Wastewater Treatment Project
Treated for a cleaner future

CORE AREA WASTEWATER TREATMENT PROJECT BOARD
Notice of a Meeting on **Tuesday, July 4, 2017 at 9:00 a.m.**
Boardroom, 6th floor, 625 Fisgard Street, Victoria, BC

Jane Bird (Chair)	Don Fairbairn (Vice Chair)	Jim Burke	Brenda Eaton
David Howe	Bob Lapham	Colin Smith	

AGENDA

1. Approval of Agenda and Statement of No Conflict

2. Safety Minute

3. Approval of the June 6, 2017 Meeting Minutes

4. Report of the Chair

5. Presentations/Delegations

6. Project Board Business
   6.1. Staff Report for Information: Monthly Project Report – May 2017

   RESOLVED that:
   1. The Wastewater Treatment Project Monthly Report – May 2017 be received for information.
   2. The Wastewater Treatment Project Monthly Report – May 2017 be forwarded to the Core Area Liquid Waste Management Committee and Capital Regional District Board for information.

7. Business arising from other Governments, including the CRD Board, CRD Committees and member Municipalities:

   7.1. June 2, 2017 letter from the District of Saanich's Bicycle and Pedestrian Mobility Advisory Committee

8. Correspondence
   8.1. Correspondence received June 2017

9. New Business

10. Project Board Meeting Schedule: Updated dates and co-ordination with CALWMC meetings

11. **Motion to close the meeting in accordance with the Community Charter, Part 4, Division 3, 90(1)(j)** information that is prohibited, or information that if it were presented in a document would be prohibited, from disclosure under section 21 of the Freedom of Information and Protection of Privacy Act.

12. Adjournment

To ensure quorum, advise Denise Dionne 250.360.3192 if you are unable to attend.

Wastewater Treatment Project
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Minutes of a Meeting of the Core Area Wastewater Treatment Project Board
Held Tuesday, June 6, 2017 in the Boardroom, 625 Fisgard Street, Victoria, BC

Present: **Members:** J. Bird (Chair); D. Fairbairn (Vice Chair); D. Howe; R. Lapham; C. Smith
CRD Staff: D. Clancy, Project Director; E. Scott, Deputy Project Director; D. Dionne (recorder)
Regrets: J. Burke; B. Eaton
Also in Attendance: K. Quayle, Communications Coordinator; S. Singh, Bennett Jones LLP

The meeting was called to order at 9:02 a.m.

D. Clancy introduced the following new Project Team members:
- David Tuckwell, Quality Manager
- Alan Wardell, Construction Scheduler
- Kevin Simpson, Environmental, First Nations and Regulatory Manager

1. Approval of Agenda and Statement of No Conflict

The members stated they had no conflict of interest with the agenda items.

MOVED by C. Smith, **SECONDED** by D. Howe,
That the agenda be approved as circulated.

CARRIED

2. Safety Minute

D. Clancy led the safety minute regarding parking protocols. He identified the dangers of backing out of parking spots, noting the many blind spots. He advised that the Project's policy will require staff to back into parking spots so that they can clearly see what is in front of them as they pull out. This will be policy in the safety management plan.

3. Approval of the May 2, 2017 Meeting Minutes

MOVED by R. Lapham, **SECONDED** by D. Howe,
That the minutes of the May 2, 2017 meeting be approved.

CARRIED

4. Report of the Chair

The Chair reported on these items:
- The Project is moving forward and activity has begun at both the Ogden Point and McLaughlin Point sites.
- The Project Team continues to improve community engagement.
- She noted that the Project is linear, and there will be a staggered series of plans and discussions, which will dictate when community discussions for each project component will take place.
- The 24-hour public information line has been receiving calls and the process of referring calls to the various construction managers for response is working well.

5. Presentations/Delegations

There was one delegation.

Barney Hiney of RJH Services addressed the Project Board, noting that his company submitted a proposal for the Integrated Resource Management (IRM) Request for Proposals and asked what the status was. The Chair advised that this falls under the Integrated Resource Management Advisory Committee and that he would need to address them at their next meeting of June 28, 2017.

6. Project Board Business

6.1. Staff Report for Information: Monthly Project Report – April 2017

The Chair clarified for the Project Board that the April monthly report was compiled in May and presented in June due to:

- financial reporting closing at the end of the month
- the Project Board meetings being held at the beginning of the month
- there isn't sufficient time between financial month end and the Project Board meeting to compile the financial report

She noted that it is confusing and asked the Project Team to consider that, if there are activities, in particular communications and engagement activities, that occur in May that are worth noting with the April report, to please do so.

D. Clancy and E. Scott presented the information in the report. The Project Board discussed the report and provided the following comments:

- Staff were asked to consider, as part of the Schedule section of the monthly report, incorporating an eight-week look ahead of potential significant activities that are ongoing in the four week period after financial month end and the upcoming four week period. It is important to link the April report to what is being focused on in the current and upcoming months.
- The font size on the Cost Management and Forecast tables should be increased to make it more reader friendly.
- The Project Team should remain aware of the challenges of a linear project and availability of information when planning its stakeholder and engagement for the indicative design for the conveyance route in Saanich. The community will have concerns about the Project's commitment to aligning the indicative design with the District of Saanich's planned upgrades to trail-ways and sidewalks.
- The Project Team should clarify Risk No. 4. It is important to understand that this risk is related specifically to the various touchpoints of senior levels of government and the Capital Regional District (CRD) around their expectations as funders and permitting agencies.
- The Chair outlined the process of how the Project Board manages requests from other levels of government, CRD Committees and the CRD Board. She noted that formal requests that are received via motion, are responded to formally at a Project Board meeting as laid out in Agenda Item 7 below. The resolution and response will then be included in the monthly report. Less formal questions or requests will be responded to by e-mail through the CRD's Corporate Officer.

- Responses to other CRD Committee or Board requests, that cannot wait to be dealt with in the Monthly Report, will be submitted by the Project Board Chair via the CRD's Corporate Officer and then will be included for information in the Monthly Report.
- Regarding the Green Shores Certification, the Project Team was asked to review what other municipalities have pursued in this regard.
- The Project Board should respond in writing, through the CRD's Corporate Officer, to other non-formal or verbal actions received from other CRD Committees or the CRD Board.

MOVED by D. Fairbairn, **SECONDED** by C. Smith,
That the Project Board approve the following resolution:

Be it RESOLVED that:

1. The Wastewater Treatment Project Monthly Report – April 2017 be received for information.
2. The Wastewater Treatment Project Monthly Report – April 2017 be forwarded to the Core Area Liquid Waste Management Committee and Capital Regional District Board for information.

CARRIED

6.2. Staff Report for Information: Summary of Documents Related to Topics of Interest: Odour, Seabed Pipeline, Bluffs / Shorelines, Geotechnical and Noise Topics

E. Scott spoke to the staff report, noting that the Project Team prepared a Summary Report of the many reports that were undertaken as part of the CRD's wastewater treatment planning in an effort to alleviate any confusion between the applicability and inapplicability of the various historical and current reports to the current Project. The list in the Summary Report will be reviewed regularly and updated as necessary. There are a number of reports in the City of Victoria archive. Staff are working with the City to get links to those reports for easy access by the public and to clarify their relevance or otherwise to the Project. The Summary Report is available on the CRD's website.

MOVED by D. Howe, **SECONDED** by R. Lapham,
That the Project Board approve the following resolution:

Be it RESOLVED that:
The Core Area Wastewater Treatment Project Board receive this report for information.

CARRIED

7. Business arising from other Governments, including the CRD Board, CRD Committees and member Municipalities

7.1. Motions from City of Victoria Council Meeting, May 11, 2017

1. That Victoria Council request that the Project Board put in place risk mitigation measures to protect the Dallas Road Bluffs during construction including but not limited to:
    a. Assembling an interdisciplinary team to study and address the protection of the bluffs.

b. As part of the detailed design of the conveyancing, include a plan for the preservation of the bluffs.

2. That Victoria City Council request the Project Board to report out to the public at one of their regular community meetings, to the James Bay Neighbourhood Association and to Victoria City Council on the measures outlined in Item 1.

8. Correspondence

8.1. Correspondence received May 2017

8.2. Project Board's Response to the City of Victoria's April 13 and May 11, 2017 Council Meeting resolutions

8.3. Project Board Chair's e-mail response to questions from the Core Area Liquid Waste Management Committee's May 10, 2017 Meeting

8.4. **Late Item:** June 1, 2017 letter from City of Victoria, Mayor Helps

8.5. **Late Item:** June 2, 2017 letter from the District of Saanich's Bicycle and Pedestrian Mobility Advisory Committee

MOVED by R. Lapham, **SECONDED** by D. Fairbairn,
That the correspondence, as attached to this agenda, be received for information.

CARRIED

9. New Business

There was no new business.

10. **MOVED** by D. Fairbairn, **SECONDED** by D. Howe,
Motion to close the meeting in accordance with the *Community Charter,* Part 4, Division 3, 90(1)(j) information that is prohibited, or information that if it were presented in a document would be prohibited, from disclosure under section 21 of the Freedom of Information and Protection of Privacy Act.

CARRIED

11. Adjournment

On motion the Project Board adjourned its meeting at 10:20 a.m. and moved into closed session.

The Project Board rose from its closed session at 1:56 p.m. without report.

_____
CHAIR

_____
RECORDER

Wastewater Treatment Project
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REPORT TO CORE AREA WASTEWATER TREATMENT PROJECT BOARD
MEETING OF TUESDAY, JULY 4, 2017

SUBJECT **Wastewater Treatment Project Monthly Report - May 2017**

ISSUE

To Provide the Core Area Wastewater Treatment Project Board with the May 2017 monthly report.

BACKGROUND

On May 25, 2016 the Regional Board of the CRD:

i) Adopted by resolution the Core Area Wastewater Treatment Project Board Terms of Reference (Project Board Terms of Reference) for the purposes of establishing principles governing the Core Area Wastewater Treatment Project (the Wastewater Treatment Project or the WTP);

ii) Established the Core Area Wastewater Treatment Project Board (Project Board) under Bylaw 4109 (the CRD Core Area Wastewater Treatment Board Bylaw No. 1, 2016) for the purposes of administering the Core Area Wastewater Treatment Project; and

iii) Delegated certain of its powers, duties and functions to the Project Board under Bylaw 4110 (the CRD Core Area Wastewater Treatment Project Board Delegation Bylaw No. 1, 2016).

On September 14, 2016 the Regional Board of the CRD:

i) Received the final report of the Project Board with respect to its recommendation for the CAWTP, dated September 7, 2016 (the Final Report); and

ii) Approved the business case attached as Appendix 1 (the Business Case) to the Final Report.

The Business Case established the CAWTP control budget (the Control Budget) of $765 million.

DISCUSSION

The CRD Core Area Wastewater Treatment Project Board (the Project Board) Terms of Reference requires, amongst other things: that the Project Board provide the CRD Board with monthly progress reports and a comprehensive quarterly report on the Project.

The monthly report for the month of May 2017 is attached as Appendix A.

RECOMMENDATION

That the Core Area Wastewater Treatment Project Board approve the following resolution:

RESOLVED that:

1. The Wastewater Treatment Project Monthly Report – May 2017 be received for information.

2. The Wastewater Treatment Project Monthly Report – May 2017 be forwarded to the Core Area Liquid Waste Management Committee and Capital Regional District Board for information.

Elizabeth Scott, Deputy Project Director
Wastewater Treatment Project

Dave Clancy, Project Director
Wastewater Treatment Project
Concurrence

Attachments: 1

Appendix A: Wastewater Treatment Project Monthly Report – May 2017

ES:dd

Wastewater Treatment Project

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CRD Wastewater Treatment Project

Monthly Report

Reporting Period: May 2017

TABLE OF CONTENTS

1 Executive Summary

1.1 Introduction

This report covers the reporting period of May 2017 and outlines the progress made during this time.

The Wastewater Treatment Project (the "Project") includes three main Project components (the "Project Components"): the Residuals Treatment Facility (the "RTF"), the McLoughlin Point Wastewater Treatment Plant (the "WWTP") and the Conveyance System (which includes upgrades to the conveyance network, including the construction of pump stations and pipes). The Project scope will be delivered through a number of contracts with a variety of contracting strategies.

Overall the Project is progressing as planned.

The construction phase of the WWTP is progressing in accordance with the schedule, with materials and equipment beginning to be mobilized and construction sites being prepared.

The RTF is in the procurement phase and the Request for Proposals ("RFP") stage is progressing as planned with technical submissions due in September 2017 and financial submissions due in October 2017 from the three proponents.

The Conveyance System will be delivered through seven contracts. Two of these entered the procurement phase over the reporting period: Clover Point Pump Station and Macaulay Point Pump Station and Forcemain. The remaining five are in the engineering phase. The RFP for the Clover Point Pump Station was issued on May 22, 2017 and the Request for Qualifications ("RFQ") for Macaulay Point Pump Station and Forcemain was issued on May 24, 2017.

1.2 Dashboard

Table 1 indicates the high level status of the Project and each Project Component with regards to the six Key Performance Indicators ("KPI") that were defined within the Project Charter. For the reporting period the Project KPI's have been met and Project progress is as planned.

Table 1- Executive Summary Dashboard

Executive Summary Dashboard

Key Performance Indicators		Project Overall	WWTP	RTF	Conveyance System	Comments
Safety	Deliver the Project safely with zero fatalities and a total recordable incident frequency (TRIF) of no more than 1*.					No safety issues
Environment	Protect the environment by meeting all legislated environmental requirements and optimizing opportunities for resource recovery and greenhouse gas reduction					No environmental issues
Regulatory Requirements	Deliver the Project such that the Core Area complies with provincial and federal wastewater regulations.					No regulatory issues
Stakeholders	Continue to build and maintain positive relationships with First Nations, local governments, communities, and other stakeholders.					Extensive engagement activities were completed in the reporting period related mainly to the Ogden and McLoughlin Point construction activities. Significant efforts will continue to be made to provide accurate and timely information to stakeholders.
Schedule	Deliver the Project by December 31, 2020.					No schedule issues
Cost	Deliver the Project within the Control Budget ($765 million).					Project expenditures within Control Budget

* A TRIF of no more than 1 means that there is 1 or fewer recordable incidents (being a work-related injury or illness that requires medical treatment beyond first aid or causes death, days away from work, restricted work or transfer to another job, or loss of consciousness) for every 200,000 person-hours of work.

Status	Description
	KPI unlikely to be met
	KPI at risk unless correction action is taken
	KPI at risk but corrective action has been identified/is being implemented
	Good progress against KPI

2 Wastewater Treatment Project Progress

2.1 Safety

Safety information for the reporting period and cumulative for the Project from January 1, 2017 is summarized in Table 2. In May, the TRIF for the Project inclusive of Project Contractor and Project Management Office staff was zero. No recordable incidents were reported in the reporting period. No corrective actions were required due to there being no open recordable incidents.

Harbour Resource Partners ("HRP") was the only Project Contractor during the reporting period. HRP began mobilization to WWTP work sites and mobilized 35 staff.

The Rock Blasting and Property Protection Plan was submitted, reviewed and rejected in the period. HRP will revise the plan and submit a second revision in June. The site specific safety plan for McLoughlin Point site was submitted and approved in the period.

The Project Management Office ("PMO") staffing level increased over the reporting period, with the PMO staff increasing from 14 to 20 full time equivalents ("FTE").
17 Office/Site Safety orientations were completed for the month of May for the PMO.

During the period the "Anglers Hut" located at Ogden Point was closed. A site trailer was located nearby at Ogden Point as a new temporary facility, facilitating demolition of the old building. During testing prior to demolition asbestos was found. All appropriate measures were taken to deal with the asbestos prior to and during demolition. The demolition of the Anglers Hut was completed in the period.

Site inspections were carried out during the reporting period. With increased construction activities on the Project these inspections will increase in frequency and site safety audits will be performed by Project construction and safety management. Office and site orientations will continue to be delivered as required.

Table 2- Project Safety Information

	Reporting Period (May 2017)	Project Total to-Date (from January 1, 2017)
Person Hours		
PMO	2852	6989
Project Contractor	6693	12326
Total Person Hours	9545	19315
Number Of Employees		
PMO	20	
Project Contractors working on Project site	37	
Total Number Of Employees	57	
Number Of Occurrences		
Near Miss Reports	0	0
High Potential near Miss Reports	0	0
Report Only	0	0
First Aid	0	0
Medical Aid	0	0
Medical Aid (Modified Duty)	0	0
Lost Time	0	0
Total Recordable Incidents	0	0
Frequency Rates		
First Aid Frequency	0	0
Medical Aid Frequency	0	0
Lost Time Frequency	0	0
Total Recordable Incident Rate	0	0

2.2 Environment and Regulatory Management

The PMO's Environmental, First Nations and Regulatory Manager role was filled at the end of the period.

2.2.1 Environment

Environmental work to date is progressing as planned. The key environmental management activities that were completed during the reporting period are as follows:

- HRP prepared environmental protection plans in anticipation of construction activities beginning at Ogden Point, McLoughlin Point sites and the laydown areas located on adjacent DND land;

- Stantec prepared a Project-wide environmental management plan to act as a framework for staff and contractors working on the Project and;
- Baseline environmental assessment work, including Environmental Impact Studies related to facility and outfall construction and effluent discharge; contaminated sites assessments and archaeological assessments that were completed during the previous iteration of the Project were reviewed and shared with HRP, Stantec, Millennia and proponents. These studies were used to inform permit applications and the development of environmental management plans and environmental protection plans.

2.2.2 Regulatory Management

The Project Team and HRP are progressing construction-related regulatory approvals in accordance with the overall schedule. Key permitting activities for the reporting period included:

- blasting notification sent by HRP to Nav Canada;
- building and development approvals issued by the City of Victoria for temporary structures at Ogden Point;
- baseline studies and assessments completed by HRP related to permit and license applications for geotechnical investigations to proceed on the outfall and Horizontal Directional Drilling ("HDD");
- the application for the Facility Alteration Permit and Licence from Transport Canada for the HDD of the cross harbour forcemain progressed; this is expected in the next reporting period;
- the application for the Facility Alteration Permit and Licence from Transport Canada for the McLoughlin Point outfall is under review by the PMO; and
- Archeological (*Heritage Act*) permits from the Ministry of Forests, Lands, and Natural Resource Operations for the Project are in development by Millennia, the PMO's archaeological contractor.

Engagement with municipal, provincial and federal government departments continued; activities included:

- the PMO conducted a project update and briefing session for Environment and Climate Change Canada; and
- the PMO conducted ongoing operational and construction related meetings and updates with DND.

The PMO continued to meet the CRD's commitments under Project-related agreements.

The status of the key project permits are summarized in Table 3.

.

Table 3- Key Permits Status

Permit / Licence	Anticipated Date	Status
McLoughlin Point WWTP		
Rezoning within the Township of Esquimalt	Obtained	Complete
Township of Esquimalt Development Permit	Obtained	Complete
Department of National Defence Licence (facility siting, works access & laydown, including for Macaulay Point)	Obtained	Complete
Ministry of Environment Draft Operational Certificate (Municipal Wastewater Regulation – "MWR" - Registration)	Q3 2017	On track
Ministry of Environment Operational Certificate (MWR Registration)	Q3 2018	On track
McLoughlin Point Harbour Crossing		
Greater Victoria Harbour Authority Licence (works access)	Obtained	Complete
Transport Canada Licence (works access)	Q2 2017	On track
Transport Canada Facility Alteration Permit	Q2 2017	On track
Transport Canada lease	Following completion of construction (As-built)	On track
McLoughlin Point Outfall		
Transport Canada Facility Alteration Permit	Q2 2017	On track
Transport Canada Licence (works access)	Q2 2017	On track
Transport Canada Lease	Following completion of construction (As-built)	On track
Macaulay Point Pump Station Upgrade		
Township of Esquimalt Development Permit	Q2 2017	On track
Clover Forcemain		
City of Victoria Licence (works access)	Obtained	Complete
Clover Point Pump Station		
Rezoning within the City of Victoria	Obtained	Complete
City of Victoria Licence (facility siting)	Obtained	Complete
ECI/Trent Twinning		
City of Victoria Licence (works access)	Q1 2019	On track
Arbutus Attenuation Tank		
Vancouver Island Health Authority Licence (works laydown)	Q2 2019	On track
Residual Solids Pipelines and Pump Stations		
Ministry of Transportation and Infrastructure permits (works access)	Q1 2018	On track

Residuals Treatment Facility		
District of Saanich Development Permits	Q2 2018	On track

2.3 First Nations

First Nations communication and engagement progressed as planned.

Following the initial planning meetings held in April with the Esquimalt and Songhees administrators regarding the First Nations liaison positions, discussions have been ongoing in May to finalize the job descriptions and terms of engagement for the positions. In April, the two Nations were exploring the possibility of co-managing the positions, however during the reporting period it was determined that the preference is to have the positions operate cooperatively, but as separate and independent positions.

In April seven letters signed by the CRD Chair (acting) were sent to neighbouring First Nations to give notice of the pending construction on the Project, including an invitation to have further discussions and Nations were asked to respond by the end of May. One Nation (Pauquachin) responded and requested an opportunity to discuss the Project further. The PMO will work with CRD First Nations Relations to follow up directly with Pauquachin representatives in the next reporting period.

A meeting with the WSANEC Leadership Committee (a committee made up of Saanich First Nations Chiefs, Council members and elders) is scheduled for mid-June, and the Project will be on the agenda. The Integrated Water Services (IWS) GM will be in attendance to provide a project overview, and an invitation will be extended for a follow-up, Project-specific meeting with the PMO.

2.4 Stakeholder Engagement

As outlined in the Project's approved Communications and Engagement Plan, now that the Project has transitioned to the construction phase the key focus of the communications and engagement activities is to keep residents and stakeholders informed of Project plans, progress and construction information, and to receive and respond to questions and concerns raised by the community.

Extensive engagement activities were completed in the reporting period through a variety of on-going communications tools, including:

- door-to-door notifications
- construction advisories
- emails to stakeholders
- website updates
    - "Community Questions" page was updated
    - construction notices posted (see section 2.4.1 for further information)
    - two media releases were issued (see section 2.4.2 for further information)
- 24-7 phone information line
- meetings with stakeholders

2.4.1 Construction Communications

During the reporting period, the focus of construction communications involved the first major component of the Project: the McLoughlin Point Wastewater Treatment Plant, which includes work at Ogden Point. There were three construction notices issued to stakeholders outlining site preparations, excavation and blasting information:

- Ogden Point Site Preparation: May 18, 2017
- Construction Laydown Site Preparation: May 29, 2017
- McLoughlin Point: Excavation and Controlled Blasting: May 30, 2017

As part of communicating with the community about longer term construction activities, the PMO members went door-to-door along Niagara Street in James Bay in order to provide residents with information. The PMO delivered 188 notices to residents with an information sheet to inform them of future construction along that corridor anticipated to be undertaken in June 2018. The PMO team members spoke in-person to approximately 60 residents. Residents were also provided with the most recent Project Update #2 newsletter and were informed that the PMO is planning an update meeting in spring 2018.

The Project website, wastewaterproject.ca, was active with information regularly updated, including all construction and media releases, relevant reports, and updates to the “Community Questions” webpage to provide stakeholders with answers to commonly-asked questions.

2.4.2 Media Releases

There were two media releases issued in this period:

- Request for Qualifications released for the Macaulay Point Pump Station and Forcemain: May 24, 2017
- Clover Point Pump Station Proponents Shortlisted: May 25, 2017

2.4.3 Public Inquiries

The Project public email interface was established via a web email link from the following public email page: https://www.crd.bc.ca/project/wastewater-treatment-project/contact-us.

The Project public information line (1-844-815-6132) was launched on May 1, 2017. This provides members of the public with a number that will be answered 24 hours a day, 7 days a week, and provides a single point of contact for any Project-related inquiry.

Public inquiry numbers from these sources are noted in Table 4.

Table 4- Project Inquiries

Inquiry Source	Contacts for the Period
Information phone line inquiries	7
Web-email inquiries	14

2.4.4 Community Meetings

Meetings were held with the following community groups:

- The Esquimalt Liaison Committee was established and held its inaugural meeting during the reporting period. 13 committee members attended the meeting
- Fairfield Gonzales Community Association Land Use Committee (CALUC)
- President of James Bay Neighbourhood Association and City of Victoria Mayor

Meetings were held with the following municipalities:

- Saanich Technical Working Group – first meeting
- Township of Esquimalt Special Council meeting - Traffic Management Plan

In addition, the Project Team presented at the BC Water and Waste Association Annual Conference and Trade Show held in Victoria.

2.4.5 Communications Planning

An Incident Communications Plan workshop was held to confirm procedures to manage communications during an incident or potential crisis situation, and an Incident Communications Plan is under development.

As construction plans progress, the team will continue to inform the community through various channels of information and meetings.

2.5 Resolutions from Other Governments

2.5.1 City of Victoria

The Project Board received a resolution from the City of Victoria's May 11th Council meeting. The Council's resolution is in italics.

> *That Victoria Council request that the Project Board put in place risk mitigation measures to protect the Dallas Road Bluffs during construction including but not limited to:*
>
> *a. Assembling an interdisciplinary team to study and address the protection of the bluffs.*
>
> *b. As part of the detailed design of the conveyancing, include a plan for the preservation of the bluffs.*
>
> *That the Victoria City Council request the Project Board to report out to the public at one of their regular community meetings, to the JBNA and to Victoria City Council on the measures.*

The Project Team's plans to address this resolution were covered in section 2.9.1 of the Project's April Monthly Report, as this resolution was related to a resolution received from the Core Area Liquid Waste Management Committee's April 12th meeting.

2.5.2 District of Saanich

Mayor Richard Atwell sent a letter dated June 2, 2017to the Chair of the Project Board that included a motion passed by the District of Saanich's Bicycle and Pedestrian Mobility Advisory Committee at its May 18, 2017 meeting. The letter is attached as Appendix A and the Committee's May 18 motion is in italics below.

That the Bicycle and Pedestrian Mobility Advisory Committee write to the CRD Wastewater Treatment Project Board to inquire about the proposed sewer pipeline conveyance route as it travels through Saanich, and the proposed consultation timeline for this project.

The letter is included in the Project Board's July 4th meeting agenda and it is anticipated the Project Board will discuss the matter at that time.

2.6 Schedule

All scheduled activities were progressed as planned over the reporting period.
HRP has begun construction phase activities of the WWTP Project Component which has progressed in line with HRP's schedule. The RTF Project Component is in the procurement phase and is on-track to be completed as per schedule. The Conveyance System Project Component progressed in line with the schedule. Procurement progressed on Clover Point Pump Station, Macaulay Point Pump Station and Forcemain as per schedule. Preparation of indicative design progressed as per schedule for the RTF pipes and pump stations, and Clover Point Forcemain.

Figure 1 shows the high-level Project schedule. This schedule is unchanged from the April monthly report and from that shown at the recent community meetings, however it remains subject to optimization.

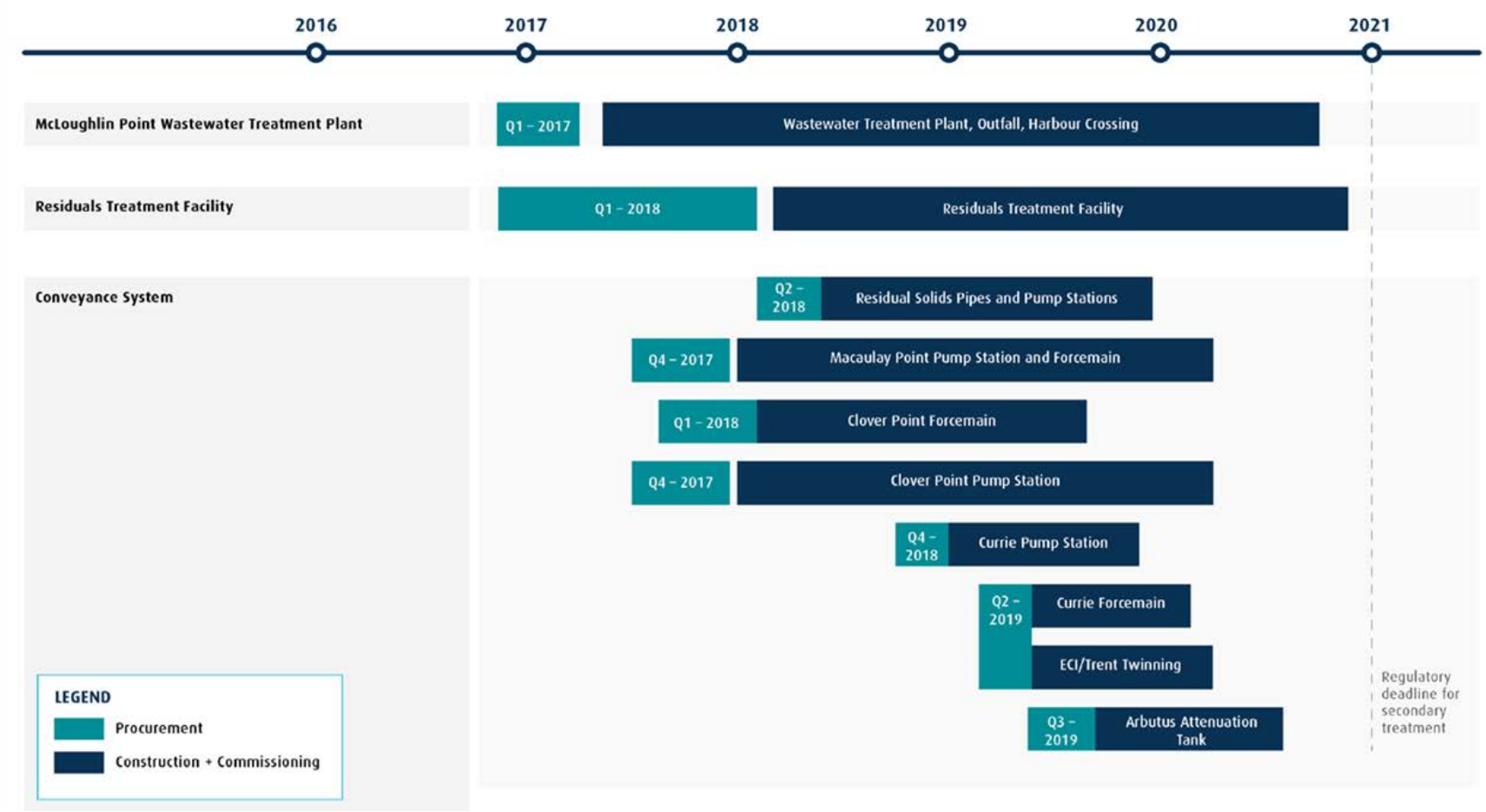
2.6.1 Detailed Schedule Development

Given the early execution stage of the Project a number of Project planning related activities were ongoing over the reporting period. Key amongst these were detailed schedule integration activities including:

- further development of the Work Breakdown Structure ("WBS"), populated with approved budgets, to facilitate earned value management and progressing systems; and
- on-going review of HRP's baseline schedule for alignment and incorporation into the Projects detail schedule and project controls structure.

Cost-loading of the Project schedule to support earned value management is planned to be undertaken next month.

Figure 1-High-Level Project Schedule



2.6.2 30 day and 60 day lookahead

Key activities and milestones for the next 30 days are:

- completion of construction of noise wall at Ogden Point
- installation of casing in preparation for horizontal directional drilling
- review of various HRP environmental and safety plans
- review of HRP permit applications prior to submission to regulators
- ongoing site preparation at Mcloughlin Point site
- geotechnical investigations along Dallas Road
- cost loading of Project Schedule
- meetings with CRD operational staff and BC Ministry of Environment to facilitate Operational Certificate development and MWR (Municipal Wastewater Regulation) registration
- submission by the PMO to the BC Ministry of Forests, Lands, and Natural Resource Operations of archaeology permit to cover entire construction program
- documentation to Infrastructure Canada as per section 19 (Aboriginal Consultations) of the two Infrastructure Canada funding agreements
- finalization of the Incident Communications Plan

Key activities and milestones for the next 60 days are:

- appointment of First Nations liaison positions
- submittal of 30% design by HRP for the WWTP
- closure of the Request for Qualifications for the Macaulay Point Pump Station and Forcemain Design-Build contract
- commencement of RFP process for Clover Forcemain Design
- commencement of RFP process for Residuals Solids Pipes and Pumping Stations Engineer of Record
- commencement of blasting and excavation at McLoughlin Point
- commencement of horizontal directional drilling activities for the Harbour Crossing between Ogden Point and McLoughlin Point

2.7 Cost Management and Forecast

The asset management cost report for the reporting period is shown in Appendix B. The cost report summarizes Project expenditures and commitments by the three Project Components.

The main Project expenditures incurred over the reporting period were associated with: WWTP construction activities; third-party commitments; communications and engagement activities and PMO costs. The Project expenditures for the reporting period were as expected and the forecast to completion remains the Control Budget ($765 million), with no variance. No contingency or program reserve was drawn during the reporting period.

2.7.1 Cost and Finance System Set up

The allocation of the Project's Control Budget, and associated implementation of the Prolog Project cost management software system was ongoing.

The WBS structure and WBS dictionary were approved in the reporting period. The approved WBS was created in Prolog and SAP and the transfer of costs was initiated. The historical WBS was closed for posting and the new WBS codes were distributed for use.

The allocation formulas were defined in Prolog to enable reporting the Project on the three major Project Components. The mapping of grant funding and its allocations in Prolog is under development.

2.7.2 Commitments

No significant financial commitments were made during the reporting period.

2.7.3 Expenses and invoicing

The Project expenditures were within the budget allocations for each of the budget areas, with no variance to the planned budgets during the reporting period.

2.7.4 Contingency

No contingency funds were drawn during the reporting period.

2.8 Key Risks and Issues

The Project Team actively identified and managed Project risks over the reporting period.

Table 5 summarizes the highest-level risks that were actively managed over the reporting period, as well as the mitigation steps identified and/or undertaken over the reporting period.

Table 5- Project Active Risks Summary

Risk No.	Risk	Risk Status	Risk mitigation activities undertaken or planned in the reporting period	Assessed risk level (based on likelihood and potential impact)	Trend in risk level from previous reporting period
2	First Nations engagement	The assessed risk level reflects the PMO's priority of establishing strong and effective relationships with First Nations interfacing with, or interested in, the Project.	First Nations engagement activities remained ongoing over the reporting period (see section 2.3 for further details).	M	No change
3	PMO Start up: development and implementation of systems, plans and processes	The roll-out of the PMO systems and the development of the Project Management Plan and key subsidiary plans was ongoing over the reporting period.	The development of Project management plans and supporting systems implementation remained ongoing as resources were hired. Advisors were also engaged to provide support on an interim basis.	M	No change
4	PMO Start up: Hiring of staff	The hiring of key staff remained a priority with a number of senior staff operating in interim capacities across a number of functional and project management roles.	Hiring of project office staff continued over the period, with the PMO FTEs increasing from 14 to 20.	M	No change
6	Divergent interests between multiple parties and governance bodies whose co-operation is required to successfully deliver the Project	As detailed in section 2.5 a number of local government authorities and management committees met over the period and passed resolutions.	The Project Board considered and responded to resolutions from other governments. The Project Team hosted a technical working group meeting with Saanich.	M	No change

Risk No.	Risk	Risk Status	Risk mitigation activities undertaken or planned in the reporting period	Assessed risk level (based on likelihood and potential impact)	Trend in risk level from previous reporting period
7	Misalignment between Project objectives/scope and stakeholder expectations	The assessed risk level reflects the PMO's priority of establishing strong and effective community stakeholder engagement.	Community engagement activities were on-going over the reporting period.	M	No change
10	Senior government funds issue delayed	The assessed risk level reflects the PMO's priority of ensuring project funding commitments are honoured.	Responsibility for meeting funding commitments have been assigned and are monitored.	M	No change
18	Provincial or Federal government/agency permit requirements not met	Project Component required Provincial or Federal permit conditions are not met by WTP works contractors resulting in delays or work stoppage.	The Project Team will compile and maintain a permit compliance register to monitor and manage Project permit condition compliance by the WTP works contractors.		Added

Risk Level Range	Risk Level Range
L	Low
M	Medium
H	High

2.9 Status (Engineering, Procurement and Construction)

The Project Components are at different stages of engineering, procurement and construction. All components are progressing according to plan.

2.9.1 WWTP

The WWTP is in the construction phase. The construction phase of the WWTP is progressing in line with the schedule, with HRP furthering design and beginning to mobilize materials and equipment (see Figure 4), and preparing construction sites (see Figures 2, 3 & 5). The majority of work on the WWTP Project Component consisted of preparation for the Harbour Crossing at Ogden Point. The following figures show examples of progress made in the reporting period on the WWTP Project Component.

Figure 2- Negative air pressure asbestos enclosure

Figure 3- Temporary Angler's Hut delivered and set up

Figure 4- Mobilization of equipment and drill components

Figure 5- Temporary fencing installed

2.9.2 RTF

The RTF is in the procurement phase and progressed as planned. During the reporting period a proponent kick off meeting was held, the first Addendum was released, the first round of collaborative meetings were held and enquiries were received from Proponents.

2.9.3 Conveyance System

The Conveyance System is in the engineering and procurement phase. During the reporting period the indicative designs were progressed for the RTF pipes and pump stations, and, as noted, the Clover Point Forcemain and the RFQ for the Macaulay Point Pump Station and Forcemain and the RFP for the Clover Point Pump Stations were issued.

Appendix A: June 2, 2017 Letter from Mayor Richard Atwell

District of Saanich – Legislative Division
Bicycle and Pedestrian Mobility Advisory Committee
770 Vernon Ave.
Victoria BC V8X 2W7

t. 250-475-1775
f. 250-475-5440
saanich.ca

Saanich
LEGISLATIVE SERVICES

June 2, 2017

CAWTP
JUN 05 2017
Received

Jane Bird
Chair, Core Area Wastewater
Treatment Project Board
Capital Regional District
510 – 1675 Douglas Street
Victoria BC V8W 2G5

Dear Jane Bird:

SEWAGE CONVEYANCE NEAR INTERURBAN RAIL TRAIL

At the May 18, 2017, Bicycle and Pedestrian Mobility Advisory Committee meeting, committee members discussed potential trail improvements along the Interurban Rail trail from Hartland Avenue to Interurban Road when the CRD installs sewage conveyance pipeline in the area. The following motion was made:

> **"That the Bicycle and Pedestrian Mobility Advisory Committee write to the CRD Wastewater Treatment Project Board to inquire about the proposed sewer pipeline conveyance route as it travels through Saanich, and the proposed consultation timeline for this project."**

Any information that you could provide regarding the proposed timeline, and the details of the sewage pipeline conveyance route would be most appreciated.

Yours truly,

Mayor Richard Atwell, Chair
Bicycle and Pedestrian Mobility Advisory Committee

/td

Wastewater Treatment Project
Treated for a cleaner future

Appendix B: Asset Management Cost Report

ASSET MANAGEMENT COST REPORT
AS AT MAY 31, 2017

($ millions)

Project Component	Control Budget	COST EXPENDED					COMMITMENTS			FORECAST		VARIANCE	
		Expended to April 30, 2017	Expended over reporting period (May 2017)	Expended to May 31, 2017	Expended to May 31, 2017 as a % of Control Budget	Remaining (Unexpended) Budget at May 31, 2017	Total Commitment at May 31, 2017	Unexpended Commitment at May 31, 2017	Uncommitted Budget at May 31, 2017	Forecast to complete	Forecast at completion	Variance at Completion $	Variance at Completion as a % of Control Budget
McLoughlin Point Wastewater Treatment Plant ^	378	21	5	26	7%	352	315	289	64	352	378	-	0%
Residuals Treatment Facility ^	195	9	1	10	5%	185	12	2	184	185	195	-	0%
Conveyance System ^	192	23	1	24	13%	168	26	2	166	168	192	-	0%
										-			
Total Costs	765	53	7	60	8%	705	352	292	413	705	765	-	0%

A - Including PMO and Common Costs
* Values presented in $millions, results in minor rounding differences
** Prolog/SAP integration is in progress. Reporting is based on available information.

ITEM 7.1

District of Saanich – Legislative Division
Bicycle and Pedestrian Mobility Advisory Committee
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Saanich
LEGISLATIVE SERVICES

June 2, 2017

CAWTP
JUN 05 2017
Received

Jane Bird
Chair, Core Area Wastewater
Treatment Project Board
Capital Regional District
510 – 1675 Douglas Street
Victoria BC V8W 2G5

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> **"That the Bicycle and Pedestrian Mobility Advisory Committee write to the CRD Wastewater Treatment Project Board to inquire about the proposed sewer pipeline conveyance route as it travels through Saanich, and the proposed consultation timeline for this project."**

Any information that you could provide regarding the proposed timeline, and the details of the sewage pipeline conveyance route would be most appreciated.

Yours truly,

Mayor Richard Atwell, Chair
Bicycle and Pedestrian Mobility Advisory Committee

/td

Wastewater Treatment Project T: 250.360.3002
510-1675 Douglas Street F: 250.360.3071
Victoria, BC, V8W 2G5 www.wastewaterproject.ca

ITEM 8.1

Wastewater Treatment Project
Treated for a cleaner future

June 2, 2017

Delivered via email

James Bay Neighbourhood Association

Attn: Marg Gardiner, President

Dear Marg:

RE: Summary Report of Documents and Reports Related to Topics of Interest

Further to my letter of May 23, 2017, please find enclosed a copy of the summary report that I referenced. As mentioned in my May 23, 2017 letter, there have been several references - in various emails and during the May 1, 2017 meeting with Mayor Helps - to reports that appear to be reports prepared in earlier phases of planning for wastewater treatment in the region. As you know, the planning for this project extended over decades, and there are many, many reports.

We note that these reports were not commissioned by the Project Board. However, in the interests of providing context and clarity, we have summarized those reports that we have identified that pertain to topics of particular interest: odour, noise, seabed pipelines and bluffs and shoreline preservation, as well as geotechnical reports. The summary notes the date and title of the report, the purpose of the report and the applicability of the report to the CRD Board-approved Project currently under construction. The summary also includes a link to each report, stored on the Project website.

As noted, the enclosed summary is *not* a comprehensive list of reports completed over decades of wastewater treatment planning for the Core Area, it is a compilation of those reports we have identified that relate to key topics of interest.

We hope the enclosed summary, and the links, are helpful.

Yours truly,

Jane Bird
Chair, Core Area Wastewater Treatment Project Board
CRD Wastewater Treatment Project

Enclosure: *Summary of Documents Related to Topics of Interest: Odour, Seabed Pipeline, Bluffs and Shoreline, Geotechnical and Noise Topics*

cc: Mayor Lisa Helps (with enclosure)

WWTP-1302841000-106

JBNA

James Bay Neighbourhood Association

jbna@vcn.bc.ca www.jbna.org
Victoria, B.C., Canada

June 5th, 2017

Jane Bird,
Chair, Core Area Wastewater Treatment Project Board,
CRD, Victoria

Dear Jane,

Thank you for your letter and attachments of May 23, 2017 and the June 2nd Summary of Documents. We appreciate the detail provided in this comprehensive response.

You will recall that a few of the requests, as identified on the CAWTPB May 19 Inventory of Requests, many of which were identified at the May 1st meeting, were either not addressed to the CRD Board and/or not from JBNA.

Regarding the May 23, 2017, draft document entitled **"Wastewater Treatment Project JBNA Committee",** we offer the following comments:

Document Title:
Change title to Wastewater Treatment Project: JBNA & CRD Project Team Joint Committee

Item 2: Joint Committee Overview
Para 1: In addition to providing a forum for the discussions of issues relating to mitigation of construction impacts, please add a statement to the effect that the committee provides a forum for discussing the ways to meet the CRD commitment to leave a neighbourhood (streets and public space) better than when a CRD project begins in a neighbourhood.
Para 2: point 2 – suggest adding "*Mitigation, including performance targets, of construction related impacts; and"*
Para 2: point 4 – please add *"Plan community consultation meetings".*
Para 3: In addition to ensuring JBNA participants are aware of the objectives, please add a statement to the effect that *"those participating on the CRD Project Team are aware of community expectations regarding mitigation of impacts and community enhancements".*

Item 3.2 Conduct of Meeting
Title: change section title to "*Conduct of JBNA & CRD Project Team Joint Committee Meetings"*
Schedule: change to *"Meetings will be scheduled as needed around key construction milestones and mid-month, in advance of community consultation meetings at the following month's JBNA General Meeting".*

Item 3.3 Appointment Term: I have rewritten the sentence and identified in bold what appears to be a typographical/word error. *"The term of appointment is **until** the completion of the project."*

. . . 2

Item 4.5 Role of the Chairs:
c) Suggest *"Facilitate discussion to ensure project issues are raised and discussed with the objective of seeking resolution".*

On December 14, you had suggested attending each JBNA meeting while I suggested once a quarter or more if needed. At the January 11 JBNA General Meeting, you suggested participating at least at quarterly JBNA General Meetings as milestones developed.

As mentioned several weeks ago, July 12th might be most appropriate JBNA General Meeting for Dave and his team to present an update and receive feedback from residents as the drilling will have commenced.

Regarding the sections of your May 23rd correspondence regarding seabed conveyance, geotechnical monitoring and protection of the bluffs, we will review these comments along with the May 30th, 2017, Stantec document referenced in the **"Summary of Documents"** forwarded late on June 2nd. We expect to respond to you next week on these topics. On a quick look at the Stantec document, it appears confirmed that the Douglas/Dallas area and the Dallas seawall remain the areas which would require the most attention. I noted that a few documents are not directly linked (those stored in City Archives). Will these documents be retrieved and loaded onto the Wastewater project web-site?

In the past week, the trucks have been heading to Camel Point with materials and equipment. The trucks have been much larger than I personally had anticipated, much larger than most military trucks carrying equipment to Coast Guard and DND Malahat properties off Huron. The trucks I have seen have been quite early in the morning, thereby not interfering with most tourism activity and, aside from noise, not interfering with local traffic.

As you know, the James Bay neighbourhood has expressed concerns about the potential for adverse impacts as a result of this project. We believe that providing accurate information in a timely way will serve to alleviate some of the anxiety we have heard about the project. We look forward to moving forward with consultation, exploration of Dallas bluff conveyance discussions, mitigation of construction impacts and the improvements to our streetscape as the project concludes.

Thank you again for your response.

Yours truly

Marg Gardiner
President, JBNA

Cc: JBNA Board

cawtpb

From: John Gunton <geogunton@shaw.ca>
Sent: Friday, June 09, 2017 1:46 PM
To: Dave Clancy
Cc: councillors@victoria.ca; carole.james.mla@leg.bc.ca; fwork@victoria.ca; cawtpb; Wastewater; 'mailto:colin.plant@saanich.ca'; Denise Blackwell; Susan Brice; Judy Brownoff; CRD Chair; 'mayor'; Jane Bird; Nils Jensen; Colin Plant; David Screech; 'Geoff Young (Councillor'; 'lseatonis'; 'Lisa Helps (Mayor'; bisitt@victoria.ca; 'Marg Gardiner, JBNA'; Tom Gallagher; Richard Atwell
Subject: Seabed Pipeline Proposal_Further Considerations
Attachments: Letter to D Clancy June 9 2017.pdf

Dear Mr. Clancy,
Please find attached a letter outlining further important points in respect of the Seabed Pipeline Proposal originally discussed with yourself earlier this year. I would very much appreciate your further consideration of this matter as the issue is very much in the public eye and I am sending this as a concerned resident of Victoria. It confounds me that your Project Team continues to dismiss the merits of the subject proposal when your own reports, which have recently been made available, clearly describe the substantial risks of the current plan. Further, only a few years ago when a possible design was to convey wastewater across Royal Roads to a facility south of Colwood, that the recommended form of conveyance was by way of a seabed pipeline. In your dismissal of my proposal, you never disclosed that this form of conveyance had been considered by the project board, albeit your predecessors. I believe that this point, along with all the others that I have made, are worthy of further discussion and consideration.
Kind regards,
John

John E. Gunton
geogunton@shaw.ca
250-388-7564 (res)
250-514-4026 (cell)

CRD Core Area Wastewater Treatment Project (By Email)
510 – 1675 Douglas Street,
Victoria, BC. V8W 2G5

June 9, 2017

Dear Mr. Clancy,

Re: Seabed Pipeline Route Your file:0220-20 General Correspondence

Your letter to me dated March 3, 2017 described the CRD decision not to consider the Subsea Pipeline Proposal I made to the Project Team on January 26, 2017. The reasons for your rejection of this proposal were further elaborated on in an accompanying letter from CRD's engineering advisors, Stantec, dated March 13, 2017. I have rebutted the points raised on 2 occasions (March 8th CALWMC meeting and in a note to file dated April 25, 2017. The latter is appended for your reference).

The CRD provided "Summary of Documents Related to Topics of Interest" dated May 30, 2017, updated June 2, 2017, which referenced documents relevant to the Seabed Pipeline Proposal. Of note these included:

Stantec, May 30, 2017, ***Dallas Road Cliffs, Historic Foreshore Erosion Assessment***

Stantec, April 12, 2013, ***Geotechnical Data Report, Core Area Wastewater Treatment Program***

In addition, I have also identified 2 other relevant reports not included in the summary:

Kerr Wood Leidal, October 12, 2011,
Dallas Bluffs Conservation Plan CoV: KWL Project No. 809.046

Stantec, November 15, 2010,
Sub-Marine Pipeline Crossings CRD Wastewater Treatment Program: Alignment Evaluation

The purpose of this letter is to point out that all these reports, most of which were commissioned by the CRD, are at odds with the CRD decision to reject the Seabed Pipeline Proposal as described in your letter of March 3, 2017.

1. The recently completed Stantec report of May 30th is excellent in its detail and clearly shows the huge challenge faced by the undertaking to trench the pipeline along Dallas Road. It points out the need for the substantial collection of further geotechnical data including drilling and sampling of the unconsolidated soils and rubble fill with which I agree despite the not inconsiderable disruption this will impose on residents of James Bay. The recommendation to install ground motion detectors is well taken although this instrumentation should have been in place years prior to provide a baseline of data. The report does not recognize the need for geophysical surveys to aid in identifying the distribution of different material types. This, in my view, is short sighted as mapping of the overburden characteristics will be essential. The report clearly states that the proposed alignment is of concern due to the uncertainty of the competency of the materials into which the trench will be excavated but few alternatives are available. A possible alternative is to switch the alignment to run along Niagara St but this is only a partial solution since the Cook St cliffs would still pose a problem. In the report there is only one brief reference to earthquake risks with no suggestion of mitigation. In historic times there has not been a magnitude 6+ earthquake and so the effects of catastrophic slumping cannot be seen in the time

period covered by the historic review. A magnitude 6+ earthquake is highly probable in the lifetime of a pipeline installed today. The October 12, 2011 Dallas Bluffs Conservation Plan report corroborates the findings of the May 30 Stantec report and also refers to the work of Gilles, 1997 and Thurber, 1977. **All of these issues would be eliminated if the Seabed Pipeline Proposal were to be implemented.**

2. The April 12, 2013 Stantec report details the geotechnical aspects of the Harbour Crossing undersea drilling. I was previously unable to locate this report and did not know of it's existence at the time I speculated on the technical risks of tackling this project. The report is excellent in the detail it provides and specifically the description and analysis of the cores recovered from the drilling of the proposed crossing and more specifically the Ogden site is essential in identifying the risks that will be faced by the contractor. I am aware that additional data has been collected subsequent to the writing of the report however the data described in the April 12 report clearly shows the high risks associated with the HDD project by virtue of the nature of the materials which will be drilled and the severe fracturing of these materials. My assessment of the high risk of technical failure is corroborated by this report and it is no wonder that the estimated cost is in excess of $35 million allowing the contractor some cushion to absorb the financial risk. **A Seabed Pipeline alternative would have eliminated the need for this costly and risky project.**
3. It is ironic that Stantec would recommend a subsea pipeline project in their 2010 report and yet without reference to this report, reject the Seabed Pipeline made in respect of the Clover Point - McLoughlin Point proposal. While the distance of the Royal Roads crossing is reasonably comparable, and the size of the pipeline is comparable, the Royal Roads alignment necessitated the dredging and armouring of the entire route due to the shallow depth (15 metres) of the crossing. **Despite this, Stantec recommended this project over a tunneling option and yet failed to see the clear merits of the Subsea Pipeline Proposal from Clover Point to McLoughlin Point. The reasons given are contradictory.**

Based on the points briefly described above it is clear to me that the CRD has been too hasty in rejecting the Subsea Pipeline Proposal which would have the effect of resolving all of the problems which the CRD will face as it doggedly pursues the current plan. I am firmly convinced that with a proper, thorough independent study of the proposal that it would be determined to have merit and clear advantages in cost, safety and environmental considerations. It continues to be a disappointment that the proposal received only cursory consideration by Stantec and that the CRD Project Team accepted their assessment without checking their assumptions particularly in light of the rebuttal of their points raised by myself. Again, for your reference, these points are appended below. The need for a third party engineering technical opinion is clear and the public need to be advised.

Yours truly,
John Gunton

cc: CALWMC & Ms. Jane Bird, Chair CRD Wastewater Project Board
City of Victoria Mayor and Council
Ms. Marg Gardiner, JBNA
Fraser Work, CoV
Carole James, MLA

Seabed Pipeline Route Denied by Project Board

April 25, 2017

The Core Area Liquid Waste Management Committee (CALWMC) appears to have accepted the Stantec 6 page letter (March 13, 2017) citing reasons why CALWMC is not prepared to consider the seabed pipeline proposal. The 6 pages enumerate 6 points:

1. **Permitting:** While it is acknowledged permitting will be necessary (just as it will be for a land based route along Dallas Road: Migratory Bird Sanctuary, endangered species etc.) Stantec used as a reason not to consider the seabed proposal the disruption that would be caused to eelgrass beds. There are no known eelgrass beds along the proposed seabed route. In addition, Stantec's concern over the presumed lengthy permitting process is perhaps based on the amount of time taken to obtain a permit for the McLoughlin Outfall. The McLoughlin Outfall is a discharge facility and because it discharges in to the environment, it has a much more significant impact on the environment than a closed forcemain. Stantec may be unduly pessimistic, alluding to a potentially lengthy bureaucratic permitting process (EIA, DFO) without knowing what a timeline would be. The Nanaimo Outfall which was successfully completed in 2016 took less than 6 months to fully permit. The key shoreline crossings at Clover Pt and McLoughlin Pt where delays might be anticipated, could be considerably shortened because of the existing approvals.

2. **Protection from Wave-Action (and Current**s): A simple analogy with the installation of other seabed pipelines (eg. the Nanaimo Outfall) shows that proper ballasting and securing of a seabed pipeline is common practice and can be completed cost effectively and efficiently. Stantec has failed to present solid engineering reasons for their concerns. Wave and current effects can be quickly simulated and used in engineering design. There is nothing unique or alarming about conditions along the proposed route. We have referenced all available data sources and the wave conditions cited in the Stantec rebuttal have never been recorded in the subject area whereas 90 m wave lengths (as cited) are not uncommon at the western entrance to the Juan de Fuca Straits from the effect of Pacific Ocean swells 100 kms to the west. The Stantec reference does not address local conditions. Wave and current data modellers through the Department of Engineering at the University of Victoria (West Coast Wave Initiative – WCWI) and Dynamic Systems Analysis (DSA) are available at short notice to engage and collaborate.

3. **Ship anchors:** The proposed route is north and well outside shipping lanes. According to a marine construction contractor consulted to discuss potential problems which may arise from the emergency deployment of ships anchors, rip rapping, trenching and berm construction could fully protect a seabed pipeline over the short distance crossing the entrance to the outer harbour. While this might add marginally to the cost of a seabed pipeline, the additional engineering costs are probably a fraction of what will be required to successfully construct a land-based route on geotechnically vulnerable parts of Dallas Road.

4. **Location of a fault line:** The Stantec reference to the Geological Survey of Canada document authored by Dr. Barrie *et al* is misinterpreted and is unnecessarily alarmist in terms of inferring a 95 to 150 cm vertical displacement along a fault 50 kms to the east of Victoria. From my discussions with Dr. Barrie, an inferred fault in the Victoria area shown in the publication, likely occurs to the south of the proposed subsea pipeline route. The exact location of this fault, if it exists, will be the subject of a 3-line seismic survey planned for later this year. It is unfortunate that Stantec did not discuss the seabed proposal with Dr. Barrie at the Geological Survey of Canada, whereupon Stantec would have found support for the seabed proposal in preference to the Dallas Road trenching on the basis of anticipated seismicity. The concern is less to do with displacements along a fault as opposed to ground motions propagated from an earthquake where the focus of the earthquake will likely be in the Victoria area. Literature suggests that constrained trenched land-based pipelines are more susceptible to rupture from surface ground waves

than loosely constrained seabed pipelines: Kershenbaum, *et al*, 1998 "Subsea Pipeline Behaviour Under Seismic Impact". Proc. 8th International Offshore and Polar Engineering Conference.

5. **Repair and maintenance:** Discussions held with an experienced marine construction and barge equipment contractor have indicated that a proposed seabed pipeline in a water depth of approximately 35 metres would not lead to operational access problems. Certainly the Stantec reference to the Comox Valley Regional District pipeline on Balmoral Beach is completely inappropriate. The Comox pipeline failure and subsequent issues associated with its repair are entirely related to the pipeline being located along the foreshore. This has no bearing on the proposed seabed pipeline located in a water depth of 35 metres. A rupture in any forcemain would likely be a serious event: a rupture in a 48" forcemain located in a trench along Dallas Road would have equally if not more dire consequences than a release from a seabed pipeline.

6. **Cost implications:** *"Based on our high-level estimate of the capital costs we are confident that Mr. Gunton's sea bed pipeline proposal would be more expensive to construct and maintain than the land-based option approved by the CRD Board as part of the Core Area Wastewater Treatment Project. - Stantec"*. This quote is troubling in that we have repeatedly requested capital cost details from CRD. Stantec's statement as quoted implies that they have cost data on which to make the comparison and yet they have not released the data. In order to obtain an independent opinion, discussions were recently held with a major local marine construction and barging company experienced in laying pipelines on the seabed. The contracting company considers itself to be qualified to construct a seabed forcemain based on successfully completing a seabed pipeline project on time and on budget in the Nanaimo area. From these discussions, it is estimated that the project could be completed within 6 months and for approximately double the cost of the Nanaimo Outfall. Unlike the Nanaimo Outfall, a CRD seabed forcemain would not require diffusers nor would it require the use of construction techniques used in deep water because of the shallower water depths planned for the route. Other construction concerns were also discussed but none would preclude a seabed route. A rough estimate of double the Nanaimo costs would be a first order estimate and therefore a cost of $30+/- million for the entire seabed route is a number which could be used for comparison purposes with a land-based route. CRD has not published a cost estimate for the Dallas trenching but an estimate of $36+/- million for the Harbour Drilling-Tunnelling has been published. This would suggest that the Stantec higher capital cost rationale for not pursuing the seabed route is not valid and in fact, there is a strong likelihood that a seabed pipeline would result in savings of tens of millions of dollars.

The CALWMC appears prepared to accept the six Stantec points without further discussion and considers the matter closed. All attempts to convene a forum of independent technical subject experts to review conveyance alternatives and specifically the six points of concern discussed above have been rejected by the CRD and the City of Victoria. There are very real risks associated with trenching along the Dallas Bluffs, along the sea wall, drilling and tunnelling a challenging harbour crossing, as well as the risks of future exposure and rupture of the pipeline along the land route through slope failure and the significant disruption associated with two years of land-based construction. Additionally, potential capital cost savings have not been explored.

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ITEM 8.1

Wastewater Treatment Project
Treated for a cleaner future

June 14, 2017

Via Email: jbna@vcn.bc.ca

James Bay Neighbourhood Association
Attention: Marg Gardiner, President, JBNA

Dear Marg:

RE: RESPONSE TO JBNA LETTER DATED JUNE 5, 2017

Thank you for your letter of June 5, 2017. We have reviewed your suggested changes to the Terms of Reference for the Wastewater Treatment Project JBNA and CRD Project Team Joint Committee, and the attached revised TOR incorporates the changes on which we have agreement. The following are your suggestions that were partially incorporated or not incorporated, and our reasons:

Para 1:You asked us to add a statement to the effect that the Committee provides a forum for discussing ways to meet the CRD commitment to leave a neighbourhood (streets and public space) better than when a project begins in a neighbourhood. We are happy to include a statement which says we will leave the neighbourhood (streets and public spaces) in as good a condition if not better than when the project began.

Para 2: point 2 – You suggest adding "Mitigation, including performance targets, of construction related impacts". As we will not be discussing "performance targets of construction related impacts" with the committee, we have not included this statement.

Para 2: point 4 – You have asked us to add "Plan community consultation meetings". The Project team will be planning the community information meetings as per our Communications and Engagement Plan. We will be bringing planned topics to the Committee for feedback and discussion, but as we will not be asking the Committee to assist with planning the meetings, we have not added this statement.

The following suggestion was incorporated in part:

Para 3: You asked us to add "those participating on the CRD Project Team are aware of community expectations regarding mitigation of impacts and community enhancements." We have added a statement to reflect that the Project team is aware of community expectations regarding mitigation of community impacts. As community enhancements are for discussion with the City of Victoria, we have not included this part of the statement.

Meeting Schedule – You asked for "Meetings will be scheduled as needed around key construction milestones and mid-month, in advance of community consultation meetings at the

following month's JBNA meeting." We found this confusing, so have suggested the following version:

Meetings will be scheduled around key construction milestones and held at least two weeks in advance of community information meetings (with consideration of the timing of monthly JBNA meetings).

Regarding your July 12 JBNA meeting, thank you for your invitation. We will not be attending this meeting because, as discussed in our May meeting with Mayor Helps, we will be seeking space on your agenda, well in advance, when we have significant new information to share, at this point we think that will be the fall of this year. As you are aware, it is frustrating for both your membership and our team to have us on the agenda when there is no new information to provide. In the meantime, we look forward to meeting with the Wastewater Treatment Project JBNA and CRD Project Team Joint Committee. Please provide some dates in the coming month that would work for your committee members.

Finally, you asked about the archived documents that are included in the "Summary of Documents". We have provided all documents that are available to us. There are two documents which are available in the City of Victoria archive:

- *Thurber Consultants Ltd, 1977 -* ***Dallas Road Shoreline Erosion***
- *R.D. Gille, 1997.* ***Waterfront Erosion Benchmark Study***

We are unable to access these documents outside of being physically at the archive. We have provided links to the archive information so that anybody who would like to review those documents can do so.

Sincerely,

Jane Bird
Chair, Core Area Wastewater Treatment Project Board

Attachment: JBNA Committee Terms of Reference

Wastewater Treatment Project

JBNA and CRD Project Team Joint Committee

1. Wastewater Treatment Project Overview

In September 2016, the Capital Regional District (CRD) Board approved the Wastewater Treatment Project. The Wastewater Treatment Project meets all of the goals that were established for the Project Board by the CRD:

- Meet federal requirements for secondary treatment by 2020
- Minimize costs to residents
- Optimize opportunities for resource recovery
- Reduce greenhouse gas emissions
- Add value to the surrounding community and enhance livability of neighbourhoods

The Wastewater Treatment Project Board has appointed a Project Team to manage the execution of the Project. The Project will provide secondary and tertiary treatment for wastewater from the core area municipalities of Victoria, Esquimalt, Saanich, Oak Bay, View Royal, Langford and Colwood, and the Esquimalt and Songhees Nations.

The Wastewater Treatment Project will be complete by the end of 2020, and consists of three main elements:

1. McLoughlin Point Wastewater Treatment Plant

Located at McLoughlin Point in Esquimalt, the treatment plant will provide tertiary treatment to the core area's wastewater.

2. Residuals Treatment Facility

Residual solids from the wastewater treatment plant will be piped to Hartland Landfill, where they will be turned into "Class A" biosolids. These biosolids are a high quality by-product treated such that it is safe for further use.

3. Conveyance System

The conveyance system refers to the "pumps and pipes" of the Wastewater Treatment Project. This system will carry wastewater from across the core area to the treatment plant. It will also send residual solids from the wastewater treatment plan to the residuals treatment facility.

2. James Bay Neighbourhood Association Committee Overview

The Wastewater Treatment Project will establish and maintain a committee to provide a forum for the discussion of issues relating to mitigation of construction impacts of the Wastewater Treatment Project on the community. The committee will include representatives from the James Bay Neighbourhood Association membership and representatives from the Project Team as required. The Project team intends to leave the neighbourhood (streets and public spaces) in as good a condition if not better than when the project began.

The Project team will ensure timely contact with the James Bay Neighbourhood Association in advance of key construction milestones and will provide a forum for discussion related to:

- Effective tools for communicating with James Bay residents;
- Mitigation of construction related impacts; and
- Topics being presented to the broader community in community information meetings

This Terms of Reference ensures that those participating in the James Bay Neighbourhood Association Committee are aware of the objectives, the advisory nature of the Committee to the Wastewater Treatment Project, the roles of participants, and the time commitment for participation. It also ensures that those participating on the CRD project team are aware of community expectations regarding mitigation of impacts.

3. James Bay Neighbourhood Association Committee Terms of Reference

3.1 Objectives

1. To bring together the community and representatives from the Wastewater Treatment Project team ahead of broader community information meetings.

2. To facilitate two-way information exchange on matters related to communications and construction impacts of the Wastewater Treatment Project.

3.2 Conduct of JBNA and CRD Project Team Joint Committee Meetings

Venue: Meetings will be held [where]

Schedule:
Meetings will be scheduled around key construction milestones and held at least two weeks in advance of community information meetings (with consideration of the timing of monthly JBNA meetings).

Chair: The meeting will be co-chaired by the President of the JBNA and the Project Communications Lead.

Agendas: Agendas and meeting materials will be circulated one week in advance.

Reporting: Project team members will report back to the Project Director. Community representatives will report back to the JBNA.

3.3 Appointment Term

The term of appointment is for one year and is renewable until the completion of the Project.

3.4 Summary of Responsibilities

Wastewater Treatment Project and HRP representatives agree to:

a) Provide project updates and construction information
b) Take due note and consideration of input from committee members and make recommendations to relevant project team members
c) Give committee members feedback on how their recommendations have been considered
d) Respond within agreed timeframes to requests for information

JBNA representatives agree to:

a) Attend meetings and actively participate in discussions
b) Report the views of their membership
c) Focus on issues associated with communications and construction impacts associated with the Wastewater Treatment Project.

4.5. Role of the Chairs:

a) Oversee logistics, meeting notes, and reporting
b) Facilitate discussion to achieve objectives
c) Facilitate discussion to ensure project issues are raised and discussed with the objective of seeking resolution

cawtpb

From: Wastewater
Sent: Tuesday, June 20, 2017 1:37 PM
To: John Gunton
Cc: councillors@victoria.ca; carole.james.mla@leg.bc.ca; fwork@victoria.ca; cawtpb; 'mailto:colin.plant@saanich.ca'; Denise Blackwell; Susan Brice; Judy Brownoff; CRD Chair; 'mayor'; Jane Bird; Nils Jensen; Colin Plant; David Screech; 'Geoff Young (Councillor'; 'lseatonis'; 'Lisa Helps (Mayor'; bisitt@victoria.ca; 'Marg Gardiner, JBNA'; Tom Gallagher; Richard Atwell
Subject: RE: Seabed Pipeline Proposal_Further Considerations

Mr. Gunton,

Thank you for your emails. The project team has reviewed your suggestion regarding a seabed pipe route to transport the wastewater from the Clover Point Pump Station. That review has been completed. Stantec Consulting engaged experts with background in environmental permitting, geological terrain analysis, marine pipeline engineering, geotechnical engineering and civil engineering to complete this review. The Project Team shared the answer with you and the public. It was found that, for a number of reasons, the approved plan, which includes a pipe running along Dallas Road, remains a better option.

The proposed alignment of the Clover Forcemain was developed in collaboration with City of Victoria planning staff and considered the bluffs, location of mature trees, sensitive vegetation, potential erosion, and traffic impacts.

The Wastewater Treatment Project has engaged the appropriate technical expertise to gather and analyze the geotechnical information required to inform the indicative design and alignment of the pipe. We appreciate the comments included in your email dated 13/06/2017 and have forwarded them to our geotechnical consultant for their review and incorporation into the program where applicable. Reports detailing the results of the geotechnical investigations and the indicative alignment will be complete in the fall of 2017. The Project Team will report on these to the public at one of its regular community information meetings, to the James Bay Neighbourhood Association and to Victoria City Council. Results will also be posted on the Project website.

Regards

Dave Clancy

From: John Gunton [mailto:geogunton@shaw.ca]
Sent: Tuesday, June 13, 2017 2:12 PM
To: Dave Clancy <dclancy@crd.bc.ca>
Cc: councillors@victoria.ca; carole.james.mla@leg.bc.ca; fwork@victoria.ca; cawtpb <cawtpb@crd.bc.ca>; Wastewater <Wastewater@crd.bc.ca>; 'mailto:colin.plant@saanich.ca'; Denise Blackwell <dblackwell@crd.bc.ca>; Susan Brice <sbrice@crd.bc.ca>; Judy Brownoff <jbrownoff@crd.bc.ca>; CRD Chair <crdchair@crd.bc.ca>; 'mayor' <mayor@colwood.ca>; Jane Bird <jane@janebird.ca>; Nils Jensen <njensen@crd.bc.ca>; Colin Plant <cplant@crd.bc.ca>; David Screech <dscreech@crd.bc.ca>; 'Geoff Young (Councillor' <gyoung@victoria.ca>; 'lseatonis' <lseatonis@gmail.com>; 'Lisa Helps (Mayor' <mayor@victoria.ca>; bisitt@victoria.ca; 'Marg Gardiner, JBNA' <marg.jbna@shaw.ca>; Tom Gallagher <primeogl@gmail.com>; Richard Atwell <mr.ratwell@gmail.com>
Subject: RE: Seabed Pipeline Proposal_Further Considerations

Dear Mr. Clancy,

I regret that I have had no response to the letter I sent to you on June 9th. Subsequent to sending this letter, I note from the "Wastewater Treatment Project Construction Notice" email received today, the details of the Clover Forcemain: Geotechnical Work. The Notice advises of the plan to drill 22 boreholes, the collection of samples and the installation of "monitoring instruments".

I wish to re-emphasize that a technical team is available to consult and engage with your engineers preparing the forcemain design. This technical team has detailed knowledge of the geology, seismicity and other key issues which should be considered in the forcemain design. Team members are the authors of relevant published articles on the Dallas Bluffs and the related area and our knowledge I'm sure you will find valuable to the design being prepared by Stantec.

In the Notice, distributed today we note there is no mention of several key items which we feel are essential in design:

1. No petrophyiscal logging of the drillholes to assist in quantifying rock/soil parameters and their mapped distribution.
2. No reference to geophysical surveys such as lidar, seismic or resistivity which would be essential to the mapping of the drillhole observations.
3. No proposal to tie to existing stratigraphic framework available in published maps.

I would also suggest in the strongest possible terms that while the collection and analysis of these data is critical in designing the forcemain, every consideration must be given to the mitigation of the effects of a seismic event. Failure to do so could be catastrophic. With this in mind, I draw your attention to the relatively recent paper by Bathurst and Zanarni, (2013): *Earthquake Load Attenuation Using EPS Geofoam Buffers in Rigid Wall Applications,* Indian Geotech J, October–December 2013) 43(4):283–291. The use of geofoam buffers along the entire trenched route of the forcemain is, in my opinion, very worthwhile considering. I have attached a copy of this paper for your review.

Of course the anticipated high cost of any design of a trenched forcemain along Dallas Road should be measured against the cost and benefits of the Seabed Proposal and it is unfortunate that the Project Team is not willing to further evaluate this proposal as we have requested on numerous occasions.

Regards

John

John E. Gunton
geogunton@shaw.ca
250-388-7564 (res)
250-514-4026 (cell)

From: John Gunton [mailto:geogunton@shaw.ca]
Sent: 09 June 2017 13:46
To: 'dclancy@crd.bc.ca'
Cc: 'councillors@victoria.ca'; 'carole.james.mla@leg.bc.ca'; 'fwork@victoria.ca'; 'cawtpb@crd.bc.ca'; 'Wastewater@crd.bc.ca'; 'mailto:colin.plant@saanich.ca'; 'dblackwell'; 'sbrice'; 'jbrownoff'; 'crdchair'; 'mayor'; Jane Bird (jane@janebird.ca); 'njensen'; 'cplant'; 'dscreech'; 'Geoff Young (Councillor'; 'lseatonis'; 'Lisa Helps (Mayor'; 'bisitt@victoria.ca'; 'Marg Gardiner, JBNA'; Tom Gallagher; Richard Atwell
Subject: Seabed Pipeline Proposal_Further Considerations

Dear Mr. Clancy,

Please find attached a letter outlining further important points in respect of the Seabed Pipeline Proposal originally discussed with yourself earlier this year. I would very much appreciate your further consideration of this matter as the issue is very much in the public eye and I am sending this as a concerned resident of Victoria. It confounds me that your Project Team continues to dismiss the merits of the subject proposal when your own reports, which have recently been made available, clearly describe the substantial risks of the current plan. Further, only a few years ago when a possible design was to convey wastewater across Royal Roads to a facility south of Colwood, that the recommended form of conveyance was by way of a seabed pipeline. In your dismissal of my proposal, you never disclosed that this form of conveyance had been considered by the project board, albeit your predecessors. I believe that this point, along with all the others that I have made, are worthy of further discussion and consideration.

Kind regards,

John

John E. Gunton
geogunton@shaw.ca
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Indian Geotech J (October–December 2013) 43(4):283–291
DOI 10.1007/s40098-013-0047-5

STATE OF THE ART / PRACTICE PAPER

Earthquake Load Attenuation Using EPS Geofoam Buffers in Rigid Wall Applications

R. J. Bathurst · S. Zarnani

Received: 22 January 2013 / Accepted: 19 February 2013 / Published online: 3 March 2013

Abstract The paper is a synthesis of previously published work by the authors that is focused on the use of expanded polystyrene (EPS) geofoam buffers for seismic load attenuation against rigid basement and soil retaining walls. The paper begins with a brief description of the first documented field application followed by a description of physical 1 m-high reduced-scale shaking table tests that provided the first "proof of concept". Next, details of the development and verification of a displacement-based model and a FLAC numerical model are described and simulation results that were verified against the physical shaking table tests presented. The numerical results include simulations using simple linear elastic constitutive models for the EPS buffers and granular soil backfill and more complex non-linear hysteretic models. Finally, the verified FLAC model was used to develop a series of preliminary design charts for the selection of a suitable seismic buffer based on characteristics of the design earthquake accelerogram.

Keywords Seismic buffer · Retaining walls · Geofoam · EPS

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Introduction

Recent updates to USA and Canadian design codes for civil engineering structures include increases in the earthquake return period for seismic design (e.g. [1], [2]). This has led to larger earthquake design loads for earth structures including rigid basement and conventional soil retaining walls. New strategies to mitigate larger dynamic loads on these types of structures due to earthquake are therefore of interest to both structural and geotechnical engineers.

This paper is focused on the use of seismic buffers constructed from expanded polystyrene (EPS) to reduce earthquake-induced dynamic loads on rigid walls. Interest in this technique by the first author was prompted by a case study reported by Inglis et al. [3]. They proposed placing vertical EPS layers against a 10 m-high tier of three rigid basement walls below a high-rise tower in Vancouver, Canada to reduce earthquake loads (Fig. 1). They used a numerical model to design the system. The model predicted that a 1 m-thick layer of EPS placed between each wall and granular backfill could reduce lateral loads during an earthquake event by 50 % compared to the unprotected wall option.

The concept of a compressible vertical inclusion to reduce *static* earth pressures against rigid earth retaining wall structures is not new. Karpurapu and Bathurst [4] used a finite element numerical model to show that static horizontal stresses could be reduced to "quasi-active" values behind a rigid wall structure and thus reduce the structural requirements of the rigid wall. The numerical model was then used to generate design charts for selection of a minimum thickness and modulus for the compressible inclusion to achieve a minimum earth pressure condition when in combination with a range of cohesionless backfill materials compacted to different densities.

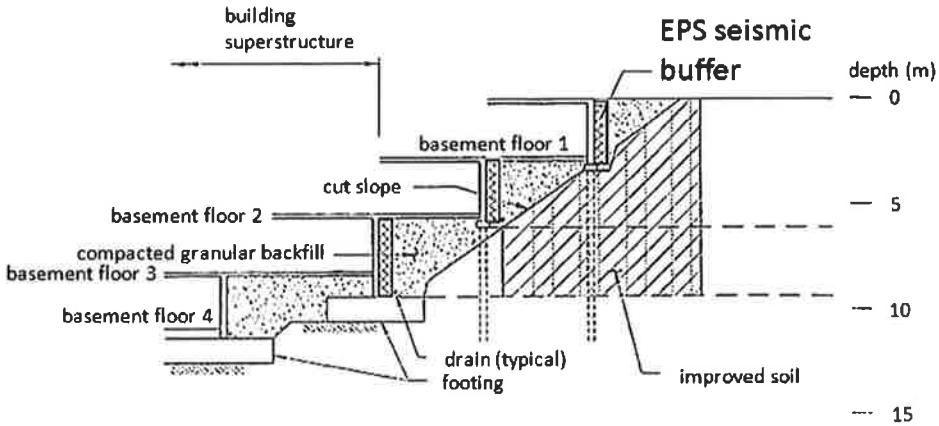

Fig. 1 Example EPS seismic buffer installation for basement structure in Vancouver Canada (after Inglis et al. [3])

Today, the choice for the compressible inclusion is block-moulded low-density EPS, or EPS "geofoam" according to modern geosynthetics terminology. A logical extension of the EPS "yielding" compressible inclusion application is the same construction technique to mitigate seismic loads. This paper summarizes the first documented physical "proof of concept" for EPS seismic buffers to reduce dynamic earthquake-induced earth pressures against rigid earth retaining walls using laboratory shaking table tests. The remainder of the paper summarizes recent research related to numerical modelling of seismic buffer tests, dynamic EPS properties, parametric numerical studies and finally a series of design charts that can be used for preliminary design of these systems.

Shaking Table Tests

Zarnani and Bathurst [5] and Bathurst et al. [6] reported the results of shaking table tests carried out on 1 m-high rigid walls with and without EPS seismic buffers, and a cohesionless soil backfill extending 2 m beyond the rigid wall (or buffer) (Fig. 2). The wall, seismic buffer and sand backfill were contained within a rigid strongbox fixed to the shaking table. The thickness of the geofoam was kept constant at 0.15 m. Figure 3 shows a photograph of the geofoam buffer during construction. Five different EPS materials with densities $\rho = 16$, 14 (elasticized EPS), 12, 6 and 1.3 kg/m^3 were used. The densities below 12 kg/m^3 were achieved by removing material by drilling holes or cutting strips from the virgin EPS sheets. The corresponding initial (bulk) tangent Young's modulus values for these materials were $E_i = 4.7$, 3.2, 1.3, 0.6 and 0.34 MPa, respectively.

A stepped-amplitude sinusoidal base excitation record with predominant frequency of 5 Hz and maximum acceleration amplitude of about 0.8 g was applied to the shaking table. The applied frequency of 5 Hz corresponds to a value of 3 Hz at prototype scale assuming a model to field (height) scale factor of six [7]. The rigid wall (bulkhead) against which the geofoam layer was placed was supported by a series of load cells which allowed the dynamic load-time history on the wall to be recorded in real time. Potentiometer-type displacement transducers

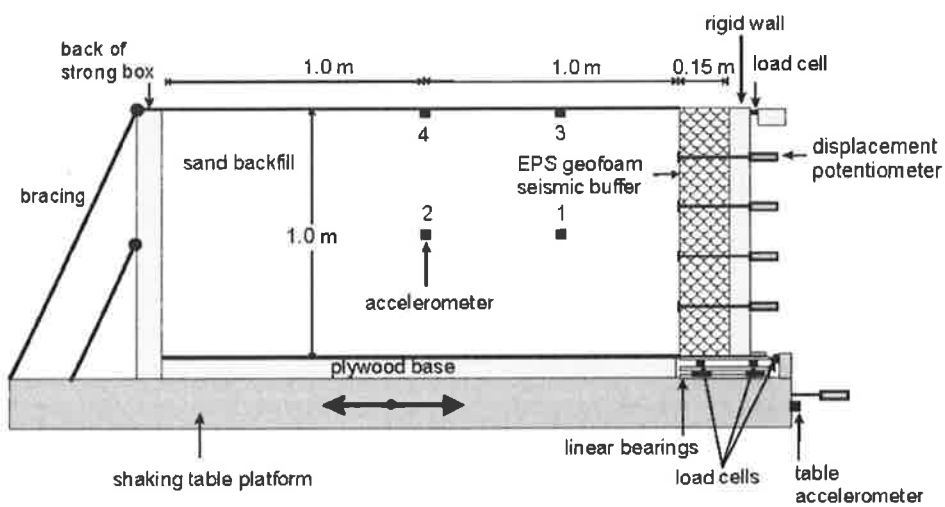

Fig. 2 Shaking table model with EPS geofoam seismic buffer (after Bathurst et al. [6])

Fig. 3 View of back of EPS geofoam seismic buffer in shaking table strongbox prior to backfilling

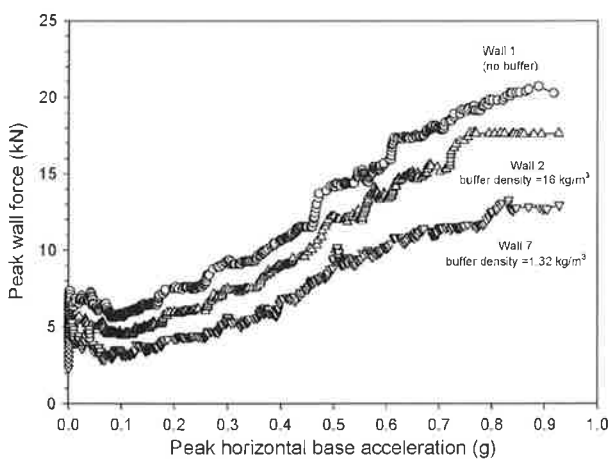

Fig. 4 Peak wall force versus shaking table peak *horizontal* acceleration (after Bathurst et al. [6])

were inserted through the rigid wall and attached to small plates located on the surface of the geofoam to allow permanent and dynamic compressive strain in the seismic buffer to be computed.

Experimental results (Fig. 4) showed that at peak base excitation amplitude of about 0.7 g the geofoam compressible inclusion reduced dynamic earth loads by 15–40 % compared to the rigid wall case. The greatest force reduction occurred for the geofoam buffer with lowest density corresponding to the material with the lowest initial elastic tangent modulus. The reductions in dynamic loads recorded in this experimental study provided "proof of concept" and the motivation for the work that is described next. An additional benefit of the load and displacement instrumentation described earlier was that the dynamic elastic modulus of the EPS geofoam could be

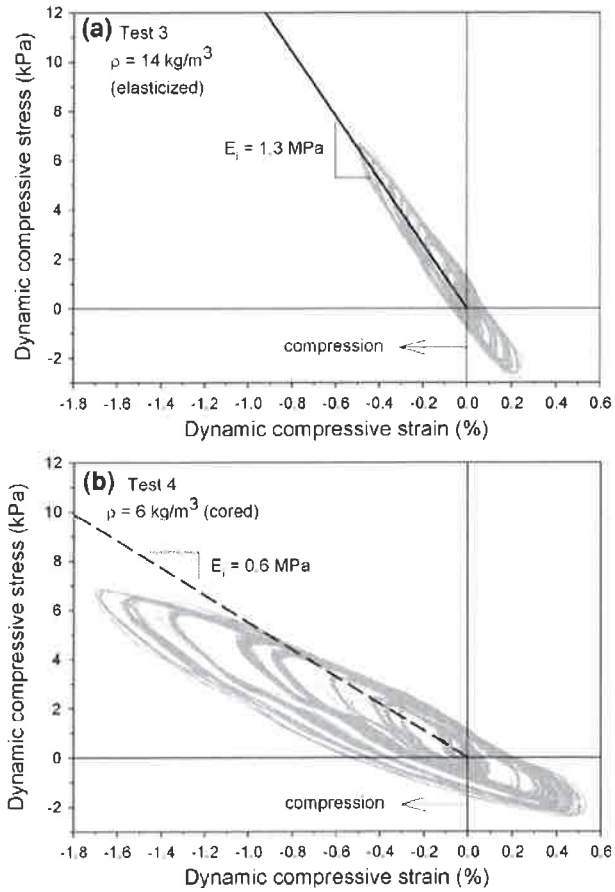

Fig. 5 Measured dynamic EPS buffer stress–strain loops during shaking table tests (after Bathurst et al. [6])

computed from dynamic stress–strain loops (Fig. 5) and these values were used in subsequent numerical models.

Numerical Modelling

Displacement Model

Bathurst et al. [8] proposed a simple one-block model for calculating the dynamic response analysis of seismic buffer retaining walls (Fig. 6). The soil wedge is modelled as a rigid block under plane strain conditions. The seismic buffer is located between the rigid retaining wall and soil. A linear failure plane is assumed to propagate through the backfill soil from the heel of the buffer at an angle to the horizontal (α) that decreases with increasing magnitude of peak input acceleration. The forces at the wedge boundaries are computed using linear spring models. The compression-only force developed at the boundary between the soil wedge and geofoam buffer is computed using a single linear compression-only spring. This spring is called the buffer stiffness and is computed as $K_{N1} = E_i/b$ where E_i is

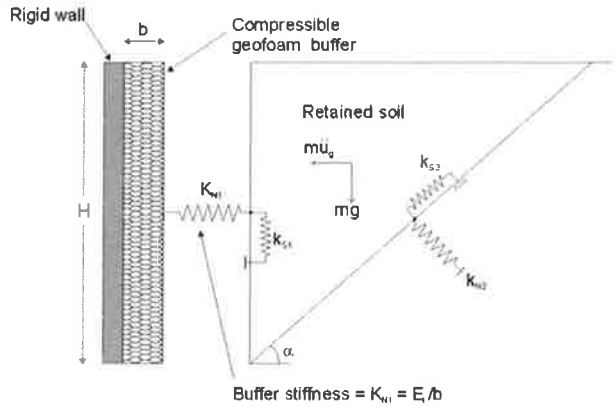

Fig. 6 Discrete element components for rigid wall-seismic buffer displacement model (after Bathurst et al. [8])

the linear elastic modulus of the EPS and b is the thickness. Later in the paper the buffer stiffness expression is simplified to K = E/b. The shear springs at block boundaries are modelled as stress-dependent linear-slip elements to permit plastic sliding. The other quantities in the figure are k_{S1} = geofoam–sand interface shear stiffness, k_{N2} and k_{S2} = soil–soil normal and shear spring stiffness, respectively, m = mass of soil wedge, $\ddot{u}_g$ = horizontal acceleration of soil wedge, and g is acceleration due to gravity. The linear normal spring acting at the soil–soil wedge boundary permits tension and compression but was observed to develop only compressive forces during computation cycles. The solution scheme is based on an explicit time-marching finite difference approach, which is commonly used for the solution of discrete element problems. The approach was modified to consider the compressible geofoam–soil boundary condition and changes in geometry of the soil wedge (block). At each time step, the numerical scheme involves the solution of the equations of motion for the block followed by calculation of the forces. The computed load-time response for an example case is presented in Fig. 7. For clarity only the peak values from

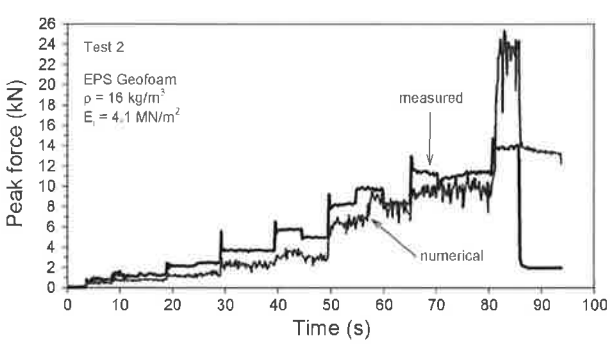

Fig. 7 Example measured and predicted peak force versus time response using discrete element (single block) model (after Bathurst et al. [8])

the load-time record for each numerical simulation are plotted in the figure. The datum for the plot is the end of construction. Hence, these values are the result of dynamic loading only. There is generally good agreement between the physical and numerical models for the configurations up to about 70 s corresponding to a peak excitation acceleration of 0.7 g. At higher accelerations there are likely more complex system responses that cannot be captured by the simple displacement model employed. For example, there are likely higher wall deformation modes at higher levels of base excitation. The poor predictions at peak base excitation levels likely led to the overestimation of buffer compression and loads at the end of the tests when the walls were returned to the static condition. Nevertheless, the trends in the measured data for the two walls with respect to buffer force are generally captured by the numerical model up to about 0.7 g, and in many instances there is good quantitative agreement. A peak ground acceleration value of 0.7 g is a significant value in geotechnical earthquake design.

Finite Difference Method (FLAC)

Numerical simulations of the Royal Military College (RMC) reduced-scale models were also carried out using the finite difference method computer program FLAC [9]. The numerical FLAC grid is illustrated in Fig. 8. Two constitutive modelling approaches were used. The first model for both the sand and EPS geofoam was linear-elastic plastic with Mohr–Coulomb (M–C) criterion and Rayleigh damping (3 %). The model captures hysteretic load–unload behaviour if plasticity occurs. A description of the selection of model parameters and the general modelling approach can be found in the paper by Zarnani and Bathurst [10]. The second more sophisticated model investigated by the writers is called the equivalent linear method (ELM) (Zarnani and Bathurst [11]. This model simulates non-linear cyclic behaviour including shear modulus degradation with shear strain and strain-dependent damping ratio. The properties of the backfill sand and EPS geofoam were established from resonant column tests and cyclic uniaxial compression tests performed by the authors. Shear modulus degradation and damping ratio curves for EPS geofoam are shown in Fig. 9. Here the shear modulus, G, is normalized with the maximum shear modulus, G_{max}. The data from testing performed by the authors are plotted as circle symbols in the figure. The three-parameter sigmoidal function approximation to the experimental data is judged to be in reasonable agreement with the physical data from the authors and other data reported in the literature (e.g. [16–18]).

A no-slip boundary at the bottom of the sand backfill was assumed to simulate the rough boundary in the physical tests (i.e. a layer of sand was epoxied to the bottom of the strongbox container). A slip and separation interface

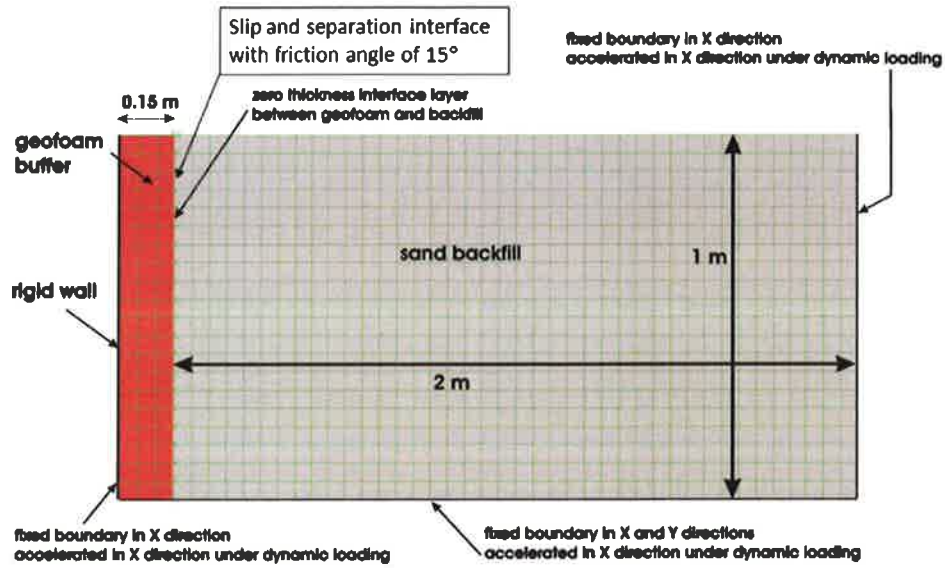

Fig. 8 FLAC numerical grid (after Zarnani and Bathurst [10])

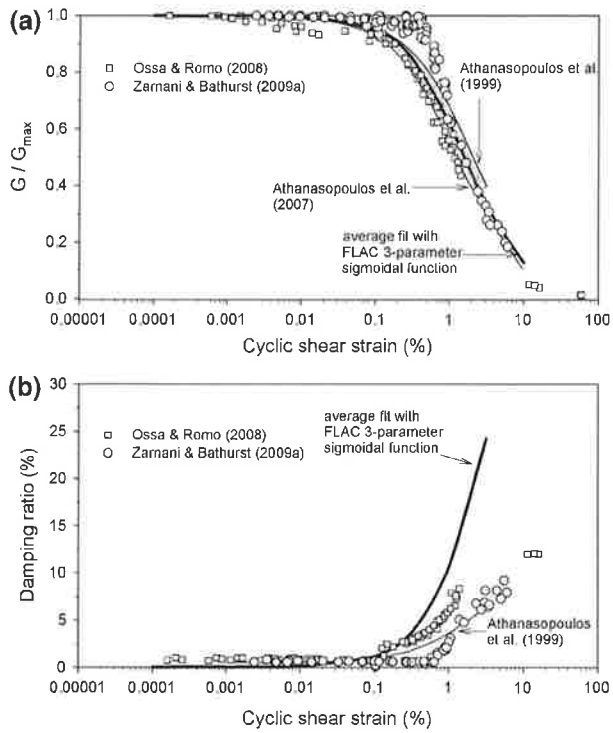

Fig. 9 Variation of: **a** shear modulus; **b** damping ratio with cyclic shear strain amplitude for EPS geofoam

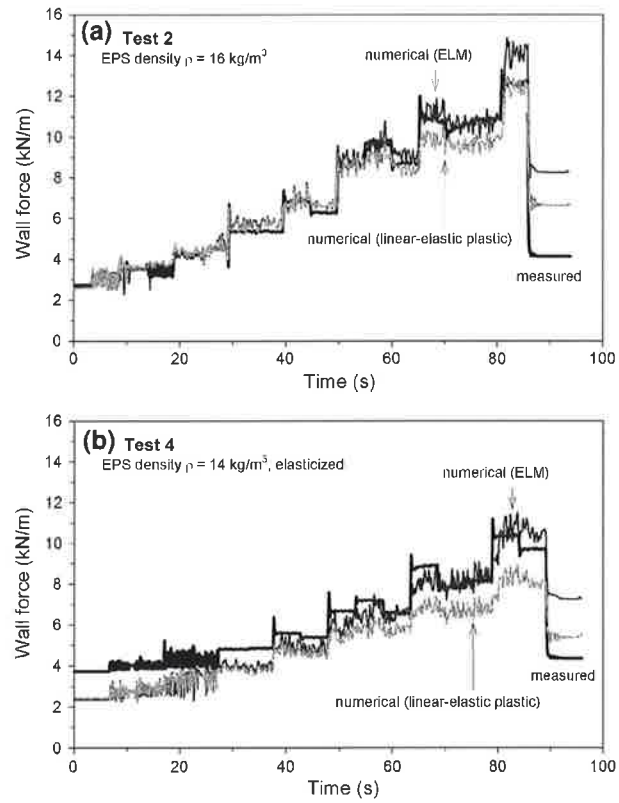

Fig. 10 Total peak wall force versus time: **a** $\rho = 16$ kg/m^3; **b** $\rho = 14$ kg/m^3 (elasticized) (after Zarnani and Bathurst [11])

between the buffer and the soil was specified. This interface allowed the soil and buffer to separate with no tensile stress. The base and the two vertical boundaries of the model were excited using the equivalent velocity record computed from the measured acceleration. The numerical results of interest are the peak magnitudes of horizontal force developed at end of construction and during base excitation. Maximum wall force versus time histories for two physical tests and numerical simulations with two constitutive model types are presented in Fig. 10. Additional comparisons of numerical and physical tests can be found in the paper by Zarnani and Bathurst [11].

The vertical axis in the plots corresponds to the total horizontal earth force acting against the rigid wall per unit width of wall. The figures show that there is reasonably good agreement between measured and predicted results regardless of model type. There is a noticeable discrepancy between results at the beginning of the test for Wall 4. This is believed to be due to locked-in initial horizontal stresses that may have developed as a result of the gentle initial vibro-compaction technique that was used to densify the soil during placement of the sand layers in the strongbox. Both numerical models captured the qualitative trends in the measured load-time history of the walls and in many instances were in good quantitative agreement with measured data. In some simulations reported by Zarnani and Bathurst [11] the ELM approach gave higher predictions of total peak wall forces at the final excitation level, but predictions were closer to the measured results for the seismic buffer test with the most compressible EPS material. However, if only the dynamic increment of force is considered, the simpler model was judged to be sufficiently accurate over much of the load-time history of the systems for practical purposes. Hence, the simple linear-elastic perfectly plastic model was adopted for the simulations used in the parametric analyses described in the next section.

Parametric Analysis

Program FLAC [9] was used to carry out numerical simulations of rigid walls of height H = 1, 3, 6 and 9 m with and without a geofoam seismic buffer. The walls were modelled as fully rigid with no lateral or rotational degrees of freedom. The model width (B) to height (H) ratio of the retained soil in all simulations was constant at B/H = 5. Here B is the width of the model from the front of the test to the back of the shaking table strongbox. This ratio was selected based on experience with similar numerical parametric studies on reinforced soil walls using FLAC and reported by Bathurst and Hatami [12]. They showed that the magnitudes of wall response (lateral displacements and axial reinforcement loads) are influenced by the volume of the soil behind the reinforced soil zone in numerical simulations. For example, the larger the volume, the greater the wall deformations and reinforcement loads. However, they also showed that there is diminishing effect of backfill volume on these response features for B/H > 5. Hence this ratio was fixed at five in the current study in order to minimize the numerical grid size and computation time. The thickness of the geofoam seismic buffers (parameter b) was varied according to the ratio b/H = 0.025, 0.05, 0.1, 0.2 and 0.4. In order to minimize the possible influence of numerical grid refinement on model response, the same numerical grid density was used in all models. For example, for 1-, 3-, 6- and 9 m-high wall models, the mesh was generated using nodes placed on a square grid with 0.05, 0.15, 0.3 and 0.45 m centres, respectively. The mesh density was selected to match the value in the original FLAC simulations by Zarnani and Bathurst [10] that were used to verify the numerical model in the parametric analyses. Nevertheless, a check on the sensitivity of the numerical results to mesh density was carried out by repeating simulations for a 6 m-high wall with mesh sizes of 0.3, 0.15 and 0.05 m. The difference between maximum wall forces was about 1 %, which is negligible. The rigid wall was modelled with a fixed velocity boundary condition in the X direction. The far-end boundary of the retained soil had fixed velocity in both X and Y directions. The fixed X–Y velocity condition for the far-end boundary was adopted because in some simulations carried out at high excitation frequencies and only X direction fixed, the soil could flow over the top of the wall and cause numerical instability. Numerical simulations were carried out to investigate the influence of far-end boundary conditions on model results. It was found that the difference in maximum measured wall force between the two cases (far-end boundary with fixed velocity in X direction only, or fixed velocity in both X and Y directions) at low excitation frequencies was about 1 %, which is negligible. Further details regarding the dynamic loading of the wall models are described in the paper by Zarnani and Bathurst [13]. The horizontal excitation record that was applied to the bottom horizontal boundary and the two vertical boundaries of the model was a variable-amplitude sinusoidal wave with peak acceleration amplitude of 0.7 g (Fig. 11) and frequencies ranging from f = 0.7 to 21 Hz. The frequency values were selected to investigate the influence of proximity of input predominant frequency to the fundamental frequency of the models (ratio f/f_{11} where f_{11} is the fundamental (resonance) frequency of the system). The duration and peak acceleration amplitude of the excitation was the same in all simulations (t_{max} = 17 s and a_{max} = 0.7 g, respectively). A variable-amplitude excitation record was selected because it is relatively simple to characterize compared to an actual earthquake accelerogram. Furthermore, it is not as aggressive as the same sinusoidal record applied with constant or stepped peak acceleration amplitude [14]. The application of an actual earthquake accelerogram may appear attractive but the choice of which earthquake record to use is problematic. Nevertheless, the effects of actual scaled earthquake records and synthetic accelerograms were investigated and found not to significantly influence design chart outcomes presented later. An example of a typical wall force–time response curve for a rigid wall control case (i.e. no seismic buffer) is plotted in Fig. 12. This structure was 3 m high and was excited at a frequency that was 30 % of the fundamental frequency (f_{11}) of the system. Superimposed on the figure are the peak force–time envelopes for the same wall without and with seismic buffers of varying thickness (b). The plot shows that wall

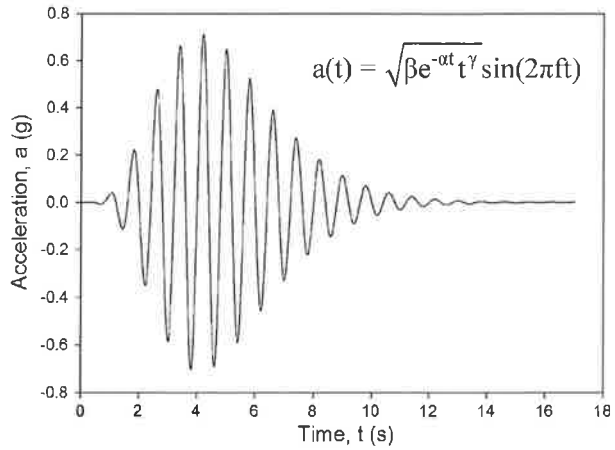

Fig. 11 Example wall excitation accelerogram. Note: β, α and γ are dimensionless coefficients and f is frequency

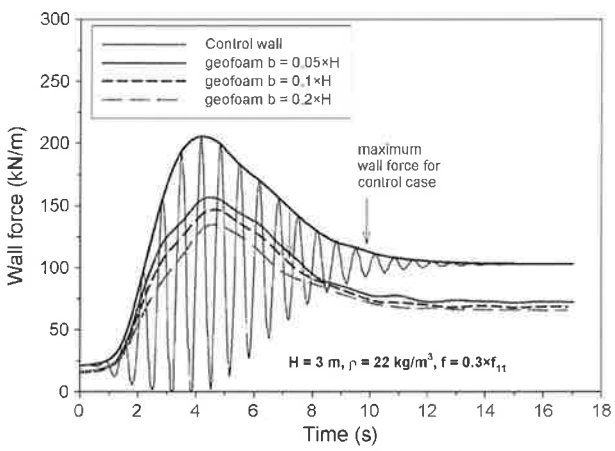

Fig. 12 Wall force–time responses for a 3 m-high wall with and without geofoam seismic buffer (after Zarnani and Bathurst [13])

forces are attenuated when a geofoam seismic buffer is placed against the back of the rigid wall compared to the control case, and the magnitudes of peak wall force decrease with increasing buffer thickness.

Preliminary Design Charts

In this numerical study, EPS19, EPS22 and EPS29 materials (according to ASTM D6817 designation system [15]) were assumed which correspond to EPS with minimum densities of 18.4, 21.6 and 28.8 kg/m^3, respectively. The EPS geofoam was modelled as linear-elastic purely cohesive material and the soil as a linear-elastic perfectly plastic material with M–C failure criterion and Rayleigh damping. Numerical investigations described earlier showed that this was satisfactory based on comparison with physical test results and results of simulations using the more sophisticated ELM approach. Independent laboratory testing has shown that non-elasticized EPS geofoam typically behaves linear elastic up to about 1 % strain. There are correlations available in the literature that relate the density of geofoam to initial tangent Young's modulus, Poisson's ratio, compressive strength and tensile strength (e.g. [5]). Initial stiffness values of non-elasticized geofoam materials reported in the literature were similar to the measured dynamic stiffness of the EPS seismic buffer in the shaking table test program. Hence, the initial stiffness from conventional compression tests can be used for parameter E to compute buffer K = E/b for non-elasticized EPS. However, for elasticised geofoam, the back-calculated elastic modulus values from the shaking table tests (e.g. Fig. 5a) were higher than the value reported by the manufacturer. Regardless, it is up to the designer to select project-specific values for use in the design charts or in numerical simulations of the type described in this paper. The results of simulations in this numerical parametric study are presented in the form of design charts in Fig. 13. In these charts the practical quantity of interest to attenuate dynamic loads is the buffer stiffness introduced earlier and defined as the ratio of EPS elastic Young's modulus to EPS thickness. This is the same parameter used in the displacement model to quantify the stiffness of the geofoam layer (Fig. 6). Combinations of materials with different modulus and thickness can provide the same dynamic load reduction. Hence numerical parametric results are presented in Fig. 13 with K as the independent parameter and isolation efficiency as a quantitative measure of the improvement in seismic load reduction. Isolation efficiency of the seismic buffer is defined as the ratio of change in wall force between rigid and seismic buffer cases divided by peak wall force without the buffer. For each wall height, isolation efficiency versus stiffness curves fall into narrow bands based on frequency ratio and these curves are sensibly independent of buffer density. The difference in curves based on predominant frequency values of $0.3f_{11}$ and $1.4f_{11}$ diminishes with increasing wall height. In all cases there is a highly non-linear reduction of isolation efficiency with increasing buffer stiffness. Taken together, the data plots suggest that $K \leq 50$ MN/m^3 is the practical range for the design of these systems. More results and discussion related to this parametric study are reported by Zarnani and Bathurst [13].

Conclusions

This paper provides a synthesis of recently published work by the authors on both experimental and numerical simulation work related to EPS seismic buffers to reduce earthquake-induced loads against rigid basement wall and

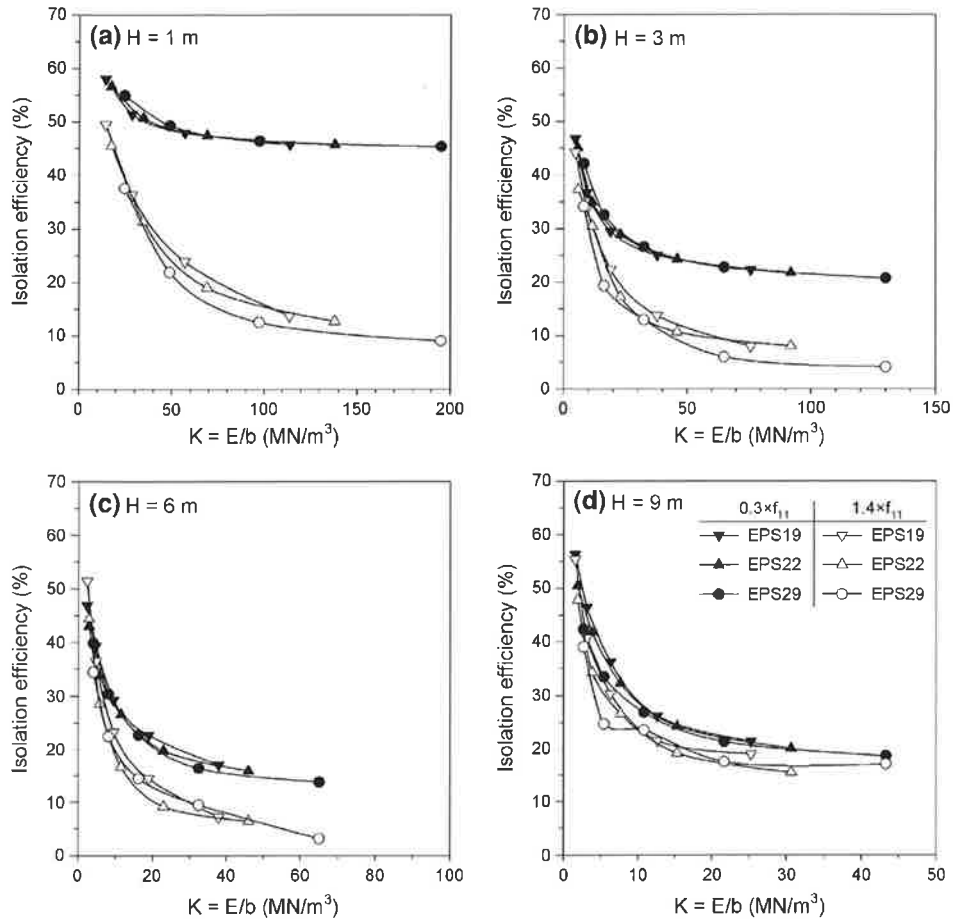

Fig. 13 Preliminary EPS seismic design charts for different wall heights (after Zarnani and Bathurst [13])

rigid soil retaining wall structures. Validated FLAC numerical models were used to carry out a parametric analysis to investigate the influence of wall height, EPS geofoam type, thickness, stiffness and excitation record on seismic buffer performance. The major practical outcome of this research is the identification of buffer stiffness (defined as $K = E/b$ where E is the elastic modulus and b is thickness) as the parameter of interest to design these systems. For the range of parameters investigated, $K \leq 50$ MN/m^3 was observed to be the practical range for the design of these systems to attenuate earthquake loads against rigid wall systems.

Acknowledgments The authors are grateful for funding provided by the Natural Sciences and Engineering Research Council of Canada, the Academic Research Program at RMC, and grants from the Department of National Defence (Canada).

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James Bay Neighbourhood Association

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July 22nd, 2017

Jane Bird
Chair, CRD Core Area Wastewater Treatment Project Board

Dear Jane,

Re: JBNA & CRD project Team Joint Committee

We have received your letter dated June 14th. Thank you.

We believe that a meeting in the next couple of weeks should focus on the outstanding issues of the ToR. We appreciate the changes made to date, but believe more discussion is warranted. Examples are:

- Discussion of mitigation of construction impacts: We believe that both the project and the community need a means whereby such issues can be discussed, and hopefully resolved, thereby minimizing complaints. The missed oversight of access to and from the waterfront and Beacon Hill Park, as experienced early this week, was an easily avoided situation. There will undoubtedly be similar issues which arise over the months/years ahead where considerations for residents (and visitors) in advance of construction activity prevent problems. There must be a vehicle for these discussions elsewhere if not through the JBNA & CRD project Team Joint Committee. ***(Para 2: point 2)***
- In December, 2016, and in January 2017, you made a commitment to present at JBNA General Meetings, suggesting monthly presentations, which we considered too frequent. We suggested that the team present at every second or third monthly meeting. We suggest an amendment to ***Para 2 point 4*** amendment of the draft ToR in support of your commitment.
- ***Para 3:*** We fully understand the issue of enhancements. The City has suggested to us that it is all in your hands, while you suggest it is all in the City's hands. James Bay should not be treated as a ping-pong ball.
- Meeting schedule: Two weeks notice for JBNA General Meetings is insufficient. Meeting scheduling must respect JBNA's obligations *vis a vis* the city's CALUC (land use) process. We have explained this in December and since. Perhaps a discussion with calendars in hand would clarify.

. . .2

Dates/times which would work for a few of the JBNA Board committee members would be:

- June 30, between 11:30 am and 3 pm (ending at 3)
- July 3, between 10:30 and 3 (ending at 3)
- July 4, at either 1 pm or 7 pm.

We wish to get some update of ToR and dialogue to our membership soon, hence hope that one of the suggested time periods is agreeable to you.

Yours truly

Marg Gardiner
President, JBNA

Cc: JBNA Board

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Wastewater Treatment Project
Treated for a cleaner future

June 27, 2017

Via Email: marg.jbna@shaw.ca

James Bay Neighbourhood Association
Attention: Marg Gardiner, President, JBNA

Dear Marg:

RE: RESPONSE TO JBNA LETTER RECEIVED JUNE 23, 2017

Thank you for your letter which we received on June 23. We note that your letter was dated July 22 but we will assume for our records that is was written on June 22.

We look forward to meeting with the committee as soon as we have established a common understanding of the Terms of Reference. The dates you have suggested (June 30, July 3) are coming up very quickly and the Project team members are unable to accommodate these in their schedule. We would like to suggest the following alternative dates and times:

July 4	3pm - 4pm
July 6	11am - noon or 2:30pm - 3:30pm
July 11	any time
July 13	any time
July 18	any time (Jane Bird would not be in attendance)
July 20	after 10:00 a.m. (Jane Bird would not be in attendance)

You have suggested that further discussion is warranted on some items in the Terms of Reference.

We have reviewed these suggestions as follows:

1. **Discussion of mitigation of construction impacts**.
   You suggest in your letter that "the project and the community need a means whereby such issues can be discussed, and hopefully resolved, thereby minimizing complaints."
   This is clearly covered in the TOR. Point 2 paragraph 2 states that "The Project team will ensure timely contact with the James Bay Neighbourhood Association in advance of key construction milestones and will provide a forum for discussion related to:
   - Effective tools for communicating with James Bay residents;
   - Mitigation of construction related impacts; and
   - Topics being presented to the broader community in community information meetings

2. **JBNA Meetings**
   As discussed on our May 1 meeting with Mayor Helps and reiterated again in my June 14 letter, "we will be seeking space on your agenda, well in advance, when we have

significant new information to share, at this point we think that will be the fall of this year. As you are aware, it is frustrating for both your membership and our team to have us on the agenda when there is no new information to provide. In the meantime, we look forward to meeting with the Wastewater Treatment Project JBNA and CRD Project Team Joint Committee."

3. **Enhancements**
   Re Multi-use Trail along Dallas Road. The City of Victoria and the CRD are in agreement that the responsibility of the CRD is as follows:
   - The CRD will present the alignment of the Works and Cycle Track and the Design Proposal to City Council in a public meeting prior to the commencement of the detailed design and prior to the commencement of the construction.
   - At the 50% design stage, the CRD will present the 50% design and alignment of the Cycle Track and alignment of the Works to City Council at a public meeting and to the James Bay Neighbourhood Association and Fairfield-Gonzales Community Association in a separate presentation.

   With regard to James Bay Amenities, The City of Victoria and the CRD are in agreement that the City will lead engagement activities regarding identification of amenities to be provided in James Bay, and the CRD Project Team will be in a supporting role.

4. **Meeting schedule**
   The most recent revised TOR states that "Meetings will be scheduled around key construction milestones and held at least two weeks in advance of community information meetings (with consideration of the timing of monthly JBNA meetings).
   Our intention with this wording was to indicate that meetings of the JBNA and CRD Project Team Joint Committee would take place at least two weeks prior to our Community Information Meetings, so that we could consider input from the Committee prior to finalizing our materials for these meetings. We added "with consideration of the timing of monthly JBNA meetings" to indicate that we would try to schedule the JBNA and CRD Project Team Joint Committee meetings in a way that would not interfere with, and would consider timing of, your regular monthly meetings. If you think there is a clearer way to capture that intention, we are happy to revise the language.

I look forward to finalizing the TOR soon so that we can schedule a meeting on one of the dates and times suggested above. If these dates do not work for your committee members, please suggest some alternatives in the following week(s).

Sincerely,

Jane Bird
Chair, Core Area Wastewater Treatment Project Board
CRD Wastewater Treatment Project

Wastewater Treatment Project
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SUBJECT **Project Board Meeting Schedule: Updated dates and co-ordination with CALWMC meetings**

Project Board Meeting Date **(Fourth Thursday of the month)**	**Standing Project Report**	**Project Report Reporting Period**	**Project Report to be Presented to CALWMC (meets Quarterly; second Wednesday of Nov, Feb, May & Aug)**
September 28, 2017	Quarterly Monthly Monthly	April - June 2017 July 2017 August 2017	November 8, 2017
October 26, 2017	Quarterly	July - September 2017	November 8, 2017
November 23, 2017	Monthly	October, 2017	February 14, 2017
January 25, 2018	Monthly & Quarterly	November 2017 & October - December 2017	February 14, 2017
February 22, 2018	Monthly	January 2018	May 9, 2018
March 22, 2018	Monthly	February 2018	May 9, 2018