

DATE: April 6, 2016

FILE: 5340-07

TO: Chair and Members
Comox Valley Sewage Commission

FROM: Debra Oakman, CPA, CMA
Chief Administrative Officer

RE: Capital assistance agreement – HMCS Quadra project update

Purpose

To provide a project update regarding the forcemain replacement from HMCS Quadra to the Jane Place pump station funded by the Department of National Defence (DND) capital assistance program (CAP).

Policy analysis

Bylaw No. 2541 being the “Comox Valley Sewerage Service Establishment Bylaw No. 2541, 2003” was adopted to convert the function to a service as defined in the bylaw. The bylaw defines the participants as the City of Courtenay, Town of Comox, and the DND.

At the May 13, 2014 sewage commission meeting the following resolution was adopted:

THAT the Comox Valley Regional District provide a letter of interest to DND expressing the Comox Valley Regional District’s interest to enter into negotiations for a contribution agreement with the Department of National Defence for the design and replacement of the HMCS Quadra forcemain.

AND FURTHER THAT subject to a successful application under the capital assistance program for the HMCS Quadra forcemain replacement and the Comox Valley Regional District enter into a contribution agreement(s) with the Department of National Defence;

AND FINALLY THAT the chair and corporate legislative officer be authorized to execute the agreement.

At the December 11, 2014 Comox Valley Regional District (CVRD) board meeting the following resolution was adopted:

THAT as a result of a competitive process, the contract for the design and construction management services for HMCS Quadra forcemain replacement be awarded to McElhanney Engineering in the amount of \$131,431.30 exclusive of GST;

AND FURTHER THAT the chair and corporate legislative officer be authorized to execute the contract;

AND FINALLY THAT the chair and corporate legislative officer be authorized to execute the capital assistance agreement

Executive summary

The Comox Valley sewerage system (CVSS) was installed and commissioned in the early 1980's in response to a need for improved sewage treatment for the City of Courtenay, Town of Comox and the DND. As part of the project construction, the old outfall previously utilized by the Town of Comox became available for use as a sewer forcemain from HMCS Quadra to the new CVRD pump station located at Jane Place. The forcemain was initially installed in the early 1960's and is currently in poor condition and requires replacement.

In 2014 DND retained Ausenco (engineering consultants) who completed a study assessing the different options available for replacement of the forcemain. After reviewing three possible options Ausenco recommended that the forcemain be replaced as a submarine line along the existing right of way. This option attracted slightly higher environmental permitting costs but lower costs of construction and was overall the lowest cost option.

In early 2015 the CVRD entered into a contribution agreement with DND as part of DND's CAP for the HMCS Quadra forcemain replacement project. The CAP provides funding for infrastructure projects that when complete, become the property of local government to own, operate and maintain in perpetuity. All initial capital costs for upgrades and replacements are provided by DND through the CAP. As part of the contribution agreement the CVRD awarded detailed engineering to McElhanney Engineering for the sewage forcemain replacement from HMCS Quadra at Goose Spit to the CVRD's existing Comox No. 1 sewerage pump station at Jane Place.

As part of the detailed design work McElhanney has assessed the environmental risks associated with the submarine crossing and determined the following (see Appendix A):

1. The project is likely to result in the permanent destruction of eel grass habitat which will cause disruption to breeding fish.
2. The project may result in the destruction of the yellow sand verbena plant which is the only host plant of the endangered sand verbena moth.

Considering the above environmental risks McElhanney investigated an alternate inland route aligned directly along Goose Spit Road, discharging to the Town of Comox sewer system at the intersection of Balmoral Avenue and Croteau Road. The alternate route eliminates all marine impacts and provides greater flexibility to avoid the yellow sand verbena plant.

DND has reviewed McElhanney's assessment and agrees that an inland route is preferred over the submarine crossing. The inland route is longer and requires high pressure pumping in order to overcome the elevation gain by routing along Hawkins Road. The inland route will require an upgrade to the DND pump station at Goose Spit. As part of the upgrade work DND has requested that the pump station also be included in a new contribution agreement for the inland route. Following project completion the CVRD will be responsible for the upgraded pump station at HMCS Quadra plus the new forcemain along Goose Spit and Hawkins Roads.

The inland route initially discharges to the Town of Comox sewer which then travels down Croteau Road and along the foreshore to the existing Comox No. 1 pump station at Jane Place. The tie-in to Comox's gravity system is considered temporary until the completion of the future Comox No. 2 pump station on Beech Street. As part of their engineering work McElhanney met with the Town to review the inland route. The Town has requested that the following considerations be included in project design and implementation:

1. That considering the long length of the inland route, odour control be considered and implemented as part of the design; and
2. That the connection to the Town of Comox' gravity sewer system be considered temporary for a maximum three year period following which compensation for the use of town infrastructure would be required.

Once complete, the HMCS Quadra forcemain will be routed to the Comox No. 2 pump station. The CVRD will work closely with the Town of Comox on the initial tie-in and on the future transition to the Comox No. 2 pump station.

As a result of the above change in project concept and scope, DND has completed the contribution agreement with CVRD and has initiated a new contribution agreement for the updated scope of work. All capital project costs involved with the design, construction and construction management are borne by DND as part of the new contribution agreement. Pending successful design and approvals based on the new scope construction is planned for summer 2016.

Recommendation from the chief administrative officer:

This report is for information only.

Respectfully:

D. Oakman

Debra Oakman, CPA, CMA
Chief Administrative Officer

Prepared by:

M. Rutten

Marc Rutten, P.Eng.
General Manager of
Engineering Services

Attachment: Appendix A – “HMCS Quadra-Sanitary Forcemain Alternatives Assessment, McElhanney, dated January 15, 2016”

TECHNICAL MEMORANDUM

PREPARED BY: John Sorenson, P.Eng.

PREPARED FOR: David Leitch, AScT
Comox Valley Regional District

CHECKED BY: Bob Hudson, P.Eng.

DATE: January 15, 2016

FILE NO: 2211-47393-0

RE: **HMCS QUADRA – SANITARY FORCEMAIN ALTERNATIVES ASSESSMENT**

INTRODUCTION

At the request of the Comox Valley Regional District (CVRD), alternative alignments for routing the sanitary forcemain for the HMCS Quadra have been reviewed; two options have now been investigated. Option 1 proposes a submarine crossing of the Comox Harbour, whereas Option 2 proposes an alignment directly along Goose Spit road, discharging to the Town of Comox Sewer System at the intersection of Balmoral Avenue and Croteau Road.

This Memorandum provides a comparison of the technical features of both options, an environmental overview of the projects as well as associated cost estimates. Additionally, a detailed work plan and schedule has been prepared for Option 2: Goose Spit Road Alignment to guide the project as it moves to the design and construction phases.

OPTION 1: COMOX HARBOUR CROSSING

Option 1 proposes a submarine crossing of the Comox Harbour along the existing statutory right of way that contains the existing HMCS forcemain. The graphic depicted within Figure 1 illustrates the proposed crossing, in concept. The crossing would require the installation of a new forcemain within the tidal mud flats. A portion of the sanitary forcemain would be below the low tide water level, thus construction techniques such as high pressure jetting or underwater open cutting would likely be required. Due to the disturbance associated with the installation of a new forcemain within tidal regions, the works would likely be considered as a permanent destruction of eelgrass habitat. This determination, made by DFO, would require intensive environmental approvals, as discussed in later sections. In an effort to mitigate the amount of time required to obtain environmental approvals, and to provide a measure of certainty to the CVRD and DND that the project can indeed be constructed (DFO is under no obligation to approve any works that cause a HAAD), routing Option 2 was developed.



Figure 1 – Forcemain alignments Option 1 and Option 2 from HMCS Quadra to the potential point of connections.

OPTION 2: GOOSE SPIT ROAD ALIGNMENT

Alternate routing (Option) 2 would take the forcemain along Goose Spit Road off Federal lands to Hawkins Road, up the hill where it would discharge to the Town of Comox's gravity sewer on Balmoral. MCSL has contacted the Town of Comox to discuss connection to their municipal gravity collection system. These discussions, though preliminary, have been promising. Town staff do not anticipate any insurmountable challenges if the CVRD requires a point of connection to the Town gravity system. Town staff have authorized MCSL to consult their 2013 hydraulic model of the gravity collection system to verify if any capacity constraints exist. This analysis is ongoing.

Route 2 negates the need for working below the high tide level along Goose Spit. In order to ensure that the Sand Verbena plants known to exist along Goose Spit are not impacted by construction, Horizontal Directional Drilling (HDD) is being considered. This construction methodology will minimize disturbance to adjacent habitat. Confirmation of the suitability of HDD will require a geotechnical investigation to determine the underlying soils conditions. Further details of the proposed geotechnical investigation are discussed below.

Installation of the forcemain within the road allowance will also allow for easier access for any



future maintenance. It should be noted that a section of this alignment runs adjacent to an Archaeological Site and therefore MCSL is recommending that a Site Alteration Permit (under the Heritage Conservation Act) be in place prior to construction. Further detail regarding the identified archaeological site is provided below.

It should be noted that the installation of the forcemain within the Goose Spit Road Alignment will impact local residents, personnel accessing the base, as well as recreational users. The existing roadway is very narrow, so the implementation of a traffic management plan will be critical to the success of the project. In order to minimize the impacts to residents and local users, MCSL will investigate if directional drilling could be utilized along the entire length of the project. Although HDD requires entry and exit pits, it would reduce the impacts to traffic, local users and residents.

To confirm the potential need for pump system upgrades to suite the new alignment, a preliminary review of the systems hydraulics was undertaken. The review indicates that with the extra lift required to convey sewerage up to Balmoral Avenue, new pumps would be required. The pumps would need to be upgraded to Flygt NP 3153 SH~276 (17 hp), utilizing a 150mm diameter HDPE forcemain.

As part of the ongoing transition of assets to the CVRD, MCSL has been requested to carry out a detailed condition and capacity assessment of the HMCS lift station. A separate costing for this effort is included in the attached work plan.

ENVIRONMENTAL RISKS ASSOCIATED WITH OPTION 1: COMOX HARBOUR CROSSING

Although DFO has not committed any clarification in writing, McElhanney staff have spoken to Byron Nutton, RP Bio (Byron.Nutton@dfo-mpo.gc.ca Phone: 250-618-4268) and his technician Michelle Biggs concerning the HCMS Quadra forcemain request for project review.

They indicated that:

- a) The project will 'probably' require an Authorization as it will 'probably' cause serious harm to fish. The Fisheries Act is intended to prevent any Harmful Alteration Disruption or Destruction (HADD) to fish or fish habitat.
- b) DFO considers the pipeline placement as a PERMANENT destruction of eelgrass habitat (even if it is transplanted and replaced) and will cause disruption to breeding fish. Since there is no time during the year when there are no fish species breeding at all in the Comox Harbour, the project could impact those fish species for 3-5 years.
- c) DFO would require a considerable amount of species inventory data to determine how much of each habitat and numbers of each species (fish, shellfish, clams, starfish, etc.) that are going to be affected by the project, and what compensation would be provided as a result of the HADD to fish and fish habitat.

This ruling has significant implications on the project scope, budget and schedule as the compensation work could be considerable and costly.



Additional Environmental Assessment work would be required to define:

1. Description of all substrate types affected by the work.
2. Mapping of all vegetation and habitats along the alignment: intertidal salt marsh, various intertidal and subtidal habitats.
3. Species inventories (species, density, and numbers); that is, species, densities and areas of all shellfish, algae (red, green, brown), as well as all eelgrass areas that will be destroyed, fish species that will be killed, disrupted from breeding, etc.

The above scope items would need to be assessed over a period of at least one year, with two years being recommended.

Once inventory of species is completed, mitigation measures to avoid impacts to these species needs to be developed. From what HADD cannot be avoided, DFO determines the amount of serious harm to fish caused by the project. Compensation plans need to be submitted for any impacts that cannot be avoided. Both of these items will affect the project schedule and cost, as there will be timing issues related to the installation, as well as scope and budget increases for the compensation work.

Finally, additional costs will be incurred as the post project environmental works will need to be monitored periodically over 5 years, with annual reports to DFO. While this cost is relatively low, it is likely to amount to between \$3,500 and \$5,000 annually. The amount is dependent on the success of the elements of the compensation plan. For example, if eelgrass is planted in another deserving area, but the mortality rate is high, or the success rate is low, then additional plantings will need to be installed.

Definitive costs cannot be estimated at this time, but the professional fees associated with the assessment and planning for the environmental risks are likely to be greater than \$150,000. Cost for the construction of compensation works could be of a similar magnitude.

ENVIRONMENTAL RISKS ASSOCIATED WITH OPTION 2: GOOSE SPIT ROAD ALIGNMENT

As the proposed alignment for Option 2 will remain in the travelled surface of the roadway (disturbed land) and above the high water mark of the ocean, there are no direct regulatory requirements for federal or provincial environmental permitting. That said, as the proposed alignment for Option 2 lies adjacent to the critical habitat of the sand verbena moth and to the Comox Harbour, which is utilized by many species of birds, avoidance of the sand verbena moth habitat is critical. Therefore, MCSL recommends undertaking the three following tasks.

Task 1 Environmental Assessment Reporting

The environmental assessment report for Option 2 will be a revision of the previously completed Option 1 report, with emphasis on the special sensitivities around the Option 2 alignment. Due to the proximity of the proposed project alignment to the marine foreshore and species at risk



habitat, Environment Canada (EC) and Fisheries and Oceans Canada (DFO) will be contacted to determine any issues or concerns of these agencies with respect to this project.

Task 2 Environmental Management Plan

McElhanney will develop an Environmental Management Plan (EMP) incorporating best construction practices to be employed during construction to minimize and mitigate potential construction impacts. The EMP will include construction specific mitigation measures for protection of the environment including, but not limited to, a plan for fuel and spill response management, waste management, marine habitat protection, wildlife encounter and bird management, and an erosion and sediment control plan. The project specific EMP will provide recommendations for mitigation or minimization of potential impacts to adjacent sensitive marine and species at risk habitat.

This document is to be followed by the construction contractor during construction to assist project compliance to federal and provincial environmental legislation. This EMP will also contain an Erosion and Sediment Control (ESC) plan that is to be implemented by the construction contractor for compliance to water quality protection legislation within the Fisheries Act.

Prior to construction, our botanist, specializing in plant species at risk, will flag the no-go zones for vehicles, construction equipment and material laydown areas for the protection of the sand-verbena plant and the habitat for the sand verbena moth.

Task 3 Environmental Monitoring

Monitoring during the construction period will be conducted to ensure project compliance to federal and provincial regulatory requirements for maintenance of water quality, the protection of habitat, and the best management practices outlined in the environmental management plan. To monitor contractor's implementation of the project's EMP and to evaluate the effectiveness of environmental protection measures installed or utilized, McElhanney will assign an environmental monitor to review the site during construction.

The monitoring budget assumes daily site reviews from the McElhanney Courtenay office during times of construction adjacent to the sensitive marine foreshore. Once the project enters the developed portions of the city away from the sensitive marine environment, site reviews by the environmental monitor are planned to be reduced to two times a week.

PRELIMINARY COST ESTIMATES

Class 'C' cost estimates for Options 1 and Options 2 are shown in **Table 1**, overleaf. The Class 'C' cost estimate has included soft costs associated with the detailed design of both Options as well as budget costing associated with completing an environmental assessment as well as recommendations for construction contingencies.



The proposed crossing of Comox Harbour (Option 1) would necessitate jetting for the installation of the forcemain. Jetting requires the sewer to be sunk to the bottom of the seabed with concrete collars. Diver then use high pressure nozzles to essentially liquefy the underlying soils and embed the pipe on the sea bottom. For areas above the high water level, a traditional open cut installation would be used.

Option 2: Comox Harbour Crossing

For the basis of this cost estimate, it has been assumed that HDD will be utilized in the areas adjacent to the ocean and that an open cut installation would be utilized for the upland areas. The proposed installation methodology will need to be confirmed upon detailed design.

TABLE 1: CLASS C CONSTRUCTION COST ESTIMATE

HMCS - QUADRA
Class C Construction Cost Estimate



McElhanney

2211-47393-0
15-Jan-16

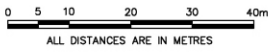
Cost Comparison for Forcemain Replacement

	Option 1-Comox Harbour Crossing				Option 2 - Installation within Hawkins Road ROW			
	Quantity	Unit	Price	Amount	Quantity	Unit	Price	Amount
General								
Mobilization/Demobilization	1	LS	\$ 45,000	\$ 45,000	1	LS	\$ 45,000	\$ 45,000
Environmental Protection Plan + Traffic Control	1	LS	\$ 100,000	\$ 100,000	1	LS	\$ 25,000	\$ 25,000
				\$ 145,000				\$ 70,000
Mechanical Works								
Pump Replacement	N / A	N / A	N / A	N / A	2	EA	\$35,000.00	\$ 70,000
Electrical Upgrades Allowance	N / A	N / A	N / A	N / A	1	EA	\$25,000.00	\$ 25,000
				\$ -				\$ 95,000
Civil Works								
150mm HDPE DR11 Forcemain by Jetting	975	LM	\$ 250.00	\$ 243,750	N / A	N / A	N / A	N / A
150mm HDPE DR11 Forcemain by HDD	N / A	N / A	N / A	N / A	950	LM	\$ 315.00	\$ 299,250
150mm (6") HDPE DR21 Forcemain - Open Trench	375	LM	\$ 185.00	\$ 69,375	1250	LM	\$ 185.00	\$ 231,250
Surface Restoration	190	LM	\$ 105.00	\$ 19,950	1250	LM	\$ 105.00	\$ 131,250
End Connections (allowance)	1	LS	\$ 27,500.00	\$ 27,500	1	LS	\$27,500.00	\$ 27,500
				\$ 360,575				\$ 689,250
				Construction Cost Subtotal				Construction Cost Subtotal
				\$ 505,575				\$ 854,250
Engineering, Administration & Contingency								
Environmental Assessment, Approvals and Monitoring				\$ 150,000				\$ 15,000
Professional Fees				\$ 130,000				\$ 130,000
Administration (5%)				\$ 25,000				\$ 43,000
Contingency (25%)				\$ 126,000				\$ 214,000
Allowance for Inflation (10%)				\$ 51,000				\$ 85,000
				Total Construction Cost				Total Construction Cost
				\$ 987,575				\$ 1,341,250

EXTENTS OF ARCHAEOLOGICAL SITE FOR OPTION 2

As shown in the sketch **Figure 2** overleaf, the approximate extents of the archaeological site is situated off the east side of the roadway from the Northeast parking area of Goose Spit Park northwards to Yates Road. As the proposed site is in the proximity of the work area, the proposed geo-technical site assessment, discussed in detail below, will be undertaken with the supervision of Baseline Archaeological services Ltd, the archaeological sub consultant for the project. Although the site is identified as being off the roadway and may not be impacted by the proposed forcemain installation, we would recommend that the permitting process commence

TOPOGRAPHIC PLAN OF PART OF
HAWKINS ROAD, COMOX, BC.

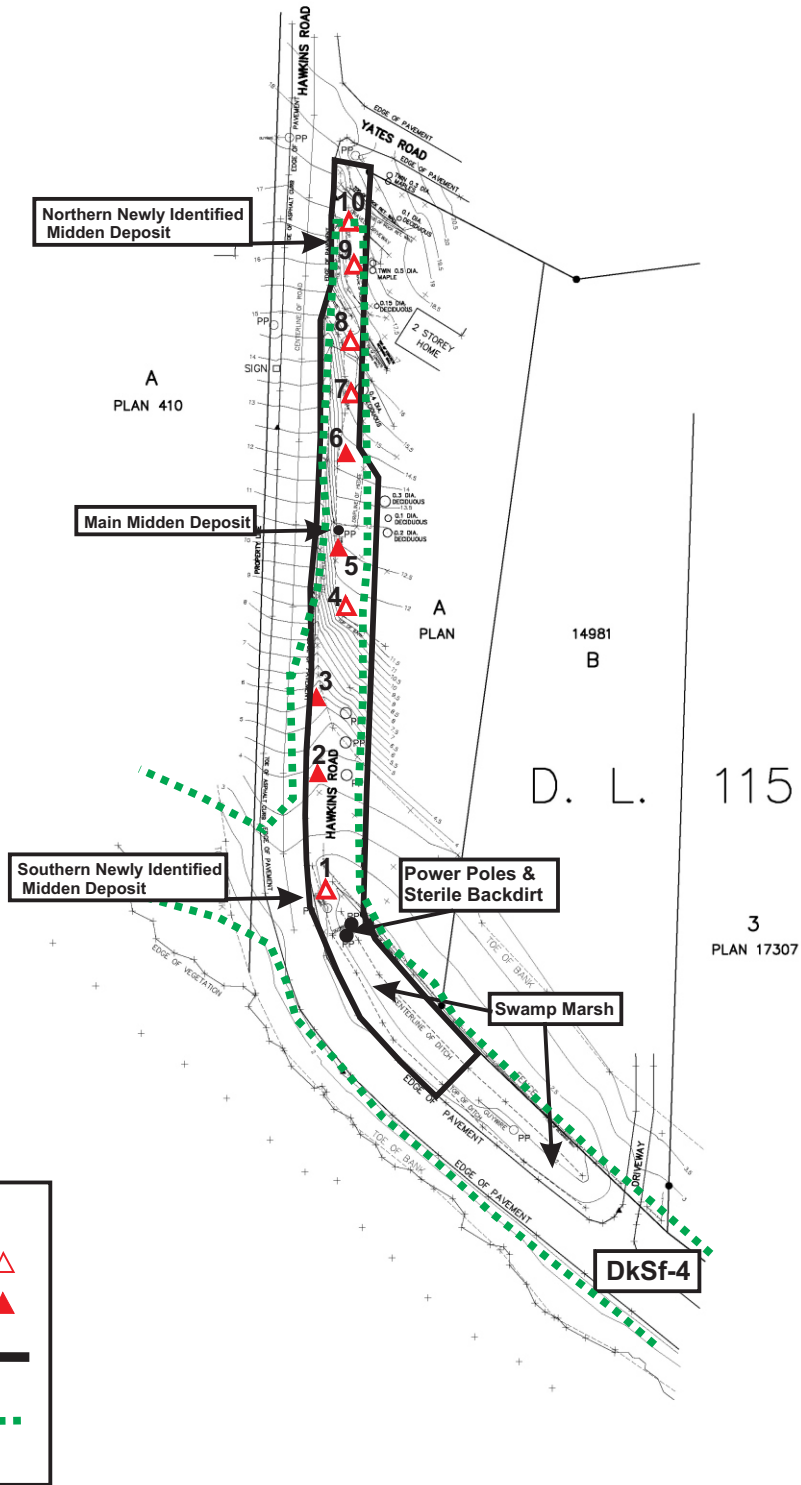


ELEVATIONS ARE GEODETIC AND BASED ON CFB COMOX
CONTROL MONUMENTS AT HMCS QUADRA.

LEGEND:

BEARINGS ARE ASTRONOMIC AND DERIVED
FROM BASE CONTROL MONUMENTS.

- STANDARD CAPPED POST FOUND
- STANDARD IRON POST FOUND
- STANDARD LEAD PLUG FOUND
- ▲ TRAVERSE STATION SET
- W WATER VALVE
- SPOT ELEVATION
- MH MANHOLE
- JB DENOTES ELECTRICAL JUNCTION BOX
- PP DENOTES POWER POLE



LEGEND

Negative Shovel Test (AIA)	△
Positive Shovel Test (AIA)	▲
Development Area	—
Revised Archaeological Site Boundary	---

JUNE 9, 2011

Figure 2. Location of AIA Subsurface Tests and Newly Identified Midden Deposits.



immediately upon project authorization to minimize the chance of delays should items of archaeological significance be encountered during the construction of the forcemain.

GEOTECHNICAL ASSESSMENT FOR OPTION 2

A subsurface geotechnical investigation will be completed along the proposed alignment of the sanitary sewer forcemain. The location of the proposed bore holes will be confirmed with both the MSCL Environmental Engineer as well as Baseline Archaeological services ltd.

Once the bore hole locations are confirmed and the road permits are in place, the field investigation can be completed. A truck mount solid stem auger rig will be utilized to advance approximately 11 boreholes to depths up to 4.0 m, along the length of the proposed alignment. Soil conditions encountered will be logged and select samples will be taken by a representative of MCSL. Upon completion, boreholes will be backfilled with soil cuttings, and, for areas within the asphalt, the surface will be repaired with cold patch asphalt.

Soil samples will be returned to our laboratory facilities for further testing and soil classification. Borehole logs and a borehole location plan will then be drafted along with a geotechnical report covering the following:

1. General discussion of soil conditions and existing road structure encountered;
2. Feasibility of directional drilling;
3. Feasibility of open trenching;
4. Groundwater conditions;
5. Road section re-instatement recommendations;
6. Potential re-use of salvage or native soils;
7. Recommendation for import construction aggregates.

PROJECT SCHEDULE

A detailed project schedule has been prepared for Option 2 and can be found in **Table 2**, overleaf. The required archaeological provincial permitting has been incorporated into the proposed schedule and is shown to run concurrently with the design process.

Based on the proposed project schedule, it is estimated that Tendering can take place in the beginning of June, 2016 with construction commencing at the end of July, 2016.

DETAILED WORK PLAN AND FEE ESTIMATE

The attached manpower matrix indicates in detail MCSL's anticipated scope of work to complete design, tender and construction administration of alternate Option 2.

We have also included with this document **Table 3**, double overleaf, which compares/summarizes routing Options 1 and 2.

CVRD HMCS Quadra Sanitary Forcemain Replacement (Option 2)

McElhanney Consulting Services Ltd

ID	Task Name	Working	Start	Finish	January	February	March	April	May	June	July	August	September	October
1	PHASE 1 - DESIGN AND TENDER	131 days	Jan 25 '16	Jul 25 '16	[Gantt bar spanning from Jan 25 '16 to Jul 25 '16]									
2	DATA ACQUISITION, PLANNING AND PRELIMINARY DESIGN	36 days	Jan 25 '16	Mar 14 '16	[Gantt bar spanning from Jan 25 '16 to Mar 14 '16]									
3	[Meet with CVRD] Project Start-up	0.5 days	Jan 25 '16	Jan 25 '16	◆ 1/25									
4	Topographic & Legal Survey	15 days	Jan 25 '16	Feb 12 '16	[Gantt bar spanning from Jan 25 '16 to Feb 12 '16]									
5	Archeological Assessment & Reporting	10 days	Feb 1 '16	Feb 12 '16	[Gantt bar spanning from Feb 1 '16 to Feb 12 '16]									
6	Environmental Assessment & Reporting	20 days	Jan 25 '16	Feb 19 '16	[Gantt bar spanning from Jan 25 '16 to Feb 19 '16]									
7	Geotechnical Assessment & Reporting	20 days	Feb 15 '16	Mar 11 '16	[Gantt bar spanning from Feb 15 '16 to Mar 11 '16]									
8	Compile Base Plan & Preliminary Design Brief	15 days	Feb 15 '16	Mar 4 '16	[Gantt bar spanning from Feb 15 '16 to Mar 4 '16]									
9	Preliminary Design, Brief & Progress	1 day	Mar 7 '16	Mar 7 '16	◆ 3/7									
10	[Meet with Stakeholders] Consultation Meeting	0.5 days	Mar 14 '16	Mar 14 '16	◆ 3/14									
11	DETAILED DESIGN	55 days	Mar 14 '16	May 27 '16	[Gantt bar spanning from Mar 14 '16 to May 27 '16]									
12	Compile 50% Design Drawings & Class 'B' Cost Estimate	20 days	Mar 14 '16	Apr 8 '16	[Gantt bar spanning from Mar 14 '16 to Apr 8 '16]									
13	Prepare Draft Environmental Management Plan	10 days	Mar 14 '16	Mar 25 '16	[Gantt bar spanning from Mar 14 '16 to Mar 25 '16]									
14	<Submission> 50% Design Package	0 days	Apr 11 '16	Apr 11 '16	◆ 4/11									
15	[Meet with CVRD] 50% Design Review	0.5 days	Apr 18 '16	Apr 18 '16	◆ 4/18									
16	Compile 90% Design Drawings & Class 'A' Cost Estimate	14 days	Apr 19 '16	May 6 '16	[Gantt bar spanning from Apr 19 '16 to May 6 '16]									
17	<Submission> 95% Design Package	0 days	May 9 '16	May 9 '16	◆ 5/9									
18	[Meet with CVRD] 95% Design Review	0.5 days	May 16 '16	May 16 '16	◆ 5/16									
19	Compile 100% Design Drawings & Update Class 'A' Cost Estimate	9 days	May 16 '16	May 26 '16	[Gantt bar spanning from May 16 '16 to May 26 '16]									
20	<Submission> 100% Design Package	1 day	May 27 '16	May 27 '16	[Gantt bar spanning from May 27 '16 to May 27 '16]									
21	ANTICIPATED PERMITTING and CONSULTATION	110 days	Feb 15 '16	Jul 15 '16	[Gantt bar spanning from Feb 15 '16 to Jul 15 '16]									
22	Archeological Site Alteration Permit - Assuming 5 Month Permitting Period	110 days	Feb 15 '16	Jul 15 '16	[Gantt bar spanning from Feb 15 '16 to Jul 15 '16]									
23	CVRD Permit	0.5 days	May 30 '16	May 30 '16	◆ 5/30									
24	Town of Comox Construction Permit	0.5 days	May 30 '16	May 30 '16	◆ 5/30									
25	TENDERING	40 days	May 31 '16	Jul 25 '16	[Gantt bar spanning from May 31 '16 to Jul 25 '16]									
26	Compile Draft Tender Documents & Supplemental Specifications	4 days	May 31 '16	Jun 3 '16	[Gantt bar spanning from May 31 '16 to Jun 3 '16]									
27	<Submission> Draft Tender Documents	0 days	Jun 3 '16	Jun 3 '16	◆ 6/3									
28	Compile Tender Documents	10 days	Jun 6 '16	Jun 17 '16	[Gantt bar spanning from Jun 6 '16 to Jun 17 '16]									
29	Advertise Tender	5 days	Jun 13 '16	Jun 17 '16	[Gantt bar spanning from Jun 13 '16 to Jun 17 '16]									
30	Tendering Period	15 days	Jun 20 '16	Jul 8 '16	[Gantt bar spanning from Jun 20 '16 to Jul 8 '16]									
31	Tender Evaluation	4 days	Jul 11 '16	Jul 14 '16	[Gantt bar spanning from Jul 11 '16 to Jul 14 '16]									
32	Project Award	0 days	Jul 15 '16	Jul 15 '16	◆ 7/15									
33	Prepare the Contract Documents	5 days	Jul 19 '16	Jul 25 '16	[Gantt bar spanning from Jul 19 '16 to Jul 25 '16]									
34	PHASE 2 - CONSTRUCTION	58 days	Jul 25 '16	Oct 12 '16	[Gantt bar spanning from Jul 25 '16 to Oct 12 '16]									
35	CONTRACT ADMINISTRATION AND CONSTRUCTION INSPECTION	58 days	Jul 25 '16	Oct 12 '16	[Gantt bar spanning from Jul 25 '16 to Oct 12 '16]									
36	Compile and Issue "For Construction" Drawings	2 days	Jul 25 '16	Jul 26 '16	◆ 7/26									
37	[Meeting] Pre-Construction Meeting	0.5 days	Jul 29 '16	Jul 29 '16	◆ 7/29									
38	Construction Survey Layout	2 days	Aug 2 '16	Aug 3 '16	[Gantt bar spanning from Aug 2 '16 to Aug 3 '16]									
39	Quality Assurance Construction Monitoring & Reporting	30 days	Aug 2 '16	Sep 12 '16	[Gantt bar spanning from Aug 2 '16 to Sep 12 '16]									
40	Contract Administration	49 days	Aug 2 '16	Oct 7 '16	[Gantt bar spanning from Aug 2 '16 to Oct 7 '16]									
41	Environmental Construction Monitoring	15 days	Aug 31 '16	Sep 20 '16	[Gantt bar spanning from Aug 31 '16 to Sep 20 '16]									
42	Progress Report #1	0 days	Aug 31 '16	Aug 31 '16	◆ 8/31									
45	Substantial Completion Inspection & Certificates	0.5 days	Sep 19 '16	Sep 19 '16	[Gantt bar spanning from Sep 19 '16 to Sep 19 '16]									
43	Progress Report #2	0 days	Sep 28 '16	Sep 28 '16	◆ 9/28									
44	Substantial Completion	0 days	Oct 7 '16	Oct 7 '16	◆ 10/7									
46	Construction Record Drawings	5 days	Oct 6 '16	Oct 12 '16	[Gantt bar spanning from Oct 6 '16 to Oct 12 '16]									



TABLE 3

	Option 1: Comox Harbour Crossing	Option 2: Goose Spit Road Alignment
Environmental / Permitting	Pros	Pros
		Water quality impacts can be mitigated by ESC measures.
		SAP permitting can be completed without impacting design and tendering process.
		Minimizes potential environmental impacts.
		SARA permit is likely not required.
		DFO permitting/authorization not required as work is above high tide.
		Long term risk of sewerage spills into aquatic environments is greatly reduced.
		Can ultimately be re-routed into the Comox #2 pumpstation, decreasing the number of times that effluent must be pumped (2 vs 3), and the total required energy to pump.
		Cons
	Construction will result in a HAAD situation, according to DFO. This necessitates the need for lengthy, and costly permitting (1.5-3 years).	Requires agreement from the Town of Comox to discharge into its gravity collection system.
	Required construction methodology will impact Water Quality .	The proposed alignment runs adjacent to a known archaeological site and therefore a SAP required.
	SAP required; this has not previously been accounted for in the project schedule (not required per Ausenco report).	2015/2016 detailed design is complete to +/-75%.
	Long term environmental monitoring likely required	Causeway construction could limit ability to HDD; additional SARA permitting required if this is the case.
	The proposed alignment runs adjacent to a known archaeological site and therefore a SAP required.	
Constructability	Pros	Pros
	No pump station upgrades required to meet hydraulic demands.	Ease of future access and maintenance.
		Ease of construction, conventional installation and multiple contractors able to complete the works.
		Decreased construction impacts for HMCS operations.
	Cons	Cons
	Difficult construction methodology below tide line, and only one company is known to have the equipment to construct as proposed in Ausenco report.	Requires upgrade of the existing pump station.
Maintenance of forcemain is difficult below tide line.	Impacts traffic and local users.	
Greater likelihood of impacting adjacent forcemain during construction.		
Schedule	2017 or 2018 construction as environmental impacts will likely require a 1 to 2 year permitting process. Project close out will take approximately 7 years if post construction monitoring is required.	Summer 2016 construction is likely.
Project Cost (Inclusive of Contingencies and Soft Costs)	\$987,575	\$1,341,250



CLOSURE

Thank you for the opportunity to be of continued assistance to the Comox Valley Regional District. We trust you will find this document complete, and as expected. Should you have any questions, or wish to discuss further, we would gladly meet at your convenience.

Yours truly,

MCELHANNEY CONSULTING SERVICES LTD.

Mark DeGagné, P.Eng.

JLS/njg

Enclosures

Reviewed by:

Bob Hudson, P.Eng.
Branch Manager

REVISION HISTORY

Date	Status	Revision	Author
January 15, 2016	Final	2	Mark DeGagné, P.Eng.
November 25, 2015	Final	1	Mark DeGagné, P.Eng.
November 13, 2015	Final	0	Mark DeGagné, P.Eng.

LIMITATION

This report has been prepared for the exclusive use of the Comox Valley Regional District. The material in it reflects the best judgement of the Consultant in light of the information available to the Consultant at the time of preparation. As such, McElhanney, its employees, sub-consultants and agents will not be liable for any losses or other consequences resulting from the use or reliance on the report by any third party.

MCELHANNEY CONSULTING SERVICES LTD. 2211-47393 FEE ESTIMATE SUMMARY - Phase 2 (Revision 1) HMCS QUADRA SANITARY FORCEMAIN REPLACEMENT PHASE 2 CONSTRUCTION 15/01/2015		Budgeted Hours											Budgeted Fees															
		Bob Hudson, P.Eng Quality and Project Coordinator	Mark DeGagne, P.Eng Lead Engineer	John Sorenson, P.Eng Civil Engineer	Ed Mullen Civil Technologist	Paul Burt, RPBio. Env QA and Review	Cindy Lipp, RPBio. Project Biologist	Environmental Monitor	Survey Field Crew	Field Assessment Assistant	Construction Inspector	Administration	TOTAL HOURS	Bob Hudson, P.Eng Quality and Project Coordinator	Mark DeGagne, P.Eng Lead Engineer	John Sorenson, P.Eng Civil Engineer	Ed Mullen Civil Technologist	Paul Burt, RPBio. Env QA and Review	Cindy Lipp, RPBio. Project Biologist	Environmental Monitor	Survey Field Crew	Field Assessment Assistant	Construction Inspector	Administration	SUBTOTAL	DISBURSEMENTS (6% (unless bold))	TOTAL FEES	
ACTIVITY 5	CONTRACT ADMINISTRATION AND CONSTRUCTION INSPECTION												\$ 155	\$ 155	\$ 135	\$ 85	\$ 166	\$ 127	\$ 95	\$ 175	\$ 90	\$ 95	\$ 75					
5.1	Prepare and issue "For Construction" drawing set.		1.0	2.0	8.0						2.0	13.0	\$ -	\$ 155	\$ 270	\$ 680	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 150	\$ 1,255	\$ 75.30	\$ 1,330.30		
5.2	Organize, chair and minute a preconstruction meeting, to be attended by the contractor, engineer, CVRD, DND.		3.0	4.0							1.0	8.0	\$ -	\$ 465	\$ 540	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 75	\$ 1,080	\$ 64.80	\$ 1,144.80		
5.3	Provide quality assurance inspection of the forcemain installation, based on 4 hours per day x 30 working days. Inspectors daily duties to include: - photographing works, construction activities, - ensure compliance with WCB, CVRD, DND, and provincial/federal legislation, - ensure compliance with the Environmental Management Plan, - ensure all required testing (air pressure tests, manhole exfiltration tests, etc.) are completed, - confirm payment quantities to evaluate progress claims, - generate deficiency lists.			15.0							7.0	172.0	\$ -	\$ -	\$ 2,025	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 14,250	\$ 525	\$ 16,800	\$ 1,008.00	\$ 17,808.00		
5.4	Provide quality assurance inspection of pumpstation upgrades, based on 4 hours per day x 5 working days. Inspectors daily duties to include: - photographing works, construction activities, - ensure compliance with WCB, CVRD, DND, and provincial/federal legislation, - ensure compliance with the Environmental Management Plan, - ensure all required testing are completed, - confirm payment quantities to evaluate progress claims, - generate deficiency lists.											0.0	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
5.5	Prepare monthly reports for the CVRD with indicating project progress, status and schedule, payment certificates, summary of change orders, and balance of funding to date. One monthly report and one summary report are assumed.			1.0	4.0							5.0	\$ -	\$ -	\$ 135	\$ 340	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 475	\$ 28.50	\$ 503.50		
5.6	Provide materials testing services (density testing of all structural fills, asphalt, and concrete).											0.0	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
5.7	Attend to all required Contract Administration duties, including but not limited to: - review of all shop drawings and contractor submittals, - prepare and certify monthly progress draws (based on the construction duration we have assumed there will be 3 draws), - attend to contractor inquiries, - issue change orders, field directives as required, - ensure overall delivery schedule is met, - attend to public enquiries as needed.			20.0	6.0						4.0	30.0	\$ -	\$ -	\$ 2,700	\$ 510	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 300	\$ 3,510	\$ 210.60	\$ 3,720.60		
5.8	Prepare certificates of substantial and total contract performance.			2.0	4.0						4.0	10.0	\$ -	\$ -	\$ 270	\$ 340	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 300	\$ 910	\$ 54.60	\$ 964.60		
5.9	Environment monitoring during construction. We have assumed all works within environmentally sensitive areas will be completed within a 2 week work window and all works outside sensitive areas will be completed within an additional 2 weeks.						16.0	28.0				44.0	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,032	\$ 2,660	\$ -	\$ -	\$ -	\$ -	\$ 4,692	\$ 281.52	\$ 4,973.52		
5.10	Construction survey Layout of all major components of the work, including deflection points within the forcemain alignment, the locations of fittings, appurtenances, manholes, connections, etc.			1.0	6.0						24.0	31.0	\$ -	\$ -	\$ 135	\$ 510	\$ -	\$ -	\$ -	\$ 4,200	\$ -	\$ -	\$ -	\$ 4,845	\$ 290.70	\$ 5,135.70		
5.11	Construction Record Drawings based on contactor markups		2.0	6.0	24.0							33.0	\$ -	\$ 310	\$ 810	\$ 2,040	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 75	\$ 3,235	\$ 194.10	\$ 3,429.10		
	SUBTOTAL	0.0	6.0	51.0	52.0	0.0	16.0			24.0	0.0	150.0	19.0	346.0	\$ -	\$ 930	\$ 6,885	\$ 4,420	\$ -	\$ 2,032	\$ 2,660	\$ 4,200	\$ -	\$ 14,250	\$ 1,425	\$ 36,802	\$ 2,208.12	\$ 39,010.12
PROVISIONAL ITEMS FOR BUDGETARY PURPOSES (Not Included In Project Total)																												
Provisional 1	Materials Testing																										\$ 15,000.00	
Provisional 2	On-site Archaeology review during construction																										\$ 25,000.00	
Provisional 3	Design of upgrades to proposed pump station																										\$ 30,000.00	
Provisional 4	Species at Risk (SARA) Permitting																										\$ 5,000.00	
Provisional 5	Pump Station Construction Administration and Supervision																										\$ 10,000.00	
Provisional 5	Additional project coordination meetings. Lump sum \$675 for 2 hour meeting attending by project engineer and project coordinator, distribution of meeting minutes thereafter. (4 additional meetings assumed)																										\$ 2,700.00	
	SUBTOTAL																										\$ 87,700.00	