



THE MUNICIPALITY OF THE VILLAGE OF LIONS BAY

REGULAR MEETING OF THE COUNCIL OF THE VILLAGE OF LIONS BAY HELD ON MARCH 3, 2015 at 7:00 PM VILLAGE HALL, 400 CENTRE ROAD, LIONS BAY

AGENDA

- 1. Call to Order**
- 2. Approval of Agenda**
- 3. Public Participation**
- 4. Delegations**
 - A. RCMP Annual Report
- 5. Adoption of Minutes**
 - A. February 17, 2015 Regular Council Minutes (Page 3)
- 6. Business Arising from the Minutes**
- 7. Unfinished Business**
- 8. Reports**
 - A. Chief Administrative Officer
 - i. CAO Information Report (Page 9)
 - B. Mayor and Council
 - C. Committees
 - i. Community Committee – Members and Terms of Reference
 - D. Staff
 - i. Manager of Public Works Report (Page 13)
 - ii. 2014 Annual Drinking Water Report (Page 17)
 - E. Emergency Services Reports
- 9. Resolutions**
 - A. Community Grants Approval
 - B. Infrastructure Committee
 - i. Preliminary Recommendations (Page 123)
 - ii. Lions Bay Beach Park Retaining Wall (Page 135)
- 10. Bylaws**
- 11. Correspondence**
 - A. List of Correspondence to Wednesday, February 25, 2015 (Page 139)

Agenda – Regular Meeting of Council – March 3, 2015

Village of Lions Bay

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12. New Business

- A. Status of March 17, 2015 Regular Council Meeting
- B. Age Friendly Grant – Open House (Page 173)

13. Public Questions & Comments

14. Resolution to Close Meeting

BE IT RESOLVED THAT the Village of Lions Bay Council does close the March 3, 2015 Regular Council Meeting to the public on the basis of matters to be considered under the following section(s) of the *Community Charter*:

90 (1) A part of a council meeting may be closed to the public if the subject matter being considered relates to or is one or more of the following:

- c) labour relations or other employee relations;
- g) litigation or potential litigation affecting the municipality;
- j) information that is prohibited, or information that if it were presented in a document would be prohibited, from disclosure under section 21 of the *Freedom of Information and Protection of Privacy Act*

15. Reporting Out from Closed Session

16. Adjournment



THE MUNICIPALITY OF THE VILLAGE OF LIONS BAY

REGULAR MEETING OF THE COUNCIL OF THE VILLAGE OF LIONS BAY HELD ON TUESDAY, FEBRUARY 3, 2015 at 7:00 PM IN THE COUNCIL CHAMBERS, 400 CENTRE ROAD, LIONS BAY

MINUTES

In Attendance: Mayor Karl Buhr
Councillor Fred Bain
Councillor Jim Hughes
Councillor Ron McLaughlin
Councillor Helen Waterson
Chief Administrative Officer Mandy Koonts
Office Coordinator Shawna Gilroy (Recorder)
Chief Financial Officer Pam Rooke

Attendees in Gallery: 5

1. Call to Order

Mayor Buhr called the meeting to order at 7:00 p.m.

2. Approval of Agenda

To add the following Items:

- 9C Resolutions – Resolution to Appoint a Representative to the North Shore Substance Abuse Working Group
- 11 Correspondence – Addition to the Correspondence

Moved/Seconded

BE IT RESOLVED THAT the Village of Lions Bay Council approves the Agenda of the February 3, 2015 Regular Council meeting, as amended.

CARRIED

3. Public Participation

A. Mr. Jeff Stone

Mr. Stone addressed the following concerns:

- He feels there is nothing wrong with the current Council Procedures Bylaw and that perhaps staff and Council are wasting their time amending it. Also, that section 8 and 9 are missing.
- That Council should not be able to rescind a third reading.
- The failure to post notice of a meeting.

4. Delegations

5. Adoption of Minutes

A. January 27, 2015 Special Council Meeting

Moved/Seconded

BE IT RESOLVED THAT the Village of Lions Bay Council adopts the Minutes of the January 27, 2015 Special Council meeting as submitted.

CARRIED

B. February 3, 2015 Regular Council Meeting

- Page 10 of 124 – Under Finance Committee after the word “provided” (in both paragraphs), add the page number of the report mentioned from the Council package.
- Page 10 of 124 – Action item under Staff Reports (i), end the sentence after “parking” and remove the rest.

Moved/Seconded

BE IT RESOLVED THAT the Village of Lions Bay Council adopts the Minutes of the February 3, 2015 Regular Council meeting, as amended.

CARRIED

6. Business Arising from the Minutes

- A. Mayor Buhr followed up with the action item from page 8 of 124 of the Council Package.

ACTION: Staff to recirculate the Cumulative Effects Assessment for Howe Sound correspondence letter under item 6.

- B. CAO Koonts confirmed the action items under 8A, 8D and 8E.
- C. It was confirmed that the action items under 11 Correspondence were completed.
- D. Mayor Buhr discussed his draft report to Council.
- E. Action item 12B was confirmed.
- F. It was determined that item 9A is left unclear until more information becomes available from the Fire Chief.

7. Unfinished Business

8. Reports

A. CAO

CAO Koonts highlighted topics from her information report and answered questions from Council regarding the trail maintenance in the Village.

B. Mayor and Council

C. Committees

(i) Finance

Councillor McLaughlin briefed on the Finance Committee meeting held on February 11, 2015.

(ii) Infrastructure

Councillor Bain briefed on the last Infrastructure Committee Meeting held on February 12, 2015.

- Updated Terms of Reference
 Moved/Seconded

BE IT RESOLVED THAT the Village of Lions Bay adopts the Infrastructure Committee Terms of Reference on February 17, 2015 as presented.

CARRIED

D. Staff

(i) BDO Planning Report

CFO Rooke briefed on the BDO Planning Report and responded to questions from Council.

(ii) CFO Report

CFO Rooked briefed on her CFO Report and responded to questions from Council.

E. Emergency Services Reports

Council reviewed and discussed the Emergency Services Reports.

9. Resolutions

A. Resolution to Appoint Representative to the Sea to Sky Invasive Species Council
 Moved/Seconded

BE IT RESOLVED THAT the Village of Lions Bay Council endorses Joanne Ronsley to participate in the Sea to Sky Invasive Species Council as a representative for the Village of Lions Bay;

AND THAT Mrs. Ronsley report back to Council periodically on related matters affecting the Village.

CARRIED

B. Appointment of Chief Financial Officer and Banking Signatory
 Moved/Seconded

BE IT RESOLVED THAT the Village of Lions Bay Council appoints Pamela Rooke as the Village's Chief Financial Officer;

AND THAT Ms. Rooke be appointed as a bank signing authority for the Village.

CARRIED

C. Appointment to Substance Abuse Working Group
 Moved/Seconded

BE IT RESOLVED THAT the Village of Lions Bay Council appoints Joanne Ronsley as the Village representative for the North Shore Substance Abuse Working Group.

CARRIED

10. Bylaws

A. Water Bylaw No. 482 - Adoption

Moved/Seconded

BE IT RESOLVED THAT the Village of Lions Bay Council adopts the Water Rates and Regulations Amendment 2015 Bylaw No. 482 on February 17, 2015.

CARRIED

B. Waste Bylaw No. 483 - Adoption

Moved/Seconded

BE IT RESOLVED THAT the Village of Lions Bay Council adopts the Waste Collection Amendment Bylaw No. 483 on February 17, 2015.

CARRIED

C. Council Procedures Bylaw No. 476 – Second Reading

Council decided that there should be further interpretation to this bylaw and that it will be tabled.

Moved/Seconded

BE IT RESOLVED THAT the Village of Lions Bay Council tables the Council Procedures Bylaw No. 476.

TABLED

11. Correspondence

“Woodfibre LNG/Pipeline Expansion Community Meeting” letter was added on-table.

Moved/Seconded

BE IT RESOLVED THAT the Village of Lions Bay Council receives the list of Correspondence to February 13, 2015.

CARRIED

ACTION: Staff to provide Ruth Simons with a copy of the letter from the Mayor of Squamish regarding the Woodfibre LNG/Pipeline Expansion Community Meeting.

Moved/Seconded

BE IT RESOLVED THAT the Village of Lions Bay Council does hereby proclaim the week of May 17-23, 2015 as Public Works Week in The Village of Lions Bay.

CARRIED

ACTION: CAO Koonts to arrange lunch one day during Public Works Week for Public Works staff.

12. New Business

A. Early Years Grant for Additional Child Care Space

Councillor McLaughlin briefed on the Early Years Grant for Additional Child Care Space.

B. 2015 Municipal Grant Applications

CFO Rooke briefed on her 2015 Municipal Grant Applications report. The Applications will come forward on March 3, 2015 for resolution.

ACTION: Staff to draft an information letter on the formal process for Grant Applications in the next ePost.

C. Community Beautification

Councillor McLaughlin briefed on what Community Beautification entails. A formal consideration will be provided near the end of March.

D. Library Update

Councillor McLaughlin announced that the shelves have been painted and installed in the library. They should be wrapping up within the next month.

13. Public Questions & Comments

Mr. Jeff Stone

Mr. Stone thanked Council for tabling the Council Procedures Bylaw due to the amount of information it entails. His questions and concerns were as follows:

- Interested in knowing what the money from the Public Art Design in the Grants can be used for.
- Concerned about a possible water shortage in the Village due to the lack of snow on the mountain.
- Concerned about the residents in the Village who do not use electronic communication and are unaware of what is happening in the Village.
- Queried the preventative maintenance at CN Rail.
- Concerned for child safety at Brunswick Beach with regards to the nudity in the summer.
- Concerned with general beach safety with new people coming and not being aware of the depth of the water.

14. In Camera Resolution

Moved/Seconded

BE IT RESOLVED THAT the Village of Lions Bay Council does close the February 17, 2015 Regular Council Meeting to the public at 8:21 p.m. on the basis of matters to be considered under the following section of the *Community Charter*:

90 (1) A part of a council meeting may be closed to the public if the subject matter being considered relates to or is one or more of the following:

- c) labour relations or other employee relations;
- g) litigation or potential litigation affecting the municipality;

- j) information that is prohibited, or information that if it were presented in a document would be prohibited, from disclosure under section 21 of the *Freedom of Information and Protection of Privacy Act*

15. Reporting Out
Moved/Seconded

BE IT RESOLVED THAT the Chief Financial Officer and the Public Works Manager be authorized to act in the Chief Administrative Officer role during periods of CAO's absence as directed by the CAO.

CARRIED

16. Adjournment
Moved/Seconded

BE IT RESOLVED THAT the Village of Lions Bay Council adjourns the February 17, 2015 Regular Council meeting at 9:09 p.m.

CARRIED

Mayor

CAO

Date Adopted by Council:	
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THE MUNICIPALITY OF THE VILLAGE OF LIONS BAY

Type	Report to Council			
Title	Information Report – Chief Administrative Officer			
Author	M. Koonts	Reviewed By:		
Date	February 25, 2015		Version	
Issued for	March 3, 2015 Regular Council Meeting			

1. Recommendation:

THAT Council receives this report for information purposes.

2. Attachments:

CAO's Punchlist Report to Mayor & Council

3. Background:

The attached workplan is a high-level overview of key tasks currently being addressed.

4. Discussion:

I would be pleased to discuss the information or provide clarification on the information contained herein.

CAO's Punchlist, report to Mayor & Council							
Start	Deadline	Priority (1 high to 5 low)	Council portfolio	Administrative classification	Task, status and notes (last updated February 25, 2015)	Primary	Update since last report
Pre-CAO		2	infrastructure	Admin	Emergency Management Plan	MK	Drafting of Business Case for consideration in budget process.
Pre-CAO	Spring 2015	2	Community	Admin	Communications Plan	MK	Review of neighbouring municipalities' communications plans to glean perspective on best practices we could adopt.
Pre-CAO	N/A	2	Government	Legal	Legal matters	MK	Ongoing
Pre-CAO	1/Feb/15	2	Government	Finance	Annual budget process	MK, PR, HC	Working with CFO; Finance Committee and Council involved as necessary
1/Feb/15	1/Apr/15	2	Government	Staffing	Staff Goal Planning	MK	One on one meetings with staff. Objective is to establish annual goals, training needs, etc. Once complete, will form basis of an annual review plan.
Feb. 2015	1/Mar/15	2	Community	Engagement	Age Friendly Grant - establishment of program	MK, HW	Preliminary open house scheduled; invite issued by ePost and ad-mail flyer, postings. Weekly program to be running by April. Preliminary programming being researched.
Feb. 2015	Mar. 2015	2	Government	Admin	Regional Context Statement	MK	Preliminary work forwarded to Metro to establish if it will suffice as a "work around" statement, prior to involving consultant.
Feb. 2015	March 28/2015	2	Community	Grants	CCR official opening event	MK, HW	Scheduled for March 28th, working with Cllr. Waterson to establish speakers, event details. This initiative is required under the grant funding agreement. Save the dates sent to provincial and federal stakeholders.
17/Feb/14	31/Mar/14	2	Government	Bylaws	Council Procedure Bylaw	MK	Researching procedure bylaw template recommended by Ministry; reviewing provisions of template in conjunction with our new draft. Comments/recommendations to be provided to Cllr. Hughes for review committee.
Pre-CAO		3	infrastructure	Grants	CCR Project	MK	Accessibility walkway work has commenced; anticipated completion 3-4 weeks. Deficiencies currently being addressed; expected to be completed first week of March. Sourcing for outside storage options underway.
1/Dec/14	Spring 2015	3	Government	Admin	Tree Cutting Application Process	MK	Working with staff to streamline this process so that it is not as administratively cumbersome. Will also speed up turnaround time from application receipt to decision being reached.
1/Jan/15	1/Apr/15	3	infrastructure	Grants	Strategic Wildfire Funding Grant opportunity	MK	Deferred - reviewing existing wildfire plan to establish what, if any, updating might be required to avoid a full re-write. Expected to be incorporated to the overall emergency plan.
1/Jan/15	1/Mar/15	3	Community	Planning	Village survey/census	MK, HW	No change. Work with Cllr. Waterson on delivery of a Village survey/census to assist with goal planning.
1/Feb/15	1/Apr/15	3	Government	Admin	Implement regular OHS meeting schedule to comply with WSBC legislation	MK, NH	Being coordinated with bi-weekly staff meetings.
23/Jan/15	1/Mar/15	3	Government	Insurance	Trail Network Recommendations	MK	Research other Trail Master Plan documents and consider implementation of our own, consider potential select committee to liaise between Council/Trailblazers on an annual workplan policy for trail maintenance and to help with drafting a Trails Master Plan. Meeting scheduled with FLNRO trail operations on March 4 for some additional perspective on best practices.

CAO's Punchlist, report to Mayor & Council							
Start	Deadline	Priority (1 high to 5 low)	Council portfolio	Administrative classification	Task, status and notes (last updated February 25, 2015)	Primary	Update since last report
23/Jan/15	1/Mar/15	3	Government	Insurance	Risk Assessment on beach play areas	MK	Assessment has been requested; to be completed in the next month.

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THE MUNICIPALITY OF THE VILLAGE OF LIONS BAY

Type	Report to Council		
Title	Information Report – Public Works		
Author	N. Hoglund	Reviewed By:	
Date	January 29, 2015	Version	-
Issued for	February 03, 2015 Regular Council Meeting		

1. RECOMMENDATION

THAT Council receive this report for information purposes.

2. ATTACHMENTS

1. Public Works Management workplan as at January 15, 2015

3. BACKGROUND

As per Mayor Buhr's request, the format of the Manager of Public Works' Information Report to Council has been modified in format to a task-list style to provide a broad overview of tasks and functions currently in progress, with status updates noted. Attachment 1 is by no means a comprehensive list of active tasks, but instead a high-level overview of key tasks that must be completed in addition to the myriad of activities that are generated during the day-to-day operational oversight of the Public Works department.

4. DISCUSSION

I would be pleased to discuss the information or provide clarification on the information contained herein.

For Council's consideration.

Start	Deadline	Priority (1 high to 5 low)	Portfolio	Administrative Classification	Task, Status and Notes (as at February 26, 2015)	Primary	Other
6-Aug-14	18-Feb-15	1	Infrastructure	Grants	Build Canada Grant application recommendation report written and presented to Council. Direction from previous Council received Sept 2. Direction from new Council received Dec 16. COMPLETE (Feb 13)	NH	MK
5-Jan-15	31-Mar-15	2	Infrastructure	Regulatory	Water Quality Report - must be written and submitted to VCH by EOM March	NH	
5-Jan-15	28-Feb-15	1	Finance	Finance	Water and Sewer Rates to be established by EOM February. Preliminary rates completed in conjunction with HS. COMPLETE	HS	NH
24-Jul-14	mid-March	2	Finance	Finance	2015 Operating & Capital Budget - put forward recommendations for both to Council; research options for capital requests; prioritize capital requests and present business cases; new coding requirements for better granularity; recommendations for contingency funding; etc	NH	HS, MK, FC, Council
1-Jul-14	mid-March	2	Government	Administration	Levels of Service for Public Works activities to be presented to Council - currently no clearly defined levels of service exist that have been presented to or endorsed by Council	NH	MK, Council
15-Jul-14		3	Government	Administration	Water restrictions recommendation to be written and presented to Council - currently no water restrictions exist and water supply is limited in summer	NH	MK
16-Dec-14	mid-March	2	Infrastructure	Administration/ Grants	Write RFP for Infrastructure Master Plan; seek grant opportunities to offset cost. Direction from Council from Public Manager's report received Dec 16, 2014 Council meeting. Liaise with Infrastructure Committee	NH	IC, Council
7-Oct-14	31-Jan-15	4	Government	Community	Organics Ban 2015. Recommendations from Public Works Mgr endorsed Oct 7, 2014 Council meeting. Working in conjunction with Ruth Simmons and MK - now secondary role as opposed to lead role. Downgraded priority rating accordingly. No organics plan existed prior to report and recommendations being written. COMPLETE	Ruth Simmons, MK	NH
5-Jan-15	16-Jan-15	1	Government	Administration	Create high-level Public Works annual workplan for 2015; present to Council. First workplan was created July 2014. Ensure newly created (2014) work programs are reflected in the plan. COMPLETE	NH	
10-Dec-14		1	Infrastructure	Infrastructure	Magnesia Intake - next steps. Aerial inspection with Geotechnical Scientist on Dec 11. Report received on Dec 12. Engineering company on-site on December 16 for preliminary assessment and recommendations. Follow-up visit required with construction expert. Heavy rainfall and Christmas prevented timely follow-up in December. Follow-up on-site visit January 7. North Construction onsite January 13 & 14. McRae's onsite January 14. Followup works completed January 15 & 16. Phase 2 works undertaken to prevent intake outfall from causing serious bank erosion - started January 20 with estimated completion first week of February.	NH	MK, Council, IC
20-Nov-14		3	Infrastructure	Infrastructure	Research flow meters and similar to determine actual flows. Determine locations and feasible zones. Add in to newly created (2014) leak detection program.	NH	
15-Oct-14		2	Government	Administration	Get quotations from certified arbourist companies to assess all trees tagged by Village crews as part of the newly created (2014) winter readiness program. Trees tagged October 14-17. Request for Quotations sent Feb 12. Initial quotations received and collated Feb 20. Follow up questions sent Feb 23.	NH	
22-Jul-14		4	Government	Administration	Work with CAO and Finance to create a "preferred vendors" strategy and implementation recommendations to Council - nothing exists at present	NH, MK	
28-Oct-14	28-Feb-15	3	Government	Administration	Work with Geoscientist once 3 - 4 months of quantifiable and verifiable data exists for rainfall amounts at intake locations to revisit and revise the safe working procedures due to unstable terrain upslope - at present they are set to the highest level to ensure Village crews are safe.	NH	Pierre Friele
23-Jun-14		2 & 3	Infrastructure	Infrastructure	2014 Capital Projects - a number of capital projects were endorsed for 2014 that had not been started prior to my arrival. Kelvin Grove Washroom Upgrades, Lions Bay Beach Park Septic System Upgrades, and Road Remediation at Oceanview Gate projects have been completed. SCADA Upgrade, Kelvin Grove Smell Remediation, Oceanview Road Culvert are outstanding. Harvey and Magnesia Intake Road Upgrades and Magnesia PRV Bypass were earmarked for the Build Canada Small Communities grant funding and have been delayed for that process	NH	
22-Oct-14		3	Government	Regulatory	Work with FLNRO/MOTI with regard to levels of service/expectations/roles/responsibilities and Village adherence to Acts and Legislation with regard to Crown Lands, and leases. Various phone conversations/emails in 2014. First face-to-face meeting took place January 14. Meeting with MOTI on Feb 2 re: trees on MOTI ROW	NH, MK	FLNRO, EMBC

Start	Deadline	Priority (1 high to 5 low)	Portfolio	Administrative Classification	Task, Status and Notes (as at February 26, 2015)	Primary	Other
15-Sep-14		4	Government	Administration	Work with CAO, Fire Chief, and Council to create a comprehensive Village parking strategy. Original recommendation report written in September 2014, but was put on hold pending public input	NH, AO, MK	
17-Jul-14		4	Government	Administration	Work with CAO to draft and present to Council various much-needed bylaw updates and new permits (such as road use and business licence)	NH, MK	
7-Jan-15		2	Infrastructure	Administration	work with VCH/ALS to extend testing to include raw water sample at both treatment plants, and sample taken after UV treatment pre-chlorination to show results of UV application. Research and provide information to VCH as a result of a resident complaint to VCH. Research and compile data to provide answers to a number of IC questions with regard to the efficacy of the UV system. VCH followup completed Jan 27. IC audit of water system completed Feb 20.	NH	VCH, IC
6-Aug-14		4	Government	Administration	Research and incorporate "best practices" into all newly defined work programs and track progress - as time permits	NH	
7-Jan-15		3	Infrastructure	Administration	Investigate debris net hazard mitigation strategies for Harvey and Magnesia creeks upstream of both intakes. Preliminary conversations have taken place with EMBC (for endorsement for potential grant funding), installation companies, and the District of North Vancouver	NH	
13-Aug-14		3	Infrastructure	Administration	Research and obtain quotations from CCTV sewer/drainage companies and vendors to ascertain whether equipment should be purchased to inspect drainage and sewer pipe infrastructure in-house or via a contractor	NH	
3-Nov-14		4	Government	Administration	Work with CAO to write and present to Council OR create an RFP for numerous plans that do not currently exist that the Village must have to put forward various grant funding requests. Initial emphasis: watershed management plan, and water conservation plan	NH, MK	
23-Jul-14		4	Infrastructure	Administration	Research cost-effective smell remediation options for the STP and obtain quotations from relevant vendors	NH	
28-Oct-14		4	Infrastructure	Administration	Work with Environment Canada re: weather station/rainfall gauge to be located at the Yard	NH	
3-Jul-14		4	Infrastructure	Administration	Work with MetroVancouver for PSAB contaminated site inventory; and landfill inventory and closure status assessment study - one item remaining	NH	MetroVancouver
3-Jul-14		4	Infrastructure	Administration	Work with MetroVancouver with regard to regional GHG credits/carbon credits	NH	MetroVancouver
12-Feb-15		2	Infrastructure	Administration	Write recommendation report to Council from IC in conjunction with CAO as part of capital budget process	NH, MK	

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THE MUNICIPALITY OF THE VILLAGE OF LIONS BAY

Type	Report to Council		
Title	Drinking Water Quality Annual Report 2014		
Author	N. Hoglund	Reviewed By:	M. Koonts
Date	February 26, 2015	Version	-
Issued for	March 03, 2015 Regular Council Meeting		

1. RECOMMENDATION

THAT Council receive this report for information purposes.

2. ATTACHMENTS

1. Village of Lions Bay Drinking Water Quality Annual Report 2014

3. BACKGROUND

Distribution of high-quality potable water is a key function of the Village of Lions Bay's Public Works Department. The Village is required to meet stringent water quality standards that are reviewed and enforced by Vancouver Coastal Health (VCH). As part of this program, the Village's raw and treated water is tested daily (workdays) by Village crews for turbidity; daily for chlorine residual (treated water); weekly (treated water) for total coliform and E. coli; and twice annually for metals, organics, and chemical composition. The test results are summarized in the attached annual report.

The *Drinking Water Protection Act* outlines requirements for water suppliers in terms of ensuring that the water supplied to their users is potable; and that such water meets any additional requirements established by the *Drinking Water Protection Regulation* or by the water supply system's operating permit, as set by VCH's Environmental Health Officer. VCH, in turn, requires permit holders to conduct testing, provide information, and notify the public on drinking water quality issues. This annual report is one such requirement.

4. DISCUSSION

Considerable rainfall and windstorm events created considerable challenges for the Village in 2014. Heavy rains caused high turbidity in early March. Two separate debris slides in October (affecting Harvey) and December (affecting Magnesia) had the Village's designed water systems under considerable duress. Boil water advisories had to be issued during these events and strict conservation measures had to be implemented in December in an effort to keep any water flowing.

Given the extreme conditions that dramatically affected the Village's water system infrastructure, the results contained within the attached report are a true indicator that Village crews are experienced, knowledgeable, and competent in the effective operation and maintenance of the Village's water supply and distribution system.

I would be pleased to discuss or provide clarification on the information contained herein.

For Council's consideration.



VILLAGE OF LIONS BAY DRINKING WATER QUALITY ANNUAL REPORT

FY 2014

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INTRODUCTION

INTRODUCTION

This report comprises the 2014 Drinking Water Quality Annual Report prepared by the Village of Lions Bay. It provides pertinent information about the Village's drinking water to support the Village's application for its annual Operating Permit, issued by the Medical Health Officer. The purpose of the report is to provide Village water consumers with drinking water sampling test results for 2014, as well as to present background information on Village-specific issues concerning water supply, treatment, and measures being taken to protect and enhance drinking water quality as per requirements under the *Drinking Water Protection Regulation* and the *Drinking Water Protection Act*.

Although the Village is a member of Metro Vancouver, its water supply is not sourced from the Greater Vancouver Water District (GVWD). The Village of Lions Bay owns and operates its own water supply, treatment, and distribution system, and has the water from its system analyzed for the presence of microbiological pathogens (and other indicator organisms), metals, and chlorine residuals by laboratories approved by the Medical Health Officer.

GENERAL DESCRIPTION

GENERAL DESCRIPTION

The Village of Lions Bay supplies potable water to its customers via a waterworks system comprised of 2 intakes located on Harvey and Magnesia Creeks, 2 water treatment plants (which provide UV disinfection and chlorination) located downstream from the respective intakes, 5 storage tanks, 13 PRV stations, and 13 kilometers of water mains. A population of approximately 1,348 is served through 591 service connections.

LICENSES

The Village of Lions Bay held 6 water licenses (5 utilized) in 2014, issued by the Ministry of Environment. Table 1 lists the licenses and quantity of water associated with each.

Table 1. Village Water Licenses

License No	Imperial Quantity	Metric Quantity	Stream Name
C059405	10,000,000.00 gal/year	45,460.90000 m3/year	Magnesia Creek
C065267	4,380,000.00 gal/year	19,911.87420 m3/year	Magnesia Creek
C065316	7,300,000.00 gal/year	33,186.45700 m3/year	Magnesia Creek
C042330	18,250,000.00 gal/year	82,966.14250 m3/year	Alberta Creek *
C119916	9,125,000.00 gal/year	41,483.07125 m3/year	Harvey Creek
C119917	54,750,000.00 gal/year	248,898.42750 m3/year	Harvey Creek

*Alberta Creek is not utilized by the Village

In 2014, 772,300.85 m3 of water was supplied to residents from Magnesia and Harvey creeks. As such, the Village's annual water consumption far exceeded its licenses.

SOURCE WATER

SOURCE WATER

The Village of Lions Bay's watershed areas include Magnesia Creek drainage (421 hectares), Harvey Creek drainage (635 hectares), Alberta Creek drainage (51 hectares), and Rundle Creek drainage (20 hectares). All Village water is drawn from 2 intakes located on Magnesia and Harvey Creeks, and the Village is responsible for water acquisition, supply, treatment, and distribution to its residents.

The Village is systematically working toward a "4-barrier" approach to mitigate source water quality issues that include the potential for waterborne disease, seasonal raw water turbidity fluctuations, and bacterial regrowth in its distribution system. The barriers are as follows: primary (UV) and secondary (chlorine) treatment, water quality monitoring (daily, weekly, and monthly), water main cleaning/flushing (bi-annually), and watershed protection (in progress).

ISSUES

Adequate supply for both residential consumption and fire protection is the primary issue for the Village, as both creek flow levels vary throughout the year. Harvey Creek flow levels are the more volatile of the two, ranging from 1564.5 gallons per minute (January 13 to 323.2 gallons per minute (September 16) in 2014. Conversely, Magnesia Creek flow levels averaged around 218 gallons per minute virtually year-round.

CHALLENGES

The Village draws all of its water from surface sources that are subject to fluctuating turbidity levels, and are designated as unstable terrain upslope. This fluctuation in raw water turbidity presents many challenges for the treatment of the water to ensure that turbidity and chlorine residuals throughout the entire supply system are not adversely affected. The water treatment plants are monitored remotely via a SCADA system, and are checked daily (work days) by crews; each intake is checked at least weekly.

The watershed areas for the intakes are contained by steep, rocky, unstable terrain upslope on one side, and steep flowing creeks subject to debris torrents on the other. Access to the intakes is via narrow gravel roads which are subject to rock fall and tree throw hazards from above. Strict safe working guidelines for unstable terrain upslope prohibit crews from entering the watershed areas and water intakes if rainfall parameters are exceeded. This

SOURCE WATER

prevents crews from being able to investigate decreased water flow or increased raw water turbidity levels during periods of heavy rain – the exact times most likely to cause either event.

Considerable rainfall and windstorm events have created further challenges for the Village. In late 2014, two separate debris slides in October (affecting Harvey) and December (affecting Magnesia) effectively shut down the respective intakes completely, necessitating boil water advisories to be issued, and strict conservation measures to be undertaken in an effort to ensure the Village did not run out of water completely in December.

TESTING & RESULTS

The Village tests raw source water for turbidity from both creeks daily (work days). More extensive testing is undertaken bi-annually for general water chemistry, hardness, metals, and other contaminants including organic compounds. Table 2 presents the Village's raw water turbidity test results for 2014.

Table 2. 2014 Raw Water Turbidity Results

	Harvey Creek	Magnesia Creek
Count	231	239
Maximum result (NTU)	2.70	9.64
Minimum result (NTU)	0.13	0.15
Average (NTU)	0.54	0.49
Number >5 NTU	0	2
Percentage > 5 NTU	0%	0.84%

Section 3.3 of the 2003 Guidelines for Canadian Drinking Water Quality Supporting Documentation titled "Turbidity, Criteria for Exclusion of Filtration in Waterworks Systems" contains a provision for exemption from its recommendation of filtration for all surface water supplies if the system's average daily source water turbidity levels measured immediately prior to where disinfection is applied, are around 1.0 NTU but do not exceed 5.0 NTU for more than 2 days in a 12-month period. As indicated in Table 1, raw water

SOURCE WATER

turbidity did not exceed 5 NTUs from Harvey Creek during the year, and exceeded 5 NTUs twice from Magnesia.

Elevated turbidity levels caused by debris slides and stream scouring upslope of the Village's intakes resulted in 3 separate boil water advisories issued by Vancouver Coastal Health in 2014. Boil water advisories were in effect for the following timeframes:

- Issued March 6; lifted March 13
- Issued October 22; lifted November 13
- Issued December 11; lifted December 29

Appendix B contains all source raw water test results for 2014, and Appendix E contains copies of all boil water advisories issued in 2014.

The Village further tests twice a year for metals and general chemistry of its treated and raw water, including hardness, pH, total suspended solids, turbidity, alkalinity, organic carbon, biochemical oxygen demand (BOD), and trihalomethanes. Appendix D contains the 2014 raw water metals and general chemistry test results.

WATER TREATMENT

WATER TREATMENT

The Village of Lions bay does not have a filtration system. Raw water from Harvey and Magnesia Creek intakes is treated via a 2-stage process within their respective treatment plants – the primary stage is disinfection utilizing ultraviolet radiation (UV), and the secondary stage is chlorine injection. This 2-stage process is required because although UV is very effective at inactivating *Giardia* and *Cryptosporidium*, it does not introduce any disinfectant residual to the water, rendering it incapable of protecting the distribution system against contamination. Therefore, chlorination is used as the secondary stage of disinfection in order to establish a residual throughout the system.

The Village tests samples which are taken daily (workdays) for turbidity and chlorine residuals from 6 sampling stations located in the middle and ends of the distribution system, in addition to those taken from the 2 reservoir tanks located at the treatment plants. Once a week, further samples are taken from the 2 reservoir tanks and sent to a Vancouver Coastal Health approved testing laboratory and tested for E. coli and total coliforms.

The *Drinking Water Protection Regulation's* water quality standards for potable water indicate that there can be no detectable E. coli per 100ml; and that total coliform bacteria samples (for more than 1 sample taken per month) must have at least 90% of samples with no detectable total coliform bacteria per 100ml and no 1 sample can have more than 10 total coliform bacteria per 100ml. No test samples taken weekly from the Village's 2 reservoir tanks exceeded these parameters in 2014.

CHALLENGES & TURBIDITY EVENT RESPONSE

The challenges outlined in the Source Water Section of this report also impact the Village's water treatment plants. The performance of the primary UV treatment is affected by increased turbidity because water that has higher turbidity absorbs a significant amount of UV light, and will therefore have a correspondingly low UV transmittance (UVT) rate. The UV system automatically increases lamp intensity to counter the lower UVT. If turbidity exceeds 5 NTUs entering the plants, the UV system will send an alarm through SCADA to notify the Water Operator, and the UV reactor shuts down. During turbidity events in excess of 5 NTU, microbiological sampling and testing is increased at all sampling locations; chlorine residual sampling and testing is likewise increased; and the Village will

WATER TREATMENT

contact Vancouver Coastal Health, who may issue a Boil Water Advisory. Appendix F contains the Village's Emergency Response Plan.

In times of severe weather, the Water Operator increases the frequency of testing and adjusts chlorine injection rates to compensate for any fluctuating chlorine demand caused by varying turbidity levels. As chlorine residual levels increase, so do resident complaints about taste and/or odor, especially at the beginning of the distribution system. The generally agreed minimum acceptable residual chlorine level for treated drinking water at all points in the distribution system is 0.2ppm; and the maximum is 4ppm.

TESTING & RESULTS

Table 3 presents an overview of the Village's treated water turbidity results at Harvey and Magnesia reservoir storage tanks located directly downstream of their respective treatment plants. Table 4 presents an overview of the chlorine residuals at the same reservoir storage tanks. Appendix C contains 3-year comparison graphs of turbidity and chlorine residual test results.

Table 3. 2014 Village Treated Water Turbidity at Reservoir Tanks

	Harvey reservoir tank	Magnesia reservoir tank
Count	253	250
Maximum NTU	3.71	3.95
Minimum NTU	0.10	0.13
Average NTU	0.57	0.52
Number >5 NTU	0	0
Percentage >5 NTU	0%	0%

Table 4. 2014 Village Chlorine Residuals at Reservoir Tanks

	Harvey reservoir tank	Magnesia reservoir tank
Count	253	251
Maximum ppm	1.38	1.75
Minimum ppm	0.13	0.03
Average ppm	0.83	0.91
Number <0.2 ppm	2	1
Percentage <0.2 ppm	0.79%	0.40%

DISTRIBUTION SYSTEM

DISTRIBUTION SYSTEM

The Village of Lions Bay's distribution system serves a population of approximately 1,348 residents accounting for essentially 100% of the Village's annual water consumption. As the Village is located on a mountainside, water pressure within the Village's 13km of water mains is controlled by 13 PRV stations; 7 of which are located on the Harvey Creek supplied system, and 6 on the Magnesia Creek supplied system. These mains are constructed primarily of ductile iron (DI), however a variety of materials, including asbestos cement (AC), cast iron (CI), and PVC also exist within the Village. The oldest pipes in the Village's distribution system were installed between 1970 and 1971.

There are 8 storage tanks located on the system, 5 of which were in use in 2014. The 5 in use were Harvey reservoir tank (400,000 imperial gallon), Magnesia reservoir tank (100,000 imperial gallon), Phase 4 tank (20,000 imperial gallon), Phase 5 tank (25,000 imperial gallon), and the Highway tank (21,000 imperial gallon).

In 2014, 772,300.85 m³ of water was supplied to the Village from Magnesia and Harvey creeks through 591 service connections. This equates to a rough average of 465,400 imperial gallons consumed by the Village per day.

TESTING & RESULTS

The Village tests samples which are taken daily (workdays) for turbidity and chlorine residuals from 6 sampling stations located in the middle and ends of the distribution system, in addition to those taken from the 2 reservoir tanks located at the treatment plants, to ensure all meet the generally accepted minimum residual of 0.2ppm for chlorine residual and are less than 5 NTU for turbidity. Once a week, further samples are sent to a Vancouver Coastal Health approved testing laboratory and tested for E. coli and total coliforms.

The *Drinking Water Protection Regulation's* water quality standards for potable water indicate that there can be no detectable E. coli per 100ml; and that total coliform bacteria samples (for more than 1 sample taken per month) must have at least 90% of samples with no detectable total coliform bacteria per 100ml and no 1 sample can have more than 10 total coliform bacteria per 100ml. No test sample results taken weekly from the Village's distribution and storage system exceeded these parameters in 2014.

DISTRIBUTION SYSTEM

Table 5 presents an overview of the Village's treated water turbidity results on the Harvey system and Table 6 presents the same overview on the Magnesia system. Tables 7 and 8 present an overview of the Village's chlorine residual results on the Harvey and Magnesia distribution systems respectively. Appendix A lists all sample site locations, the tests performed, and the frequency of testing at each. Appendix B contains all Village treated water test results for 2014.

Table 5. 2014 Turbidity Results in Harvey Distribution System

	PRV-3	CAFÉ	LIONS BAY AVE	KELVIN GROVE
Count	253	252	252	253
Maximum NTU	2.99	8.84	5.49	4.94
Minimum NTU	0.11	0.10	0.10	0.10
Average NTU	0.47	0.40	0.30	0.32
Number >5 NTU	0	2	1	0
Percentage >5 NTU	0%	0.79%	0.40%	0%

Table 6. 2014 Turbidity Results in Magnesia Distribution System

	PRV-5	BRUNSWICK BEACH
Count	253	253
Maximum NTU	5.34	4.23
Minimum NTU	0.12	0.13
Average NTU	0.49	0.35
Number >5 NTU	1	0
Percentage >5 NTU	0.40%	0%

As indicated in Tables 5 and 6 above, the Village's treated water turbidity on both distribution systems was on average less than ½ of 1 NTU; and was in excess of 5 NTU in less than 1% of any samples taken in 2014.

Table 7. 2014 Chlorine Residual Results in Harvey Distribution System

	PRV-3	CAFÉ	LIONS BAY AVE	KELVIN GROVE
Count	253	252	252	253
Maximum ppm	1.72	1.41	1.15	1.23

DISTRIBUTION SYSTEM

Minimum ppm	0.31	0.23	0.18	0.08
Average ppm	0.87	0.75	0.68	0.63
Number >0.2 ppm	0	0	1	1
Percentage >0.2 ppm	0%	0%	0.40%	0.40%

Table 8. 2014 Chlorine Residual Results in Magnesia Distribution System

	PRV-5	BRUNSWICK BEACH
Count	253	253
Maximum ppm	1.71	1.47
Minimum ppm	0.35	0.01
Average ppm	0.93	0.61
Number >0.2 ppm	0	2
Percentage >0.2 ppm	0%	0.79%

As indicated in Tables 7 and 8 above, the Village's treated water chlorine residuals on both distribution systems was on average less than 1 ppm; and was below 0.2 ppm in less than 1% of any samples taken in 2014. As indicated in the Water Treatment Section of this report, the Water Operator adjusts chlorine injection rates to compensate for any fluctuating chlorine demand caused by varying turbidity levels, and must ensure that all points in the system show minimum residuals. The generally agreed minimum acceptable residual chlorine level for treated drinking water at all points in the distribution system is 0.2ppm; the maximum is 4ppm.

Appendix C contains 3-year comparison graphs of turbidity and chlorine residual test results.

The Village further tests 10 locations twice a year for metals and general chemistry of its treated and raw water, including hardness, pH, total suspended solids, turbidity, alkalinity, organic carbon, biochemical oxygen demand (BOD), and trihalomethanes. First draw test results from samples taken in March for lead exceeded the limits set in the *Guidelines for Canadian Drinking Water Quality* of a maximum acceptable concentration of 0.010 mg/L measured at the tap in 3 locations – at the Works Yard, at the elementary school, and at the Village Community Centre. Given that lead test results have been consistently low in the distribution system, the most likely sources of lead found in these locations would be from lead in the private-side service lines, lead solder in plumbing, or brass fittings such as

DISTRIBUTION SYSTEM

faucets. All 3 locations tested well below the acceptable limit after flushing. In October, the Works Yard location's first draw test was above the acceptable limit; it again tested well below the acceptable limit after flushing. Appendix D contains metals and general chemistry test results for 2014.

WORK PROGRAM - 2014

The Village performed a Village-wide soft water main flush in 2014; however the scheduled hard water main flush scheduled for October did not take place due to a combination of low creek flows and debris slides that impacted critical infrastructure at first one, then the other water intake. No capital water main replacement work was scheduled for 2014. Several capital projects scheduled for 2014 were put forward for potential grant funding, and are now itemized in 2015's work program below.

WORK PROGRAM - 2015

Village-wide hard water main flushing programs are scheduled for April and October of 2015. The Village will also commission an overall Infrastructure Master Plan, of which the Village's water infrastructure is a key component, in 2015. It is anticipated that this plan will identify and recommend future required capital improvements and policies, ranked by priority, to ensure that the water system as a whole is efficiently managed and responsibly operated.

The Village has applied for improvements to both Harvey and Magnesia water intakes via the New Build Canada Fund: Small Communities Fund (NBCF-SCF). These improvements include the following: an new infiltration intake design to be retrofitted to the existing Magnesia and Harvey Creek intakes to mitigate the impact of sediment debris that enters the system and reduces the amount of time staff must spend at the intake itself to manually clean out debris; installation of a PRV upstream of the Magnesia water treatment plant to mitigate infrastructure and safety concerns for staff working on or near this main and in the treatment plant; and the installation of a bypass at the Magnesia water treatment plant to ensure that regular maintenance or emergency work to the water plant can be undertaken without shutting down the entire supply system.

OPERATOR TRAINING

OPERATOR TRAINING

The *BC Drinking Water Protection Regulation* outlines water system operator qualification standards. Water systems are classified by the Environmental Operators Certification Program (EOCP), based on the population served and the complexity of the system. The chief “operator(s)” of the system must, in turn, be certified by the EOCP at the matching classification level of the system. The Village’s water treatment and distribution system has been evaluated as a “Level 2” classification. The Village currently has one water distribution system operator (Alberto Urrutia) with Level 2 certification from the EOCP.

The Village recognizes the inherent value that operator education training and education provides; and ensures that its operator participates annually in a variety of product orientation, workshops, and technical courses that become available annually. In 2014, the courses undertaken to maintain the year’s mandatory Continuing Education Units (CEUs) were Reservoir Maintenance, Unidirectional Flushing, Transportation of Dangerous Goods, and Confined Space Awareness Entrant Training.

Appendices H and I respectively contain the Village’s EOCP facility classification and operator certification.

APPENDIX A: WATER QUALITY SAMPLING SITE LOCATIONS AND TEST FREQUENCY

SAMPLE STATIONS AND TESTS

SAMPLE STATIONS AND TESTS

Tests	Location	Source	Frequency
Chlorine Residual & Turbidity (Treated Water)	PRV-3	Harvey Creek	Daily (workdays)
	Harvey Reservoir Tank	Harvey Creek	Daily (workdays)
	Lions Bay Café	Harvey Creek	Daily (workdays)
	Lions Bay Avenue	Harvey Creek	Daily (workdays)
	Kelvin Grove	Harvey Creek	Daily (workdays)
	PRV-5	Magnesia Creek	Daily (workdays)
	Magnesia Reservoir Tank	Magnesia Creek	Daily (workdays)
	Brunswick Beach	Magnesia Creek	Daily (workdays)

Test	Location	Source	Frequency
Raw Water Turbidity	Harvey Intake	Harvey Creek	Daily (workdays)
	Magnesia Intake	Magnesia Creek	Daily (workdays)

Tests	Location	Source	Frequency
Treated Water Bacteriological (E. coli & total coliforms)	PRV-3	Harvey Creek	weekly
	Harvey Reservoir Tank	Harvey Creek	weekly
	Lions Bay Café	Harvey Creek	weekly
	Lions Bay Avenue	Harvey Creek	weekly
	Kelvin Grove	Harvey Creek	weekly
	PRV-5	Magnesia Creek	weekly
	Magnesia Reservoir Tank	Magnesia Creek	weekly
	Brunswick Beach	Magnesia Creek	weekly

Test	Location	Source	Frequency
Raw Water Turbidity	Harvey Intake	Harvey Creek	Daily (workdays)
	Magnesia Intake	Magnesia Creek	Daily (workdays)

SAMPLE STATIONS AND TESTS

Tests	Location	Source	Frequency
Treated Water Metals & Chemical Composition	PRV-3	Harvey Creek	2x annually
	Harvey Reservoir Tank	Harvey Creek	2x annually
	Lions Bay Café	Harvey Creek	2x annually
	Lions Bay Avenue	Harvey Creek	2x annually
	Kelvin Grove	Harvey Creek	2x annually
	Community Centre	Harvey Creek	2x annually
	Magnesia Reservoir Tank	Magnesia Creek	2x annually
	Brunswick Beach	Magnesia Creek	2x annually
	Elementary School	Magnesia Creek	2x annually
	PRV-5	Magnesia Creek	2x annually

Test	Location	Source	Frequency
Raw Water Metals & Chemical Composition	Harvey Intake	Harvey Creek	2x annually
	Magnesia Intake	Magnesia Creek	2x annually

APPENDIX B: SOURCE & DISTRIBUTION WATER TESTING RESULTS

	RAW WATER JANUARY 2014					
	HARVEY CREEK			MAGNESIA CREEK		
Date	Time	24 Hr Flow	NTU	Time	24 Hr Flow	NTU
1						
2			0.76			0.24
3			0.24			0.36
4						
5						
6			0.28			0.20
7			0.25			0.21
8			0.23			0.34
9			0.21			0.28
10			0.13			0.21
11						
12						
13			0.21			0.21
14			0.20			0.28
15			0.28			0.31
16			0.25			0.53
17			0.25			0.18
18						
19						
20			0.79			0.23
21			0.27			0.29
22			0.18			0.35
23			0.27			0.29
24			0.20			0.25
25						
26						
27			0.42			0.19
28			0.32			0.17
29			0.20			0.18
30			0.35			0.26
31			0.25			0.21

	RAW WATER FEBRUARY 2014					
	HARVEY CREEK			MAGNESIA CREEK		
Date	Time	24 Hr Flow	NTU	Time	24 Hr Flow	NTU
1						
2						
3			0.46			0.17
4			0.32			0.20
5			0.27			0.24
6			0.15			0.20
7			0.28			0.16
8						
9						
10						
11			0.59			0.30
12			0.51			0.23
13			0.31			0.32
14			0.54			0.57
15						
16						
17			0.27			0.35
18			0.35			0.22
19			0.42			0.30
20			0.15			0.18
21			0.13			0.15
22						
23						
24			0.31			0.23
25			0.20			0.23
26			0.20			0.19
27			0.19			0.26
28			0.23			0.23
29						

	RAW WATER MARCH 2014					
	HARVEY CREEK			MAGNESIA CREEK		
Date	Time	24 Hr Flow	NTU	Time	24 Hr Flow	NTU
1						
2						
3			0.63			0.42
4			0.40			0.31
5			0.72			0.27
6			1.37			1.45
7			1.77			0.97
8						
9			0.55			0.77
10			0.34			0.52
11			0.46			0.44
12			0.38			0.28
13			0.35			0.23
14			0.54			0.35
15						
16						
17			0.17			0.28
18			0.24			0.45
19			0.28			0.37
20			0.21			0.48
21			0.29			0.31
22						
23						
24			0.44			0.20
25			0.74			0.44
26			0.25			1.60
27			0.47			0.34
28			0.53			0.47
29						
30						
31			0.41			0.98

	RAW WATER APRIL 2014					
	HARVEY CREEK			MAGNESIA CREEK		
Date	Time	24 Hr Flow	NTU	Time	24 Hr Flow	NTU
1			0.65			0.67
2			0.19			0.36
3			0.49			0.25
4			0.30			0.25
5						
6						
7			2.09			0.26
8			0.54			0.45
9			0.34			0.26
10			0.24			0.40
11			0.24			0.24
12						
13						
14			0.41			0.20
15			0.26			0.18
16			0.26			0.28
17			0.57			0.37
18						
19			0.66			0.30
20						
21						
22			0.22			0.62
23			0.23			0.63
24			0.31			0.23
25			0.27			0.37
26						
27						
28			0.39			0.31
29			0.19			0.20
30			0.29			0.75

	RAW WATER MAY 2014					
	HARVEY CREEK			MAGNESIA CREEK		
Date	Time	24 Hr Flow	NTU	Time	24 Hr Flow	NTU
1			0.31			0.43
2			0.40			0.64
3						
4						
5			0.43			0.44
6			0.34			0.35
7			0.45			0.46
8			0.58			0.62
9			0.46			0.71
10						
11						
12			0.22			0.31
13			0.24			0.35
14			1.17			0.76
15			0.37			0.57
16			0.66			0.87
17						
18						
19						
20			0.52			0.26
21			0.51			0.38
22			0.39			0.31
23			0.86			1.18
24						
25						
26			0.60			0.36
27			0.33			0.37
28			0.27			0.57
29			0.85			0.68
30			0.54			0.57
31						

	RAW WATER JUNE 2014					
	HARVEY CREEK			MAGNESIA CREEK		
Date	Time	24 Hr Flow	NTU	Time	24 Hr Flow	NTU
1						
2			0.93			0.46
3			0.36			0.80
4			0.27			0.33
5			0.27			0.42
6			0.68			0.66
7						
8						
9			0.58			0.27
10			0.87			0.33
11			0.35			0.46
12			0.40			0.43
13			0.24			0.49
14						
15						
16			0.28			0.22
17			0.40			0.24
18			0.29			0.27
19			0.28			0.34
20			0.47			0.49
21						
22						
23			0.16			0.22
24			0.19			0.18
25			0.15			0.31
26			0.18			0.28
27			0.29			0.24
28						
29						
30			0.14			0.22

	RAW WATER JULY 2014					
	HARVEY CREEK			MAGNESIA CREEK		
Date	Time	24 Hr Flow	NTU	Time	24 Hr Flow	NTU
1						
2			0.15			0.21
3			0.16			0.19
4			0.23			0.16
5						
6						
7			0.14			0.21
8			0.37			0.28
9			0.31			0.22
10			0.20			0.25
11			0.23			0.19
12						
13						
14			0.72			0.37
15			0.45			0.25
16			0.24			0.16
17			0.36			0.16
18			0.38			0.23
19						
20						
21			1.04			0.18
22			0.65			0.23
23			0.43			0.18
24			0.46			0.52
25			0.44			0.45
26						
27						
28			0.55			0.22
29			0.28			0.24
30			0.29			0.25
31			0.37			0.32

	RAW WATER AUGUST 2014					
	HARVEY CREEK			MAGNESIA CREEK		
Date	Time	24 Hr Flow	NTU	Time	24 Hr Flow	NTU
1			0.24			0.43
2						
3						
4						
5			1.16			0.16
6			0.39			0.24
7			0.30			0.36
8			0.38			0.41
9						
10						
11			1.25			0.20
12			0.64			0.21
13			0.40			0.33
14			0.45			0.23
15			0.45			0.30
16						
17						
18			1.19			0.23
19			0.64			0.21
20			0.58			0.29
21			0.51			0.20
22			0.64			0.15
23						
24						
25			1.63			0.26
26			0.38			0.32
27			0.77			0.84
28			0.62			0.19
29			0.81			0.19
30						
31						

	RAW WATER SEPTEMBER 2014					
	HARVEY CREEK			MAGNESIA CREEK		
Date	Time	24 Hr Flow	NTU	Time	24 Hr Flow	NTU
1						
2			1.44			0.21
3			0.70			0.21
4			0.61			0.33
5			0.58			0.43
6						
7						
8			1.24			0.20
9			0.65			0.21
10			0.63			0.15
11			0.55			2.33
12			0.71			0.48
13						
14						
15			1.18			0.30
16			0.81			0.19
17			1.06			0.39
18			0.97			0.24
19			0.80			0.22
20						
21						
22			1.86			0.21
23			0.71			0.29
24			1.22			4.84
25			0.23			0.67
26			2.38			5.37
27						
28						
29			0.23			0.26
30			0.25			0.23

	RAW WATER OCTOBER 2014					
	HARVEY CREEK			MAGNESIA CREEK		
Date	Time	24 Hr Flow	NTU	Time	24 Hr Flow	NTU
1			0.22			0.18
2			0.32			0.21
3			0.43			0.16
4						
5						
6			0.60			0.90
7			0.35			0.49
8			0.26			0.29
9			0.46			0.36
10			0.38			0.16
11						
12						
13						
14			1.36			0.51
15			0.90			0.28
16			0.95			0.45
17			0.45			0.36
18						
19						
20			0.67			0.34
21			0.49			0.39
22			N/A			9.64
23			N/A			1.90
24			N/A			1.28
25						
26						
27			N/A			0.77
28			N/A			1.72
29			N/A			1.53
30			N/A			0.52
31			N/A			0.82

	RAW WATER NOVEMBER 2014					
	HARVEY CREEK			MAGNESIA CREEK		
Date	Time	24 Hr Flow	NTU	Time	24 Hr Flow	NTU
1						
2						
3			N/A			0.54
4			N/A			0.73
5			N/A			0.39
6			N/A			2.19
7			N/A			1.03
8						
9						
10			N/A			0.26
11			N/A			0.40
12			N/A			0.23
13			N/A			0.17
14			N/A			0.17
15						
16						
17			N/A			0.16
18			N/A			0.30
19			N/A			0.19
20			2.05			0.36
21			0.72			0.17
22						
23						
24			1.20			0.21
25			0.41			0.33
26			0.63			0.46
27			1.41			0.59
28			0.57			0.60
29						
30						

	RAW WATER DECEMBER 2014					
	HARVEY CREEK			MAGNESIA CREEK		
Date	Time	24 Hr Flow	NTU	Time	24 Hr Flow	NTU
1			0.29			0.27
2			0.52			0.24
3			0.70			0.23
4			0.80			0.31
5			0.71			0.28
6						
7						
8			1.47			0.21
9			2.70			3.00
10			2.20			2.30
11			N/A			N/A
12			1.10			N/A
13						
14						
15			0.88			N/A
16			0.47			N/A
17			1.07			N/A
18			0.62			N/A
19			0.61			N/A
20						
21						
22			0.58			N/A
23			0.42			N/A
24			0.35			N/A
25						
26						
27			0.55			N/A
28						
29			0.71			N/A
30			0.15			N/A
31			0.16			N/A

	TREATED WATER JANUARY 2014															
	HARVEY										MAGNESIA					
	400 HAR. TANK		PRV-3		STORE/CAFÉ		LIONS BAY AVE.		KELVIN GROVE		100 MAG. TANK		PRV-5		BRUNSWICK B.	
	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)
1																
2	0.14	0.92	0.32	0.90	0.18	0.69	0.30	0.78	0.18	0.57	0.25	0.91	0.22	0.88	0.30	0.55
3	0.37	0.79	0.51	0.76	0.31	0.57	0.37	0.69	0.26	0.60	0.54	0.78	0.52	0.78	0.30	0.66
4																
5																
6	0.21	0.92	0.15	0.90	0.25	0.72	0.19	0.73	0.37	0.69	0.30	0.90	0.55	0.85	0.40	0.46
7	0.21	0.95	0.53	0.94	0.24	0.75	0.15	0.80	0.14	0.65	0.21	0.90	0.33	0.88	0.27	0.48
8	0.17	0.90	0.34	0.88	0.23	0.77	0.33	0.81	0.40	0.68	0.17	0.93	0.47	0.91	0.36	0.56
9	0.36	0.63	0.28	0.60	0.36	0.56	0.27	0.69	0.19	0.66	0.57	0.78	0.56	0.75	0.37	0.62
10	0.21	0.67	0.23	0.64	0.36	0.49	0.23	0.46	0.15	0.25	0.30	0.91	0.43	0.81	0.20	0.66
11																
12																
13	0.31	0.95	0.27	0.93	0.29	0.80	0.24	0.71	0.34	0.53	0.45	0.87	0.72	0.86	0.28	0.53
14	0.46	1.04	0.51	1.01	0.42	0.80	0.38	0.82	0.16	0.58	0.38	0.92	0.29	0.89	0.71	0.39
15	0.34	0.95	0.91	0.93	0.38	0.76	0.51	0.86	0.35	0.61	0.33	0.92	0.46	0.89	0.61	0.47
16	0.68	1.00	0.40	0.98	0.26	0.81	0.32	0.86	0.46	0.84	1.35	0.95	0.33	0.92	0.42	0.52
17	0.28	0.95	0.40	0.92	0.52	0.77	0.19	0.86	0.26	0.69	0.38	0.82	0.31	0.87	0.34	0.55
18																
19																
20	0.23	0.92	0.41	0.90	0.25	0.72	0.18	0.79	0.51	0.62	0.20	0.85	0.22	0.84	0.31	0.57
21	0.75	0.95	0.39	0.93	0.71	0.77	0.34	0.84	0.30	0.82	0.17	0.95	0.27	0.81	0.30	0.61
22	0.81	0.96	0.22	0.94	0.36	0.74	0.22	0.82	0.13	0.83	0.33	0.85	0.23	0.81	0.20	0.60
23	0.27	1.02	0.91	0.99	0.30	0.76	0.32	0.86	0.35	0.69	0.29	0.85	0.44	0.86	0.39	0.53
24	0.36	0.94	0.49	0.91	0.32	0.77	0.25	0.83	0.37	0.66	0.25	0.82	0.23	0.81	0.28	0.54
25																
26																
27	0.42	0.83	0.30	0.80	0.23	0.64	0.25	0.63	0.18	0.56	0.25	0.79	0.27	0.76	0.29	0.56
28	0.39	0.81	0.27	0.79	0.22	0.68	0.16	0.60	0.14	0.56	0.30	0.84	0.19	0.80	0.22	0.52
29	0.54	0.81	0.39	0.79	0.34	0.66	0.30	0.62	0.19	0.55	0.38	0.83	0.19	0.83	0.30	0.52
30	0.40	0.76	0.25	0.74	0.27	0.62	0.23	0.62	0.13	0.55	0.66	0.81	0.49	0.79	0.30	0.53
31	0.53	0.80	0.40	0.79	0.31	0.63	0.21	0.60	0.28	0.48	0.29	0.82	0.35	0.84	0.49	0.51

	TREATED WATER FEBRUARY 2014															
	HARVEY										MAGNESIA					
	400 HAR. TANK		PRV-3		STORE/CAFÉ		LIONS BAY AVE.		KELVIN GROVE		100 MAG. TANK		PRV-5		BRUNSWICK B.	
	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)
1																
2																
3	0.30	0.82	0.24	0.79	0.17	0.68	0.14	0.68	0.17	0.57	0.19	0.90	0.18	0.87	0.37	0.67
4	0.49	0.95	0.53	0.93	0.25	0.67	0.19	0.66	0.15	0.61	0.33	0.88	0.15	0.86	0.42	0.69
5	0.30	0.88	0.39	0.86	0.33	0.88	0.36	0.67	0.37	0.73	0.45	0.87	0.58	0.90	0.31	0.67
6	0.28	0.94	0.37	0.92	0.23	0.71	0.16	0.67	0.16	0.65	0.33	1.06	0.46	0.96	0.28	0.67
7	0.28	0.91	0.47	0.87	0.35	0.71	0.21	0.73	0.31	0.74	0.18	1.11	0.45	0.99	0.43	0.69
8																
9																
10																
11	0.51	1.11	0.26	1.08	0.82	0.93	N/A	N/A	0.30	0.83	N/A	N/A	0.20	1.05	0.43	0.86
12	0.68	0.90	0.86	0.87	0.21	0.85	0.70	0.95	0.46	0.90	N/A	N/A	0.35	1.01	0.22	0.88
13	0.53	0.65	0.54	0.62	0.70	0.67	0.21	0.85	0.21	0.71	0.81	1.00	0.33	0.95	0.27	0.85
14	0.31	0.68	0.37	0.67	0.26	0.59	0.29	0.56	0.49	0.49	0.56	1.03	0.24	0.99	0.53	0.78
15																
16																
17	0.49	0.73	0.51	0.71	0.43	0.49	0.28	0.43	0.27	0.27	0.52	0.86	0.33	0.89	0.35	0.62
18	0.75	0.81	0.40	0.79	0.34	0.62	0.32	0.38	0.27	0.46	0.28	0.81	0.31	0.80	0.34	0.58
19	0.50	0.87	0.54	0.84	0.31	0.65	0.27	0.46	0.15	0.69	0.26	0.90	0.31	0.81	0.32	0.63
20	0.21	1.02	0.58	1.00	0.67	0.64	0.58	0.58	0.94	0.48	0.33	0.85	0.21	0.83	0.24	0.53
21	0.39	1.06	0.19	1.03	0.16	0.77	0.24	0.73	0.20	0.49	0.28	0.89	0.22	0.88	0.19	0.56
22																
23																
24	0.27	1.16	0.16	1.13	0.48	0.97	0.19	0.88	0.69	0.85	0.17	0.94	0.29	0.95	0.34	0.73
25	0.41	1.09	0.55	1.07	0.26	0.95	0.54	0.82	0.46	0.85	0.22	1.02	0.19	1.00	0.20	0.76
26	0.43	1.09	0.39	1.07	0.41	0.95	0.20	0.94	0.19	0.84	0.31	0.97	0.39	0.93	0.22	0.75
27	0.57	0.90	0.33	0.88	0.48	0.83	0.51	0.87	0.75	0.91	0.46	1.01	0.75	0.91	0.20	0.76
28	0.60	0.71	0.31	0.69	0.25	0.63	0.17	0.78	0.18	0.67	0.27	0.97	0.20	0.94	0.27	0.75

	TREATED WATER MARCH 2014															
	HARVEY										MAGNESIA					
	400 HAR. TANK		PRV-3		STORE/CAFÉ		LIONS BAY AVE.		KELVIN GROVE		100 MAG. TANK		PRV-5		BRUNSWICK B.	
	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)
1																
2																
3	0.57	0.92	0.39	0.90	0.31	0.72	0.15	0.55	0.40	0.68	0.36	0.97	0.17	0.97	0.47	0.70
4	0.40	0.84	0.93	0.82	0.43	0.68	0.38	0.64	0.26	0.67	0.23	0.88	0.32	0.91	0.29	0.75
5	0.36	0.85	0.31	0.82	0.34	0.64	0.29	0.64	0.26	0.53	0.26	0.89	0.29	0.87	0.20	0.72
6	0.64	0.69	0.59	0.68	0.26	0.59	0.21	0.58	0.28	0.57	0.58	0.77	0.54	0.72	0.38	0.70
7	1.01	0.67	1.39	0.71	0.75	0.50	0.23	0.49	0.40	0.28	1.75	1.23	1.74	1.20	0.82	0.62
8																
9	0.78	0.84	1.01	0.81	0.81	0.60	0.74	0.40	1.00	0.35	1.24	0.86	1.25	0.74	1.17	0.35
10	0.92	0.97	0.93	0.95	0.61	0.77	0.58	0.50	0.67	0.53	0.85	0.99	0.94	1.00	0.55	0.74
11	0.85	1.06	1.28	1.04	0.81	0.73	0.47	0.53	0.43	0.63	0.33	1.14	0.39	1.12	0.60	0.50
12	0.51	0.96	0.84	0.99	0.96	0.88	0.37	0.66	0.37	0.71	0.58	1.00	0.57	0.97	0.48	0.51
13	0.70	1.04	0.53	1.02	0.37	0.91	0.36	0.71	0.26	0.80	0.31	0.92	0.29	0.94	0.26	0.76
14	0.61	0.96	0.66	0.94	0.56	0.83	0.43	0.74	0.76	0.84	0.44	0.90	0.48	0.84	0.48	0.69
15																
16																
17	0.16	0.69	0.21	0.65	0.28	0.51	0.15	0.43	0.21	0.43	0.28	0.77	0.21	0.74	0.22	0.53
18	0.73	0.82	0.26	0.79	0.31	0.59	0.25	0.35	0.18	0.43	0.39	0.78	0.22	0.73	0.43	0.49
19	0.75	0.87	0.31	0.84	0.23	0.74	0.42	0.63	0.24	0.70	0.73	0.90	0.28	0.87	0.48	0.47
20	0.23	0.89	0.47	0.86	0.19	0.70	0.21	0.55	0.18	0.57	0.60	0.89	0.24	0.89	0.25	0.47
21	0.26	0.93	0.36	0.90	0.37	0.71	0.25	0.57	0.16	0.69	0.71	0.88	0.72	0.81	0.28	0.51
22																
23																
24	0.33	1.05	0.25	1.00	0.20	0.82	0.16	0.70	0.24	0.82	0.25	1.02	0.44	1.02	0.20	0.60
25	0.42	0.99	0.34	0.96	0.19	0.85	0.17	0.79	0.42	0.92	0.34	0.98	0.22	0.96	0.25	0.72
26	0.56	0.56	0.62	0.58	0.33	0.50	0.21	0.77	0.56	0.70	0.93	0.63	0.71	0.69	0.42	0.79
27	0.92	0.83	0.35	0.80	0.36	0.50	0.32	0.55	0.36	0.41	0.59	0.79	0.47	0.78	0.25	0.70
28	0.99	1.02	0.36	1.00	0.24	0.60	0.36	0.36	0.46	0.56	0.58	0.98	0.85	0.89	0.47	0.43
29																
30																
31	0.46	0.92	0.75	0.88	0.23	0.68	0.24	0.44	0.18	0.51	0.24	0.95	0.30	0.93	0.26	0.56

	TREATED WATER APRIL 2014															
	HARVEY										MAGNESIA					
	400 HAR. TANK		PRV-3		STORE/CAFÉ		LIONS BAY AVE.		KELVIN GROVE		100 MAG. TANK		PRV-5		BRUNSWICK B.	
	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)
1	0.23	0.89	0.25	0.90	0.23	0.71	0.18	0.46	0.29	0.79	0.30	0.97	0.63	0.94	0.33	0.73
2	0.57	1.03	0.36	1.01	0.27	0.90	0.19	0.63	0.27	1.03	0.59	0.98	4.98	0.91	0.42	0.75
3	0.88	1.07	0.43	1.05	0.38	0.80	0.22	0.76	0.23	0.92	0.28	0.99	0.30	0.99	0.22	0.71
4	0.59	0.94	0.47	0.90	0.39	0.78	0.32	0.75	0.37	0.82	0.47	0.89	0.45	0.92	0.37	0.73
5																
6																
7	0.39	0.85	0.41	0.82	0.27	0.66	0.18	0.50	0.30	0.47	0.42	0.87	0.27	0.85	0.19	0.59
8	0.67	0.81	0.82	0.79	0.42	0.68	0.32	0.52	0.43	0.76	0.39	0.87	0.46	0.84	0.46	0.62
9	0.37	0.84	0.49	0.81	0.32	0.58	0.18	0.50	0.67	0.57	0.40	0.84	0.45	0.78	0.25	0.63
10	0.49	0.91	0.36	0.88	0.20	0.63	0.20	0.45	0.18	0.57	0.48	0.89	0.28	0.89	0.27	0.56
11	0.41	0.96	0.63	0.95	0.34	0.70	0.24	0.49	0.26	0.73	0.29	0.93	0.34	0.89	0.30	0.58
12																
13																
14	0.24	0.93	0.47	0.91	0.43	0.79	0.20	0.74	0.37	0.77	0.19	0.92	0.25	0.92	0.22	0.67
15	0.19	0.90	0.24	0.88	0.21	0.72	0.18	0.75	0.22	0.80	0.35	0.88	0.46	0.91	0.20	0.69
16	0.21	0.91	0.68	0.89	0.31	0.72	0.22	0.73	0.18	0.62	0.39	0.93	0.25	0.86	0.41	0.62
17	0.86	0.90	0.61	0.87	0.40	0.68	0.31	0.71	0.34	0.74	0.36	0.83	0.29	0.79	0.35	0.62
18																
19	0.87	0.82	0.48	0.78	0.37	0.52	0.46	0.46	0.41	0.37	0.78	0.78	0.51	0.72	0.42	0.54
20																
21																
22	0.79	0.88	0.19	0.86	0.29	0.63	0.22	0.66	0.16	0.60	0.29	0.84	0.29	0.79	0.31	0.44
23	0.39	0.87	0.21	0.84	0.20	0.67	0.17	0.67	0.23	0.54	0.47	0.93	0.30	0.94	0.27	0.49
24	0.28	0.92	0.41	0.89	0.23	0.72	0.18	0.76	0.47	0.72	0.26	0.91	0.21	0.91	0.30	0.57
25	0.16	0.91	0.24	0.78	0.17	0.69	0.22	0.73	0.31	0.59	0.32	0.97	0.30	1.00	0.21	0.59
26																
27																
28	0.25	0.91	0.17	0.89	0.26	0.74	0.21	0.79	0.21	0.73	0.24	0.92	0.26	0.88	0.28	0.63
29	0.20	0.93	0.23	0.91	0.18	0.77	0.17	0.72	0.19	0.76	0.41	0.88	0.23	0.90	0.49	0.71
30	0.24	0.88	0.24	0.87	0.20	0.75	0.25	0.80	0.18	0.83	0.94	0.97	0.30	0.90	0.24	0.65

	TREATED WATER MAY 2014															
	HARVEY										MAGNESIA					
	400 HAR. TANK		PRV-3		STORE/CAFÉ		LIONS BAY AVE.		KELVIN GROVE		100 MAG. TANK		PRV-5		BRUNSWICK B.	
DATE	Turbidity	CL2 Res.	Turbidity	CL2 Res.	Turbidity	CL2 Res.	Turbidity	CL2 Res.	Turbidity	CL2 Res.	Turbidity	CL2 Res.	Turbidity	CL2 Res.	Turbidity	CL2 Res.
	(NTU)	(ppm)	(NTU)	(ppm)	(NTU)	(ppm)	(NTU)	(ppm)	(NTU)	(ppm)	(NTU)	(ppm)	(NTU)	(ppm)	(NTU)	(ppm)
1	0.32	0.91	0.44	0.88	0.32	0.72	0.21	0.72	0.36	0.72	0.49	0.49	0.35	0.35	0.23	0.23
2	0.83	0.85	0.74	0.84	0.41	0.64	0.25	0.68	0.29	0.68	0.60	0.74	0.71	0.73	0.48	0.62
3																
4																
5	0.42	0.76	0.36	0.75	0.32	0.64	0.27	0.60	0.34	0.55	0.34	0.74	0.37	0.78	0.50	0.31
6	0.31	0.96	0.47	0.95	0.28	0.76	0.25	0.55	0.35	0.73	0.41	0.99	0.31	0.91	0.32	0.32
7	0.25	1.09	0.49	1.06	0.34	0.80	0.26	0.72	0.24	0.81	0.42	1.04	0.52	1.04	0.48	0.38
8	0.94	1.00	0.24	0.98	0.29	0.85	0.23	0.79	0.30	0.83	0.43	0.95	0.28	1.07	0.25	0.61
9	0.75	0.84	0.96	0.82	0.52	0.76	0.23	0.75	0.23	0.78	0.83	0.87	0.61	0.86	0.33	0.68
10																
11																
12	0.15	0.76	0.14	0.83	0.15	0.76	0.17	0.62	0.17	0.58	0.25	0.88	0.20	0.87	0.27	0.38
13	0.21	0.85	0.25	0.87	0.19	0.87	0.17	0.66	0.18	0.64	0.17	0.66	0.27	0.85	0.26	0.53
14	0.71	0.90	0.33	0.87	0.25	0.64	0.28	0.69	0.30	0.76	0.67	0.90	0.39	0.84	0.21	0.54
15	0.28	0.80	0.32	0.79	0.38	0.67	0.51	0.68	0.19	0.70	0.60	0.77	0.56	0.74	0.26	0.53
16	1.39	0.82	0.22	0.80	0.23	0.61	0.37	0.59	0.23	0.54	1.26	0.77	0.50	0.76	0.31	0.46
17																
18																
19																
20	0.31	0.98	0.20	0.95	0.16	0.81	0.17	0.80	0.16	0.76	0.33	0.91	0.29	0.90	0.29	0.57
21	0.43	0.98	0.37	0.96	0.53	0.77	0.42	0.82	0.18	0.73	0.66	0.99	0.35	0.93	0.35	0.62
22	0.30	0.97	0.40	0.94	0.26	0.79	0.21	0.82	0.18	0.77	0.48	1.00	0.42	0.96	0.32	0.58
23	1.17	1.01	0.66	0.98	0.68	0.78	0.33	0.80	0.19	0.69	0.84	0.96	0.56	0.94	0.60	0.73
24																
25																
26	0.23	0.94	0.27	0.92	0.46	0.79	0.25	0.76	0.20	0.62	0.60	0.93	0.51	0.96	0.52	0.28
27	0.31	0.86	0.27	0.84	0.42	0.68	0.23	0.65	0.33	0.58	0.56	0.90	0.41	0.89	0.45	0.47
28	0.30	0.96	0.45	0.95	0.23	0.72	0.20	0.72	0.24	0.61	0.44	0.96	0.37	0.86	0.37	0.55
29	2.58	1.05	0.29	1.04	0.35	0.86	0.21	0.79	0.33	0.71	0.69	0.93	0.69	0.93	4.23	0.64
30	1.42	0.85	0.32	0.83	0.23	0.71	0.20	0.77	0.19	0.74	0.75	0.90	0.41	0.86	1.20	0.50
31																

	TREATED WATER JUNE 2014															
	HARVEY										MAGNESIA					
	400 HAR. TANK		PRV-3		STORE/CAFÉ		LIONS BAY AVE.		KELVIN GROVE		100 MAG. TANK		PRV-5		BRUNSWICK B.	
	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)
1																
2	0.65	0.92	0.23	0.89	0.17	0.76	0.32	0.78	0.23	0.67	0.48	0.87	0.31	0.96	0.29	0.55
3	0.21	0.96	0.26	0.94	0.21	0.75	0.41	0.79	0.16	0.72	0.40	0.94	0.33	0.91	0.32	0.58
4	0.53	0.97	0.48	0.95	0.29	0.76	0.37	0.76	0.19	0.81	0.48	0.94	0.32	0.84	0.25	0.61
5	0.51	0.95	0.90	0.93	0.27	0.86	0.37	0.82	0.16	0.79	0.44	1.00	0.39	0.98	0.30	0.59
6	0.34	0.99	0.29	0.97	0.23	0.82	0.34	0.85	0.20	0.69	0.54	0.99	0.43	0.94	0.38	0.66
7																
8																
9	0.59	0.97	0.21	0.95	0.21	0.77	0.14	0.82	0.17	0.68	0.26	0.97	0.22	0.96	0.38	0.69
10	1.03	0.98	0.27	0.96	0.19	0.76	0.18	0.83	0.22	0.71	0.53	0.96	0.40	0.93	0.32	0.67
11	0.36	0.91	0.28	0.88	0.25	0.76	0.19	0.74	0.16	0.76	0.55	0.96	0.31	0.96	0.26	0.59
12	0.72	0.95	0.43	0.92	0.43	0.81	0.19	0.76	0.15	0.71	0.96	1.02	0.45	0.98	0.24	0.61
13	0.63	0.87	0.29	0.84	0.40	0.76	0.21	0.80	0.38	0.64	0.24	0.98	0.51	0.96	0.20	0.66
14																
15																
16	0.15	0.92	0.20	0.89	0.18	0.73	0.13	0.71	0.12	0.73	0.21	0.98	0.19	0.98	0.30	0.68
17	0.17	0.92	0.17	0.89	0.24	0.82	0.20	0.68	0.16	0.82	0.27	1.04	0.33	0.96	0.47	0.64
18	0.28	0.95	0.36	0.92	0.19	0.76	0.16	0.73	0.13	0.71	0.34	1.01	0.24	0.94	0.27	0.73
19	0.39	0.93	0.53	0.88	0.33	0.77	0.18	0.77	0.19	0.62	0.48	0.98	0.46	1.01	0.22	0.74
20	0.52	0.91	0.30	0.88	0.30	0.77	0.34	0.72	0.43	0.65	0.49	1.03	0.32	1.00	0.46	0.66
21																
22																
23	0.10	0.83	0.13	0.85	0.20	0.76	0.28	0.82	0.20	0.78	0.29	0.94	0.29	0.93	0.21	0.71
24	0.13	0.89	0.17	0.84	0.12	0.73	0.12	0.74	0.14	0.69	0.16	0.96	0.19	0.96	0.23	0.62
25	0.23	0.62	0.17	0.81	0.19	0.73	0.11	0.76	0.14	0.75	0.19	0.97	0.15	0.92	0.19	0.59
26	0.14	0.38	0.16	0.83	0.13	0.58	0.11	0.75	0.17	0.69	0.13	0.92	0.31	0.90	0.20	0.62
27	0.24	0.94	0.17	0.81	0.14	0.73	0.16	0.73	0.16	0.63	0.16	0.88	0.18	0.83	0.21	0.61
28																
29																
30	0.16	0.62	0.17	0.70	0.19	0.55	0.19	0.58	0.13	0.48	0.19	0.88	0.21	0.86	0.19	0.43

	TREATED WATER JULY 2014															
	HARVEY										MAGNESIA					
	400 HAR. TANK		PRV-3		STORE/CAFÉ		LIONS BAY AVE.		KELVIN GROVE		100 MAG. TANK		PRV-5		BRUNSWICK B.	
	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)
1																
2	0.11	0.55	0.13	0.88	0.15	0.74	0.18	0.73	0.13	0.60	0.17	0.94	0.18	0.87	0.20	0.63
3	0.20	0.92	0.16	0.83	0.18	0.71	0.24	0.70	0.18	0.50	0.18	0.84	0.18	0.86	0.17	0.62
4	0.13	0.95	0.12	0.87	0.12	0.76	0.13	0.78	0.14	0.53	0.21	0.93	0.18	0.87	0.18	0.53
5																
6																
7	0.14	0.72	0.15	0.75	0.14	0.66	0.15	0.69	0.15	0.57	0.21	0.94	0.27	0.89	0.28	0.58
8	0.25	0.84	0.42	0.81	0.25	0.73	0.24	0.72	0.22	0.56	0.32	0.93	0.66	0.90	0.51	0.60
9	0.22	0.82	0.18	0.81	0.20	0.68	0.34	0.77	0.19	0.50	0.26	0.98	0.24	0.89	0.20	0.67
10	0.16	0.96	0.20	0.94	0.13	0.73	0.22	0.81	0.14	0.67	0.19	0.90	0.35	0.90	0.18	0.63
11	0.30	0.92	0.17	0.90	0.15	0.77	0.40	0.85	0.22	0.76	0.17	0.91	0.22	0.91	0.29	0.62
12																
13																
14	0.40	0.92	0.41	0.89	0.17	0.77	0.24	0.85	0.16	0.65	0.15	0.81	0.32	0.89	0.25	0.55
15	0.28	0.90	0.21	0.88	0.27	0.84	0.19	0.80	0.16	0.66	0.28	0.93	0.21	0.96	0.26	0.67
16	0.24	0.88	0.28	0.85	0.26	0.71	0.22	0.79	0.13	0.68	0.23	0.93	0.19	0.88	0.23	0.66
17	1.82	0.87	0.43	0.85	0.17	0.78	0.34	0.66	0.14	0.67	0.20	0.97	0.26	0.94	0.16	0.73
18	0.36	0.83	0.29	0.88	0.13	0.71	0.18	0.78	0.18	0.63	0.26	0.96	0.17	0.94	0.19	0.71
19																
20																
21	0.11	0.84	0.13	0.82	0.13	0.72	0.13	0.75	0.10	0.70	0.18	0.94	0.18	0.95	0.28	0.63
22	0.19	0.85	0.39	0.83	0.16	0.71	0.15	0.79	0.14	0.64	0.20	0.90	0.21	0.89	0.26	0.71
23	0.24	0.88	0.22	0.85	0.19	0.75	0.15	0.84	0.12	0.62	0.16	0.90	0.20	0.86	0.24	0.67
24	0.40	0.41	0.37	0.37	0.30	0.40	0.20	0.73	0.18	0.43	0.42	0.67	0.44	0.59	0.20	0.67
25	0.45	0.57	0.43	0.50	0.25	0.23	0.24	0.29	0.26	0.28	0.53	0.75	0.43	0.67	0.19	0.55
26																
27																
28	0.19	1.00	0.20	0.97	0.14	0.79	0.23	0.54	0.13	0.87	0.24	0.91	0.22	0.89	0.19	0.62
29	0.17	0.91	0.18	0.89	0.18	0.72	0.16	0.80	0.13	0.51	0.21	0.90	0.17	0.90	0.16	0.71
30	0.27	0.84	0.16	0.81	0.13	0.72	0.13	0.74	0.12	0.54	0.20	0.91	0.34	0.84	0.16	0.80
31	0.14	0.87	0.31	0.84	0.28	0.70	0.17	0.72	0.15	0.53	0.54	0.91	0.25	0.90	0.16	0.75

	TREATED WATER AUGUST 2014															
	HARVEY										MAGNESIA					
	400 HAR. TANK		PRV-3		STORE/CAFÉ		LIONS BAY AVE.		KELVIN GROVE		100 MAG. TANK		PRV-5		BRUNSWICK B.	
DATE	Turbidity	CL2 Res.	Turbidity	CL2 Res.	Turbidity	CL2 Res.	Turbidity	CL2 Res.	Turbidity	CL2 Res.	Turbidity	CL2 Res.	Turbidity	CL2 Res.	Turbidity	CL2 Res.
	(NTU)	(ppm)	(NTU)	(ppm)	(NTU)	(ppm)	(NTU)	(ppm)	(NTU)	(ppm)	(NTU)	(ppm)	(NTU)	(ppm)	(NTU)	(ppm)
1	0.22	0.87	0.19	0.84	0.19	0.69	0.14	0.75	0.11	0.48	0.37	0.97	0.34	0.90	0.14	0.71
2																
3																
4																
5	0.19	0.88	0.11	0.85	0.11	0.68	0.12	0.78	0.29	0.65	0.26	0.86	0.17	0.92	0.13	0.66
6	0.11	0.86	0.23	0.83	0.13	0.72	0.13	0.78	0.17	0.56	0.45	0.84	0.30	0.81	0.23	0.65
7	0.22	0.88	0.19	0.85	0.13	0.68	0.13	0.78	0.12	0.57	0.24	0.82	0.31	0.76	1.49	0.60
8	0.31	0.84	0.13	0.80	0.22	0.67	0.19	0.75	0.15	0.64	0.39	0.84	0.18	0.81	0.21	0.61
9																
10																
11	0.18	0.91	0.30	0.87	0.13	0.73	0.18	0.78	0.24	0.63	0.21	0.86	0.30	0.86	0.21	0.62
12	0.18	0.87	0.12	0.84	0.12	0.72	0.13	0.76	0.16	0.57	0.37	0.90	0.24	0.97	0.22	0.63
13	0.34	0.81	0.18	0.78	0.14	0.67	0.14	0.72	0.12	0.55	0.44	0.90	0.27	0.95	0.24	0.58
14	0.14	0.75	0.21	0.72	0.14	0.58	0.16	0.64	0.23	0.51	0.32	0.91	0.23	0.88	0.20	0.58
15	0.20	0.55	0.23	0.59	0.19	0.52	0.16	0.56	0.16	0.50	0.28	0.90	0.42	0.80	0.26	0.54
16																
17																
18	0.17	0.78	0.16	0.75	0.13	0.60	0.12	0.60	0.17	0.53	0.20	0.88	0.17	0.89	0.33	0.58
19	0.56	0.79	0.30	0.76	0.17	0.63	0.22	0.67	0.15	0.58	0.39	0.67	0.25	0.65	0.25	0.63
20	0.20	0.84	0.23	0.81	0.15	0.66	0.17	0.73	0.11	0.60	0.19	0.94	0.23	0.88	0.29	0.41
21	0.16	0.98	0.28	0.96	0.15	0.82	0.18	0.83	0.18	0.71	0.30	0.99	0.27	0.95	0.25	0.60
22	0.19	1.11	0.12	1.09	0.12	0.87	0.16	0.95	0.21	0.81	0.16	0.99	0.14	0.97	0.21	0.68
23																
24																
25	0.13	0.87	0.11	0.83	0.12	0.74	0.13	0.77	0.11	0.57	0.17	0.80	0.18	0.86	0.16	0.57
26	0.24	0.84	0.17	0.81	0.13	0.74	0.11	0.71	0.11	0.71	0.33	0.97	0.18	0.99	0.30	0.51
27	0.23	0.85	0.84	0.83	0.40	0.70	0.14	0.78	0.14	0.58	0.34	1.02	0.32	0.98	0.18	0.64
28	0.14	0.84	0.15	0.80	0.17	0.75	0.13	0.72	0.12	0.54	0.20	1.00	0.18	0.99	0.20	0.70
29	0.21	0.83	0.15	0.80	0.19	0.69	0.13	0.71	0.20	0.57	0.24	0.92	0.20	0.90	0.18	0.69
30																
31																

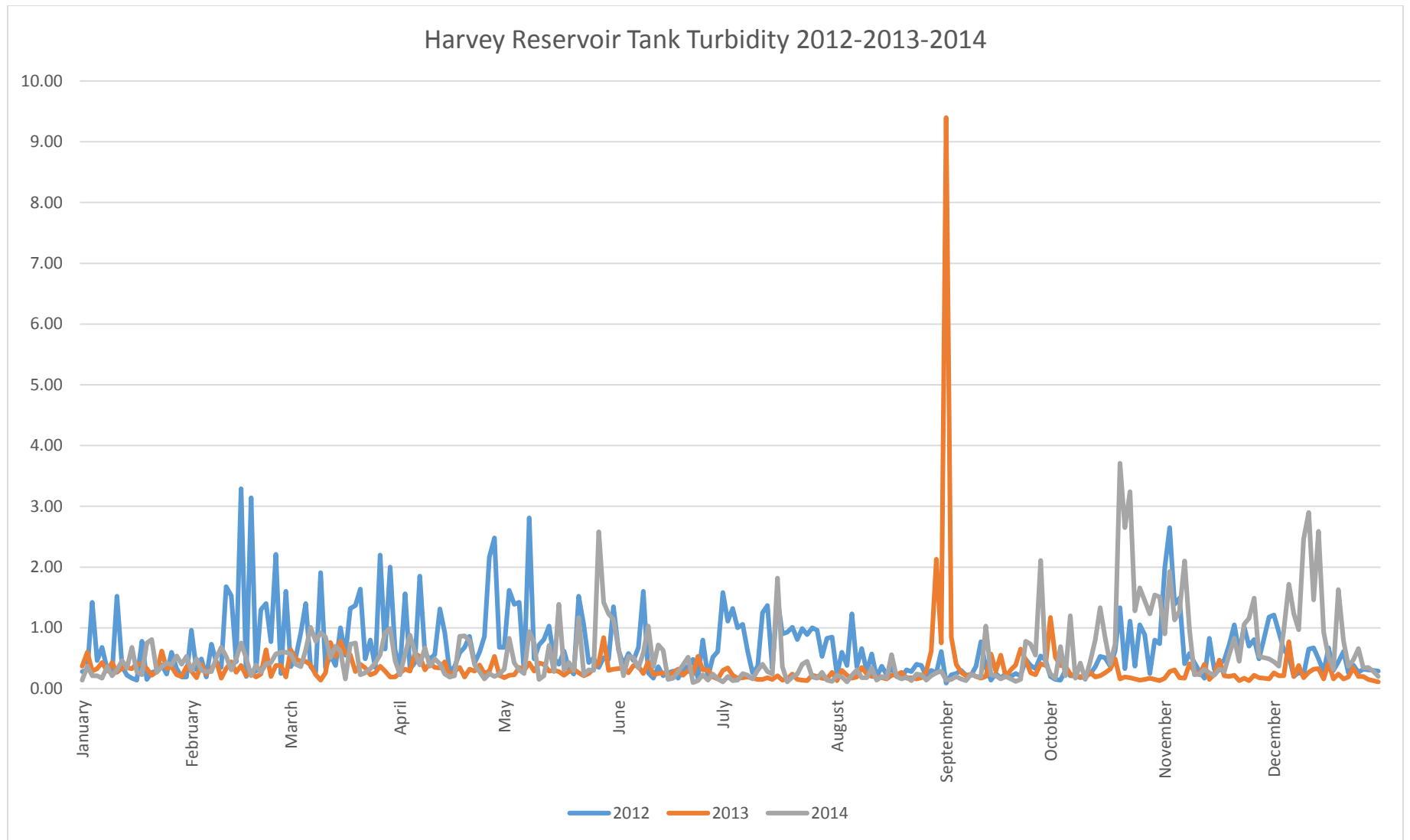
	TREATED WATER SEPTEMBER 2014															
	HARVEY										MAGNESIA					
	400 HAR. TANK		PRV-3		STORE/CAFÉ		LIONS BAY AVE.		KELVIN GROVE		100 MAG. TANK		PRV-5		BRUNSWICK B.	
	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)
1																
2	0.14	0.75	0.15	0.73	0.10	0.68	0.13	0.69	0.16	0.54	0.14	0.94	0.12	0.91	0.24	0.66
3	0.15	0.64	0.25	0.60	0.13	0.52	0.15	0.57	0.14	0.56	0.25	0.64	0.21	0.58	0.18	0.64
4	0.20	0.71	0.16	0.67	0.13	0.51	0.17	0.49	0.16	0.45	0.36	0.76	0.25	0.76	0.20	0.44
5	0.16	0.84	0.18	0.81	0.24	0.60	0.16	0.57	0.13	0.55	0.55	0.85	0.20	0.81	0.24	0.33
6																
7																
8	0.13	0.84	0.13	0.80	0.15	0.67	0.12	0.69	0.15	0.54	0.13	0.68	0.12	0.69	0.19	0.41
9	0.24	0.85	0.14	0.82	0.13	0.67	0.12	0.68	0.10	0.55	0.13	0.93	0.18	0.96	0.19	0.45
10	0.20	0.85	0.17	0.83	0.18	0.73	0.13	0.76	0.16	0.58	0.14	1.00	0.16	0.92	0.15	0.62
11	0.19	0.88	0.17	0.85	0.20	0.71	0.13	0.74	0.12	0.59	0.13	0.93	0.15	0.93	0.15	0.72
12	1.03	0.92	0.28	0.88	0.18	0.75	0.13	0.76	0.14	0.71	0.25	0.83	2.02	0.75	0.24	0.61
13																
14																
15	0.23	0.87	0.43	0.83	0.17	0.79	0.15	0.83	0.15	0.68	0.19	0.82	0.18	0.80	0.18	0.60
16	0.21	0.84	0.13	0.82	0.16	0.72	0.12	0.77	0.16	0.66	0.17	0.68	0.18	0.67	0.15	0.60
17	0.16	0.85	0.13	0.82	0.13	0.62	0.15	0.71	0.12	0.60	0.30	0.75	0.17	0.78	0.20	0.44
18	0.20	0.81	0.23	0.78	0.19	0.68	0.12	0.68	0.13	0.57	0.31	0.77	0.20	0.75	0.24	0.39
19	0.16	0.75	0.26	0.72	0.17	0.60	0.17	0.72	0.13	0.56	0.29	0.72	0.28	0.54	0.40	0.45
20																
21																
22	0.12	0.80	0.43	0.76	0.20	0.62	0.13	0.62	0.11	0.60	0.14	0.81	0.19	0.81	0.20	0.53
23	0.15	0.76	0.15	0.73	0.12	0.66	0.18	0.67	0.14	0.56	0.52	0.91	0.25	0.57	0.51	0.50
24	0.78	0.37	0.81	0.33	0.38	0.35	0.20	0.64	0.22	0.43	1.00	0.71	0.66	0.71	0.30	0.50
25	0.73	0.33	0.66	0.53	0.48	0.26	0.63	0.37	0.38	0.34	0.73	0.89	0.88	0.65	0.48	0.25
26	0.55	0.33	0.49	0.40	0.31	0.30	0.37	0.32	0.35	0.33	0.27	0.77	1.37	0.86	1.21	0.30
27																
28																
29	2.11	0.83	0.64	0.80	0.54	0.65	0.27	0.69	0.24	0.45	0.32	0.87	0.35	0.88	0.52	0.36
30	0.42	0.59	0.53	0.55	0.28	0.49	0.24	0.56	0.16	0.34	0.28	0.67	0.28	0.64	0.31	0.46

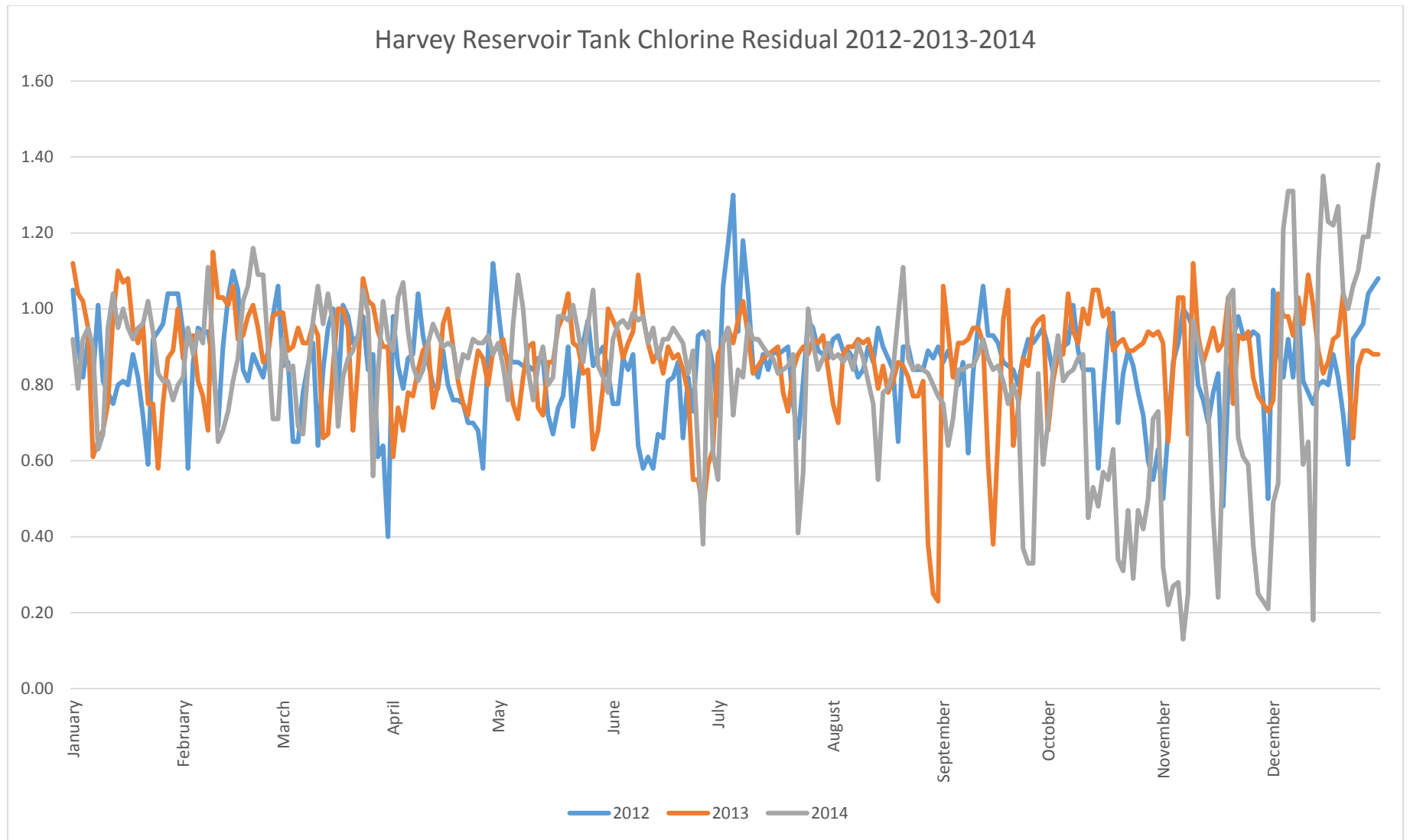
	TREATED WATER OCTOBER 2014															
	HARVEY										MAGNESIA					
	400 HAR. TANK		PRV-3		STORE/CAFÉ		LIONS BAY AVE.		KELVIN GROVE		100 MAG. TANK		PRV-5		BRUNSWICK B.	
	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)
1	0.24	0.70	0.33	0.71	0.25	0.49	0.17	0.38	0.22	0.24	0.22	0.79	0.26	0.76	0.25	0.28
2	0.17	0.84	0.32	0.79	0.23	0.59	0.17	0.49	0.15	0.43	0.18	1.00	0.20	0.83	0.22	0.23
3	0.69	0.93	0.28	0.89	0.18	0.71	0.15	0.64	0.40	0.54	0.27	0.87	0.22	0.86	0.53	0.28
4																
5																
6	0.21	0.81	0.31	0.76	0.36	0.64	0.19	0.65	0.21	0.51	0.34	0.79	0.41	0.76	0.16	0.44
7	1.20	0.83	0.97	0.79	0.18	0.69	0.23	0.63	0.12	0.38	0.79	1.00	0.39	0.93	0.17	0.37
8	0.17	0.84	0.20	0.80	0.16	0.70	0.16	0.65	0.13	0.49	0.15	1.01	0.22	0.98	0.16	0.52
9	0.42	0.87	0.36	0.83	0.19	0.72	0.13	0.69	0.13	0.54	0.36	0.92	0.21	0.88	0.19	0.58
10	0.15	0.88	0.14	0.83	0.18	0.72	0.18	0.70	0.13	0.51	0.31	0.87	0.18	0.85	0.16	0.63
11																
12																
13																
14	0.44	0.45	0.27	0.41	0.18	0.38	0.16	0.56	0.14	0.39	0.78	0.51	0.68	0.51	0.17	0.46
15	0.80	0.53	0.59	0.49	0.23	0.32	0.22	0.21	0.27	0.29	0.61	0.64	0.80	0.60	0.27	0.30
16	1.33	0.48	0.90	0.44	0.56	0.30	0.40	0.21	0.22	0.27	0.83	0.58	1.31	0.52	0.32	0.32
17	0.85	0.57	0.59	0.54	0.44	0.31	0.27	0.21	0.26	0.22	0.51	0.68	0.50	0.69	0.40	0.25
18																
19																
20	0.40	0.55	0.49	0.50	0.35	0.35	0.27	0.28	0.21	0.32	0.39	0.60	0.50	0.65	0.39	0.22
21	0.73	0.63	0.39	0.59	0.26	0.35	0.25	0.27	0.32	0.22	0.32	1.00	0.49	0.92	0.28	0.24
22	3.71	0.34	1.31	0.31	0.70	0.30	0.24	0.38	0.38	0.33	3.95	0.67	3.49	0.60	0.40	0.21
23	2.65	0.31	2.21	0.37	5.20	0.77	5.49	0.35	2.41	0.37	2.25	1.09	5.34	1.05	0.37	0.52
24	3.24	0.47	2.36	1.16	3.04	0.82	2.25	0.44	1.22	0.38	1.97	1.24	1.61	1.28	2.16	0.01
25																
26																
27	1.28	0.29	0.99	1.40	1.06	1.36	1.11	0.49	1.41	0.34	0.69	1.29	0.88	1.35	0.48	0.64
28	1.66	0.47	2.07	1.19	1.44	1.06	0.89	0.76	0.63	0.76	1.14	0.95	1.46	0.96	0.78	0.38
29	1.45	0.42	1.81	1.14	1.23	0.56	0.81	0.41	0.56	0.60	0.98	0.95	2.44	0.97	0.64	0.91
30	1.23	0.50	0.84	1.14	0.72	1.20	0.98	0.54	0.75	0.25	0.57	1.04	0.71	1.43	0.66	0.22
31	1.54	0.71	2.18	0.69	1.53	0.50	0.58	0.77	1.12	0.51	1.84	0.87	1.75	1.13	1.52	0.28

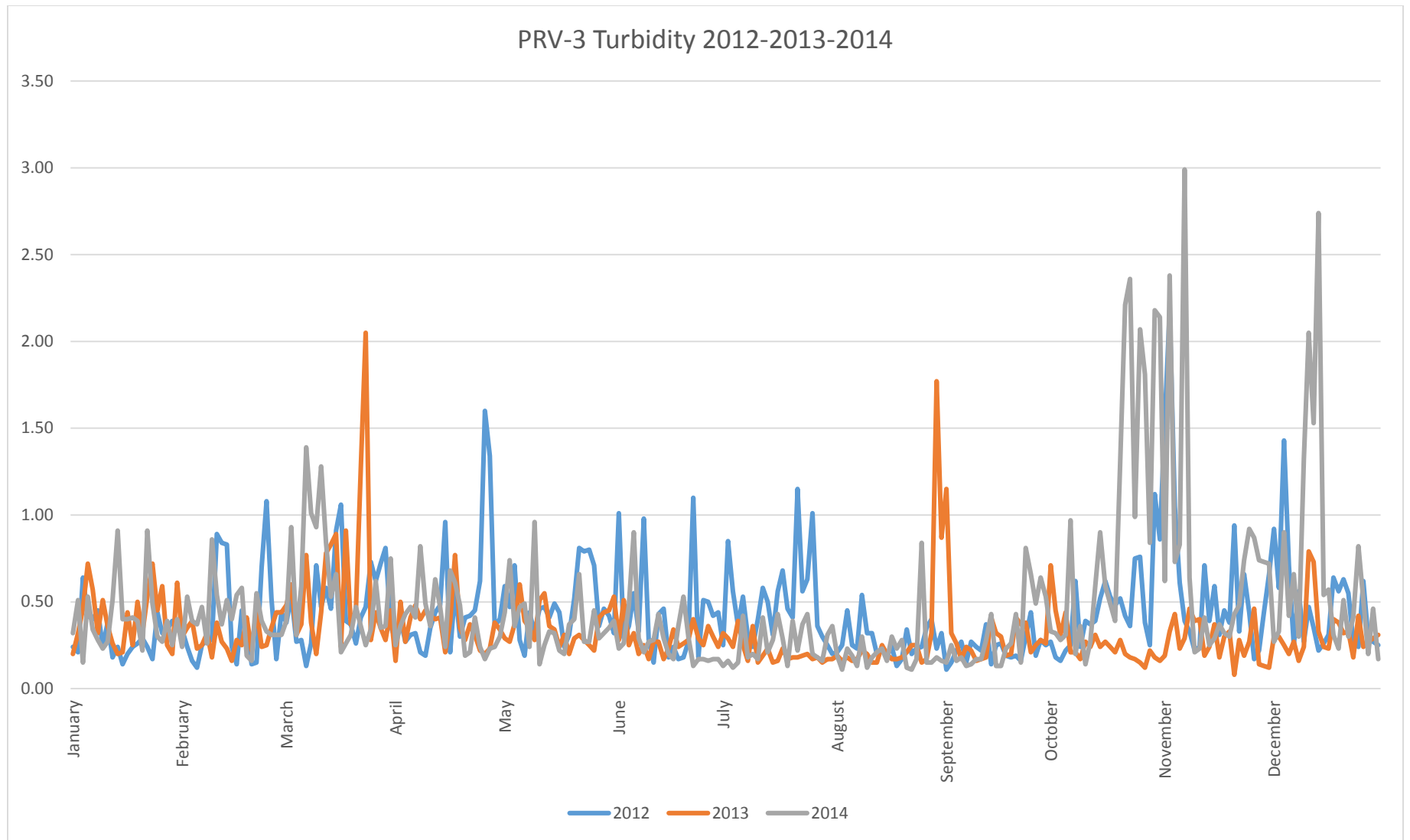
	TREATED WATER NOVEMBER 2014															
	HARVEY										MAGNESIA					
	400 HAR. TANK		PRV-3		STORE/CAFÉ		LIONS BAY AVE.		KELVIN GROVE		100 MAG. TANK		PRV-5		BRUNSWICK B.	
DATE	Turbidity	CL2 Res.	Turbidity	CL2 Res.	Turbidity	CL2 Res.	Turbidity	CL2 Res.	Turbidity	CL2 Res.	Turbidity	CL2 Res.	Turbidity	CL2 Res.	Turbidity	CL2 Res.
	(NTU)	(ppm)	(NTU)	(ppm)	(NTU)	(ppm)	(NTU)	(ppm)	(NTU)	(ppm)	(NTU)	(ppm)	(NTU)	(ppm)	(NTU)	(ppm)
1																
2																
3	0.90	0.32	0.62	1.37	0.76	0.97	0.41	0.75	0.53	0.69	0.34	1.22	0.51	1.59	0.35	0.48
4	1.93	0.22	2.38	1.23	1.63	1.32	0.42	0.88	0.37	0.94	1.45	1.03	1.85	1.29	0.39	0.68
5	1.13	0.27	0.73	1.72	0.54	1.15	0.60	0.66	0.78	0.54	0.41	1.38	0.43	1.68	0.23	0.76
6	1.27	0.28	0.83	0.32	0.69	1.11	0.58	0.76	0.48	0.47	0.60	1.25	1.11	1.38	0.41	0.55
7	2.10	0.13	2.99	0.92	1.89	0.71	0.58	0.37	0.84	0.48	2.37	1.00	2.43	1.10	0.36	0.78
8																
9																
10	0.97	0.25	0.64	1.39	0.42	1.41	0.32	0.94	0.34	0.52	0.79	1.53	0.49	1.56	0.46	0.77
11	0.23	0.97	0.21	1.26	N/A	N/A	0.24	1.04	0.21	0.91	0.31	1.35	0.23	1.35	0.39	0.82
12	0.24	0.91	0.23	0.96	0.41	0.94	0.21	0.87	0.22	0.78	0.34	1.13	0.34	1.10	0.24	0.96
13	0.32	0.85	0.41	1.14	0.39	0.98	0.21	0.89	0.55	1.23	0.24	1.17	0.32	1.29	0.29	0.85
14	0.26	0.74	0.25	1.00	0.30	1.04	0.24	0.98	0.27	0.93	0.20	1.17	0.95	1.43	0.19	0.75
15																
16																
17	0.22	0.45	0.29	1.22	0.23	1.32	0.17	0.69	0.19	1.02	0.27	1.21	0.37	1.48	0.52	0.83
18	0.32	0.24	0.37	1.32	0.70	1.35	0.17	0.76	0.17	0.84	0.29	1.40	0.30	1.58	0.23	0.86
19	0.28	0.63	0.32	1.05	0.40	1.27	0.19	0.89	0.28	0.59	0.19	1.39	0.29	1.41	0.21	0.90
20	0.56	1.03	0.30	1.00	0.68	1.23	0.24	0.67	0.16	0.84	0.37	1.35	0.30	1.35	0.18	1.12
21	0.83	1.05	0.43	1.10	0.30	1.22	0.17	0.71	0.18	0.98	0.24	1.32	0.49	1.34	0.27	1.03
22																
23																
24	0.45	0.66	0.48	0.70	0.28	1.03	0.33	0.61	0.42	0.42	0.29	1.16	0.27	1.16	0.46	0.22
25	1.06	0.61	0.74	0.73	0.37	0.87	0.40	0.57	0.39	0.60	0.25	1.19	0.30	1.16	0.25	0.66
26	1.16	0.59	0.92	0.55	0.56	0.98	0.48	0.51	0.27	0.42	0.64	1.28	0.52	1.20	0.21	0.82
27	1.49	0.38	0.87	0.52	0.71	0.75	0.43	0.39	0.55	0.37	0.83	1.15	0.95	1.15	0.50	0.82
28	0.53	0.25	0.74	0.52	0.59	0.71	0.33	0.31	0.24	0.21	0.71	1.45	0.72	1.13	0.29	

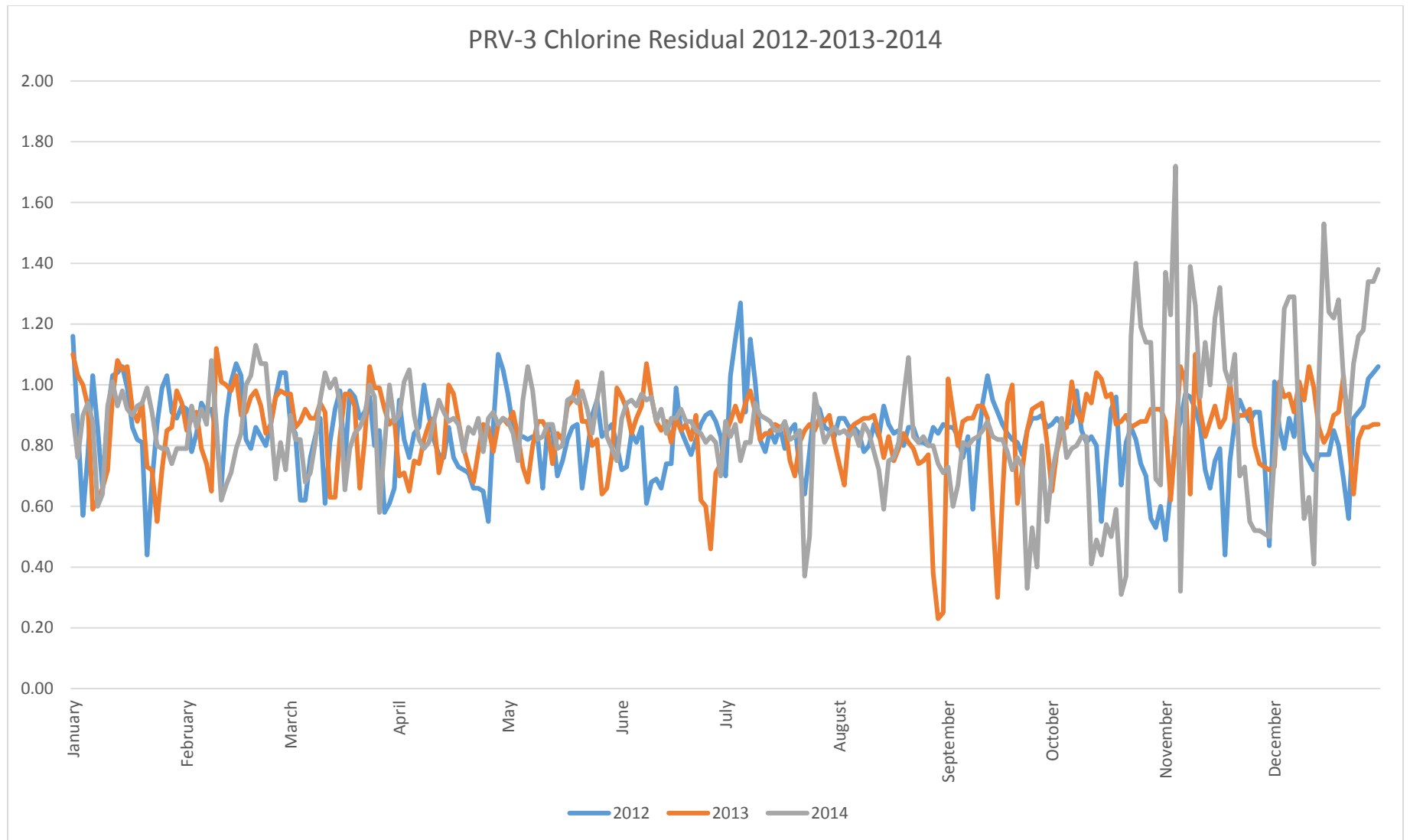
	TREATED WATER DECEMBER 2014															
	HARVEY										MAGNESIA					
	400 HAR. TANK		PRV-3		STORE/CAFÉ		LIONS BAY AVE.		KELVIN GROVE		100 MAG. TANK		PRV-5		BRUNSWICK B.	
	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)	Turbidity (NTU)	CL2 Res. (ppm)
1	0.44	0.49	0.27	0.77	0.28	1.24	0.19	0.43	0.19	0.36	0.46	1.68	0.24	1.71	0.24	1.11
2	0.37	0.54	0.33	0.91	0.55	1.16	0.16	0.52	0.28	0.50	0.18	1.75	0.41	1.70	0.23	1.37
3	0.96	1.21	0.90	1.25	0.29	1.00	0.17	0.62	0.19	0.93	0.18	1.53	0.25	1.50	0.21	1.44
4	1.72	1.31	0.42	1.29	0.54	1.20	0.20	1.03	0.17	1.01	0.44	1.29	0.55	1.30	0.20	1.47
5	1.23	1.31	0.66	1.29	0.31	1.13	0.17	1.15	0.22	1.19	0.40	1.11	0.67	1.09	0.26	1.34
6																
7																
8	0.97	0.85	0.30	0.84	0.29	0.72	0.30	0.62	0.51	0.68	0.22	0.80	0.23	0.86	0.30	0.64
9	2.46	0.59	1.32	0.56	0.79	0.62	0.45	0.58	1.62	0.59	3.50	0.86	2.46	0.86	0.33	0.39
10	2.90	0.65	2.05	0.63	1.44	0.43	0.78	0.49	0.66	0.27	2.52	0.73	1.54	0.55	0.34	0.39
11	1.46	0.18	1.53	0.41	0.78	0.27	0.83	0.31	4.94	0.26	2.30	0.48	1.15	0.40	0.86	0.34
12	2.59	1.11	2.74	1.01	8.84	0.86	1.14	0.18	1.08	0.08	N/A	N/A	1.82	1.02	1.21	0.15
13																
14																
15	0.93	1.35	0.54	1.53	0.42	1.23	0.50	0.68	0.27	1.13	1.57	0.87	0.99	1.48	0.78	0.30
16	0.52	1.23	0.57	1.24	0.35	1.13	0.45	0.84	1.48	1.15	3.34	0.82	0.33	1.29	0.33	0.96
17	0.32	1.22	0.31	1.22	0.44	1.06	0.32	0.90	0.38	0.96	1.38	0.75	0.44	1.21	0.39	1.01
18	1.63	1.27	0.23	1.28	0.34	1.11	0.24	0.90	0.28	0.97	1.32	0.58	0.25	1.17	0.20	0.90
19	0.79	1.04	0.51	1.02	0.41	0.95	0.23	0.79	0.29	0.90	1.15	0.03	0.27	1.10	0.24	0.78
20																
21																
22	0.37	1.00	0.30	0.87	0.43	0.77	0.21	0.56	0.29	0.39	1.03	0.39	0.34	0.79	0.26	0.49
23	0.47	1.06	0.41	1.07	0.46	0.90	0.26	0.42	0.41	0.43	1.11	0.33	0.35	0.95	0.32	0.37
24	0.66	1.10	0.82	1.16	0.33	0.89	0.27	0.48	0.23	0.71	1.07	0.30	0.28	1.00	0.24	0.33
25																
26																
27	0.34	1.19	0.51	1.18	0.29	1.02	0.15	0.81	0.43	0.95	0.95	0.44	0.22	1.26	0.19	0.73
28																
29	0.35	1.19	0.20	1.34	0.27	1.14	0.15	1.01	0.28	1.03	0.89	0.39	0.17	1.26	0.13	0.86
30	0.29	1.29	0.46	1.34	0.25	1.17	0.13	1.04	0.53	1.06	0.92	0.38	0.16	1.25	0.14	0.89
31	0.20	1.38	0.17	1.38	0.23	1.15	0.10	1.08	0.22	1.01	0.82	0.38	0.18	1.28	0.15	0.91

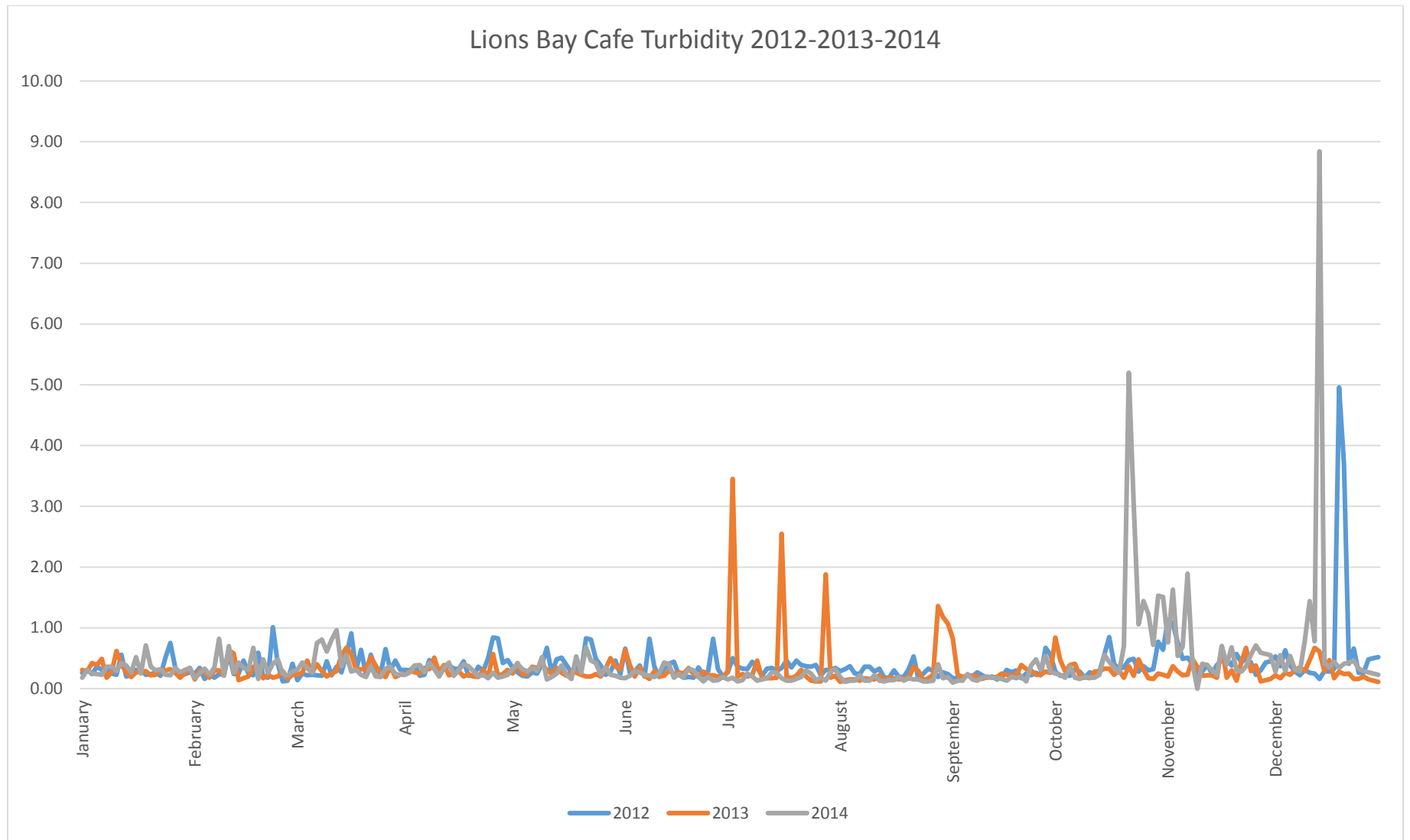
APPENDIX C: 3-YEAR COMPARISON GRAPHS – TURBIDITY AND CHLORINE RESIDUALS

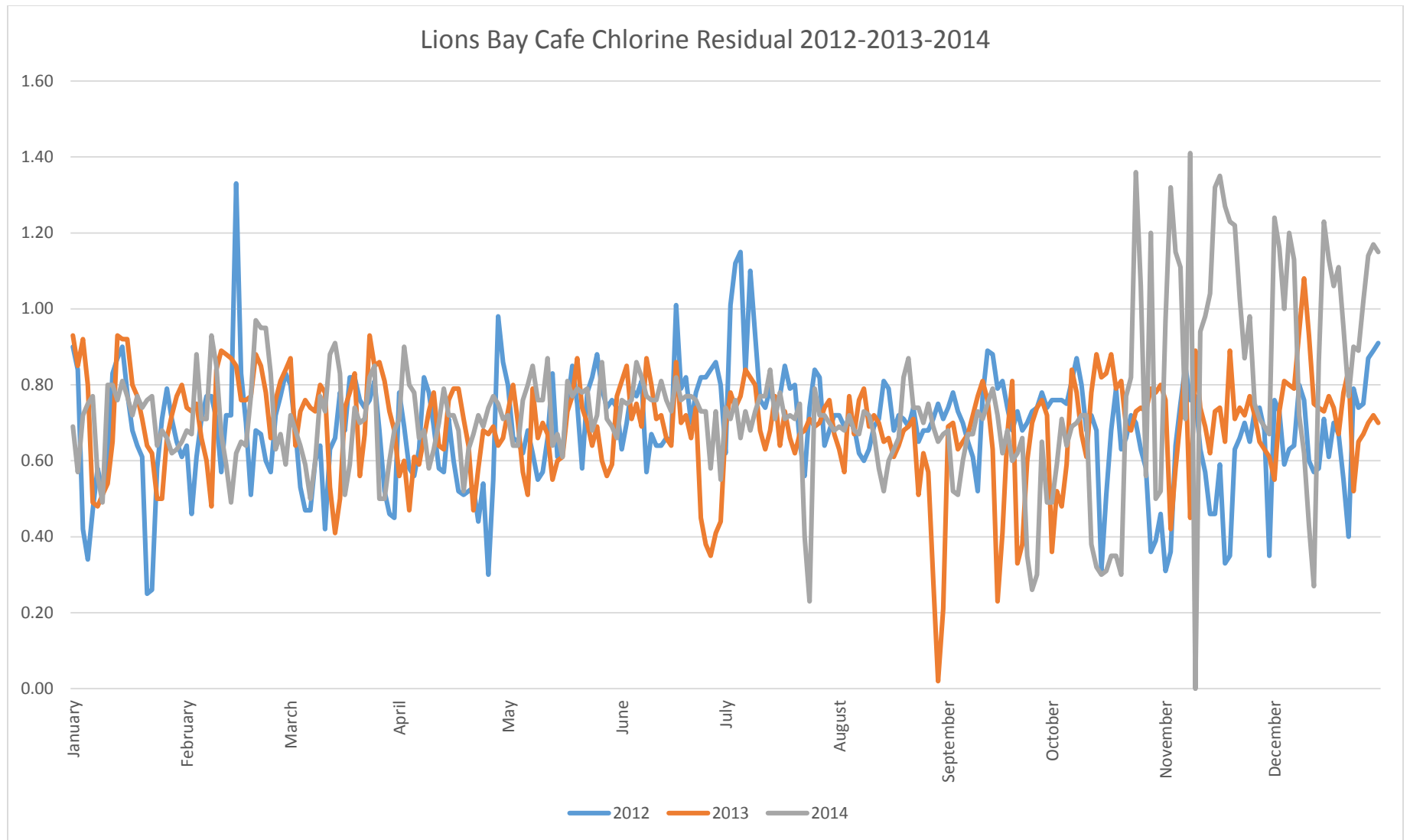


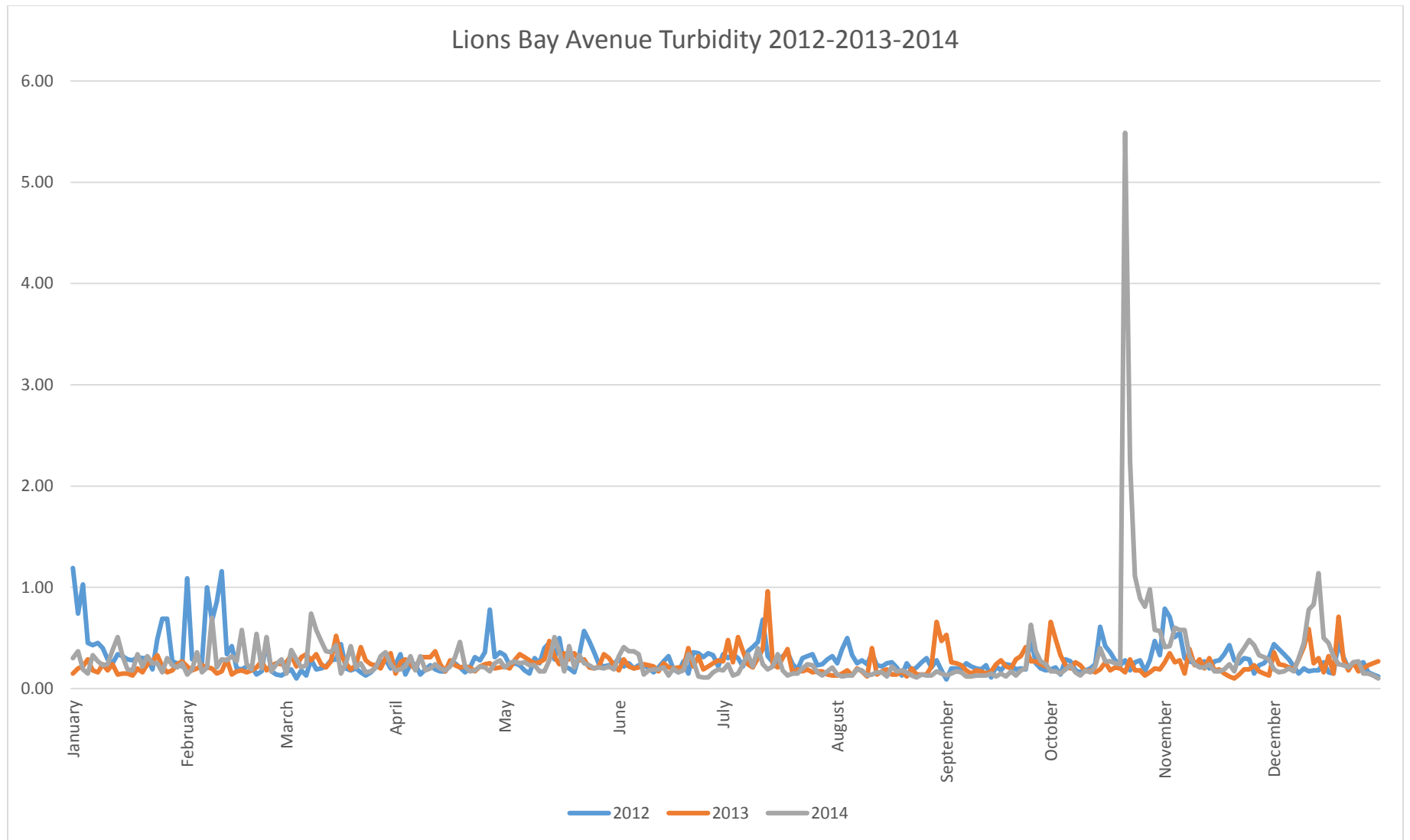


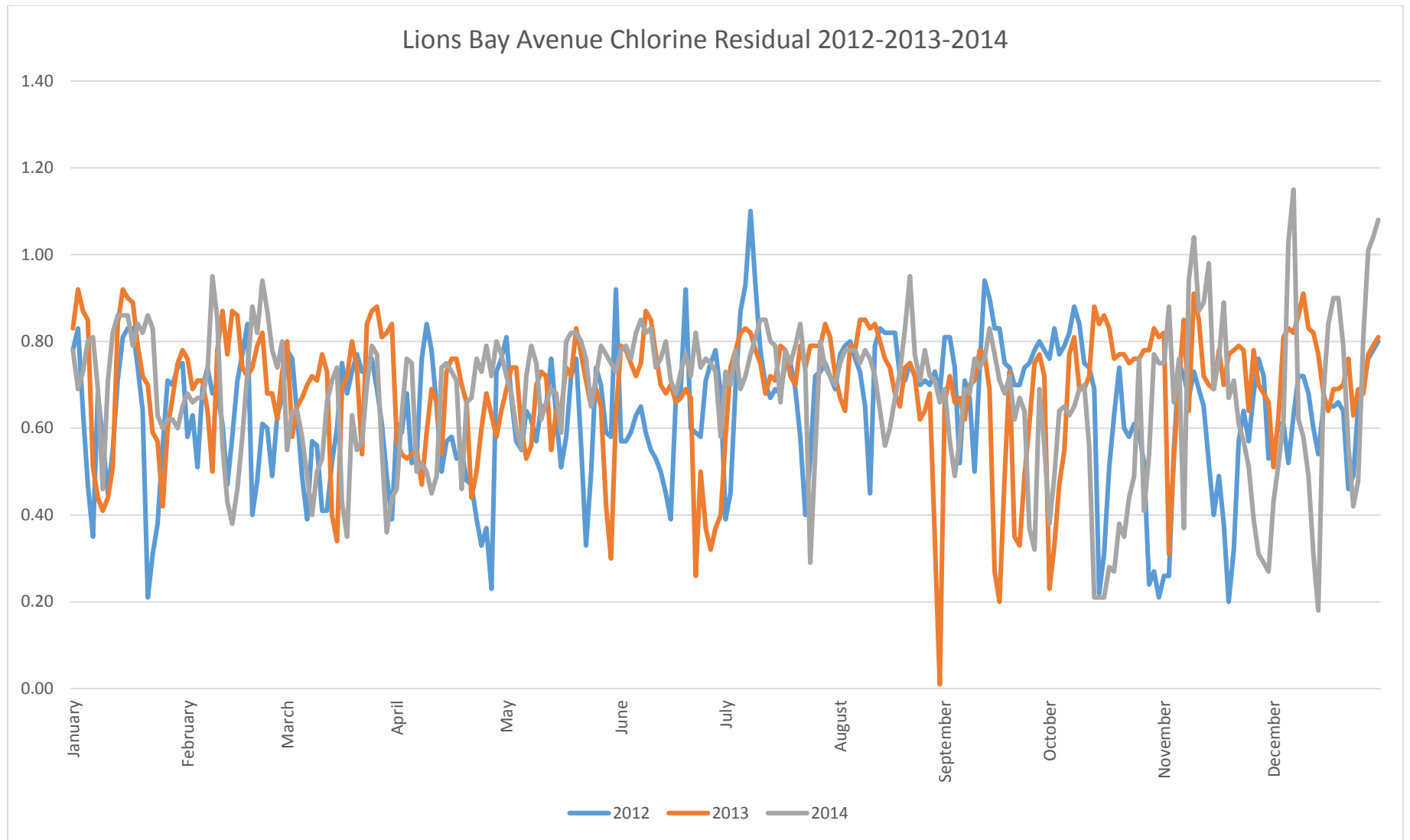


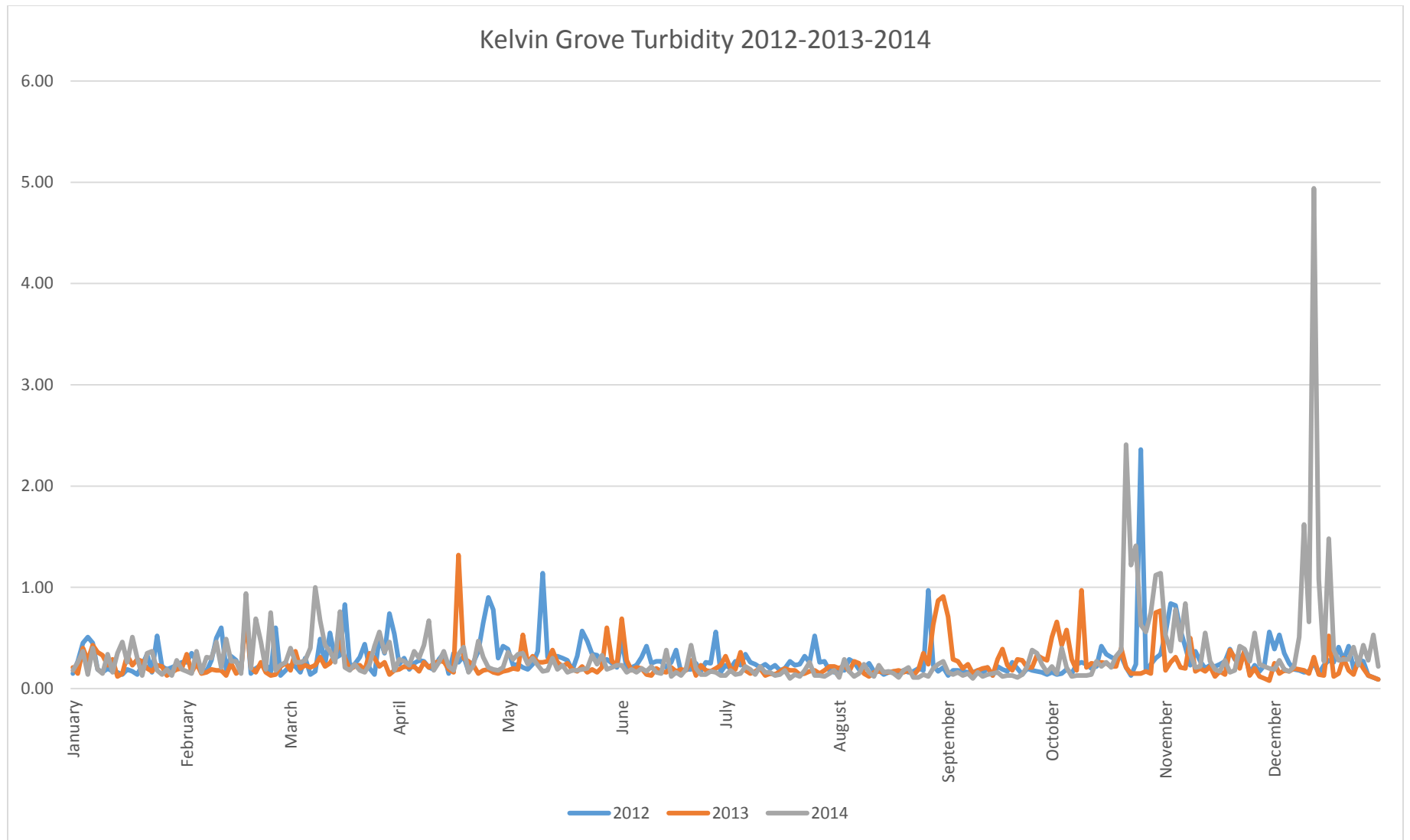


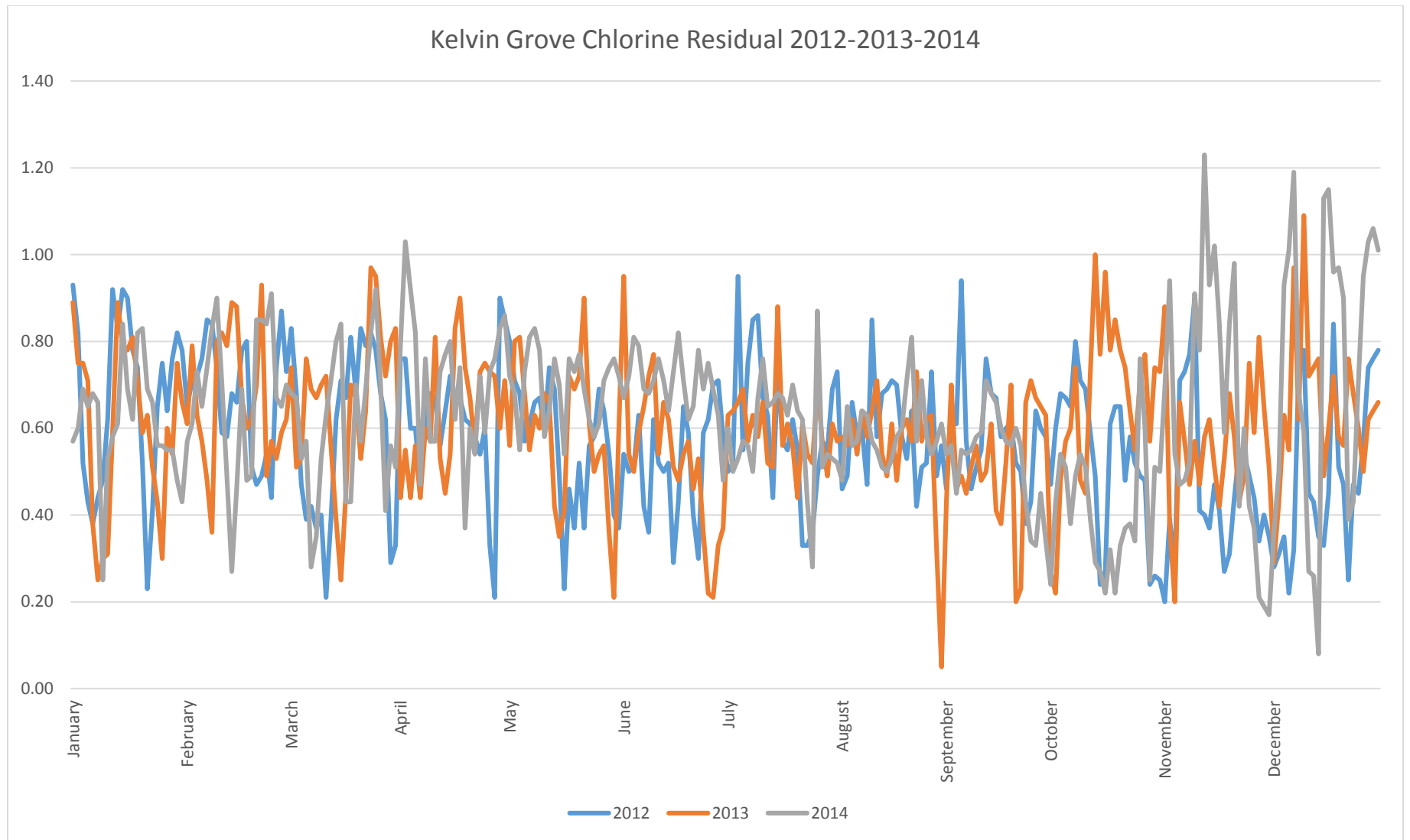


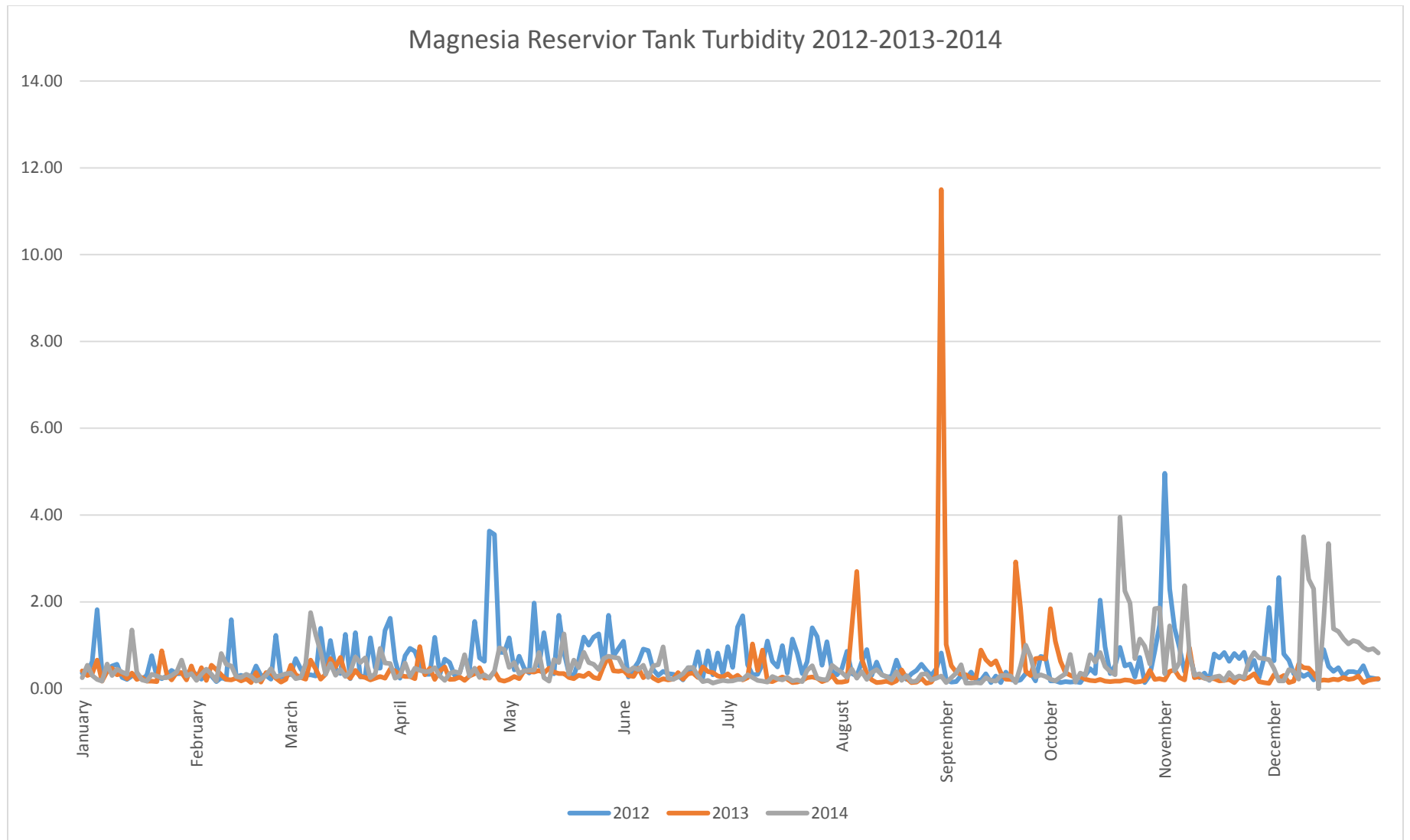


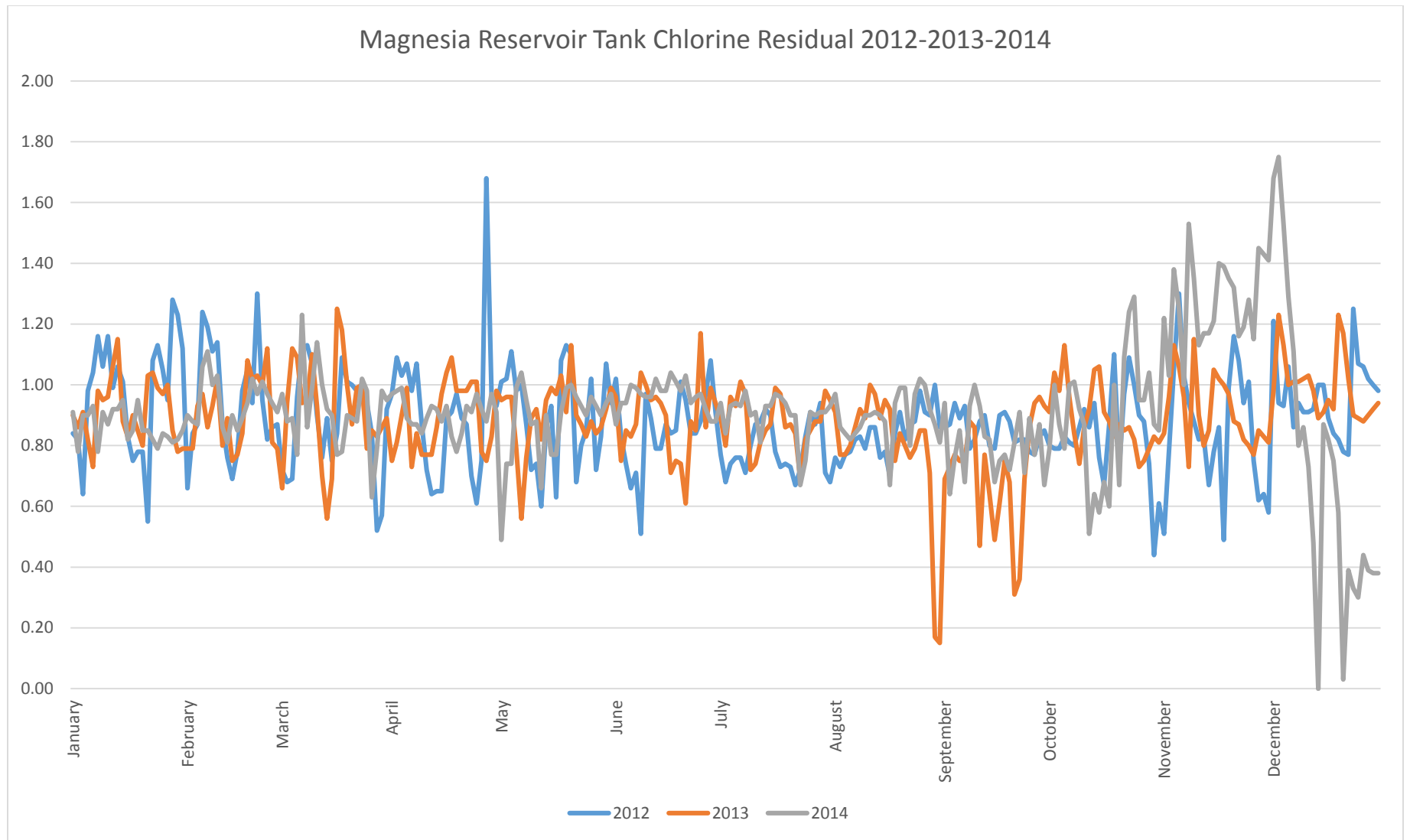


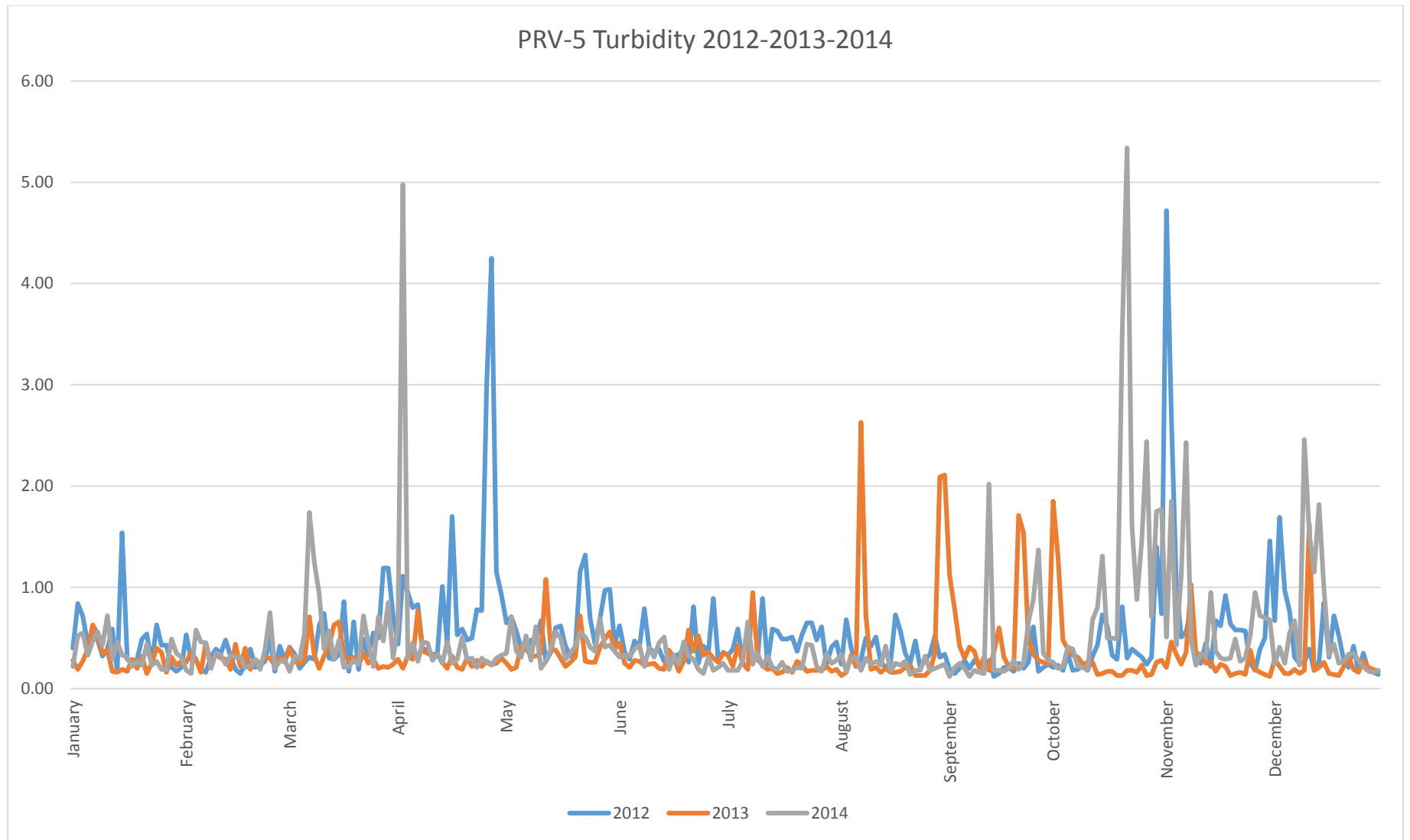


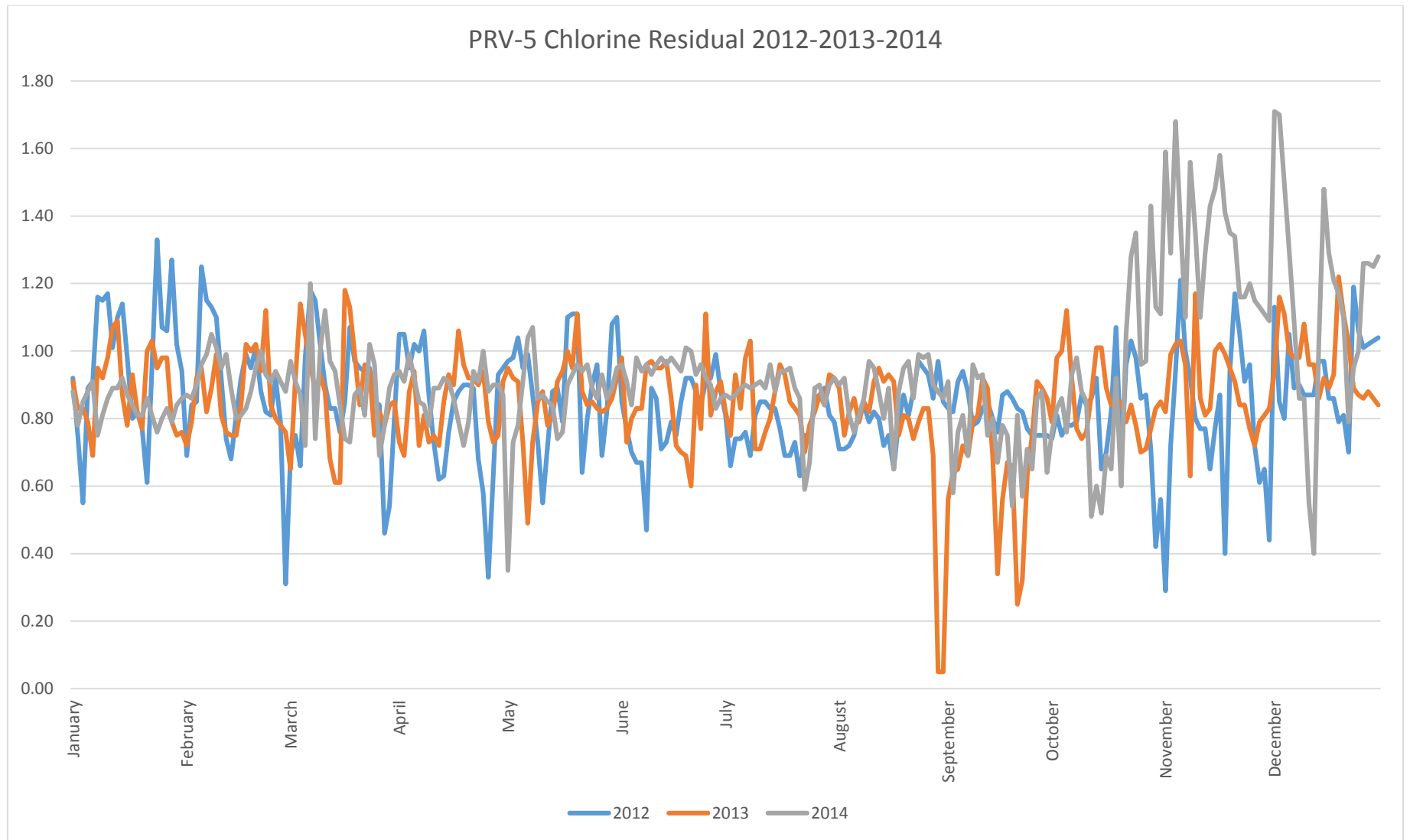


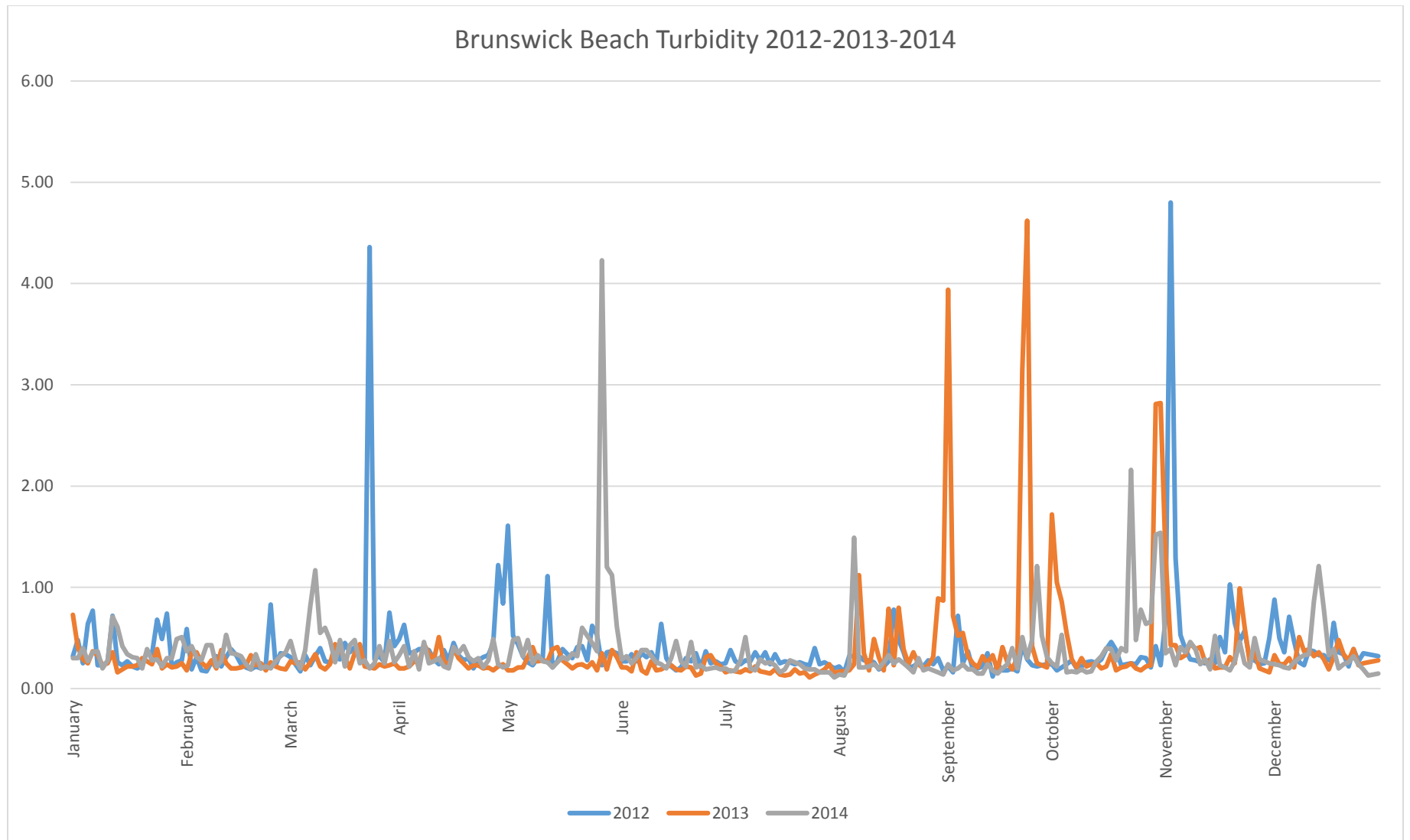


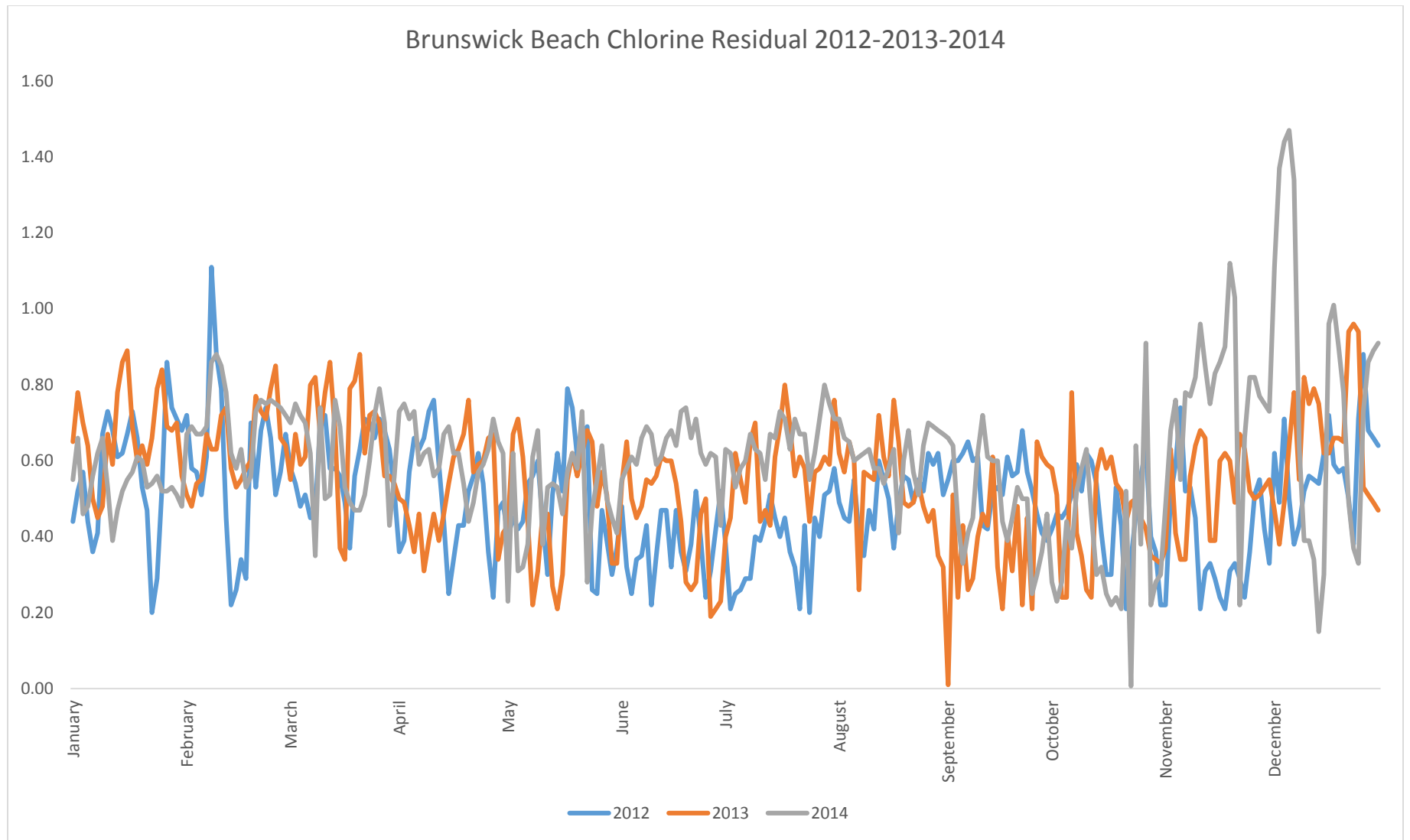


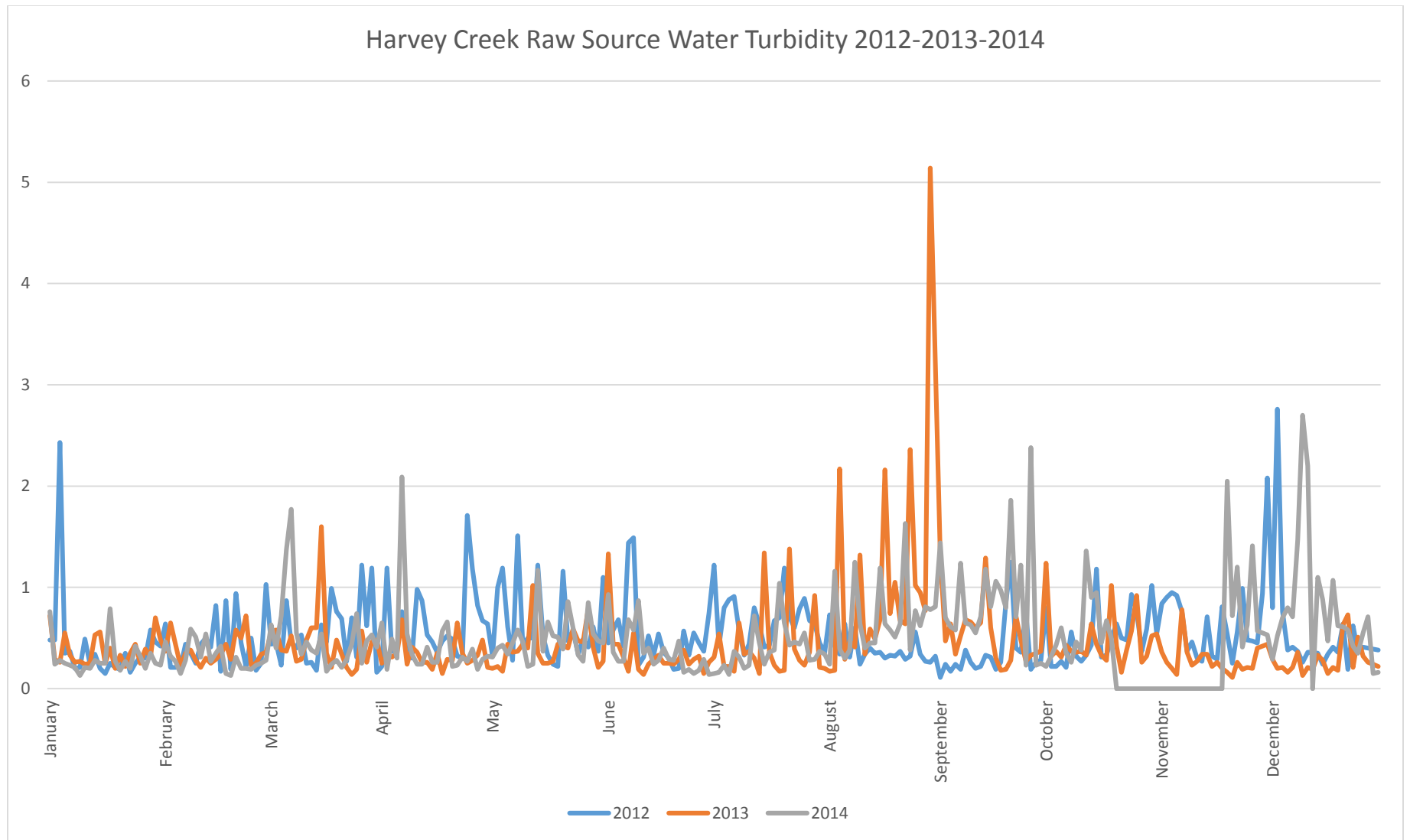


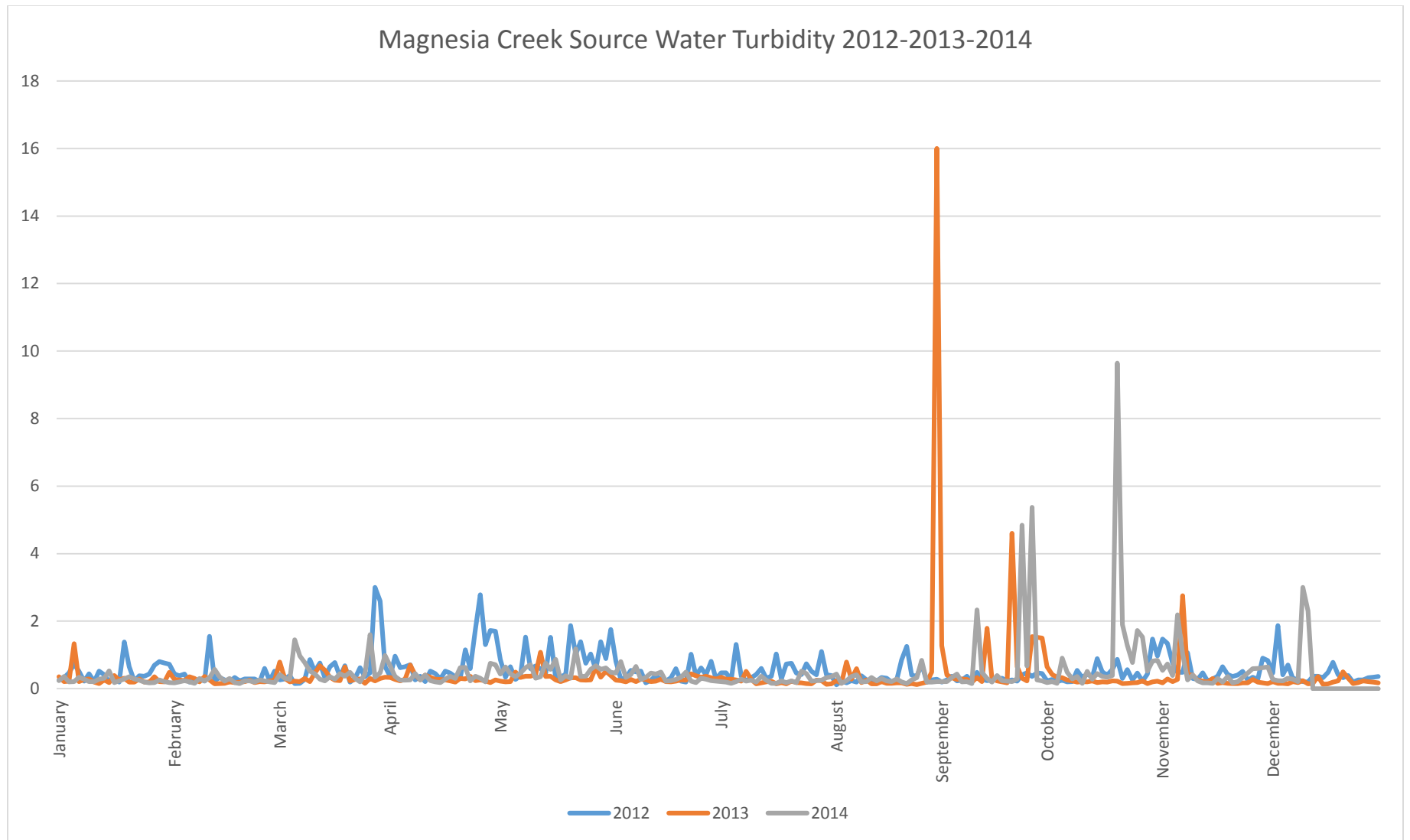












APPENDIX D: METALS & WATER CHEMISTRY TEST RESULTS



VILLAGE OF LIONS BAY
ATTN: Will Emo
PO Box 141, 400 Center Road
Lions Bay BC V0N 2E0

Date Received: 19-MAR-14
Report Date: 02-APR-14 15:11 (MT)
Version: FINAL

Client Phone: 604-921-9833

Certificate of Analysis

Lab Work Order #: **L1434230**
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: 1
Legal Site Desc:

Selam Worku
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
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Environmental

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1434230-1 Water 19-MAR-14 10:10 HARVEY TANK (FIRST DRAW)	L1434230-2 Water 19-MAR-14 10:10 HARVEY TANK (AFTER FLUSH)	L1434230-3 Water 19-MAR-14 09:40 PRV-3 (FIRST DRAW)	L1434230-4 Water 19-MAR-14 09:40 PRV-3 (AFTER FLUSH)	L1434230-5 Water 19-MAR-14 07:50 STORE/CAFE (FIRST DRAW)
Grouping	Analyte					
WATER						
Physical Tests	Hardness (as CaCO ₃) (mg/L)	5.17		4.87		4.99
	pH (pH)	6.88		6.94		6.93
	Total Suspended Solids (mg/L)	<3.0		<3.0		<3.0
	Turbidity (NTU)	0.13		0.12		0.13
Anions and Nutrients	Alkalinity, Total (as CaCO ₃) (mg/L)	5.8		5.8		4.9
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	1.28		1.25		1.32
Total Metals	Aluminum (Al)-Total (mg/L)	0.068	0.047	0.049	0.052	0.034
	Antimony (Sb)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Arsenic (As)-Total (mg/L)	0.00010	<0.00010	<0.00010	0.00012	<0.00010
	Barium (Ba)-Total (mg/L)	<0.020	<0.020	<0.020	0.035	<0.020
	Boron (B)-Total (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	Cadmium (Cd)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Calcium (Ca)-Total (mg/L)	1.72	1.56	1.61	1.63	1.67
	Chromium (Cr)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Copper (Cu)-Total (mg/L)	0.0082	0.0035	0.385	0.0031	0.226
	Iron (Fe)-Total (mg/L)	<0.030	<0.030	<0.030	0.051	<0.030
	Lead (Pb)-Total (mg/L)	<0.00050	<0.00050	0.00386	0.00488	0.00209
	Magnesium (Mg)-Total (mg/L)	0.21	0.20	0.21	0.21	0.20
	Manganese (Mn)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Mercury (Hg)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Potassium (K)-Total (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	Selenium (Se)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Sodium (Na)-Total (mg/L)	<2.0	<2.0	<2.0	<2.0	<2.0
	Uranium (U)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Zinc (Zn)-Total (mg/L)	<0.050	<0.050	0.089	<0.050	0.137
Aggregate Organics	BOD (mg/L)	<2.0		<2.0		<2.0
Trihalomethanes	Bromodichloromethane (mg/L)	<0.0010		<0.0010		<0.0010
	Bromoform (mg/L)	<0.0010		<0.0010		<0.0010
	Dibromochloromethane (mg/L)	<0.0010		<0.0010		<0.0010
	Chloroform (mg/L)	0.0337		0.0337		0.0406
	Total THMs (mg/L)	0.0337		0.0337		0.0406

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1434230-6 Water 19-MAR-14 07:50 STORE/CAFE (AFTER FLUSH)	L1434230-7 Water 19-MAR-14 09:20 LIONS BAY AVE. (FIRST DRAW)	L1434230-8 Water 19-MAR-14 09:20 LIONS BAY AVE. (AFTER FLUSH)	L1434230-9 Water 19-MAR-14 12:50 KELVIN GROVE (FRIST DRAW)	L1434230-10 Water 19-MAR-14 12:50 KELVIN GROVE (AFTER FLUSH)
Grouping	Analyte					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)		4.93		6.23	
	pH (pH)		6.94		7.03	
	Total Suspended Solids (mg/L)		<3.0		<3.0	
	Turbidity (NTU)		0.12		0.12	
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)		4.6		5.8	
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)		1.41		1.25	
Total Metals	Aluminum (Al)-Total (mg/L)	0.047	0.024	0.064	0.048	0.050
	Antimony (Sb)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Arsenic (As)-Total (mg/L)	<0.00010	<0.00010	<0.00010	0.00011	<0.00010
	Barium (Ba)-Total (mg/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Boron (B)-Total (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	Cadmium (Cd)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Calcium (Ca)-Total (mg/L)	1.61	1.66	1.66	2.19	1.93
	Chromium (Cr)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Copper (Cu)-Total (mg/L)	0.0164	0.946	0.0032	0.214	0.0055
	Iron (Fe)-Total (mg/L)	0.044	<0.030	<0.030	0.037	<0.030
	Lead (Pb)-Total (mg/L)	0.00069	0.00399	<0.00050	0.0289	0.00165
	Magnesium (Mg)-Total (mg/L)	0.19	0.19	0.19	0.19	0.19
	Manganese (Mn)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Mercury (Hg)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Potassium (K)-Total (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	Selenium (Se)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Sodium (Na)-Total (mg/L)	<2.0	<2.0	<2.0	<2.0	<2.0
	Uranium (U)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Zinc (Zn)-Total (mg/L)	<0.050	<0.050	<0.050	0.054	<0.050
Aggregate Organics	BOD (mg/L)		<2.0		<2.0	
Trihalomethanes	Bromodichloromethane (mg/L)		<0.0010		<0.0010	
	Bromoform (mg/L)		<0.0010		<0.0010	
	Dibromochloromethane (mg/L)		<0.0010		<0.0010	
	Chloroform (mg/L)		0.0573		0.0487	
	Total THMs (mg/L)		0.0573		0.0487	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1434230-11 Water 19-MAR-14 12:05 MAGNESIA TANK (FIRST DRAW)	L1434230-12 Water 19-MAR-14 12:05 MAGNESIA TANK (AFTER FLUSH)	L1434230-13 Water 19-MAR-14 12:35 PRV-5 (FIRST DRAW)	L1434230-14 Water 19-MAR-14 12:35 PRV-5 (AFTER FLUSH)	L1434230-15 Water 19-MAR-14 11:20 BRUNSWICK BEACH (FIRST DRAW)
Grouping	Analyte					
WATER						
Physical Tests	Hardness (as CaCO ₃) (mg/L)	10.5		10.9		11.1
	pH (pH)	6.99		7.00		7.07
	Total Suspended Solids (mg/L)	<3.0		<3.0		<3.0
	Turbidity (NTU)	0.15		0.15		0.16
Anions and Nutrients	Alkalinity, Total (as CaCO ₃) (mg/L)	7.1		6.9		6.5
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	0.72		0.88		0.95
Total Metals	Aluminum (Al)-Total (mg/L)	0.014	0.029	0.027	0.027	0.030
	Antimony (Sb)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Arsenic (As)-Total (mg/L)	<0.00010	0.00010	0.00012	<0.00010	0.00012
	Barium (Ba)-Total (mg/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Boron (B)-Total (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	Cadmium (Cd)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Calcium (Ca)-Total (mg/L)	3.43	3.65	3.57	3.58	3.69
	Chromium (Cr)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Copper (Cu)-Total (mg/L)	0.578	0.0076	0.0130	0.0046	0.0159
	Iron (Fe)-Total (mg/L)	0.032	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)-Total (mg/L)	0.00110	<0.00050	<0.00050	<0.00050	0.00064
	Magnesium (Mg)-Total (mg/L)	0.47	0.50	0.49	0.49	0.46
	Manganese (Mn)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Mercury (Hg)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Potassium (K)-Total (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	Selenium (Se)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Sodium (Na)-Total (mg/L)	2.4	2.5	2.5	2.5	2.4
	Uranium (U)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Zinc (Zn)-Total (mg/L)	0.075	<0.050	<0.050	<0.050	<0.050
Aggregate Organics	BOD (mg/L)	<2.0		<2.0		<2.0
Trihalomethanes	Bromodichloromethane (mg/L)	<0.0010		<0.0010		<0.0010
	Bromoform (mg/L)	<0.0010		<0.0010		<0.0010
	Dibromochloromethane (mg/L)	<0.0010		<0.0010		<0.0010
	Chloroform (mg/L)	0.0178		0.0195		0.0362
	Total THMs (mg/L)	0.0178		0.0195		0.0362

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1434230-16 Water 19-MAR-14 11:20 BRUNSWICK BEACH (AFTER FLUSH)	L1434230-17 Water 19-MAR-14 07:35 ELEMENTARY SCHOOL (FIRST DRAW)	L1434230-18 Water 19-MAR-14 07:35 ELEMENTARY SCHOOL (AFTER FLUSH)	L1434230-19 Water 19-MAR-14 08:15 COMMUNITY CENTRE (FIRST DRAW)	L1434230-20 Water 19-MAR-14 08:15 COMMUNITY CENTRE (AFTER FLUSH)
Grouping	Analyte					
WATER						
Physical Tests	Hardness (as CaCO ₃) (mg/L)		15.7		9.61	
	pH (pH)		7.14		6.93	
	Total Suspended Solids (mg/L)		<3.0		<3.0	
	Turbidity (NTU)		0.56		0.13	
Anions and Nutrients	Alkalinity, Total (as CaCO ₃) (mg/L)		6.4		4.5	
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)		0.74		1.29	
Total Metals	Aluminum (Al)-Total (mg/L)	0.030	0.011	0.049	<0.010	0.049
	Antimony (Sb)-Total (mg/L)	<0.00050	0.00078	<0.00050	<0.00050	<0.00050
	Arsenic (As)-Total (mg/L)	0.00010	0.00054	0.00017	0.00020	<0.00010
	Barium (Ba)-Total (mg/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Boron (B)-Total (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10
	Cadmium (Cd)-Total (mg/L)	<0.00020	<0.00020	<0.00020	0.00098	<0.00020
	Calcium (Ca)-Total (mg/L)	3.60	5.37	4.18	3.31	1.65
	Chromium (Cr)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
	Copper (Cu)-Total (mg/L)	0.0057	0.108	0.0449	2.96	0.0757
	Iron (Fe)-Total (mg/L)	<0.030	<0.030	0.341	<0.030	0.037
	Lead (Pb)-Total (mg/L)	0.00064	0.0337	0.00141	0.0188	0.00101
	Magnesium (Mg)-Total (mg/L)	0.45	0.56	0.45	0.33	0.19
	Manganese (Mn)-Total (mg/L)	<0.0020	<0.0020	0.0026	0.0031	<0.0020
	Mercury (Hg)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Potassium (K)-Total (mg/L)	<0.10	0.10	<0.10	0.13	<0.10
	Selenium (Se)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Sodium (Na)-Total (mg/L)	2.4	2.9	2.5	<2.0	<2.0
	Uranium (U)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Zinc (Zn)-Total (mg/L)	<0.050	<0.050	<0.050	0.757	<0.050
Aggregate Organics	BOD (mg/L)		<2.0		<2.0	
Trihalomethanes	Bromodichloromethane (mg/L)		<0.0010		<0.0010	
	Bromoform (mg/L)		<0.0010		<0.0010	
	Dibromochloromethane (mg/L)		<0.0010		<0.0010	
	Chloroform (mg/L)		0.0410		0.0435	
	Total THMs (mg/L)		0.0410		0.0435	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1434230-21 Surface Water 19-MAR-14 10:15 HARVEY RAW WATER (FIRST DRAW)	L1434230-22 Surface Water 19-MAR-14 10:15 HARVEY RAW WATER (AFTER FLUSH)	L1434230-23 Surface Water 19-MAR-14 12:10 MAGNESIA RAW WATER (FIRST DRAW)	L1434230-24 Surface Water 19-MAR-14 12:10 MAGNESIA RAW WATER (AFTER FLUSH)	
Grouping	Analyte					
WATER						
Physical Tests	Hardness (as CaCO ₃) (mg/L)	4.86		11.6		
	pH (pH)	6.83		6.94		
	Total Suspended Solids (mg/L)	<3.0		<3.0		
	Turbidity (NTU)	0.12		0.15		
Anions and Nutrients	Alkalinity, Total (as CaCO ₃) (mg/L)	4.2		4.6		
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	1.15		0.76		
Total Metals	Aluminum (Al)-Total (mg/L)	0.040	0.043	0.034	0.031	
	Antimony (Sb)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Arsenic (As)-Total (mg/L)	<0.00010	<0.00010	0.00011	0.00010	
	Barium (Ba)-Total (mg/L)	<0.020	<0.020	<0.020	<0.020	
	Boron (B)-Total (mg/L)	<0.10	<0.10	<0.10	<0.10	
	Cadmium (Cd)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	
	Calcium (Ca)-Total (mg/L)	1.61	1.62	3.76	3.77	
	Chromium (Cr)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	
	Copper (Cu)-Total (mg/L)	0.0062	0.0063	0.0057	0.0050	
	Iron (Fe)-Total (mg/L)	<0.030	<0.030	<0.030	<0.030	
	Lead (Pb)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Magnesium (Mg)-Total (mg/L)	0.20	0.21	0.53	0.53	
	Manganese (Mn)-Total (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	
	Mercury (Hg)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	
	Potassium (K)-Total (mg/L)	<0.10	<0.10	<0.10	<0.10	
	Selenium (Se)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	Sodium (Na)-Total (mg/L)	<2.0	<2.0	<2.0	<2.0	
	Uranium (U)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Zinc (Zn)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	
Aggregate Organics	BOD (mg/L)	<2.0		<2.0		
Trihalomethanes	Bromodichloromethane (mg/L)					
	Bromoform (mg/L)					
	Dibromochloromethane (mg/L)					
	Chloroform (mg/L)					
	Total THMs (mg/L)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Sample Submission Listed:

Qualifier	Description
WSMT	Water sample(s) for total mercury analysis was not submitted in glass container with HCl preservative. Results may be biased low.

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Total Organic Carbon	MS-B	L1434230-1, -11, -13, -15, -17, -19, -21, -23, -3, -5, -7, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	EPA 310.2
This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.			
BOD5-VA	Water	Biochemical Oxygen Demand- 5 day	APHA 5210 B- "BIOCHEMICAL OXYGEN DEMAND"
This analysis is carried out using procedures adapted from APHA Method 5210 B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
BOD5-VA	Water	Biochemical Oxygen Demand- 5 day	APHA 5210 B- BIOCHEMICAL OXYGEN DEMAND
This analysis is carried out using procedures adapted from APHA Method 5210 B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".			
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B
Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.			
HG-TOT-CVAFS-VA	Water	Total Mercury in Water by CVAFS	EPA 245.7
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).			
MET-TOT-ICP-VA	Water	Total Metals in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
MET-TOT-LOW-MS-VA	Water	Total Metals in Water by ICPMS(Low)	EPA SW-846 3005A/6020A
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).			
PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"
This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode			
It is recommended that this analysis be conducted in the field.			
PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value
This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode			
It is recommended that this analysis be conducted in the field.			

Reference Information

THM-HSMS-VA Water VOC (THM) by Headspace GCMS EPA SW-846, METHOD 8260

This procedure is suitable for the analysis of trihalomethanes (chloroform, bromodichloromethane, dibromochloromethane, and bromoform) in chlorinated waters that have been treated to prevent the formation of trihalomethanes after sample collection. The analysis involves the headspace extraction of the sample prior to analysis by capillary column gas chromatography with mass spectrometric detection (GC/MS). The trihalomethanes analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260, published by the United States Environmental Protection Agency (EPA).

THM-SUM-CALC-VA Water Total Trihalomethane-THM CALCULATION

Total Trihalomethanes (where not conducted as part of a formation potential analysis) is equal to the sum of the individual parameter concentrations with non-detect results treated as zero.

TSS-VA Water Total Suspended Solids by Gravimetric APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

TURBIDITY-VA Water Turbidity by Meter APHA 2130 "Turbidity"

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

TURBIDITY-VA Water Turbidity by Meter APHA 2130 Turbidity

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
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VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA
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Chain of Custody Numbers:

1

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



L1434230-COFC

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Page 1 of 1

Report To			Report Format / Distribution			Service Requested (Rush for routine analysis subject to availability)														
Company: Village of Lions Bay			☐ Standard ☐ Other			☒ Regular (Standard Turnaround Times - Business Days)														
Contact: Will Emo			☒ PDF ☐ Excel ☐ Digital ☐ Fax			☐ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT														
Address: 400 Centre Rd			Email 1: aurrutia@lionsbay.ca			☐ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT														
Lions Bay, BC V0N 2E0			Email 2:			☐ Same Day or Weekend Emergency - Contact ALS to Confirm TAT														
Phone: 604 921 9833 Fax:			Email 3:			Analysis Request														
Invoice To Same as Report? ☒ Yes ☐ No			Client / Project Information			Please indicate below Filtered, Preserved or both (F, P, F/P)														
Hardcopy of Invoice with Report? ☐ Yes ☐ No			Job #:																	
Company:			PO / AFE:																	
Contact:			LSD:																	
Address:																				
Phone: Fax:			Quote #:																	
Lab Work Order # (lab use only)			ALS Contact: Selam Worku			Sampler: Alberto Urrutia														
Sample #	Sample Identification (This description will appear on the report)		Date (dd-mm-yy)	Time (hh:mm)	Sample Type	Hardness	pH	TSS	BOD	Turbidity	Alkalinity Total	Total Metals (First Draw)	Total Metals (After Flush)	Mercury	Total Organic Carbon	Trihalomethanes	Number of Containers			
	Harvey Tank		19-Mar-14	10:10	Water	X	X	X	X	X	X	X	X	X	X	X	8			
	PRV-3		19-Mar-14	9:40	Water	X	X	X	X	X	X	X	X	X	X	X	8			
	Store / Café		19-Mar-14	7:50	Water	X	X	X	X	X	X	X	X	X	X	X	8			
	Lions Bay Ave.		19-Mar-14	9:20	Water	X	X	X	X	X	X	X	X	X	X	X	8			
	Kelvin Grove		19-Mar-14	12:50	Water	X	X	X	X	X	X	X	X	X	X	X	8			
	Magnesia Tank		19-Mar-14	12:05	Water	X	X	X	X	X	X	X	X	X	X	X	8			
	PRV-5		19-Mar-14	12:35	Water	X	X	X	X	X	X	X	X	X	X	X	8			
	Brunswick Beach		19-Mar-14	11:20	Water	X	X	X	X	X	X	X	X	X	X	X	8			
	Elementary School		19-Mar-14	7:35	Water	X	X	X	X	X	X	X	X	X	X	X	8			
	Community Centre		19-Mar-14	8:15	Water	X	X	X	X	X	X	X	X	X	X	X	8			
	Harvey Raw Water		19-Mar-14	10:15	Surface Water	X	X	X	X	X		X	X	X			4			
	Magnesia Raw Water		19-Mar-14	12:10	Surface Water	X	X	X	X	X		X	X	X			4			
Special Instructions / Regulations: h water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details																				
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.																				
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.																				
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.																				
SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)														
Released by:	Date (dd-mm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:										
			YC	Mar 19	15:15	4.9/7.3					Yes / No ?									
											If Yes add SIF									

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VILLAGE OF LIONS BAY
ATTN: Nikii Hoglund
400 Centre Road
Lions Bay BC V0N 2E0

Date Received: 07-OCT-14
Report Date: 21-OCT-14 15:09 (MT)
Version: FINAL

Client Phone: 604-921-9833

Certificate of Analysis

Lab Work Order #: L1529295
Project P.O. #: NOT SUBMITTED
Job Reference:
C of C Numbers: 1
Legal Site Desc:

Courtney Duncan
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1529295-1 HARVEY TANK (FIRST DRAW)							
Sampled By: Alberto Urrutia on 07-OCT-14 @ 11:00							
Matrix: Water							
Total Metals in Water (DW)							
Total Mercury in Water by CVAFS							
Mercury (Hg)-Total	<0.00020		0.00020	mg/L		08-OCT-14	R2977449
Total Metals in Water by ICPMS(Low)							
Aluminum (Al)-Total	0.036		0.010	mg/L		18-OCT-14	R3005149
Antimony (Sb)-Total	<0.00050		0.00050	mg/L		18-OCT-14	R3005149
Arsenic (As)-Total	0.00010		0.00010	mg/L		18-OCT-14	R3005149
Cadmium (Cd)-Total	<0.00020		0.00020	mg/L		18-OCT-14	R3005149
Chromium (Cr)-Total	<0.0020		0.0020	mg/L		18-OCT-14	R3005149
Copper (Cu)-Total	0.0631		0.0010	mg/L		18-OCT-14	R3005149
Lead (Pb)-Total	0.00101		0.00050	mg/L		18-OCT-14	R3005149
Manganese (Mn)-Total	<0.0020		0.0020	mg/L		18-OCT-14	R3005149
Potassium (K)-Total	0.13		0.10	mg/L		18-OCT-14	R3005149
Selenium (Se)-Total	<0.0010		0.0010	mg/L		18-OCT-14	R3005149
Uranium (U)-Total	<0.00010		0.00010	mg/L		18-OCT-14	R3005149
Total Metals in Water by ICPOES							
Barium (Ba)-Total	<0.020		0.020	mg/L		16-OCT-14	R2998460
Boron (B)-Total	<0.10		0.10	mg/L		16-OCT-14	R2998460
Calcium (Ca)-Total	2.16		0.10	mg/L		16-OCT-14	R2998460
Iron (Fe)-Total	<0.030		0.030	mg/L		16-OCT-14	R2998460
Magnesium (Mg)-Total	0.24		0.10	mg/L		16-OCT-14	R2998460
Sodium (Na)-Total	2.2		2.0	mg/L		16-OCT-14	R2998460
Zinc (Zn)-Total	<0.050		0.050	mg/L		16-OCT-14	R2998460
Miscellaneous Parameters							
Alkalinity, Total (as CaCO3)	7.8		2.0	mg/L		10-OCT-14	R2981805
BOD	<2.0		2.0	mg/L		08-OCT-14	R2983253
Hardness (as CaCO3)	6.38		0.50	mg/L		20-OCT-14	
Total Suspended Solids	<3.0		3.0	mg/L		11-OCT-14	R2984125
Total Organic Carbon	1.03		0.50	mg/L		17-OCT-14	R3001214
Turbidity	0.14		0.10	NTU		08-OCT-14	R2977640
pH	6.67		0.10	pH		15-OCT-14	R2989733
THM by Headspace GCMS							
Total Trihalomethane-THM							
Total THMs	0.0304		0.0020	mg/L		20-OCT-14	
VOC (THM) by Headspace GCMS							
Chloroform	0.0304		0.0010	mg/L	19-OCT-14	19-OCT-14	R3003109
Bromodichloromethane	<0.0010		0.0010	mg/L	19-OCT-14	19-OCT-14	R3003109
Bromoform	<0.0010		0.0010	mg/L	19-OCT-14	19-OCT-14	R3003109
Dibromochloromethane	<0.0010		0.0010	mg/L	19-OCT-14	19-OCT-14	R3003109
L1529295-2 HARVEY TANK (AFTER FLUSH)							
Sampled By: Alberto Urrutia on 07-OCT-14 @ 11:00							
Matrix: Water							
Total Metals in Water (DW)							
Total Metals in Water by ICPMS(Low)							
Aluminum (Al)-Total	0.037		0.010	mg/L		18-OCT-14	R3005149
Antimony (Sb)-Total	<0.00050		0.00050	mg/L		18-OCT-14	R3005149
Arsenic (As)-Total	0.00012		0.00010	mg/L		18-OCT-14	R3005149
Cadmium (Cd)-Total	<0.00020		0.00020	mg/L		18-OCT-14	R3005149
Chromium (Cr)-Total	<0.0020		0.0020	mg/L		18-OCT-14	R3005149
Copper (Cu)-Total	0.0037		0.0010	mg/L		18-OCT-14	R3005149
Lead (Pb)-Total	<0.00050		0.00050	mg/L		18-OCT-14	R3005149
Manganese (Mn)-Total	<0.0020		0.0020	mg/L		18-OCT-14	R3005149

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1529295-2 HARVEY TANK (AFTER FLUSH) Sampled By: Alberto Urrutia on 07-OCT-14 @ 11:00 Matrix: Water							
Total Metals in Water by ICPMs(Low)							
Potassium (K)-Total	0.14		0.10	mg/L		18-OCT-14	R3005149
Selenium (Se)-Total	<0.0010		0.0010	mg/L		18-OCT-14	R3005149
Uranium (U)-Total	<0.00010		0.00010	mg/L		18-OCT-14	R3005149
Total Metals in Water by ICPOES							
Barium (Ba)-Total	<0.020		0.020	mg/L		16-OCT-14	R2998460
Boron (B)-Total	<0.10		0.10	mg/L		16-OCT-14	R2998460
Calcium (Ca)-Total	2.21		0.10	mg/L		16-OCT-14	R2998460
Iron (Fe)-Total	<0.030		0.030	mg/L		16-OCT-14	R2998460
Magnesium (Mg)-Total	0.24		0.10	mg/L		16-OCT-14	R2998460
Sodium (Na)-Total	2.2		2.0	mg/L		16-OCT-14	R2998460
Zinc (Zn)-Total	<0.050		0.050	mg/L		16-OCT-14	R2998460
L1529295-3 STORE/CAFE (FIRST DRAW) Sampled By: Alberto Urrutia on 07-OCT-14 @ 07:40 Matrix: Water							
Total Metals in Water (DW)							
Total Mercury in Water by CVAFS							
Mercury (Hg)-Total	<0.00020		0.00020	mg/L		08-OCT-14	R2977449
Total Metals in Water by ICPMs(Low)							
Aluminum (Al)-Total	0.022		0.010	mg/L		18-OCT-14	R3005149
Antimony (Sb)-Total	<0.00050		0.00050	mg/L		18-OCT-14	R3005149
Arsenic (As)-Total	<0.00010		0.00010	mg/L		18-OCT-14	R3005149
Cadmium (Cd)-Total	<0.00020		0.00020	mg/L		18-OCT-14	R3005149
Chromium (Cr)-Total	<0.0020		0.0020	mg/L		18-OCT-14	R3005149
Copper (Cu)-Total	0.0964		0.0010	mg/L		18-OCT-14	R3005149
Lead (Pb)-Total	0.0109		0.00050	mg/L		18-OCT-14	R3005149
Manganese (Mn)-Total	<0.0020		0.0020	mg/L		18-OCT-14	R3005149
Potassium (K)-Total	0.14		0.10	mg/L		18-OCT-14	R3005149
Selenium (Se)-Total	<0.0010		0.0010	mg/L		18-OCT-14	R3005149
Uranium (U)-Total	<0.00010		0.00010	mg/L		18-OCT-14	R3005149
Total Metals in Water by ICPOES							
Barium (Ba)-Total	<0.020		0.020	mg/L		16-OCT-14	R2998460
Boron (B)-Total	<0.10		0.10	mg/L		16-OCT-14	R2998460
Calcium (Ca)-Total	2.11		0.10	mg/L		16-OCT-14	R2998460
Iron (Fe)-Total	<0.030		0.030	mg/L		16-OCT-14	R2998460
Magnesium (Mg)-Total	0.24		0.10	mg/L		16-OCT-14	R2998460
Sodium (Na)-Total	2.1		2.0	mg/L		16-OCT-14	R2998460
Zinc (Zn)-Total	<0.050		0.050	mg/L		16-OCT-14	R2998460
Miscellaneous Parameters							
Alkalinity, Total (as CaCO3)	7.3		2.0	mg/L		10-OCT-14	R2981805
BOD	<2.0		2.0	mg/L		08-OCT-14	R2983253
Hardness (as CaCO3)	6.25		0.50	mg/L		20-OCT-14	
Total Suspended Solids	<3.0		3.0	mg/L		11-OCT-14	R2984125
Total Organic Carbon	1.11		0.50	mg/L		17-OCT-14	R3001214
Turbidity	0.18		0.10	NTU		08-OCT-14	R2977640
pH	6.68		0.10	pH		17-OCT-14	R2998403
THM by Headspace GCMS							
Total Trihalomethane-THM							
Total THMs	0.0332		0.0020	mg/L		20-OCT-14	
VOC (THM) by Headspace GCMS							
Chloroform	0.0332		0.0010	mg/L	19-OCT-14	19-OCT-14	R3003109

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1529295-3 STORE/CAFE (FIRST DRAW) Sampled By: Alberto Urrutia on 07-OCT-14 @ 07:40 Matrix: Water VOC (THM) by Headspace GCMS Bromodichloromethane Bromoform Dibromochloromethane	<0.0010 <0.0010 <0.0010		0.0010 0.0010 0.0010	mg/L mg/L mg/L	19-OCT-14 19-OCT-14 19-OCT-14	19-OCT-14 19-OCT-14 19-OCT-14	R3003109 R3003109 R3003109
L1529295-4 STORE/CAFE (AFTER FLUSH) Sampled By: Alberto Urrutia on 07-OCT-14 @ 07:40 Matrix: Water Total Metals in Water (DW) Total Metals in Water by ICPMS(Low) Aluminum (Al)-Total Antimony (Sb)-Total Arsenic (As)-Total Cadmium (Cd)-Total Chromium (Cr)-Total Copper (Cu)-Total Lead (Pb)-Total Manganese (Mn)-Total Potassium (K)-Total Selenium (Se)-Total Uranium (U)-Total Total Metals in Water by ICPOES Barium (Ba)-Total Boron (B)-Total Calcium (Ca)-Total Iron (Fe)-Total Magnesium (Mg)-Total Sodium (Na)-Total Zinc (Zn)-Total	0.030 <0.00050 0.00011 <0.00020 <0.0020 0.0163 <0.00050 <0.0020 0.13 <0.0010 <0.00010 <0.020 <0.10 2.12 <0.030 0.23 2.2 <0.050		0.010 0.00050 0.00010 0.00020 0.0020 0.0010 0.00050 0.0020 0.10 0.0010 0.00010 0.020 0.10 0.10 0.030 0.10 2.0 0.050	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L		18-OCT-14 18-OCT-14 18-OCT-14 18-OCT-14 18-OCT-14 18-OCT-14 18-OCT-14 18-OCT-14 18-OCT-14 18-OCT-14 18-OCT-14 16-OCT-14 16-OCT-14 16-OCT-14 16-OCT-14 16-OCT-14 16-OCT-14 16-OCT-14	R3005149 R3005149 R3005149 R3005149 R3005149 R3005149 R3005149 R3005149 R3005149 R3005149 R3005149 R2998460 R2998460 R2998460 R2998460 R2998460 R2998460 R2998460
L1529295-5 LIONS BAY AVE. (FIRST DRAW) Sampled By: Alberto Urrutia on 07-OCT-14 @ 12:10 Matrix: Water Total Metals in Water (DW) Total Mercury in Water by CVAFS Mercury (Hg)-Total Total Metals in Water by ICPMS(Low) Aluminum (Al)-Total Antimony (Sb)-Total Arsenic (As)-Total Cadmium (Cd)-Total Chromium (Cr)-Total Copper (Cu)-Total Lead (Pb)-Total Manganese (Mn)-Total Potassium (K)-Total Selenium (Se)-Total Uranium (U)-Total Total Metals in Water by ICPOES Barium (Ba)-Total Boron (B)-Total Calcium (Ca)-Total Iron (Fe)-Total	<0.00020 0.017 <0.00050 <0.00010 <0.00020 <0.0020 0.378 0.00310 <0.0020 0.14 <0.0010 <0.00010 <0.020 <0.10 2.10 <0.030		0.00020 0.010 0.00050 0.00010 0.00020 0.0020 0.0010 0.00050 0.0020 0.10 0.0010 0.00010 0.020 0.10 0.10 0.030	mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L		08-OCT-14 18-OCT-14 18-OCT-14 18-OCT-14 18-OCT-14 18-OCT-14 18-OCT-14 18-OCT-14 18-OCT-14 18-OCT-14 18-OCT-14 18-OCT-14 16-OCT-14 16-OCT-14 16-OCT-14 16-OCT-14	R2977449 R3005149 R3005149 R3005149 R3005149 R3005149 R3005149 R3005149 R3005149 R3005149 R3005149 R3005149 R2998460 R2998460 R2998460 R2998460

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1529295-5 LIONS BAY AVE. (FIRST DRAW) Sampled By: Alberto Urrutia on 07-OCT-14 @ 12:10 Matrix: Water							
Total Metals in Water by ICPOES							
Magnesium (Mg)-Total	0.22		0.10	mg/L		16-OCT-14	R2998460
Sodium (Na)-Total	2.1		2.0	mg/L		16-OCT-14	R2998460
Zinc (Zn)-Total	<0.050		0.050	mg/L		16-OCT-14	R2998460
Miscellaneous Parameters							
Alkalinity, Total (as CaCO3)	7.0		2.0	mg/L		10-OCT-14	R2981805
BOD	<2.0		2.0	mg/L		08-OCT-14	R2983253
Hardness (as CaCO3)	6.18		0.50	mg/L		20-OCT-14	
Total Suspended Solids	<3.0		3.0	mg/L		11-OCT-14	R2984125
Total Organic Carbon	1.11		0.50	mg/L		17-OCT-14	R3001214
Turbidity	<0.10		0.10	NTU		08-OCT-14	R2977640
pH	6.82		0.10	pH		17-OCT-14	R2998403
THM by Headspace GCMS							
Total Trihalomethane-THM							
Total THMs	0.0314		0.0020	mg/L		20-OCT-14	
VOC (THM) by Headspace GCMS							
Chloroform	0.0314		0.0010	mg/L	19-OCT-14	19-OCT-14	R3003109
Bromodichloromethane	<0.0010		0.0010	mg/L	19-OCT-14	19-OCT-14	R3003109
Bromoform	<0.0010		0.0010	mg/L	19-OCT-14	19-OCT-14	R3003109
Dibromochloromethane	<0.0010		0.0010	mg/L	19-OCT-14	19-OCT-14	R3003109
L1529295-6 LIONS BAY AVE. (AFTER FLUSH) Sampled By: Alberto Urrutia on 07-OCT-14 @ 12:10 Matrix: Water							
Total Metals in Water (DW)							
Total Metals in Water by ICPMS(Low)							
Aluminum (Al)-Total	0.032		0.010	mg/L		18-OCT-14	R3005149
Antimony (Sb)-Total	<0.00050		0.00050	mg/L		18-OCT-14	R3005149
Arsenic (As)-Total	0.00013		0.00010	mg/L		18-OCT-14	R3005149
Cadmium (Cd)-Total	<0.00020		0.00020	mg/L		18-OCT-14	R3005149
Chromium (Cr)-Total	<0.0020		0.0020	mg/L		18-OCT-14	R3005149
Copper (Cu)-Total	0.0023		0.0010	mg/L		18-OCT-14	R3005149
Lead (Pb)-Total	<0.00050		0.00050	mg/L		18-OCT-14	R3005149
Manganese (Mn)-Total	<0.0020		0.0020	mg/L		18-OCT-14	R3005149
Potassium (K)-Total	0.14		0.10	mg/L		18-OCT-14	R3005149
Selenium (Se)-Total	<0.0010		0.0010	mg/L		18-OCT-14	R3005149
Uranium (U)-Total	<0.00010		0.00010	mg/L		18-OCT-14	R3005149
Total Metals in Water by ICPOES							
Barium (Ba)-Total	<0.020		0.020	mg/L		16-OCT-14	R2998460
Boron (B)-Total	<0.10		0.10	mg/L		16-OCT-14	R2998460
Calcium (Ca)-Total	2.15		0.10	mg/L		16-OCT-14	R2998460
Iron (Fe)-Total	<0.030		0.030	mg/L		16-OCT-14	R2998460
Magnesium (Mg)-Total	0.23		0.10	mg/L		16-OCT-14	R2998460
Sodium (Na)-Total	2.1		2.0	mg/L		16-OCT-14	R2998460
Zinc (Zn)-Total	<0.050		0.050	mg/L		16-OCT-14	R2998460
L1529295-7 KELVIN GROVE (FIRST DRAW) Sampled By: Alberto Urrutia on 07-OCT-14 @ 08:15 Matrix: Water							
Total Metals in Water (DW)							
Total Mercury in Water by CVAFS							
Mercury (Hg)-Total	<0.00020		0.00020	mg/L		08-OCT-14	R2977449

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1529295-7 KELVIN GROVE (FIRST DRAW)							
Sampled By: Alberto Urrutia on 07-OCT-14 @ 08:15							
Matrix: Water							
Total Metals in Water by ICPMS(Low)							
Aluminum (Al)-Total	0.039		0.010	mg/L		18-OCT-14	R3005149
Antimony (Sb)-Total	<0.00050		0.00050	mg/L		18-OCT-14	R3005149
Arsenic (As)-Total	0.00012		0.00010	mg/L		18-OCT-14	R3005149
Cadmium (Cd)-Total	<0.00020		0.00020	mg/L		18-OCT-14	R3005149
Chromium (Cr)-Total	<0.0020		0.0020	mg/L		18-OCT-14	R3005149
Copper (Cu)-Total	0.0608		0.0010	mg/L		18-OCT-14	R3005149
Lead (Pb)-Total	0.0124		0.00050	mg/L		18-OCT-14	R3005149
Manganese (Mn)-Total	<0.0020		0.0020	mg/L		18-OCT-14	R3005149
Potassium (K)-Total	0.12		0.10	mg/L		18-OCT-14	R3005149
Selenium (Se)-Total	<0.0010		0.0010	mg/L		18-OCT-14	R3005149
Uranium (U)-Total	<0.00010		0.00010	mg/L		18-OCT-14	R3005149
Total Metals in Water by ICPOES							
Barium (Ba)-Total	<0.020		0.020	mg/L		16-OCT-14	R2998460
Boron (B)-Total	<0.10		0.10	mg/L		16-OCT-14	R2998460
Calcium (Ca)-Total	2.76		0.10	mg/L		16-OCT-14	R2998460
Iron (Fe)-Total	0.035		0.030	mg/L		16-OCT-14	R2998460
Magnesium (Mg)-Total	0.20		0.10	mg/L		16-OCT-14	R2998460
Sodium (Na)-Total	2.1		2.0	mg/L		16-OCT-14	R2998460
Zinc (Zn)-Total	<0.050		0.050	mg/L		16-OCT-14	R2998460
Miscellaneous Parameters							
Alkalinity, Total (as CaCO3)	8.0		2.0	mg/L		10-OCT-14	R2981805
BOD	<2.0		2.0	mg/L		08-OCT-14	R2983253
Hardness (as CaCO3)	7.71		0.50	mg/L		20-OCT-14	
Total Suspended Solids	<3.0		3.0	mg/L		11-OCT-14	R2984125
Total Organic Carbon	0.96		0.50	mg/L		17-OCT-14	R3001214
Turbidity	<0.10		0.10	NTU		08-OCT-14	R2977640
pH	6.94		0.10	pH		17-OCT-14	R2998403
THM by Headspace GCMS							
Total Trihalomethane-THM							
Total THMs	0.0496		0.0020	mg/L		20-OCT-14	
VOC (THM) by Headspace GCMS							
Chloroform	0.0496		0.0010	mg/L	19-OCT-14	19-OCT-14	R3003109
Bromodichloromethane	<0.0010		0.0010	mg/L	19-OCT-14	19-OCT-14	R3003109
Bromoform	<0.0010		0.0010	mg/L	19-OCT-14	19-OCT-14	R3003109
Dibromochloromethane	<0.0010		0.0010	mg/L	19-OCT-14	19-OCT-14	R3003109
L1529295-8 KELVIN GROVE (AFTER FLUSH)							
Sampled By: Alberto Urrutia on 07-OCT-14 @ 08:15							
Matrix: Water							
Total Metals in Water (DW)							
Total Metals in Water by ICPMS(Low)							
Aluminum (Al)-Total	0.042		0.010	mg/L		18-OCT-14	R3005149
Antimony (Sb)-Total	<0.00050		0.00050	mg/L		18-OCT-14	R3005149
Arsenic (As)-Total	0.00012		0.00010	mg/L		18-OCT-14	R3005149
Cadmium (Cd)-Total	<0.00020		0.00020	mg/L		18-OCT-14	R3005149
Chromium (Cr)-Total	<0.0020		0.0020	mg/L		18-OCT-14	R3005149
Copper (Cu)-Total	0.0021		0.0010	mg/L		18-OCT-14	R3005149
Lead (Pb)-Total	0.00102		0.00050	mg/L		18-OCT-14	R3005149
Manganese (Mn)-Total	<0.0020		0.0020	mg/L		18-OCT-14	R3005149
Potassium (K)-Total	0.13		0.10	mg/L		18-OCT-14	R3005149
Selenium (Se)-Total	<0.0010		0.0010	mg/L		18-OCT-14	R3005149
Uranium (U)-Total	<0.00010		0.00010	mg/L		18-OCT-14	R3005149

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1529295-8 KELVIN GROVE (AFTER FLUSH)							
Sampled By: Alberto Urrutia on 07-OCT-14 @ 08:15							
Matrix: Water							
Total Metals in Water by ICPOES							
Barium (Ba)-Total	<0.020		0.020	mg/L		16-OCT-14	R2998460
Boron (B)-Total	<0.10		0.10	mg/L		16-OCT-14	R2998460
Calcium (Ca)-Total	2.81		0.10	mg/L		16-OCT-14	R2998460
Iron (Fe)-Total	0.035		0.030	mg/L		16-OCT-14	R2998460
Magnesium (Mg)-Total	0.20		0.10	mg/L		16-OCT-14	R2998460
Sodium (Na)-Total	2.2		2.0	mg/L		16-OCT-14	R2998460
Zinc (Zn)-Total	<0.050		0.050	mg/L		16-OCT-14	R2998460
L1529295-9 MAGNESIA TANK (FIRST DRAW)							
Sampled By: Alberto Urrutia on 07-OCT-14 @ 09:15							
Matrix: Water							
Total Metals in Water (DW)							
Total Mercury in Water by CVAFS							
Mercury (Hg)-Total	<0.00020		0.00020	mg/L		08-OCT-14	R2977449
Total Metals in Water by ICPMS(Low)							
Aluminum (Al)-Total	<0.010		0.010	mg/L		18-OCT-14	R3005149
Antimony (Sb)-Total	<0.00050		0.00050	mg/L		18-OCT-14	R3005149
Arsenic (As)-Total	<0.00010		0.00010	mg/L		18-OCT-14	R3005149
Cadmium (Cd)-Total	<0.00020		0.00020	mg/L		18-OCT-14	R3005149
Chromium (Cr)-Total	<0.0020		0.0020	mg/L		18-OCT-14	R3005149
Copper (Cu)-Total	0.519		0.0010	mg/L		18-OCT-14	R3005149
Lead (Pb)-Total	0.00349		0.00050	mg/L		18-OCT-14	R3005149
Manganese (Mn)-Total	<0.0020		0.0020	mg/L		18-OCT-14	R3005149
Potassium (K)-Total	<0.10		0.10	mg/L		18-OCT-14	R3005149
Selenium (Se)-Total	<0.0010		0.0010	mg/L		18-OCT-14	R3005149
Uranium (U)-Total	<0.00010		0.00010	mg/L		18-OCT-14	R3005149
Total Metals in Water by ICPOES							
Barium (Ba)-Total	<0.020		0.020	mg/L		16-OCT-14	R2998460
Boron (B)-Total	<0.10		0.10	mg/L		16-OCT-14	R2998460
Calcium (Ca)-Total	4.58		0.10	mg/L		16-OCT-14	R2998460
Iron (Fe)-Total	0.112		0.030	mg/L		16-OCT-14	R2998460
Magnesium (Mg)-Total	0.48		0.10	mg/L		16-OCT-14	R2998460
Sodium (Na)-Total	2.5		2.0	mg/L		16-OCT-14	R2998460
Zinc (Zn)-Total	0.261		0.050	mg/L		16-OCT-14	R2998460
Miscellaneous Parameters							
Alkalinity, Total (as CaCO3)	8.0		2.0	mg/L		10-OCT-14	R2981805
BOD	<2.0		2.0	mg/L		08-OCT-14	R2983253
Hardness (as CaCO3)	13.4		0.50	mg/L		20-OCT-14	
Total Suspended Solids	<3.0		3.0	mg/L		11-OCT-14	R2984125
Total Organic Carbon	0.73		0.50	mg/L		17-OCT-14	R3001214
Turbidity	0.11		0.10	NTU		08-OCT-14	R2977640
pH	7.34		0.10	pH		15-OCT-14	R2989733
THM by Headspace GCMS							
Total Trihalomethane-THM							
Total THMs	0.0196		0.0020	mg/L		20-OCT-14	
VOC (THM) by Headspace GCMS							
Chloroform	0.0196		0.0010	mg/L	19-OCT-14	19-OCT-14	R3003109
Bromodichloromethane	<0.0010		0.0010	mg/L	19-OCT-14	19-OCT-14	R3003109
Bromoform	<0.0010		0.0010	mg/L	19-OCT-14	19-OCT-14	R3003109
Dibromochloromethane	<0.0010		0.0010	mg/L	19-OCT-14	19-OCT-14	R3003109

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1529295-10 MAGNESIA TANK (AFTER FLUSH) Sampled By: Alberto Urrutia on 07-OCT-14 @ 09:15 Matrix: Water Total Metals in Water (DW) Total Metals in Water by ICPMS(Low) Aluminum (Al)-Total 0.020 0.010 mg/L 18-OCT-14 R3005149 Antimony (Sb)-Total <0.00050 0.00050 mg/L 18-OCT-14 R3005149 Arsenic (As)-Total 0.00012 0.00010 mg/L 18-OCT-14 R3005149 Cadmium (Cd)-Total <0.00020 0.00020 mg/L 18-OCT-14 R3005149 Chromium (Cr)-Total <0.0020 0.0020 mg/L 18-OCT-14 R3005149 Copper (Cu)-Total 0.0086 0.0010 mg/L 18-OCT-14 R3005149 Lead (Pb)-Total <0.00050 0.00050 mg/L 18-OCT-14 R3005149 Manganese (Mn)-Total <0.0020 0.0020 mg/L 18-OCT-14 R3005149 Potassium (K)-Total <0.10 0.10 mg/L 18-OCT-14 R3005149 Selenium (Se)-Total <0.0010 0.0010 mg/L 18-OCT-14 R3005149 Uranium (U)-Total <0.00010 0.00010 mg/L 18-OCT-14 R3005149 Total Metals in Water by ICPOES Barium (Ba)-Total <0.020 0.020 mg/L 16-OCT-14 R2998460 Boron (B)-Total <0.10 0.10 mg/L 16-OCT-14 R2998460 Calcium (Ca)-Total 4.72 0.10 mg/L 16-OCT-14 R2998460 Iron (Fe)-Total <0.030 0.030 mg/L 16-OCT-14 R2998460 Magnesium (Mg)-Total 0.50 0.10 mg/L 16-OCT-14 R2998460 Sodium (Na)-Total 2.7 2.0 mg/L 16-OCT-14 R2998460 Zinc (Zn)-Total <0.050 0.050 mg/L 16-OCT-14 R2998460							
L1529295-11 BRUNSWICK BEACH (FIRST DRAW) Sampled By: Alberto Urrutia on 07-OCT-14 @ 12:40 Matrix: Water Total Metals in Water (DW) Total Mercury in Water by CVAFS Mercury (Hg)-Total <0.00020 0.00020 mg/L 08-OCT-14 R2977449 Total Metals in Water by ICPMS(Low) Aluminum (Al)-Total 0.021 0.010 mg/L 18-OCT-14 R3005149 Antimony (Sb)-Total <0.00050 0.00050 mg/L 18-OCT-14 R3005149 Arsenic (As)-Total 0.00013 0.00010 mg/L 18-OCT-14 R3005149 Cadmium (Cd)-Total <0.00020 0.00020 mg/L 18-OCT-14 R3005149 Chromium (Cr)-Total <0.0020 0.0020 mg/L 18-OCT-14 R3005149 Copper (Cu)-Total 0.0086 0.0010 mg/L 18-OCT-14 R3005149 Lead (Pb)-Total <0.00050 0.00050 mg/L 18-OCT-14 R3005149 Manganese (Mn)-Total <0.0020 0.0020 mg/L 18-OCT-14 R3005149 Potassium (K)-Total 0.11 0.10 mg/L 18-OCT-14 R3005149 Selenium (Se)-Total <0.0010 0.0010 mg/L 18-OCT-14 R3005149 Uranium (U)-Total <0.00010 0.00010 mg/L 18-OCT-14 R3005149 Total Metals in Water by ICPOES Barium (Ba)-Total <0.020 0.020 mg/L 16-OCT-14 R2998460 Boron (B)-Total <0.10 0.10 mg/L 16-OCT-14 R2998460 Calcium (Ca)-Total 4.75 0.10 mg/L 16-OCT-14 R2998460 Iron (Fe)-Total 0.046 0.030 mg/L 16-OCT-14 R2998460 Magnesium (Mg)-Total 0.47 0.10 mg/L 16-OCT-14 R2998460 Sodium (Na)-Total 2.5 2.0 mg/L 16-OCT-14 R2998460 Zinc (Zn)-Total <0.050 0.050 mg/L 16-OCT-14 R2998460 Miscellaneous Parameters Alkalinity, Total (as CaCO3) 6.6 2.0 mg/L 10-OCT-14 R2981805 BOD <2.0 2.0 mg/L 08-OCT-14 R2983253 Hardness (as CaCO3) 13.8 0.50 mg/L 20-OCT-14							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1529295-11 BRUNSWICK BEACH (FIRST DRAW) Sampled By: Alberto Urrutia on 07-OCT-14 @ 12:40 Matrix: Water							
Total Suspended Solids	<3.0		3.0	mg/L		11-OCT-14	R2984125
Total Organic Carbon	0.84		0.50	mg/L		17-OCT-14	R3001214
Turbidity	0.13		0.10	NTU		08-OCT-14	R2977640
pH	7.50		0.10	pH		15-OCT-14	R2989733
THM by Headspace GCMS							
Total Trihalomethane-THM							
Total THMs	0.0253		0.0020	mg/L		20-OCT-14	
VOC (THM) by Headspace GCMS							
Chloroform	0.0253		0.0010	mg/L	19-OCT-14	19-OCT-14	R3003109
Bromodichloromethane	<0.0010		0.0010	mg/L	19-OCT-14	19-OCT-14	R3003109
Bromoform	<0.0010		0.0010	mg/L	19-OCT-14	19-OCT-14	R3003109
Dibromochloromethane	<0.0010		0.0010	mg/L	19-OCT-14	19-OCT-14	R3003109
L1529295-12 BRUNSWICK BEACH (AFTER FLUSH) Sampled By: Alberto Urrutia on 07-OCT-14 @ 12:40 Matrix: Water							
Total Metals in Water (DW)							
Total Metals in Water by ICPMS(Low)							
Aluminum (Al)-Total	0.021		0.010	mg/L		18-OCT-14	R3005149
Antimony (Sb)-Total	<0.00050		0.00050	mg/L		18-OCT-14	R3005149
Arsenic (As)-Total	0.00013		0.00010	mg/L		18-OCT-14	R3005149
Cadmium (Cd)-Total	<0.00020		0.00020	mg/L		18-OCT-14	R3005149
Chromium (Cr)-Total	<0.0020		0.0020	mg/L		18-OCT-14	R3005149
Copper (Cu)-Total	0.0073		0.0010	mg/L		18-OCT-14	R3005149
Lead (Pb)-Total	<0.00050		0.00050	mg/L		18-OCT-14	R3005149
Manganese (Mn)-Total	<0.0020		0.0020	mg/L		18-OCT-14	R3005149
Potassium (K)-Total	0.11		0.10	mg/L		18-OCT-14	R3005149
Selenium (Se)-Total	<0.0010		0.0010	mg/L		18-OCT-14	R3005149
Uranium (U)-Total	<0.00010		0.00010	mg/L		18-OCT-14	R3005149
Total Metals in Water by ICPOES							
Barium (Ba)-Total	<0.020		0.020	mg/L		16-OCT-14	R2998460
Boron (B)-Total	<0.10		0.10	mg/L		16-OCT-14	R2998460
Calcium (Ca)-Total	4.90		0.10	mg/L		16-OCT-14	R2998460
Iron (Fe)-Total	0.049		0.030	mg/L		16-OCT-14	R2998460
Magnesium (Mg)-Total	0.48		0.10	mg/L		16-OCT-14	R2998460
Sodium (Na)-Total	2.6		2.0	mg/L		16-OCT-14	R2998460
Zinc (Zn)-Total	<0.050		0.050	mg/L		16-OCT-14	R2998460
L1529295-13 ELEMENTARY SCHOOL (FIRST DRAW) Sampled By: Alberto Urrutia on 07-OCT-14 @ 07:20 Matrix: Water							
Total Metals in Water (DW)							
Total Mercury in Water by CVAFS							
Mercury (Hg)-Total	<0.00020		0.00020	mg/L		08-OCT-14	R2977449
Total Metals in Water by ICPMS(Low)							
Aluminum (Al)-Total	0.019		0.010	mg/L		18-OCT-14	R3005149
Antimony (Sb)-Total	<0.00050		0.00050	mg/L		18-OCT-14	R3005149
Arsenic (As)-Total	0.00017		0.00010	mg/L		18-OCT-14	R3005149
Cadmium (Cd)-Total	<0.00020		0.00020	mg/L		18-OCT-14	R3005149
Chromium (Cr)-Total	<0.0020		0.0020	mg/L		18-OCT-14	R3005149
Copper (Cu)-Total	0.0066		0.0010	mg/L		18-OCT-14	R3005149
Lead (Pb)-Total	0.00748		0.00050	mg/L		18-OCT-14	R3005149
Manganese (Mn)-Total	0.0024		0.0020	mg/L		18-OCT-14	R3005149

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

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Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1529295-13 ELEMENTARY SCHOOL (FIRST DRAW)							
Sampled By: Alberto Urrutia on 07-OCT-14 @ 07:20							
Matrix: Water							
Total Metals in Water by ICPMS(Low)							
Potassium (K)-Total	<0.10		0.10	mg/L		18-OCT-14	R3005149
Selenium (Se)-Total	<0.0010		0.0010	mg/L		18-OCT-14	R3005149
Uranium (U)-Total	<0.00010		0.00010	mg/L		18-OCT-14	R3005149
Total Metals in Water by ICPOES							
Barium (Ba)-Total	<0.020		0.020	mg/L		16-OCT-14	R2998460
Boron (B)-Total	<0.10		0.10	mg/L		16-OCT-14	R2998460
Calcium (Ca)-Total	4.60		0.10	mg/L		16-OCT-14	R2998460
Iron (Fe)-Total	<0.030		0.030	mg/L		16-OCT-14	R2998460
Magnesium (Mg)-Total	0.54		0.10	mg/L		16-OCT-14	R2998460
Sodium (Na)-Total	3.0		2.0	mg/L		16-OCT-14	R2998460
Zinc (Zn)-Total	0.085		0.050	mg/L		16-OCT-14	R2998460
Miscellaneous Parameters							
Alkalinity, Total (as CaCO3)	6.3		2.0	mg/L		10-OCT-14	R2981805
BOD	<2.0		2.0	mg/L		08-OCT-14	R2983253
Hardness (as CaCO3)	13.7		0.50	mg/L		20-OCT-14	
Total Suspended Solids	<3.0		3.0	mg/L		11-OCT-14	R2984125
Total Organic Carbon	0.72		0.50	mg/L		17-OCT-14	R3001214
Turbidity	0.17		0.10	NTU		08-OCT-14	R2977640
pH	7.47		0.10	pH		15-OCT-14	R2989733
THM by Headspace GCMS							
Total Trihalomethane-THM							
Total THMs	0.0264		0.0020	mg/L		20-OCT-14	
VOC (THM) by Headspace GCMS							
Chloroform	0.0264		0.0010	mg/L	19-OCT-14	19-OCT-14	R3003109
Bromodichloromethane	<0.0010		0.0010	mg/L	19-OCT-14	19-OCT-14	R3003109
Bromoform	<0.0010		0.0010	mg/L	19-OCT-14	19-OCT-14	R3003109
Dibromochloromethane	<0.0010		0.0010	mg/L	19-OCT-14	19-OCT-14	R3003109
L1529295-14 ELEMENTARY SCHOOL (AFTER FLUSH)							
Sampled By: Alberto Urrutia on 07-OCT-14 @ 07:20							
Matrix: Water							
Total Metals in Water (DW)							
Total Metals in Water by ICPMS(Low)							
Aluminum (Al)-Total	0.013		0.010	mg/L		18-OCT-14	R3005149
Antimony (Sb)-Total	<0.00050		0.00050	mg/L		18-OCT-14	R3005149
Arsenic (As)-Total	0.00012		0.00010	mg/L		18-OCT-14	R3005149
Cadmium (Cd)-Total	<0.00020		0.00020	mg/L		18-OCT-14	R3005149
Chromium (Cr)-Total	<0.0020		0.0020	mg/L		18-OCT-14	R3005149
Copper (Cu)-Total	0.0026		0.0010	mg/L		18-OCT-14	R3005149
Lead (Pb)-Total	<0.00050		0.00050	mg/L		18-OCT-14	R3005149
Manganese (Mn)-Total	0.0023		0.0020	mg/L		18-OCT-14	R3005149
Potassium (K)-Total	<0.10		0.10	mg/L		18-OCT-14	R3005149
Selenium (Se)-Total	<0.0010		0.0010	mg/L		18-OCT-14	R3005149
Uranium (U)-Total	<0.00010		0.00010	mg/L		18-OCT-14	R3005149
Total Metals in Water by ICPOES							
Barium (Ba)-Total	<0.020		0.020	mg/L		16-OCT-14	R2998460
Boron (B)-Total	<0.10		0.10	mg/L		16-OCT-14	R2998460
Calcium (Ca)-Total	4.78		0.10	mg/L		16-OCT-14	R2998460
Iron (Fe)-Total	0.030		0.030	mg/L		16-OCT-14	R2998460
Magnesium (Mg)-Total	0.53		0.10	mg/L		16-OCT-14	R2998460
Sodium (Na)-Total	2.6		2.0	mg/L		16-OCT-14	R2998460
Zinc (Zn)-Total	<0.050		0.050	mg/L		16-OCT-14	R2998460

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1529295-14 ELEMENTARY SCHOOL (AFTER FLUSH) Sampled By: Alberto Urrutia on 07-OCT-14 @ 07:20 Matrix: Water							
L1529295-15 HARVEY RAW WATER (AFTER FLUSH) Sampled By: Alberto Urrutia on 07-OCT-14 @ 11:05 Matrix: Surface Water							
Total Metals in Water (DW)							
Total Mercury in Water by CVAFS							
Mercury (Hg)-Total	<0.00020		0.00020	mg/L		08-OCT-14	R2977449
Total Metals in Water by ICPMS(Low)							
Aluminum (Al)-Total	0.033		0.010	mg/L		18-OCT-14	R3005149
Antimony (Sb)-Total	<0.00050		0.00050	mg/L		18-OCT-14	R3005149
Arsenic (As)-Total	0.00012		0.00010	mg/L		18-OCT-14	R3005149
Cadmium (Cd)-Total	<0.00020		0.00020	mg/L		18-OCT-14	R3005149
Chromium (Cr)-Total	<0.0020		0.0020	mg/L		18-OCT-14	R3005149
Copper (Cu)-Total	0.0060		0.0010	mg/L		18-OCT-14	R3005149
Lead (Pb)-Total	<0.00050		0.00050	mg/L		18-OCT-14	R3005149
Manganese (Mn)-Total	<0.0020		0.0020	mg/L		18-OCT-14	R3005149
Potassium (K)-Total	0.14		0.10	mg/L		18-OCT-14	R3005149
Selenium (Se)-Total	<0.0010		0.0010	mg/L		18-OCT-14	R3005149
Uranium (U)-Total	<0.00010		0.00010	mg/L		18-OCT-14	R3005149
Total Metals in Water by ICPOES							
Barium (Ba)-Total	<0.020		0.020	mg/L		16-OCT-14	R2998460
Boron (B)-Total	<0.10		0.10	mg/L		16-OCT-14	R2998460
Calcium (Ca)-Total	2.12		0.10	mg/L		16-OCT-14	R2998460
Iron (Fe)-Total	<0.030		0.030	mg/L		16-OCT-14	R2998460
Magnesium (Mg)-Total	0.25		0.10	mg/L		16-OCT-14	R2998460
Sodium (Na)-Total	<2.0		2.0	mg/L		16-OCT-14	R2998460
Zinc (Zn)-Total	<0.050		0.050	mg/L		16-OCT-14	R2998460
Miscellaneous Parameters							
Alkalinity, Total (as CaCO3)	5.7		2.0	mg/L		10-OCT-14	R2981805
BOD	<2.0		2.0	mg/L		08-OCT-14	R2983253
Hardness (as CaCO3)	6.34		0.50	mg/L		20-OCT-14	
Total Suspended Solids	<3.0		3.0	mg/L		11-OCT-14	R2984125
Total Organic Carbon	0.92		0.50	mg/L		17-OCT-14	R3001214
Turbidity	<0.10		0.10	NTU		08-OCT-14	R2977640
pH	6.48		0.10	pH		17-OCT-14	R2998403
L1529295-16 MAGNESIA RAW WATER (AFTER FLUSH) Sampled By: Alberto Urrutia on 07-OCT-14 @ 09:20 Matrix: Surface Water							
Total Metals in Water (DW)							
Total Mercury in Water by CVAFS							
Mercury (Hg)-Total	<0.00020		0.00020	mg/L		08-OCT-14	R2977449
Total Metals in Water by ICPMS(Low)							
Aluminum (Al)-Total	0.021		0.010	mg/L		18-OCT-14	R3005149
Antimony (Sb)-Total	<0.00050		0.00050	mg/L		18-OCT-14	R3005149
Arsenic (As)-Total	0.00013		0.00010	mg/L		18-OCT-14	R3005149
Cadmium (Cd)-Total	<0.00020		0.00020	mg/L		18-OCT-14	R3005149
Chromium (Cr)-Total	<0.0020		0.0020	mg/L		18-OCT-14	R3005149
Copper (Cu)-Total	0.0043		0.0010	mg/L		18-OCT-14	R3005149
Lead (Pb)-Total	<0.00050		0.00050	mg/L		18-OCT-14	R3005149
Manganese (Mn)-Total	<0.0020		0.0020	mg/L		18-OCT-14	R3005149
Potassium (K)-Total	0.10		0.10	mg/L		18-OCT-14	R3005149

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

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* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	EPA 310.2
This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.			
BOD5-VA	Water	Biochemical Oxygen Demand- 5 day	APHA 5210 B- "BIOCHEMICAL OXYGEN DEMAND"
This analysis is carried out using procedures adapted from APHA Method 5210 B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
BOD5-VA	Water	Biochemical Oxygen Demand- 5 day	APHA 5210 B- BIOCHEMICAL OXYGEN DEMAND
This analysis is carried out using procedures adapted from APHA Method 5210 B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".			
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B
Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.			
HG-TOT-CVAFS-VA	Water	Total Mercury in Water by CVAFS	EPA 245.7
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).			
MET-TOT-ICP-VA	Water	Total Metals in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
MET-TOT-LOW-MS-VA	Water	Total Metals in Water by ICPMS(Low)	EPA SW-846 3005A/6020A
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).			
PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"
This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode			
It is recommended that this analysis be conducted in the field.			
PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value
This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode			
It is recommended that this analysis be conducted in the field.			
THM-HSMS-VA	Water	VOC (THM) by Headspace GCMS	EPA SW-846, METHOD 8260
This procedure is suitable for the analysis of trihalomethanes (chloroform, bromodichloromethane, dibromochloromethane, and bromoform) in chlorinated waters that have been treated to prevent the formation of trihalomethanes after sample collection. The analysis involves the headspace extraction of the sample prior to analysis by capillary column gas chromatography with mass spectrometric detection (GC/MS). The trihalomethanes analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 8260, published by the United States Environmental Protection Agency (EPA).			
THM-SUM-CALC-VA	Water	Total Trihalomethane-THM	CALCULATION
Total Trihalomethanes (where not conducted as part of a formation potential analysis) is equal to the sum of the individual parameter concentrations with non-detect results treated as zero.			
TSS-VA	Water	Total Suspended Solids by Gravimetric	APHA 2540 D - GRAVIMETRIC
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
(TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.			
TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 "Turbidity"
This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.			
TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 Turbidity
This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

1

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg ww - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



L1529295-COFC

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC #

Page 1 of 1

Report To				Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)											
Company: Village of Lions Bay				☐ Standard ☐ Other				☒ Regular (Standard Turnaround Times - Business Days)											
Contact: Nikii Hoglund				☒ PDF ☐ Excel ☐ Digital ☐ Fax				☐ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT											
Address: 400 Centre Rd				Email 1: aurrutia@lionsbay.ca				☐ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT											
Lions Bay, BC V0N 2E0				Email 2: works@lionsbay.ca				☐ Same Day or Weekend Emergency - Contact ALS to Confirm TAT											
Phone: 604 921 9833 Fax:				Email 3:				Analysis Request											
Invoice To Same as Report? ☒ Yes ☐ No				Client / Project Information				Please indicate below Filtered, Preserved or both (F, P, F/P)											
Hardcopy of Invoice with Report? ☐ Yes ☐ No				Job #:															
Company:				PO / AFE:															
Contact:				LSD:															
Address:				Quote #:															
Phone: Fax:																			
Lab Work Order # (lab use only)				ALS Contact: Selam Worku				Sampler: Alberto Urrutia											
Sample #	Sample Identification (This description will appear on the report)			Date (dd-mm-yy)	Time (hh:mm)	Sample Type	Hardness	pH	TSS	BOD	Turbidity	Alkalinity Total	Total Metals (First Draw)	Total Metals (After Flush)	Mercury	Total Organic Carbon	Trihalomethanes	Number of Containers	
	Harvey Tank			07-Oct-14	11:00	Water	X	X	X	X	X	X	X	X	X	X	X	8	
	Store / Café			07-Oct-14	7:40	Water	X	X	X	X	X	X	X	X	X	X	X	8	
	Lions Bay Ave.			07-Oct-14	12:10	Water	X	X	X	X	X	X	X	X	X	X	X	8	
	Kelvin Grove			07-Oct-14	8:15	Water	X	X	X	X	X	X	X	X	X	X	X	8	
	Magnesia Tank			07-Oct-14	9:15	Water	X	X	X	X	X	X	X	X	X	X	X	8	
	Brunswick Beach			07-Oct-14	12:40	Water	X	X	X	X	X	X	X	X	X	X	X	8	
	Elementary School			07-Oct-14	7:20	Water	X	X	X	X	X	X	X	X	X	X	X	8	
	Harvey Raw Water			07-Oct-14	11:05	Surface Water	X	X	X	X	X		X	X	X			4	
	Magnesia Raw Water			07-Oct-14	9:20	Surface Water	X	X	X	X	X		X	X	X			4	
Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details																			
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.																			
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.																			
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.																			
SHIPMENT RELEASE (client use)				SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)											
Released by:	Date (dd-mm-yy)	Time (hh-mm)		Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:								
				<i>Jacou</i>	Oct 7	15:20 pm	10/10°C				Yes / No ?								
											If Yes add SIF								

GENF 18.01 Front

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APPENDIX E: BOIL WATER ADVISORIES ISSUED

BOIL WATER NOTICE

Issued pursuant to Order of a Drinking Water Officer
under Section 14 of the *Drinking Water Protection Act*

WATER SUPPLY SYSTEM COVERED BY THIS NOTICE

This Boil Water Notice issued **March 6, 2014** by Drinking Water Officer **Nader Massoud** applies to the following water supply system:

Lions Bay Water System located at **400 Centre Street, Lions Bay, V0N 2E0**
For **Harvey Creek** and **Magnesia Creek** Water systems, and should be followed by all persons using water from the system.

REASON FOR THIS NOTICE

This Notice is being issued because:

- **Elevated turbidity levels on March 6, 2014**

REQUIREMENTS

The Drinking Water Officer, in consultation with the Medical Health Officer, requires the following steps be taken to minimize the risks associated with this water system.

1. **Water from the water system must not be used for DRINKING, WASHING READY TO EAT FOODS, MAKING ICE FOR CONSUMPTION OR BRUSHING TEETH. Must use either bottled water or water that has been otherwise fully disinfected as per instructions on the HealthLinkBC #49b – How to Disinfect Drinking Water document.**
2. **Water can be used as is for flushing toilets, laundry and the washing of non-food preparation surfaces.**
3. **Contact the issuing Vancouver Coastal Health Drinking Water Officer at 604-983-6758 when the water treatment system is back in operation to discuss the procedures to properly disinfect the water distribution system and the water testing necessary before this notice will be rescinded.**

OBLIGATION OF OWNERS OF PUBLIC PREMISES

Owners of public premises served by this water system must:

- (a) **notify the public that the water is not potable water by posting a sign at every sink or drinking water fountain accessible to the public;**
- (b) **if normal business practices provide an opportunity, verbally advise any person who may use the domestic water system for a domestic purpose that the water is not potable water.**

(See Drinking Water Protection Regulation, section 10)

DURATION OF THIS NOTICE

This Notice remains in effect unless and until another public notice is issued upon the Order of a Drinking Water Officer advising that the Notice has been amended or may be rescinded.

CONSEQUENCES OF FAILURE TO COMPLY

It is an offence under the *Drinking Water Protection Act* to fail to comply with an Order under Section 14 of this Act. Failure to provide public notice of a drinking water threat issued is subject to a Violation Ticket with a monetary penalty of \$575 for each day of non-compliance.

QUESTIONS

If you have any questions concerning this notice, please contact:

Will Emo, Village of Lions Bay at **604-968-7309**

Or:

Nader Massoud, Drinking Water Officer, Vancouver Coastal Health at **604-983-6758**

BOIL WATER NOTICE

Issued pursuant to Order of a Drinking Water Officer
under Section 14 of the *Drinking Water Protection Act*

WATER SUPPLY SYSTEM COVERED BY THIS NOTICE

This Boil Water Notice issued **October 22, 2014** by Drinking Water Officer Mark Lysyshyn applies to the following water supply system:

Lions Bay Water System located at **400 Centre Street, Lions Bay, V0N 2E0**
For **Harvey Creek** and **Magnesia Creek** Water systems, and should be followed by all persons using water from the system.

REASON FOR THIS NOTICE

This Notice is being issued because:

- **Elevated turbidity levels on October 22, 2014**
- **Low chlorine residuals on October 22, 2014**

REQUIREMENTS

The Drinking Water Officer, in consultation with the Medical Health Officer, requires the following steps be taken to minimize the risks associated with this water system.

1. **Water from the water system must not be used for DRINKING, WASHING READY TO EAT FOODS, MAKING ICE FOR CONSUMPTION OR BRUSHING TEETH. Must use either bottled water or water that has been otherwise fully disinfected as per instructions on the HealthLinkBC #49b – How to Disinfect Drinking Water document.**
2. **Water can be used as is for flushing toilets, laundry and the washing of non food preparation surfaces.**
3. **Contact the issuing Vancouver Coastal Health Drinking Water Officer at 604-983-6758 when the water treatment system is back in operation to discuss the procedures to properly disinfect the water distribution system and the water testing necessary before this notice will be rescinded.**

OBLIGATION OF OWNERS OF PUBLIC PREMISES

Owners of public premises served by this water system must:

- (a) **notify the public that the water is not potable water by posting a sign at every sink or drinking water fountain accessible to the public;**
- (b) **if normal business practices provide an opportunity, verbally advise any person who may use the domestic water system for a domestic purpose that the water is not potable water.**

(See Drinking Water Protection Regulation, section 10)

DURATION OF THIS NOTICE

This Notice remains in effect unless and until another public notice is issued upon the Order of a Drinking Water Officer advising that the Notice has been amended or may be rescinded.

CONSEQUENCES OF FAILURE TO COMPLY

It is an offence under the *Drinking Water Protection Act* to fail to comply with an Order under Section 14 of this Act. Failure to provide public notice of a drinking water threat issued is subject to a Violation Ticket with a monetary penalty of \$575 for each day of non-compliance.

QUESTIONS

If you have any questions concerning this notice, please contact:

Nikii Hoglund, Village of Lions Bay at **604-921-9833**

Or:

Nader Massoud, Drinking Water Officer, Vancouver Coastal Health at **604-983-6758**

BOIL WATER NOTICE

Issued pursuant to Order of a Drinking Water Officer
under Section 14 of the *Drinking Water Protection Act*

WATER SUPPLY SYSTEM COVERED BY THIS NOTICE

This Boil Water Notice issued **December 11, 2014** by Drinking Water Officer **Nader Massoud** applies to the following water supply system:

Harvey Creek and Magnesia Creek Water System (Village of Lions Bay) located at 400 Centre Road, Lions Bay, V0N 2E0

and should be followed by all persons using water from the system.

REASON FOR THIS NOTICE

This Notice is being issued because:

- **Elevated turbidity and lose of water sources.**

REQUIREMENTS

The Drinking Water Officer, in consultation with the Medical Health Officer, requires the following steps be taken to minimize the risks associated with this water system.

1. **Water from the water system must not be used for DRINKING, WASHING READY TO EAT FOODS, MAKING ICE FOR CONSUMPTION OR BRUSHING TEETH. Must use either bottled water or water that has been otherwise fully disinfected as per instructions on the HealthLinkBC #49b – How to Disinfect Drinking Water document.**
2. **Water can be used as is for flushing toilets, laundry and the washing of non food preparation surfaces.**
3. **Need to contact the issuing Vancouver Coastal Health Drinking Water Officer at 604-983-6700 when the water treatment system is back in operation to discuss the procedures to properly disinfect the water distribution system and the water testing necessary before this notice will be rescinded.**
4. **Operator is to undertake water conservation measures.**

OBLIGATION OF OWNERS OF PUBLIC PREMISES

Owners of public premises served by this water system must:

- (a) notify the public that the water is not potable water by posting a sign at every sink or drinking water fountain accessible to the public;**
- (b) if normal business practices provide an opportunity, verbally advise any person who may use the domestic water system for a domestic purpose that the water is not potable water.**

(See Drinking Water Protection Regulation, section 10)

DURATION OF THIS NOTICE

This Notice remains in effect unless and until another public notice is issued upon the Order of a Drinking Water Officer advising that the Notice has been amended or may be rescinded.

CONSEQUENCES OF FAILURE TO COMPLY

It is an offence under the *Drinking Water Protection Act* to fail to comply with an Order under Section 14 of this Act. Failure to provide public notice of a drinking water threat issued is subject to a Violation Ticket with a monetary penalty of \$575 for each day of non-compliance.

QUESTIONS

If you have any questions concerning this notice, please contact:

Nader Massoud, Drinking Water Officer, Vancouver Coastal Health at **604-983-6758**

APPENDIX F: EMERGENCY RESPONSE PLAN

EMERGENCY RESPONSE PLAN

Table 1 below outlines the notification process for unusual situations that could potentially affect the Village's potable water system.

Table 1. Notification of Unusual Situations Potentially Affecting Water Quality

Situation	Notifying Agency	Agency Notified	Notification Time Frame
E. coli – positive sample	VCH/Lab	VoLB and VCH	Immediate
Total coliform >10/100ml & low chlorine residual	VoLB	VCH	Immediate
Chemical contamination	VoLB	VCH	Immediate
Turbidity events >5 NTU	VoLB	VCH	Immediate
Disinfection failures/continued loss of residual	VoLB	VCH	Immediate for continued loss of residual
Loss of pressure due to high demand	VoLB	VCH	Immediate
Water main breaks	VoLB	VCH	Immediate

E. COLI POSITIVE SAMPLES

1. Any interim samples (samples that have been taken in the period between the time the E. coli sample was first drawn and when the laboratory determined it to be positive) that have been taken from the same sampling station will be immediately examined by the laboratory.
2. The chlorine residual noted on the Water Operator's field sheet will be reviewed by the laboratory and compared to previous test results to determine if there is any localized loss of disinfectant residual.
3. The Public Works Manager (or designate) and VCH will be notified immediately by the laboratory.
4. Arrangements will be made for the immediate collection of a repeat sample, and, where possible, both upstream and downstream of the E. coli positive sample location.
5. VCH and the Public Works Manager (or designate) will liaise and determine the need for a Boil Water Advisory (BWA) to be issued. If it is determined to be warranted, VCH will issue the BWA.

6. The laboratory will continue to test the subsequent samples. Once consecutive negative sample results are returned, the Public Works Manager (or designate) will liaise again with VCH and determine whether the BWA can be lifted.

CHEMICAL CONTAMINATION

In the event of chemical contamination of the Village's water supply or distribution system, VCH will immediately be notified, and steps will commence to isolate the contaminated area. The level of contamination will be determined through water sampling and testing; identified; and any public health risk factors associated with the chemical presence and level will be determined. A public advisory will be issued and carried out by the Public Works Manager (or designate) under the guidance of VCH. Once the contamination is remedied and consecutive negative sample results are returned from the laboratory, the Public Works Manager (or designate) will again liaise with VCH and determine whether the public advisory can be lifted.

TURBIDITY EVENTS

Turbidity in the Village's treated water system is monitored on a regular basis through the water sampling and testing program. Water sample turbidity results that register >1 - 3 NTU are scrutinized, along with corresponding chlorine residual levels, and actively monitored. Any sections of the water system generating high turbidity results are field-checked and flushed if required.

Turbidity events in the raw source water impact the Village's water treatment plants. The performance of the primary UV treatment is affected by increased turbidity because water that has higher turbidity absorbs a significant amount of UV light, and will therefore have a correspondingly low UV transmittance (UVT) rate. The UV system automatically increases lamp intensity to counter the lower UVT. If turbidity exceeds 5 NTUs entering the plants, the UV system will send an alarm through SCADA to notify the Water Operator, and the UV reactors will shut down. The Water Operator will immediately inform the Public Works Manager (or designate) and investigate the alarm at the plant.

During turbidity events in excess of 5 NTU, microbiological sampling and testing is increased at all sampling locations; chlorine residual sampling and testing is likewise increased; and the Village will contact VCH, who may issue a Boil Water Advisory.

DISINFECTION FAILURES

Chlorine residuals in the Village's treated water system are monitored on a regular basis through the water sampling and testing program. If a daily sample registers below the generally accepted minimum chlorine residual of 0.2ppm, the Water Operator will first flush water through the system to attempt to bring the chlorine residual up to the minimum required. Should the results continue to not meet the minimum, the Village will immediately

commence increased monitoring of all chlorine residuals in the system, including the reservoir tank, and determine the root cause of the problem. Chlorine will be added manually to the reservoir tank if required; and residuals checked frequently at all locations. The Public Works Manager (or designate) will contact VCH, who may issue a Boil Water Advisory if continued loss of residual is observed.

LOSS OF PRESSURE DUE TO HIGH DEMAND

In the event of adverse pressure loss due to high demand, Village crews will make adjustments to the system to isolate the affected section, and then take measures to supplement pressure in the affected area. The Public Works Manager (or designate) will immediately consult with VCH regarding further actions; and all water quality complaints from the public will be immediately and thoroughly investigated for potential contamination.

WATER MAIN BREAKS

In the event of a water main break where chemical or microbiological contamination of the system is suspected, Village crews will make adjustments to the system to isolate the contaminated section from the rest of the distribution system. The Public Works Manager (or designate) will immediately consult with VCH regarding further actions; and all water quality complaints from the public will be immediately and thoroughly investigated for potential contamination. Water samples will be taken from the vicinity and downstream of the break if possible, and tested for the suspected contamination. The same procedures as noted under E. coli positive samples above will be implemented if required.

APPENDIX G: VANCOUVER COASTAL HEALTH PERMIT TO OPERATE



Vancouver Coastal Health

PERMIT TO OPERATE

Drinking Water System 301-10,000 Connections

Facility Number: 3317552348
Name of Facility: Lions Bay Harvey Creek Water System
Address: Upper Oceanview Road
Lions Bay, BC
Owner: Municipality of The Village of Lions Bay
Conditions:

1. Submit weekly water samples for bacteriological testing at sites approved by VCH.
2. Chlorine residuals must be recorded daily at locations approved by VCH.
3. Biannual flushing on the entire distribution system.
4. Daily turbidity testing.
5. Annual chemical testing of source
6. Submit annual updated ERP to VCH.

September 29, 2010

Effective Date

A handwritten signature in blue ink, appearing to read "Rod Schluter", is written over a horizontal line.

Rod Schluter
Environmental Health Officer

*This permit must be displayed
in a conspicuous place and is nontransferable.*





Vancouver Coastal Health

PERMIT TO OPERATE

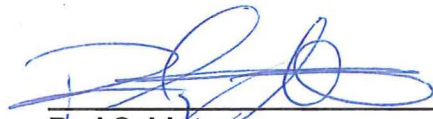
Drinking Water System 301-10,000 Connections

Facility Number: 3317552347
Name of Facility: Lions Bay Magnesia Creek Water System
Address: Upper Sunset Road
Lions Bay, BC
Owner: Municipality of The Village of Lions Bay
Conditions:

1. Submit weekly water samples for bacteriological testing at sites approved by VCH.
2. Chlorine residuals must be recorded daily at locations approved by VCH.
3. Biannual flushing on the entire distribution system.
4. Daily turbidity testing.
5. Annual chemical testing of source
6. Submit annual updated ERP to VCH.

September 29, 2010

Effective Date



Rod Schluter
Environmental Health Officer

*This permit must be displayed
in a conspicuous place and is nontransferable.*



APPENDIX H: EOCP FACILITY CLASSIFICATION

ENVIRONMENTAL OPERATORS CERTIFICATION PROGRAM

Facility Classification

THIS IS TO CERTIFY THAT

Village of Lions Bay Water System

has been classified by the Environmental Operators Certification Program in accordance
with the guidelines established in co-operation with the Association of Boards of Certification (A.B.C.) as

Class II

Dated at Burnaby, B.C. on July 28, 2003

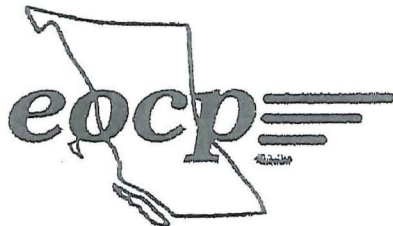


Secretary - Certification Board



Chairman - Certification Board

CERTIFICATE NO.675



MEMBER OF ASSOCIATION OF BOARDS OF CERTIFICATION
AFFILIATE OF B.C. WATER AND WASTE ASSOCIATION
A Society Incorporated under the Society Act, S.B.C. S-28724

APPENDIX I: EOCP OPERATOR CERTIFICATES

ENVIRONMENTAL OPERATORS CERTIFICATION PROGRAM

Certificate of Qualification

This is to certify that:

Alberto Urrutia

By Examination Has Qualified As A

Water Distribution System Operator

and certifies that he/she has met the established qualifications and has the ability to efficiently operate and maintain a specified maximum size and type of water distribution system designated as follows:

Level II



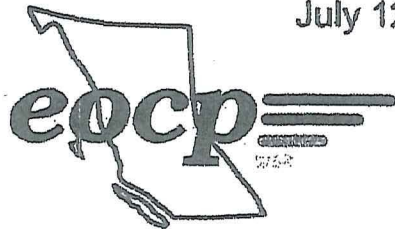
Secretary - Certification Board



Chairman - Certification Board

July 12, 2006

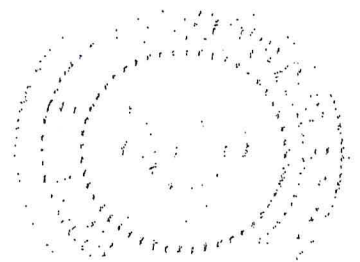
Certificate No: 4766



Member of Association of Boards of Certification
Affiliate of B.C. Water and Waste Association

This certificate shall be in full force and effect when accompanied by an annual renewal seal

A Society Incorporated under the Society Act, S.B.C. S-28724



ENVIRONMENTAL OPERATORS CERTIFICATION PROGRAM

Course Completion Certificate

This is to certify that

Alberto Urrutia

By Examination Has Qualified As A

Chlorine Handler



Secretary - Certification Board


Chairman - Certification Board

Certificate No. CH-4766

May 6, 2005





THE MUNICIPALITY OF THE VILLAGE OF LIONS BAY

Type	Report to Council		
Title	Infrastructure Committee – Preliminary Recommendations		
Author	M. Koonts / N. Hoglund	Reviewed By:	F. Bain, Committee Chair
Date	February 23, 2015	Version	1
Issued for	March 3, 2015 Regular Council Meeting		

Resolution:

THAT the Village of Lions Bay Council endorses the recommendations of the Infrastructure Committee as noted in this report titled *Infrastructure Committee – Preliminary Recommendations* and dated February 23, 2015.

Background:

On January 22, 2015, the Infrastructure Committee met to discuss, among other things, the preliminary recommendations which had been previously brought forward to Council for information purposes. Staff were tasked with organizing the recommendations into a document which would clearly reflect potential next steps.

Staff organized the 30 recommendations into the following nine headings:

1. Items which could reasonably be tasked to staff, for further research, by Council for cost and feasibility;
2. Items which could be addressed through projects resolved by the previous Council;
3. Items which have already been started on or completed;
4. Items which could be addressed as part of the Infrastructure Master Plan;
5. Items which are already on the Public Works Manager's punchlist;
6. Items which are already on the Public Works annual workplan;
7. Items which are outside of Council's purview;
8. Items which would require an increased level of service, requiring budget increase; and
9. Items outside of Council's jurisdiction but discussions with stakeholders could determine potential feasibility of implementation (Council discussion material if so chosen).

At its February 12, 2015 meeting, the Committee discussed the refined document and recommended the following items be put forward for Council resolution:

1. THAT the following two items be referred to the HAG for further research & report:
 - Research the feasibility of engaging ICBC's consulting service for Village traffic flow, intersections and signage

- Lions Bay Underpass Aesthetic Concerns: In an effort to make this area more visually pleasing, research the feasibility of engaging a landscape architect to establish design parameters (and review of said design). This may lead to a requirement for a Village notice board policy and/or a signage bylaw.
2. THAT the following item be included as part of Council's previously endorsed Traffic & Parking Review:
 - Add "Park Only in Designated Spaces" signs at selective sites, and so designate. Remove all No Parking signs, and as many other prohibitory/exclusionary signs as possible.
 3. THAT the following item be researched further for cost and service level implications:
 - Proactively and visibly enhancing public health by regularly sampling the water in the ditch on Bayview Road in front of the school and testing for fecal coliform (ecoli), sporidium, giardia, metals, biological oxygen demand, and dissolved solids. Post results via ePost and on website.

For Council's consideration.



THE MUNICIPALITY OF THE VILLAGE OF LIONS BAY

Table 1: The following items could reasonably be tasked to staff for further research by Council for cost and feasibility.

Potential Recommendation: *THAT the Infrastructure Committee recommends Council undertake further research into the following items.*

Details	Potential Actionables	Cost Neutral?
Discuss ICBC's consulting service for Village traffic flow, intersections and signage (see http://www.icbc.com/road-safety/safer-roads/invest-roads)	Research by HAG/CAG	Unknown
ROADS: The underpass is the gateway to the Village and the main connector between upper and lower Lions Bay. Engage landscape architect to make it less of a mishmash of signs, banners, notice boards, small scale plantings in plastic pots and Christmas lights draped on bushes. Dynamic-colour wash lighting? Murals? Better sidewalk?	Committee to be struck (HAG/CAG), design parameters to be established, RFQ for landscape architect, drafting of policies for use of notice boards, potentially need for a signage bylaw	No. Would be a capital project.
Use the same landscape architect to plan and add outdoor shower pad at beach level, renovate wash/change room, repair stone steps, service BBQ area pavers.	RFQ for landscape architect, level of maintenance services to be established, ongoing maintenance budget increase Not critical	No. Would be a capital project.
Live electricity demand (MW) and consumption (MW.h) as provided by BC Hydro	Associated costs unknown; increase to Admin time to update website daily. For what purpose? Is this critical?	Unknown

Table 2: The following items could be addressed through projects resolved by the previous Council (NOTE: no budget was set specifically for this review):

Potential Recommendation: THAT the Infrastructure Committee recommends that Council include a general overall signage review as part of the traffic and parking review previously resolved by Council to be undertaken in 2015 (note: no budget was ever set).

Details	Potential Actionables	Cost neutral?
Add "Park Only in Designated Spaces" signs at selective sites, and so designate. Remove all No Parking signs, and as many other prohibitory/exclusionary signs as possible.	Parking Committee, bylaw/policy review committee	No

Table 3: The following items have already been started on or completed (no recommendations required unless a change in budget or scope is required):

Details	Potential Actionables	Cost Neutral?
Replace septic system with a model installation to promote resident awareness of systems complying with the 2005 Health Act standards. Install recommended signage.	This has already been replaced; what is specifically meant by “model” and “recommended” signage?	No.
Post water test results	We do this in summer for beaches and place a beach link on the main web page. We only test beach water in summer. Admin time associated to more frequent web updates. If the intent is to post drinking water results, there would be additional admin time associated to posting updates weekly.	Mostly.
IC pages (scope, mission, framework), document library, all maps, LIDAR, GIS, photos. All in viewable, not downloadable, formats.	Updated TORs (which include scope, framework, etc). can be posted once approved by Council. When GIS student has map created, it will also be available here. There is currently an IC library on the website with many links to viewable and/or downloadable documents. There is also a link for requesting access to those documents not yet linked (to which we have only ever had one request). The only reason all of the links aren’t yet live is limited staff time to locate, scan and upload the various documents.	No.

How much does the general community want this? Is the cost to deliver this the best use of funds if there is little interest from the public?

Table 4: The following items could be addressed as part of the Infrastructure Master Plan (no recommendation required; include parameters in RFP):

Details	Potential Actionables	Cost Neutral?
Address SOME runoff issues by adjusting asphalt and adding humps to provide passes into roadside ditches.	Part of Drainage Master Plan	No.
Address geese impact on water quality by flying eagle kites in summer, and installing eagle nesting platforms in suitable nearby trees	Would require an “expert opinion” and report written outlining recommendations – could potentially be part of the IMP for parks/facilities.	No.
Address known issues at intersection of Mountain/Bayview, intersection of Upper Bayview/Bayview Pl, Traffic or Structure?	Part of Roads Master Plan.	No.

Table 5: The following items are already on the Public Works Manager's punchlist (no recommendation required unless a change in budget or scope is required):

Details	Potential Actionables	Cost Netural?
Secure an Environment Canada weather station and air-quality monitoring station.	Preliminary discussions w/Environment Canada are in progress	Unknown
GENERAL: institute qualification process to establish preferred vendors for septic,excavation, road resurfacing, tree surgery, etc.	Not yet started. Requires formal policy drafting, EOI process, etc.	Unknown

Table 6: The following items are already on the Public Works workplan (no recommendation required unless a change in budget or scope is required):

Details	Potential Actionables	Cost Neutral?
Contract a nearby municipality or 3rd party to run a street sweeper. West Van, North Van and Miller-Cap all have nice ones.		N/A. Already part of PW program.
Despite many roads likely being dug up in the next few years, repaint all road markings (with highway paint), after work above.	We do an annual painting program with a \$3500 budget per year for line marking; anything additional will require budget increases.	N/A. Already part of PW program.

Not an IC issue

Table 7: The following items are out of Council's purview for making recommendations:

Details	Potential Actionables	Cost Neutral?
Request Canada Post to spruce up mailroom, replace faded, peeling official sign from 1972 and paint mailbox modern colors, or apply decals, or remove it since it is allegedly only cleared monthly.	Commercial strata property; Council has no authority to make recommendations.	N/A. No authority.
Are we required to have the Telus payphone outside the Store?	Commercial strata property; Council has no authority to make recommendations.	N/A. No authority.

ESS believes return of the payphone to be useful for displaced residents or travelers without cell phone (or cell dead)

Table 8: The following items would require an increased level of service, requiring budget increase.

Details	Potential Actionables	Cost Neutral?
FACILITIES: Continue supporting SD45 and grassroots project to improve Lions Bay Field (note: not “the school field”). Add aerating, fertilization, watering and mowing to Public Work Procedures Manual.	Requires new service contract with SD45. Current LOS is mow every 2 weeks Not IC purview	No
WASTEWATER: proactively and visibly enhance public health by sampling locations in ditches and streams (particularly the one flowing past the school) and test for fecal coliform (ecoli), sporidium, giardia, metals, biological oxygen demand, dissolved solids. Post results (as a push, not a pull).	Increased LOS. We don’t have any noxious substance bylaws (except in parks) so not certain what we would do with the results – though we would require a plan to investigate based on results which will be an increase in costs. Not IC purview	No
Aerate and reseed lawn and renovate tables and play area.	Requires increase to levels of service, the only LOS is currently to mow and minor landscaping. Play area to be included in upcoming risk assessment. Not IC purview	No. Capital budget.
Add a lifeguard chair and a qualified lifeguard program under the auspices of LBFD to watch the beach noon to six in July, August and September. Add to Village’s liability insurance coverage, or place an appropriate sign.	Liability issues – requires substantial research Not IC purview	No

Table 9: The following items are out of Council's jurisdictions but discussions with stakeholders could determine potential feasibility of implementation: **Council discussion material if so chosen**

Details	Potential Actionables	Cost Neutral?
Install missing safety fences on 99 below outlooks at Eagle View and Reflection Loop without impinging on the view.	Consult with MOTI	Unknown
Do we want/need the huge white "Entering Village of Lions Bay Next 3 Exits" signs at both ends of the Village?	Consult with MOTI	Unknown
Install permanent "Your Speed Is XX" signs mounted on the soundwalls.	Consult with MOTI	Unknown
Install highway webcams at the Village.	Consult with MOTI	Unknown
Augment Stop and Yield signs: "2/3/4-Way" and "Traffic From Left/Right Does Not Stop," etc.	Consult with MOTI	Unknown
Address known issues at 99 off-ramps in both directions at Lions Bay Ave.	Consult with MOTI	Unknown
Add "Village-wide speed 40 km/h Unless Otherwise Posted" at entrances	Consult with MOTI	Unknown
Add payphone or local-calls-only phone.	Consult with Telus	Unknown

Add non-resident parking meters rated at say \$2/hr at CN lot to help cover beach use costs. Will CN pay to pave it?	Preliminary research underway through discussions with CNR; awaiting feedback from CN's real estate department.	No.
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DRAFT



THE MUNICIPALITY OF THE VILLAGE OF LIONS BAY

Type	Report to Council		
Title	Infrastructure Committee Recommendation Report – Lions Bay Beach Park Retaining Wall Remediation		
Author	N. Hoglund & M Koonts	Reviewed By:	F. Bain, Committee Chair
Date	February 26, 2015	Version	-
Issued for	March 03, 2015 Regular Council Meeting		

1. RECOMMENDATION

THAT Council direct Staff to undertake a cost analysis for proposed remediation work on the Lions Bay Beach Park retaining wall;

AND THAT Staff bring forward the cost analysis for inclusion in the 2014 Capital Budget process

2. ATTACHMENTS

1. 2015-02-14 Review of Beach Wall

3. BACKGROUND

As a result of storm surge events in late 2014 and early 2015, damage to the footings of the rock and mortar retaining wall at Lions Bay Beach Park was noted. Two Infrastructure Committee members visited the site, and have provided a condition assessment and remediation work plan for the damage. Their joint report is contained in Attachment 1.

4. DISCUSSION

The Infrastructure Committee would be pleased to discuss or provide clarification on the information contained herein, should it be required for decision-making purposes, via a future report to Council.

For Council's consideration.

2015-02-14 – Review of Beach Wall

Background

At some point in late 2014 / early 2015 storm damage to the footings of the rock & mortar retaining wall located by the beach within Beach Park in Lions Bay has resulted in the undermining of the wall. At the request of the Infrastructure Committee, Mr. Hughes and Mr. Garland were asked/volunteered to visit the site and provide a report of the current conditions, and a potential remedial works plan depending on what was observed. Three (3) field visits have been completed – one by Mr. Garland on Jan 23rd, one by Mr. Hughes on Jan 23rd, and a second visit by Mr. Garland on Feb 14th.

Photographs taken by Mr. Garland on Jan 23rd



Looking south – rock & mortar retaining wall
Approximately 26m (85') +/- long
and 1.2m (4') +/- high



A 7.5m (25') section where the foundation is
partially undermined.

Photographs taken by Mr. Hughes on Jan 23rd



Photographs showing minor damage caused by tidal action
against the unprotected footing for about 25-30 feet.

Photographs taken by Mr. Garland on Feb 14th



Looking north identifying area of interest.



Photograph noting vertical and horizontal alignment – seems intact, i.e. no lean.

Additional Photos



This photo shows an area that has been previously reinforced with cement and embedded rocks.



Photo illustrating example of loose rocks at base of wall as added protection.

Remedial Works Recommended

The integrity of the wall appears to be intact based on field review. Further professional review, i.e. by a geotechnical engineer, appears not to be necessary. The Village is encouraged by IC members to consider prompt remedial measures, i.e. preventative maintenance, to prevent further undermining that may lead to more significant damage and/or failure of the wall. This work should be completed prior to the busy summer time activities on the beach.

It is believed by Mr. Hughes that the repair to the footing of the wall appears to be straight forward and should not incur a large cost. Further, it is believed that the necessary repair can be defined as a maintenance and operations activity that likely could be completed by the Operations Staff during their annual beach clearing activity. Further comment and confirmation of this perspective is to be provided by the Public Works Manager.

Mr. Hughes provides further comment regarding the remedial works provided. The suggested steps in repair of the foundation would be:

1. Dig out an area which would become a footing within the area of undermining
2. Drive some re-bar 1.0m (3') long into the ground.
3. Tie a couple of 20 foot long 15M reinforcing bars across them.
4. Place rocks under the wall where possible to fill in gaps and reduce the volume required for concrete.
5. Provide a front form to the excavated area with a 2 X 6.
6. Order and Place concrete ensuring it goes under the wall around the rocks.
7. Once concrete is set, add additional small rocks at base of wall in a similar fashion to those noted in photo above, adding addition protection of the wall from storm activities.

The above is offered as a recommended approach. Further comment, and confirmation of works to be completed and related costs are to be provided by the Public Works Manager.

Prepared and Respectfully Submitted By:

Greig Garland MBA P.Eng.

VILLAGE OF LIONS BAY

Incoming Correspondence - March 3, 2015

General Correspondence:

G-1: Asset Management BC Newsletter

G-2: BC Fault Line Map WLNG

G-3: BC Hydro

G-4: City of Abbotsford Recycling & Solid Waste

G-5: Letter from Minister of Environment

G-6: Declaration for the Right to a Healthy Environment

G-7: Striking a Balance Update

G-8: EA Public Comment Periods

Resident Correspondence:

R-1: Squamish Declares Need for Healthy Environment

From: [INFRA, CSCD CSCD:EX](#)
Subject: Asset Management BC Newsletter
Date: Monday, February 23, 2015 8:21:51 AM
Attachments: [AMBC Newsletter Issue No. 13 February 2015.pdf](#)

On behalf of **[Asset Management BC](#)** attached is the Winter 2015 edition of the newsletter. Topics include:

- The Renewed Gas Tax Agreement and Asset Management – Part 2 (see Fall 2014 issue for Part 1)
- Case Study: Fort Saskatchewan Road Corridor Asset Management Optimization
- Climate Change and Asset Management Strategies
- Watershed Health, Resilient Rainwater Management, and Sustainable Service Delivery
- ISO 55000 – The Canadian Context
- And more...

For questions, feedback, or newsletter contributions please contact: info@assetmanagementbc.ca

To manage your subscription to the newsletter, please visit the CivicInfo BC website at www.civicinfo.bc.ca. On the left hand side of your screen, you'll see a "Newsletters" subscription box. Enter your e-mail address, and select/de-select the Asset Management BC Newsletter from the menu.



Asset Management Newsletter

THIRTEENTH EDITION – WINTER 2015 ISSUE



Feature Article: The Renewed Gas Tax Agreement and Asset Management, Part Two

Glen Brown, General Manager, Victoria Operations, UBCM



On May 22, 2014, it was announced that the Administrative Agreement on the Federal Gas Tax Fund in British Columbia (the GTA) had been signed between Canada, British Columbia and UBCM, taking effect as of April 1, 2014.

The GTA provides the administrative framework for the delivery of federal Gas Tax funding to British Columbia local governments and other recipients over the next ten years.

Within the GTA, it is clearly articulated that asset management, and its implementation by local governments, is a priority by all parties. There is recognition by all levels of government that asset management is integral in providing local government services, and managing the infrastructure needed to support those services, in a sustainable manner.

Annex B, section 7 of the GTA states;

The Parties agree that strengthening Local Government capacity to undertake Asset Management is integral to building strong cities, communities and regions, and agree to support Asset Management practices in all Local Government jurisdictions during the term of the

Agreement. Schedule F (Asset Management) provides more details on the approach agreed upon by the Parties.

SCHEDULE F – Asset Management, identifies the approach;

The Parties agree that the approach to integrated community sustainability planning under the First Agreement was effective in increasing the capacity of the diverse range of Local Governments in British Columbia to enhance their community's sustainability.

Building on that success, the Parties wish to maintain the program's support for building Local Government capacity to take an integrated, long-term approach to plan, build and maintain strong sustainable communities, while providing a particular focus on strengthening Asset Management within those communities.

Asset Management is a key underpinning of community sustainability because it can inform a range of investment, servicing and community planning decisions, which support maximizing Local Government investment in services and related infrastructure.

Local Governments in British Columbia exhibit varying degrees of capacity to undertake Asset Management activities and integrate Asset Management into their operational and policy decision-making frameworks. Consequently, an approach that recognizes these varying capacities will be most effective in supporting the full range of Local Governments as they work to begin or strengthen their Asset Management activities.

Given this, the partnership committee will develop an Asset Management framework to guide Local Governments in meeting their Asset Management commitment under this

Agreement. The framework will support all Local Governments to build and strengthen Asset Management over the term of the Agreement while recognizing the varying capacities of Local Governments and the range of ongoing Asset Management activities.

In meeting the asset management goals within the GTA, there are two key actions in Schedule F that support strengthening local government asset management capacity:

- The development of an Asset Management Framework
- Identifying that there are Local Government Asset Management Commitments under the Agreement

Asset Management for Sustainable Service Delivery – A BC Framework



See www.assetmanagementbc.ca

With approval from the GTA Partnership Committee, UBCM, in partnership with Asset Management BC and the Province, developed “Asset Management for Sustainable Service Delivery – a BC Framework” (the Framework) that fulfills the requirements under Section 7 of Annex B and Schedule F of the GTA, but also serves as a stand-alone document that provides strategic direction for asset management and its implementation in BC

The approach identified under the GTA and integrated into the Framework is in strong alignment with the current ‘BC Approach’ which is being led by Asset

Management British Columbia (AMBC) - an organization that is a provincial and national leader in building awareness, education, development of tools and resources, and supporting integration and collaboration with respect to asset management. The Framework identifies accepted best management practices that have been endorsed internationally, as well as best management practices that have been developed and endorsed by BC local government practitioners.

The Framework has been developed to recognize the diversity of BC’s communities. The Framework also recognizes that asset management, and the best practices that support asset management, must be scalable to community size, character and capacity. It focuses on desired outcomes rather than prescribing specific methodologies, thereby allowing local governments to develop and implement an approach that can be measured and incremental, tailored to the individual needs and capacity of individual local governments.

The Framework for Asset Management describes asset management as a process, providing a guide to the why, what and how of asset management. The Framework is further supported by additional tools and resources available on the AMBC website, as well as tools and resources that are available on AMBC partner websites.

For local governments looking for strategic direction and/or guidance with asset management, and meeting their GTA asset management commitment, the Framework becomes the principal resource.

Articles in this Edition:

- **Feature Article: The Renewed Gas Tax Agreement and Asset Management, Part Two**
- **New Position: Liam Edwards**
- **Case Study: The City of Fort Saskatchewan Road Corridor Asset Management Optimization**
- **Is Climate Change Part of your Asset Management Strategy?**
- **Watershed Health, Resilient Rainwater Management, and Sustainable Service Delivery: How they are connected?**
- **Is Asset Management a Fad? An Opinion**
- **2015 CNAM Conference**
- **Upcoming Events**
- **Tips & Tactics: ISO 55000 – Canadian Context**

Local Government Commitments to Asset Management under the GTA

In addition to the development of the Framework, the GTA Partnership Committee also established and approved local government commitments to Asset Management under the GTA. In keeping with Schedule F, the commitments recognize the varying capacities of local governments and the range of ongoing asset management activities. The approach is to support local government, not prescribe, and allow individual local governments to develop an asset management approach that meets their individual needs and capacity. The Framework becomes the tool that provides direction and guidance with asset management best practice.

Local government asset management commitments under GTA are captured as three separate steps or actions. They include:

Step 1 – Establishing an Asset Management Baseline

To support local governments in their efforts to improve asset management practices, and to support asset management objectives within the GTA, baseline level information is required.

Establishing baseline data on the ‘status’ of asset management within individual local governments is critical in gaining a comprehensive understanding of current capacity to implement and identifying those areas/actions/activities that need to be addressed, as well as establishing priorities. It is also critical in the development of performance measurements, supporting local governments in monitoring/measuring improvements and value within the process.

Step 2 – Developing an Implementation Plan under the GTA

Local governments, with an understanding of current status with respect to Asset Management (after completion of Step 1), will then be required to develop a ‘moving forward’ or Implementation Plan.

The Implementation Plan will focus on how the local government will strengthen their respective asset management process over the life of the GTA and identify actions/activities and milestones.

There is no ‘approval’ of an Implementation Plan, but rather, the Framework will provide guidance with respect to asset management goals/objectives, as well as to the scalability of asset management actions/activities.

Step 3 – Asset Management Reporting

Step 3 involves reporting on the status of the Implementation Plan. Reporting would be integrated into UBCM reporting requirements under the Community Works Fund Agreement – and the Outcomes Report (March 31, 2018 and March 31, 2023).

At this time, the GTA Partnership Committee is developing standardized reporting templates for each step. These templates will be integrated into the annual and/or outcome reporting that is required under the GTA. The Step 1 – Establishing an Asset Management Baseline template will be part of the annual reporting requirement in 2016. Step 2 – Developing an Implementation Plan under the GTA template will be part of the annual reporting requirement in 2017. Step 3 – Asset Management Reporting will be part of the annual reporting requirement in 2018 and 2023 as a component of the Outcome Reports. These templates will be made available to local governments in 2015.

For any further questions on the Renewed Gas Tax Agreement, please contact Program staff by e-mail at gastax@ubcm.ca or by phone at 250-356-5134.



If you have specific questions regarding asset management under the GTA, please contact Glen Brown by email at gbrown@ubcm.ca

New Position

Congratulations to **Liam Edwards** who has been appointed Executive Director, Local Government Infrastructure and Finance Branch, Ministry of Community, Sport and Cultural Development. Liam has been an active participant with **Asset Management BC** and will take even a more significant role in his new function. Liam replaces Glen Brown who is now General Manager, Victoria Operations for the Union of British Columbia Municipalities (UBCM).



Fort Saskatchewan Road Corridor Asset Management Optimization

Bradley McDonald, Manager, Utility Services,
City of Fort Saskatchewan

Chris Lombard, P. Eng. MBA, Senior Asset Manager,
Tetra Tech Inc.

Introduction

The City of Fort Saskatchewan ("the City") is committed to managing its infrastructure assets responsibly by seeking the best value approach in achieving the optimal combination of costs, risks, performance and sustainability. Tetra Tech EBA ("Tetra Tech") was retained in 2012 by the City for a multi-year assignment to create an Asset Management System for the 162 centreline-km of roadway, and the 280km long underground utility network (water, sanitary & storm sewer). The objective was to provide optimized renewal and replacement decisions for the right-of-way requirements across the multiple asset groups.

A customized, off-the-shelf analysis software was the primary analysis engine used to complete the study. The data, analysis and results were all integrated within a GIS. Following the pavement needs analysis, existing sanitary, storm and water pipe locations, meta-data and year of pipe replacement were imported into the analysis software which was then programmed so that utility projects were coordinated with pavement renewal projects.

The resultant capital plan presented an optimized and coordinated plan including cost estimates and dates for the renewal and replacement of the City's roadway, water, sewer and storm system for the period 2014 to 2033. Some of the key innovations developed in this project were:

- Spatial coordination and optimization of infrastructure work between roads and utilities, resulting in a projected 5% saving in City capital expenditures over 30 years.
- Defining the pricing of multiple asset interventions and use of life-cycle cost optimization to identify the least cost intervention strategies across multiple asset classes.
- Development of a GIS-based asset inventory to serve as the central store of asset information.



- Assisting the City to articulate target levels of service in the context of overall long-term financial sustainability.

Breaking Down the Asset Management Silos

Municipal road and utility departments commonly employ piecemeal or "silo-based" planning which results in e.g., project delays or utility staff making cuts into newly-paved roads to perform a utility pipe or service connection replacement. This results in an irate public that rightly questions whether their tax dollars are spent in the most efficient manner.

The opportunity therefore exists to improve and optimize the coordination between the capital and O&M interventions on especially roads, water, sewer and storm assets to minimize disruption and cost. This project presents one of the first known examples of how a road and utility asset management system were created to act synergistically whereby road right-of-way capital interventions are coordinated and optimized to minimize disruption and life cycle costs, as presented in Figure 1 (shown on page 5).

Use of Locally Calibrated Highway Development and Management (HDM) Performance Models

The roadway analyses employed current best practices and pavement management principles including life cycle cost analysis. The distresses used in this evaluation were modeled using locally calibrated HDM (Highway Development and Management) performance models to predict the pavement condition in terms of individual distresses. This method of prediction provides a much more accurate and defensible approach to the treatment selection phase of the project.

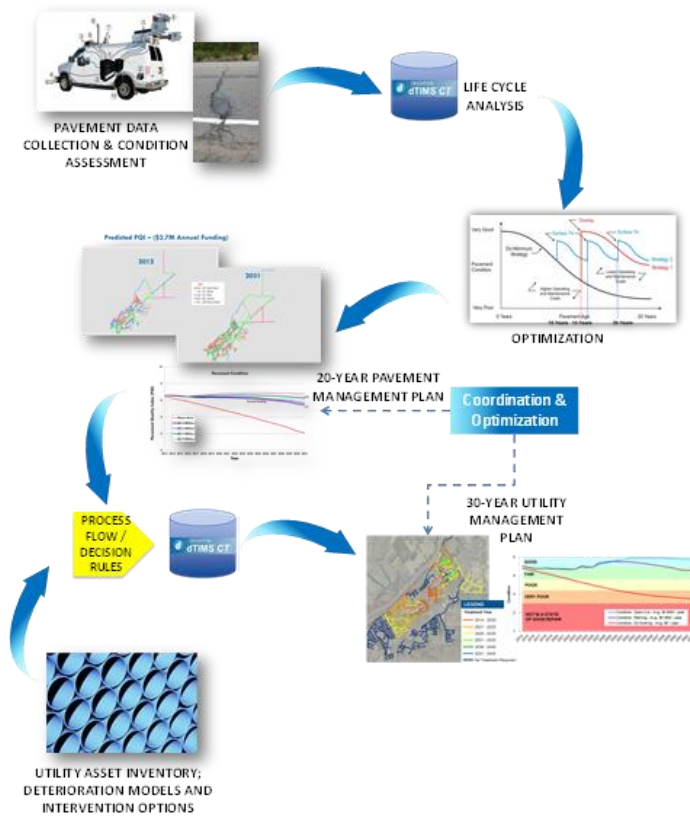


Figure 1: Synergistic connection of road and utility AM systems

The individual distresses are then averaged or “rolled” into an overall network performance, based on a Pavement Quality Index (PQI). The PQI uses a 0 to 10-scale to relate the overall condition of a pavement as calculated from a combination of three key performance indicators.

Figure 2 demonstrates the PQI, from very good to very poor, for each roadway classification as well as for the paved network as a whole. It is important to note that the road network that is in poor to very poor condition represents the network backlog or “debt” and signifies a significant financial burden for the City.

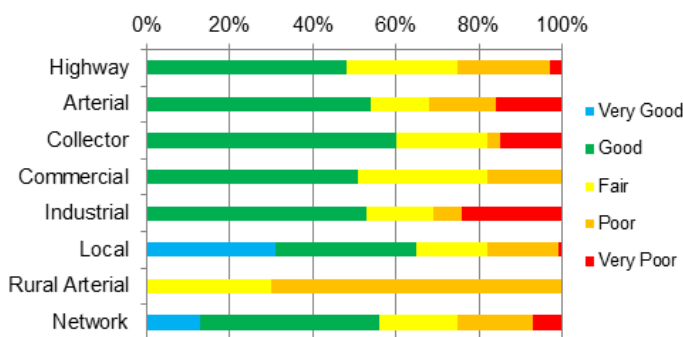


Figure 2: PQI Distribution by Road Class

Imbuing Linear Assets with “Spatial Awareness”

The project team was able to add “spatial awareness” to the road corridor and its underground utilities by the creation of GIS polygons (Figure 3) and associating all linear assets in a polygon with one another. These polygons provided the necessary spatial link from the road corridor to the underground utilities, which accomplished a number of important things: Firstly, the in-filling of data to bridge data gaps and secondly, the cross asset optimization between the utility rehabilitation program and the road rehabilitation program.

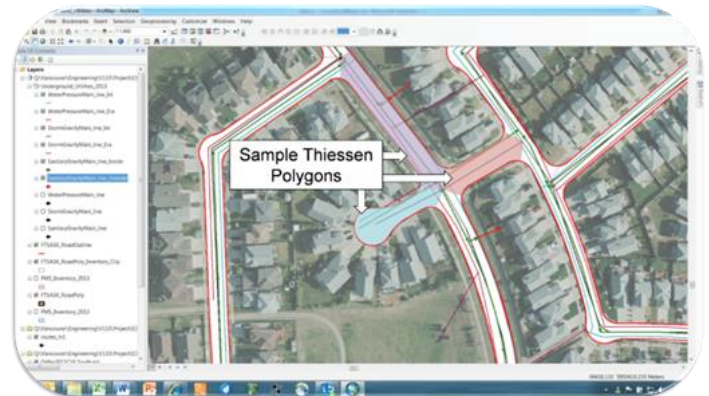


Figure 3: Creation of Thiessen Polygons to Associate Linear Assets per Polygon

Pipe Intervention Process Flow

While performance models such as the HDM model exists for roadways, no such well-defined model exists for predicting the performance of underground utilities. The project team defined the intervention process flow governing the decision-making on when and how to intervene on the pipes leveraging off best practices identified in the recent Water Environment Research Foundation (WERF) documents on condition assessment and cost information for drinking water and wastewater pipes. Figure 4 (shown on page 6) presents the pipe intervention process flow applied in this analysis.

The pipe intervention process flow will be refined in the future based on the results of pipe condition surveys. True condition assessment will improve the prediction of life expectancy of a pipe class or individual pipe section. This will ensure that the model is not overly conservative (which could result in the premature replacement of pipes) and that high risk pipes are prioritized.

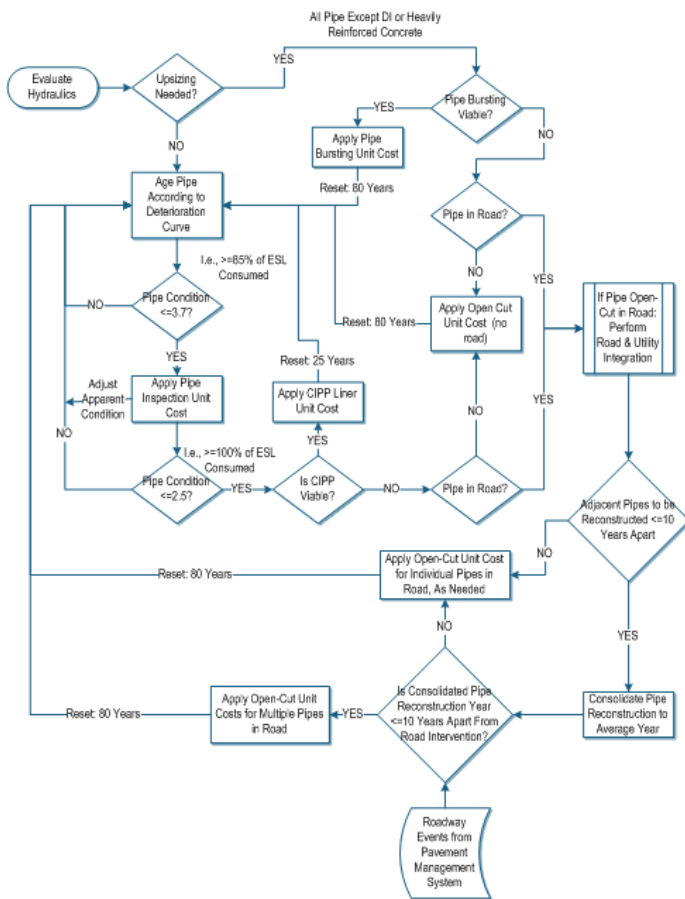


Figure 4: Process Flow for Pipe Interventions

Impact of Renewal Budgets on Levels of Service (LoS)

The project team generated a projection of asset / asset portfolio Levels of Service (LoS) over time combined with the renewal budget requirement for sustaining a target LoS. For example, an analysis was performed on three potential reinvestment strategies for the City's water network (Figure 5), each with a different annual expenditure, intervention strategy (i.e., reline or replace) and resultant condition at the end of the 30-year analysis period (2014 – 2043). The following three scenarios were modelled:

- Do Nothing: No expenditure on pipe renewal or replacement.
- Relining: All pipes in backlog (i.e., requiring renewal by 2014) to be renewed through open-cut methods. All other pipes to be renewed by means of CIPP liners (relining).
- Open-Cut: All pipes to be replaced by means of open-cut methods

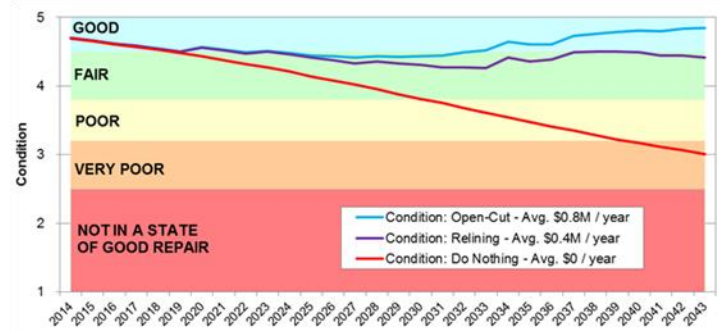


Figure 5: Water Network LoS under Three Budget Scenarios

Budget Recommendations

The analysis showed that the average annual budget required to maintain the road network in its current condition was \$2.7 million per year. At this funding level the average network PQI is projected to improve from 6.42 in 2013 to 6.7 in 2033. A network level five year paving program based upon the \$2.7 million recommended budget was provided, including the surface treatment and rehabilitation treatment options included in the analysis (i.e. surface treatment, overlay, mill / inlay, reconstruction and road reclamation).

Similarly, the primary recommendation from the utilities study was for the City to budget for an average expenditure of \$1.4 million per year for utility main renewal and replacement, which would be sufficient to maintain the City's pipe network in a "Good" condition up to 2043. A key project deliverable was a set of GIS shape files showing which assets (roads and / or utilities) need to be renewed, by year.

Figure 6 presents the five-year paving programs for the City's Roads.

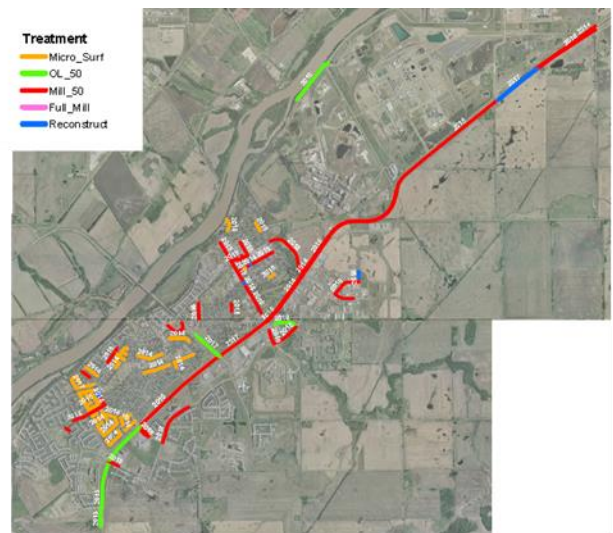


Figure 6: Roads Five-Year Paving Program

Figure 7 presents the recommended open-cut replacement program for the City's water mains in five – year increments.

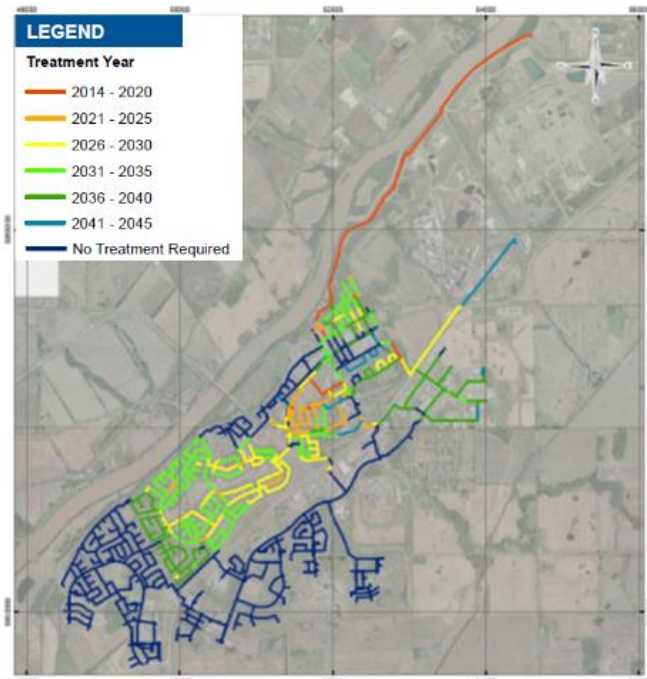


Figure 7: Water Pipe Open Cut Replacement Program

Annual savings in approximately five percent of the capital budget could be generated through coordinating and optimizing the interventions on the road and utility networks, which in the City's case translated into approximately \$85,000 per year. Another benefit of the coordinated works is the elimination of cuts and patches in pavement, which are commonly one of the leading contributors to the accelerated deterioration of a road surface.

Conclusion

The project outputs helped to answer the following questions on financial sustainability for the City's road corridor assets:

Is our City's long-term financial performance and position sustainable by meeting planned long-term service and infrastructure levels and standards without unplanned increases in rates or disruptive cuts to services?¹

This project employed a number of innovations to address the financial sustainability and asset management challenges often faced by municipalities in

Canada. The intent of this article was to highlight these innovations and provide a framework for other municipalities that may want to implement it for themselves

Watershed Health, Resilient Rainwater Management, and Sustainable Service Delivery: How they are Connected?

By Kim A Stephens, M.Eng, P.Eng, Executive Director
Partnership for Water Sustainability in BC
In collaboration with Peter Law and Derek Richmond,
Directors, Partnership for Water Sustainability in BC
and Glen Brown, General Manager – Victoria Operations,
UBCM



Local governments in BC are challenged with the question of how best to move forward with asset management and protection of watershed health in light of two considerations: a changing climate; and community expectations to provide higher levels-of-service at reduced levels-of-cost.

The unfunded 'infrastructure liability' is a driver for local governments to consider longevity, focus on what happens after developers hand-off municipal infrastructure, get it right at the front-end, and prepare for the future. Climate change is part of the liability equation – adaptation has level-of-service implications for infrastructure.

Cascading Objectives for Inter-Regional Collaboration

The Partnership for Water Sustainability is facilitating an inter-regional collaboration initiative within the Georgia

¹ Definition from Local Government Australia (2012): Financial Sustainability Information Paper No 1 – Financial Sustainability. Adelaide, SA

Basin. The initiative is connecting the cascading objectives for Watershed Health, Resilient Rainwater Management, and Sustainable Service Delivery.

Collaboration is guided by this mantra:

“Through sharing and learning, ensure that where we are going is indeed the right way”.

A guiding principle for collaboration is to leverage ‘science-based understanding’ of the relationship between land use changes and resulting stream health and financial liability consequences. A desired outcome is to influence community planning by means of an environmentally adaptive approach.

Local governments on the east coast of Vancouver Island and in the Lower Mainland are ‘learning by doing’ to implement affordable and effective science-based practices to achieve:

- Watershed Health: Protect and/or restore hydrologic integrity
- Resilient Rainwater Management: Mimic the natural water balance
- Sustainable Service Delivery: Integrate natural systems thinking and adaptation to a changing climate into asset management

Launched in 2012, the Georgia Basin Inter-Regional Education Initiative helps local government champions in each region understand what the other regions are doing, what works and what does not.

Protect and /or Restore Hydrologic Integrity

Watershed Health is a function of how the landscape is altered by humans. A primary measure is the condition of aquatic ecosystems in stream corridors. Altering the land surface short-circuits the water cycle. The result: either too much or too little flow in streams. ‘Design with Nature’ requirements for land development maintain a watershed’s hydrologic integrity.

Mimic the Natural Water Balance

Resilient Rainwater Management accounts for all the rainfall-days per year. Emphasis is on soil-water interaction, how rainwater reaches streams via three pathways (surface runoff, lateral interflow in shallows soils, and deep groundwater), and performance targets for ‘design with nature’ solutions. These address the implications for both water supply and drainage. The technical foundation is the ‘Water Balance

Methodology’. This integrates the site with the watershed, stream and groundwater aquifer.

Integrate Natural Systems Thinking & Adaptation to a Changing Climate into Asset Management

Sustainable Service Delivery builds on the principles of Asset Management. It integrates land use, infrastructure servicing, financial and ecological planning. Emphasis is on the **Levels-of-Service** that assets provide, and ‘what level is affordable’ over time. Nature is an asset and provides ‘services’. The benefits and value of ‘design with nature’ solutions grow over time.

Restore Watershed Health in the Built Environment

In 2014, two landmark developments provided local governments with a fresh impetus to do business differently:

- BC’s new Water Sustainability Act, passed in May 2014; and
- Asset Management for Sustainable Service Delivery: A BC Framework, released in December 2014.

Accepted ‘standards of practice’ - especially those for engineering, planning and finance - influence the form and function of the Built Environment. Implementing green infrastructure, turning the clock back, shifting the ecological baseline, and creating a watershed legacy will ultimately depend on the nature of changes in standards of practice.

Do Business Differently

Released in 2008, Living Water Smart: British Columbia’s Water Plan is a call to action to prepare for climate change, live water smart and build greener communities. Living Water Smart has 45 actions and targets. Asset Management for Sustainable Service Delivery: A BC Framework achieves this Living Water Smart policy objective:

“Governments will develop new protocols for capital planning that will look at the life-cycle costs and benefits of buildings, goods and services.”

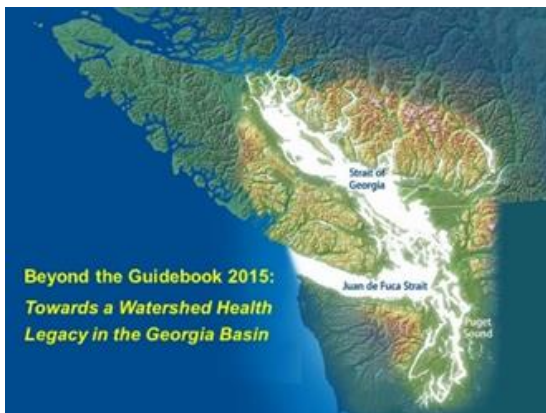
Reference: p 69, Living Water Smart

The term Sustainable Service Delivery was coined in 2010. It was introduced by the Province to integrate financial accountability, infrastructure sustainability and service delivery.

The 'Worth Every Penny Workshop' hosted by the Regional District of Nanaimo in September 2010 initiated the branding of the concept.

Towards a Watershed Health Legacy in the Georgia Basin

In 2002, the Province adopted the Water Balance Methodology as the technical foundation for *Stormwater Planning: A Guidebook for British Columbia*. The Guidebook vision is that community development activities and further alteration of the Built Environment will result in cumulative benefits, not impacts. In 2002, the Guidebook identified a path forward for local governments.



The 'Beyond the Guidebook Series' documents the progress of local government champions who are leading implementation of changes in practice. It takes time to make a difference. Doing business differently and making a difference is a building block process. Later in 2015, the Partnership will be rolling out the third in the series.

Titled *Beyond the Guidebook 2015: Towards a Watershed Health Legacy in the Georgia Basin*, this guidance document will present a framework for integration of the cascading objectives for watershed health, resilient rainwater management, and sustainable service delivery. It will also provide the springboard to the 2016-2017 program for inter-regional collaboration.

A Look Ahead

Implementing 'design with nature' standards of practice at the site scale – so that benefits accumulate and mimic the natural Water Balance at a watershed scale – ultimately means that communities will be more resilient during periods when there is either too much or too little rain. Community champions have a role to play in collaborating with local government decision-makers to achieve this outcome.

Asset Management for Sustainable Service Delivery

A BC Framework illustrates a holistic and integrated approach to asset management. It identifies natural services and the use of natural resources – and how they are part of / integrated into the overall services provided at a local government level.



Is Climate Change Part of Your Asset Management Strategy?

Climate Change is an issue of growing significance as part of our asset management strategies. Do you have a climate change action plan? Have you carried out work respecting climate changes impacts on your infrastructure? Then share it with other BC communities.



The BC Climate Action Toolkit provides the latest news; information and strategic guidance to help BC local governments successfully reduce greenhouse gas emissions and strengthen our communities. The community is being broadened to include all our infrastructure and address asset management processes.

Go to www.toolkit.bc.ca and join the discussion group.

Find climate change resources for addressing infrastructure and risk management issues on www.assetmanagementbc.ca.

Is Asset Management a Fad? An Opinion.

Wally Wells P. Eng. Asset Management BC

What are the benefits, short and long term, of asset management? Is it just another file on the side of our desk when we have time to get to it? Well that is the "thinking" of many, so let's talk about some of the benefits of the process.

First asset management is not a task but a process. And as long as we own assets; it never ends. Hence, it is an on-going continuous process. Too much emphasis is placed on the "Asset Management Plan". The PLAN is only a part of the overall process. The PROCESS deals with all of the components necessary to refocus our business process to properly manage our infrastructure within the built environment in our communities that is all the physical infrastructure that supports all the services we deliver. The irony is that many communities have successfully used the principles of asset management and long term funding formulas for many years for fleet management but failed to use the same business process for all other asset groups.

Asset Management represents a change in our current business process, not something new. By calling it 'asset management' rather than 'managing our assets' we have highlighted and called attention to a long-standing and growing problem of aging and failing infrastructure that we never properly funded.

For our municipal governments and regional districts, budgeting process has always focused on current operations and maintenance without much attention to asset rehabilitation, adequate repair, and replacement. After decades of this practice, we have growing problem in 4000 communities across Canada that we finally must face up to.

Fortunately, through groups like Asset Management BC and our partner Associations, many tools, references and guides are now able to help with the process. These are available at www.assetmanagementbc.ca. The most recent addition is the Asset Management: Framework for Sustainable Service Delivery.

The Chief Administration Officer of one of our very progressive communities was heard to tell staff "Asset Management is what we do. It is our day job." Let's hope we all get there and soon.

In 20 years, we should not be talking about asset management but just doing it as part of our daily business. Then we have sustainable service delivery. We all need to get there!

CNAM 2015 in Vancouver - See you there!



The program is set with near 50 very diverse presentations plus keynote speakers. The opening night 'get acquainted' will be hosted at the Vancouver Aquarium. An excellent national conference focusing on all aspects of integrated asset management is waiting for you.

Registration is now available on-line. Keynote speakers include;

- **Gord Hume**, author of "Taking Back our Cities" and a previous City Councillor,
- **Dr. Anna Robak**, Technical Principal - Global Asset Management, Opus International,
- **Allen Mapstone**, JRA Associates and a lead trainer for the IPWEA NAMS program here in Canada and,
- **Dr. Mark DeVolder**, Synergy Sense - change management.

Their biographies and detailed program are on the CNAM website at www.cnam.ca under the conference tag. Register now for reduced rates and take advantage of special rates at the Marriot Pinnacle Downtown hotel. The networking opportunities with like-minded people from across Canada and other countries is, in itself, worth the price of admission. Then you also get the benefit of the learning experience from great presentations.

See you there.

Upcoming Events

BC Water & Waste Association with GFOA BC

February 26, 2015

WaterBreaks Webinar: The Sustainable Foundation

How the District of North Vancouver implemented an integrated asset management approach to infrastructure management
 Webinar Asset Management

www.bcwwa.org

Public Works Association of BC

February 26, 2015

Introduction to Public Works Vancouver Island
 Victoria Public Works

www.pwabc.ca

Planning Institute of BC

April 16-17, 2015

Annual Conference

Washington State Convention Centre
 Seattle WA

www.pibc.bc.ca

Canadian Network of Asset Managers

May 11-14, 2015

8th Annual Networking Conference and Workshops

Vancouver Marriott Pinnacle
 Vancouver, BC

www.cnam.ca

BC Water and Waste Association

May 27 – 30, 2015

43rd Annual Conference and Trade Show

Kelowna, BC

www.bcwwa.org

Government Financial Officers Association of BC

May 27 – 29, 2015

Annual Conference

Penticton BC

www.gfoabc.ca

Federation of Canadian Municipalities

June 5-8, 2015

Annual Conference and Trade Show

Shaw Convention Centre
 Edmonton AB

www.fcm.ca

Canadian Water Summit

June 25, 2015

6th Annual Canadian Water Summit

Vancouver, BC

www.watersummitt.ca

Public Works Association of BC

September 21 - 23, 2015

Annual Conference and Trade Show

Penticton, BC

www.pwabc.ca

Union of British Columbia Municipalities

September 21 – 25, 2015

Annual Convention

Vancouver Conference Centre
 Vancouver, BC

www.ubcm.ca

Centre for Advancement of Trenchless Technology

November 17 – 19, 2015

Conference and Trade Show

Executive Airport Plaza, Hotel & Conference Center,
 Richmond/Vancouver, BC

www.cattevents.ca

Tips and Tactics: ISO 55000 – The Canadian Context

*By Bernadette O'Connor and Barbara Rober
 Opus International Consultants (Canada) Ltd*

With all the various standards, frameworks, guides, roadmaps, and manuals available for Asset Management, Canadian Municipalities could be excused for wondering which one to follow? How do they connect together? Do they connect? Which one is best for us? This article sets out to briefly explain the inter-relationship and purpose of the following key documents for Asset Management;

- **ISO 55000 Series** (International Standard)
- **AMF** (Asset Management Framework) – refer lead article in this issue of newsletter
- **IIMM** (International Infrastructure Management Manual)
- **AM Roadmap** (Asset Management BC Roadmap and Guide for Implementing AM for Canadian Municipalities)

ISO 55000 (International)

This International AM Standard consists of two parts;

- ISO 55001 – AM Management Systems **Requirements**
- ISO 55002 – AM Management Systems **Guidelines** for the application of ISO 55001

The focus of these documents is to outline good practice (not necessarily best practice), and therein identify **what** an organization needs to have in place to meet a minimum certifiable standard of Asset Management practice. The style of the documents is similar to the quality assurance standard ISO9001 and the environmental management standard ISO14001 (that some people may be familiar with).

The Key components of the standard are shown in Figure 1 and outlined below;



Figure 1: ISO 55000 Components of AM Management Systems

The key components of Planning, Operation, Performance Evaluation, and Improvement are encircled by Organizational Context and Leadership, and in the centre of all AM components is Support.

- Understand Organizational Context (Section 4)
 - What is your business/strategic AM Plan/strategy
 - Understand stakeholders needs, expectations
 - Define the scope (what assets)
 - Define and document
- Leadership (Section 5)
 - Demonstrated commitment
 - AM Policy
 - Strategic AM Plan
 - Roles, responsibilities and authorities

- Planning (Section 6)
 - AM System
 - Asset Planning (Objectives, Plans)
- Operation (Section 8)
 - Operational Planning and Control
 - Management of Change
 - Outsourcing / Contract Management
- Performance Evaluation (Section 9)
 - Monitoring, measurement, analysis and evaluation
 - Internal audit
 - Management review
- Improvement (Section 10)
 - Nonconformity and corrective action
 - Preventive action
 - Continual improvement
- Support (Section 7)
 - Resources
 - Competence
 - Awareness
 - Communication
 - Information
 - Documentation

AM Framework (BC)

In a similar way the AM Framework (AMF) document support requirements for the Federal Gas Tax Fund in British Columbia (GTA) and outlines **what** an organization with good asset management practices will have in place. This framework document provides the BC context for the Federal Gas Tax Fund requirements. There are other similar Framework documents that outline Asset Management requirements in other Canadian Provinces.



Figure 2: AM Framework for Gas Tax Agreement in BC

The key components of the AMF can generally be related to the components of ISO 55000 as follows;

ISO 55000	AM Framework
Organizational Context	Engage
Leadership	Communicate
Planning	Plan
Operation	Implement
Performance	Assess
Improvement	Review
Support	Core Elements

This table shows the relationship of main components but there are many other connections between parts of the standard (ISO) and the framework (AMF) throughout both documents.

IIMM (International)

This manual for infrastructure management is an international document. It differs from the international standard (ISO 55000) in level of detail and focus. The IIMM is primarily about **how** to do asset management.

The key components of the IIMM are;

- Introduction to Infrastructure AM
 - Introduction
 - AM Drivers and Benefits
 - Defining AM
 - The AM Process
- Understanding and defining requirements
 - Strategic Context & AM Policy
 - Developing & Monitoring LOS
 - Forecasting Future Demand
 - Establishing Base Asset Knowledge
 - Assessing Asset Condition
 - Identifying Critical Assets & Business Risks
- Developing AM Lifecycle Strategies
 - Decision making techniques
 - Developing Operational Strategies & Plans
 - Developing Maintenance Strategies & Plans
 - Developing Capital Investment Strategies & Plans
 - Financial & Funding Strategies
- AM Enablers
 - AM Teams
 - AM Plans
 - Information Systems & Tools
 - Service Delivery Models
 - Quality Management
 - Continuous Improvement

AM Roadmap (Canada)

Although developed in BC the AM Roadmap is a simplified version of the IIMM document and is equally applicable to any asset owner, and particularly to Canadian Municipalities. It is an ideal beginner's guide, giving practical information on **how** to do asset management. It is consistent with all the principles and requirements in both ISO 55000 and the AMF, as well as the IIMM. It does however breakdown the elements of AM into modules of practice, which helps users to more easily identify one or two key areas to get started on implementing or improving AM in their organization, and getting results. The key components of the AM Roadmap for a basic level of AM Practice are;

- Know your Assets
 - Basic Asset Inventory
 - Asset Components
 - Data, Software, and Tools
- Know Your Financial Position
 - Current Asset Investment
 - Current O&M Costs
 - Future Capital Costs
 - Funding Sources
- Understand Decision Making
 - Evaluate Decision Making
 - Improvement Plan & Process
 - Prioritizing Improvements
- Manage Your Lifecycle
 - Asset Condition
 - Level of Service
 - Assess Renewal Alternatives
 - Assess Maintenance Strategies
- Know the Rules
 - Strategic Goals
 - Legislation, Regulation, Policy & Standards
- Monitor Sustainability
 - Sustainability Assessment
 - Coordinating Infrastructure Works

Both the IIMM and the AM Roadmap provide targets for Basic, Intermediate, and Advanced levels of AM Practice. Currently the detailed guide document for the AM Roadmap only includes AM Practice Modules that are required for Basic Level AM whereas the IIMM provides guidance on all levels of AM Practice.

It is expected that Intermediate and Advanced practice modules will be added to the AM Roadmap when needed by Canadian municipalities and organizations.

Discussion and Application

Both the IIMM and the AM Roadmap existed before the ISO 55000 standard was written, however the universal principles of AM are the foundation of all these and this is why they all connect and support each other. Future document updates for the IIMM and the AM Roadmap will undoubtedly include terminology from ISO 55000 to strengthen consistency across the documents. Document structures may also become more aligned, and additions made to content.

They are none-the-less both excellent resource documents on **how** to do the AM practice required by ISO 55000 and the AM Framework.

Another framework to mention is the seven questions of AM listed in the InfraGuide document - Innovation and Best Practices (Managing Infrastructure Assets and Decision Making and Investment Planning). These are;

1. What do you have and where is it?(Inventory)
2. What is it worth? (Costs/replacement rates)
3. What is its condition and expected remaining service life? (Condition and capability analysis)
4. What is the level of service expectation, and what needs to be done? (Capital and operating plans)
5. When do you need to do it? (Capital and operating plans)
6. How much will it cost and what is the acceptable level of risk(s)? (Short- and long-term financial plan)
7. How do you ensure long-term affordability? (Short- and long-term financial plan)

Both the IIMM and the AM Roadmap provide detail on how to answer these questions, as does the InfraGuide document referred to. However the IIMM and AM Roadmap provide additional useful information on implementing and improving integrated AM business practices in a broader context.

These seven questions are often used for communication of AM concepts to people unfamiliar with AM and they have been used as a general framework for AM Plan documents.

Conclusion

The principles and key concepts of AM are universal and this provides consistency and connectivity between standards, manuals, roadmaps, and frameworks.

AM guides provide flexibility for organizations to identify the most appropriate practice for their circumstances, community, assets, and priorities. This recognizes that there is no standardized best-practice-one-size-fits-all template that can be equally effective for all organizations. Each organization's circumstances and needs are unique. But there are reputable guides for beginners through to advanced practitioners to help you with both the **what** and the **how** to implement and improve asset management.

Editor: Bernadette O'Connor



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Issued by: **Asset Management BC**



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Asset Management: Questions and Answers

Responses provided by Editorial Panel

Note to Readers: You are invited to email questions or comments to Asset Management BC or to the editor – see final page - and you can note in your email whether you wish your comment or question to be published.

Raising questions and making comment are strongly encouraged as this newsletter is provided for the greater good of all types of Local Governments managing infrastructure and for the advancement of Asset Management within the Province.

From: [Mona Helcermanas-Benge](#)
To: efinn@shaw.ca
Subject: BC fault line Map, WLNG proposed site has 2 faults
Date: Tuesday, February 17, 2015 6:08:44 PM
Attachments: [Fault Lines in HoweSound.jpg](#)
Importance: High

Following segment is taken from the WLNG Environmental Assessment Application presently accepting public comment.

Sec. 12.0 Effects of the Environment on the Project.

12.1 Project setting

The Project area is located in Howe Sound, a fjord approximately 3 km wide and 42 km long, with vertical relief of approximately 1,770 m from the seafloor to mountain summits.

The Project area is within the zone of moderate to high earthquake risk of coastal BC. Valleys along the shoreline of Howe Sound, have steep slopes with active and historic mass wasting events & potentially unstable terrain.

Please see below, with source reference: for BC Fault lines including the 2 under the WLNG proposed facility site.

<http://www.cbc.ca/news/multimedia/every-fault-line-in-british-columbia-1.291>

9420

Please view the attached map that indicates the fault lines both under the WLNG site and the proposed FortisBC pipeline route.

<http://www.squamishchief.com/news/earthquake-rumbles-squamish-1.1763509>

[http://www.earthquakescanada.nrcan.gc.ca/recent/maps-cartes/index-eng.php?tp
l_region=swbc](http://www.earthquakescanada.nrcan.gc.ca/recent/maps-cartes/index-eng.php?tpl_region=swbc)

Please contact Eoin Finn for more information

604-715-7991

efinn@shaw.ca

Known Fault Lines in BC

Feb 15, 2015
3.4 magnitude earthquake
hits Vancouver's coast
Felt throughout
Howe Sound

<http://globalnews.ca/news/1831562/3-5-magnitude-earthquake-hits-vancouver-coast/>

Woodfibre
LNG plant &
LNG tanker port

Squamish

Woodfibre Proposal:
An LNG plant and LNG
tanker port directly on
known fault lines?

Thrust
Fault Lines

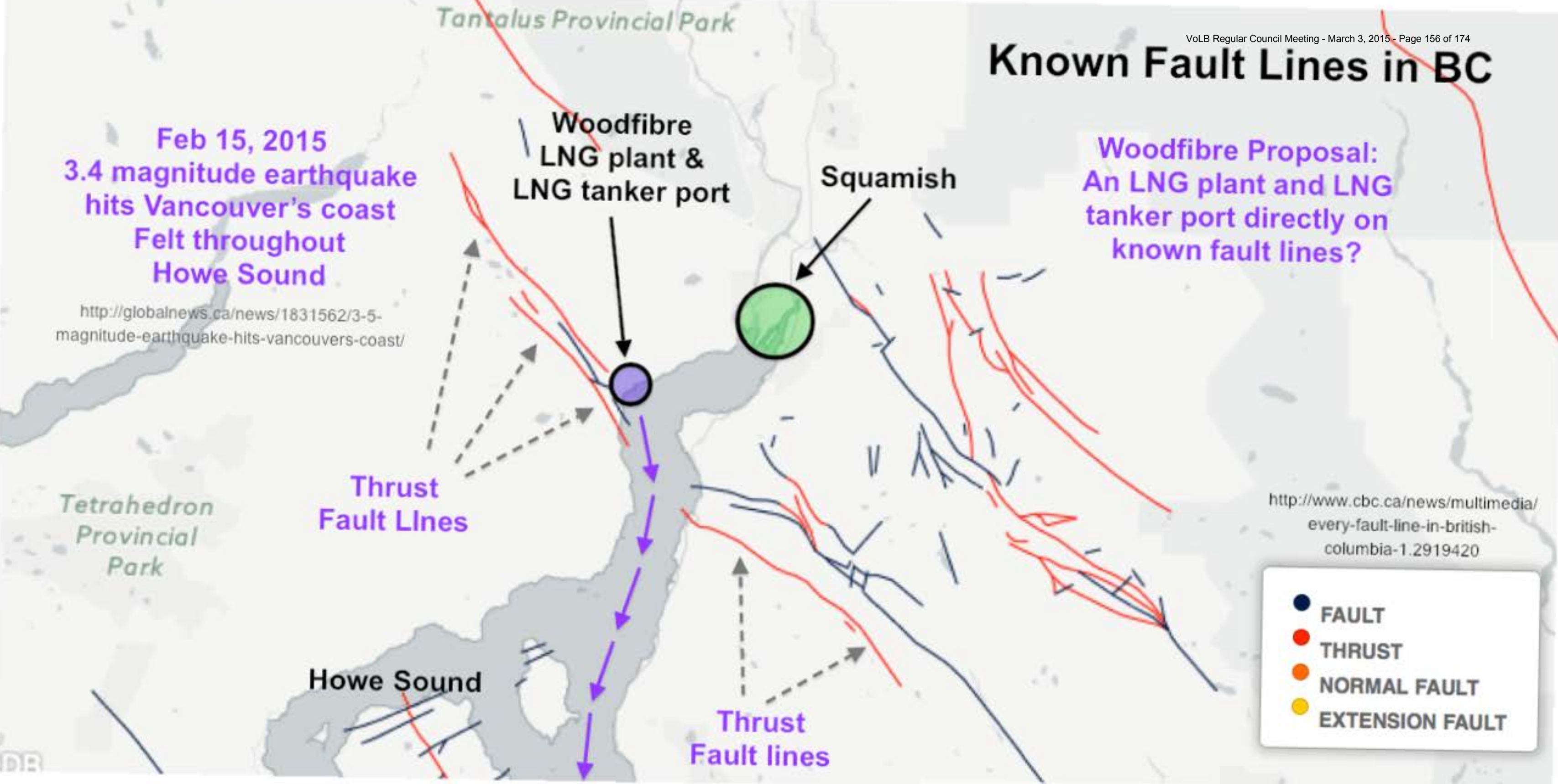
Tetrahedron
Provincial
Park

Howe Sound

Thrust
Fault lines

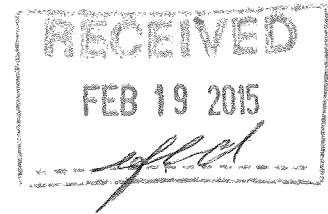
<http://www.cbc.ca/news/multimedia/every-fault-line-in-british-columbia-1.2919420>

- **FAULT**
- **THRUST**
- **NORMAL FAULT**
- **EXTENSION FAULT**





Jerry Muir
Community Relations Manager
Lower Mainland
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Email: jerry.muir@bchydro.com



VILLAGE OF LIONS BAY
FILE TO I/C
FILE TO PROPERTY FILE
OTHER

February 12, 2015

Mayor Karl Buhr
Village of Lions Bay
Box 141
Lions Bay, BC V0N 2E0

Dear Mayor Buhr and Council:

Congratulations to you and your council on your election last fall.

With this letter, I would like to offer the assistance of the Lower Mainland Community Relations team to help address any BC Hydro related issues that are brought to the attention of your office. The Lower Mainland Community Relations team for BC Hydro consists of Lisa Waddell and myself in Vancouver and Steve Higginbottom in Abbotsford.

In the past, our team has worked with elected officials and staff to address and resolve inquiries associated with our construction projects, vegetation management requirements, service connections and reliability, as well as community donations and sponsorships.

For more information on our funding programs and support for local governments, please visit <http://www.bchydro.com/community.html>

Again, congratulations on your recent election. Please do not hesitate to contact me for assistance with any BC Hydro related activities in your community.

Sincerely,

Jerry Muir

Councillors

Les Barkman
Sandy Blue
Kelly Chahal
Brenda Falk



CITY OF ABBOTSFORD

Mayor, Henry Braun

VolB Regular Council Meeting - March 3, 2015 - Page 158 of 174

Councillors

Moe Gill
Dave Loewen
Patricia Ross
Ross Siemens

February 10, 2015

File: 5360-20-03

Mayor Malcolm Brodie, Chair
Metro Vancouver Zero Waste Committee
4330 Kingsway
Burnaby BC V5H 4G8

RECEIVED
FEB 17 2015
VILLAGE OF LIONS BAY
FILE TO I/C
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Dear Malcolm:

Re: Summary of European Delegate Recycling and Solid Waste Management Presentations

Thank you for your letter, dated November 13, 2014, with an attached staff report dated September 11, 2014, summarizing presentations received from European delegations regarding European solid waste management. The letter and its attached report were discussed at the Abbotsford City Council Executive Committee Meeting on January 12, 2015. The City reviewed the Metro Vancouver report and found the European solid waste information did not support waste-to-energy (WTE). Our findings on the key points of the report and attachments are provided below.

1) Key points in Metro Vancouver report on WTE

- a) *"Countries with high use of WTE also have high recycling rates; countries with high use of landfilling and low use of WTE have lower recycling rates."*

The City agrees with this correlation; however, the reason for the correlation is important to understand. Participation rates in recycling programs vary depending on cost and convenience. If the recycling costs are lower than disposal costs the participation rates will be high. Waste disposal using WTE has a high cost; therefore, countries with WTE have a financial incentive for higher recycling rates. Disposal of waste using landfilling usually is low cost; consequently countries with low use of WTE have lower recycling rates unless a high landfill disposal levy is charged or bans are imposed; therefore, it is not WTE that is responsible for high recycling rates; it is the high disposal costs which can also be achieved through a high landfill disposal levy or through bans.

- b) *"Statistics show that low cost landfilling, not WTE, impedes recycling."*

Low cost landfilling without any recycling regulations or incentives could impede recycling; however, WTE also has the same challenges. One of the main concerns with the Metro Vancouver WTE plan is that the high capital investment for the WTE facility will result in the need to keep high amounts of waste flowing to the incinerator to ensure its capital repayment and financial viability. This is also known as "the need to feed the beast". Implementing recycling initiatives would be counterproductive to the business case for WTE. Achieving high diversion rates would impact the volume of feedstock for WTE and reduce the energy revenue. This situation is already being observed in the Netherlands where recycling achievements

created a shortage of feed for their WTE incinerators. Importation of garbage from the UK to the Netherlands was used to address this shortage. The Metro Vancouver report cites this case.

- c) *"There are some differences between the UK, Netherlands, and Metro Vancouver climate and topography. Nonetheless, experience shows that WTE is a safe, well-regulated industry whose contribution to air pollution is very small compared to other sources such as heavy industry and transportation."*

The Fraser Valley airshed is substantially different than the UK and the Netherlands and is already compromised with occasional poor air quality incidences. Air quality experts, consulted by the Fraser Valley Regional District, looked at the impact of the WTE incinerator to the Fraser Valley airshed and expressed concern over the potential impact. In addition to the significant topographical and meteorological differences is that, unlike the UK and the Netherlands, Metro Vancouver has easy access to regional, modern landfills in desert-like environments that are ideal locations for landfilling. Metro Vancouver also has access to potential WTE locations outside the Fraser Valley airshed.

2) Key Point on Mixed Waste Material Recovery Facilities

- a) *"Various methods have been tried to process residual garbage including Mixed Waste Material Recovery Facilities (MWMRF) / Mechanical Biological Treatment (MBT) facilities."*
- b) *"...effectively all products from these facilities are either landfilled or incinerated due to poor product quality."*
- c) *"These facilities recover in the order of 1% or less of recyclables."*

It is widely accepted that there were problems with older MWMRF/MBT facilities. The Metro Vancouver report does not state the age of the UK and Netherlands facilities or whether the latest technologies would be expected to improve the outcome. Much better outcomes, although still not ideal, were achieved at moderately newer MWMRFs in the US. The private sector appears to strongly believe modern technologies and design would allow even higher separation of recyclables from source-separated garbage and appear willing to take on the risk of failure. MWMRF technologies for the separation of recyclables from garbage appear to be developing quickly and greater success of separation is expected in the near future.

3) Key Point on Other Diversion Actions

"A European directive will come into effect in 2015 which will further maximize diversion by mandating source separation."

The City of Abbotsford agrees that source separation is critical for a successful diversion program. A review of the diversion numbers at a large MWMRF in the US confirmed the advantage of source separation. Our City currently has source separation of compostables and recyclables in the curbside program. Abbotsford also has mandatory source separation of recyclables in multi-family residential buildings and at commercial properties. The City is currently moving toward mandatory source separation of compostables in the commercial food services sector and will soon also be looking at mandatory source separation of compostables at multi-family residential buildings. The

Metro Vancouver

3

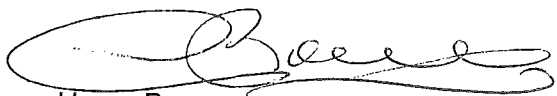
February 10, 2015

Fraser Valley Regional District is also working towards implementing bans on compostables and recyclables at all landfills and transfer stations throughout the Fraser Valley. This ban will reinforce the mandatory source separation requirements in the City.

In summary, the Metro Vancouver report appears to over-interpret the European solid waste management information in a way that supports WTE more than is justified by the information. In addition, the report appears to downplay the impact to the Fraser Valley airshed and the potential opportunities for a modern MRF to process source-separated garbage and increase diversion.

If you have any questions, please call me at 604-864-5500 or email mayor@abbotsford.ca.

Yours truly,



Henry Braun
Mayor

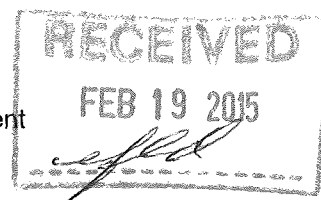
- c. Honourable Mary Polak, Minister of Environment
Greg Moore, Chair, Metro Vancouver
Member Municipalities of Metro Vancouver
Sharon Gaetz, Chair, Fraser Valley Regional District
Council Members
George Murray, City Manager
Jim Gordon, General Manager, Engineering and Regional Utilities

Minister of the Environment



Ottawa, Canada K1A 0H3

Ministre de l'Environnement



FEB 11 2015

His Worship Mayor Karl Buhr
The Municipality of the Village of Lions Bay
P.O. Box 141
400 Centre Road
Lions Bay BC V0N 2E0

VILLAGE OF LIONS BAY
FILE TO I/C
FILE TO PROPERTY FILE
OTHER

Dear Mayor Buhr and Councillors:

The Honourable Lisa Raitt, Minister of Transport wrote on January 9, 2015, to the Office of the Mayor responding to matters raised by the Village of Lions Bay about liquefied natural gas carrier traffic in Howe Sound, including traffic from the proposed Woodfibre LNG Project.

On January 31, 2014, the Canadian Environmental Assessment Agency announced that the Project would be subject to an environmental assessment under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012). Shortly thereafter, on February 19, 2014, I approved British Columbia's request for substitution of the environmental assessment process, as set out in the *Memorandum of Understanding between the Canadian Environmental Assessment Agency and B.C.'s Environmental Assessment Office on the Substitution of Environmental Assessments, 2013*. Both my decision and the announcement are posted on the Canadian Environmental Assessment Registry website at www.ceaa.gc.ca/050/documents-eng.cfm?evaluation=80060.

In taking my decision, I considered public and Aboriginal comments received by the Agency during the comment period on the request, along with the commitment by the B.C. Environmental Assessment Office to consider the factors as set out in subsection 19(1) of CEAA 2012 when conducting a substituted environmental assessment. As referenced in my decision, the substituted process will include analysis and conclusions pertaining to potential environmental effects of the proposed liquified natural gas facility, marine terminal and marine shipping activities in Howe Sound. The substituted assessment will include environmental effects of accidents and malfunctions, effects on fish and fish habitat and cumulative environmental effects. I understand that Minister Raitt has responded to your concerns regarding marine safety. Furthermore, as part of B.C.'s process, safety will be considered in the assessment of potential adverse social and economic effects.

Canada

.../2



- 2 -

The next key step in the environmental assessment is the review of the proponent's *Environmental Assessment Application* and the B.C. Environmental Assessment Office is providing an opportunity for the public to provide comments from January 22, 2015 to March 9, 2015. I also understand that the B.C. Environmental Assessment Office recently extended an invitation to the Village of Lions Bay to participate as an Environmental Assessment Advisory Working Group member for the Project, which includes additional opportunities to provide input to the environmental assessment.

The concerns raised by the Village of Lions Bay are valuable and help to inform the environmental assessment of this project. I encourage your continued participation.

Sincerely,

A handwritten signature in dark ink, appearing to read 'Leona Aglukkaq', written in a cursive style.

The Honourable Leona Aglukkaq, P.C., M.P.
Minister of the Environment

February 23, 2015

File No. 01-0230-40

Dear Mayor and Council:

Re: Declaration of the Right to a Healthy Environment

At the Regular Council meeting of February 10, 2015, Port Moody City Council passed the following resolution:

“WHEREAS municipalities and regional districts are the governments nearest to people and the natural environment, and therefore share a deep concern for the welfare of the natural environment and understand that a healthy environment is inextricably linked to the health of individuals, families, future generations and communities;

AND WHEREAS fostering the environmental well-being of the community is a municipal purpose under section 7(d) of the *Community Charter* and a regional district purpose under section 2(d) of the *Local Government Act*;

The Council of the City of Port Moody declares that:

1. every resident has the right to live in a healthy environment, including the right to:
 - a. breathe clean air,
 - b. drink clean water,
 - c. consume safe food,
 - d. access nature,
 - e. know about pollutants and contaminants released into the local environment, and
 - f. participate in decision making that will affect the environment;
2. The City of Port Moody has the authority, within its jurisdiction, to respect, protect, fulfill and promote these rights;
3. The City of Port Moody will consider the precautionary principle when making decisions: where threats of serious or irreversible damage to human health or the environment exist, the City of Port Moody will consider cost effective measures to prevent the degradation of the environment and protect the health of its citizens, and the absence of full scientific certainty will not be viewed as sufficient reason for the City of Port Moody to postpone such measures;

4. The City of Port Moody will apply full cost accounting when evaluating reasonably foreseeable costs of proposed actions and alternatives, the City of Port Moody will consider costs to human health and the environment;
5. By 2016, the City of Port Moody will specify objectives, targets, timelines and actions the City of Port Moody will consider, within its jurisdiction, to address the residents' right to a healthy environment under section 1, including priority actions to:
 - a. Ensure infrastructure and development projects of the City of Port Moody and private sector respect the objective of protecting the environment, including air quality;
 - b. address climate change by reducing greenhouse gas emissions and implementing adaptation measures;
 - c. prioritize walking, cycling and public transit as preferred modes of transportation;
 - d. prioritize infrastructure and protected water sources for the provision of safe and accessible drinking water;
 - e. reduce solid waste and promote recycling, re-use and composting;
 - f. establish and maintain accessible green spaces in all residential neighbourhoods, and protect and conserve nature in public open spaces;
6. The City of Port Moody will review the objectives, targets, timelines and actions of its healthy environment policy every five (5) years, and measure progress toward fulfilling this Declaration; and
7. The City of Port Moody will consult with residents as part of this process.

AND THAT this declaration be forwarded to the Lower Mainland Local Government Association, the Union of BC Municipalities, the Federation of Canadian Municipalities and member local governments, requesting favourable consideration by local councils and by delegates at the 2015 annual general meetings of these associations.”

The City of Port Moody has forwarded this resolution to the Lower Mainland Local Government Association (LMLGA), the Union of British Columbian Municipalities (UBCM), and the Federation of Canadian Municipalities (FCM) for discussion at their 2015 Conference/Convention. We respectfully request that your Council favourably support this initiative when it comes forth for discussion. Should you have any questions, please feel free to contact the undersigned at 604-469-4505.

Yours truly,

Kelly Ridley
Manager of Legislative Support

From: [Lions Bay Reception](#)
To: [Agenda](#)
Subject: FW: Striking a Balance Update
Date: Monday, February 23, 2015 1:57:42 PM
Attachments: [image001.jpg](#)
[image002.jpg](#)

For Incoming Correspondence

Susan Loutet

Administrative Assistant

The Municipality of the Village of Lions Bay. www.lionsbay.ca

PO Box 141, 400 Centre Road, Lions Bay, BC V0N 2E0 CANADA

Tel: (604) 921-9333 ext. 100 | Fax: (604) 921-6643

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From: Office of the Ombudsperson [mailto:outreach@bcombudsperson.ca]

Sent: Friday, February 20, 2015 4:54 PM

To: Lions Bay Reception

Subject: Striking a Balance Update

Office of the Ombudsperson



Update on status of recommendations in *Striking a Balance: The Challenges of Using a Professional Reliance Model in Environmental Protection – British Columbia's Riparian Areas Regulation*.

In March 2014, the Ombudsperson released *Striking a Balance*, a report addressing deficiencies in the administration of the Riparian Areas Regulation (RAR), an environmental protection program that is aimed at protecting fish habitat located near populated areas. The Minister of Forests, Lands and Natural Resource Operations accepted all but one of the 25 recommendations made in the report.

This initial update reflects implementation actions up to December 2014. The province has updated its website to accurately reflect the ministry's responsibility for the RAR – implementing one recommendation. Action is still required in other areas, including

recommendations intended to help local governments administer the RAR and protect fish habitat for British Columbians.

Download the update table by clicking [here](#).

Download the news release by clicking [here](#).

Download *Striking a Balance* by clicking [here](#).

Brad Densmore

Outreach, Information and Education Officer

Office of the Ombudsperson

250.387.5855

1.800.567.3247

outreach@bcombudsperson.ca

[Unsubscribe](#) [Contact the Office of the Ombudsperson](#)

From: [Tracey Saxby](#)
To: [Michael.Shepard@gov.bc.ca](#); [Woodfibre@ceaa-acee.gc.ca](#); [Alanya.Smith@gov.bc.ca](#); [Scott.Bailey@gov.bc.ca](#); [Amber.Paulson@gov.bc.ca](#); [Jane.Mayall@gov.bc.ca](#); [Doug.Caul@gov.bc.ca](#)
Cc: [premier@gov.bc.ca](#); [env.minister@gov.bc.ca](#); [lisa.raitt@parl.gc.ca](#); [Leona.aglukqaq@parl.gc.ca](#); [john.weston@parl.gc.ca](#); [andrew.weaver.mla@leg.bc.ca](#); [MNGD.minister@gov.bc.ca](#); [MEM.Minister@gov.bc.ca](#); [FLNR.Minister@gov.bc.ca](#); [MIT.Minister@gov.bc.ca](#); [JTST.Minister@gov.bc.ca](#); [STSB.Minister@gov.bc.ca](#); [Minister@ec.gc.ca](#); [info@ceaa-acee.gc.ca](#); [todd.stone.mla@leg.bc.ca](#); [rich.coleman.mla@leg.bc.ca](#); [bill.bennett.mla@leg.bc.ca](#); [Teresa.wat.mla@leg.bc.ca](#); [Naomi.yamamoto.mla@leg.bc.ca](#); [steve.thomson.mla@leg.bc.ca](#); [Shirley.bond.mla@leg.bc.ca](#); [john.horgan.mla@leg.bc.ca](#); [Nicholas.Simons.MLA@leg.bc.ca](#); [shane.simpson.mla@leg.bc.ca](#); [s.chandraherbert.mla@leg.bc.ca](#); [jordan.sturdy.mla@leg.bc.ca](#); [council@squamish.ca](#); [mayorandCouncil@westvancouver.ca](#); [slwilliams@gibsons.ca](#); [info@sechelt.ca](#); [info@cdpr.bc.ca](#); [ron.hallman@ceaa-acee.gc.ca](#); [irene.gendron@ceaa-acee.gc.ca](#); [kurt.saunders@ceaa-acee.gc.ca](#); [sylvain.ouellet@ceaa-acee.gc.ca](#); [jim.delaney@nrcan.gc.ca](#); [lisa.walls@ceaa-acee.gc.ca](#); [Elaine.kinequon@Squamish.net](#); [lisa_wilcox@squamish.net](#); [chris.lewis@squamish.net](#); [chief@twnation.ca](#); [bbaptiste@twnation.ca](#); [peter@katzie.ca](#); [reception@kwikwetlem.com](#); [lsparrow@musqueam.bc.ca](#); [saugust@secheltnation.net](#); [lbaker@secheltnation.net](#); [mayorandCouncil@westvancouver.ca](#); [mayorandCouncil@bimbc.ca](#); [Council @ Lions Bay](#); [Shawna Gilroy](#); [slwilliams@gibsons.ca](#); [info@sechelt.ca](#); [info@cdpr.bc.ca](#); [msmith@islandstrust.bc.ca](#); [mayorsoffice@whistler.ca](#); [icentre@metrovanvancouver.org](#); [MayorandCouncil@Vancouver.ca](#); [Brenda.paguin@powellriverd.bc.ca](#); [info@scrd.ca](#); [Autumn.Ruinat@scrd.ca](#); [info@slrd.bc.ca](#)
Subject: Request for an extension for EA public comment periods
Date: Thursday, February 19, 2015 3:27:33 PM

To: BC Environmental Assessment Office staff

Copying: Premier Christy Clark, the Honourable Rich Coleman, Mr. John Weston, M.P., MLA Jordan Sturdy, MLA Nicholas Simons, MLA Andrew Weaver, the Honourable Bill Bennett, the Honourable Teresa Wat, the Honourable Naomi Yamamoto, the Honourable Mary Polak, the Honourable Steve Thomson, the Honourable Shirley Bond, the Honourable Todd Stone, MLA John Horgan, MLA Spencer Chandra Herbert, the Honourable Lisa Raitt, the Honourable Leona Aglukqaqand, the Canadian Environmental Assessment Agency, Squamish Nation, Tsleil-Waututh Nation, Katzie First Nation, Musqueam Indian Band, Sechelt First Nation, and Howe Sound Municipal Councils and Regional Districts

RE: Request for an extension for the BC Environmental Assessment public comment periods for the proposed Woodfibre LNG Project and the proposed Eagle Mountain - Woodfibre Gas Pipeline Project.

Dear Sirs/Madams,

Following a phone conversation with BC EAO staff, I am writing to formally request an extension for the coinciding public comment periods for the two projects proposed in Squamish that are concurrently going through the BC Environmental Assessment process:

- Woodfibre LNG Project
- Eagle Mountain – Woodfibre Gas Pipeline Project

As noted in our conversation, the legislated timeline of providing one week's notice to advertise dates of open houses and the start of public comment periods is not adequate. When the public comment periods for two of these proposed projects occur at the same time it is even less feasible for the general public to be able to respond in a meaningful way with such a short timeframe for both projects.

In response to my expressed concerns about the timing of the previous public comment period in June/July 2014 that started at the end of school term and during summer holidays, and my request for an extension, the Project Assessment Manager at the time responded via email:

“We do not anticipate extending the comment period beyond 30 days. As the comment period runs for 19 days in June that will allow for sufficient time for people who may be away in July to still comment on the project. Also considering the length of the document for comments being only 34 pages, plus maps, 30 days is more than sufficient time for people to comment on those.”

However, nineteen days is not enough time for people to:

- a) become aware that this public engagement process is happening,
- b) read through the documents,
- c) fully understand the documents and do any research necessary to be able to fully understand these documents and request studies to be done, and
- d) respond in an informed manner.

While the first public comment period was extended to 45 days, this was still an insufficient amount of time to respond. This is one of several flaws in the existing BC Environmental Assessment process: the proponent has no time limit to prepare these documents, while the general public are expected to spend their time, unpaid, and engage in a highly technical, very complicated process and respond in a mere 19 days?

Now, for the second public comment period we have a 45 day period to submit our comments, yet the amount of time we are now granted still does not allow adequate time to review the wealth of material provided: the Woodfibre LNG Project application numbers over 2,341 pages (not to mention the 7,008 pages in the appendices), while the Fortis BC pipeline application is an additional 1,613 pages plus 2,010 pages of appendices.

If 19 days is deemed sufficient by EAO staff to review a 34 page document, how much time is “sufficient” to review a grand total of 12,972 pages of dense, highly technical documents? How is the general public expected to read such a large document in their spare time over a 45 day period given work, family, and life commitments? Over 45 days that’s equivalent to reading 288 pages a day, which is absurd.

Most importantly, with this huge volume of information and limited time to comment, does the EAO believe that it is compliant with the Federal Minister of Environment’s substitution decision, which specifically states that a goal of this substituted process is to enable “meaningful participation” by the public?

With the public comment period for two of these projects occurring simultaneously, the amount of time allocated for the general public to respond needs to be extended significantly to enable the public to respond in an informed manner.

If these projects were intended to be considered as one project, then they should have been proposed as such, which would have triggered a Federal Environmental Assessment.

Thank you for considering this request to extend the public comment periods for these two proposed projects in Squamish.

Sincerely,
Tracey Saxby

Tracey Saxby

Co-Founder

My Sea to Sky

Home: +1 (604) 892-5096

Cell: +1 (604) 892-7501

Email: tracey@myseatosky.org

Web: <http://myseatosky.org>

From: [Gillian Smith](#)
To: [Shawna Gilroy](#)
Subject: declaration
Date: Friday, February 20, 2015 1:43:46 PM

Dear Major and Council,

Would be great to see this same resolution adopted in Lions Bay. Especially with pending LNG, open-pit mine and incinerator planned for Howe Sound:

<http://www.squamishchief.com/news/local-news/squamish-declares-need-for-healthy-environment-1.1768468>

Gillian Smith, 20 Oceanview

Squamish declares need for healthy environment

Council unanimously passes Blue Dot initiative

Jennifer Thuncher /jthuncher@squamishchief.com / Squamish Chief

February 19, 2015 10:26 AM

- [Email](#)
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David Suzuki, whose foundation spears the Blue Dot campaign, chats during his visit to Porteau Cove on Nov. 8. Photo by File photo

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David Suzuki, whose foundation spears the Blue Dot campaign, chats during his visit to Porteau Cove on Nov. 8. Photo by File photo

Squamish has been declared a place where its citizens have the right to live in a healthy environment.

The declaration was made by council Tuesday night after a presentation by Carolyn Neu, who spoke on behalf of the Blue Dot campaign, which is a project of the David Suzuki Foundation. “A declaration by Squamish to show it supports a safe and healthy community environment and to show support for all inhabitants the right to continue to breathe clean air, drink fresh water, consume safe food and to access nature,” said Neu in her request that council make the declaration.

The declaration states that council will ensure in its practices and policies that the cost to human health and the environment has been considered. It also states that a lack of full scientific certainty will not prevent council from taking measures to protect these things.

According to Neu, the ultimate goal is to amend the Canadian Charter of Rights and Freedoms to include the right to a healthy environment. So far 110 nations have made the declaration, Canada is not one of them.

Mayor Patricia Heintzman said council had been doing many of the things requested in the declaration, but said she was happy to put forward the motion, which was unanimously passed.

“A lot of things in here we already have imbedded in our policies, but I think what this does is makes it mindful, it brings it to the forefront and it hopefully helps influence the federal government to embody it within the constitution like so many other countries have done,” said Heintzman.

Squamish is the 17th Canadian municipality to make the declaration.

After the meeting, Neu said she was surprised that council passed the declaration right away.

“I wasn’t expecting that,” she said. “That was so wonderful.”

For more on the Blue Dot campaign, go bluedot.ca.

- See more at: <http://www.squamishchief.com/news/local-news/squamish-declares-need-for-healthy-environment-1.1768468#sthash.bkzGNRTH.dpuf>



Welcome to **LIONS BAY 55+ CLUB!**

Help launch this new Lions Bay Community Social Club!
An "Age Friendly" grant will help us get off the ground.
Bring your ideas and suggestions.
All ideas are welcomed!

Refreshments and fresh baked goods will be served.
Come drop in to meet your fellow villagers on:

WEDNESDAY, MARCH 4, 2015
1:00 - 3:00PM
VILLAGE HALL

If you need transportation or more information please call:

Louis Peterson (921-7260) or Tony Cox
(921-9496)

"pro tem" organizers:

Tony Cox, Hilda Mayo, Louis Peterson,
Margaret Watson, Eileen Wilke,
and Helen Waterson, Councillor



Intentionally Blank