THE MUNICIPALITY OF THE VILLAGE OF LIONS BAY

INFRASTRUCTURE COMMITTEE MEETING
OF THE VILLAGE OF LIONS BAY
HELD ON THURSDAY, MAY 25, 2017 at 7:00 PM
COUNCIL CHAMBERS, 400 CENTRE ROAD, LIONS BAY

AGENDA

1. Call to Order

2. Appointment of Recorder

3. Approval of the Agenda

4. Public Questions & Comments

5. Approval of Minutes

A. Infrastructure Committee Meeting – April 24, 2017 (Page 3)
B. Action Items from the Minutes
- ACTION: Nai to see if we can obtain coverage from a cable cam system in action
- ACTION: Tony to fill in many of the blanks in the matric with information for water systems along Howe Sound that he is familiar with

6. Business Arising from the Minutes

7. Unfinished Business

A. Water Storage Facility Replacement (Page 7)
B. UBC Water Hydrology Project Update
C. Metro Vancouver Water – Progress Update
D. Howe Sound Water Source Matric – Update
E. Cell Towers – Update
F. Bayview Road Work - Update

8. New Business

A. Beach Sampling for Health (Page 69)

9. Public Questions & Comments

10. Adjournment

LIONS BAY INFRASTRUCTURE COMMITTEE MEETING
MONDAY 24 APRIL 2017 AT 7:00 PM
COUNCIL CHAMBERS, 400 CENTER ROAD, LIONS BAY

MINUTES OF THE MEETING

In Attendance:

Fred Bain – Councilor and Committee Chair
Naizam Jaffer – Public Works Manager
Jim Mutrie – Resident
Tony Greville – Resident
Karl Buhr – Mayor
Brian Ulrich – Resident

Regrets:

Jim Hughes – Councilor
Peter Dejong - CAO

1. **Call to Order**
   Meeting was called to order at 7:05 pm.

2. **Appointment of Recorder**
   Regular recorder: Brian Ulrich

3. **Approval of the Agenda**
   The Agenda was approved as tabled.

4. **Public Participation**
   No public questions or comments

5. **Approval of Minutes**
   A. The 27 March 2017 IC meeting minutes were approved as is.

   B. Review of Action items from 27 March 2017 minutes.

      Carry Forward Actions:

      From Section 5:

      ACTION: Nai to see if we can obtain coverage from a cable cam system in action.

      New Actions:
      From Section 7C:

ACTION: Tony to fill in many of the blanks in the matrix with information for water systems along Howe Sound that hi is familiar with.

6. Business Arising from the Minutes

None.

7. Unfinished Business

A. UBC Water Hydrology Project.
The MOU with UBC has been signed. This is good progress toward beginning the study this summer. Lions Bay must contribute a portion of the overall funding of the project and we can possibly get this covered by Metro Vancouver or the Green Municipal Fund. Our first choice is to seek 100% funding from Metro, and the Green Municipal Fund being second with 80% maximum coverage.

Tony suggested that it might be possible to get a professional engineering company (like OPUS –ex Dayton & Knight) to sponsor the project. Often times these organizations like to be involved in leading edge projects like this even if there is no monetary return in it for them.
(nobody was given an action to investigate this as of this meeting)

The question was also raised as to what other sources of funding might be out there that could cover our portion of the costs for this study.

As a follow-up to comments in correspondence with the UBC team, it was suggested that we should get some press out of this and have a publicly announced launch in media like the APEGBC Innovations Magazine and similar publications.

Next steps are for Steve and his new team to visit our facilities and catchment areas and begin their work. We need to install robust flow measurement in the studied areas of our catchments.

The IC will be the de-facto steering committee for this project

B. Request to Metro Water District.
Tim Jervis has offered to potentially do the feasibility study for the pipeline as we requested.

C. Howe Sound Water Source Matrix.
Updates to the matrix coming from Tony

D. Cell Towers Update.
The cell tower company mentioned at last meeting, SBA Communications, met with staff on March 30th. They would like 2 sites; one up on the mountain as opposed to

waterfront. The higher they are the better so Harvey and Magnesia intakes are good potential sites.

Various possible Revenue arrangements were discussed. There is an advantage in a private company like this owning the tower instead of one of the big carriers (Rogers, TELUS, etc.). If a carrier owns the tower(s), the service provided to the community would be restricted to that one carrier and would be stuck with whatever quality service they provide. With a third party company owing the tower, all the carriers can lease space on the tower and compete for subscribers in our community. Since Lions Bay would be providing the land on which the towers are erected, we can arrange a revenue sharing agreement with the tower company. This is more attractive than relying on the carriers to service our challenging area.

SBA is eager to start on this project, which is part of Council's approved SCADA communications improvement project.

ACTION: Nai to draft the RFQ, including public consultation plan, for a multi-purpose tower which is not limited to a single-use provider (carrier).

(update on related topic: The RFP for the communications study is still on Nai's desk at this point. It is on hold pending the assessment for the new tanks, which must make sure that they can tie into the existing SCADA system. A good portion of the communications study will therefore be done during the tank assessment and consequently reduce the scope of the communications study).

E. Bayview Road Work Update. Review of the 50% design drawings is still in progress. The preliminary cost is approximately $850K for everything. The stormwork portion of this is $525K (which Staff deems to be on the high side – it's only for 325m of road).

F. Clean Water and Wastewater Fund (CWWF) Grant.
The RFP has been issued for this project and several (thought provoking) responses have been received. Addendums have been issued to answer questions. The documents are on the BC Bid web page.

8. New Business

A. Annual Drinking Water Quality Report.
The report was distributed to the IC before the meeting and all members had the chance to review it and bring comments to the meeting. There were only a few comments:
The question was posed: "Why is it in US gallons?"
Response: All our instrumentation is in US gallons.

The frequency and magnitude of turbidity events was noted and we discussed the need for future filtration. It's something we may need to be proactive on and install at some point in response to changes in regulations that will eventually force it.

B. Harvey Weir Design.

We reviewed the design drawings provided by CREUS and made several comments on the design that will be communicated back to CREUS.

9. Public Questions and Comments

There were no questions or comments from the gallery.

10. Adjournment

Meeting was adjourned at 9:15 pm.

11. Next Meeting

The next meeting originally scheduled for Monday 22 May 2017 at 7:00 pm was moved to Thursday 25 May 2017 at 7:00 pm

THE MUNICIPALITY OF THE VILLAGE OF LIONS BAY

Type	**Request for Decision**		
Title	**Award of RFP 17.01 Water Storage Facility Replacement**		
Author	**Naizam Jaffer**	**Reviewed By:**	**Peter DeJong**
Date	**May 12, 2017**	**Version**	**1**
Issued for	**May 16, 2016 Council Meeting**		

Recommendation:

THAT Council award RFP 17.01 Water Storage Facility Replacement to AECOM in the amount of $302,807.00 and authorize the Mayor and CAO to execute a contract, substantially in the same form as in the RFP, and any associated documents pertaining to the fulfillment of the contract.

Attachments:

(1) RFP 17.01 Water Storage Facility Replacement
(2) Staff Evaluation Matrix

Key Information:

Pursuant to the award of the Clean Water Wastewater Fund grant for the replacement of four water storage tanks throughout the Village of Lions bay, staff issued a request for proposal (RFP) on April 6, 2017. The initial closing date for the completion was April 24, 2017; however, due to requests from proponents, this was extended to May 2, 2017.

Sections 19 through 37 on pages 7 through 11 of the RFP define the scope of services requested by the Village of Lions Bay. These requirements break down the project into several core components:

1. Feasibility Memorandum: the proponents must review and assess all available information and address current and future water storage requirements, firefighting requirements, redundancy, and life cycle costs in order to recommend the optimal number of tanks on the Harvey Creek water system.

2. Design: the proponents must provide the overall design of the proposed upgrades, though the tank design itself will likely be provided by a tank supplier. The proponents design will take into account the supply of power and communications to each of the sites, pipe and valve works from the treatment plant or existing distribution system, automation and control strategy, internal components as required to ensure stagnation does not occur, sensors and equipment to enable real time monitoring of water quality, and operational and maintenance requirements for each of the sites. Improvement of the roadways, geotechnical investigations, WorkSafeBC worker access requirements, and all regulatory requirements through agencies such as the Department of Fisheries and Oceans, Ministry of the Environment, Ministry of Transportation and Highways Infrastructure, and Vancouver Coastal Health.

3. Tendering and Project Management: upon review and approval of the final design, the proponent will be responsible for the tendering process, proposal evaluations, recommending award, project management and technical support during the construction, act as primary payment certifier, and prepare reports to the administrators of the Clean Water Wastewater Fund on behalf of the Municipality.

4. Water Conservation Plan (WCP): the proponent will be responsible for working with staff to develop a WCP in accordance with the 2013 Water Conservation Guide for British Columbia produced by the B.C. Ministry of Community, Sport & Cultural Development.

In response to the call for proposals, three submissions were received from the following proponents:

1. Onsite Engineering Ltd. (OEL)
2. ISL Engineering and Land Services (ISL)
3. AECOM Canada Ltd. (AECOM)

The evaluation process consisted of an 8 day detailed review, analysis, and group discussion of the attributes of each of the proponents' RFP submissions. Proposals were then graded based upon the evaluation criteria established within the RFP as follows:

THE MUNICIPALITY OF THE VILLAGE OF LIONS BAY

Requests for Proposals will be evaluated against the following criteria	Points
General project approach and methodology	25
Key staff qualifications and roles for this project	30
Project Innovations	5
Fee Proposal/Level of involvement for senior and experienced staff	20
Availability	10
Work Schedule	10
	100

Staff evaluation results are summarized in the table below:

PROPONENT	R1	R2	R3	R4	R5
AECOM	**68**	**63**	**80**	**73**	**85**
ISL	62	**63**	66	72	74
OEL	53	47	64	69	66

During the course of the staff evaluation, several key factors were identified:

1. AECOM has completed a number of projects very similar in scope, and many exceeding the scope of the Village's RFP, and is superlatively qualified for the project.
2. The level of involvement for senior and experienced staff by AECOM far outweighed the effort of ISL and OEL.
3. The quality of the proposal for both AECOM and ISL were relatively equivalent while the proposal from OEL was found to be inferior in comparison.
4. In comparison to ISL, AECOM's proposal was found to be more complete and had thoroughly addressed the subtle and not so subtle complexities of this project.
5. Comparing the fees from both ISL and AECOM, the deviation between the totals was 0.03% while the quality of AECOM's proposal was superior to that of ISL.

Given the import and complexity of this project, the thoroughness of the proposal received by AECOM, the commitment level of senior staff involvement, and their substantial past experience in projects of a similar scope, Village staff believe AECOM to be the most suitable proponent.

Options:

(1) Award RFP 17.01 to AECOM Canada Ltd. in accordance with the evaluations performed by staff;
(2) Award RFP 17.01 to ISL Engineering and Land Services contrary to the evaluations performed by staff;
(3) Award RFP 17.01 to Onsite Engineering Ltd. contrary to the evaluations performed by staff;
(4) Refer the evaluation process back to staff with further instructions.

Preferred Option:

Option (1) per the rationale outlined in the body of the report. If further detailed discussion is required, Council will need to close the meeting to the public in order to receive information about the proposals which cannot be vetted in open meeting under the requirements of the *Freedom of Information and Protection of Privacy Act*.

Legal Considerations:

The Mayor and CAO to execute a contract, substantially in the same form as in the RFP document, and any associated documents pertaining to the fulfillment of the contract.

The Municipality of the Village of Lions Bay

REQUEST FOR PROPOSAL (RFP)

RFP.17.01

For

WATER STORAGE FACILITY REPLACEMENT

CLOSING DATE AND TIME:

Monday, April 24, 2017
Proposals will be accepted between:
10:00 AM and 3:00 PM only.

SUBMIT QUOTATIONS TO:

Attention Nai Jaffer, Manager of Public Works
Village of Lions Bay Municipal Hall
PO Box 141-400 Centre Rd,
Lions Bay BC, V0N 2E0

Introduction

The Village of Lions Bay (the "Municipality") invites proposals from experienced multi-disciplinary engineering firms ("Proponents") to provide consulting engineering and design services for the proposed replacement of four of the Municipality's potable water storage facilities.

Services will include, but are not limited to, the evaluation of configuration options, pre-design, detailed design, preparation of tender documents, tendering, construction support, and overall project management of this project for the Municipality as outlined in this Request for Proposals ("RFP") document.

Proposals must include the Scope of Work required, an upset limit fee for the provision of services, and the name and professional resume of the project members who would be assigned to the project.

All enquiries regarding this RFP should be directed to the person named below.

If a Proponent contacts anyone inside the Municipality's organization, including members of Council, or members of the Infrastructure Committee, regarding this RFP without being referred to such person by the appropriate person identified below, the Municipality may exclude any proposal submitted by that Proponent from consideration.

Enquiries regarding the RFP process may be directed to:

Nai Jaffer, Public Works Manager
T: 604-921-9833 / E: njaffer@lionsbay.ca

The deadline for enquires is 3:00 PM, Monday, April 24, 2017. Enquiries received after that time will not receive any response from the Municipality. All amendments or responses to enquiries will be posted to the BC Bid website (bcbid.gov.bc.ca). It is the responsibility of the Proponent to monitor this website to check for updates.

A non-mandatory site tour is scheduled for:

Tuesday, April 11th, 2017, at 10:00 AM.
Meet at the Village Office:
400 Centre Road, Lions Bay, BC, V0N 2E0

Proponents are required to R.S.V.P. to the contact above prior to noon on ***Monday, April 10th, 2017***. Due to site conditions Proponents will be transported to the sites – ***personal protective equipment is mandatory.***

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Terms And Conditions

1. NO CONTRACTUAL OBLIGATIONS AS A RESULT OF RFP OR PROPOSAL. This is a request for proposal (RFP), and not a call for tenders or request for binding offers. The Municipality does not intend to enter into contractual relations as part of this RFP process and no contractual obligations whatsoever will arise between the Municipality and any Proponent who submits a proposal in response to this RFP until and unless the Municipality and a Proponent enter into a formal, written contract for the Proponent to undertake the project described in this RFP.
2. It is the intention of the Municipality that this RFP document and completed executed copy of the ***Article 55. Price Schedule*** will be part of any contract entered into between the successful Proponent and the Municipality.
3. The preparation of a response to this RFP is on a voluntary basis and all costs incurred in the preparation of a proposal are completely those of the Proponent.
4. All proposals become the property of the Municipality and as such, are subject to the *Freedom of Information and Protection of Privacy* Legislation. To request documentation confidentiality, Proponents must submit a covering letter with their Proposal, detailing the specifics of their request.
5. Proposals are to be submitted in a sealed envelope plainly marked "RFP.17.01 – WATER STORAGE FACILITY REPLACEMENT" with the Proponent's name in the upper left hand corner. **Two hard copies and one USB** of the proposal are to be submitted and a duplicate is to be retained by the Proponent. Proposals are to be at the Village of Lions Bay Municipal Hall at 400 Centre Road, Lions Bay, BC, V0N 2E0 by the due date and time indicated on the first page of this document. ***Faxed or emailed submissions will not be accepted***.
6. By submission of a clear and detailed written notice, the Proponent may amend or withdraw its proposal prior to the Closing Date and Time. Upon Closing Time, all proposals become irrevocable. The Proponent will not change the wording of its proposal after closing and no words or comments will be added to the proposal unless requested by the Municipality for purposes of clarification.
7. The accuracy and completeness of proposals shall be the sole responsibility of each Proponent and any errors or omissions shall be corrected at the Proponent's expense.
8. This RFP is intended to invite Proponents to submit detailed proposals by which the Municipality's objectives, as stated herein, can be met, following which the Municipality will enter into further negotiations with a selected Proponent for the provision of the required services.
9. Prices will be firm for the entire Contract period unless this Request for Proposals specifically states otherwise. Remuneration will be based on established rates, up to an upset limit. The successful Proponent will be required to provide the required services within approved upset limit.
10. All Proposals are irrevocable for a period of (60) business days from the closing date.

11. A contract may or may not result from this RFP process. Award of a contract is subject to budget approval by Council. The Municipality may cancel this RFP process for any reason, at any time, before or after proposals have been received, or at any time during subsequent negotiations.

12. By submission of a proposal, the Proponent agrees that should its proposal be successful the Proponent will enter into a Contract with the Municipality in substantially the terms set out in Appendix A. Without limiting the generality of the foregoing, the form of agreement is a contract for services and not a contract of employment. Final contract terms and conditions will be agreed upon as a result of any ensuing negotiations.

13. If any manager, officer, employee, agent or other representative of a Proponent makes any representation or solicitation to any employee or elected official of the Municipality with respect to the RFP, whether before or after submission of the proposal, the Municipality shall be entitled to reject or not accept the proposal.

Project Purpose

14. This project is intended to increase the Municipality's water reservoir storage capacity to the 2045 year population horizon, provide for emergency storage, prevent stagnant water development during low use periods, integrate and enhance controls of and into the existing SCADA system, and supply secure power and communications to the reservoir site(s). The project is funded through the Clean Water and Wastewater Fund ("CWWF") program.

Project Background

15. The Municipality supplies potable water to its customers via a water distribution system comprised of 2 raw water intakes located on Harvey and Magnesia Creeks, 2 water treatment plants (UV disinfection and chlorination), 5 storage tanks, 13 Pressure Reducing Valve (PRV) stations, and 13 kilometers of water mains including 16 pressure zones (see Appendix B). The Municipality's population of 1,334 (2016 Census) is served through approximately 551 service connections.

16. Four of the five distribution system tanks require replacement:

Tank	Capacity (ML)	Construct	Built in	Condition
Highway	0.09	Circular concrete tank	1960	Fair
Harvey	1.72	Circular concrete tank	1980	Poor
Phase IV	0.08	Circular concrete tank	1960	Poor
Phase V	0.10	Circular concrete tank	1960	Poor

17. Early in 2017, GeoAdvice Engineering Inc. (GeoAdvice) was engaged to model the water distribution network to determine the hydraulic performance. Several reservoir configuration options as well as PRV zone control requirements were modelled (Appendix C – GeoAdvice Technical Memoranda).

18. In March of 2017, the Municipality was awarded a Clean Water and Wastewater Fund (CWWF) grant for the replacement of the aforementioned four tanks. As a result, the Municipality is seeking proposals from consulting engineering firms to evaluate configuration options and recommend a replacement strategy, prepare pre-design and detailed design drawings, prepare tender documents, manage the tendering process, evaluate bids and prepare a letter of recommendation for award, provide construction management and support, contract management, and overall project management through to the commissioning and completion of as-constructed drawings.

Scope Of Engineering Services

19. Proponents are encouraged to identify tasks that are necessary to provide the Municipality with adequate professional services on this project to achieve the Project Purpose. The Scope of Work for this project includes, but is not necessarily limited to the following tasks:

    19.1. The Proponent shall gather and review all existing information such as as-constructed documents, record maps, reports, and similar documentation. The Municipality will provide the limited GIS information at its disposal with the caveat that all information must be field verified to assure its accuracy. All drawings are to be done in the UTM NAD 83 Zone 10 coordinates system for X and Y coordinates. For all drawings, the horizontal scale shall be 1:500, and the vertical scale shall be 1:100 or 1:50. All drawings will become the property of the Municipality; however the Proponent's name shall be indicated on the drawings.

    19.2. The Municipality will make available LIDAR survey information of the site. It is up to the Proponent to complete additional topographical survey(s) for their proposed alignments or locations of infrastructure as needed.

    19.3. The Proponent shall complete the detailed design of the proposed works and shall comply with the 2009 Platinum edition of the Master Municipal Construction Document (MMCD) Design Guideline Manual.

    19.4. The Proponent's work plan must be broken down to include, but shall not limited to, the following tasks:

        19.4.1. Upon the review of existing documentation including the GeoAdvice Memoranda, the Proponent shall prepare a Feasibility Memorandum (FM) which shall not be limited to, but shall take into consideration:

19.4.1.1. alternative scenarios to the direct, one-for-one, replacement of the existing water storage facilities;

19.4.1.2. the optimum number, siting, and storage capacity of the tanks;

19.4.1.3. options to prevent water stagnation during periods of low use;

19.4.1.4. a review of the storage requirements inclusive of the full build out of the Lions Bay community (30 year horizon) including potential multi-family development(s), simple subdivision of existing parcels over 1600 square metres, and additional dwellings on residential parcels beyond the principal residence (e.g. secondary suites and detached cottages);

19.4.1.5. construction form and materials;

19.4.1.6. Public Works staff's operational, maintenance, and access considerations;

19.4.1.7. the condition of the existing site locations including site access considerations and access road stability;

19.4.1.8. a condition assessment of existing structures, piping and equipment;

19.4.1.9. retrofit options to improve and enhance water quality, SCADA controls, electrical control, monitoring equipment, and redundancy;

19.4.1.10. a review of the current maximum day demand, fire flows, balancing volumes, and emergency storage requirements;

19.4.1.11. options for minimizing disruption to the surrounding neighbourhood during demolition and construction phases;

19.4.1.12. options for minimizing the disruption of service to the water distribution system;

19.4.1.13. operational considerations including redundancy and emergency scenarios;

19.4.1.14. document the pros and cons on each option; and

19.4.1.15. a cost comparison between the options based on life cycle cost including operations and maintenance considerations.

19.4.2. Submit the Feasibility Memorandum report, findings and recommendations for the review and acceptance before proceeding with the design.

19.4.3. In the event that the Feasibility Memorandum recommendations call for the elimination of one or more of the four existing water storage facilities, a further

Change Justification Memorandum summarizing the rationale for this recommendation will be required and a request for review and approval of the change will be required by the CWWF administrators for the Province of British Columbia.

19.4.4. Preparation of preliminary design drawings and cost estimates for the recommended replacement scenario.

19.4.5. Municipality's review of preliminary designs and cost estimates.

19.4.6. Preparation of detailed design drawings for reservoir(s) and site works and cost estimates.

19.4.7. Design of electrical and expanded instrumentation components for retrofit into the existing treatment plant building.

19.4.8. Municipal review of detailed design drawings and cost estimates.

19.4.9. Preparation of tender documents.

19.4.10. The Municipality will post the tender using BC Bid, the Proponent will provide technical support during tendering period, answer questions, prepare draft addenda for posting by the Municipality, and similar support.

19.4.11. Facilitate bidder meetings and answer technical inquiries from bidders.

19.4.12. Tender evaluation and recommendation for contract award.

19.4.13. Project management and construction monitoring and support.

19.4.14. Review and certify progress payments from contractors and remit to the Municipality for payment and submission to the Province.

20. The Proponent shall identify all utilities (both existing and planned) that may conflict with the design layout. Determination of their locations and elevations is also required at the preliminary stage to ensure that all potential conflicts are addressed in the design.

21. The Proponent may engage an environmental consultant (if the firm does not have in house staff) to apply for and obtain approval from senior agencies (DFO, FLNRO, MOTI, and similar agencies as required), submit mitigation or compensation package, prepare a comprehensive sediment, siltation, and erosion management plan to be included in the tender package if there are impacts as part of this work. An environmental consultant is required for monitoring during the construction and preparation of the construction completion report.

22. The Proponent shall engage a geotechnical consultant (if the firm does not have in house staff) to conduct a geotechnical investigation and provide recommendations as required. All geotechnical and materials testing and monitoring during construction is the responsibility of the Proponent.

23. The Proponent shall engage structural, electrical and SCADA consultants (if the firm does not have in house staff) to design improvements and interconnections to existing electrical, building, and SCADA services, as well as to coordinate with the Municipality's staff. The Village's existing SCADA system consists of older Allen Bradley PLC's operated and controlled by Rockwell's Factory Talk HMI. Communication to the treatment plants is through N-Tron Ethernet switches, Prosoft gateways, and DATA-LINC dial-up modems.
24. The Proponent shall provide detailed cost estimates upon completion of the preliminary and detailed designs to assist the Municipality with budget allocations.
25. The Proponent shall prepare detailed technical specifications and a schedule of quantities of the completed design work sufficient for tender calls using the 2009 Platinum edition of the MMCD Contract Documents.
26. The Proponent shall obtain, through the Regional Public Health Engineer's office, a Permit to Construct, issued under the BC *Drinking Water Protection Act*.
27. The Proponent must certify that the project meets the authorization requirements under the *Water Sustainability Act*.
28. The Proponent shall provide tender documents, (IFT) drawings, and (IFC) drawings.
29. The Proponent shall provide a Plan of Record and final as-constructed drawings.
30. The Proponent shall provide contract administration; construction management, including field inspection and documentation during construction and demolition; issue Change Orders; and provide field instructions as required.
31. The Proponent shall provide a complete digital record of the project inclusive of photos and video clips throughout the project timeline.
32. The Proponent shall act as Payment Certifier for the project.
33. The Proponent shall prepare and submit record drawings and project files in the following numbers and formats:
    - 33.1. Two paper copies;
    - 33.2. AutoCAD files projected with UTM NAD 83 Zone 10 coordinates;
    - 33.3. PDF electronic files;
    - 33.4. Biweekly Field Inspection Reports (See Appendix D for sample); and
    - 33.5. All photographs and video records.
    - 33.6. Digital files to be provided on a USB device.
34. Other conditional or optional items to improve this project for the Municipality to consider.

Design Considerations

35. All detailed design work must be in accordance with the 2009 Platinum edition of the Master Municipal Specifications (available for purchase from MMCD at www.mmcd.net).

36. The Proponents design must consider the following construction and operational concerns:

    36.1. The design must allow the individual reservoir(s) to be taken out of service while maintaining water quality in the reservoirs that are on line.

    36.2. The design and phasing of the project must be such that it causes the least amount of disruption to the Village's water supply.

    36.3. The design must take into account the prevention of water stagnation through recirculation or other method.

    36.4. Elimination of a reservoir(s) may necessitate the installation of a PRV. In this case, the PRV must:

        36.4.1. be designed to provide access in accordance with WorkSafeBC guidelines for confined spaces;

        36.4.2. contain both a fire flow and a domestic PRV; and

        36.4.3. be installed to be fully controlled and monitored via the Municipality's existing SCADA.

    36.5. The design and tender documents may consider ways to accelerate the construction and commissioning of the reservoir(s).

    36.6. The design must consider current seismic standards, requirements from the British Columbia Building Code, and requirements from the British Columbia Fire Code.

    36.7. The design must consider upgrading the existing SCADA system to accommodate the added reservoir(s) including upgrades the Works Yard SCADA, Water Treatment Plant SCADA, including alarming, redundancy, and data logging or historical recording.

    36.8. The design must consider upgrades to the existing power supply including running underground cabling to the site.

    36.9. The design must consider the provision of increased water quality monitoring through sensors.

    36.10. The design must consider Crime Prevention through Environmental Design (CPTED) principles and site security considerations.

Water Conservation Plan

37. The Proponent shall provide an up-to-date, succinct, and effective water conservation plan which covers the entire water system for the Municipality. The water conservation plan will be prepared in accordance with The Water Conservation Guide for British Columbia, December 2013, Version 3 or newer and must include:

    37.1. Current water consumption (L/capita/day);

    37.2. Set a water reduction target (L/capita/day by year);

    37.3. Outline the community's current and planned water conservation actions/measures (e.g. universal metering or zone metering, conservation plumbing fixtures, leakage reduction, rebate programs, education programs, xeriscaping, etc.);

    37.4. Identify current and planned mitigation and adaptation strategies to address climate change (e.g. installing water meters to secure water supply, lowering demand to reduce pumping requirements, etc.);

    37.5. Detail how strategies/initiatives will be implemented (e.g. schedule, funding, staff responsibility, etc.); and,

    37.6. Link the plan to other regulatory mechanisms, policies and plans (e.g. Official Community Plan, water master plan, wastewater management strategy, BC Living Water Smart, Climate Action Plan, etc.).

Project Timeline

38. The project is to be completed no later than February 2, 2018.

Submission Requirements

39. Proponents are to provide the following information as part of their proposal submission:

    39.1. Executed copy of *Article 55. Price Schedule* positioned in front of the first page of the proposal;

    39.2. An outline of the Proponent's understanding of the project objectives, deliverables and outcomes, and how they will be achieved (methodology) within the specified time period;

    39.3. A work plan approach and methodology to successfully accomplish the project assignment(s) including a project schedule showing the work breakdown of each component of the project identifying key dates, milestones and deliverables;

    39.4. A price proposal in the form of a spreadsheet indicating project staff and the proposed level of involvement indicated by the number of hours by each. The spreadsheet must indicate

fees for each stage of the project supported by a cost breakdown, as well as an estimate of the anticipated disbursements. Note that disbursements charged as a percentage of the professional fee will not be acceptable;

39.5. A summary of the Proponent's experience in completing similar projects, complete with references. If the project team comprises a consortium of consultants, indicate the group's past experience working together;

39.6. The name and professional resume of the key team members who would be assigned to the various components of the project;

39.7. Confirmation in writing that the professional team members named in the RFP will remain involved as described throughout the term of the project and a statement of commitment to undertake the project and provide the staff and support necessary to complete the project on time and within budget.;

39.8. The names of all sub-consultants, if any, and the scope of their intended work;

39.9. A statement as to any other value added services or additional services that would assist or may be beneficial to the Municipality that will differentiate your firm from other Proponents.

Project Innovations

40. Proponents are encouraged to develop innovative approaches where applicable. Particular emphasis is encouraged on:

    40.1. Technology Innovation: new technologies that will lead to cost savings, longer life-cycle of the facility and/or more efficient service

    40.2. Environmental Considerations: design and/or construction approaches that promote more efficient use of natural resources and environmentally-friendly construction.

Proposal Evaluation

41. The Municipality intends to evaluate proposals using all information requested with the objective of arriving at a contract with the Proponent that best meets the Municipality's objectives related to this project. The Municipality may consider value added services offered, whether or not they were requested.

42. Proposals will be evaluated by Municipality staff, who may call upon other consultants at their discretion. Ratings may be subjective and it is the Municipality's intent that the evaluation of each criteria will be relative to the strength of the other proposals received. The evaluation criteria may be revised by the Municipality at any time without notice to the Proponents.

Requests for Proposals will be evaluated against the following criteria	Points
General project approach and methodology	25
Key staff qualifications and roles for this project	30
Project Innovations	5
Fee Proposal/Level of involvement for senior and experienced staff	20
Availability	10
Work Schedule	10
	100

43. A joint proposal from more than one firm collaborating on this project will be considered as if submitted by a single Proponent – all joint proposals must name a lead Proponent.

44. The Municipality may elect to short-list Proponents in stages as deemed necessary. Short-listed Proponents may be asked to provide additional information or details for clarification, which may include attending one or more interviews and making a presentation.

45. An award of a contract may or may not take place as a result of proposals received. In the event the Municipality receives no acceptable proposals, the Municipality may reject all proposals and explore alternate procurement strategies for the provision of these services.

46. No information will be released until a proposal has been accepted by the Municipality. At that time, the Municipality will release the name of the selected proponent, the contract value, the total number of proposals received, and the range of scores of all proposals received.

Remuneration & Reporting

47. Remuneration will be on a time-charge basis to a maximum upset fee based on the cost proposed by the Proponent. The Proponent will be required to provide their services and complete this agreement within the proposed fee limit.

48. Financial Reporting: Monthly claims must be submitted with an up-to-date progress report and Municipality may not reimburse a claim unless the following have been submitted:

    48.1. A current progress report;

    48.2. A current budget forecast report; and

48.3. A summary of expenditures which includes the name of the payee, date paid, work rendered, start / end dates, invoice number, and invoice date.

49. Quarterly Reporting: The Proponent will prepare a Periodic Progress Report (PPR) on a quarterly basis ending March 31, June 30, September 30, and December 31 during the project period. The PPR will be in a form established by the Municipality.

Extra Works

50. The Proponent will submit a Change Order indicating proposed extra or additional works and the impact it will have on the project for written approval from the Municipality. The Proponent must receive written approval prior to commencing any additional works which will affect the project cost or schedule.

51. A Change Order must also be submitted in the event the Proponent fees will exceed the original Proposal amount (i.e. original budget change must be requested and must be approved in writing). In this situation the Proponent may be requested to provide scope change alternatives to meet budget.

52. An invoice encompassing additional works that have not been approved in writing will not be accepted by the Municipality.

Relevant Documentation:

53. The Municipality maintains an online infrastructure library on its website, a quick link to which is provided here: http://www.lionsbay.ca/ic-library.html

54. The Municipality's recently completed Infrastructure Master Plan can be found online in the library, or via this link:

http://files.lionsbay.ca/Public%20Works/VoLB%20IMP%20%28Rev%20G%29%20-%20FINAL%20with%20Appendix%20combined.pdf

55. Price Schedule for ***RFP 17.01 – Water Storage Facility Replacement***

ATTACH THIS PAGE TO THE FRONT OF YOUR PROPOSAL

The Proponent, through its duly authorized signing officer, and having visited the project site(s) and having reviewed the contents of this RFP, hereby agree to the Terms and Conditions of this RFP and propose the following total fees and disbursements for the services described herein and as further categorized and detailed in the attached proposal.

Prices below are to be exclusive of GST

Fees	$
Disbursements	$
Total	**$**

COMPANY NAME: _____

COMPANY ADDRESS: _____

_____

TELEPHONE NUMBER: _____

EMAIL: _____

By submitting a proposal and signing below, the undersigned declares that the owners and officers of the Proponent have no relationship with any employee, elected official, or committee member of the Municipality, or any other relationship or circumstance which could be perceived to be a conflict of interest, unless such relationship or circumstance is fully disclosed and attached to this form.

SIGNATURE OF SIGNING OFFICER: _____

PRINTED NAME OF SIGNING OFFICER: _____

TITLE OF SIGNING OFFICER: _____

DATE: _____

Appendicies:

A – Sample Proffessional Services Agreement

B – Overview of the Municipality's Water System

C – GeoAdvice Memoranda

D – Project Inspection Report Sample

PROFESSIONAL SERVICES AGREEMENT

THIS AGREEMENT dated for reference April 28, 2017

BETWEEN:

> VILLAGE OF LIONS BAY, a municipality duly incorporated under the laws of British Columbia and having an address at 400 Centre Road, Lions Bay, BC, V0N 2E0 (the "Municipality").

AND:

> [Name of Firm], an engineering consultant having an address at [Address of Firm] (the "Consultant").

GIVEN THAT the Municipality wishes to engage the Consultant to perform the evaluation of configuration options, pre-design, detailed design, preparation of tender documents, tendering, construction support, and overall project management for water storage facilities, and the Consultant wishes to provide such services to the Municipality in accordance with the terms and conditions of this Agreement;

This Agreement is evidence that in consideration of payment of $1.00 by the Municipality to the Consultant (the receipt and sufficiency the Consultant acknowledges) and in consideration of the promises exchanged below, the Municipality and the Consultant agree with each other as follows:

Definitions

1. In this Agreement, in addition to the words defined above:

   a. **"Terms of Reference"** means, having regard to the Request for Proposals issued by the Municipality on April 6, 2017 and the Consultant's Proposal in response, the scope of work set out in the Consultant's Negotiated Proposal attached hereto as Schedule "A" and forming part of this Agreement;

   b. **"Services"** means the acts, services and work described in the Terms of Reference and all acts, services and work necessary to achieve the objectives set out in the Terms of Reference, including any services required to be performed by subcontractors.

   c. **"Fees"** means the amount to be paid for the work and services described in the Terms of Reference.

Services To Be Performed By the Consultant

2. The Consultant agrees to perform the Services during the Term, in accordance with the Terms of Reference, on the terms and conditions of this Agreement.

Term

3. The term of this Agreement commences on [Date] and expires on the earlier of the completion of the Services or [Date] (the "Term"), unless terminated sooner in accordance with this Agreement.

Warranty As To Quality of Services

4. The Consultant represents and warrants to the Municipality that:

   a. the Consultant has the education, training, skill, experience and resources necessary to perform the Services; and

   b. the Services will be performed in accordance with all applicable enactments and laws, and with all relevant codes, rules, regulations and standards of any professional or industry organization or association; and

   c. the persons as noted in the Terms of Reference will perform the Services under this Agreement; and

   d. the Consultant acknowledges and agrees that the Municipality has entered into this Agreement relying on the representations and warranties in this section.

Remuneration and Reimbursement

5. The Municipality must pay the Consultant for the Services in the amount provided in the Terms of Reference in accordance with this Agreement.

Permits and Licences

6. All permits and licences, including any associated fees, are the responsibility of the Consultant.

Change Orders

7. The Consultant must notify the Municipality in advance if any changes are required to the Services and if any additional costs will be incurred as a result of such changes. All changes to the Services must be authorized by the Municipality. No additional payments for any changes will be permitted without the written consent of the Municipality.

Invoices

8. Not more than once each month, the Consultant may deliver an invoice to the Municipality, in respect of the immediately preceding month, setting out the aggregate amount of fees and disbursements claimed for Services performed in that preceding month. Invoices are to be addressed to the Village of Lions Bay, Attn: Accounts Payable, PO Box 141, 400 Centre Road, Lions Bay, BC, V0N 2E0. Invoices may be submitted by mail or by email to: accounting@lionsbay.ca.

Payment by the Municipality

9. The Municipality must, to the extent the Municipality is satisfied the fees and disbursements are for Services reasonably and necessarily performed by the Consultant and subject to sections 10 and 11, pay the Consultant the fees and disbursements claimed in any invoice delivered in accordance with section 2, within 30 days after delivery of an invoice to the Municipality.

Completion of Services

10. The Consultant expressly acknowledges and agrees that it is a fundamental term of this Agreement that the Services be completed on or before the end of the Term, and that should the Consultant fail to complete the Services by that date the Municipality may retain and set off up to 10% of the total fees payable to the Consultant under this Agreement payable to the Consultant for the Services, as liquidated damages.

11. The right of the Municipality under section 10 will not apply to the extent the Consultant fails to complete the Services before the end of the Term due to circumstances beyond the Consultant's reasonable control, including a labour strike, Acts of God or any failure by the Municipality to provide materials as required under this Agreement (each, an "Event of Delay") but not including delays in materials, equipment or labour required to be provided by the Consultant. The Municipality will only consider an Event of Delay where the Consultant has notified the Municipality of such within twenty- four hours of the occurrence of the Event of Delay. The Municipality shall determine, acting reasonably, whether the event has arisen due to circumstances beyond the Consultant's reasonable control, and shall advise the Consultant of the extended Term as determined by the Municipality.

Termination or Suspension at the Municipality's Discretion

12. Despite the rest of this agreement, the Municipality may, in its sole discretion, by giving notice to the Consultant, terminate or suspend all, or any part, of the Services. If the Municipality terminates or suspends all or part of the Services under this section, the Consultant may deliver an invoice to the Municipality for the period between the end of the month for which the last invoice was delivered by the Consultant and the date of termination or suspension.

The Municipality must, to the extent the Municipality is satisfied the fees and disbursements are for Services reasonably and necessarily performed by the Consultant and subject to sections 10 and 11, pay the Consultant the fees and disbursements claimed in any invoice delivered in accordance with section 2, within 30 days after delivery of an invoice to the Municipality. The Consultant is not entitled to, and irrevocably waives and releases, damages or compensation for costs incurred, loss of profit, or loss of opportunity, directly or indirectly arising out of termination or suspension of all, or any part, of the Services.

Termination For Default

13. Despite the rest of this agreement, the Municipality may terminate all, or any part of, the Services, by giving notice of termination to the Consultant, which is effective upon delivery of the notice, if:

    a. the Consultant breaches this agreement and the Consultant has not cured the breach, or is not diligently pursuing a cure for the breach to the satisfaction of the Municipality, in the Municipality's sole discretion, within five days after notice of the breach is given to the Consultant by the Municipality; or

    b. the Consultant becomes bankrupt or insolvent, a receiving order is made against the Consultant, an assignment is made for the benefit of its creditors, an order is made or resolution passed for the winding up or dissolution of the Consultant, or the Consultant takes the benefit of any enactment relating to bankrupt or insolvent debtors.

12. Without limiting any other right or remedy available to the Municipality, if the Municipality terminates part or all of the Services under this section, the Municipality may arrange, upon such terms and conditions and in such manner as the Municipality considers appropriate, for performance of any part of the Services remaining to be completed, and the Consultant is liable to the Municipality for any expenses reasonably and necessarily incurred by the Municipality in engaging the services of another person to perform those Services. The Municipality may set off against, and withhold from amounts due to the Consultant such amounts as the Municipality determines, acting reasonably, are necessary to compensate and reimburse the Municipality for the expenses described in this section.

Indemnity

13. Without limiting any other obligation of the Consultant under this Contract or otherwise:

    a. The Consultant hereby agrees to Indemnify and Save Harmless the Municipality, its elected officials, officers, employees, servants, agents and others for whom the Municipality is in law responsible, from and against any liability, loss, claims, demands, damages, fines and penalties, costs and expenses (including consulting

fees), investigatory and legal expenses, and any other actions or causes of actions, suits, caused by or attributed to any wilful or negligent act, omission, delay, or allegations thereof on the part of the Consultant, its officers, employees, subcontractors, agents, licensees, assignees, invitees or other persons engaged in the performance, non-performance or attempted performance of the professional Work pursuant to this Contract or anyone else for whom the Consultant is in law responsible.

b. Should the Municipality be made a party to any litigation commenced by or against the Consultant, then the Consultant will protect, indemnify and hold the Municipality harmless and will promptly pay all costs, expenses, and legal fees (on a solicitor and own client basis) incurred or paid by the Municipality in connection with such litigation upon demand. The Consultant will also promptly pay upon demand all costs, expenses and legal fees (on a solicitor and own client basis) that may be incurred or paid by the Municipality in enforcing the terms, covenants and conditions in this Contract.

c. The Consultant's obligation under this indemnification section will survive the expiry or early termination of this Contract.

Insurance

14. a. The Consultant shall obtain and maintain during the Term a Broad form Commercial General Liability policy for a limit of not less than two million ($2,000,000.00) dollars per occurrence with respect to third party liability claims for bodily injury, property damage, personal injury. This policy shall include but shall not be limited to: Premises and Operation Liability, Blanket Contractual Liability, Products and Completed Operations, Tenants' Legal Liability, Non-Owned Automobile Liability, Owner's and Contractor's Protective Liability, Contingent Employers' Liability, Breach of Conditions clause. The Municipality shall be added as an "Additional Insured" along with Cross-Liability and Severability of Interest clauses. Consultant shall obtain and maintain during the Term a Professional Liability Insurance policy covering errors and omissions with coverage of not less than one million ($1,000,000) dollars.

b. All such insurance policies shall stay in force and not be amended, cancelled or allowed to lapse and shall contain the necessary "Endorsements" to provide the Municipality with thirty (30) days prior written notice by Registered Mail to the attention of the Municipality Corporate Officer/Secretary.

c. The Consultant agrees to be responsible for any and all deductible amounts including any claim expenses incurred and policy premiums payments. All of the required Consultant's insurance policies shall be primary, non-contributing with respect to any insurance carried by the Municipality. The Municipality reserves the right to impose

such higher limits or other types of insurance, provided coverage is available at commercially affordable terms and conditions, as would reasonably be required of a prudent Consultant of similar operations.

Work Safe BC

15. The Consultant will observe WorkSafeBC safety rules and regulations and all assessments are to be fully paid throughout the term of this contract. The Consultant is to ensure that they and/or their company are current and in good standing with WorkSafeBC for the duration of this contract.

Records

16. The Consultant:

a. must keep reasonably detailed accounts and records of its performance of the Services, including invoices, receipts and vouchers, which must at all reasonable times be open to audit and inspection by the Municipality, which may make copies and take extracts from the accounts and records;

b. must afford facilities and access to accounts and records for audit and inspection by the Municipality and must furnish the Municipality with such information as the Municipality may from time to time require regarding those documents; and

c. must preserve, and keep available for audit and inspection, all records described in section 15a for at least two years after completion of the Services or termination of this agreement, whichever applies.

Confidential Information

17. Except as required by law, the Consultant must not, during or after the Term, divulge or disclose any secret or confidential information, or any information that the Consultant receives in connection with this agreement which in good faith or good conscience ought not be disclosed.

Delivery of Records

18. If the Municipality terminates all or part of the Services under this agreement, the Consultant must immediately deliver to the Municipality, without request, all Service-related documents in the Consultant's possession or under its control.

Ownership of Intellectual Property

19. By this section, the Consultant irrevocably grants to the Municipality the unrestricted licence for the Municipality to use all technical information and intellectual property, including designs and inventions, conceived or developed, or first actually reduced to practice, in performing the Services. The Consultant agrees that the licence granted by this section includes the right for the Municipality, at any time, to adapt, use and modify all such technical information and intellectual property for the Municipality's uses set out above.

Agreement for Services

20. This is an agreement for the performance of services and the Consultant is engaged under the agreement as an independent contractor for the sole purpose of providing the Services. Except as is otherwise expressly prescribed in this agreement, neither the Consultant nor any of its employees or contractors is engaged by the Municipality as an employee or agent of the Municipality. The Consultant is solely responsible for any and all remuneration and benefits payable to its employees and contractors, and all payments or deductions required to be made by any enactment, including those required for Canada Pension Plan, employment insurance, workers' compensation and income tax. This agreement does not create a joint venture or partnership, and the Consultant has no authority to represent or bind the Municipality in any way.

Conflict of Interest

21. The Consultant warrants that it has no financial interest, directly or indirectly, in the business of any third party that would give rise to a conflict of interest in the provision and performance of the Services, such determination to be made by the Municipality, acting reasonably. Should such an interest be acquired during the term of the contract, the Consultant shall declare it immediately in writing to the Municipality. The Municipality may direct the Consultant to resolve the conflict of interest to the Municipality's satisfaction, failing which the Municipality may immediately terminate the contract and may demand forfeiture of any compensation paid under the contract.

Assignment

22. No part of this agreement may be assigned or subcontracted by the Consultant without the prior written consent of the Municipality, such consent shall not be unreasonably withheld, and any assignment or subcontract made without that consent constitutes a breach by the Consultant of this agreement. The Consultant agrees that, among other things, the Municipality may refuse its consent if the Municipality, in its sole discretion, determines that the proposed assignee or subcontractor has not got the skill, experience or corporate resources necessary to perform the Services. A permitted subcontract does not relieve the

Consultant from any obligation already incurred or accrued under this agreement or impose any liability upon the Municipality.

Time of the Essence

23. Time is of the essence of this agreement.

Severance

24. If any portion of this agreement is held to be illegal or invalid by a court of competent jurisdiction, the illegal or invalid portion must be severed and the decision that it is illegal or invalid does not affect the validity of the remainder of this agreement.

Notice

25. Any notice, direction, demand, approval, certificate or waiver which may be or is required to be given under this agreement must be in writing and delivered personally or by courier or sent by fax or e-mail, addressed as follows:

a. To the Municipality:
Village of Lions Bay
400 Centre Road
Box 141
Lions Bay, B.C. V0N 2E0
Fax Number: (604) 921-6643
E-mail Address: njaffer@lionsbay.ca
Attention: Naizam Jaffer

b. To the Consultant:

or to such other address, e-mail address or fax number of which notice has been given as provided in this section. Any notice, direction, demand, approval or waiver delivered is to be considered given on the next business day after it is dispatched for delivery. Any notice, direction, demand, approval or waiver sent by fax or e-mail is to be considered given on the day it is sent, if that day is a business day and if that day is not a business day, it is to be considered given on the next business day after the date it is sent.

Interpretation and Governing Law

26. In this agreement:

    a. reference to the singular includes a reference to the plural, and vice versa, unless the context requires otherwise;

    b. reference to a particular numbered section or Schedule is a reference to the correspondingly numbered section or Schedule of this agreement;

    c. the word "enactment" has the meaning given to it in the *Interpretation Act* (British Columbia) on the reference date of this agreement;

    d. reference to any enactment is a reference to that enactment as amended, unless otherwise expressly provided;

    e. reference to a month is a reference to a calendar month; and

    f. section headings have been inserted for ease of reference only and are not to be used in interpreting this agreement.

27. This agreement is governed by, and is to be interpreted according to, the laws of British Columbia.

Binding on Successors

27. This agreement enures to the benefit of and is binding upon the parties and their respective successors, subcontractors, trustees, administrators and receivers, despite any rule of law or equity to the contrary.

Entire Agreement

28. This agreement is the entire agreement between the parties and it terminates and supersedes all previous communications, representations, warranties, covenants and agreements, whether verbal or written, between the parties with respect to the subject matter of this agreement.

Waiver

29. Waiver of any default by either party must be express and in writing to be effective, and a waiver of a particular default does not waive any other default.

As evidence of their agreement to be bound by the above terms and conditions of this agreement, the parties have executed this agreement below, on the respective dates written below.

VILLAGE OF LIONS BAY by its authorized signatories:

c/s

_____

Mayor

_____

Corporate Officer:

Date executed: _____, 2017.

[Name of Firm] by its authorized signatories:

_____

[Name of Signatory]

_____

[Name of Signatory]

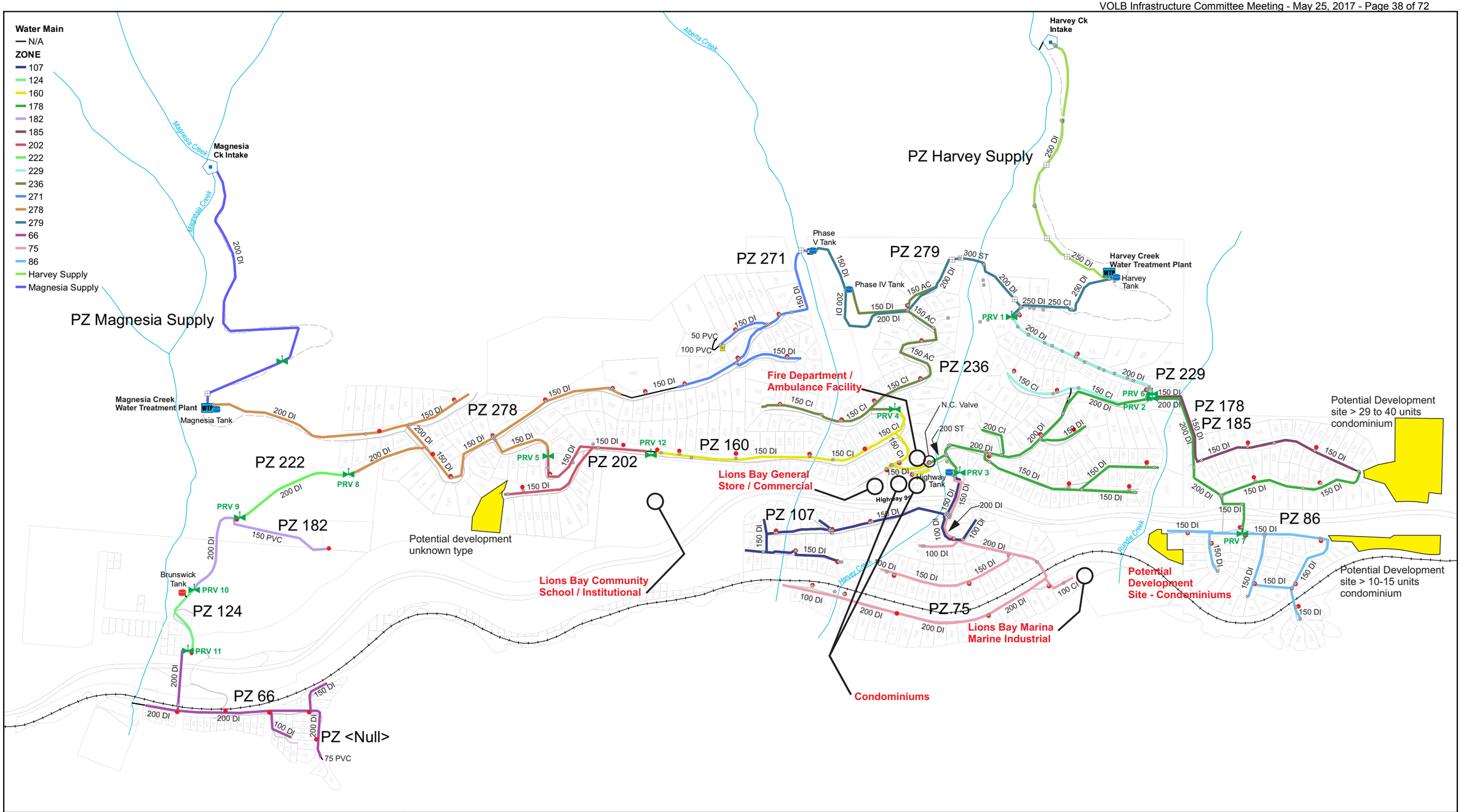
Date executed: _____, 2017.

Schedule "A"

[Name of Firm] Proposal

for the Village of Lions Bay

Water Storage Facility Replacement



VILLAGE OF LIONS BAY
Infrastructure Master Plan
Figure 2-2 Pressure Zones

AECOM

Legend

Property Parcels
Village Roads
Sealed
Unsealed
MOTI Roads
On-Ramp
Highway
Treatment Plant
Intake
Tanks (by Water Type)
Not In Service
Raw Water
Treated Water
Valves (by Type)
Air Valve
Check Valve
Gate Valve
PRV
Hydrant
Pump Station

0 50 100 200
Metres

Village of Lions Bay

Appendix B

The Village of Lions Bay Water Distribution System Storage Tank Sizing Analysis

Technical Memorandum 1

Prepared for:
The Village of Lions Bay
400 Center Road
Lions Bay, BC V9N 2E9

Prepared by:
GeoAdvice Engineering Inc.
Unit 203, 2502 St. Johns Street
Port Moody, BC V3H 2B4

Submission Date: April 6, 2017

Contact: Mr. Werner de Schaetzen, Ph.D., P.Eng.
Re: Project 2017-006-LIO

Document History and Version Control

Revision No.	Date	Document Description	Revised By	Reviewed By
R0	April 5, 2017	First Draft	Sean Geyer, E.I.T.	Werner de Schaetzen, Ph.D., P.Eng.
R1	April 6, 2017	Final	Sean Geyer, E.I.T.	Werner de Schaetzen, Ph.D., P.Eng.

Statement of Qualifications and Limitations
This document represents GeoAdvice Engineering Inc. best professional judgment based on the information available at the time of its completion and as appropriate for the project scope of work. Services performed in developing the content of this document have been conducted in a manner consistent with that level and skill ordinary exercised by member of the engineering profession currently practicing under similar conditions. No warranty, express or implied is made.

1.0 Introduction

GeoAdvice Engineering Inc. (GeoAdvice) was retained by the Village of Lions Bay, BC (the Village) to complete a storage tank capacity and sizing analysis of the Village water distribution system.

The Village currently has four (4) potable water storage tanks on the Harvey Creek water distribution system:

- Harvey Tank
- Highway Tank
- Phase IV Tank
- Phase V Tank

The Village is interested in replacing, removing and/or modifying the existing Harvey, Highway, Phase IV, and the Phase V tanks without impacting the distribution's system ability to meet pressure, demand and fire flow requirements. During subsequent discussions with the Village, two preferred scenarios were identified:

- Scenario 1: decommission Highway, Phase IV, and Phase V tanks; increase storage capacity at Harvey Tank.
- Scenario 2: decommission Highway and Phase IV tanks; increase storage capacity at Harvey and Phase V tanks.

This memo describes the assumptions and results of the storage tank sizing analysis. All tank sizing was conducted for the 2045 planning horizon in accordance with MMCD standards. Please refer to GeoAdvice Technical Memorandum 2 (TM #2) - PRV Sizing Analysis for the results of a related study conducted simultaneously.

In the preparation of this memo, GeoAdvice would like to acknowledge the support of the following Village Staff:

- Garth Begley, Public Works Operator
- Will Emo, Public Works Operator
- Nai Jaffer, Public Works Manager
- Alberto Urrutia, Public Works Operator

2.0 Water Model Update

Prior to conducting any analysis, GeoAdvice worked in conjunction with the Village to determine any updates required to the Village water model (InfoWater). The Village provided new information since the model was developed in 2015.

The updates include:

- Updated diameter to 150 mm downstream of the Phase IV Tank (Pipe ID: 260)
- Updated diameter to 150 mm upstream of the Phase IV Tank (Pipe ID: 745)
- Updated diameter to 150 mm along 350-360 Centre Road (Pipe ID: 310)
- Updated diameter to 200 mm along 10 Oceanview Road (Pipe ID: 510)
- Updated diameter to 150 mm along 85-115 Isleview Place (Pipe ID: 575)
- Updated diameter to 150 mm at the crossing of Oceanview Road and Highway 99 (Pipe ID: P31)
- Updated diameter to 100 mm along 270-300 Lions Bay Avenue (Pipe ID: PPE-GA-48)
- Updated diameter to 200 mm along 220-240 Lions Bay Avenue (Pipe ID: PPE-GA-50)
- Updated diameter to 150 mm along 20-60 Seaview Place (Pipe ID: PPE-GA-60)

The Village also identified several areas that should have their fire flow requirement changed from 60 L/s[1] to 150 L/s. The following locations require 150 L/s:

- The Lions Bay Marina at 60 Lions Bay Ave
- The Lions Bay Community School at 250 Bayview Road
- The Lions Bay General Store Complex at 350 Centre Road
- The Lions Bay Condominiums at 402 and 422 Crosscreek Road
- The Fire Hall / Ambulance Facility at 410 Centre Road
- Potential Development unknown type at 252 Steward Road (Junction ID 185)
- Potential Development Site - condominiums at 10 Tidewater Way (Junction ID 460)
- Potential Development Site - 10-15 units condominium at 95 Tidewater Way (Junction ID 800)
- Potential Development Site - 29-40 units condominium at 165-195 Kelvin Grove Way (Junctions ID 780 and 785)

Finally, the Village provided updated information about Highway Tank.

- Bottom elevation = 76.65 m
- Maximum water level = 3.35 m
- Water volume = 0.08 ML

[1]At the request of the Village, the original model assumed a fire flow requirement of 60 L/s at each hydrant.

The properties of each Village storage tank, as modeled, are summarized in **Table 2.1**. As the Magnesia Tank is not to be considered in this assignment, it has been excluded from this memo. It should be understood that the Magnesia Tank is assumed to remain as-is for all following analyses.

Table 2.1: Tank Hydraulic Modeling Data (Existing Sizes)

ID	Bottom Elevation (m)	Maximum Level (m)	Volume (ML)
TNK-HARVEY	270.00	9.00	1.72
TNK-HIGHWAY	76.65	3.35	0.08
TNK-PHASE_IV	233.70	1.30	0.08
TNK-PHASE_V	266.40	2.60	0.10

The 2045 fire flow and demand requirements for the service area of each tank are summarized in **Table 2.2**.

Table 2.2: 2045 Fire Flow and Water Demand Serviced by each Tank

Tank ID	Downstream Pressure Zones	Maximum Fire Flow (L/s)	2045 MDD (L/s)
TNK-HARVEY	279, 271, 236, 229, 185, 178, 160, 107, 86, 75	150	21.95
TNK-HIGHWAY	75	150	3.69
TNK-PHASE_IV	236, 160	150	3.49
TNK-PHASE_V	271	60	1.03

The control levels for each tank are summarized in **Table 2.3**.

Table 2.3: Tank Control Levels

Tank ID	Open Level (m)	Closed Level (m)
TNK-HARVEY	8.51	8.88
TNK-HIGHWAY	3.05	3.35
TNK-PHASE_IV	1.00	1.30
TNK-PHASE_V	2.30	2.60

3.0 EPS Model Development

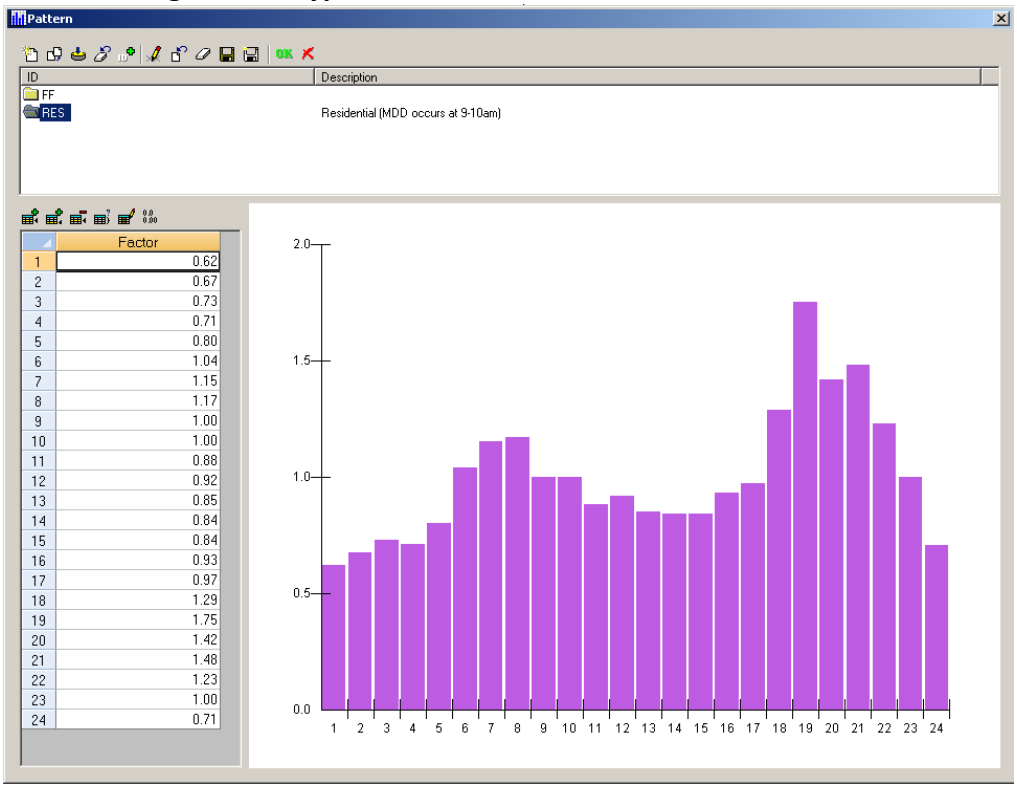
An Extended Period Simulation (EPS) was set up in the model. Running an EPS was required for evaluating the water system over time as opposed to the instantaneous results obtained from a steady-state analysis. Issues related to the storage tank cycling can only be analyzed through EPS Simulation.

The EPS model was developed with the following time parameters:

- Scenario = 2045 MDD + FF
- Duration = 24 hours
- Start time = 00:00
- Timestep = 1 hour

A diurnal pattern, typical of residential land users, was applied to all demands in the model. This pattern is shown in **Figure 3.1**.

Figure 3.1: Typical Residential Diurnal Demand Pattern



4.0 Storage Tank Sizing Analysis

Required tank capacities were calculated based on the MMCD standards. According to MMCD standards, a tank's capacity shall not be less than the summation of the following:

- Fire storage (A) – This is the amount of water required to extinguish fires within the service area of a tank. This storage is based on the worst case fire flow land use scenario in the service area.
- Equalization storage (B) – This is the amount of storage required for normal water consumption (25 % of MDD).
- Emergency storage (C) – The emergency storage requirement of 25% of (A) + (B).

Per MMCD, the required tank capacity is the sum of the fire storage (A), the equalization storage (B) and the emergency storage (C).

The fire storage requirements used in this analysis are presented in **Table 4.1**.

Table 4.1: Fire Flow Storage Requirements

Landuse	Required Fire Flow (L/s)*	Duration (min)**	Fire Flow Volume (ML)
Single Family	60	90	0.32
Multi Family + ICI	150	120	1.08

***As provided by the Village.**
****Based on "Water Supply for Public Fire Protection", Fire Underwriters Survey, 1999.**

The required tank capacities to meet the goals of the two preferred scenarios are presented in **Table 4.2** and **Table 4.3**. Each tank was sized to ensure that adequate domestic and fire storage is available for all pressure zones. In the event that a tank is recommended for decommissioning, a PRV station must be installed on site so that flow can be provided to the downstream service area at the appropriate HGL.

Scenario 1:

- The existing Highway, Phase IV, and Phase V tanks are decommissioned.
- Bypass PRVs are installed at the Highway, Phase IV and Phase V tank sites (see **Section 5**).
- Harvey is sized to accommodate storage for a 150 L/s fire flow event.
- The tank size calculated below exceeds the equivalent storage of two days' worth of average day demand (Harvey 2 x ADD = 1.92 ML). This check was requested by the Village to mitigate the impact of supply shortages from Harvey Creek.

Table 4.2: Tank Sizing Scenario 1

Tank ID	A – Fire Storage (ML)	B – Equalization Storage (ML)	C - Emergency Storage (ML)	Requirement A + B + C (ML)
TNK-HARVEY	1.08	0.48	0.39	1.95
			Total	**1.95**

Scenario 2:

- The existing Highway and Phase IV tanks are decommissioned.
- Bypass PRVs are installed at the Highway and Phase IV tank sites (see **Section 5**).
- Harvey is sized to accommodate storage for a 150 L/s fire flow event, while Phase IV is sized to accommodate storage for a 60 L/s fire flow event.
- The tank sizes calculated below exceed the equivalent storage of two days' worth of average day demand (Harvey 2 x ADD = 1.92 ML and Phase V 2 x ADD = 0.40 ML). This check was requested by the Village to mitigate the impact of supply shortages from Harvey Creek.

Table 4.3: Tank Sizing Scenario 2

Tank ID	A – Fire Storage (ML)	B – Equalization Storage (ML)	C - Emergency Storage (ML)	Requirement A + B + C (ML)
TNK-HARVEY	1.08	0.48	0.39	1.95
TNK-PHASE_V	0.32	0.10	0.11	0.53
			Total	**2.47**

4.1 EPS Tank Cycling Validation

EPS simulations were run for both scenarios to verify that the recommended tank sizes provided adequate storage and cycling response in the event of a fire event. Each simulation was run for a 24-hour period. It was assumed that the Harvey Creek intake was closed for the duration of the fire event. It should be noted that, as modeled, the Harvey Creek intake represents an unlimited source and the actual refill rate of the Harvey Tank will be dependent on the available flow.

Under Scenario 1, the response of the Harvey Tank to a 150 L/s fire event (from 09:00 to 11:00) in the original Highway Tank service area (Pressure Zone 75) is presented in **Figure 4.1.**

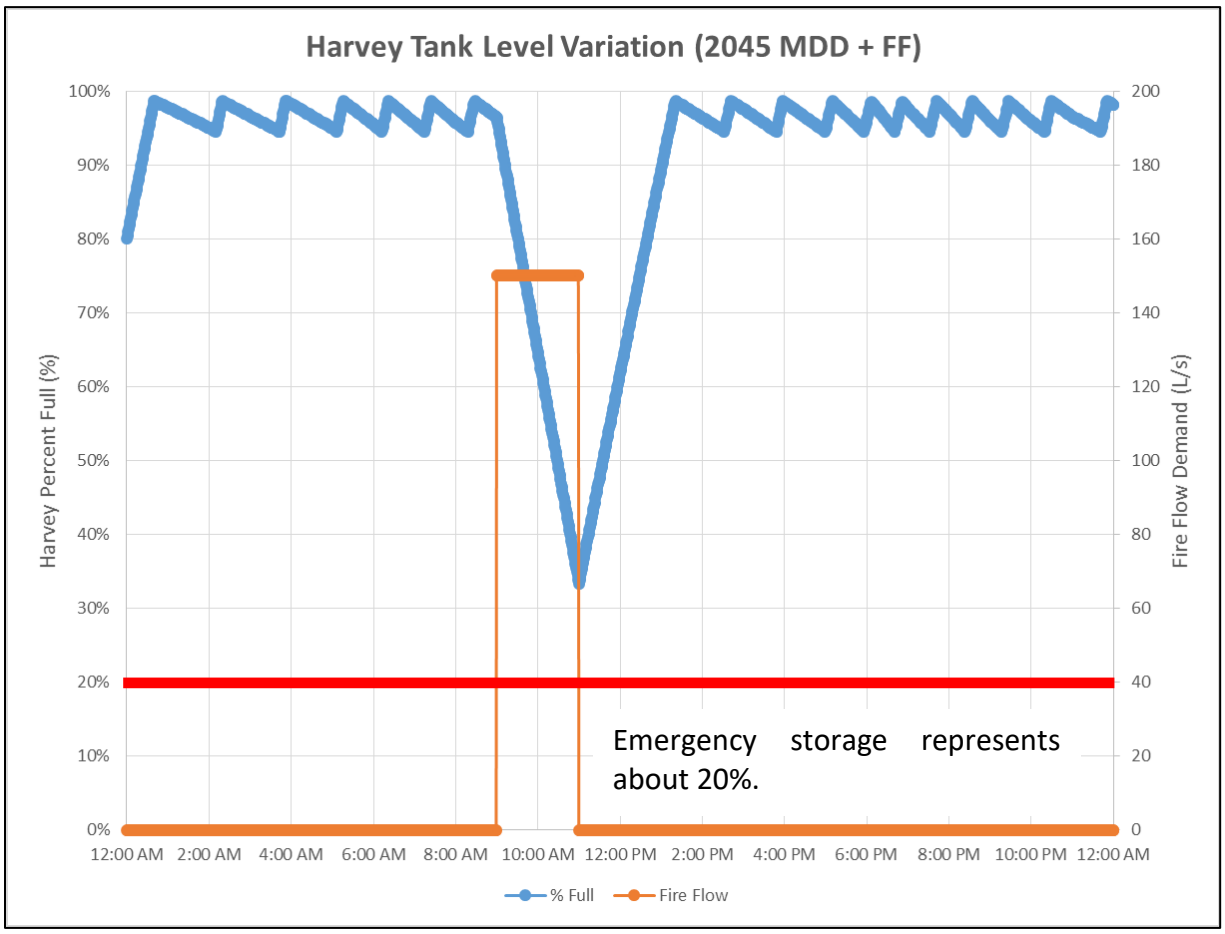


Figure 4.1: Scenario 1 – Harvey Tank Level Variations (2045 MDD + 150 L/s FF)

It can be seen that the Harvey Tank, when sized to the recommended storage capacity, is capable of meeting fire flow requirements during a 150 L/s fire flow event.

Under Scenario 2, the response of the Harvey and Phase V tanks to a 150 L/s fire event (from 09:00 to 11:00) in the original Highway Tank service area (Pressure Zone 75) is presented in **Figure 4.1** and **Figure 4.3.**

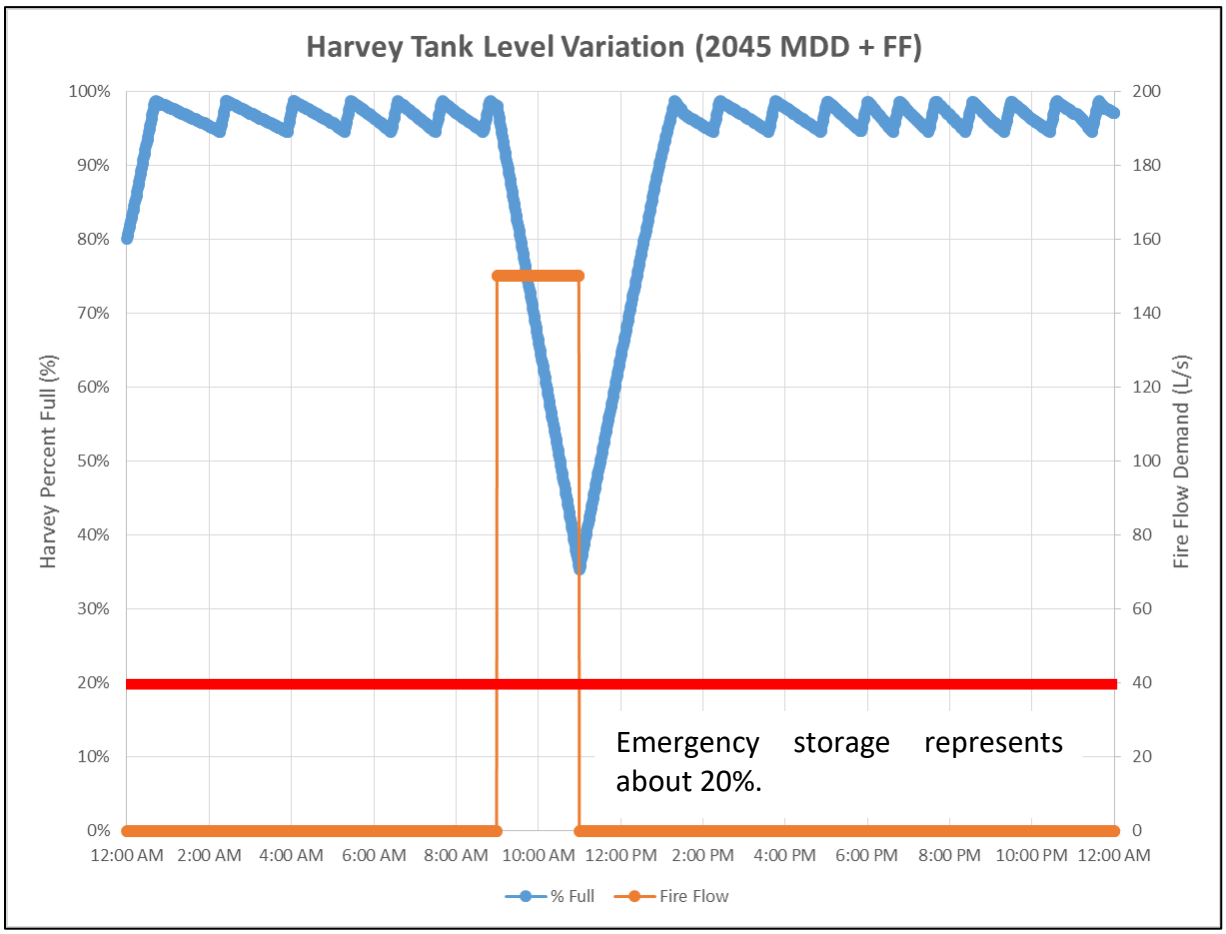


Figure 4.2: Scenario 2 – Harvey Tank Level Variations (2045 MDD + 150 L/s FF)

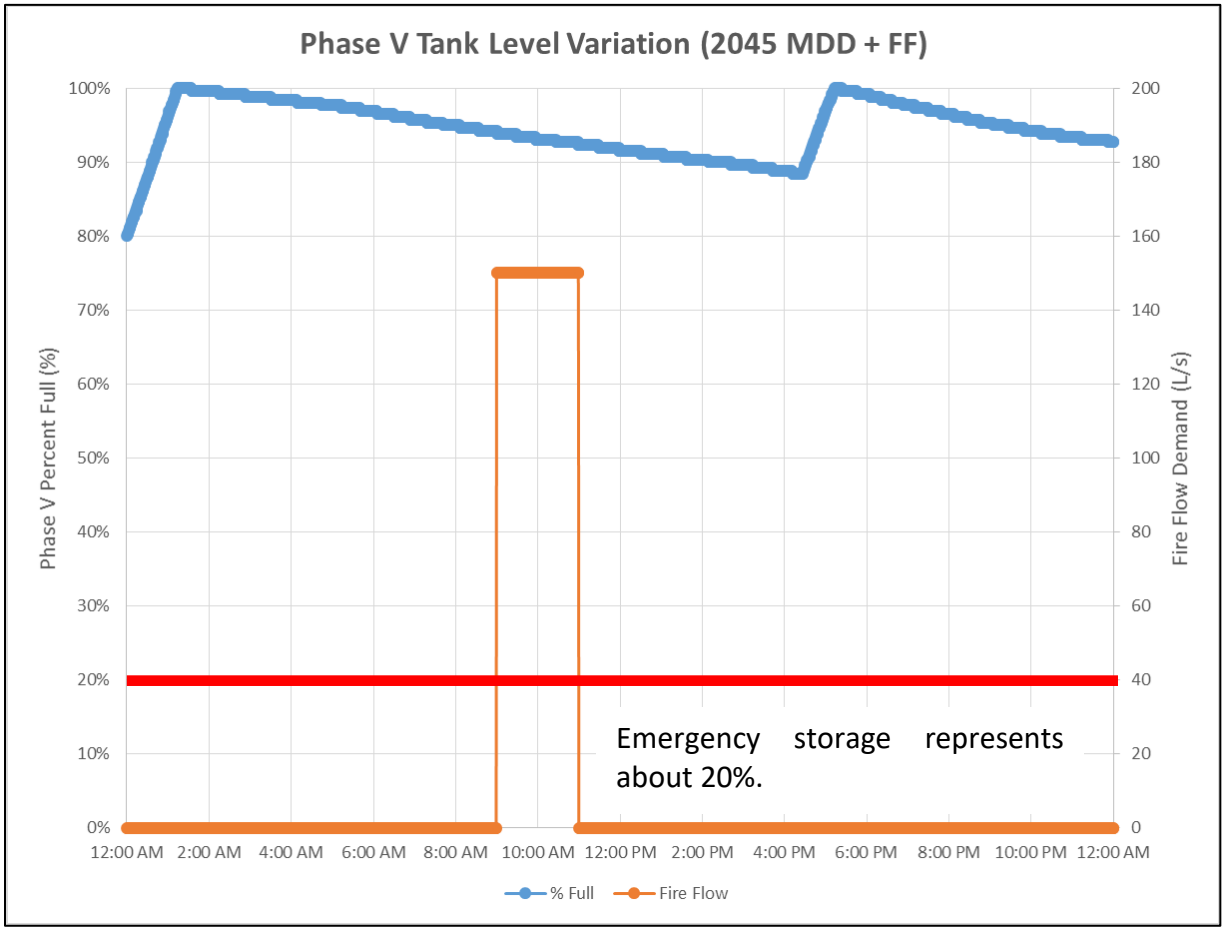


Figure 4.3: Scenario 2 – Phase V Tank Level Variations (2045 MDD + 150 L/s FF)

It can be seen that the Harvey and Phase V Tanks, when sized to their recommended storage capacities, are capable of meeting fire flow requirements during a 150 L/s fire flow event.

Under Scenario 2, the response of the Harvey and Phase V tanks to a 60 L/s fire event (from 09:00 to 10:30) in the Phase V service area (Pressure Zone 271) is presented in **Figure 4.4** and **Figure 4.5.**

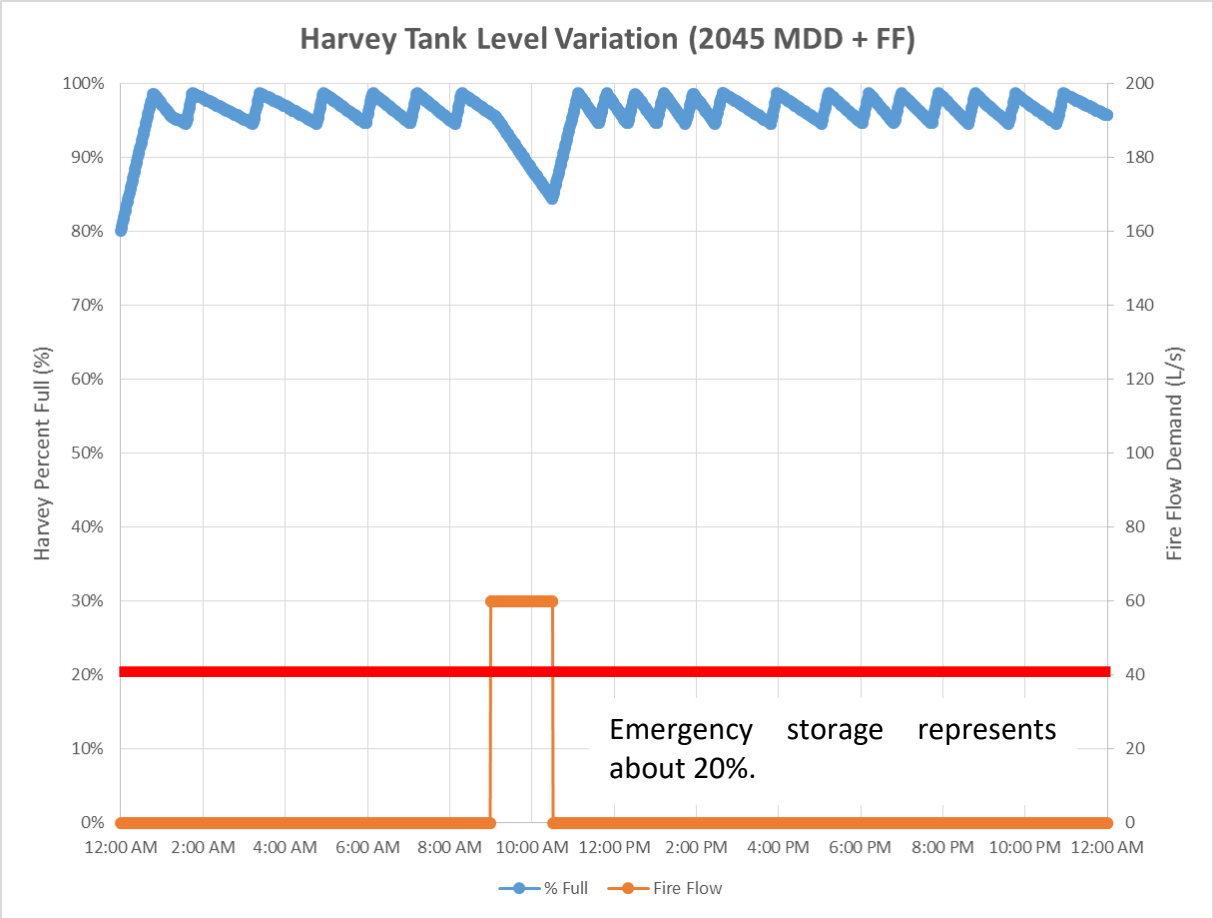


Figure 4.4: Scenario 2 – Harvey Tank Level Variations (2045 MDD + 60 L/s FF)

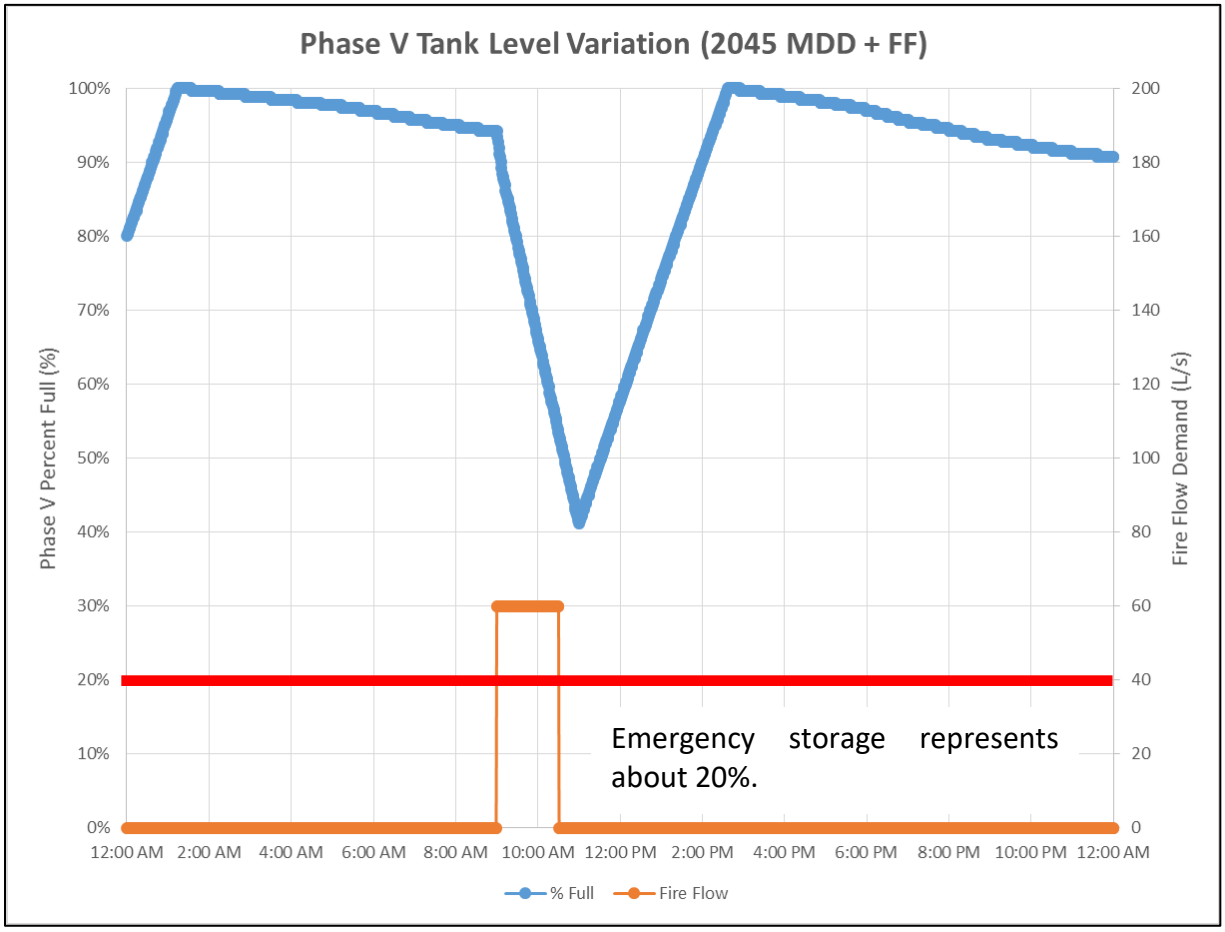


Figure 4.5: Scenario 2 – Phase V Tank Level Variations (2045 MDD + 60 L/s FF)

It can be seen that the Harvey and Phase V Tanks, when sized to their recommended storage capacities, are capable of meeting fire flow requirements during a 60 L/s fire flow event in the Phase V service area.

4.2 Steady State Fire Flow Validation

Following confirmation that the recommended tank sizes were capable of providing adequate fire flow storage, it was necessary to confirm that the above recommendations will not have a negative hydraulic impact on the Village distribution system. The results of the steady state fire flow analyses are summarized in **Table 4.4**.

Table 4.4: Fire Flow Results Summary (2045 MDD + FF)

Scenario	Fire Flow Deficiencies	Average Available Fire Flow (L/s)
2045 MDD +FF – Existing System	38 (51% of hydrants)	72
2045 MDD +FF – Scenario 1	42 (56% of hydrants)	70
2045 MDD +FF – Scenario 2	38 (51% of hydrants)	72

To understand these results, it must first be understood that the Village system, as it currently exists, is predicted to be incapable of providing the required fire flow to many locations throughout the Village, including all of the sites requiring 150 L/s. Additional upgrades are required for the system to meet fire flow requirements, with or without the tank upgrades discussed herein. Currently, the system is predicted to be incapable of providing 150 L/s to any multi family or ICI site.

From the results presented in **Table 4.4**, there are two major takeaways:

- Overall, decommissioning Phase IV Tank and Highway Tank will have no impact on system hydraulics and the system's ability to provide fire flow.
- Eliminating Phase V Tank (Scenario 1), rather than resizing it for fire flow as in Scenario 2, will necessitate additional water main capacity upgrades between Harvey Tank and the Phase V Tank site.

5.0 Recommendations

Based on the results of the storage tank sizing analysis, the sizing recommendations made for both scenarios will provide adequate fire flow storage, in addition to adequate reserve storage in the event of supply shortfalls. Furthermore, decommissioning the Phase IV and Highway Tanks is not predicted to have any significant hydraulic impact on the Village distribution system. Finally, should Phase V be decommissioned, it will be necessary to complete additional water main upgrades between Harvey Tank and the Phase V Tank site. The cost of these upgrades will need to be assessed with respect to the cost of the recommended Phase V Tank improvement.

With respect to the tanks that are recommended for decommissioning, each tank that is removed from service will need to be replaced by a new PRV station, with settings to match the top water level of the tank being replaced and with sizes as follows:

- **Highway Tank:** Small Valve = 50 mm, Large Valve = 200 mm
- **Phase IV Tank:** Small Valve = 50 mm, Large Valve = 200 mm
- **Phase V Tank:** Small Valve = 50 mm, Large Valve = 150 mm

While beyond the scope of this project, it was noted during the analysis that the Village system is predicted to be incapable of providing fire flow to any of the newly identified sites requiring 150 L/s. Neither the storage tank upgrades recommended herein nor the PRV Station upgrades recommended in TM #2 will have any significant impact on this. It will be necessary for the Village to pursue additional system improvements to improve the distribution system's capacity to convey fire flow.

We recommended that the Village conduct the following analyses:

- **Water Main Capacity Analysis**
  While a capacity analysis was conducted in 2015, it was based on the assumption of the system requiring only 60 L/s at all hydrants. With the newly identified 150 L/s requirements, a new capacity analysis should be completed to identify the improvements necessary to enable the system to meet all fire flow requirements.

- **Harvey Creek Intake Shutdown Analysis**
  As the Village is concerned about potential supply shortfalls from Harvey Creek, additional analyses should be conducted to determine how the system will respond to a 48-hour ADD period without supply from Harvey Creek.

- **Water Quality Analysis**
  The Village should develop a water quality model and conduct water quality analyses to determine the current state of water quality within the system and how it may be affected by the storage tank scenarios developed herein.

- **Alberta Creek Intake Analysis**
  As the Village has expressed interest in reactivating the Alberta Creek intake, modeling analysis should be undertaken to assess the impact of the additional source on the existing system and how it may affect the recommendations made herein.

Submission

Prepared by:

Sean Geyer, E.I.T.
Hydraulic Modeler / Project Engineer

Approved by:

April 6 2017

Werner de Schaetzen, Ph.D., P.Eng.
Senior Modeling Review / Project Manager

The Village of Lions Bay
Water Distribution System
PRV Sizing Analysis

Technical Memorandum 2

Prepared for:
The Village of Lions Bay
400 Center Road
Lions Bay, BC V9N 2E9

Prepared by:
GeoAdvice Engineering Inc.
Unit 203, 2502 St. Johns Street
Port Moody, BC V3H 2B4

Submission Date: April 6, 2017

Contact: Mr. Werner de Schaetzen, Ph.D., P.Eng.
Re: Project 2017-006-LIO

Appendix C

Document History and Version Control

Revision No.	Date	Document Description	Revised By	Reviewed By
R0	April 5, 2017	First Draft	Sean Geyer, E.I.T.	Werner de Schaetzen, Ph.D., P.Eng.
R1	April 6, 2017	Final	Sean Geyer, E.I.T.	Werner de Schaetzen, Ph.D., P.Eng.

Statement of Qualifications and Limitations

This document represents GeoAdvice Engineering Inc. best professional judgment based on the information available at the time of its completion and as appropriate for the project scope of work. Services performed in developing the content of this document have been conducted in a manner consistent with that level and skill ordinary exercised by member of the engineering profession currently practicing under similar conditions. No warranty, express or implied is made.

1.0 Introduction

GeoAdvice Engineering Inc. (GeoAdvice) was retained by the Village of Lions Bay, BC (the Village) to size twelve (12) distribution system pressure reducing valves (PRV) stations.

The Village water distribution system is separated into eighteen (18) pressure zones. The boundaries along the pressure zones consist of a series of closed valves and twelve (12) pressure regulating valve (PRV) stations to decrease the pressure to an acceptable range for delivery of water to users.

The Village will be replacing or rehabilitating twelve (12) PRV stations throughout the Village as follows:

- PRV stations 2, 4, 5, 8, 9, and 12 will be replaced; and
- PRV stations 1, 3, 6, 7, 10, and 11 will be rehabilitated.

The new stations will be composed of one (1) small valve and one (1) large valve and will also require an external bypass PRV (small valve).

This memo describes the assumptions and results of the PRV sizing analysis. Please refer to GeoAdvice Technical Memorandum 1 (TM #1) - Storage Tank Sizing Analysis related to this study.

In the preparation of this memo, GeoAdvice would like to acknowledge the support of the following Village Staff:

- Garth Begley, Public Works Operator
- Will Emo, Public Works Operator
- Nai Jaffer, Public Works Manager
- Alberto Urrutia, Public Works Operator

2.0 PRV Sizing Analysis

This section summarizes the results of the PRV sizing analysis conducted on the water distribution system. Based on the Village's design specifications and discussions with the Village, the criteria shown below were used.

Table 2.1: Hydraulic Design Criteria

Criteria	Parameter
Sizing Scenarios	2045 PHD 2045 MDD + FF
Minimum Pressure (PHD)	40 psi
Minimum Pressure (MDD+FF)	20 psi
Maximum PRV Velocity	6 m/s
Single Family Fire Flow	60 L/s
Multi Family and ICI Fire Flow	150 L/s

Each new PRV station was sized in terms of its peak velocity using the following scenarios:

- 2045 Peak Hour Demand (PHD) scenario for sizing the small valve and bypass valve
- 2045 Maximum Day Demand + Fire Flow (MDD + FF) scenario for sizing the large valve

To limit the amount of "wear and tear", the peak velocity through any PRV should be less than 6 m/s.

A summary of the properties for each PRV station, as modeled and confirmed by the Village, is provided in **Table 2.2**. For the purposes of sizing the valves within each station, it is assumed that the elevations, downstream pressure settings, and minor loss assumption remain unchanged.

Table 2.2: PRV Hydraulic Modeling Data

ID	From Zone HGL (m)	To Zone HGL (m)	Elevation (m)	Small Valve Setting (psi)*	Large Valve Setting (psi)
PRV-1	279	229	193.63	55	50
PRV-2	229	178	153.18	40	35
PRV-3	178	107	79.09	45	40
PRV-4	236	160	119.22	62	57
PRV-5	278	202	173.83	45	40
PRV-6	229	185	153.50	50	45
PRV-7	178	86	61.50	40	35
PRV-8	278	222	197.55	45	40
PRV-9	222	182	157.41	40	35
PRV-10	182	124	88.54	50	45
PRV-11	124	66	40.94	40	35
PRV-12	202	160	131.88	N/A	38

***Assumed same pressure setting for the small bypass PRV.**

During the replacement process, the location (and elevation) of PRV Stations 2, 4, 5, 8, 9 and 12 may change within ±5 m. If the location and elevation are changed for those stations, then the PRV settings should be updated to maintain the same downstream HGL.

The predicted service area demands and maximum fire flows for each PRV station at the 2045 planning horizon are summarized in **Table 2.3**.

Table 2.3: Summary of 2045 Flows Serviced by Each PRV Station

ID	Downstream Pressure Zones	Maximum Fire Flow (L/s)	2045 MDD (L/s)	2045 PHD (L/s)
PRV-1	229, 185, 178, 107, 86, 75	150	17.03	34.06
PRV-2	178, 107, 86, 75	150	13.95	27.90
PRV-3	107, 75	150	7.39	14.77
PRV-4	160	150	1.85	3.69
PRV-5	202	150	0.82	1.64
PRV-6	185	150	1.03	2.05
PRV-7	86	150	2.67	5.33
PRV-8	222, 182, 124, 66	60	2.05	4.10
PRV-9	182, 124, 66	60	2.05	4.10
PRV-10	124, 66	60	1.44	2.87
PRV-11	66	60	1.44	2.87
PRV-12*	160	150	1.85	3.69

***Assumed same service area as PRV-4, per Village.**

The recommended valve sizes resulting from the PRV sizing analysis are presented in **Table 2.4**. Each valve was sized to meet its expected 2045 flow requirements, with the "small" valve sized to convey peak hour demand and the "large" valve sized for fire flow. The bypass valve is a redundant copy of the "small" valve at each station for use during system maintenance.

Table 2.4: Summary of Required PRV Sizes

ID	Small Valve (mm)	Large Valve (mm)	Bypass Valve (mm)
PRV-1	100	200	100
PRV-2	100	200	100
PRV-3	100	200	100
PRV-4	50	200	50
PRV-5	50	200	50
PRV-6	50	200	50
PRV-7	50	200	50
PRV-8	50	150	50
PRV-9	50	150	50
PRV-10	50	150	50
PRV-11	50	150	50
PRV-12*	50	200	50

***Assumed same size as that of PRV-4, per Village.**

Using the valve sizes recommended in **Table 2.4**, the velocities predicted at each PRV station under 2045 PHD and MDD+FF conditions are summarized in **Table 2.5**.

Table 2.5: Summary of PRV Velocity Results

ID	Small/Bypass Valve (mm)	2045 PHD (m/s)**	Large Valve (mm)	2045 MDD + FF (m/s)
PRV-1	100	4.34	200	5.32
PRV-2	100	3.55	200	5.22
PRV-3	100	1.88	200	5.01
PRV-4	50	1.88	200	4.83
PRV-5	50	0.84	200	4.80
PRV-6	50	1.04	200	4.81
PRV-7	50	2.72	200	4.86
PRV-8	50	2.09	150	3.51
PRV-9	50	2.09	150	3.51
PRV-10	50	1.46	150	3.48
PRV-11	50	1.46	150	3.48
PRV-12*	50	1.88	200	4.83

***Assumed same service area as PRV-4, per Village.**
****Assumed same velocity for the small and bypass valves**

In accordance with the Village design criteria, the predicted velocities for all valves of all PRV stations are not predicted to exceed 6 m/s.

Please note, all recommended valve sizes assume that the Village distribution system is capable of conveying the required flows under 2045 MDD+FF and PHD conditions. Please refer to **Section 3**, *Recommendations*, for additional discussion concerning this point.

3.0 Recommendations

In conducting this study, it was necessary to assume that the Village water distribution system is capable of conveying the required flows under 2045 MDD+FF and 2045 PHD conditions. However, as noted in TM #1, the existing Village system is not capable of meeting fire flow requirements in several pressure zones. The PRV sizes recommended herein assume that the system will be upgraded to meet all existing and future fire flow requirements. As such, it is highly recommended that the Village undertake the following:

- **Conduct FUS Analysis to Determine System-Wide Fire Flow Requirements**

  Prior to conducting any sizing analyses or work on the system's PRV stations, the Village should undertake a study to determine actual fire flow requirements based on FUS for the entire distribution system. Following that study, the results of this analysis should be verified based on any changes made to the fire flow requirement assumptions.

- **Conduct Pipe Sizing Analysis to Meet 2045 MDD+FF Conditions**

  The Village's previous capacity network analysis and sizing recommendations were developed on the assumption of providing 60 L/s (at 20 psi residual) to all existing fire hydrants. This assumption was made by the Village at the time of the original study. Prior to undertaking this PRV Sizing Analysis study, several fire flow requirements were increased to 150 L/s.

  Prior to replacing or rehabilitating any of the valves noted herein, the Village should undertake a water main sizing analysis with the goal of developing system improvements to allow the Village water distribution system to convey all required fire flows, with an emphasis on the sites requiring 150 L/s.

Submission

Prepared by:

Sean Geyer, E.I.T.
Hydraulic Modeler / Project Engineer

Approved by:

April 6, 2017
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
W. de SCHAETZEN
30059

Werner de Schaetzen, Ph.D., P.Eng.
Senior Modeling Review / Project Manager

[redacted]

[redacted]

Inspection Report

Project: [redacted] **File:** [redacted]

Contractor: [redacted] **Date:** [redacted]

Weather: [redacted]

SITE ACTIVITY	
No site activity at time of site visit	
SITE OBSERVATIONS / RECOMMENDATIONS:	**ACTION BY:**
Asphalt works to be completed. Contractor to coordinate works with VOLB to try and complete paving works once VOLB services have been run.	[redacted]
Benching completed in Storm Manhole D02.	
A cleanout was installed on storm pipe downstream of retaining wall	
Storm pipe has been installed from retaining wall to discharge point. Rock rip rap to be placed at outlet of discharge pipe to mitigate erosion.	[redacted]
ONGOING:	
Compaction tests and asphalt tests to be completed on all works in roadway. Test results to be forwarded to [redacted]	[redacted]
All technical correspondence to be to [redacted]. [redacted] contact for technical matters is [redacted] or [redacted]	
Other works on going during this contract may include servicing works by VOLB crews. Co-ordinate with VOLB to establish if site servicing repave works can be incorporated into storm culvert works.	[redacted]
Ensure all sediment and erosion features are in place and operating prior to commencing works. Works are not detailed on plans, contractor is responsible for providing adequate measures, ongoing maintenance and repair and working in a manner to meet regulatory requirements. See supplemental specifications.	[redacted]
Contractor to maintain road clear of dirt and debris and prevent run off of sediment. Note sensitive water receptors nearby (stream and Howe Sound)	[redacted]
Works to be constructed per drawings, drawing notes and contract. A site modification has been approved by [redacted] as per markup distributed to all parties. Modification to have no change to contract lump sum values	
Proposed to lay first lift of asphalt with second lift completed at time of driveway surfacing. Contractor wants to pave first and second lift at same time - to be approved by client. If approved by client, contractor to ensure consideration of future driveway is made to ensure proper drainage of cul de sac to catch basin and accommodate future driveway tie in.	[redacted]

Report By: [redacted] **Review Engineer:** [redacted]

	
CB and MH installed	Storm MH D03
	
Cleanout Installed on Downstream Side of Retaining Wall	Storm Pipe Installed from Retaining Wall to Discharge Point
	
Storm Discharge	Storm Discharge

RFP 17.01 Water Storage Facility - Staff Evaluation Matrix

AECOM	R1	R2	R3	R4	R5
Item					
General Approach and Methodology (25%)	20.0	25.0	23.3	22.5	25.0
Staff / Company Qualifications & Roles On This Project (30%)	22.8	25.2	25.2	22.2	28.8
Project Innovation (5%)	3.0	5.0	4.0	3.5	3.0
Fee Proposal / Level of Effort for Senior & Experienced Staff (20%)	12.0	0.0	17.3	15.3	18.7
Availability (10%)	5.0	4.0	5.0	5.0	5.0
Work Schedule (10%)	5.0	4.0	5.0	4.5	5.0
TOTAL	**68**	**63**	**80**	**73**	**85**

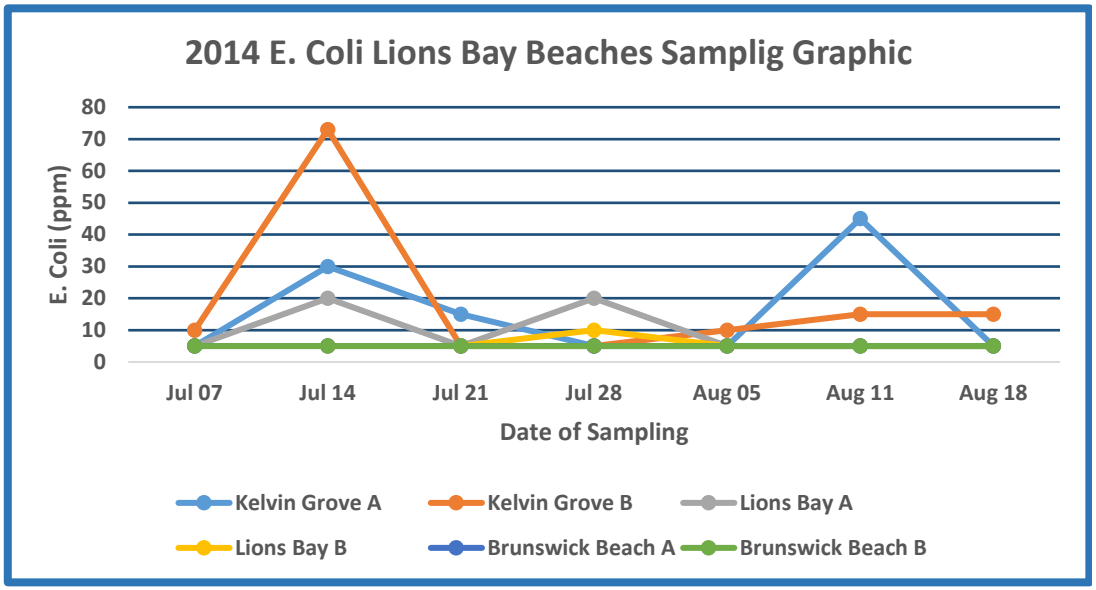
ISL	R1	R2	R3	R4	R5
Item					
General Approach and Methodology (25%)	18.3	23.3	20.0	21.7	21.7
Staff / Company Qualifications & Roles On This Project (30%)	19.2	30.0	21.6	23.4	24.0
Project Innovation (5%)	5.0	4.0	4.0	3.5	3.0
Fee Proposal / Level of Effort for Senior & Experienced Staff (20%)	12.0	0.0	13.3	14.0	16.0
Availability (10%)	3.0	3.0	4.0	5.0	4.0
Work Schedule (10%)	4.0	3.0	3.5	4.0	5.0
TOTAL	**62**	**63**	**66**	**72**	**74**

ONSITE	R1	R2	R3	R4	R5
Item					
General Approach and Methodology (25%)	15.0	16.7	18.3	20.0	16.7
Staff / Company Qualifications & Roles On This Project (30%)	14.4	22.8	21.6	24.0	24.0
Project Innovation (5%)	3.0	4.0	4.0	3.0	3.0
Fee Proposal / Level of Effort for Senior & Experienced Staff (20%)	13.3	0.0	13.3	14.7	14.7
Availability (10%)	3.0	2.0	3.0	4.0	4.0
Work Schedule (10%)	4.0	2.0	4.0	3.5	4.0
TOTAL	**53**	**47**	**64**	**69**	**66**

PROPONENT	R1	R2	R3	R4	R5
AECOM	68	63	80	73	85
ISL	62	63	66	72	74
ONSITE	53	47	64	69	66

2014 E. COLI (ppm) LIONS BAY BEACHES SAMPLING

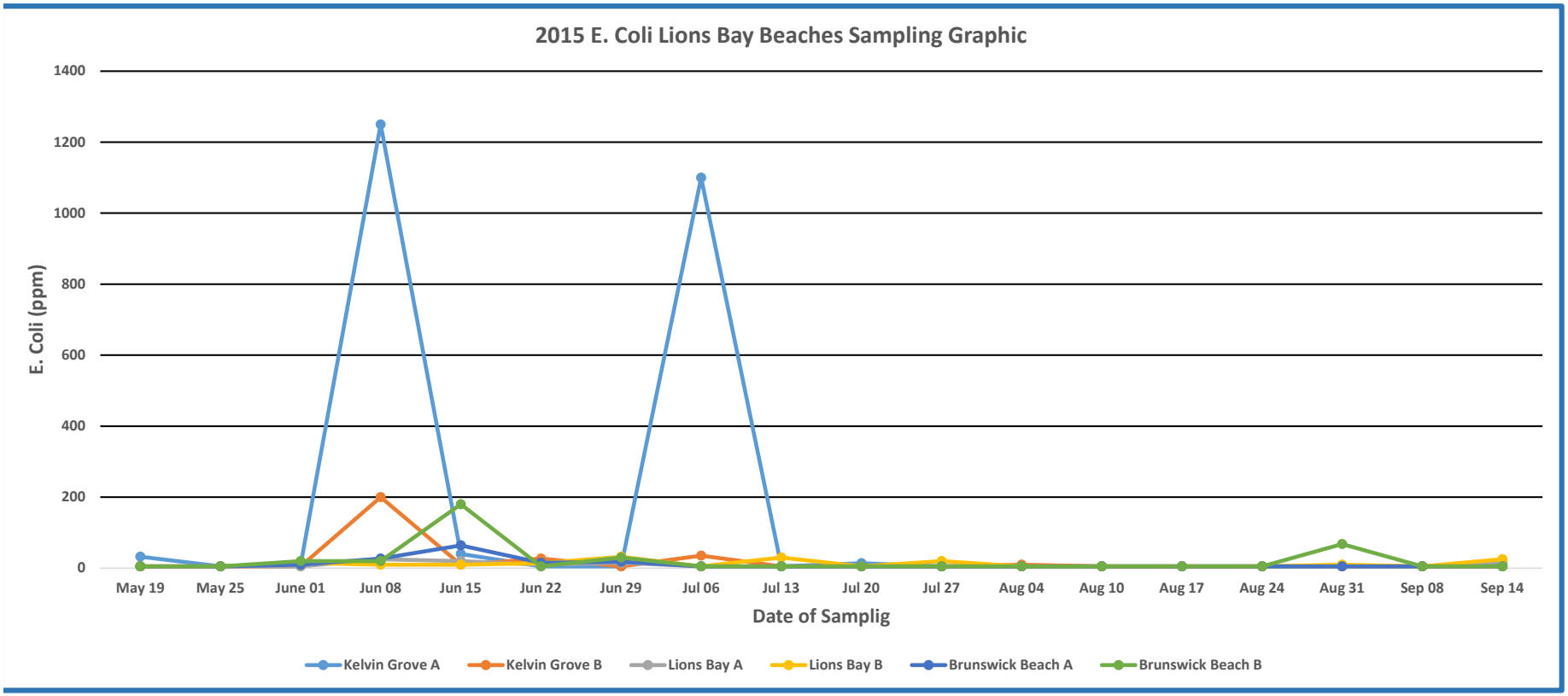
	Jul 07	Jul 14	Jul 21	Jul 28	Aug 05	Aug 11	Aug 18
Kelvin Grove A	5	30	15	5	5	45	5
Kelvin Grove B	10	73	5	5	10	15	15
Lions Bay A	5	20	5	20	5	5	5
Lions Bay B	5	5	5	10	5	5	5
Brunswick Beach A	5	5	5	5	5	5	5
Brunswick Beach B	5	5	5	5	5	5	5



Maximum Acceptable Concentration E. Coli= 200 ppm

2015 E. COLI (ppm) LIONS BAY BEACHES SAMPLING

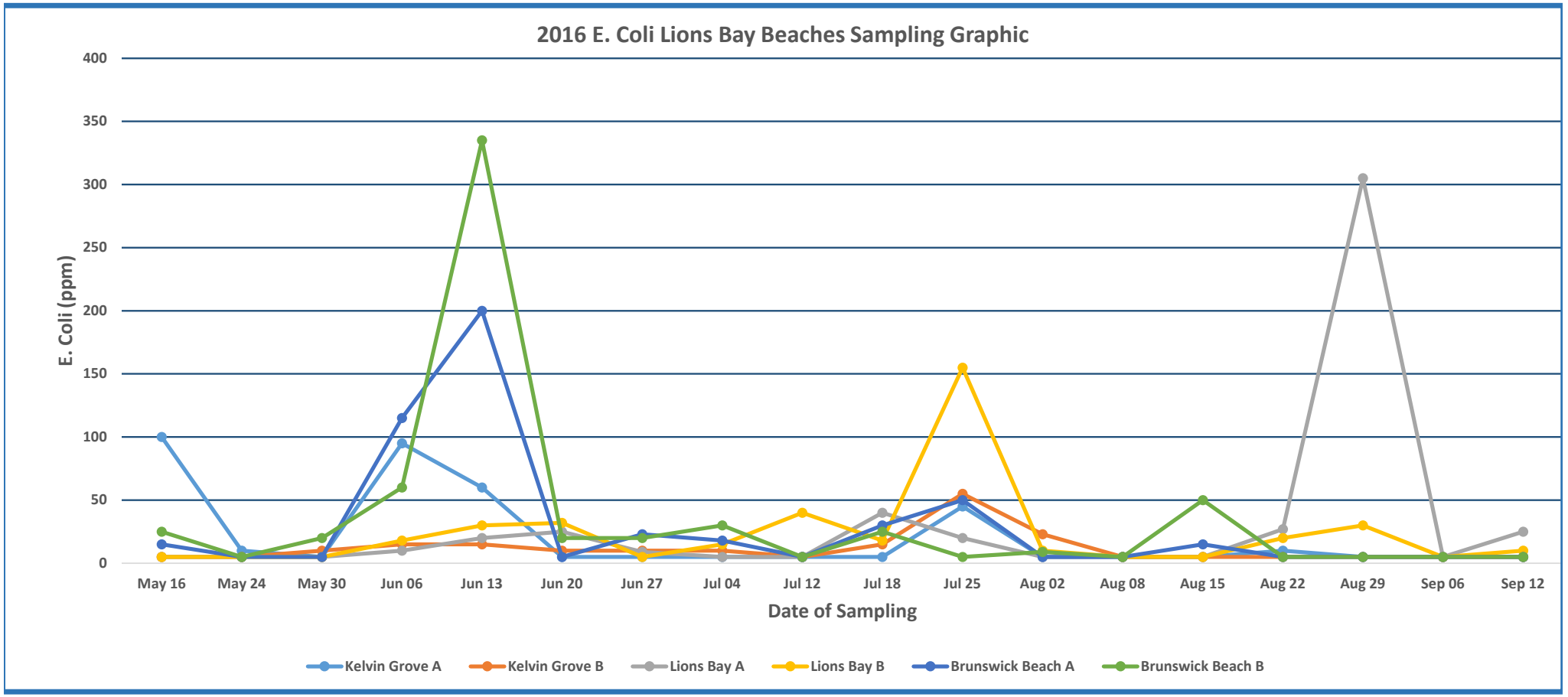
	May 19	May 25	June 01	Jun 08	Jun 15	Jun 22	Jun 29	Jul 06	Jul 13	Jul 20	Jul 27	Aug 04	Aug 10	Aug 17	Aug 24	Aug 31	Sep 08	Sep 14
Kelvin Grove A	32	5	10	1250	40	5	5	1100	5	14	5	5	5	5	5	5	5	10
Kelvin Grove B	5	5	5	200	10	27	5	35	5	5	5	10	5	5	5	5	5	5
Lions Bay A	5	5	5	25	20	10	15	5	5	5	5	5	5	5	5	5	5	18
Lions Bay B	5	5	15	10	10	14	32	5	30	5	20	5	5	5	5	10	5	25
Brunswick Beach A	5	5	10	27	64	15	18	5	5	5	5	5	5	5	5	5	5	5
Brunswick Beach B	5	5	20	20	180	5	30	5	5	5	5	5	5	5	5	68	5	5



Maximum Acceptable Concentration E. Coli= 200 ppm

2016 E. COLI (ppm) LIONS BAY BEACHES SAMPLING

	May 16	May 24	May 30	Jun 06	Jun 13	Jun 20	Jun 27	Jul 04	Jul 12	Jul 18	Jul 25	Aug 02	Aug 08	Aug 15	Aug 22	Aug 29	Sep 06	Sep 12
Kelvin Grove A	100	10	5	95	60	5	5	5	5	5	45	5	5	5	10	5	5	5
Kelvin Grove B	5	5	10	15	15	10	10	10	5	15	55	23	5	5	5	5	5	5
Lions Bay A	5	5	5	10	20	25	9	5	5	40	20	5	5	5	27	**305**	5	25
Lions Bay B	5	5	5	18	30	32	5	15	40	18	155	10	5	5	20	30	5	10
Brunswick Beach A	15	5	5	115	200	5	23	18	5	30	50	5	5	15	5	5	5	5
Brunswick Beach B	25	5	20	60	**335**	20	20	30	5	25	5	9	5	50	5	5	5	5



Maximum Acceptable Concentration E. Coli= 200 ppm