5/18/2022 9:20:00 AM	LT1	LT1	
	5/24/2022 9:20:00 AM	LT1	LT1	
	5/30/2022 9:20:00 AM	LT1	LT1	
	6/6/2022 9:20:00 AM	LT1	LT1	
	6/13/2022 9:10:00	LT1	LT1	

AM		
6/20/2022 9:20:00 AM	LT1	LT1
6/27/2022 9:20:00 AM	LT1	LT1
7/4/2022 9:20:00 AM	LT1	LT1
7/12/2022 9:20:00 AM	LT1	LT1
7/18/2022 9:20:00 AM	LT1	LT1
7/26/2022 9:20:00 AM	LT1	LT1
8/2/2022 9:20:00 AM	LT1	LT1
8/8/2022 9:20:00 AM	LT1	LT1
8/15/2022 9:20:00 AM	LT1	LT1
8/24/2022 7:20:00 AM	LT1	LT1
8/30/2022 7:20:00 AM	LT1	LT1
9/6/2022 9:20:00 AM	LT1	LT1
9/12/2022 9:20:00 AM	LT1	LT1
9/20/2022 9:20:00 AM	LT1	LT1
9/26/2022 9:20:00 AM	LT1	LT1
10/3/2022 9:20:00 AM	LT1	LT1
10/12/2022 9:20:00 AM	LT1	LT1
10/18/2022 9:20:00 AM	LT1	LT1
10/24/2022 9:20:00 AM	LT1	LT1
10/31/2022 9:20:00 AM	LT1	LT1
11/8/2022 7:20:00 AM	LT1	LT1
11/14/2022 9:20:00 AM	LT1	LT1
11/21/2022 7:20:00 AM	LT1	LT1
11/29/2022 9:10:00 AM	LT1	LT1
12/5/2022 9:20:00 AM	LT1	LT1
12/12/2022 9:10:00 AM	LT1	LT1
12/20/2022 9:20:00 AM	LT1	LT1
Total Positive:	**0**	**0**

Result Values:	E - estimated	L - less than	G - greater than

Samples that contain total coliform:	0	0.00% of total
Samples that contain e. coli:	0	0.00% of total
Samples that contain fecal coliform:	0	0.00% of total
Number of consecutive samples that contain total coliform:	0	
Number of samples that contain total coliform in last 30 days:	0/0	
Total number of samples:	51	

Comments:

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Environmental Health Officer
Feb 9 2023

FOR FURTHER INFORMATION PLEASE CALL: Dan Glover (604) 892-2293

Box 100 | 7400 Prospect Street
Pemberton, BC V0N 2L0
P: 604.894.6135 | F: 604.894.6136
Email: admin@pemberton.ca
Website: www.pemberton.ca

APPENDIX V

2022 Water System Evaluation Reports

Vancouver Coastal Health
Promoting wellness. Ensuring care.

Water System Report

Inspection Information	
Facility Name:	**Village of Pemberton**
Facility Number:	1110292
Officer:	Dan Glover
Inspection type:	Routine
Inspection date:	March 28, 2023
Follow-up Inspection Required:	No
Hazard Rating:	Low

Comments

Water Quality and Quantity

Excellent bacteriological water sampling frequency in 2022 with 255 treated water samples submitted and 0 with presence of coliform bacteria. Good ongoing operation and maintenance of the water system including consistent chlorine residual in the distribution system and regular water main flushing continue to be effective measures. An additional 102 raw (untreated) water samples were collected from well #2 and well #3 with a total of 7 positive for total coliforms.

A full chemical drinking water analysis was undertaken for both wells and the treated water in 2022; no significant changes in the raw water quality of either of these wells (fluctuating manganese levels in well 2 noted). Well 2 is utilized as a back-up source and used periodically when servicing of well 3 is necessary. Treated water results also indicate very low levels of THM's in the distribution system.
Increased development results in increased water demand; as a result investigations into securing additional high quality water sources continues. Options identified in the KWL Water Treatment Investigation report are under evaluation. We recommend a thorough Water Conservation Plan be completed which would complement a Ground Water and Surface Water Master Supply Strategy and help guide this work.

Source water protection continues to be an important factor in the ongoing provision of safe drinking water. There are challenges given the existing development around the existing wells however it should always be given high priority for these wells and any new water sources brought online.

Operation of the soda ash plant continues to be successful, with chemically stable water being produced on an ongoing basis. VCH is comfortable with the approach taken by the VOP in continuing to advise the public to flush taps before water consumption to minimize lead levels in drinking water.

Infrastructure

Reservoir security improvements have been substantially completed.

Regular exercising of the back-up generator is being implemented.
Upgrades to the SCADA system completed.
Implementation of the cross connection control bylaw continues to provide an increased level of protection as part of the multi-barrier approach in place.

<u>Administration</u>
A water system Emergency Response and Contingency Plan (ERCP) is in place; please review periodically to ensure the contact information is accurate.
Thank you for submitting your Annual Report for the 2021 year. The Annual Report for the 2022 year is due June 30, 2023.

Dan Glover
DWO

Vancouver CoastalHealth
Promoting wellness. Ensuring care.

Water System Report

Inspection Information	
Facility Name:	**Pemberton North Water System**
Facility Number:	1110293
Officer:	Dan Glover
Inspection type:	Evaluation
Inspection date:	March 28, 2023
Follow-up Inspection Required:	**No**
Hazard Rating:	**Low**

Comments

This is an evaluation of the Pemberton North Water System as of March 28, 2023.

A total of 72 treated water samples were submitted for bacteriological analysis in 2022 with none showing presence of coliform bacteria. Excellent sampling frequency February to October however winter conditions and design of sample stations makes sampling challenging in Nov to January. It is worth considering options for establishing 1 year-round sample point in the near future. The excellent water quality is likely attributable to good operation and maintenance of the water system including consistent chlorine residual in the distribution system, regular water main flushing. The current Permit to Operate a water System is being adjusted to reflect current operation and sampling requirements.
Our records don't indicate an Annual Report for the 2021 year was submitted. Please ensure an Annual Report for the 2022 year is received by June 30, 2023.

As water is supplied by the Village of Pemberton (VoP) water system the following comments from the VoP inspection report apply:

"A full chemical drinking water analysis was undertaken for both wells and the treated water in 2022; no significant changes in the raw water quality of either of these wells (fluctuating manganese levels in well 2 noted). Well 2 is utilized as a back-up source and used periodically when servicing of well 3 is necessary. Treated water results also indicate very low levels of THM's in the distribution system.
Increased development results in increased water demand; as a result investigations into securing additional high quality water sources continues. Options identified in the KWL Water Treatment Investigation report are under evaluation. We recommend a thorough Water Conservation Plan be completed which would complement a Ground Water and Surface Water Master Supply Strategy and help guide this work.
Operation of the soda ash plant appears to be successful, with chemically stable water being produced on an ongoing basis. VCH is comfortable with the approach taken by the VOP in continuing to advise the public to flush taps before water consumption to

minimize lead levels in drinking water.

Infrastructure
Reservoir security improvements within the VoP water system have been substantially completed.
Implementation of the cross connection control bylaw continues to provide an increased level of protection as part of the multi-barrier approach in place.

Upgrades to the SCADA system completed."

Dan Glover
DWO

Water System Report

Inspection Information	
Facility Name:	**Pemberton Industrial Park Water System**
Facility Number:	
Officer:	Dan Glover
Inspection type:	Evaluation
Inspection date:	March 28, 2023
Follow-up Inspection Required:	**No**
Hazard Rating:	**Low**

Comments

This is an annual evaluation of the water supply within the Pemberton Industrial Park.

A total of 50 bacteriological samples were submitted in 2021 which meets the minimum frequency standard. Due to courier issues one sample was too long in transit to be processed by BCCDC lab. No samples were positive for total coliforms or e. coli.
Improved free chlorine residuals in the supplied water were noted in 2022 by routine monitoring.

The water is supplied from a ground water source located in Mount Currie on Lil'wat lands. Historical water results indicate the water alkalinity is low and the pH is slightly acidic. General advice is that water users should be advised to run the water until cold before consumption.
A water sample from the Industrial Park supply was submitted for full water analysis in 2022 and the results indicate no significant changes in water quality.
We understand improvements to reservoir security and development of a water System Emergency Response Plan and underway, although VCH does not regulate the Mount Currie Water System. VCH sees these improvements as important.

A water system Annual Report for 2021 was submitted in 2022. Thank you. The Annual Report for 2022 is due by June 30, 2023.
Please review and update your Emergency Response and Contingency Plan as needed to ensure the contacts remain accurate.

_____

Dan Glover
DWO

VILLAGE OF PEMBERTON WATER SYSTEM PERFORMANCE ASSESSMENT

Village of Pemberton

A review and inventory of the existing water system with emphasis on the performance of the source aquifer.

2020

Contents

Figures

Tables

Design Criteria – Village of Pemberton Bylaw 677, 2011

Per Capita Demand	
Average daily domestic Flow	455 litres/capita/day
Maximum daily domestic flow	910 litres/capita/day
Peak hour domestic flow	1,820 litres/capita/day
Design Pressures	
Minimum pressure at peak demand	300 kPa (44 psi)
Maximum allowable pressure	850 kPa (123 psi)
Minimum pressure for Fire Flow plus max day demand	150a (22 psi)

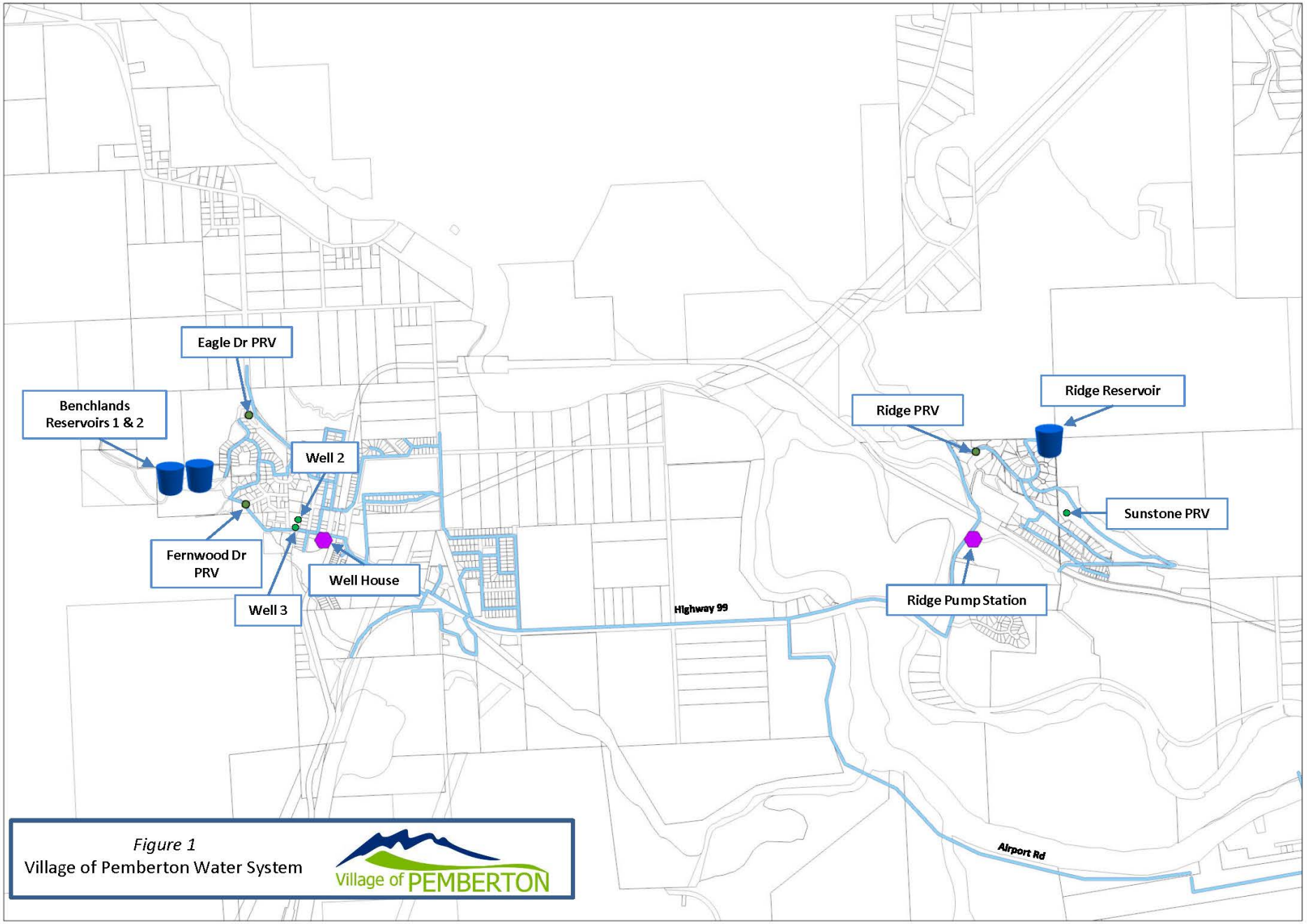

Figure 1
Village of Pemberton Water System

1 Introduction

1.1 Background

The Village of Pemberton, under the authority of Vancouver Coastal Health, operates two water systems: the Village system, and the Industrial Park system and in addition supplies water to the Pemberton North Water System (**PNWS**) which is owned and maintained by the Squamish Lillooet Regional District. The main Village system withdraws water from the Pemberton Creek Fan Aquifer through two 300mm (12") diameter wells which supply the current Village population of approximately 3,100 as well as the water demands of the **PNWS**. The Industrial Park system is separate from the Village system and is supplied with metered water from the neighboring Lil'wat Nation through a water use agreement. This report describes the results of a study to determine the performance of the Village water system with emphasis on the performance of the source aquifer.

1.2 Previous Studies

The following reports, studies and documents were reviewed in preparation of this report:

- Village of Pemberton Water Study, NovaTec, 1991
- Pemberton Water System Study, Binnie, 1998
- Village of Pemberton Water System Capacity Study, Associated Engineering, 2007
- Hydrogeological Assessment for Groundwater Protection Plan, Enterprise Geoscience Services Ltd., 2012
- Groundwater Recharge Assessment For Pemberton Creek Fan Aquifer, Enterprise Geoscience Services Ltd., 2015
- Alternate Water Source Assessment, ISL, 2017
- Guidance on Manganese in Drinking Water, BC Ministry of Health, 2019

1.3 Report Objectives

The main objectives of this report are:

1. Summarize and assess the existing water system and its ability to provide sufficient potable water to meet current and future demands.
2. Determine the improvements required to ensure the Village is able to maintain the ability to provide sufficient water that meets all Guidelines for Canadian Drinking Water Quality (**GCDWQ**).

2 Village Water System

2.1 Supply Source

The Village of Pemberton's water source is comprised of 2 active wells that withdraw water from the Pemberton Creek Fan Aquifer; Well 2, located in Foughberg Park; and Well 3, located in Pioneer Park. Well 1, located in the well house, is currently isolated from the system and is included here for reference in regards to water quality which is discussed in Section 5.4 of this report. Table 1 summarizes the relevant information for each well.

Table 1 – Village Well Information

Well	Year of Construction	Diameter (mm)	Depth (m)	Rated Flow (L/s)	Notes
1	1992	200 (10")	29	28.8	Isolated from distribution due to declining yield and poor water quality.
2	1997	300 (12")	41.8	76	Current backup well.
3	2007	300 (12")	46	50	Current duty well.

Figure 2- Well locations

Well 1

Constructed in 1992, by 1997 Well 1's performance began to decline due to what is believed to be the colonization of naturally occurring iron bacteria in the well causing fouling and decreased flow. In 1997 and again in 2001 it was re-developed using high pressure water jet and acidization[1] which resulted in temporary minor improvements in productivity. It was utilized as a backup well until 2007 when it was isolated from the system due to excessive iron and manganese concentrations.

Well 2

Well 2 was constructed in 1997 to serve as a backup well and in short order became the duty well due to the declining performance of Well 1. It was utilized as the duty well until 2014 when iron and manganese levels began rising leading to aesthetic issues for operations staff who began using Well 3 as the duty well with its better water quality. It was redeveloped in 2014 in an attempt to restore performance with only a temporary improvement. In 2019 the Government of Canada implemented a Maximum Acceptable Concentration (**MAC**) of 0.12 mg/L for manganese which Well 2 has exceeded. It is currently the sole backup well and is periodically operated for maintenance purposes only.

Well 3

Well 3 was constructed in 2007 to replace Well 1 as the backup well and served as the backup until 2014 when Well 2's water quality began to decline. It is the current duty well and until 2020 provided water that met all **GCDWQ** targets. *In 2018 manganese levels began to increase and the most recent results from February 2020 show that manganese levels have now exceeded the **GCDWQ** Aesthetic Objective of 0.02 mg/L. Water quality will be discussed further in Section5.4– Aquifer Water Quality.*

2.2 Treatment

Current water treatment consists of soda ash conditioning (since 2017) to increase the pH of the well water from approximately 6.5 to 7.0 in order to minimize corrosivity. The Village also chlorinates (since 2009) using sodium hypochlorite for both primary disinfection and to maintain a minimum free chlorine residual of 0.2 mg/L at the farthest ends of the distribution system.

2.3 Reservoirs

The distribution system includes 3 reservoirs totaling 4,551 m^3 of water storage. Table 2 summarizes the relevant information for each reservoir.

[1] Technical Briefing #4 – Water Supply Assessment New Village Production Well, Golder Associates, 2007.

Table 2 - Reservoir Information

Reservoir	Year Constructed	Type	Capacity (m^3)	Top Water Level Elevation (m)
Benchlands Reservoir 1	2002	Circular Concrete Tank	1,640	290.5
Benchlands Reservoir 2	2014	Circular Steel Tank	1,490	290.5
Ridge Reservoir	2017	Circular Steel Tank	1,421	357.6

The total required storage volume is determined based on the following formula from the MMCD Design Guidelines referenced by VoP Bylaw 677, 2011:

Required Storage = A + B + C, where: *Village*

A = Fire Storage ---------- (*2 hours at 150 L/s for Schools)*

B = Equalization Storage = 25% of Maximum Day Demand ------- *(MDD = 3,700 m^3)*

C = Emergency Storage = 25% of (A+B)

The required storage based on current water consumption rates is 2,506 m^3 which leaves 2,045 m^3 to accommodate future growth. Figure 3 summarizes the Village's water storage.

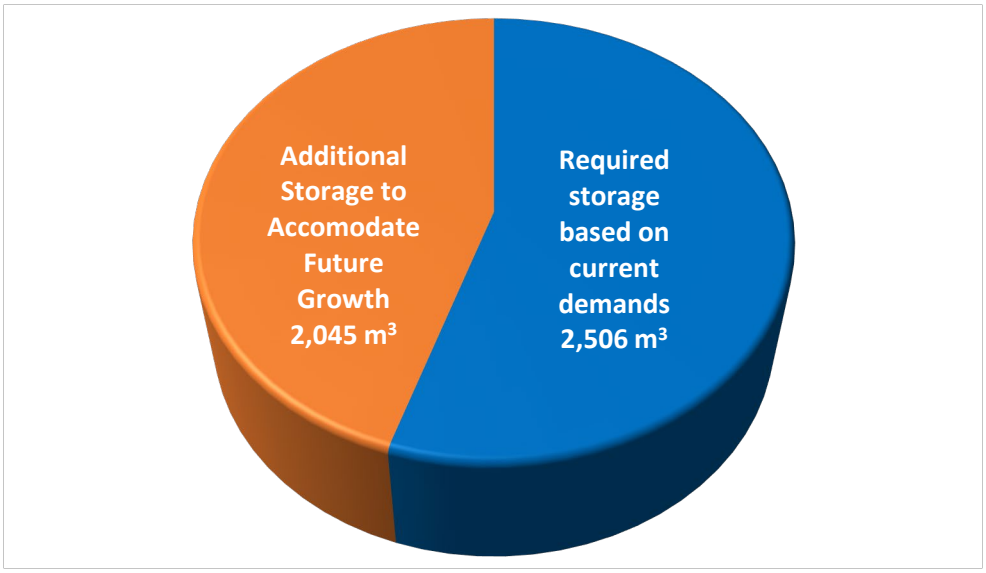

Figure 3- Existing storage capacity based on MMCD Design Guidelines

The amount of storage indicates ample capacity to accommodate future growth below the elevation of the existing reservoirs. Using the Village's per capita demand design value of 910 L/c/d for MDD shows that current storage capacity can accommodate a total population of approximately 10,000.

2.4 Backup Power

The Village does not currently have a backup power generator for its wells. In the event of a power failure of significant time, the reservoirs will provide enough water to last between 1.5 to 3 days depending on seasonal water demands. A project has been identified in the Village of Pemberton five year financial plan to design and construct a back-up generator for the well house in 2021.

2.5 Distribution System

The distribution system is comprised mainly of PVC water piping with some sections of asbestos cement piping that are scheduled for replacement. All recently installed mains have been PVC with diameters ranging between 50mm and 300mm (2" to 12"). The distribution system extends from the Benchlands reservoirs eastwards to the Sunstone Development, southwards to the WWTP on Airport Road and northwards to the **PNWS**.

2.5.1 Pressure Zones

There is a total of four distinct pressure zones within the Village water system that are governed by the water levels in the reservoirs and the setpoints of the four Pressure Reducing Valve (**PRV**) stations. Operations staff have set the PRVs to reduce pressure such that the maximum pressure (coincident with the lowest elevation) in each pressure zone is 620 kPa (90 psi).

291 m Pressure Zone – The two Benchlands reservoirs share a top water level of 290.5 m which represents the Hydraulic Grade Line (HGL) of this pressure zone. It services a large portion of the Benchlands just below the reservoirs.

265 m Pressure Zone – This is the main pressure zone that encompasses the downtown core and extends east to Pemberton Farm Road East and includes the **PNWS**. It is fed from the 291 m Pressure Zone via two **PRV**s; one located on Fernwood Dr. and the other on Eagle Dr and which are both set to reduce the HGL to 265 m.

358 m Pressure Zone – The Ridge booster pump station boosts water from the 265 m Pressure Zone to the Ridge Reservoir which has a top water level of 357.6 m. This pressure zone services the Ridge Development exclusively.

265 m Sunstone Pressure Zone – The Sunstone Development is fed water from the 358 m Pressure Zone via a PRV set to reduce the HGL to 265 m. It is anticipated that this zone will merge with the Village 265 m Pressure Zone during future water main looping.

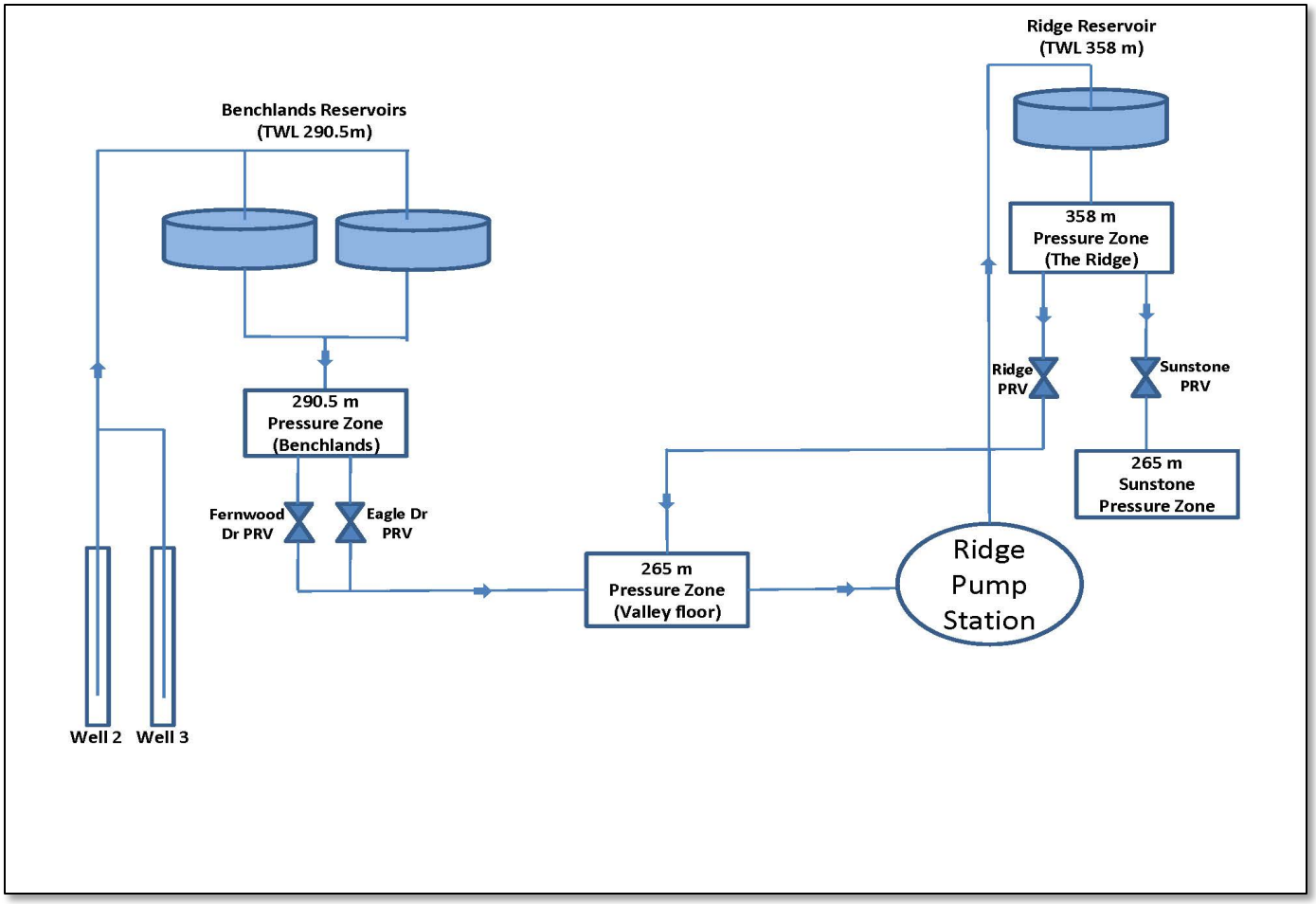

Figure 4- Village water system and pressure zones.

2.5.2 The Ridge Booster Pump Station

The Ridge booster pump station was constructed in 2017 to pump water up to the newly constructed Ridge Reservoir. The pump station also includes chlorine dosing equipment to boost chlorine levels, as this is the far end of the water system and experiences low chlorine residuals due to chlorine decay. The pump station is connected to the Ridge Reservoir via a dedicated water main.

2.5.3 Fire Protection

The Village owns and maintains a total of 95 fire hydrants spread throughout the community that provide fire flow for fire suppression activities. The Village's reservoirs are designed to include sufficient capacity for fire protection of buildings as large as schools.

3 Village Population Trends

3.1 Historic Population

The Village has experienced considerable growth over the years increasing from an approximate population of 550 in 1991 to 2,574 in the most recent 2016 Census. The data indicates that from 1991 to 2006 the Village grew at a relatively steady rate averaging 100 people per year and has slowed in recent years to an average of 50 people per year from 2006 to 2016.

3.2 Future Population

On average between 1991 and 2016, the Village grew at a rate of 80 people per year and extrapolating this growth rate indicates the Village will likely have a population of approximately 4,750 in the year 2040. Using the equation of the best fit line shows the current estimated 2020 population to be 3,100 which will be used for the purposes of this report in the absence of any recent census data. Previous studies of the Village have had a tendency to overestimate future population using exponential growth models however over the previous 25 years the data appears to more closely follow a linear trend.

There are also a number of significant residential developments currently under construction or planned for construction in the next 5 - 10 years that will presumably increase the Village population. For the purposes of this report, it will be assumed that population will increase at a linear rate as historically observed, as shown in Figure 5, but the system capacity will be assessed based on build-out of current and future planned developments.

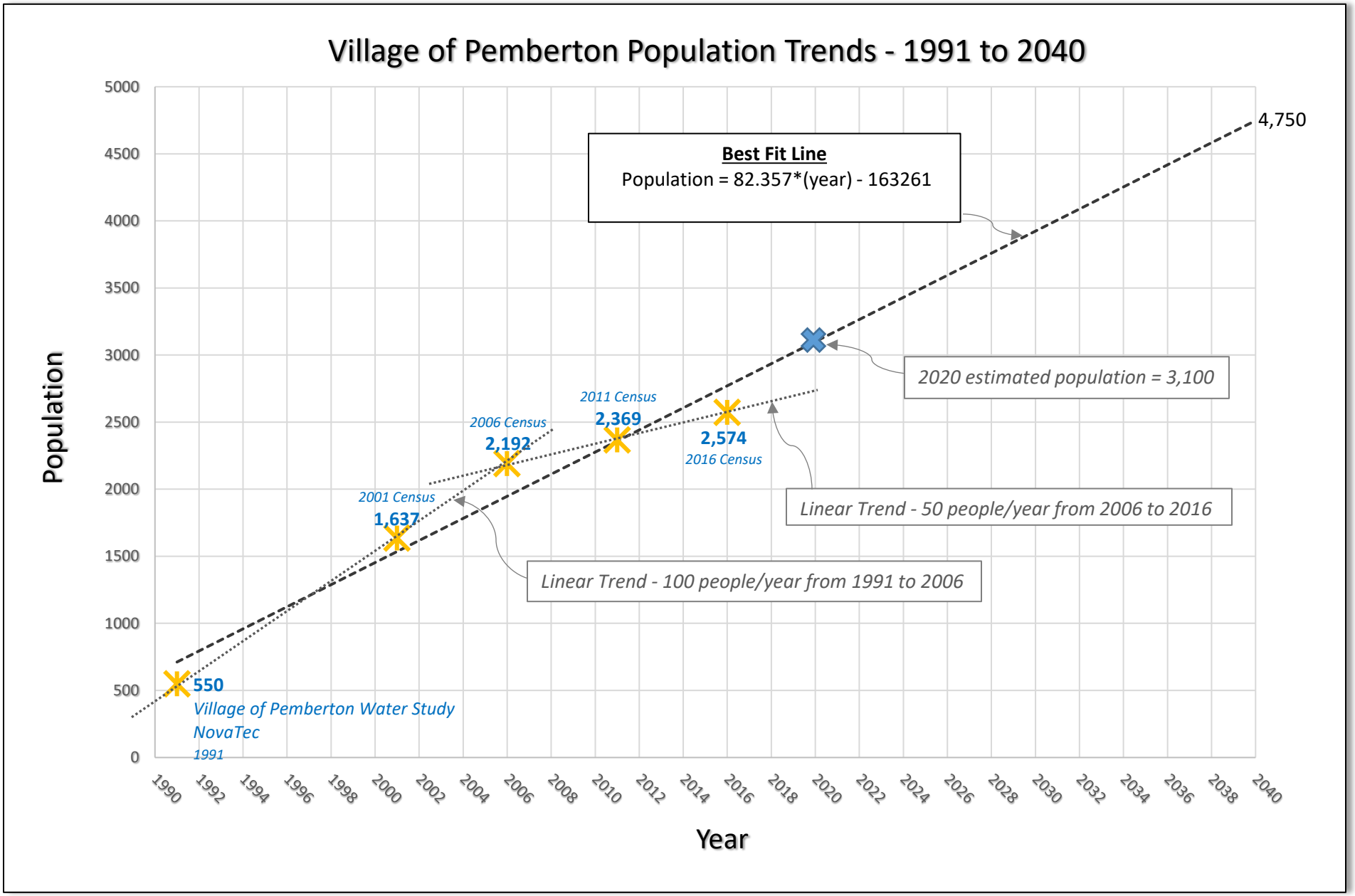

Figure 5 - Village Population Trends

4 Water Demands

4.1 Historical Demands

Figure 6 on the following page shows the daily water consumption of the Village water system from 2010 to 2020. The peaks represent consumption during the summer months and the troughs represent demand during the winter months. Water consumption increased steadily from 2010 until 2015 when a major leak was identified and repaired resulting in an immediate and substantial decrease in consumption. Records indicate the leak was responsible for a daily loss upwards of 500 m^3 or 500,000 L.

From 2016 to 2020 water consumption has remained remarkably consistent and has declined to a small extent despite a growing population. This decline can be attributed to factors such as the repairing of leaks as well as the effectiveness of water conservation measures such as summer lawn watering restrictions and increased use of water efficient appliances. It is anticipated that with increasing population, water consumption rates will again show an increasing trend in future years.

Due to the significant water leak that was repaired in 2015 impacting previous data, only data from 2016 onward was used in determining the average and maximum day consumption rates for the Village water system. Note that these values include the demands of the **PNWS**. Table 3 summarizes the Average Day and Maximum Day demands for the years 2016-2019.

Table 3 - Village Water Demands

Year	Average day demand (m^3/day)	Max day demand (m^3/day)	Peaking Factor
2016	1,847	3,696	2.0
2017	1,880	3,579	1.9
2018	1,799	3,570	2.0
2019	1,838	3,527	1.9

The maximum day demand from 2016-2019 was 3,696 m^3 on July 28, 2016. For the calculations found in this report, the rounded value of 3,700 m^3/day (42.8 L/s) will be used as the present-day Max Day Demand (**MDD**) and the 2017 average of 1,880 m^3/day (21.9 L/s) will be used for the Average Day Demand (**ADD**). The estimated sustainable aquifer withdrawal rate (2,600 m^3/day or 30 L/s) shown in Figure 6 is discussed in more detail in Section 5.2 – Aquifer Recharge Rate and is shown here to illustrate current demands with respect to aquifer capacity.

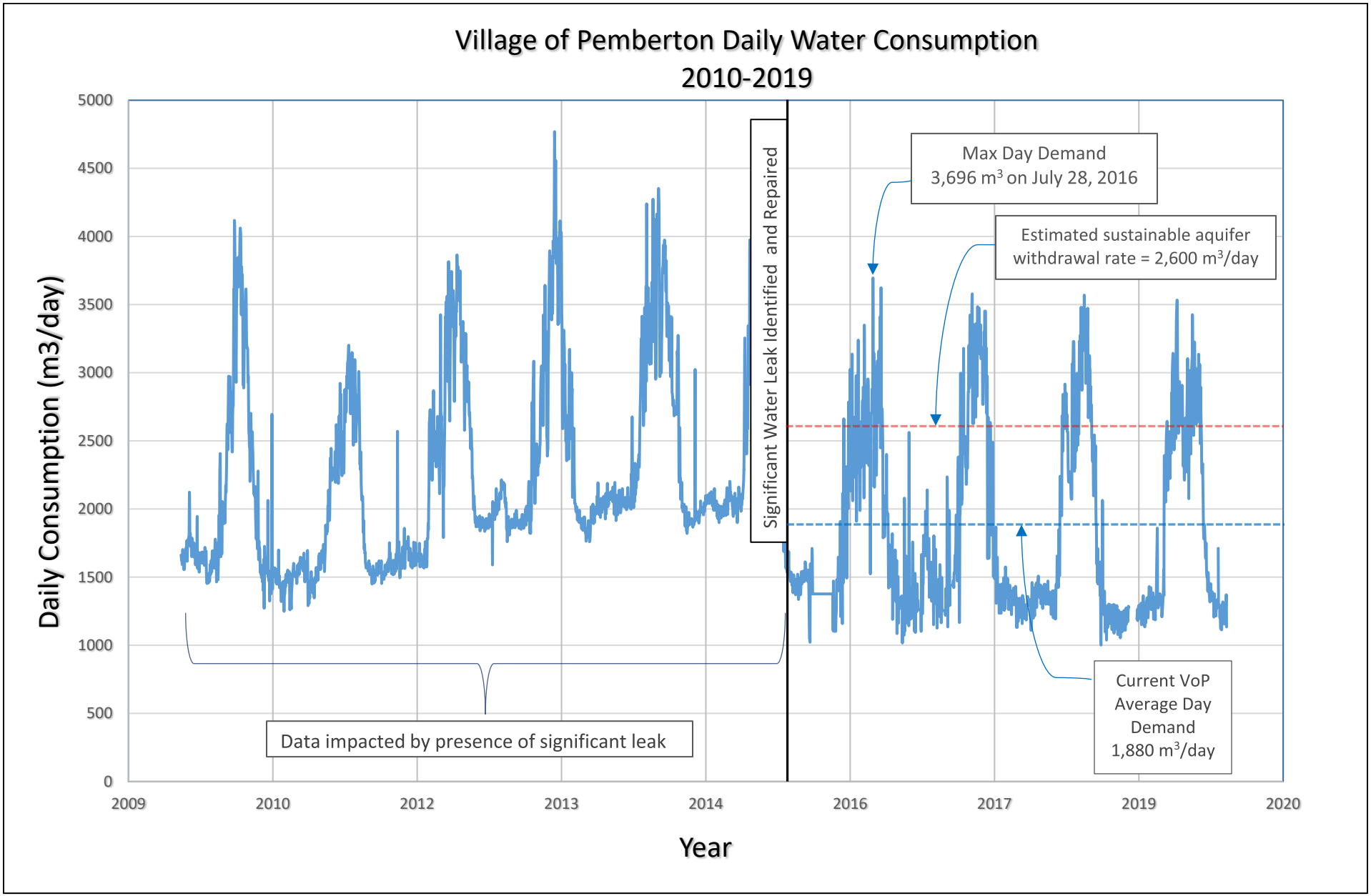

Figure 6- Daily water consumption from 2010 – 2020

4.2 Future Demands

Using the estimated population growth rate in Figure 5, along with Village design criteria for per capita water use, Table 4 shows projected Village populations along with the corresponding estimated future water use.

Table 4 - Projected future Village water demands

Year	Estimated Village population	Estimated ADD (m^3/day)	Estimated MDD (m^3/day)
2020	3,100	1,880	3,700
2025	3,510	2,067	4,073
2030	3,925	2,255	4,451
2035	4,335	2,442	4,824
2040	4,750	2,631	5,202

4.3 Per Capita Water Use

Total per capita water use, which includes residential, industrial, commercial, and other uses of water provided by the Village averaged 611 L/capita/day[1] in 2016, the last year with census data. This is above the Canadian average of 427 L/capita/day[2] indicating the potential for reducing consumption through increased water conservation efforts and or leak detection and repair.

4.4 Current and Future Development and Impacts to Water Consumption

The Village currently has several developments that are either under construction or have been completed within the previous 2 years and have not yet been substantially populated. Once populated these developments will add to the demands on the water system. Using Village Design Criteria, Table 5 summarizes the developments including their potential impacts on water consumption and assuming the average unit or lot will contribute 2.7 to the Village population as found in the 2016 census.

[1] 2016 PNWS demands deducted from Village demands.
[2] https://www150.statcan.gc.ca/n1/daily-quotidien/190611/dq190611b-eng.htm

Table 5 - Current Developments and their estimated impacts on water consumption.

Development	Population Estimate	ADD (m^3/day)	MDD (m^3/day)
The Ridge - Phase 1	119	54	108
Sunstone - Phase 1	105	48	96
Sunstone - Phase 2	108	49	98
Sunstone - Townhomes	146	66	133
Tiyata - Phase 1	51	23	47
Tiyata - Phase 2	35	16	32
Orion	122	55	111
Totals	**686**	**312**	**624**

There are also several developments currently in the planning phase and are expected to be constructed within the next 5 – 15 years. The anticipated impacts are summarized in Table 6.

Table 6 - Future developments in planning and their estimated impacts on water consumption.

Development	Population Estimate	ADD (m^3/day)	MDD (m^3/day)
The Ridge - Phase 2	65	29	59
Tiyata - Phase 3	57	26	52
Tiyata - Phase 4	32	15	29
Crestline	97	44	88
Wye Lands	216	98	197
Coombs	81	37	74
Benchlands	1215	553	1106
Totals	**1763**	**802**	**1604**

Table 7 below summarizes the impacts to water demands when both current and future developments are fully populated. The current demands and system capacity are included for comparison/reference. The system capacity is governed by the **ADD** which is an annual average while the **MDD** is a one day demand and does not impact system capacity.

Table 7 - Projected impacts to water demands when current and future developments are fully populated.

Scenario	ADD (L/s)	MDD (L/s)
Current 2020 Demands	21.9	42.8
Demands when current developments are fully populated.	25.3	50
Demands when future planned developments are fully populated.	34.6	68.6
System Capacity	**30**	**n/a**

5 Pemberton Creek Fan Aquifer

5.1 Aquifer Description

Pemberton Creek begins flowing at the base of the Ipsoot Glacier approximately 10 km west of the Village. It flows down the steep mountainous watershed before flowing out onto the Pemberton Creek alluvial fan that encompasses most of the Village's downtown core. The alluvial fan consists of cobbles, gravel, sand, and silt that have been deposited over millennia by the creek due its flattening gradient as it flows down onto the valley floor. Alluvial fan deposits vary widely over the area due to flooding events as well as changes in the creek path over the depositional history. The saturated alluvial fan deposits are what form the Pemberton Creek Fan Aquifer. The aquifer is unconfined and is considered highly susceptible to contamination by surface sources.

Several test wells have been drilled in the aquifer over the years with yields varying between 2 - 79 L/s confirming the highly variable stratigraphy of the underlying sediments. Towards the western edge of the aquifer (near the fire hall) test wells revealed cemented sand and gravel at depth which produced low yields insufficient for conversion into a municipal production well. Towards the eastern edge of the aquifer (near the railway) test wells indicate finer sands at depth contributing to low yield potential. The central portion of the aquifer where all production wells (1, 2 and 3) are located consists mainly of sand and gravel at depth, producing wells that are able to meet the demands of the Village water system.

5.2 Recharge Rate

The Pemberton Creek Fan Aquifer is primarily (~99%) recharged via leakage from Pemberton Creek with a minor contribution (~1%) from surface water sources such as snowmelt and rainfall infiltration. The 2015 report, Village of Pemberton Groundwater Recharge Assessment for Pemberton Creek Fan Aquifer by Enterprise Geoscience Services Ltd, estimated that the recharge rate of the aquifer at approximately 30 L/s. This was deduced from the observation that average water levels in Wells 2 and 3 were declining in 2014/2015 when the ADD was 30 L/s. A 2017 ISL report, Alternate Water Source Assessment, also suggested the aquifer yield to be 30 L/s based on pumping and well level records.

5.3 Aquifer Levels

Figure 7 shows the static water level for Wells 2 and 3 since 2018, when this data began being consistently collected. As expected, the summer months show a decrease in the water level of the aquifer as summer water usage exceeds the estimated 30 L/s recharge rate of the aquifer. As water usage drops below 30 L/s in the winter months the aquifer is able to recharge.

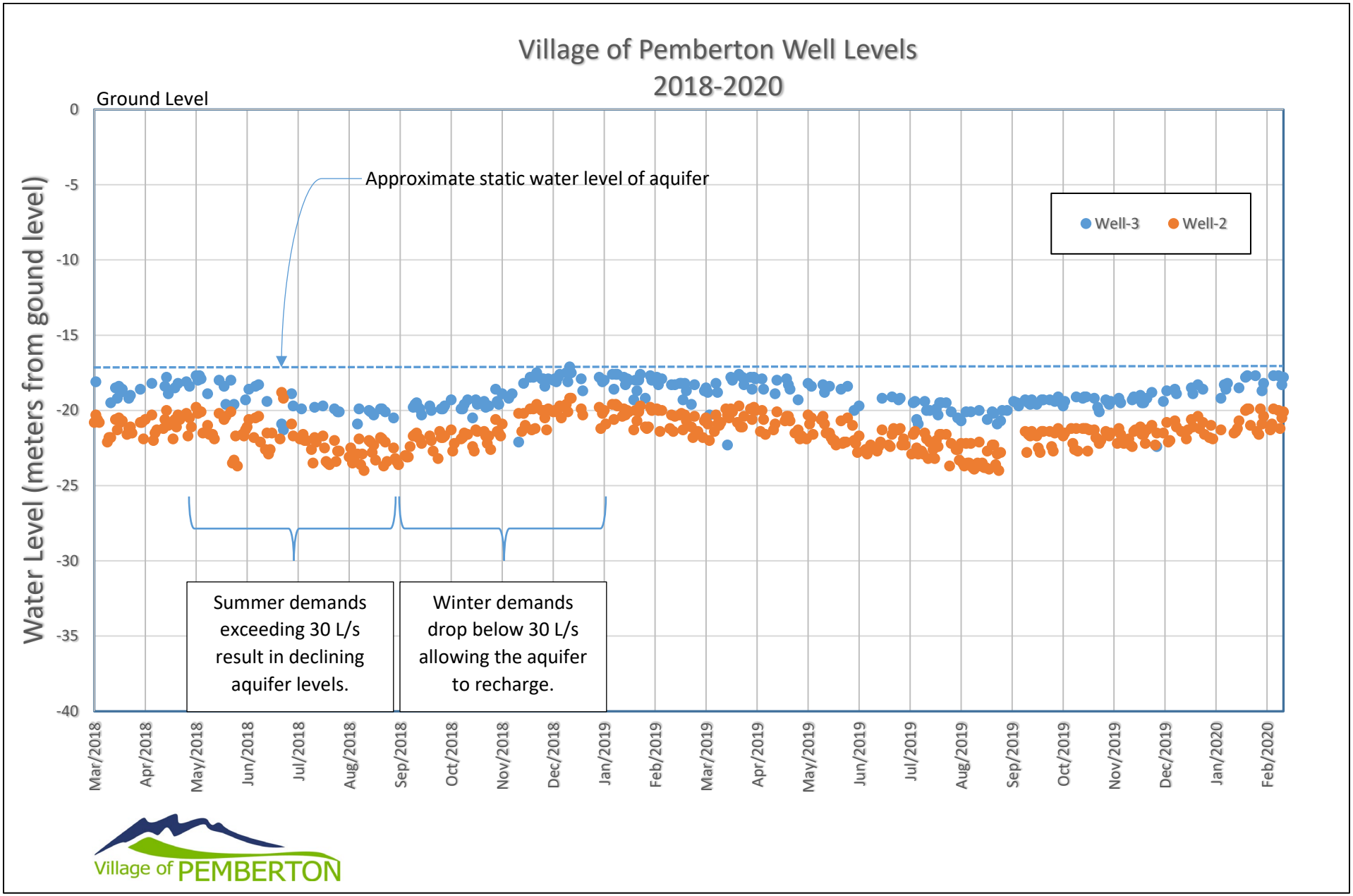

Figure 7 - VoP Well water levels

5.4 Water Quality

The Pemberton Creek Fan Aquifer produces water that is slightly acidic, is low in total dissolved solids and has shown elevated levels of iron and manganese. The presence of iron and manganese is common in groundwater wells in British Columbia and Health Canada has implemented an Aesthetic Objective (**AO**) for both iron and manganese in drinking water as both lead to staining of fixtures and appliances at higher concentrations. Manganese also has a Maximum Acceptable Concentration (**MAC**) that was implemented in 2019 due to health concerns at elevated levels which is discussed further in Section 6 – Conclusions.

Iron

Iron levels for Wells 2 and 3 clearly show the elevated levels present in Well 2 as compared to Well 3. Well 2 appears to have had negligable levels before suddenly and sharply increasing in 2011, exceeding the **AO**. Well 2 was redeveloped in 2014 resulting in a drop in iron levels that lasted two years before again surging to exceed the **AO** in 2016. The most recent results in 2020 show that iron levels have decreased back below the **AO** despite not having been redevoped or having any additional maintenance performed that can explain the decrease. Well 1, not shown on the graph due to scale, had a test result of 16.7 mg/L in 2013, the last time it was tested.

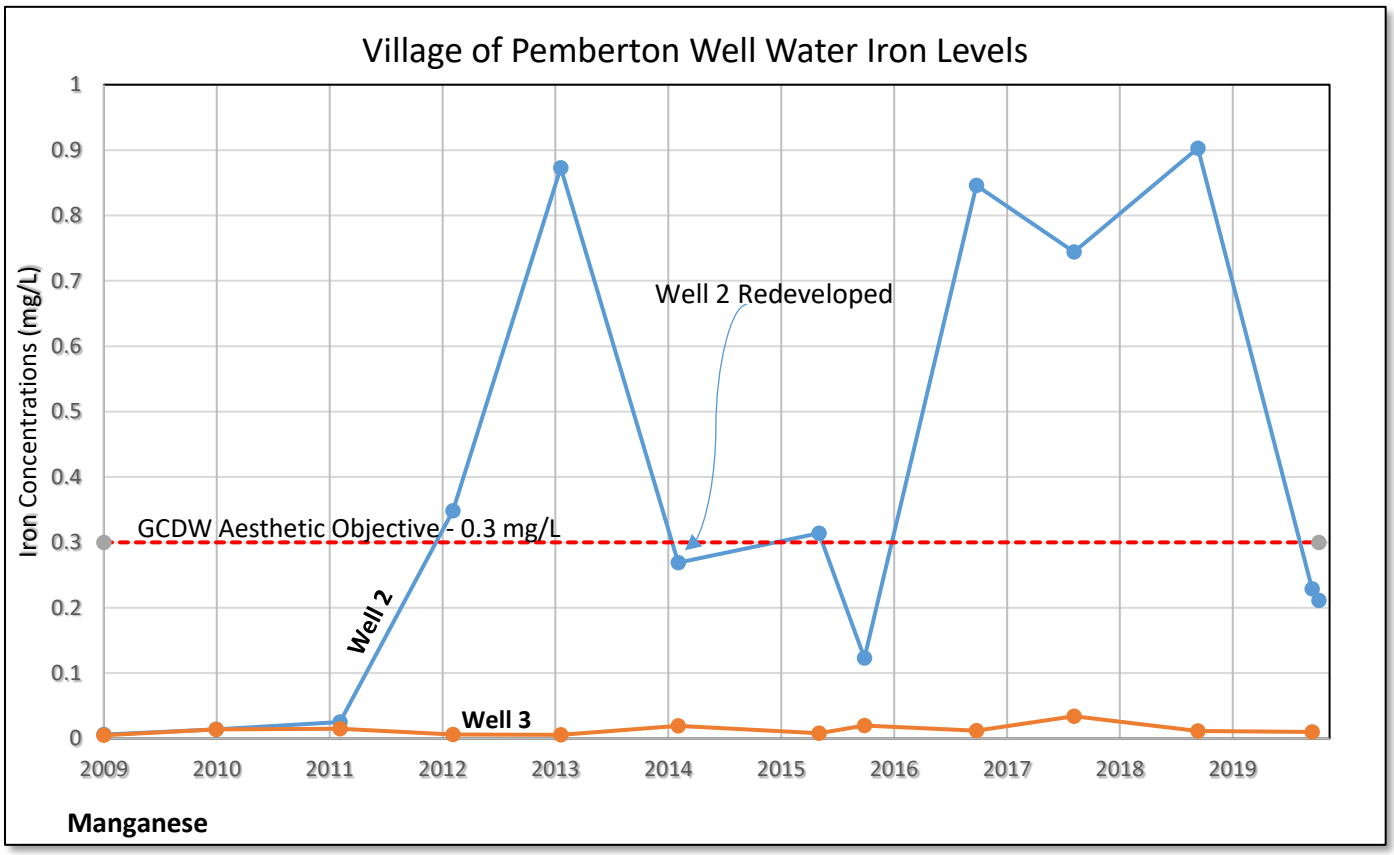

Figure 8 - Iron levels in Village Wells

Manganese trends closely resemble iron trends for both Wells 1 and 2 with one key exception, manganese tends to appear before iron within the same well. Well 2 showed negligible manganese levels until starting to increase in 2010; two years before iron began increasing in the same well. Since 2010, manganese levels in Well 2 have not dropped below the **AO** of 0.02 mg/L and operations staff have observed the need for increased flushing when Well 2 is in use. Well 2 has also exceeded the recently introduced **MAC** at various times over the past several years before the **MAC** was introduced. As with iron levels, the most recent manganese results for Well 2 also show a decreasing trend and at present the level is below the **MAC** but above the **AO**. Well 3 manganese levels have historically been negligible, but in 2017 began to increase and in 2020 exceeded the **AO** for manganese. Considering that both Wells 1 and 2 showed similar trends of having good water quality to start with before rising iron and manganese levels exceeded **AO** and **MAC** limits, it is concerning to see the start of that trend with Well 3, the Villages main well. Well 1 was last tested in 2015 and had levels of manganese close to three times the **MAC**.

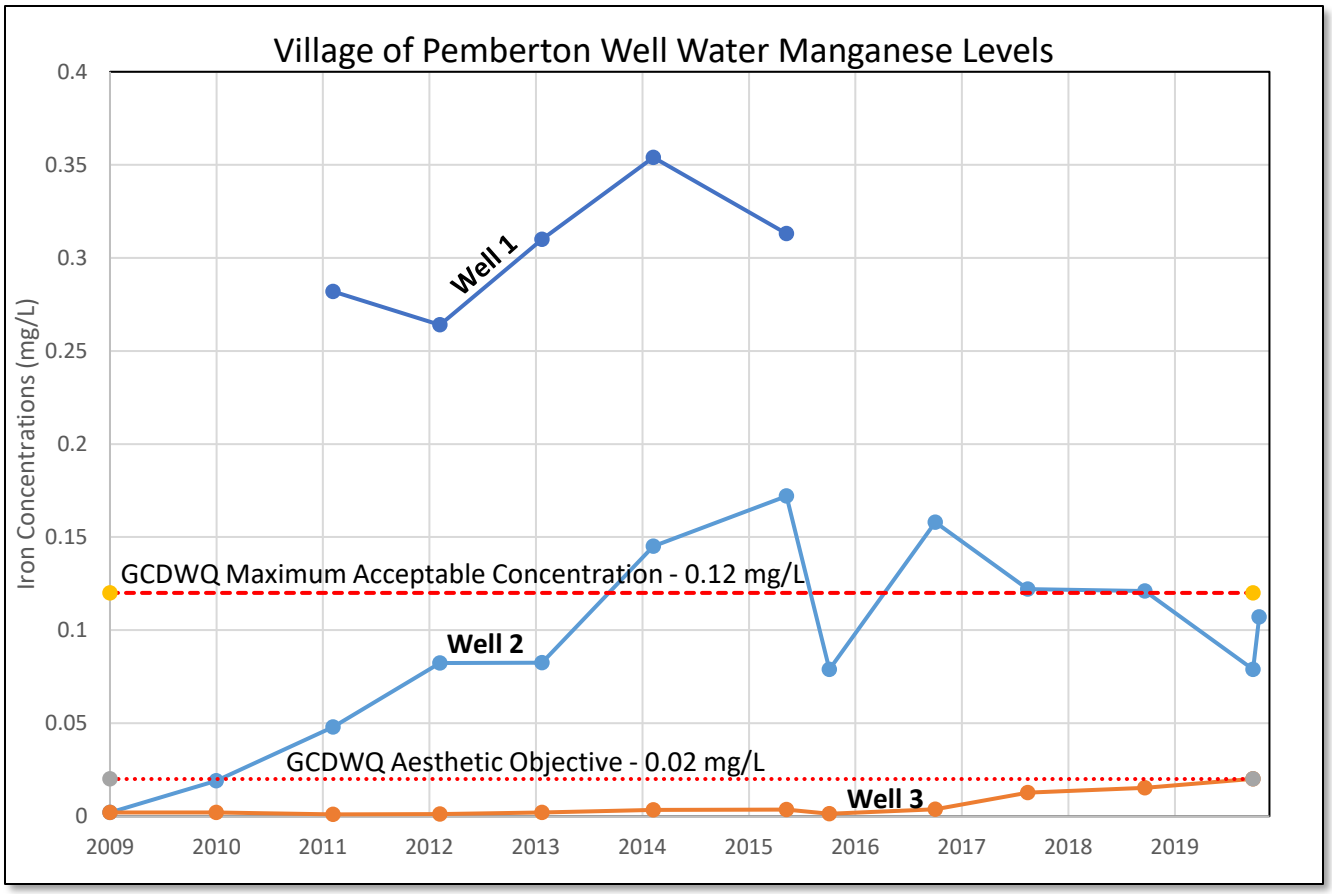

Figure 9 - Manganese Levels in Village Wells

6 Conclusions

The water supply for the Village of Pemberton is showing concerning trends with regards to increasing manganese concentrations in its well water. Historical records of the wells indicate that manganese and iron levels have tended to appear in increasing concentrations 5-10 years after well construction. This trend has been observed for Wells 1 and 2 and is now starting to show the same early signs in Well 3, the main Village well. The central concern is the level of manganese which in Wells 1 and 2 has risen above the Maximum Acceptable Concentration set out by Health Canada. Well 3 has recently exceeded the Aesthetic Objective for manganese and if it continues the same trend, in the next 4-6 years it may exceed the **MAC** requiring the Village to implement additional treatment targeting manganese to maintain the ability to provide water that meets all **GCDWQ** guidelines.

In 2019 the BC Ministry of Health issued the document "Guidance on Manganese in Drinking Water" in conjunction with the implementation of the new **MAC** for manganese. It summarized the health impacts associated with high levels of manganese and that "*measurable neurological impacts may be possible when infants and children are chronically exposed to manganese concentrations greater than the MAC.*" It also stated that "*Ongoing elevated trends in manganese concentration may indicate a change in source water or watershed conditions and could be associated with changes to water chemistry or the presence of co-contaminants and warrant significant consideration.*" It is beyond the scope of this report to determine the cause of the increasing manganese levels other than to observe that it appears to be a change in source water quality over time that warrants further investigation.

Current testing of water quality including metals such as iron and manganese occurs on an annual basis for Wells 2 and 3 as required by Vancouver Coastal Health. Increasing testing to monthly will provide greater detail on the manganese and iron trends moving forward and will allow early detection of manganese levels approaching the **MAC**. Increasing testing frequency will also provide vital data that will aid in the design of any future treatment solutions. Iron bacteria is another parameter worth tracking in order to observe how their numbers fluctuate with changing iron and manganese levels.

Due to Well 2 exceeding the recently established MAC for manganese the Village decided to attempt to develop a new backup well to replace it in early 2020. Two test wells were drilled in early spring of 2020, one in Pioneer Park and the other in Foughberg Park. The Pioneer Park test well's drilling record showed fine sands at depth indicating low yield potential that would not be adequate for development into a full production well. The Foughberg Park test well showed suitable yield potential but also showed similar water quality concerns as Well 2, the well it would be replacing. These latest results

indicate that the Village would be best served by implementing treatment of the existing wells rather than searching and attempting to develop another well in the small highly developed central portion of the aquifer.

The sustainable use of the Pemberton Creek Fan Aquifer also requires average annual water consumption to remain below 30 L/s. The current average consumption is 21.3 L/s and using Village design criteria, a population increase of 1,555 people will bring the ADD to 30 L/s which based on population projections will occur around the year 2040. From a development viewpoint, developments under construction and those completed within the last couple years will add to the demands of the system as they are populated. Current system capacity can accommodate these developments when fully populated. Developments that are currently in the planning phase for construction within the next 5-15 years will further add to the demands of the system must take into account how close the current system is to capacity with regards to the sustainable use of the aquifer. Although there is ample reservoir capacity, the supply source will soon be under strain and require either a new or supplemental source for future developments. There are a number of options for developing a new source that warrant further investigation as outlined in ISL's 2017 report "Alternate Water Source Assessment".

To maximize the time that the Pemberton Creek Fan Aquifer can be utilized as the sole source for the Village, water conservation efforts must be implemented in order to bring the Village's per capita water consumption down. By lowering consumption through water conservation efforts in combination with leak detection and repair, the Village can buy itself significant time before needing to develop a new source. Developing a new source is a considerable undertaking that must take into account not only water quality and quantity, but also location and ease of incorporating into the existing distribution system, which if not ideal, can dramatically increase capital costs.

The Village of Pemberton is significantly invested in its current source and to ensure its ongoing viability, options for both the treatment of manganese, and the reduction of overall consumption must be investigated. Implementing these measures will help ensure the Village is able to provide water that meets all **GCDWQ** targets while extending the time before a new source must be developed to either supplement or replace the existing source.

7 Recommendations

Considering the conclusions reached above, the following recommendations are put forth for the Village to consider with regards to the water supply system:

1. Increase the frequency of water quality testing for iron, manganese and iron bacteria for Wells 2 and 3 from annually to monthly to more closely monitor changes in WQ
2. Perform redevelopments of Wells 2 and 3 to potentially improve water quality and Well efficiency in the short term.
3. Initiate a study for the treatment of iron and manganese in Wells 2 and 3 comparing various treatment options along with their estimated capital and O&M costs.
4. Undertake a Water Source Feasibility Study to determine the most feasible option in developing a new source to replace/supplement the existing source. The study should focus on both groundwater and surface water sources and include Class D capital and operating cost estimates.
5. Investigate methods of reducing water consumption such as water conservation methods and leak detection and repair to bring down the Village's per capita water demands
6. Initiate the design and installation of a backup generator for Wells 2 and 3 to ensure the Village is able to provide water in emergency situations involving loss of power.

8 Closure

I trust this information is sufficient for meeting the Objectives of this report. If you have any questions, please do not hesitate to contact the undersigned.

Respectfully submitted,

_____

David Ward, P.Eng.

Village of Pemberton, Assistant Manager Operations

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Water Treatment Investigation

Final Report
January 31, 2022
KWL Project No. 0743.016-300

Prepared for:

Village of PEMBERTON

Table of Contents

Figures

Tables

1. Introduction

This report has been prepared for the Village of Pemberton (Village) and summarizes the completed water treatment investigation regarding three (3) groundwater wells that provide water to the Village. Water is currently supplied by two groundwater wells (Wells 2 and 3) that are connected to the Pemberton Creek Fan Aquifer. A third well (Well 1) is no longer connected to the system. Water quality data collected from 2009 to 2020 indicate periods in which iron and manganese levels in the well water exceeded the Health Canada guidelines for aesthetic parameters. In May of 2019, Health Canada lowered the aesthetic limit for manganese and introduced a new health-based limit for manganese. The health-based limit was the outcome of recent research and peer reviewed studies.

The purpose of this investigation was to review up to three available water treatment options that would provide Village residents with potable water that meets Canadian Drinking Water Quality (GCDWQ) guidelines. This report addresses the following tasks:

1. Investigate potential treatment options to address water quality concerns in the Village water system;
2. Evaluate different treatment options and recommend the most suitable option for the application;
3. Identify proposed water treatment plant (WTP) configurations based on locations and access to sanitary system; and
4. Provide a Capital and Operation and Maintenance (O&M) cost opinion for the recommended options.

2. Background/Justification

A review of the existing water system with emphasis on the performance of the source aquifer was performed by the Village in 2020. Water quality results from the Village wells report iron and manganese levels exceeding the Aesthetic Objectives of 0.3 mg/L for iron (Wells 1 and 2) and 0.02 mg/L for manganese stated in the GCDWQ (Wells 1, 2, and 3). Manganese levels in Wells 1 and 2 also exceed the Maximum Allowable Concentration (MAC) of 0.12 mg/L.

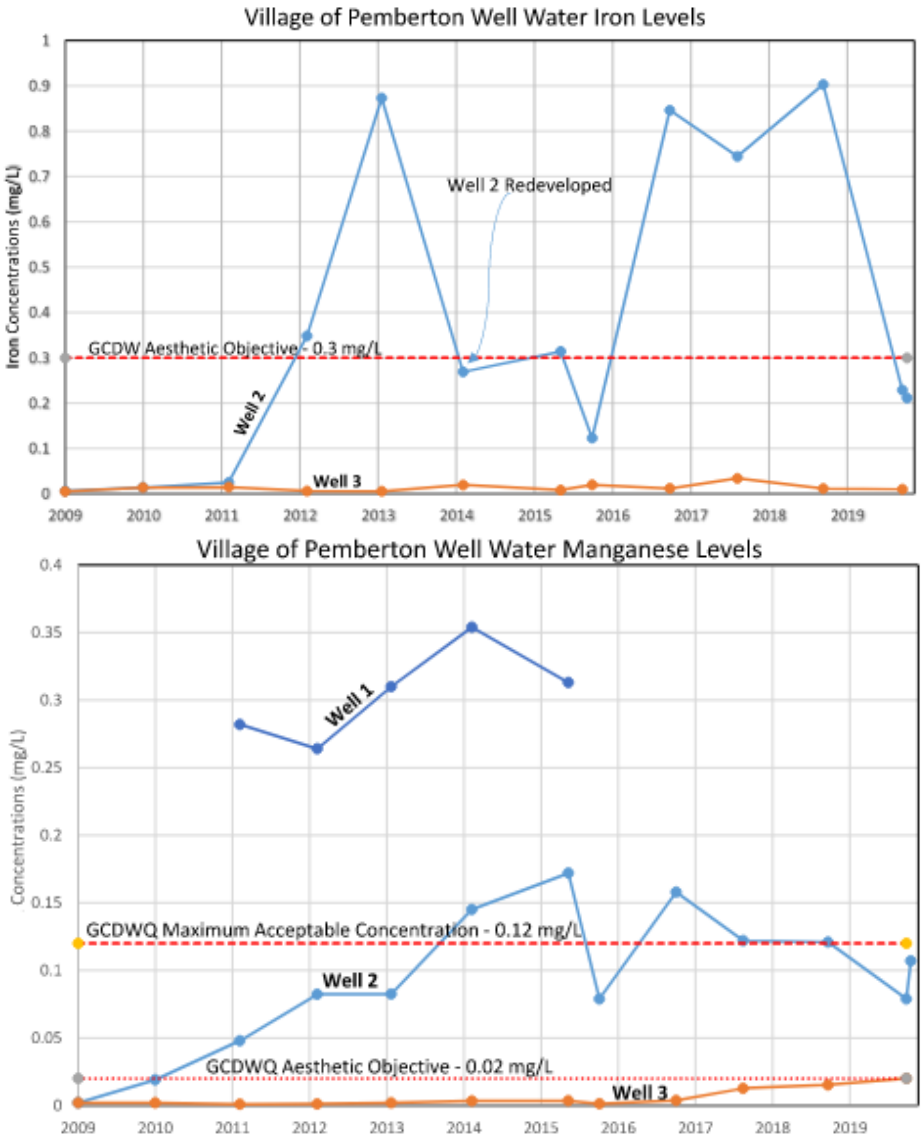


Figure 2-1: Water Quality Data for Wells 1, 2, and 3 [1]

[1] Village of Pemberton, *Water System Performance Assessment*, 2020. Well 1, not shown on the iron level graph due to scale, had a test result of 16.7 mg/L in 2013, the last time it was tested.

3. Existing System

The existing groundwater system consists of two (2) wells (Wells 2 and 3) that distribute water, through mostly 50 to 300 mm PVC piping, from the Benchlands reservoirs, throughout the Village core and adjacent neighbourhoods, and eastwards to Pemberton Farm Road East and Airport Road, and North towards PNWS. Sections of existing piping are comprised of asbestos cement that are scheduled to be replaced. The existing system provides soda ash conditioning to increase the pH from 6.5 to 6.8, and chlorination for both primary disinfection and to maintain a minimum free chlorine residual of 0.2 mg/L at the farthest ends of the distribution system. There are no other treatment processes in place with respect to reduction of iron or manganese in the raw water. The tables and enclosed information presented in this section are extracted from the Village of Pemberton's *Water System Performance Assessment* completed in 2020.

A third well (Well 1) is no longer connected to the distribution system due to high levels of iron and manganese.

The Per Capita Demand (in litres per capita per day, or LPCD) and Design Pressures are summarized in Table 3-1.

Table 3-1: Per Capita Demand

Per Capita Demand	
Average Daily Domestic Flow	455 LPCD
Maximum Daily Domestic Flow	910 LPCD
Peak Hour Domestic Flow	1,820 LPCD
Design Pressures	
Minimum Pressure at Peak Demand	300 kPa (44 psi)
Maximum Allowable Pressure	850 kPa (123 psi)
Minimum Pressure for Fire Flow Plus Max Day Demand	150 kPa (22 psi)

There are three (3) reservoirs totaling 4,511 m^3 of storage. The total required storage is 2,506 m^3 which leaves 2,045 m^3 for future expansion. Table 3-2 summarizes the relevant information for each reservoir. This calculation was completed in Section 2.3 of Village of Pemberton's *Water System Performance Assessment* (2020).

Table 3-2: Existing Reservoir Details

Reservoir	Year Constructed	Type	Capacity (m^3)	Top Water Level Elevation (m)
Benchlands Reservoir 1	2002	Circular Concrete Tank	1,640	290.5
Benchlands Reservoir 2	2014	Circular Steel Tank	1,490	290.5
Ridge Reservoir	2017	Circular Steel Tank	1,421	357.6

Table 3-3 summarizes the year of construction, diameter, depth, rated flow, location, and general notes of the three wells in the Village.

Table 3-3: Existing Well Details

Well	Construction Year	Diameter (mm)	Depth (m)	Rated Flow (L/s)	Location	Notes
1	1992	200	29	28.8	Well house	Isolated from distribution due to declining yield and poor quality.
2	1997	300	42	68	Foughberg Park	Current backup well.
3	2007	300	46	52	Pioneer Park	Current duty well.

4. Future Development

Skénkenam Development Limited Partnership applied to develop certain lands within the Pemberton Benchlands (known as the Nkukwma project), as referenced in the Village of Pemberton Official Community Plan (OCP). The plan indicates Block A DL 8556 (10.6 ha), Block J DL 202 (9.69 ha), and Block I DL 202 (11 ha) will potentially be developed into single family homes, duplexes, townhomes, and apartments. However, Block K 8410, DL 202, and DL 2297 are not included due to concerns with historical contamination of these sites. It is possible that these sites will be remediated to a standard suitable to residential development, while development of these blocks will continue over the next 30+ years.

The Water Distribution plan for Pemberton Benchlands includes construction of a new reservoir on the upper limits of the Block J DL 202 development boundary, a pump station adjacent to the existing reservoirs, a second pump station next to the newly proposed reservoir, supply of relevant back-up generators, and relocation of the existing reservoir's supply and distribution mains to follow the new proposed alignment of the collector road.

There are other potential future developments in the village which include 40-120 more units in the Ridge/Sunstone Area, 30-90 more units in the downtown area, and 60-70 more in the Glen area. These projects total 130 to 280 more units. The previously mentioned Nkwukwma project totals 200 to 400 projects over the next 10 years. Combining all future developments totals 330 to 680 potential additional units over the next 20 years.

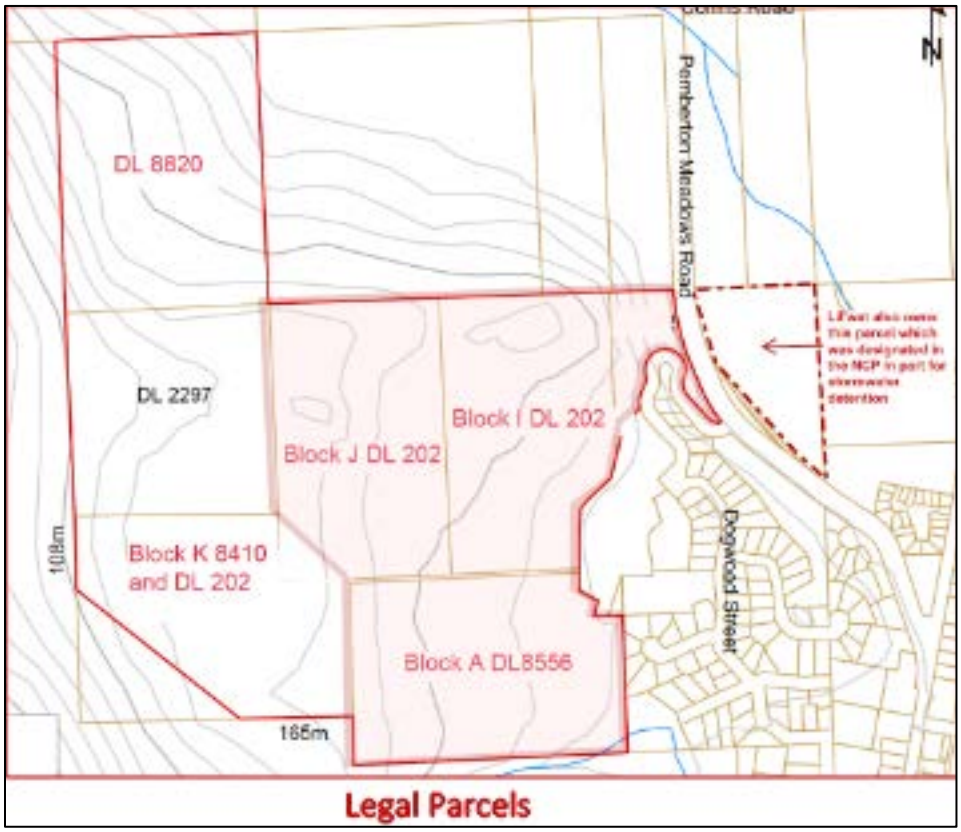


Figure 4-1: Developer Plans

The north side of the reservoirs is surrounded by proposed townhomes. On the east side of the reservoirs, there is a proposed park. There is also a proposed pump station located in this park that would service zone 3 (a small number of lots within the current development as well as the whole extent of the future development to the west).

The development will increase the population by approximately 1,252 people. For the proposed and future developments, this will create an average daily domestic flow of 569,660 L/day (6.6 L/s), a maximum daily domestic flow of 1,139,320 L/day (13.2 L/s) and a peak domestic flow of 2,258,640 L/day (26.1 L/s) for the new development alone.

Skénkenam Development Limited Partnership is funding the Village's engineers to update/develop existing village infrastructure, water/sewer/storm models to determine capacity.

5. Water Treatment Investigation

Three water treatment options to reduce the iron and manganese levels in the system were considered. This section briefly summarizes these options.

5.1 Option 1: Oxidation and Filtration using Catalytic Media

Most iron and manganese removal treatment processes require oxidation as the first step of treatment to precipitate the iron and manganese dissolved in the water. Normally this is done by injecting the source water with an oxidant such as sodium hypochlorite or potassium permanganate. Once oxidized, the precipitates can be settled or filtered out. Sufficient oxidant must also be added to ensure the adsorption characteristics of the GreenSandPlus™ are regenerated to continue to attract any dissolved manganese.

Media filtration with GreenSandPlus™ media is an effective and proven means for reducing both iron and manganese in dissolved or precipitated form in raw water. In a GreenSandPlus™ media filter the media acts as a catalyst for the iron and manganese oxidation process. As water passes through the filter bed, the oxidized iron and manganese are retained by the filter media and their concentration in the water reduces as water progresses downward through the filter. The filter would require periodic backwashing to remove the accumulated iron and manganese precipitate.

GreenSandPlus™ media can remove both iron and manganese but removal efficiency of each parameter varies depending on the pH of the water as well as the concentrations of other constituents in the water. Pilot testing is usually completed to establish the removal efficiency of iron and manganese in a specific water. As a minimum, bench scale testing with the actual water should be completed prior to full-scale implementation.

5.2 Option 2: Oxidation and Media Filtration

This treatment process incorporates oxidation of iron and manganese in the water to convert the dissolved forms of the metals to a solid. Often exposure to air is sufficient for oxidizing iron, but for manganese, a stronger oxidant such as ozone or potassium permanganate is used in the oxidation process. Following the oxidation process, water passes through sand media filters to filter out the formed precipitate. Sodium hypochlorite is then dosed to provide virus inactivation and secondary chlorine residuals.

Sand media filters are either gravity or pressure type. The filters are backwashed periodically for removing the precipitated material on the surface of the filters.

5.3 Option 3: Biological Treatment

Biological filters are designed to remove soluble iron and manganese from the water supply by the biological activity and uptake of impurities by the naturally occurring bacteria retained in the filter media. Unlike Options 1 and 2, biological treatment does not require any chemical oxidants and relies on usually two stages of biological filters.

The process consists of raw water passing through the biological filters, where conditions are established to promote the growth of specific bacteria for iron removal, and a different type of bacteria for manganese removal. Soluble particles will build up and be retained in the filter media and form dense and compact precipitates. Over time, insoluble particles build up in the filters and backwashing is required to remove the build up. Due to the compaction of precipitates and longer filter times, the biological treatment process has a longer retention time and therefore allows the system to achieve longer filter run times. Air is injected into the raw water prior to entry into the biological filters to foster bacteria growth.

For application related to the biological treatment of iron and manganese, the process system will require individual treatment (or two stages in a series) to meet the required environmental conditions for biological removal of iron and manganese. This requires controlled aeration and filtration for biological iron removal and intensive aeration and filtration for biological manganese removal. [2] Biological treatment can be applied in gravity or pressure filters, where pressure filters are designed for high-rate operations.

[2] Sharma K.K. Petruseveski B, & Schippers J.C. 2005 *Biological Iron Removal from Groundwater: A Review*.

6. Treatment Options Discussion

Table 6-1 lists the advantages and disadvantages of the treatment options for the existing groundwater source.

Table 6-1: Comparison of Technologies to Treat Existing Groundwater Source

Water Treatment Technology	Advantages	Disadvantages	O&M Requirements
Oxidation and Catalytic Media Filtration	• Can effectively remove both iron and manganese in combination with oxidation. • Relatively simple operation. • Media is readily available and can be ordered ahead of time. • Chlorination provides continuous insitu media regeneration and primary and residual disinfection.	• Generation of backwash wastewater.	• Periodic backwashing of catalytic media. • Oxidant chemical usage.
Oxidation and Media Filtration	• Relatively simple operation. • Media is readily available and can be ordered ahead of time.	• Not as effective at removing dissolved manganese, compared to catalytic media. • Need for strong pre-oxidant and hypochlorite. • Generation of backwash wastewater.	• Periodic backwashing or replacement of filter media. • Multiple chemicals used.
Biological Treatment	• Can effectively remove both iron and manganese in combination with air oxidation. • No strong oxidants required. • Lower backwash requirements and reduced backwash water quantities.	• Higher initial cost due to the requirement of oxidation using an air compressor. • Relies on naturally occurring bacteria and appropriate environment to consume iron and manganese. • Usually requires two stage filtration step for removal of iron and then manganese. • Always a risk of a biological process upset that results in poor water quality that takes time to resolve.	• More effort and skill required to maintain and operate the system. • Complex maturation for new filters.

6.1 Recommended Water Treatment Process

Oxidation and catalytic (GreenSandPlus™) filtration for the specific removal of iron and manganese is the preferred treatment option for the existing source based on the information summarized in Table 6-1.

Options 1 and 2 are similar in process and configuration; however, the primary process difference is that Option 1 only uses chlorination process as the pre-oxidant with GreendSandPlus™. The chlorination pre-treatment completes two steps; step one allows for continuous regeneration of the GreenSandPlus™, and step 2 provides for 4-log virus inactivation and a secondary chlorine residual of the treated water.

For Option 2, a stronger pre-oxidant other than chlorine is required and involves the introduction of another chemical (i.e., potassium permanganate or ozone) to fully oxidize the dissolved iron and manganese. A conventional sand media filter is then used to remove the precipitated iron and manganese. Option 2 still requires disinfection with chlorine and contact time for virus inactivation and a chlorine residual.

Option 1 uses chlorination for two requirements, Option 2 uses chlorination for only one requirement, but also requires a stronger pre-oxidant like ozone prior to the sand media filter. Option 1 is a more efficient and cost-effective process and is easier to operate than Option 2.

With respect to Option 3 biological treatment, benefits such as longer filter times and less backwashing as well as the need for no chemical oxidants are considered favourable, but biological treatment can still be considered an option with many unknowns that can be influenced by the source water. Limitations with biological treatment are summarized below:

1. High reliance on bacteria formation at start of the process. This may require additional adjustments and trial periods at the start of the project resulting in a duration that provides inefficient treatment. Maturation of bacteria for full efficiency may last up to 50 to 60 days for a new filter; [3]
2. Chance of bacterial die out resulting in treatment stoppages;
3. Process may be influenced by substances such as ammonia, hydrogen sulfide, and zinc; [4]
4. Need for experienced operators that understand the system and requirements to operate biological treatment;
5. Formation of anaerobic conditions in the filter bed resulting in elevated iron concentrations in the filtrate; and
6. Need for specific conditions for iron and manganese oxidising bacteria (i.e., may required two-stage filtration).

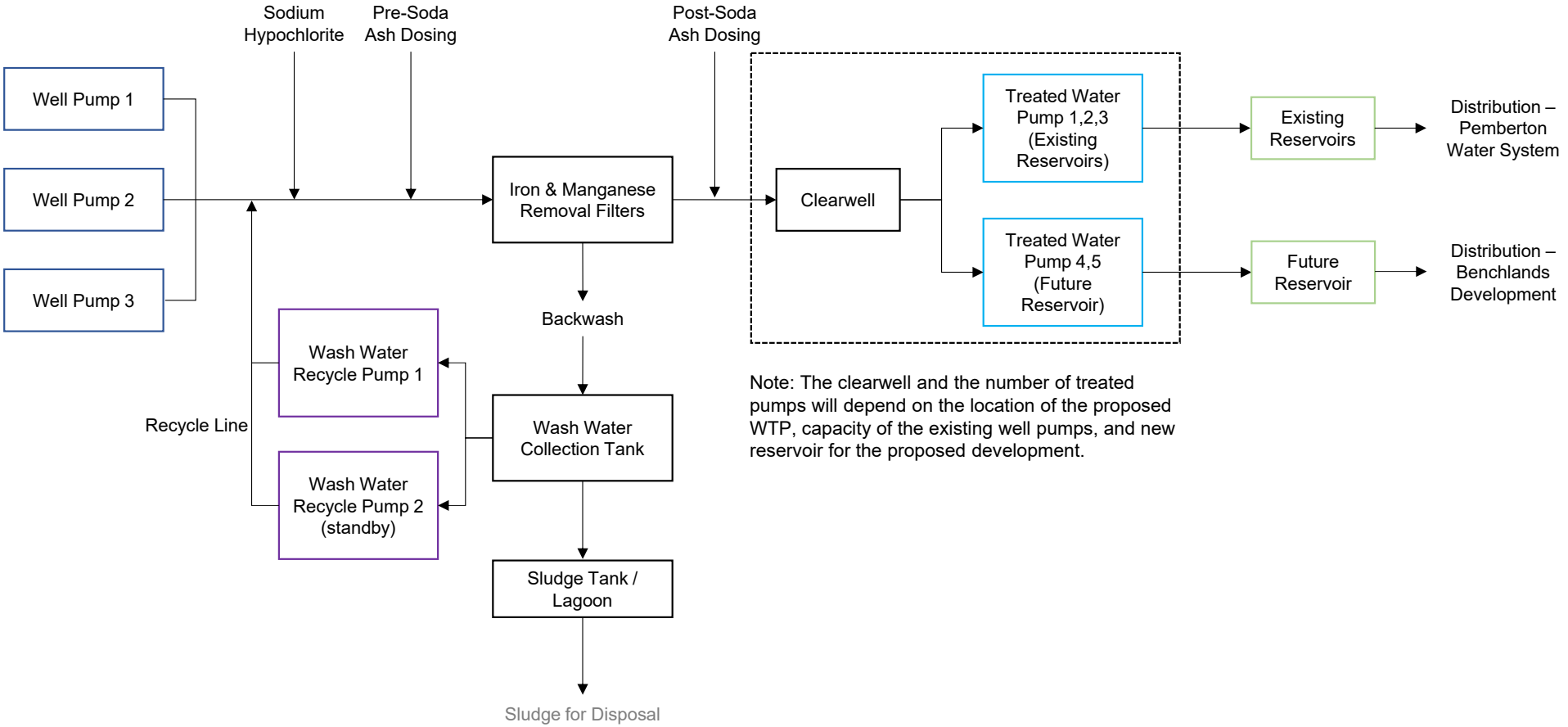
Based on the above, a more conventional approach with oxidation by chlorination and catalytic media filtration is recommended.

The recommended treatment process is portrayed in the block flow diagram shown in Figures 6-1 and 6-2. These figures show similar details, but the main difference is whether the proposed WTP includes access to a sanitary collection system. These figures can be used as a guide or refences as information is described in the report.

[3] Stevenson, D. G. 1997 Water Treatment Unit Processes. World Scientific, Singapore, pp. 261–266, 275–293.

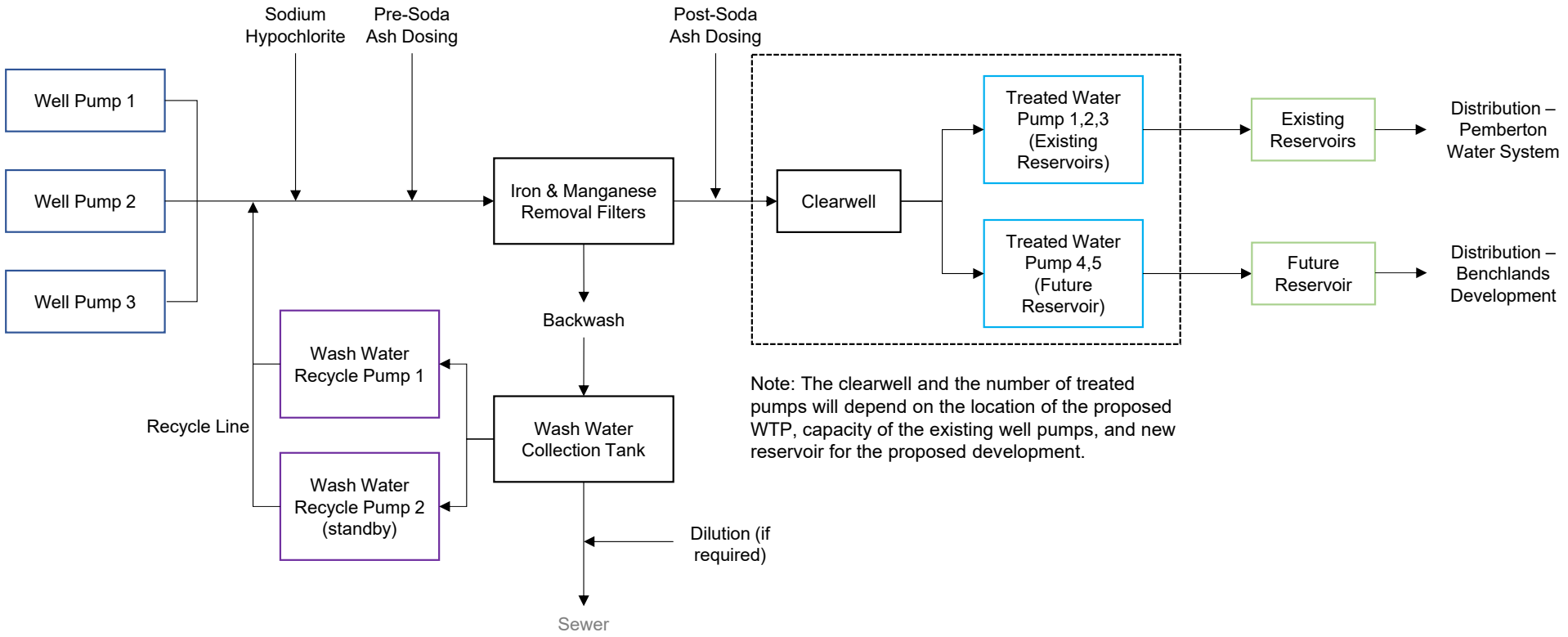
[4] Twort, A. C., Ratnayaka, D. D. & Brandt, M. J. 2000 Water Supply, 5th ed. Arnold, London.

Description of Option 1: WTP Without Access to Sanitary Line



Note: The clearwell and the number of treated pumps will depend on the location of the proposed WTP, capacity of the existing well pumps, and new reservoir for the proposed development.

Description of Option 2: WTP With Access to Sanitary Line



7. Water Treatment Location and Facility

Based on the Village's expected population growth (with the future development included), the flow of 60 L/s was chosen for the maximum day design flow of the water treatment plant to meet 2040 demands. Table 7-1 summarizes the anticipated flow rates based on village population growth until 2040 as per the *Village Water System Performance Assessment Report*, (2020).

Table 7-1: Anticipated Flow Rate Based on Population Growth

Year	Village Population	ADD (m^3/day)	ADD (L/s)	MDD (m^3/day)	MDD (L/s)
2020	3,100	1,880	22	3,700	43
2025	3,510	2,067	24	4,073	47
2030	3,925	2,255	26	4,451	52
2035	4,335	2,442	28	4,824	56
2040	4,750	2,631	31	5,203	60

7.1 Proposed Water Treatment Building

There are two proposed locations for the water treatment building; the north side of the existing reservoirs (Location 1), and southeast of the reservoirs where the developer proposes a new pump station (Location 2). The current existing treatment location was not considered as the existing infrastructure would not be large enough to include the required equipment. If a new water treatment plant were to be added at this existing location, it would take up a significant portion of the park and would not be acceptable to park users. Figure 7-1 below provides the approximate location of the both the proposed locations.

Village of Pemberton
Water Treatment Investigation

KERR WOOD LEIDAL
consulting engineers

DRAFT

Service Layer Credits: Canada Hillshade: Sources: NRCan, Esri Canada, and Canadian Community Maps contributors.
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World Imagery: Maxar
World Hillshade: Esri, USGS

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere

Scale Disclaimer: The map scale of 1:6,000 is only valid on a 11"x17" print.

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Project No. 743-020
Date January 2022
Scale 1:6,000
0 25 50 100 Metres

Site Plan

Figure 7-1

7.2 Location 1: Behind Existing Reservoir

At Location 1, the proposed WTP will be positioned behind, and elevated above, the existing reservoirs. Siting the proposed WTP at this location provides both benefits and drawbacks. The major benefit of having the proposed WTP at Location 1 is the option to have treated water gravity fed to the existing reservoirs. This would eliminate the need for a clearwell and domestic pump(s) to provide treated water to the existing reservoirs. The removal of clearwell and domestic pump(s) would reduce capital and operation costs, as well reduce maintenance associated with pump operation and future replacement.

Drawbacks related to Location 1 include increased capital costs associated with increased sitework related to locating the proposed WTP to the north of the existing reservoirs. Existing well pumps would likely need to be updated or replaced as the well pumps will need to pump to a higher elevation and will need to account for added pressure associated with treatment.

Design and construction considerations to locate the proposed WTP north of the reservoirs will include the following:

1. Environmental and permit applications related but not limited to tree removal, bird surveys, and working within set back of creeks;
2. Increased work associated with archaeological and geotechnical assessments near Location 1;
3. Review of elevation details related to site location and top water level (TWL) of the existing reservoirs. Additional pump(s) may still be required if elevation difference between the proposed WTP and TWL of the reservoirs is not achievable;
4. Increased sitework preparation such as clearing, excavation, backfill, and compaction, as well as increased construction related to access roads and parking spaces to allow for access to the proposed facility;
5. Additional routing of buried utilities such as raw, treated, backwash, and recycle lines will need to be designed and constructed;
6. Upgrades to existing well pumps to increase head pressures to allow well water to reach higher elevation of the WTP and capacity to pump through the proposed WTP; and
7. Will likely require a future pump station to provide water to a proposed future development. Should the proposed development move forward, a clearwell with domestic pump(s) could be constructed at the proposed WTP at Location 1. This would eliminate any benefits associated with gravity fed treated water to the existing reservoirs as described above. This would provide an opportunity for cost sharing with the developer. It is assumed the cost of the clearwell and pump(s) would be the responsibility of the developer should the proposed WTP be located at Location 1 and gravity feed of treated water is achievable.

Based on information provided by Skénkenam Development Limited Partnership (refer to Section 4), the Village will need to discuss with the developer the proposed location of the proposed WTP which may result in the overall reduction of lots or units located near the reservoir. The Village will also need to discuss with the developer regarding future pump station and reservoir requirements, as a clearwell at the WTP could be constructed to perform the duties of a future pump station. This would save additional space near the reservoirs by reducing the need for a separate pump station building and would be more cost effective for both parties.

7.3 Location 2: Front Existing Reservoir

The second proposed location for the WTP is southeast of the existing reservoirs. Location 2 will be at an elevation lower than the TWL of the reservoirs, so a clearwell and domestic pump(s) would be required to feed treated water to existing reservoirs. Based on field reconnaissance of the existing reservoir site, Location 2 will likely require less site modification, reducing the capital cost of the proposed WTP.

Drawbacks of Location 2 include higher costs associated with constructing the clearwell and installation of domestic pump(s). Additional pump(s) also increase operational and maintenance requirements and adds additional complexity should pump issues (faults, failures, power outages, etc.) become frequent in the future.

If the proposed WTP were to be developed at Location 2, there is an opportunity to incorporate the design for future domestic pump(s). This would provide an opportunity to combine both the clearwell and the future pump station building for the proposed development into a single footprint. Cost-sharing opportunities would be made available as discussed above.

Design considerations for Location 2 will be similar those noted above but are noted as follows:

1. Environmental and permit applications related to tree removal, bird surveys, and working within set back of creeks;
2. Complete archaeological and geotechnical assessments;
3. Review of elevation details related to site location and TWL of the existing reservoirs to confirm domestic pump(s) sizing;
4. Upgrades to existing well pumps to increase head pressures to allow well water to be pumped through the proposed WTP; and
5. Design and construction of a clearwell and domestic pump(s) to provide water to the existing reservoir. Provisions can be made to include additional space for future domestic pump(s) for future reservoir.

Similar cost sharing opportunities will need to be discussed with the developer.

7.4 Potential Well Pump Upgrades

To provide treated water to the existing reservoirs, the existing well pumps will require approximately 11 m (15 psi) of pressure to pump water through the filters of the WTP. Should the proposed WTP be located at Location 1, additional pressure will also be required to lift raw water above the existing TWL of the reservoirs. This section is a high-level analysis of the existing well pumps based on pump curve drawings provided by the Village. The analysis assumes the following:

1. The TWL of the existing reservoirs is 290.50 m;
2. The existing dedicated water main has a 300 mm diameter with an approximate length of 1.57 km;
3. The elevation of well pumps is approximately 188.3 m based on Well 3 drawings;
4. Hazen-Williams coefficient of 130 was used to determine the major head loss; and
5. Loss associated with pipe fittings were not included in the calculation.

Table 7-2 summarizes preliminary well pump requirements. System curve calculations will need to be refined during detail design to account for exact dedicated water main lengths and diameters, losses with pipe fittings, and exact well pump elevations.

Table 7-2: Well Pump Requirements for Proposed WTP

Well #	Design for Well Pump [1]	Design Head [1]	Major Head Loss	Assumed Minor Head Loss	Assumed Pressure Loss through WTP [2]	Estimated Pressure Required [3]	Upgrades Required to Meet Flow Demand
2	68 L/s	107 m	5 m	2 m	11-15 m	120-124 m (171-176 psi)	Yes
3	52 L/s	108 m	3 m	2 m	11-15 m	118-122 m (168-173 psi)	Yes

1. Based on pump curves provided by VOP. Well 2: Warson Pump 9WH-1C (stage 2). Well 3: 825 GPM 10" SSI Sub-Pump
2. Additional pressure required to push water through proposed WTP and lift water to Location 1 (north of existing WTP).
3. Estimated well pump requirements based on high level calculations.

Based on the estimates presented in Table 7-2, the well pumps will eventually need to be upgraded to meet design flows and pressures to pump raw water through the proposed WTP. It should be noted that existing well pumps could continue to operate until the pumps are replaced but will operate at a reduced flow to meet increased pressure requirements. Operating the existing well pumps in this manner will be less efficient and will require longer duration to fill the existing reservoirs.

Existing infrastructure such as piping, fittings, and flanges near the well pump will need to be evaluated and rated for pressures above 173 psi prior to initiating design of the new well pumps. If rated pressure for piping connections are unable to maintain high pressure requirements for new well pumps, another option such as a inline booster pump at the front end of the proposed WTP would need to be considered and would allow existing well pumps to remain in use.

7.5 Dedicated Watermain to WTP and Existing Chemical Dosing

An existing dedicated water main provides water from Wells 2 and 3 to the existing reservoir. Sodium hypochlorite and soda ash are currently dosed along Aster Street near Pioneer Park. Based on discussion with operators, there do not appear to be issues with the sodium hypochlorite dosing system. The current soda ash dosing system is located at the Well 1 pump station. Operation staff have noted concerns and higher staff requirements with operating the soda ash dosing system and include increased labour requirements associated with preparing soda ash solution and scaling issues when injecting rates decrease during low demand periods.

The Village has requested KWL review past dosing requirements and testing procedures to determine whether the existing soda dosing requirements should be changed. Findings from this investigation are out of scope for this report but will be summarized in a separate technical memorandum.

The cost estimates presented in Section 8 will include a new soda ash dosing system and a bulk bag feeder for comparative purposes. The bulk bag feeder system should reduce operation requirements related to preparation of soda ash solution. Additional information related to chemical dosing is described in the following section and dosing related to the recycle line.

7.6 Soda Ash Dosing and pH Adjustment

Based on water quality parameters discussed in Section 2, pH levels are adjusted with soda ash from 6.0 to 6.8 pH. It should be noted that pH greater than 6.8 may cause some iron precipitation issues in the proposed media filters (GreenSand Plus™). If the required target pH is higher than 6.8, a two-stage dosing process will need to be implemented to restrict formation of the precipitation in the filters and to meet corrosion control requirements. These stages would involve the following:

1. Stage 1 (pre-dosing), pH can be increased to 6.8 (via dosing with soda ash) for efficient filtration; and
2. Stage 2 (post dosing), pH can be increased with soda ash (or caustic based on confirmation of enough alkalinity in water after Stage 1 pH adjustment) for corrosion control.

Stage 1 and 2 pH adjustments will need to be further investigated during pre-design based on the technical memorandum to be issued on soda ash dosing, testing, and sampling.

A recycle line (to be discussed in later section) will be piped to the front of the treatment process from the wash water collection tank to reduce the amount of water that would be disposed to the sanitary system. The recycle water will mix with unprocessed groundwater prior to entering the treatment filters. Depending on the recycle water's time spent in the wash water collection tank, chlorine and pH adjustment may need be injected into the recycle line prior to being blended with unprocessed groundwater.

Due to this arrangement, it is recommended that the existing soda ash systems be relocated to the newly constructed WTP. New soda ash dosing systems can replace the existing system once the system is unable to keep up with demands. It is proposed, a new chlorine dosing system should be installed at the proposed WTP to limit the risk involved with relocating the existing chlorination equipment.

Chemical dosing systems will be sized to meet full buildout system so adequate sizing of these systems can be fitted into the proposed WTP.

7.7 Tie-ins

The developer has proposed new routes for the existing watermains to align with the proposed roads, as shown in Figure 7-2. It is assumed two tie-ins for the inlet and outlet piping would need to be installed upstream of the existing reservoirs to service the proposed WTP.

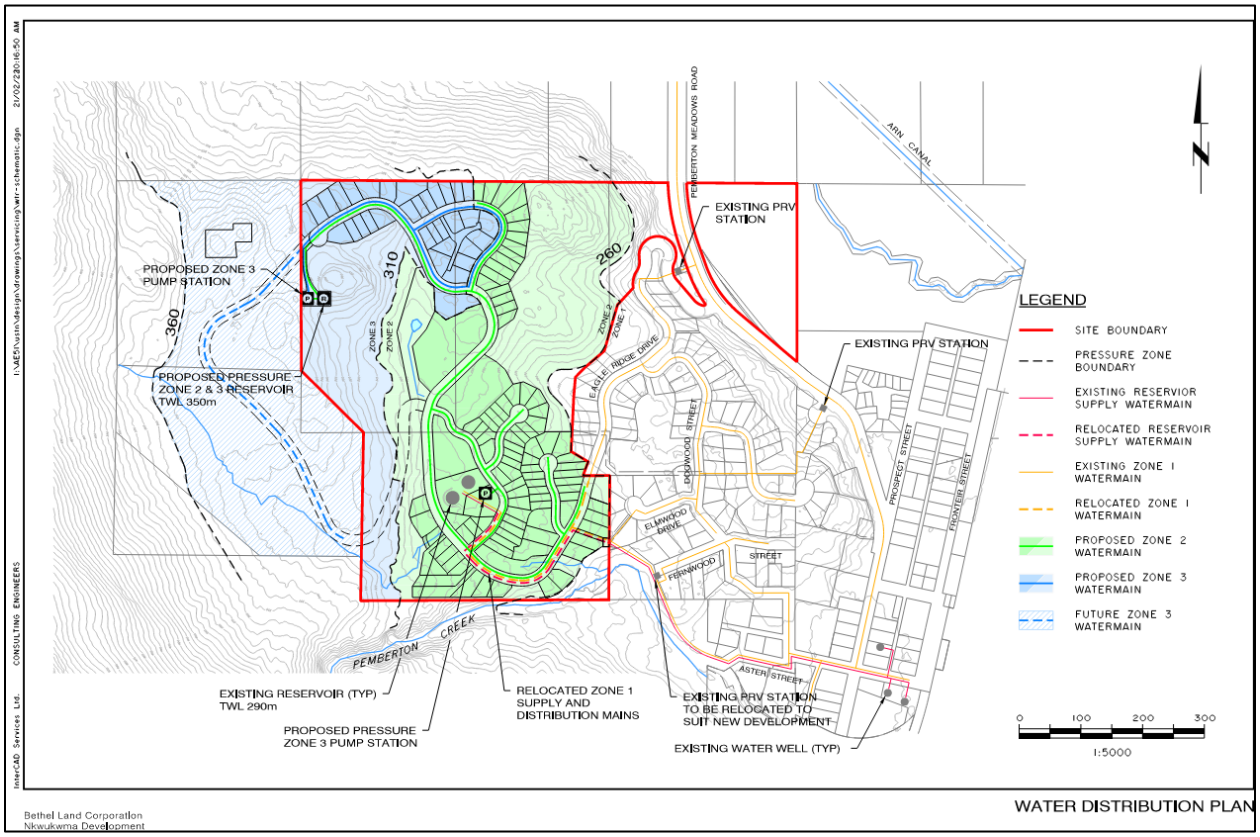


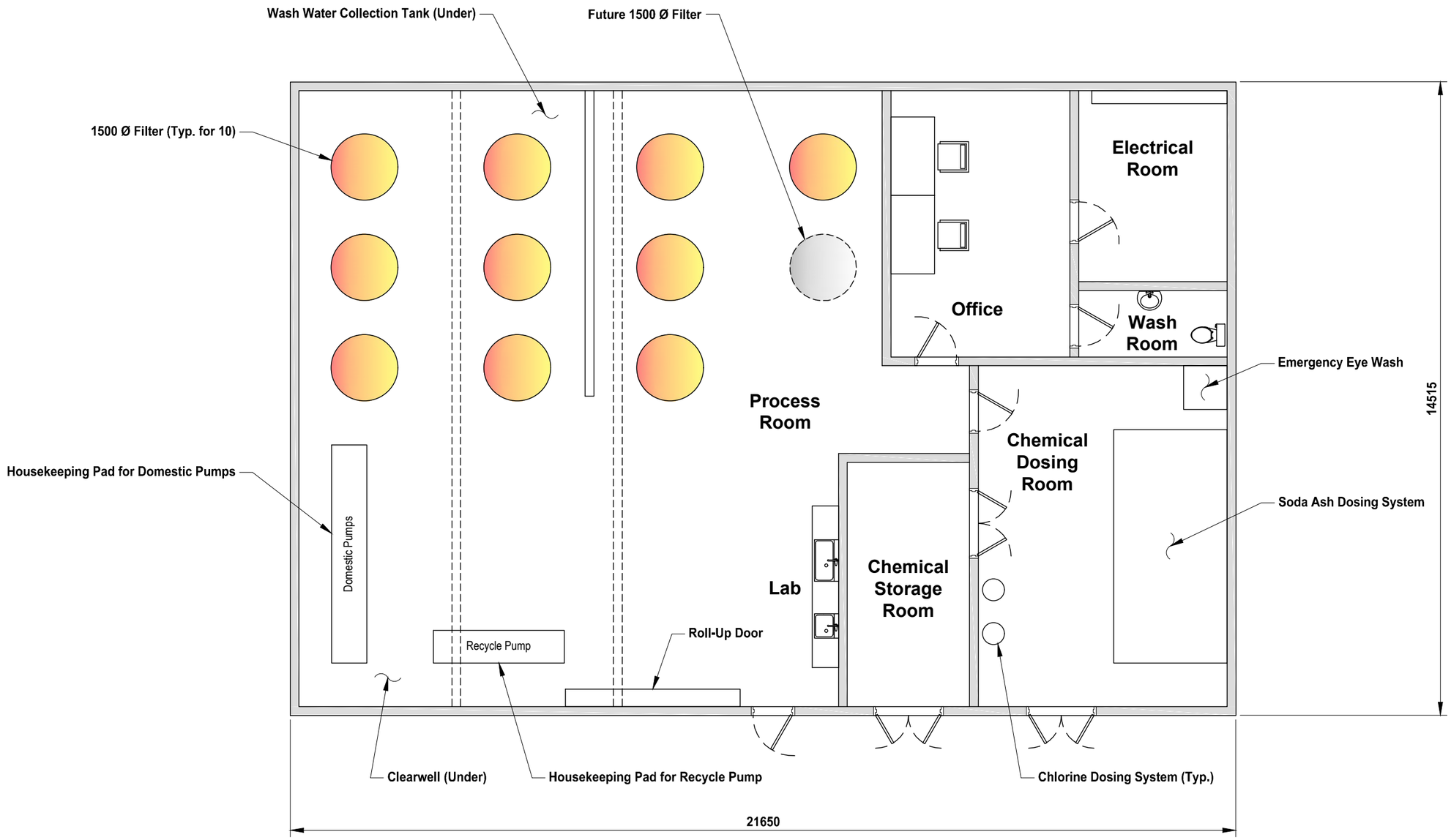
Figure 7-2: Proposed Alignment for Intake Pipes

7.8 Facility Layout

As a post-disaster designed building, it is anticipated that the building structure would consist of a mixture of reinforced concrete, potentially concrete block with wood or steel stud framing for interior walls. Surface finishing in process rooms is likely to be cement board and/or chemical resistant fibreglass wall panels. Concrete provides a more durable aesthetic look and provides an opportunity to customize the building layout to suit site and treatment conditions as well as any operator preferences. Based on the design requirement, room layout (soda ash and chlorine dosing), and future development, it is recommended a customized post-disaster concrete building be constructed to house the treatment equipment. The proposed water treatment plant layout is shown in Figure 7-3. It should be noted, the layout is for discussion purposes only, as items may be omitted based on Village preferences, locations of the proposed WTP, and access to sanitary services.

The proposed water treatment plant has a concrete foundation which includes 1.5 m pony walls for raw water, backwash supply, and treated water pipe anchoring. This also provides for solid anchoring points for the filter vessels. The dimensions of the proposed water treatment plant are approximately 21.7 m x 14.5 m, or 314 m^2. The height of the building will be approximately 5 m in height to allow for pump and filter removal and spacing for chemical dosing equipment. A clearwell and backwash tank (if required) would be placed below the WTP floor as shown below. The following lists the major components of the proposed WTP layout that were considered:

1. Three (two duty, one standby) vertical turbine pumps adequately spaced centre to center;
2. Two (duty and standby) vertical turbine pumps adequately spaced. Pumps to be installed when proposed Pressure Zone 2 and 3 reservoir is constructed;
3. Ten 1,500 mm (60”) diameter filters spaced approximately 3.5 m apart center to center. Filters are oriented so that operators have easy access to control valves and other components for easy operation and maintenance;
4. Spacing for one future 1,500 mm (60”) filters to act as a spare treatment filter;
5. Separate electrical room comprising of VFDs, control panels (MCC), and other electrical equipment. A clearance allowance of 1 m to meet code requirements and additional spacing for operations was provided;
6. One 3 m roll up door located in the process room of the proposed WTP to allow for removal of pumps and filters for maintenance, repairs, or equipment replacements;
7. Several access doors located throughout the building to allow for operator ingress and emergency egress;
8. Laboratory area to allow for water collection and sampling work;
9. Chemical dosing and storage rooms to house sodium hypochlorite and soda ash;
10. Standard washroom with water closet, lavatory sink, and faucets; and
11. A 50 m^3 clearwell and a backwash water collection tank located below WTP.



Project No. 743-016
Date December 2021
Scale 1:100

Proposed Water Treatment Plant Layout

Figure 7-3

7.9 Infrastructure Requirements

Electrical

The proposed WTP will require 3-phase 600 VAC power with a minimum of 200 A service but will likely require less amperage if domestic pump(s) are not required.

Based on the site visit, 3-phase power is available off Eagle Ridge Drive, near the road that enters the reservoirs. The village has requested that some electrical equipment stationed near the reservoirs be moved into the water treatment plant. Building service electrical requirements and any additional services need to be evaluated in a subsequent detail design phase.

The Village should discuss with the developer whether 3-phase power will be extended from Eagle Ridge Drive up to the proposed Zone 3 Pump Station. Should extension of 3-phase power proceed up to the proposed pump station, the Village should negotiate responsibility and conditions as part of the development.

Sanitary Systems and Filter Backwash Collection

Use of filters to remove iron and manganese will require periodic backwash to remove accumulated solids in filters. When the filters are backwashed, the generated backwater will head to the wash water collection tank. To conserve water and reduce volumes of backwash water, water from the top of the wash water collection tank will be recycled to the front of the proposed WTP for treatment.

The recycle pump will be programed to pump the recycled water on a pre-determined intervals (after allowing approximately two hours after backwash for solids to settle down in the wash water collection tank). Based on similar facilities, typical backwash volumes are approximately 5 to 7% of the total water treated by the facility. It is safe to assume more than half of the backwash volume can be recycled to the front of WTP.

Depending on the access and sewer capacities, the settled sludge will be pumped to a sludge tank. The sludge tank will need to be cleaned out and haul away on a regular basis. If access to sewer is available, settling and recycling can still be used to conserve water as previously mentioned.

Currently there are no existing sanitary mains near the existing reservoir locations that would be able to accept any backwash wastewater from the proposed WTP; therefore, wastewater generated from backwashing of media filters and other maintenance procedures will need to be captured and collected in tanks for disposal.

Should a sanitary line be installed for the future development, portion of the backwash from the proposed WTP can be disposed via the sanitary line. Access to a sanitary system would eliminate the need for the backwash settling, and recycle, but a solids collection tank would still be used to reduce the solids loading to the wastewater collection system. This option should be further evaluated in preliminary design phase and should be evaluated against proposed development requirements and wastewater treatment plant capacities.

Based on anticipated filter backwash volumes, a wash water collection tank will be approximately 50 m^3 in size which is equivalent to four backwash volumes plus room for freeboard. A 30 m^3 tank would be used for sludge collection.

Domestic Booster Pumps Clearwell

Domestic booster pumps may also need to be installed to provide the required pressure to pump water to the reservoir TWL height. Technical requirements along with Village preferences and location will need to be reviewed during the design phase.

At Location 1 (north side of the existing reservoirs), the treatment plant would not require a clearwell or pumps as the water would be gravity fed to the existing reservoirs. At Location 2 (southeast of the reservoirs), a clearwell approximately 12.8 x 3.5 x 1.5 m (50 m^3) would be required and would be located below the floor of the proposed WTP. Should the Village include provision to have future domestic pumps installed in the clearwell to provide treated water to a future reservoir, spacing (i.e., concrete pad) could be included into the design and future pumps can be installed when the development is being built. The Village will need to discuss cost share details with the developer.

Based on the above, if a clearwell were to be installed at the proposed WTP, the following pump configurations or a combination of both could exist:

1. Three pumps (two duty, one standby) to pump water to the existing reservoirs; and
2. Two pumps (one duty, one standby) to pump water to the future pressure zone 2/3 reservoir.

Since it is considered a benefit for both the Village and developer to have a clearwell with provisions for future pumps, all WTP option discussed below will include a clearwell. Clearwell size will differ based on gravity fed and pumping requirements.

Allowances for well pump replacements and domestic pump installation have been included in the Class D cost estimate.

7.10 Summary of Proposed Water Treatment Plant Options

Based on the details discussed above, there are several options or configurations that the proposed WTP can be constructed. These options would depend on the Villages preferences related to the location of the proposed WTP, access to sanitary system, and the configuration of chemical dosing systems.

Table 7-3 summarizes major details for each of the proposed WTP options. A breakdown of costs is provided in Section 0 of the report.

Table 7-3: Proposed WTP Options

Parameters	Option 1	Option 2	Option 3	Option 4
Location	Location 1	Location 1	Location 2	Location 2
# Filter Tanks (dia. 60“)	9	9	9	9
Gravity Fed WTP to Existing Reservoir	Yes	Yes	No	No
Clearwell Tank Volume	~ 20 m^3	~ 20 m^3	50 m^3	50 m^3
Domestic Pump(s) to Existing Reservoirs	None	None	3 (2 duty, 1 standby)	3 (2 duty, 1 standby)
Domestic Pumps(s) to Future Reservoir	2 (1 duty, 1 standby)	2 (1 duty, 1 standby)	2 (1 duty, 1 standby)	2 (1 duty, 1 standby)
Wash Water Collection Tank	50 m^3	50 m^3	50 m^3	50 m^3
Access to Sanitary Line	Yes	No	Yes	No
Sludge Holding Tank	None	30 m^3	None	30 m^3
Capital Cost ($)	$8,159,000	$8,024,000	$8,013,00	$7,877,000
O&M Cost ($/year)	$248,000	$285,000	$248,000	$285,000

7.11 Alternative Source and Post Expansion

The Village has conducted desktop assessment of alternative sources to supplement water supply should the existing groundwater source be unable to meet demands of the community while meeting the sustainable recharge rate of 30 L/s for the Pemberton Creek Fan Aquifer. Such alternative sources include both surface sources and other groundwater sources not tied to the Pemberton Creek Fan Aquifer.

As discussed in Section 7 and Table 7-1, the capacity of the proposed WTP is 60 L/s and is based on 2040 population growth with the intention to meet the sustainable recharge rate of the Pemberton Creek Fan Aquifer. Should an alternative source be added to supplement the water supply the Village has the option to expand the overall capacity of the WTP by adding addition space/structure for more filters or treatment equipment.

Based on discussion with the Village, a likely additional water source would be drilling new well(s) into the Lillooet River Aquifer. The Village plans to complete sampling of this potential well source, but past water quality samples have suggested the Lillooet River Aquifer may have higher iron and manganese and may be susceptible to the influence of surface water. Should this alternative source be added in the future, the proposed WTP can be expanded to include additional treatment process such as UV disinfection to meet treatment requirements. Where a UV disinfection system could be installed after the filters or downstream of the clearwell prior to entering the existing reservoirs. The addition of a UV disinfection system can be investigated during detail design.

8. Class D Cost Estimate

This section summarizes the cost opinions for various options discussed above. Options will be split based on the locations of the proposed WTP and access to the sanitary line for backwashing of the filters.

8.1 Limitations

The projected capital costs presented in this report are based on Class D Capital Cost Opinions. These costs opinions are order-of-magnitude level costs prepared with brief site information and should be used for planning purposes only. The costs may be subject to change upon receipt of significant new site or other information. A 60% allowance (40% contingency and 20% engineering) has been applied to the cost options to reflect their high-level nature.

8.2 Assumptions

The selection, sizing, and projected costs of the proposed WTP are based on the following:

1. All options will meet design flow target of 60 L/s by 2040 and will have provisions to include additional filters and pumps by 2040;
2. All options include a clearwell and pump(s) to provide treated water to the existing reservoir or future Pressure Zone 2 and 3 reservoirs;
3. A revised soda ash system to be installed for all options;
4. Electrical supply is available at existing site;
5. Includes contractor overhead and profit mark up (30%) and PST (7%); and
6. Cost escalation uncertainty with supply chain issues, pandemic fallout or recent provincial flooding could result in a cost escalation of 20 to 30%. This cost escalation has not been included in the cost opinion presented below.

8.3 Summary of Capital Cost Opinions

A summary of the proposed WTP located at Location 1 (north of the existing reservoirs) cost opinions are provided in Table 8-1.

Table 8-1: Summary of Cost Opinions for Proposed WTP located North of Existing Reservoirs

Item	Option 1, No Access to Sanitary Water Line (North of Reservoirs)	Option 2, Available Access to Sanitary Water Line (North of Reservoirs)
General Requirements	347,600	342,100
Site Work	529,000	485,900
Concrete	638,200	602,400
Building	492,500	492,500
Equipment	2,316,900	2,316,900
Mechanical & Piping	314,000	314,000
Electrical	461,000	461,000
Sub-Total	5,099,200	5,014,800
Engineering (20%)	1,020,000	1,003,000
Contingency (40%)	2,040,000	2,006,000
Total	**8,159,000**	**8,024,000**

A summary of the proposed WTP located at Location 2 (south of the existing reservoirs) cost opinions are provided in Table 8-2.

Table 8-2: Summary of Cost Opinions for Proposed WTP located South of Existing Reservoirs

Item	Option 3, No Access to Sanitary Water Line (South of Reservoirs)	Option 4, Available Access to Sanitary Line (South of Reservoirs)
General Requirements	341,600	336,100
Site Work	320,300	277,200
Concrete	638,200	602,400
Building	492,500	492,500
Equipment	2,439,900	2,439,900
Mechanical & Piping	314,000	314,000
Electrical	461,000	461,000
Sub-Total	5,007,500	4,923,100
Engineering (20%)	1,002,000	985,000
Contingency (40%)	2,003,000	1,969,000
Total (Rounded)	**8,013,000**	**7,877,000**

8.4 O&M Cost Estimate

The Operation and Maintenance, O&M costs are allowances based on similar WTP projects completed by KWL and are intended to be for comparison purposes between the various treatment processes evaluated. It is anticipated that the estimate for O&M costs would be refined with subsequent phases of work such as pilot testing, preliminary design, final design.

At this stage, the proposed WTP O&M Cost estimate is split among six categories which include electrical operating charges, staffing, water monitoring, consumables, waste management, and facility maintenance. The following summarizes how each category were calculated:

1. Electrical charges are based on typical electrical requirements of major equipment (i.e., pumping) and anticipated duty cycle. Electrical cost rates at $0.10/kwh reflect industrial averages;
2. Staffing charges are based on typical hours required to maintain and operate the WTP. Assumes an hourly charge rate of $40/hour. Staffing generally relates to routine labour, filter replacement, sludge disposal, and after-hour response;
3. Water monitoring is assumed to be completed at the proposed WTP to measure overall performance of the treatment process and to confirm the distribution is receiving treated water that meets guideline requirements. It is anticipated samples will be collected quarterly at the proposed WTP;
4. Consumables are based on the recommended treatment process which include filter media replacement and removal as well as chemical consumptions;
5. Waste management is the cost associated with disposal of accumulated sludge from the backwashing of media filters. A disposal fee of $1,500/haul was applied at a rate of two hauls per month for the proposed WTP. The cost associated with hauling could be eliminated if a sanitary line is accessible; and
6. Maintenance are costs associated with the maintenance and replacement of equipment at the WTPS.

Based on the assumptions above, the estimated O&M costs for the proposed WTP ranges between $248,000 and $285,000 per year. Lower range cost would be related to WTP options that have access to sanitary system and would not require the need for sludge disposal services. It should also be noted, approximately $110,000 of the O&M costs are related to replacement and maintenance costs which would most likely be put aside to allow for equipment to age and be replaced.

9. Overall Discussion and Summary

Four proposed WTP options were presented in the information above to treat existing groundwater wells to meet requirements of the GCDWQ. The proposed WTP should be designed to operate at 60 L/s and will have provisions to supply any future adjacent development with the addition of domestic pumps dedicated for that development. The proposed WTP will consist of ten 1,500 mm (60”) diameter filters with GreenSandPlus™ media to remove iron and manganese and will be fitted with domestic pumps, recycle pumps, and sludge pumps.

The treatment process at the proposed WTP will consist of oxidation by chlorination and filtration by GreenSandPlus™ media. Oxidations by chlorine disinfection will promote precipitate formation of iron and manganese and provide primary and secondary disinfection of the water. Catalytic media filtration with GreenSandPlus™ will further react with dissolved manganese to promote absorption to the filter media.

Periodic backwash of the GreenSandPlus™ filter media will be required to remove the accumulated iron and manganese in the filter. The backwash water will be sent to wash water collection tank where settling of solids will occur. To reduce the amount of liquid waste for disposal, a recycle pump will pump the supernatant liquid to the front of the WTP for treatment. Solids in the backwash collection tank will settle to the bottom, where a sludge pump will transfer the solids to a sludge collection tank or lagoon for storage and disposal. It is anticipated, disposal of solid waste will occur approximately one to two times per month at the proposed WTP but will depend on the water quality of the raw water and actual volume of water being treated.

The recycle line will be piped to the front of the proposed WTP from the wash water collection tank, where chemicals will need to be injected upstream or downstream of the filters. Due to the proposed arrangement, it is recommended, the existing soda ash systems be moved to the constructed WTP and a new chlorine system be installed at the proposed WTP. A new pH adjustment system can replace the existing systems once the system is unable to keep up with future demands.

The capital cost of the proposed WTP options range between $7.9 to $8.2 million depending on the location, pumping requirements, and access to sanitary systems for sludge disposals. O&M costs estimated to be $248,000 to $285,000 per year.

10. Conclusion and Recommendations

10.1 Conclusions

Based on the scope of this water treatment investigation, several conclusions have been reached and are listed below:

1. The existing Wells 2 and 3 groundwater sources, will eventually have elevated iron and manganese water levels that do not meet the requirements of the Guideline for Canadian Drinking Water Quality;
2. Anticipated flow rates based on village population growth until 2040 are summarized in the table below:

Table 10-1: Summary of Flow Rates

Year	Village Population	ADD (m^3/day)	ADD (L/s)	MDD (m^3/day)	MDD (L/s)
2020	3,100	1,880	22	3,700	43
2025	3,510	2,067	24	4,073	47
2030	3,925	2,255	26	4,451	52
2035	4,335	2,442	28	4,824	56
2040	4,750	2,631	31	5,203	60

3. The proposed water treatment process of oxidation with chlorine injection and catalytic media filtration (GreenSandPlus™) will provide adequate treatment and disinfection to the water from the wells;
4. The proposed WTP should be designed to operate at 60 L/s and will have provisions to supply any future adjacent development with the addition of domestic pumps dedicated for that development;
5. Two proposed locations were identified. Location 1 would have the proposed WTP located north of the existing reservoirs at an elevation above the reservoirs TWL to allow for gravity feed. Location 2 will be located southeast of the existing reservoirs and will require a clearwell and additional pumps to provide treated water to the reservoir. Both locations have advantages and drawbacks;
6. A separate technical memorandum related to soda ash dosing is currently being prepared by KWL and will provide additional insight into the design of future soda ash dosing system for corrosion control of the treated water;
7. To conserve water use and produce reduce volumes of wash waste for disposal at the proposed WTP, a pump from the wash water collection tank will recycle settled water to the front of the WTP for treatment. Hypochlorite injection and pH adjustment systems will need to be installed downstream of the tie-in point of the raw water and recycle line;
8. Four WTP configurations were presented based on the location of the proposed WTP and access to sanitary system. Costs of the WTP range from $7.9 to $8.2 Million and include 40% contingency;
9. O&M costs to operate the WTP is estimated to be $248,000 to $285,000 per year. Costs will be impacted by access to sanitary system and sludge disposal; and

10.2 Recommendations

Based on the conclusions of this study, a list of recommendations is provided below:

1. The Village to review the proposed WTP options and determine which configuration best suits their needs and requirements;
2. Conduct bench scale testing with water from Well #2 and #3 to confirm Oxidation and Catalytic Media Filtration with GreenSandPlus™ is able to meet treatment requirements;
3. Proceed with pre-liminary design of the preferred WTP option;
4. The Village, supported by KWL, apply for Investing in Canada Infrastructure Program Green Infrastructure Grant by February 23, 2022;
5. The Village to confirm existing wastewater treatment plant capacity and determine whether additional volumes as a result of the proposed WTP and future development would impact the treatment facility, or the conveyance of sewage to that facility; and
6. Complete additional water quality samples of potential additional water sources to determine if additional treatment process may need to be included at the proposed WTP.

11. Report Submission

KERR WOOD LEIDAL ASSOCIATES LTD.

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Revision History

Revision #	Date	Status	Revision Description	Author
A	November 26, 2021	Draft		AL/KSB
B	December 10, 2021	Draft		AL/KSB
0	January 31 ,2022	Final		AL/KSB

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Technical Memorandum

DATE: February 14, 2022

TO: Tom Csima, Manager, Operation and Projects
Village of Pemberton

FROM: Brandon Johnson, P.Eng.

RE: **Village of Pemberton**
Water Conservation Plan
Our File: 0743.018-300

Background

Kerr Wood Leidal Associates Ltd. (KWL) has been retained by the Village of Pemberton (the Village) to provide a Water Conservation Plan (the Plan). The Village has a higher per capita water use than the Canadian average, indicating potential for reducing consumption through water conservation and leak detection efforts.

The Village's water source derives from two active wells that withdraw from the Pemberton Creek Fan Aquifer which supply the Village population of approximately 3,100 as well residents of the Squamish-Lillooet Regional District who live in the Pemberton North Improvement District. Demands from the Pemberton North Water System (PNWS) comprise approximately 17% of the total demand.

The goal of the Plan is to identify both where conservation efforts should be made, and tools and work needed to reduce water use and leakage to achieve an overall reduction in per capita water use of 15% in the next 10 years.

Incentives to conserve water are both economic and environmental. Economically, the Village is significantly invested in its current source. Alleviating capacity constraints will defer infrastructure replacement costs, reduce operational costs, reduce water treatment costs, and maximize the time that the Pemberton Creek Fan Aquifer can be utilized before needing a new source. Environmentally, reducing the extraction of water from the aquifer will subsequently also reduce the volume of wastewater released, minimizing the impact to the environment.

Per-Capita Water Demands and Component Analysis

Average per capita water use is approximately 600 L/capita/day which included residential, industrial, and commercial use but excludes water demand from the Pemberton North Water System. In 2017, Canadian average per capita water use is 427 L/capita/day which also includes industrial, commercial, and other uses.

The village's current maximum day per capita demands are estimated at 1,190 L/cap/day which is high.

Per-capita water use is often used as a metric for assessing residential use and conservation efforts, however, it is affected by the type and quantity of industrial and commercial (ICI) use. High ICI water use

combined with a relatively low population can inflate the average per capita water use metric. Equally, higher than average system leakage can have the same effect.

Water conservation initiatives should put focus and effort where improvements can be made based on analysis of the components of water use. It is therefore necessary to understand where the greatest reductions are possible by measuring other metrics such as leakage levels, the leakage infrastructure index, residential base (indoor use), and seasonal water use.

The recommended process for determining the components of water use, including leakage, are as follows:

1. ICI Use: Quantified by customer water meter billing database and estimates for unmetered commercial and industrial use. It is noted that all businesses located in the Village's industrial park have water meters installed and it is estimated that metered ICI customers account for roughly half of the total ICI use[1] in the Village; however, these users are not serviced via the Village's water system. Average, base, and seasonal usage for industrial and commercial users may be estimated if all meters are read for billing at set times marking the normal transition from winter to summer usage.
2. Water System Leakage: Quantified by zone night flow analysis. It is noted that the Village is working towards providing SCADA monitoring for zone metering to allow leakage assessments to be completed.
3. Base Demand and Base Residential water use: Review of average winter demand data. Base demand is average winter demand. Base residential water use is calculated by deducting the estimated industrial and commercial use and estimated system leakage from average winter demand.
4. Seasonal water use: Review of yearly flow data. The yearly quantity of seasonal demand and period in which it occurs can be quantified by review of daily flow records.

Components of Water Demand

Water billing data from 2010 through to 2020 was reviewed along with source flow data from 2020 and 2021. In 2015, a major leak was identified and repaired. The leak was responsible for a daily loss upwards of 500 m^3 or 5.79 L/s, which accounted for roughly 20% of the water demand at the time.

A water balance was completed using billing data from 2016 to 2021 to categorize water use and applying the breakdown to 2020 source flow data. Water demands have decreased by approximately 10% since 2016. Seasonal water use in 2021 was significantly higher than 2020 (+32%); however, 2021 was an uncharacteristically hot year, leading to many municipalities observing record water usage and therefore was not considered in this analysis.

The following assumptions were made to complete the water balance:

1. Indoor residential water use is estimated to be 230 L/cap/day.
2. Unmetered ICI demands are assumed as approximately one-third of the total ICI demand. Approximately half of the total ICI customers are metered, and it is assumed that these include the larger water users. Note that metered ICI customers are serviced via the Mount Currie Water System under a water use agreement.
3. Total base usage is calculated from the average day winter demand multiplied by 365 days.

[1] Village of Pemberton Water System Performance Assessment

4. Seasonal usage is all water usage above the average winter base demand that occurs from May through September.

The components of water demand are presented in Table 1 below.

Table 1: Estimated Annual Water Use Breakdown

Period	Usage by Demand Type (m^3)					Total	% of Annual Total	Industrial Park Water Use[1]
	Res.	ICI	Bulk Water	PNWS	Water Losses			
Base Usage	220,000	25,000	7,000	32,000	135,000	419,000	69%	49,000
Seasonal Usage (% of Total for Demand Type)	143,000 (39%)	8,000 (24%)	4,000 (36%)	36,000 (53%)	NA	191,000	31%	16,000
Annual Total	363,000	33,000	11,000	68,000	135,000	610,000	100%	65,000
% of Annual Total	60%	5%	2%	11%	22%			
1. Industrial Park is supplied via the Mount Currie water system								

The following is noted with regards to the estimated annual water use breakdown:

1. Seasonal water use is high and accounts for 31% of total yearly demand and is estimated to account for 39% of the total non-metered residential demand. By comparison, in the lower mainland, seasonal demand accounts for 33% of total residential demand. The difference in seasonal use between the Village and the Lower Mainland is greater than these numbers signal since the assumed residential base use for the Village (230 L/cap/day) is approximately 30% greater than Lower Mainland base residential usage. On average each residential account uses 142 m^3 of seasonal (outdoor) water between May 1 and September 30 or 934 L/property/summer-day.
2. Water losses are moderate, estimate at 135,000 m^3/year which is roughly 22% of total annual water use or a leakage rate of 4.3 L/s. It is noted that actual loss levels may be higher than reported as loss levels are calculated based on a relatively conservative estimates of legitimate residential base demand. The accuracy of the audit would be improved by determining water loss through minimum night flow analysis once zone metering is completed and connected to SCADA.
3. The water loss total includes leakage within PNWS. The total annual water supplied to PNWS is approximately 120,000 m^3; comprised of an estimated 68,000 m^3 of legitimate usage and 52,000 m^3 of water loss. PNWS water losses are estimated to be 39% of the Village's total water loss of 135,000 m^3. The Village can liaise with Squamish-Lillooet Regional District on managing water use in PNWS to identify and reduce water losses.

Population and Growth

The village's current population serviced by the Village's water system is estimated at approximately 3,100. The following is noted with regards to serviced population, current development plans, and future growth.

1. On average between 1991 and 2016, the Village has grown at a rate of 80 people per year.
2. The Village population is estimated to increase by 686 people according to the several developments that are either under construction or have recently been completed.

3. Over the next 5 to 10 years, there are significant residential plans approved, housing approximately another 1,763 people.
4. Extrapolating the population best fit line into the year 2040, the population for the Village is estimated for the years 2020 to 2040[2] as shown in Table 2 below.

Table 2: Projected Water Service Population

Year	Population
1991 Water Study	550
2001 Census	1,637
2006 Census	2,192
2011 Census	2,369
2016 Census	2,574
2021 Census	3,407
2025 Estimate	3,510
2030 Estimated	3,925
2035 Estimate	4,335
2040 Estimated	4,750

Water Supply Capacity

The Pemberton Creek Fan Aquifer is unconfined and primarily recharged via Pemberton Creek at a rate of approximately 30 L/s. Production wells 1, 2, and 3 are located in the central portion of the aquifer.

1. Well 1 is inactive due to excessive iron and manganese concentrations.
2. Well 2 is the backup well constructed in 1997 at a depth of 41.8 m. It has a diameter of 300 mm and a rated flow of 76 L/s.
3. Well 3 is the current duty well constructed in 2007 at a depth of 46 m. It has a diameter of 200 mm and a rated flow of 50 L/s.

During the summer months water is consumed quicker than the aquifer's recharge rate. The aquifer water levels typically recover each winter as the Village's water usage drops. The sustainable use of the Pemberton Creek Fan Aquifer requires the Average Daily Demand (ADD) to remain below 30 L/s (2,600 m^3/day). Currently, ADD is approximately 21 L/s.

Climate Change Adaptation and Mitigation

The following is noted with regards to climate change adaptation and mitigation:

1. In general, weather is likely to become wetter in the winter and drier in the summer in the future in the Squamish-Lillooet region. According to the Pacific Climate Impacts Consortium (PCIC; plan2adapt.ca), by the 2050s, precipitation in the region is expected to change from current normal as follows (median of forecasts, and range of 10^{th} to 90^{th} percentiles):

[2] Village of Pemberton Water System Performance Assessment

   a. Annual +2.4% (-1.7% to +7%)
   b. Summer -5.9% (-30% to 5.3%)
   c. Winter +2.9% (-1.9% to +8%)
2. As well, the Pacific Climate Impacts Consortium (PCIC; plan2adapt.ca), estimates that by the 2050s annual average temperatures in the region will increase by +3.1˚C (+2.1˚C to +4.2˚C).
3. Extreme weather events (temperature and precipitation, drought, and flooding) are expected to increase in frequency. The impact on water service may include increased storage requirements for balancing peak flows.
4. The physical capacity of the Pemberton Creek Aquifer is considered a constraint into the future with climate change worsening the effects of a growing population on demand.
5. Benefits of water conservation (mitigation and adaptation):
   a. Reducing the extraction of water from the aquifer will reduce the volume of wastewater released, minimizing the impact to the environment.
   b. Reducing costs and carbon emissions of expanding the infrastructure to accommodate growth (e.g., manufacturing, transporting, and installing larger watermains).
   c. Reducing carbon emissions associated with trucking water to overcome capacity constraints.
   d. Maintaining more water storage in reserve for emergencies such as wildfires or extreme drought, which may increase due to climate change.

Water Demand Targets

The following water conservation targets are recommended:

1. Overall water supply flow (annual total or average) at WTP: Maintain below 25 L/s through year 2040.
2. Maximum day demand at WTP: Maintain below 50 L/s through year 2040.
3. End user demand (L/cap/day): Reduce to 900 L/cap/day Maximum Daily Demand (MDD) and 450 L/cap/day ADD at WTP by year 2040.

Achieving a per-capita reduction in water demands of approximately 25% over the next 20 years will rely on a combination of educational and regulatory measures to reduce water demands in existing buildings, water-efficient new construction, and implementation of a water distribution loss management program. If these measures are implemented, the targets are achievable with a water service area population of 4,750 in year 2040.

Current and Planned Water Conservation Measures

A planned adaptive strategy enables conservation measures to be tailored to meet the changing needs of the community over time. The following conservation measures are currently undertaken or are planned for implementation as required.

1. **Regulation** (current): In 2015 the Village established an Outdoor Water Use Regulation Bylaw (Bylaw No. 792), which includes four water conservation levels as shown on Figure 1 below.

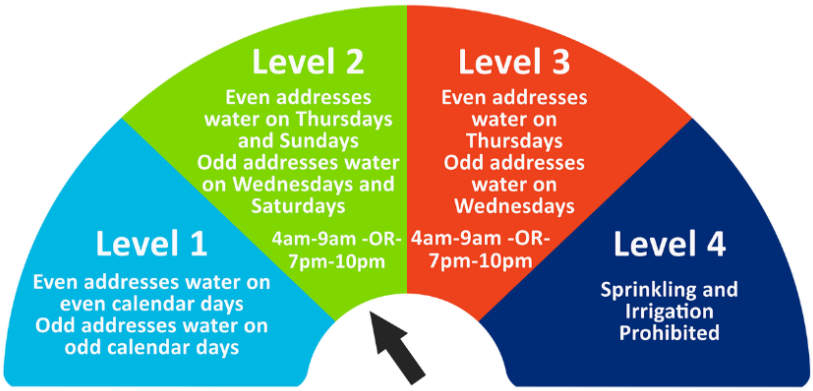

Figure 1: Village of Pemberton Outdoor Water Use Levels

The Village advertises the current level of watering restrictions in social media and on its website. The Village also provides details about best practices for reducing indoor water use on its website to educate the public.

2. **Retail metering program** (feasibility study completed 2007, prioritized implementation in progress: The Village's zoning and building code bylaws require all new developments to install water meters and low-flow toilets and urinals (residential and ICI). Approximately half of all ICI connections are currently metered.
3. **Consumption based billing** (current): Metered customers are billed for water based on water consumption and a two-tiered inclining block rate structure where consumption over 65 m^3 per quarter is penalized with a higher water rate (2.25 times). The Village has developed appropriate non-metered and metered rate structures that achieve stable revenues and appropriate incentives to reduce base and peak demands.
4. **Water Loss Management** (current and planned): The Village has implemented zone metering and is in the process of connecting zone meters to SCADA for the purpose of monitoring nighttime flows and leakage levels. Distribution losses are estimated to average 2.2 L/s, which is approximately 11% of annual demand. Ongoing recommended measures include minimum overnight flow monitoring, keeping records of leaks found and repaired, and sounding for leaks at line valves and curb stops when they are exercised or located. Losses are the greatest in the Pemberton North Water System, comprising approximately three quarters the total loss value.
5. **Demand Management Program** (Current): Providing information to customers through print and electronic media has been a major component of the Village's conservation program since its inception. Print media has included bill stuffers, flyers and brochures that address indoor and outdoor water conservation practices. This information has also been posted on the Village's website and published in its bi-monthly e-newsletter. The Village also ensures responsible 'water wise' irrigation for all civic properties in accordance with their bylaw. The Village will continue to implement a program to reduce peak and annual water use as needed to defer capacity upgrades and meet the planned conservation targets, including a community awareness campaign aimed at water efficient lawn and landscape maintenance.
6. **Reporting usage and water budgets on water bills** (current and future): Displaying information about water use on water bills is completed to raise customer awareness about their water use. Comparing each customer's water use to a system average, or to a water use budget based on

system constraints will enable customers to make informed and timely decisions about how they use water.

7. **Water Conservation Plan Renewal** (planned for 2026, and every five years thereafter): A review of this plan will be conducted every five years to update forecasts and targets, consider new information, and adjust program activities as required to meet targets.

Program Implementation Responsibility, Cost and Schedule

The Manager of Operations and Projects will have overall responsibility for the water conservation program. Aspects of the program may be delivered by public works (e.g., water-loss management), finance (rates), and development services, corporate, and legislation (bylaw administration, forecasting and public engagement). The program can be considered in the municipal water budget. Planned measures will proceed within the next five years (subject to budget approvals), or as necessary to achieve targets and avoid premature infrastructure capacity upgrades where it is cost-effective.

Linkages to Other Plans and Policies

This Plan supports the Official Community Plan; outdoor water use bylaw; Water Rates Bylaw; PNWS water rates study; Water and Sewer Asset Management Plan; and Corporate Asset Management Policy.

KERR WOOD LEIDAL ASSOCIATES LTD.

Prepared by:

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BLJ/aah

Statement of Limitations

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Revision History

Revision #	Date	Status	Revision Description	Author
A	January 10, 2022	DRAFT	Initial Draft	BLJ/RYL
B	January 17, 2022	DRAFT	Updated based on received data	BLJ/RYL
1	January 31, 2022	FINAL	Minor updates based on feedback from client	RLJ/RYL
2	February 14, 2022	FINAL	Minor updates based on feedback from client	RLJ/RYL

Proudly certified as a leader in quality management under Engineers and Geoscientists BC's OQM Program from 2013 to 2022.

Village of PEMBERTON

REPORT TO COUNCIL

Date: **Tuesday, May 30, 2023**

To: **Elizabeth Tracy, Chief Administrative Officer**

From: **Tom Csima, Manager of Operations and Projects**

Subject: **Crown Land Licence of Occupation Application – One Mile Lake Boardwalk**

PURPOSE

The purpose of this report is to seek support from the Council for the Village to make application for a Crown land License of Occupation for the One Mile Lake boardwalk.

BACKGROUND

The boardwalk structure at One Mile Lake Park requires maintenance and replacement for safety and accessibility reasons. As parts of the existing boardwalk structure are located beyond the top of bank of One Mile Lake a Section 11, permitting approval under the *Water Sustainability Act* (WSA,) is required to conduct the works. The proposed replacement and widening of the boardwalk structure requires a Crown land License of Occupation (tenure) under the *Land Act* in any parts of the boardwalk trail that are located within Crown provincial land. The WSA approval for the works can only be granted once a Crown land tenure has been registered for the proposed structures.

The eastern and northern lands surrounding One Mile Lake are registered as municipal park land. The Village holds an active tenure (Land File# 2410786) for the southwest portion of the lakeshore which includes the beach area and car park.

The existing boardwalk on the western and northwestern section of the lake is within Crown provincial land and outside the Village registered land interests (see Figure 1). The province is requesting the Village apply for a Crown land tenure under the Community Institutional land use policy to register the boardwalk structure and its use on Crown land in the western section of the lake. The boardwalk would be registered under the Community Institutional Land Use Policy as it supports community infrastructure and benefits the public-at-large.

DISCUSSION & COMMENTS

As Crown land tenure is being applied for under the Community Institutional Land Use Policy by a local government the province requires a resolution of the municipal council endorsing the application.

Figure 1 below shows municipal park in green, crown provincial land to west for which the Village holds an existing license of occupation in yellow, and the portion of the crown land that the Village will be applying for occupation highlighted in Red.

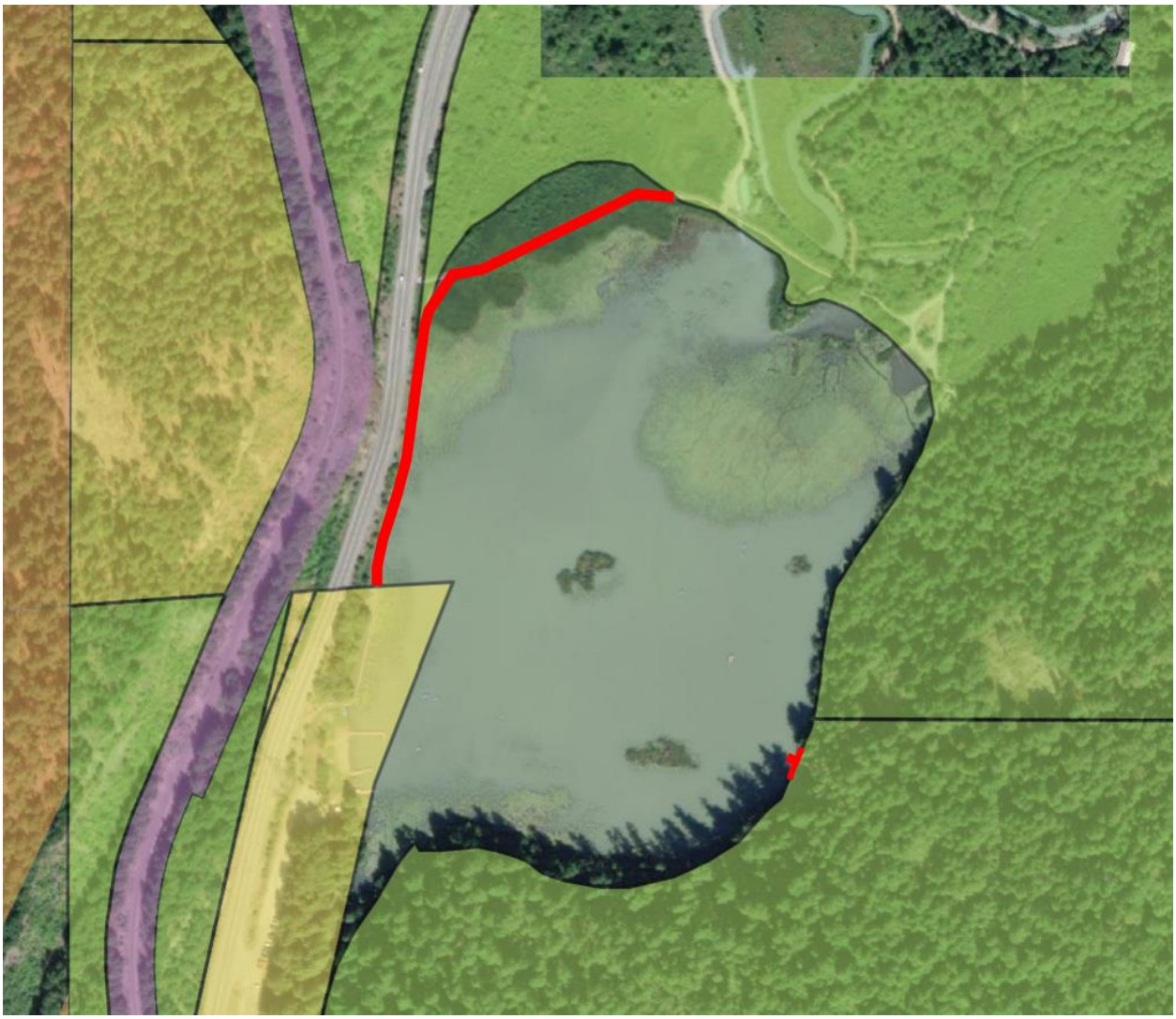

Figure 1 – Land parcels at One Mile Lake

COMMUNICATIONS

This process does not require a communications element

LEGAL CONSIDERATIONS

As stated, the applicable legislature are the *Water Sustainability Act* and *the Land Act.*

IMPACT ON BUDGET & STAFFING

The cost associated with this initiative will be allocated from the Trails Maintenance budget in Public Works and included in the WSA application works being done by our Environmental Consultants.

INTERDEPARTMENTAL IMPACT & APPROVAL

The above noted project will not impact the day-to-day operations of another department.

COMMUNITY CLIMATE ACTION PLAN

Although this initiative does not directly impact the Community Climate Action plan, securing this land use will allow the Village to continue to maintain and improve the publicly used trails which aligns with the “Shift Beyond the Car” initiative, providing an alternative mode of transportation for Village residents.

IMPACT ON THE REGION OR NEIGHBOURING JURISDICTIONS

The process for applying for Crown Land Tenure involves consultation from neighbouring jurisdictions. This will include notification and the opportunity to provide feedback from the Squamish-Lillooet Regional District Electoral Area C, Pemberton Valley Dyking District, Lil’wat Nation through FrontCounter BC.

ALTERNATIVE OPTIONS

There are no alternative options for consideration.

RECOMMENDATIONS

THAT the application for a Crown Land License of Occupation for the One Mile Lake boardwalk be supported**.**

Prepared by:	Tom Csima, Manager of Operations and Projects
CAO Approval by:	Elizabeth Tracy, Chief Administrative Officer

Spel̓kúmtn Community Forest
located within the Unceded Territory of the Líl'wat Nation
spelkumtncf@gmail. com | PO Box 605, Mount Currie, BC, V0N 2K0 | 604-894-6115

May 23, 2023

Mayor Mike Richman
Elizabeth Tracy, CAO
Village of Pemberton
7400 Prospect Street, PO Box 100
Pemberton, BC
V0N 2L0

Via email: etracy@pemberton.ca, mrichman@pemberton.ca

Re: Spel'kúmtn Community Forest Distribution of Funds to Shareholders

Dear Mike and Elizabeth,

On behalf of the Spel'kúmtn Board of Directors, I am thrilled to be writing to inform you of the Board's recent resolution to distribute funds to the Shareholders this year.

As the Shareholders know, forestry operates in a volatile market but conditions in 2022 were favourable, particularly for community forests. The SCF, with the dedication and hard work of the team at Líl'wat Forestry Ventures, was able to maximize profit with a busy operational year of 21,000m3, a 'catch-up' volume on previous underharvests.

As such, following the 2022 audit the Board met on May 12, 2023, to review the SCF's financial position and resolved that an amount of $329,000 shall be disbursed to each of its two Shareholders.

The Distributable Funds being disbursed to the Shareholders may be spent at the Shareholders' discretion, though the Board does anticipate that the funds

will go towards spending that aligns with the SCF vision and values. Attached to this letter is a document highlighting the Guiding Statements of the SCF.

Additionally, the SCF would like to note the following:

the monies distributed may be used to leverage matching funds in partner grant applications;

the SCF and each of the Shareholders shall communicate to the public the distributable amounts paid and received;

at each Annual General Meeting, both Shareholders will share back to the Board of Directors how the previous year's Distributable Funds were utilized. The intention of this guideline is to provide the opportunity to communicate and celebrate the ways in which the Shareholders and their communities are seeing the benefit of the partnership.

The SCF is proud and honoured to be working on behalf of its Shareholders and communities, towards reconciliation, strengthening relationships, economic development, stewardship and connection to the land.

Kind regards,

Andrea Blaikie

Andrea Blaikie
Executive Director
Spel'kúmtn Community Forest

Enclosure:
Spel'kúmtn Community Forest Guiding Statements

Spel̓kúmtn
COMMUNITY FOREST

Guiding Statements

The vision of the Spel'kúmtn Community Forest is to further reconciliation and strengthen relationships between the partnering communities of Líl̓wat Nation and the Village of Pemberton through connection to the land, good stewardship and economic opportunity.

The mission of Spel̓kúmtn Community Forest is to operate a safe, profitable and sustainable community forest.

Management of the Spel̓kúmtn Community Forest recognizes and respects a set of shared community values:

Community Relationships
Social Responsibility

Economic Viability
Giving Back to the Community

Environmental Stewardship
Wildlife Conservation and
Habitat Enhancement
Watershed Protection

Culture
Outdoor Lifestyle, Recreation
Connection between Land and
People, Connection to Nature

DISTRICT OF COLDSTREAM

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"Rural Living At Its Best"

OFFICE OF THE MAYOR

File: 0410-01
May 9, 2023

Honourable Ravi Kahlon
Minister of Housing
Room 248 Parliament Buildings
Victoria BC V8V 1X4

VIA EMAIL: ravi.kahlon.MLA@leg.bc.ca

Dear Honourable Kahlon:

Re: Homes for People Action Plan

At their Regular meeting held on May 8, 2023, the District of Coldstream passed the following resolution:

> *"THAT the Mayor be authorized to send a letter to the Minister of Housing, with copies to the MLA for Vernon-Monashee and all members of the Union of British Columbia Municipalities, regarding the recently announced action plan "Homes for People" and request that the Minister take into consideration the following:*
>
> 1. *the diversity and size of communities throughout the province and their unique housing needs;*
> 2. *the differences between rural and urban communities and their availability of infrastructure; and*
> 3. *the significant impact on existing local infrastructure capacity to service increased development and density;*
>
> *AND THAT the Minister be further advised that the District of Coldstream is concerned that broad legislative changes may curtail the local planning authority vested in local governments and expressed in their Official Community Plans and Zoning bylaws, for which significant public input has been received and accounted for in these important planning instruments.*

In addition to the points enumerated above, we would also bring to your attention that a large portion of Coldstream is served by septic systems, which are not equipped to manage the type of densification the Homes for People Action Plan contemplates. To provide the appropriate infrastructure would have a considerable financial impact to our residents without guaranteed and predictable funding/grants from the Province.

.../2

A good portion of Coldstream is in the Agricultural Land Reserve (ALR); as such, we have concerns regarding the potential conflict between residential and agricultural land use. We have struggled with this very issue in recent years as have other communities surrounded with rural areas and have experienced development pressure.

The portion of Coldstream that would be characterized as urban is very much residential and we lack access to local services such as shopping, health care, employment, and transit. These types of services and amenities are located in Vernon, a neighbouring community which acts as a the commercial 'hub' for many of our residents.

The District of Coldstream values and is known for our carefully managed growth which has always respected the wishes of the members of this community. Our Official Community Plan and Zoning Bylaws have been developed with considerable input from the residents. Coldstream is a desirable place to live, farm and enjoy the abundance of natural amenities we are fortunate to have. We have worked diligently to balance the need for a variety of housing types and density with moderate growth while preserving the much sought after rural lifestyle that Coldstream is known for.

Respectfully, we request you consider that there are other communities, just as unique as ours, for which a province-wide, "one-size-fits-all", approach to increasing housing supply may not be in their best interest and may result in communities that no longer resemble the ones that people chose to live in. If the Province targeted support to communities either better suited or desirous of increased density, British Columbians would have the ability to choose the housing type and the community that is the best fit for them.

We thank you for your thoughtful consideration of our concerns on this very important initiative.

Sincerely,

[redacted]

Ruth Hoyte
Mayor

cc: Council, District of Coldstream (via email)
MLA Harwinder Sandhu (Harwinder.sandhu.MLA@leg.bc.ca)
Members of the Union of British Columbia Municipalities

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Website: www.pemberton.ca

OPEN QUESTION PERIOD POLICY

THAT the following guidelines for the Open Question Period held at the conclusion of the Regular Council Meetings:

1) The Open Question Period will commence after the adjournment of the Regular Council Meeting;

2) A maximum of 15 minutes for the questions from the Press and Public will be permitted, subject to curtailment at the discretion of the Chair if other business necessitates;

3) Only questions directly related to business discussed during the Council Meeting are allowed;

4) Questions may be asked of any Council Member;

5) Questions must be truly questions and not statements of opinions or policy by the questioner;

6) Not more than two (2) separate subjects per questioner will be allowed;

7) Questions from each member of the attending Press will be allowed preference prior to proceeding to the public;

8) The Chair will recognize the questioner and will direct questions to the Councillor whom he/she feels is best able to reply;

9) More than one Councillor may reply if he/she feels there is something to contribute.

Approved by Council at Meeting No. 920
Held November 2, 1999

Amended by Council at Meeting No. 1405
Held September 15, 2015