

**DATE:** May 12, 2016

**FILE:** 5340-02

**TO:** Chair and members  
Comox Valley sewage commission

**FROM:** Debra Oakman, CPA, CMA  
Chief Administrative Officer

**RE:** Comox No. 2 pump station siting – Beech Street update

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### **Purpose**

To provide the results of survey work, preliminary layout and preliminary architectural work related to the siting of the Comox No. 2 pump station on Beech Street.

### **Policy analysis**

The Comox Valley Regional District (CVRD) operates a sewerage service primarily for the City of Courtenay and Town of Comox, established by Bylaw No. 2541, being the “Comox Valley Sewerage Service Establishment Bylaw No. 2541, 2003”.

At its March 1, 2016 meeting, the Comox Valley sewage commission approved the following recommendation:

*THAT staff continue efforts on the Beech Street property for a Comox No. 2 pump station and a public open house be held regarding the Beech Street site within three months from March 1, 2016.*

### **Executive summary**

A new Comox No. 2 pump station is required in order to resolve the long standing environmental risk associated with the CVRDs wastewater forcemain along Willemar Bluff, and also to increase pumping capacity at the Courtenay and Jane Place pump stations. In late 2014 the CVRD purchased a property on Beech Street in the Croteau Beach neighbourhood as the site for the future Comox No. 2 pump station. Local neighbourhood opposition to the selection of the Beech Street site has been significant and in an effort to address neighbourhood concerns the sewage commission established the Comox No 2 pump station site advisory group to investigate alternate sites.

An alternate site at the base of Croteau Road was investigated by the CVRD with the completion of several preliminary studies aimed at identifying the potential layout of future infrastructure, the impact to archeological features, the impact to ground water resources and the placement of features in the unopened road right of way. The study work revealed that the site was constrained by its narrow configuration and low elevation and generally not suitable for the construction of the future pump station.

At its March 1, 2016 meeting, the Comox Valley sewage commission approved the following recommendation:

*THAT staff continue efforts on the Beech Street property for a Comox No. 2 pump station and a public open house be held regarding the Beech Street site within three months from March 1, 2016.*

The CVRD has completed preliminary study work related to the potential configuration of the Comox No. 2 pump station at Beech Street, as well as preliminary conceptual architectural work

showing possible building design. The following sections provide a brief overview of these reports along with a summary of survey work completed at the site:

### 1. Pump station configuration (Appendix A)

The CVRD retained AECOM to prepare a preliminary pump station configuration for the Beech Street site. The site is less constrained than the Croteau Road right-of-way previously examined and as a result, AECOM has delivered the optimum configuration for this property. The site elevation varies from 15 metres to 19 metres such that a retaining wall is proposed to maintain a pump station floor elevation of 15.5 metres. The bottom of the wet-well would be constructed at an elevation of 10 metres. Setting the floor elevation equal to the lower property elevation also helps to set the pump station down into the property, improving aesthetics.

This configuration allows operation of the wet-well at 12 metres geodetic thereby optimizing the existing Courtenay and Jane Place pump stations. Additional storage volume is gained by the installation of a gravity sewer pipe along Doeliddle Road from its intersection with Croteau Road to the pump station on Beech Street. Through this configuration a total of 22.5 minutes of storage is provided. The building size, at approximately 175m<sup>2</sup> (1,880ft<sup>2</sup>), although larger than previous conceptual layouts, is appropriate for the site and provides better containment of and access to the pumping equipment. All pumps, motors, mechanical equipment, electrical equipment and backup generator are now housed in the pump station building providing excellent opportunities for sound and odour control.

The Comox No. 2 Pump Station will be designed to the highest standards for acoustic sound control, pump station odour control and operational redundancy. Air will be extracted from the pumping station wet-well, upstream gravity sewer and forcemain discharge chamber and treated to remove all odour. The station will be constructed with acoustical panels and insulation to attenuate noise on site. An acoustical engineer will specify material and construction details. Operationally the pump station will have several redundant system including a standby generator to ensure continuous availability.

The configuration provided is conceptual only and will be further refined and optimized during the next phase of more detailed planning and engineering.

### 2. Architectural concepts (Appendix B)

The CVRD retained HDR|CEI Architecture Associates Inc. (HDR) to prepare preliminary concepts of how the Comox No. 2 pump station could be designed to suit the form and character of the Croteau Beach neighbourhood. HDR has developed three concepts as follows:

- Earth sheltered building – in this concept the future pump station building would be designed to integrate with the existing landscape to the greatest extent possible. The pump station building could be designed with a low-profile green roof similar to the concepts provided by HDR.
- Residential character – in this concept the future pump station building would be designed to match the form and character of other buildings in the Croteau Beach neighbourhood. Several examples are provided by HDR including the Currie Road pump station in Oak Bay, BC which is fully integrated into a residential area on Currie Road.
- Simple rural form – in this concept the future pump station building would be designed to take the form of a simple rural building (like a historical area barn).

The architectural work completed by HDR for the Comox No. 2 pump station project is preliminary and conceptual in nature and will be further refined and optimized during the next phase of more detailed planning and engineering.

### 3. Topographic survey (Appendix C)

The CVRD retained McElhanney Associates Land Survey Ltd. to complete a comprehensive survey of the Beech Street property. McElhanney have produced a detailed drawing showing all key features including existing trees, buildings, fencing and ditching. The property slopes gently from the south-west corner to the north-east corner dropping approximately 3.5 metres and provides good opportunity for buffering to adjacent properties.

#### Communications

The CVRD will host a public information meeting tentatively scheduled for June 9, 2016 in the CVRD boardroom. The meeting will set-up as an information sharing session with poster boards displayed around the following topics:

- beach erosion along Willemar Bluff
- study work recommending the Comox No. 2 pump station and inland forcemain
- sewer master plan summarizing routing options
- Heuristic study recommending Beech Street
- preliminary layout and architectural concepts developed for Beech Street

The meeting format will provide residents from across the Comox Valley to gain an appreciation for the project need and provide them with the conceptual solution. Staff and consultants will be on hand to answer the public's questions.

#### Next steps

The next step in the Comox No. 2 pump station project is for the CVRD to retain an engineering consultant to complete more detailed planning and engineering required to progress the work. The next phase of engineering will generally be focused on:

- Environmental permitting
- Detailed pump and motor sizing
- Detailed pipe sizing and routing
- Detailed tie-in design
- Detailed pump station configuration and optimization
- Detailed construction planning
- Detailed architectural design

Over the next month, staff will work to prepare the terms of reference for this next stage of detailed engineering and then work through a request for proposal process in summer 2016 for the selection of a design consultant.

**Recommendation from the chief administrative officer:**

For information purposes only.

Respectfully:

***D. Oakman***

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Debra Oakman, CPA, CMA  
Chief Administrative Officer

Prepared by:

***M. Rutten***

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

Attachments: Appendix A – “Pump station configuration, AECOM”  
Appendix B – “Architectural concepts, HDR | CEI”  
Appendix C – “Topographic survey, McElhanney”

# Technical Memorandum

To Marc Rutten, Comox Valley Regional District Page 1

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CC Ken Moysiuk, AECOM

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Subject **Comox Pump Station No. 2  
Beech Street Location**

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From Michael Celli, AECOM

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Date May 6, 2016 Project Number 60333483

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## 1. Introduction

Flow from the Courtenay Pump Station and Jane Place Pump Station currently discharges into a common forcemain. The forcemain is 750 mm diameter at the discharge of the Courtenay Pump Station and increases in size to 900 mm at the tie-in point downstream of the Jane Place Pump Station. After the tie-in, the forcemain runs along the shoreline past Goose Spit, along the Wilemar Bluffs, with final discharge to the Comox Valley Water Pollution Control Centre (CVWPCC).

The Comox Valley Regional District is investigating options for constructing a new pump station (Comox Pump Station No. 2) to reroute the Courtenay Forcemain away from the Wilemar Bluffs due to shoreline erosion and environmental concerns. A new pump station is required to overcome the elevation gain with this overland route. More details on the forcemain routing can be found in the *Forcemain Re-alignment Study (2005)* prepared by CH2M Hill for the CVRD. The new pump station would also augment the capacity of the Courtenay Pump Station by reducing the forcemain length (i.e. less friction loss). The Courtenay Pump Station is currently operating near maximum capacity.

This memorandum is intended to discuss a potential site identified on Beech Street for the Comox Pump Station No. 2.

### 1.1 Work to Date

This technical memorandum is intended to build upon work completed to date to address the re-routing of the Courtney PS forcemain around the Wilemar bluffs. The work completed includes the following:

- *Forcemain Re-alignment Study (2005)*, CH2M Hill
- *CVRD Sanitary Sewerage Master Plan (2011)*, OPUS DaytonKnight and McElhanney
- *Courtney Pump Station Sewerage Systems Upgrading and Staging Plan (2013)*, AECOM
- *Pump Station Siting Study (2014)*, AECOM
- *Courtenay Pump Station Forcemain Routing (2016)*, AECOM

## 2. Beech Street Site

### 2.1 Scope of Project

The original CH2M Hill (2005) study recommended that the Comox Pump Station No. 2 be constructed on near Docliddle Rd. and Croteau Rd. The CVRD has purchased a site near the intersection of Beech St. and Docliddle Rd. This location is illustrated in Figure 1.

**Figure 1. Proposed Beech St. Site**



The scope of construction for Comox Pump Station No. 2 would include the following:

- Construction of a new pump station near the intersection of Docliddle Rd. and Beech St.
- Diversion of the existing Courtenay Pump Station forcemain to a discharge chamber at Docliddle Rd.
- Gravity sewer piping along Docliddle Rd. to the proposed site at Beech St.
- Construction of the proposed landside forcemain realignment from the Comox Pump Station No. 2 to the CVWPCC

Conceptual drawings for construction of the Comox Pump Station No. 2 on this proposed site are attached to this memorandum.

## **2.2 Site Elevation**

The elevation of the proposed site varies from 15 m at the southwest corner to 19 m at the northeast corner. As shown on the drawings, AECOM proposes that a lockblock retaining wall would be constructed to maintain a common grade elevation of 15.5 m on site. The building floor elevation would then be 15.8 m, and the wet-well would be constructed to a depth of 10 m geodetic.

The proposed operating water level for the Comox Pump Station No. 2 is 12 m geodetic based on previous studies. It would be feasible to operate at this water level based on the Beech St. site elevation. If this site is selected, further hydraulic study should be performed to identify a final wet-well depth and identify pump start / start levels as well as the hydraulic impact to the existing upstream pump stations.

## **2.3 Pump Station Layout**

The design standard for layout of pumping stations is the Hydraulic Institute Standard for Pump Intake Design (ANSI/HI 9.8-2012). This standard provides several design options and guidelines for the construction of a pumping station wet well and would be applied for the design of the Comox Pump Station no. 2.

Based on the layout of the proposed site and anticipated piping alignment, AECOM has selected a Flygt-style rectangular wet-well as described in Appendix E of the HI standard. This wet-well configuration is illustrated in the attached drawings.

The pumps would be installed in a wet-well / dry-well arrangement, which is recommended for this size of pump station. The pumps would be installed below-grade and would be shaft-driven or dry-pit submersible type (similar to the Courtenay Pump Station). The dry-well would be designed to include a means of pump removal and service when required.

## **2.4 Wet-well Storage**

Key components of this pumping station site option are the forcemain discharge chamber and gravity sewer piping along Docliddle Rd. The gravity piping provides an alternative for wet-well storage. Provision of in-pipe storage upstream of a pump station wet-well is a common design that is applied for regional pumping stations.

Regional pumping stations such as the proposed Comox Pump Station No. 2 have high flow rates, and on-site storage would require a large reservoir wet-well. It is generally impractical to construct a wet-well of sufficient volume to provide storage for a regional pumping station. Therefore, in-pipe storage provides a solution that allows storage to be provided in the main gravity trunk sewers upstream.

In the case of the Comox Pump Station 2, it is recommended that storage be provided to simplify the coordination of control with the existing Courtenay and Comox Pump Stations. The in-pipe storage will provide buffering of flow such that there can be a time delay between pump start at the Courtenay and existing Comox Pump Station, and pump start at the proposed Comox Pump Station No 2. Further, if a pump fails to start at the proposed Comox Pump Station No. 2, then the provision of storage will allow the system time to react to this failure condition.

As an example, the forcemain discharge chamber could be constructed in the road right-of-way at the intersection of Doeliddle and Croteau Rd. At this point, flow would transition to a 1200 mm gravity pipe to the proposed pump station. Considering a single pump running at the Courtenay Pump Station at a flow rate of 350 L/s, this pipe would provide 13.5 minutes storage. The wet-well would provide an additional 8.7 minutes storage and therefore a total storage time of 22.2 minutes could be achieved under this design concept. If additional storage is required, a deeper wet-well could also be constructed under this option.

The challenge to providing in-pipe storage is identifying a site where a long, large diameter gravity pipe may be installed at a shallow grade. Further, odour could be an issue in the storage pipe and forcemain discharge chamber and therefore ventilation will be required as part of the overall pump station odour control facility.

## ***2.5 Electrical, Instrumentation and Controls***

Due to the size and limited storage at the proposed pump station, VFD-driven pumps would be a requirement. It is anticipated that the pumps will be powered by 600 v / 3 Ph. / 60 Hz VFDs that would be installed in the electrical room that is illustrated on the attached drawing. The pump station would also include a standby diesel genset of sufficient capacity to meet the design flow in case of a power outage.

An ultrasonic level sensor would be used to measure the water level in the wet-well. Standby level measurement would be provided by a redundant level sensor. The pumps would be operated to maintain a constant water level. The pumps would be progressively started in a lead/1<sup>st</sup> lag/2<sup>nd</sup> lag type configuration, with separate start and operating levels for each lag pump.

The pump station would be controlled by a PLC that would be interconnected with all instruments and electrical equipment. A standby PLC would be included in the design to provide redundancy in case of PLC failure. An RTU would also be included to communicate with the CVRD SCADA system, and for coordination of controls with the upstream pumping stations (Courtenay Pump Station and Comox Pump Station No. 1).

## ***2.6 Constructability Issues***

### ***2.6.1 Pump Station Construction***

The proposed pump station site is essentially green-field and therefore construction of the pump station can be performed without difficulty. The proposed area is on well water, septic tanks and overhead power; therefore utility conflicts are not expected to be an issue. Three phase power may be available on Croteau Road, and if not, it is likely available close by on Lazo Road.

### ***2.6.2 Forcemain Tie-ins***

Construction challenges will occur during tie-in to the existing Courtenay Forcemain. The nearest upstream isolation valve on the forcemain is near the Marina Park at Port Augusta St. The isolation valve would be closed to allow tie-in of a forcemain diversion chamber; however the long pipe length to the valve would mean significant time would be required to drain the forcemain in this area. The

forcemain diversion chamber would allow flow to be redirected to the proposed pumping station. The chamber would be overbuilt on the Courtenay Forcemain, and the forcemain broken into once construction of the chamber and pumping station is complete.

The Courtenay Forcemain is constructed of Hyprescon pipe—a reinforced concrete pipe with tensioned steel reinforcement. Specific design and construction guidelines must be followed in accordance with the manufacturer's recommendations when cutting or otherwise breaking into this type of pipe for forcemains.

## ***2.7 Aesthetic Impacts / Considerations***

The pump station could be designed architecturally to fit in with the local area to limit aesthetic impacts. An attractively designed building and landscaped site would likely be better received by local residents.

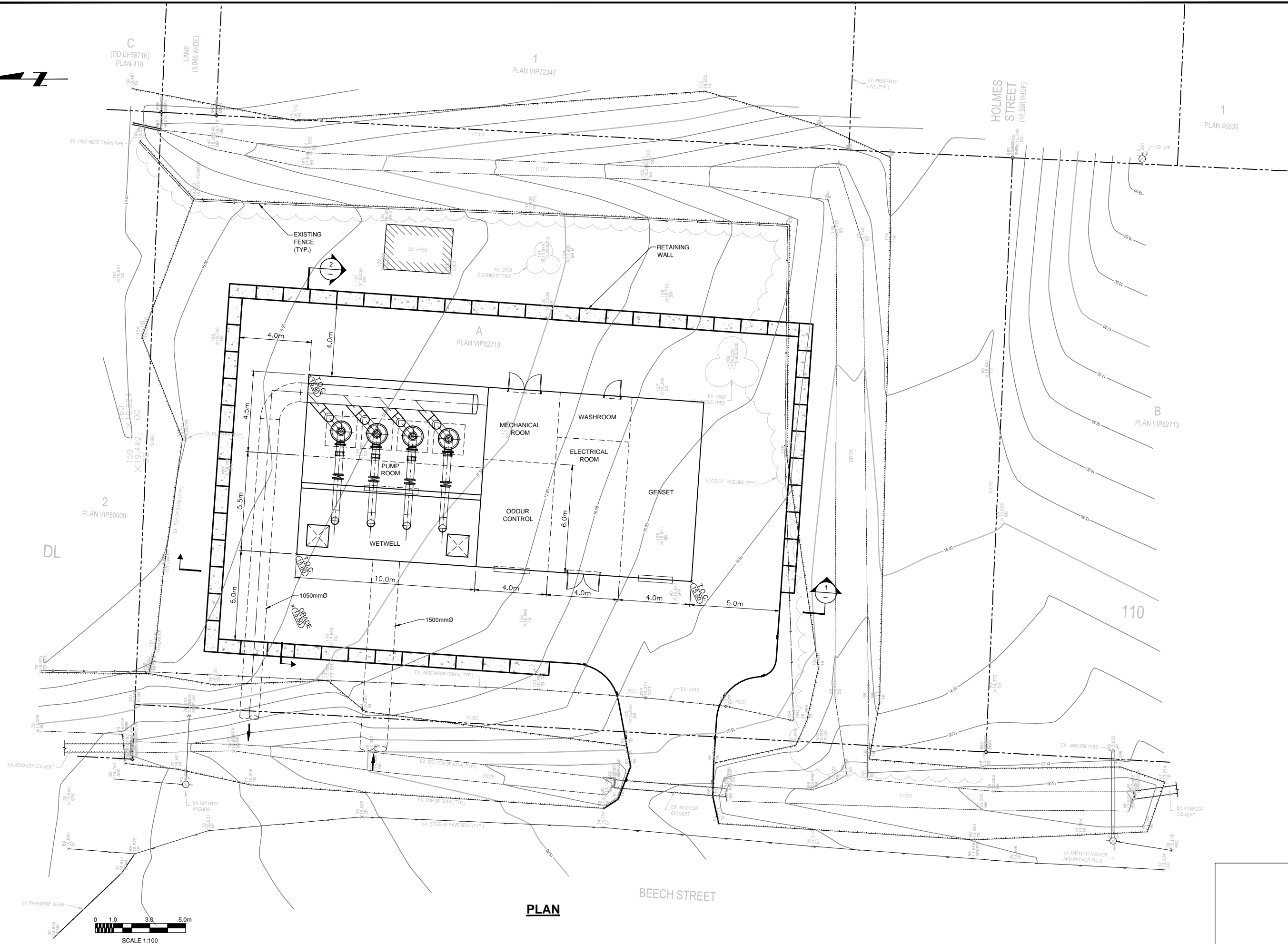
Odour control would be a key consideration for the pump station given its close proximity to residents. Odour control would be required to extract air from the pumping station wet-well, upstream gravity sewer, and the forcemain discharge chamber. Sufficient air would be extracted to maintain this entire system at negative pressure to prevent the release of fugitive emissions. A carbon scrubber would be a suitable technology for odour control. Treated air could be discharged above the pump station building roofline through a dispersion stack.

The pump station would be constructed with acoustical panels and insulation to attenuate noise on site. An acoustical engineer would specify materials and construction details to ensure that the total noise emission is within an acceptable range.

### ***2.7.1 Construction***

There will be significant noise impacts to the neighbourhood around the proposed site during construction of the pump station. The contract documents would need to place limitations on timing and methods of construction to meet current noise bylaws.

An environmental assessment (EA) would be required for the project and it is recommended that it be undertaken during the preliminary design phase. The EA would cover off such items as sediment control, species assessment, air emissions, etc. and proposed mitigation measures.

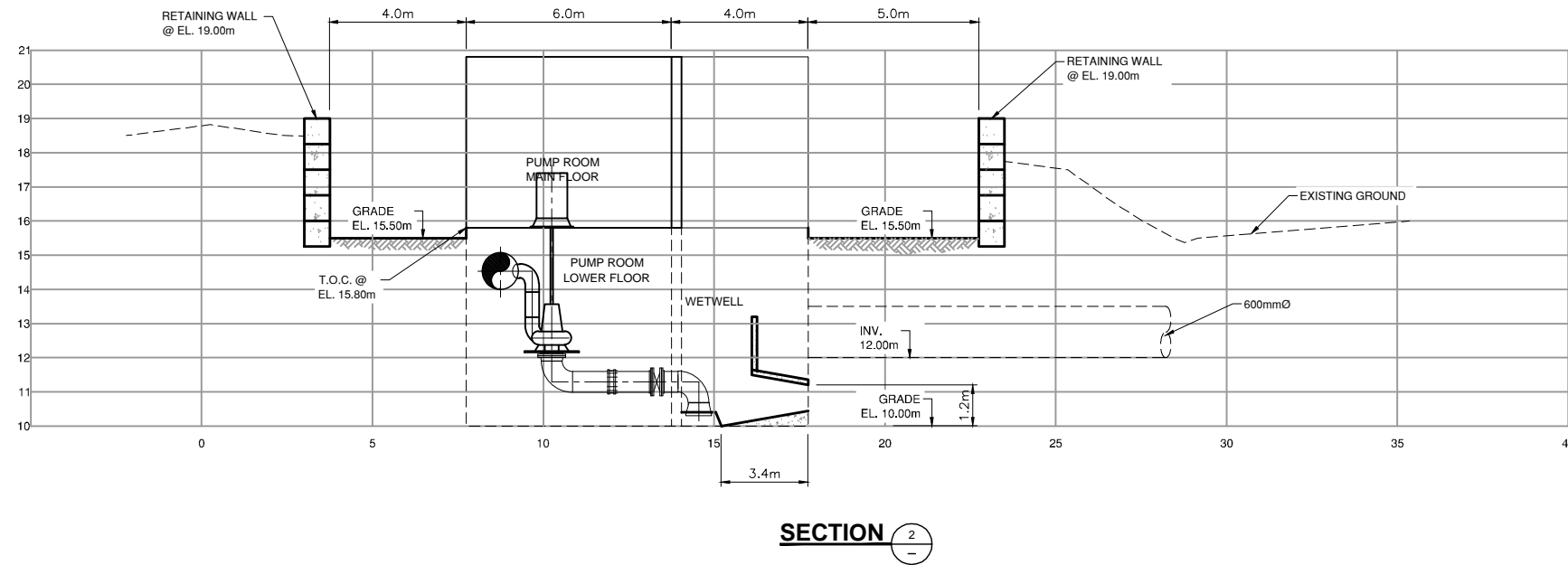
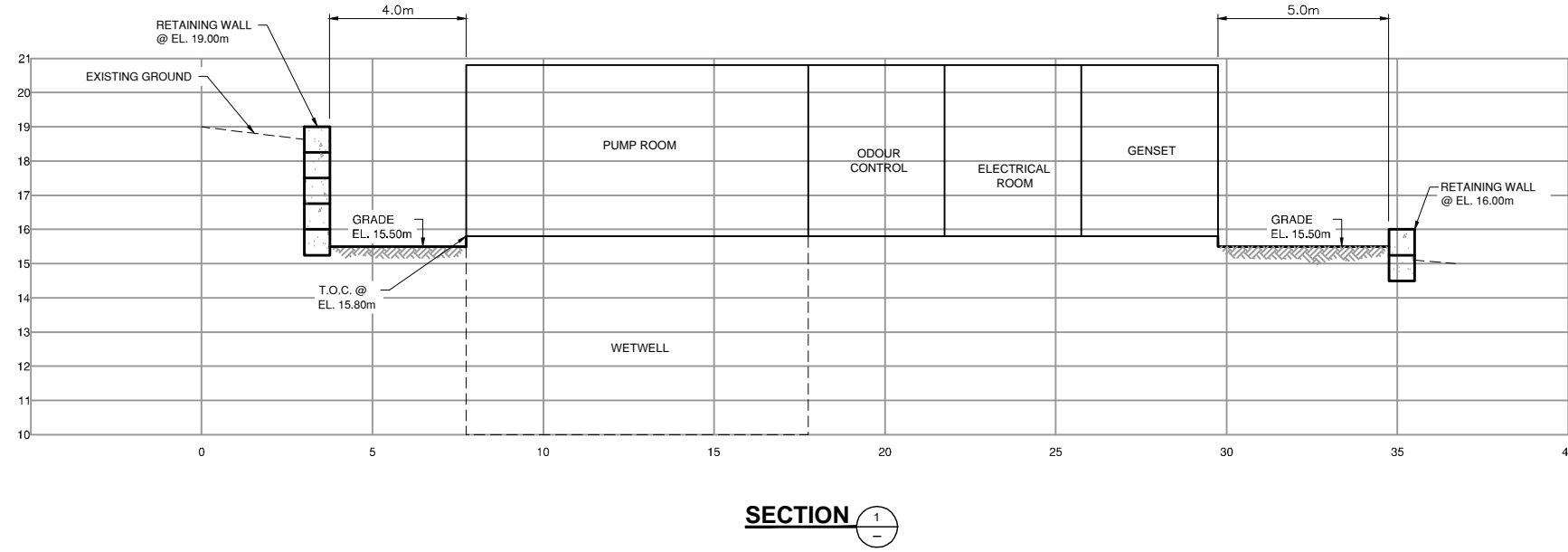
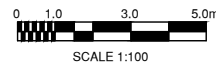


**PLAN**

COMOX VALLEY REGIONAL DISTRICT		COMOX VALLEY REGIONAL DISTRICT		COMOX VALLEY REGIONAL DISTRICT	
COMOX PUMP STATION No. 2		COMOX VALLEY REGIONAL DISTRICT		COMOX VALLEY REGIONAL DISTRICT	
SITE PLAN		COMOX VALLEY REGIONAL DISTRICT		COMOX VALLEY REGIONAL DISTRICT	
PROJECT START DATE (M / Y)		MAY, 2016		PROJECT NO. 60333483	
FILENAME		SK-001_002_60333483.dwg		SHEET NO.	
DRAWING NO.		SK-001		DESCRIPTION	
DRN BY:	PTL	DES BY:	KM	CHK BY:	A
APP BY:	REV	APP BY:	REV	APP BY:	REV
VERIFIED IF PLAN SHEET IS REDUCED				DRN	CHK
30mm				20160502	DATE (YMD)

**AECOM**  
 4th FLOOR,  
 3292 PRODUCTION WAY,  
 BURNABY, B.C., V5A 4R4  
 604-444-6400

**Comox Valley**  
 REGIONAL DISTRICT



DRN BY:	PTL	DES BY:	KM	CHK BY:	APP BY:	REV	DESCRIPTION
						A	

PREPARED FOR:

VERIFIED SCALE IF PLAN SHEET IS REDUCED

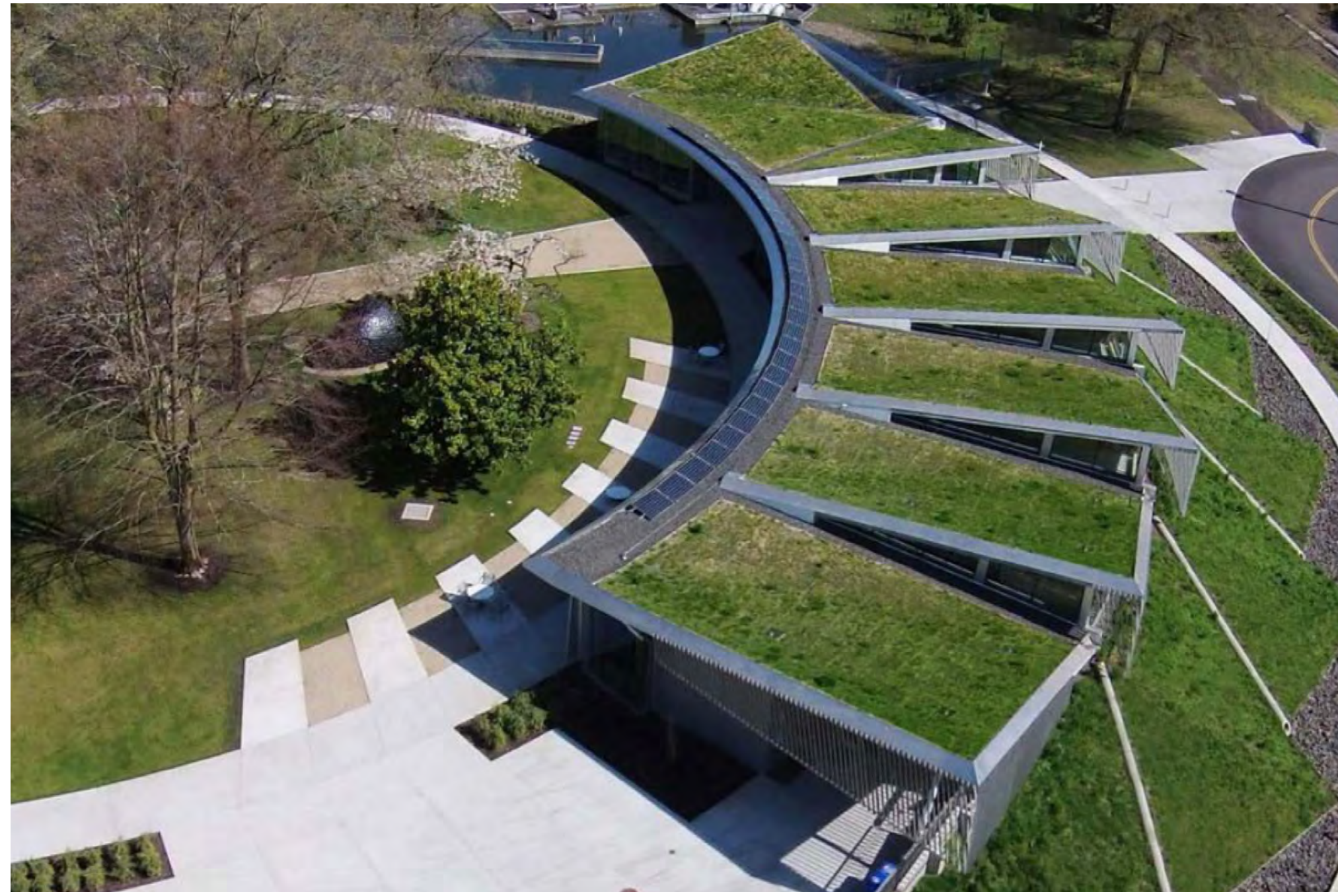
PREPARED BY:

4th FLOOR,  
 3292 PRODUCTION WAY,  
 BURNABY, B.C., V5A 4R4  
 604-444-6400

COMOX VALLEY REGIONAL DISTRICT  
 COMOX PUMP STATION No. 2  
 SECTIONS

PROJECT START DATE (M / Y)	MAY, 2016
PROJECT NO.	60333483
FILENAME	SK-001_002_60333483.dwg
SHEET NO.	
DRAWING NO.	SK-002

**EARTH SHELTERED BUILDING**



**COLUMBIA BOULEVARD WASTEWATER TREATMENT PLANT**  
SKYLAB ARCHITECTURE



**RESIDENTIAL CHARACTER**



**CURRIE ROAD PUMP STATION - OAK BAY BC**



**SIMPLE RURAL FORM**

APPENDIX B



**TILLIMOOK FOREST RESEARCH CENTRE**  
THE MILLER HULL PARTNERSHIP

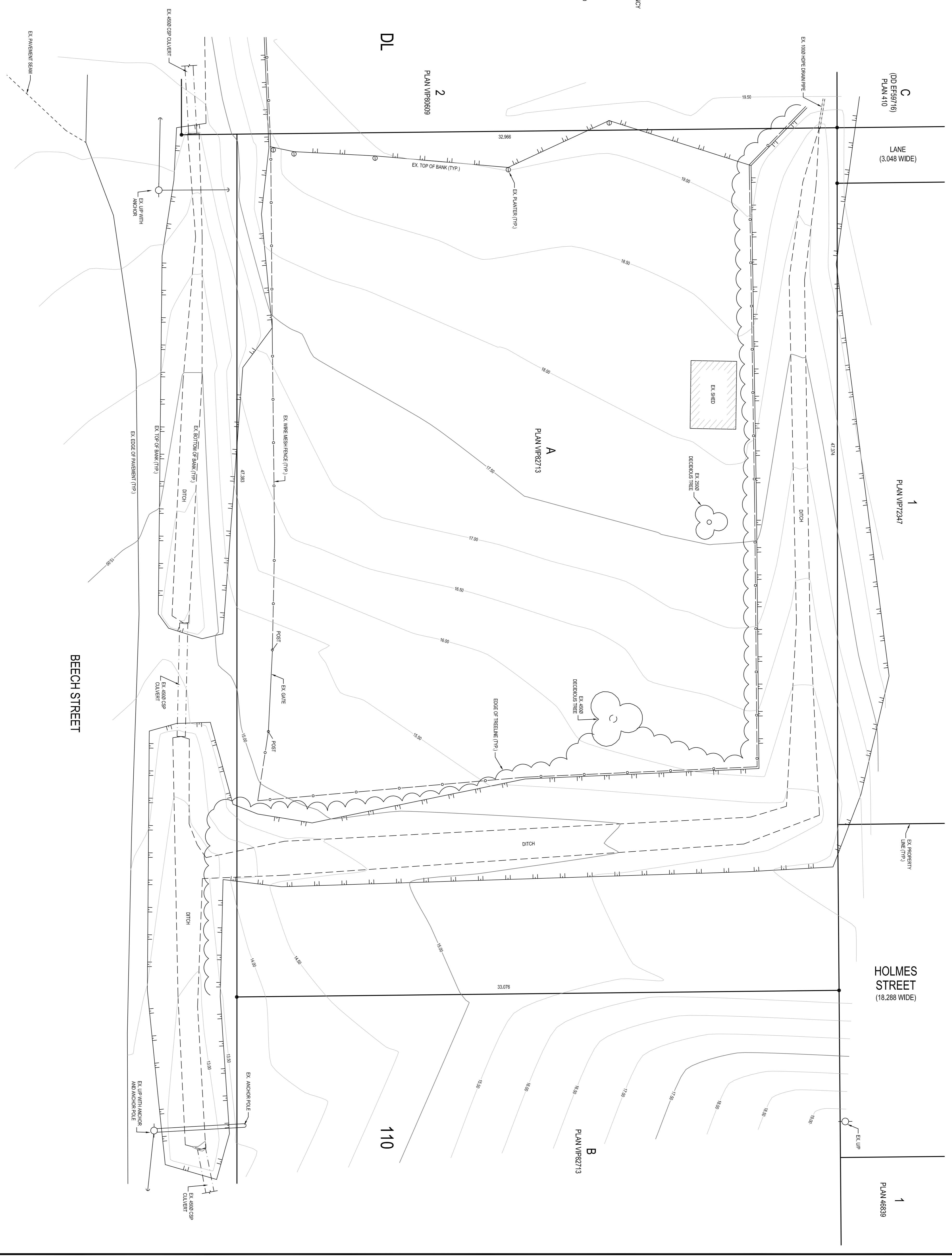




LEGEND

- STANDARD IRON POST FOUND
- EXISTING UTILITY POLE AND ANCHOR
- EXISTING PLANTER
- EXISTING TOP OF BANK
- EXISTING BOTTOM OF BANK
- EXISTING EDGE OF PAVEMENT
- EXISTING PROPERTY LINES
- EXISTING DRAINAGE CULVERT
- EXISTING FENCE
- EXISTING DECIDUOUS TREE
- EDGE OF FREELINE

ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM DUAL FREQUENCY GNSS OBSERVATIONS.  
 CONTOURS ARE SHOWN IN 0.5 METRE INTERVALS.  
 SURVEY COMPLETED MARCH 23 2016.  
 PARCEL BOUNDARIES HAVE BEEN DERIVED FROM PLAN VIP82713 AND SURVEY EVIDENCE AS SHOWN.



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**McElhanney**  
 McElhanney Associates Land Surveying Ltd.  
 405 Sisk Street  
 Courtenay BC  
 Canada V9N 6V4  
 TEL: 250.338.9465

Approved Sealed

COMOX VALLEY REGIONAL DISTRICT  
 600 COMOX ROAD, COURTENAY, BC  
 TOPOGRAPHIC SURVEY OF  
 LOT A, D.L. 110, COMOX DISTRICT  
 PLAN VIP82713

Drawing No. 2  
 Project Number 2212-05544-0  
 Rev 0