

FORM 1

Riparian Areas Protection Regulation - Qualified Environmental Professional - Assessment Report

**Riparian Areas Protection Regulation: Assessment Report**

Please refer to submission instructions and assessment report guidelines when completing this report.

Date

**I. Primary QEP Information**

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Prov/state	BC	Country	CAN

**II. Secondary QEP Information (use Form 2 for other QEPs)**

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Prov/state	BC	Country	Canada

**III. Developer Information**

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Prov/state	BC	Country	CAN

**IV. Development Information**

Development Type	Construction: Commercial		
Area of Development (ha)	1.63	Riparian Length (m)	520
Lot Area (ha)	3.25	Nature of Development	Redevelopment
Proposed Start Date	October 1, 2021	Proposed End Date	April 30, 2022

**V. Location of Proposed Development**

Street Address (or nearest town)	2401 Burnside Road		
Local Government	Town of View Royal	City	View Royal
Stream Name	Craigflower Creek		
Legal Description (PID)	024850225	Region	British Columbia
Stream/River Type	Stream	DFO Area	19 (tributary to 19-1)
Watershed Code	920-077200		
Latitude	48	27	48.13 Longitude 123 26 48.3

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## **Section 1. Description of Fisheries Resources Values and a Description of the Development proposal**

### **Proposed Development**

The proposed development is located at 2401 Burnside Road (the Site) in the Town of View Royal, British Columbia (BC) adjacent to Highway 1 and within the Capital Regional District (CRD). The property is currently leased by the Victoria Bowman Outdoor Range. Galloping Goose Trail is located on the northeast side of the property and a BC Hydro right-of-way runs north-south through the centre of the property, which includes one high voltage transmission tower. The property is a mix of open grass and shrubs (primarily invasive plants) with some treed areas on the south and east sides of the property. Access to the property is via a gravel driveway off Burnside Road on the northwest side. There are four ditches / watercourses within and adjacent to the property, including: Craigflower Creek, Watercourse 1, Watercourse 2, and Watercourse 3 (Figure 1). These are discussed below.

The proposed development is the construction of a handyDART bus facility at the Site (the Project). To facilitate construction of the facility, the Project will require the realignment and subsequent infilling of Watercourse 2 which flows through the centre of the property. Construction of the Project will be broken into two stages. The first stage includes installing site access, grading the hill on the west side of the Site, construction of the Watercourse 2 realignment channel including a tie-in to Craigflower Creek, and wick drain installation (Figure 2).

Watercourse 2 flows from a culvert beneath Burnside Road, south of the property entrance, to the east and then to the south, entering a treed area before discharging into Craigflower Creek outside the southern property line. Watercourse 2 is proposed to be realigned to flow along the west and south sides of the property, tying into Craigflower Creek via a low-gradient channel constructed with riffles and boulder weirs to provide habitat for fish. The tie-in will be within the Craigflower Creek SPEA. Once the realignment of the watercourse is complete, the current alignment will be infilled. Realignment design can be found in Appendix D and a detailed description of works, including habitat balance and offsetting design, is provided in Appendix E.

Applications for an Authorization under Section 35(2)(b) of the *Fisheries Act* and Approval under Section 11 of the *Water Sustainability Act* will be submitted to the authorizing agencies with respect to the realignment and infilling of Watercourse 2.

The second stage of the Project will be the remainder of the handyDART bus facility construction (Figure 3). The facility would include a total building area of approximately 2,380 m<sup>2</sup>, divided between a wash bay, office building and maintenance building. A paved area with a total of 109 bus parking stalls, 10 employee parking stalls, two visitor parking stalls, and driving lanes, will also be included in this construction. A retaining wall will be constructed along the southeast edge of the development. Design drawings related to the development can be found in Appendix D.

Impacts of the Project on natural conditions include:

- A net gain of 432 m<sup>2</sup> of instream habitat calculated from a loss of 970 m<sup>2</sup> of instream habitat with the infilling of Watercourse 2 at its current location and a gain of 1,402 m<sup>2</sup> of instream habitat for the realignment of Watercourse 2. The instream area being infilled provides poor to moderate habitat for fish, as there are few pools and the substrate was made up of fines. Access to Watercourse 2 from Craigflower Creek appears to be very limited. The instream habitat being constructed will provide good fish habitat in the form of a series of riffles and pools with cobble, gravel, and boulder substrate.

- A net gain of 257 m<sup>2</sup> of riparian habitat calculated from a loss of 3,614 m<sup>2</sup> of riparian habitat around Watercourse 2 at its current location, primarily consisting of invasive species, and a gain of 3,871 m<sup>2</sup> of riparian habitat around the Watercourse 2 realignment and in the Craigflower Creek SPEA accomplished through plant of native trees and shrubs.
- Clearing of primarily invasive vegetation species from previously disturbed areas of the property in locations where construction will occur.
- Removal of approximately 143 trees within the construction footprint, including 13 danger trees within the SPEA, and replanting of the same number of trees within the property. This tree replacement is in addition to riparian planting associated with the realignment of Watercourse 2. The wood from many of the Douglas-fir (*Pseudotsuga menziesii*) trees to be removed will be used for habitat enhancement.

### **Site Visit**

Stantec biologists completed a detailed assessment of the property on April 23, 2020 during partly cloudy conditions. No rainfall was recorded at the Victoria International Airport weather station<sup>1</sup> on the day of the site visit; however, it had rained 16.7 mm the previous day (April 22, 2020). Additional site visits were conducted on June 4, 2020 to assess Watercourse 3 and on September 2, 2020 to look at connectivity between upstream watercourses and Watercourse 2.

### **Craigflower Creek**

Craigflower Creek (Photos 1-4) is the primary drainage of the Craigflower Creek watershed, which originates as several small streams in the District of Highlands and flows south into Portage Inlet. Much of the Craigflower Creek watershed is in its natural state<sup>2</sup>. In the lower section of the creek system, which includes the property, the CRD has identified flooding, bank erosion, and loss of summer base flows as concerns<sup>3</sup>. Craigflower Creek roughly follows the southeast boundary of the property.

Craigflower Creek is a fish-bearing stream with records of coho salmon (*Oncorhynchus kisutch*), rainbow trout/steelhead (*Oncorhynchus mykiss*), coastal cutthroat trout (*Oncorhynchus clarkii clarkii*), sculpin (general) (*Cottus* sp.), smallmouth bass (*Micropterus dolomieu*, exotic), pumpkinseed (*Lepomis gibbosus*, exotic), and brown catfish (*Ameiurus nebulosus*, exotic)<sup>4</sup>. Coho salmon are known to spawn in Craigflower Creek as far upstream as Prior Lake<sup>2</sup>, upstream of the Site. During the site visit one dead coho salmon parr was observed.

Craigflower Creek was measured at 11 transects over 100 m within the property, with the upstream extent of the measurements starting approximately 20 m downstream of the Highway 1 culvert. The creek had an average channel width of 10.4 m and an average gradient of 2%. The channel displayed a riffle-pool morphology with an irregular meandering channel pattern. The dominant substrate was organics and the subdominant substrate was fines. Gravels were present but limited.

Stream flows were moderate at the time of assessment, though evidence of flood flows were present throughout the reach in the form of rafting and debris in trees above and beside the channel (Photo 3). Beaver activity was observed in the form of a small dam (Photo 4)

<sup>1</sup> <https://climate.weather.gc.ca/> Accessed May 2020.

<sup>2</sup> <https://www.crd.bc.ca/education/our-environment/watersheds/featured-watersheds/craigflower-creek>

<sup>3</sup> <https://www.crd.bc.ca/education/our-environment/watersheds/featured-watersheds/craigflower-creek/interesting-facts>

<sup>4</sup> <https://maps.gov.bc.ca/ess/hm/habwiz/>

downstream of the Highway 1 culvert, which impounded water into a large pool. Areas of seepage above the high watermark were observed on the left (north) bank of the creek.

Cover was abundant throughout Craigflower Creek in the form of deep pools, large woody debris, and some undercut banks. Large woody debris was clumped and formed deep pools more than 1 m deep on their upstream sides. Trees were fallen or growing over much of the channel. Banks were a mixture of vertical and sloping with fines as the dominant substrate and were approximately 2 m in height.

Overall, spawning habitat in Craigflower Creek within the property was determined to be poor due to the lack of gravel and cobbles. Habitat for other life stages of fish (e.g., overwintering, rearing, migration) was good to excellent due to the abundance of instream cover such as deep pools and large woody debris.

Within the survey area, tree cover primarily consisted of deciduous species in the pole sapling stage. The shrub layer was primarily salmonberry (*Rubus spectabilis*), skunk cabbage (*Lysichiton americanus*), and lady fern (*Athyrium filix-femina*). The herb layer consisted of horsetail (*Equisetum* sp.) and white fawn lily (*Erythronium oregonum*). The invasive species present were primarily creeping buttercup (*Ranunculus repens*) with minor amounts of English holly (*Ilex aquifolium*) and Himalayan blackberry (*Rubus armeniacus*).

### **Watercourse 1**

Watercourse 1 is a constructed ditch that flows west to east on the southwest side of the property, parallel to Highway 1 (Photo 5). It terminates near the left bank of Craigflower Creek but does not discharge into the creek as surface flow. It ends in an area of pooling water between Watercourse 2 and Highway 1. A riprap berm surrounds this pool and no connectivity, culverts, or water flow was observed that would connect Watercourse 1 to either Craigflower Creek or Watercourse 2 (Photo 6). It is assumed that water from Watercourse 1 pools and infiltrates to ground at the east end of the ditch. Upstream of this area, the ditch is heavily overgrown with Himalayan blackberry.

A review of historical air photos indicates that Watercourse 1 appears to have been constructed at the same time as the Burnside Road offramp from Highway 1. Prior to this time, the area around Watercourse 1 was forested with no indications of a natural watercourse. See Appendix A for the historical air photos of the site.

As no connectivity between Watercourse 1 and other watercourses was found. Watercourse 1 is isolated and not protected under the Riparian Areas Protection Regulation. No measurements of this ditch were recorded, and it is not discussed further in this document.

### **Watercourse 2**

Watercourse 2 (Photos 7-10) is a modified stream that enters the Site from a culvert flowing under Burnside Road on the west side of the property (Photo 11). The watercourse flows to the east, south of the Site's access road, and flows south near a transmission line tower. It enters Craigflower Creek north of Watercourse 1.

Watercourse 2 is not shown on Town of View Royal<sup>5</sup>, CRD<sup>6</sup>, and provincial<sup>7</sup> mapping sources; however, a stream is present on CRD's mapping north of Kami Court, approximately 300 m north

<sup>5</sup>

<https://www.viewroyal.ca/assets/Town~Hall/Documents~and~Forms/Planning~and~Development~Documents~and~Forms/2018%2009%2020%20OCP%20Development%20Permit%20Areas.pdf>

<sup>6</sup> <https://maps.crd.bc.ca/Html5Viewer/?viewer=public>

<sup>7</sup> <https://maps.gov.bc.ca/ess/hm/habwiz/>

of the Site. Connection between this stream and Watercourse 2 via the stormwater system and ditching network was confirmed through an additional site visit and municipal storm system information. The watercourse north of Kami Court appears to be a natural watercourse. Though most of the watercourse is overgrown with grass (Photo 12), some sections are scoured with gravel and cobble substrate (Photo 13). The property owner indicated the watercourse is seasonal, flowing during winter months. This connection confirms Watercourse 2 is a modified stream.

No information of fish presence was found for Watercourse 2 and no fish were observed during the assessment.

A review of historical air photos (see Appendix A) indicates that Watercourse 2 was constructed at its current location at the same time as the construction of the Burnside Road offramp from Highway 1. Prior to this time, a ditch may have been present in the same area running approximately west to east; however, this may also have been a field boundary as no watercourse or ditch is evident in the earliest air photos when the area was a cleared field. Watercourse 2 may also have flowed through the treed area at the west end of the property, which was later piled with fill. A cleared right-of-way was present upslope of Watercourse 2 from 1964 onwards.

Watercourse 2 was measured at 11 transects over 100 m within the property, beginning immediately upstream of its confluence with Craigflower Creek. The watercourse had an average width of 3.34 m and an average gradient of 4.5%. It generally had a straight alignment, with curves in some areas to parallel the access road. Fines and organics were the dominant substrate with riprap being subdominant. Small pockets of gravel were observed near the Burnside Road culvert.

Water levels were moderate at the time of the assessment, which was one day after a rain event. An assessment on the watercourse completed by Stantec in fall 2017<sup>8</sup> indicated that sections were dry and wetted areas were restricted to shallow pools, indicating that flows in the watercourse may be seasonal.

Cover was abundant throughout Watercourse 2 in the form of instream vegetation, primarily reed canary grass (*Phalaris arundinacea*), a few deep pools, and small woody debris. Banks were sloping and consisted of riprap and fines. In the lower section of Watercourse 2, the right (south) bank is formed by the riprap berm that contains Watercourse 1. A small wooden pedestrian bridge had been constructed over the watercourse within the archery range.

Spawning habitat quality in Watercourse 2 was nil to poor, lacking appropriate substrate. Habitat quality for other life stages of fish was poor to moderate with abundant instream vegetation and a few deep pools that provided cover to fish. The moderate quality fish habitat was primarily in the downstream sections of the channel and fish habitat became poorer in upstream areas with fewer pools and instream vegetation. Watercourse 2 is classified as fish bearing, as no barriers to fish access were observed within Watercourse 2. However, seasonal flows and habitat quality may limit fish distribution to the lower section of the channel.

Tree cover was almost exclusively restricted to the downstream 50 m of Watercourse 2 (Photos 7 & 8) and consisted of red alder (*Alnus rubra*), big leaf maple (*Acer macrophyllum*), and limited Douglas-fir. Upstream of this area, vegetation consisted of a narrow band (3-5 m) of Himalayan blackberry and reed canary grass (Photos 9-11). Beyond this strip, vegetation was made up of lawn for the archery range, gravel driveway/walkway, and invasive vegetation.

### **Watercourse 3**

<sup>8</sup> Stantec. 2017. Riparian Areas Assessment and Preliminary Options for Ditch Alterations at 2401 Burnside Road, Victoria, British Columbia

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Watercourse 3 (Photos 13-17) is a constructed stormwater drainage ditch that originates at a culvert flowing below Watkiss Way at the north end of the property. This watercourse will be utilized for the Watercourse 2 realignment works. The ditch flows southeast towards Galloping Goose Trail and then continues east along the trail until it crosses below the trail via a culvert near Talcott Road prior to connection to Craigflower Creek. Watercourse 3 is not shown on Town of View Royal<sup>4</sup> or provincial<sup>6</sup> mapping sources. CRD<sup>5</sup> mapping shows a storm drainage watercourse north of Watkiss Way that appears to connect to Watercourse 3, but no watercourse was visible south of Watkiss Way. No information on fish presence was available from these mapping sources and no fish were observed during the assessment.

Watercourse 3 was measured at 10 transects over 100 m within the property (on the portion north side of the Galloping Goose) and had an average width of 2.5 m. The first transect was measured directly south of Watkiss Way, immediately downstream of a culvert and a section of rock armoring (Photo 14).

Water levels were low at the time of assessment. In some places the channel was dry and in others water flowed slowly. A few shallow pools were observed, and organic matter and small woody debris were common throughout the channel.

Substrate in Watercourse 3 was comprised of organic debris with small patches of gravel. Vegetation lined both banks and canopy cover was high (>75%) throughout the 100 m surveyed.

There is a steep gradient (40%) for approximately 5-10 m as Watercourse 3 flows into Craigflower Creek. This gradient precludes fish access to the ditch and flows in the ditch at the time of the assessment were too low to support resident fish year-round. The ditch may provide food and nutrient value to Craigflower Creek.

All sections within the 100 m of channel observed had over 50% canopy cover. There was little cover for fish from overhanging vegetation. Small amounts of in-stream vegetation were observed, and banks were lined with Himalayan blackberry and young deciduous trees (alder).

**Section 2. Results of Riparian Assessment (SPEA width)**

**Results of Detailed Riparian Assessment**

Date: April 23, 2020

Description of Water bodies involved (number, type)	
Stream	X – Craigflower Creek
Wetland	
Lake	
Ditch	
Number of reaches	1
Reach #	1

3 – 2 streams, 1 ditch

**Channel width and slope and Channel Type (use only if water body is a stream or a ditch, and only provide widths if a ditch)**

	Channel Width(m)	Gradient (%)	
starting point	14.2		I, <u>Michelle Penner</u> , hereby certify that: a) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the <i>Riparian Areas Protection Act</i> ; b) I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>BC Transit</u> ; c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and d) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.
downstream	8.9		
	9.9	2	
	<del>8.3</del>		
	8.8		
	11.4		
	13.3	2	
	11.0		
	9.0		
	8.8		
upstream	12.8		
Total: minus high /low	93.9		
mean	10.4	2.0	
	R/P	C/P	
Channel Type	X		

**Site Potential Vegetation Type (SPVT)**

	Yes	No	
SPVT Polygons		X	Tick yes only if multiple polygons, if No then fill in one set of SPVT data boxes  I, <u>Michelle Penner</u> , hereby certify that: a) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the <i>Riparian Areas Protection Act</i> ; b) I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>BC Transit (name of developer)</u> ; c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and d) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.
Polygon No:	1		Method employed if other than TR
SPVT Type	LC	SH	TR
			X
			n/a



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**Zone of Sensitivity (ZOS) and resultant SPEA**

Segment No:	1	If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons					
LWD, Bank and Channel Stability ZOS (m)	30						
Litter fall and insect drop ZOS (m)	15						
Shade ZOS (m) max	n/a	South bank	Yes		No	X	
Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)				No		
Ditch Fish Bearing	Yes		No		If non-fish bearing insert no fish bearing status report		
<b>SPEA maximum</b>	<b>30</b>	(For ditch use table 3-7)					

I, Michelle Penner, hereby certify that:

- a) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;
- b) I am qualified to carry out this part of the assessment of the development proposal made by the developer BC Transit (*name of developer*);
- c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and
- d) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.

**Comments**

A small beaver dam was observed in Craigflower Creek, downstream of the Highway 1 culvert.

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Date: April 23, 2020  
3 – 2 streams, 1 ditch

Description of Water bodies involved (number, type)	
Stream	<input checked="" type="checkbox"/> – Watercourse 2
Wetland	
Lake	
Ditch	
Number of reaches	<span style="border: 1px solid black; padding: 2px;">1</span>
Reach #	<span style="border: 1px solid black; padding: 2px;">1</span>

**Channel width and slope and Channel Type (use only if water body is a stream or a ditch, and only provide widths if a ditch)**

	Channel Width(m)	Gradient (%)		
starting point	<span style="border: 1px solid black; padding: 2px;">3.5</span>		I, <u>Michelle Penner</u> ( <i>name of qualified environmental professional</i> ), hereby certify that: e) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the <i>Riparian Areas Protection Act</i> ; f) I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>BC Transit</u> ( <i>name of developer</i> ) ; g) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and h) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.	
downstream	<span style="border: 1px solid black; padding: 2px;">3.1</span>			
	<span style="border: 1px solid black; padding: 2px;">2.6</span>			
	<span style="border: 1px solid black; padding: 2px;">3.3</span>	<span style="border: 1px solid black; padding: 2px;">5</span>		
	<span style="border: 1px solid black; padding: 2px;">3.9</span>			
	<span style="border: 1px solid black; padding: 2px;">4.3</span>	<span style="border: 1px solid black; padding: 2px;">4</span>		
	<span style="border: 1px solid black; padding: 2px;">3.8</span>			
	<span style="border: 1px solid black; padding: 2px;">3.4</span>			
	<span style="border: 1px solid black; padding: 2px;">3.0</span>			
	<span style="border: 1px solid black; padding: 2px;">3.5</span>			
upstream	<span style="border: 1px solid black; padding: 2px;">2.2</span>			
Total: minus high /low mean	<span style="border: 1px solid black; padding: 2px;">30.1</span> <span style="border: 1px solid black; padding: 2px;">3.3<sup>9</sup></span>	<span style="border: 1px solid black; padding: 2px;">4.5</span>		
	R/P          C/P          S/P			
Channel Type	<span style="border: 1px solid black; padding: 2px;"></span>	<span style="border: 1px solid black; padding: 2px;">X</span>		

**Site Potential Vegetation Type (SPVT)**

	Yes	No	
SPVT Polygons	<span style="border: 1px solid black; padding: 2px;"></span>	<span style="border: 1px solid black; padding: 2px;">X</span>	Tick yes only if multiple polygons, if No then fill in one set of SPVT data boxes I, <u>Michelle Penner</u> , hereby certify that: e) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the <i>Riparian Areas Protection Act</i> ; f) I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>BC Transit</u> ( <i>name of developer</i> ) ; g) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and h) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.
Polygon No:	<span style="border: 1px solid black; padding: 2px;">1</span>		Method employed if other than TR
SPVT Type	<span style="border: 1px solid black; padding: 2px;">LC</span>	<span style="border: 1px solid black; padding: 2px;">SH</span>	<span style="border: 1px solid black; padding: 2px;">TR</span> n/a
	<span style="border: 1px solid black; padding: 2px;"></span>	<span style="border: 1px solid black; padding: 2px;"></span>	<span style="border: 1px solid black; padding: 2px;">X</span>

<sup>9</sup> Intermediate steps have been rounded to one significant figure for presentation in the table; however, the final SPEA calculation is based on the unrounded values of intermediate steps.

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**Zone of Sensitivity (ZOS) and resultant SPEA**

Segment No:	1	If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons					
LWD, Bank and Channel Stability ZOS (m)	10.0						
Litter fall and insect drop ZOS (m)	10.0						
Shade ZOS (m) max	10.0	South bank	Yes		No	X	
Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)				No		
Ditch Fish Bearing	Yes		No		If non-fish bearing insert no fish bearing status report		
<b>SPEA maximum</b>	<b>10.02</b>	(For ditch use table 3-7)					

Segment No:	2	If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons					
LWD, Bank and Channel Stability ZOS (m)	10						
Litter fall and insect drop ZOS (m)	10						
Shade ZOS (m) max	10	South bank	Yes	X	No		
<b>SPEA maximum</b>	<b>10</b>	(For ditch use table3-7)					

I, Michelle Penner, hereby certify that:

e) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;

f) I am qualified to carry out this part of the assessment of the development proposal made by the developer BC Transit (name of developer);

g) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and

h) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.

**Comments**

Watercourse 2 enters the property from a culvert beneath Burnside Road and flows into Craigflower Creek. It is fed by a natural stream via the storm water system and ditch network, and thus is considered a modified stream.

It is acknowledged that the work will affect Watercourse 2 and its SPEA. Calculations have been completed for Watercourse 2 to quantify the riparian impact in order to incorporate that into the habitat balance for offsetting habitat (associated with the realigned channel).

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Refer to Section 3 of Technical Manual

Date: June 4, 2020

Description of Water bodies involved (number, type)

3 – 2 streams, 1 ditch

Stream	
Wetland	
Lake	
Ditch	X – Watercourse 3

Number of reaches	1
Reach #	1

**Channel width and slope and Channel Type (use only if water body is a stream or a ditch, and only provide widths if a ditch)**

	Channel Width(m)	Gradient (%)		
starting point	3.2		I, <u>Michelle Penner</u> ( <i>name of qualified environmental professional</i> ), hereby certify that: a) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the <i>Riparian Areas Protection Act</i> ; b) I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>BC Transit</u> ( <i>name of developer</i> ) ; c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and d) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.	
upstream	2.0			
	4.2			
	2.0			
	4.0			
downstream	2.0			
	3.4			
	7.4			
	1.8			
	1.1			
Total: minus high /low	19.7			
mean	2.5			
	R/P	C/P		S/P
Channel Type				

**Site Potential Vegetation Type (SPVT)**

	Yes	No	
SPVT Polygons		X	Tick yes only if multiple polygons, if No then fill in one set of SPVT data boxes
			I, <u>Michelle Penner</u> ( <i>name of qualified environmental professional</i> ), hereby certify that: a) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the <i>Riparian Areas Protection Act</i> ; b) I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>BC Transit</u> ( <i>name of developer</i> ) ; c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and d) In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.
Polygon No:	1		Method employed if other than TR
SPVT Type	LC	SH	
			X

**Zone of Sensitivity (ZOS) and resultant SPEA**

Segment No:	1	If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons
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LWD, Bank and Channel Stability ZOS (m)	2						
Litter fall and insect drop ZOS (m)	2						
Shade ZOS (m) max	2	South bank	Yes		No	X	
Ditch	Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow)					Watercourse 3 collects road runoff from Watkiss Way and Galloping Goose Trail. View Royal mapping indicates it is fed by roadside ditching and storm drainage with no natural watercourses in the vicinity. The ditch has no scour or defined banks and no significant headwaters.	
Ditch Fish Bearing	Yes		No	X	If non-fish bearing insert no fish bearing status report	There is a steep gradient (40%) for approximately 5-10 m as Watercourse 3 flows into Craigflower Creek. This gradient precludes fish access to the ditch. In addition, flows in the ditch at the time of the assessment were too low to support resident fish.	
<b>SPEA maximum</b>	2	(For ditch use table3-7)					

Segment No:	2	If two sides of a stream involved, each side is a separate segment. For all water bodies multiple segments occur where there are multiple SPVT polygons					
LWD, Bank and Channel Stability ZOS (m)	2						
Litter fall and insect drop ZOS (m)	2						
Shade ZOS (m) max	2	South bank	Yes	X	No		
<b>SPEA maximum</b>	2	(For ditch use table3-7)					

I, Michelle Penner (*name of qualified environmental professional*), hereby certify that:

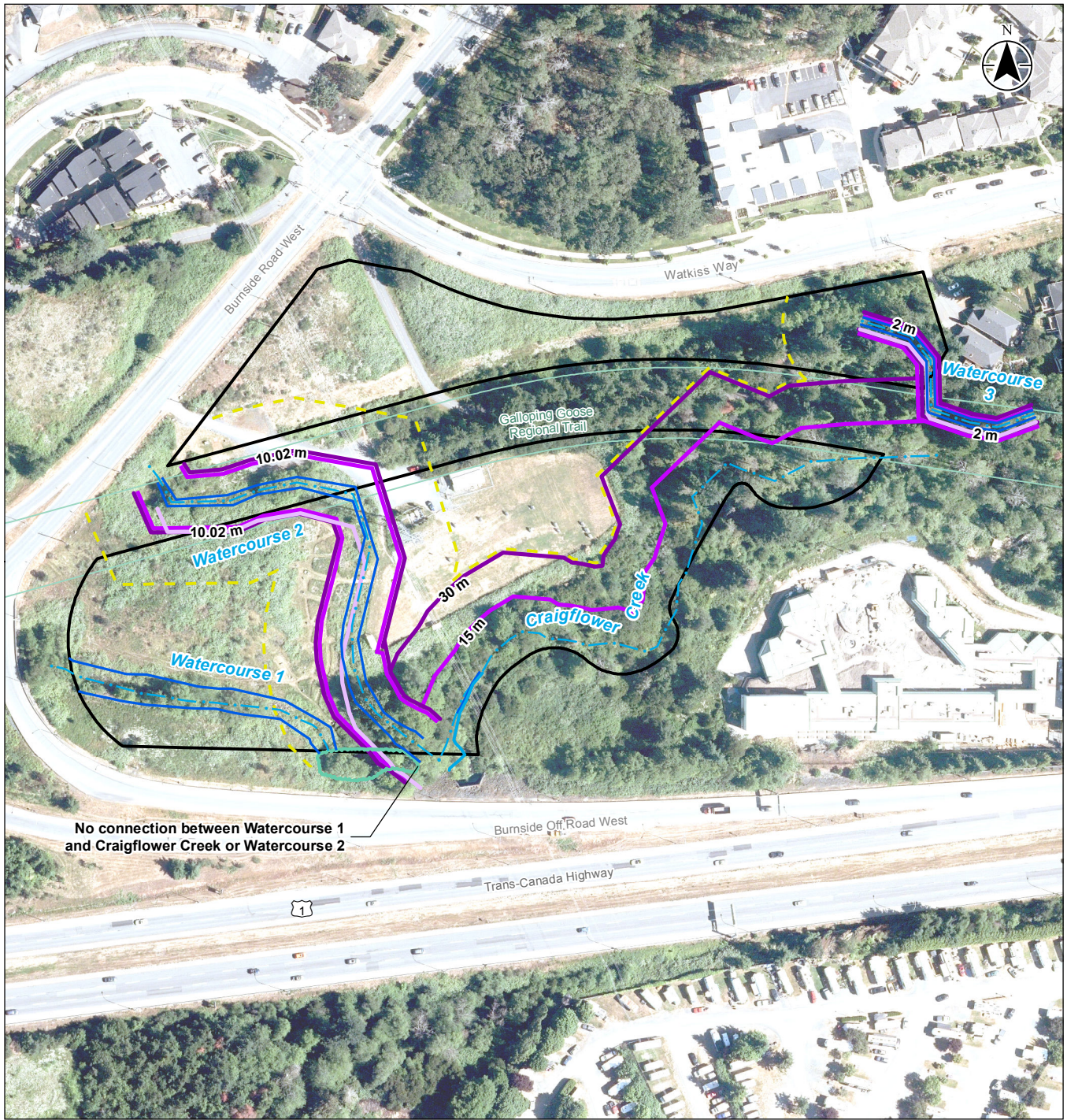
- I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;
- I am qualified to carry out this part of the assessment of the development proposal made by the developer BC Transit (*name of developer*);
- I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and
- In carrying out my assessment of the development proposal, I have followed the technical manual to the Riparian Areas Protection Regulation.

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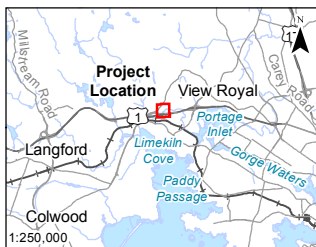
Riparian Areas Protection Regulation - Qualified Environmental Professional - Assessment Report

**Comments**

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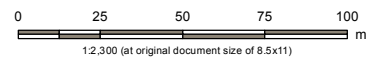


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- Notes**
1. Coordinate System: NAD 1983 UTM Zone 10N
  2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada
  3. Imagery: CRD Orthoimagery 2019

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li><span style="color: grey;">—</span> Topographic Contour</li> <li><span style="color: blue;">—</span> Watercourse</li> <li><span style="background-color: lightblue; border: 1px solid blue; display: inline-block; width: 15px; height: 10px;"></span> Waterbody</li> <li><span style="background-color: lightgreen; border: 1px solid green; display: inline-block; width: 15px; height: 10px;"></span> Local Greenspace</li> <li><span style="border: 2px solid black; display: inline-block; width: 15px; height: 10px;"></span> Property Boundary</li> <li><span style="color: blue; font-weight: bold;">—</span> High Water Mark</li> <li><span style="color: blue; font-weight: bold;">- - -</span> Watercourse Centreline</li> <li><span style="color: blue; font-weight: bold;">—</span> Top of Bank</li> <li><span style="color: green; font-weight: bold;">—</span> Pooling Water</li> </ul> | <p><b>SPEA ZOS</b></p> <ul style="list-style-type: none"> <li><span style="border-bottom: 2px solid purple; width: 20px; display: inline-block;"></span> LWD, Bank &amp; Channel Stability</li> <li><span style="border-bottom: 2px solid magenta; width: 20px; display: inline-block;"></span> Litter Fall and Insect Drop</li> <li><span style="border-bottom: 2px solid pink; width: 20px; display: inline-block;"></span> Shade</li> <li><span style="border-bottom: 2px dashed yellow; width: 20px; display: inline-block;"></span> Riparian Assessment Area</li> </ul> |
|---|--|



Project Location: Victoria, British Columbia  
 Project Number: 123220871  
 Prepared by LTRUPELL on 20200810  
 Requested by MPENNER on 20200810

Client/Project/Report  
 BC Transit  
 2401 Burnside Road HandyDART Facility  
 Riparian Areas Regulation Development Permit

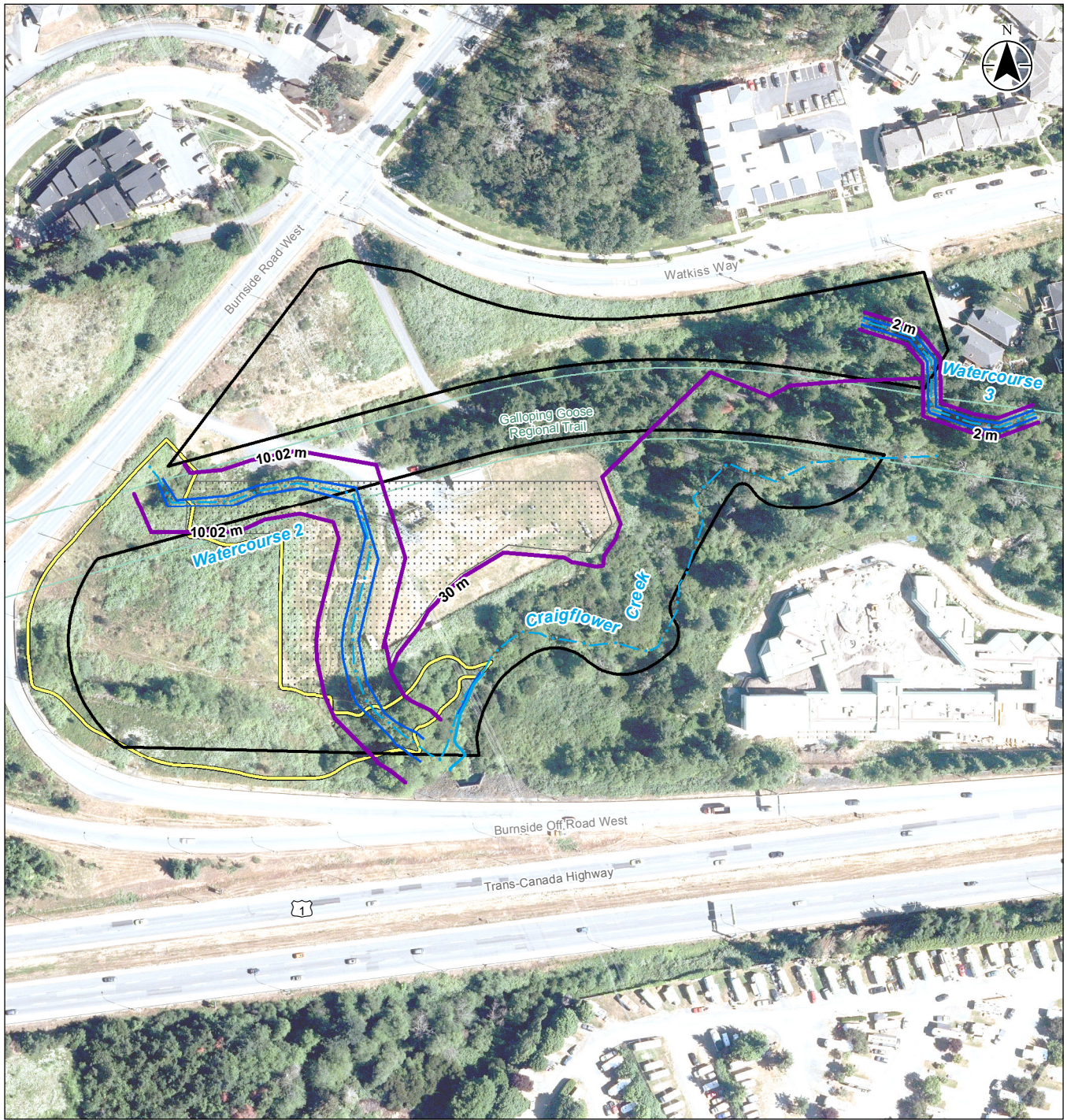
Figure No.

**1**

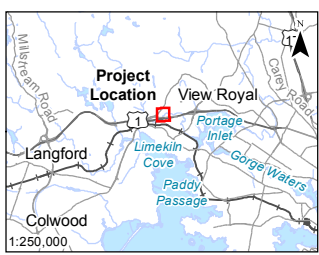
Title

**Site Plan**

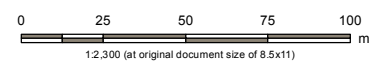
Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.



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- Local Greenspace
  - Property Boundary
  - High Water Mark
  - Watercourse Centreline
  - Top of Bank
- SPEA**
- LWD, Bank & Channel Stability
- Construction Activity**
- Watercourse 2 Alignment and Grading
  - Wick Drain Area



Project Location: Victoria, British Columbia  
 Project Number: 123220971  
 Prepared by LTRUPELL on 20200810  
 Requested by MPENNER on 20200810

Client/Project/Report  
 BC Transit  
 2401 Burnside Road HandyDART Facility  
 Riparian Areas Regulation Development Permit

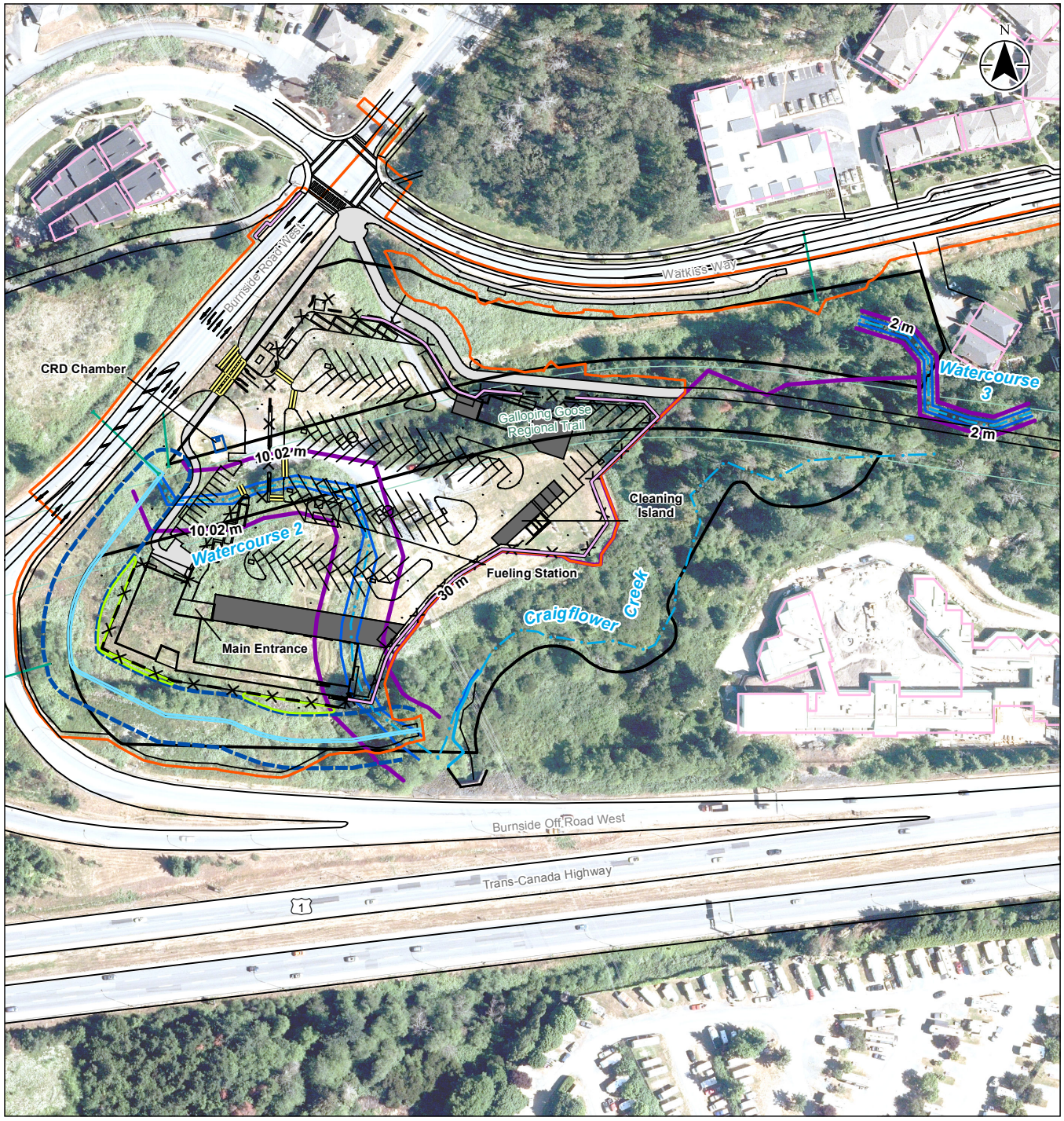
Figure No.  
**2**

Title  
**Streamside Protection and Enhancement Area and Phase 1 Construction Footprint**

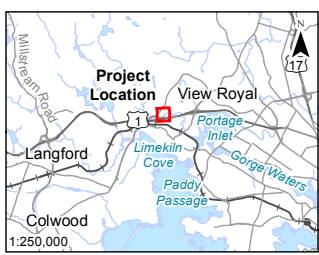
- Notes**
1. Coordinate System: NAD 1983 UTM Zone 10N
  2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada
  3. Imagery: CRD Orthoimagery 2019

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.



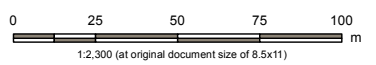


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**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 10N  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada  
 3. Imagery: CRD Orthoimagery 2019

- |                               |                           |
|-------------------------------|---------------------------|
| Local Greenspace              | Culvert                   |
| Property Boundary             | Watercourse 2 Realignment |
| High Water Mark               | Fenceline                 |
| Watercourse Centreline        | Rain Garden               |
| Top of Bank                   | Riparian Area             |
| <b>SPEA</b>                   | Retaining Wall            |
| LWD, Bank & Channel Stability | Site Feature              |
| <b>Site Plan</b>              | Sliding Gate              |
| Building                      | Water Structure           |
| Construction Boundary         |                           |



Project Location: Victoria, British Columbia  
 Project Number: 123220971  
 Prepared by ZNAVSTOV on 20210624  
 Requested by MPENNER on 20210624

Client/Project/Report  
 BC Transit  
 2401 Burnside Road HandyDART Facility  
 Riparian Areas Regulation Development Permit

Figure No.  
**3**

Title  
**Streamside Protection and Enhancement Area and Ultimate Site Layout**

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

**Section 4. Measures to Protect and Maintain the SPEA**

This section is required for detailed assessments. Attach text or document files, as need, for each element discussed in Part 4 of the RAPR. It is suggested that documents be converted to PDF *before* inserting into the assessment report. Use your “return” button on your keyboard after each line. You must address and sign off each measure. If a specific measure is not being recommended a justification must be provided.

<b>1. Danger Trees</b>	
<p>Bartlett Tree Experts (arborist and tree contractor) identified several danger trees within the SPEA on the east side of the property in their Tree Risk Assessment and Tree Protection Plan (Appendix B). Trees #205-210 will be removed during the second stage of construction and replaced as per the Planting Plan Overview drawing related to riparian planting around Watercourse 2 realignment and Tree Planting Plan drawing related to overall site construction in Appendix D. Other trees will be altered as follows:</p> <ul style="list-style-type: none"> <li>• Reduce the heights of trees #211-213 to live growth or by approximately 15% to reduce the likelihood of impact to Galloping Goose trail in the event of a failure</li> <li>• Reduce the dead portions of trees #214-215 to live growth to reduce the likelihood of impact to Galloping Goose trail in the event of a failure</li> </ul>	
<p>I, <u>Michelle Penner</u> (<i>name of qualified environmental professional</i>), hereby certify that:</p> <p>e) I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the <i>Riparian Areas Protection Act</i>;</p> <p>f) I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>BC Transit</u> (<i>name of developer</i>);</p> <p>g) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister’s technical manual to the Riparian Areas Protection Regulation.</p>	
<b>2. Windthrow</b>	
<p>The Tree Risk Assessment and Tree Protection Plan prepared by Bartlett Tree Experts (Appendix B) identified measures to address windthrow. They include:</p> <ul style="list-style-type: none"> <li>• Reduce the overall canopy heights of dead trees # 202, 204 and 216 by approximately half and leave remainder as a wildlife pole.</li> <li>• Thin the upper canopy of tree #203 by 20% of total canopy density. Monitor the tree for future changes in health.</li> </ul>	
<p>I, <u>Michelle Penner</u> (<i>name of qualified environmental professional</i>), hereby certify that:</p> <p>a. I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the <i>Riparian Areas Protection Act</i>;</p> <p>b. I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>BC Transit</u> (<i>name of developer</i>);</p> <p>c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister’s technical manual to the Riparian Areas Protection Regulation.</p>	
<b>3. Slope Stability</b>	
<p>A geotechnical field reconnaissance was conducted by Stantec. It found that proposed development is unlikely to have an adverse impact on the stability of slopes above Craigflower Creek and the risk to the SPEA is very low. See Appendix C for more information.</p>	
<p>I, <u>Michelle Penner</u> (<i>name of qualified environmental professional</i>), hereby certify that:</p> <p>a. I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the <i>Riparian Areas Protection Act</i>;</p> <p>b. I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>BC Transit</u> (<i>name of developer</i>);</p> <p>c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister’s technical manual to the Riparian Areas Protection Regulation.</p>	

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4. Protection of Trees	
<p>The Tree Risk Assessment and Tree Protection Plan prepared by Bartlett Tree Experts (Appendix B) identified measures to protect trees. While the proposed development will generally have a limited impact on the SPEA, the following recommendations from the report will be implemented during construction:</p> <ul style="list-style-type: none"> <li>• Tree protection fencing will be installed at the southeast corner of the proposed project area, near the tie-in of Watercourse 2 to Craigflower Creek.</li> <li>• Tree protection fencing will be installed at the northeast corner of the proposed project area near the Craigflower Creek SPEA.</li> <li>• Tree protection fencing will be installed prior to construction commencement and will be in place for the duration of work. The tree protection fencing will be constructed in accordance with the specifications in the Tree Risk Assessment and Tree Protection Plan. The fencing will be maintained as required for the duration of construction.</li> <li>• After initial tree clearing, an additional site visit by the project arborist is recommended to reassess retained trees for safety as well as assess the need for changes to the recommendations found in the Tree Risk Assessment and Tree Protection Plan. Tree protection fences must not be breached or moved without consulting the Project Arborist. Materials, equipment etc. must not be stored within the tree protection zones</li> <li>• An arborist will be onsite during excavation of the southeast corner of the development area at the Watercourse 2 tie-in to Craigflower Creek and to perform root pruning and mitigation work as necessary to minimize damage to the root system.</li> <li>• If construction activity is required within a tree protection zone, it must first be discussed with the Project Arborist. Any such construction activity must be carried out by hand to avoid damage to the roots and/or compaction of the soil. An air spade should be used to expose roots before excavation takes place. Depending on the weather during the construction period, irrigation may be required. Entire root zones should be watered heavily and infrequently (once every 7 days). Any exposed roots must be covered with burlap and kept moist. Compaction of soil in the root zones should be alleviated with an air spade as soon as practically possible.</li> </ul>	
<p>I, <u>Michelle Penner</u> (<i>name of qualified environmental professional</i>), hereby certify that:</p> <ol style="list-style-type: none"> <li>a. I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the <i>Riparian Areas Protection Act</i>;</li> <li>b. I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>BC Transit</u> (<i>name of developer</i>);</li> <li>c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.</li> </ol>	
5. Encroachment	
<p>A major cause of riparian loss and stream degradation is a result of encroachment by adjacent landowners. Human impacts to streams and riparian areas commonly consist of refuse dumping (including yard waste which can introduce invasive species), trampling of vegetation, and bank erosion. There will be a minimum 10 m setback from the highwater mark of relocated Watercourse 2 (which will be at the approximate location of Watercourse 1) within the Site. A fence will be constructed slightly beyond the 10 m setback within the property to protect the riparian area and the area between the fence and the watercourse will be planted with native species. The location of the fence and planting with respect to Watercourse 2 can be found in Appendix D.</p> <p>To avoid encroachment into the Craigflower Creek SPEA Protection Zone (SPZ) during construction, a high visibility no-clearing snow fence or similar will be erected along the SPZ boundary prior to clearing, excavation or grading begins. The no-clearing fence is intended to prevent inadvertent damage or disturbance to the SPZ by construction activities. The no-clearing SPZ boundary fence is to be reinforced with wood-framing, similar to typical tree protection fencing. Work will be required in the Craigflower Creek SPEA/SPZ to facilitate the construction and planting</p>	

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of Watercourse 2 relocation channel, as detailed in Appendix D. The work footprint within the Craigflower Creek SPEA will be minimized and fenced in the same way as the SPEA/SPZ boundary. Upon completion of construction in the area, the fencing will be relocated to the edge of the Craigflower Creek SPZ.

No works are planned in the vicinity of Watercourse 3, so no fencing or other SPEA protection measures are proposed for that area.

Once construction has been completed, the no-clearing (SPZ) boundary fence must be replaced with a permanent post and rail fence. The permanent fence will, at a minimum, be a post and rail wood fence (1.5 m high) with wire mesh, or an alternate design which is acceptable to the QEP.

I, Michelle Penner (*name of qualified environmental professional*), hereby certify that:

- I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;
- I am qualified to carry out this part of the assessment of the development proposal made by the developer BC Transit (*name of developer*);
- I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.

6. Sediment and Erosion Control

A formal erosion and sediment control (ESC) plan will be developed prior to construction to support other municipal permitting; a Construction Environmental Management Plan (CEMP) has also been developed for the works (Appendix F). For Watercourse 2 realignment works, there will be a constructed basin near the downstream end of the realignment area to capture surface flows for infiltration. This basin will be decommissioned under the supervision of an environmental monitor after upgradient slopes are stabilized and prior to the channel tie-in to Craigflower Creek. Work will be staged to minimize exposed soils and soil stabilization measures (e.g., seeding, mulch, fabric/blankets) will be applied as work progresses. Silt fencing keyed into the ground with a crushed rock berm will be installed along the perimeter of works areas. A detailed ESC plan will be required from the construction contractor, which must ensure there are no deleterious substances leaving the project site or entering Craigflower Creek.

Water discharged from the site must meet the BC Water Quality Guidelines for the Protection of Aquatic Life (BCWQG-AL) to prevent the discharge of "waste" into storm sewers or watercourses. No wastes described in the Township of View Royal's Storm Water Regulation Bylaw No. 902, 2015<sup>10</sup> will be discharged into the site watercourses or the municipal drainage system.

An environmental monitor will review the installation of ESC measures as directed in the ESC plan following clearing, prior to grading, and frequently during construction. The environmental monitor will monitor the implementation and effectiveness of the ESC plan. Following construction, the environmental monitor will confirm the removal of all temporary ESC measures and final installation of permanent ESC measures (e.g. seeding).

I, Michelle Penner (*name of qualified environmental professional*), hereby certify that:

- I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;
- I am qualified to carry out this part of the assessment of the development proposal made by the developer BC Transit (*name of developer*);
- I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and in carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.

<sup>10</sup> <https://www.viewroyal.ca/assets/Town~Hall/Bylaws/902%20-%20Storm%20Sewer%20Bylaw.pdf>

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7. Stormwater Management	
<p>Development activities tend to increase the proportion of impervious surfaces on a parcel of land by converting previously forested or grass covered area into building structures with roofs and paved surfaces. The associated increase in impervious surfaces can have a significant impact on the hydrology of a stream, by increasing peak storm flows and decreasing stream base flow. Peak storm flows are increased when rainwater hitting impervious surfaces is collected and directed to the stream as stormwater runoff (as opposed to infiltrating into the ground). Increasing peak storm flows within streams increases the erosion risk posed to stream banks and can increase slope stability concerns. As infiltration of rainwater is reduced, groundwater recharge is reduced and consequently the baseflow of the stream is reduced. Reduced baseflow is particularly significant during the drier summer months when insufficient flow can be an issue to aquatic life.</p> <p>A stormwater management plan has been developed for the site (see site drawings in Appendix D), which includes the use of several rain gardens throughout the site to capture rain from developed areas and impervious surfaces. The rain gardens will be connected to a storm drain that discharges to the Watercourse 2 realignment area via a flow dissipator pool and rock weir. The total area of rain garden provided exceeds the requirements to manage a 2-year/24-hour rain event.</p>	
<p>I, <u>Michelle Penner</u> (<i>name of qualified environmental professional</i>), hereby certify that:</p> <ol style="list-style-type: none"> <li>I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the <i>Riparian Areas Protection Act</i>;</li> <li>I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>BC Transit</u> (<i>name of developer</i>);</li> <li>I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.</li> </ol>	
8. Floodplain Concerns (highly mobile channel)	
<p>There are no floodplain concerns regarding the proposed development and Craigflower Creek. The channel shows some indications of channel mobility within the gully that contains the channel; however, Craigflower Creek is highly unlikely to impact the proposed development given the width of the calculated SPEA and the height of the gully.</p> <p>The Burnside Road culvert at the upstream end of the Watercourse 2 limits the amount of flow into Watercourse 2. The channel has a 1:200 attenuation and is not designed to a specific flood level.</p>	
<p>I, <u>Michelle Penner</u>, hereby certify that:</p> <ol style="list-style-type: none"> <li>I am a qualified environmental professional, as defined in the Riparian Areas Protection Regulation made under the <i>Riparian Areas Protection Act</i>;</li> <li>I am qualified to carry out this part of the assessment of the development proposal made by the developer <u>BC Transit</u> (<i>name of developer</i>);</li> <li>I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Minister's technical manual to the Riparian Areas Protection Regulation.</li> </ol>	

### **Section 5. Environmental Monitoring**

Attach text or document files explaining the monitoring regimen Use your "return" button on your keyboard after each line. It is suggested that all document be converted to PDF *before* inserting into the PDF version of the assessment report. Include actions required, monitoring schedule, communications plan, and requirement for a post development report.

Environmental monitoring during the construction phase of the project will be conducted to support the implementation of the recommendations outlined within this report, the CEMP, and the formal ESC Plan. The environmental monitor shall be a QEP or working under the direction of a QEP.

The measures to protect the SPEA must be maintained though the duration of all stages of redevelopment including construction and restoration works. The installation of the SPEA/SPZ fence is to be inspected regularly by the environmental monitor to verify that the SPEA and SPZ are protected, before and after clearing as well as during the excavation and construction at the property.

#### **Post-Construction Report**

A post-development report must be prepared by the environmental monitor documenting the measures taken to establish the SPEA on the ground and the implementation of measures to protect the SPEA (e.g., SPEA encroachment avoidance, sediment and erosion control, and stormwater management) described above. The post-development report will also describe the effectiveness of the SPEA protection measures and detail steps taken to correct any problems and verify compliance with the establishment and protection of the SPEA.

**Section 6. Photos**

**Photo 1** Typical photo of Craigflower Creek taken at transect 1 looking downstream.



**Photo 2** Typical photo of Craigflower Creek looking upstream.



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**Photo 3** Craigflower Creek looking upstream. Note log rafted in tree (red circle) indicating creek has very high flow at times.



**Photo 4** Beaver dam on Craigflower Creek downstream of Highway 1 culvert.





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**Photo 5** Watercourse 1 looking upstream from the area where water pools.



**Photo 6** Watercourse 1 at downstream terminus, looking upstream. Berm surrounding area contains and pools water, with no connection to Craigflower Creek found. The pipe in the photograph is not connected to anything.



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**Photo 7** Downstream, vegetated area of Watercourse 2 looking downstream. Right bank is made up of riprap berm that contains Watercourse 1.



**Photo 8** Downstream, vegetated and natural area of Watercourse 2 looking upstream.



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**Photo 9** Watercourse 2 within the archery range, looking upstream. Channel had copious amounts of reed canary grass and banks were covered in Himalayan blackberry.



**Photo 10** Watercourse 2 looking downstream from within archery range. Ditch is within area heavily infested with Himalayan blackberry.



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**Photo 11** Culvert outlet beneath Burnside Road that discharges to Watercourse 2.



**Photo 12** The watercourse north of Kami Court that provides a seasonal source of water to Watercourse 2. The watercourse was primarily overgrown with grass.



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**Photo 13** A portion of scoured channel along the watercourse north of Kami Court that provides a source of water to Watercourse 2.



**Photo 14** Watercourse 3 south of Watkiss Way showing rock armouring on banks.



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**Photo 15** Watercourse 3 south of Watkiss Way showing area of channelization.



**Photo 16** Watercourse 3 south of Watkiss Way showing wetted areas between deciduous vegetation.



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**Photo 17** Watercourse 3 south of Watkiss Way showing dry areas in non-channelized areas.



**Section 7. Professional Opinion**

**Qualified Environmental Professional opinion on the development proposal's riparian assessment.**

Date

1. I/We \_\_\_\_\_ Michelle Penner \_\_\_\_\_

Please list name(s) of qualified environmental professional(s) and their professional designation that are involved in assessment.

hereby certify that:

- a) I am/We are qualified environmental professional(s), as defined in the Riparian Areas Protection Regulation made under the *Riparian Areas Protection Act*;
- b) I am/We are qualified to carry out the assessment of the proposal made by the developer BC Transit (*name of developer*), which proposal is described in section 3 of this Assessment Report (the "development proposal");
- c) I have/We have carried out an assessment of the development proposal and my/our assessment is set out in this Assessment Report; and
- d) In carrying out my/our assessment of the development proposal, I have/We have followed the specifications of the Riparian Areas Protection Regulation and assessment methodology set out in the minister's manual; AND

2. As qualified environmental professional(s), I/we hereby provide my/our professional opinion that:

- a)  the site of the proposed development is subject to undue hardship, (if **applicable, indicate N/A otherwise**) and
- b)  the proposed development will meet the **riparian protection standard** if the development proceeds as proposed in the report and complies with the measures, if any, recommended in the report.

**[NOTE: "Qualified Environmental Professional" means an individual as described in section 21 of the Riparian Areas Protection Regulation.]**

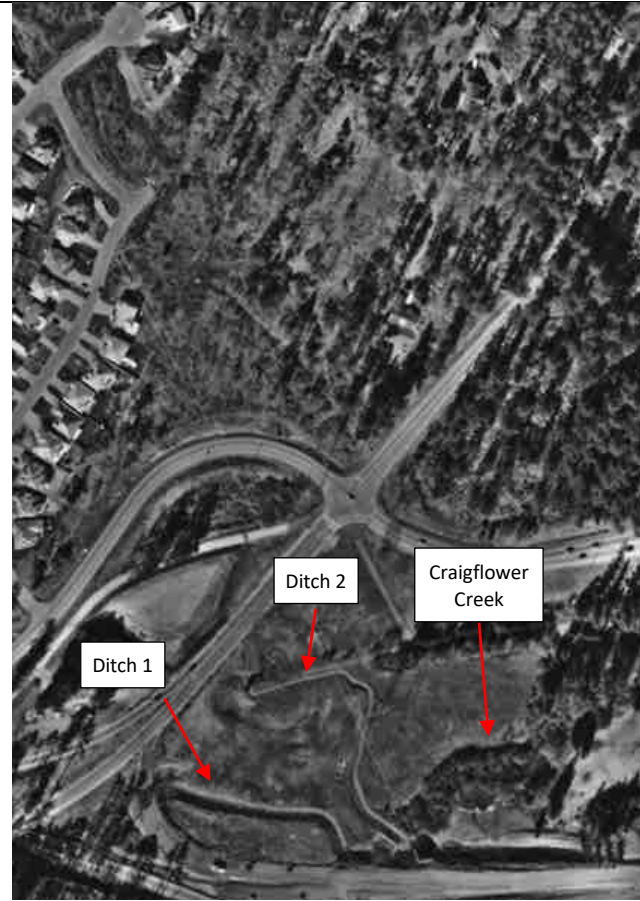


# **APPENDIX A**

**Air Photos**



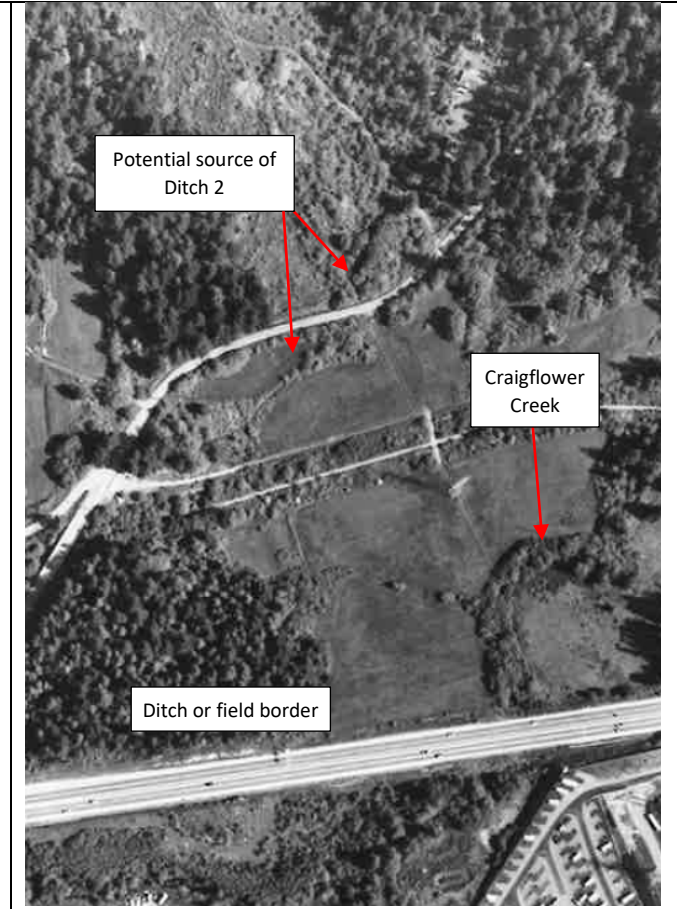
**Air Photo – 2005:** Site conditions after the construction of the Burnside Road offramp from Highway 1.



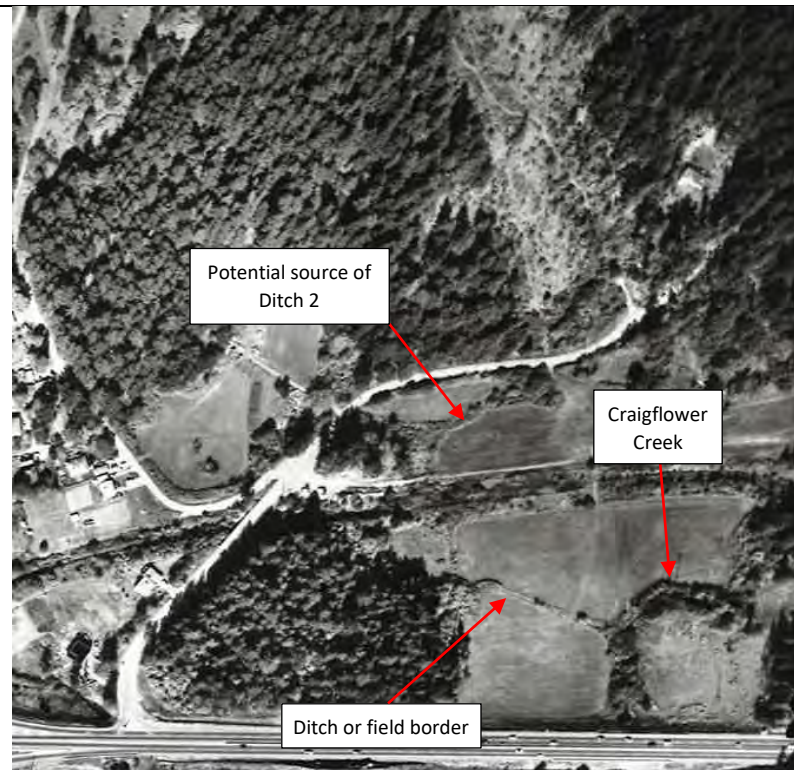
**Air Photo – 1997:** Site conditions during the construction of the Burnside Road offramp from Highway 1. The alignment of Ditch 1 and Ditch 2 are pronounced.



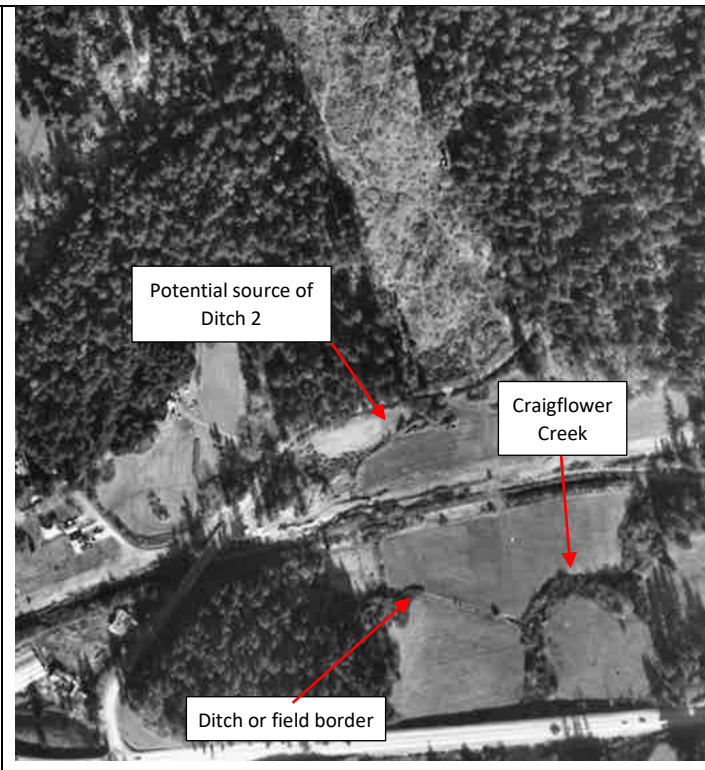
**Air Photo – 1992:** Site conditions prior to the construction of the Burnside Road offramp from Highway 1. Ditch 1 does not appear to be present and a ditch or field border is present in a similar location as Ditch 2 was previously.



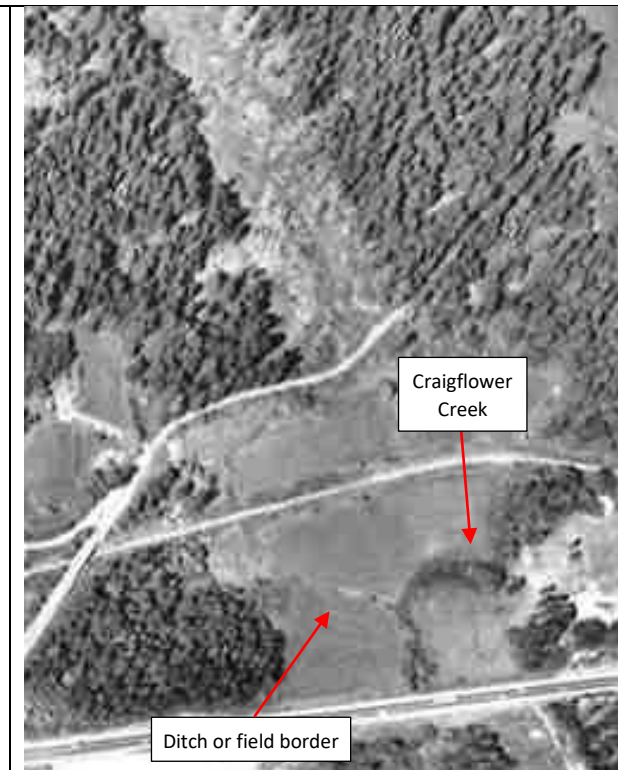
**Air Photo – 1986:** A potential source of water for Ditch 2 may be present in the cleared right-of-way upslope (north) of the property.



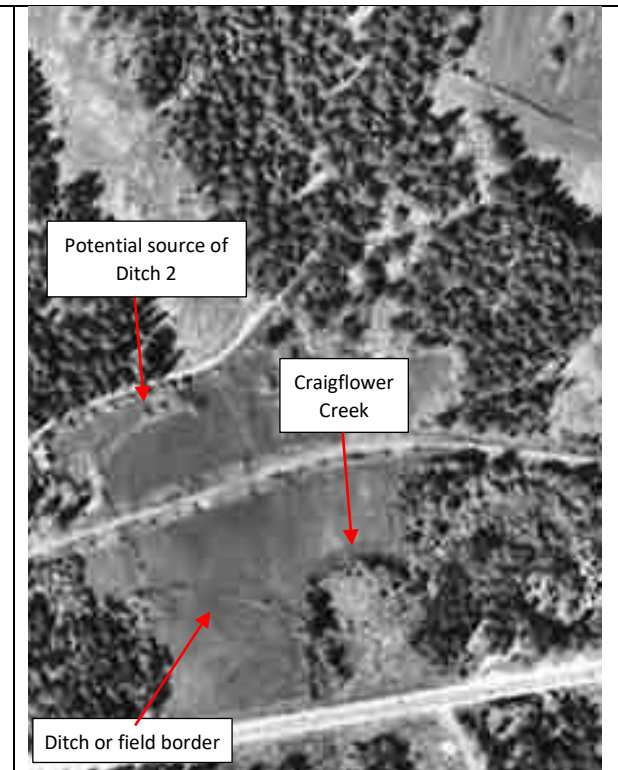
**Air Photo – 1979:** Similar conditions to 1986.



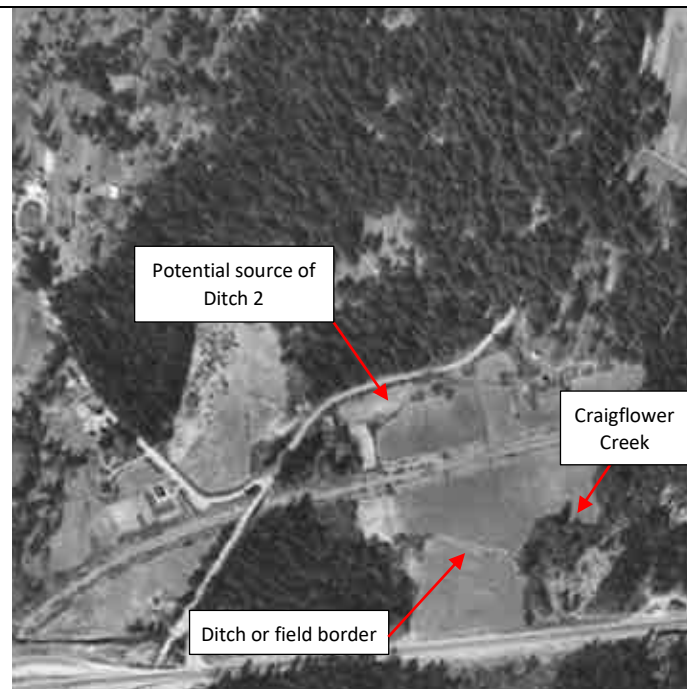
**Air Photo – between 1974:** Similar conditions to 1986.



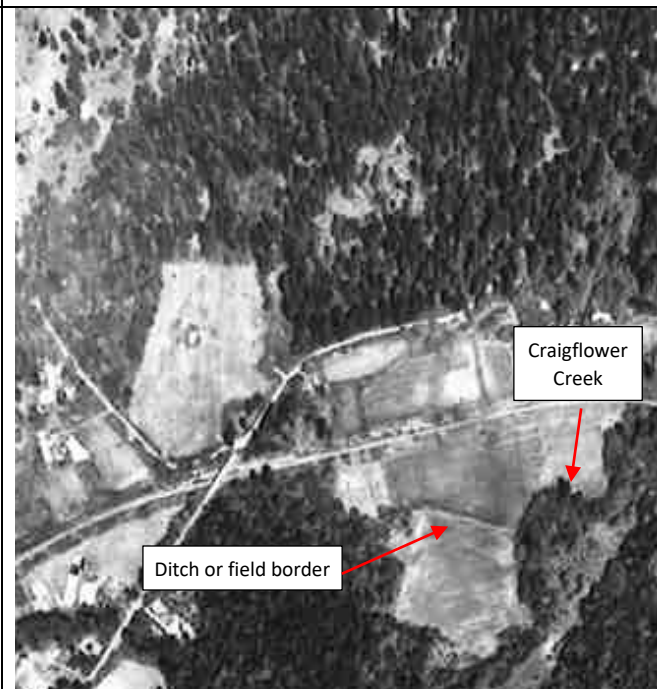
**Air Photo – 1968:** Similar conditions to 1986.



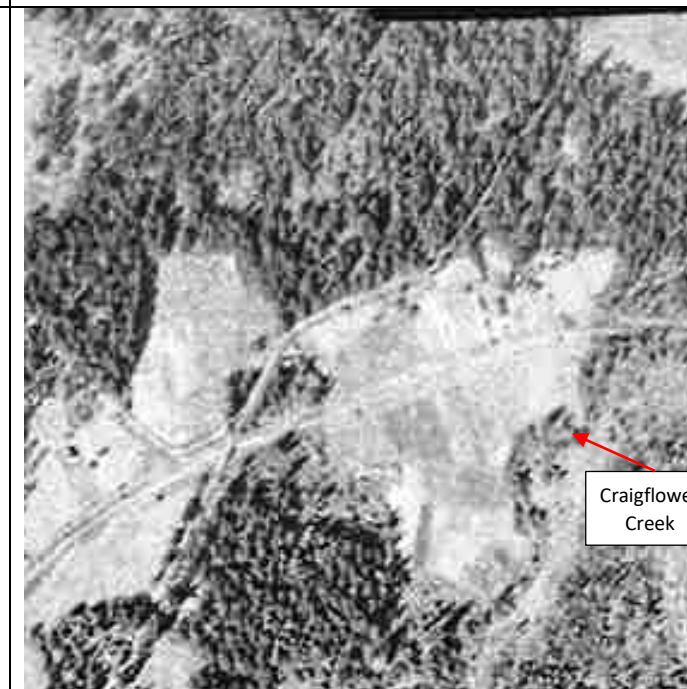
**Air Photo – 1964:** Similar conditions to 1986.



**Air Photo – 1956:** Cleared right-of-way no longer present north of the site



**Air Photo – 1949:** The ditch / field border in the area around Ditch 2 appear more prominently as a border to a field as opposed to a ditch.



**Air Photo – 1932:** The ditch / field border is no longer visible, though the area is cleared. No watercourses appear to flow into Craigflower Creek



**Air Photo – 1926:** The ditch / field border is no longer visible, though the area is cleared. No watercourses appear to flow into Craigflower Creek from the site.

# **APPENDIX B**

## **Tree Risk Assessment and Tree Protection Plan**



# Tree Risk Assessment & Tree Protection Plan

---

**Site:**

2401 Burnside Road West  
View Royal, BC V9B 6M7

**Prepared for:**

Stantec Consulting  
400 - 655 Tye Road  
Victoria, BC V9A 6X5

**Prepared by:**

Peter McAra  
Regional Inventory Arborist  
ISA Certified Arborist PN-7521A  
ISA Tree Risk Assessment Qualified  
pmcara@bartlett.com



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## Executive Summary

Bartlett Tree Experts were retained by Stantec Consulting to provide recommendations for the management of trees ahead of proposed construction work at 2401 Burnside Road West. Multiple trees are planned for removal to make way for the proposed infrastructure project. Subsequently, the wind forces exerted on the retained trees within the SPEA will be increased due to the new exposure. Mitigation recommendations are discussed within the report to reduce likelihood of impacts to surrounding targets. Construction activity will occur in the vicinity of trees along the western edge of the SPEA and the trees will require protection, as outlined in this report. The protection measures outlined in this report must be followed if these trees are to be retained.

## Introduction

In June 2020, Stantec Consulting retained Bartlett Tree Experts to provide an inventory and subsequent advice on the management of protected trees on the site. This project was initially started by former colleague, Charles Noseworthy. After a site plan revision in April 2021 Regional Inventory Arborist Pete McAra was tasked with overseeing the project. The intended purpose of this report is to evaluate the trees within the Streamside Protection and Enhancement Area (SPEA), to assess the risk they pose to the proposed development. Make recommendations to mitigate the hazard posed by these trees. Provide recommendations for the protection of trees within the SPEA from potential damage caused by construction activities.

## Site and Project Description

The property is minimally developed, and is currently used by the Victoria Bowmen's Archery Club as an archery range. BC Transit intends to develop the site into a bus depot, which will be located predominantly outside of the SPEA. However, there will be a few areas of construction that will come close to trees within the SPEA, where tree protection will be required. Adjacent to the property is the Galloping Goose Regional Trail which is used by cyclists and pedestrians throughout the majority of the day. Numerous trees border the pathway and are the subject of this report.

## Methodology

Through email correspondence with Stephanie Nabess of Stantec Consulting, I was provided with the updated site plans. I visited the site on April 15, 2021 to familiarize

myself with the project. The following supporting documents were used in production of this report:

- 2401 Burnside Road West, View Royal, BC Tree Risk Assessment & Tree Protection Plan June 2020 by Charles Noseworthy
- 23.03.29 HandyDart MDI Tree Removal.pdf
- 2019195-Surface Features-Ultimate-Site Plan.pdf

## Tree Data

The collected data is presented in Appendix II.

## Tree Impacts

The predominant winds of the area are west from mid-March to mid-October and east for the remainder of the year. In addition to increased wind exposure, the retained trees will likely have growth forms typical of trees growing within a forest interior and not a forest edge, which will make them more susceptible to wind-throw. Trees within a forest interior tend to develop into tall trees with poor taper and low live crown ratios. Due to the large majority of trees which appear to be planned for removal to make way for the project infrastructure, mitigation actions should be taken to reduce wind-throw forces on the remaining trees in the area.

The location of the proposed development should have minimal impact on the trees located within the SPEA. However, tree protection fencing will be required for the retained trees located to the northeast and southeast corners of the development areas due to the proposed retaining wall location. An arborist should be on site for the excavation required for the installation of these features, and to perform root pruning and mitigation work as necessary to minimize damage to the root system.

Trees #202, #204-207 and # 216 are tall, dead, grand fir trees which pose an increased risk of failure during high wind events and as they decay. Tree #202 is in the vicinity of a bus maintenance area and some of the bus parking stalls in the northeast corner of the construction area. The remaining trees could potentially strike the Galloping Goose trail should they fail. However, these trees are located far enough away from these potential targets that a reduction in their height would allow them to be retained as habitat trees while mitigating the risk they pose to surrounding infrastructure. We recommend that the height of these trees be reduced to eliminate the risk they pose to current or proposed infrastructure. The height reductions should be approximately half the canopy size as to reduce force exerted on them from wind throw due to the potential change in wind pattern in the area. Alternatively, trees #205-207 could also be removed to enable space for the Garry oak tree located to the south of them to thrive.



Tree #203 is a grand fir tree that is in poor condition and has a trunk lean towards the project area. Due to the potential changes in topographical features surrounding the tree from the project development, this tree could be impacted. The wind pattern could have an increased force upon the tree due to the new exposure from the surrounding tree removals. We recommend thinning the upper crown of the tree by 20 percent to enable better wind penetration through the crown and decrease wind throw. Future monitoring of the tree is also recommended.

Trees #208-210 are tall, recently dead trees located directly along the edge of the Galloping Goose trail within the SPEA. These trees pose a hazard to users of the trail as a result of their potential for failure during wind events or progressive decay. Due to their proximity to the trail, they cannot be reasonably retained as nature trees without continuing to pose a hazard. For these reasons, we recommend that these trees be removed to mitigate the risk they pose to trail users.

Trees #214-215 are a pair of over-mature red alders which appear to be nearing the end of their lifespan. Both trees are exhibiting significant signs of decline, such as progressive dieback of much of their canopy. Due to their species and age, the potential for internal decay in these trees is high. This could result in stem failure which has the potential to impact users of the Galloping Goose trail. For this reason we recommend that the decaying portion of the crown of both trees be removed to reduce their heights to a point where they will not impact the trail should a failure occur.

Trees #211-213 are a group of declining grand fir trees located near the Galloping Goose trail behind tree #215. These firs are showing indications of rapid decline, including dieback of the crown, low vitality and a high ratio of dead to live branches. These symptoms can be the result of decay in the lower stem or root flare; however, due to the thickness of the undergrowth in the vicinity of these trees and the need for advanced diagnostics to detect internal decay, this could not be confirmed. Being some of the taller trees in the area they're more likely to be impacted by the potentially changing wind patterns. We recommend that the canopy of these trees be reduced to minimize the likelihood of them impacting the trail should a failure occur.

The majority of trees inventoried on this site are located in isolation or in small groups, and many are either dead or are in a state of decline, these factors increase the trees susceptibility to wind throw. Trees growing in isolation or small groups are more susceptible to wind throw than those growing within a closed forest canopy, due to their increased level of exposure to wind. Dead trees (such as trees #208-210) become more susceptible to wind throw over time, as a result of progressive decay of their stems and root systems, in conjunction with their exposure to forceful winds. Similarly, trees exhibiting signs of crown dieback or significant decline (such as trees #211-213) often develop these symptoms as a result of root loss or decay which predisposes these trees to wind throw during storm events. No root decay fungi were observed at the time of our inspection; however, the decline symptoms of many of these mature trees suggest that

such pathogens may be present. Finally, many of the fir trees are very tall, meaning that they will be loaded heavily by the wind during storm events increasing the probability of wind throw. This increased risk of wind throw has been considered in the likelihood of failure assessment for all trees inventoried.

## Recommendations

1. Remove trees #d 205 - 210 due to proximity to trail. Cut stumps as low as possible.
2. After initial tree clearance on the project site has taken place an additional site visit by the project arborist is recommended. This is to reassess any retained trees to ensure project thoroughness and safety. Changes to below recommendations may be required.
3. Thin upper canopy of tree # 203 by 20 % of total canopy density. Monitor the tree for future changes in health.
4. Reduce the overall canopy heights of dead trees # 202, 204 and 216 by approximately half and leave remainder as a wildlife pole.
5. Reduce the heights of declining fir trees #d 211 – 213 to live growth or by approximately 15 percent as to reduce likelihood of impact to trail in the event of a failure.
6. Reduce the dead portions of the red alder trees #'s 214 and 215 to live growth to reduce likelihood of impact to trail in the event of failure.
7. Tree protection fencing should be installed for trees retained in the SPEA area adjacent to the northeast corner and southeast corner of the proposed project area. These trees were not a part of our inventory but if they are to be retained they'll need tree protection to minimize impact to their roots. Tree protection will be installed before construction commences and will remain in place until all activity has been completed. Tree protection fences must not be breached or moved without consulting the Project Arborist. Materials, equipment etc. must not be stored within the tree protection zones. If construction activity is required within a tree protection zone, it must first be discussed with the Project Arborist. Any such construction activity must be carried out by hand to avoid damage to the roots and/or compaction of the soil. An air spade should be used to expose roots before excavation takes place. Depending on the weather during the construction period, irrigation may be required. Entire root zones should be

watered heavily and infrequently (once every 7 days). Any exposed roots must be covered with burlap and kept moist. Compaction of soil in the root zones should be alleviated with an air spade as soon as practically possible.

## Limits of the Assignment

All recommendations made in this report are based on our interpretation of the site visited and our communication with the client via email.

The tree inventory was performed from the ground for visual conditions. The site conditions were sunny and clear at the time of the assessment.

The assessments were based on a single visit to the trees and visual assessments from the ground. Assessments were made of the designated trees on Thursday April 15, 2021. All photographs of the site and the trees were taken on the day the evaluation was performed. **Targets** were assessed based on estimated normal **occupancy rates** and usage for the sites. Risk assessments are considered over a three year period.

It must be emphasized however, that all trees pose a certain degree of inherent risk and this evaluation does not preclude all possibility of **failure**, especially during storms. For those trees that the client considers hazardous and representing an immediate safety concern, we recommend that the area around the tree be physically blocked off. The area could be blocked off by placing a sign, tape, or other warning device near those trees until such time as the hazard can be mitigated.

Tree risk assessment has a unique set of terms with specific meanings. Definitions of all specific terms may be found in the *International Society of Arboriculture's Best Management Practice for Tree Risk Assessment* (Smiley *et al.* 2011). Definitions of some of these terms used in this report are as follows:

The *likelihood of failure* may be categorized as **imminent** meaning that failure has started or could occur at any time; **probable** meaning that failure may be expected under normal weather conditions within the next three years; **possible** meaning that failure could occur, but is unlikely under normal weather conditions during that time frame; and **improbable** meaning that failure is not likely under normal weather conditions, and may not occur in severe weather conditions during that time frame.

The *likelihood of the failed tree part impacting a target* may be categorized as **high** meaning that a failed tree or tree part will most likely impact a target; **medium** meaning that a failed tree or tree part may or may not impact a target with equal *likelihood*; **low** meaning that the failed tree or tree part is not likely to impact a target; and **very low** meaning that the chance of a failed tree or tree part impacting the target is remote.

The *Likelihood of Failure and Impact* is defined by Table 1, the Likelihood Matrix:

Table 1: LIKELIHOOD OF FAILURE AND IMPACT

Likelihood of Failure	Likelihood of Impacting Target			
	Very Low	Low	Medium	High
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

The **consequences** of a known target being struck may be categorized as **severe** meaning that impact could involve serious personal injury or death, damage to high value property, or disruption to important activities; **significant** meaning that the impact may involve personal injury, property damage of moderate to high value, or considerable disruption; **minor** meaning that impact could cause low to moderate property damage, small disruptions to traffic or a communication utility, or minor injury; and **negligible** meaning that impact may involve low value property damage, disruption that can be replaced or repaired, and do not involve personal injury.

Levels of assessment 1) *Limited visual assessments* are conducted to identify obvious defects. 2) *Basic assessments* are visual inspections done by walking around the tree looking at the site, buttress roots, trunk and branches. It may include the use of simple tools to gain information about the tree or defects. 3) *Advanced assessments* are performed to provide detailed information about specific tree parts, defects, targets of site conditions. Drilling to detect decay is an *advanced assessment* technique.

Tree Risk Ratings are terms used to communicate the level of risk rating. They are defined in Table 2, the Risk Matrix, as a combination of Likelihood and Consequences:

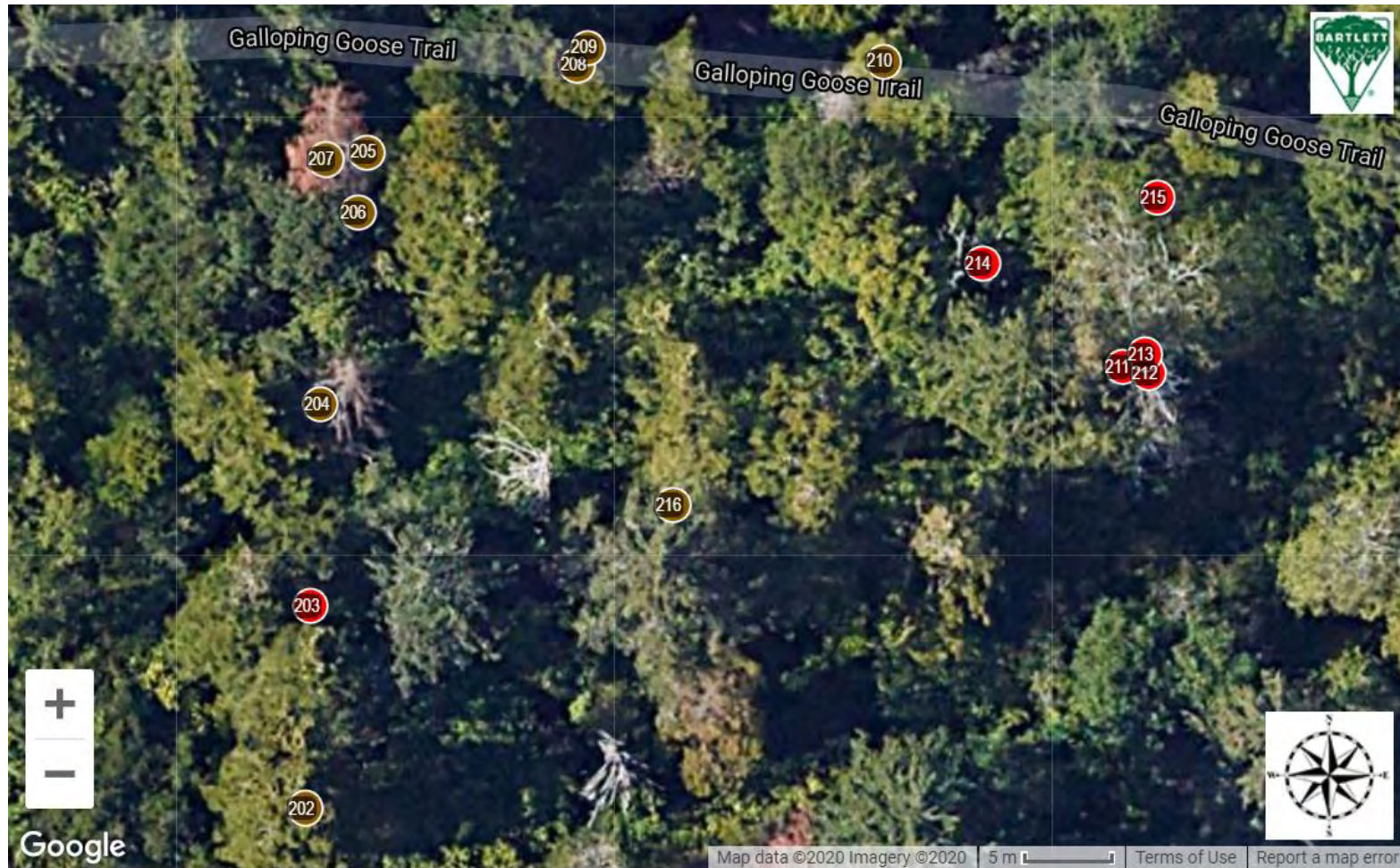
Table 2: ISA RISK MATRIX

Likelihood of Failure & Impact	Consequences of the Tree Failure			
	Negligible	Minor	Significant	Severe
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

Overall tree risk rating is the highest individual risk identified for the tree.

### Appendix I – Site Plans

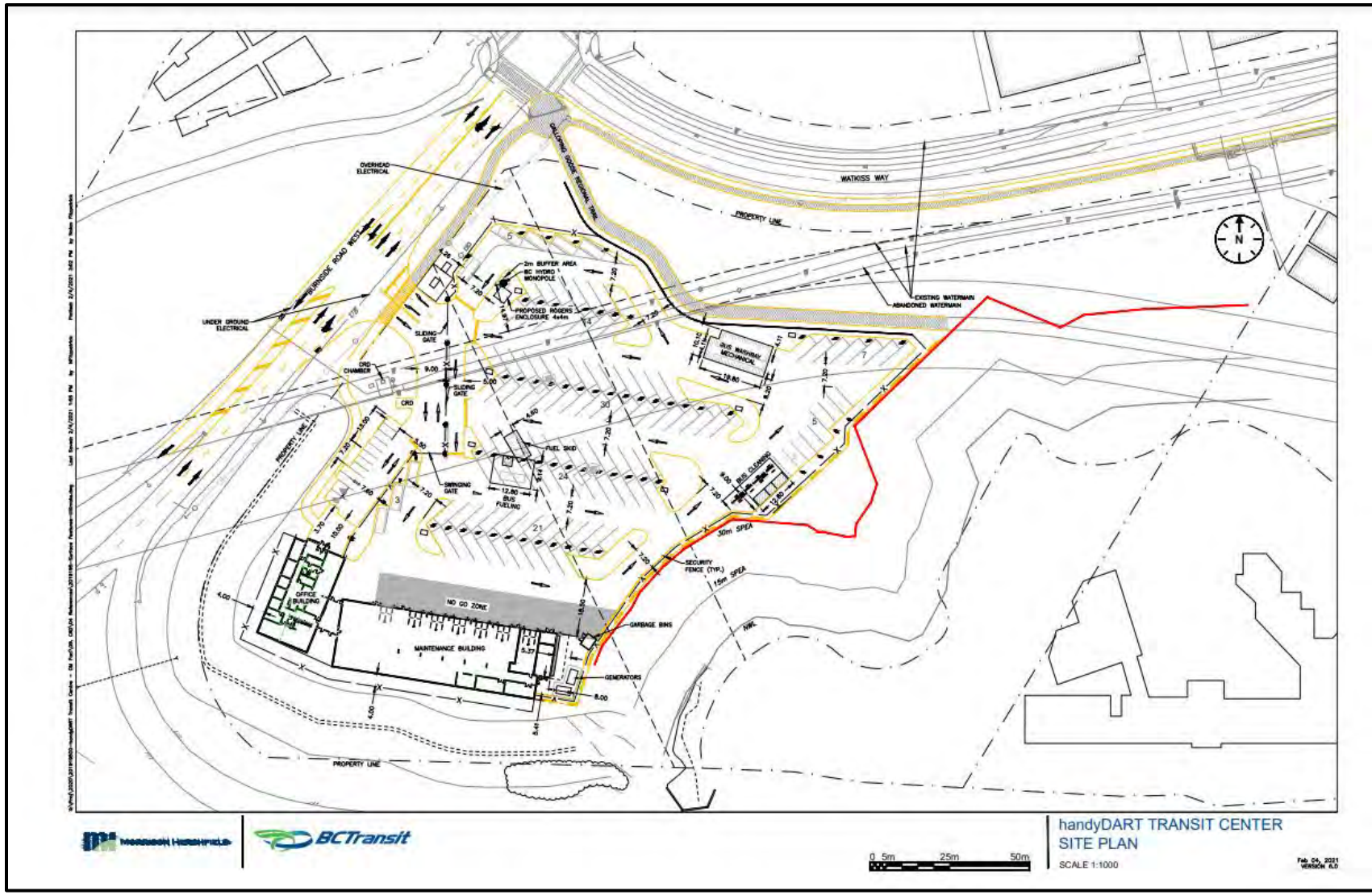




**Condition:** ● Poor ● Dead







## Appendix II – Tree Data

Tag #	Species	DBH (cm)	Height (m)	Condition	Plant Part of Concern	Targets	Likelihood of Failure	Likelihood of Impact	Consequences	Risk Rating
202	Grand fir ( <i>Abies grandis</i> )	89	34	Dead	Stem	Bus Maintenance & Parking Area	Possible	Low	Severe	Low
203	Grand fir ( <i>Abies grandis</i> )	70	34	Poor	Stem	Bus Maintenance & Parking Area	Possible	Low	Severe	Low
204	Grand fir ( <i>Abies grandis</i> )	46	25	Dead	Stem	Galloping Goose trail	Possible	Very Low	Severe	Low
205	Grand fir ( <i>Abies grandis</i> )	21	22	Dead	Stem	Galloping Goose trail	Possible	Very Low	Significant	Low
206	Grand fir ( <i>Abies grandis</i> )	26	22	Dead	Stem	Galloping Goose trail	Possible	Very Low	Significant	Low
207	Grand fir ( <i>Abies grandis</i> )	24	22	Dead	Stem	Galloping Goose trail	Possible	Low	Significant	Low
208	Grand fir ( <i>Abies grandis</i> )	22	23	Dead	Stem	Galloping Goose trail	Possible	Low	Significant	Low
209	Douglas fir ( <i>Pseudotsuga menziesii</i> )	36	26	Dead	Stem	Galloping Goose trail	Possible	Low	Severe	Low
210	Grand fir ( <i>Abies grandis</i> )	31	26	Dead	Stem	Galloping Goose trail	Possible	Low	Severe	Low
211	Grand fir ( <i>Abies grandis</i> )	60	24	Poor	Stem	Galloping Goose trail	Possible	Very Low	Severe	Low
212	Grand fir ( <i>Abies grandis</i> )	71	34	Poor	Stem	Galloping Goose trail	Possible	Low	Severe	Low
213	Grand fir ( <i>Abies grandis</i> )	66	34	Poor	Stem	Galloping Goose trail	Possible	Low	Severe	Low
214	Red alder ( <i>Alnus rubra</i> )	51, 49	24	Poor	Stem	Galloping Goose trail	Possible	Low	Severe	Low
215	Red alder ( <i>Alnus rubra</i> )	70	24	Poor	Branches	Galloping Goose trail	Possible	Medium	Severe	Low
216	Grand fir ( <i>Abies grandis</i> )	51	35	Dead	Stem	Galloping Goose trail	Possible	Very Low	Severe	Low

**Note:**

- All likelihood of impact assessments made for the Galloping Goose trail were done for the likelihood the tree part would strike a person, not the trail itself.
- All likelihood of failure assessments were made for portions of the tree which could potentially impact a target.

## Tree Location Data

Tag #	Species	Latitude	Longitude
202	Grand fir ( <i>Abies grandis</i> )	48.463684074	-123.444341810
203	Grand fir ( <i>Abies grandis</i> )	48.463789299	-123.444337558
204	Grand fir ( <i>Abies grandis</i> )	48.463893737	-123.444329665
205	Grand fir ( <i>Abies grandis</i> )	48.464025079	-123.444293394
206	Grand fir ( <i>Abies grandis</i> )	48.463993597	-123.444301081
207	Grand fir ( <i>Abies grandis</i> )	48.464021584	-123.444326383
208	Grand fir ( <i>Abies grandis</i> )	48.464070362	-123.444128551
209	Douglas fir ( <i>Pseudotsuga menziesii</i> )	48.464079521	-123.444120357
210	Grand fir ( <i>Abies grandis</i> )	48.464072319	-123.443888572
211	Grand fir ( <i>Abies grandis</i> )	48.463913520	-123.443701681
212	Grand fir ( <i>Abies grandis</i> )	48.463910111	-123.443680612
213	Grand fir ( <i>Abies grandis</i> )	48.463919824	-123.443683811
214	Red alder ( <i>Alnus rubra</i> )	48.463967247	-123.443811478
215	Red alder ( <i>Alnus rubra</i> )	48.464001343	-123.443674036
216	Grand fir ( <i>Abies grandis</i> )	48.463841709	-123.444053941

## Appendix III – Photographs



**Figure 1: Subject trees #205-207 circled in red (04/15/2021).**



**Figure 2: Subject tree #214 circled in red (04/15/2021).**



**Figure 3: Subject trees #211-213 circled in red (04/15/2021).**



**Figure 4: Subject tree #202 which leans towards project direction (04/15/2021).**



**Figure 5: Subject tree #204 (04/15/2021).**



**Figure 6: Subject tree #215 circled in red (04/15/2021).**

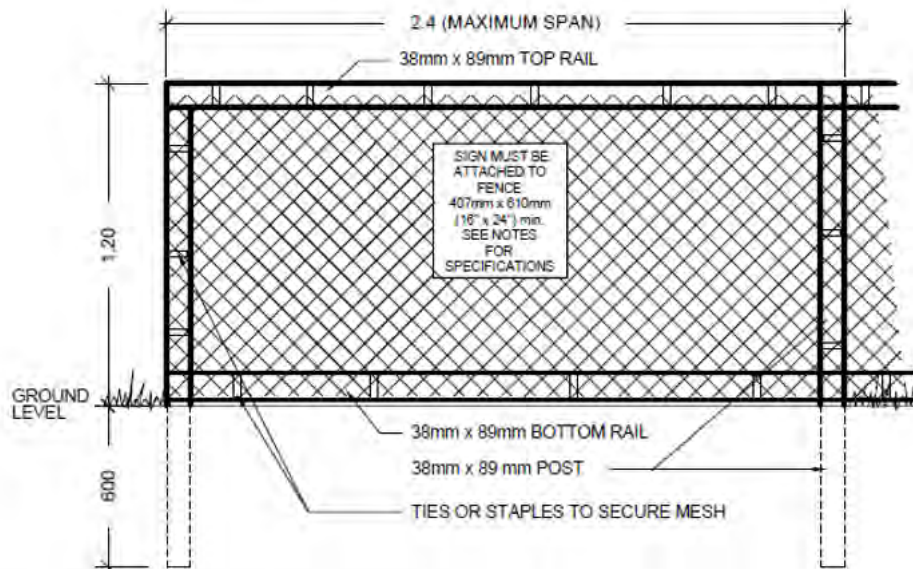


**Figure 7: Subject tree #216 circled in red (04/15/2021).**

## Appendix IV – Tree Protection

### Schedule “C”

#### TREE PROTECTION FENCING



#### **Tree Protection Fencing Specifications:**

1. The fence will be constructed using 38 x 89 mm (2" x 4") wood frame:
  - Top, Bottom and Posts.\*
  - Use orange snow fencing mesh and secure to the wood frame with "zip" ties or galvanized staples.
2. Attach a sign with minimum size of 407 mm x 610 mm (16" X 24") with the following wording:
  - a) **DO NOT ENTER**- Tree Protection Zone (For retained trees) or;
  - b) **DO NOT ENTER**- Future Tree Planting Zone (For tree planting sites)

This sign must be affixed on every fence face or at least every 10 linear metres.

\*In rocky areas, metal posts (t-bar or rebar) drilled into rock will be accepted.



## Appendix V - Assumptions and Limiting Conditions

Any legal description provided to the consultant is assumed to be correct. Any titles and ownership to any property are assumed to be good and marketable. No responsibility is assumed for matters legal in character. Any and all property is evaluated as though free and clear, under responsible ownership and competent management.

Care has been taken to obtain all information from reliable sources. All data has been verified insofar as possible; however, the consultant can neither guarantee nor be responsible for the accuracy of information provided by others.

The consultant shall not be required to give testimony or attend court by reason of this report unless subsequent contractual arrangements are made, including payment of an additional fee for such services as described in the fee schedule and contract of engagement.

Loss or alteration of any part of this report invalidates the entire report.

Possession of this report or a copy thereof does not imply right of publication or use for any purpose by any other than the persons to whom it is addressed, without the prior expressed written or verbal consent of the consultant.

This report, or any copy thereof, shall not be conveyed, in whole or in part, by anyone, including the client, to the public via any media type or outlet, without the prior expressed consent of the consultant specifically as to value conclusions, identity of the consultant, or any reference to any professional society or institute or to any initialed designation conferred upon the consultant as stated in his qualification.

This report and values expressed herein represent the opinion of the consultant, and the consultant's fee is in no way contingent upon the reporting of a specified value, a stipulated result, the occurrence of a subsequent event, nor upon any finding to be reported.

Illustrations, diagrams, graphs, and photographs in this report, being intended as visual aids, are not necessarily to scale and should not be construed as engineering or architectural reports or surveys.

Information contained in this report covers only those items that were examined and reflects the condition of those items at the time of inspection. There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the plans or property in question may not arise in the future.

## Appendix VI - Certificate of Performance

I, Peter McAra, certify that:

I have no current or prospective interest in the trees on the property, and have no personal interest or bias with respect to the parties involved;

The analysis, opinions and conclusions stated herein are my own and are based on current scientific procedures and facts;

My analysis, opinions, and conclusions were developed and this report has been prepared according to commonly accepted arboricultural practices;

No one provided significant professional assistance to me, except as indicated within this report;

My compensation is not contingent upon the reporting of a predetermined conclusion that factors the cause of the client or any other party, nor upon the results of the assessment, the attainment of stipulated results, or the occurrence of any subsequent events.

I further certify that I am an International Society of Arboriculture (ISA) Certified Arborist #PN-7521A and am tree risk assessment qualified. I am a member in good standing of with the ISA. I have been involved in the field of Arboriculture in a fulltime capacity for a period of 15 years.

Signed: *Peter McAra*

Date: April 20, 2021

# **APPENDIX C**

## **Riparian Area Protection Regulation Geotechnical Assessment**

---

To: Stephanie Nabess  
Stantec Consulting Ltd.

From: Jacob Nicklen, Tyler Trudel  
Stantec Consulting Ltd.

File: 123221593

Date: April 1, 2021

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**Reference: Burnside Road HandyDART Facility - Riparian Area Regulation Geotechnical Assessment**

Revision	Date	Revision Description
A	July 3, 2020	First release
B	April 1, 2021	Updated based on 70% design drawings

**INTRODUCTION**

Stantec Consulting Ltd. (Stantec) carried out a geotechnical assessment in support of the Riparian Areas Protection Regulation (RAR) Detailed Assessment Report, for BC Transit's proposed HandyDART facility at 2401 Burnside Road, in View Royal, British Columbia (herein referred to as the 'site'). The scope of work for the geotechnical assessment consisted of the following:

- Review of the proposed development plans, including location of proposed structures, addition of site grading fill, and modifications to the slope configuration and vegetation cover.
- Review of surficial geology maps and available geotechnical reports to identify the anticipated soil conditions in this area.
- Site reconnaissance to observe the location of the Streamside Protection and Enhancement Area (SPEA) in relation to the slopes and to identify, if any, indicators of possible slope instability that may exist.
- Geotechnical engineering review and preparation of this memorandum.

This assessment was carried out in general accordance with our proposal letter *Burnside Road HandyDART Facility—Proposal for Riparian Area Regulation Detailed Assessment, Environmental Management Plan and Fisheries Act Request for Review*, dated February 26, 2020.

**PROJECT UNDERSTANDING**

The site is bound by Watkiss Way to the north, Craigflower Creek to the east, the Trans-Canada Highway to the south, and Burnside Road to the west. The western portion of the site contains stockpiled fill material overgrown with shrubs. An archery range is present on the eastern portion of the site, and a BC Hydro right-of-way runs north-south through the center of the site. Three watercourses are present onsite including Craigflower creek and two unnamed watercourses (herein referred to as 'Watercourse 1' and 'Watercourse 2'). Watercourse 1 is located at the south end of the site, parallel to the Trans-Canada Highway. Watercourse 2 begins near the northwest corner of the site and runs southeast through the site before draining into Craigflower creek.

We understand the proposed HandyDART facility would include an operations and maintenance building, wash bay, fuel station, staff and visitor parking stalls, and parking for HandyDART buses. Based on our review of the 70% design landscape drawings prepared by Murdoch de Greeff Inc (Rev. 2 dated February 23, 2021), we understand that Watercourse 2 would be infilled, and water diverted into Watercourse 1.

April 1, 2021

Stephanie Nabess

Page 2 of 4

**Reference:** Burnside Road HandyDART Facility - Riparian Area Regulation Geotechnical Assessment

Proposed site grading plans were not available at the time of writing. Approximate elevations of the existing ground surface were taken from the 70% design drawings and utilized for this assessment.

## SUBSURFACE CONDITIONS

Based on our review of the *Quaternary Geological Map of Greater Victoria* (Geoscience Map 2000-2) and the *Victoria HandyDART Facility Geotechnical Summary Report* prepared by WSP Canada Inc. (dated January 31, 2019), we understand the site is generally underlain by topsoil or fill, overlying firm brown clay, overlying soft blue clay over bedrock. The WSP report indicates fill soils were up to 7.5 m thick in the western portion of the site in the stockpile.

## SITE RECONNAISSANCE

A Stantec geotechnical field representative carried out a site reconnaissance on April 23, 2020 to observe pertinent site features and identify any indicators of possible slope instability above the watercourses. Two Stantec biologists were also present at the time of the site reconnaissance.

Watercourse 1 is a vegetated, rip-rap lined drainage channel located at the toe of the stockpile adjacent to the Trans-Canada Highway (refer to Figure 1) and terminates in a pool adjacent to Craigflower Creek. No connectivity, culverts, or water flow were observed that would suggest Watercourse 1 currently connects to Craigflower Creek or Watercourse 2. Further, the 70% design drawings indicate that a new channel would be created approximately 7 m north of the existing channel. As such, the existing channel is isolated and not protected under the *Riparian Areas Regulation*. Therefore, no geotechnical assessment is required at this time for Watercourse 1 in support of the RAR Detailed Assessment Report.



**Figure 1** Looking east with Watercourse 1 on the right side of the image (overgrown with vegetation) and the stockpile on the left side of the image

**Reference:** Burnside Road HandyDART Facility - Riparian Area Regulation Geotechnical Assessment

Watercourse 2 is a vegetated, rip-rap lined drainage channel that connects to Craigflower Creek at the southeast corner of the site (refer to Figure 2). We understand Watercourse 2 would be infilled, and water diverted into the new channel adjacent to Watercourse 1. Therefore, no geotechnical assessment is required at this time for Watercourse 2 in support of the RAR Detailed Assessment Report.



**Figure 2** Looking northeast with 2 in the foreground, and the crest of the slope above Craigflower Creek in the background (both overgrown with vegetation)

Craigflower Creek runs along the southeast edge of the site (refer to Figure 2). The existing ground surface slopes up towards the northwest from approximately El. 5 m at the creek, to El. 9.5 m at the crest of the slope which is roughly 20 m away at the closest point. Trees were fallen or growing over much of the creek channel, and the slope to the northwest was densely vegetated with trees and shrubs. The existing slope is estimated to be approximately 4H:1V or flatter. No signs of instability were identified during the site reconnaissance. Cross section F-F' included in the 70% design drawings indicates no significant grade changes are proposed in the area adjacent to Craigflower Creek.

## DISCUSSION

Based on our review of the available information and our site reconnaissance, we consider that the proposed development will not have an adverse impact on the stability of the slope above Craigflower Creek. As such, the risk to the SPEA can be considered very low. Any changes to the development plan should be reviewed by a qualified professional prior to construction or site preparation. Once grading plans are available, these should be provided to Stantec for review.

Note that this assessment considers the impact on the slope as a result of the development. However, it does not consider the impact the slope may have on the proposed development. The ravine slope could naturally become unstable without the development as a contributing factor, and this instability could impact structures at the top of the ravine banks in the future. This should be addressed by the engineer of record for the proposed development.

April 1, 2021

Stephanie Nabess

Page 4 of 4

**Reference:** Burnside Road HandyDART Facility - Riparian Area Regulation Geotechnical Assessment

## **CLOSURE**

We trust this information meets your requirements at this time. Should you have any questions, please do not hesitate to contact the undersigned.

**Stantec Consulting Ltd.**



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Fax: 604-436-3752  
tyler.trudel@stantec.com

Attachment: Statement of General Conditions

## STATEMENT OF GENERAL CONDITIONS

**USE OF THIS REPORT:** This report has been prepared for the sole benefit of the Client or its agent and may not be used by any third party without the express written consent of Stantec and the Client. Any use which a third party makes of this report is the responsibility of such third party.

**BASIS OF THE REPORT:** The information, opinions, and/or recommendations made in this report are in accordance with Stantec's present understanding of the site specific project as described by the Client. The applicability of these is restricted to the site conditions encountered at the time of the investigation or study. If the proposed site specific project differs or is modified from what is described in this report or if the site conditions are altered, this report is no longer valid unless Stantec is requested by the Client to review and revise the report to reflect the differing or modified project specifics and/or the altered site conditions.

**STANDARD OF CARE:** Preparation of this report, and all associated work, was carried out in accordance with the normally accepted standard of care in the state or province of execution for the specific professional service provided to the Client. No other warranty is made.

**INTERPRETATION OF SITE CONDITIONS:** Soil, rock, or other material descriptions, and statements regarding their condition, made in this report are based on site conditions encountered by Stantec at the time of the work and at the specific testing and/or sampling locations. Classifications and statements of condition have been made in accordance with normally accepted practices which are judgmental in nature; no specific description should be considered exact, but rather reflective of the anticipated material behavior. Extrapolation of in situ conditions can only be made to some limited extent beyond the sampling or test points. The extent depends on variability of the soil, rock and groundwater conditions as influenced by geological processes, construction activity, and site use.

**VARYING OR UNEXPECTED CONDITIONS:** Should any site or subsurface conditions be encountered that are different from those described in this report or encountered at the test locations, Stantec must be notified immediately to assess if the varying or unexpected conditions are substantial and if reassessments of the report conclusions or recommendations are required. Stantec will not be responsible to any party for damages incurred as a result of failing to notify Stantec that differing site or sub-surface conditions are present upon becoming aware of such conditions.

**PLANNING, DESIGN, OR CONSTRUCTION:** Development or design plans and specifications should be reviewed by Stantec, sufficiently ahead of initiating the next project stage (property acquisition, tender, construction, etc), to confirm that this report completely addresses the elaborated project specifics and that the contents of this report have been properly interpreted. Specialty quality assurance services (field observations and testing) during construction are a necessary part of the evaluation of sub-subsurface conditions and site preparation works. Site work relating to the recommendations included in this report should only be carried out in the presence of a qualified geotechnical engineer; Stantec cannot be responsible for site work carried out without being present





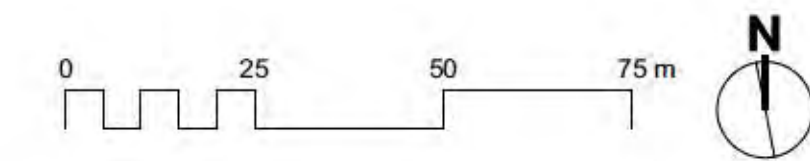
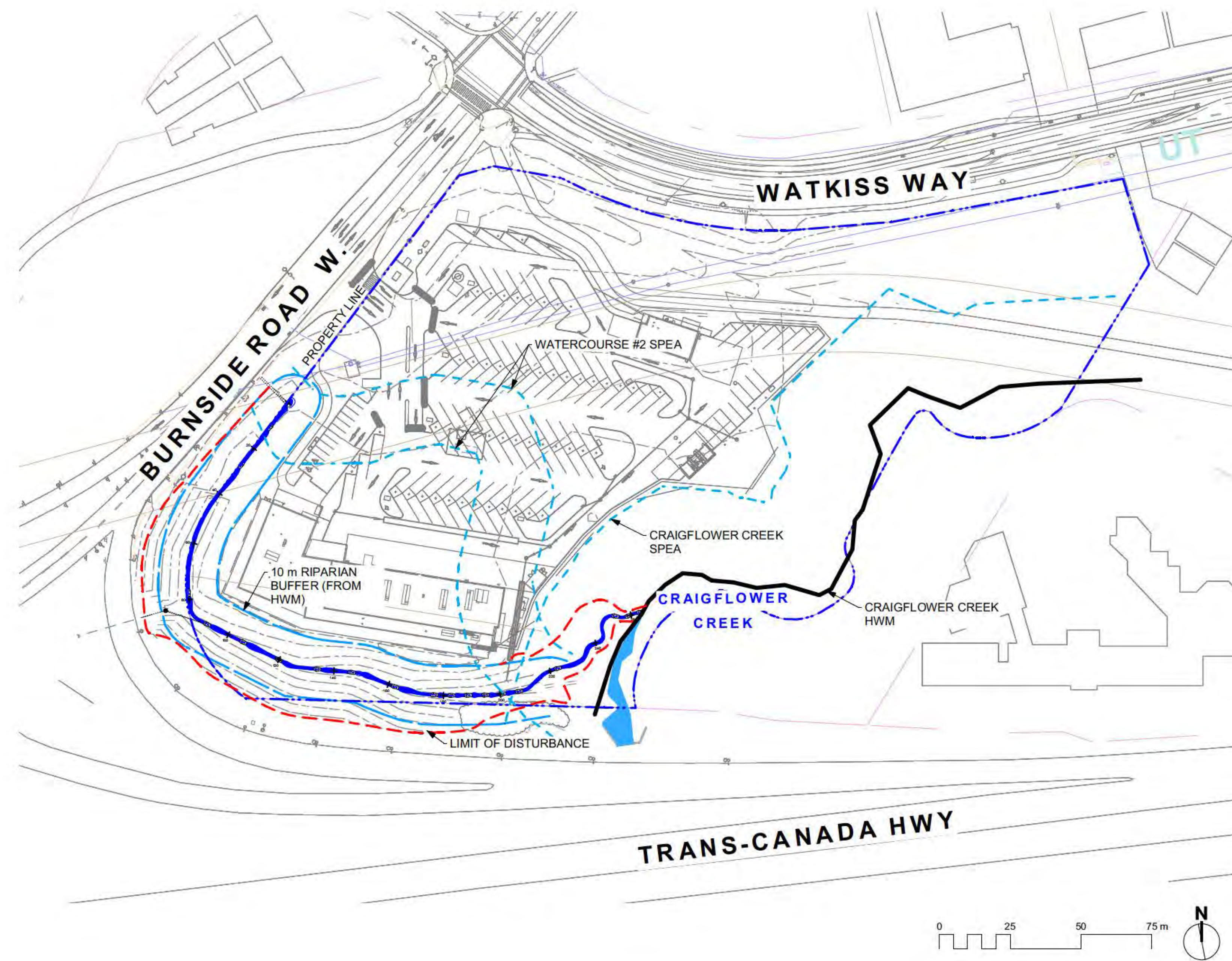
# **APPENDIX D**

## **Site Drawings**

BC Transit  
**VICTORIA handyDART CENTRE**  
 Victoria, BC

Landscape Drawings	
Sheet No.	Sheet Title
L0.00	Cover
L0.01	General Information Sheet
L0.02	Tree Removal and Protection Plan
L1.01	Existing Site Plan
L1.02	Proposed Stream Plan
L1.03	Site Sections
L1.04	Site Sections
L2.01	Stream Profile - Upper
L2.02	Stream Profile - Middle
L2.03	Stream Profile - Lower
L2.04	Stream Profile - Low Gradient Channel
L3.01	Planting Plan Overview
L3.02	Planting Plan - Upper
L3.03	Planting Plan - Middle
L3.04	Planting Plan - Lower
L4.01	Landscape Details

**KEY PLAN**



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All dimensions in Metric

REV	DESCRIPTION	DATE
6	Issued for Tender	2021-07-05
5	Draft IFT	2021-06-25
4	Revised EDP No.1	2021-05-24
3	EDP No.1	2021-05-03
2	70% Design	2021-02-02
1	Revision #1	2021-01-06
REV	DESCRIPTION	YYYY-MM-DD

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STAMPS



CLIENT: BC TRANSIT  
 PROJECT: VICTORIA handyDART CENTRE

COVER

SCALE:	PROJECT NO.	
1:1000	201919500	
DWG.#	REV	DATE:
TP2 - L0.00	3	2021-06-24

**GENERAL NOTES**

- 1. Work performed shall comply with the following: a) These General Notes, and Construction Documents and Specifications; b) Canadian Landscape Standards, Current Edition (CLS-CE); and c) All applicable local, provincial, and federal codes, ordinances, and regulations.
2. Contractor is responsible for verifying all existing site conditions including location of all property lines, existing structures, utilities, and buried infrastructure. Verify all field conditions prior to commencing work.
3. Contractor is responsible for determining means and methods for construction. These drawings may indicate a limit of proposed improvements or limit of work for the delineation of expected extents of disturbance. Should limits of disturbance exceed boundaries defined in drawings, contractor to contact Contract Administrator for resolution.
4. Contractor is responsible for repairing all work disturbed by construction outside of limit lines defined on drawings or through their means and methods to a condition better than or equal to the existing conditions prior to commencement of construction at no additional cost to the owner.
5. Contractor is responsible for maintaining a complete up-to-date set of drawings and specifications at the construction site and ensuring the documents are readily available for review by the Contract Administrator and governing agency.
6. Contractor is responsible for coordination of all designs, drawings, specifications and other documents or publications upon which construction is based. Any discrepancies with the drawings and/or specifications and site conditions is to be brought to the attention of the Contract Administrator, prior to proceeding with construction.
7. The drawings and specifications are complementary to one another and implied to correspond with one another. Any discrepancies should be brought to the attention of the Contract Administrator for resolution immediately.
8. General Contractor and/or sub-contractors are responsible for all costs related to production and submission to Contract Administrator of all landscape as-built information including irrigation.

**TREE RETENTION AND REMOVAL NOTES**

- 1. Tree protection fencing, for existing trees, to be installed prior to commencement of all site work. Refer to Landscape Drawings and Arborist's plans for location of tree protection fencing, and protection fencing detail.
2. Refer to arborist's report for detailed information for existing tree resources.

**SITE GRADING AND DRAINAGE NOTES**

- 1. All elevations are in meters.
2. Refer to Architectural plans, sections and elevations for top of slab elevations. Slab elevations indicated on Landscape Drawings are for reference only. Report any discrepancies to consultant for review and response.
3. All road, public, walkway and vehicular drive aisles and parking area elevations indicated on the Landscape Drawings are for reference only. Refer to Civil Drawings. Report any discrepancies to Contract Administrator for review and response.
4. Confirm all existing grades prior to construction. Report any discrepancies to Contract Administrator for review and response.
5. Unless otherwise noted provide a minimum slope of 2% on all hard and soft landscape areas to ensure positive drainage away from buildings, to rain gardens, or to drainage devices.
6. All landscape areas not to exceed a maximum slope of 3:1 in all instances.
7. Upon discovery, contractor to refrain from blasting rock to meet landscape subgrades. Contractor to contact Contract Administrator on how to proceed in each instance.

**IRRIGATION NOTES**

- 1. Contractor to provide irrigation system for all planters to current IABC Standards and Contract Specifications.
2. All specified work to meet the project specifications, and all standards or specifications established in the latest edition of the Canadian Landscape Standard and IABC standards.
3. Design/build drawings for detailed irrigation plan to be submitted to Contract Administrator in PDF and .dwg formats at least two weeks prior to commencement of irrigation installation.
4. Utilities - Contractor to verify location of all on-site utilities, prior to construction. Restoration of damaged utilities shall be made at the contractor's expense, to the satisfaction of the Contract Administrator.
5. Refer to electrical drawings for electrical service.
6. Controller and backflow prevention device to be located in valve box, unless otherwise noted. Refer to Civil drawings for size and location of irrigation service.
7. Contractor to verify pressure and flow prior to installation of irrigation and notify Contract Administrator in writing if such data adversely affects the operation of the system.
8. Sleeves to be installed at the necessary depths, prior to pavement construction. Sleeving to extend 300 mm from edge of paving into planting area, and is to have ends marked above grade unless otherwise shown.
9. Contractor to field fit irrigation system around existing trees, to limit disturbance to root systems. Work within 2 m of the tree drip line to be reviewed with project arborist.
10. At various milestones during construction, inspection and testing of components will be required to ensure that the performance of irrigation system meets standards and specifications. Contractor to provide equipment and personnel necessary for performance of inspections and tests. Conduct all inspections and tests in the presence of the Contract Administrator. Keep work uncovered and accessible until successful completion of inspection or test.
11. Over spray onto hardscape areas to be minimized.
12. Trees within shrub or rain garden areas to be irrigated with spray heads.

**GROWING MEDIUM NOTES**

- 1. Refer to Landscape Specifications for growing medium properties by soil type.
2. Advise Contract Administrator of sources of growing medium to be utilized 21 days in advance of starting work.
3. Growing medium properties and handling to meet CLS-CE (see Section 5 CLS-CE).
4. Contractor is responsible for soil analysis and amendment requirements to supply suitable growing medium, as specified by testing agency. Soil analysis and amendment costs to be included in the price for the work.
5. Submit to the Contract Administrator a copy of the soil analysis report from Pacific Soil Analysis Inc. 5-11720 Voyageur Way, Richmond, BC, V6X 3G9. p. 604- 273-8226. The analysis is to be of tests done on the proposed growing medium from stratified samples taken from the supply source within thirty (30) days immediately prior to growing medium placement. Costs of the initial and all subsequent tests to ensure compliance with the specifications is to be borne by the Contractor.
6. Landscape Architect will collect sample of growing medium in place and determine acceptance of material, depth of growing medium and finish grading. Approval of growing medium material subject to soil testing and analysis. Planting is not to occur until finished grades have been approved by Contract Administrator.

**SITE LAYOUT NOTES**

- 1. Provide layout of all work for approval by Contract Administrator prior to proceeding with work. Requests for site review as required 48 hours in advance of performing any work, unless otherwise noted on this sheet.
2. Layout and verify dimensions prior to construction. Bring discrepancies to the attention of the Contract Administrator.
3. Written dimensions take precedence over scale. Do not scale drawings.
4. All plan dimensions in metres and all detail dimensions in millimetres, unless otherwise noted.
5. Where dimensions are called as 'equal' or 'eq', space referenced items equally, measured to centre line.

**BOULDER SIZE AND PLACEMENT**

- 1. Stone to be durable, non-sedimentary and non-spalling rock.
2. Key 1/3 of rock into soil unless otherwise noted.
3. Landscape Architect to approve layout of boulders prior to placement. Allow time for field review with Landscape Architect and adjust final locations of boulders as required to meet design intent.
4. Boulder dimensions to meet tolerances shown in Landscape Drawings on three axes. Smallest axis to be greater than 75% of widest dimension.

**GENERAL PLANTING NOTES**

- 1. Plant quantities on Plans shall take precedence over plant list quantities.
2. Provide layout of all work for approval by Contract Administrator prior to proceeding with work.
3. Plant material, installation and maintenance to conform to the current edition of the Canadian Landscape Standard.
4. Plant quantities and species may change between issuance of E.D.P. and Construction due to plant availability and design changes. Substitutions and changes will be approved by the Contract Administrator prior to plant installation.
5. Landscape installation to carry a 1 year warranty from date of acceptance. This warranty is based on adequate maintenance by the Owner after Acceptance. The Contractor will not be responsible for plant loss due to extreme climatic conditions such as abnormal freezing temperatures or hail which occur after Acceptance. The Contractor is responsible for plant loss due to inadequate acclimatization of plants for their planted location.
6. Trees will be planted such that they do not impact visibility for drivers. Trees will not be planted within 7m of Burnside Road or the highway off-ramp.

**LARGE WOODY DEBRIS SALVAGE**

- 1. All Large Woody Debris (LWD) will remain on site and be incorporated into the new stream channel design.
2. LWD is defined as stems larger than 10 cm diameter and root wad (attached to tree or separate).
3. Contractor will salvage LWD and retain on site at location TBD. LWD will be sorted in piles 10-20 cm, 20-40 cm and >40 cm diameter.
4. Where feasible, trees should be pushed over. Do not cut off root wad. Retain root wad with 4 to 6 m trunk. Buck logs in 4 to 6 m lengths.
5. LWD placement will be at direction of Landscape Architect and Biologist.
6. Other wood waste from felled trees (branches and unused woody limbs) to be used to create wood mulch. Mulch size to be consistent with a Course Bark Mulch product and shall be 75 mm (in.) minus.

**FLOW INTRODUCTION**

- 1. Conduct during a period of low flow and with no rain in the forecast following completion of construction of the tie-in to Craigflower Creek.
2. Install a barrier in Watercourse 2 upstream of the point where it will be diverted into the new channel. Pump flow from behind the barrier downstream into Watercourse 2. Discharge the outlet hose onto a hard surface for energy dissipation.
3. Complete the tie-in from the now dry section of Watercourse 2 to the new channel.
4. Install an isolating barrier in Watercourse 2 downstream of the tie-in to the new channel.
5. Install an isolating barrier downstream in Watercourse 1 before it discharges to Craigflower Creek. The Flooded Riparian Bench may be able to function as this barrier.
6. Complete a fish salvage in the entirety of Watercourse 2.
7. Shut off the pump and remove the upstream barrier. Allow flow into the new channel.
8. Sediment-laden water will be intercepted by the barrier at Craigflower Creek (or Flooded Riparian Bench). Pump flow behind the barrier in the Flooded Riparian Bench to a vegetated area until the flow runs clear.
9. Fill in upper section of Watercourse 2.
10. Remove all barriers.

**LIST OF ABBREVIATIONS**

Table with 3 columns: APPROX, ARCHITECT, and MAX. Lists abbreviations for terms like APPROXIMATE, ARCHITECT, MAXIMUM, etc.

**LINE TYPE LEGEND**

Table mapping line styles to descriptions: Property line (dashed), Existing Non-Mountable Curb (solid), Existing No-Post Barrier (solid), etc.

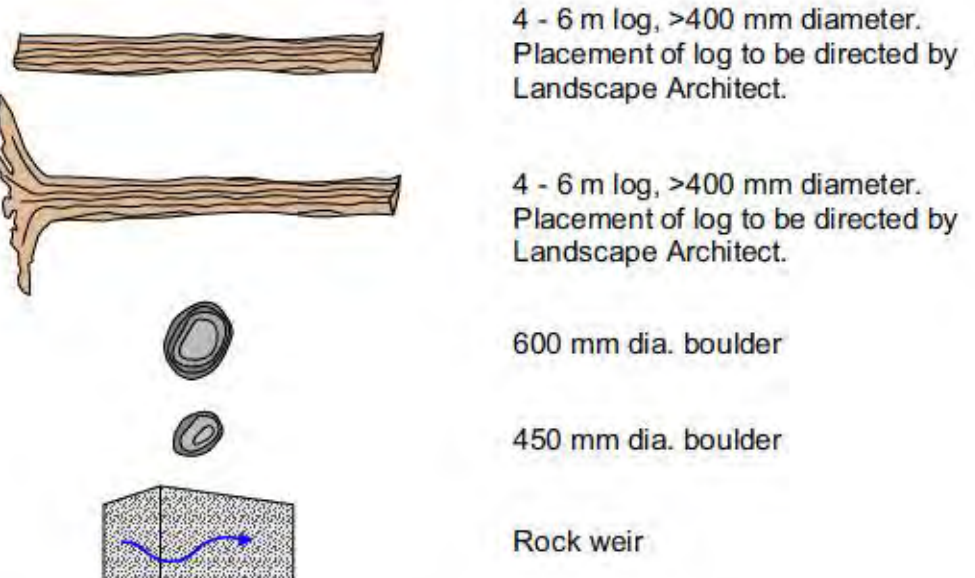
**UNDERGROUND UTILITIES**

(Shown for reference only - refer to Civil Drawings).

Table mapping line colors to utility types: Storm drain (green), Sewer (red), Water (blue), etc.

**MATERIALS LEGEND**

Table mapping textures to materials: Proposed Stream (blue), Berm (hatched), Rock and Cobble (stippled).



**PLANTING LEGEND**

Table mapping colors and textures to planting areas: Maintenance Access Planting Area (light green), Upland (Sun) Planting Area (medium green), etc.



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Revision table with columns: REV, DESCRIPTION, DATE. Includes entries for Issued for Tender, Draft IFT, Revised EDP No.1, etc.

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**STAMPS**

Empty stamp area table.



CLIENT: BC TRANSIT

PROJECT: VICTORIA handyDART CENTRE

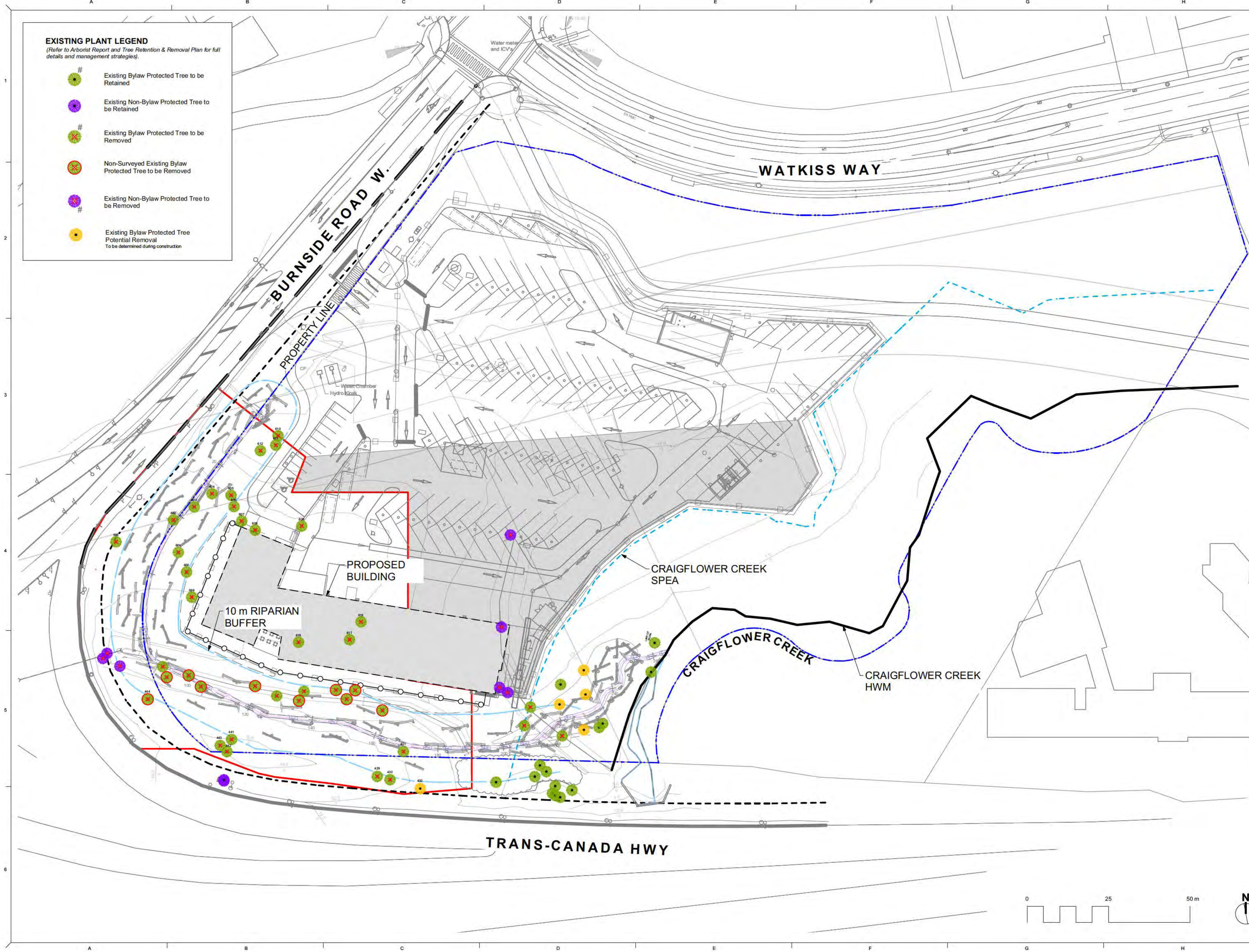
**GENERAL INFORMATION SHEET**

Table with project details: SCALE: AS SHOWN, PROJECT NO: 201919500, DWG.#: TP2 - L0.01, REV: 3, DATE: 2021-06-24

ALL DRAWINGS TO BE READ IN ASSOCIATION WITH LANDSCAPE SPECIFICATIONS DOCUMENT.

**EXISTING PLANT LEGEND**  
(Refer to Arborist Report and Tree Retention & Removal Plan for full details and management strategies).

- Existing Bylaw Protected Tree to be Retained
- Existing Non-Bylaw Protected Tree to be Retained
- Existing Bylaw Protected Tree to be Removed
- Non-Surveyed Existing Bylaw Protected Tree to be Removed
- Existing Non-Bylaw Protected Tree to be Removed
- Existing Bylaw Protected Tree Potential Removal To be determined during construction



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REV	DESCRIPTION	DATE
6	Issued for Tender	2021-07-05
5	Draft IFT	2021-06-25
4	Revised EDP No.1	2021-05-24
3	EDP No.1	2021-05-03
2	70% Design	2021-02-02
1	Revision #1	2021-01-06
	DESCRIPTION	YYYY-MM-DD

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CLIENT:  
BC TRANSIT

PROJECT:  
VICTORIA handyDART CENTRE

TREE REMOVAL AND PROTECTION PLAN

SCALE:	1:500	PROJECT NO:	201919500
DWG.#	TP2 - L0.02	REV	3
		DATE:	2021-06-24





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2021-07-04

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STAMPS

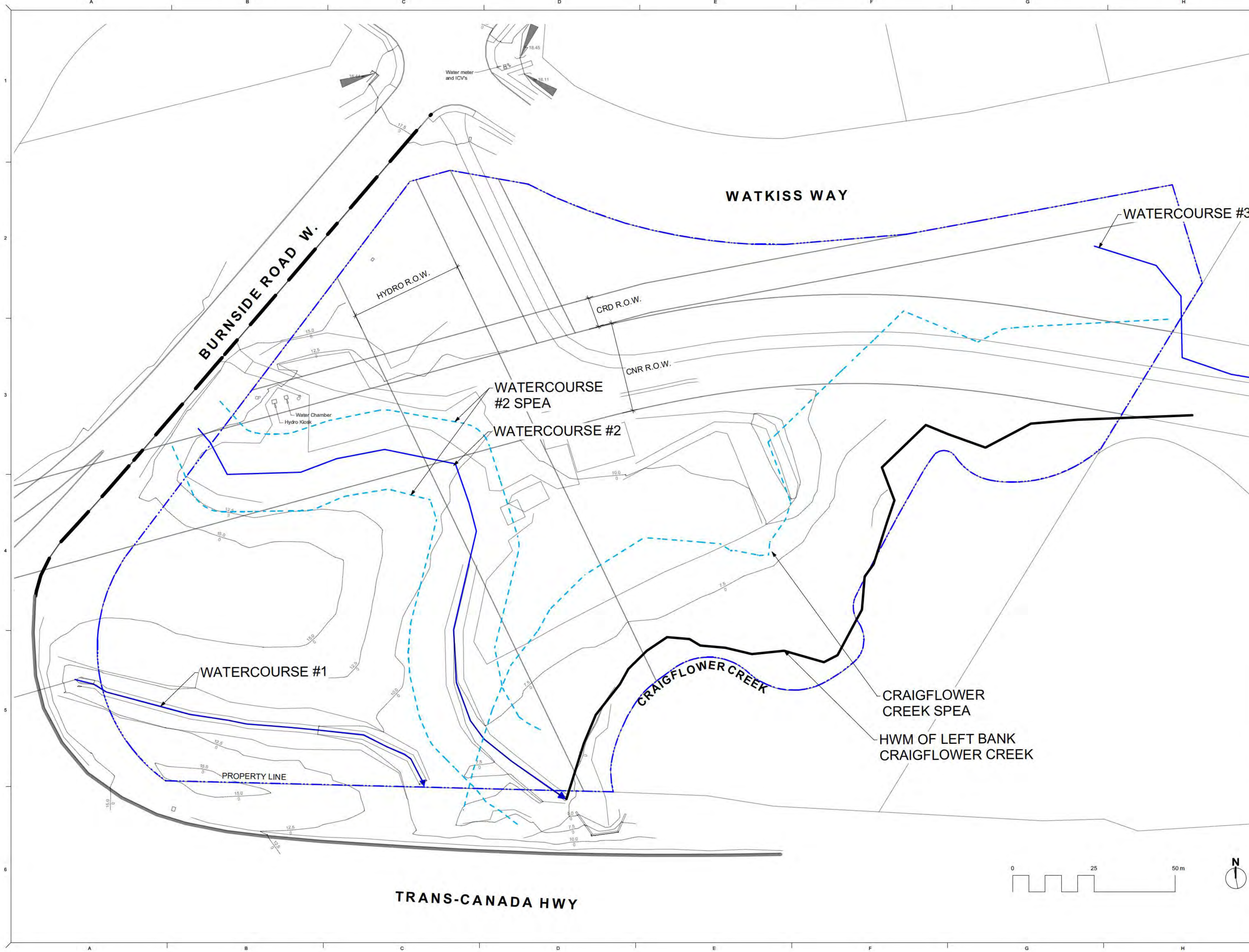


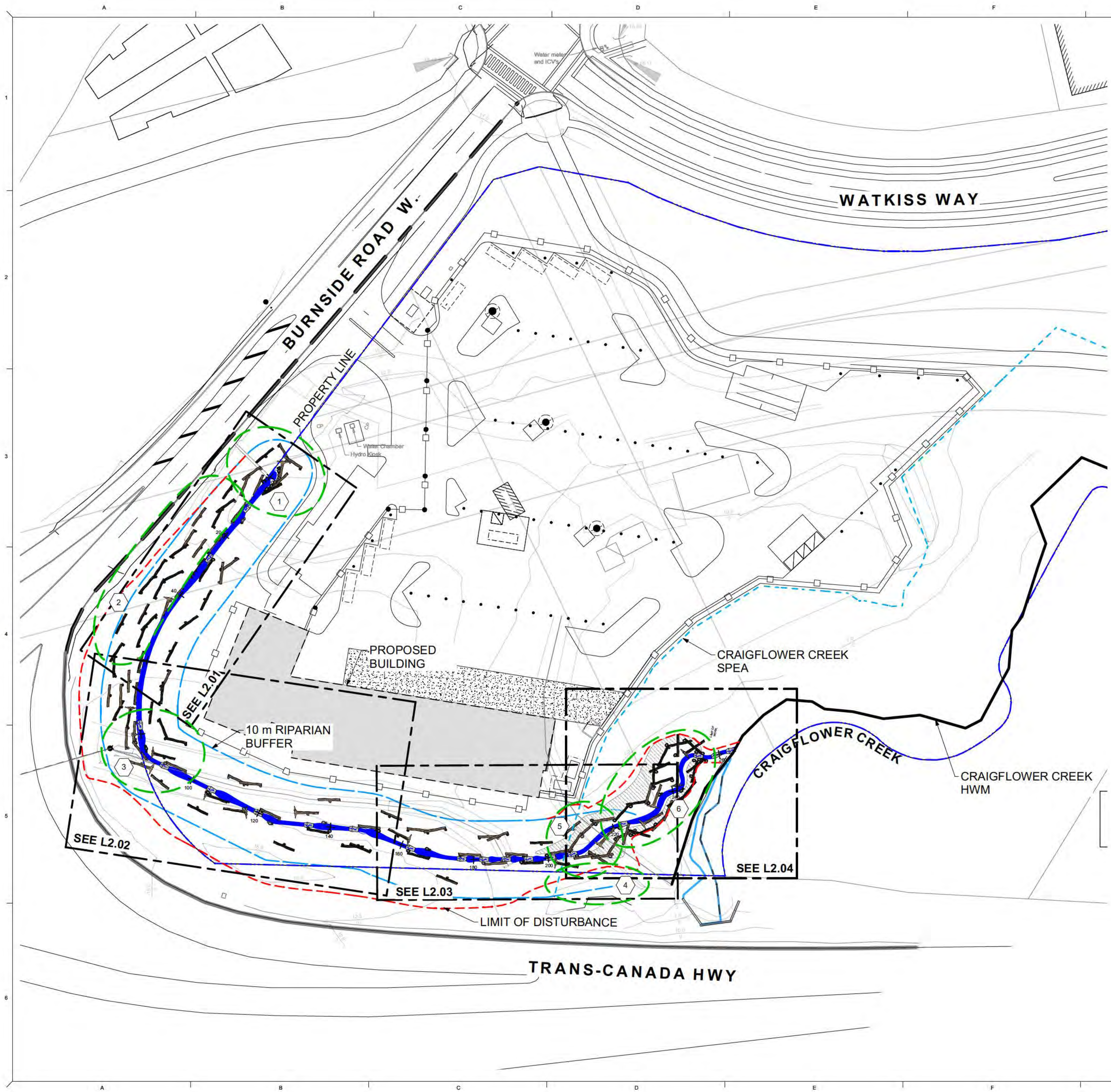
CLIENT:  
BC TRANSIT

PROJECT:  
VICTORIA handyDART  
CENTRE

EXISTING SITE PLAN

SCALE:	PROJECT NO.	
1:500	201919500	
DWG.#	REV	DATE:
TP2 - L1.01	3	2021-06-24





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STAMPS



CLIENT:  
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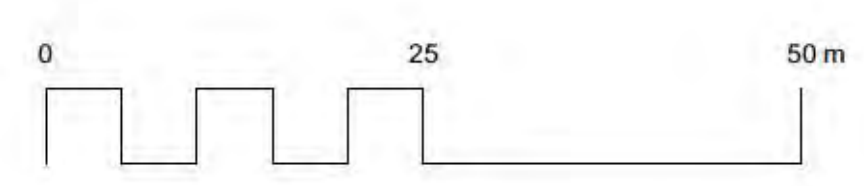
PROJECT:  
VICTORIA handyDART  
CENTRE

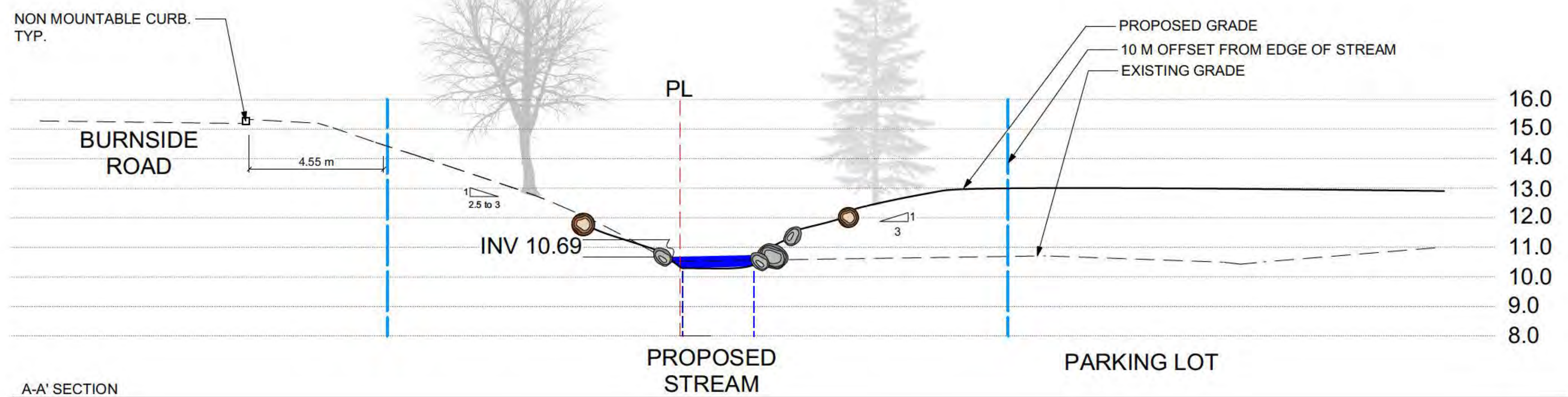
PROPOSED STREAM PLAN

SCALE:	1:500	PROJECT NO.	201919500
DWG.#	TP2 - L1.02	REV	3
		DATE:	2021-06-24

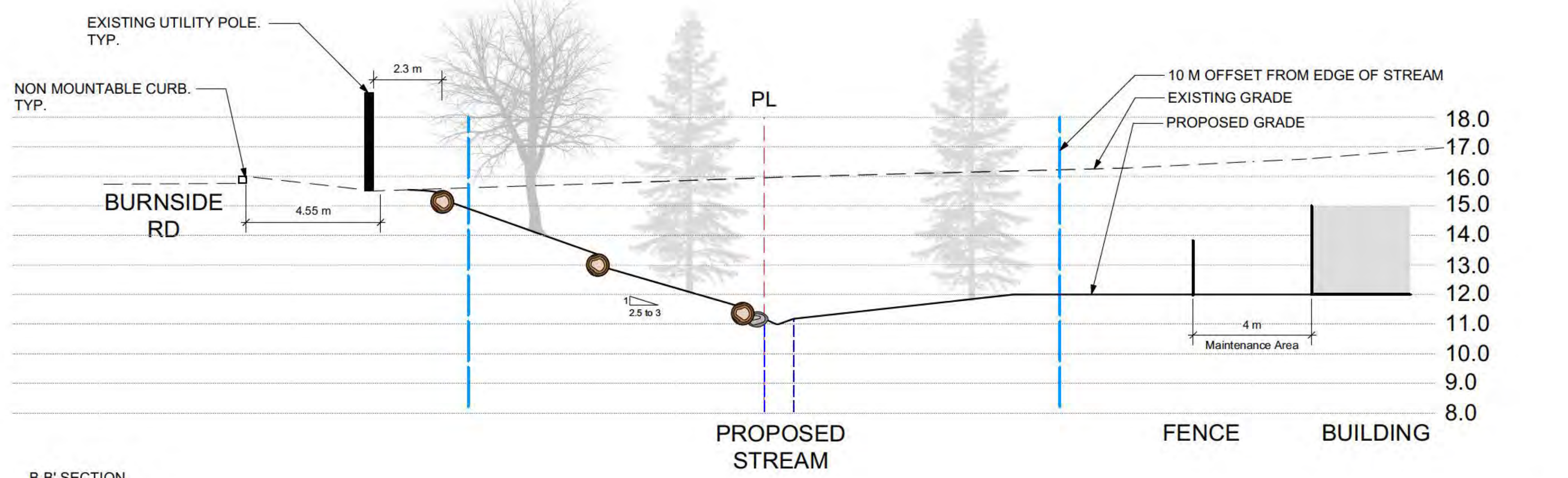
AREA DESCRIPTIONS

1	Location of main stream culvert inlet.
2	Channel slope 2.5 to 3:1 in this area. Use logs and boulders to retain soil and reduce slope.
3	Small culvert discharge location. Culvert goes under highway off ramp.
4	Existing wetland-like area. Retain to manage water / debris from highway curb cut.
5	Intersection of new stream channel and existing Watercourse #2.
6	Low gradient stream channel. Sensitive area not conducive to large equipment. No fill or extra soil to be imported into Craigflower Creek floodplain. Grade change through excavation and recontouring of existing site materials.

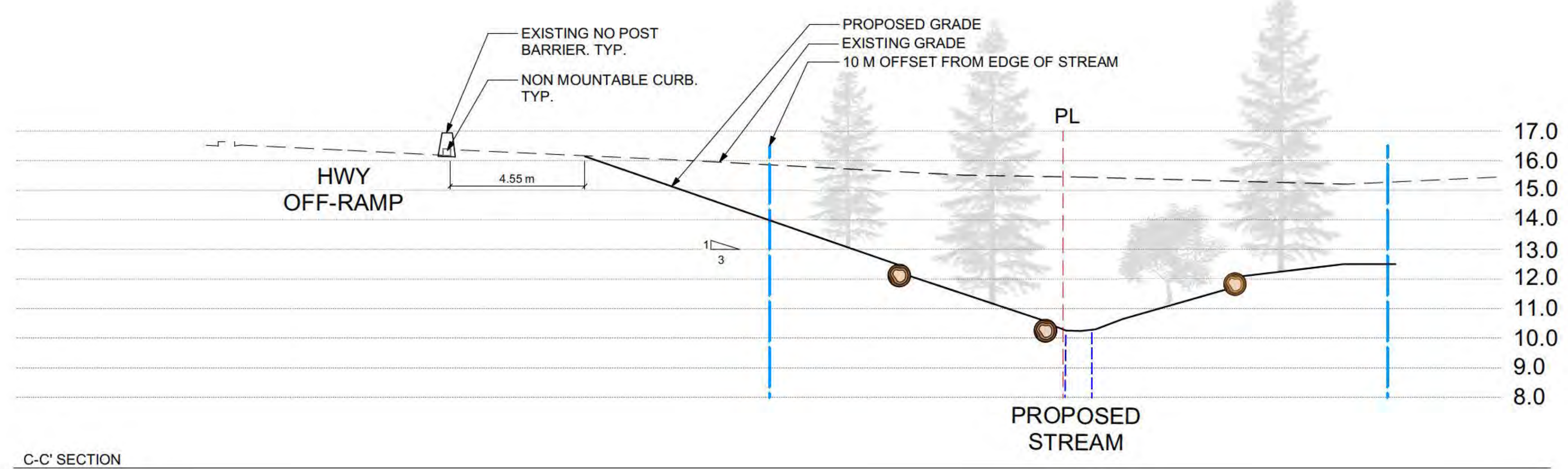




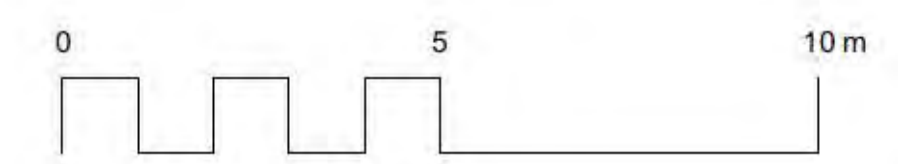
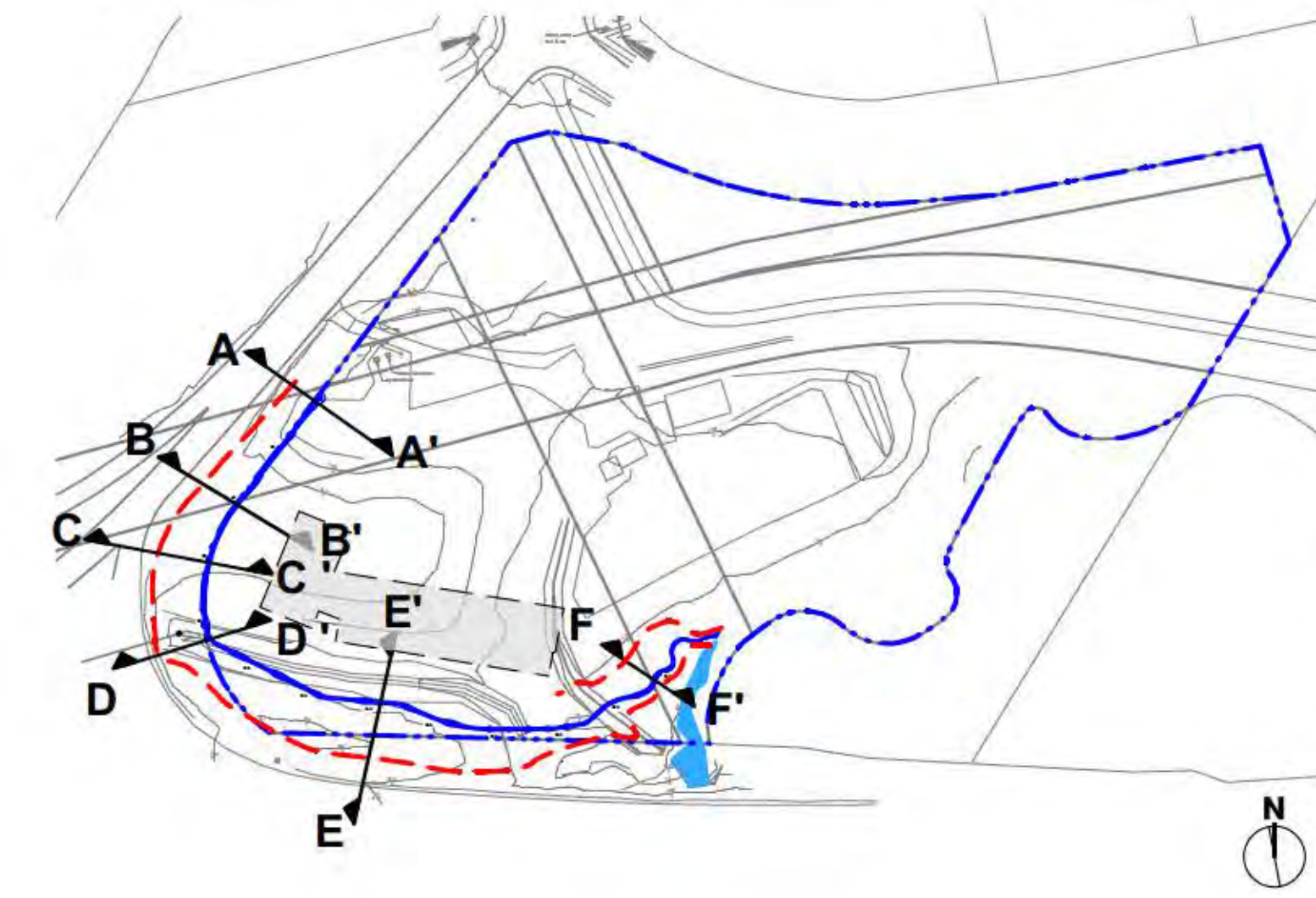
A-A' SECTION  
Scale: 1:100



B-B' SECTION  
Scale: 1:100



C-C' SECTION  
Scale: 1:100



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4	Revised EDP No.1	2021-05-24
3	EDP No.1	2021-05-03
2	70% Design	2021-02-02
1	Revision #1	2021-01-06
	DESCRIPTION	YYYY-MM-DD

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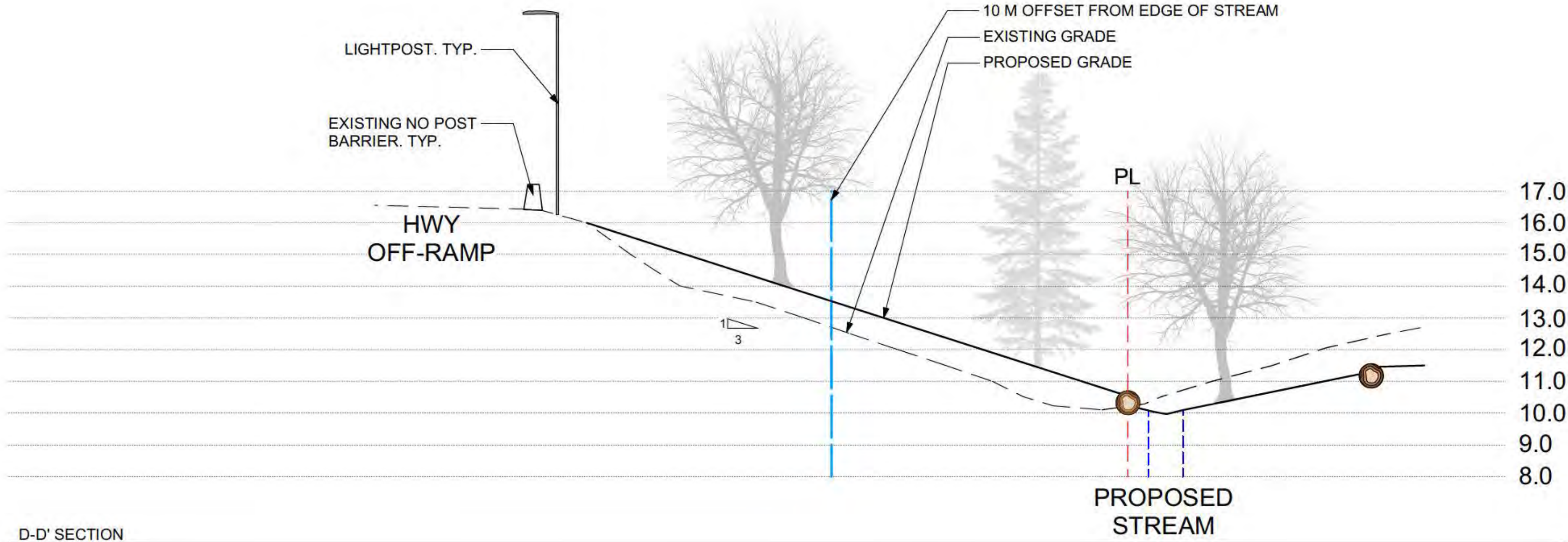


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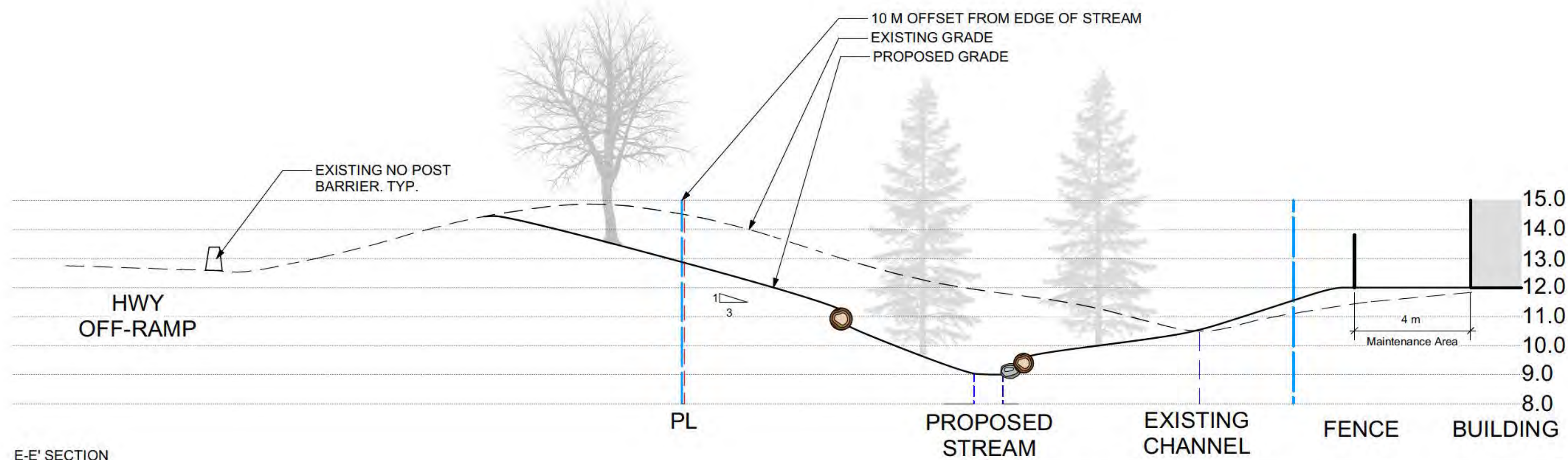
PROJECT:  
VICTORIA handyDART CENTRE

SITE SECTIONS

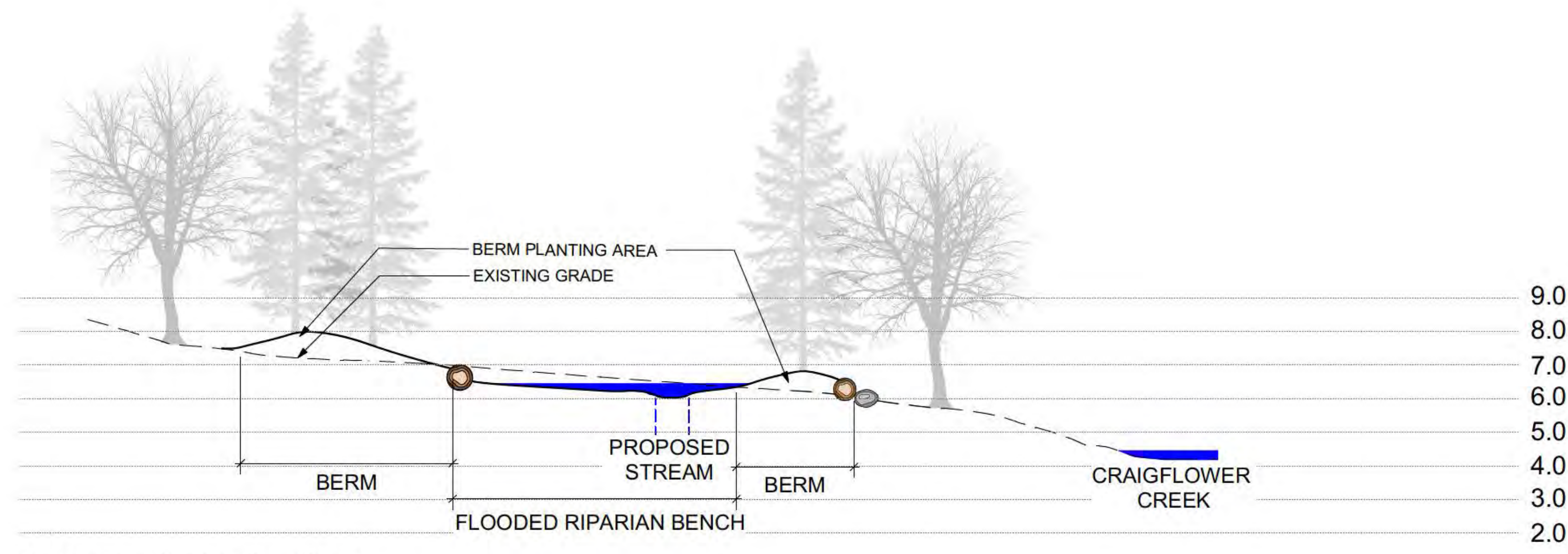
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AS SHOWN	201919500	
DWG.#	REV	DATE:
TP2 - L1.03	3	2021-06-24



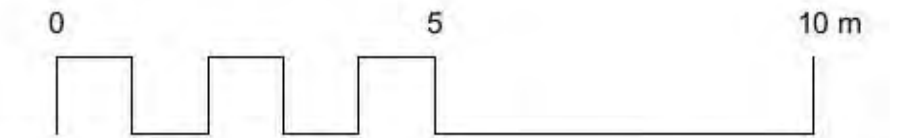
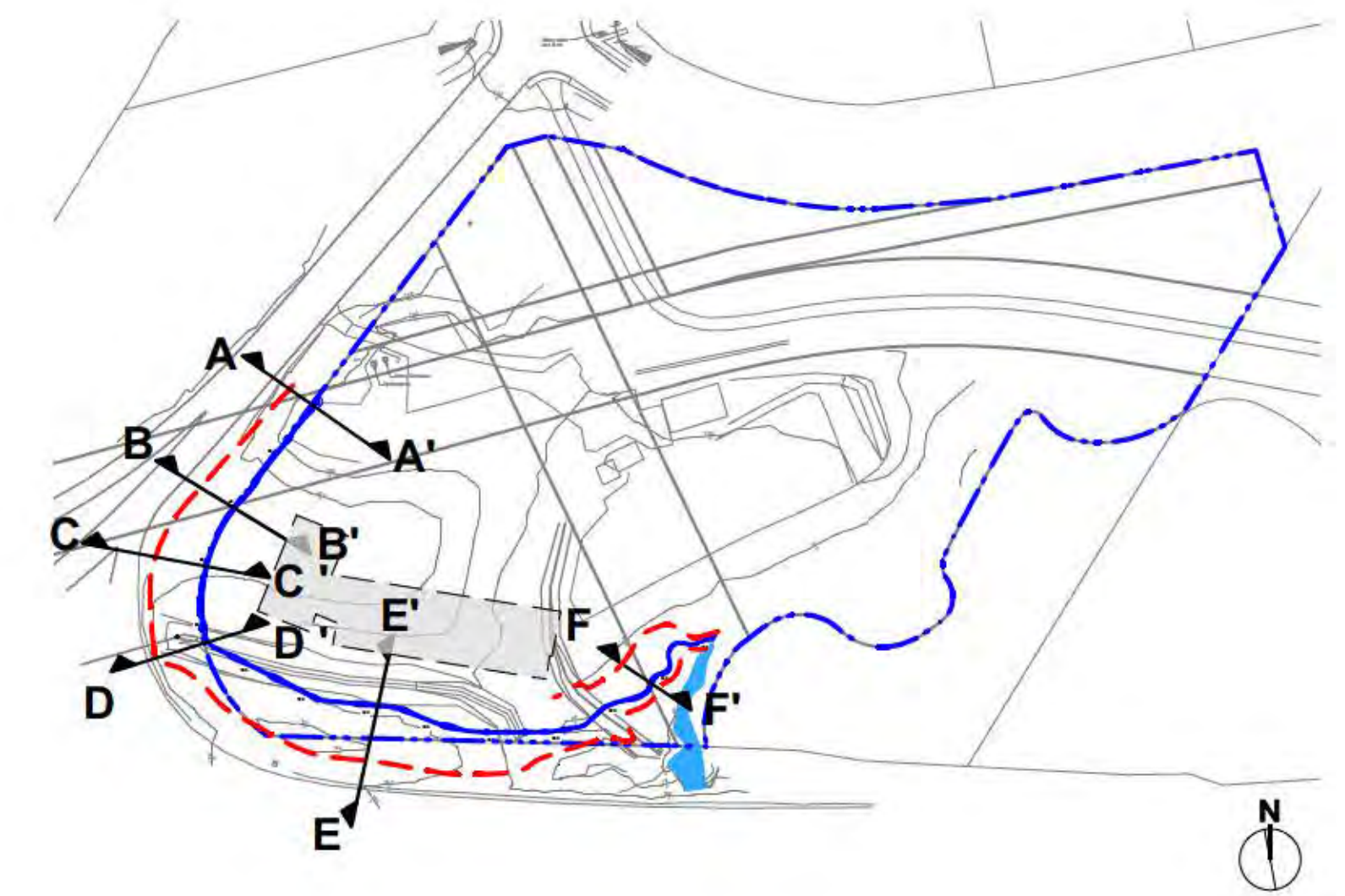
D-D' SECTION  
Scale: 1:100



E-E' SECTION  
Scale: 1:100



F-F' SECTION (LOW GRADIENT CHANNEL)  
Scale: 1:100



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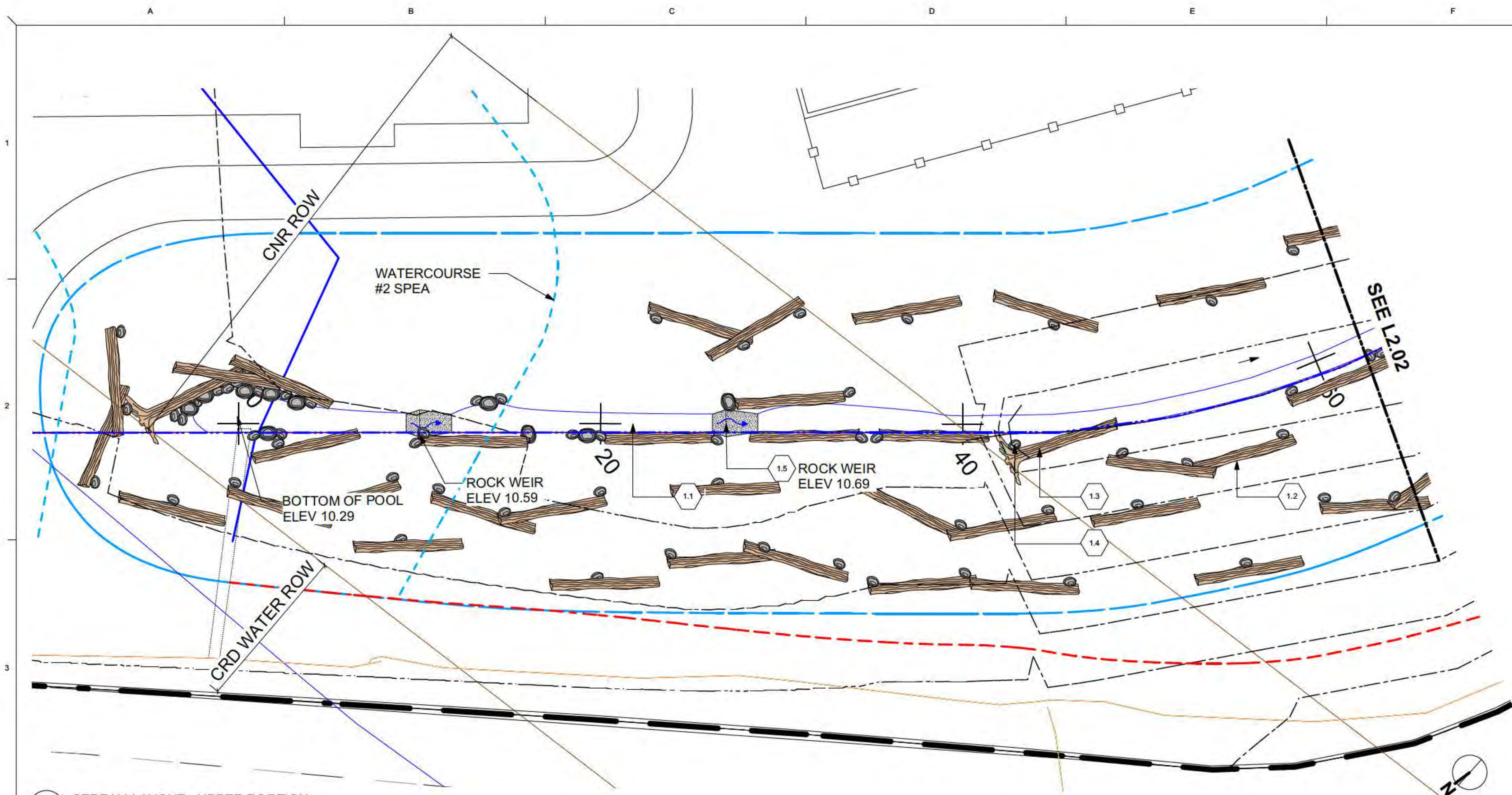
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PROJECT:  
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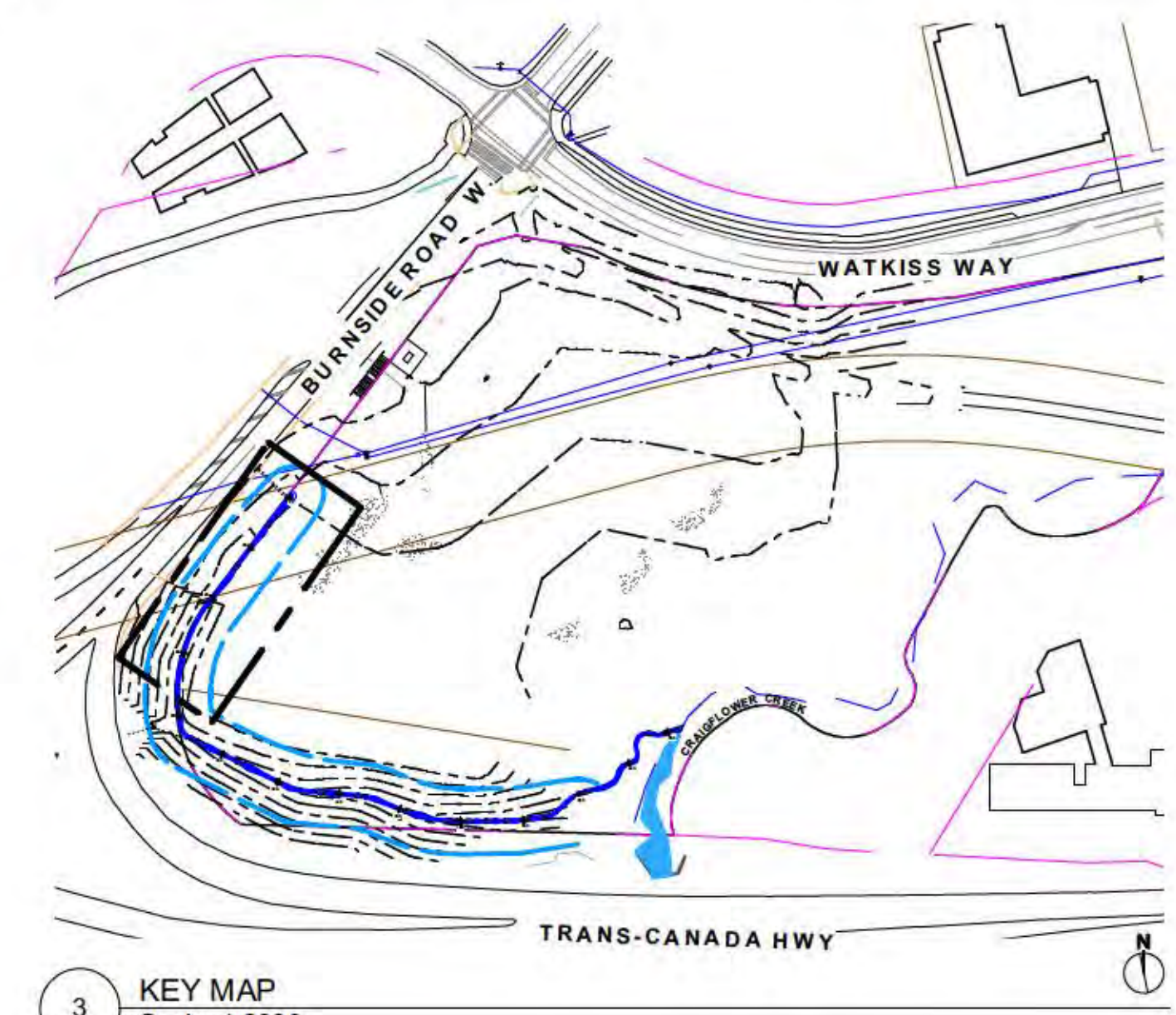
SITE SECTIONS

SCALE:	PROJECT NO.	
1:500	201919500	
DWG.#	REV	DATE:
TP2 - L1.04	3	2021-06-24



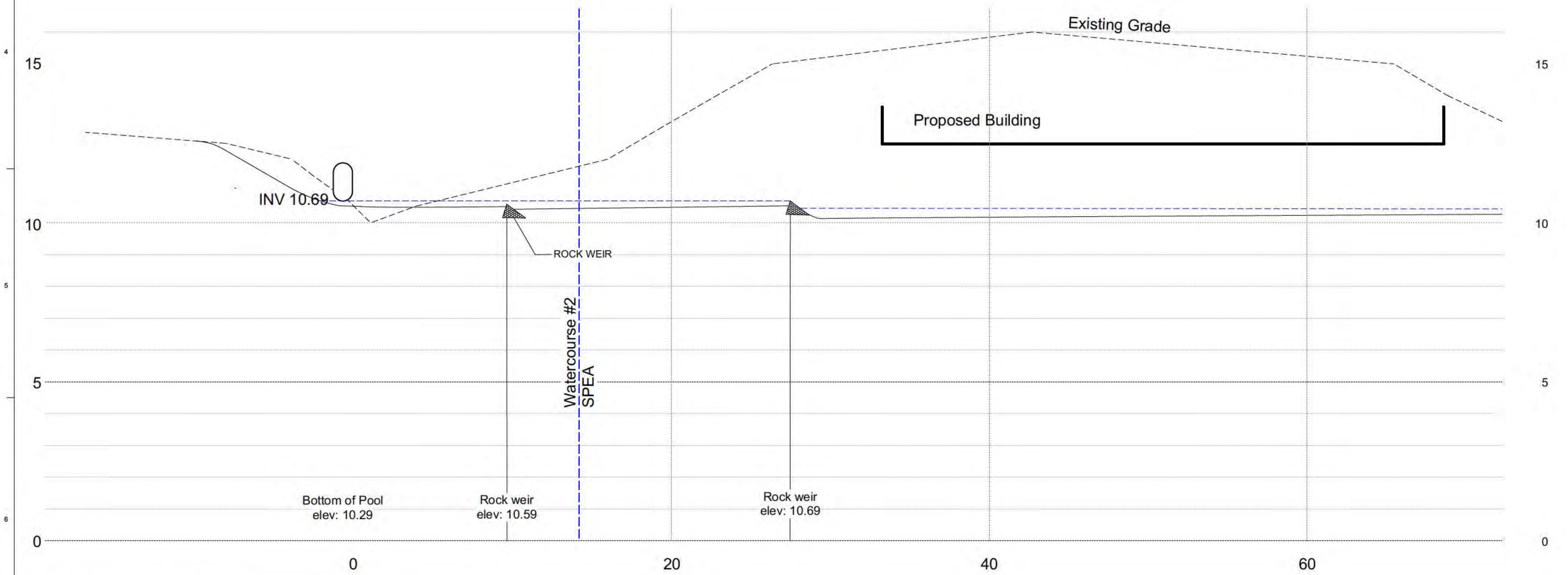


1 STREAM LAYOUT - UPPER PORTION  
Scale: 1:150



**SITE KEYNOTES:**

DETAIL - SHEET	DETAILED PRODUCT INFORMATION
<b>1.0 SITE MATERIALS</b>	
1.1 Rock and Cobble Stream Channel	2/L4.01 Refer to detail.
1.2 Log	6/L4.01 4-6 m x 500 mm dia. log. Placement of log to be directed by Landscape Architect and Biologist.
1.3 Log with Root Mass	6/L4.01 4-6 m x 500 mm dia. log. Placement of log to be directed by Landscape Architect and Biologist.
1.4 Boulder	450 mm or 600 mm dia. boulder. Placement to be directed by Landscape Architect.
1.5 Rock Weir	1/L4.01 Refer to detail.
<b>2.0 PLANTING AND LANDSCAPE</b>	
2.1 Shrub and Tree Planting Area - On Grade	3/L4.01, 4/L4.01 2P growing medium, 450 mm depth
2.2 Shrub and Tree Planting Area - In Channel	5/L4.01 25 mm drain rock over 2P growing medium, depth varies.



2 PROPOSED STREAM PROFILE  
Horizontal Scale 1:150 Vertical Scale 1:75



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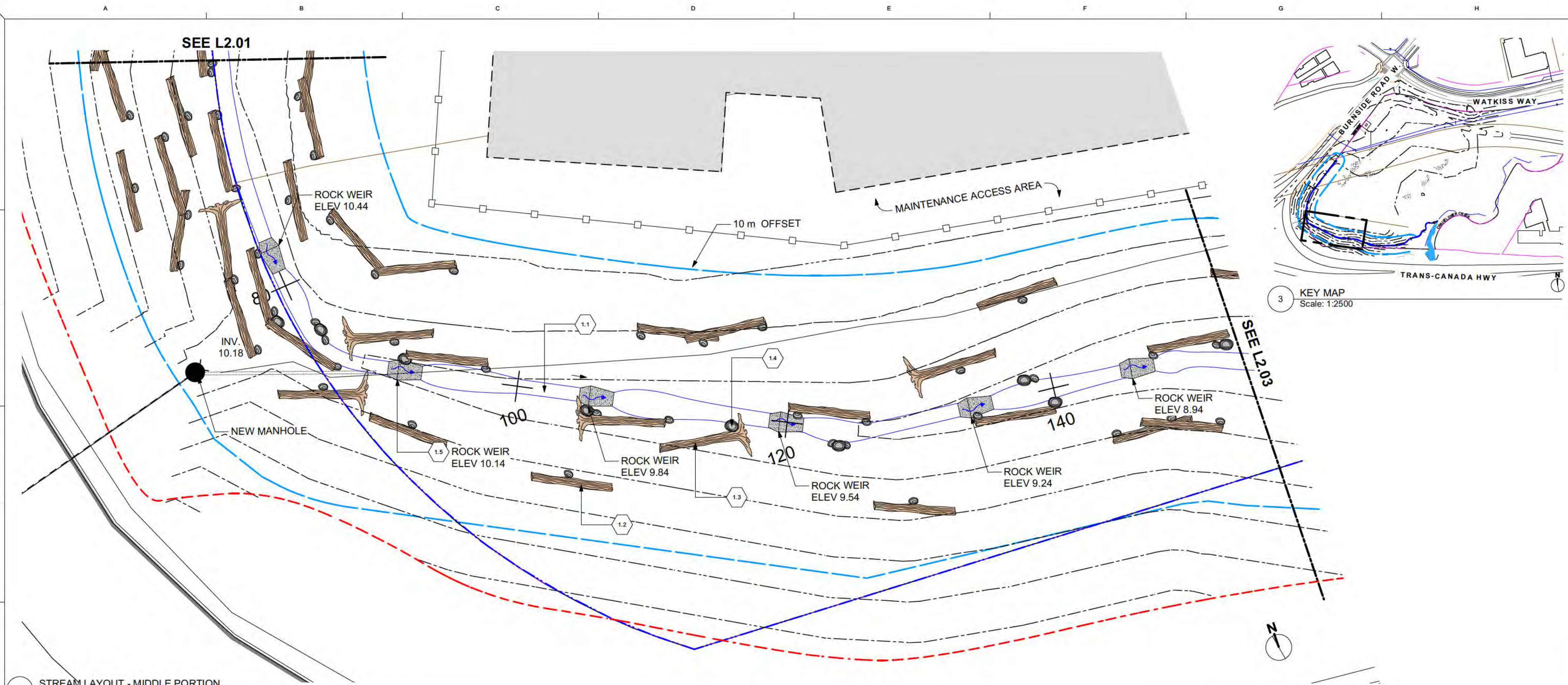


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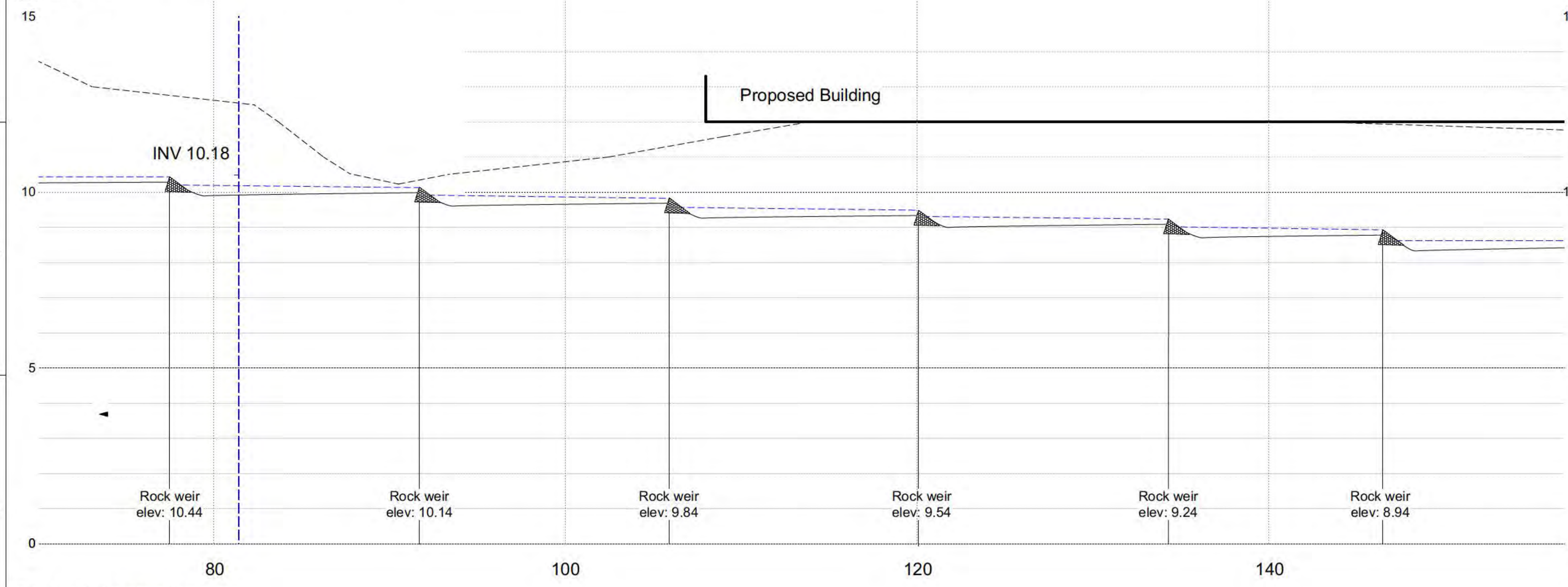
PROJECT: VICTORIA handyDART CENTRE

STREAM PROFILE - UPPER

SCALE:	PROJECT NO.	
AS SHOWN	201919500	
DWG.#	REV	DATE:
TP2 - L2.01	3	2021-06-24



1 STREAM LAYOUT - MIDDLE PORTION  
Scale: 1:150



2 PROPOSED STREAM PROFILE  
Horizontal Scale 1:150 Vertical Scale 1:75

15 SITE KEYNOTES:

DETAIL - SHEET	DETAILED PRODUCT INFORMATION
<b>1.0 SITE MATERIALS</b>	
1.1 Rock and Cobble Stream Channel	2/L4.01 Refer to detail.
1.2 Log	6/L4.01 4-6 m x 500 mm dia. log. Placement of log to be directed by Landscape Architect and Biologist.
1.3 Log with Root Mass	6/L4.01 4-6 m x 500 mm dia. log. Placement of log to be directed by Landscape Architect and Biologist.
1.4 Boulder	450 mm or 600 mm dia. boulder. Placement to be directed by Landscape Architect.
1.5 Rock Weir	1/L4.01 Refer to detail.
<b>2.0 PLANTING AND LANDSCAPE</b>	
2.1 Shrub and Tree Planting Area - On Grade	3/L4.01, 4/L4.01 2P growing medium, 450 mm depth
2.2 Shrub and Tree Planting Area - In Channel	5/L4.01 25 mm drain rock over 2P growing medium, depth varies.



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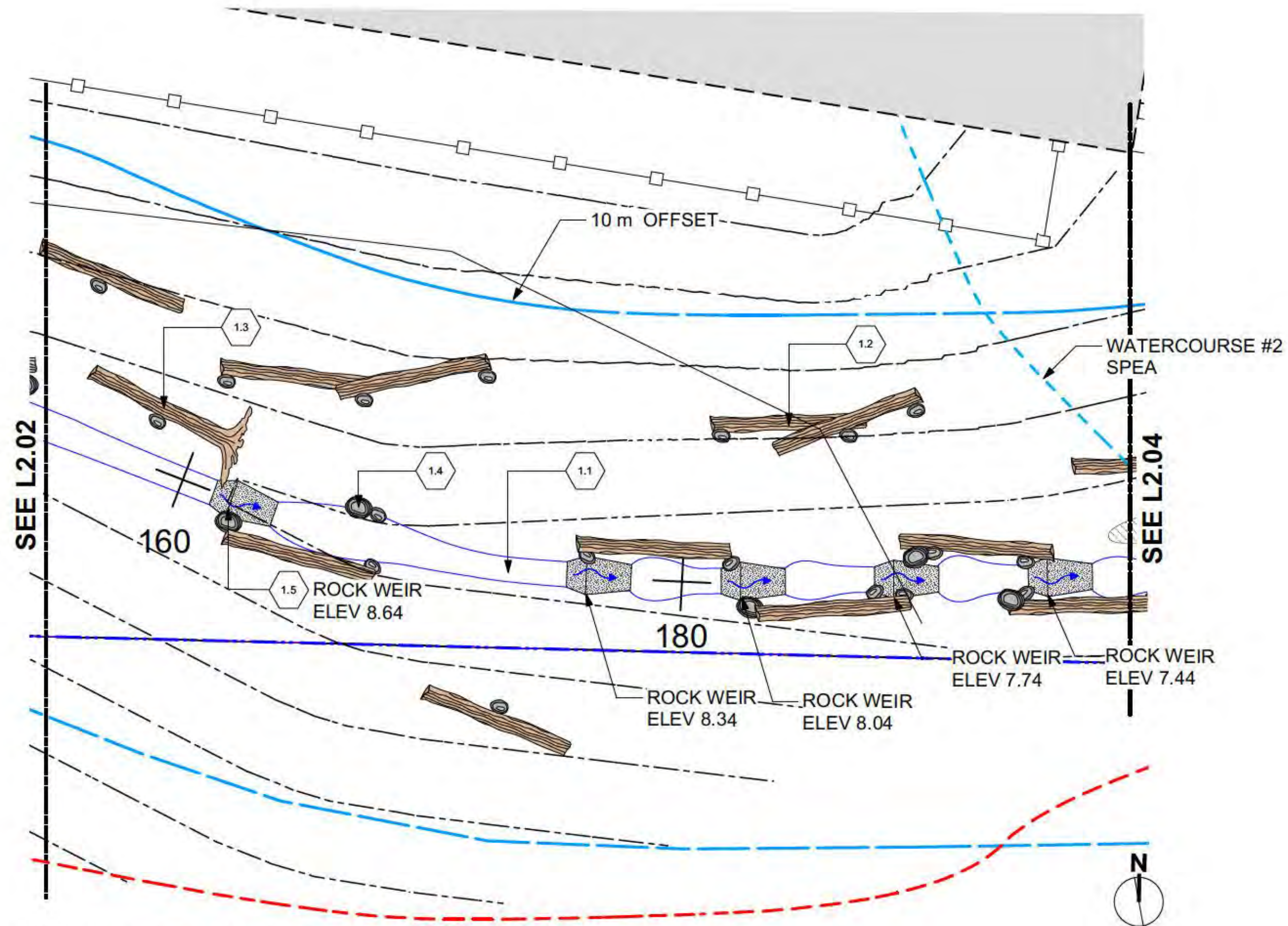


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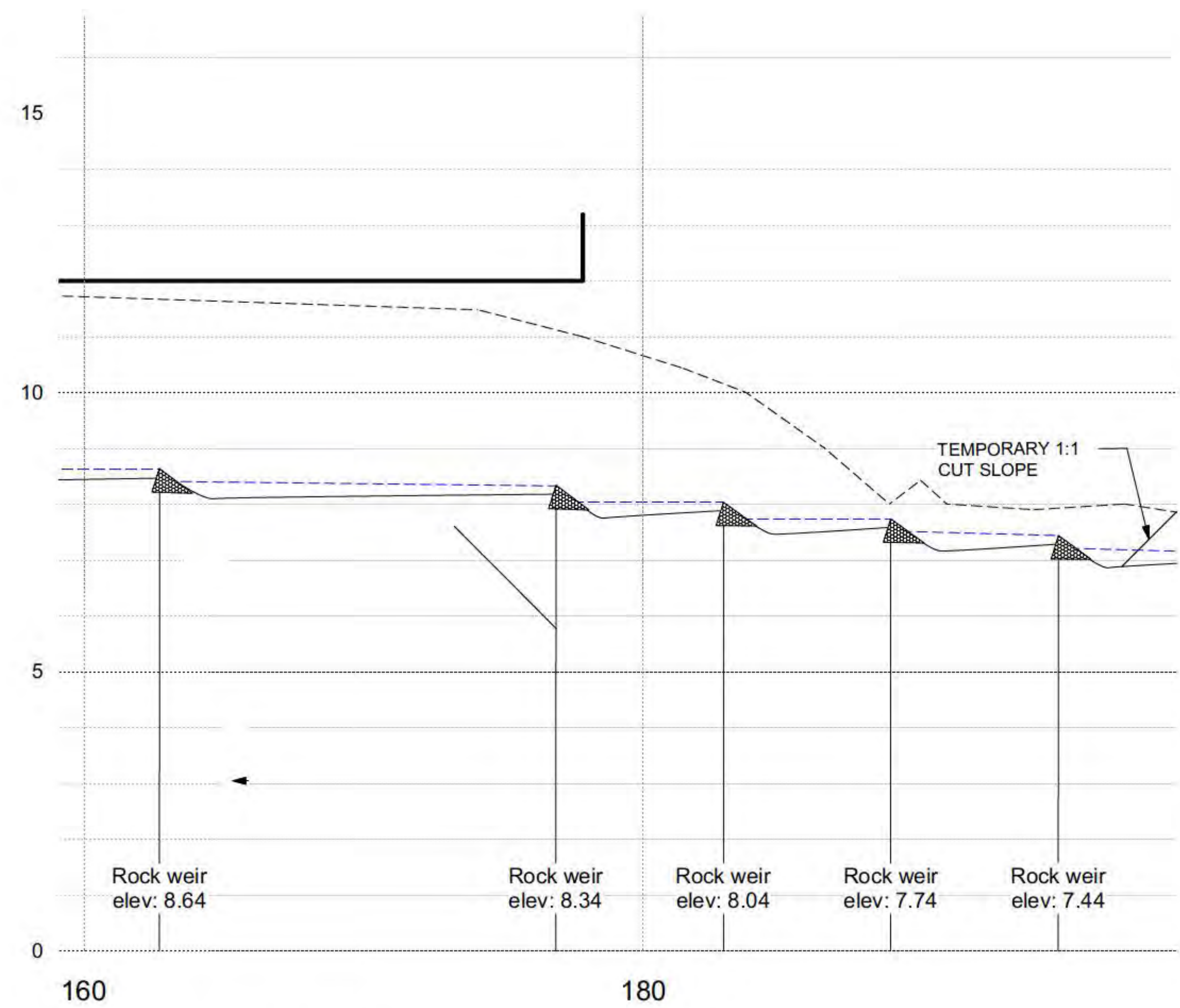
PROJECT: VICTORIA handyDART CENTRE

STREAM PROFILE - MIDDLE

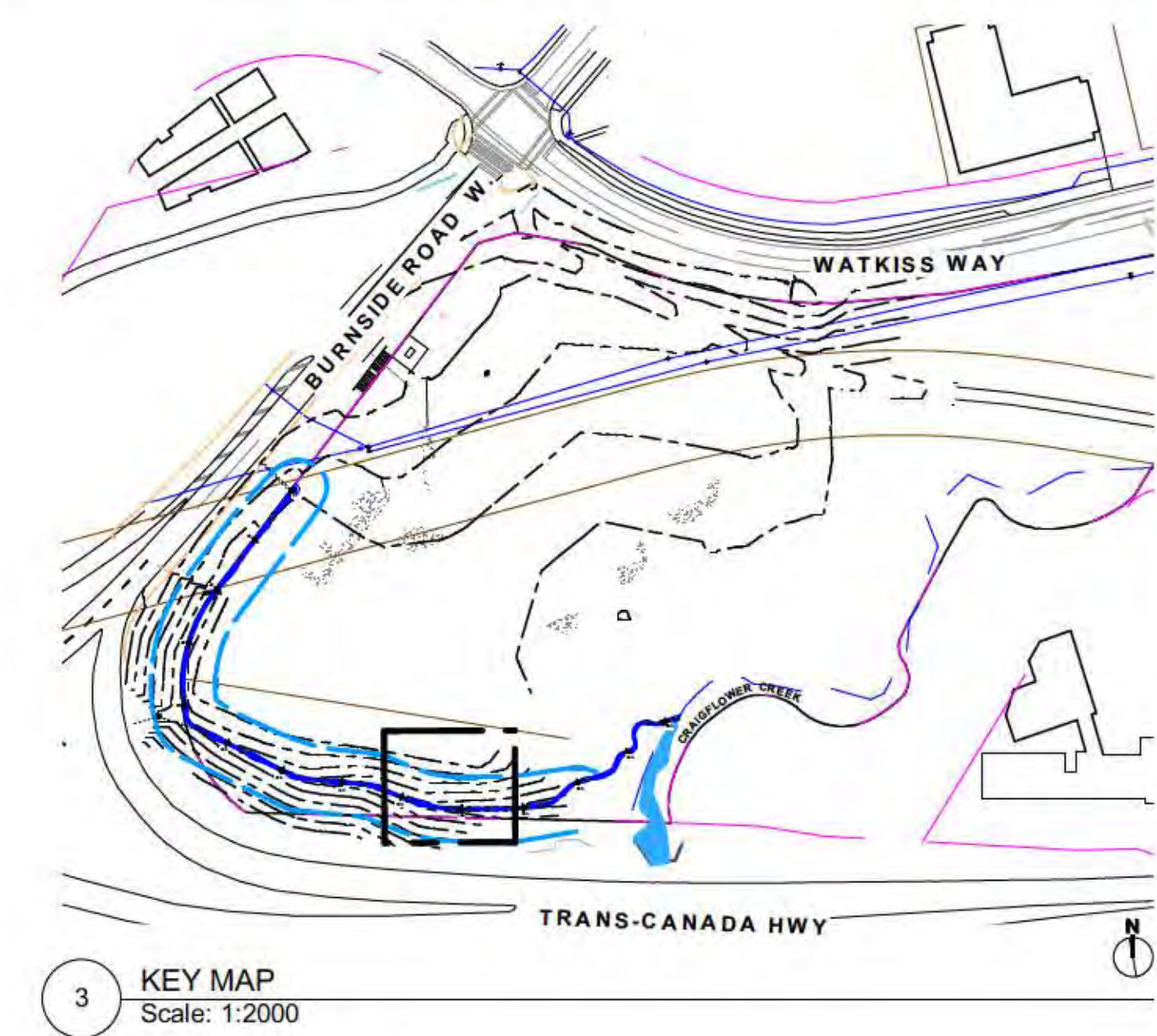
SCALE:	PROJECT NO.	
AS SHOWN	201919500	
DWG.#	REV	DATE:
TP2 - L2.02	3	2021-06-24



1 STREAM LAYOUT - LOWER PORTION  
Scale: 1:150



2 PROPOSED STREAM PROFILE  
Horizontal Scale 1:150 Vertical Scale 1:75



SITE KEYNOTES:

	DETAIL - SHEET	DETAILED PRODUCT INFORMATION
<b>1.0 SITE MATERIALS</b>		
1.1	2/L4.01	Refer to detail.
1.2	6/L4.01	4-6 m x 500 mm dia. log. Placement of log to be directed by Landscape Architect and Biologist.
1.3	6/L4.01	4-6 m x 500 mm dia. log. Placement of log to be directed by Landscape Architect and Biologist.
1.4		450 mm or 600 mm dia. boulder. Placement to be directed by Landscape Architect.
1.5	1/L4.01	Refer to detail.
<b>2.0 PLANTING AND LANDSCAPE</b>		
2.1	3/L4.01, 4/L4.01	2P growing medium, 450 mm depth
2.2	5/L4.01	25 mm drain rock over 2P growing medium, depth varies.



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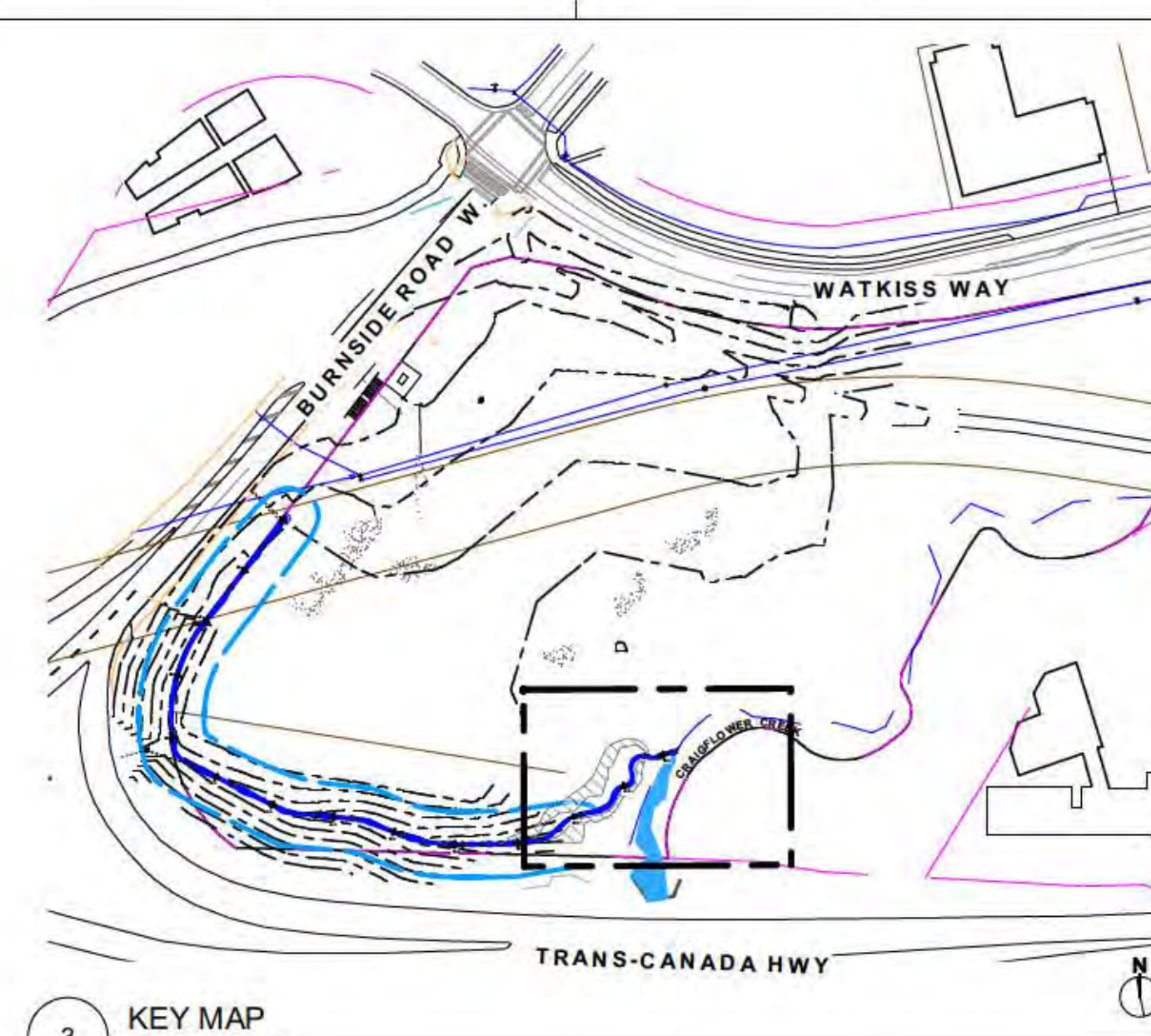
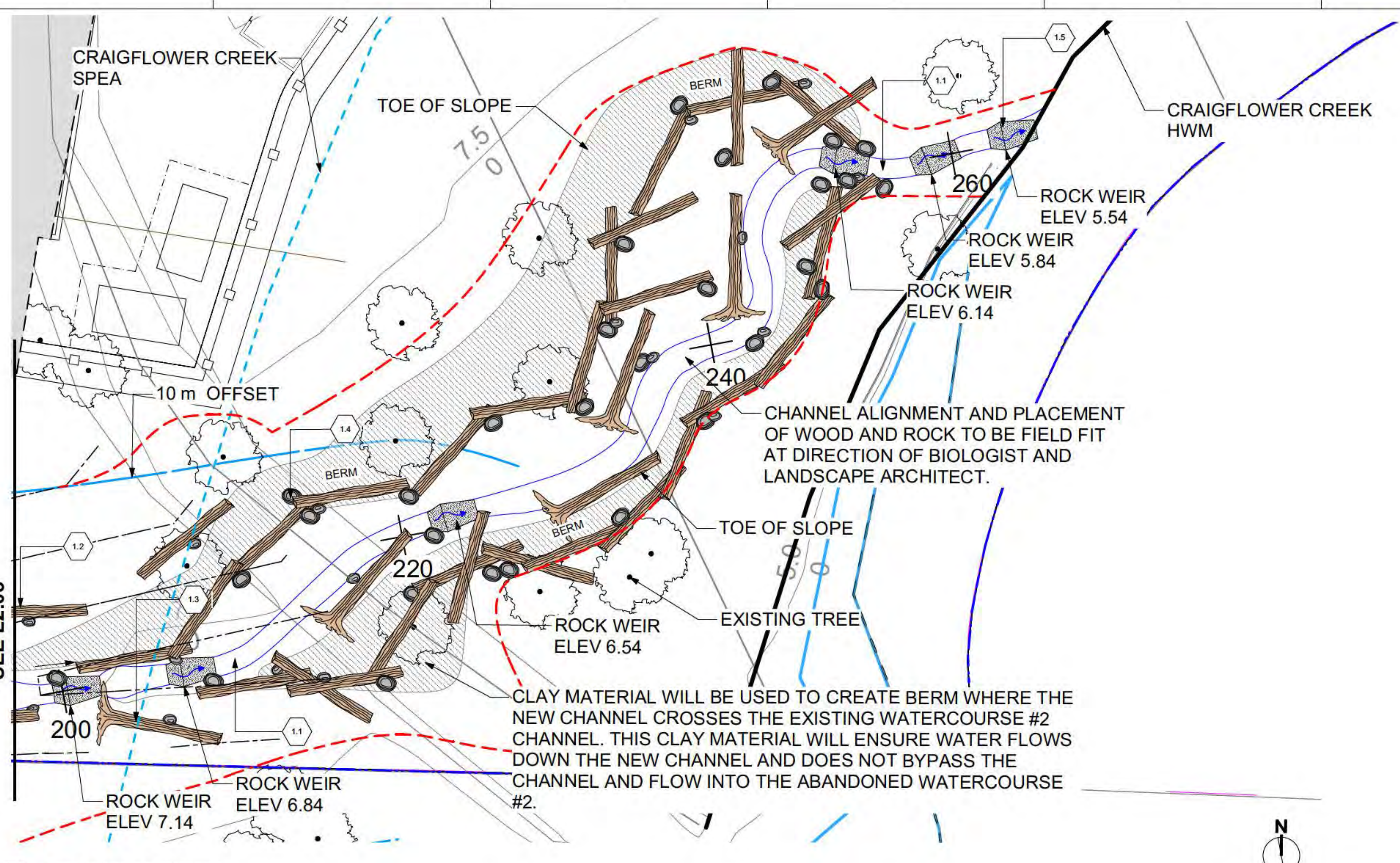


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PROJECT:  
VICTORIA handyDART  
CENTRE

STREAM PROFILE - LOWER

SCALE:	PROJECT NO.	
AS SHOWN	201919500	
DWG.#	REV	DATE:
TP2 - L2.03	3	2021-06-24



**SITE KEYNOTES:**

DETAIL - SHEET	DETAILED PRODUCT INFORMATION
<b>1.0 SITE MATERIALS</b>	
1.1 Rock and Cobble Stream Channel	2/L.4.01 Refer to detail.
1.2 Log	6/L.4.01 4-6 m x 500 mm dia. log. Placement of log to be directed by Landscape Architect and Biologist.
1.3 Log with Root Mass	6/L.4.01 4-6 m x 500 mm dia. log. Placement of log to be directed by Landscape Architect and Biologist.
1.4 Boulder	450 mm or 600 mm dia. boulder. Placement to be directed by Landscape Architect.
1.5 Rock Weir	1/L.4.01 Refer to detail.
<b>2.0 PLANTING AND LANDSCAPE</b>	
2.1 Shrub and Tree Planting Area - On Grade	3/L.4.01, 4/L.4.01 2P growing medium, 450 mm depth
2.2 Shrub and Tree Planting Area - In Channel	5/L.4.01 25 mm drain rock over 2P growing medium, depth varies.



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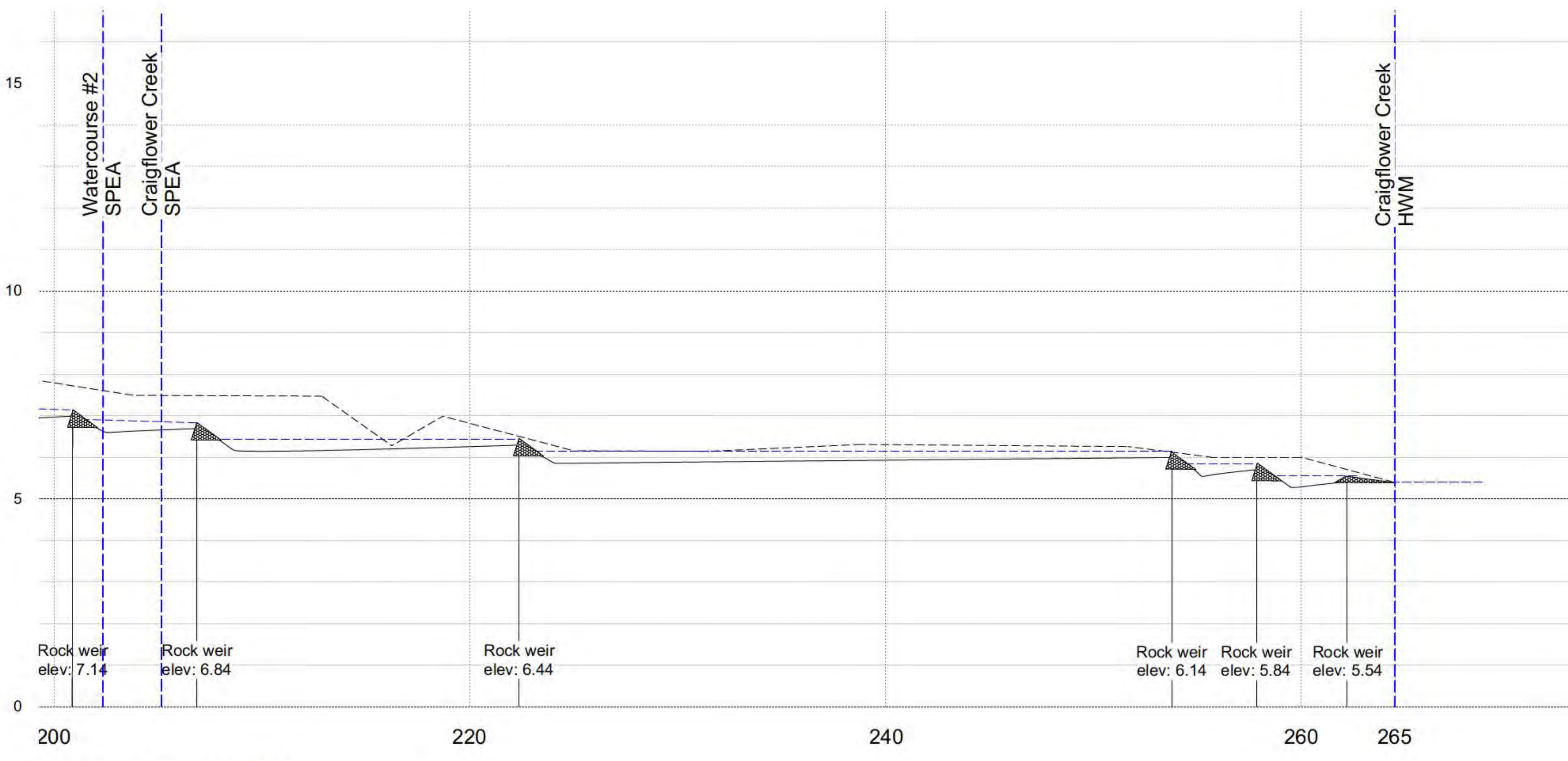


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LOW GRADIENT CHANNEL - STREAM CONNECTION

SCALE:	PROJECT NO.	
AS SHOWN	201919500	
DWG.#	REV	DATE:
TP2 - L2.04	3	2021-06-24



**RANGE PLANT NUMBERS & SPACING INFORMATION**

PLANT SIZE	SPACING (m)	NUMBER	PLANT SPECIES
Medium (1 gal)	0.7	108	Rosa nutkana Rubus parviflorus Symphoricarpos albus
Medium / Large (1 gal)	1.0	249	Mahonia aquifolium (2 gal) Polystichum munitum Ribes sanguineum Salix scouleriana (whip) Spiraea douglasii Symphoricarpos albus
Large (3 gal)	1.5	118	Holodiscus discolor Physocarpus capitatus Salix scouleriana (whip)
Total Number of Plants		475	

**RANGE RESTORATION PLANTING LEGEND**

LANDSCAPE AREA	DESCRIPTION	PLANT SPECIES
Upland (Sun) 508 sq. m	The existing upland Bow Range land within the SPEA that is not effected by new construction.	Holodiscus discolor Mahonia aquifolium Ribes sanguineum Rosa nutkana Salix scouleriana Spiraea douglasii

**PLANT LIST**

Sym	Qty	Botanical Name	Common Name	Sched. Size / Plant Spacing
<b>TREES:</b>				
Acc	8	Acer circinatum	Vine Maple	1.8 m ht, b&b
Acm	21	Acer macrophyllum	Bigleaf Maple	2.5 m ht, 15 gal.
Alr	27	Alnus rubra	Red Alder	#5 pot
Am	5	Arbutus menziesii	Pacific Madrone	#5 pot
Cd	6	Crataegus douglasii	Black Hawthorn	2m height, b&b
Mf	5	Malus fusca	Pacific Crab Apple	#10 pot, Min 1.2m ht
Psm	68	Pseudotsuga menziesii	Douglas Fir	#15 Pot
Qg	6	Quercus garryana	Garry Oak	4.0m cal, b&b
Qg-s	18	Quercus garryana - Small	Garry Oak - Small	1 gallon
Thp	6	Thuja plicata	Western Red Cedar	2.4 m ht/wb
Tsh	5	Tsuga heterophylla	Western Hemlock	2.4 m ht/wb
<b>SHRUBS/FERNS/GRASSES/VINES:</b>				
Co	128	Carex obovata	Slough Sedge	#1 pot

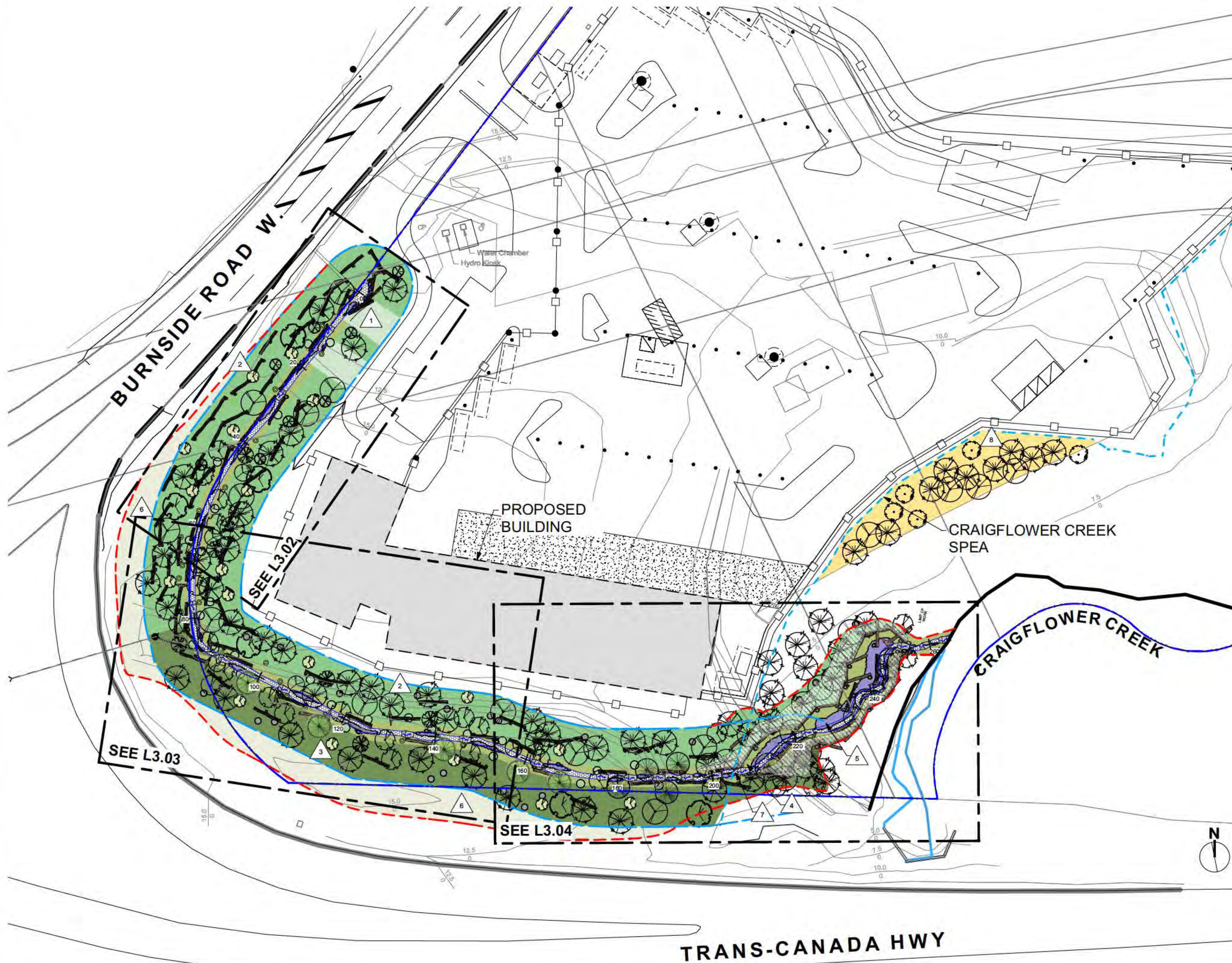
In addition to the above plant list, the Contractor is to include 75 - 1 gal. Douglas Fir and 25 - 1 gal. Western Red Cedar. These will be planted at the direction of the Landscape Architect.

**STREAM PLANTING LEGEND**

LANDSCAPE AREA	DESCRIPTION	BOTANICAL NAME	PLANT SIZE	QUANTITY	POT SIZE
Maintenance Access Area 130 sq. m	Maintenance access areas to remove deposited sediment from channel.	Blechnum spicant Gaultheria shallon Mahonia aquifolium Mahonia repens Rosa nutkana Symphoricarpos albus Vaccinium ovatum	S SM ML SM M M SM	94 100 11 40 68 100 10	#1 #1 #1 #1 #1 #1 #1
Upland (Sun) 2,560 sq. m	Upland areas outside of direct moisture from stream. East, west and south facing slopes.	Comus sericea Gaultheria shallon Holodiscus discolor Mahonia aquifolium Mahonia repens Myrica californica Ribes sanguineum Rosa nutkana Rubus parviflorus Salix scouleriana Symphoricarpos albus	L SM L ML SM L ML M M L M	200 400 80 133 192 40 80 1000 400 140 1616	whip #1 #1 #1 #1 #1 #1 #1 #1 whip #1
Upland (Shade) 1,235 sq. m.	Upland areas outside of direct moisture from stream. North facing slopes.	Blechnum spicant Comus sericea Gaultheria shallon Holodiscus discolor Mahonia aquifolium Myrica californica Polystichum munitum Oemleria cerasiformis Ribes sanguineum Rosa nutkana Salix scouleriana Sambucus racemosa Symphoricarpos albus	S L SM L ML L M ML ML M L L M	45 60 240 18 60 20 500 300 52 123 40 20 250	#1 whip #1 #1 #1 #1 #1 #1 #1 #1 whip whip #1 #1
Riparian / Stream Edge 860 sq. m	Planting areas 1.5 m from channel edge. Wet area throughout year.	Comus sericea Mahonia aquifolium Myrica californica Physocarpus capitatus Polystichum munitum Ribes sanguineum Rosa nutkana Salix scouleriana Sambucus racemosa Symphoricarpos albus	L ML L L M ML M L L M	20 47 25 25 300 40 50 80 27 200 55	whip #1 #1 #1 #1 #1 #1 whip whip #1
In-Channel Plantings 140 sq. m	Small patches of water-loving plants on point bar edges.	Carex obovata Carex rostrata Juncus effusus	S S SM	600 208 129	Sp3 Sp3 Sp3
Grass / Hydrosed 875 sq. m	Premier Coast Revegetation Mix				
Channel Bottom 265 sq. m	Non-planted areas of stream channel.				

**STREAM PLANT NUMBERS & SPACING INFORMATION**

PLANT SIZE	SPACING (m)	NUMBER	PLANT SPECIES
Small (Sp3)	0.4	902	Blechnum spicant Carex obovata Carex rostrata
Small / Medium (1 gal)	0.5	1156	Gaultheria shallon Juncus effusus Mahonia repens Vaccinium ovatum
Medium (1 gal)	0.7	4463	Rosa nutkana Rubus parviflorus Symphoricarpos albus
Medium / Large (1 gal)	1.0	923	Mahonia aquifolium Polystichum munitum Ribes sanguineum Salix scouleriana (whip) Spiraea douglasii Symphoricarpos albus
Large (3 gal)	1.5	795	Holodiscus discolor Physocarpus capitatus Salix scouleriana (whip)
Total Number of Plants		8238	



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2021-07-04

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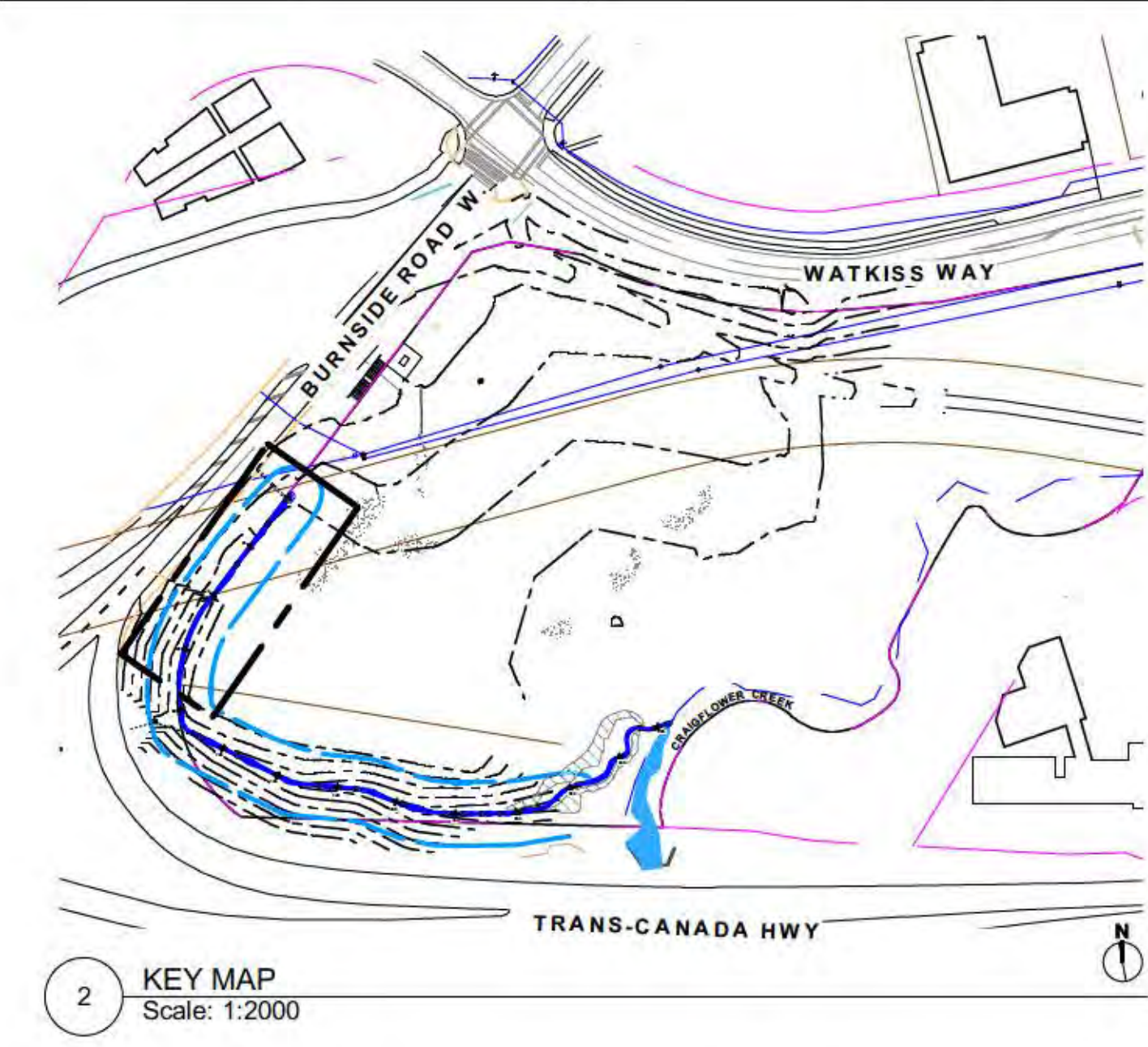


CLIENT: BC TRANSIT

PROJECT: VICTORIA handyDART CENTRE

PLANTING PLAN OVERVIEW

SCALE:	PROJECT NO.	
1:500	201919500	
DWG.#	REV	DATE:
TP2 - L3.01	3	2021-06-24



SEE SHEET L3.01 FOR PLANT LIST



1 PLANTING PLAN - UPPER PORTION  
Scale: 1:150



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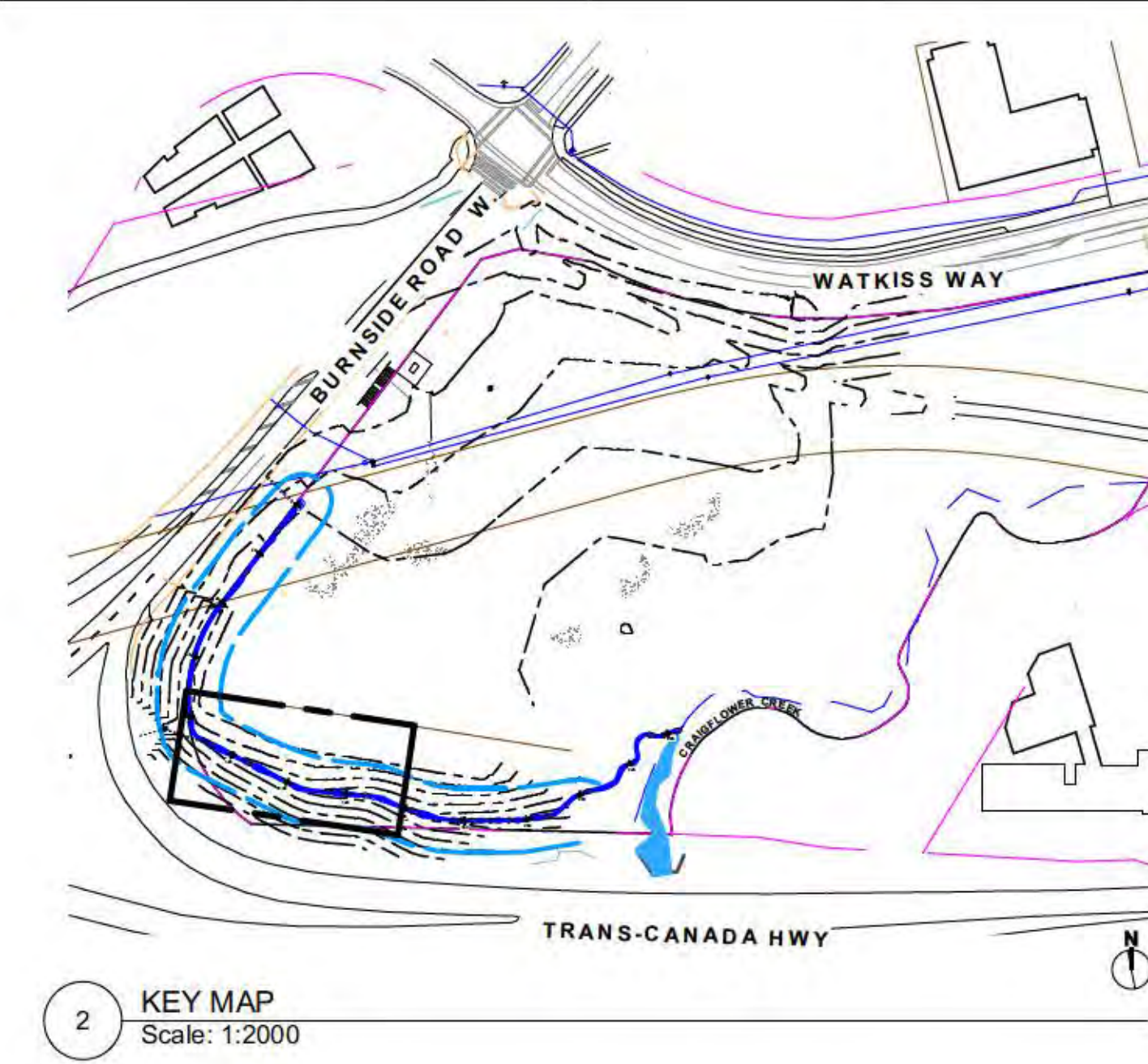
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CLIENT:	BC TRANSIT	
PROJECT:	VICTORIA handyDART CENTRE	
	PLANTING PLAN - UPPER	
SCALE:	AS SHOWN	PROJECT NO. 201919500
DWG.#	TP2 - L3.02	REV 3 DATE 2021-06-24



SEE SHEET L3.01 FOR PLANT LIST

1 PLANTING PLAN - MIDDLE PORTION  
Scale: 1:150



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REV	DESCRIPTION	DATE
6	Issued for Tender	2021-07-05
5	Draft IFT	2021-06-25
4	Revised EDP No.1	2021-05-24
3	EDP No.1	2021-05-03
2	70% Design	2021-02-02
1	Revision #1	2021-01-06
		YYYY-MM-DD

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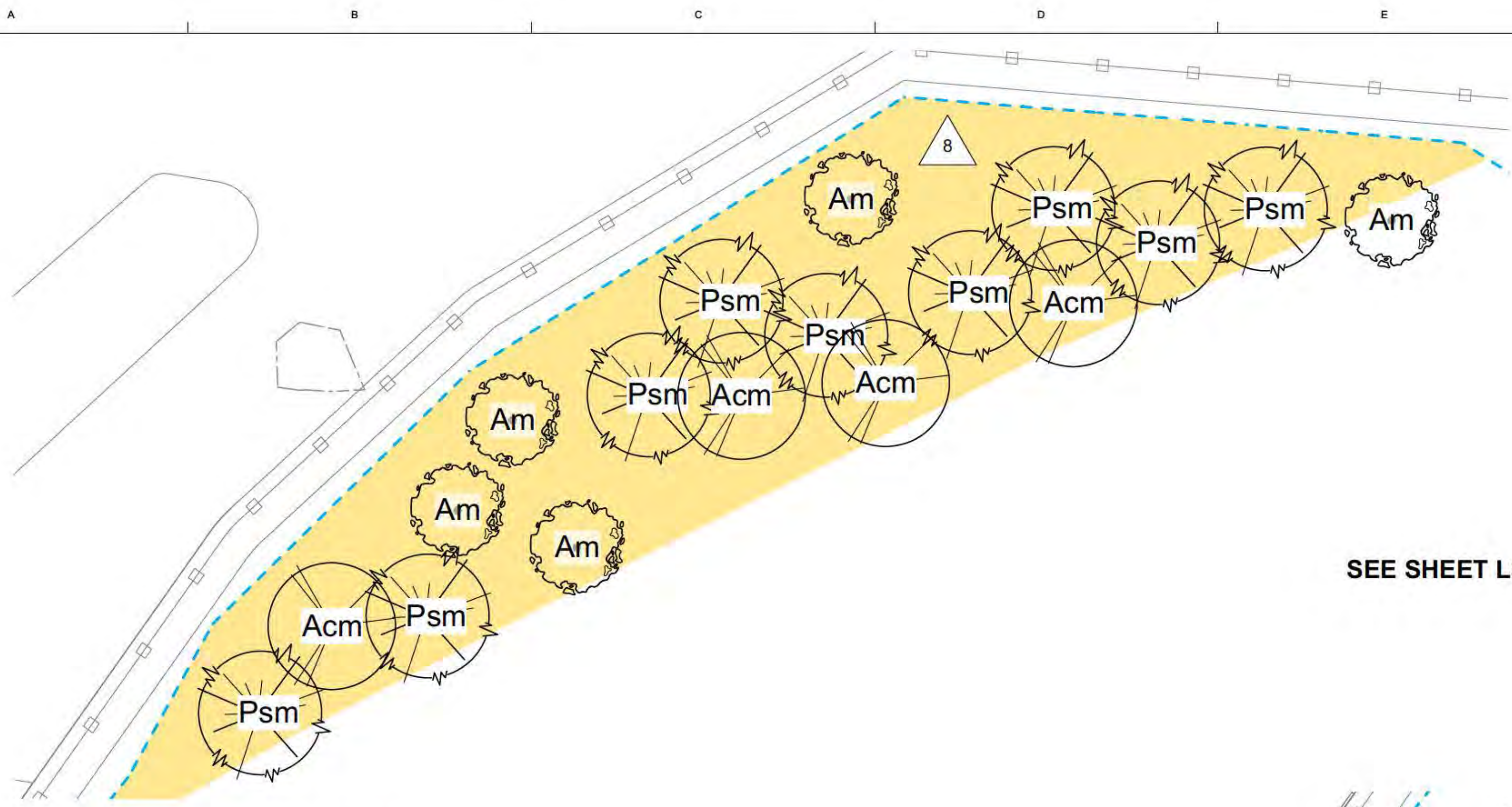


CLIENT:  
BC TRANSIT

PROJECT:  
VICTORIA handyDART  
CENTRE

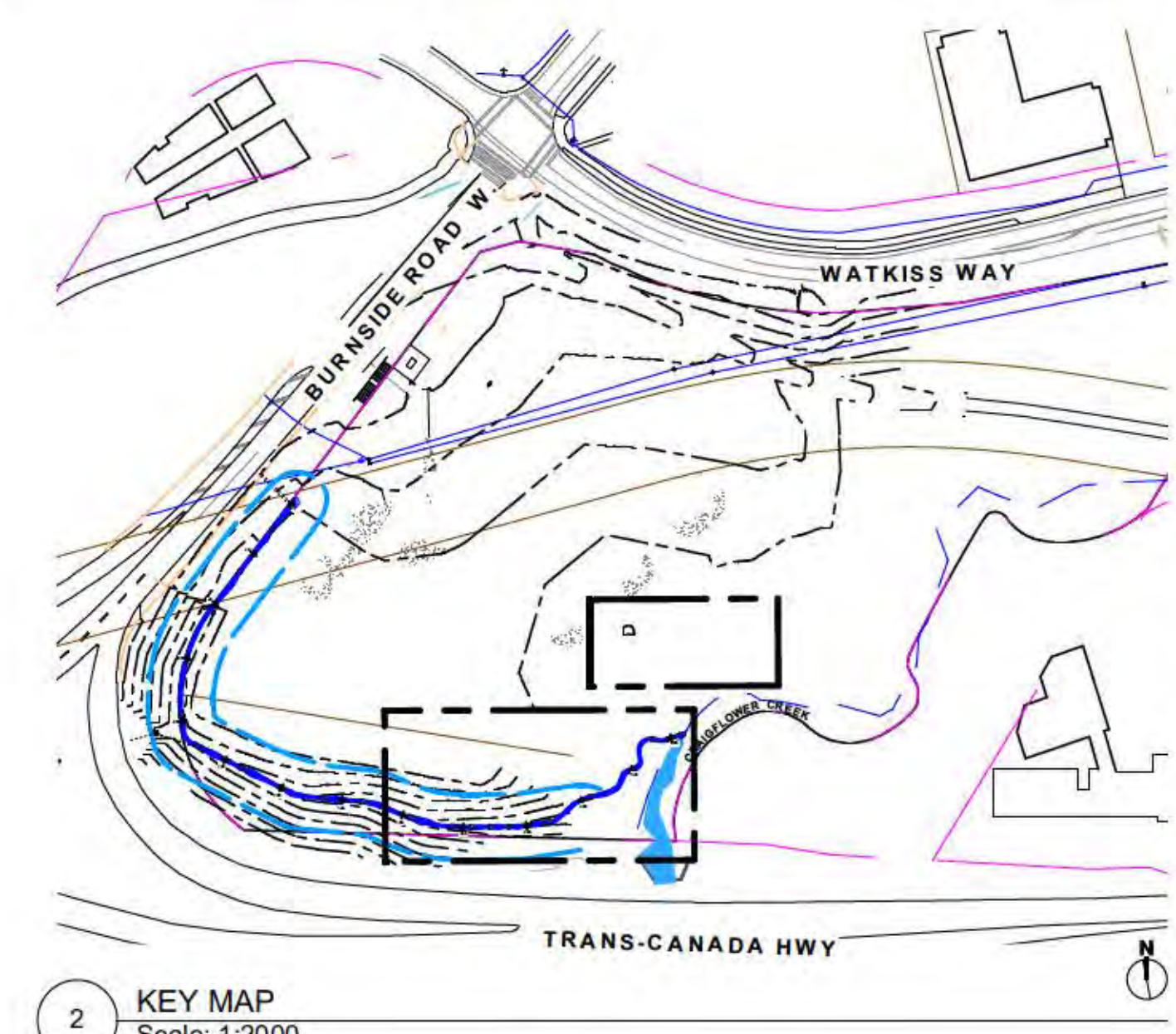
PLANTING PLAN - MIDDLE

SCALE:	PROJECT NO.	
AS SHOWN	201919500	
DWG.#	REV	DATE:
TP2 - L3.03	3	2021-06-24

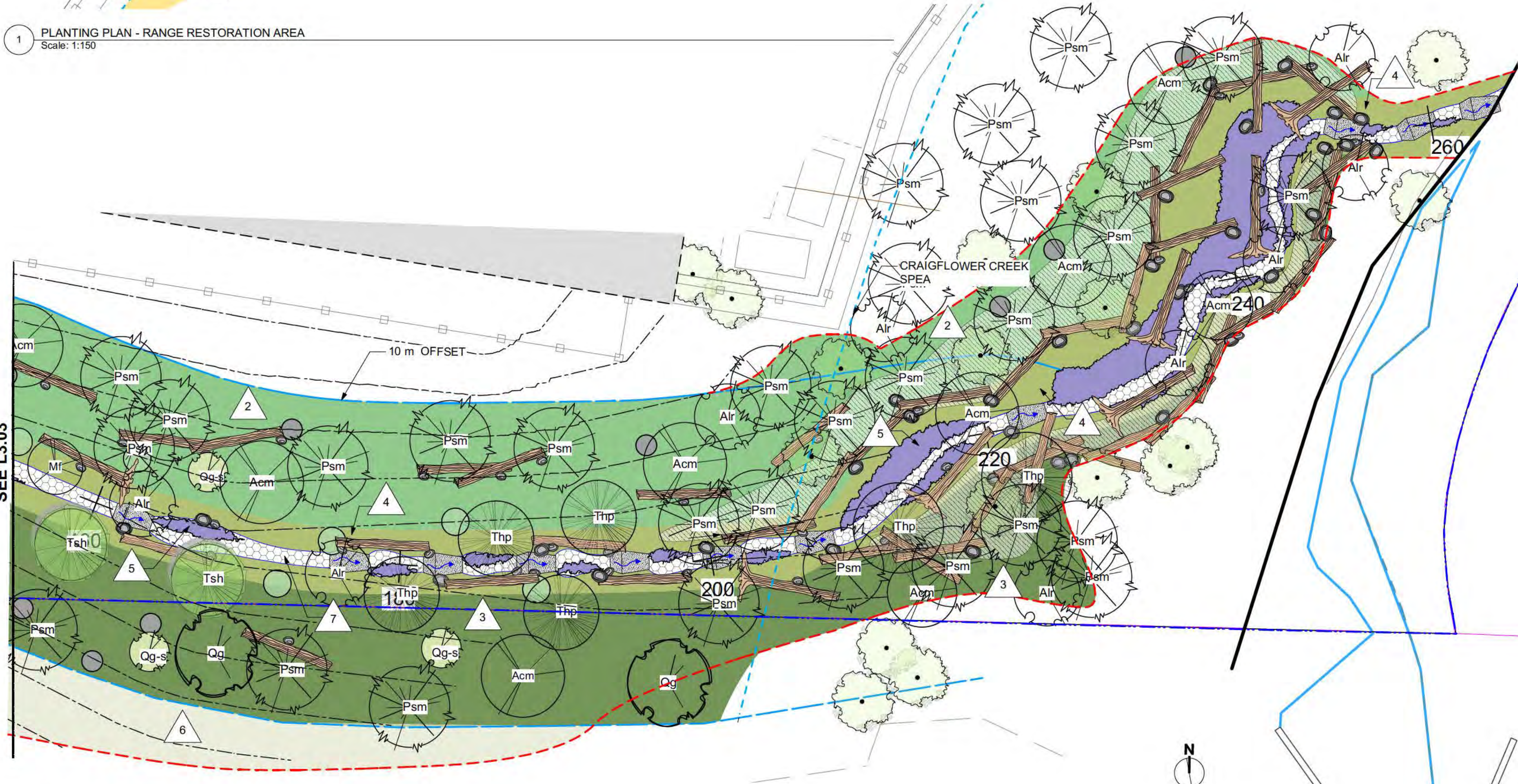


1 PLANTING PLAN - RANGE RESTORATION AREA  
Scale: 1:150

SEE SHEET L3.01 FOR PLANT LIST



2 KEY MAP  
Scale: 1:2000



3 PLANTING PLAN - LOWER PORTION  
Scale: 1:150



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1	Revision #1	2021-01-06
REV	DESCRIPTION	YYYY-MM-DD

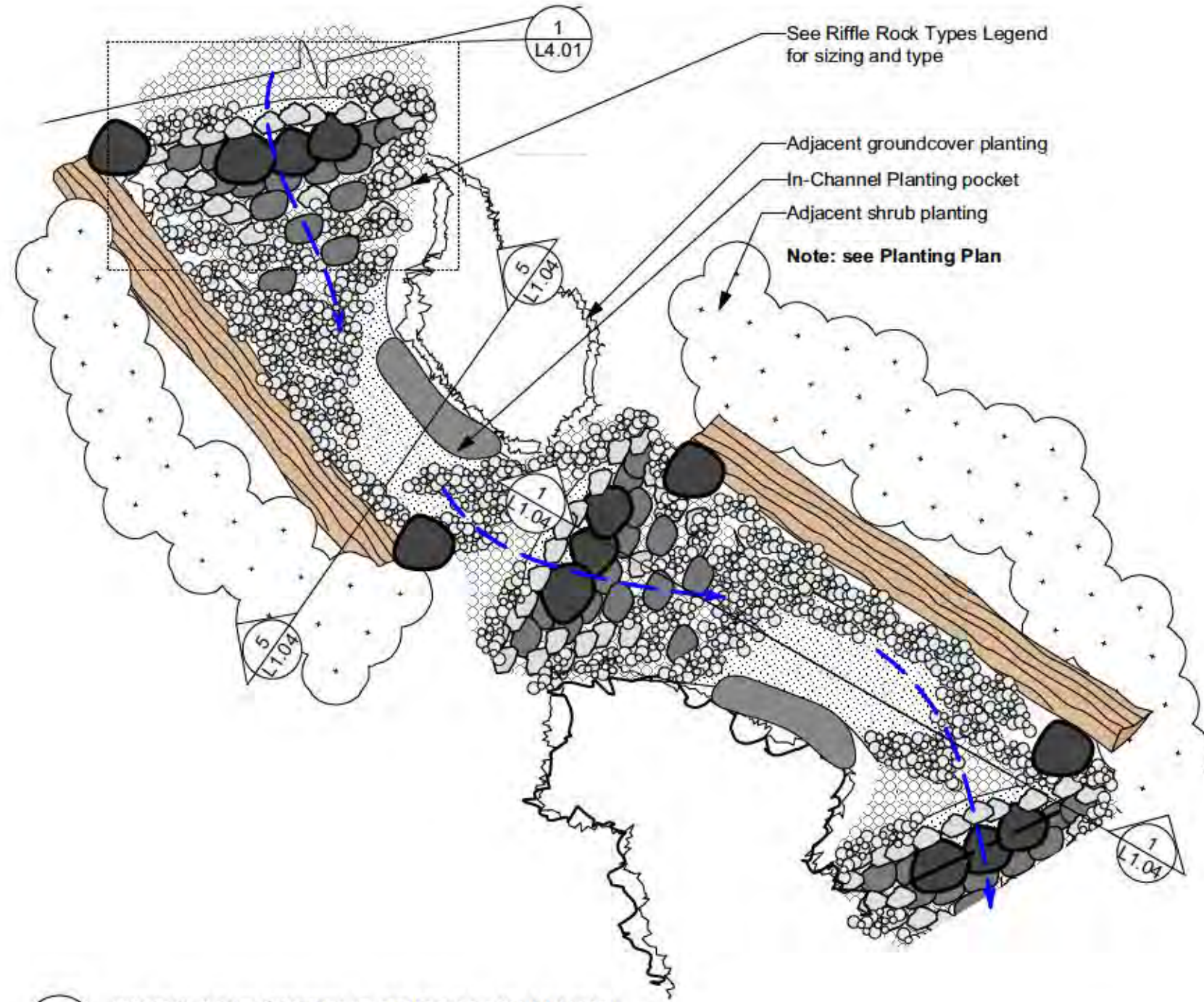
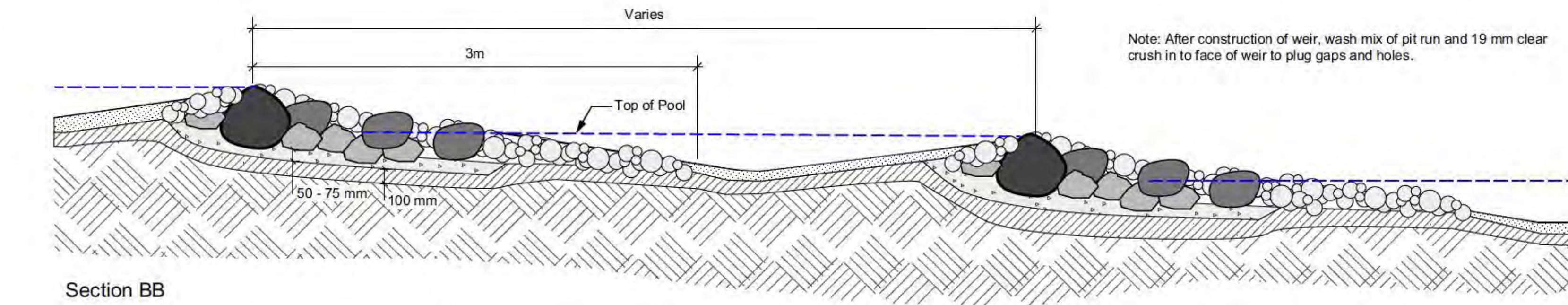
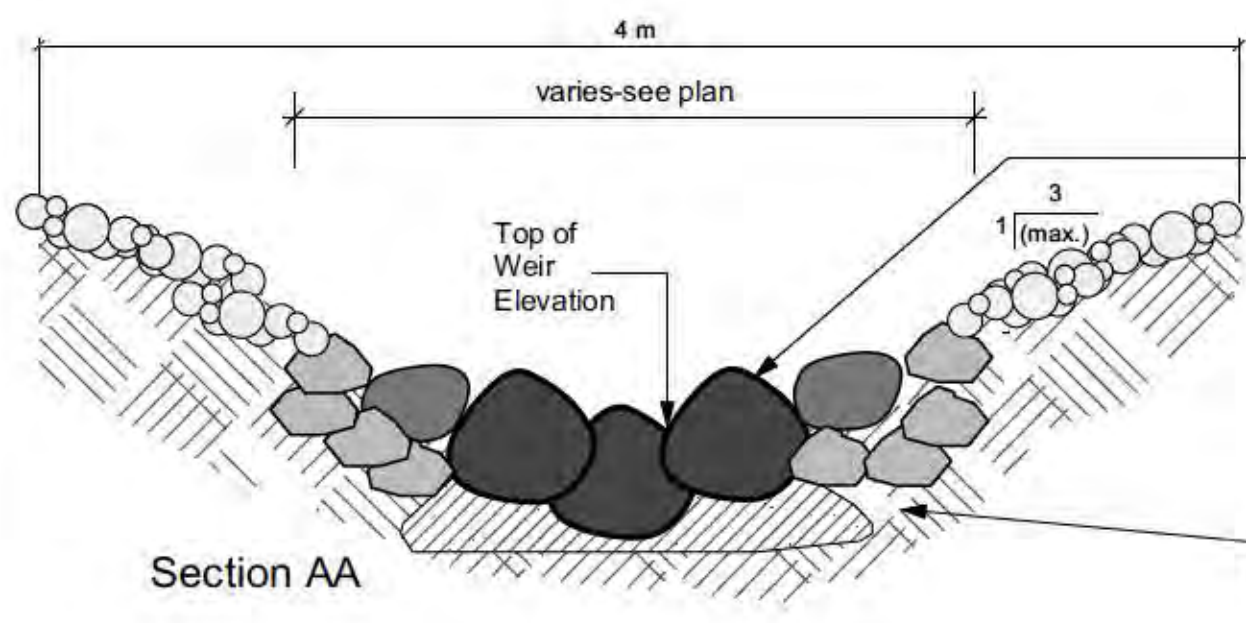
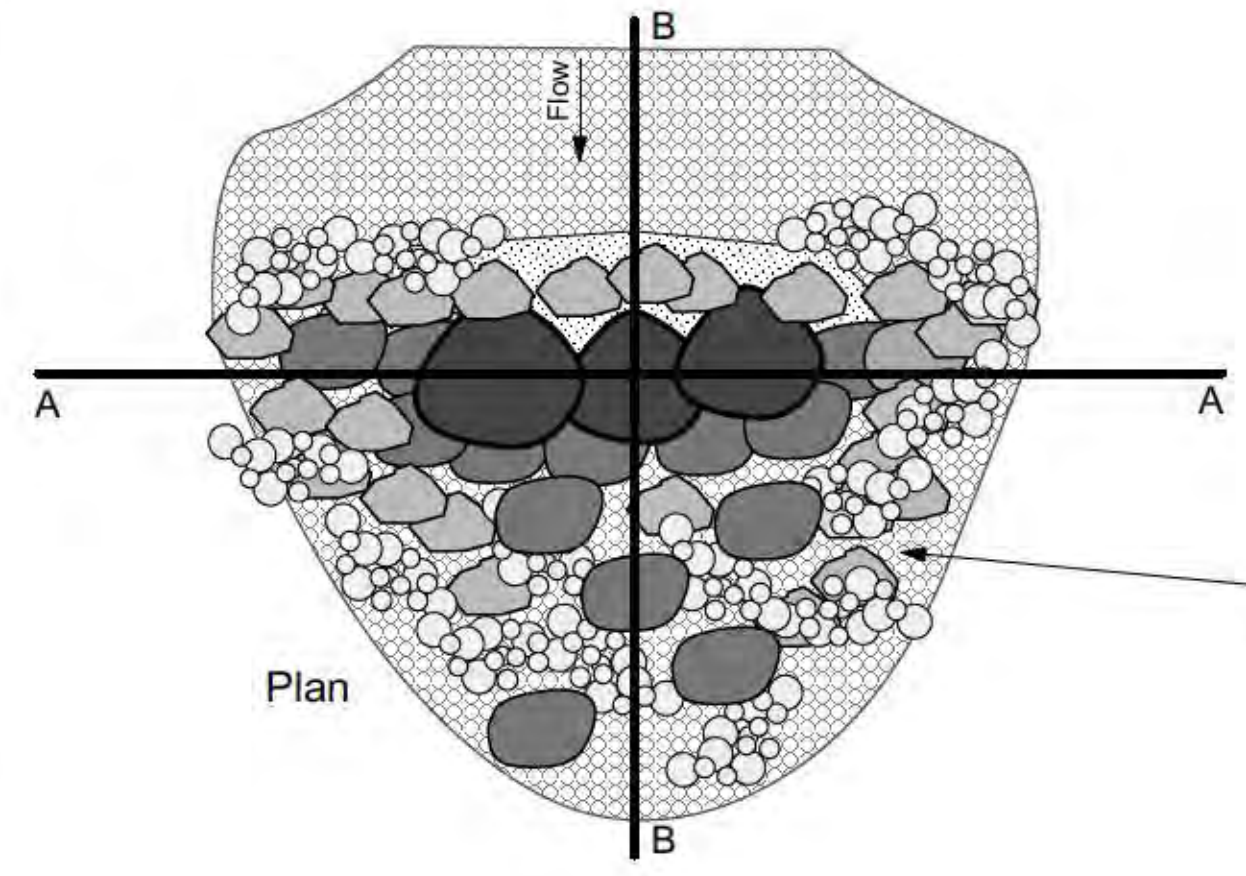
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PROJECT:	VICTORIA handyDART CENTRE	
	PLANTING PLAN - LOWER	
SCALE:	AS SHOWN	PROJECT NO. 201919500
DWG.#	TP2 - L3.04	REV DATE: 3 2021-06-24



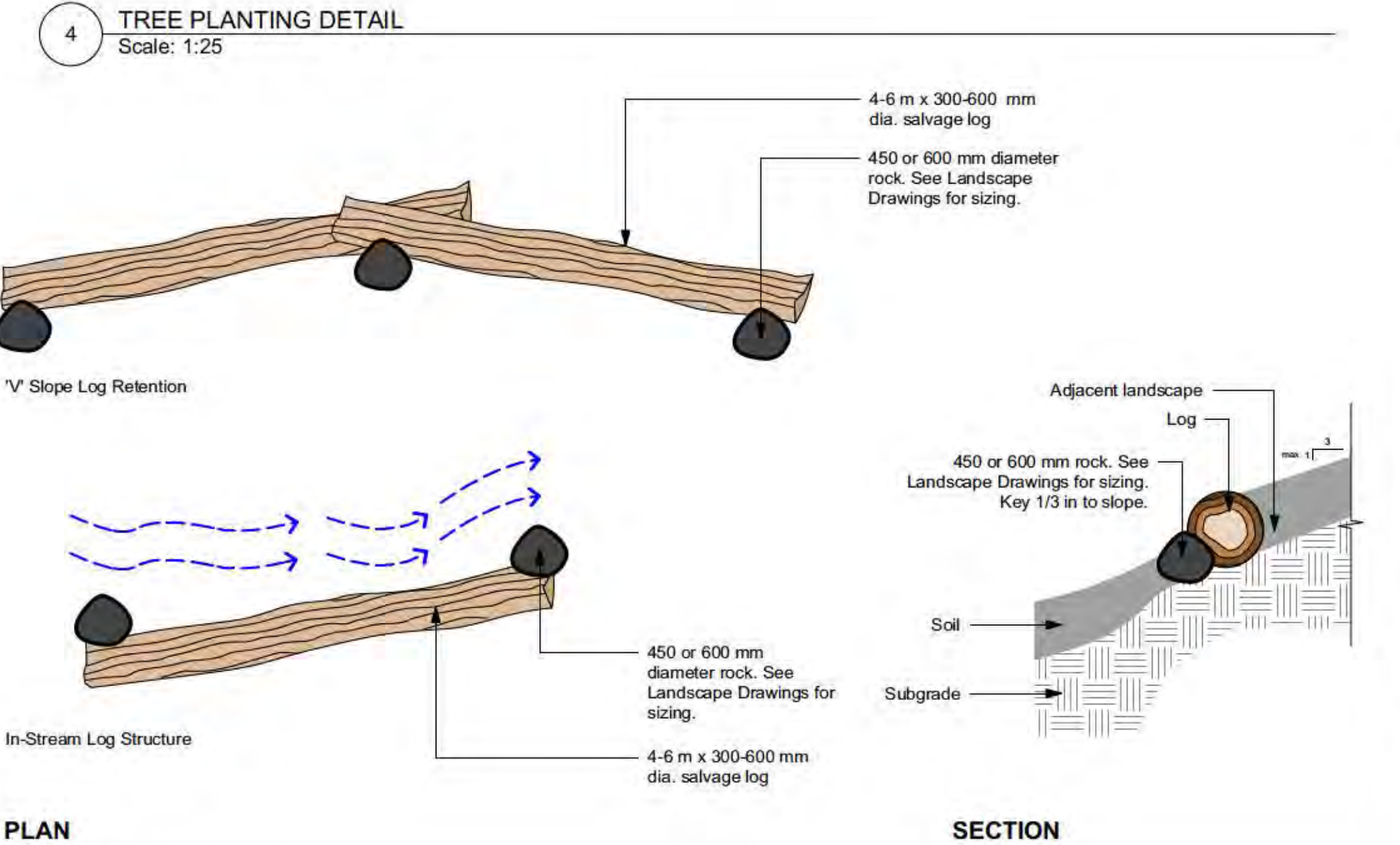
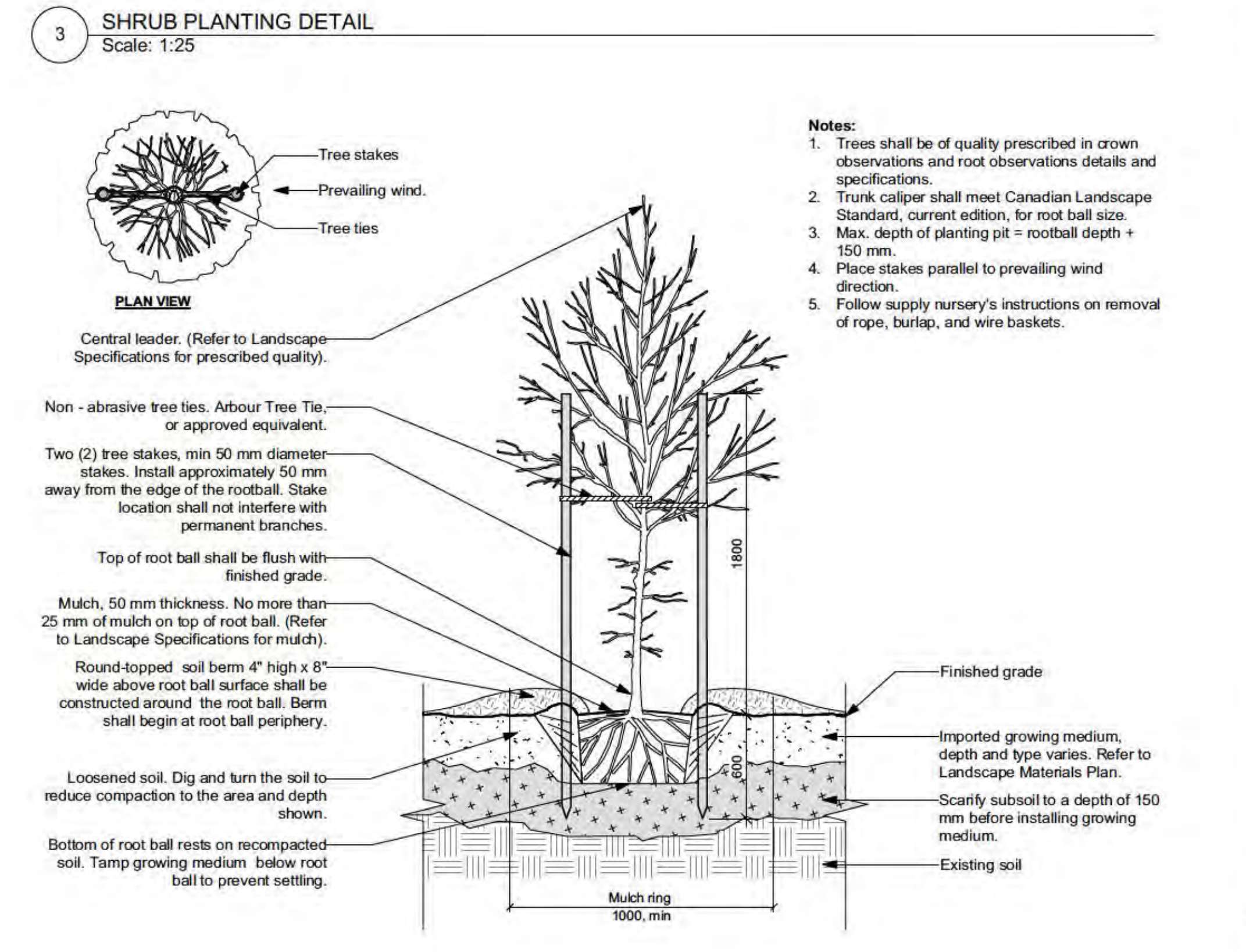
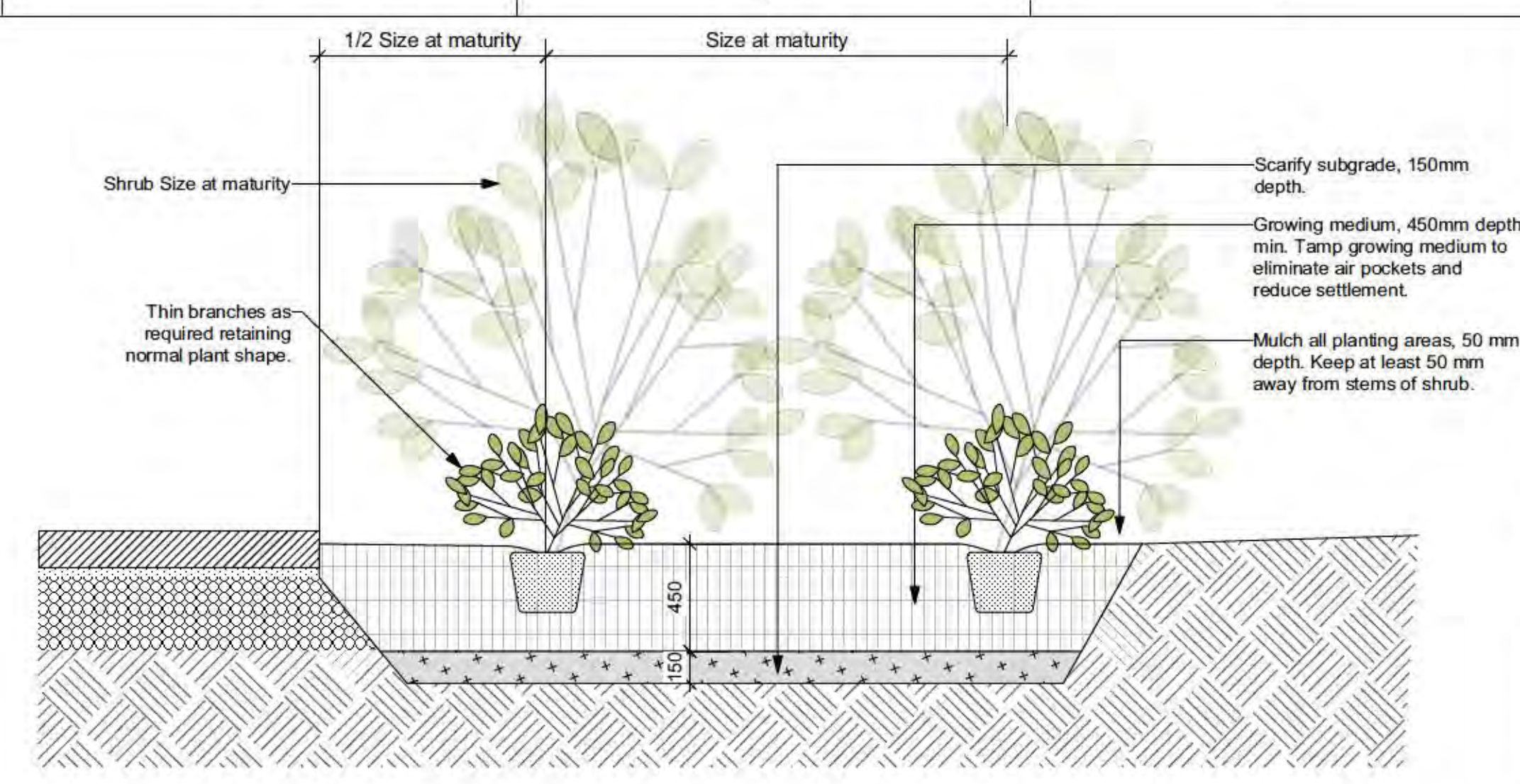


2 ROCK AND COBBLE STREAM CHANNEL  
Scale: 1:50

**RIFFLEROCK TYPES**

	400 - 500 mm boulder		25 - 75 mm drain rock
	300 mm rock		19 mm drain rock
	200 mm angular rock		19 mm clear crush
	100 - 200 mm cobbles		Pit Run Gravel

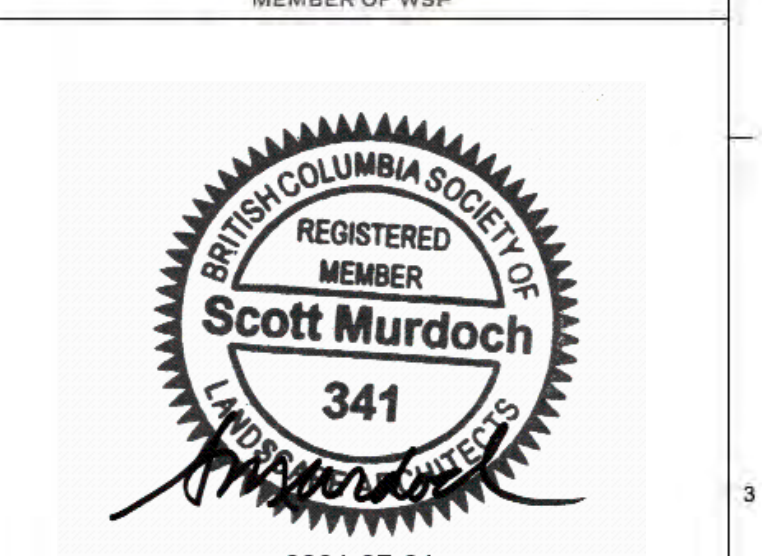
Note: After construction of weir, wash mix of pit run and 19 mm clear crush in to face of weir to plug gaps and holes.



ALL DRAWINGS TO BE READ IN ASSOCIATION WITH LANDSCAPE SPECIFICATIONS DOCUMENT.



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1	Revision #1	2021-01-08
	DESCRIPTION	YYYY-MM-DD

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PROJECT: VICTORIA handyDART CENTRE

LANDSCAPE DETAILS

SCALE:	AS SHOWN	PROJECT NO.	201919500
DWG.#	TP2 - L4.01	REV	3
		DATE:	2021-06-24

50% DESIGN REVIEW

2021/04/27



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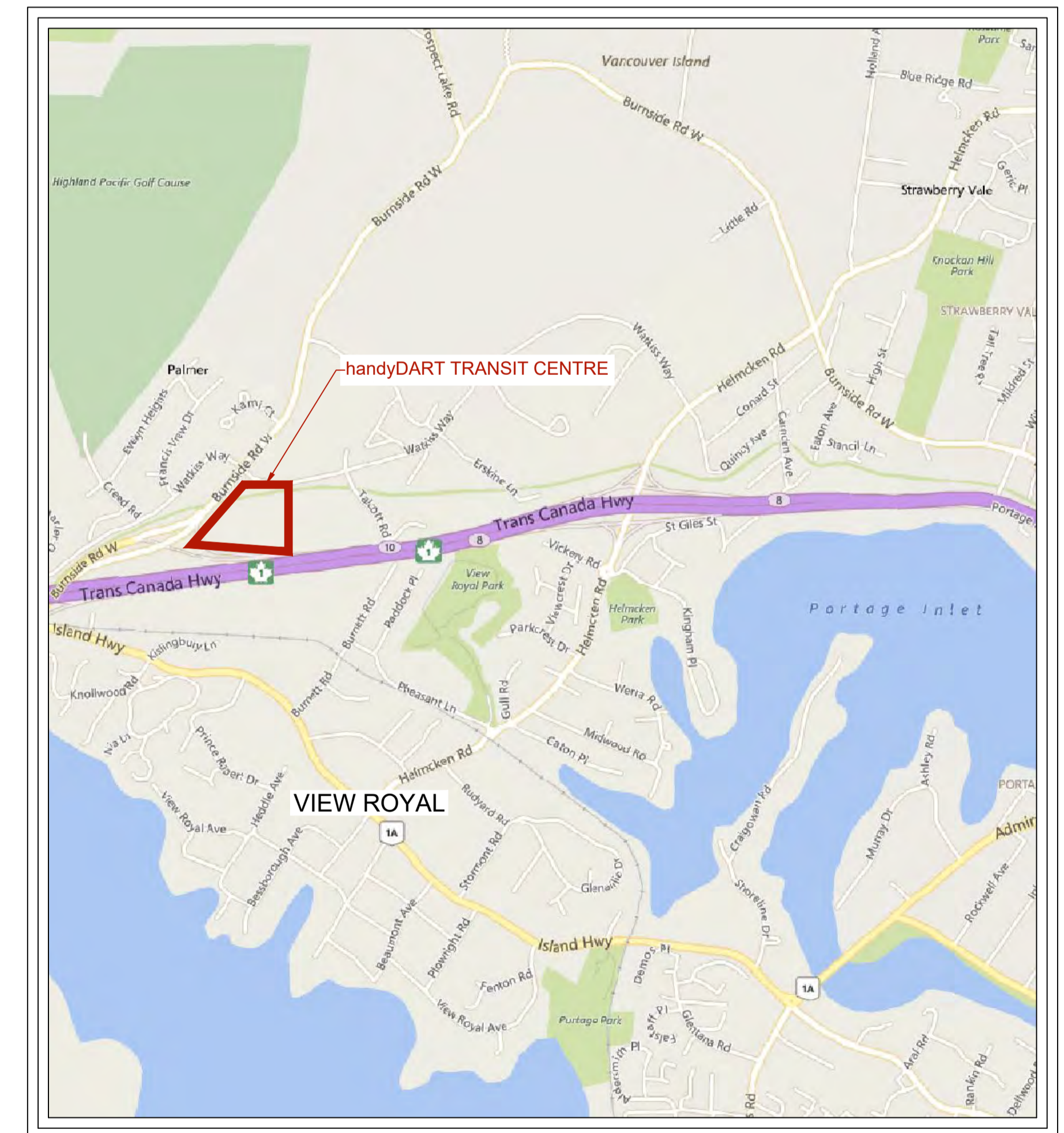
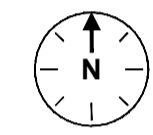
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201919500.00

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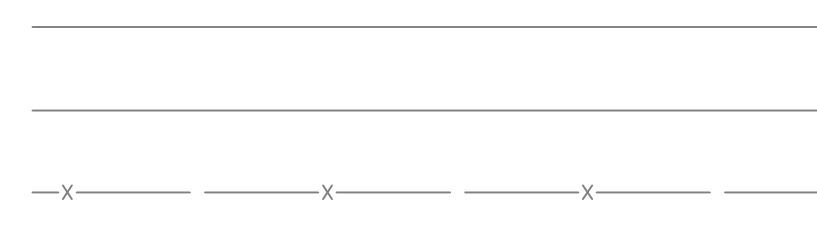
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Sheet Number	Sheet Title
C000	SHEET INDEX
C001	LEGEND & NOTES
C102	SITE GRADING PLAN
C103	STORMWATER MANAGEMENT PLAN
C104	SITE SERVICING PLAN
C110	GGRT PLAN AND PROFILE
C201	SITE PLAN BURNSIDE ROAD
C202	SITE PLAN WATKISS WAY
C501	SANITARY LIFT STATION
C502	SANITARY LIFT STATION DETAILS
C700	CUT - FILL PLAN

LOCATION PLAN  
NTS

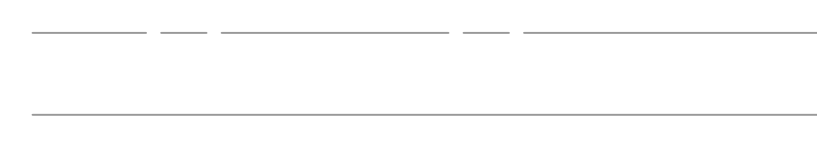


EXISTING FEATURES

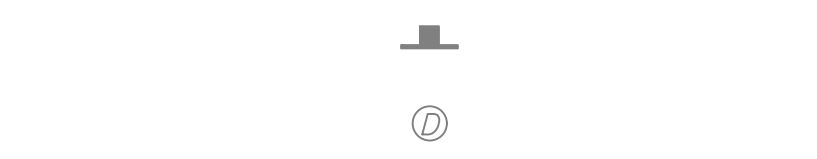
SIDEWALK  
NON MOUNTABLE CURB  
FENCE



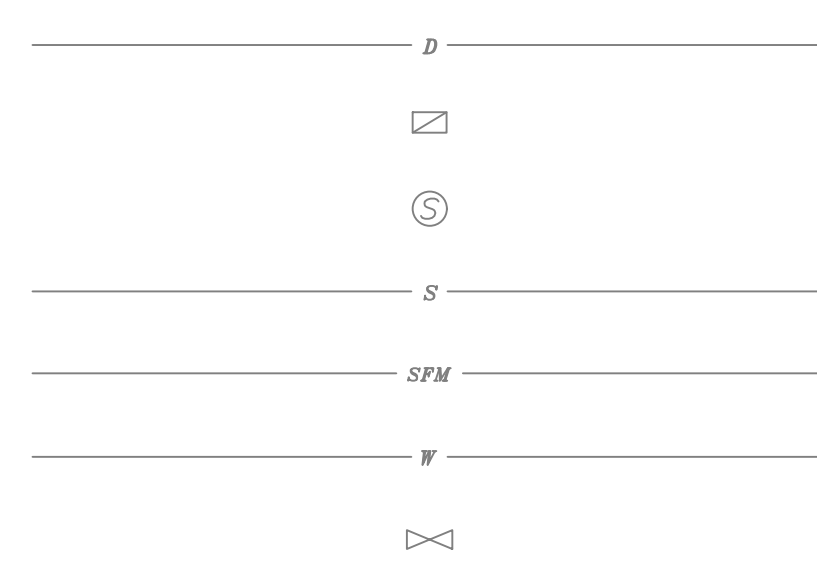
YELLOW PAINT LINES  
WHITE PAINT LINES



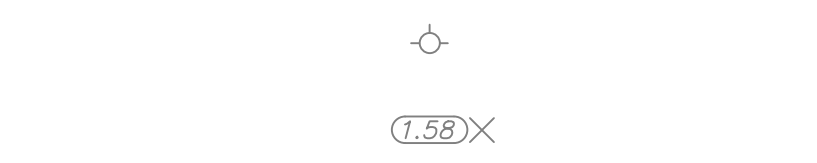
ROAD SIGN  
STORM MANHOLE



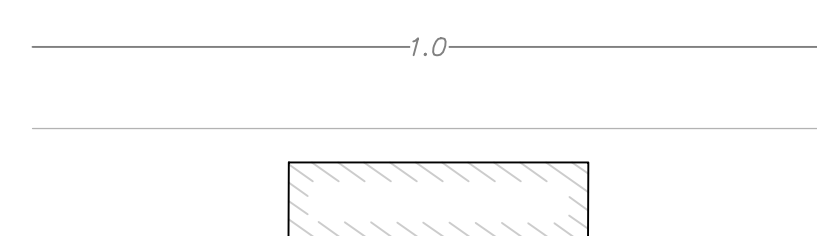
STORM SEWER  
CATCH BASIN  
SANITARY MANHOLE  
SANITARY SEWER  
SANITARY FORCE MAIN  
WATERMAIN  
WATER VALVE



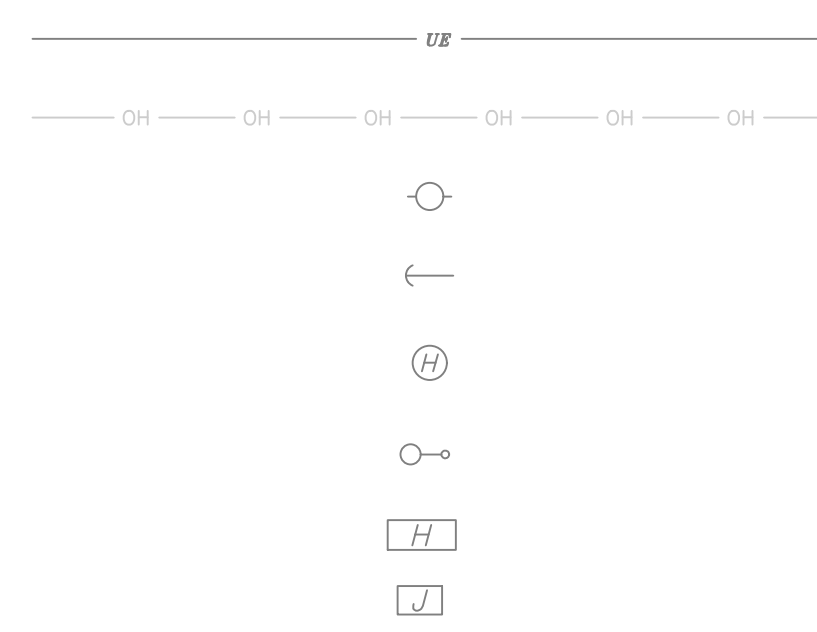
FIRE HYDRANT  
EXISTING GRADES



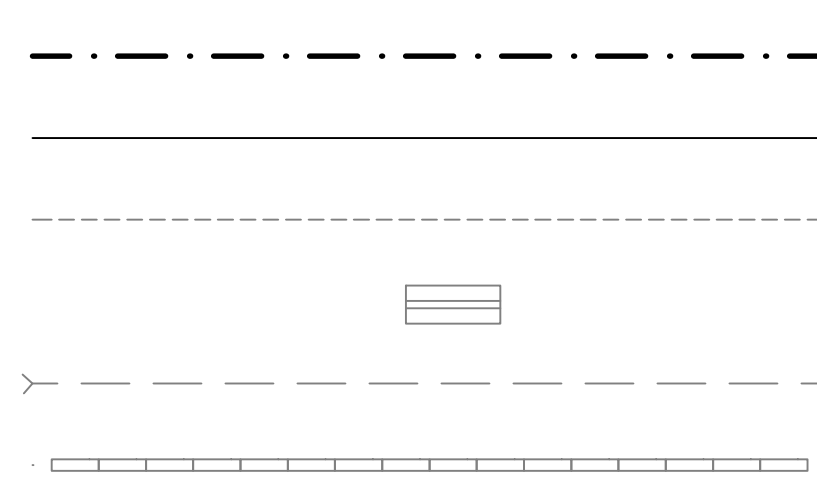
MAJOR CONTOURS  
MINOR CONTOURS  
BUILDINGS



ELECTRICAL CONDUIT  
OVERHEAD POWER LINES  
HYDRO POLE  
HYDRO POLE GUYWIRE  
HYDRO MANHOLE  
LIGHT POLE  
ELECTRICAL HYDRO POWER BOX  
ELECTRICAL JUNCTION BOXES



PROPERTY LINE  
EASEMENT  
UTILITY RIGHT OF WAY  
CONCRETE BARRIER  
CULVERT  
ROAD BARRIER

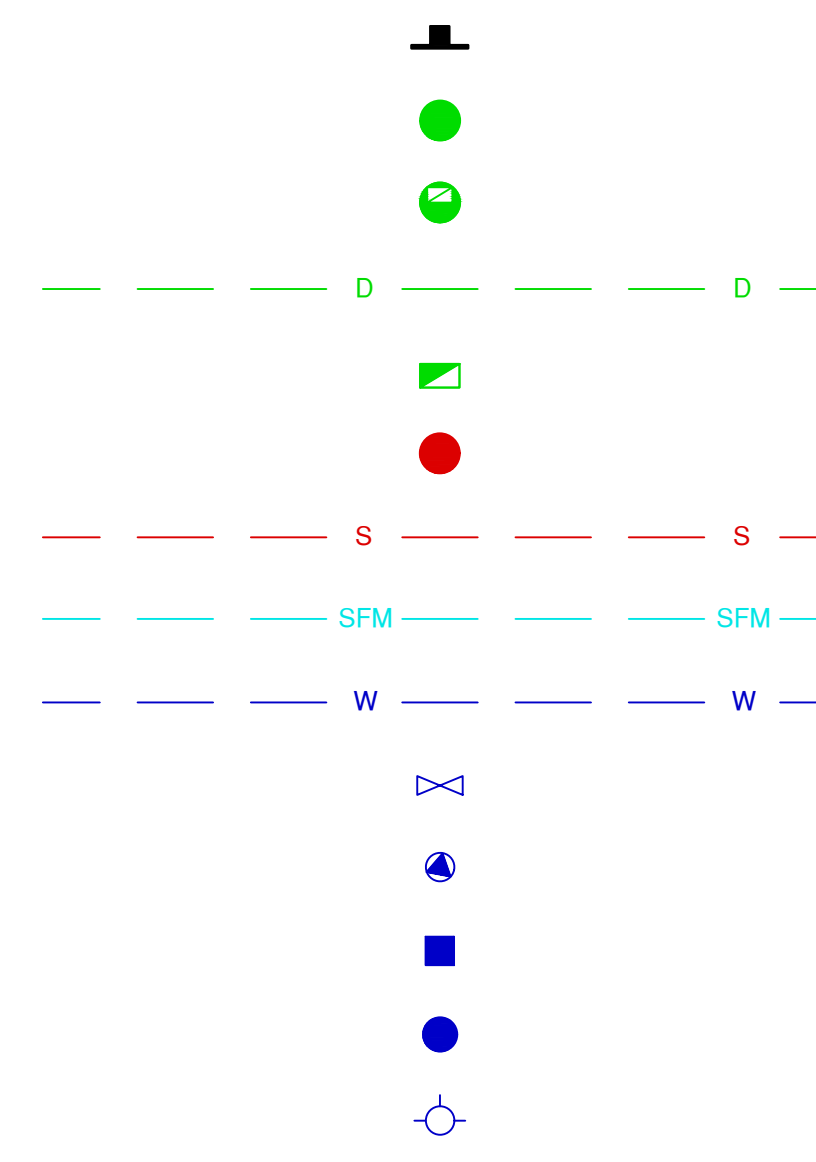


PROPOSED FEATURES

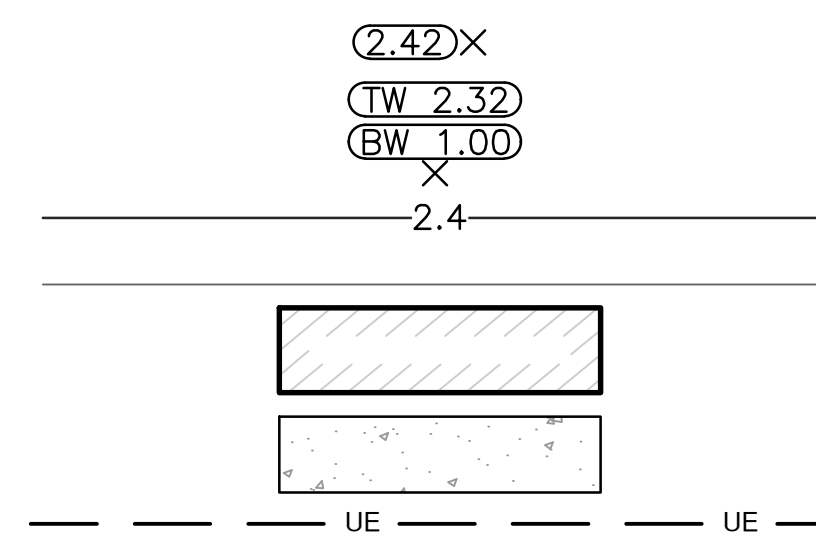
CONSTRUCTION BOUNDARY  
PATH/SIDEWALKS  
CURB  
FENCE  
DITCHING  
PAINT LINES  
BROKEN WHITE LINE  
ACCEL/DECEL LANES  
PARKING PAINT LINES  
RETAINING WALL  
STOP BAR



ROAD SIGN  
STORM MANHOLE  
CATCH BASIN MANHOLE  
STORM SEWER  
CATCH BASIN  
SANITARY MANHOLE  
SANITARY SEWER  
SANITARY FORCE MAIN  
WATERMAIN  
WATER VALVE  
BACKFLOW PREVENTION VALVE  
WATER METER  
WATER SYSTEM FLUSH  
FIRE HYDRANT



PROPOSED GRADES  
WALL TOP/BOTTOM GRADES  
MAJOR CONTOURS  
MINOR CONTOURS  
BUILDINGS  
CONCRETE  
ELECTRICAL CONDUIT



CULVERT  
ROAD BARRIER



ABBREVIATIONS

GENERAL

c/w	—	COMPLETE WITH
CONC	—	CONCRETE
DWG	—	DRAWING
EX	—	EXISTING
FUT	—	FUTURE
MF	—	MAIN FLOOR
MC	—	MOUNTABLE CURB
NMC	—	NON MOUNTABLE CURB
NTS	—	NOT TO SCALE
PL	—	PROPERTY LINE
R	—	RADIUS
TYP	—	TYPICAL

UTILITIES

CB	—	CATCH BASIN
CBMH	—	CATCH BASIN MANHOLE
COMM	—	COMMUNICATIONS
FM	—	FORCEMAIN
HYD	—	HYDRANT
ICD	—	INLET CONTROL DEVICE
INV	—	INVERT
LS	—	LIFT STATION
MH	—	MANHOLE
O/H	—	OVERHEAD
PVC	—	POLYVINYL CHLORIDE
RPVC	—	RIGID POLYVINYL CHLORIDE
RIM	—	MANHOLE RIM
SAN	—	SANITARY
SMH	—	SANITARY MANHOLE
STM	—	STORM
DMH	—	STORM MANHOLE
SOV	—	SHUT OFF VALVE
U/G	—	UNDERGROUND
WAT	—	WATERMAIN



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**BC TRANSIT**

PROJECT:  
**VICTORIA handyDART TRANSIT CENTRE**

**LEGEND & NOTES**

SCALE: NTS	PROJECT NO. 201919500
DWG.# <b>C001</b>	REV DATE: B 2021/04/26

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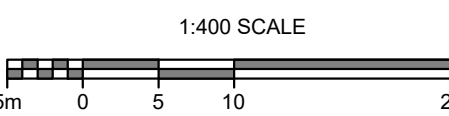
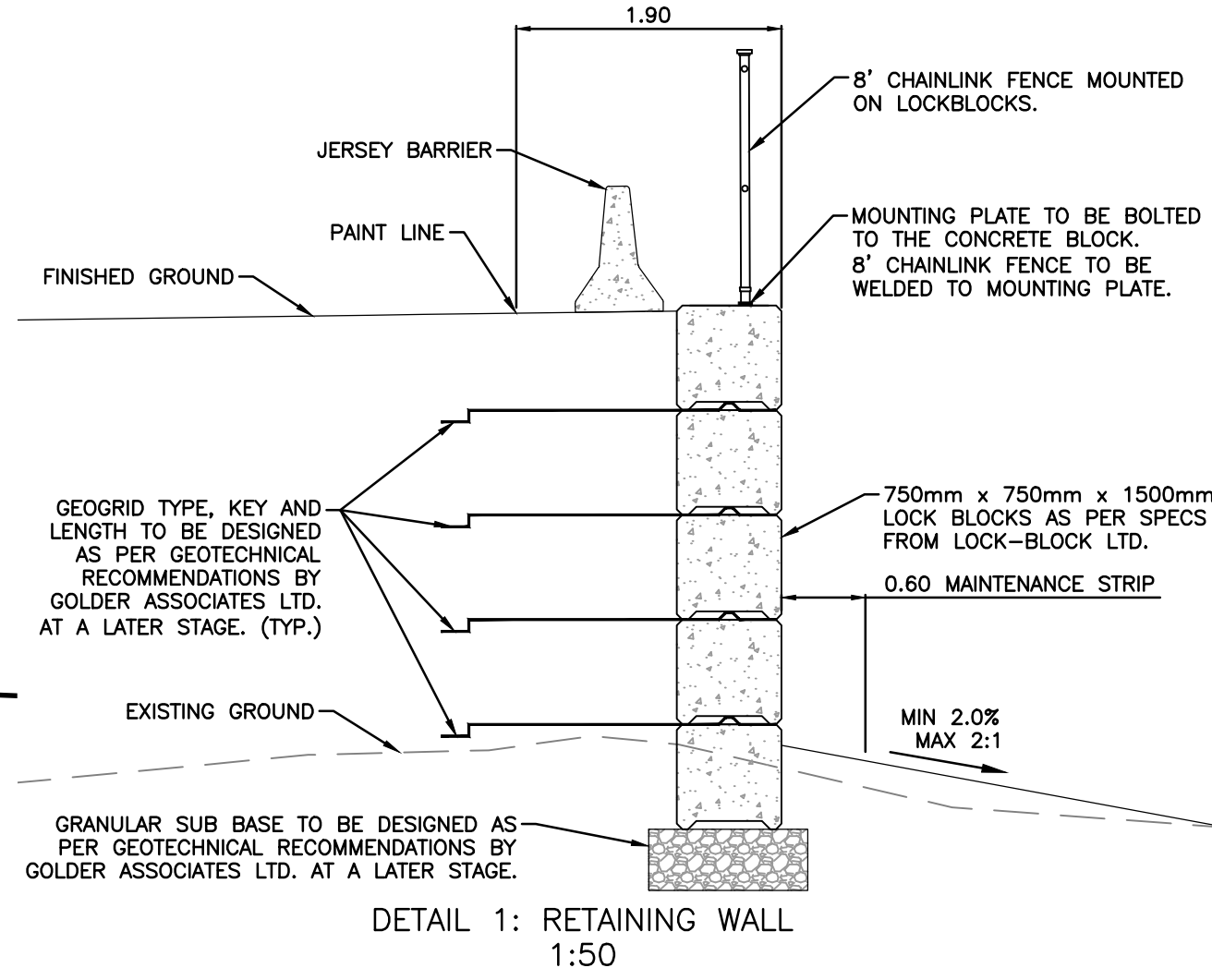
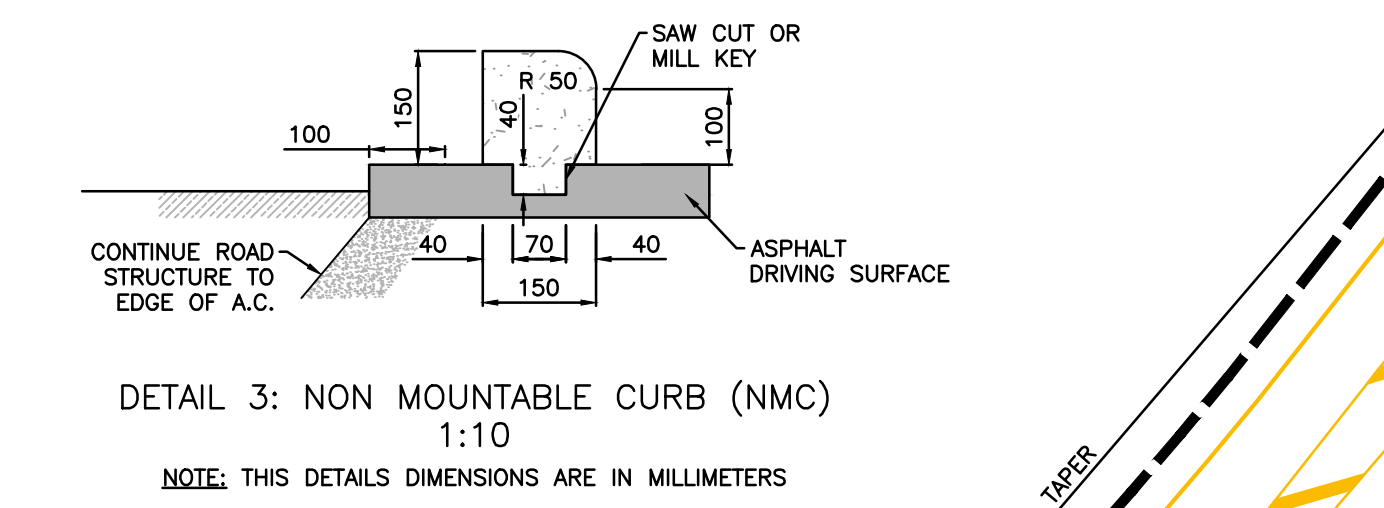
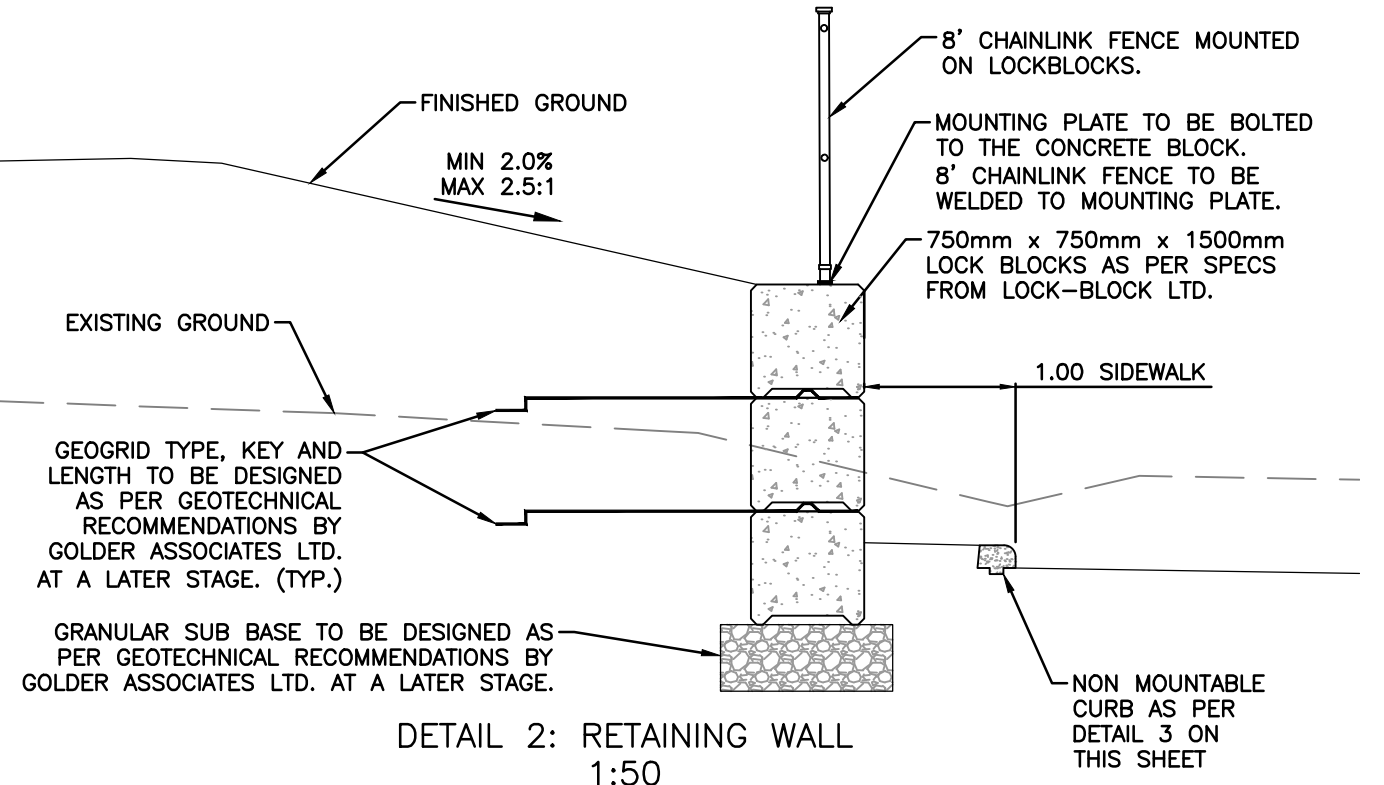
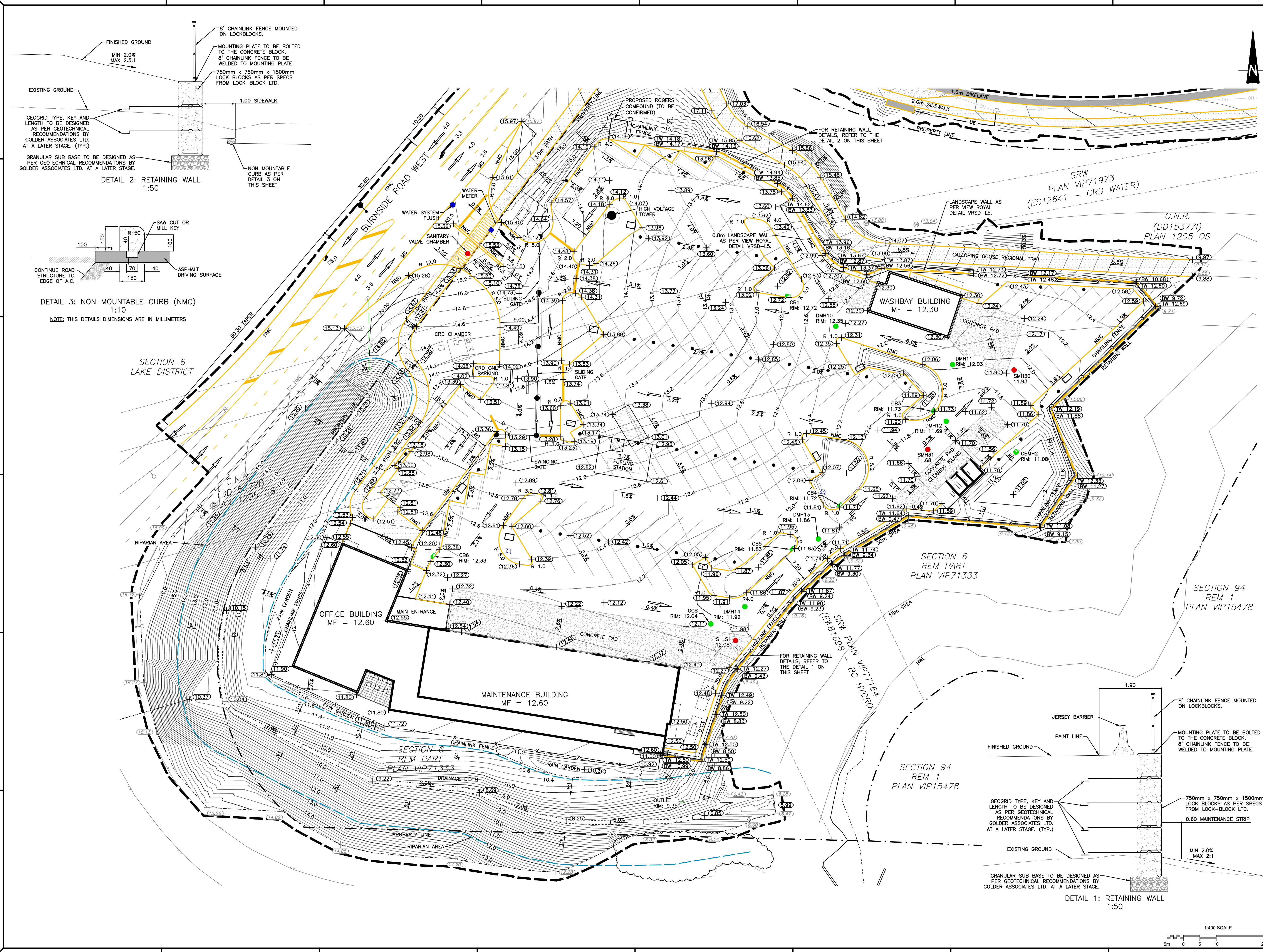
STAMPS

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SITE GRADING PLAN

SCALE: 1:400	PROJECT NO. 201919500
DWG.# C102	REV DATE: B 2021/04/26



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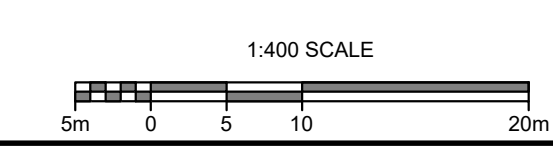
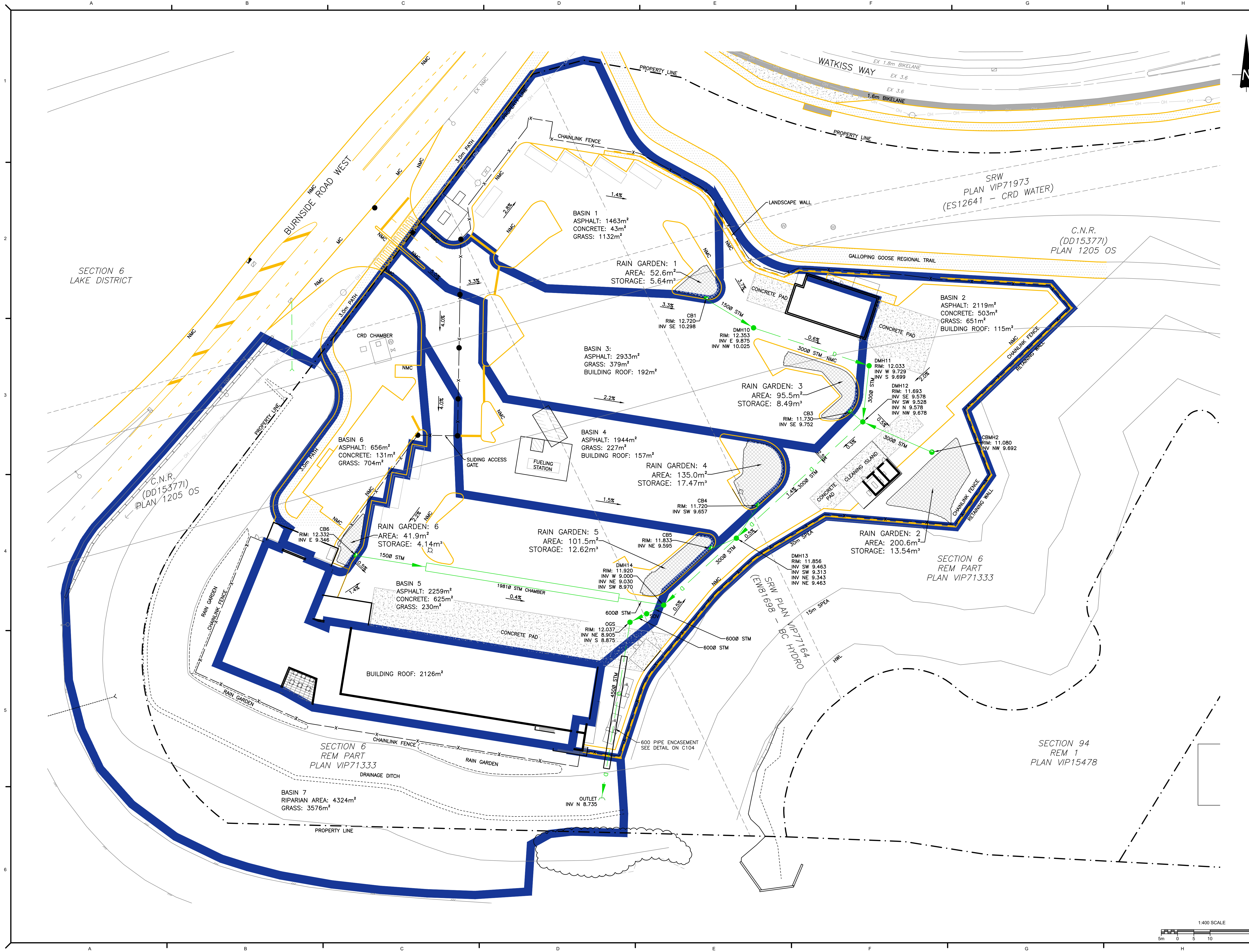


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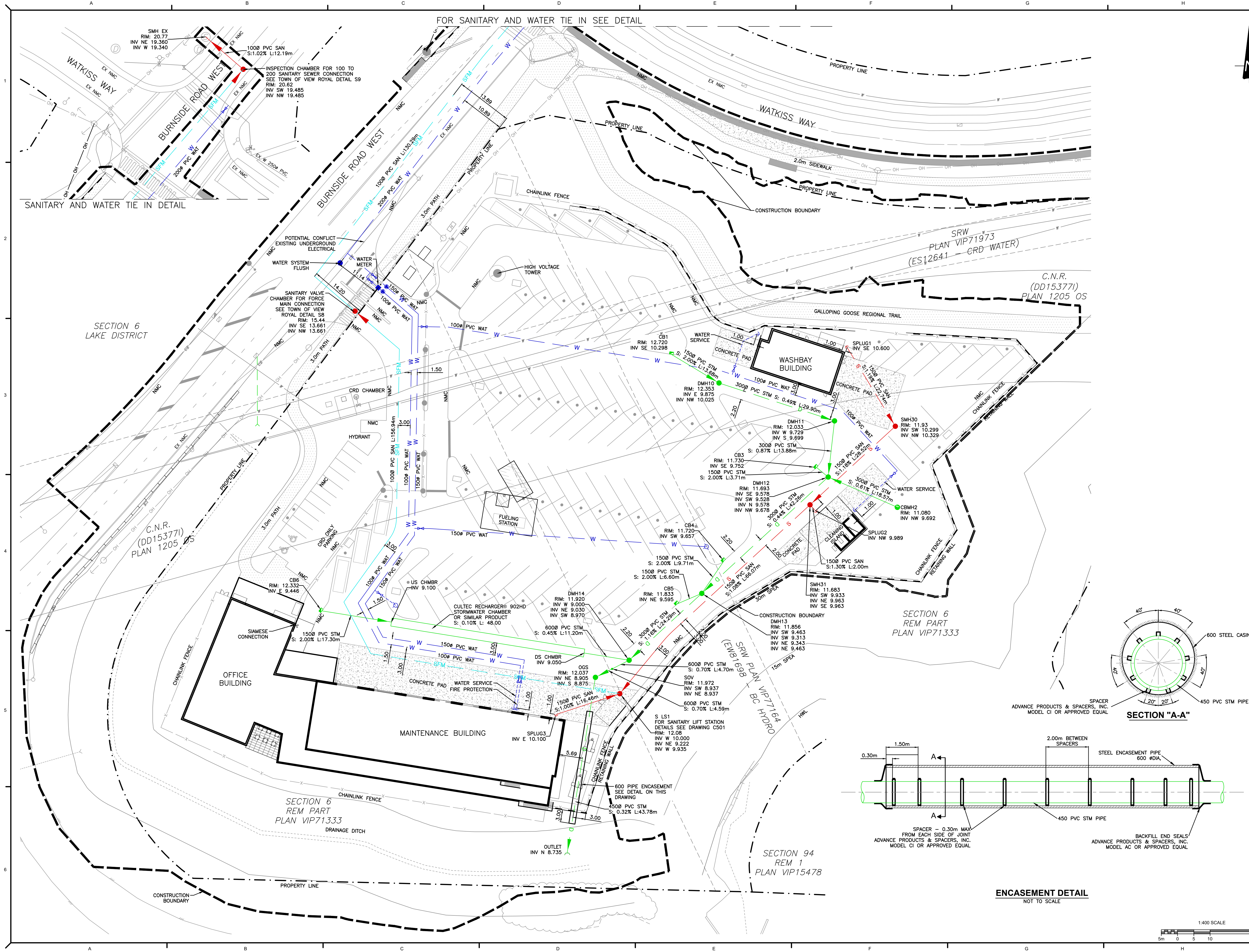
PROJECT:  
**VICTORIA handyDART  
 TRANSIT CENTRE**

**STORMWATER MANAGEMENT PLAN**

SCALE: 1:400	PROJECT NO. 201919500
DWG.# <b>C103</b>	REV B
	DATE: 2021/04/26



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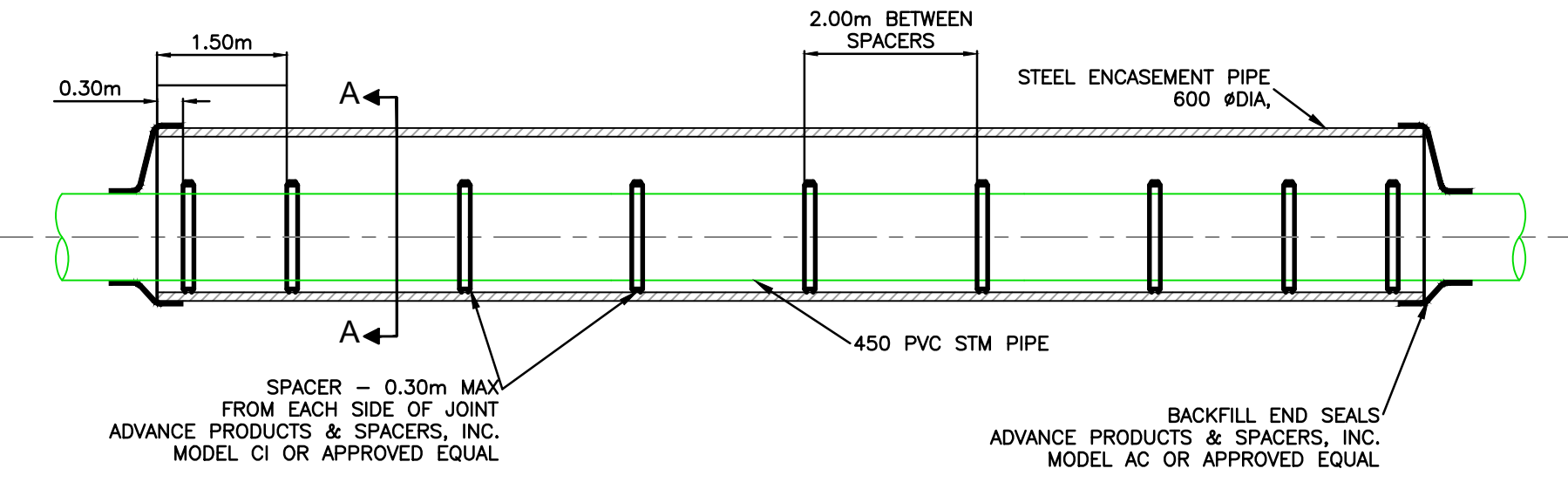
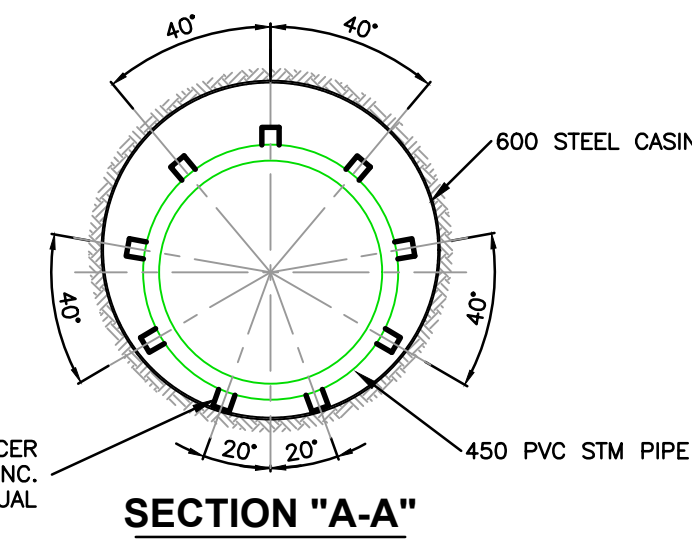
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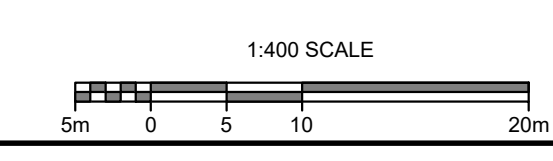
CLIENT: BC TRANSIT  
 PROJECT: VICTORIA handyDART TRANSIT CENTRE

SITE SERVICING PLAN

SCALE: 1:400	PROJECT NO: 201919500
DWG# C104	REV B
	DATE: 2021/04/26



ENCASEMENT DETAIL  
 NOT TO SCALE



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NOTES:  
1. EXISTING WATERMAIN LOCATIONS AND ELEVATIONS ARE APPROXIMATE. THESE ARE BASED ON ASBUILT INFORMATION PROVIDED BY CRD. FIELD CONFIRMATION DURING CONSTRUCTION IS REQUIRED.

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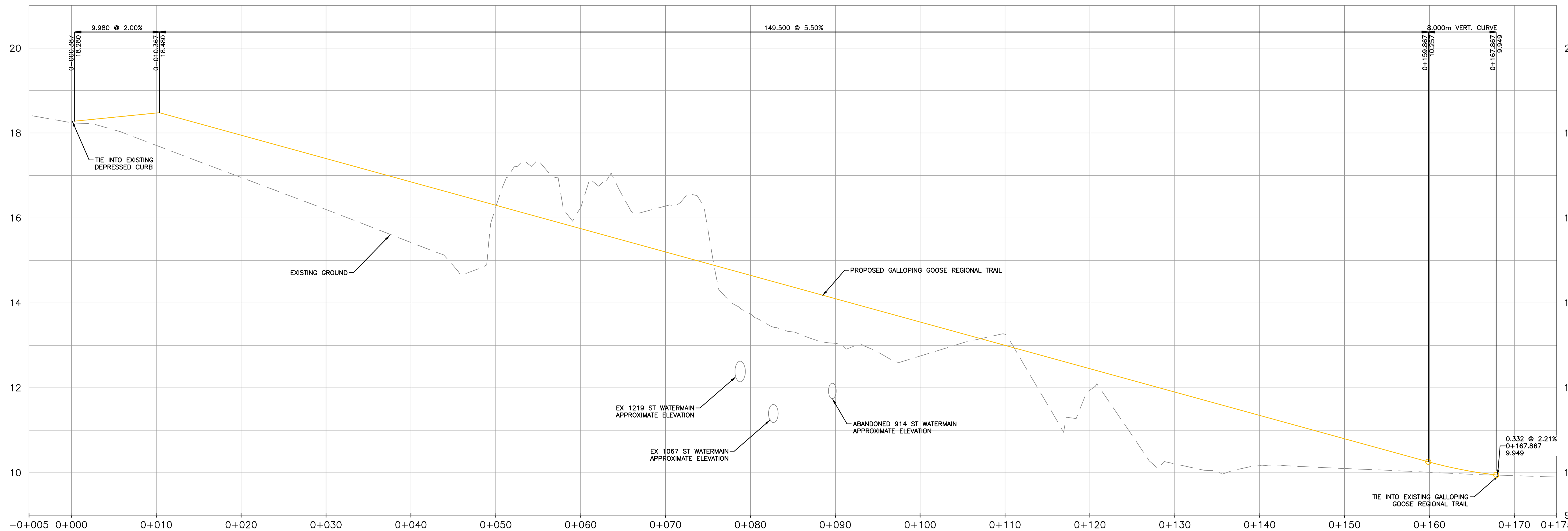
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PROJECT:  
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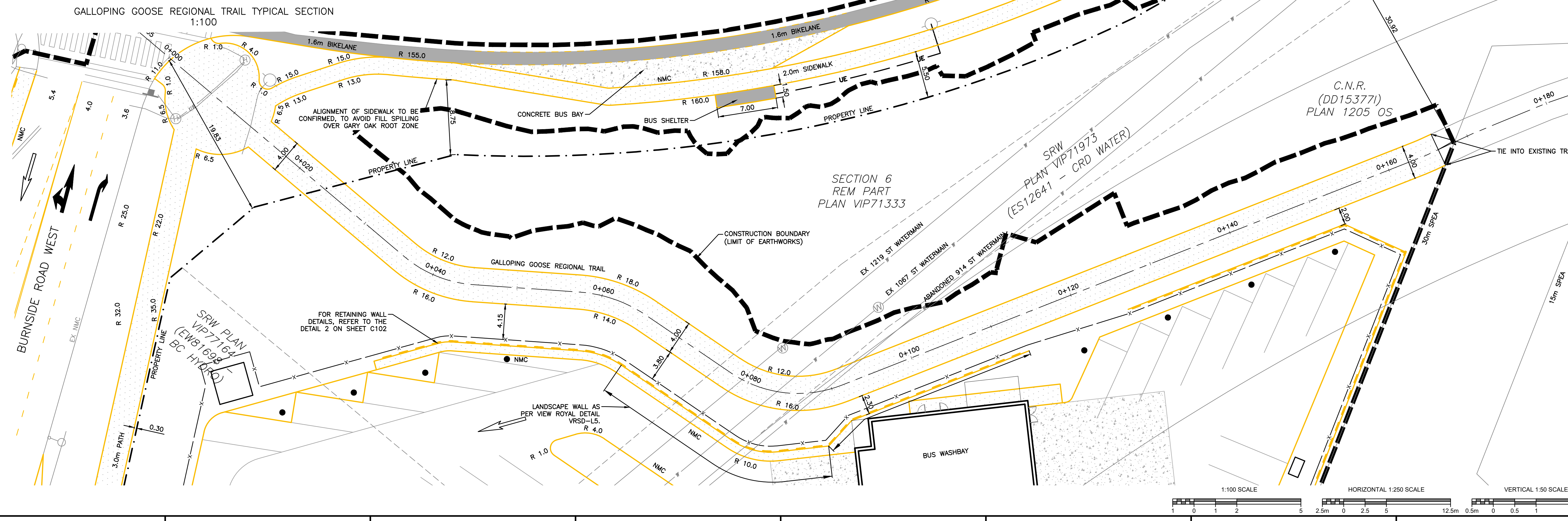
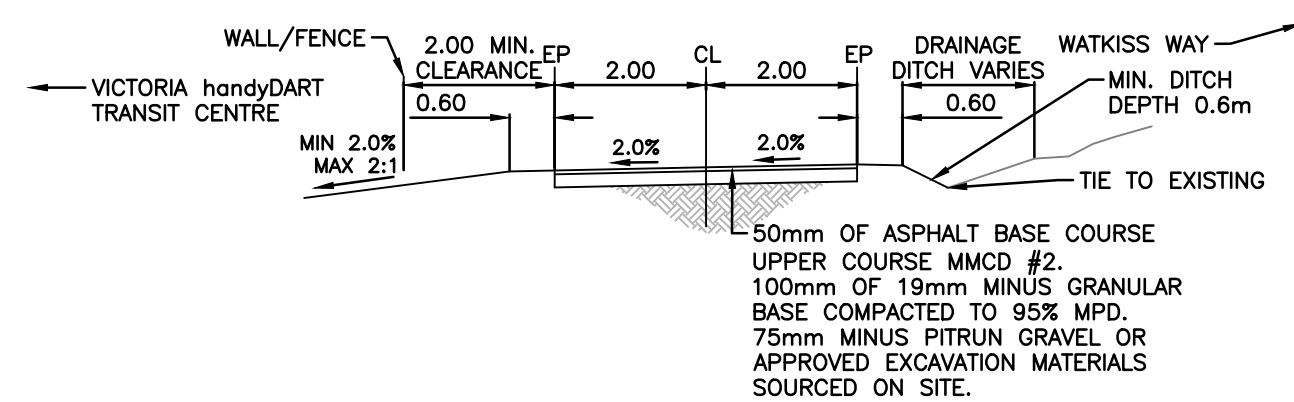
GGRT PLAN AND PROFILE

SCALE: H 1:250 V 1:50 PROJECT NO. 201919500

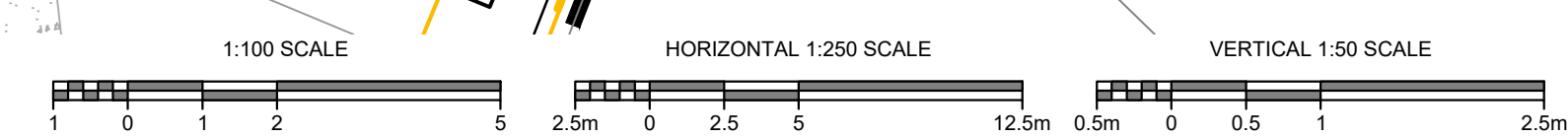
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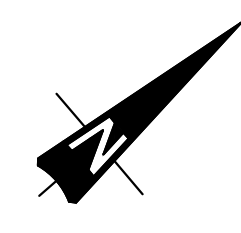
GALLOPING GOOSE REGIONAL TRAIL PROFILE  
H 1:250 V 1:50



SECTION 6  
REM PART  
PLAN VIP71333



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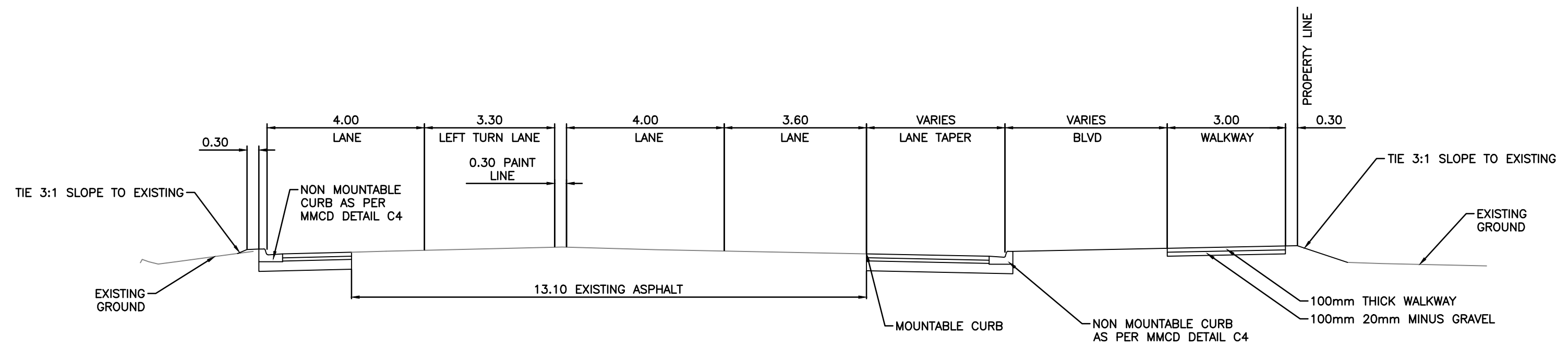


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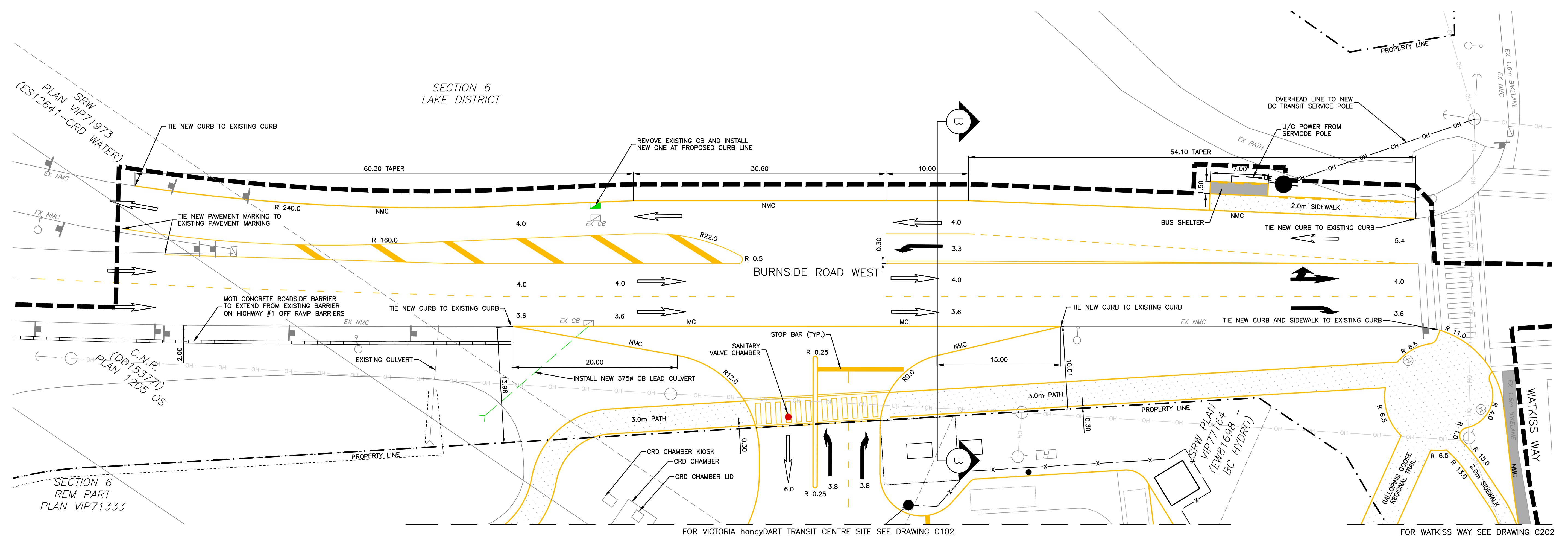
PROJECT:  
VICTORIA handyDART  
TRANSIT CENTRE

SITE PLAN  
BURNSIDE ROAD

SCALE: 1:250	PROJECT NO. 201919500
DWG# C201	REV DATE: B 2021/04/26

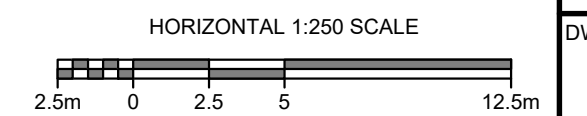


SECTION B-B  
BURNSIDE ROAD WEST TYPICAL SECTION  
NTS



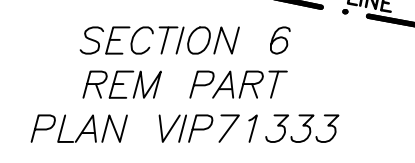
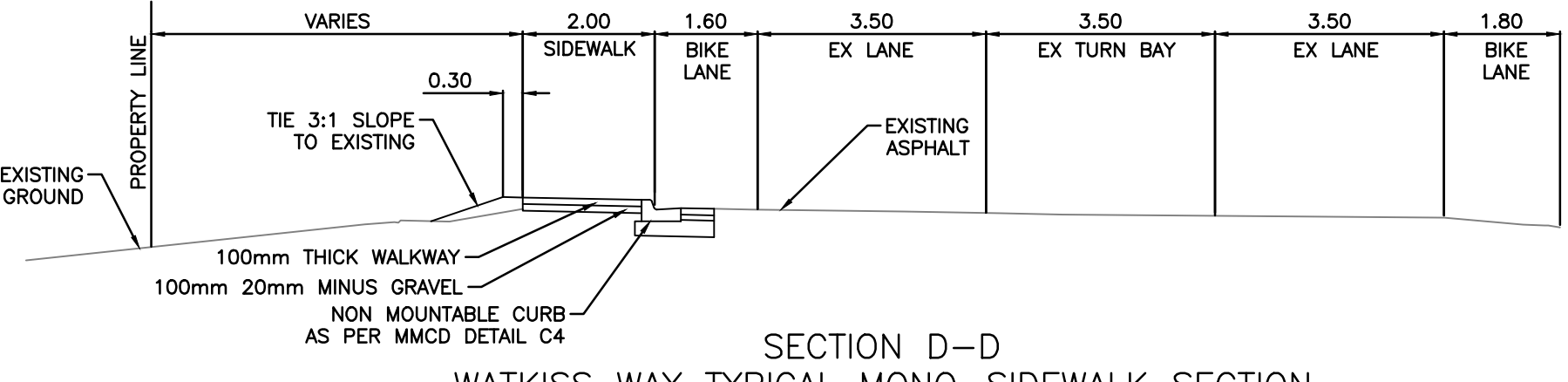
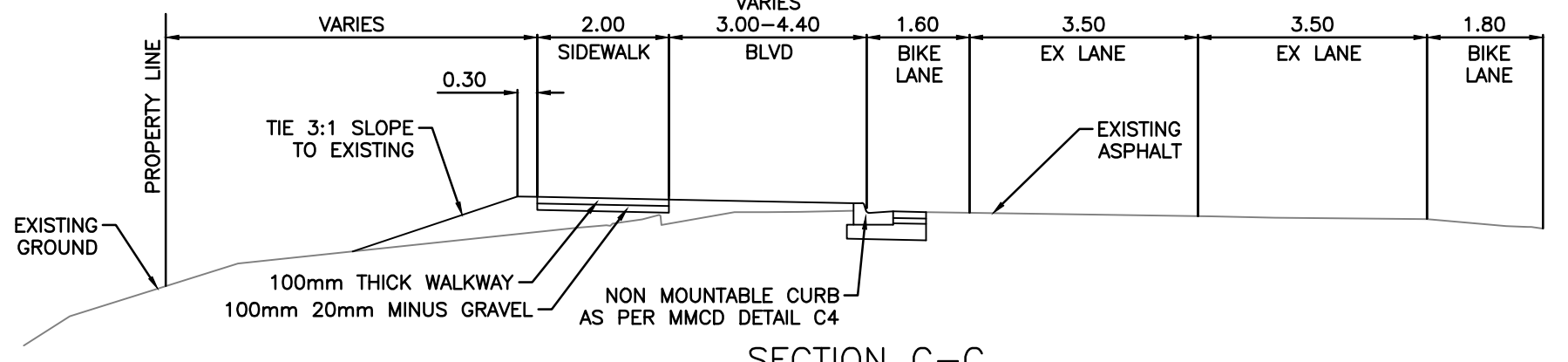
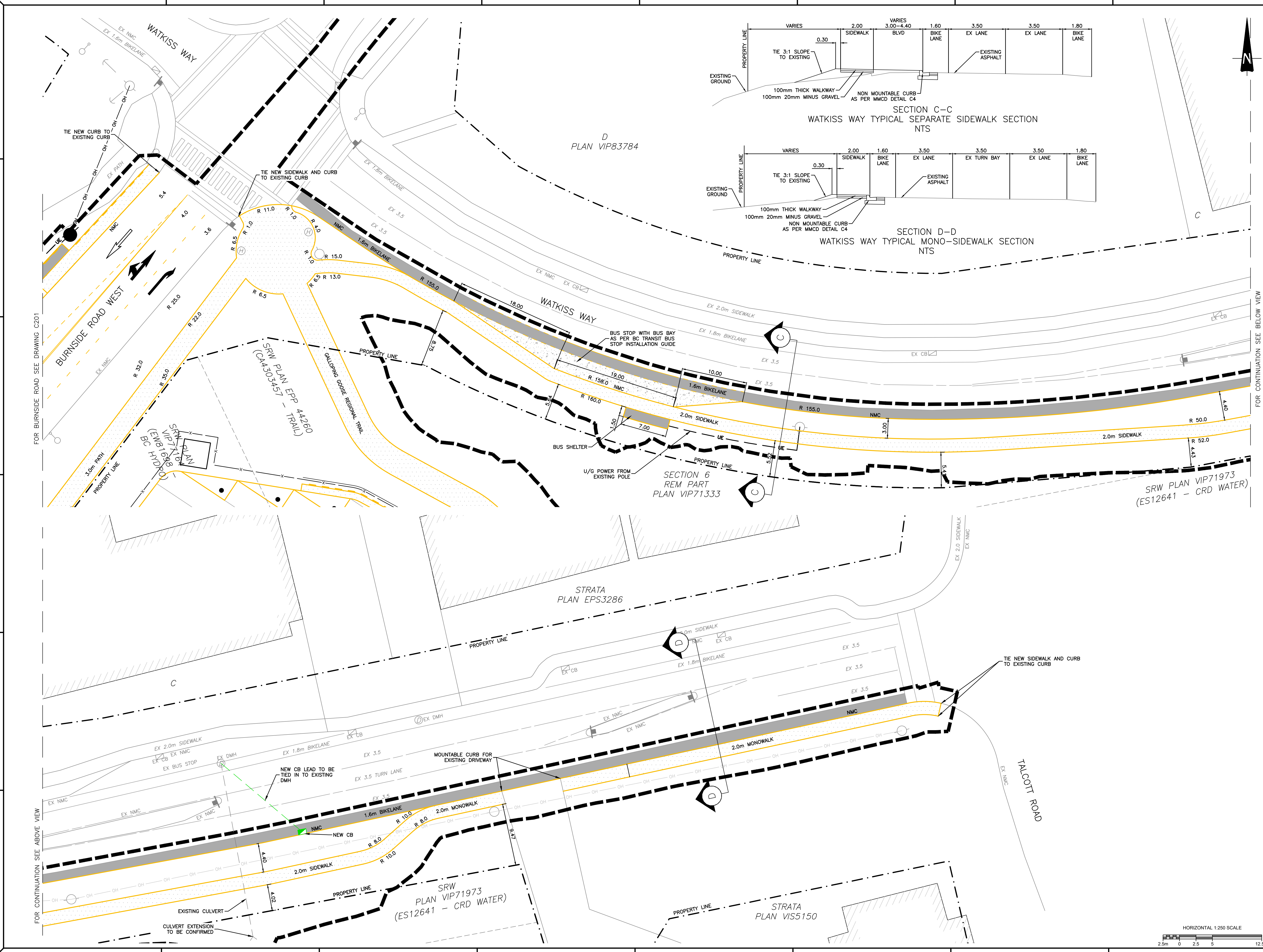
FOR VICTORIA handyDART TRANSIT CENTRE SITE SEE DRAWING C102

FOR WATKISS WAY SEE DRAWING C202



X:\p\2020\201919500-handydart\Transit Centre - OM Facilities - CAD\07 Sheets\C201 BURNSIDE ROAD.dwg Plotter: 4/26/2021 4:13 PM by Nolan Fitzpatrick





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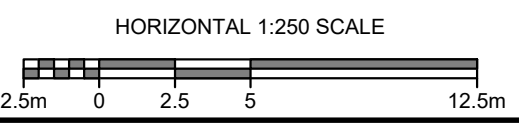
STAMPS



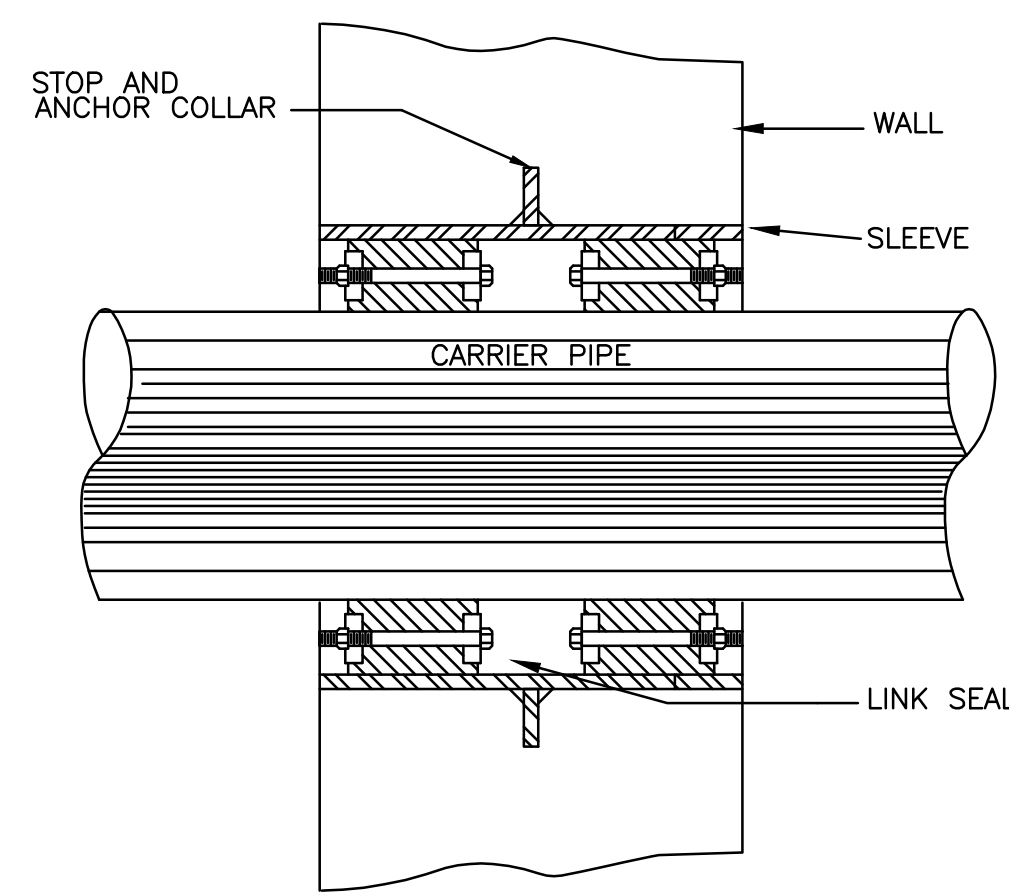

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PROJECT: VICTORIA handyDART TRANSIT CENTRE

SITE PLAN WATKISS WAY

SCALE: 1:250	PROJECT NO: 201919500
DWG# C202	REV B DATE: 2021/04/26

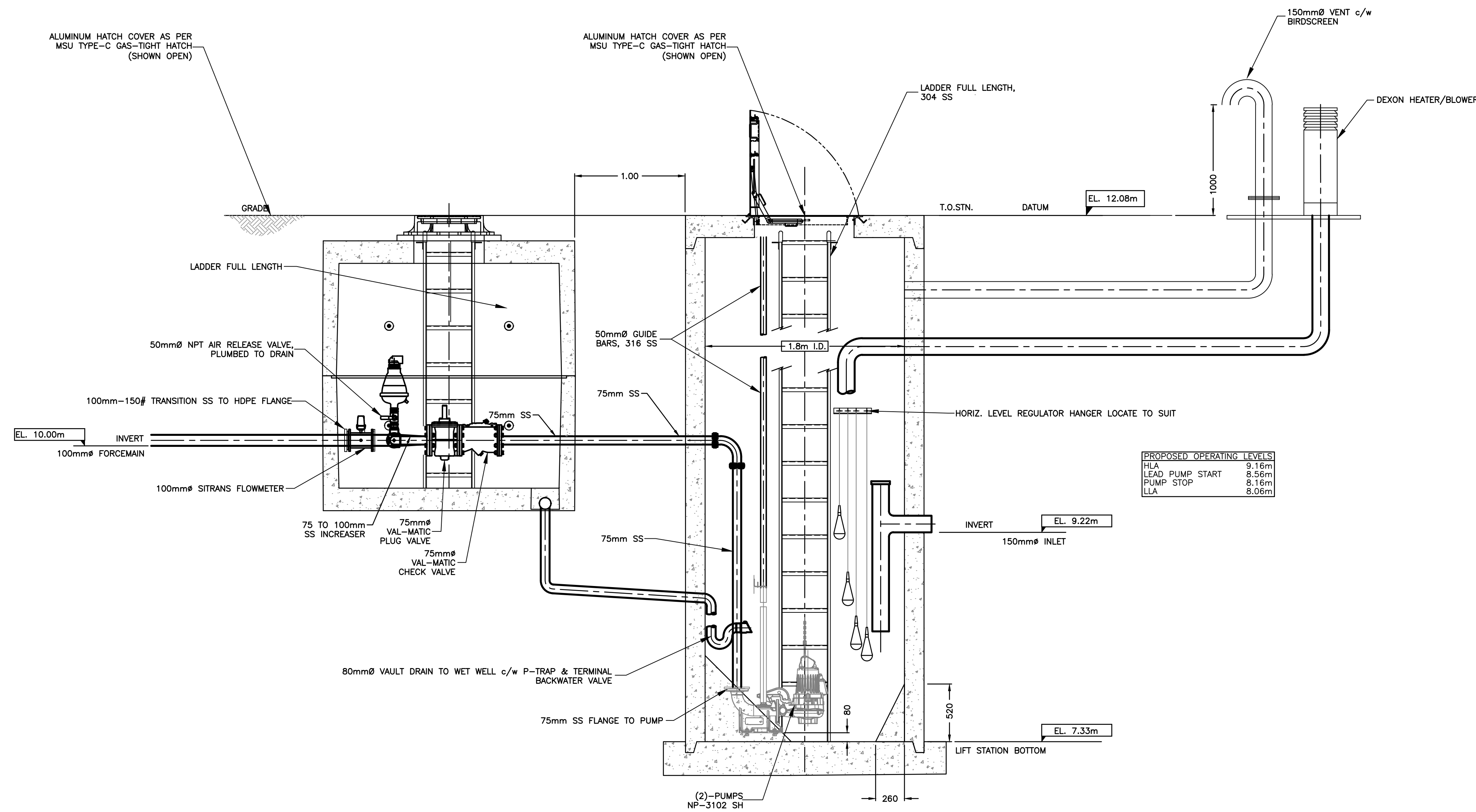


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DOUBLE LINK SEAL DETAIL  
 NTS

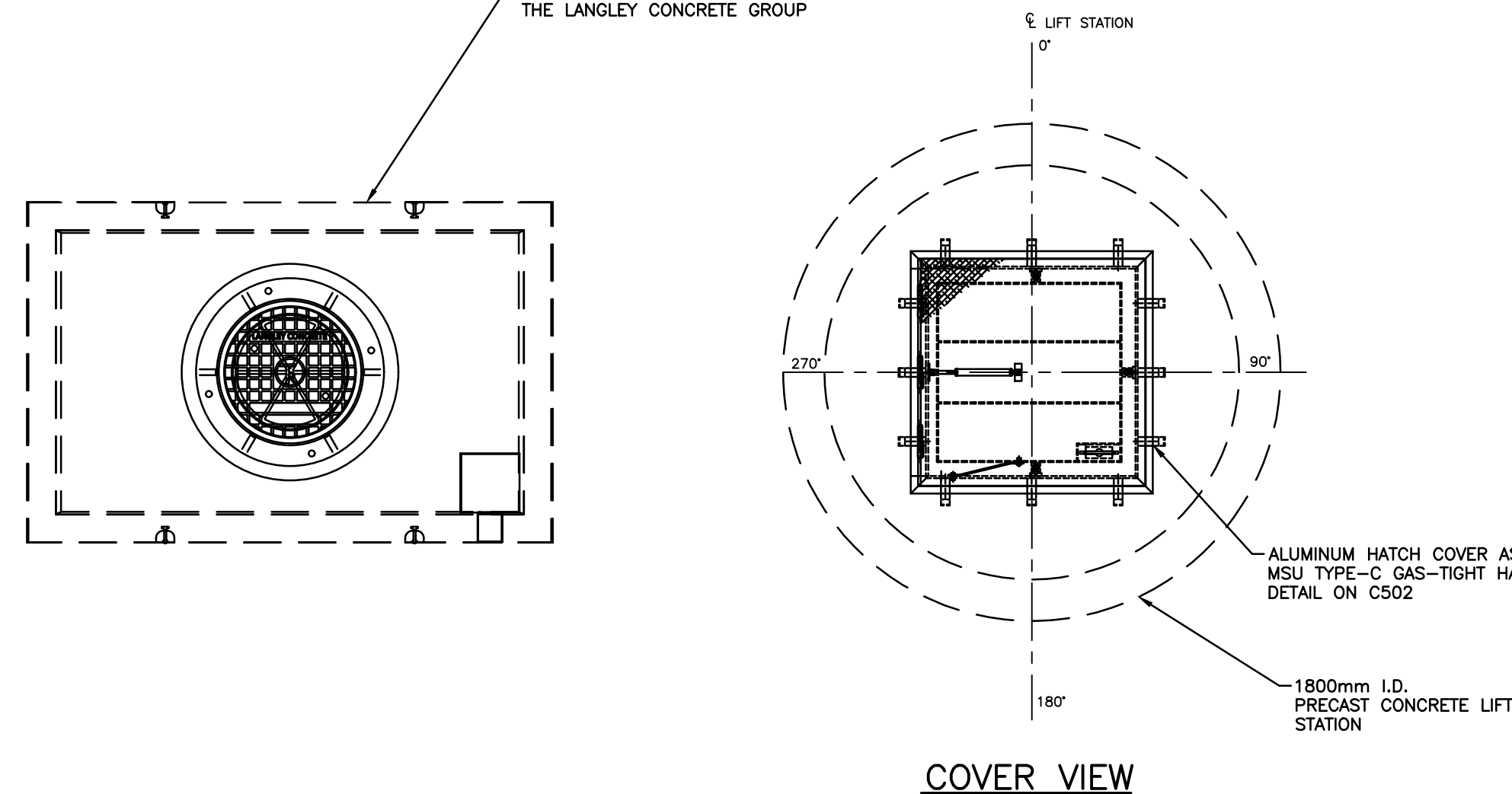
NOTE: SEAL MUST BE APPLIED TO ALL PIPES ENTERING/EXITING THE LIFT STATION



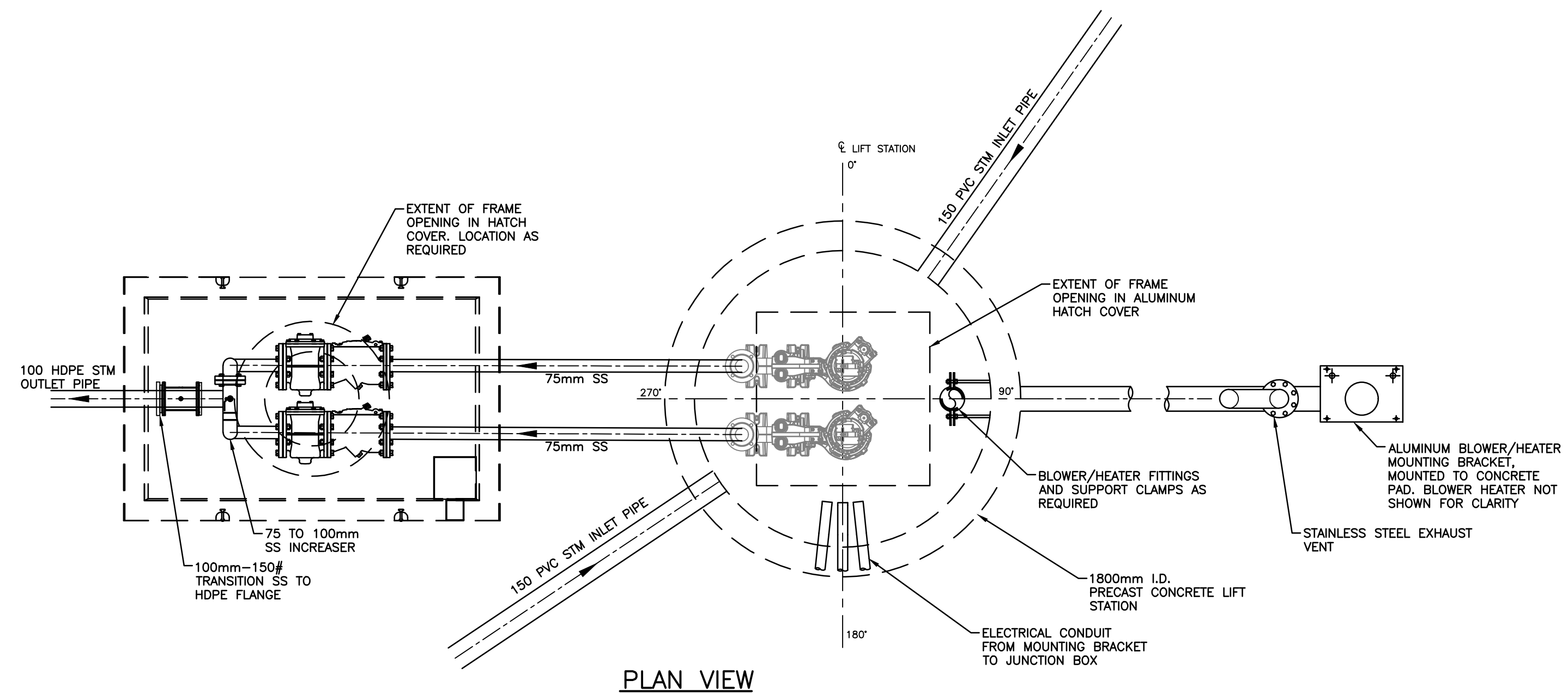
PROPOSED OPERATING LEVELS	
HLA	9.16m
LEAD PUMP START	8.94m
PUMP STOP	8.16m
LLA	8.06m

ELEVATION VIEW

CONCRETE VAULT 2122 AS PER THE LANGLEY CONCRETE GROUP



COVER VIEW



PLAN VIEW



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PROJECT: **VICTORIA handyDART TRANSIT CENTRE**

**SANITARY LIFT STATION**

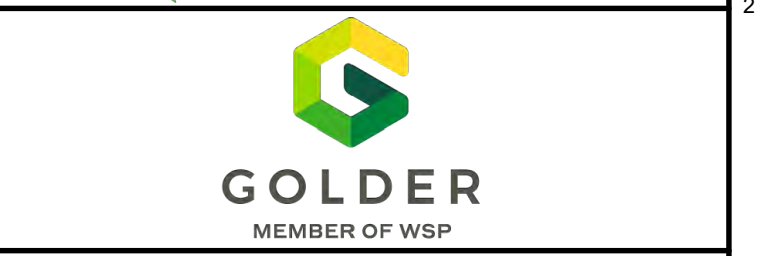
SCALE: 1:25	PROJECT NO. 201919500
DWG.# <b>C501</b>	REV B DATE: 2021/04/26

X:\Proj\2020\201919500-handydart\Transit Centre - OM Facilities\_CAD\07 Sheets\C501 SANITARY LIFT STATION.dwg  
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- CUT CONTOUR
- ZERO CONTOUR
- FILL CONTOUR
- WICK DRAIN AREA

**EARTHWORKS VOLUMES FROM STRIPPING TO ROUGH GRADE**

STRIPPING (TOP SOIL): 9,382m<sup>3</sup>

SETTLEMENT (ESTIMATED 450mm): 3,122m<sup>3</sup>

300mm GRAVEL LAYER ON WICK DRAIN AREA: 2,081m<sup>3</sup>

TOTAL CUT: 20,351m<sup>3</sup>

TOTAL FILL: 32,923m<sup>3</sup>

TOTAL FILL IMPORT REQUIRED (15% FILL FACTOR APPLIED): 37,861m<sup>3</sup>

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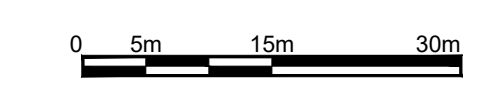


CLIENT:  
**BC TRANSIT**

PROJECT:  
**VICTORIA handyDART TRANSIT CENTRE**

**CUT - FILL PLAN**

SCALE: 1:600	PROJECT NO. 201919500
DWG.# <b>C700</b>	REV DATE: B 2021/04/26



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District of Saanich

# BC TRANSIT HANDYDART

Saanich, BC

### Landscape Sheets

Sheet No.	Sheet Title
L0.00	Cover
L0.02	Tree Retention and Removals
L0.03	Tree Planting Plan
L0.04	Stormwater Management Plan
L1.01	Landscape Materials
L1.02	Landscape Materials
L1.03	Landscape Materials
L1.04	Landscape Materials
L1.05	Landscape Materials
L2.01	Landscape Details

## KEY PLAN



MORRISON HERSHFIELD

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COVER

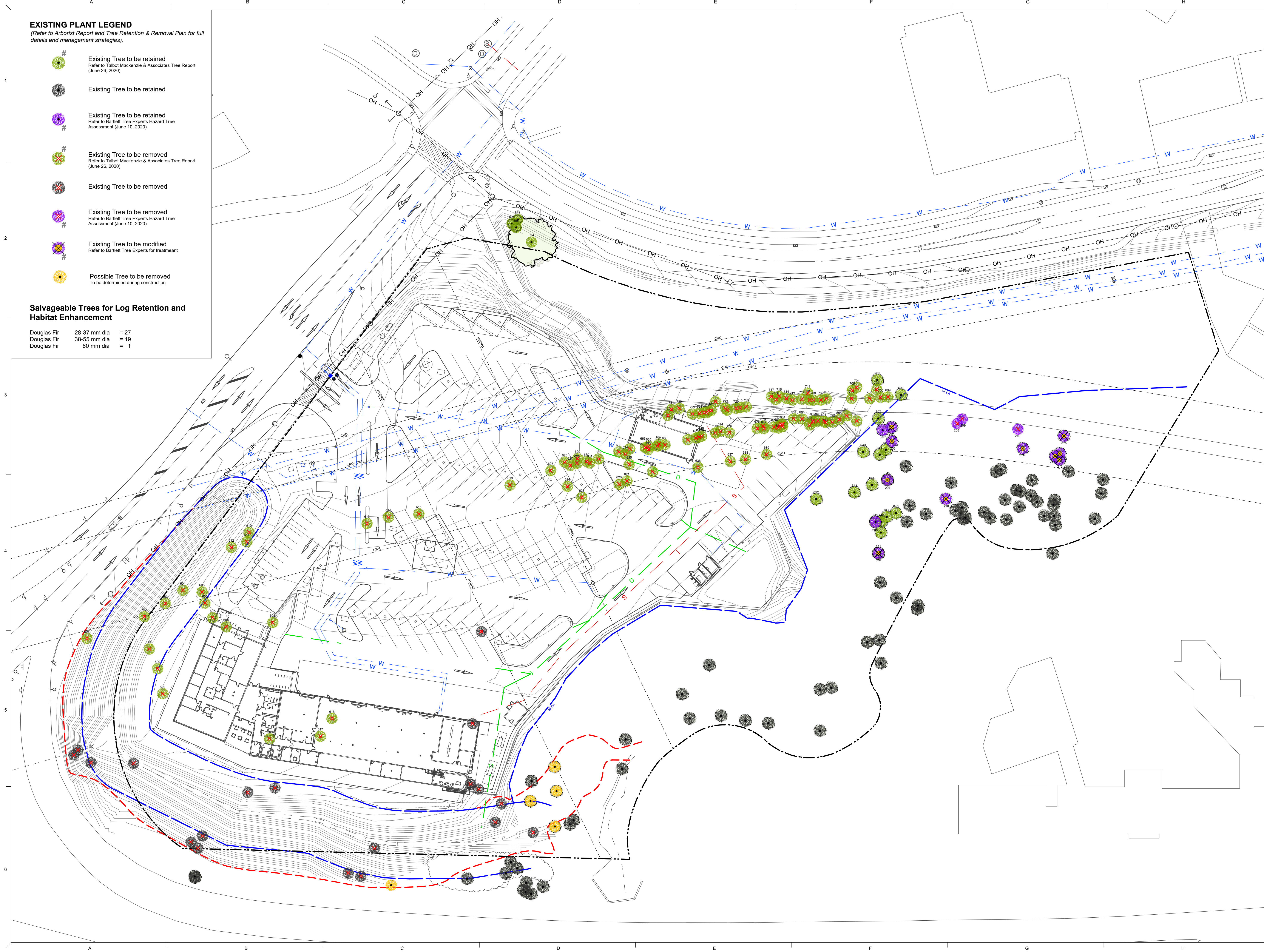
SCALE:	PROJECT NO.	
1:750	201919500	
DWG.#	REV	DATE:
L0.00	B	2021-04-22

**EXISTING PLANT LEGEND**  
(Refer to Arborist Report and Tree Retention & Removal Plan for full details and management strategies).

- Existing Tree to be retained  
Refer to Talbot Mackenzie & Associates Tree Report (June 26, 2020)
- Existing Tree to be retained
- Existing Tree to be retained  
Refer to Bartlett Tree Experts Hazard Tree Assessment (June 10, 2020)
- Existing Tree to be removed  
Refer to Talbot Mackenzie & Associates Tree Report (June 26, 2020)
- Existing Tree to be removed
- Existing Tree to be removed  
Refer to Bartlett Tree Experts Hazard Tree Assessment (June 10, 2020)
- Existing Tree to be modified  
Refer to Bartlett Tree Experts for treatment
- Possible Tree to be removed  
To be determined during construction

**Salvageable Trees for Log Retention and Habitat Enhancement**

- Douglas Fir 28-37 mm dia = 27
- Douglas Fir 38-55 mm dia = 19
- Douglas Fir 60 mm dia = 1



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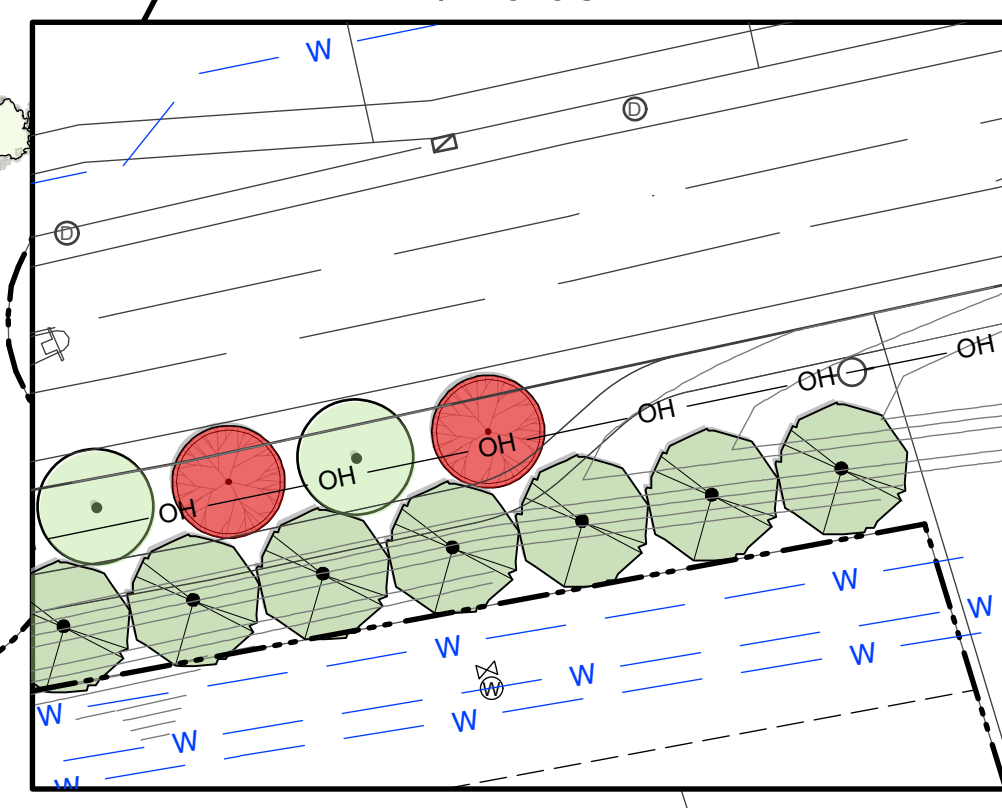
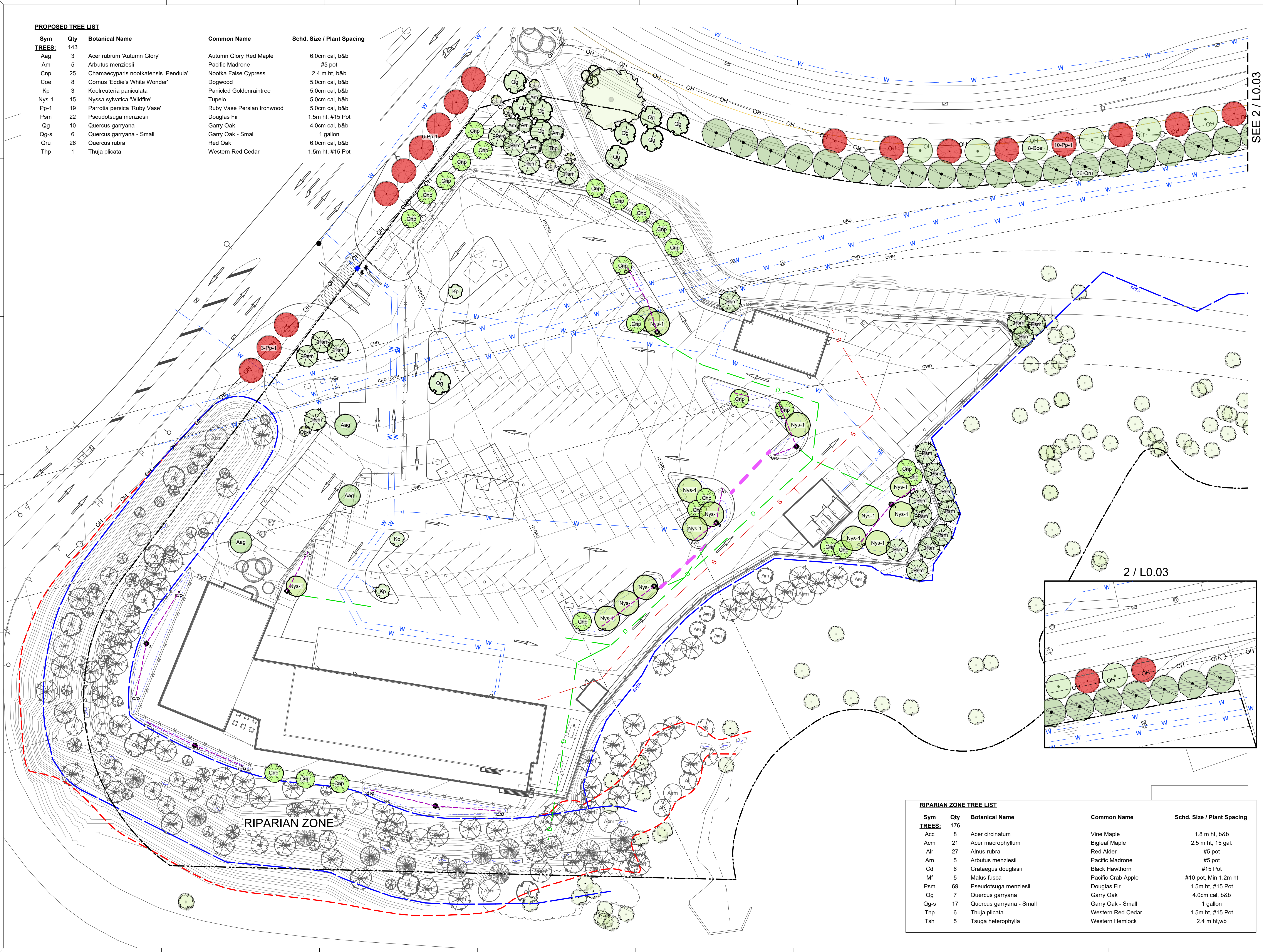
PROJECT:  
**VICTORIA handyDART TRANSIT CENTRE**

**TREE RETENTION AND REMOVALS**

SCALE:	PROJECT NO.	
1:500	201919500	
DWG.#	REV	DATE:
L0.02	B	2021-04-22

**PROPOSED TREE LIST**

Sym	Qty	Botanical Name	Common Name	Schd. Size / Plant Spacing
<b>TREES:</b>	143			
Aag	3	Acer rubrum 'Autumn Glory'	Autumn Glory Red Maple	6.0cm cal, b&b
Am	5	Arbutus menziesii	Pacific Madrone	#5 pot
Cnp	25	Chamaecyparis nootkatensis 'Pendula'	Nootka False Cypress	2.4 m ht, b&b
Coe	8	Cornus 'Eddie's White Wonder'	Dogwood	5.0cm cal, b&b
Kp	3	Koeleruteria paniculata	Panicled Goldenraintree	5.0cm cal, b&b
Nys-1	15	Nyssa sylvatica 'Wildfire'	Tupelo	5.0cm cal, b&b
Pp-1	19	Parrotia persica 'Ruby Vase'	Ruby Vase Persian Ironwood	5.0cm cal, b&b
Psm	22	Pseudotsuga menziesii	Douglas Fir	1.5m ht, #15 Pot
Og	10	Quercus garryana	Garry Oak	4.0cm cal, b&b
Og-s	6	Quercus garryana - Small	Garry Oak - Small	1 gallon
Oru	26	Quercus rubra	Red Oak	6.0cm cal, b&b
Thp	1	Thuja plicata	Western Red Cedar	1.5m ht, #15 Pot



**RIPARIAN ZONE TREE LIST**

Sym	Qty	Botanical Name	Common Name	Schd. Size / Plant Spacing
<b>TREES:</b>	176			
Acc	8	Acer circinatum	Vine Maple	1.8 m ht, b&b
Acm	21	Acer macrophyllum	Bigleaf Maple	2.5 m ht, 15 gal.
Alr	27	Alnus rubra	Red Alder	#5 pot
Am	5	Arbutus menziesii	Pacific Madrone	#5 pot
Cd	6	Crataegus douglasii	Black Hawthorn	#15 Pot
Mf	5	Malus fusca	Pacific Crab Apple	#10 pot, Min 1.2m ht
Psm	69	Pseudotsuga menziesii	Douglas Fir	1.5m ht, #15 Pot
Og	7	Quercus garryana	Garry Oak	4.0cm cal, b&b
Og-s	17	Quercus garryana - Small	Garry Oak - Small	1 gallon
Thp	6	Thuja plicata	Western Red Cedar	1.5m ht, #15 Pot
Tsh	5	Tsuga heterophylla	Western Hemlock	2.4 m ht,wb



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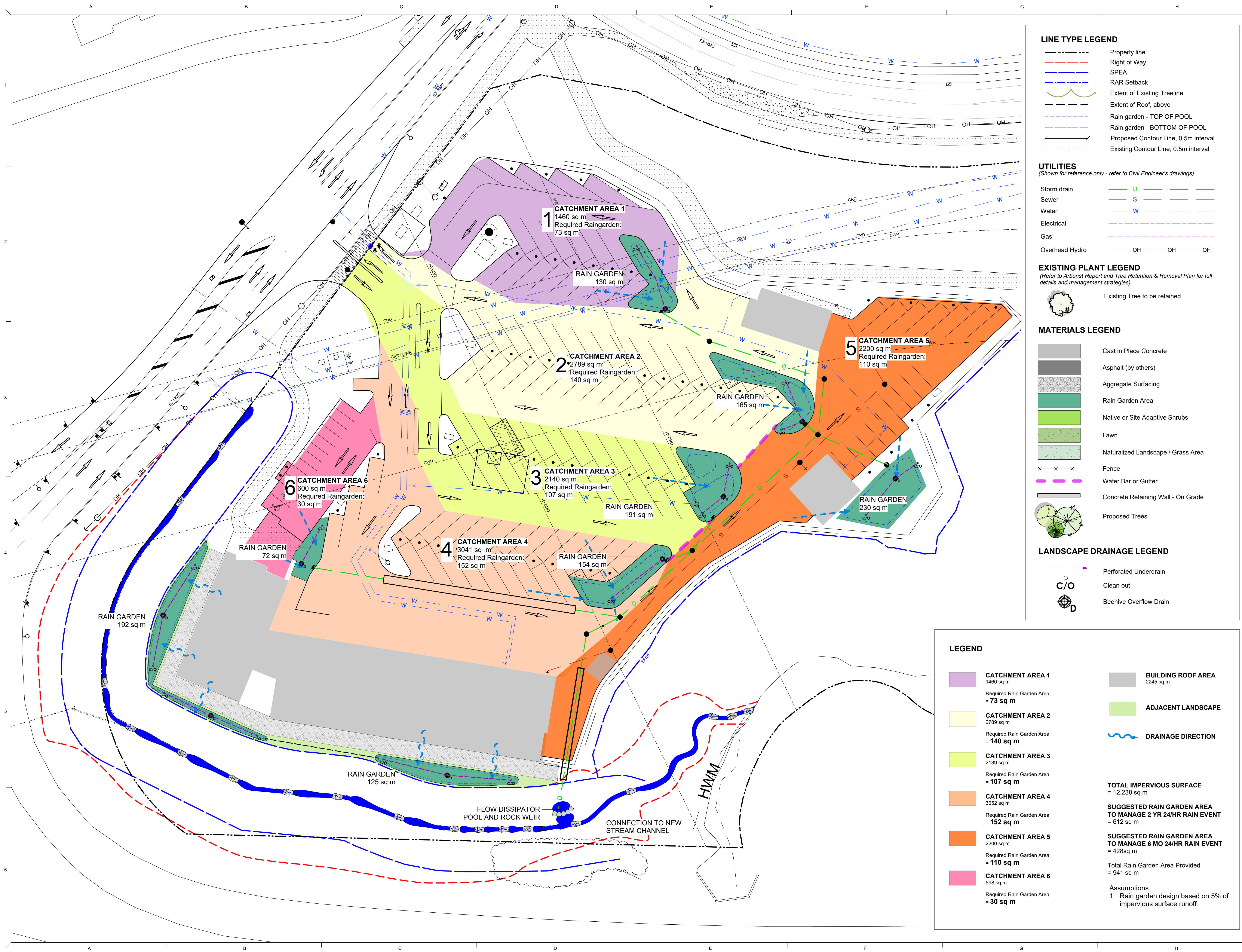
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PROJECT: VICTORIA handyDART TRANSIT CENTRE

TREE PLANTING PLAN

SCALE: 1:400 PROJECT NO. 201919500

DWG.# L0.03 REV B DATE: 2021-04-22



**LINE TYPE LEGEND**

- Property line
- Right of Way
- SPEA
- RAR Setback
- Extent of Existing Treeline
- Extent of Roof, above
- Rain garden - TOP OF POOL
- Rain garden - BOTTOM OF POOL
- Proposed Contour Line, 0.5m interval
- Existing Contour Line, 0.5m interval

**UTILITIES**  
(Shown for reference only - refer to Civil Engineer's drawings).

- Storm drain
- Sewer
- Water
- Electrical
- Gas
- Overhead Hydro

**EXISTING PLANT LEGEND**  
(Refer to Arborist Report and Tree Retention & Removal Plan for full details and management strategies).

- Existing Tree to be retained

**MATERIALS LEGEND**

- Cast in Place Concrete
- Asphalt (by others)
- Aggregate Surfacing
- Rain Garden Area
- Native or Site Adaptive Shrubs
- Lawn
- Naturalized Landscape / Grass Area
- Fence
- Water Bar or Gutter
- Concrete Retaining Wall - On Grade
- Proposed Trees

**LANDSCAPE DRAINAGE LEGEND**

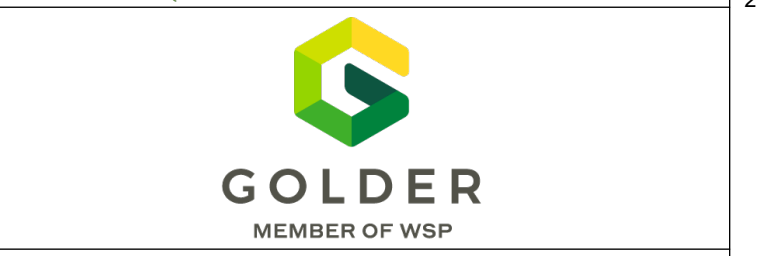
- Perforated Underdrain
- Clean out
- Beehive Overflow Drain

**LEGEND**

- CATCHMENT AREA 1**  
1460 sq m  
Required Rain Garden Area = 73 sq m
- CATCHMENT AREA 2**  
2789 sq m  
Required Rain Garden Area = 140 sq m
- CATCHMENT AREA 3**  
2140 sq m  
Required Rain Garden Area = 107 sq m
- CATCHMENT AREA 4**  
3041 sq m  
Required Rain Garden Area = 152 sq m
- CATCHMENT AREA 5**  
2200 sq m  
Required Rain Garden Area = 110 sq m
- CATCHMENT AREA 6**  
600 sq m  
Required Rain Garden Area = 30 sq m
- BUILDING ROOF AREA**  
2245 sq m
- ADJACENT LANDSCAPE**
- DRAINAGE DIRECTION**
- TOTAL IMPERVIOUS SURFACE**  
= 12,238 sq m
- SUGGESTED RAIN GARDEN AREA TO MANAGE 2 YR 24/HR RAIN EVENT**  
= 612 sq m
- SUGGESTED RAIN GARDEN AREA TO MANAGE 6 MO 24/HR RAIN EVENT**  
= 428 sq m
- Total Rain Garden Area Provided**  
= 941 sq m
- Assumptions**  
1. Rain garden design based on 5% of impervious surface runoff.



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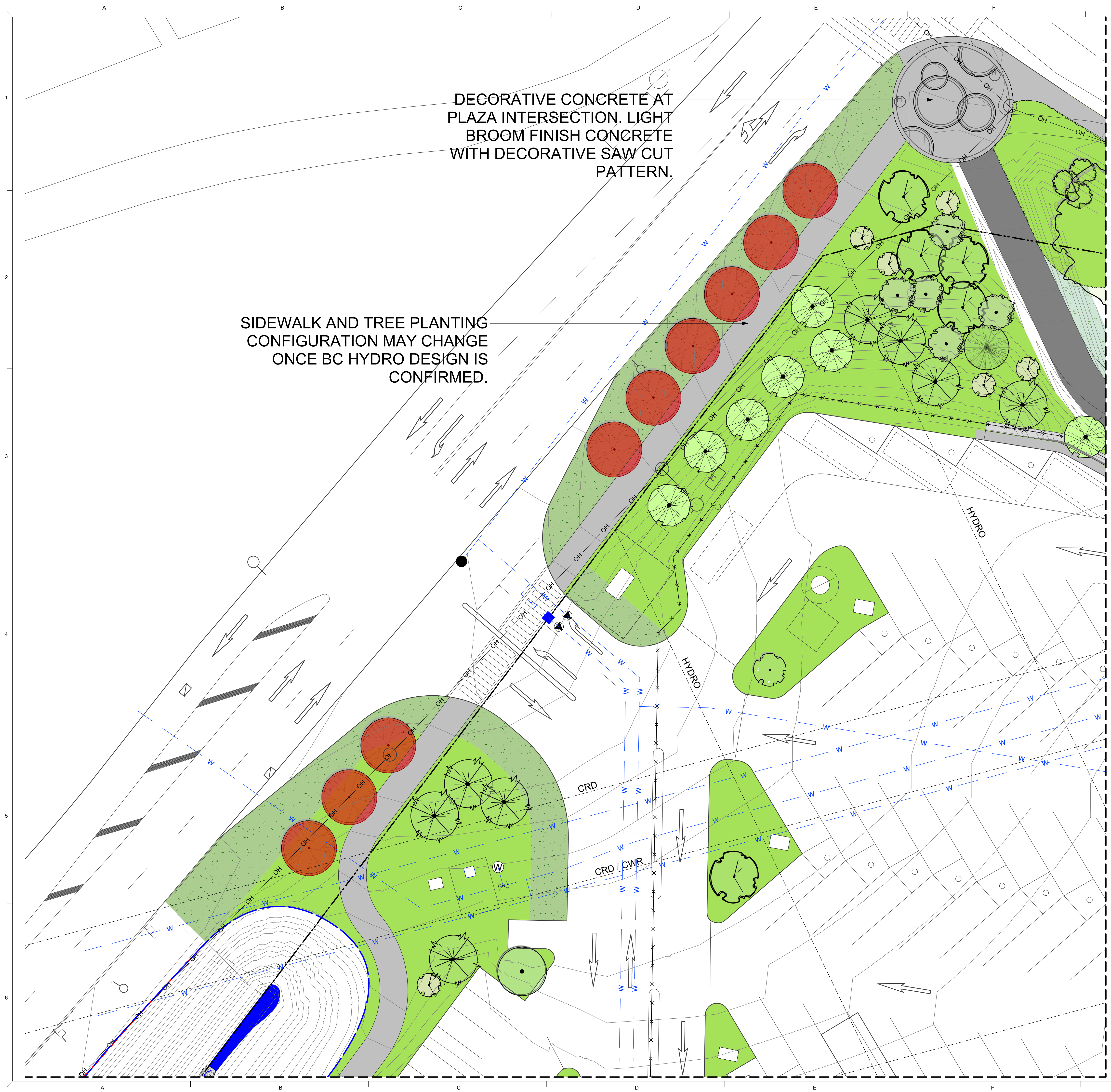
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CLIENT:	BC TRANSIT
PROJECT:	VICTORIA handyDART TRANSIT CENTRE
SCALE:	1:400
DWG.#	L0.04
PROJECT NO.	201919500
REV	B
DATE:	2021-04-22



**STORMWATER MANAGEMENT PLAN**





DECORATIVE CONCRETE AT PLAZA INTERSECTION. LIGHT BROOM FINISH CONCRETE WITH DECORATIVE SAW CUT PATTERN.

SIDEWALK AND TREE PLANTING CONFIGURATION MAY CHANGE ONCE BC HYDRO DESIGN IS CONFIRMED.

**LINE TYPE LEGEND**

- Property line
- Right of Way
- SPEA
- RAR Setback
- Extent of Existing Treeline
- Extent of Roof, above
- Rain garden - TOP OF POOL
- Rain garden - BOTTOM OF POOL
- Proposed Contour Line, 0.5m interval
- Existing Contour Line, 0.5m interval

**UTILITIES**  
*(Shown for reference only - refer to Civil Engineer's drawings).*

- Storm drain
- Sewer
- Water
- Electrical
- Gas
- Overhead Hydro

**EXISTING PLANT LEGEND**  
*(Refer to Arborist Report and Tree Retention & Removal Plan for full details and management strategies).*

- Existing Tree to be retained

**MATERIALS LEGEND**

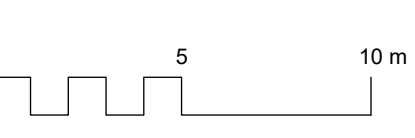
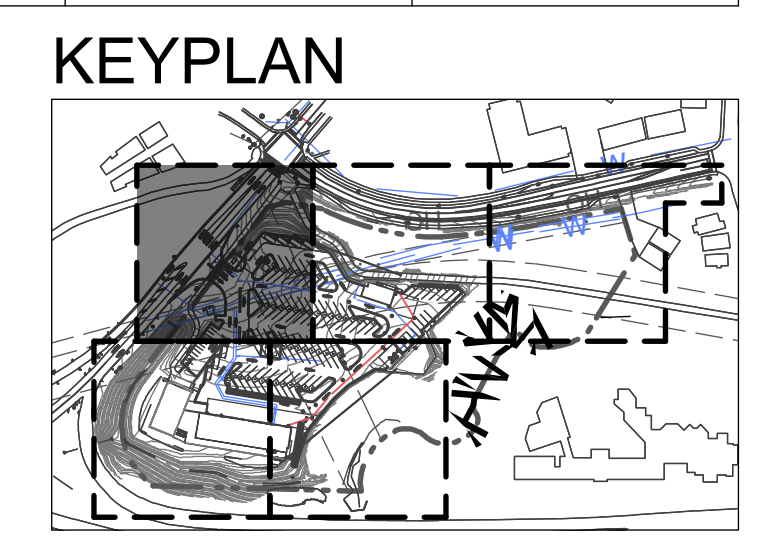
- Cast in Place Concrete
- Asphalt (by others)
- Aggregate Surfacing
- Rain Garden Area
- Native or Site Adaptive Shrubs
- Lawn
- Naturalized Landscape / Grass Area
- Fence
- Water Bar or Gutter
- Concrete Retaining Wall - On Grade
- Proposed Trees

**LANDSCAPE DRAINAGE LEGEND**

- Perforated Underdrain
- Clean out
- Beehive Overflow Drain

**PLANTING LEGEND**

LANDSCAPE AREA	DESCRIPTION	PLANT SPECIES
Maintained Grass 2534sq. m.	Maintained grass along road edge.	
Naturalized Grass 569 sq. m.	Seeded and left to naturalize.	
Native Shrubs 3318 sq. m.	Upland areas outside of direct moisture from stream. North facing slopes.	Gaultheria shallon Holodiscus discolor Mahonia aquifolium Polystichum munitum Ribes sanguineum Rosa nutkana Rubus parviflorus Salix scouleriana Symphoricarpos albus Vaccinium ovatum
Raingarden 1363 sq. m.	Planting area 1.5 m from channel edge. Wet area throughout year.	Carex obnupta Carex rostrata Juncus effusus



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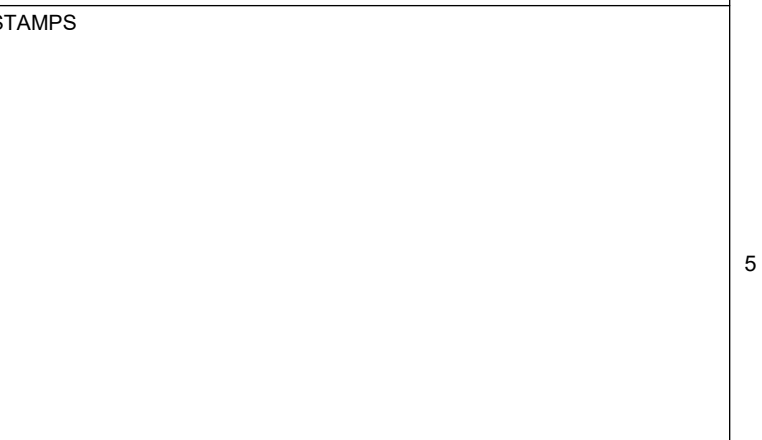


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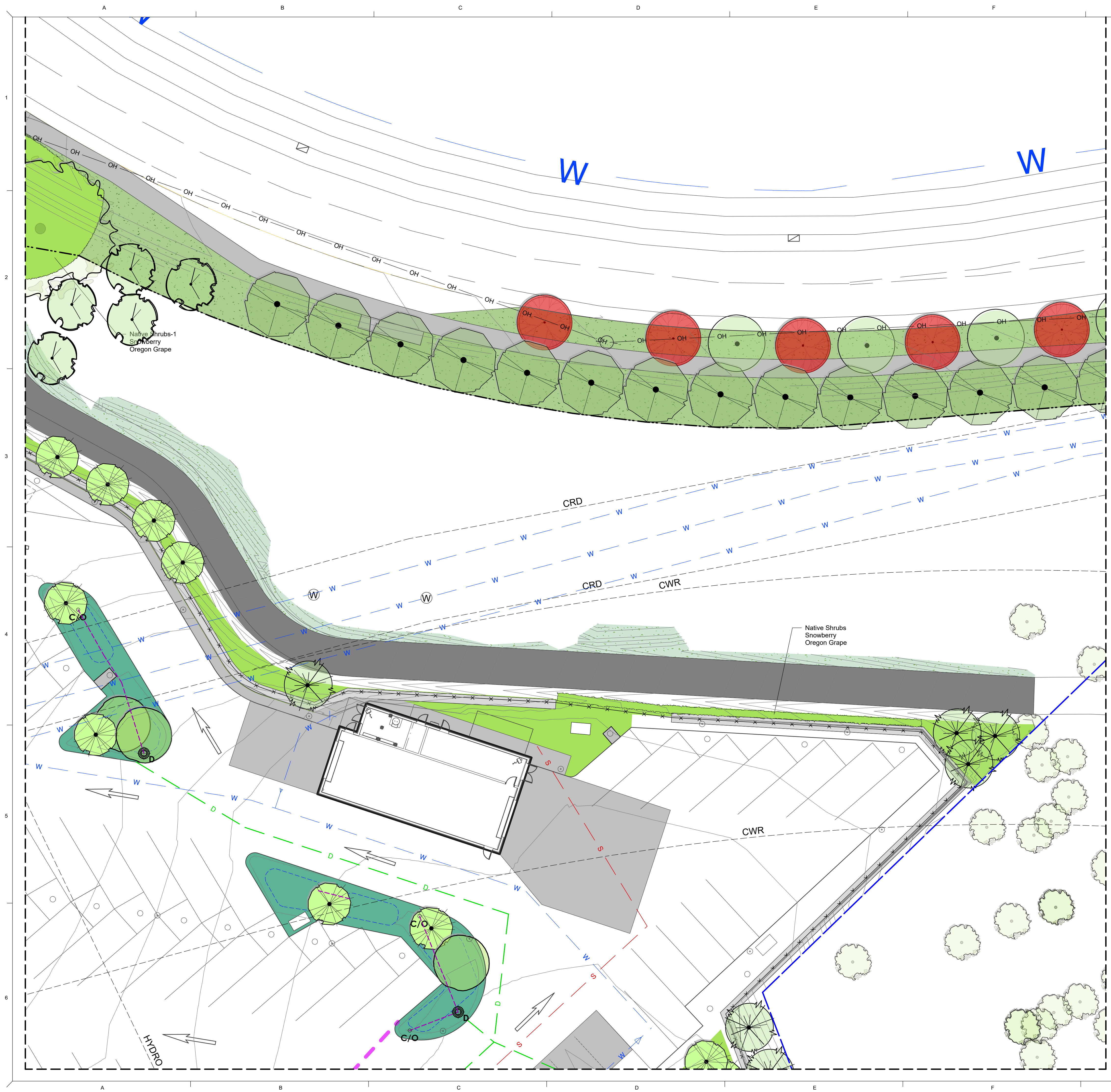


CLIENT: BC TRANSIT

PROJECT: VICTORIA handyDART TRANSIT CENTRE

LANDSCAPE MATERIALS

SCALE:	PROJECT NO.	
1:200	201919500	
DWG.#	REV	DATE:
L1.01	B	2021-04-22



**LINE TYPE LEGEND**

- Property line
- Right of Way
- SPEA
- RAR Setback
- Extent of Existing Treeline
- Extent of Roof, above
- Rain garden - TOP OF POOL
- Rain garden - BOTTOM OF POOL
- Proposed Contour Line, 0.5m interval
- Existing Contour Line, 0.5m interval

**UTILITIES**  
(Shown for reference only - refer to Civil Engineer's drawings).

- Storm drain
- Sewer
- Water
- Electrical
- Gas
- Overhead Hydro

**EXISTING PLANT LEGEND**  
(Refer to Arborist Report and Tree Retention & Removal Plan for full details and management strategies).

- Existing Tree to be retained

**MATERIALS LEGEND**

- Cast in Place Concrete
- Asphalt (by others)
- Aggregate Surfacing
- Rain Garden Area
- Native or Site Adaptive Shrubs
- Lawn
- Naturalized Landscape / Grass Area
- Fence
- Water Bar or Gutter
- Concrete Retaining Wall - On Grade
- Proposed Trees

**LANDSCAPE DRAINAGE LEGEND**

- Perforated Underdrain
- Clean out
- Beehive Overflow Drain

**NOT FOR CONSTRUCTION**

All dimensions in Metric

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B	Issued For 50% Design Review	2021-04-27
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		YYYY-MM-DD

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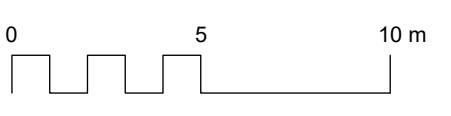
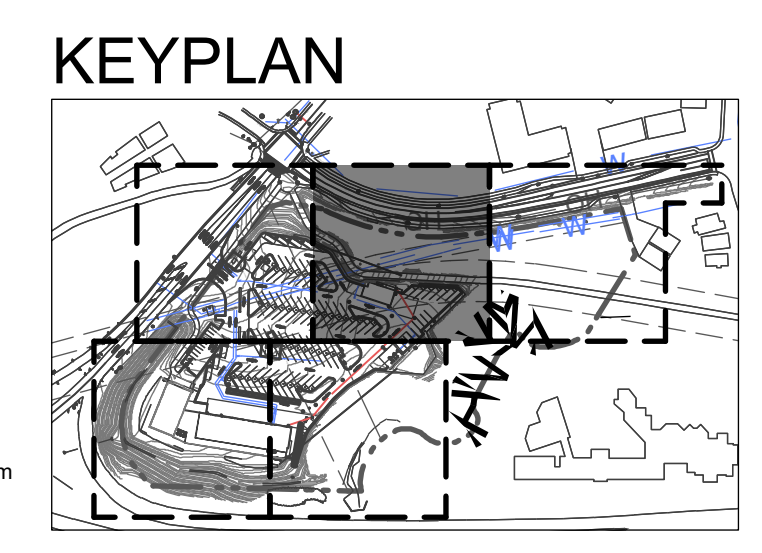


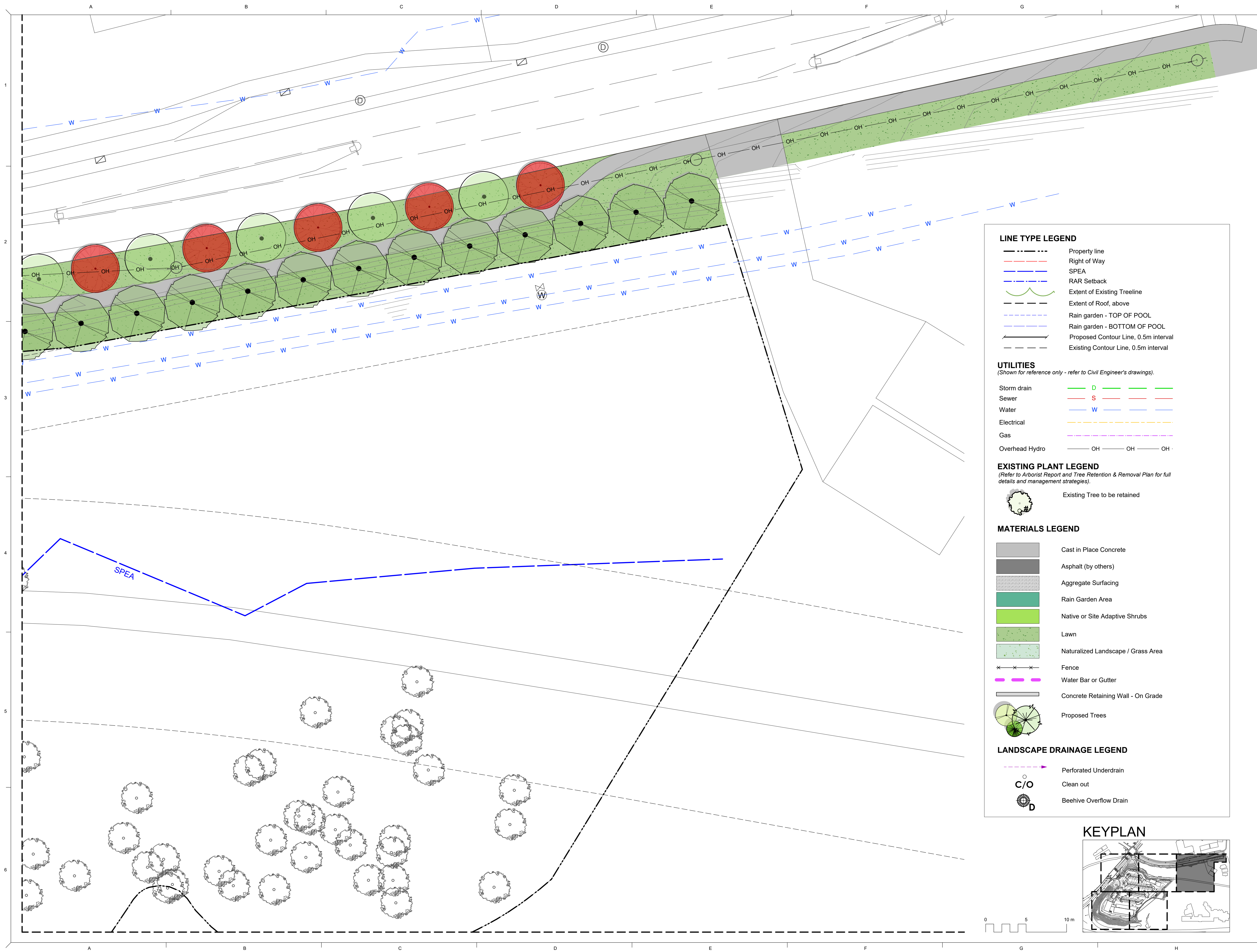
CLIENT: **BC TRANSIT**

PROJECT: **VICTORIA handyDART TRANSIT CENTRE**

**LANDSCAPE MATERIALS**

SCALE:	PROJECT NO.
1:200	201919500
DWG.#	REV DATE:
L1.02	B 2021-04-22





**LINE TYPE LEGEND**

- Property line
- Right of Way
- SPEA
- RAR Setback
- Extent of Existing Treeline
- Extent of Roof, above
- Rain garden - TOP OF POOL
- Rain garden - BOTTOM OF POOL
- Proposed Contour Line, 0.5m interval
- Existing Contour Line, 0.5m interval

**UTILITIES**  
(Shown for reference only - refer to Civil Engineer's drawings).

- Storm drain
- Sewer
- Water
- Electrical
- Gas
- Overhead Hydro

**EXISTING PLANT LEGEND**  
(Refer to Arborist Report and Tree Retention & Removal Plan for full details and management strategies).

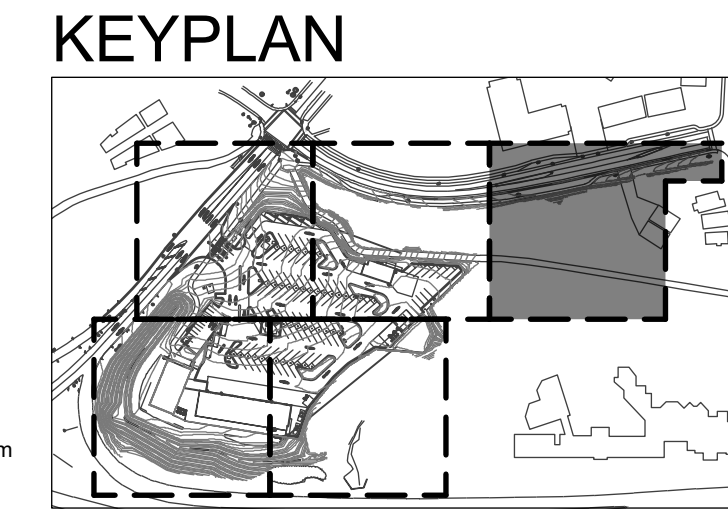
- Existing Tree to be retained

**MATERIALS LEGEND**

- Cast in Place Concrete
- Asphalt (by others)
- Aggregate Surfacing
- Rain Garden Area
- Native or Site Adaptive Shrubs
- Lawn
- Naturalized Landscape / Grass Area
- Fence
- Water Bar or Gutter
- Concrete Retaining Wall - On Grade
- Proposed Trees

**LANDSCAPE DRAINAGE LEGEND**

- Perforated Underdrain
- C/O Clean out
- Beehive Overflow Drain



**NOT FOR CONSTRUCTION**

All dimensions in Metric

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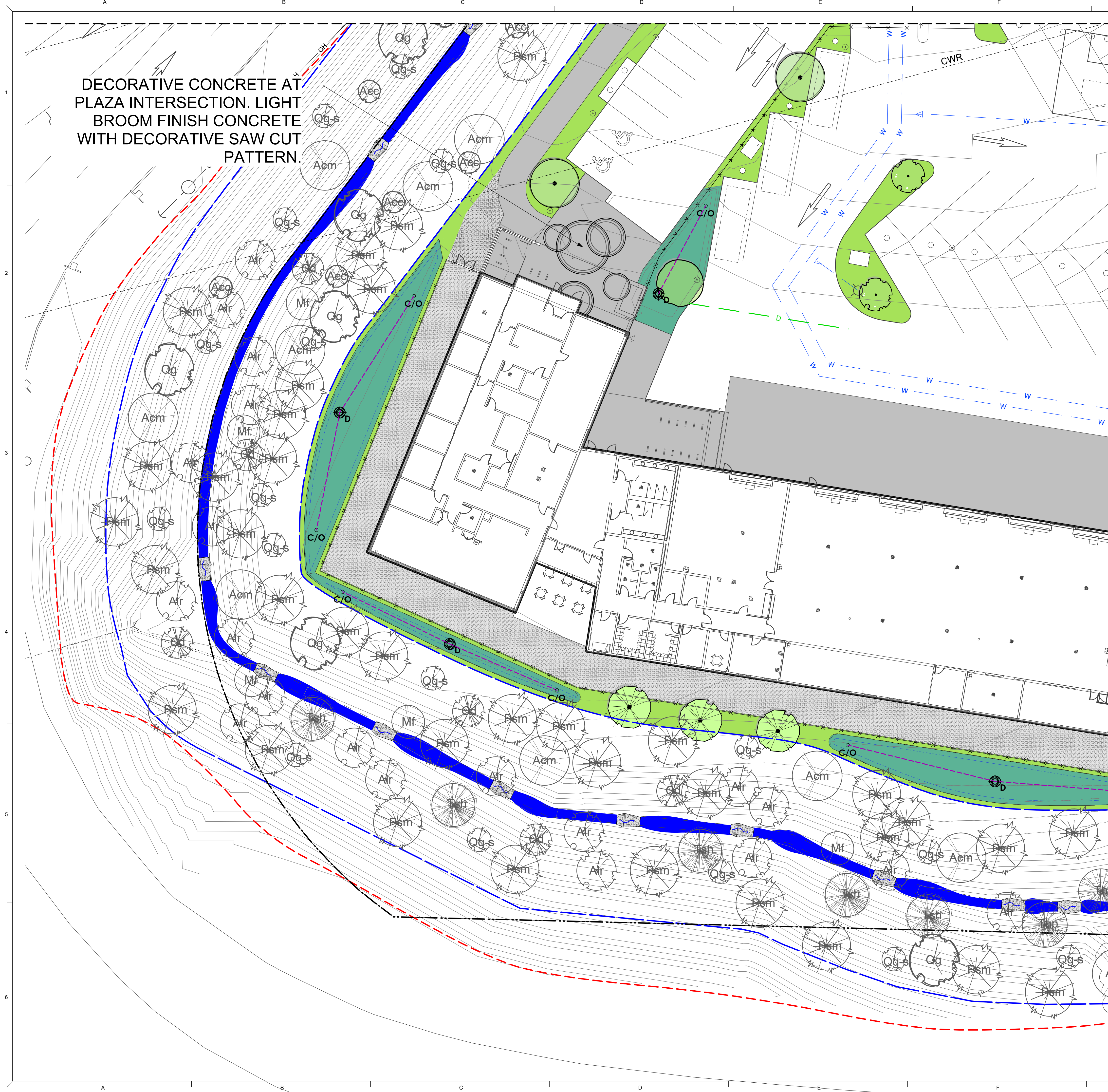
CLIENT: BC TRANSIT

PROJECT: VICTORIA handyDART TRANSIT CENTRE

LANDSCAPE MATERIALS

SCALE:	PROJECT NO.	
1:200	201919500	
DWG.#	REV	DATE:
L1.03	B	2021-04-22

DECORATIVE CONCRETE AT PLAZA INTERSECTION. LIGHT BROOM FINISH CONCRETE WITH DECORATIVE SAW CUT PATTERN.



**LINE TYPE LEGEND**

- Property line
- Right of Way
- SPEA
- RAR Setback
- Extent of Existing Treeline
- Extent of Roof, above
- Rain garden - TOP OF POOL
- Rain garden - BOTTOM OF POOL
- Proposed Contour Line, 0.5m interval
- Existing Contour Line, 0.5m interval

**UTILITIES**  
(Shown for reference only - refer to Civil Engineer's drawings).

- Storm drain
- Sewer
- Water
- Electrical
- Gas
- Overhead Hydro

**EXISTING PLANT LEGEND**  
(Refer to Arborist Report and Tree Retention & Removal Plan for full details and management strategies).

- Existing Tree to be retained

**MATERIALS LEGEND**

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- Asphalt (by others)
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- Rain Garden Area
- Native or Site Adaptive Shrubs
- Lawn
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- Fence
- Water Bar or Gutter
- Concrete Retaining Wall - On Grade
- Proposed Trees

**LANDSCAPE DRAINAGE LEGEND**

- Perforated Underdrain
- Clean out
- Beehive Overflow Drain



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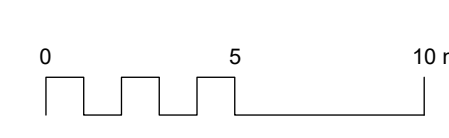
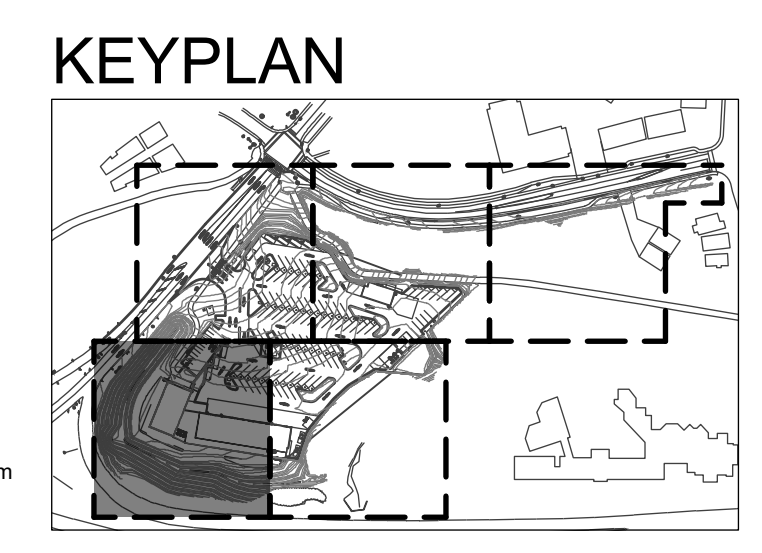
STAMPS

CLIENT: BC TRANSIT

PROJECT: VICTORIA handyDART TRANSIT CENTRE

LANDSCAPE MATERIALS

SCALE:	PROJECT NO.	
1:200	201919500	
DWG.#	REV	DATE:
L1.04	B	2021-04-22





**LINE TYPE LEGEND**

- Property line
- Right of Way
- SPEA
- RAR Setback
- Extent of Existing Treeline
- Extent of Roof, above
- Rain garden - TOP OF POOL
- Rain garden - BOTTOM OF POOL
- Proposed Contour Line, 0.5m interval
- Existing Contour Line, 0.5m interval

**UTILITIES**  
(Shown for reference only - refer to Civil Engineer's drawings).

- Storm drain: D
- Sewer: S
- Water: W
- Electrical
- Gas
- Overhead Hydro: OH

**EXISTING PLANT LEGEND**  
(Refer to Arborist Report and Tree Retention & Removal Plan for full details and management strategies).

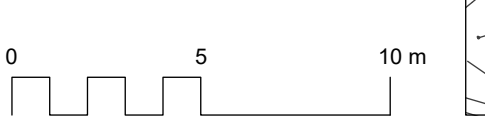
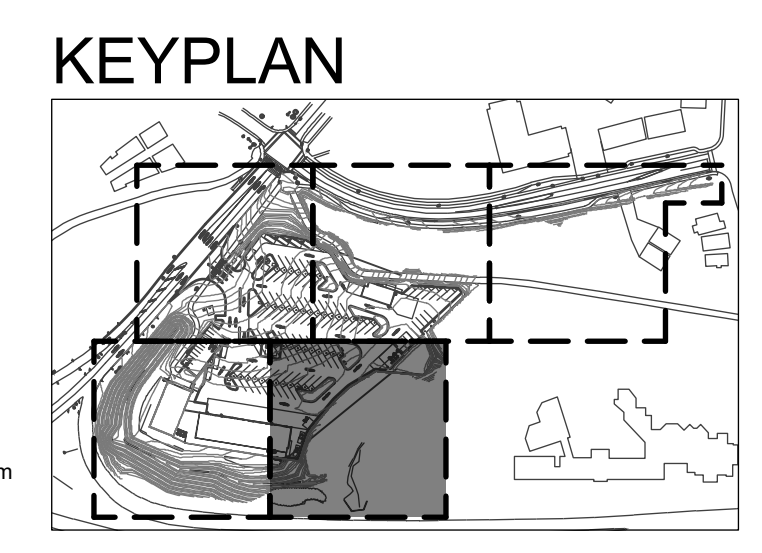
- Existing Tree to be retained

**MATERIALS LEGEND**

- Cast in Place Concrete
- Asphalt (by others)
- Aggregate Surfacing
- Rain Garden Area
- Native or Site Adaptive Shrubs
- Lawn
- Naturalized Landscape / Grass Area
- Fence
- Water Bar or Gutter
- Concrete Retaining Wall - On Grade
- Proposed Trees

**LANDSCAPE DRAINAGE LEGEND**

- Perforated Underdrain
- Clean out: C/O
- Beehive Overflow Drain: D



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All dimensions in **Metric**

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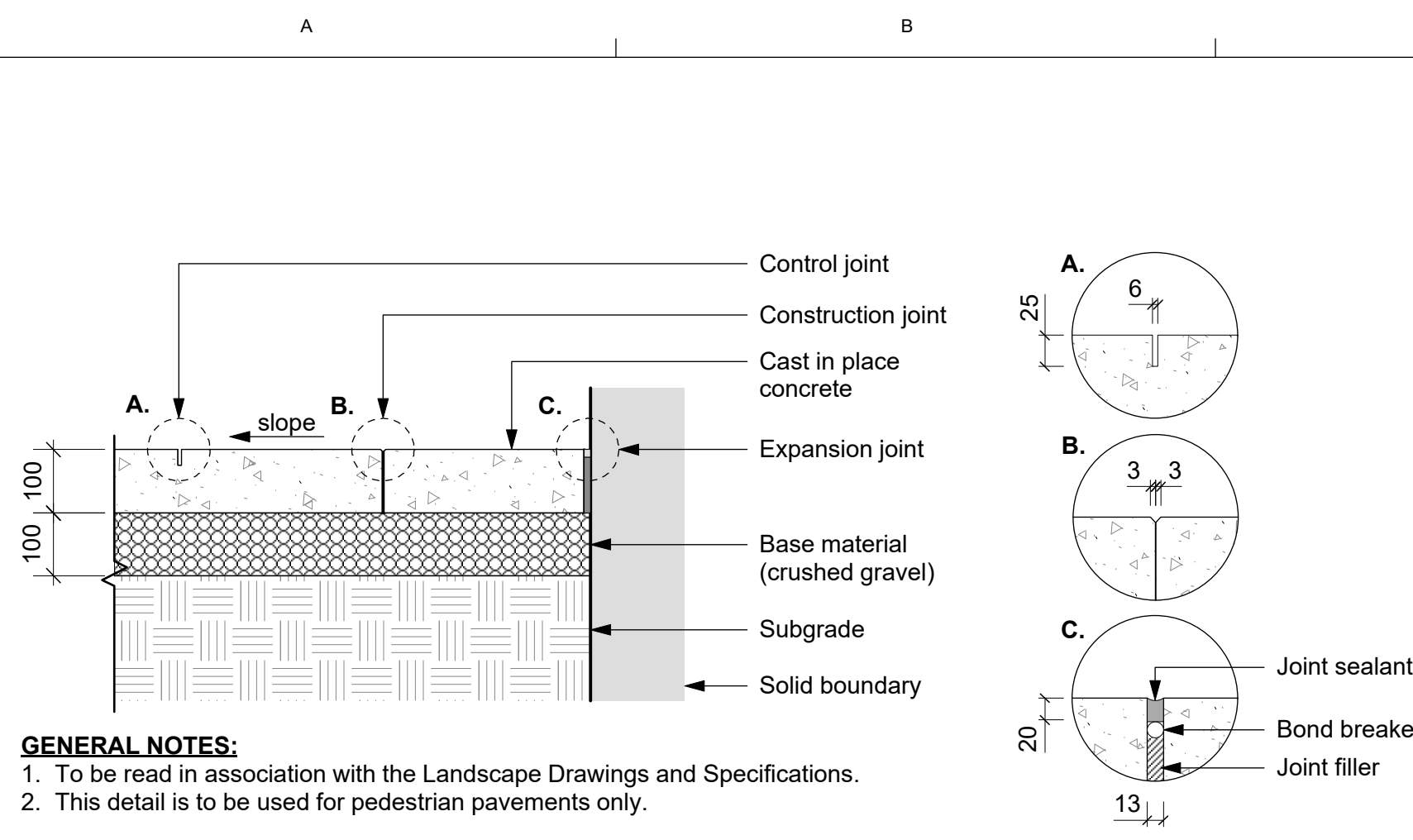


CLIENT:  
**BC TRANSIT**

PROJECT:  
**VICTORIA handyDART TRANSIT CENTRE**

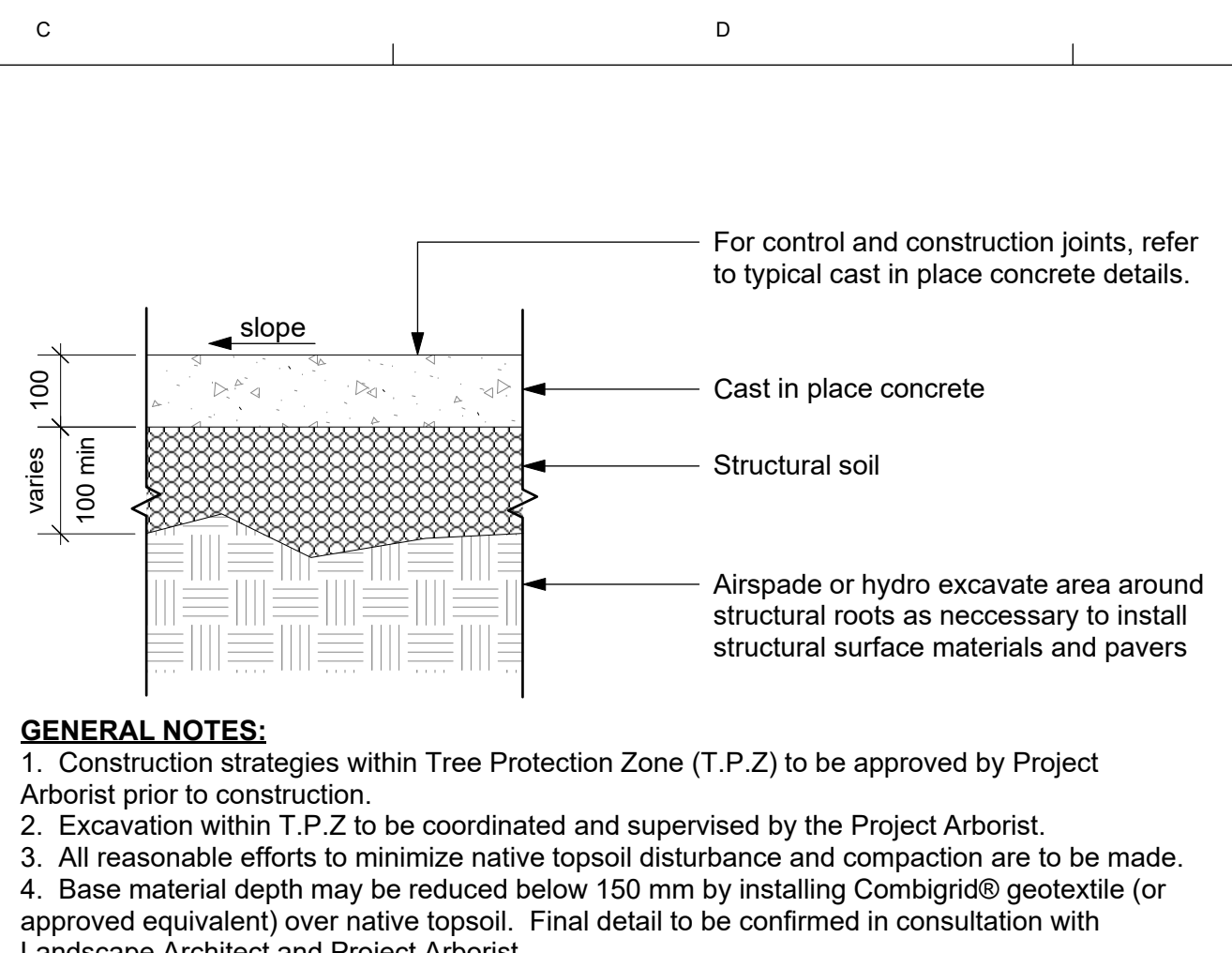
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SCALE:	PROJECT NO.
1:200	201919500
DWG.#	REV DATE:
L1.05	B 2021-04-22



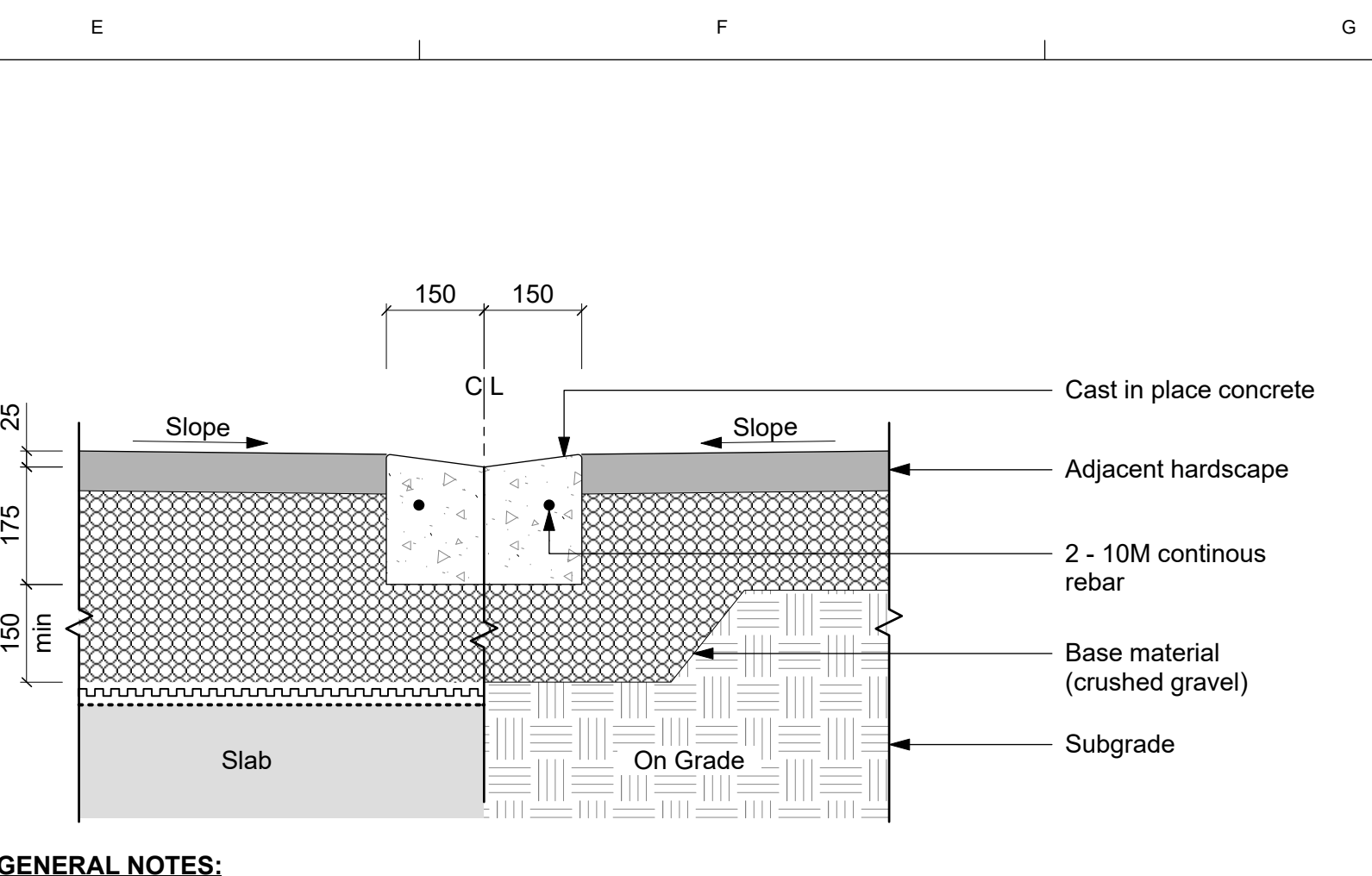
**GENERAL NOTES:**  
 1. To be read in association with the Landscape Drawings and Specifications.  
 2. This detail is to be used for pedestrian pavements only.

1 CIP Concrete Paving on Grade  
 Scale: 1:10



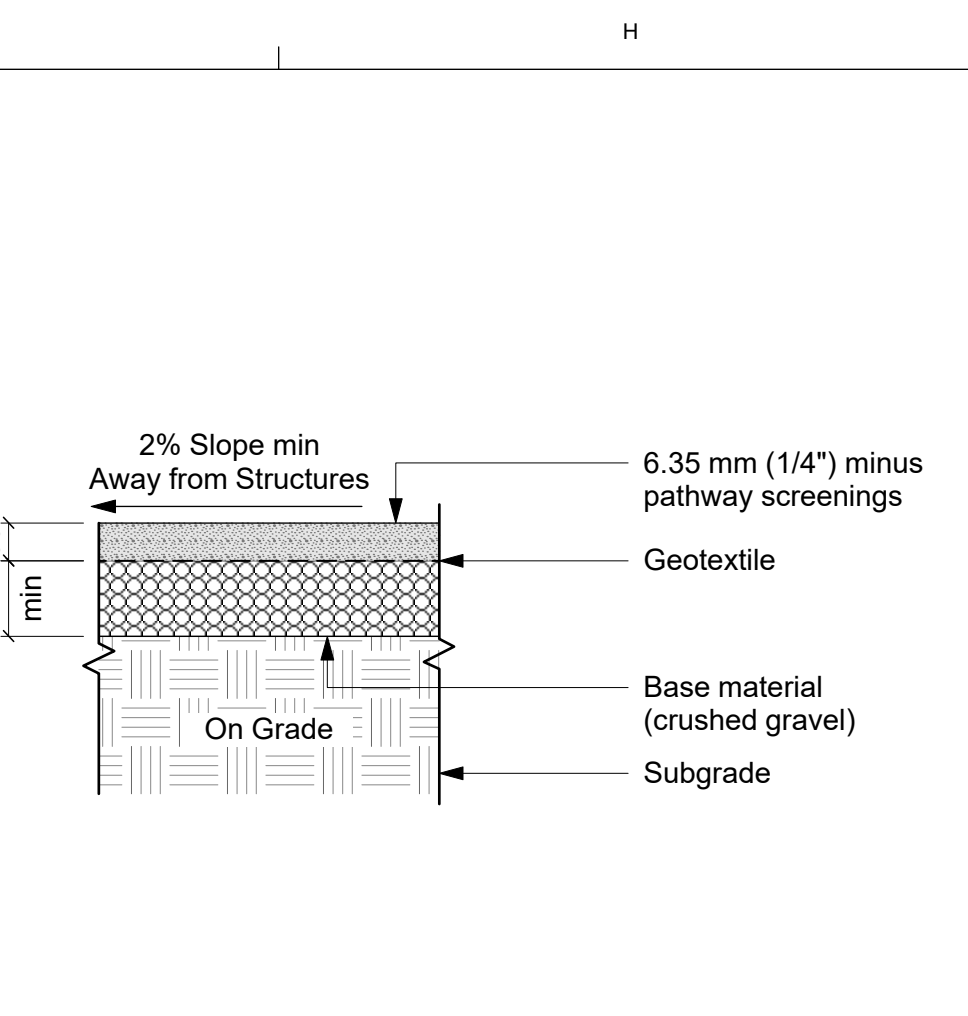
**GENERAL NOTES:**  
 1. Construction strategies within Tree Protection Zone (T.P.Z) to be approved by Project Arborist prior to construction.  
 2. Excavation within T.P.Z to be coordinated and supervised by the Project Arborist.  
 3. All reasonable efforts to minimize native topsoil disturbance and compaction are to be made.  
 4. Base material depth may be reduced below 150 mm by installing Combigrid® geotextile (or approved equivalent) over native topsoil. Final detail to be confirmed in consultation with Landscape Architect and Project Arborist.

2 CIP Concrete in Tree Protection Zone (T.P.Z)  
 Scale: 1:10

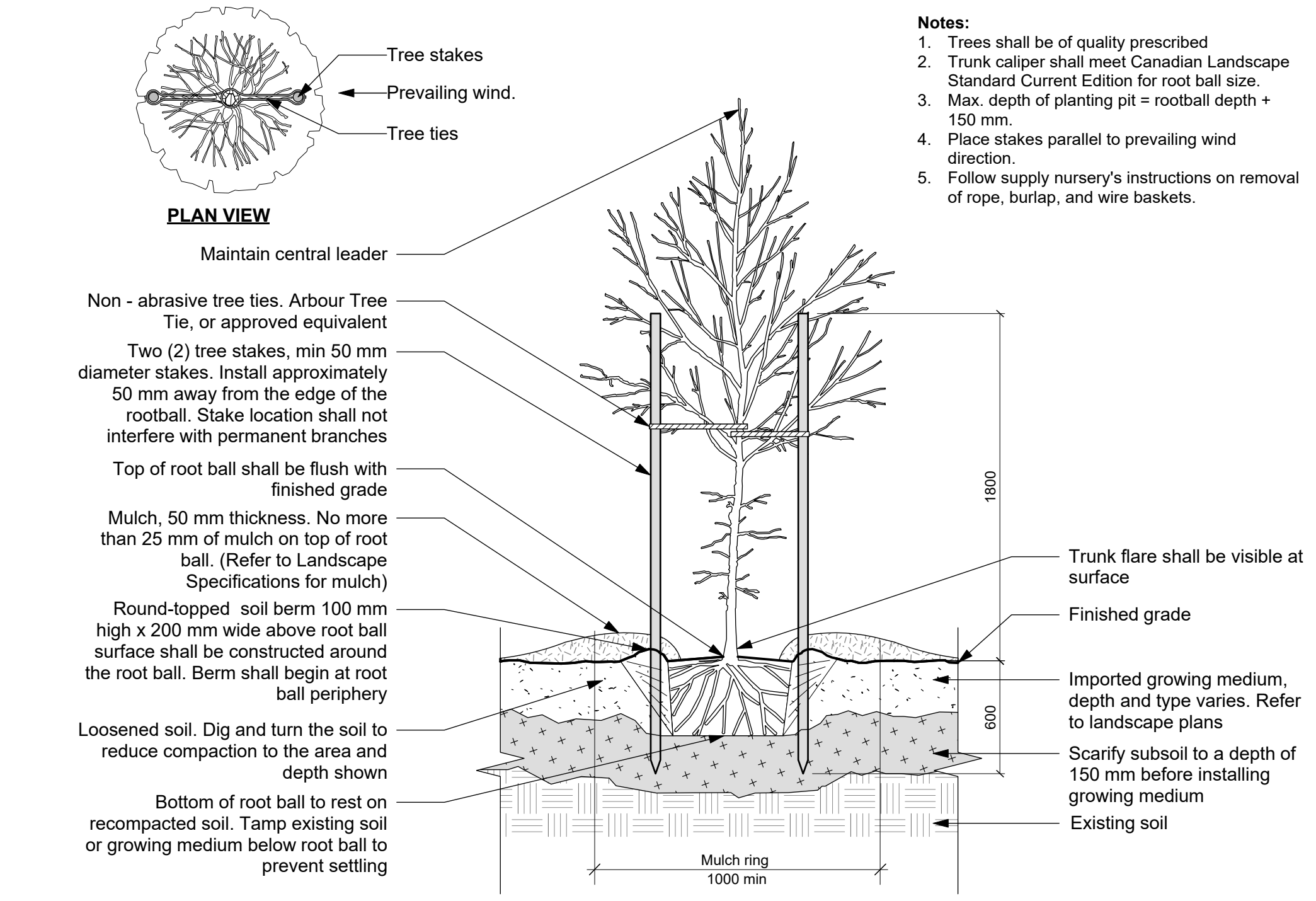


**GENERAL NOTES:**  
 1. To be read in association with the Landscape Drawings and Specifications.  
 2. This detail is to be used for pedestrian pavements only.

3 CIP Concrete Gutter  
 Scale: 1:10

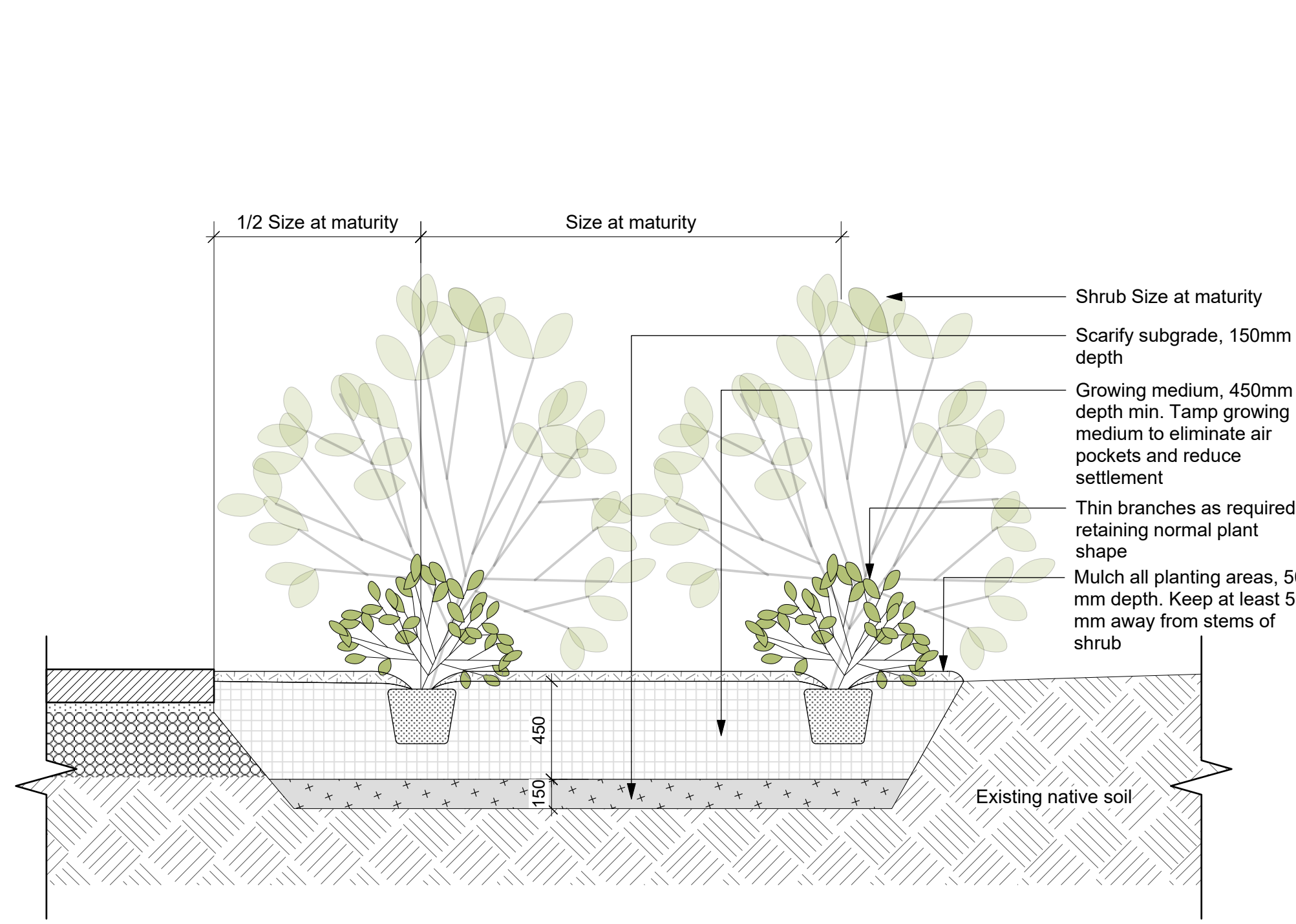


4 Aggregate Surfacing Detail  
 Scale: 1:10

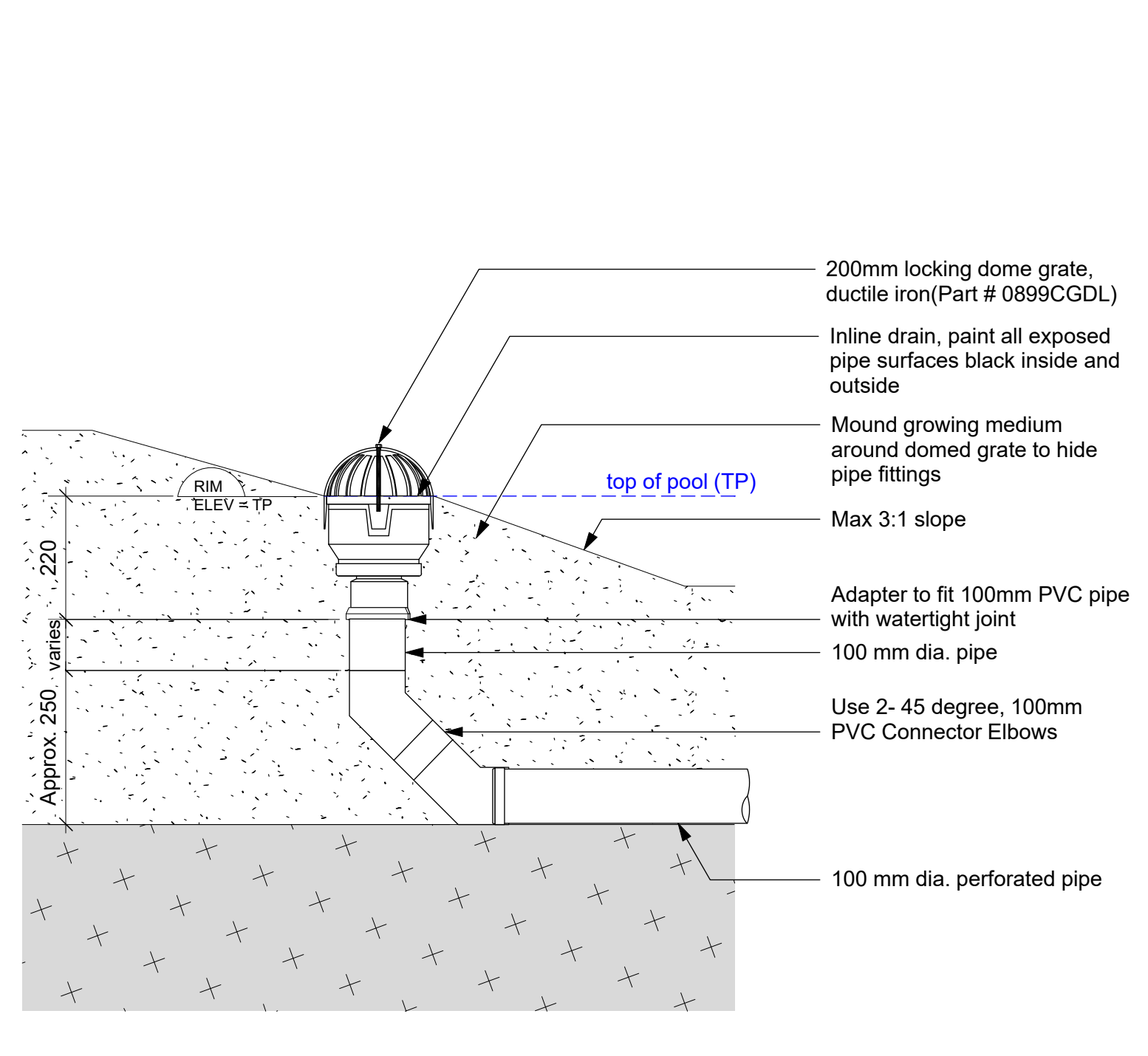


**Notes:**  
 1. Trees shall be of quality prescribed  
 2. Trunk caliper shall meet Canadian Landscape Standard Current Edition for root ball size.  
 3. Max. depth of planting pit = rootball depth + 150 mm.  
 4. Place stakes parallel to prevailing wind direction.  
 5. Follow supply nursery's instructions on removal of rope, burlap, and wire baskets.

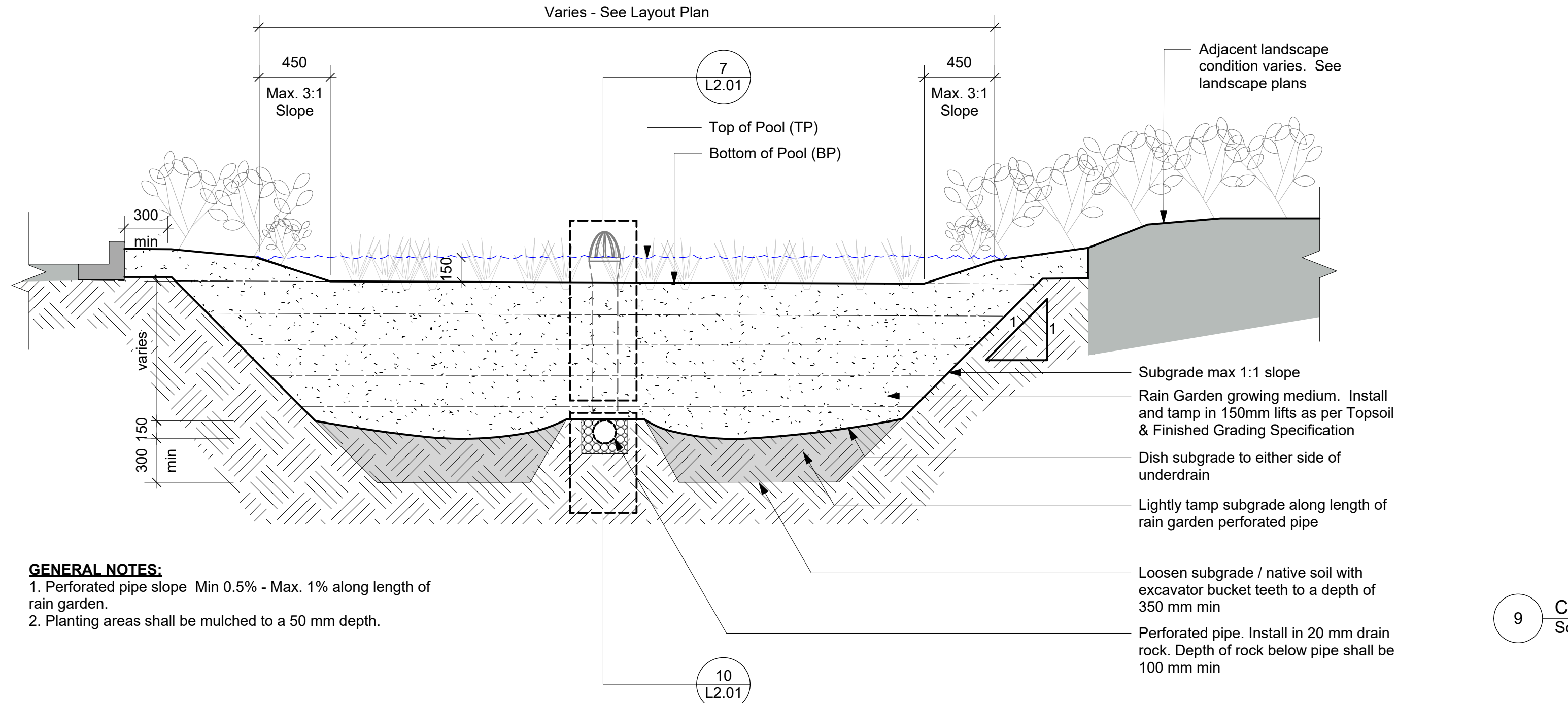
5 Tree Planting Detail on Grade  
 Scale: 1:25



6 Shrub Planting Area on Grade  
 Scale: 1:25

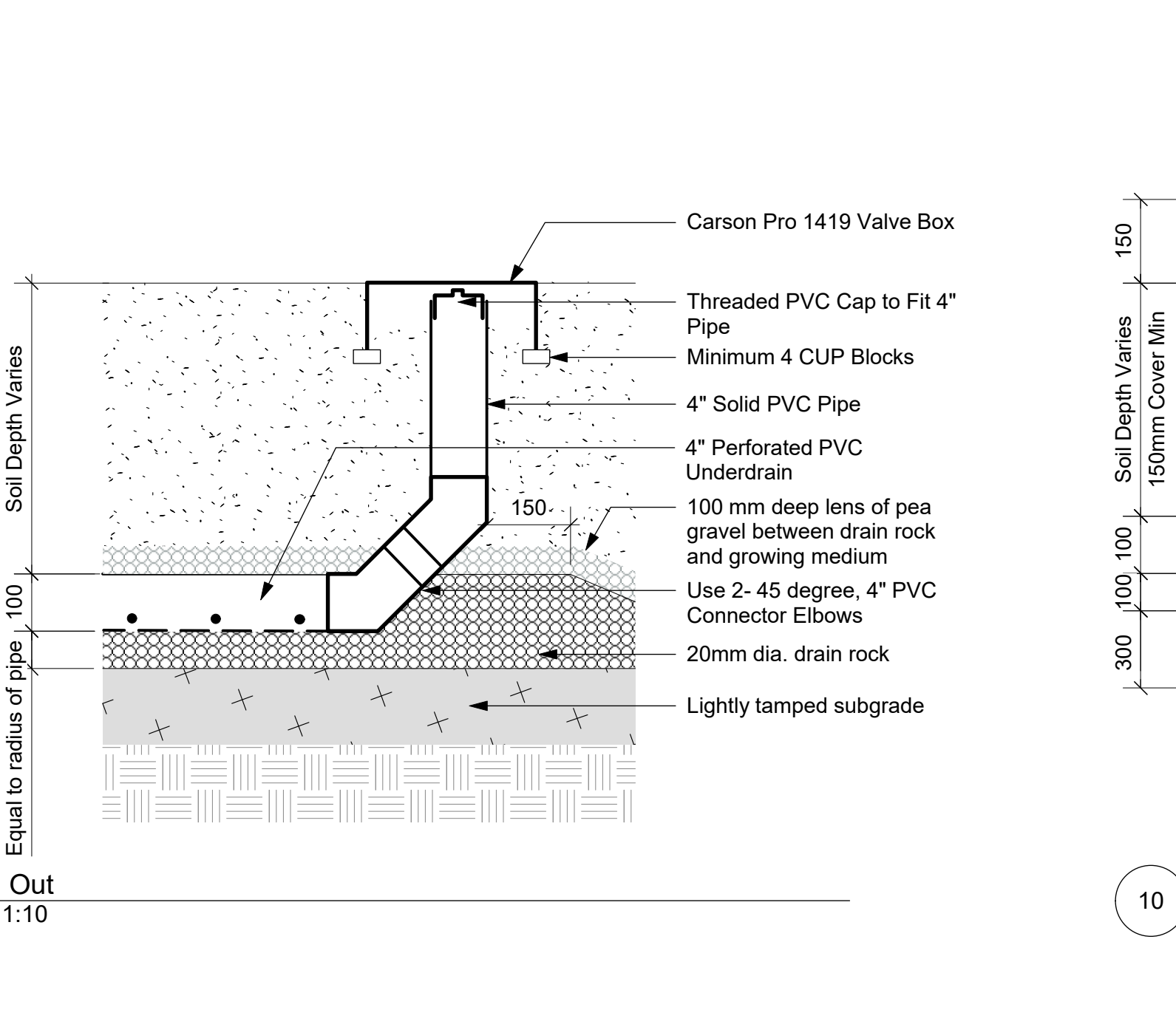


7 Rain Garden Overflow (8" dia. Nyloplast Inline) Drain  
 Scale: 1:10

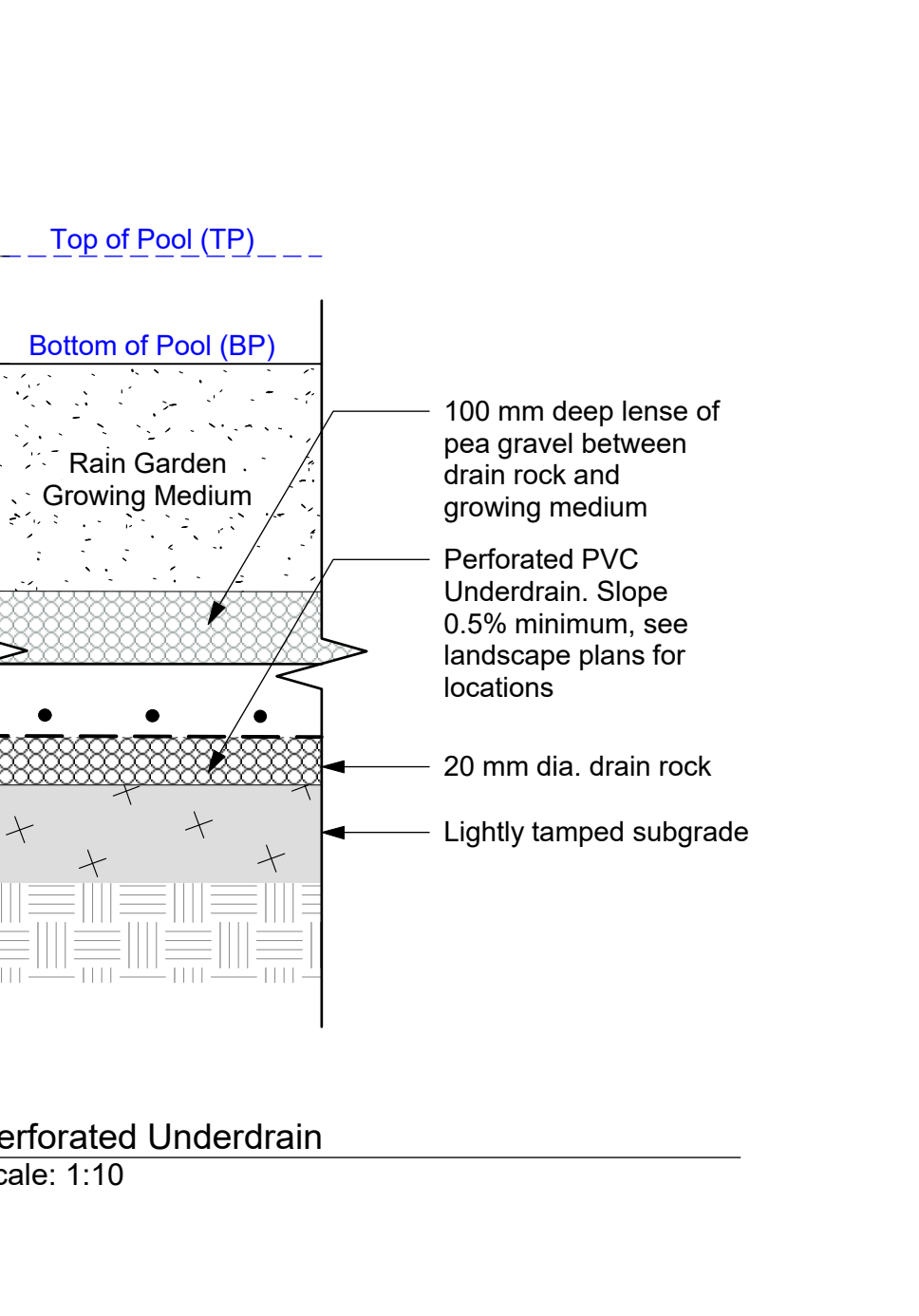


**GENERAL NOTES:**  
 1. Perforated pipe slope Min 0.5% - Max. 1% along length of rain garden.  
 2. Planting areas shall be mulched to a 50 mm depth.

8 Rain Garden on Grade  
 Scale: 1:25



9 Clean Out  
 Scale: 1:10



10 Perforated Underdrain  
 Scale: 1:10

ALL DRAWINGS TO BE READ IN ASSOCIATION WITH CONTRACT SPECIFICATIONS.



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CLIENT: BC TRANSIT  
 PROJECT: VICTORIA handyDART TRANSIT CENTRE  
 LANDSCAPE DETAILS

SCALE:	PROJECT NO.	
L2.01	201919500	
DWG.#	REV	DATE:
L2.01	B	2021-04-22

# **APPENDIX E**

## ***Fisheries Act Authorization Application and Offsetting Plan***



June 29, 2021

Fisheries and Oceans Canada  
4250 Commerce Cir  
Victoria, BC V8Z 4M2

To Whom it May Concern,

**Re: Fisheries Act Authorization and Habitat Offsetting Plan for Proposed Victoria handyDART Centre, Victoria, BC**

Please find attached the Section 35 (2)(b) Authorization application in support of BC Transit's proposal for environmental restoration and enhancement of a portion of the site of the future handyDART centre on Burnside Rd in the Town of View Royal.

handyDART is an accessible, door-to-door transit service for people with permanent or temporary disabilities that prevent them from using fixed-route transit without assistance. The new operations and maintenance centre enables a shift to a fully electric handyDART service and includes an office building, maintenance bays, bus and employee parking, a bus wash and temporary fueling kiosk and a new BC Hydro transmission tower. The project also includes realignment of the Galloping Goose trail to improve safety and visibility and improvements to Burnside Road West to mitigate traffic impacts and improve streetscapes with trees and a new sidewalk.

The redevelopment of this property offers opportunities to improve the ecological health of the Craigflower Watershed. To restore the ecological health of the site, the proposed permit work includes moving a seasonal creek connected to the upper watershed on the west side and to Craigflower Creek to the western and southern edge of the property. This creek realignment would be creating over an acre of restored and protected streamside habitat, and preventing any future upstream contamination including road pollutants from reaching Craigflower Creek.

BC Transit has been actively consulting with Indigenous groups regarding the project since 2019 to ensure their input informs project plans and design, environmental restoration and enhancement opportunities, permitting, and opportunities for cultural recognition and economic benefits. Our approach to consultation has focused on the expressed priorities and preferences of each Indigenous group and has been adapted over the past year as Indigenous communities have responded to the pandemic. BC Transit is committed to continuing consultation with Indigenous groups in an adaptive and responsive manner throughout project development and implementation.



Recent consultation with Indigenous groups has focused on the proposed creek enhancement work and has included an overview letter and offer to meet, a site visit video with commentary on existing site conditions and proposed works, and the sharing of draft permit applications for review and feedback.

Esquimalt Nation has completed a comprehensive review of this permit application, as well as a review of all other relevant project documentation. The project team met with Esquimalt's Consultant on May 20<sup>th</sup>, to walk the site and discuss the project. There is a planned presentation by the Consultant to Esquimalt's Chief and Council on July 8<sup>th</sup> to review his recommendations. BC Transit is committed to integrating Esquimalt Nation's feedback into this proposal and will issue an addendum to communicate their input as we receive it.


A concurrent process of community and stakeholder engagement, including the local Craigflower Creek stewardship groups was also undertaken where the planned creek work was described for information and feedback. Consultation efforts with Indigenous groups, stream keepers, stakeholders and the local community are summarized with this application.

BC Transit has retained Stantec Consulting Ltd (Stantec) to provide environmental support and preparation of the attached submission. We have also included a cost estimate for construction and monitoring of the proposed offsetting habitat. Given that BC Transit is a Crown Corporation, a financial guarantee in the form of a letter of credit is not required and as such, the estimate is provided for information only.

We thank you in advance for your review of our Section 35(2)(b) Authorization application. Per the application guidance, the attached document describes existing environmental site conditions, details the proposed construction works, outlines anticipated impacts to fish and fish habitat, and provides an offsetting plan to address those impacts.

If you have any questions or require further information, please contact Nathan Gregory, Stantec Senior Biologist at [Nathan.Gregory@stantec.com](mailto:Nathan.Gregory@stantec.com) or 250-619-5068.

Sincerely,

 Digitally signed by Lori Beaulieu  
DN: cn=Lori Beaulieu, o=BC Transit, ou=Fixed Assets, email=lori\_beaulieu@bctransit.com, c=CA  
Date: 2021.07.05 08:09:57 -07'00'

Lori Beaulieu  
Project Manager, Capital Projects  
[LBeaulieu@bctransit.com](mailto:LBeaulieu@bctransit.com)

Cc Steven Colwell - Senior Biologist, Fisheries and Oceans Canada



**BC Transit Victoria handyDART  
Facility**

*Fisheries Act* Authorization Application  
and Habitat Offsetting Plan

July 5, 2021

Prepared for:

BC Transit  
520 Gorge Rd E,  
Victoria, BC V8W 2P3

Prepared by:

Stantec Consulting Ltd.  
11-2042 Mills Rd,  
Sidney, BC V8L 5X4

## BC TRANSIT VICTORIA HANDYDART FACILITY

This application has been prepared by Stantec Consulting Ltd. (Stantec) based on the information requirements set out in “Authorizations Concerning Fish and Fish Habitat Protection” (SOR/2019-286) and *Applicant’s Guide Supporting the “Applications Concerning Fish and Fish Habitat Protection Regulations”* (Fisheries and Oceans Canada [DFO] October 2019a). In respect of fisheries data published by third parties, Stantec has exercised its professional judgment in incorporating such data into the application and, in respect of all other information published by third parties, Stantec has assumed that it is correct. This application has been prepared by, or under the direction and supervision of, a Registered Professional Biologist in good standing with the College of Applied Biology. It has also been peer-reviewed by a Registered Professional Biologist in good standing with the College of Applied Biology.

**Nathan Gregory**, B.Sc., R.P.Bio.  
Senior Biologist



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# BC TRANSIT VICTORIA HANDYDART FACILITY

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## Abbreviations

BC	British Columbia
BC CDC	BC Conservation Data Centre
BMP	best management practice
CAD	computer-aided design
CDFmm	Coastal Douglas-fir moist maritime
CEMP	Construction Environmental Management Plan
CRD	Capital Regional District
DFO	Fisheries and Oceans Canada
FLNRORD	Ministry of Forests, Lands, Natural Resource Operations and Rural Development
GIS	geographic information system
HADD	harmful alteration, disruption, or destruction
HWM	high water mark
LWD	large woody debris
m <sup>3</sup> /s	cubic metre per second
NCD	non-classified drainages
RAPR	Riparian Areas Protection Regulation
RISC	Resource Inventory Standards Committee
SARA	<i>Species at Risk Act</i>
WSA	<i>Water Sustainability Act</i>



# BC TRANSIT VICTORIA HANDYDART FACILITY

Introduction  
July 5, 2021

## 1.0 INTRODUCTION

BC Transit has retained Stantec Consulting Ltd. (Stantec) to prepare this report for the proposed construction of a handyDART facility (the facility) on its property at 2401 Burnside Road in View Royal, British Columbia (BC) (the site). The facility is required for improved service and maintenance for handyDART buses which are utilized people with permanent or temporary disabilities that prevent them from using fixed-route transit without assistance.

This facility would include a total building area of approximately 2,380 m<sup>2</sup>, divided between Operations (415 m<sup>2</sup>), Service/Delivery (482 m<sup>2</sup>) and Maintenance (1,483 m<sup>2</sup>). A paved area covering 13,605 m<sup>2</sup>, with a total of 109 bus parking stalls, 10 employee parking stalls, two visitor parking stalls and driving lanes, will also be included in this development. This is referred to as “the Project” throughout this document. The Project location is indicated in Figure 1.

Aquatic habitat present onsite includes the mainstem of Craigflower Creek and three channels designated as Watercourse 1 (non continuous drainage, isolated), Watercourse 2 (S4 classified stream), and Watercourse 3 (non continuous drainage). Specific to aquatic habitat, the work will require infilling of Watercourse 2 within the site which will be offset by construction of a new section of channel which will flow along the north west side of the site along the approximate path of Watercourse 1 for a portion of the flow pathway (which will be reconstructed as a stream) to a connection to Craigflower Creek. Additional detail is provided in Section 1.2.2.

Given that infilling of a section of creek is proposed, it has been determined that the Project will result in the harmful alteration, disruption, or destruction (HADD) of fish habitat and that an Authorization under Section 35(2)(b) of the *Fisheries Act* will be required. The objectives of this report are to meet the requirements outlined in the *Applicant's Guide Supporting the “Applications Concerning Fish and Fish Habitat Protection Regulations”* (DFO October 2019a), as described below:

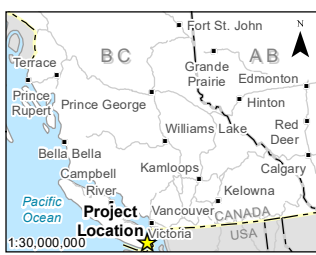
- Provide Fisheries and Oceans Canada (DFO) with a description of the Project location, proposed works and design.
- Summarize the consultation and engagement conducted for the Project.
- Provide important Project contacts.
- Describe the Project phases and schedule.
- Describe the fish and fish habitat.
- Describe the measures and standards to avoid and mitigate potential effects.
- Describe potential and residual effects on fish and fish habitat due to the Project.
- Discuss the conceptual offsetting plan, habitat balance, monitoring plan, and preliminary cost estimates.





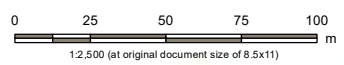


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- Highway
- Road
- Local Street
- Cadastral (Legal Lot) Boundary
- ▨ Local Greenspace
- - - Municipal Boundary

- Watercourse
- Culvert



Project Location: Victoria, British Columbia  
 Project Number: 123220971  
 Prepared by LTRUdell on 20210408  
 Requested by SNABESS on 20210408

Client/Project/Report  
 BC Transit  
 Greater Victoria HandyDART Facility  
 Fisheries Act Authorization Application

Figure No.  
**1**  
 Title  
**Project Location**

**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 10N  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

# BC TRANSIT VICTORIA HANDYDART FACILITY

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## 1.1 PROJECT LOCATION

The site is located at 2401 Burnside Road in View Royal. The site is bounded by Highway 1 to the south, Burnside Road to the west, Watkiss Way along the north side, and private property off Talcott Road on the eastern property line. The property is currently used as an archery range by the Victoria Bowmen. The Galloping Goose Trail crosses the property towards the northern property line.

Craigflower Creek is the main watercourse on the property. Flow discharges onto the property via a culvert conveying flow under Highway 1. Subsequently, flow is conveyed to the northeastern corner at a culvert under Watkiss Way. Flow is generally conveyed in a northeastern direction prior to flowing from the site. Additional information on aquatic habitat is provided in Section 5.2.

## 1.2 DESCRIPTION OF THE ANTICIPATED PROJECT SCHEDULE AND PHASES

General Project activities will include works to relocate, enhance, and infill existing instream habitat; clearing and grading; construction of the proposed facility; and post-construction stabilization and vegetation installation. The anticipated Project schedule and description of works are described below.

### 1.2.1 Anticipated Project Schedule

A preliminary Project schedule has been developed based on discussion with BC Transit and the anticipated timelines for the receipt of environmental approvals. Table 1 outlines this schedule which will be updated as required and is dependent on receipt of permits and site conditions at the proposed time of construction

**Table 1 Preliminary Project Schedule**

Project Phase	Proposed Dates	
Mobilization	September 15 to 30, 2021	<ul style="list-style-type: none"><li>• Mobilize to site</li><li>• Establish environmental controls</li></ul>
Initial clearing and grubbing		<ul style="list-style-type: none"><li>• Clearing in proximity to offsetting habitat</li></ul>
Offsetting habitat	October 1 to November 30, 2021	<ul style="list-style-type: none"><li>• Construct new habitat (new section of Watercourse 2)</li><li>• Install native vegetation (new section of Watercourse 2)</li><li>• Tie in new habitat (upstream connection to Watercourse 2 and downstream connection to Craigflower Creek)</li><li>• Infill of remaining section of Watercourse 2 within site</li></ul>
Final clearing and grading	December 1 to April 30, 2021	<ul style="list-style-type: none"><li>• Clear remainder of site</li><li>• Complete grading</li></ul>
Construction		<ul style="list-style-type: none"><li>• Construction of proposed facilities</li></ul>
Demobilization		<ul style="list-style-type: none"><li>• Stabilize site and demobilize</li></ul>



## BC TRANSIT VICTORIA HANDYDART FACILITY

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The current schedule for the works is targeted for a ten-week period from approximately mid-September to the end of November 2021. The realigned channel would be constructed commencing early October, and work in the Craigflower Creek or Watercourse #2 streamside protection and enhancement area (SPEA) would commence within a window during which rain is not in the forecast in late October or November 2021.

Given that work is proposed outside of the least risk work window for southern Vancouver Island, mitigation measures will be appropriately applied (see Section 7.2) as weather conditions permit. The proposed infilling of a section of Watercourse 2 (see Section 5.2.2.4) is not anticipated to have a direct impact to fish given that fish presence is not anticipated and the channel will be isolated from downstream fish habitat.

### 1.2.2 Proposed Construction Phases

Specific to the instream work component of the Project, the proposed works will consist of:

- Construction of the new Watercourse 2 channel (268 m in length) which includes three reaches:
  - Reach 1: channel along the east side of Burnside Road approximately 86 m in length. This section of channel will be constructed to intercept flow currently being conveyed into Watercourse 2 and direct it to the location of the current upper terminus of Watercourse 1. The upper 10 m of the channel will form a shallow pool.
  - Reach 2: channel along Highway 1 along the general path of the current Watercourse 1, approximately 126 m in length. This section of channel will be a series of riffle/pool structures.
  - Reach 3: channel connecting Reach 2 to Craigflower Creek, approximately 56 m in length. This section of channel will be a low gradient low-flow channel designed to allow for an expanded flood plain during periods of high precipitation and providing a wetted forest area.
- Infilling of the upper section of Watercourse 2 within the proposed facility's footprint.

Construction will be staged to limit impacts to habitat to the extent possible. Staging is anticipated to consist of:

- Construction of the new reaches of Watercourse 2 in isolation of existing habitat along the current alignment of isolated Watercourse 1. Access to this area will be via the existing access location and involve a temporary culvert crossing of Watercourse 2. Culvert will be designed to meet the requirements of the temporary crossings interim code of practice and a separate notification will be submitted.
- Isolating the upper section of Watercourse 2 and tying into the upstream end of the new section of channel.
- Isolating Craigflower Creek to tie in the new downstream reach of Watercourse 2.
- Splitting flows between the existing section of Watercourse 2 and the new channel. The intention will be to allow a "settling period" for the new channel to limit the potential for the generation of sediment. The estimated time for this "settling period" is three weeks.



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- Allow all flow to be conveyed to the newly constructed/enhanced sections of channel once it has “settled”.
- Infill the old Watercourse 2 within the Project site.

Please note that this staging sequence is preliminary. The final staging plan will be developed in consultation with the Contractor.

The specifics of the channel design are discussed in the Section 9.1. Details on impact mitigation are provided in Section 7.0.

### 1.3 OTHER INSTREAM WORK

After the new habitat is constructed and all flow diverted into the new channel, the portion of Watercourse 2 within the Project site will be infilled. This will consist of grading and placement of material suitable for use as a base for the proposed parking areas and buildings.

Additionally, a retaining wall will be constructed on the west side of Burnside Road to allow for a wider turning radius for handyDART buses exiting the site. The retaining wall will extend to a poorly defined wetted area to the west of the road. However, it will not extend into the wetted perimeter. Displaced vegetation will be limited primarily to Himalayan blackberry.

### 1.4 STORMWATER MANAGEMENT

The site design will utilize two key approaches for onsite control of stormwater – a rain garden system to manage rainwater from the 2-year/24-hour rain event and a stormwater flow attenuation system to manage events up to the 200-year rain event.

The main parking area at the site will be divided into four main catchment areas, each with a rain garden feature at its eastern extent. The topography within each catchment area will convey rainwater that falls onsite via overland flow to the rain gardens. The rain garden areas will be designed to manage the 2-year/24-hour rain event (53.4 mm of rainfall amount) (Morrison Hershfield 2021). Each garden will be designed with an organic rich growing medium and will biologically filter runoff. They will be constructed with under drains that will collect water that infiltrates through the soil. A significant amount of groundwater recharge is not anticipated given the existing soil conditions of the site (Morrison Hershfield 2021). The system is designed to clean runoff, cool the water, and slow down the delivery of the water back to the drainage network. Each rain garden will have an overflow drain/catch basin (the perforated under drain will discharge into this structure as well) that will convey water to an underground storage tank (the attenuation system).

The underground storage tank will be designed to control the 200-year/24-hour rainfall event (127.2 mm of rainfall amount) and to release it at a controlled rate to Craigflower Creek (Morrison Hershfield 2021). The intent is not to infiltrate water on-site but rather to attenuate the flow and slowly release it to the creek. The system includes an oil grit separator and a main shut-off valve. In the event of a spill, the outlet can be shut off and the spill can be contained in the tank.



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An orifice plate installed on the manhole downstream of the tank will control the release rate from the site to Craigflower Creek. This system will discharge near the old Watercourse 2 channel location to ground through a series of rock weirs and pools to dissipate the energy before flowing into the newly aligned Watercourse 2 stream channel. Stormwater will not be released directly into either Watercourse 2 or Craigflower Creek.

### 1.5 EQUIPMENT AND MATERIALS

Temporary structures and materials, including diversion berms, pumps, and temporary construction roads are required to facilitate construction of the proposed facility and enhanced habitat. It is anticipated that the following equipment will be required for construction:

- excavators
- backhoe
- bulldozer
- dump trucks
- wheel-wash station
- hand-held equipment

It is anticipated that the following materials will be required for construction of the new channel habitat:

- gravel for temporary road access
- boulders to form the weirs and for instream complexity
- gravel and round river rock to complete the weirs
- gravel and cobble for the channel invert
- imported clay
- large woody debris
- native plant stock
- topsoil
- grass seed (hydroseed)
- erosion and sediment control materials (e.g., silt fence)
- temporary bridges
- coffer dam material (e.g., sandbags, coffer dam material)
- pumps
- protective fencing (e.g., snow fencing)



## 2.0 REGULATORY REQUIREMENTS

### 2.1 FISHERIES ACT

Given the HADD of habitat anticipated due to infilling of a section of Watercourse 2, this document has been developed to meet the requirements for a *Fisheries Act* Authorization.

### 2.2 WATER SUSTAINABILITY ACT

A Change Approval under the *Water Sustainability Act* (WSA) Section 11 is required. The requirement to pump groundwater is not anticipated and, as such, a Water Use Approval WSA Section 10 will not be required for the Project.

### 2.3 SPECIES AT RISK ACT

A review of available background information for vegetation, wildlife, and fish species of conservation concern in British Columbia and Canada was conducted for the Project Area. The background review was supplemented by a series of field investigations. This assessment was conducted to identify at-risk species that could potentially be located within the Project Area and the proposed Project footprint and, therefore, to determine if legislative triggers under the *Species at Risk Act* (SARA) may exist.

Known fish presence is limited to Craigflower Creek and includes three species of salmonids, sculpin (species not confirmed) and three introduced species (see Section 5.2 for additional detail). None of the fish species with confirmed presence in Craigflower Creek are considered at risk under SARA. The coastal cutthroat trout (*Oncorhynchus clarkii clarkia*) is blue-listed provincially (i.e., it is a species of special concern). Some sculpin species are also blue- or red-listed (endangered or threatened) but given that the specific sculpin species has not been identified, the presence of a rare fish species cannot be confirmed.

A review of federally and provincially listed plant species at risk showed that there are six listed plant species which have potential to occur in habitats that are generally represented by the Project site and adjacent and surrounding areas (e.g., mixed forest/riparian/anthropogenic) (BC CDC 2020). These consist of green-sheathed sedge (*Carex feta*), green-fruited sedge (*Carex interrupta*), small bedstraw (*Galium trifidum* ssp. *trifidum*), pointed rush (*Juncus oxymeres*), streambank lupine (*Lupinus rivularis*), and water-pepper (*Persicaria hydropiperoides*). A rare plants field survey has not been conducted at the Project location and no confirmed records of these species were found.

There are 27 wildlife species of management concern that were identified as potentially occurring in the Project area including 18 birds, four mammals, three amphibians, and two reptiles (BC CDC 2020). A review of publicly available data from CDC iMap showed no known occurrences of SARA-listed wildlife species that overlap the Project area. Much of the property intersects proposed critical habitat for western painted turtle (*Chrysemys picta*) (BC CDC 2020b). The critical habitat polygon is intersected by the property, centered on Craigflower Creek, and includes a 150 m buffer on either side of the watercourse.



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Consultation and Engagement

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Occurrences of western painted turtle in the region are primarily confined to lakes and ponds with the closest recorded occurrence being more than 2 km from the property in a different watershed. The closest occurrence in the same watershed as the property is more than 3 km to the northwest in McKenzie Lake (BC CDC 2020b).

Given the lack of confirmed rare species at the site, the requirement for permitting under SARA is not anticipated. However, permits will be acquired if their presence is confirmed onsite.

### 2.4 CANADIAN NAVIGABLE WATERS ACT

None of the watercourses on site are considered navigable. As such, the *Navigable Waters Act* will not apply to the Project.

### 2.5 HERITAGE CONSERVATION ACT

The *Heritage Conservation Act* applies to this Project. An Archaeological Impact Assessment is currently underway to determine if archaeological or cultural resources may be present onsite.

### 2.6 OTHER LEGISLATION

Other legislation that will be applicable to the Project, but will not require approval are listed below:

- *Weed Control Act* – Requires property owners or those in control of a property to control the spread of noxious weeds.
- *Environmental Management Act* – Regulates contaminated sites remediation and response if contamination is noted at a Project site.

## 3.0 CONSULTATION AND ENGAGEMENT

BC Transit is advancing this Project in the traditional territories of the Esquimalt and Songhees Nations. BC Transit commenced engagement with Indigenous groups who may be affected by, or have interests in, the Project area in the early planning stages of Project development.

Since early 2019, the Project team has been in dialogue with Indigenous groups to inform Project plans and design, environmental restoration and enhancement opportunities, permitting, and opportunities for cultural recognition and economic benefits. The following information summarises the key activities supporting consultation related to the Project.



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### 3.1 INDIGENOUS GROUPS

The following Indigenous groups were identified as potentially interested in the Project during early planning as the site lies within, or is near, their asserted traditional territories:

- Esquimalt Nation
- Songhees Nation
- Pauquachin First Nation
- Tsawout First Nation
- Tsartlip First Nation
- Tseycum First Nation
- Te'Mexw Treaty Association

During the design and permitting phase of the Project, in July 2020, the federal government requested an additional two Indigenous groups be included in consultation:

- Beecher Bay (Scia'new) First Nation
- Malahat First Nation

#### 3.1.1 Consultation Approach

The approach responds to the priorities and preferences of each Indigenous group and has been adapted over the past year in response to the Covid-19 pandemic. BC Transit is committed to continuing consultation with Indigenous groups in an adaptive and responsive manner throughout Project development and implementation. Project consultation has included the following elements:

- Participation funding – Indigenous groups have been offered funding to facilitate participation in Project consultation.
- Meetings and follow up – virtual meetings and follow up phone calls have formed the basis for interactions given health protocols.
- Virtual site tour – a virtual site tour describing elements of the creek restoration and enhancement plans was recently undertaken and shared with Esquimalt Nation to assist with consultation discussion, given health protocols.
- Indigenous monitoring of onsite activities – Indigenous monitors were and will continue to be invited to participate in field work and video recordings will be used should this not be possible due to health protocols.
- Sharing studies and reports – proactive sharing of Project materials to ensure Indigenous input and discussion as needed.
- Invitation to provide input in advance of permitting – plans for creek enhancement are being proactively shared to ensure input can be included prior to submission.





## **BC TRANSIT VICTORIA HANDYDART FACILITY**

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July 5, 2021

### **3.1.2 Consultation Phases and Activities to Date**

Consultation has been undertaken with Indigenous groups according to the following Project development phases.

#### **Feasibility – November 2017**

Early options identification for the Project included outreach to Indigenous groups to share information and identify their interest in participating in consultation on the Project. Outreach included a letter and follow up calls to the following Indigenous groups:

- Esquimalt Nation
- Songhees Nation
- Pauquachin First Nation
- Tsawout First Nation
- Tsartlip First Nation
- Tseycum First Nation
- Te'Mexw Treaty Association

#### **Pre-Planning – December 2019 to February 2020**

Once the Project received federal and provincial funding to proceed, outreach continued to share information about the Project, and invite participation in consultation throughout Project development. This phase included a letter and follow up calls to the Indigenous groups listed above, and an offer to meet.

Introductory meetings were held with:

- Esquimalt Nation
- Songhees Nation
- Pauquachin First Nation

### **3.1.3 Design and Permitting Phase Consultation**

As the design and permitting phase of the Project commenced, outreach to Indigenous groups continued. This phase has focused on sharing Project-related information; confirming the preferences of Indigenous groups for participation and involvement; and obtaining input on environmental restoration and enhancement, Project design, economic opportunities, and cultural recognition.



## **BC TRANSIT VICTORIA HANDYDART FACILITY**

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### **May to July 2020**

Consultation materials, notice of and invitation to participate in geotechnical field work, sharing of studies and reports completed for early Project planning including archaeology were shared with the interested Indigenous groups. A meeting was held with Esquimalt Nation to discuss this material, involvement in geotechnical monitoring and consultation priorities going forward. Monitors from Esquimalt Nation and Songhees Nation were present for the geotechnical program.

### **July to September 2020**

Follow up with Esquimalt Nation continued and early outreach commenced with Beecher Bay (Scia'new) First Nation and Malahat First Nation.

### **January 2021 to present**

Recent materials on Project development include creek restoration and enhancement plans, permitting requirements, cultural recognition, and economic opportunities. Information has been shared with the identified Indigenous groups, with follow up correspondence continuing with Esquimalt Nation, Pauquachin First Nation, Beecher Bay First Nation, and Malahat First Nation. Project meetings have continued with Esquimalt Nation.

## **3.1.4 Summary of Indigenous Input**

### **3.1.4.1 Esquimalt Nation**

The Project team has met with Esquimalt Nation on three occasions to discuss the Project. In February 2020, during an introductory meeting, the Project team described the purpose and location of the Project, including existing encumbrances and current conditions of the site. At this time Esquimalt Nation expressed an interest in participating in Project consultation, with a particular focus on environmental restoration of the site and potential opportunities for involvement during implementation.

In June 2020, the Project team met with Esquimalt Nation to discuss early concepts for the site layout, including guiding principles for site planning for input. At this time Esquimalt Nation confirmed an interest in ensuring that work was conducted in a way that was respectful of existing archaeological resources on site; prioritizing the enhancement and restoration of Craigflower Creek including using plants of importance to Indigenous groups; and exploring opportunities for cultural recognition on site. Esquimalt Nation recommended Aqua-Tex Scientific for their holistic approach to environmental restoration and enhancement. BC Transit has since welcomed Aqua-Tex to the Project team to collaborate with Stantec and Murdoch de Greeff (landscape architect) on this important element of the Project.

In February 2021, BC Transit met with Esquimalt Nation and provided an update on the proposed creek enhancement work including a video site visit, due to current health protocols. Esquimalt Nation provided



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the following input regarding the creek enhancement proposal. BC Transit has committed to following up on these items and status of work underway is also noted below:

- Ensure knowledge and plans are shared early for input to ensure Esquimalt Nation interests are addressed – BC Transit is committed to this process and is sharing permitting applications related to the creek enhancement work proposed in the spirit of this commitment.
- Ensure appropriate protocols are followed with respect to archaeological resources on site – BC Transit is committed to following chance find procedures preferred by Esquimalt Nation and to sharing archaeological permit applications in advance.
- Input on plantings – BC Transit is following up with members of Esquimalt and Songhees Nation to provide input into planting lists, at the recommendation of Esquimalt Nation.
- Synergies with other watercourse enhancement projects underway along Craigflower Creek – BC Transit will continue to monitor any synergies with other enhancement work underway in the vicinity of the Project.

In April 2021, discussions with Esquimalt Nation continued regarding the Project, including environmental components. In May 2021, an independent consultant was engaged by Esquimalt Nation to review and comment on all relevant Project documentation including permit applications, chance find procedures, and previous archaeological impact assessments. The permit application consultation included a site visit on May 20<sup>th</sup> with the Project team.

A presentation to Chief and Council is scheduled for July 8<sup>th</sup> to review his findings and recommendations.

Follow up on employment opportunities and cultural recognition are also underway per these discussions.

BC Transit is committed to continuing to work with Esquimalt Nation on the Project, and to integrating their knowledge and feedback into Project planning, design, and implementation.

#### **3.1.4.2 Songhees Nation**

The Project team has met with Songhees Nation on one occasion, presenting an overview of the site, land ownership and encumbrances, and the need for and features of the Project to Chief and Council in February 2020. Songhees Nation indicated an interest in the Project as Songhees members use the handyDART service and in terms of understanding the role of BC Transit in determining transit priorities and funding. Since the pandemic, BC Transit has continued to share Project-related information with Songhees Nation according to their preferences, including recent correspondence regarding the proposed creek enhancement work. Songhees Nation members participated in the 2018 archaeological impact assessment of the site, geotechnical monitoring in summer 2020, and are in discussion with the Project team regarding input to planting lists for the site.

Outreach to Songhees Nation is underway to confirm their interest in meeting to discuss cultural recognition opportunities onsite collaboratively with Esquimalt Nation and BC Transit. BC Transit will work with Songhees and Esquimalt Nations to schedule the meeting and any subsequent discussions needed to advance this important component of the Project.



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### **3.1.4.3 Pauquachin First Nation**

The Project team has met with Pauquachin First Nation on one occasion, presenting an overview of the site, land ownership and encumbrances, and the need for and features of the Project to the Chief and lead administrator for the Nation. Pauquachin First Nation indicated that while they would defer to the interests of Esquimalt Nation regarding the Project, they did have an interest in the handyDART service. BC Transit committed to following up on the service issues identified by Pauquachin First Nation, and to continuing to update on Project developments.

BC Transit has continued to inform Pauquachin First Nation of Project developments by phone call, letter, and email. In May 2021, Pauquachin First Nation confirmed again their deferral in consultation to Esquimalt Nation, and an interest in continuing to be informed about the Project.

### **3.1.4.4 Tsawout First Nation**

The Project team reached out to Tsawout First Nation following the funding announcement for the Project in January 2020 to describe the Project need and proposal, and to provide an overview of the site location, features, land ownership and an offer to meet. At that time, Tsawout First Nation indicated that Esquimalt and Songhees Nations should be the focus of consultation efforts and Tsawout First Nation would not be participating in Project consultation, deferring interests in the Project to Esquimalt Nation.

BC Transit committed to informing the Tsawout First Nation of Project developments via letter, email, and phone calls. The most recent correspondence in early March was regarding the proposed creek enhancement work.

### **3.1.4.5 Tsartlip First Nation**

The Project team reached out to Tsartlip First Nation following the funding announcement for the Project in January 2020 to describe the Project need and proposal, and to provide an overview of the site location, features, land ownership and an offer to meet. A representative of Tsartlip First Nation indicated a need to confirm Tsartlip First Nation interest in consultation prior to the pandemic. Since the pandemic, BC Transit has continued to inform Tsartlip First Nation of Project developments via letter, email and follow up voice messages to confirm if there is an interest in participating in consultation. The most recent correspondence in early March was regarding the proposed creek enhancement work.

### **3.1.4.6 Tseycum First Nation**

The Project team reached out to Tseycum First Nation following the funding announcement for the Project in January 2020 to describe the Project need and proposal, and to provide an overview of the site location, features, land ownership, and an offer to meet. Prior to the pandemic, the Project team was working on a meeting date with a Tseycum First Nation representative, and since the pandemic BC Transit has continued to update Tseycum First Nation via email and follow up voice messages to share Project information and confirm if there is an interest in meeting regarding the Project. The most recent Project update by email was in early March and regarded the proposed creek enhancement work.



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In June 2021, Tseycum First Nation confirmed that they are supportive of the Project, considering handyDART to be an important service to the community, and will continue to review Project materials, as they have been during the pandemic, to ensure their interests are addressed.

#### **3.1.4.7 Te'mexw Treaty Association**

The Project team reached out to the Te'Mexw Treaty Association following the funding announcement for the Project in January 2020 to describe the Project need and proposal, and to provide an overview of the site location, features, land ownership and an offer to meet. At that time, the Treaty Association indicated that it would defer to its members for any interest they may have in participating in Project consultation. BC Transit committed informing the Te'Mexw Treaty Association of Project developments via email should they wish to share with their membership. The most recent correspondence in early March was regarding the proposed creek enhancement work.

#### **3.1.4.8 Beecher Bay First Nation**

The Project team reached out to Beecher Bay First Nation following advice from federal funding contacts in July 2020. Beecher Bay First Nation indicated that resolution to conventional service issues was required before engaging in discussions with BC Transit regarding handyDART. BC Transit has worked with Beecher Bay First Nation and the Ministry of Transportation and Infrastructure to address the conventional service issues for Beecher Bay First Nation and is continuing to share Project-related information and an offer to meet should there be an interest in participating in Project consultation.

In March and early April, a call followed by a letter was sent to Beecher Bay First Nation describing the proposed creek enhancement work and a request to meet. Beecher Bay First Nation has indicated by phone an interest in remaining informed about the Project, but not to meet at this time.

In May 2021, Beecher Bay First Nation confirmed their intent to defer consultation to Esquimalt and Songhees Nations and in wishing to continue to be informed of Project developments as they pertain to Beecher Bay's interests.

#### **3.1.4.9 Malahat First Nation**

The Project team reached out to Malahat First Nation following advice from federal funding contacts in July 2020. Malahat First Nation indicated an interest in learning more about the Project, and the Project team is working through the referrals process at Malahat First Nation to schedule a meeting. BC Transit is continuing to share Project-related information with Malahat First Nation, including a call and follow up letter regarding the proposed creek enhancement work.

In June 2021, Malahat First Nation indicated that they will be deferring an active role in consultation to Esquimalt and Songhees Nations as the Project is outside of their core territory. Malahat Nation stated that they wished to ensure BC Transit planned to include cultural monitors onsite and indicated an interest in remaining informed on key topics.



## BC TRANSIT VICTORIA HANDYDART FACILITY

Consultation and Engagement

July 5, 2021

### 3.2 SUMMARY OF PUBLIC CONSULTATION

#### 3.2.1 Public Consultation – Spring 2020

To engage the community and receive as much public feedback as possible, BC Transit engaged broadly over the period of May 27–June 12, 2020. A *What We Heard* report outlines the input collected.

With social distancing requirements related to COVID-19 at the time, in-person engagement was not possible. Online engagement and broad awareness raising methods were utilized and in-person engagement will be considered for future phases based on the social distancing requirements at the time.

A detailed mailout was delivered door-door to approximately 885 households in View Royal. An online survey was also advertised through print ads in the Goldstream Gazette, the BC Transit website, and social media. The Town of View Royal also shared the Project across their social media platforms. Posters about the Project were displayed throughout View Royal. Information was sent to eleven stakeholder groups, including:

- Eagle View Elementary School
- Save the Craigflower Creek
- Capital Regional District (CRD) Parks
- Esquimalt Anglers Association
- Portage Inlet Protection Society
- Victoria Bowman Archery Club
- Silver Threads Service for Seniors
- Garth Homer Society
- Gorge Waterway Initiative
- CRD Traffic Safety Commission
- HandyDART Staff

A neighbourhood working group comprised of diverse community perspectives continued to meet monthly during the process.

Overall, 349 people responded to the handyDART survey, with a 60% completion rate. Of those 349 respondents, 65% were BC Transit customers and 4.5% of respondents were BC Transit handyDART customers. Respondents from 12 different municipalities across the CRD participated in the survey. The majority of the respondents resided in View Royal (60%), Saanich (12%) and Victoria (11%).



## BC TRANSIT VICTORIA HANDYDART FACILITY

Consultation and Engagement  
July 5, 2021

### 3.2.2 Consultation with Neighbourhood Working Group and Gorge Waterway Initiative

Several meetings have occurred over the past year with a neighbourhood working group representing diverse perspectives within the community, as well as with the Gorge Waterway Initiative, a committee of the CRD. Both groups have been hosted onsite with socially distanced tours of the current conditions and discussion about proposed plans.

### 3.2.3 Public Consultation – Spring 2021

The next phase of public engagement ran from Friday, March 19–Tuesday, April 6. It shared the preliminary site plan, including building location and rendering as well as planned stream enhancement and trail improvements. The consultation process is designed to demonstrate how the Project is responding to earlier public input. It will continue to respect COVID public health orders that prevent public gatherings. Engagement tools included:

- Detailed household mailer delivered to the over 900 homes within 500 metres of the property
- Stakeholder letter to 20 stakeholder groups that have expressed interest within the Project
- In light of COVID, and the inability to gather in-person or on-site, a video series has been developed to help residents envision what is proposed. Will be shared on social media
- Print ads in Blackpress paper
- Social media and project website
- Posters within neighbourhood
- Input was collected through an online survey, email, Neighbourhood Working Group, and stakeholder input

The next round of public consultation is scheduled for mid- to late- July 2021.

### 3.2.4 Public Consultation – Summer 2021

The next phase of public engagement is being planned and it will provide additional details about the site design including stormwater management, landscaping, streetscape and trail improvements, and LEED amenities. It will also provide details on traffic management, noise, and neighbourhood integration measures. It will occur in mid-July 2021.

An “open-air open house” is being planned where local residents can stop by the site and view display panels located on the Project site near the corner of Burnside and Watkiss Way over the course of a few weeks, allowing them to learn more in the space. Members of the Project team will be onsite at advertised days and times to answer questions.



## BC TRANSIT VICTORIA HANDYDART FACILITY

Contact Information

July 5, 2021

### 4.0 CONTACT INFORMATION

Table 2 provides a summary of key contacts for the Project.

**Table 2**      **Contacts for the Project**

Name	Role	Phone Number	Email	Address
Lori Beaulieu	BC Transit Project Manager	250-217-3869	<a href="mailto:Lbeaulieu@bctransit.com">Lbeaulieu@bctransit.com</a>	520 Gorge Road East, Victoria, BC V8T 2W6
Nathan Gregory	Qualified Environmental Professional	250-619-5068	<a href="mailto:Nathan.Gregory@stantec.com">Nathan.Gregory@stantec.com</a>	500-4730 Kingsway, Burnaby, BC V5H 0C6
TBD	Environmental Monitor	TBD	TBD	TBD
TBD	Contractor Supervisor	TBD	TBD	TBD

### 5.0 DESCRIPTION OF FISH AND FISH HABITAT

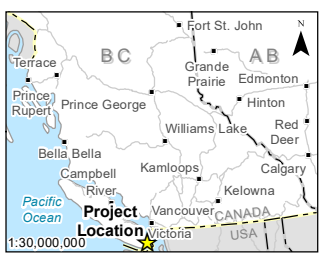
The following subsections summarize portions of the baseline (existing) fish and fish habitat descriptions supplemented by observations from 2020 reconnaissance surveys. Habitat types within the Project Area are characterized in Section 5.2 and existing watercourses are mapped in Figure 2.





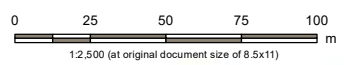


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- Highway
- Road
- Local Street
- ▭ Cadastral (Legal Lot) Boundary
- ▭ Local Greenspace
- ▭ Municipal Boundary

- Watercourse
  - Culvert
  - ▭ Instream
  - ▭ Riparian\*
  - ▭ Pooling Water
- \*Riparian habitat only shown for fish bearing watercourses.



Project Location: Victoria, British Columbia  
 Project Number: 123220971  
 Prepared by LTRUdell on 20210408  
 Requested by SNABESS on 20210408

Client/Project/Report  
 BC Transit  
 Greater Victoria HandyDART Facility  
 Fisheries Act Authorization Application

Figure No.  
**2**  
 Title  
**Existing Watercourses**

Notes  
 1. Coordinate System: NAD 1983 UTM Zone 10N  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

## BC TRANSIT VICTORIA HANDYDART FACILITY

Description of Fish and Fish Habitat

July 5, 2021

### 5.1 PHYSICAL AND WATERSHED SETTING

#### 5.1.1 Watershed

The watershed code for Craigflower Creek is 920-077200. The waterbody identification is 00000VICT-306196.

#### 5.1.2 Geography

The site is located in the Capital Regional District (CRD) of southern Vancouver Island. This area is located within the Coastal Douglas-fir moist maritime (CDFmm) biogeoclimatic zone (FLNRORD 2020d), an area generally restricted to southeastern Vancouver Island and the Lower Mainland. As a result, the CDFmm has been largely developed and fragmented for urban development.

#### 5.1.3 Climate

The CDFmm tends to be mild with limited extremes in temperature (SFU 2020). Winters tend to be wet with limited snowfall near sea level. Summers experience limited precipitation and range from warm to hot temperatures.

#### 5.1.4 Hydrology

A hydrotechnical assessment was completed for the site in January 2021 by Morrison Hershfield. The report indicated that currently the total upstream area of draining towards the site is approximately 26 ha. Runoff from this area flows through a 600 mm culvert under Burnside Road and into Watercourse 2. The runoff was determined using the rational method and the land area within the watershed was assumed half as residential and the other half as undeveloped (Morrison Hershfield 2021). This method was used to calculate the runoff coefficients for the upstream watershed area. Subsequently, the time of concentration was determined, and the intensity was confirmed using the Victoria International Airport Intensity-Duration-Frequency data. This allowed for the calculation of runoff anticipated at the site which informed the new channel design.

### 5.2 EXISTING FISH AND FISH HABITAT

Stantec conducted a review of available background information specific to the site. This was supplemented by habitat assessments conducted in the Project Area in April, June, and September 2020. Methods and results are summarized in the following sections.



## BC TRANSIT VICTORIA HANDYDART FACILITY

Description of Fish and Fish Habitat

July 5, 2021

### 5.2.1 Methods

#### 5.2.1.1 Desktop Review of Habitat and Physical Conditions

A desktop review was conducted to identify known fish, wildlife and vegetation values present on the property. A review of publicly available information, historical occurrence data, and scientific literature was conducted to characterize the fish and fish habitat, riparian vegetation, and wildlife characteristics of the Project area. The desktop review collected information available from:

- Government of British Columbia Habitat Wizard database (Government of British Columbia, 2020c)
- BC Conservation Data Centre (BC CDC, 2020b)
- Species at Risk Public Registry (Government of Canada, 2020)
- Government of BC Species and Ecosystems Explorer (BC, 2020a)
- Fisheries Inventory Data Queries (Province of British Columbia 2020)
- Species at Risk Public Registry
- Committee on the Status of Endangered Wildlife in Canada

Relevant information was compiled and utilized to guide the site assessment as described below.

#### 5.2.1.2 Field Data Collection Methods

During the site visits, two biologists walked the length of each watercourse within the property where access permitted. Methods were aligned with Riparian Areas Protection Regulation (RAPR) requirements (BC FLNRORD 2019) and BC Resource Inventory Standards Committee (RISC) stream assessment methods (BC RISC 1999). In some cases, access to the watercourses was discontinuous due to overgrowth of plants such as Himalayan blackberry (*Rubus armeniacus*) that prevented continuous access to the stream. During these habitat assessments, characteristics of each watercourse were recorded, such as substrate, cover, presence of woody debris, continuity of channel, depth, and any other notable observations. Watercourses were assessed for their ability to provide fish habitat for spawning, overwintering, rearing, migration and staging/holding. An arborist and a geotechnical engineer also visited the site to fulfill requirements of the RAPR related to vegetation and slope stability.

Trees were marked by handheld Global Positioning System and identified to genus and other plant species (e.g., shrubs) were noted. The watercourses were also assessed for their potential to provide habitat to the western painted turtle.



## BC TRANSIT VICTORIA HANDYDART FACILITY

### Description of Fish and Fish Habitat

July 5, 2021

## 5.2.2 Results

### 5.2.2.1 Desktop Review of Habitat and Physical Conditions

There are four watercourses within the Project area including Craigflower Creek along the southeast boundary of the property and three unnamed watercourses: Watercourse 1 extends west to east on the southwest side of the property, Watercourse 2 extends west to east starting from a culvert on the west side of the property, and Watercourse 3 is a constructed drainage ditch that flows southeast from the north end of the property (Figure 2). The results of the watercourse assessments are summarized in Table 3 and described in the following sections.

**Table 3 Watercourse Fish Habitat Criteria**

Criteria	Craigflower Creek	Watercourse 1	Watercourse 2	Watercourse 3
Approximate Channel Length Within Property (m)	274	117	208	93
Channel Width (m)*	10.4	-	3.34	2.5 m
Connected to Craigflower Creek?	N/A	No	Yes	Yes
Stream Classification	S2	NCD	S4	NCD
Riparian Habitat	Deciduous overstory with shrub understory; abundant large woody debris and wetland plants	Deciduous overstory overgrown with Himalayan blackberry; abundant instream grasses	Deciduous overstory in downstream 50 m; overgrown with Himalayan blackberry and abundant instream grasses in upstream section	Deciduous overstory with shrub understory; little in-stream vegetation
Dominant Substrates	Woody debris, fines, gravels	Large cobble, boulder	Fines, organics, cobble	Fines, organics
Spawning	Poor	Poor	Poor	Poor
Rearing	Excellent	Poor	Moderate	Poor
Overwintering	Excellent	Poor	Poor	Poor
Migration	Good	Poor	Moderate	Poor
Fish Presence (expected species)	BNH, CO, CT, ACT, PMB, RB, CC, SMB, ST	None	Juvenile CT/RB may use lower reach	None (ephemeral, culvert barrier in current state)
<p>NOTES:</p> <p>* No channel measurements recorded at Watercourse 1</p> <p>BNH: Brown catfish (<i>Ameiurus nebulosis</i>); CO: Coho salmon (<i>Oncorhynchus kisutch</i>); CT: Cutthroat trout (<i>Oncorhynchus clarkii</i>); ACT: Anadromous cutthroat trout (<i>Oncorhynchus clarkii</i>); PMB: Pumpkinseed (<i>Lepomis gibbosus</i>); RB: Rainbow trout (<i>Oncorhynchus mykiss</i>); CC: Sculpin (general); SMB: Smallmouth bass (<i>Micropterus dolomieu</i>); ST: Steelhead (<i>Oncorhynchus mykiss</i>).</p>				



## BC TRANSIT VICTORIA HANDYDART FACILITY

### Description of Fish and Fish Habitat

July 5, 2021

#### 5.2.2.2 Craigflower Creek

Craigflower Creek is the primary drainage of the Craigflower Creek watershed, which originates as several small streams in the District of Highlands and flows south into Portage Inlet. In the lower section of the creek system, which includes the property, the CRD has identified flooding, bank erosion, and loss of summer base flows as concerns (CRD 2020a). Craigflower Creek roughly follows the southeast boundary of the property. The creek was measured as having an average channel width of 10.4 m and an average gradient of 2% during the April 2020 site visit. Within the property, the channel has a riffle-pool morphology with an irregular meandering channel pattern. The dominant substrate is organics and the subdominant substrate is fines. Gravels were present but limited.

Craigflower Creek is a fish-bearing stream with records of Coho salmon (*Oncorhynchus kisutch*), rainbow trout/steelhead (*Oncorhynchus mykiss*), coastal cutthroat trout (*Oncorhynchus clarkia clarkii*), sculpin (general), smallmouth bass (*Micropterus dolomieu*), pumpkinseed (*Lepomis gibbosus*), and brown catfish (*Ameiurus nebulosus*) (CRD 2020a). Coho salmon are known to spawn in Craigflower Creek as far upstream as Prior Lake (CRD 2020a). During the April 2020 site visit, one dead Coho salmon parr was observed.

Stream flows were moderate at the time of the April 2020 assessment, though evidence of flood flows were present throughout the reach in the form of rafting and debris in trees above and beside the channel. Beaver activity was observed in the form of a small dam downstream of the Highway 1 culvert (south of the site), which impounded water into a large pool within the property. Areas of seepage above the high watermark was observed on the left (north) bank of the creek.

Cover was abundant throughout Craigflower Creek in the form of deep pools, large woody debris and some undercut banks. Large woody debris was clumped and formed deep pools more than 1 m deep on their upstream sides. Trees were fallen or growing over much of the channel. Banks were a mixture of vertical and sloping with fines as the dominant substrate and were approximately 2 m in height. Within the survey area, tree cover primarily consisted of deciduous species in the pole sapling stage. The shrub layer was primarily salmonberry (*Rubus spectabilis*). The herb layer consisted of skunk cabbage (*Lysichiton americanus*), lady fern (*Athyrium filix-femina*), horsetail (*Equisetum* sp.) and white fawn lily (*Erythronium oregonum*). The invasive species present were primarily creeping buttercup (*Ranunculus repens*) with minor amounts of English holly (*Ilex aquifolium*) and Himalayan blackberry.

Spawning habitat in Craigflower Creek within the Project site is poor due to the lack of gravel and cobbles. Habitat for other life stages of fish (e.g., overwintering, rearing, migration) is good to excellent due to the abundance of instream cover such as deep pools and large woody debris.

Photographs of Craigflower Creek are provided in the habitat report attached as Appendix A.



## BC TRANSIT VICTORIA HANDYDART FACILITY

### Description of Fish and Fish Habitat

July 5, 2021

#### 5.2.2.3 Watercourse 1

Watercourse 1 is a constructed ditch approximately 110 m long that flows west to east on the southwest side of the property, parallel to Highway 1. It terminates near the right bank of Craigflower Creek but does not discharge into the creek as surface flow. It ends in an area of pooling water between Watercourse 2 and Highway 1. Upstream of this area, the ditch is heavily overgrown with Himalayan blackberry and teasel (*Dipsacus* spp.). A riprap berm surrounds this pool of water and no connectivity, culverts, or water flow was observed that would connect Watercourse 1 to either Craigflower Creek or Watercourse 2. It is assumed that water from Watercourse 1 pools and infiltrates to ground at the east end of the ditch.

A review of historical air photos indicates that Watercourse 1 appears to have been constructed at the same time as the Burnside Road West offramp from Highway 1 in 1997. Prior to this time, the area around Watercourse 1 was forested with no indications of a natural watercourse.

The substrate of Watercourse 1 is mostly large cobble and boulders (i.e., riprap), and instream vegetation is comprised of grasses, while overhead cover is mainly Himalayan blackberry and deciduous trees. It begins at Highway 1 and flows into a small wetland, near where Watercourse 2 meets Craigflower Creek, but does not flow into either of these streams. All five fish habitat categories used in the assessment of this ditch are considered to be poor.

Photographs of Watercourse 1 are provided in the habitat report attached as Appendix A.

#### 5.2.2.4 Watercourse 2

Watercourse 2 is a modified stream that enters the property from a culvert flowing under Burnside Road West on the west side of the property. The watercourse flows to the east, south of the existing access road, and flows south near a transmission line tower. It enters Craigflower Creek north of Watercourse 1.

Watercourse 2 is not shown on Town of View Royal (Town of View Royal 2020), CRD (CRD 2020b), and provincial (BC ECCS 2020c) mapping sources; however, a stream is present on CRD's mapping north of Kami Court. Connection between this stream and Watercourse 2 via the stormwater system and ditching network was confirmed through an additional site visit and municipal storm system information. The watercourse north of Kami Court appears to be a natural seasonal watercourse. Within the property, most of the watercourse is overgrown with grass, some sections are scoured with gravel and cobble substrate. The watercourse is seasonal, flowing during winter months (typically from October to May) as determined from site assessments. This connection confirms Watercourse 2 is a modified stream, not a ditch, as defined in the RAPR

Watercourse 2 is approximately 200 m long within the Project site boundaries and connects to Craigflower Creek. It may therefore contain the same species of fishes as Craigflower Creek; however, habitat is poor and flow is ephemeral, restricting potential use to high flow periods. Aerial photos show that the watercourse is a historical watercourse that has been channelized to clear water from the west side of Burnside Road West. The watercourse has an average width of 3.34 m and an average gradient of 4.5%. The watercourse generally has a straight alignment, with curves in some areas to parallel the access road. Fines and organics were the dominant substrate with riprap being subdominant. Small pockets of gravel were observed near the Burnside Road West culvert.



## BC TRANSIT VICTORIA HANDYDART FACILITY

### Description of Fish and Fish Habitat

July 5, 2021

No information of fish presence was found for Watercourse 2 and no fish were observed during the site surveys.

Cover was abundant throughout Watercourse 2 in the form of instream vegetation, primarily reed canary grass (*Phalaris arundinacea*), a few deep pools, and small woody debris. Banks were sloping and made of riprap and fines. In the lower section of Watercourse 2, the right (south) bank is formed by the riprap berm that contains Watercourse 1. A small wooden pedestrian bridge has been constructed over the ditch within the archery range. Tree cover is almost exclusively restricted to the downstream 50 m of Watercourse 2. Upstream of this area, vegetation consists of a narrow band (3–5 m) of Himalayan blackberry and reed canary grass. Beyond this band of vegetation, vegetation is limited to lawn and additional invasive species. Watercourse 2 is otherwise surrounded by the archery range and a gravel driveway/walkway.

Spawning habitat in Watercourse 2 is nil to poor, lacking adequate substrate. Habitat for other fish life stages is poor to moderate with abundant instream vegetation and a few deep pools that provide cover to fish. The moderate fish habitat is primarily in the downstream sections of the watercourse immediately upstream from Craigflower Creek with fish habitat becoming poorer in upstream areas with fewer pools and instream vegetation. No barriers to fish access were observed within Watercourse 2, therefore it is classified as default fish-bearing. However, seasonal flows and habitat quality may limit fish distribution to the lower section of the watercourse during higher flow conditions.

Photographs of Watercourse 2 are provided in the habitat report attached as Appendix A.

#### 5.2.2.5 Watercourse 3

Watercourse 3 will not be impacted by construction and is excluded from further discussion.

#### 5.2.2.6 West Side of Burnside Road

A poorly defined wetted area is located to the west of Burnside Road. It is largely dominated by Himalayan blackberry. As referenced, the retaining wall required to allow a sufficient turning radius from the facility will be installed on the bank of this area, displacing blackberry. However, there will be no requirement to contact the wetted perimeter.

### 5.3 HYDRAULIC CONDITIONS

Using the flow estimates discussed in Section 5.1.4, the new section of watercourse was designed to convey the 100-year runoff based on slopes of 0.5% and 2%. Using these slopes, a channel with 3:1 side slope and a bottom width of 1 m was required. The maximum depth that is estimated to occur during the 100-year event was calculated to be 0.73 m on the channel reach with a longitudinal slope of 0.5% for flow not restricted by the culvert under Burnside Road. However, with flow restricted by the culvert, this would result in a maximum depth of 1.13 m at one location within the proposed new channel when weirs are present.



## BC TRANSIT VICTORIA HANDYDART FACILITY

### Potential Effects on Fish and Fish Habitat

July 5, 2021

After further examination of the CSP culvert under Burnside Road, the maximum headwater that could occur based on the top of road elevation was 3.0 m. According to Google Maps street view, there is some depression at the upstream end of this culvert, so the probability of reaching a maximum headwater of 3.0 m is low. However, assuming an approximate slope of 5% in the culvert, and a maximum allowable head water of 3.0 m, the approximate maximum flow that can possibly occur through this culvert is 0.9 m<sup>3</sup>/s which is equal to the 2-year natural runoff from the upstream basin.

The preceding text was taken from the January 2021 report by Morrison Hershfield.

## 6.0 POTENTIAL EFFECTS ON FISH AND FISH HABITAT

This section provides a description of the potential effects of the Project on fish and fish habitat. Consideration has been given to how effects may cause the death of fish or the HADD of fish habitat. Specifically, this assessment focuses on the fish species present that may potentially be affected by the proposed construction, the extent and type of habitat that may be affected, and the probability, magnitude, geographic extent, and duration of these potential effects.

### 6.1 ASSESSMENT METHODS

Potential effects of the Project on fish and fish habitat were assessed qualitatively and quantitatively. Qualitative assessments were conducted using a weight of evidence approach; this using professional judgement based on an understanding of the potential effect, and the habitat use and life history of potentially affected fish species. The identification of effects on fish species and fish habitat included consideration of the following:

- Review of relevant literature pertaining to construction-based effects on freshwater creek habitats including best management practices, regulatory guidelines, and appropriate scheduling.
- Design drawings overlain on base maps. The outline of the various components of the Project footprint (new habitat, enhanced habitat, paved areas, etc.) were superimposed on recent aerial imagery to indicate those portions of the construction footprint below the normal high water mark (HWM – i.e., within the normal wetted perimeter of the channel) and above the HWM (i.e., riparian area).
- Review of the Project engineering drawings using a geographic information system (GIS) and computer-aided design (CAD) software to estimate area of impact, in square metres (m<sup>2</sup>), to wetted habitat and riparian habitat.
- Professional judgment based on experience with construction of new habitat and enhancement of existing habitat.
- An understanding of the type, quality, quantity, availability, and ecological functions of fish habitats (described in Section 5.2) that have the potential to be affected by Project activities and construction.

Project related effects on fish and fish habitat prior to the application of avoidance, mitigation or offsetting measures have been characterized using the criteria defined in Table 4.





**Table 4 Characterization Criteria for Effects on Fish and Fish Habitat**

Characteristic	Description	Quantitative Measure or Definition
<b>Probability</b>	The probability of an effect occurring	<p><b>Low</b> – there is a low probability of an effect on fish and fish habitat occurring because the potential interaction between the Project and fish and fish habitat is well understood and considered not probable to occur.</p> <p><b>Medium</b> – there is a medium probability of an effect on fish and fish habitat because the potential interaction between the Project and fish and fish habitat is either not well understood or is somewhat understood and that effect is considered moderately probable to occur.</p> <p><b>High</b> – there is a high probability of an effect on fish and fish habitat because the potential interaction between the Project and fish and fish habitat is not understood and conservatively assumed to be highly probable to occur or is well understood and that effect is considered highly probable to occur.</p>
<b>Magnitude</b>	The amount of change relative to existing conditions or intensity or severity of the effect	<p><b>Low</b> – no measurable effect to fish populations or fish habitat</p> <p><b>Moderate</b> – a measurable effect to fish or fish habitat but does not have potential to adversely affect the ongoing productivity or sustainability of fish populations</p> <p><b>High</b> – a measurable effect to fish or fish habitat that has potential to adversely affect the ongoing productivity or sustainability of fish populations</p>
<b>Spatial Extent</b>	The geographic area where an effect is expected to occur	<p><b>Immediate</b> – effects restricted to Project footprint or &lt; 5 metres from the work area</p> <p><b>Local</b> – effects extend into the channel immediately adjacent to the tie-in locations</p> <p><b>Regional</b> – effects extend beyond the crossing downstream of Highway 1</p>
<b>Duration</b>	Period when effects can no longer be measured	<p><b>Short-term</b> – the effect is limited to a portion of the construction period and is non-permanent</p> <p><b>Medium-term</b> – the effect is limited to the duration of the construction period and is non-permanent</p> <p><b>Long-term</b> – the effect extends beyond the construction period and is permanent</p>

## 6.2 DESCRIPTION OF POTENTIAL EFFECTS ON FISH

The instream component of construction will interact with aquatic habitat as follows:

- Construction of new stream habitat (new Watercourse 2 channel)
- Improved connection of existing habitat to Craigflower Creek (low gradient habitat connecting new Watercourse 2 to Craigflower Creek)
- Riparian enhancement (new and enhanced habitat)
- Channel infill (upper section of Watercourse 2)



## BC TRANSIT VICTORIA HANDYDART FACILITY

### Potential Effects on Fish and Fish Habitat

July 5, 2021

The proposed work has the potential to cause both direct and indirect impacts to fish. Direct impacts consist of the loss of fish associated with completing the construction and tie-in of new habitat to Craigflower Creek. The infilling of existing Watercourse 2 may also cause direct impacts although it is likely that fish presence is limited to the lower reach of the channel.

Indirect negative effects to fish may be experienced through a change in downstream water quality due to site isolation, a hydrocarbon spill, and/or erosion and subsequent sedimentation during construction. The loss of the upper section of Watercourse 2 may also result in a reduction in food and nutrients, although it is anticipated that this effect will be limited given the general poor quality of habitat in this section. Noise from construction equipment may also have a negative effect although this will likely be very limited.

Direct and indirect negative effects to fish habitat may also be experienced. Direct effects will include the infilling Watercourse 2 and the temporary loss of riparian vegetation required for construction access and the planting of native vegetation. Indirect effects include the potential for sedimentation in the sections of Craigflower Creek downstream from the Project area.

Instream activities and the identified effects are outlined in Table 5. Each effect is described and has been characterized prior to considering mitigation measures.

**Table 5 Project Components and Potential Effects on Fish Prior to Mitigation**

Project Component	Effect	Habitat/Project Component	Effects on Fish
Construction of new habitat	Direct	Watercourse 2	Mortality or injury of fish during tie-in of new fish habitat, assuming fish are present
	Indirect		Changes in water quality if a spill or sedimentation occurs
Improved habitat connectivity	Direct	Craigflower Creek	Mortality or injury of fish during tie-ins of Watercourse 1 and/or 2
	Indirect		Changes in water quality if a spill or sedimentation occurs
Channel infill	Direct	Watercourse 2	Mortality or injury of fish, if present
General construction	Indirect	Craigflower Creek	Sensory disturbance may impact fish

Additional discussion of the potential effects to fish is provided in Section 6.2.2.

To provide context, a description of the fish species that are potentially affected by the Project has been provided in Section 6.2.1 The species discussed are potentially present in the Project area, based on the results of the field surveys and information compiled through a review of available literature. Effects that have the potential to result in fish mortality have been identified and are discussed further in Section 6.3.



## BC TRANSIT VICTORIA HANDYDART FACILITY

### Potential Effects on Fish and Fish Habitat

July 5, 2021

#### 6.2.1 Description of Fish Species with Potential to be Affected by the Project

Fish species of management concern known to use habitat in the Project area for all or some part of their life history are listed in Table 6, each of which has the potential to be impacted by construction without implementation of Project-specific mitigation measures. These species are mobile and are likely to move away from construction once equipment has mobilized to the site in the vicinity of Craigflower Creek. It should be noted that absence of observations does not rule out the possible presence of a species, but does indicate, that after the field surveys, the species is potentially sparse.

**Table 6 Fish Species and Habitat Use Overlapping and Adjacent with the Project**

Common Name	Scientific Name	Life Stage	Observed During Field Surveys	Reference
Coho salmon	<i>Oncorhynchus kisutch</i>	A, J	Yes	Stantec 2020
rainbow trout/ steelhead	<i>Oncorhynchus mykiss</i>	A, J	No	HabitatWizard 2020
coastal cutthroat trout	<i>Oncorhynchus clarkia clarkii</i>	A, J	No	HabitatWizard 2020
Sculpin	-	A, J	No	HabitatWizard 2020
NOTES: A = adult J = juvenile				

The effects of construction on introduced species (smallmouth bass, pumpkinseed, and brown catfish) have not been considered.

#### 6.2.2 Characterization of Effects on Fish

The following sections provide greater detail of the potential effects of the Project on fish before avoidance and mitigation measures are implemented to protect fish. These potential effects on fish consist of mortality or injury during site isolation for tie-ins and channel infill; changes in water quality due to spills or sedimentation; and construction noise. This includes discussion of the effects criteria outlined in Section 6.1 (Table 4). Proposed mitigation measures to address potential effects on fish are described in Section 7.0.



#### **6.2.2.1 Mortality or Injury**

Prior to the implementation of mitigation, direct mortality or injury of fish may result when site isolation is established to complete tie-ins of new habitat to Craigflower Creek and Watercourse 2. Fish are expected to vacate an area during mobilization of construction equipment to a tie-in location or the initiation of site isolation. Regardless, there is potential that less mobile juvenile fish may be entrained within an isolated section of channel or directly affected by the barriers installed to isolate a channel. The site surveys determined that it is unlikely that spawning occurs in the Project area (Sections 5.2.2.2 and 5.2.2.3), as spawning habitat was not identified in either channel.

Based on these factors, the probability of the direct loss of fish is low, even without mitigation. The magnitude would also be low as a population level effect would not be anticipated. The spatial extent would be limited to the immediate vicinity of the section of channel isolated. Finally, the duration of the effect would be short-term and only experienced during construction which is anticipated to require approximately three months to complete.

#### **6.2.2.2 Changes in Water Quality**

Prior to mitigation, there are two potential means by which water quality could be negatively affected by the proposed construction. Firstly, instream enhancement or channel infill could generate sediment if erosion and sediment control is lacking. In addition, construction can result in spills of deleterious substances, such as oils and or water contaminated with cement.

Sediment mobilization can disrupt and alter fish behaviour and, if in high enough concentrations, can result in injury or death. These effects include gill damage which can reduce the potential for oxygen intake. Sediment plumes can also obscure vision making it more difficult for fish to identify and capture prey items and detect and evade predators. Sediment can also settle in low gradient areas and smother eggs in spawning redds, if any are present with Craigflower Creek downstream (south) of Highway 1.

Spills of hydrocarbons can have lethal or sub-lethal effects if discharged to the water column in high enough concentrations. Water that comes in contact with recently poured concrete can elevate pH levels to levels that can negatively impact fish (i.e., >9.0 [BC MoE 1991]).

The probability of generating sediment without mitigation is considered to be medium, particularly at the point of connectivity of Watercourse 2 to Craigflower Creek. The magnitude would be considered moderate as sedimentation could have a measurable effect to individual fish immediately downstream although not large enough of an effect to have an impact at a population level. The spatial extent would be considered regional as sediment under typical flow conditions at the site would likely be conveyed to downstream sections of Craigflower Creek and potentially the ocean. However, the effect would be expected to be of short-term duration.



**6.2.2.3 Construction Noise**

Project activities that generate noise can also cause behavioral changes in fish (e.g., excavator buckets in a channel, equipment mobilization, etc.). Behavior changes can include adjustments to breathing rates, increase in time spent under or at the water surface, changes in swimming direction or speed, and displacement or avoidance of habitat (Mueller-Blenkle et al. 2010). Fish close to the Project Area would be potentially affected by noise. Behavior change in the form of relocation is the most likely result of noise effects as all fish species of concern in Craigflower Creek are mobile and can readily move away from the noise source.

The probability of behavioural changes occurring because of construction noise is considered to be medium as any fish in the area will likely be affected. However, the magnitude is considered to be low given that population level impacts are not anticipated. The spatial extent is limited to the immediate location of the Project footprint. Finally, the duration will be short-term (i.e., only for the duration of a portion of construction estimated at four weeks).

**6.2.2.4 Effects Characterization Summary**

A summary of effects characterization prior to mitigation is provided in Table 7. Effects that have the potential to result in the direct death of fish, without mitigation, are described further in Section 6.3.

**Table 7 Characterization of Effects on Fish Prior to Avoidance and Mitigation Measures**

Potential Effect Prior to Avoidance and Mitigation	Probability	Magnitude	Spatial Extent	Duration
Mortality or injury to fish	Low	Low	Immediate	Short-term
Changes in water quality	Medium	Moderate	Regional	Short-term
Behavioural changes from construction noise	Medium	Low	Immediate	Short-term

**6.3 DESCRIPTION OF POTENTIAL EFFECTS ON FISH HABITAT**

Clearing for access, construction or enhancement of habitat, improved connectivity, and channel infill all have the potential to result in direct and indirect effects to fish habitat prior to the implementation of mitigation as outlined in Table 8. These impacts consist of a permanent or temporary loss of instream and riparian habitat function, a temporary reduction in fish access (Watercourse 2), and changes in water quality. Each potential effect in Table 8 is identified and characterized prior to mitigation.



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### Potential Effects on Fish and Fish Habitat

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**Table 8 Project Components and Potential Effects on Fish Prior to Mitigation**

Project Component	Effect	Habitat/Project Component	Effects on Fish Habitat
Construction of new habitat	Direct	Watercourse 2	Fish habitat loss (riparian vegetation) required for site access and to complete tie-ins
Improved habitat connectivity	Direct	Craigflower Creek Watercourse 2	Temporary loss of instream and riparian fish habitat function during construction
	Indirect	Craigflower Creek	Disruption of water quality if a spill or sedimentation occurs
Channel infill	Direct	Watercourse 2	Direct loss of existing instream and fish habitat (riparian vegetation)
Riparian enhancement	Direct	Watercourse 2 Craigflower Creek	Temporary loss of fish habitat function (riparian vegetation) during installation
Riparian removal	Indirect	Craigflower Creek	Removal of vegetation at connection to Craigflower Creek could temporarily disrupt water quality

### 6.3.1 Description of Fish Habitat Potentially Affected

Based on the results of the desk-top review and field assessments conducted at the site, there are five main habitat types that may be affected within the Project area as shown on Figure 3:

- Permanently wetted, fish-accessible habitat supported by Craigflower Creek. With the Project area, Craigflower Creek has a riffle-pool morphology with an irregular meandering channel pattern. The dominant substrate is organics and the subdominant substrate is fines. Gravels were present but in limited amounts. Spawning habitat at the Project site is poor due to the lack of gravel and cobbles. Habitat for other life stages of fish (e.g., overwintering, rearing, migration) is good to excellent due to the abundance of instream cover such as deep pools and large woody debris.
- Ephemeral, fish-accessible habitat supported by the lower reach of Watercourse 2. It is likely that the upper reach of the channel is not accessible due to constraints such as seasonal flow and poor habitat value. Within the Project site, most of the watercourse is overgrown with grass, some sections are scoured with gravel and cobble substrate. The watercourse generally has a straight alignment. Fines and organics were the dominant substrate with riprap being subdominant. Spawning habitat in Watercourse 2 is nil to poor, lacking adequate substrate. Habitat for other fish life stages is moderate with abundant instream vegetation and a few deep pools that provide cover to fish.



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### Potential Effects on Fish and Fish Habitat

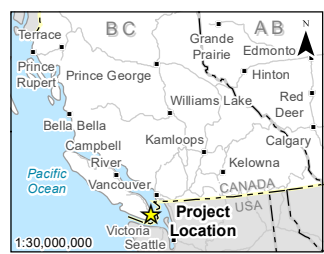
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- Non-fish accessible, ephemeral habitat consisting of Watercourse 1 and the upper reach of Watercourse 2. Watercourse 1 a roadside ditch that is not accessible due to a riprap berm surrounding a pool at its downstream end with no confirmed connectivity to either Craigflower Creek or Watercourse 2. It is assumed that water from Watercourse 1 pools and infiltrates to ground at the east end of the ditch. As referenced, Watercourse 2 generally has a straight alignment, with curves in some areas to parallel the access road. Fines and organics were the dominant substrate with riprap being subdominant. Small pockets of gravel were observed near the Burnside Road West culvert. Spawning habitat in Watercourse 2 is nil to poor, lacking adequate substrate. Habitat for other fish life stages in the upper reach is poor with abundant instream vegetation and a few deep pools that provide cover to fish.
- Riparian habitat largely dominated by shrubs and invasive vegetation, specifically Watercourse 1 and the upper reach of Watercourse 2. Overhead cover in Watercourse 1 is provided primarily by Himalayan blackberry and deciduous trees. The vegetation adjacent to Watercourse 2 consists of a narrow band (3–5 m) of Himalayan blackberry and reed canary grass. Beyond this band of vegetation, vegetation is limited to lawn and additional invasive species.
- Riparian habitat with greater tree cover and a higher percentage of native vegetation at Craigflower Creek and the lower reach of Watercourse 2. Tree cover primarily consisted of deciduous species in the pole sapling stage. The shrub layer was primarily salmonberry with a herb layer consisting of skunk cabbage, lady fern, horsetail, and white fawn lily. The invasive species present were primarily creeping buttercup with minor amounts of English holly, teasel, and Himalayan blackberry.

#### 6.3.2 Characterization of Effects on Fish Habitat

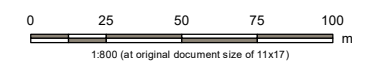
The following sections describe the potential effects of the Project on fish habitat prior to mitigation.





- Transmission Line
- Local Greenspace
- New Habitat**
- Pool
- Instream/Pool
- Instream
- Riparian
- Pooling Water
- Limit of Disturbance
- Alteration**
- Gain
- Alteration
- Loss

**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 10N  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada



Client/Project/Report  
 BC Transit  
 Greater Victoria HandyDART Facility  
 Fisheries Act Authorization Application

Figure No.  
**3**  
 Title  
**Existing and Planned Watercourse Alterations and Impacts**

S:\1232\project\123220971\FAA\_003\_Existing\_and\_Planned\_Watercourse\_Alterations\_and\_Impacts.mxd Revised: 2021-04-12 By: LTRUDEL



#### **6.3.2.1 Fish Habitat Loss**

The loss of approximately 970 m<sup>2</sup> of low quality, non-fish accessible instream habitat is anticipated due to the infill of the upper reach of Watercourse 2. The probability of a loss of instream habitat due to channel infill is anticipated to be high. However, the magnitude would be moderate as the potential to affect fish populations is not anticipated. The spatial extent will be immediate as it will be limited to an area less than 5 m from the work zone. The duration will be long-term as instream habitat will be permanently lost.

Channel infill will also result in the loss of low-quality riparian habitat dominated by invasive species and lawn along the upper reach of Watercourse 2. Low quality riparian habitat totalling will also be lost at the tie-ins for the new channel habitat to Watercourse 2. The total impact at these two locations is estimated at 3,614 m<sup>2</sup>. The probability of an effect occurring for tie-ins and infilling will be high. The magnitude is considered to be low as there will likely be no measurable effect on the ongoing sustainability of fish populations. The spatial extent will be limited to the immediate area. The duration is expected to be long-term as vegetation loss will be permanent in the absence of mitigation.

#### **6.3.2.2 Habitat Disruption**

Habitat disruption is distinct from habitat loss in that recovery of habitat is anticipated over a relatively short duration as new and restored habitat becomes functional. The new channel for Watercourse 2 and the improved connectivity of Watercourse 2 to Craigflower Creek are anticipated to cause a habitat disruption in that there will be a temporary loss of habitat availability. In addition, there will be a loss of vegetation associated with site access and construction. However, new and enhanced instream habitat will be available in the near term once the connection to Craigflower Creek is established. Additionally, native vegetation will be installed to quickly re-establish riparian function. This habitat is detailed in Section 1.3.

It is estimated that habitat disruption will affect approximately 37 m<sup>2</sup> of instream habitat. The instream habitat is located at the downstream end of the newly constructed channel. This habitat will be taken offline from the main flow. As such, its habitat function will remain but be reduced.

Riparian habitat is largely low value, consisting primarily of invasive species. Higher value riparian habitat is supported on the lower reaches of Watercourse 2 at the tie-in point to Craigflower Creek. Approximately, 236 m<sup>2</sup> of riparian habitat will be disrupted for site access for construction. However, this area will be revegetated with native species and full recovery of habitat function is anticipated.

The probability of habitat disruption is expected to be high. The magnitude is expected to be moderate given that the effects will be quantifiable but are not expected to impact productivity. The spatial extent is expected to be local as effects are expected to extend into Craigflower Creek in the immediate vicinity of the tie-in of constructed habitat. The duration is expected to be medium-term as the restoration of habitat function is anticipated at the end of construction.



**6.3.2.3 Effects Characterization Summary**

Characterization of potential effects on fish habitat prior to mitigation is provided in Table 9.

**Table 9 Characterization of Effects on Fish Habitat Prior to Avoidance and Mitigation Measures**

Potential Effect	Project Component	Probability	Magnitude	Extent	Duration
Habitat Destruction	Infill of upper reach of Watercourse 2	High	Moderate	Immediate	Long-term
	Removal of vegetation	High	Low	Immediate	Long-term
Habitat Disruption	Temporary loss of instream and riparian habitat function	High	Moderate	Local	Medium-term

**7.0 MEASURES AND STANDARDS**

In completing the design for the proposed habitat construction and enhancement, the proponent has considered the potential impacts to fish and fish habitat through the application of the Hierarchy of Measures for the Conservation and protection of Fish and Fish Habitat outlined in DFO’s “Policy for Applying Measures to Offset Adverse Effects on Fish and Fish Habitat Under the *Fisheries Act*” (DFO 2019b). The Hierarchy requires, in order of preference, designing a proposed Project to avoid impacts where possible (either by relocating the Project or scheduling the Project to when fish or fish habitat are not present), mitigating the impacts when avoidance is not possible, and offsetting any unavoidable death of fish or habitat losses or disruptions where avoidance and mitigation cannot completely remove the impacts.

**7.1 AVOIDANCE MEASURES**

The facility has been designed to avoid impacts to fish habitat to the extent possible. Watercourse 2 will be enhanced, Watercourse 3 will not be affected, and the impacts to Craigflower Creek will be limited to the tie-in location. However, given the nature of the proposed Project and the site, potential interactions with fish and fish habitat cannot be avoided. This is primarily related to the requirement to infill the upper reach of Watercourse 2 to allow for construction to proceed as designed. Reach 3 of the new Watercourse 2 channel is also planned to be designed partially during construction with the channel location placed between existing established trees where possible to create natural meanders and limit the extent of tree clearing within the Craigflower Creek riparian zone.

Given the proposed timing of the work, the work will be scheduled to avoid inclement weather for the instream component of the Project to the extent possible. As stated in Section 1.2.1, instream work is anticipated to extend into November.



## 7.2 MITIGATION MEASURES

Table 10 summarizes the mitigation measures that will be applied to reduce potential effects to fish during construction of the proposed Project. Table 11 summarizes the mitigation measures that will be applied to reduce potential effects to fish habitat during construction of the proposed Project.

**Table 10 Mitigation Measures to be Used to Reduce Potential Effects to Fish**

Mitigation Measure	Mitigation Description	Likely Effectiveness
Limited in-water work	In-water construction will be limited to the tie-ins to Craigflower Creek and existing Watercourse 2. The majority of works will be conducted in the dry (e.g., construction of new habitat / enhancement of isolated habitat).	High
Isolation of Work Area	Given that the tie-in to Craigflower Creek is proposed outside of the least risk window, additional care will be required to limit the potential for downstream impacts. The following mitigation will be applied: <ul style="list-style-type: none"> <li>Isolation of the tie-in will be completed during a weather window when rain is not in the forecast.</li> <li>A coffer dam consisting of sandbags will be installed around the tie-in point. The size of the coffer dam will be limited to the size required to complete the work. Given the width of Craigflower Creek at this location, it is anticipated that this will have no noticeable effect on water levels or flow.</li> <li>The tie-in will be completed as quickly as possible and the area stabilized, after which the coffer dam will be removed.</li> </ul>	High
Fish Salvage	Fish salvages will be conducted for Watercourse 2 and the tie-in to Craigflower Creek. The salvage will include the upper reach of Watercourse 2 even though fish presence is not anticipated. Given the substrates present, salmonid spawning is not anticipated.	High
Sediment and Erosion Control Plan	A sediment and erosion control plan has been developed as a component of the Construction Environmental Management Plan (CEMP) prepared for this Project. This plan will include measures specifically tailored to the conditions at the site and will use best management practices for similar conditions as those present in other small watercourses.	High
Spill Response Plan	Spill response is included in the Project-specific CEMP.	High

Fish salvages will be required for Craigflower Creek and Watercourse 2. The applicable sections of channel will be isolated with block nets to prevent fish ingress during and after the salvage. Isolating barriers will be installed upstream and downstream of the instream work locations. Flow will be directed around the isolated sections with pumps that will discharge to a hard surface for energy dissipation. The pump intakes will be screened consistent with DFO’s Interim code of practice: End-of-pipe fish protection screens for small water intakes in freshwater (DFO 2020). After flow is diverted, salvages will be completed in the isolated sections. Salvages will be completed using an electrofisher, minnow traps, seine nets and/or dipnets as appropriate to the conditions at the time of the salvage.



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### Residual Effects on Fish and Fish Habitat

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**Table 11 Mitigation Measures to be Used to Reduce Potential Effects to Fish Habitat**

Mitigation Measure	Mitigation Description	Likely Effectiveness
Sediment and Erosion Control Plan	A sediment and erosion control plan has been developed as a component of the Construction Environmental Management Plan (CEMP) prepared for this Project. This plan will include measures specifically tailored to the conditions at the site and will use best management practices for similar conditions as those present in other small watercourses.	High
Spill Response Plan	Spill response is included in the Project-specific CEMP.	High
Staging areas	Previously disturbed areas will be used for staging and laydown to limit the potential for the generation of sediment or disturbance of vegetation.	High
Site access	The site will be accessed from previously cleared areas to limit impacts to onsite vegetation	High
Construction material	Material placed instream for new or enhanced habitat will be washed of silt prior to placement; this will reduce the potential for sedimentation when flow is re-introduced.	High
Site isolation	Site isolation will be established where flow is present. Flow will be directed around the site with screened pumps. Sediment-laden water accumulating within the isolated sections will be pumped to a vegetated area to allow sediment to settle. Isolation will be removed slowly to allow the flow to return to the channels. The downstream isolating barriers will be retained until any sedimentation generated by the restoration of flow has settled.	High
Riparian planting	A seed mix will be used on exposed soil to generate vegetative growth as quickly as possible to reduce the potential for the mobilization of sediment. Native trees and shrubs will subsequently be installed.	Moderate

It should be noted that the DFO Hierarchy of Effects is similar to FLNRORD's Environmental Mitigation Policy (FLNRORD 2014), the steps of which are avoid, minimize, restore and offset.

## 8.0 RESIDUAL EFFECTS ON FISH AND FISH HABITAT

After consideration of avoidance and mitigation measures, Project activities are not expected to result in the death of large numbers of fish. It is possible that a small number of fish could suffer mortality or injury directly from instream works or indirectly from construction noise and changes in water quality. While the death of individual fish cannot be completely guaranteed, the mitigation measures that will be implemented will significantly reduce the likelihood of fish mortalities or injury such that offsetting for the death of fish is not warranted.



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### Residual Effects on Fish and Fish Habitat

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Despite the avoidance and mitigation measures described in Section 7.0, the HADD of fish habitat due to construction of the Project cannot be completely avoided. The mechanisms for the unavoidable HADD of fish habitat include:

- Direct loss of instream habitat due channel infill.
- Direct loss of riparian habitat from channel infill and for access to construct or enhance habitat.

Calculations for the direct loss of riparian and instream habitat was completed using AutoCAD by overlaying the channels designs onto aerial ortho-images to generate the calculated impacts outlined in Section 6.3.2.1.

Habitat disruption will also be experienced due to a temporary loss of instream and riparian habitat function. Changes in water quality could also disrupt habitat (e.g., through sedimentation).

Table 12 characterizes the potential residual effects associated with the construction of the proposed Project after the implementation of mitigation. The assessment criteria are outlined in Table 4 in Section 6.1.



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Residual Effects on Fish and Fish Habitat  
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**Table 12 Summary of Residual Effects on Fish and Fish Habitat**

<b>Effect</b>	<b>Mechanism</b>	<b>Spatial Extent of Effect</b>	<b>Probability</b>	<b>Magnitude</b>	<b>Spatial Extent</b>	<b>Duration</b>	<b>Mitigation Measures</b>	<b>Habitat Offsets Proposed</b>
Fish Mortality or Injury	Instream construction or channel isolation	0 m <sup>2</sup>	Low	Low	Immediate	Short-term	Section 7.0	No
Changes in water quality	Discharges to the creek; increased sun exposure	Craigflower Creek downstream of the site	Low	Low	Local	Short-term		
Behavioural changes from construction noise	Construction equipment and personnel	Immediately adjacent to construction	Low	Low	Local	Short-term		
Habitat Destruction	Channel infill	970 m <sup>2</sup>	High	Moderate	Immediate	Long-term	Sections 7.0 and 9.0	Yes
	Removal of vegetation	1,402 m <sup>2</sup>	High	Moderate	Immediate	Long-term		
Habitat Disruption	Changes in water quality	Craigflower Creek downstream of the site	Low	Low	Local	Short-term	Section 7.0	No
	Temporary loss of habitat function	236 m <sup>2</sup>	High	Low	Immediate	Short-term	Sections 7.0 and 9.0	



### 9.0 OFFSET PLAN AND HABITAT BALANCE

The strategy proposed for the infilling of the upper reach of Watercourse 2 aims to mitigate Project-related impacts on fish and fish habitat through construction and enhancing valuable fish habitat that will benefit local fish species in Craigflower Creek and adjacent tributaries. The goal of the proposed offset measures will be to generate a net gain of high-value fish habitat through creating new habitat, enhancing existing habitat and improving access for fish. Riparian offsetting will also be targeted for the new and enhanced habitat. The proposed fish habitat offset Project is consistent with DFO's guiding principles for measures to offset for the protection of fish and fish habitat:

- **Principle 1:** Measures to offset should support fisheries management objectives and give priority to the restoration of degraded fish habitat. Craigflower Creek provides habitat for several fish of management concern including Coho salmon, rainbow trout and cutthroat trout.
- **Principle 2:** Benefits from measures to offset should balance the adverse effects resulting from the works, undertakings or activities. Loss of instream and riparian habitats will be offset by replacement with new habitat.
- **Principle 3:** Measures to offset should provide additional benefits to the ecosystem. The proposed offsetting measures create additional, fish-accessible habitat (i.e., the entirety of Watercourse 2 rather than just the lower reach of Watercourse 2). The replacement of invasive vegetation with native species will also improve habitat. In addition to the benefits to fish populations, the offsets will benefit the general biodiversity and productivity on the property.
- **Principle 4:** Measures to offset should generate self-sustaining benefits over the long term. The proposed offsetting measures are designed to be improve overall instream habitat quality through an improvement of channel complexity, additional accessible habitat, and an increase in overall habitat productivity through the installation and enhancement of riparian vegetation.

In developing the offset habitat plan, BC Transit has applied the equivalency metrics outlined in DFO's Science Advice on the Determination of Offset Requirements for the Fisheries Protection Program (2017). As outlined in this document, there are seven equivalency metrics that are utilized to determine offsetting requirements. The offsetting strategy outlined in this section focuses primarily on the first metric of "in-kind" or "like-for-like" habitat replacement.

The habitat balance (Section 9.3) indicates that the primary habitat impact will be to instream habitat that is likely not fish accessible along with its associated riparian vegetation. The offsetting plan focuses on the construction and enhancement of in-kind fish habitat, both instream and riparian.



### 9.1 OFFSET PLAN

As referenced, BC Transit is proposing to offset all alteration and loss of fish habitat from the Project through instream construction and enhancement and the installation of riparian vegetation. The specifics of the design are described below.

#### 9.1.1 Offset Design – Instream

Currently, flow is conveyed under Burnside Road into the upper reach of Watercourse 2 via a culvert set at an invert elevation of 10.69 m. A new channel will be constructed along the east side of Burnside Road then along Highway 1 along the approximate current location of Watercourse 1 (NCD) and then connecting to Craigflower Creek. All flow from the culvert at Burnside Road will be diverted into the new channel, as well as any flow from the culvert feeding Watercourse 1. The upper section (Reach 1) of this watercourse will be constructed as a 10-m long pool with a weir at the downstream extent with a crest elevation of 10.59 metres. The pool will be constructed with a bottom set at 10.29 m (i.e., the pool will be 0.3 m in depth). Given that the normal pool elevation is only 0.1 m below the culvert invert, this may promote fish access upstream of Burnside Road.

Reach 1 will be 35 m in length, set a 0.0% grade, and with an invert set at 10.29 metres. The channel width will be 1 m at the invert. Channel slopes will be 3:1 (H:V). A second weir will be constructed and set at an elevation of 10.69 metre (i.e., the channel will be 0.4 m in depth). This will be followed by a 50-m section of channel set at a 0.5% grade. It will be 1 m in width at the invert and the end of the reach is approximately at the upstream end of the existing Watercourse 1.

Reach 2 is located approximately where the existing Watercourse 1 is located. Watercourse 1 (NCD) will be removed and reconstructed to provide improved fish habitat. The existing riprap forming the channel banks and invert will be removed. The channel will be complexed by seven weirs set at a frequency of one weir per 14.2 linear metres. Each weir will be 0.3 m in height. The average channel grade will be 2%. The total length for this section of channel will be 100 m. Channel width will be 1 m at the invert.

Reach 2 of new Watercourse 2 will be 42 m in length and reconstructed with a series of eight weirs set at a frequency of one per 6 linear metres. The average channel grade will be 5.0% with a width of 1 m at the invert.

The crest of each weir will be set at an elevation of 0.3 m above the invert of the channel. A typical weir will be constructed of three rocks with an average diameter of 400-500 mm which with their bases partially embedded within the underlying substrate consisting of imported clay or approved native material. Each weir will incorporate angular gravel (2-100 mm diameter) and round river rock (100 mm minus to 200 mm) to form a weir approximately 3 m in length (i.e., parallel to flow). The cobble and gravel will form a riffle to aerate the water column.





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The channel will be constructed in a sinuous manner. Rock and cobble substrate will be placed on the invert of the new sections of channel. Instream complexity will include large woody debris (LWD) which will be incorporated throughout the new channel. This LWD will consist of logs in 4- to 6-m lengths, some of which will have intact root mass. The logs within or immediately adjacent to the wetted perimeter will be placed on rock ballast. Additional complexity will be provided by boulders measuring 400–600 mm diameter placed in the channel in groups of one to three.

Reach 3 is the lower section of the new Watercourse 2 and will consist of a wetland. It will be approximately 1 m deep with a southwest to northeast orientation. The wetland will discharge via short channel set with four closely spaced weirs into Craigflower Creek. Reach 3 of the new Watercourse 2 channel is also planned to be designed partially during construction with the channel location placed between existing established trees where possible to create natural meanders and limit the extent of tree clearing within the Craigflower Creek riparian zone.

Design drawings for the new channel and weir structures are provided in Appendix B.

The proposed instream habitat enhancements will allow for the construction of the new Watercourse 2 to form a series of pools by the placement of weirs throughout the channel. These pools will provide refugia for fish. The channel will be lined with a cobble and gravel substrate which will provide habitat for the establishment of benthic invertebrates. The weirs will also create riffle habitat which is expected to improve aeration of the water column.

As referenced, the channel will be complexed with woody debris. Ideally, the Contractor will be able to salvage native material from the site that has been removed for access and sufficient working room. However, native woody material will be imported from offsite if required.

The proposed pool at the upper end of Watercourse 2 will serve to uptake and breakdown pollutants that may be present in the water column from upstream stormwater catchment areas. It will also provide a food and nutrient input to Craigflower Creek.

The proposed low gradient reach at the downstream end of Watercourse 2 will serve as overwintering/reading habitat for juvenile salmonids and be designed to provide an extended floodplain during periods of high precipitation. This area will also become valuable habitat for amphibians and invertebrates as it will remain wetted for longer periods of time than the other reaches. Reach 3 of the new Watercourse 2 channel will also be field-fit during construction with the channel location placed between existing established trees where possible to create natural meanders and limit the extent of tree clearing within the Craigflower Creek riparian zone.

### 9.1.2 Offset Design – Riparian

Riparian enhancement will take place through the installation of native riparian species along the new sections of Watercourse 2. This will have the added benefit of supplanting the existing invasive vegetation. This will also serve to stabilize the banks, provide food/nutrient input, provide shade and a source of woody debris, and filter runoff. The vegetation design is provided in Appendix B.



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The vegetation will be installed in six zones consisting of the following:

- Maintenance access area located at the upstream extent of the new watercourse.
- Upland sun zone located on the north side of the channel where it is oriented east-west and for both sides of that section of channel oriented north-south.
- Upland shade zone located on the south side of the channel where it is oriented east-west.
- Riparian zone immediately adjacent to the wetted perimeter.
- Wetted forest zone near Craigflower Creek.
- Upland riparian zone near Craigflower Creek.

A mixture of native trees and shrubs will be installed on the banks of the channel. Wetland species will be installed where the moisture regime is anticipated to result in wet soils for the majority of the year and within the downstream wetland.

It is anticipated that the revegetation will largely consist of nursery stock (potted and ball & bag). Plants will be installed in individual holes approximately twice the diameter of the root ball. Imported topsoil will be used around each root ball. Native soil may be utilized if it is of sufficient quality. All offsetting habitat would be located within 30 m of the HWM, within the riparian areas, adjacent to sections of the channels that are wetted under normal flow conditions (Figure 3).

Concepts for the installation of riparian function includes seeding, matting, and planting of nursery and/or transplanted stock in areas either currently lacking in significant riparian vegetation or dominated by invasive species. A suitable layer of imported topsoil of varying depth would be installed with seed applied. If it is determined that erosion control matting is required it will be biodegradable (e.g., biodegradable straw matting or coir matting, depending on location) and secured with biodegradable stakes according to manufacturer's specifications.

Plant stock would be installed at locations that promote its establishment based on the levels of available light and moisture. Hydrophilic plants are proposed closer to the wetted perimeter of the channel and within the wetland. Shade tolerant species would be installed on sections of bank with a north facing aspect.

Installed vegetation will receive one year of watering, pruning, and maintenance after substantial completion.

Detailed revegetation plans, including installation diagrams, are provided in Appendix B.

Although there will be a time lag for the riparian habitat to fully establish, fish will be able to obtain benefits from the offset habitat area immediately after planting and stabilizing local creek banks. The vegetation will also help stabilize the channel.



## BC TRANSIT VICTORIA HANDYDART FACILITY

### Offset Plan and Habitat Balance

July 5, 2021

Soil will be seeded with a hydroseed mixture incorporating native species that are appropriate to the area and site conditions to promote rapid initial establishment of vegetation and its associated stability. The specific seed composition and application rate will be developed in consultation with a contractor specializing in hydroseed application.

#### 9.1.3 Offset Construction

The majority of habitat offset construction will take place on property owned by the BC Transportation Financing Authority and leased to BC Transit; a small portion along the west and south sides of the Project site will be constructed in the Ministry of Transportation and Infrastructure right-of-way. As indicated, work will be required outside of the applicable least risk window but it is anticipated that this will be either construction of new habitat in isolation of Watercourse 2 or the infilling of the upper reach of Watercourse 2 after it has been isolated from the lower reach. Work will be conducted “in the dry” with flow being isolated and pumped around if it is present. Creation of the offsetting habitat is not expected to have significant adverse effects on the surrounding environment.

#### 9.1.4 Offset Benefits

Construction of the proposed offset habitat will benefit fisheries resources in the immediate vicinity of the site through the creation of additional fish-accessible habitat, improved instream habitat complexity, improved refugia, and enhanced riparian habitat function (shade, food and nutrient input from leaf litter and insects, bank stability). The ongoing maturity of riparian vegetation is also expected to provide long-term benefits, initially through bank stabilization and a source of food/nutrients and then via the production of LWD.

## 9.2 HABITAT BALANCE

Areas for habitat losses and gains (i.e., the balance) were determined based on calculations from the most recent AutoCAD designs for the site. The HWM was drawn based on the edge of the vegetation line to demarcate between riparian vegetation and instream habitat, identified during field visits. Based on these calculations, the Project will result in a total of 4,584 m<sup>2</sup> of altered or destroyed instream and riparian habitat (970 m<sup>2</sup> and 3,614 m<sup>2</sup>, respectively). To offset this loss, BC Transit will build a new channel, enhance existing instream habitat with weirs, construct a wetland, and install native plants in the riparian areas of new or enhanced habitat (Table 13).



## BC TRANSIT VICTORIA HANDYDART FACILITY

Offset Plan and Habitat Balance

July 5, 2021

**Table 13 Summary of Offsetting Habitat**

Impacted Habitat	Offset Habitat	Rationale
Instream habitat	New channel habitat	<ul style="list-style-type: none"> <li>In-kind habitat: offset habitat will include a new section of Watercourse 2. It will be enhanced to provide better quality habitat than currently exists in the upper reach of Watercourse 2 that will be infilled. The time lag prior to restoration of instream function is anticipated to be limited to the time to construct the channel and reintroduce flow.</li> </ul>
	Enhanced instream including weirs clusters and wetland habitat	<ul style="list-style-type: none"> <li>In-kind habitat offset: offset habitat will introduce complexity that is currently lacking in Watercourse 2. Greater productivity per unit area compared to impacted habitat is anticipated. Some time lag is associated with offset habitat. Time lag is anticipated to be limited with significant instream function anticipated to be active once flow is reintroduced to the site. A component of this work will be to create access into Watercourse 1 vicinity where it currently does not exist.</li> </ul>
Riparian trees and shrubs	Installation of native plants	<ul style="list-style-type: none"> <li>Native vegetation will replace an area currently dominated by invasive species. High-productivity habitat will become established. High confidence in effectiveness of offset habitat. Some lag time associated with offset habitat.</li> </ul>

The locations of the habitat impacts are shown on Figure 3. Table 14 provides a comparison of the areas of habitat loss and habitat gains due to construction of the Project and subsequent offset plan, respectively. To achieve the habitat balance for the unavoidable HADD of fish habitat, the offsetting plan will create 5,274 m<sup>2</sup> of new creek and riparian habitat (1,402 m<sup>2</sup> and 3,872 m<sup>2</sup> respectively).

**Table 14 Habitat Balance**

Impact	Impact Habitat Type	Impact Habitat Area (m <sup>2</sup> )	Offset Habitat Type	Offset Habitat Area (m <sup>2</sup> )	Gain in Habitat Area (m <sup>2</sup> )
Loss of creek habitat due to channel infill	Wetted creek channel	970	New channel habitat	1,402	432
Loss of riparian habitat due to channel infill and site access	Predominantly invasive vegetation	3,614	Riparian planting (nursery and transplanted stock, stakes)	3,871	257
Totals	Instream and riparian	4,584	Instream and riparian	5,273	689

As referenced in Section 6.3.2.2, an estimated 37 m<sup>2</sup> of existing wetted habitat will be taken offline but will still be present. As such, there will be reduced habitat function. Additionally, 236 m<sup>2</sup> of riparian vegetation will need to be cleared for access. However, it will be restored with native vegetation; as such, the total gain in riparian habitat function will be 493 m<sup>2</sup> as this vegetation matures.



## BC TRANSIT VICTORIA HANDYDART FACILITY

Monitoring Plan  
July 5, 2021

Please note that as referenced in Section 1.2.2, the lower section of new Watercourse 2 will consist of a low-flow channel that will allow flooding into an adjacent floodplain area. For the purposes of the habitat balance, we are considering this to be riparian function given the anticipated infrequency of inundation.

The change in habitat function is outlined in Figure 3.

### 9.3 POTENTIAL ADVERSE EFFECTS OF OFFSET CONSTRUCTION

Potential effects to fish and fish habitat associated with construction of offsets are expected to be limited. The installation of the offsetting habitat will be conducted during a favourable time of the year (i.e., summer) with the site stabilized before the advent of fall rains. As such, the measures and standards outlined in Section 7 will be applied and are expected to address the potential effects associated with offset construction.

## 10.0 MONITORING PLAN

### 10.1 CONSTRUCTION MONITORING

A qualified Environmental Monitor will be present on site during all phases of work for construction of the Project. It is anticipated that the Environmental Monitor will be present during Project initiation, for establishment of environmental mitigation controls, and key activities taking place in areas where sensitive environmental features may be affected.

Initially, full-time monitoring is anticipated to assess the efficacy of mitigation measures. The requirement for site visits by the Environmental Monitor will be reduced as construction proceeds and mitigation measures are shown to be operating effectively. At a minimum, the requirement for twice weekly monitoring is anticipated. Monitoring will continue periodically during inactive periods in the construction schedule to confirm that appropriate environmental best management practices (BMPs) are in place and continuing to function. The Environmental Monitor will also provide fish salvage services as required. If any death of fish is observed, the associated work activity will cease, DFO will be notified, and the work activity will not resume until the Environmental Monitor confirms all appropriate mitigation measures are in place.

Monitoring will include an assessment of water quality (pH, total dissolved solids, total suspended solids and turbidity) at regular intervals within the Craigflower Creek (upstream, at the site, and downstream) which will be compared to Canadian Council of Ministers of the Environment water quality guidelines and the BC Approved Water Quality Guidelines. Monitoring will also assess the site for sediment potential through a review of Erosion and Sediment Control measures. A general overview of the site for items such as cleanliness and spill potential will also be conducted. The Environmental Monitor will liaise with the Contractor on a regular basis to address any deficiencies in the application of mitigation measures.



## BC TRANSIT VICTORIA HANDYDART FACILITY

Monitoring Plan  
July 5, 2021

Results of monitoring will be reported to DFO in accordance with the terms and conditions of the *Fisheries Act* Authorization. A construction monitoring report will be submitted to DFO at the end of construction summarizing the following:

- Written and photo-documented sequence of events during construction.
- Any changes in the design necessary to adapt to unanticipated conditions.
- Technical issues that arose during construction and how they were addressed.
- Confirmation that all offsetting components meet design requirements.
- Confirmation that relevant terms and conditions of the *Fisheries Act* Authorization were met.

## 10.2 OFFSET MONITORING

### 10.2.1 Compliance Monitoring

Compliance with the extent, design, and features of the offsetting habitat will be determined by comparing offset design drawings with the offsets actually built on the ground. Discussion of the installed offsetting habitat will be included in a compliance monitoring report that outlines the quality of the offset construction and identifies any deficiencies. The compliance monitoring report will be submitted to DFO within 90 days of completion of construction of the habitat offsets or as directed by DFO.

### 10.2.2 Effectiveness Monitoring

Effectiveness monitoring of the offset habitat will be required to confirm that it is functioning as intended. Anticipated requirements for effectiveness monitoring are:

- creek channel stability
- instream feature stability
- bank stability
- riparian vegetation survival and coverage.

Success criteria for riparian plantings will include survivorship percentage, an assessment of plant health and rigour, and visual estimate of plant density and coverage.

Habitat offsets will be monitored at a frequency and duration determined in consultation with DFO. It is our recommendation that monitoring conducted during spring and fall over three years (e.g., Years 1, 3, 5 or Years 1, 2, 3) Monitoring will be completed in cooperation with the local Indigenous groups. Results of the offset effectiveness monitoring will be compiled into an annual report and provided to DFO at the end of year monitoring year (e.g., 1, 3, 5). A final summary report will be compiled and provided after the final year of monitor is complete.



### **10.2.3 Adaptive Management**

Monitoring during construction and assessment of new/enhanced habitat post-construction will determine if it has been constructed as designed and becomes sufficiently established to be self-sustaining.

It is possible that the channel may not be constructed as designed if unforeseen site conditions (e.g., porous soils) occur. Under these circumstances, the site will be assessed to determine if additional design (e.g., a channel liner) will be required. In the event that additional design components cannot be incorporated into new/enhanced habitat, additional on-site or off-site habitat enhancement options may be required.

Post-construction monitoring may determine that the habitat is not functioning as intended. This may include a lack of fish access or a loss of installed riparian vegetation. If this were to occur, additional work would be conducted to improve habitat functionality including improving instream conditions, increasing the maintenance frequency for installed vegetation, and replacing dead plant stock as required.

## **11.0 PRELIMINARY COST ESTIMATES OF HABITAT OFFSET CONSTRUCTION, MAINTENANCE AND MONITORING**

Costs of proposed offsets are summarized in Table 15 and include construction/enhancement of new sections of stream totaling 226 m in length, installation of riparian vegetation on either side of the channel (10 m per side for a total estimated area of 4,520 m<sup>2</sup>), maintenance, invasive species management, and importation/installation of materials (woody debris, rock weirs, topsoil, etc.). An Environmental Monitor and Indigenous group monitor will be present during construction of the offsetting habitat.

This cost estimate also includes three offset effectiveness monitoring field surveys assessing the established riparian vegetation coverage and survival, species richness (including recruitment of new vegetation), and estimated total vegetation coverage. Instream assessments will include stability, changes in substrate composition and complexity, and fish use of the new/enhanced habitat. The results of these assessments will be outlined in two interim reports and a final effectiveness monitoring report.

Unit rates for soil, potted stock, and delivery have been used to calculate costs.



## BC TRANSIT VICTORIA HANDYDART FACILITY

Summary  
July 5, 2021

**Table 15 Class Estimate of Offsetting Habitat**

Proposed Offsetting Line Items	Unit Rate	Cost Estimate (\$ CAD)
Construction and Maintenance		
Rough grading, excavation fill, and civil	Lump sum	\$461,060
Weir and woody debris material	\$2000/weir and debris	\$45,000
Riparian planting	\$90-\$100/m <sup>2</sup>	\$350,000
Wetland materials	Lump sum	\$45,000
Imported topsoil	Lump sum	\$256,000
Irrigation	Lump sum	\$25,000
Invasive species management	3,020 m <sup>2</sup> @ \$20/m <sup>2</sup>	\$60,000
General Contractor and Environmental Monitor	Lump sum	\$122,500
Construction and Maintenance Subtotal		\$1,364,560
20% Contingency		\$272,912
Construction and Maintenance Total		\$1,637,472
Effectiveness Monitoring		
Site visits (6 total; 3 years 2x each year)	Lump Sum	\$10,100
Reporting (two interim and one final)	Lump Sum	\$11,025
Project Management	Lump Sum	\$1,600
Effectiveness Monitoring Total		\$22,725

Please note that the estimate is for information purposes only. As a Crown Corporation, BC Transit is not required to provide a Letter of Credit for construction of the habitat.

## 12.0 SUMMARY

This report has been prepared to support a submission to DFO for a decision under paragraph 35(2)(b) of the *Fisheries Act* for realignment and infill of existing habitat at 2401 Burnside Road in View Royal BC. The need for the proposed instream work is to allow for the construction of a handyDART facility on the subject property.

The proposed construction has been planned to limit impacts to the fish and fish habitat supported within and adjacent to Craigflower Creek and its tributaries to the extent possible, including the completion of the majority of work “in the dry”. The proposed work will, however, result in the alteration and loss habitat of the following:

- Loss of 970 m<sup>2</sup> of instream habitat through channel infill.
- Loss of 3,614 m<sup>2</sup> of tree and shrub riparian habitat associated with channel infill and site access.





## BC TRANSIT VICTORIA HANDYDART FACILITY

### Closure

July 5, 2021

These impacts will be offset by creating 5,273 m<sup>2</sup> of new channel, enhanced channel and riparian habitat which will provide direct benefit to fish species within the Craigflower Creek watershed. As all offsetting is proposed through the creation or enhancement of fish habitat and riparian habitat, the offsets are anticipated to result in a net benefit to fish populations that use the site.

## 13.0 CLOSURE

We trust the information provided in this report is sufficient for your needs. If you have questions or require further information, please contact Nathan Gregory at [nathan.gregory@stantec.com](mailto:nathan.gregory@stantec.com).



## BC TRANSIT VICTORIA HANDYDART FACILITY

### References

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## BC TRANSIT VICTORIA HANDYDART FACILITY

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# **APPENDIX A**

## **Habitat Report**



**BC Transit Burnside HandyDART  
Facility**

Habitat Assessment

January 19, 2021

Prepared for:

BC Transit  
520 Gorge Rd. E  
Victoria, BC, Canada V8W 2P3

Prepared by:

Stantec Consulting Ltd.  
#400-655 Tyee Rd.  
Victoria, BC, Canada V9A 6X5



## BC TRANSIT BURNSIDE HANDYDART FACILITY – HABITAT ASSESSMENT

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**Stephanie Nabess**, M.Sc., R.P.Bio.



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## Abbreviations

BC	British Columbia
BC CDC	BC Conservation Data Centre
CDF	Coastal Douglas Fir
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CRD	Capital Regional District
ECCC	Environment and Climate Change Canada
km	kilometre
m	metres
m <sup>2</sup>	square metre
RAPR	Riparian Areas Protection Regulation
RISC	Resource Inventory Committee
RoW	right-of-way
SARA	<i>Species at Risk Act</i>
WMU	Wildlife Management Unit





# BC TRANSIT BURNSIDE HANDYDART FACILITY – HABITAT ASSESSMENT

Introduction  
January 19, 2021

## 1.0 INTRODUCTION

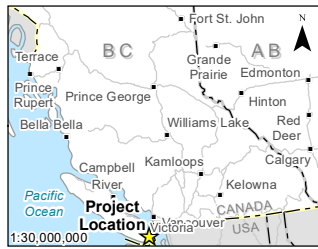
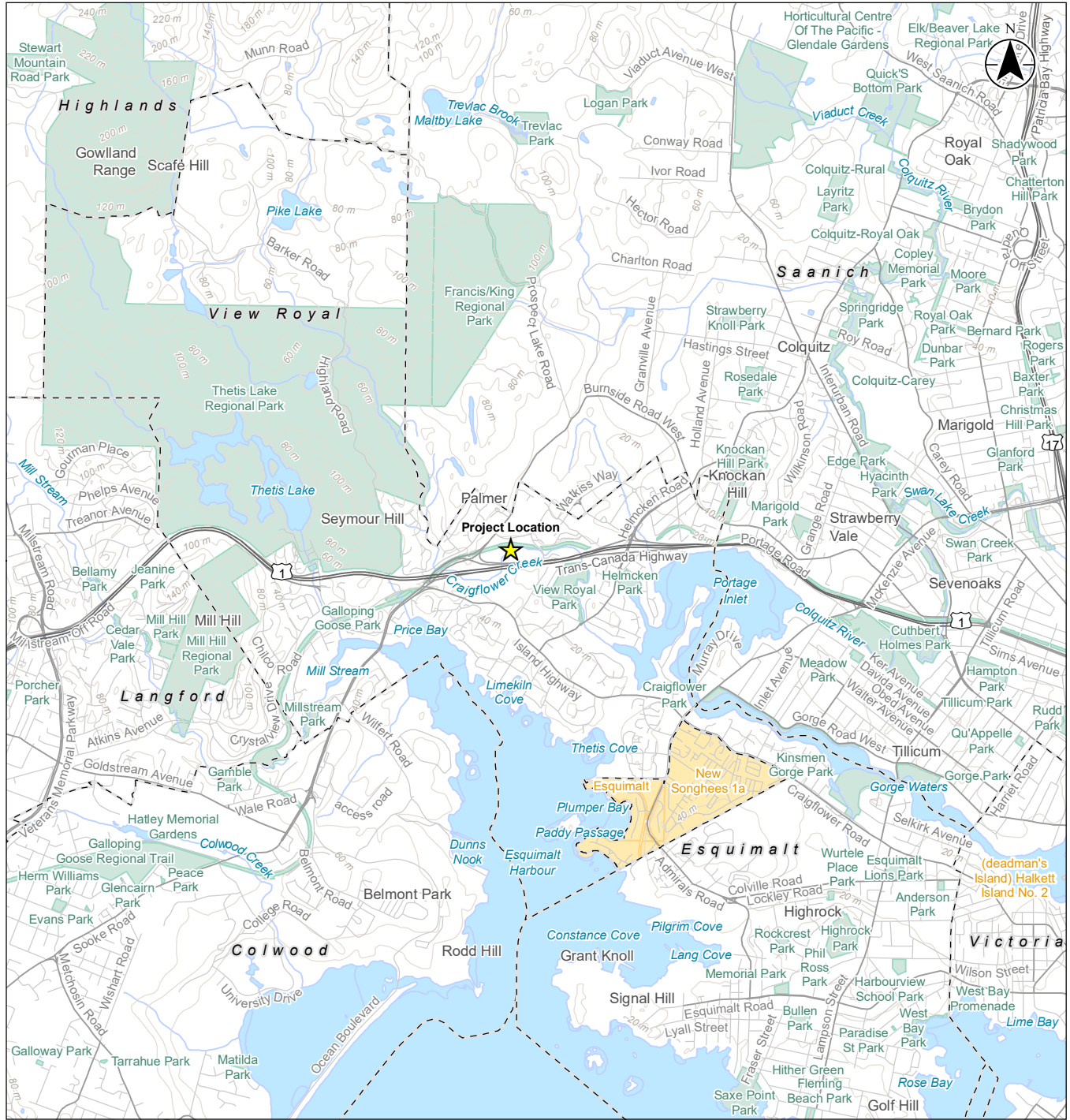
BC Transit is proposing to develop a HandyDART bus facility at 2401 Burnside Road West (the property) in the Town of View Royal, British Columbia (BC) adjacent to Highway 1 and within the Capital Regional District (CRD) (Figure 1). This proposed facility (also referred to as “the Project”) would include an operations, maintenance and service/delivery area within the main building as well as bus and visitor parking.

A portion of the property is leased by the Victoria Bowman Outdoor Range. The Galloping Goose Regional Trail is located on the northeast side of the property and a BC Hydro right-of-way (RoW) runs north-south through the centre of the property, including one high voltage distribution tower in the centre. A CRD water main RoW runs west-east along the northern edge of the property. The centre of the property is relatively flat, and is the location of the current archery range, which is bordered by a berm along the northeast and east edges and separates the range from the Galloping Goose Regional Trail. In the west corner of the lot are two fill piles separated by a ditch. The elevation of the top of the south fill pile is approximately 6 metres (m) above the archery range and the top of the north fill pile is approximately 7.5 m above the archery range. The south edge of the property is bordered by the TransCanada Highway and Craigflower Creek forms the property line along the east side of the property.

Access to the property is via a gravel driveway off Burnside Road West on the northwest side. There are four watercourses within and adjacent to the property, including: Craigflower Creek, Watercourse 1, Watercourse 2, and Watercourse 3.

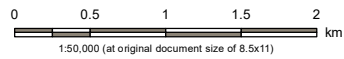
Stantec Consulting Ltd. (Stantec) has prepared this habitat assessment report on behalf of BC Transit to support environmental permitting (i.e., *Fisheries Act* and *Water Sustainability Act*) for the proposed HandyDART facility. The results of desktop reviews and site visits indicate that the Project area provides habitat for vegetation including deciduous and coniferous trees, shrubs, wetland plants and at least one invasive species (Himalayan blackberry (*Rubus armeniacus*)). There is also overlap between the Project area and an area of proposed critical habitat for western painted turtle (*Chrysemys picta bellii*) and overlap with the ranges of seventeen species listed on Schedule 1 of the *Species at Risk Act* (SARA), although there are no documented occurrences within the Project area. Two of the four watercourses provide potential fish habitat and one juvenile coho was observed during a site visit at the Craigflower Creek.





- Highway
- Road
- Local Street
- - - Resource Road
- - - Topographic Contour
- Watercourse
- Waterbody
- First Nations Reserve
- Local Greenspace
- - - Municipal Boundary

★ Project Location



Project Location: Victoria, British Columbia  
 Project Number: 123220971  
 Prepared by LTRUDEL on 20200912  
 Requested by SNABESS on 20200912

Client/Project/Report  
 BC Transit  
 2401 Burnside Road HandyDART Facility  
 Habitat Assessment

Figure No.  
**1**  
 Title  
**Project Location**

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Methods

January 19, 2021

## 2.0 METHODS

### 2.1 DESKTOP REVIEW

A desktop review was conducted to identify known fish, wildlife and vegetation values present on the property. A review of publicly available information, historical occurrence data and scientific literature was conducted to characterize the fish and fish habitat, riparian vegetation, and wildlife characteristics of the Project area. The desktop review collected information available from:

- Government of British Columbia Habitat Wizard database (Government of British Columbia 2020a)
- EcoCat Ecological Reports Catalogue (EcoCat 2020)
- DataBC (DataBC, 2020)
- BC Conservation Data Centre (BC CDC 2020)
- Species at Risk Public Registry (Government of Canada 2020)
- COSEWIC

Relevant information was compiled and is described below in the context of the Project area.

### 2.2 SITE VISIT

During the site visits, two biologists walked the length of each watercourse within the property line where access permitted. Methods were aligned with Riparian Areas Protection Regulation (RAPR) requirements (BC FLNRORD 2019) and BC Resource Inventory Standards Committee (RISC) stream assessment methods (BC RISC 1999). In some cases, access to the watercourses was discontinuous due to overgrowth of plants such as Himalayan blackberry that prevented continuous access to the stream. During these habitat assessments, characteristics of each watercourse were recorded, such as substrate, cover, presence of woody debris, continuity of channel, depth, and any other notable observations.

Watercourses were assessed for their ability to provide fish habitat for spawning, overwintering, rearing, migration and staging/holding. Trees were marked by handheld Global Positioning System and identified to genus and other plant species, e.g., shrubs, were noted. The watercourses were also assessed for their potential to provide habitat to the western painted turtle.



### Results

January 19, 2021

## 3.0 RESULTS

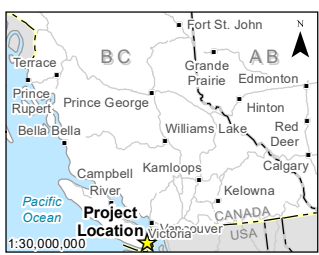
Stantec biologists completed a watercourse assessment at the property using the RAPR detailed assessment methods on April 23, 2020 (Figure 2). An arborist and a geotechnical engineer also visited the site on April 23, 2020 to fulfill requirements of the RAPR related to vegetation and slope stability. Weather during the site visit was partly cloudy with no rainfall recorded at the Victoria International Airport weather station on the day of the site visit; however, 13.2 mm of precipitation was recorded the previous day (April 22, 2020; ECCC 2020). Additional site visits were conducted on June 4, 2020 to assess Watercourse 3 and on September 2, 2020 to look at connectivity between an upstream ephemeral watercourse and Watercourse 2. Watercourse 1 extends along the south border of the property with Watercourse 2 extending approximately parallel to and 20 m from Watercourse 1. Watercourse 3 extends along the north side of the Galloping Goose Regional Trail, at the north end of the property. To the east, Craigflower Creek serves as the property line.

Each watercourse was evaluated for vegetation, wildlife habitat, and fish and fish habitat potential; the results are presented in the following sections.

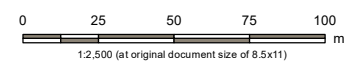




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- Highway
- Road
- Local Street
- Local Greenspace
- Municipal Boundary
- Watercourse
- Culvert



Project Location: Victoria, British Columbia  
 Project Number: 123220971  
 Prepared by LTRUDEL on 20200912  
 Requested by SNABESS on 20200912

Client/Project/Report  
 BC Transit  
 2401 Burnside Road HandyDART Facility  
 Habitat Assessment

Figure No.  
**2**

Title  
**Site Features**

**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 10N  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada

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### Results

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## 3.1 VEGETATION

The Project is located within the Coastal Douglas-fir (CDF) Biogeoclimatic zone/moist maritime (mm) subzone (Province of British Columbia 2020). The CDFmm is restricted to low elevations along southeast Vancouver Island; elevation limits range from sea level to approximately 150 m (DeLong n.d.).

The riparian vegetation adjacent to the Project area is fragmented as a result of the existing infrastructure, local roads and access points to the Victoria Bowmen Outdoor Range. Riparian vegetation within and adjacent to the Project area is comprised predominantly of red osier dogwood (*Cornus stolonifera*), willow (*Salix sp.*) and a mixture of deciduous and coniferous trees. Himalayan blackberry, an invasive species, was observed throughout the Project area; no other invasive species were identified during the site visit. Representative riparian vegetation species can be observed in the photos included in Appendix A.

Typical vegetation includes trees such as Douglas-fir (*Pseudotsuga menziesii*), western redcedar (*Thuja plicata*), grand fir (*Abies grandis*) and big leaf maple (*Acer marcophyllum*) with an understory shrub layer species dominated by dull Oregon grape (*Mahonia aquifolium*), ocean-spray (*Holodiscus discolor*), and Oregon beaked moss (*Kindbergia oregana*). Less prominent species include snowberry (*Symphoricarpos*), vanillaleaf (*Carphephorus odoratissimus*), and big shaggy moss (*Rhytidiadelphus triquetrus*). Drier sites are characterized by the presence of Garry oak (*Quercus garryana*) and arbutus (*Arbutus menziesii*), as well as numerous members of the lily family.

A review of federally and provincially listed plant species at risk showed that there are six listed plant species known to occur within the CDFmm, which have potential to occur in habitats that are generally represented by the Project site and adjacent and surrounding areas (e.g., mixed forest/riparian/anthropogenic) (BC CDC 2020). Table 1 presents species which have red provincial status and have SARA Schedule 1 federal status (SARA). A rare plants field survey has not been conducted at the Project location and no confirmed records of these species were found. Due to the highly modified nature of the site and the presence of several invasive species it is unlikely that the species listed in Table 1 are present at the site.



## BC TRANSIT BURNSIDE HANDYDART FACILITY – HABITAT ASSESSMENT

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**Table 1 Provincially and Federally Listed Plant Species at Risk with Potential to Occur Within Riparian and Anthropogenic Areas of CDF Zone**

Scientific Name	Common Name	BC Provincial Status	COSEWIC Status	SARA Status
<i>Carex feta</i>	green-sheathed sedge	Yellow	-	-
<i>Carex interrupta</i>	green-fruited sedge	Yellow	-	-
<i>Galium trifidum</i> ssp. <i>trifidum</i>	small bedstraw	Yellow	-	-
<i>Juncus oxymeris</i>	pointed rush	Yellow	-	-
<i>Lupinus rivularis</i>	streambank lupine	Red	Endangered	Endangered
<i>Persicaria hydropiperoides</i>	water-pepper	Yellow	-	-

SOURCE: BC CDC 2020

NOTES:

BC Provincial status categories:

- Red: any species or ecosystem that is at risk of being lost (Extirpated, Endangered or Threatened)
- Yellow: any species or ecosystem that is at the least risk of being lost

Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and SARA status categories:

- Endangered: species facing imminent extirpation or extinction.

## 3.2 WILDLIFE HABITAT

There are 27 wildlife species of management concern that were identified as potentially occurring in the Project area including 18 birds, four mammals, three amphibians, and two reptiles (BC CDC 2020a; Table 2). Seventeen of these species are listed on Schedule 1 of SARA (Table 2). A review of publicly available data from CDC iMap showed no known occurrences of SARA-listed wildlife species that overlap the Project area (Government of British Columbia 2020b).

The Project area lies within Wildlife Management Unit (WMU) 1-1 and does not coincide with Wildlife Habitat Areas, or Ungulate Winter Ranges (BC CDC 2020b). At present, the Project area does not overlap critical habitat for wildlife species at risk, although there is overlap with an area of proposed critical habitat for western painted turtle – Pacific coast population. (BC CDC 2020b). The study area does not intersect other key wildlife ranges or Important Bird Areas (Birdlife International, 2020).

There are 18 bird species of management concern which may use forested or open habitat within or adjacent to the study area (Table 2). These species may use forested, open, and riparian habitats within the study area for both nesting, foraging, and shelter. Of the four mammal species of management concern which may occur in the study area (Table 2), only the western water shrew (*Sorex navigator brooksi*) makes direct use of aquatic habitat and may utilize riparian areas of Craigflower Creek for foraging. Roosting habitat for Townsend’s big-eared bat (*Corynorhinus townsendii*) and little brown myotis (*Myotis lucifugus*) may be available in the forested areas of the property.



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Three amphibian species of management concern are likely to occur within the Project area (Table 2). Both western toad (*Anaxyrus boreas*) and red-legged frog (*Rana aurora*) may use slow-moving portions of Craigflower Creek, ditches, and other shallow freshwater bodies throughout the site for breeding, and forested portions of the site for overwintering (COSEWIC, 2012; ECCC, 2016). Wandering salamander (*Aneides vagrans*) is entirely terrestrial and may inhabit forested areas of the site where suitable downed wood or similar structure is available.

There are no occurrence records for the two reptile species [western painted turtle, sharp-tailed snake (*Contia tenuis*)] of management concern within the study area (BC CDC, 2020a). Sharp-tailed snake may use open and forested habitat throughout the site but requirements for hibernation sites in winter and retreat sites in summer are poorly known (COSEWIC, 2009). An area of proposed critical habitat for western painted turtle exists at the site along Craigflower Creek (ECCC, 2018).

**Table 2 Wildlife Species of Management Concern with the Potential to Occur in the Study Area**

Species	Scientific Name	COSEWIC Status <sup>1</sup>	SARA Status <sup>2</sup>	BC List <sup>3</sup>
<b>Birds</b>				
brant	<i>Branta bernicla</i>	-	-	Blue
Canada goose, <i>occidentalis</i> subspecies	<i>Branta canadensis occidentalis</i>	-	-	Red
band-tailed pigeon	<i>Patagioenas fasciata</i>	Special Concern	Special Concern	Blue
common nighthawk	<i>Chordeiles minor</i>	Special Concern	Threatened	Yellow
great blue heron, <i>fannini</i> subspecies	<i>Ardea herodias fannini</i>	Special Concern	Special Concern	Blue
bald eagle	<i>Haliaeetus leucocephalus</i>	-	-	Yellow
rough-legged hawk	<i>Buteo lagopus</i>	Not at Risk	-	Blue
Swainson's hawk	<i>Buteo swainsoni</i>	-	-	Red
barn owl	<i>Tyto alba</i>	Threatened	Threatened	Red
Northern pygmy-owl, <i>swarthi</i> subspecies	<i>Glaucidium gnoma swarthi</i>	-	-	Blue
Western screech-owl, <i>kennicottii</i> subspecies	<i>Megascops kennicottii</i>	Threatened	Threatened	Blue
gyrfalcon	<i>Falco rusticolus</i>	Not at Risk	-	Blue
peregrine falcon, <i>anatum</i> subspecies	<i>Falco peregrinus anatum</i>	Not at Risk	Special Concern	Red
peregrine falcon, <i>pealei</i> subspecies	<i>Falco peregrinus pealei</i>	Special Concern	Special Concern	Blue
olive-sided flycatcher	<i>Contopus cooperi</i>	Special Concern	Threatened	Blue
barn swallow	<i>Hirundo rustica</i>	Threatened	Threatened	Blue





**BC TRANSIT BURNSIDE HANDYDART FACILITY – HABITAT ASSESSMENT**

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**Table 2 Wildlife Species of Management Concern with the Potential to Occur in the Study Area**

Species	Scientific Name	COSEWIC Status <sup>1</sup>	SARA Status <sup>2</sup>	BC List <sup>3</sup>
evening grosbeak	<i>Coccothraustes vespertinus</i>	Special Concern	Special Concern	Yellow
rusty blackbird	<i>Euphagus carolinus</i>	Special Concern	Special Concern	Blue
<b>Mammals</b>				
ermine, <i>anguinae</i> subspecies	<i>Mustela erminea anguinae</i>	-	-	Blue
little brown myotis	<i>Myotis lucifugus</i>	Endangered	Endangered	Yellow
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	-	-	Blue
Western water shrew, brooksi subspecies	<i>Sorex navigator brooksi</i>	-	-	Blue
<b>Amphibians</b>				
Northern red-legged frog	<i>Rana aurora</i>	Special Concern	Special Concern	Blue
Western toad	<i>Anaxyrus boreas</i>	Special Concern	Special Concern	Yellow
wandering salamander	<i>Aneides vagrans</i>	Special Concern	Special Concern	Blue
<b>Reptiles</b>				
sharp-tailed snake	<i>Contia tenuis</i>	Endangered	Endangered	Red
Western painted turtle - pacific coast population	<i>Chrysemys picta</i>	Threatened	Endangered	Red
<p>NOTES:</p> <p><sup>1</sup> COSEWIC (Committee on The Status of Endangered Species in Canada) Status—list of wild species, subspecies, varieties, or other designatable units that have been identified and assessed by COSEWIC as at risk in Canada</p> <p><sup>2</sup> SARA (<i>Species at Risk Act</i>) Status—Schedule 1 of the <i>Federal Species at Risk Act</i> is the official list of wildlife species at risk in Canada. It includes species that are extirpated (extinct in Canada), endangered, threatened, and of special concern</p> <p><sup>3</sup> BC List —Red List: any species that is at risk of being lost (extirpated, endangered, or threatened) in British Columbia; Blue List: considered to be of special concern (formerly vulnerable) in British Columbia because of characteristics that make them particularly sensitive to human activities or natural events; Yellow List: apparently secure and not at risk of extinction.</p>				



### Results

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#### 3.2.1 Critical Habitat – Western Painted Turtle

Much of the property intersects proposed critical habitat for western painted turtle (Government of British Columbia 2020b). The critical habitat is intersected by the property, centered on Craigflower Creek and includes a 150 m buffer on either side of the watercourse. Occurrences of western painted turtle in the region are primarily confined to lakes and ponds with the closest recorded occurrence being more than 2 km from the property in a different watershed (Government of British Columbia 2020b). The closest occurrence in the same watershed as the property is more than 3 km to the northwest in McKenzie Lake (Government of British Columbia 2020b).

Western painted turtles prefer aquatic habitat types with slow-moving or stagnant water and abundant aquatic vegetation or large woody debris to carry out many of their life functions such as foraging and basking (Environmental and Climate Change Canada [ECCC] 2018). For basking, they prefer areas that have exposure to sunlight (e.g., southern exposure) and deeper waters (1–2 m deep, ECCC 2018). Western painted turtles prefer overwintering habitat that has dense emergent vegetation, high levels of dissolved oxygen, large woody debris and substrate that is organic silty or sandy (ECCC 2018).

Areas used for nesting are typically open terrestrial areas with exposed soil, little vegetation, and good drainage (ECCC 2018). They are typically within 5 m of the waterbody they are in, though in BC, they have been found to move up to 150 m from the water (ECCC 2018). Many of the known western painted turtle nesting sites are on human-altered sites such as gravel road shoulders, lawns, and beside gravel trails (ECCC 2018).

Western painted turtles will move between habitats to increase mate choice, for better resources, or to reach nesting or overwintering areas (ECCC 2018). Studies have found that movements are typically up to 3 km in length between habitats, though longer distances have been recorded (ECCC 2018). Connectivity between waterbodies is needed to support patch populations (ECCC 2018).

Overall, the property provides poor habitat for western painted turtle. Rafting and scour within Craigflower Creek indicate the watercourse receives high flows, which are not optimal for the species. Although woody debris and water approximately 1 m deep are present, young forest in the riparian area limits sunlight reaching the creek and basking habitat would be limited. Water levels are likely lower in the summer months than the 1 m depth recorded in some areas in April 2020, further reducing potential basking habitat. No instream vegetation was present within Craigflower Creek at the time of the site visit. The area around the Highway 1 culvert outlet and upstream of a beaver dam potentially provides moderate western painted turtle habitat, as this area has deeper, slower moving water, and is more exposed to sunlight. Most of this area is outside of the property. The remaining ditches within the property have insufficient water depth and flow to provide aquatic habitat for western painted turtle.



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Riparian areas surrounding Craigflower Creek have poor nesting habitat for western painted turtles. This area has poor drainage with many areas of seepage and pooling water. Both natural vegetation and invasive species cover much of the ground and exposed soil is limited. Outside of the Craigflower Creek riparian area, much of the site is disturbed. Approximately half is covered in invasive species such as Himalayan blackberry, which does not provide good nesting habitat for turtles. The remaining portion of the property includes the gravel access and parking off Burnside Road West and the lawn used for archery, which could provide potential nesting habitat for western painted turtles. However, as no nesting in the area has been recorded and the property is more than 3 km away from the nearest recorded occurrences of western painted turtle (Government of British Columbia 2020b), it is unlikely that the property is used for nesting.

Craigflower Creek may provide a dispersal corridor or connectivity between waterbodies for western painted turtle, as the natural riparian habitat provides adequate flow and cover for migration.

The other watercourses within the property (Watercourses 1, 2 and 3) also provide poor habitat for western painted turtles. Although Watercourses 2 and 3 are dominated by fine and organic substrates, there is minimal large woody debris, no areas over 1m depth and minimal instream vegetation.

### 3.3 FISH AND FISH HABITAT

There are four watercourses within the Project area including Craigflower Creek along the southeast boundary of the property and three unnamed watercourses: Watercourse 1 extends west to east on the southwest side of the property, Watercourse 2 extends west to east starting from a culvert on the west side of the property, and Watercourse 3 is a constructed drainage ditch that flows southeast from the north end of the property (Appendix A, Figure 2). Each watercourse was evaluated for its fish and fish habitat potential through desktop assessment and site visits. Craigflower Creek, Watercourse 1 and Watercourse 2 were evaluated on April 23, 2020 whereas Watercourse 3 was evaluated on June 4, 2020. Connectivity between the watercourse north of Kami Court and Watercourse 2 was evaluated on September 2, 2020. The results are summarized in Table 3 and described in the following sections.

**Table 3 Watercourse Fish Habitat Criteria**

Criteria	Craigflower Creek	Watercourse 1	Watercourse 2	Watercourse 3
Approximate Channel Length Within Property (m)	274	117	208	93
Channel Width (m)*	10.4	-	3.34	2.5 m
Connected to Craigflower Creek?	N/A	No	Yes	Yes
Stream Classification	S2	NCD	S4	NCD



Results  
January 19, 2021

**Table 3 Watercourse Fish Habitat Criteria**

Criteria	Craigflower Creek	Watercourse 1	Watercourse 2	Watercourse 3
Riparian Habitat	Deciduous overstory with shrub understory; abundant large woody debris and wetland plants	Deciduous overstory overgrown with Himalayan blackberry; abundant instream grasses	Deciduous overstory in downstream 50 m; overgrown with Himalayan blackberry and abundant instream grasses in upstream section	Deciduous overstory with shrub understory; little in-stream vegetation
Dominant Substrates	Woody debris, fines, gravels	Large cobble, boulder	Fines, organics, cobble	Fines, organics
Spawning	Poor	Poor	Poor	Poor
Rearing	Excellent	Poor	Moderate	Poor
Overwintering	Excellent	Poor	Poor	Poor
Migration	Good	Poor	Moderate	Poor
Fish Presence (expected species)	BNH, CO, CT, ACT, PMB, RB, CC, SMB, ST	None	Juvenile CT/RB may use lower reach	None (ephemeral, culvert barrier in current state)
<p>NOTES:</p> <p>* No channel measurements recorded at Watercourse 1</p> <p>BNH: Brown catfish (<i>Ameiurus nebulosis</i>); CO: Coho salmon (<i>Oncorhynchus kisutch</i>); CT: Cutthroat trout (<i>Oncorhynchus clarkii</i>); ACT: Anadromous cutthroat trout (<i>Oncorhynchus clarkii</i>); PMB: Pumpkinseed (<i>Lepomis gibbosus</i>); RB: Rainbow trout (<i>Oncorhynchus mykiss</i>); CC: Sculpin (general); SMB: Smallmouth bass (<i>Micropterus dolomieu</i>); ST: Steelhead (<i>Oncorhynchus mykiss</i>).</p>				

### 3.3.1 Craigflower Creek

Craigflower Creek (Appendix A; Photos 1 to 5) is the primary drainage of the Craigflower Creek watershed, which originates as several small streams in the District of Highlands and flows south into Portage Inlet. In the lower section of the creek system, which includes the property, the CRD has identified flooding, bank erosion, and loss of summer base flows as concerns (CRD 2020). Craigflower Creek roughly follows the southeast boundary of the property. The creek was measured as having an average channel width of 10.4 m and an average gradient of 2% during the April 23, 2020 site visit. Within the property, the channel has a riffle-pool morphology with an irregular meandering channel pattern. The dominant substrate is organics and the subdominant substrate is fines. Gravels were present but limited.

Craigflower Creek is a fish-bearing stream with records of coho salmon, rainbow trout/steelhead, coastal cutthroat trout, sculpin (general), smallmouth bass, pumpkinseed, and brown catfish (CRD 2020). Coho salmon are known to spawn in Craigflower Creek as far upstream as Prior Lake (CRD 2020). During the April 23, 2020 site visit, one dead coho salmon parr was observed.



## BC TRANSIT BURNSIDE HANDYDART FACILITY – HABITAT ASSESSMENT

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Stream flows were moderate at the time of the April 23, 2020 assessment, though evidence of flood flows were present throughout the reach in the form of rafting and debris in trees above and beside the channel (Appendix A; Photo 4). Beaver activity was observed in the form of a small dam (Appendix A; Photo 5) downstream of the Highway 1 culvert, which impounded water into a large pool. Areas of seepage above the high watermark was observed on the left (north) bank of the creek.

Cover was abundant throughout Craigflower Creek in the form of deep pools, large woody debris and some undercut banks. Large woody debris was clumped and formed deep pools more than 1 m deep on their upstream sides. Trees were fallen or growing over much of the channel. Banks were a mixture of vertical and sloping with fines as the dominate substrate and were approximately 2 m in height. Within the survey area, tree cover primarily consisted of deciduous species in the pole sapling stage. The shrub layer was primarily salmonberry (*Rubus spectabilis*), skunk cabbage (*Lysichiton americanus*), and lady fern (*Athyrium filix-femina*). The herb layer consisted of horsetail (*Equisetum* sp.) and white fawn lily (*Erythronium oregonum*). The invasive species present were primarily creeping buttercup (*Ranunculus repens*) with minor amounts of English holly (*Ilex aquifolium*) and Himalayan blackberry.

Spawning habitat in Craigflower Creek within the property is poor due to the lack of gravel and cobbles. Habitat for other life stages of fish (e.g., overwintering, rearing, migration) is good to excellent due to the abundance of instream cover such as deep pools and large woody debris.

### 3.3.2 Watercourse 1

Watercourse 1 (Appendix A; Photos 6 and 7) is a constructed ditch approximately 110 m long that flows west to east on the southwest side of the property, parallel to Highway 1. It terminates near the left bank of Craigflower Creek but does not discharge into the creek as surface flow. It ends in an area of pooling water between Watercourse 2 and Highway 1. Upstream of this area, the ditch is heavily overgrown with Himalayan blackberry. A riprap berm surrounds this pool of water and no connectivity, culverts, or water flow was observed that would connect Watercourse 1 to either Craigflower Creek or Watercourse 2 (Appendix A; Photo 7). It is assumed that water from Watercourse 1 pools and infiltrates to ground at the east end of the ditch.

A review of historical air photos indicates that Watercourse 1 appears to have been constructed at the same time as the Burnside Road West offramp from Highway 1 in 1997 (Appendix B). Prior to this time, the area around Watercourse 1 was forested with no indications of a natural watercourse.

The substrate of Watercourse 1 is mostly large cobble and boulders (i.e., riprap), and instream vegetation is comprised of grasses, while overhead cover is mainly Himalayan blackberry and deciduous trees. It begins at Highway 1 and flows into a small wetland, near where Watercourse 2 meets Craigflower Creek, but does not flow into either of these streams. All five fish habitat categories used in the assessment of this ditch are considered to be poor.



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#### 3.3.3 Watercourse 2

Watercourse 2 (Appendix A; Photos 8–12) is a modified stream that enters the property from a culvert flowing under Burnside Road West on the west side of the property (Appendix A; Photo 10).

The watercourse flows to the east, south of the access road, and flows south near a transmission line tower. It enters Craigflower Creek north of Watercourse 1.

Watercourse 2 is not shown on Town of View Royal (Town of View Royal, 2020), CRD (CRD, 2020), and provincial (Government of British Columbia, 2020a) mapping sources; however, a stream is present on CRD's mapping north of Kami Court. Connection between this stream and Watercourse 2 via the stormwater system and ditching network was confirmed through an additional site visit and municipal storm system information. The watercourse north of Kami Court appears to be a natural seasonal watercourse (Appendix A, Photos 13–15). Within the property, most of the watercourse is overgrown with grass (Appendix A; Photo 13), some sections are scoured with gravel and cobble substrate (Appendix A; Photo 14). The property owner indicated the watercourse is seasonal, flowing during winter months (typically from October to May) (pers. comm. Art Bickerton). This connection confirms Watercourse 2 is a modified stream, not a ditch, as defined in the RAPR

Watercourse 2 is approximately 200 m long within the Project property boundaries and connects to Craigflower Creek. It may therefore contain the same species of fishes as Craigflower Creek, however habitat is poor and flow is ephemeral restricting potential use to high flow periods. Aerial photos show that the watercourse is a historical watercourse that has been channelized to clear water from the west side of Burnside Road West. The watercourse has an average width of 3.34 m and an average gradient of 4.5%. The watercourse generally has a straight alignment, with curves in some areas to parallel the access road. Fines and organics were the dominant substrate with riprap being subdominant. Small pockets of gravel were observed near the Burnside Road West culvert.

No information of fish presence was found for Watercourse 2 and no fish were observed during the site visit.

A review of historical air photos (see Appendix A) indicates that Watercourse 2 was constructed at its current location at the same time as the construction of the Burnside Road West offramp from Highway 1 in 1997. Prior to this time, a ditch may have been present in the same area running approximately west to east; however, this may also have been a field boundary as no watercourse or ditch is evident in the earliest air photos from 1949 when the area was a cleared field. Watercourse 2 may also have flowed through the treed area at the west end of the property, which was later piled with fill. A cleared RoW was present upslope of Watercourse 2 from 1964 onwards.

Water levels were moderate at the time of the April 23, 2020 assessment, which was one day after a rain event of 13.2 mm (ECCC 2020). An assessment on the ditch completed by Stantec in fall 2017 indicated that sections of the ditch were dry and wetted areas were restricted to shallow pools, indicating that flows in the ditch may be seasonal (Stantec 2017).



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### Results

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Cover was abundant throughout Watercourse 2 in the form of instream vegetation, primarily reed canary grass (*Phalaris arundinacea*), a few deep pools and small woody debris. Banks were sloping and made of riprap and fines. In the lower section of Watercourse 2, the right (south) bank is formed by the riprap berm that contains Watercourse 1. A small wooden pedestrian bridge has been constructed over the ditch within the archery range. Tree cover is almost exclusively restricted to the downstream 50 m of Watercourse 2 (Appendix A; Photos 8 and 9). Upstream of this area, vegetation consists of a narrow band (3–5 m) of Himalayan blackberry and reed canary grass (Appendix A; Photos 10–12). Beyond this band of vegetation, vegetation is limited to lawn and additional invasive species. Watercourse 2 is otherwise surrounded by the archery range and a gravel driveway/walkway.

Spawning habitat in Watercourse 2 is nil to poor, lacking adequate substrate. Habitat for other fish life stages is poor to moderate with abundant instream vegetation and a few deep pools that provide cover to fish. The moderate fish habitat is primarily in the downstream sections of the watercourse immediately upstream from Craigflower Creek with fish habitat becoming poorer in upstream areas with fewer pools and instream vegetation. No barriers to fish access were observed within Watercourse 2, therefore it is classified as default fish-bearing. However, seasonal flows and habitat quality may limit fish distribution to the lower section of the watercourse during higher flow conditions.

### 3.3.4 Watercourse 3

Watercourse 3 (Appendix A; Photos 16–18) is a constructed stormwater drainage ditch that is approximately 100 m long and originates at a culvert flowing below Watkiss Way at the north end of the property. The ditch flows southeast towards Galloping Goose Regional Trail, then continues east along the trail until it crosses below the trail via culvert near Talcott Road, and connects to Craigflower Creek. Watercourse 3 is not shown on Town of View Royal (Town of View Royal 2020) or provincial (BC MOE 2020a) mapping sources. CRD mapping shows a storm drainage watercourse north of Watkiss Way that appears to connect to Watercourse 3, but no watercourse is visible south of Watkiss Way (CRD 2020). No information on fish presence is available from these mapping sources and no fish were observed during the assessment.

Watercourse 3 was measured at 10 transects over 100 m within the property (on the portion north side of the Galloping Goose) and had an average width of 2.5 m. The first transect was measured directly south of Watkiss Way, immediately downstream of a culvert and a section of rock armoring (Appendix A; Photo 14).

Substrate in Watercourse 3 was comprised of organic debris with small patches of gravel. Vegetation lined both banks, and canopy cover was high (>75%) throughout the 100 m surveyed.

Water levels were low at the time of assessment. In some places the channel was dry and in others water flowed slowly. A few shallow pools were observed, and organic matter and small woody debris were common throughout the channel.



## BC TRANSIT BURNSIDE HANDYDART FACILITY – HABITAT ASSESSMENT

### Results

January 19, 2021

Spawning habitat in Watercourse 3 is nil due to lack of adequate substrate. Habitat for other life stages is poor due to lack of deep pools and areas of subsurface flow. At the time of observation, it had not rained in a few days, so it is possible the water level is higher at other times of year. With a higher water level, it is possible that migration potential may exist, but it is unlikely.

Canopy cover within the 100 m of channel observed was over 50%. There was little cover for fish from overhanging or instream vegetation. Small amounts of in-stream vegetation were observed, and banks were lined with Himalayan blackberry and young deciduous trees (alder).

The substrate of Watercourse 3 is comprised of fines and organics. This ditch is north of the Galloping Goose Regional Trail and is a series of short channels between wetlands. It crosses the trail through a culvert and terminates in a wetland. Overhead cover is provided by deciduous trees and shrubs and there is very little instream cover. This ditch was also found to contain poor fish habitat for all life stages





## BC TRANSIT BURNSIDE HANDYDART FACILITY – HABITAT ASSESSMENT

### References

January 19, 2021

## 4.0 REFERENCES

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## BC TRANSIT BURNSIDE HANDYDART FACILITY – HABITAT ASSESSMENT

### References

January 19, 2021

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# **APPENDIX A**

## **Site Photos**

<b>Client:</b>	<b>BC Transit</b>	<b>Project:</b>	<b>Burnside Road HandyDART Facility</b>
<b>Site Location:</b>	<b>2401 Burnside Rd. W</b>		

**Photograph ID: 1**

**Photo Location:**  
Craigflower Creek

**Survey Date:**  
4/23/2020

**Comments:**  
Typical photo of Craigflower Creek taken looking downstream.



**Photograph ID: 2**

**Photo Location:**  
Craigflower Creek

**Survey Date:**  
4/23/2020

**Comments:**  
Typical photo of Craigflower Creek taken looking downstream.



<b>Client:</b>	BC Transit	<b>Project:</b>	Burnside Road HandyDART Facility
<b>Site Location:</b>	2401 Burnside Rd. W		

**Photograph ID:** 3

**Photo Location:**  
Craigflower Creek

**Survey Date:**  
4/23/2020

**Comments:**  
Pool downstream of Highway 1 culvert



**Photograph ID:** 4

**Photo Location:**  
Craigflower Creek

**Survey Date:**  
4/23/2020

**Comments:**  
Looking upstream and showing rafted log in tree (left side centre) indicating high flow at times.



<b>Client:</b>	BC Transit	<b>Project:</b>	Burnside Road HandyDART Facility
<b>Site Location:</b>	2401 Burnside Rd. W		

**Photograph ID:** 5

**Photo Location:**  
Craigflower Creek

**Survey Date:**  
4/23/2020

**Comments:**  
Beaver dam downstream of Highway 1 culvert.



**Photograph ID:** 6

**Photo Location:**  
Watercourse 1

**Survey Date:**  
4/23/2020

**Comments:**  
Looking upstream from the area where water pools




<b>Client:</b>	BC Transit	<b>Project:</b>	Burnside Road HandyDART Facility
<b>Site Location:</b>	2401 Burnside Rd. W		

<b>Photograph ID:</b> 7	
<b>Photo Location:</b> Watercourse 1	
<b>Survey Date:</b> 4/23/2020	
<b>Comments:</b> Downstream terminus, looking upstream. Berm surrounding area contains and pools water. No connection to Craigflower Creek found.	

<b>Photograph ID:</b> 8	
<b>Photo Location:</b> Watercourse 2	
<b>Survey Date:</b> 4/23/2020	
<b>Comments:</b> Lower, more vegetated area looking downstream. Right bank is made up of riprap berm that contains Watercourse 1.	

<b>Client:</b>	BC Transit	<b>Project:</b>	Burnside Road HandyDART Facility
<b>Site Location:</b>	2401 Burnside Rd. W		

<b>Photograph ID:</b> 9	
<b>Photo Location:</b> Watercourse 2	
<b>Survey Date:</b> 4/23/2020	
<b>Comments:</b> Lower, more vegetated and natural area of Watercourse 2, looking upstream.	

<b>Photograph ID:</b> 10	
<b>Photo Location:</b> Watercourse 2	
<b>Survey Date:</b> 4/23/2020	
<b>Comments:</b> Looking upstream from within archery range. Channel had abundant reed canary grass and banks were overgrown with Himalayan blackberry.	




<b>Client:</b>	BC Transit	<b>Project:</b>	Burnside Road HandyDART Facility
<b>Site Location:</b>	2401 Burnside Rd. W		

<b>Photograph ID:</b> 11	Apr 23, 2020 at 1:28:18 PM +48-463816-123-447038 BC
<b>Photo Location:</b> Watercourse 2	
<b>Survey Date:</b> 4/23/2020	
<b>Comments:</b> Culvert outlet beneath Burnside Road that discharges to Watercourse 2.	





<b>Photograph ID:</b> 12	Apr 23, 2020 at 1:12:11 PM +48-463538-123-446005 BC
<b>Photo Location:</b> Watercourse 2	
<b>Survey Date:</b> 4/23/2020	
<b>Comments:</b> Looking downstream from within archery range. Watercourse is within area overgrown by Himalayan blackberry.	




<b>Client:</b>	<b>BC Transit</b>	<b>Project:</b>	<b>Burnside Road HandyDART Facility</b>
<b>Site Location:</b>	<b>2401 Burnside Rd. W</b>		

<b>Photograph ID:</b> 13	
<b>Photo Location:</b> Watercourse North of Kami Court	
<b>Survey Date:</b> 9/2/2020	
<b>Comments:</b> Watercourse providing a seasonal source of water to Watercourse 2 showing the watercourse overgrown with grass.	


<b>Photograph ID:</b> 14	
<b>Photo Location:</b> Watercourse North of Kami Court	
<b>Survey Date:</b> 9/2/2020	
<b>Comments:</b> A portion of scoured channel along watercourse that provides a seasonal source of water to Watercourse 2	

<b>Client:</b> BC Transit		<b>Project:</b> Burnside Road HandyDART Facility	
<b>Site Location:</b> 2401 Burnside Rd. W			
<b>Photograph ID:</b> 15			
<b>Photo Location:</b> Watercourse North of Kami Court			
<b>Survey Date:</b> 9/2/2020			
<b>Comments:</b> Connection from Watercourse North of Kami Court to Watercourse 2.			
<b>Photograph ID:</b> 16			
<b>Photo Location:</b> Watercourse 3			
<b>Survey Date:</b> 6/4/2020			
<b>Comments:</b> South of Watkiss Way showing rock armouring on banks.			

<b>Client:</b>	<b>BC Transit</b>	<b>Project:</b>	<b>Burnside Road HandyDART Facility</b>
<b>Site Location:</b>	<b>2401 Burnside Rd. W</b>		

<b>Photograph ID:</b> 17	
<b>Photo Location:</b> Watercourse 3	
<b>Survey Date:</b> 6/4/2020	
<b>Comments:</b> South of Watkiss Way showing area of channelization.	

<b>Photograph ID:</b> 18	
<b>Photo Location:</b> Watercourse 3	
<b>Survey Date:</b> 6/4/2020	
<b>Comments:</b> South of Watkiss Way showing wetted areas between deciduous vegetation.	

<b>Client:</b>	BC Transit	<b>Project:</b>	Burnside Road HandyDART Facility
<b>Site Location:</b>	2401 Burnside Rd. W		
<b>Photograph ID:</b> 19			
<b>Photo Location:</b> Watercourse 3			
<b>Survey Date:</b> 6/4/2020			
<b>Comments:</b> South of Watkiss Way showing dry patches in non-channelized areas.			

# **APPENDIX B**

## **Historical Air Photos**



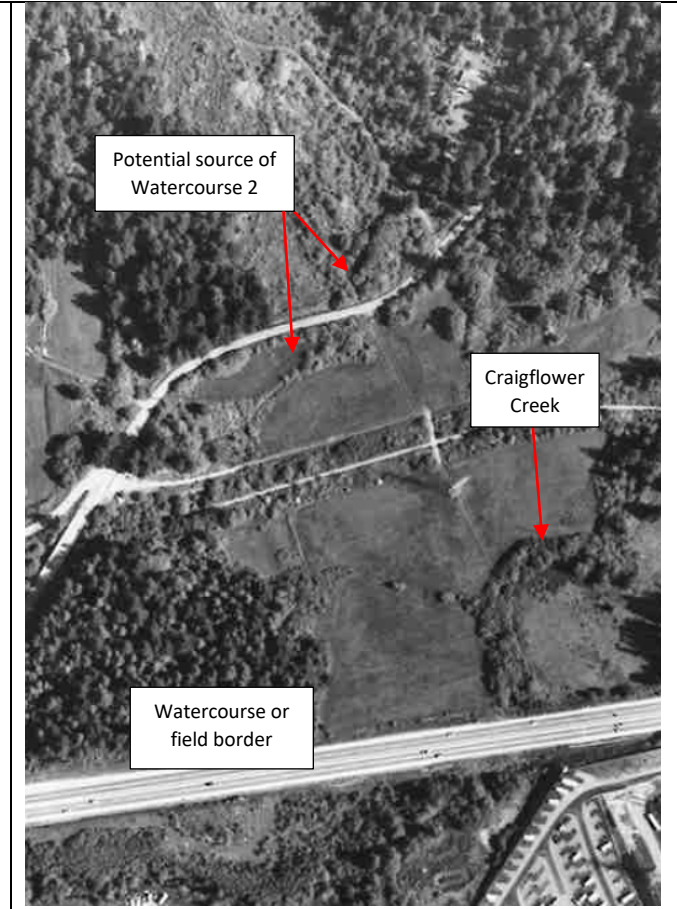
**Air Photo – 2005:** Site conditions after the construction of the Burnside Road offramp from Highway 1.



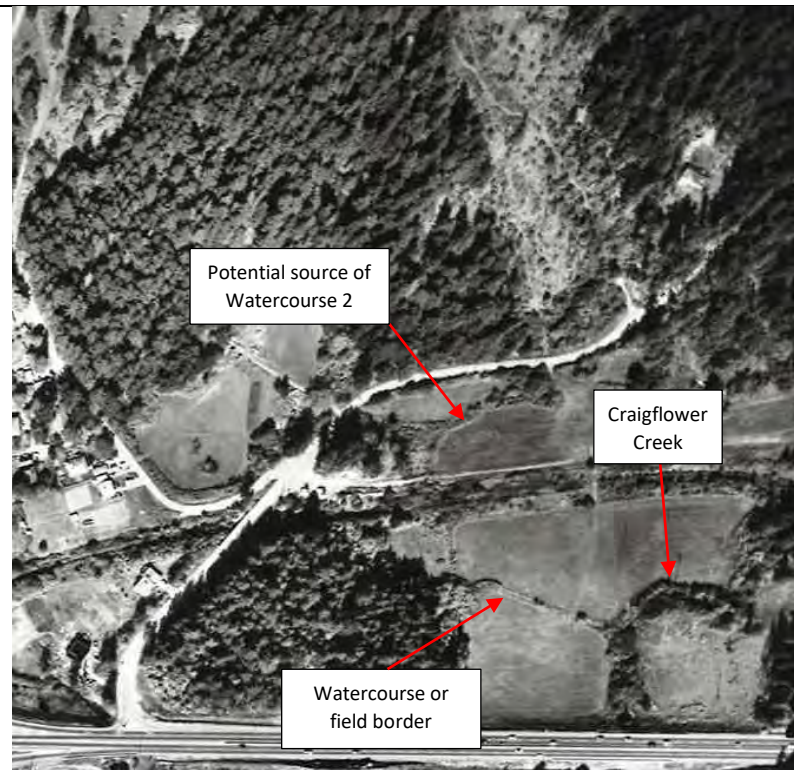
**Air Photo – 1997:** Site conditions during the construction of the Burnside Road offramp from Highway 1. The alignment of Watercourse 1 and Watercourse 2 are pronounced.



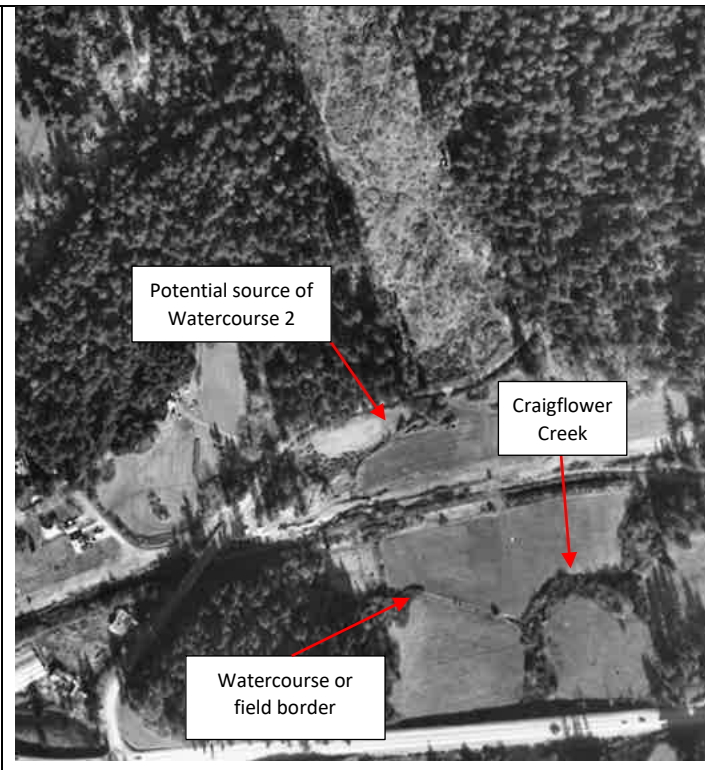
**Air Photo – 1992:** Site conditions prior to the construction of the Burnside Road offramp from Highway 1. Watercourse 1 does not appear to be present and a Watercourse or field border is present in a similar location as Watercourse 2 was previously.



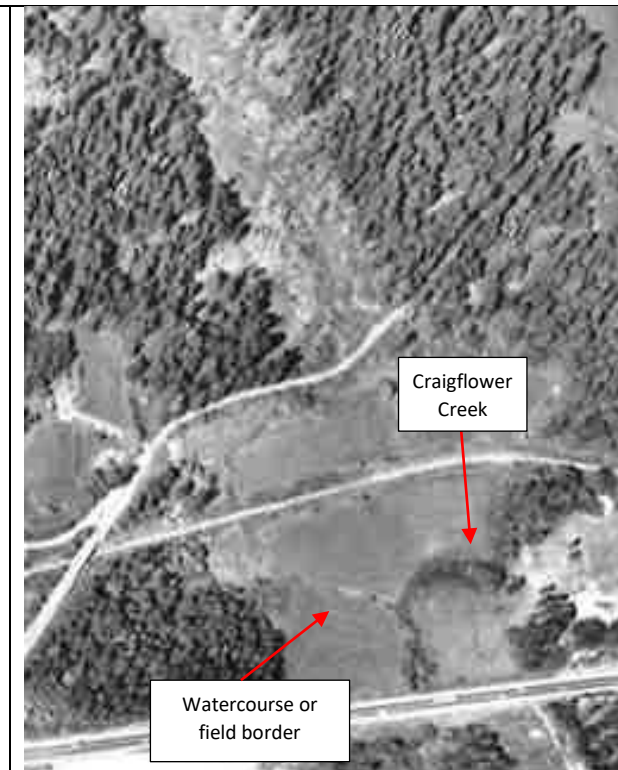
**Air Photo – 1986:** A potential source of water for Watercourse 2 may be present in the cleared right-of-way upslope (north) of the property.



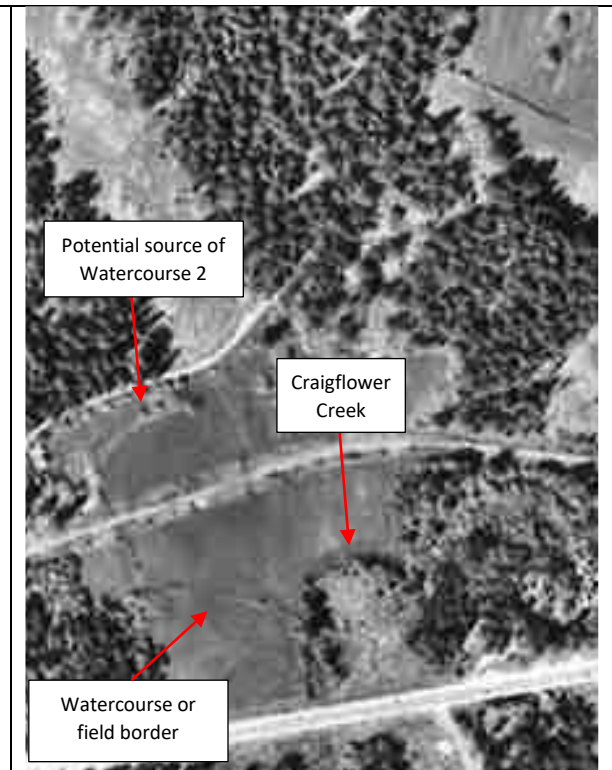
**Air Photo – 1979:** Similar conditions to 1986.



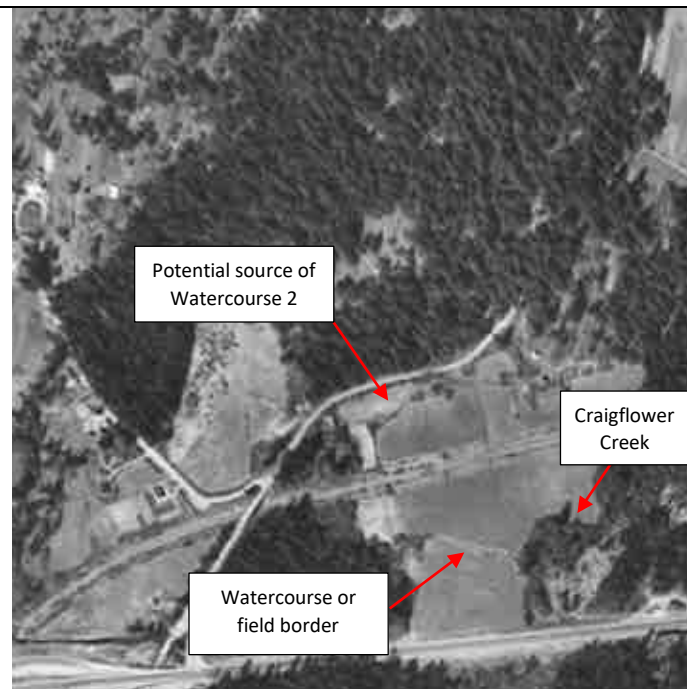
**Air Photo – between 1974:** Similar conditions to 1986.



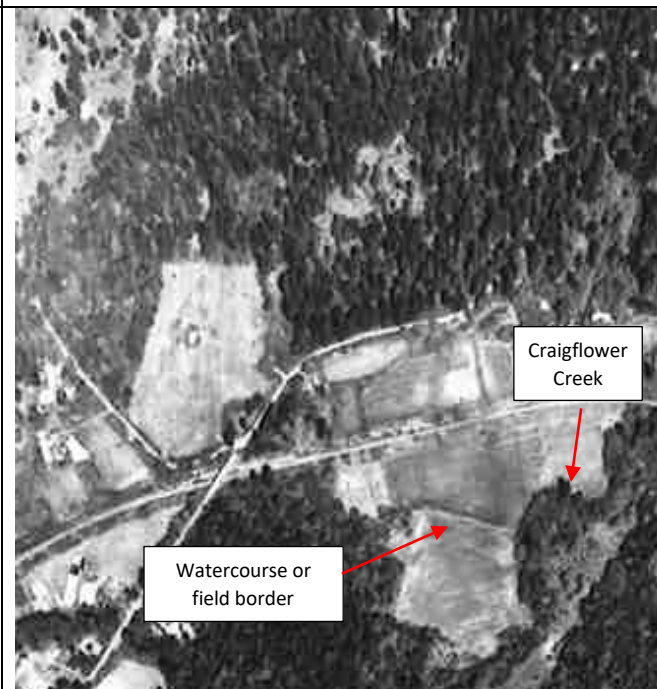
**Air Photo – 1968:** Similar conditions to 1986.



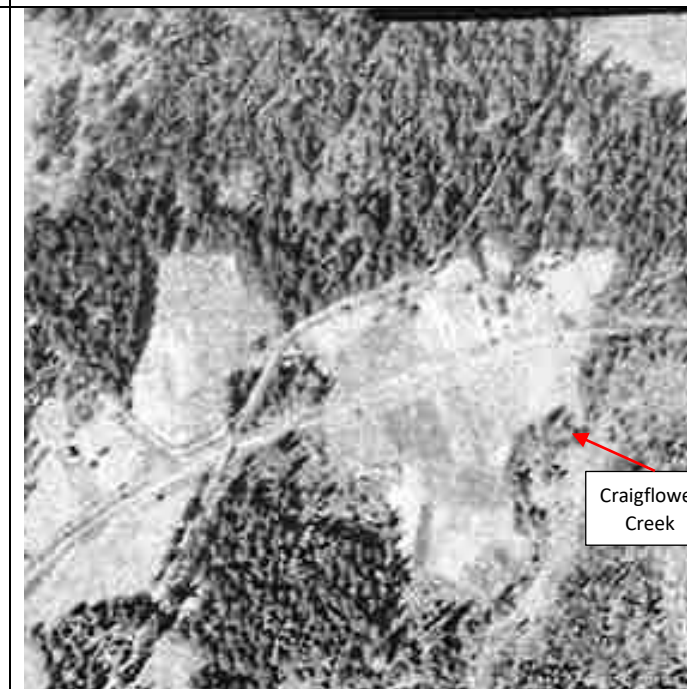
**Air Photo – 1964:** Similar conditions to 1986.



**Air Photo – 1956:** Cleared right-of-way no longer present north of the site



**Air Photo – 1949:** The watercourse / field border in the area around Watercourse 2 appear more prominently as a border to a field as opposed to a Watercourse.



**Air Photo – 1932:** The watercourse / field border is no longer visible, though the area is cleared. No watercourses appear to flow into Craigflower Creek



**Air Photo – 1926:** The watercourse / field border is no longer visible, though the area is cleared. No watercourses appear to flow into Craigflower Creek from the site.



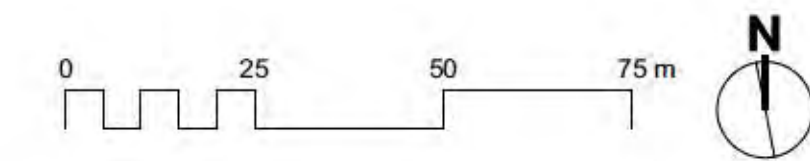
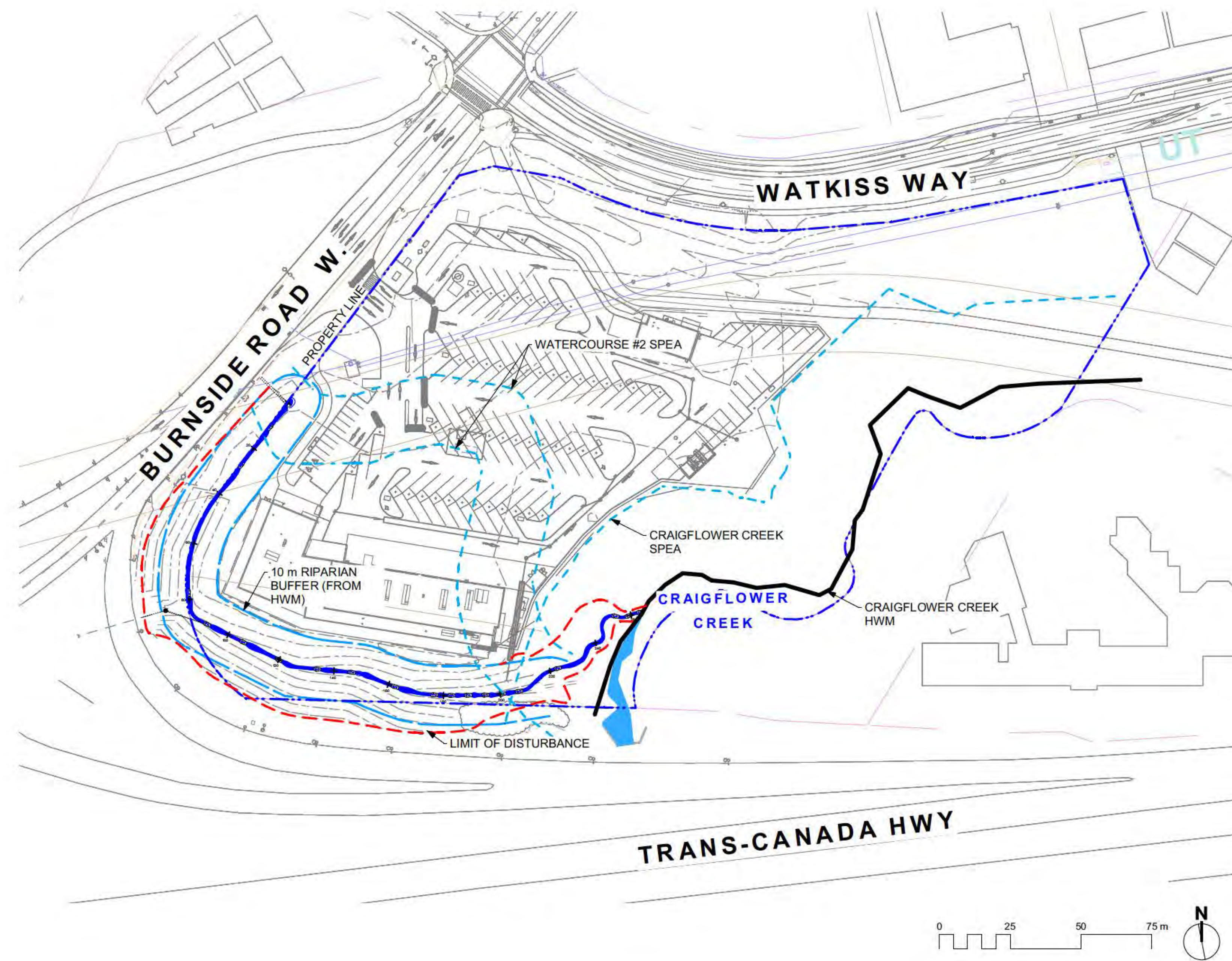
# **APPENDIX B**

## **Engineering Drawings**

BC Transit  
**VICTORIA handyDART CENTRE**  
 Victoria, BC

Landscape Drawings	
Sheet No.	Sheet Title
L0.00	Cover
L0.01	General Information Sheet
L0.02	Tree Removal and Protection Plan
L1.01	Existing Site Plan
L1.02	Proposed Stream Plan
L1.03	Site Sections
L1.04	Site Sections
L2.01	Stream Profile - Upper
L2.02	Stream Profile - Middle
L2.03	Stream Profile - Lower
L2.04	Stream Profile - Low Gradient Channel
L3.01	Planting Plan Overview
L3.02	Planting Plan - Upper
L3.03	Planting Plan - Middle
L3.04	Planting Plan - Lower
L4.01	Landscape Details

# KEY PLAN



MORRISON HERSHFIELD

Suite 310, 4321 Still Creek Drive  
 Burnaby, British Columbia, V5C  
 6S7  
 Tel: 604 454 0402 Fax: 604 454 0403  
 www.morrisonhershfield.com

**D'AMBROSIO**  
 architecture + urbanism



**NOT FOR CONSTRUCTION**

All dimensions in Metric

REV	DESCRIPTION	DATE
6	Issued for Tender	2021-07-05
5	Draft IFT	2021-06-25
4	Revised EDP No.1	2021-05-24
3	EDP No.1	2021-05-03
2	70% Design	2021-02-02
1	Revision #1	2021-01-06
REV	DESCRIPTION	YYYY-MM-DD

DO NOT SCALE FROM DRAWINGS. CONTRACTOR MUST VERIFY ALL DIMENSIONS ON SITE AND ADVISE CONSULTANTS OF ANY ERRORS OR OMISSIONS. NO VARIATIONS OR MODIFICATIONS TO WORK SHOWN SHALL BE IMPLEMENTED WITHOUT PRIOR WRITTEN APPROVAL. ALL PREVIOUS ISSUES OF THIS DRAWING ARE SUPERSEDED BY THE LATEST REVISION. ALL DRAWINGS AND SPECIFICATIONS REMAIN THE PROPERTY OF MORRISON HERSHFIELD.

STAMPS



CLIENT: BC TRANSIT  
 PROJECT: VICTORIA handyDART CENTRE

COVER

SCALE:	PROJECT NO.	
1:1000	201919500	
DWG.#	REV	DATE:
TP2 - L0.00	3	2021-06-24

**GENERAL NOTES**

- Work performed shall comply with the following: a) These General Notes, and Construction Documents and Specifications; b) Canadian Landscape Standards, Current Edition (CLS-CE); and c) All applicable local, provincial, and federal codes, ordinances, and regulations.
- Contractor is responsible for verifying all existing site conditions including location of all property lines, existing structures, utilities, and buried infrastructure. Verify all field conditions prior to commencing work.
- Contractor is responsible for determining means and methods for construction. These drawings may indicate a limit of proposed improvements or limit of work for the delineation of expected extents of disturbance. Should limits of disturbance exceed boundaries defined in drawings, contractor to contact Contract Administrator for resolution.
- Contractor is responsible for repairing all work disturbed by construction outside of limit lines defined on drawings or through their means and methods to a condition better than or equal to the existing conditions prior to commencement of construction at no additional cost to the owner.
- Contractor is responsible for maintaining a complete up-to-date set of drawings and specifications at the construction site and ensuring the documents are readily available for review by the Contract Administrator and governing agency.
- Contractor is responsible for coordination of all designs, drawings, specifications and other documents or publications upon which construction is based. Any discrepancies with the drawings and/or specifications and site conditions is to be brought to the attention of the Contract Administrator, prior to proceeding with construction.
- The drawings and specifications are complementary to one another and implied to correspond with one another. Any discrepancies should be brought to the attention of the Contract Administrator for resolution immediately.
- General Contractor and/or sub-contractors are responsible for all costs related to production and submission to Contract Administrator of all landscape as-built information including irrigation.

**TREE RETENTION AND REMOVAL NOTES**

- Tree protection fencing, for existing trees, to be installed prior to commencement of all site work. Refer to Landscape Drawings and Arborist's plans for location of tree protection fencing, and protection fencing detail.
- Refer to arborist's report for detailed information for existing tree resources.

**SITE GRADING AND DRAINAGE NOTES**

- All elevations are in meters.
- Refer to Architectural plans, sections and elevations for top of slab elevations. Slab elevations indicated on Landscape Drawings are for reference only. Report any discrepancies to consultant for review and response.
- All road, public walkway and vehicular drive aisles and parking area elevations indicated on the Landscape Drawings are for reference only. Refer to Civil Drawings. Report any discrepancies to Contract Administrator for review and response.
- Confirm all existing grades prior to construction. Report any discrepancies to Contract Administrator for review and response.
- Unless otherwise noted provide a minimum slope of 2% on all hard and soft landscape areas to ensure positive drainage away from buildings, to rain gardens, or to drainage devices.
- All landscape areas not to exceed a maximum slope of 3:1 in all instances.
- Upon discovery, contractor to refrain from blasting rock to meet landscape subgrades. Contractor to contact Contract Administrator on how to proceed in each instance.

**IRRIGATION NOTES**

- Contractor to provide irrigation system for all planters to current IABC Standards and Contract Specifications.
- All specified work to meet the project specifications, and all standards or specifications established in the latest edition of the Canadian Landscape Standard and IABC standards.
- Design/build drawings for detailed irrigation plan to be submitted to Contract Administrator in PDF and .dwg formats at least two weeks prior to commencement of irrigation installation.
- Utilities - Contractor to verify location of all on-site utilities, prior to construction. Restoration of damaged utilities shall be made at the contractor's expense, to the satisfaction of the Contract Administrator.
- Refer to electrical drawings for electrical service.
- Controller and backflow prevention device to be located in valve box, unless otherwise noted. Refer to Civil drawings for size and location of irrigation service.
- Contractor to verify pressure and flow prior to installation of irrigation and notify Contract Administrator in writing if such data adversely affects the operation of the system.
- Sleeves to be installed at the necessary depths, prior to pavement construction. Sleeving to extend 300 mm from edge of paving into planting area, and is to have ends marked above grade unless otherwise shown.
- Contractor to field fit irrigation system around existing trees, to limit disturbance to root systems. Work within 2 m of the tree drip line to be reviewed with project arborist.
- At various milestones during construction, inspection and testing of components will be required to ensure that the performance of irrigation system meets standards and specifications. Contractor to provide equipment and personnel necessary for performance of inspections and tests. Conduct all inspections and tests in the presence of the Contract Administrator. Keep work uncovered and accessible until successful completion of inspection or test.
- Over spray onto hardscape areas to be minimized.
- Trees within shrub or rain garden areas to be irrigated with spray heads.

**GROWING MEDIUM NOTES**

- Refer to Landscape Specifications for growing medium properties by soil type.
- Advise Contract Administrator of sources of growing medium to be utilized 21 days in advance of starting work.
- Growing medium properties and handling to meet CLS-CE (see Section 5 CLS-CE).
- Contractor is responsible for soil analysis and amendment requirements to supply suitable growing medium, as specified by testing agency. Soil analysis and amendment costs to be included in the price for the work.
- Submit to the Contract Administrator a copy of the soil analysis report from Pacific Soil Analysis Inc. 5-11720 Voyageur Way, Richmond, BC, V6X 3G9. p. 604- 273-8226. The analysis is to be of tests done on the proposed growing medium from stratified samples taken from the supply source within thirty (30) days immediately prior to growing medium placement. Costs of the initial and all subsequent tests to ensure compliance with the specifications is to be borne by the Contractor.
- Landscape Architect will collect sample of growing medium in place and determine acceptance of material, depth of growing medium and finish grading. Approval of growing medium material subject to soil testing and analysis. Planting is not to occur until finished grades have been approved by Contract Administrator.

**SITE LAYOUT NOTES**

- Provide layout of all work for approval by Contract Administrator prior to proceeding with work. Requests for site review as required 48 hours in advance of performing any work, unless otherwise noted on this sheet.
- Layout and verify dimensions prior to construction. Bring discrepancies to the attention of the Contract Administrator
- Written dimensions take precedence over scale. Do not scale drawings.
- All plan dimensions in metres and all detail dimensions in millimetres, unless otherwise noted.
- Where dimensions are called as 'equal' or 'eq', space referenced items equally, measured to centre line.

**BOULDER SIZE AND PLACEMENT**

- Stone to be durable, non-sedimentary and non-spalling rock.
- Key 1/3 of rock into soil unless otherwise noted.
- Landscape Architect to approve layout of boulders prior to placement. Allow time for field review with Landscape Architect and adjust final locations of boulders as required to meet design intent.
- Boulder dimensions to meet tolerances shown in Landscape Drawings on three axes. Smallest axis to be greater than 75% of widest dimension.

**GENERAL PLANTING NOTES**

- Plant quantities on Plans shall take precedence over plant list quantities.
- Provide layout of all work for approval by Contract Administrator prior to proceeding with work.
- Plant material, installation and maintenance to conform to the current edition of the Canadian Landscape Standard.
- Plant quantities and species may change between issuance of E.D.P. and Construction due to plant availability and design changes. Substitutions and changes will be approved by the Contract Administrator prior to plant installation.
- Landscape installation to carry a 1 year warranty from date of acceptance. This warranty is based on adequate maintenance by the Owner after Acceptance. The Contractor will not be responsible for plant loss due to extreme climatic conditions such as abnormal freezing temperatures or hail which occur after Acceptance. The Contractor is responsible for plant loss due to inadequate acclimatization of plants for their planted location.
- Trees will be planted such that they do not impact visibility for drivers. Trees will not be planted within 7m of Burnside Road or the highway off-ramp.

**LARGE WOODY DEBRIS SALVAGE**

- All Large Woody Debris (LWD) will remain on site and be incorporated into the new stream channel design.
- LWD is defined as stems larger than 10 cm diameter and root wad (attached to tree or separate).
- Contractor will salvage LWD and retain on site at location TBD. LWD will be sorted in piles 10-20 cm, 20-40 cm and >40 cm diameter.
- Where feasible, trees should be pushed over. Do not cut off root wad. Retain root wad with 4 to 6 m trunk. Buck logs in 4 to 6 m lengths.
- LWD placement will be at direction of Landscape Architect and Biologist.
- Other wood waste from felled trees (branches and unused woody limbs) to be used to create wood mulch. Mulch size to be consistent with a Course Bark Mulch product and shall be 75 mm (in.) minus.

**FLOW INTRODUCTION**

- Conduct during a period of low flow and with no rain in the forecast following completion of construction of the tie-in to Craigflower Creek.
- Install a barrier in Watercourse 2 upstream of the point where it will be diverted into the new channel. Pump flow from behind the barrier downstream into Watercourse 2. Discharge the outlet hose onto a hard surface for energy dissipation.
- Complete the tie-in from the now dry section of Watercourse 2 to the new channel.
- Install an isolating barrier in Watercourse 2 downstream of the tie-in to the new channel.
- Install an isolating barrier downstream in Watercourse 1 before it discharges to Craigflower Creek. The Flooded Riparian Bench may be able to function as this barrier.
- Complete a fish salvage in the entirety of Watercourse 2.
- Shut off the pump and remove the upstream barrier. Allow flow into the new channel.
- Sediment-laden water will be intercepted by the barrier at Craigflower Creek (or Flooded Riparian Bench). Pump flow behind the barrier in the Flooded Riparian Bench to a vegetated area until the flow runs clear.
- Fill in upper section of Watercourse 2.
- Remove all barriers.

**LIST OF ABBREVIATIONS**

APPROX	APPROXIMATE	MAX	MAXIMUM
ARCH	ARCHITECT	MH	MANHOLE
AVG	AVERAGE	MIN	MINIMUM
B&B	BALLED AND BURLAPPED	MISC	MISCELLANEOUS
BC	BOTTOM OF CURB	N	NORTH
BLDG	BUILDING	NIC	NOT IN CONTRACT
BM	BENCHMARK	NO	NUMBER
B'OC	BACK OF CURB	NOM	NOMINAL
BR	BOTTOM OF RAMP	NTS	NOT TO SCALE
BS	BOTTOM OF STEP	OC	ON CENTER
BW	BOTTOM OF WALL	OD	OUTSIDE DIAMETER
CAL	CALIPER	PC	POINT OF CURVATURE
CB	CATCH BASIN	PE	POLYURETHANE
CF	CUBIC FEET	PI	POINT OF INTERSECTION
CIP	CAST IN PLACE	PL	PROPERTY LINE
CL	CENTER LINE	PT	POINT, POINT OF TANGENCY
CLR	CLEARANCE	PVC	POLYVINYL CHLORIDE
CM	CENTIMETER	QTY	QUANTITY
CO	CLEAN OUT	R	RADIUS
CONT	CONTINUOUS	REF	REFERENCE
CY	CUBIC YARD	REINF	REINFORCE(D)
DEG	DEGREE	REQD	REQUIRE(D)
DEMO	DEMOLISH, DEMOLITION	REV	REVISION
DIA	DIAMETER	ROW	RIGHT OF WAY
DIM	DIMENSION	S	SOUTH
DTL	DETAIL	SAN	SANITARY
DWG	DRAWING	SD	STORM DRAIN
E	EAST	SF	SQUARE FOOT (FEET)
EA	EACH	SHT	SHEET
EL	ELEVATION	SIM	SIMILAR
ENG	ENGINEER	SPECS	SPECIFICATIONS
EQ	EQUAL	ST	STORM SEWER
EST	ESTIMATE	SY	SQUARE YARD
E.W.	EACH WAY	STA	STATION
EXIST	EXISTING	STD	STANDARD
EXP	EXPANSION, EXPOSED	SYM	SYMMETRICAL
FFE	FINISHED FLOOR ELEVATION	T&B	TOP AND BOTTOM
FG	FINISHED GRADE	TBC	TOP BACK OF CURB
FL	FLOW LINE	TC	TOP OF CURB
FOC	FACE OF CURB	TF	TOP OF FOOTING
FT	FOOT (FEET)	TH	THICK
FTG	FOOTING	TOPO	TOPOGRAPHY
GA	GAUGE	TR	TOP OF RAMP
GEN	GENERAL	TS	TOP OF STEP
GR	GRADE ELEVATION	TW	TOP OF WALL
HORIZ	HORIZONTAL	TYP	TYPICAL
HP	HIGH POINT	VAR	VARIABLE
HT	HEIGHT	VOL	VOLUME
ID	INSIDE DIAMETER	W	WITH
INV	INVERT ELEVATION	W/O	WITHOUT
IN	INCH(ES)	WT	WEIGHT
INCL	INCLUDE(D)	WL	WATER LEVEL
JT	JOINT	WWF	WELDED WIRE FRAME
LF	LINEAR FEET	YD	YARD
LP	LOW POINT	@	AT

**LINE TYPE LEGEND**

	Property line
	Existing Non-Mountable Curb
	Existing No-Post Barrier
	Craigflower Creek High Water Mark (HWM)
	SPEA
	Proposed 10 m Offset
	Phase Limit
	Limit of Disturbance
	Proposed Contour Line, (refer to Civil Drawings)
	Proposed Fence

**UNDERGROUND UTILITIES**

(Shown for reference only - refer to Civil Drawings).

EXISTING		PROPOSED
	Storm drain	
	Sewer	
	Water	
	Electrical	
	Gas	
	Hydro Tel	

**MATERIALS LEGEND**

	Proposed Stream
	Berm
	Rock and Cobble

	4 - 6 m log, >400 mm diameter. Placement of log to be directed by Landscape Architect.
	4 - 6 m log, >400 mm diameter. Placement of log to be directed by Landscape Architect.
	600 mm dia. boulder
	450 mm dia. boulder
	Rock weir

**PLANTING LEGEND**

	Maintenance Access Planting Area 300 mm growing medium depth
	Upland (Sun) Planting Area 300 mm growing medium depth
	Upland (Shade) Planting Area 300 mm growing medium depth
	Riparian / Stream Edge Planting Area 300 mm growing medium depth
	In-Channel Planting Area 150 mm growing medium depth
	Grass / Hydroseed Area 100 mm growing medium depth



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6	Issued for Tender	2021-07-05
5	Draft IFT	2021-06-25
4	Revised EDP No.1	2021-05-24
3	EDP No.1	2021-05-03
2	70% Design	2021-02-02
1	Revision #1	2021-01-06
REV	DESCRIPTION	YYYY-MM-DD

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STAMPS



CLIENT:  
**BC TRANSIT**







PROJECT:  
**VICTORIA handyDART CENTRE**

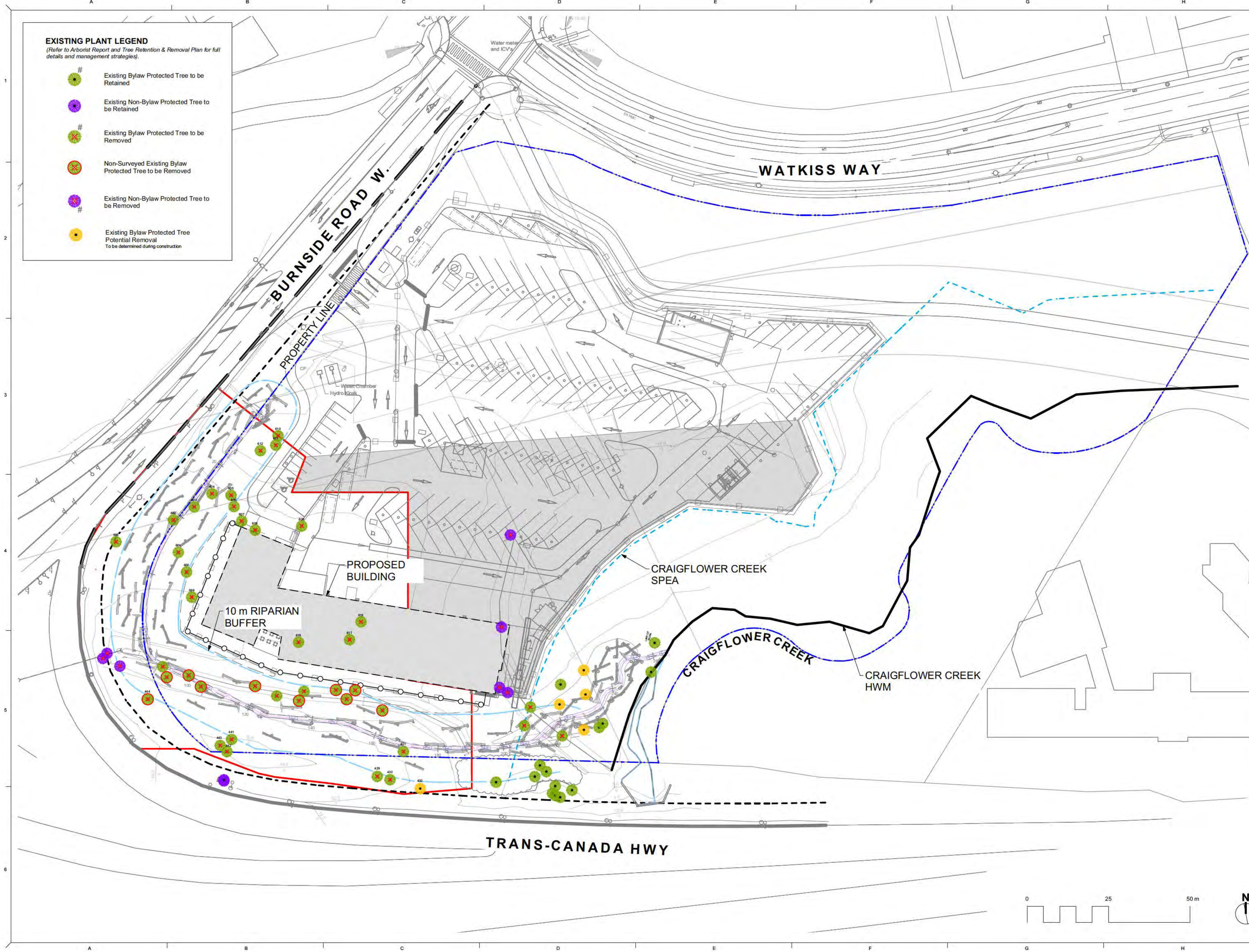
GENERAL INFORMATION SHEET

SCALE: AS SHOWN	PROJECT NO. 201919500
DWG.# TP2 - L0.01	REV DATE: 3 2021-06-24

**ALL DRAWINGS TO BE READ IN ASSOCIATION WITH LANDSCAPE SPECIFICATIONS DOCUMENT.**

**EXISTING PLANT LEGEND**  
(Refer to Arborist Report and Tree Retention & Removal Plan for full details and management strategies).

-  Existing Bylaw Protected Tree to be Retained
-  Existing Non-Bylaw Protected Tree to be Retained
-  Existing Bylaw Protected Tree to be Removed
-  Non-Surveyed Existing Bylaw Protected Tree to be Removed
-  Existing Non-Bylaw Protected Tree to be Removed
-  Existing Bylaw Protected Tree Potential Removal To be determined during construction



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TREE REMOVAL AND PROTECTION PLAN

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		DATE:	2021-06-24





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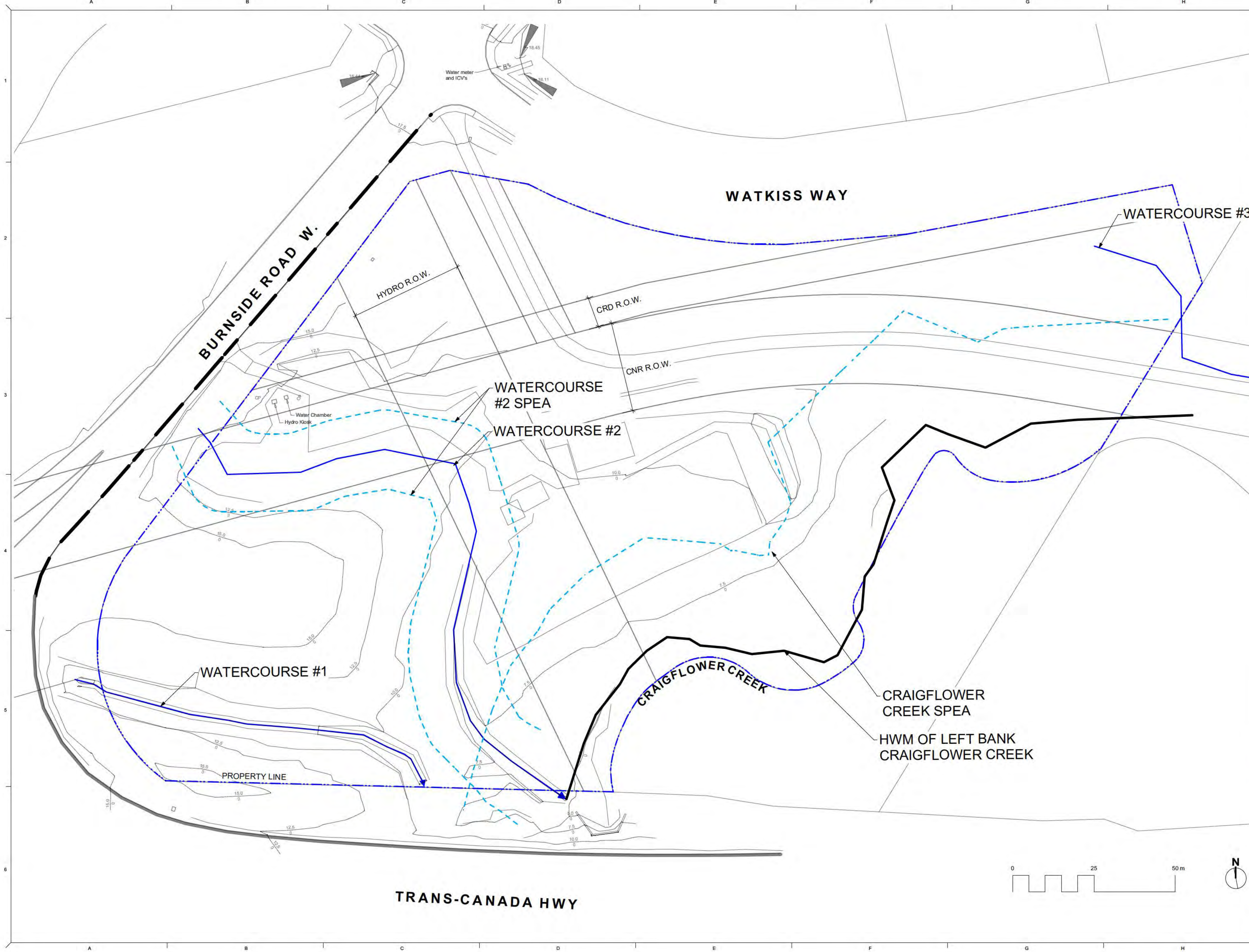


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EXISTING SITE PLAN

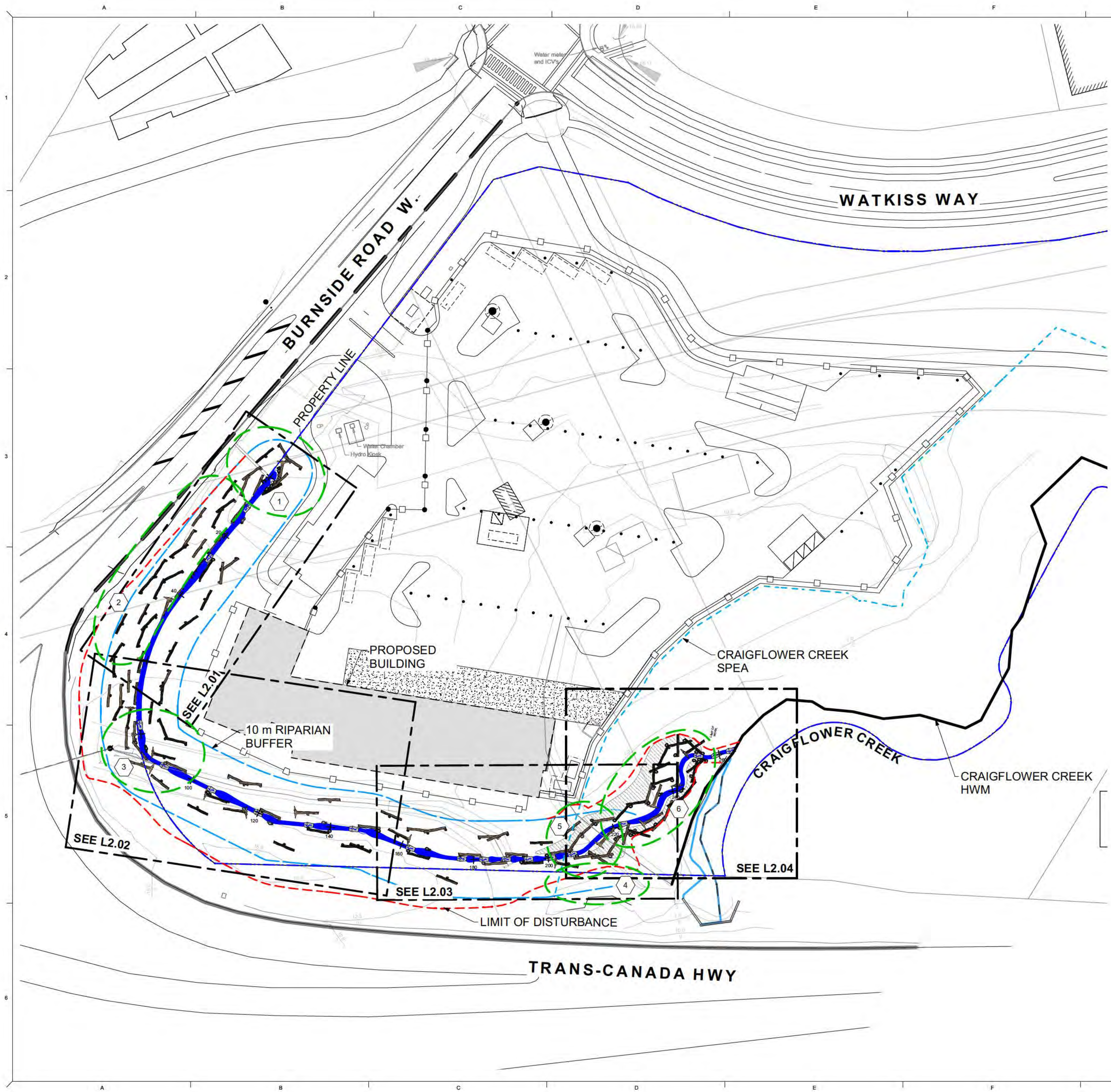
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TP2 - L1.01	3	2021-06-24



A B C D E F G H

1  
2  
3  
4  
5  
6

A B C D E F G H



**AREA DESCRIPTIONS**

1	Location of main stream culvert inlet.
2	Channel slope 2.5 to 3:1 in this area. Use logs and boulders to retain soil and reduce slope.
3	Small culvert discharge location. Culvert goes under highway off ramp.
4	Existing wetland-like area. Retain to manage water / debris from highway curb cut.
5	Intersection of new stream channel and existing Watercourse #2.
6	Low gradient stream channel. Sensitive area not conducive to large equipment. No fill or extra soil to be imported into Craigflower Creek floodplain. Grade change through excavation and recontouring of existing site materials.



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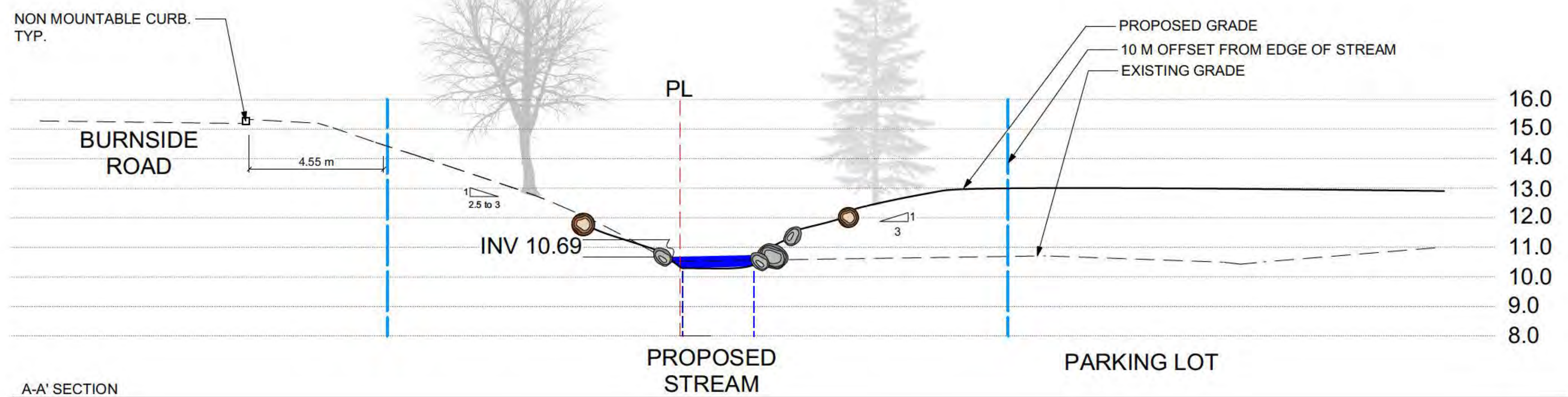


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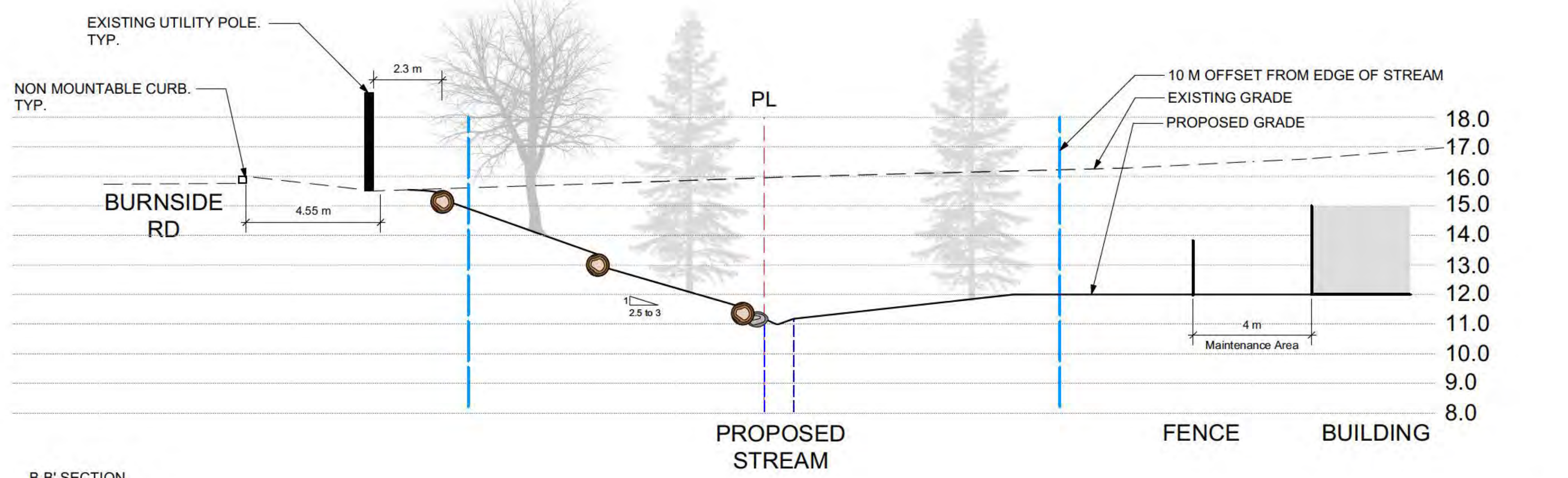
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PROPOSED STREAM PLAN

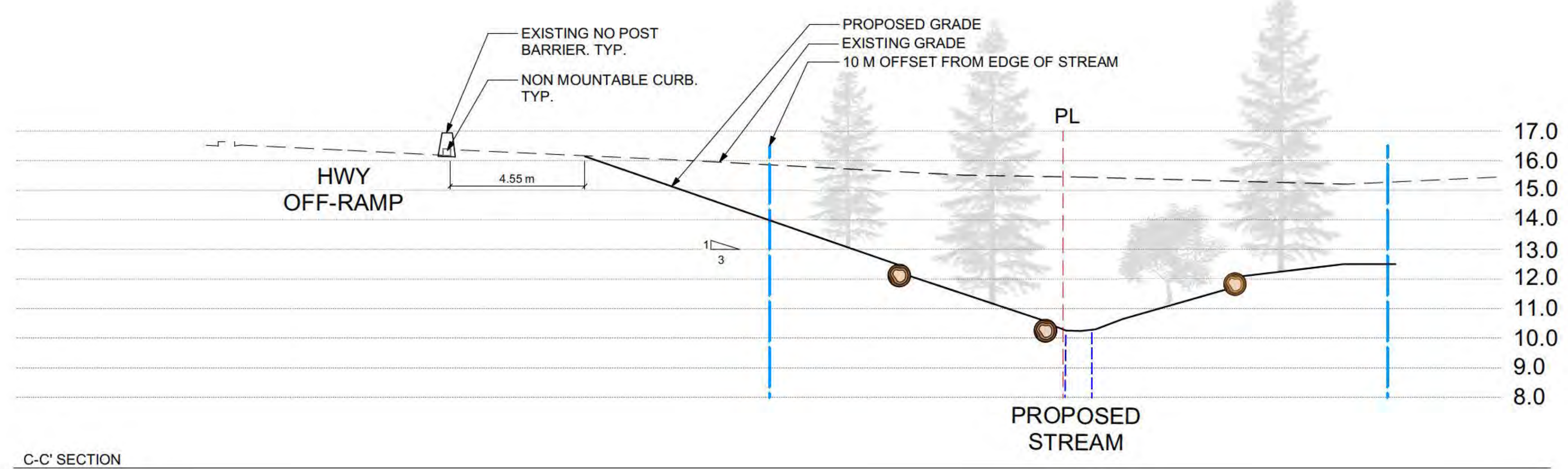
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		DATE:	2021-06-24



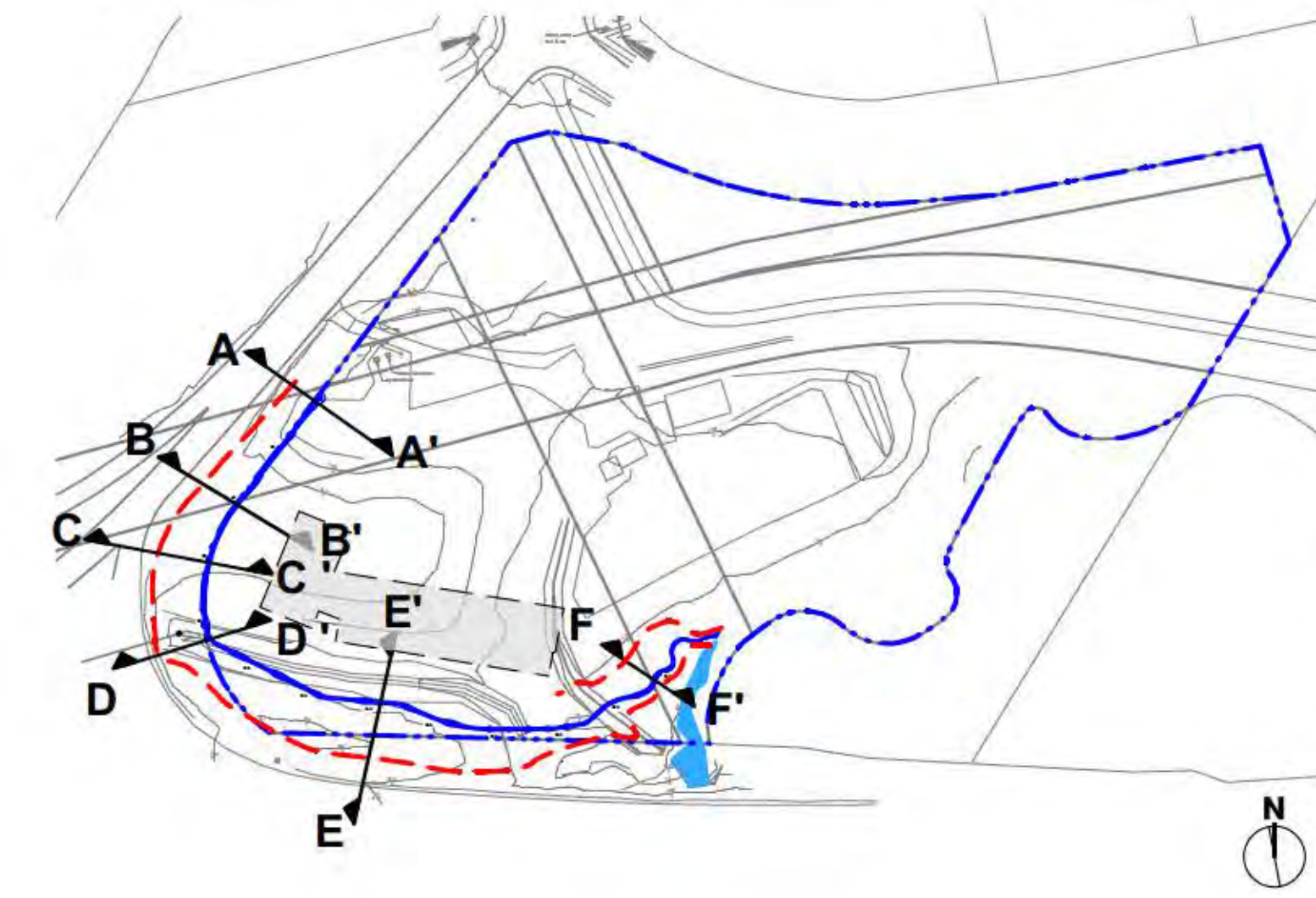
A-A' SECTION  
Scale: 1:100



B-B' SECTION  
Scale: 1:100



C-C' SECTION  
Scale: 1:100



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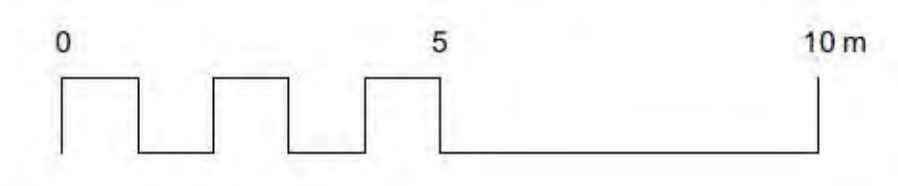


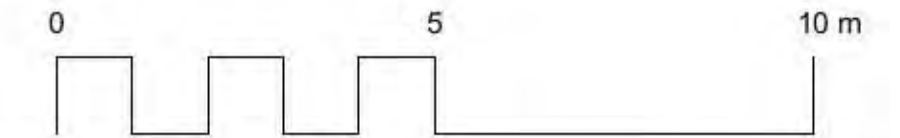
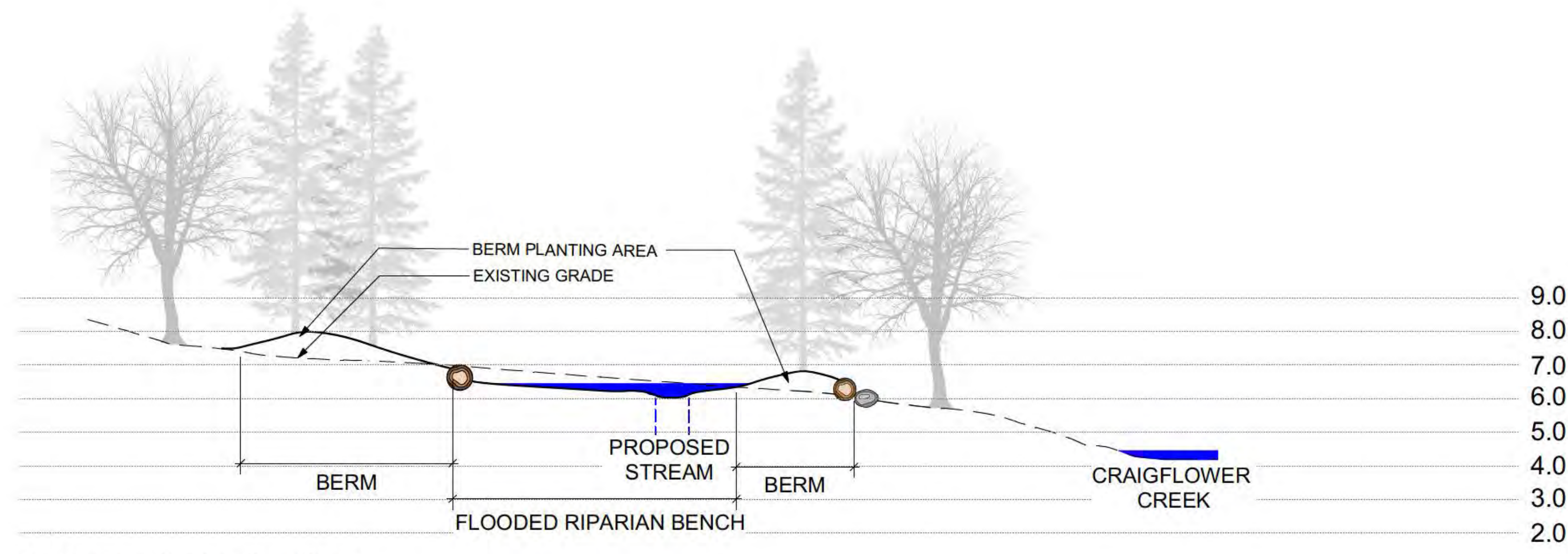
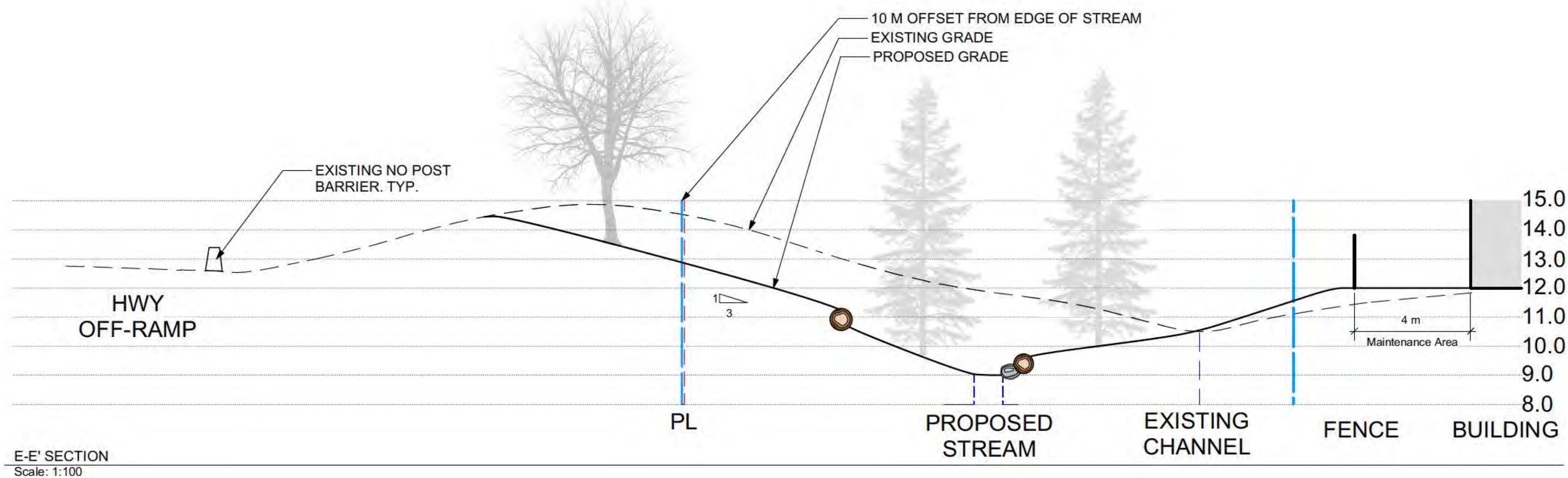
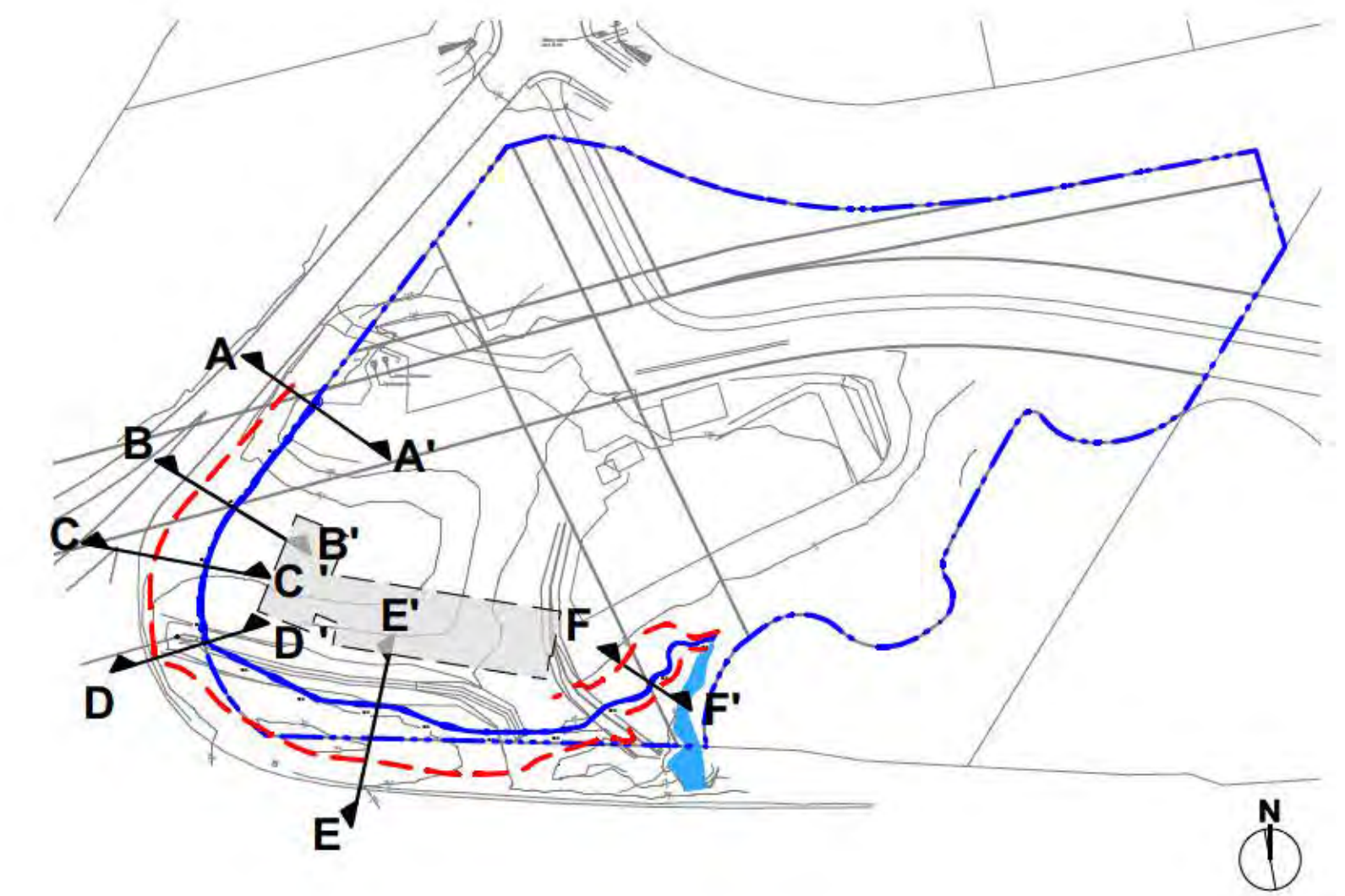
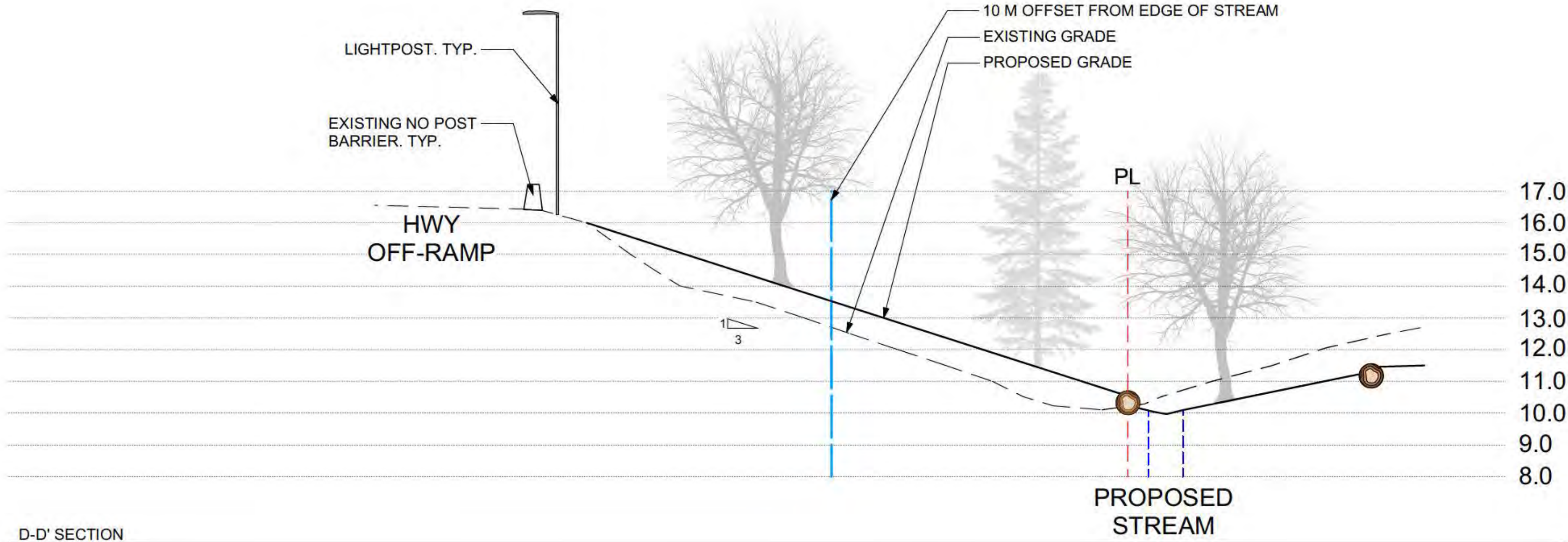
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SITE SECTIONS

SCALE:	PROJECT NO.	
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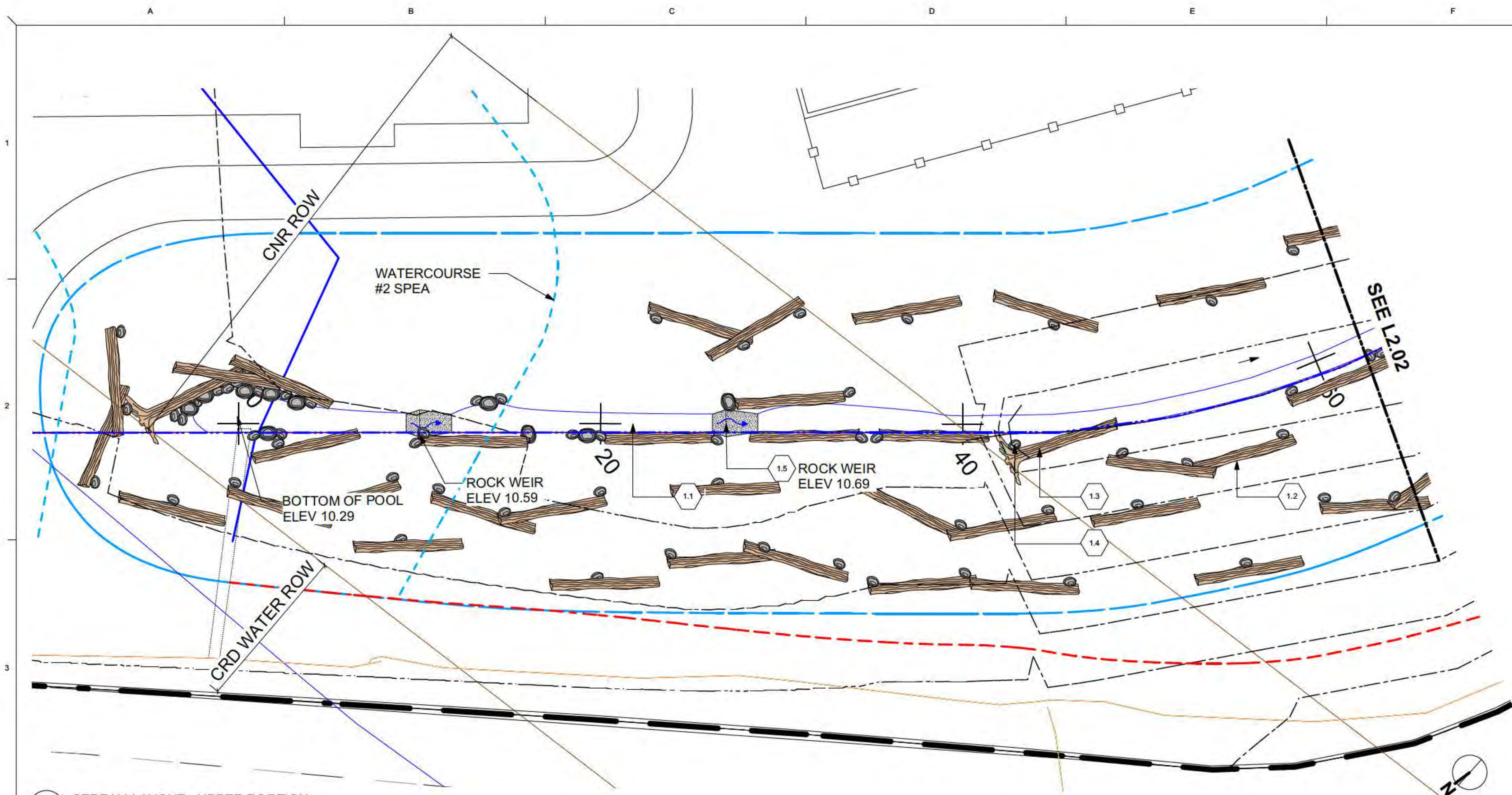
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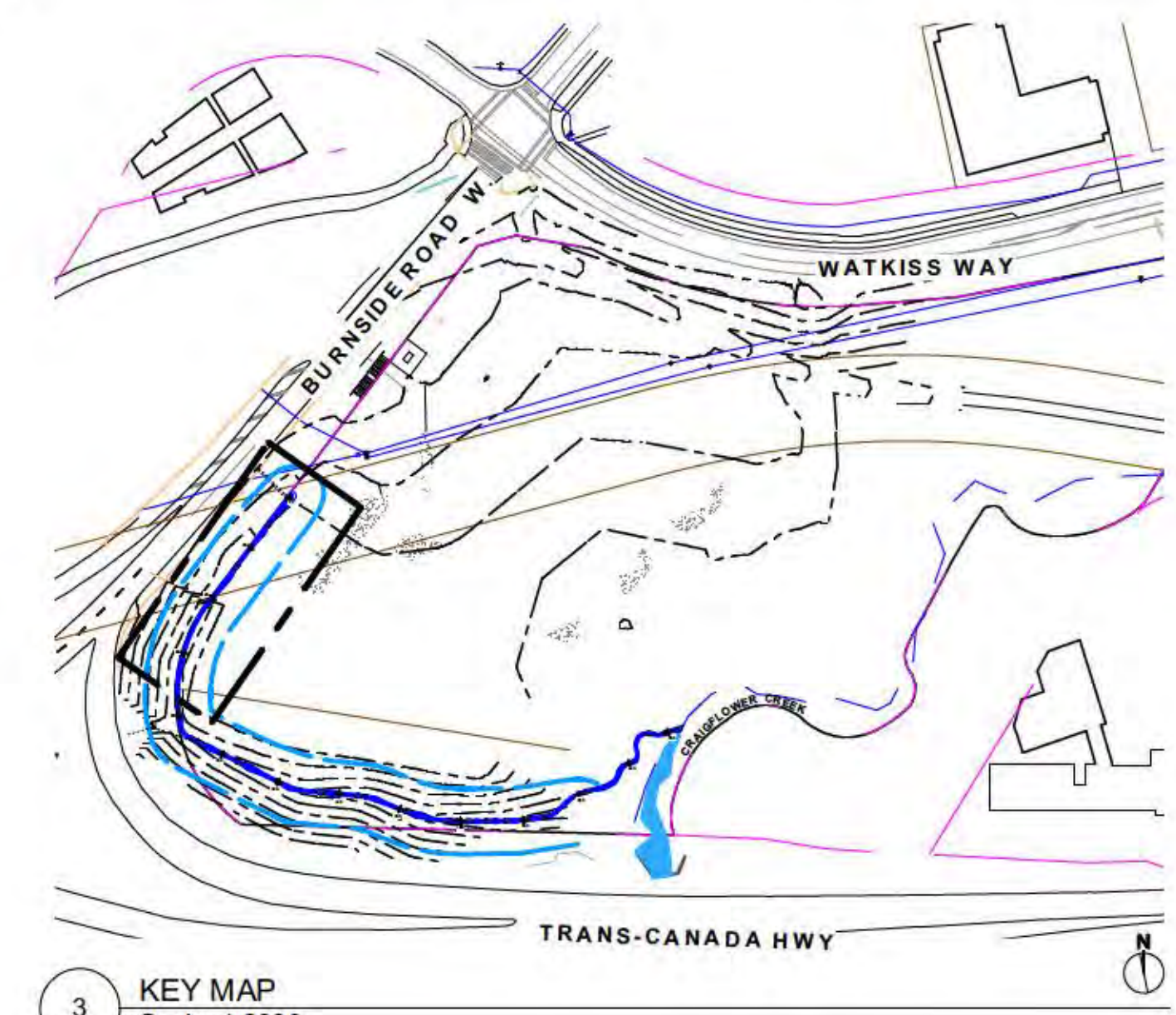
SITE SECTIONS

SCALE:	PROJECT NO.	
1:500	201919500	
DWG.#	REV	DATE:
TP2 - L1.04	3	2021-06-24



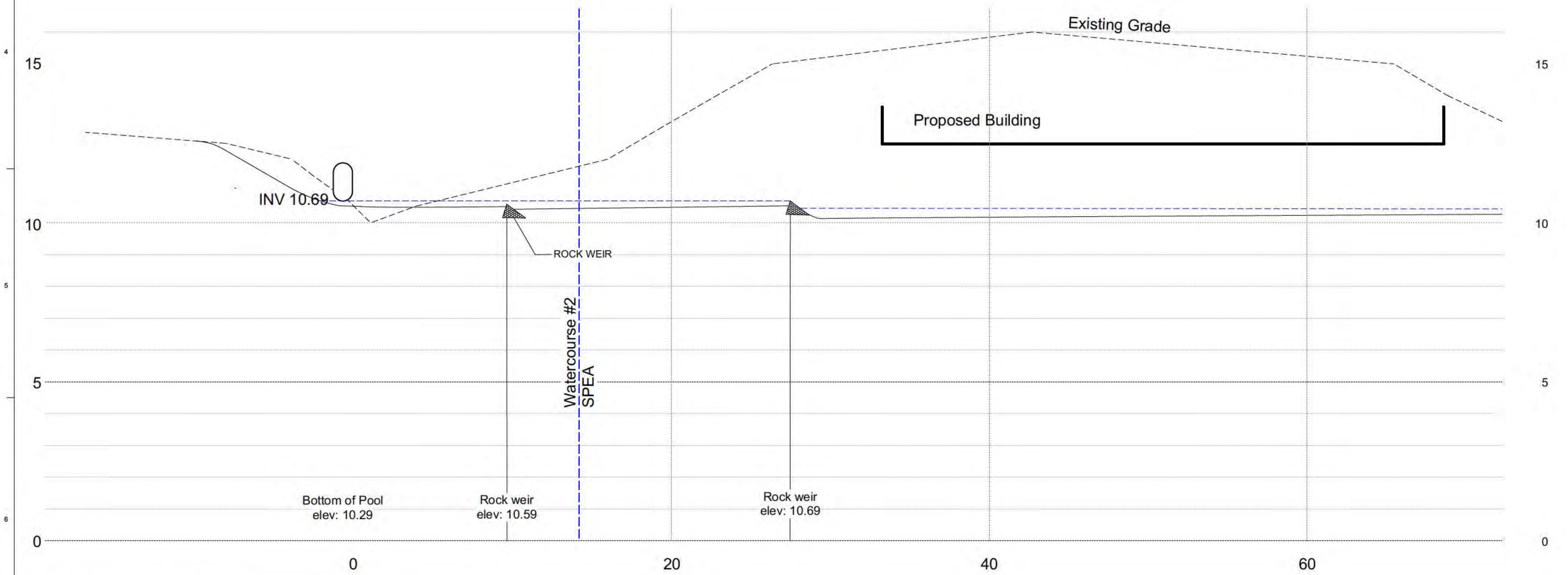


1 STREAM LAYOUT - UPPER PORTION  
Scale: 1:150



**SITE KEYNOTES:**

DETAIL - SHEET	DETAILED PRODUCT INFORMATION
<b>1.0 SITE MATERIALS</b>	
1.1 Rock and Cobble Stream Channel	2/L4.01 Refer to detail.
1.2 Log	6/L4.01 4-6 m x 500 mm dia. log. Placement of log to be directed by Landscape Architect and Biologist.
1.3 Log with Root Mass	6/L4.01 4-6 m x 500 mm dia. log. Placement of log to be directed by Landscape Architect and Biologist.
1.4 Boulder	450 mm or 600 mm dia. boulder. Placement to be directed by Landscape Architect.
1.5 Rock Weir	1/L4.01 Refer to detail.
<b>2.0 PLANTING AND LANDSCAPE</b>	
2.1 Shrub and Tree Planting Area - On Grade	3/L4.01, 4/L4.01 2P growing medium, 450 mm depth
2.2 Shrub and Tree Planting Area - In Channel	5/L4.01 25 mm drain rock over 2P growing medium, depth varies.



2 PROPOSED STREAM PROFILE  
Horizontal Scale 1:150 Vertical Scale 1:75



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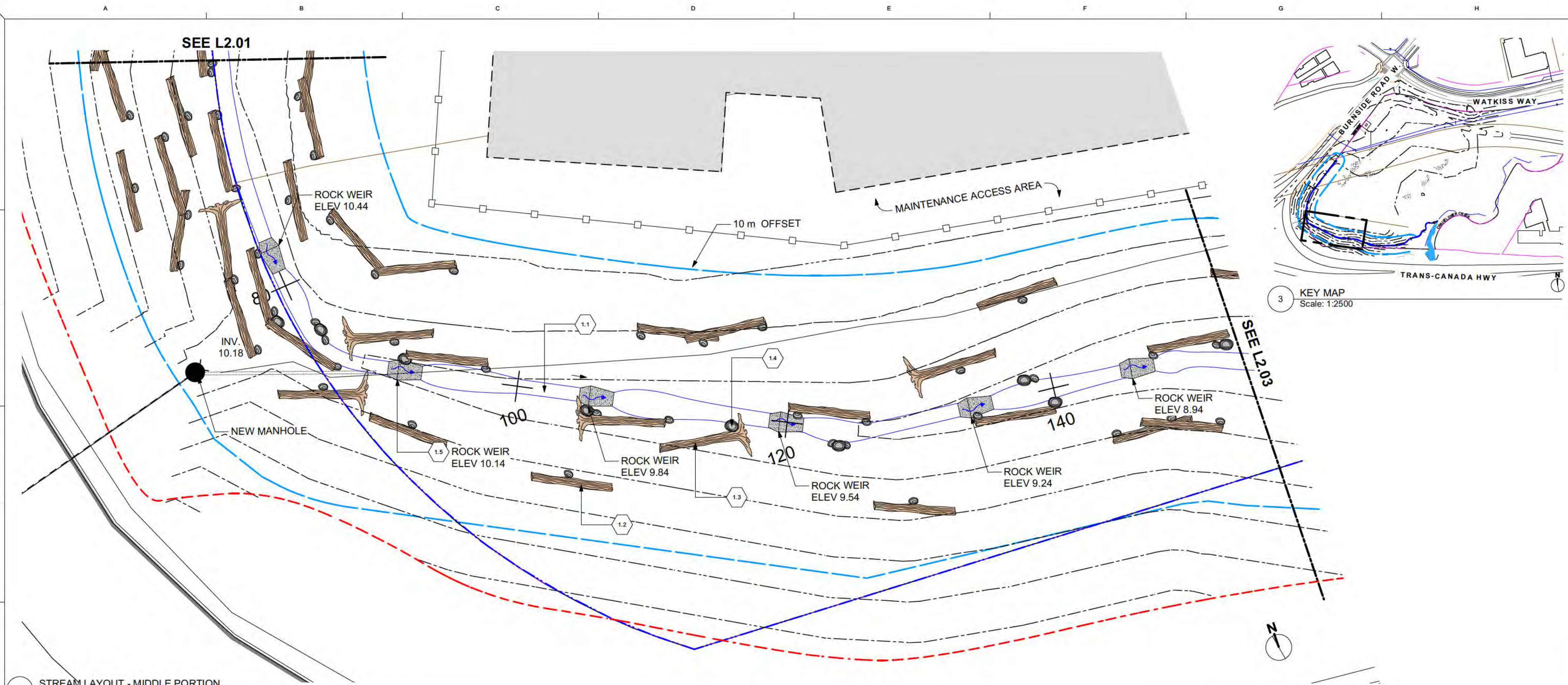


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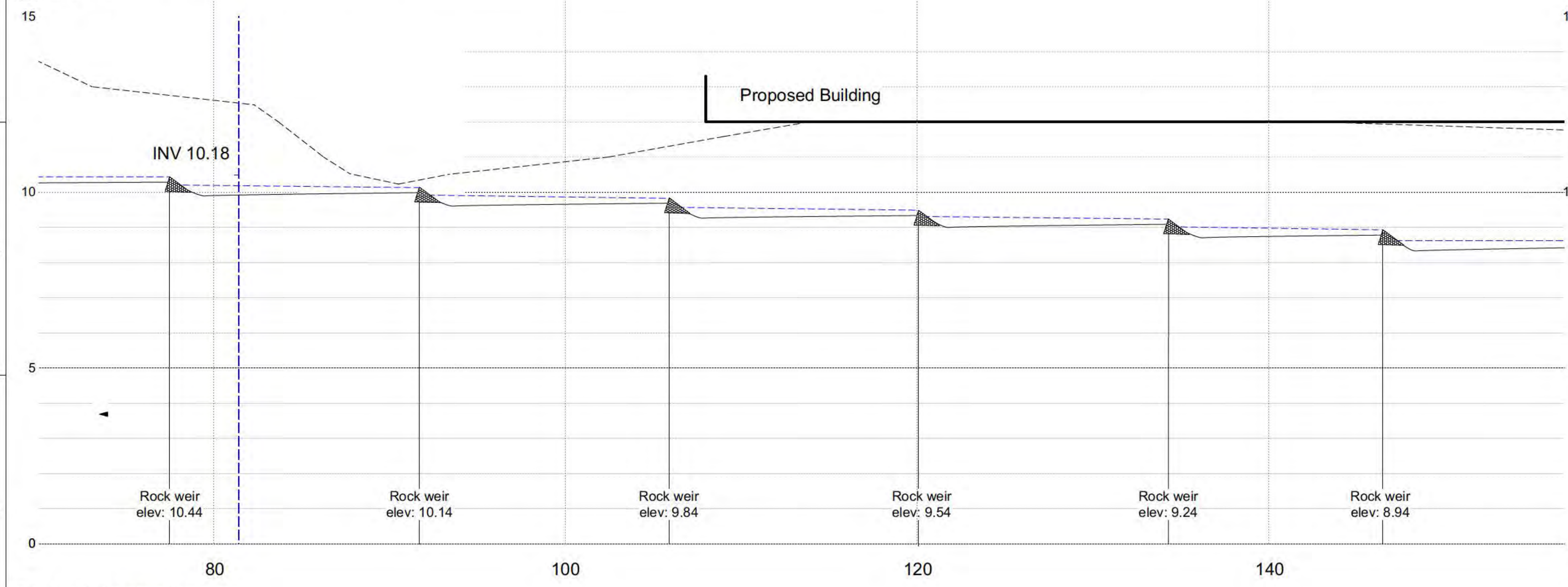
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STREAM PROFILE - UPPER

SCALE:	PROJECT NO.	
AS SHOWN	201919500	
DWG.#	REV	DATE:
TP2 - L2.01	3	2021-06-24



1 STREAM LAYOUT - MIDDLE PORTION  
Scale: 1:150



2 PROPOSED STREAM PROFILE  
Horizontal Scale 1:150 Vertical Scale 1:75

15 SITE KEYNOTES:

DETAIL - SHEET	DETAILED PRODUCT INFORMATION
<b>1.0 SITE MATERIALS</b>	
1.1 Rock and Cobble Stream Channel	2/L4.01 Refer to detail.
1.2 Log	6/L4.01 4-6 m x 500 mm dia. log. Placement of log to be directed by Landscape Architect and Biologist.
1.3 Log with Root Mass	6/L4.01 4-6 m x 500 mm dia. log. Placement of log to be directed by Landscape Architect and Biologist.
1.4 Boulder	450 mm or 600 mm dia. boulder. Placement to be directed by Landscape Architect.
1.5 Rock Weir	1/L4.01 Refer to detail.
<b>2.0 PLANTING AND LANDSCAPE</b>	
2.1 Shrub and Tree Planting Area - On Grade	3/L4.01, 4/L4.01 2P growing medium, 450 mm depth
2.2 Shrub and Tree Planting Area - In Channel	5/L4.01 25 mm drain rock over 2P growing medium, depth varies.



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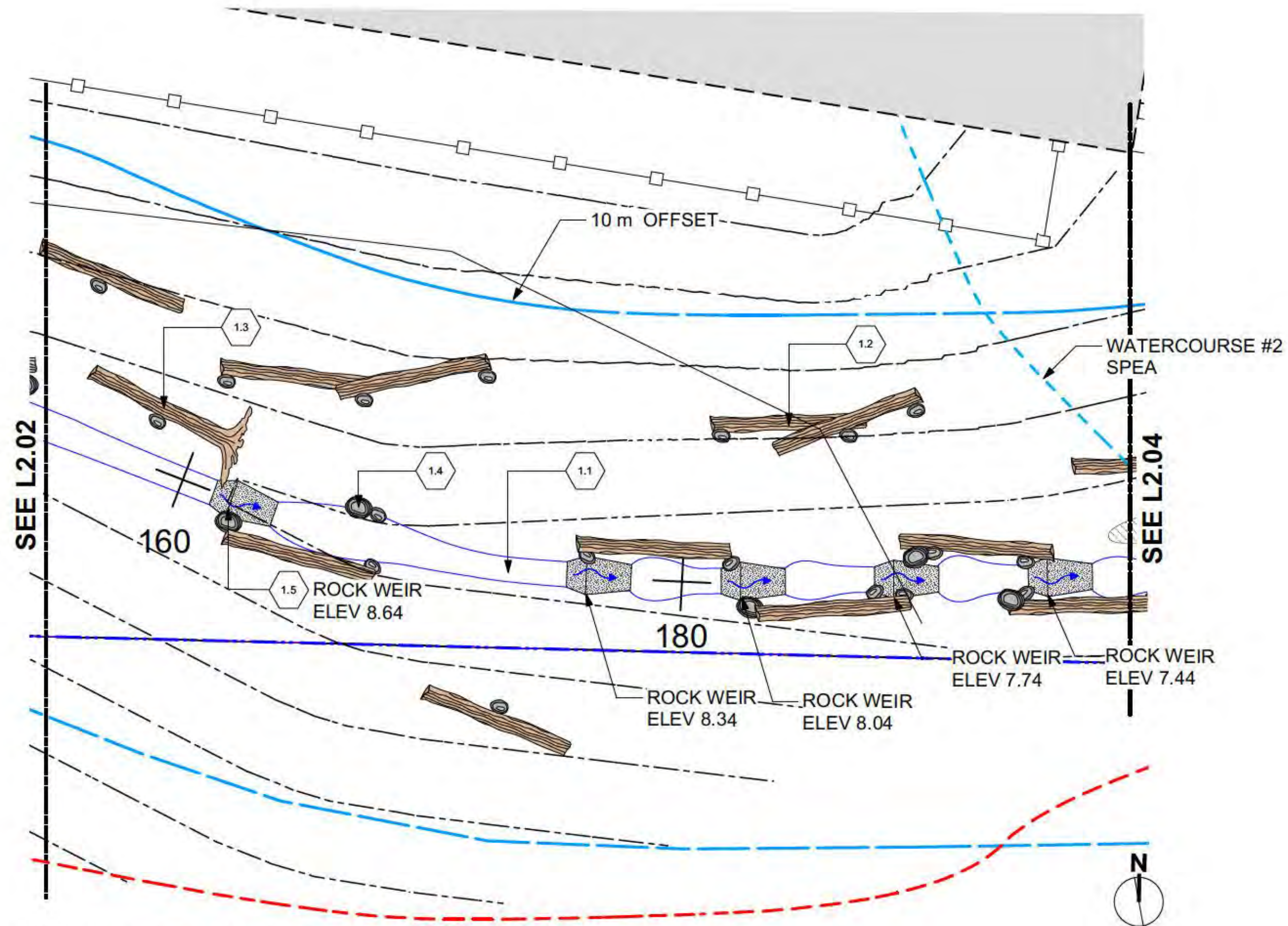


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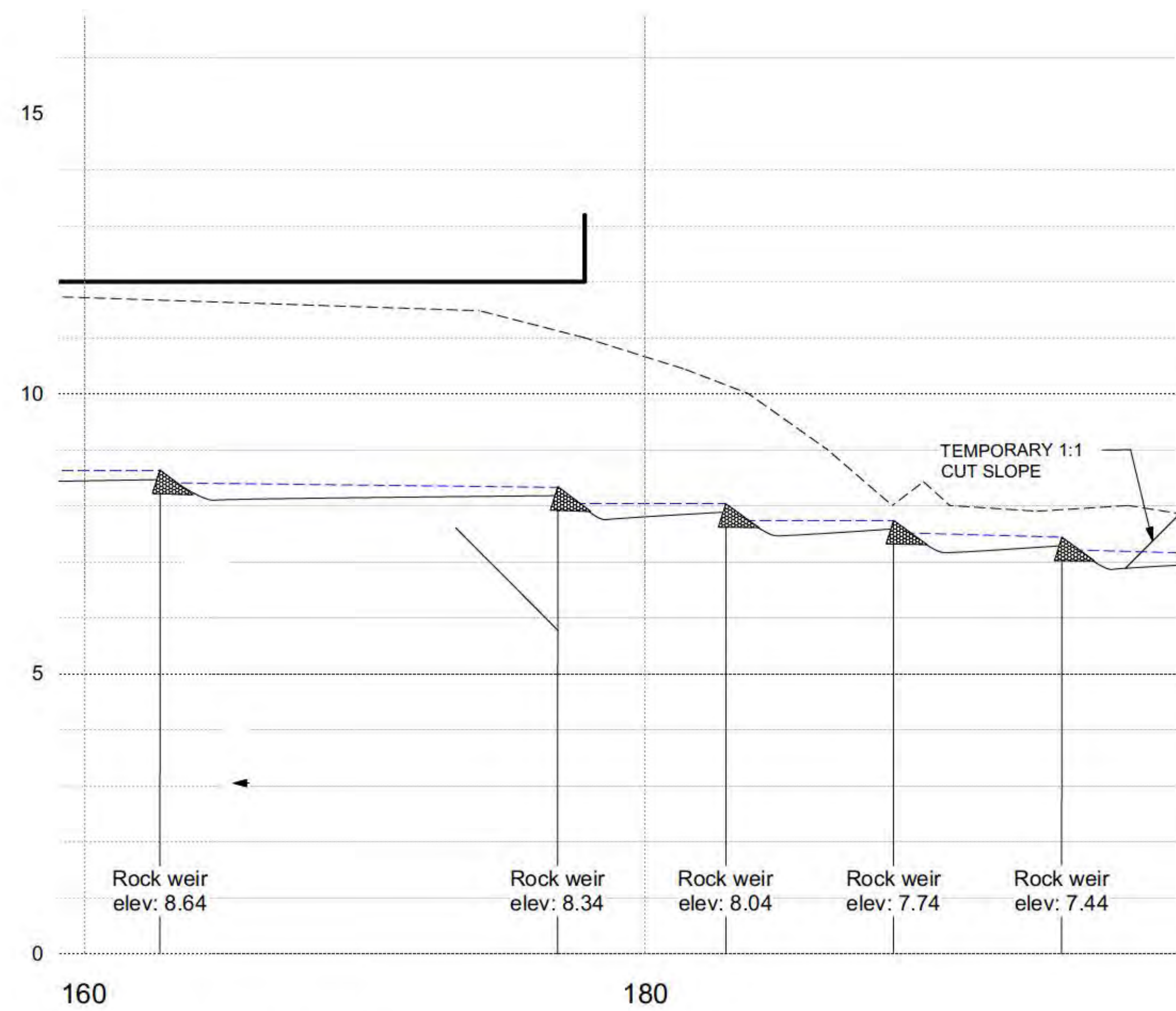
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STREAM PROFILE - MIDDLE

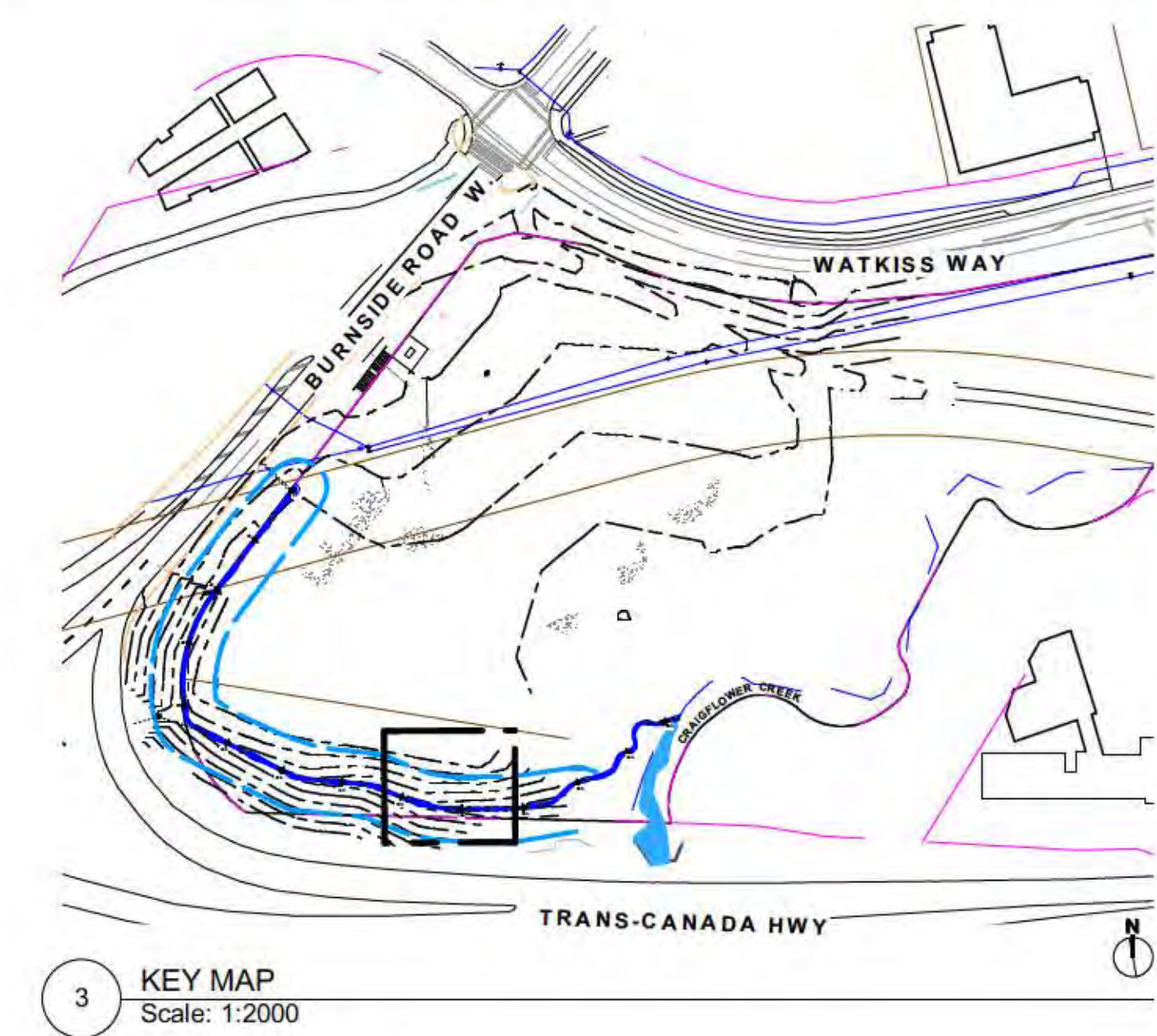
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DWG.#	REV	DATE:
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1 STREAM LAYOUT - LOWER PORTION  
Scale: 1:150



2 PROPOSED STREAM PROFILE  
Horizontal Scale 1:150 Vertical Scale 1:75



SITE KEYNOTES:

	DETAIL - SHEET	DETAILED PRODUCT INFORMATION
<b>1.0 SITE MATERIALS</b>		
1.1	2/L4.01	Refer to detail.
1.2	6/L4.01	4-6 m x 500 mm dia. log. Placement of log to be directed by Landscape Architect and Biologist.
1.3	6/L4.01	4-6 m x 500 mm dia. log. Placement of log to be directed by Landscape Architect and Biologist.
1.4		450 mm or 600 mm dia. boulder. Placement to be directed by Landscape Architect.
1.5	1/L4.01	Refer to detail.
<b>2.0 PLANTING AND LANDSCAPE</b>		
2.1	3/L4.01, 4/L4.01	2P growing medium, 450 mm depth
2.2	5/L4.01	25 mm drain rock over 2P growing medium, depth varies.



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STAMPS

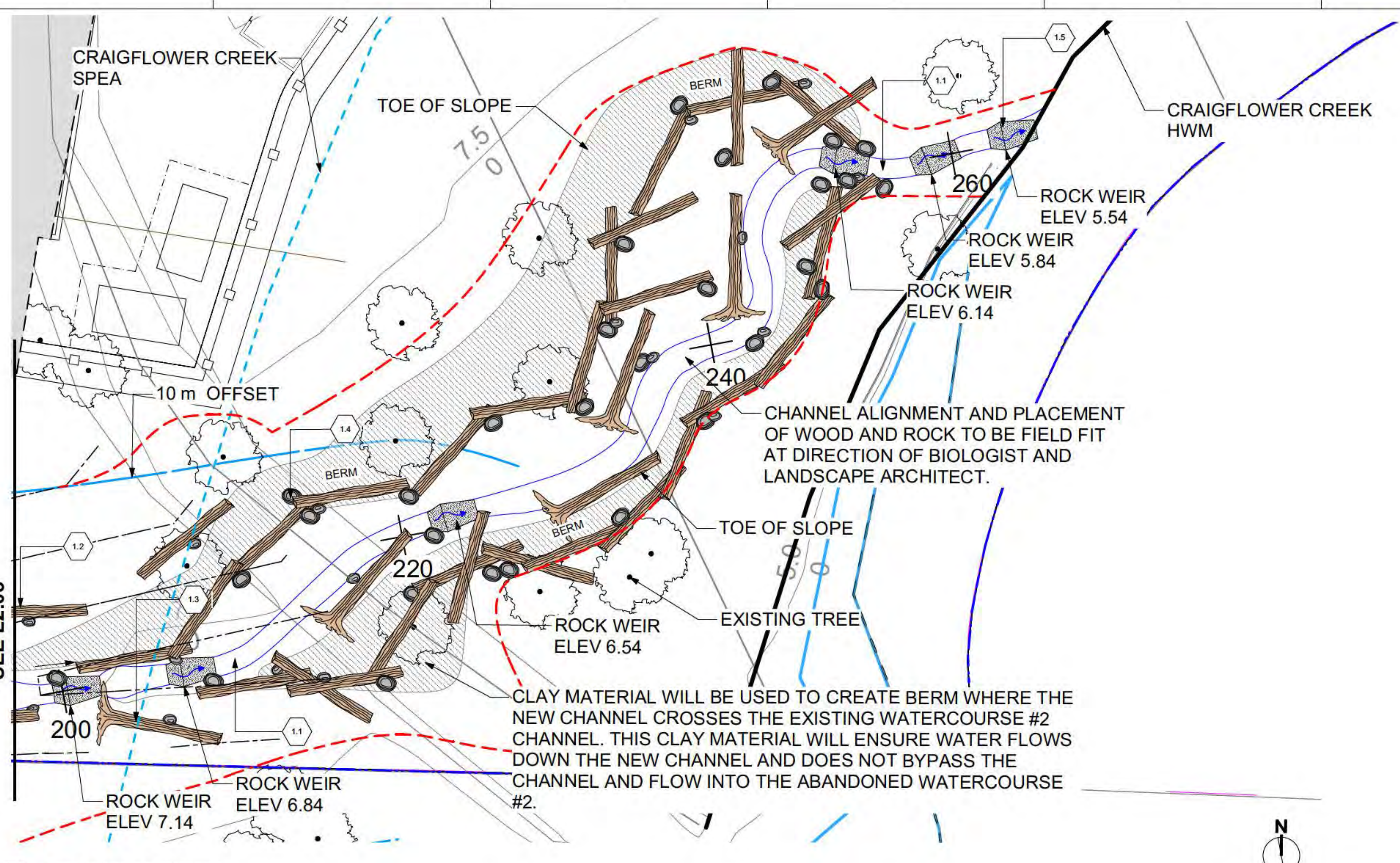


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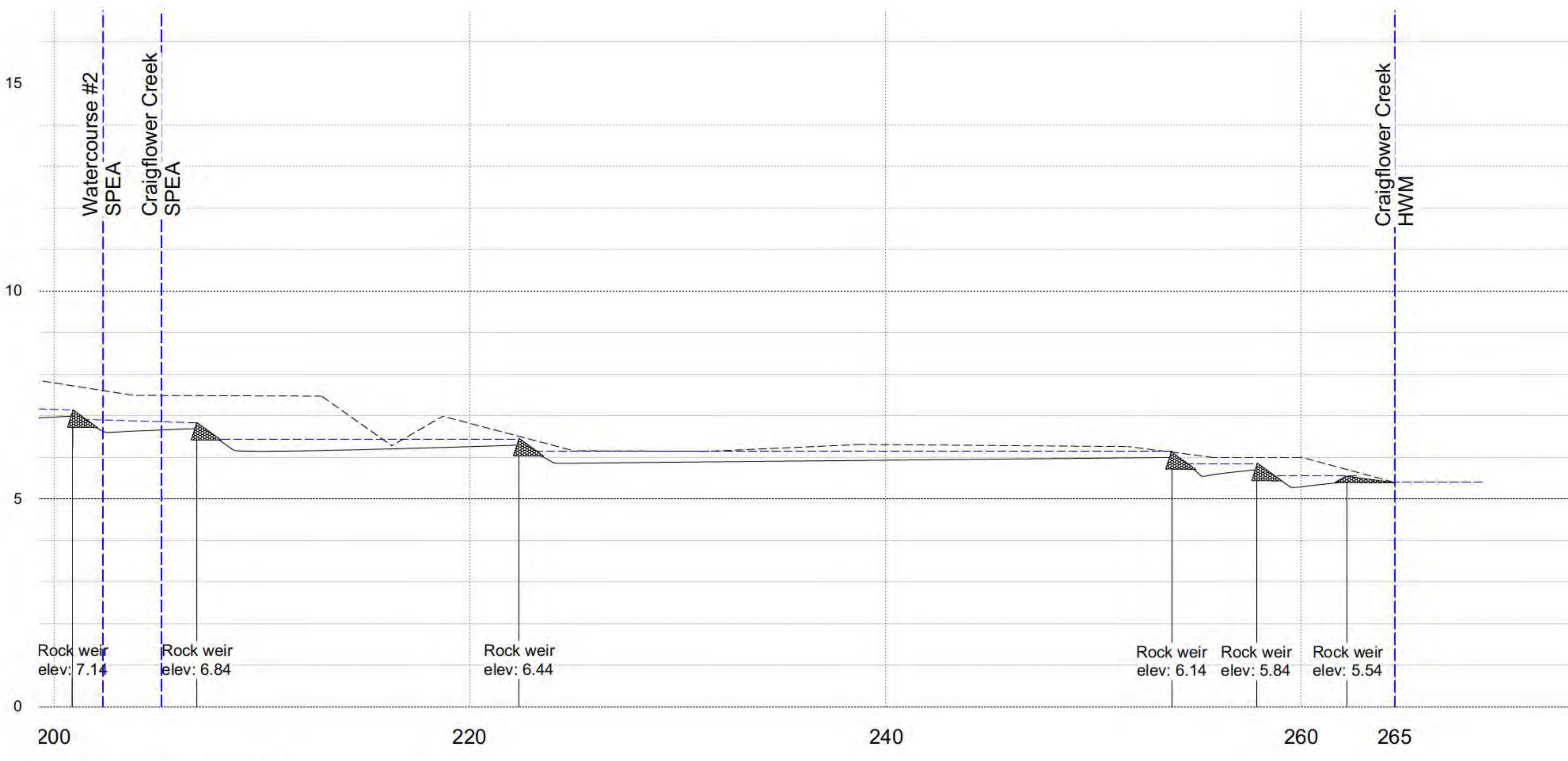
PROJECT:  
VICTORIA handyDART  
CENTRE

STREAM PROFILE - LOWER

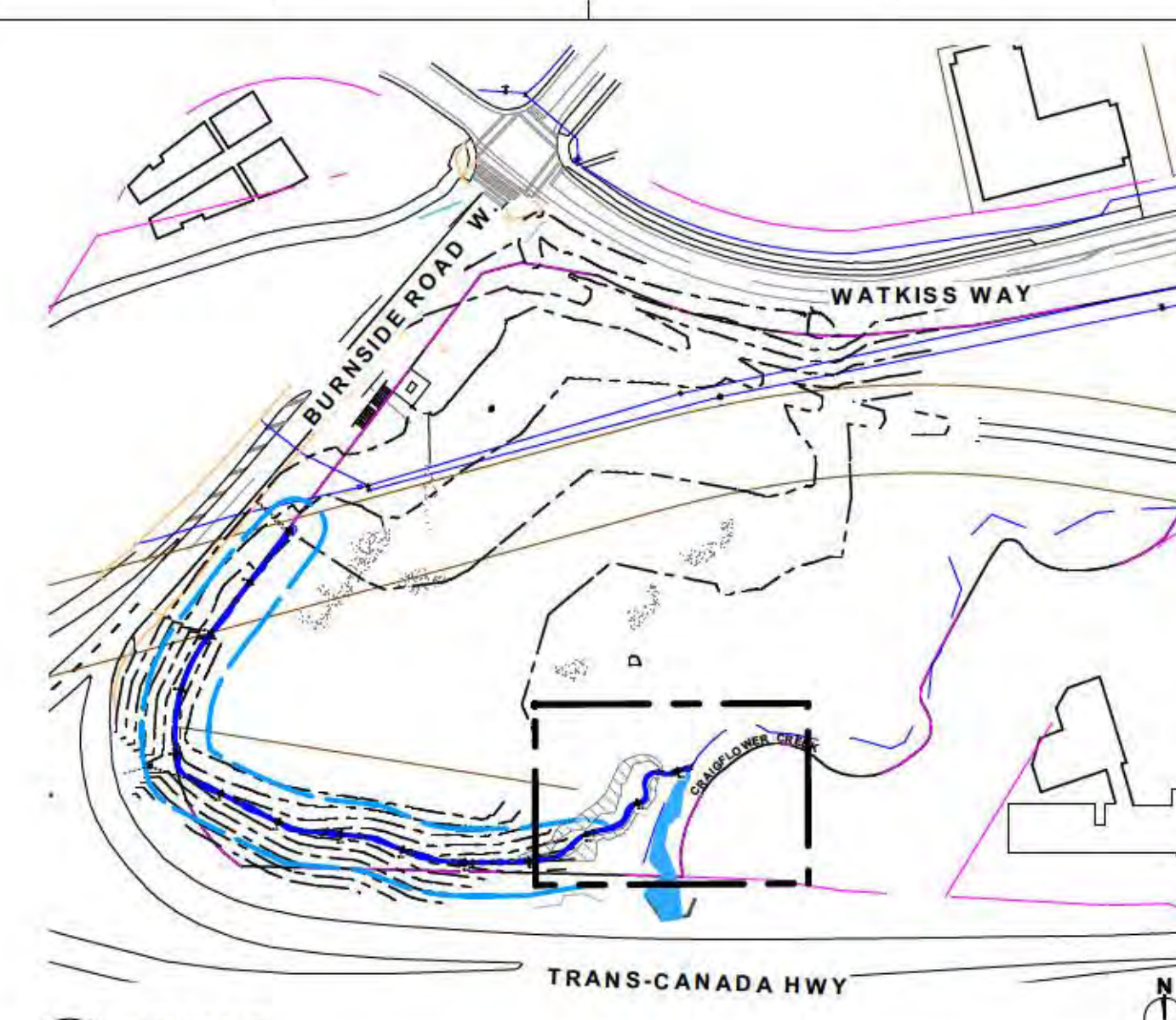
SCALE:	PROJECT NO.	
AS SHOWN	201919500	
DWG.#	REV	DATE:
TP2 - L2.03	3	2021-06-24



1 LOW GRADIENT CHANNEL  
Scale: 1:150



2 PROPOSED STREAM PROFILE  
Horizontal Scale 1:150 Vertical Scale 1:75



3 KEY MAP  
Scale: 1:2000

SITE KEYNOTES:			
	DETAIL - SHEET	DETAILED PRODUCT INFORMATION	
<b>1.0 SITE MATERIALS</b>			
1.1	Rock and Cobble Stream Channel	2/L.4.01	Refer to detail.
1.2	Log	6/L.4.01	4-6 m x 500 mm dia. log. Placement of log to be directed by Landscape Architect and Biologist.
1.3	Log with Root Mass	6/L.4.01	4-6 m x 500 mm dia. log. Placement of log to be directed by Landscape Architect and Biologist.
1.4	Boulder		450 mm or 600 mm dia. boulder. Placement to be directed by Landscape Architect.
1.5	Rock Weir	1/L.4.01	Refer to detail.
<b>2.0 PLANTING AND LANDSCAPE</b>			
2.1	Shrub and Tree Planting Area - On Grade	3/L.4.01, 4/L.4.01	2P growing medium, 450 mm depth
2.2	Shrub and Tree Planting Area - In Channel	5/L.4.01	25 mm drain rock over 2P growing medium, depth varies.



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6	Issued for Tender	2021-07-05
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2	70% Design	2021-02-02
1	Revision #1	2021-01-06
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PROJECT:	VICTORIA handyDART CENTRE	
	LOW GRADIENT CHANNEL - STREAM CONNECTION	
SCALE:	AS SHOWN	PROJECT NO. 201919500
DWG.#	TP2 - L2.04	REV DATE: 3 2021-06-24

**RANGE PLANT NUMBERS & SPACING INFORMATION**

PLANT SIZE	SPACING (m)	NUMBER	PLANT SPECIES
Medium (1 gal)	0.7	108	Rosa nutkana Rubus parviflorus Symphoricarpos albus
Medium / Large (1 gal)	1.0	249	Mahonia aquifolium (2 gal) Polystichum munitum Ribes sanguineum Salix scouleriana (whip) Spiraea douglasii Symphoricarpos albus
Large (3 gal)	1.5	118	Holodiscus discolor Physocarpus capitatus Salix scouleriana (whip)
Total Number of Plants		475	

**RANGE RESTORATION PLANTING LEGEND**

LANDSCAPE AREA	DESCRIPTION	PLANT SPECIES
Upland (Sun) 508 sq. m	The existing upland Bow Range land within the SPEA that is not effected by new construction.	Holodiscus discolor Mahonia aquifolium Ribes sanguineum Rosa nutkana Salix scouleriana Spiraea douglasii

**PLANT LIST**

Sym	Qty	Botanical Name	Common Name	Sched. Size / Plant Spacing
<b>TREES:</b>				
Acc	8	Acer circinatum	Vine Maple	1.8 m ht, b&b
Acm	21	Acer macrophyllum	Bigleaf Maple	2.5 m ht, 15 gal.
Alr	27	Alnus rubra	Red Alder	#5 pot
Am	5	Arbutus menziesii	Pacific Madrone	#5 pot
Cd	6	Crataegus douglasii	Black Hawthorn	2m height, b&b
Mf	5	Malus fusca	Pacific Crab Apple	#10 pot, Min 1.2m ht
Psm	68	Pseudotsuga menziesii	Douglas Fir	#15 Pot
Qg	6	Quercus garryana	Garry Oak	4.0m cal, b&b
Qg-s	18	Quercus garryana - Small	Garry Oak - Small	1 gallon
Thp	6	Thuja plicata	Western Red Cedar	2.4 m ht/wb
Tsh	5	Tsuga heterophylla	Western Hemlock	2.4 m ht/wb
<b>SHRUBS/FERNS/GRASSES/VINES:</b>				
Co	128	Carex obovata	Slough Sedge	#1 pot

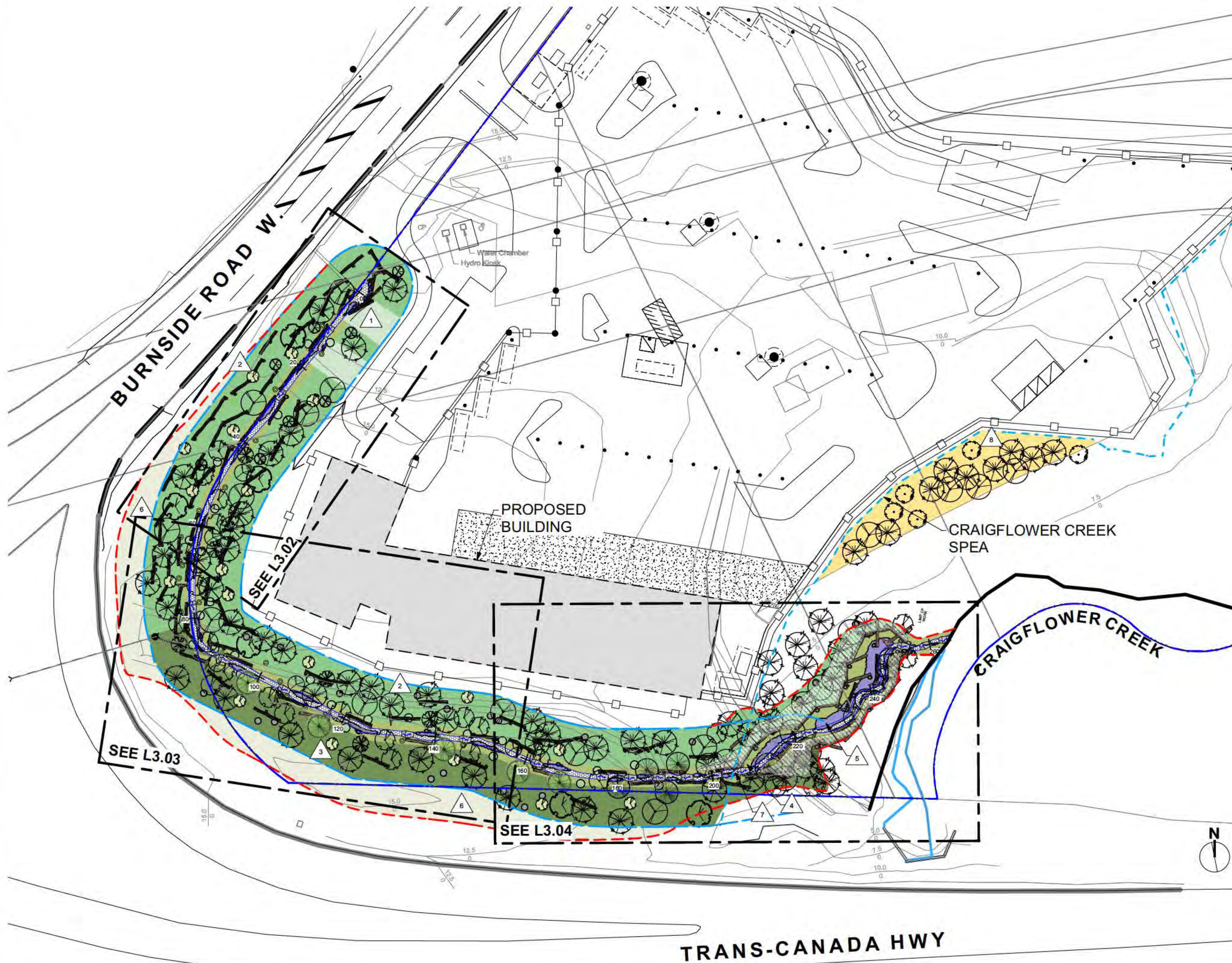
In addition to the above plant list, the Contractor is to include 75 - 1 gal. Douglas Fir and 25 - 1 gal. Western Red Cedar. These will be planted at the direction of the Landscape Architect.

**STREAM PLANTING LEGEND**

LANDSCAPE AREA	DESCRIPTION	BOTANICAL NAME	PLANT SIZE	QUANTITY	POT SIZE
Maintenance Access Area 130 sq. m	Maintenance access areas to remove deposited sediment from channel.	Blechnum spicant Gaultheria shallon Mahonia aquifolium Mahonia repens Rosa nutkana Symphoricarpos albus Vaccinium ovatum	S SM ML SM M M SM	94 100 11 40 68 100 10	#1 #1 #1 #1 #1 #1 #1
Upland (Sun) 2,560 sq. m	Upland areas outside of direct moisture from stream. East, west and south facing slopes.	Comus sericea Gaultheria shallon Holodiscus discolor Mahonia aquifolium Mahonia repens Myrica californica Ribes sanguineum Rosa nutkana Rubus parviflorus Salix scouleriana Symphoricarpos albus	L SM L ML SM L ML M M L M	200 400 80 133 192 40 80 1000 400 140 1616	whip #1 #1 #1 #1 #1 #1 #1 #1 whip #1
Upland (Shade) 1,235 sq. m.	Upland areas outside of direct moisture from stream. North facing slopes.	Blechnum spicant Comus sericea Gaultheria shallon Holodiscus discolor Mahonia aquifolium Myrica californica Polystichum munitum Oemleria cerasiformis Ribes sanguineum Rosa nutkana Salix scouleriana Sambucus racemosa Symphoricarpos albus	S L SM L ML L M ML ML M L L M	45 60 240 18 60 20 500 300 52 123 40 20 250	#1 whip #1 #1 #1 #1 #1 #1 #1 #1 whip whip #1 #1
Riparian / Stream Edge 860 sq. m	Planting areas 1.5 m from channel edge. Wet area throughout year.	Comus sericea Mahonia aquifolium Myrica californica Physocarpus capitatus Polystichum munitum Ribes sanguineum Rosa nutkana Salix scouleriana Sambucus racemosa Symphoricarpos albus	L ML L L M ML M L L M	20 47 25 25 300 40 50 80 27 200 55	whip #1 #1 #1 #1 #1 #1 whip whip #1
In-Channel Plantings 140 sq. m	Small patches of water-loving plants on point bar edges.	Carex obovata Carex rostrata Juncus effusus	S S SM	600 208 129	Sp3 Sp3 Sp3
Grass / Hydrosed 875 sq. m	Premier Coast Revegetation Mix				
Channel Bottom 265 sq. m	Non-planted areas of stream channel.				

**STREAM PLANT NUMBERS & SPACING INFORMATION**

PLANT SIZE	SPACING (m)	NUMBER	PLANT SPECIES
Small (Sp3)	0.4	902	Blechnum spicant Carex obovata Carex rostrata
Small / Medium (1 gal)	0.5	1156	Gaultheria shallon Juncus effusus Mahonia repens Vaccinium ovatum
Medium (1 gal)	0.7	4463	Rosa nutkana Rubus parviflorus Symphoricarpos albus
Medium / Large (1 gal)	1.0	923	Mahonia aquifolium Polystichum munitum Ribes sanguineum Salix scouleriana (whip) Spiraea douglasii Symphoricarpos albus
Large (3 gal)	1.5	795	Holodiscus discolor Physocarpus capitatus Salix scouleriana (whip)
Total Number of Plants		8238	



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4	Revised EDP No.1	2021-05-24
3	EDP No.1	2021-05-03
2	70% Design	2021-02-02
1	Revision #1	2021-01-06
REV	DESCRIPTION	YYYY-MM-DD

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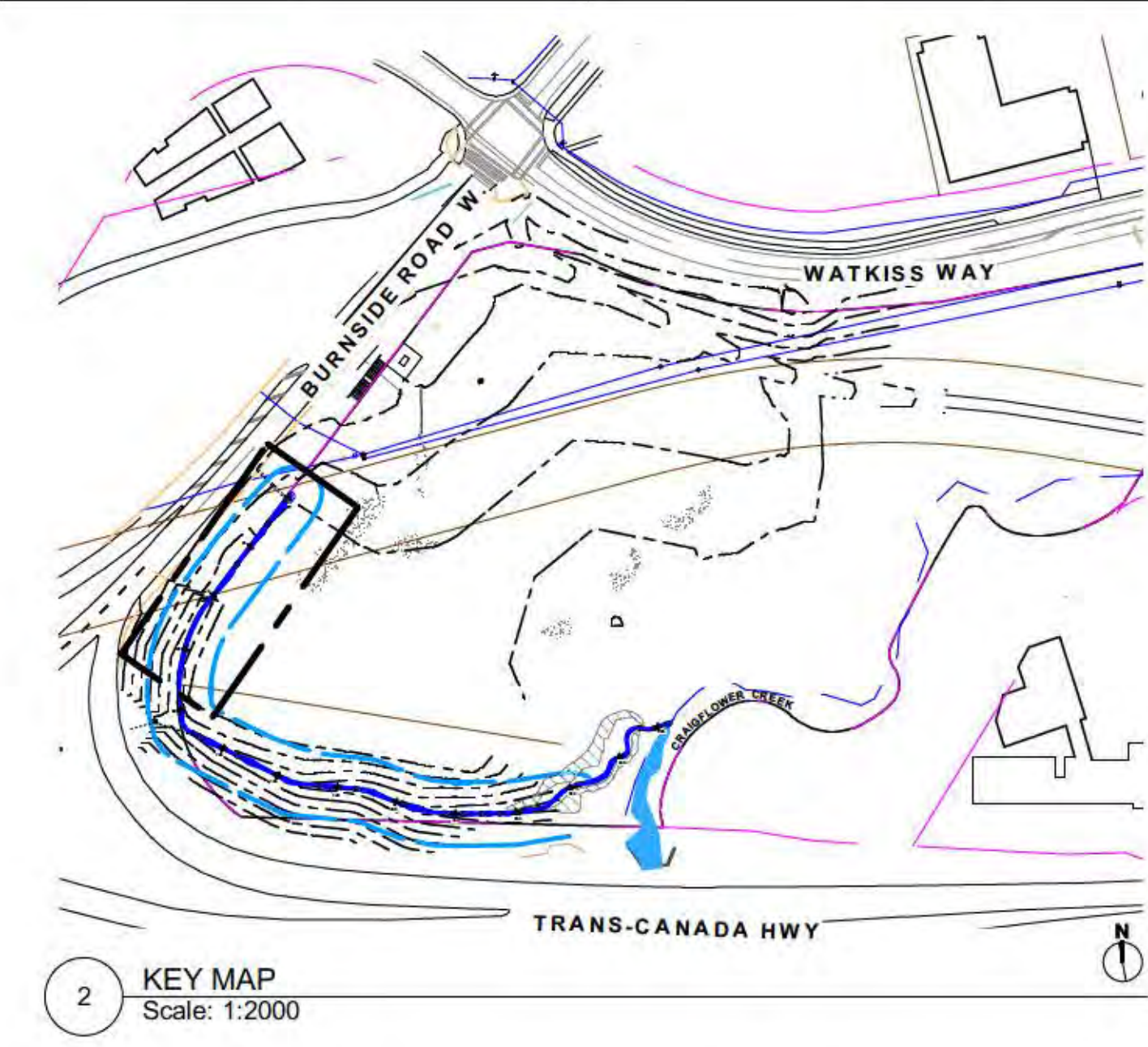


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PROJECT: VICTORIA handyDART CENTRE

PLANTING PLAN OVERVIEW

SCALE:	PROJECT NO.	
1:500	201919500	
DWG.#	REV	DATE:
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SEE SHEET L3.01 FOR PLANT LIST



1 PLANTING PLAN - UPPER PORTION  
Scale: 1:150



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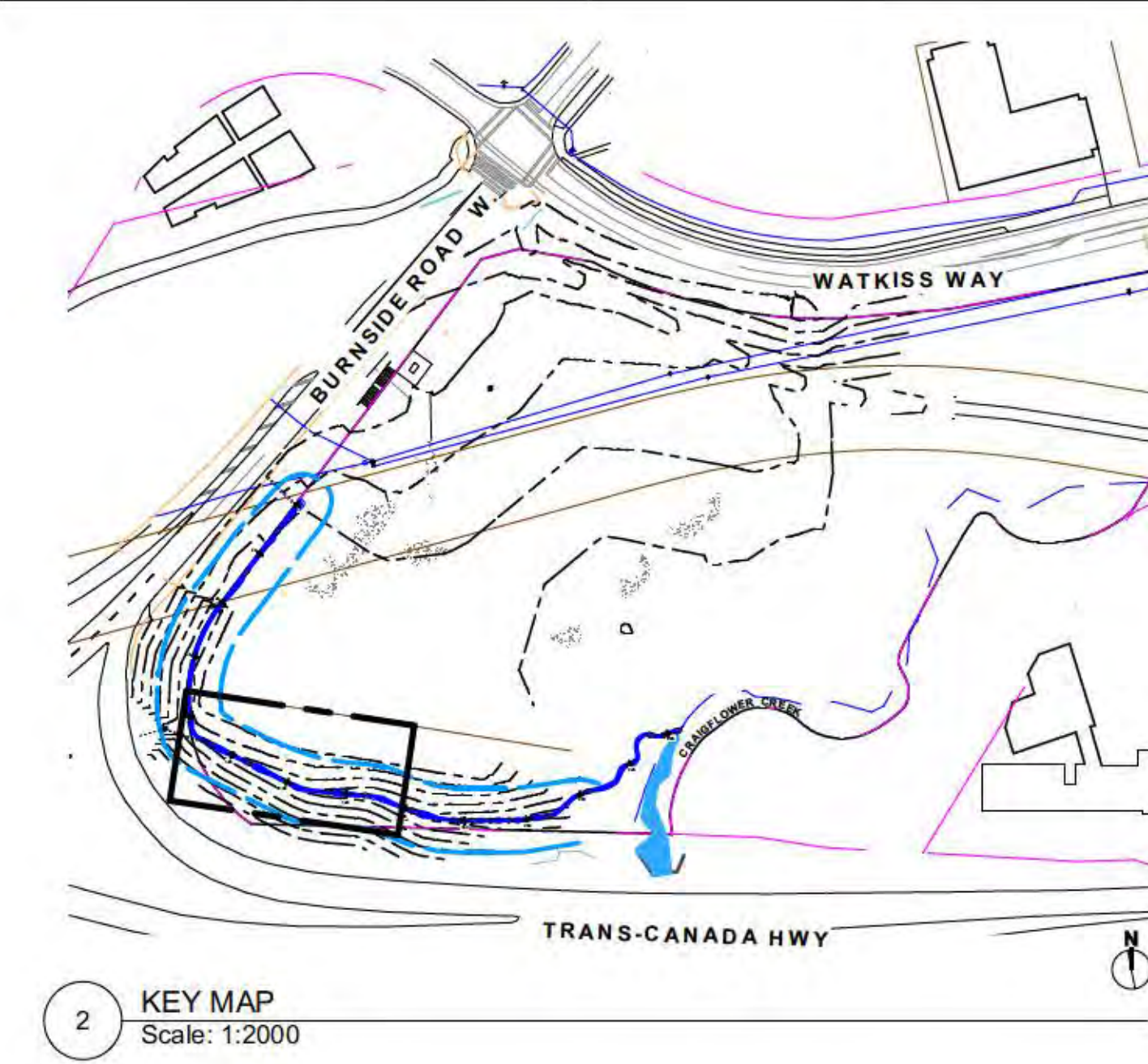


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PLANTING PLAN - UPPER

SCALE:	PROJECT NO.	
AS SHOWN	201919500	
DWG.#	REV	DATE:
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SEE SHEET L3.01 FOR PLANT LIST

1 PLANTING PLAN - MIDDLE PORTION  
Scale: 1:150



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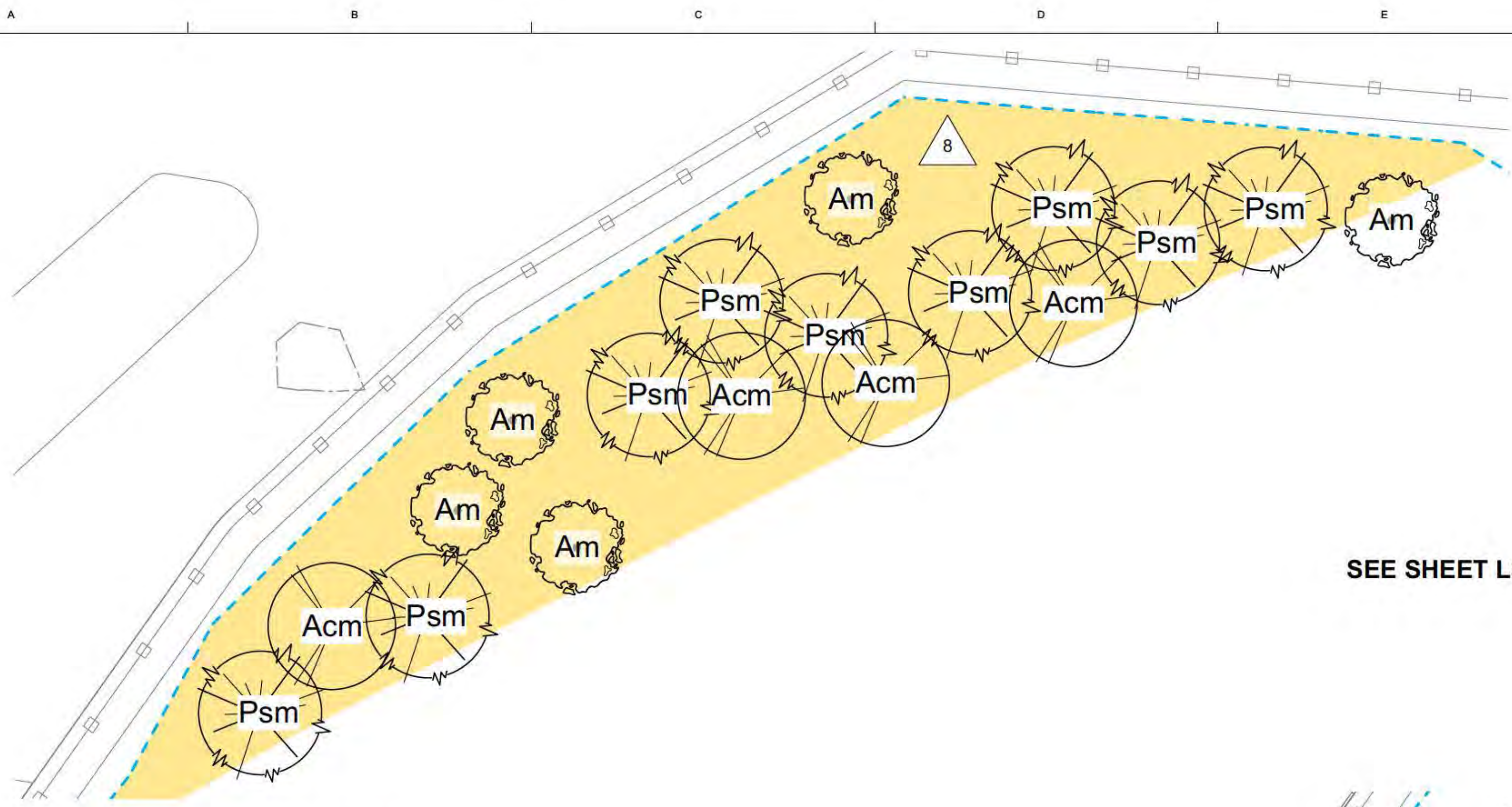


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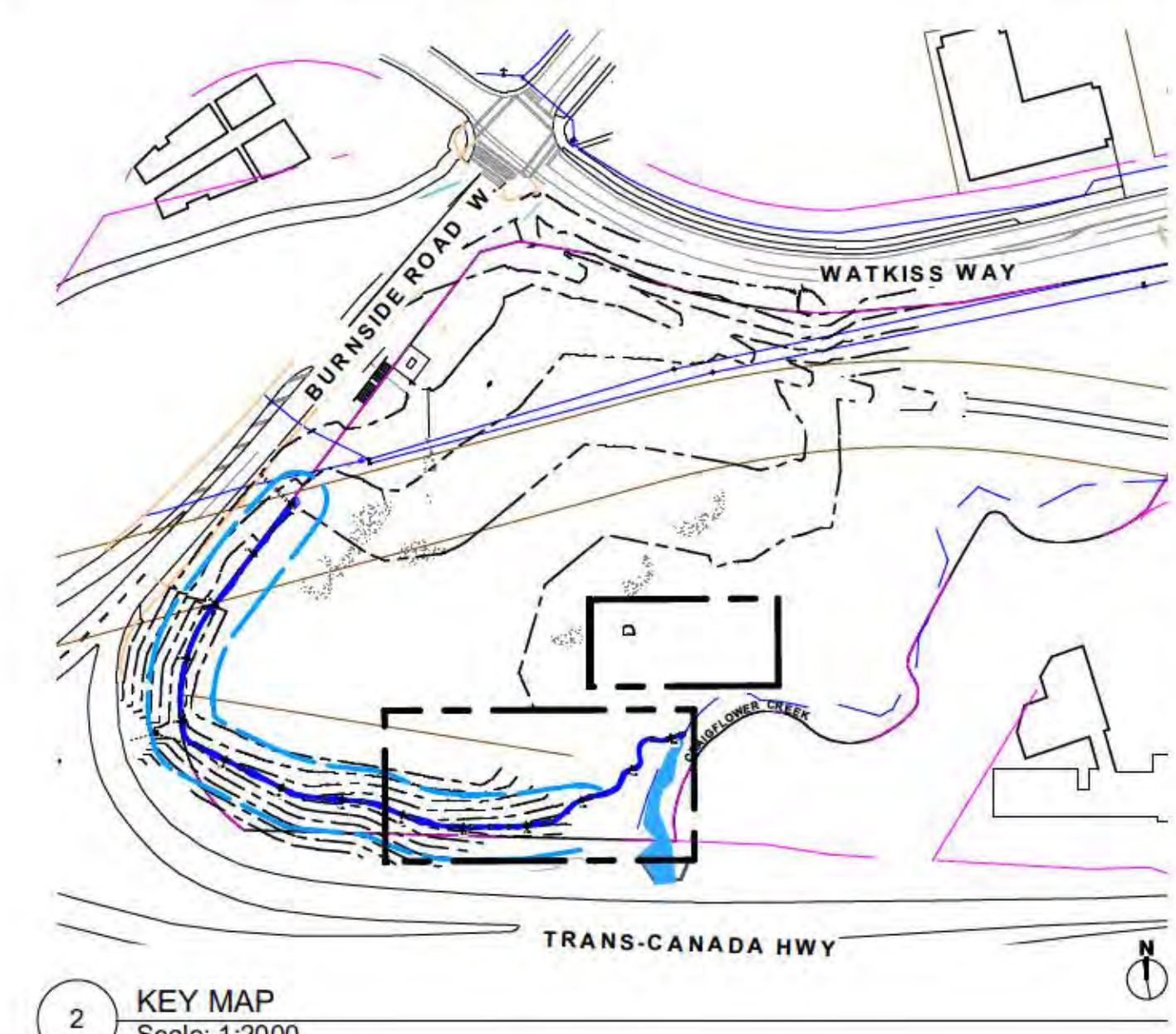
PROJECT:  
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PLANTING PLAN - MIDDLE

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AS SHOWN	201919500	
DWG.#	REV	DATE:
TP2 - L3.03	3	2021-06-24

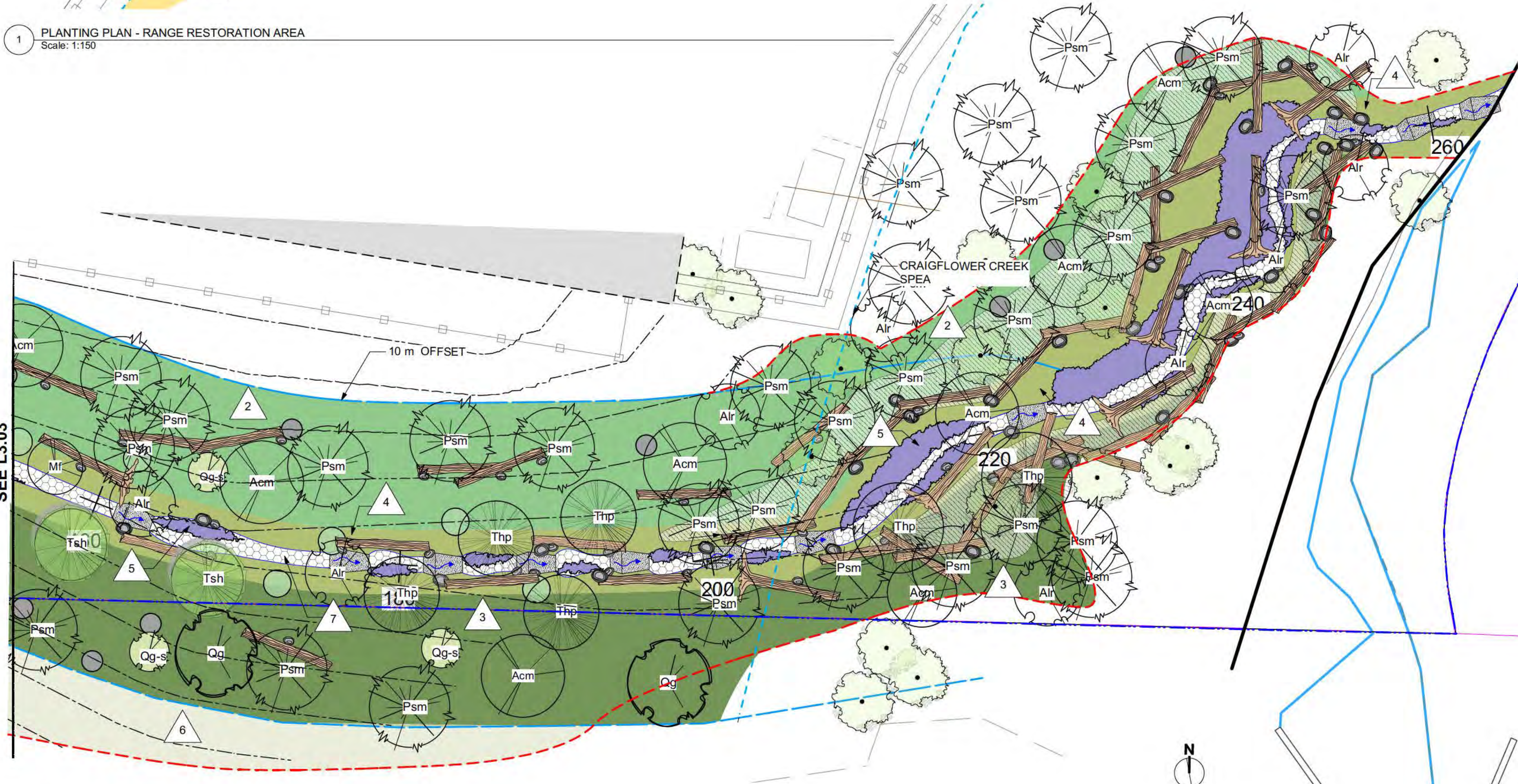


1 PLANTING PLAN - RANGE RESTORATION AREA  
Scale: 1:150



2 KEY MAP  
Scale: 1:2000

SEE SHEET L3.01 FOR PLANT LIST



3 PLANTING PLAN - LOWER PORTION  
Scale: 1:150



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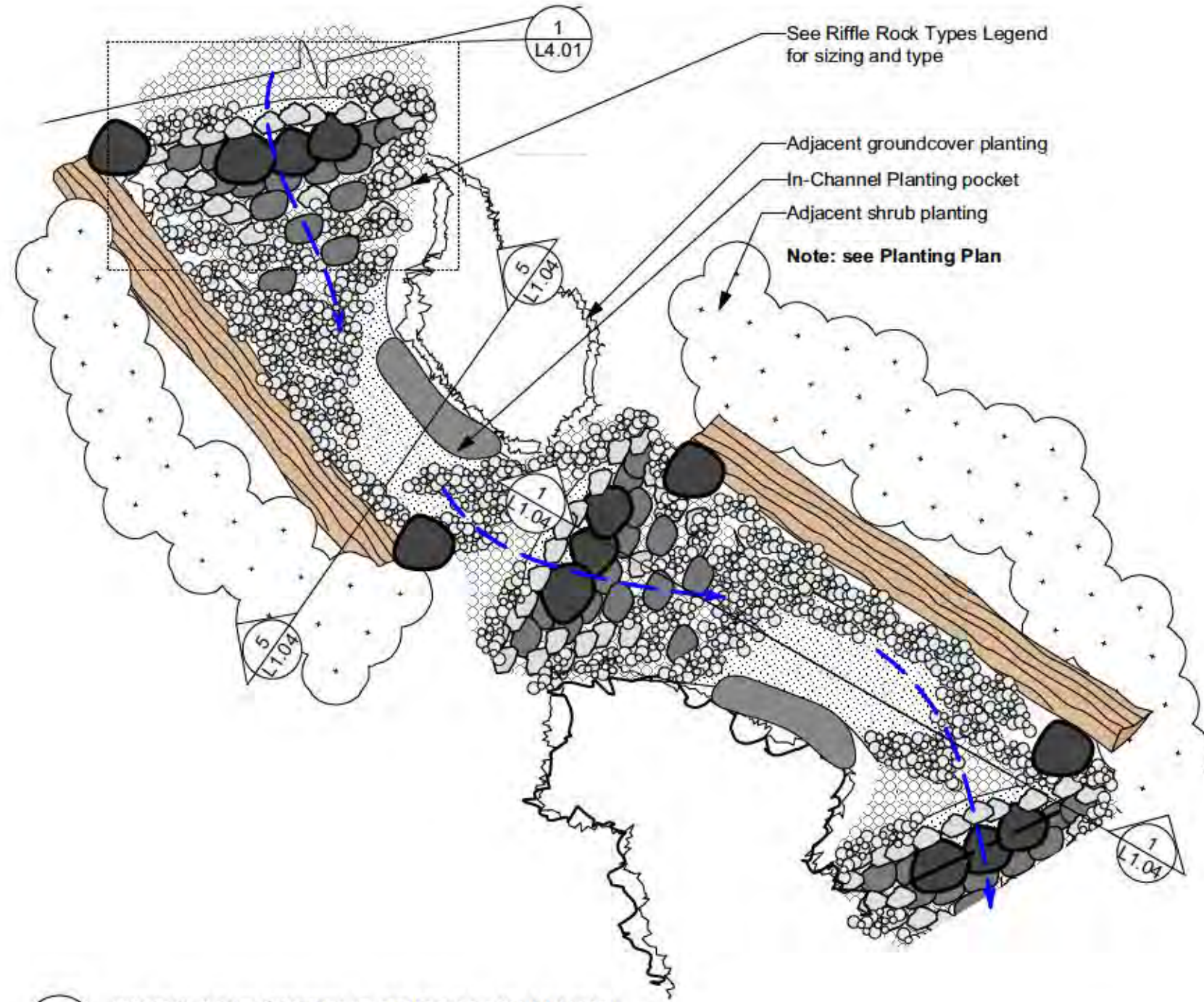
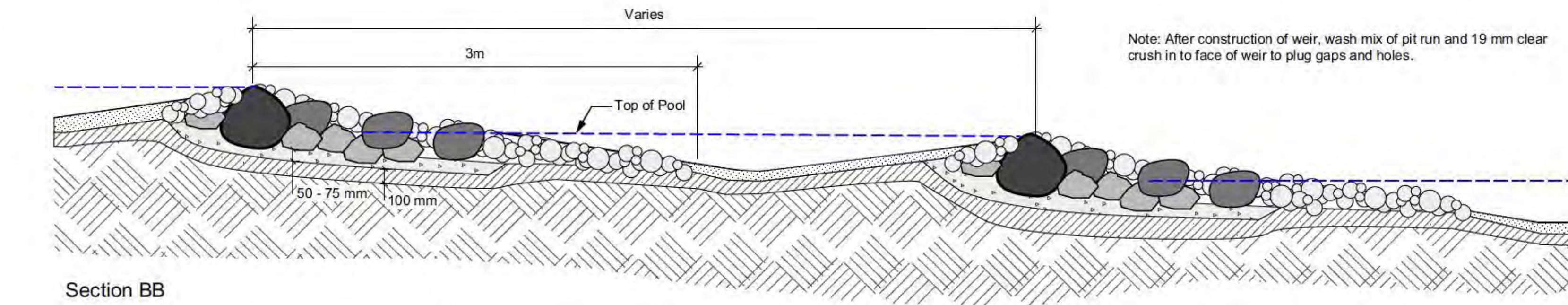
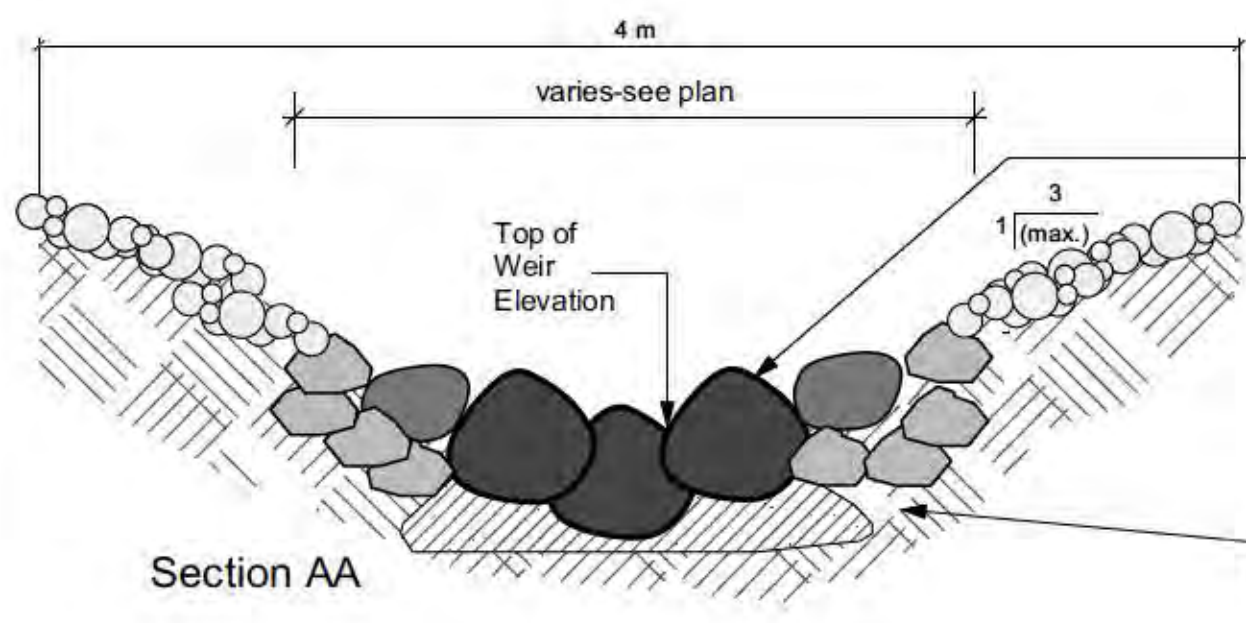
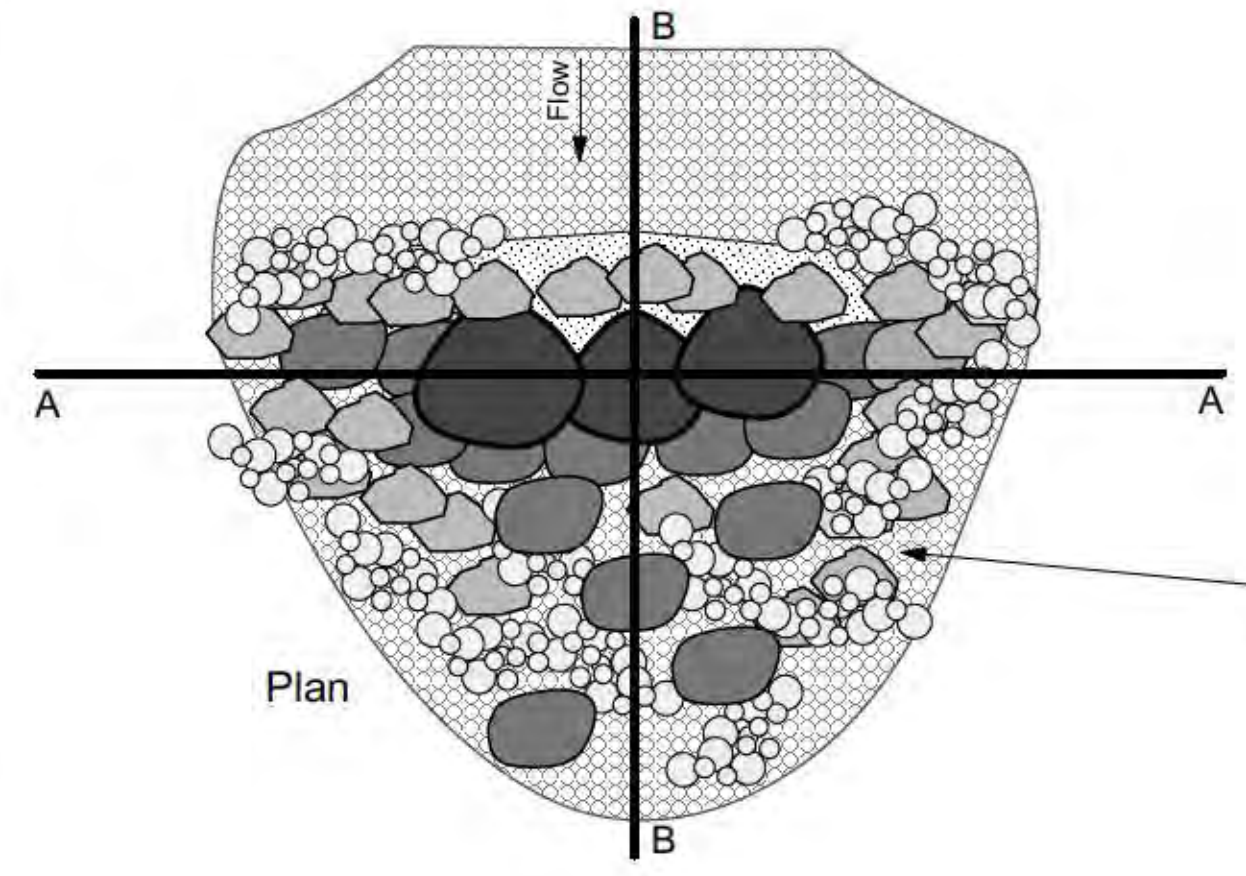
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PLANTING PLAN - LOWER

SCALE:	PROJECT NO.	
AS SHOWN	201919500	
DWG.#	REV	DATE:
TP2 - L3.04	3	2021-06-24





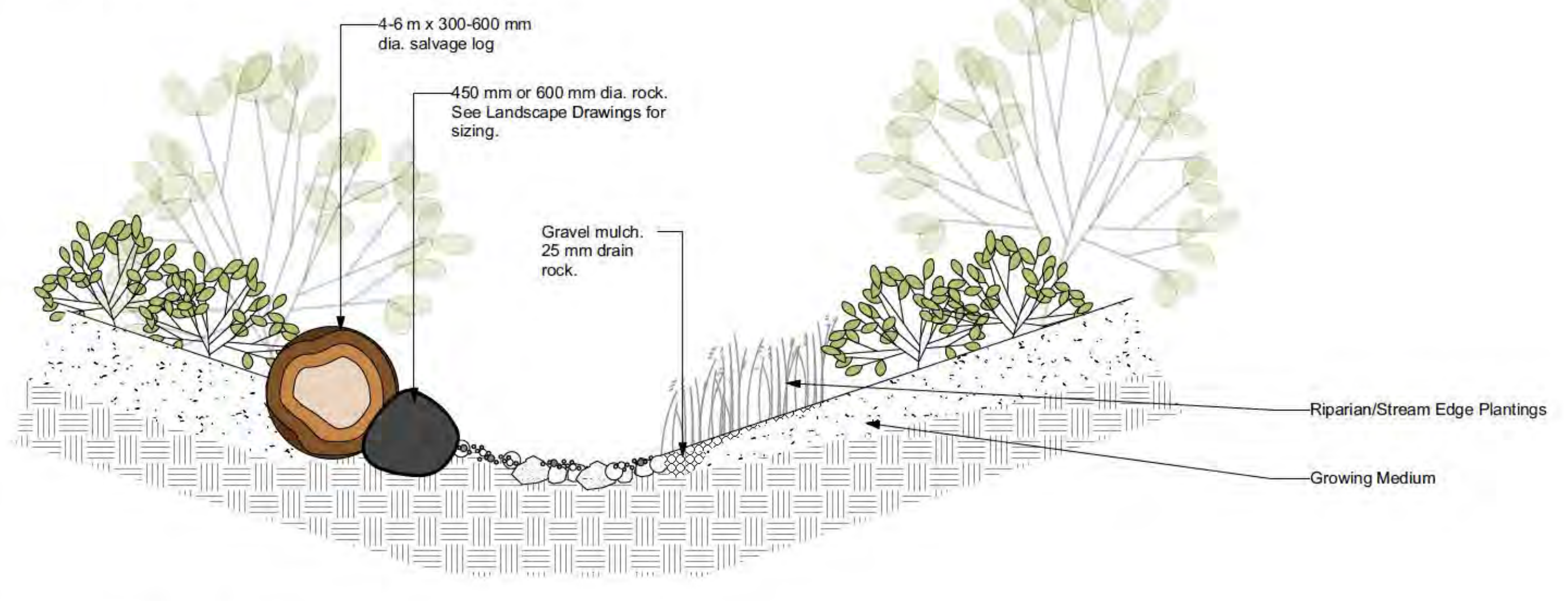
2 ROCK AND COBBLE STREAM CHANNEL  
Scale: 1:50

**RIFFLEROCK TYPES**

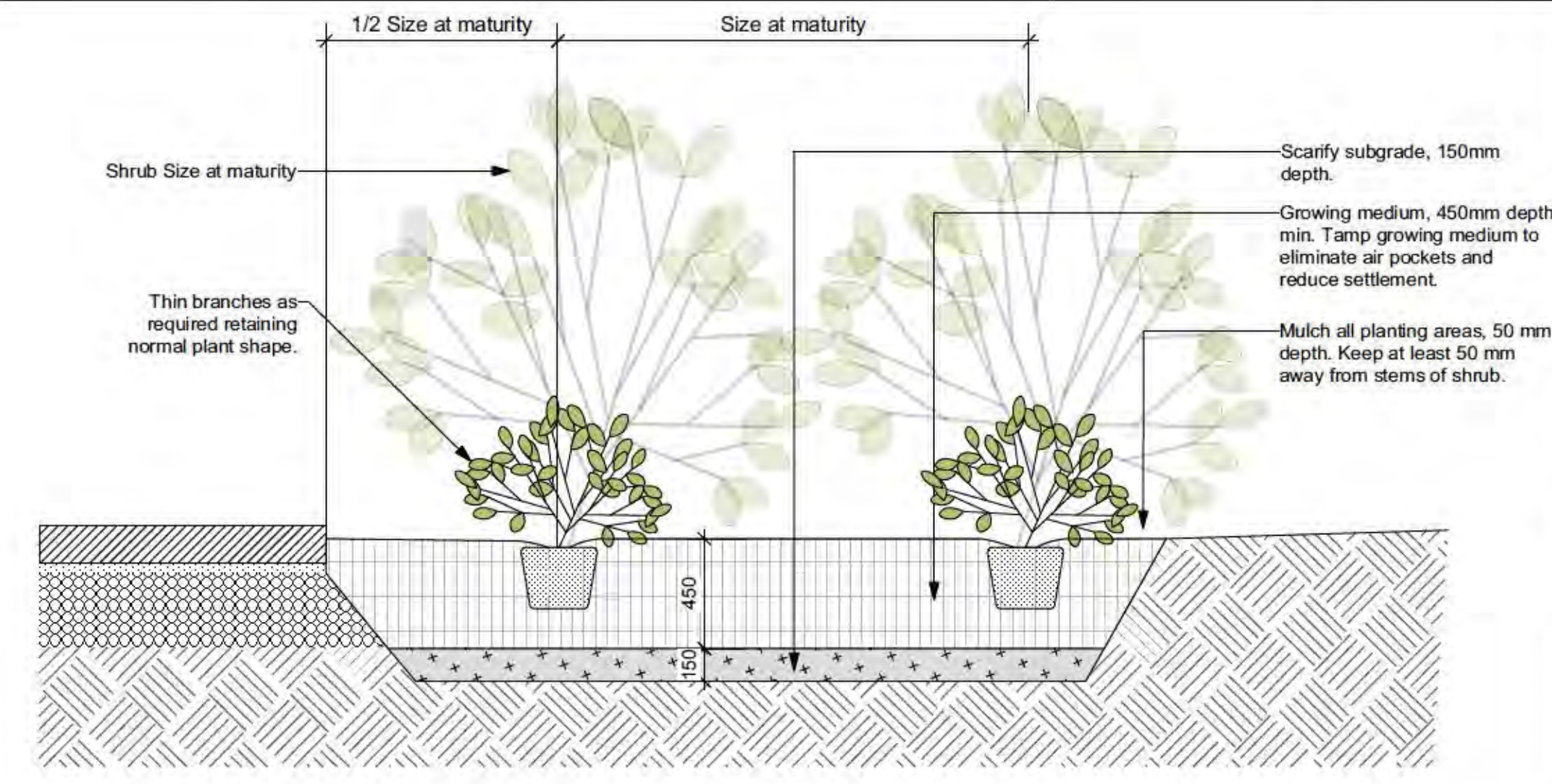
	400 - 500 mm boulder		25 - 75 mm drain rock
	300 mm rock		19 mm drain rock
	200 mm angular rock		19 mm clear crush
	100 - 200 mm cobbles		Pit Run Gravel

Note: After construction of weir, wash mix of pit run and 19 mm clear crush in to face of weir to plug gaps and holes.

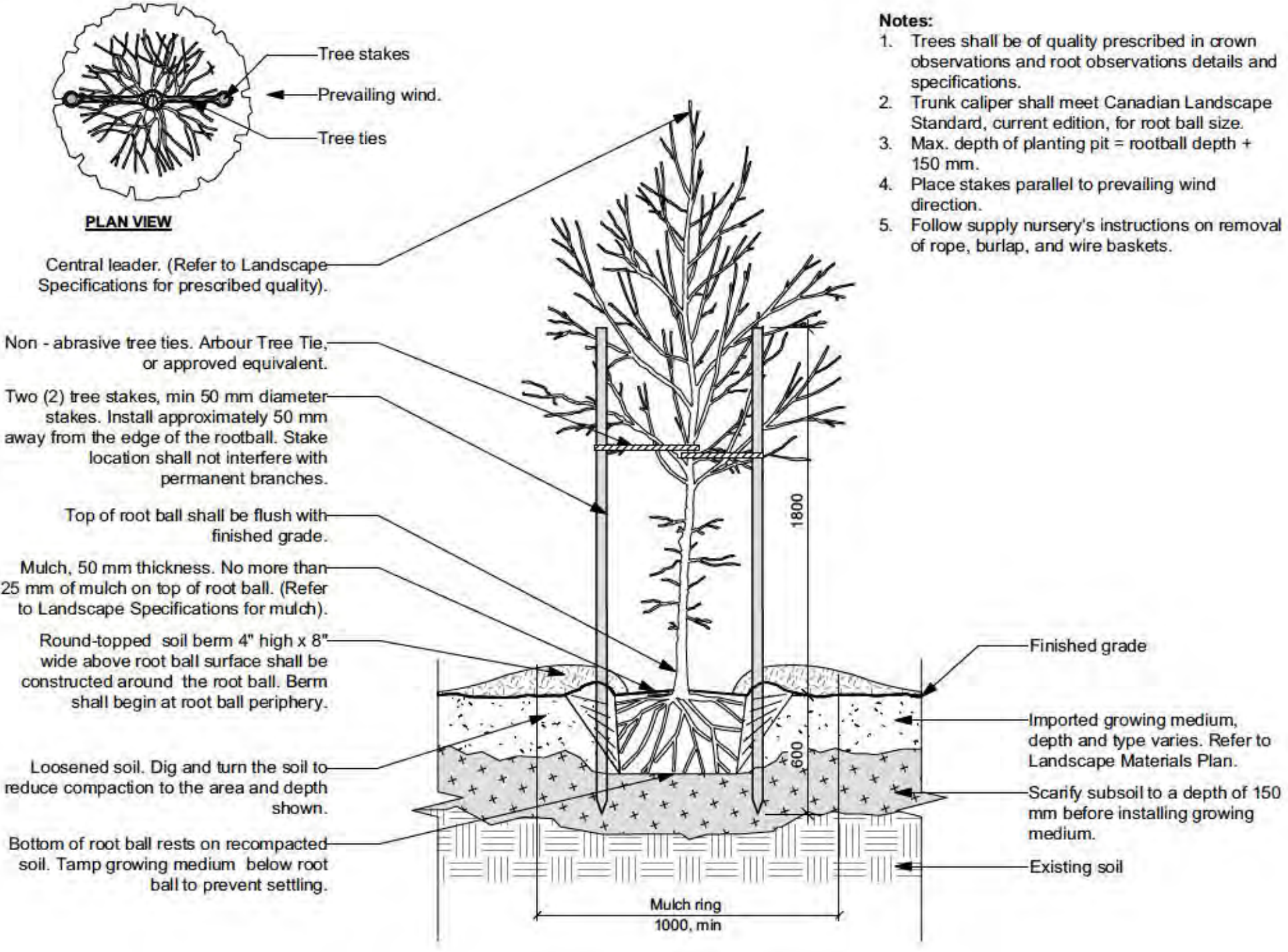
1 ROCK WEIR DETAIL  
Scale: 1:25



5 POOL CROSS SECTION  
Scale: 1:25

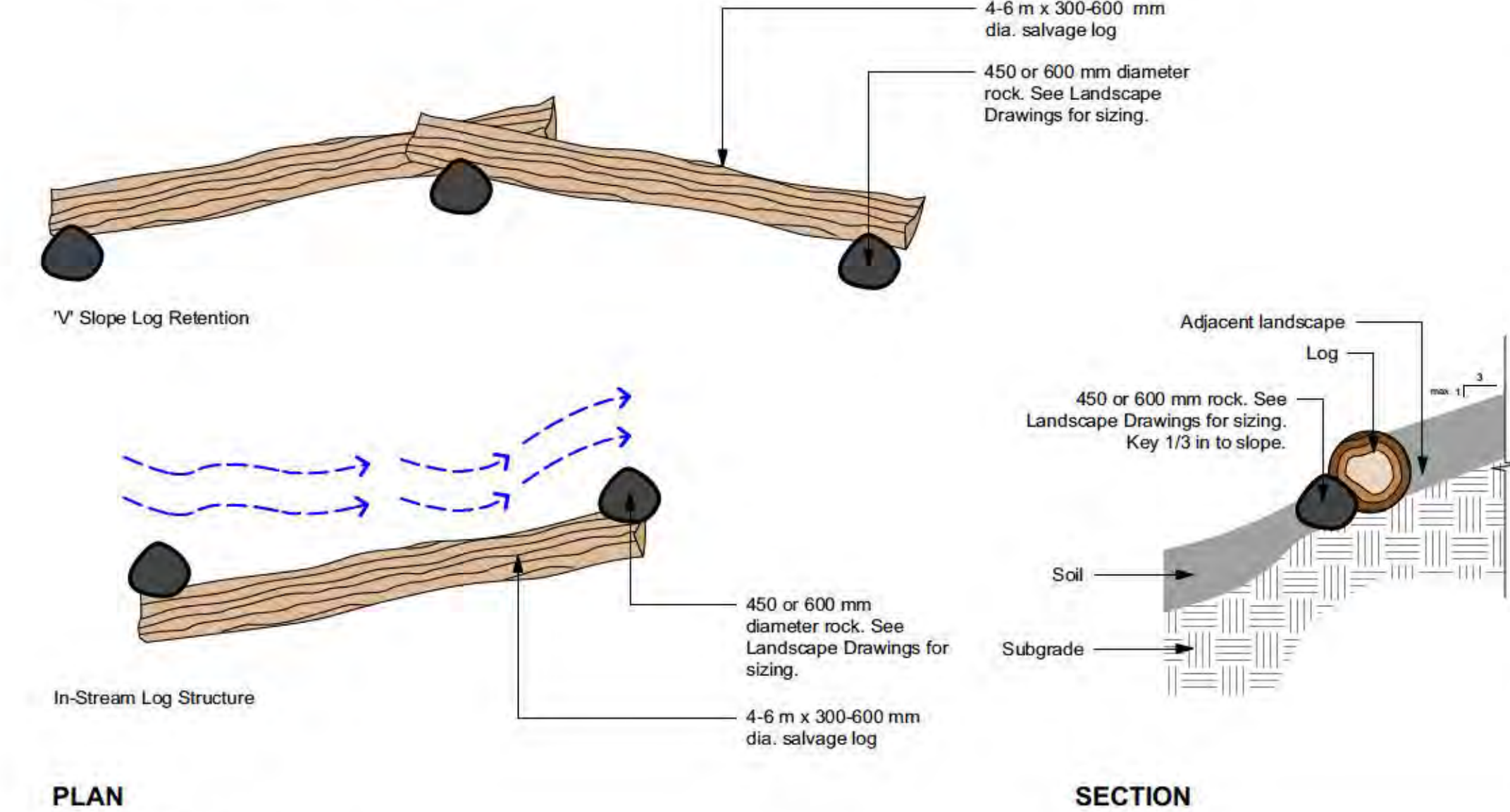


3 SHRUB PLANTING DETAIL  
Scale: 1:25



- Notes:**
1. Trees shall be of quality prescribed in crown observations and root observations details and specifications.
  2. Trunk caliper shall meet Canadian Landscape Standard, current edition, for root ball size.
  3. Max. depth of planting pit = rootball depth + 150 mm.
  4. Place stakes parallel to prevailing wind direction.
  5. Follow supply nursery's instructions on removal of rope, burlap, and wire baskets.

4 TREE PLANTING DETAIL  
Scale: 1:25



6 LOG STRUCTURES  
Scale: 1:50

ALL DRAWINGS TO BE READ IN ASSOCIATION WITH LANDSCAPE SPECIFICATIONS DOCUMENT.



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LANDSCAPE DETAILS

SCALE: AS SHOWN PROJECT NO. 201919500

DWG.#	REV	DATE
TP2 - L4.01	3	2021-06-24





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Issue	Description	Date
Issue 7		
C	Issued For Tender Package 2	2021-07-05
B	Issued For 50% Design Review	2021-04-27
A	Issued For 30% Design Review	2021-03-15
REV	DESCRIPTION	YYYY-MM-DD

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EXISTING CONDITIONS AND REMOVALS

SCALE: 1:400	PROJECT NO: 201919500
DWG# TP2-C101	REV C DATE: 2021/07/02

Last Saved: 7/20/2021 4:51 PM by NFIzpatrick  
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B	Issued For 50% Design Review	2021-04-27
A	Issued For 30% Design Review	2021-03-15
REV	DESCRIPTION	YYYY-MM-DD

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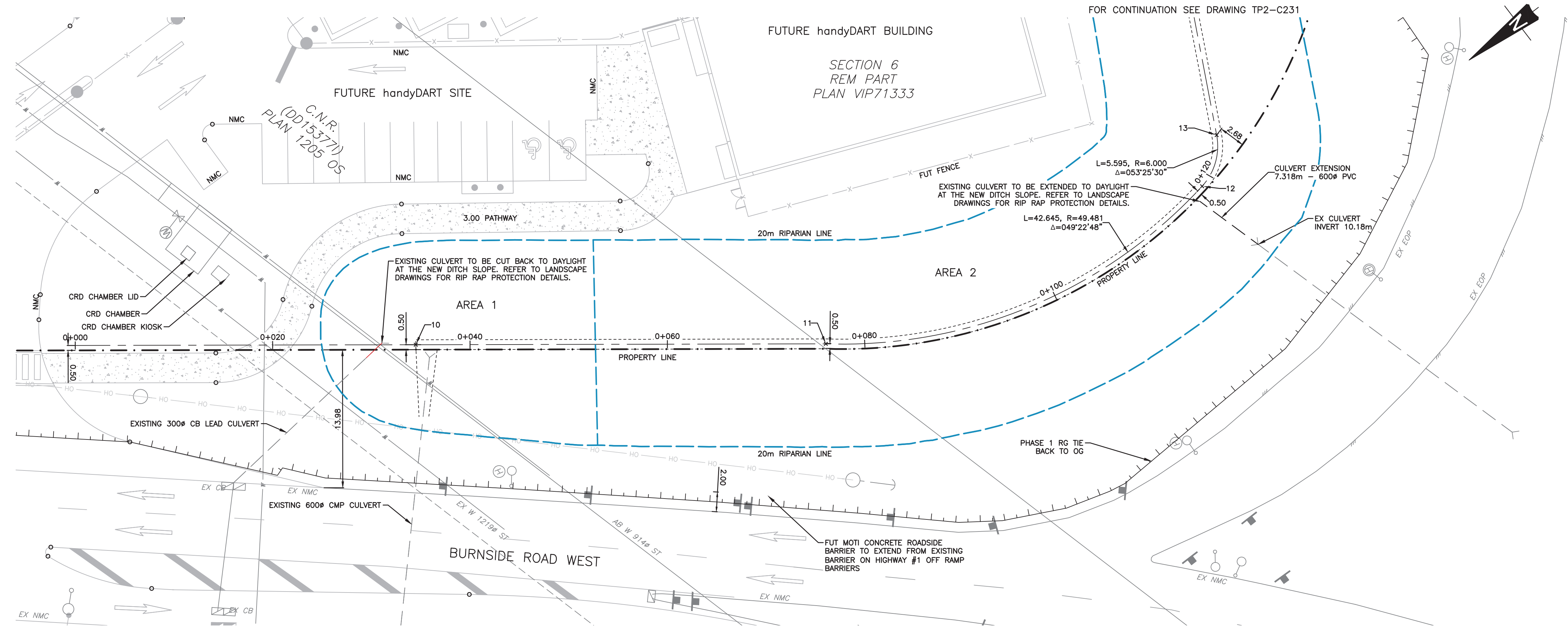
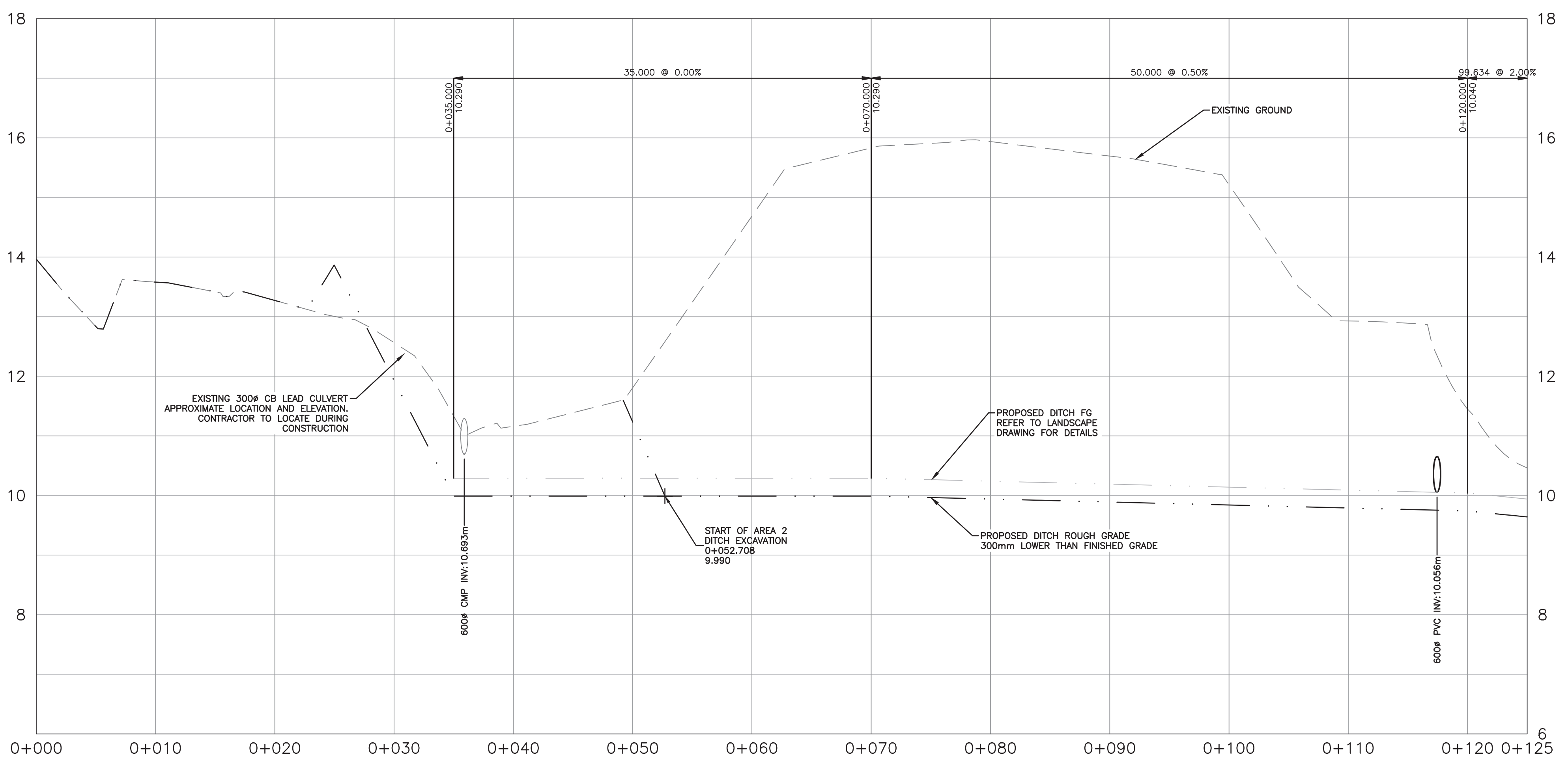



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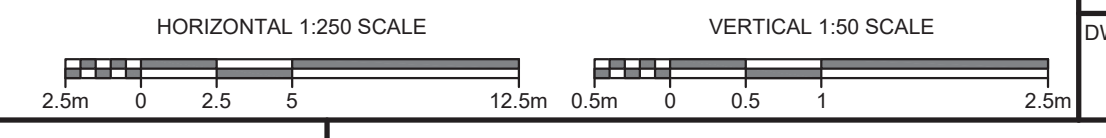
DITCH 1 BLOCK  
PROFILE 01

SCALE: 1:250	PROJECT NO. 201919500
DWG.# TP2-C230	REV DATE: C 2021/07/02

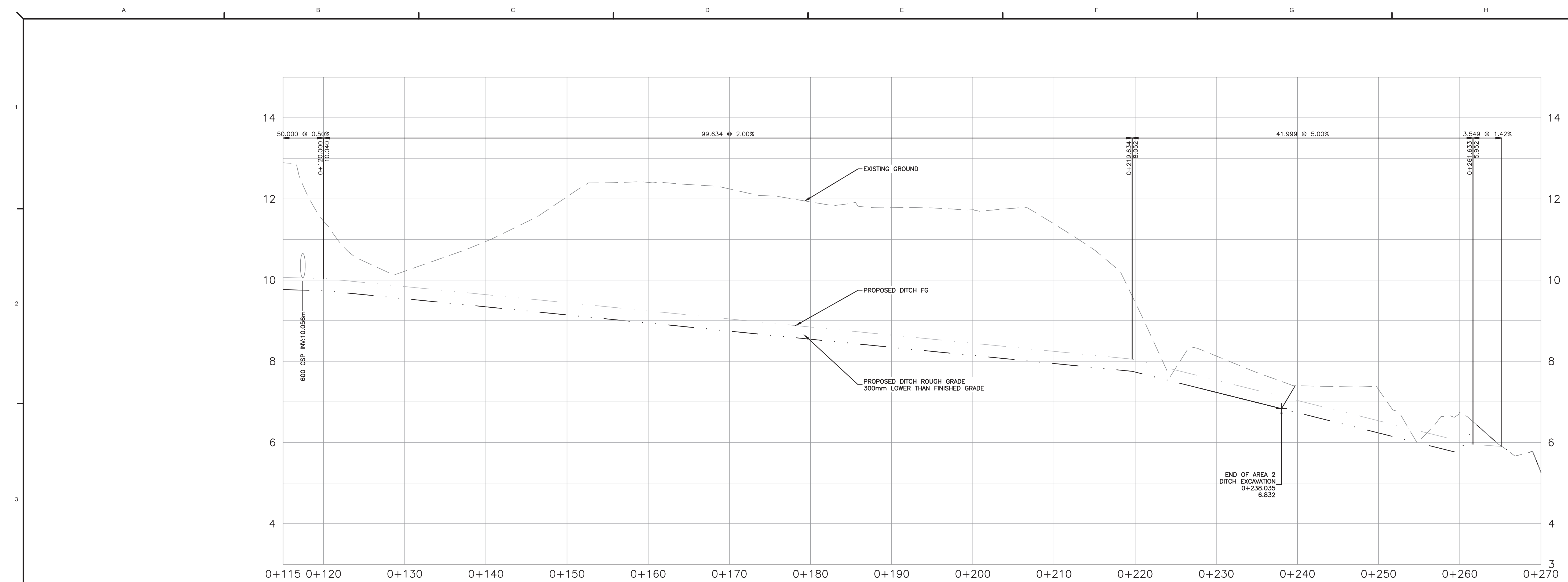


Point Table

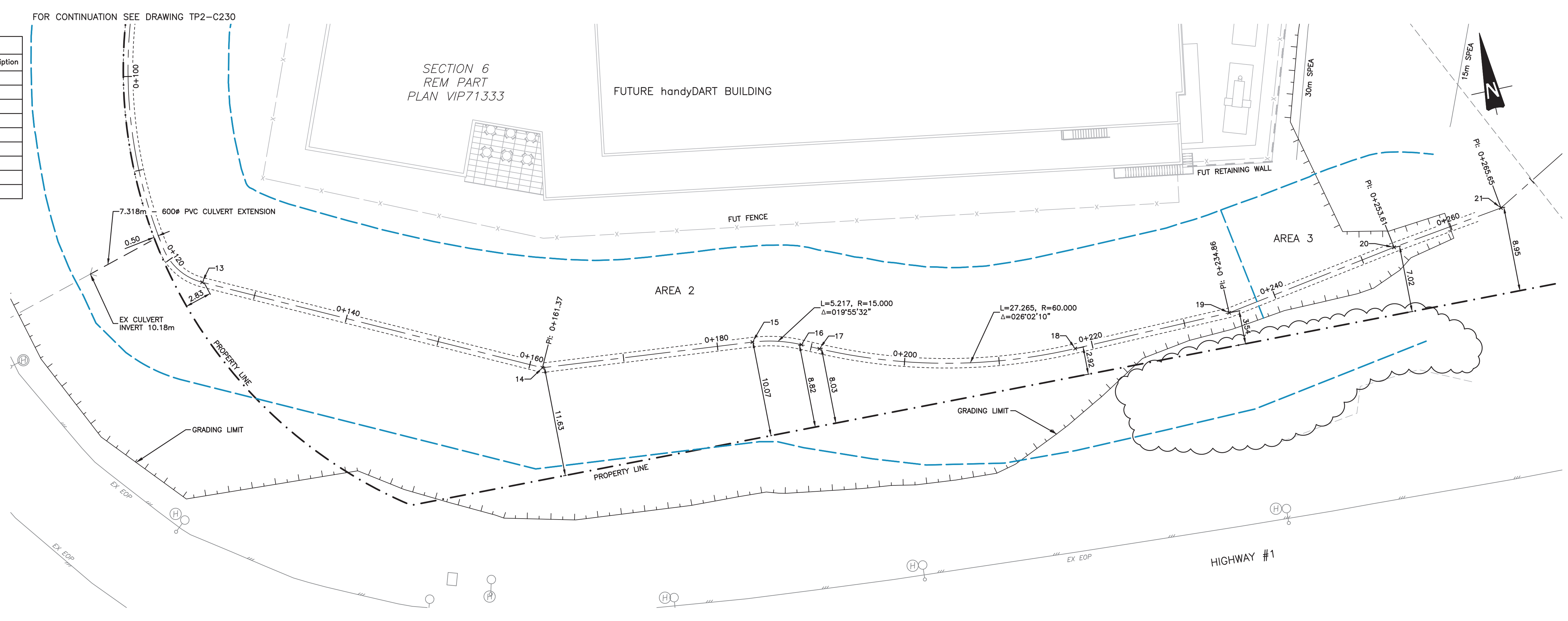
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12	5367875.3530	466918.3825	PCC
13	5367871.0362	466921.6170	EC



X:\Proj\2020\201919500-handydart\TP2-C230 DITCH 1 BLOCK PROFILE 01.dwg Plot: 7/2/2021 4:59 PM by NFIzpatrick Last Saved: 7/2/2021 5:10 PM by Nolan Fitzpatrick



Point #	Northing	Easting	Raw Description
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16	5367851.051	466982.079	EC
17	5367850.219	466983.838	BC
18	5367844.461	467010.249	EC
19	5367844.671	467026.957	PI
20	5367847.697	467045.459	PI
21	5367849.340	467057.387	PI



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		YYYY-MM-DD

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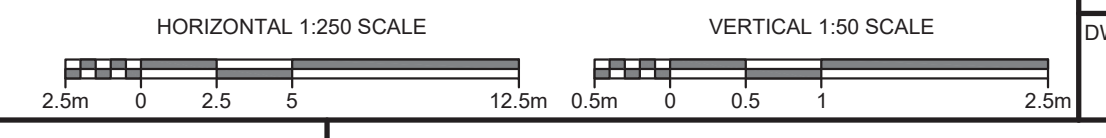


CLIENT: BC TRANSIT

PROJECT: VICTORIA handyDART CENTRE

DITCH 1 BLOCK PROFILE 02

SCALE:	PROJECT NO.	
1:250	201919500	
DWG#	REV	DATE:
TP2-C231	C	2021/07/02



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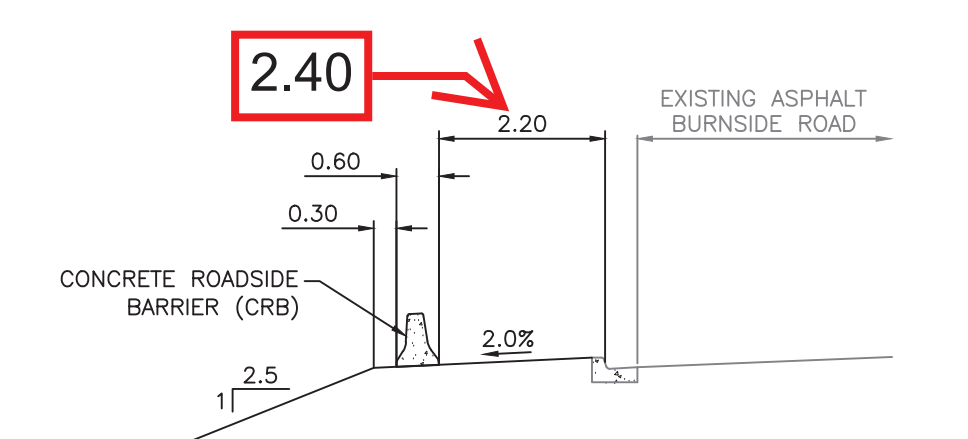
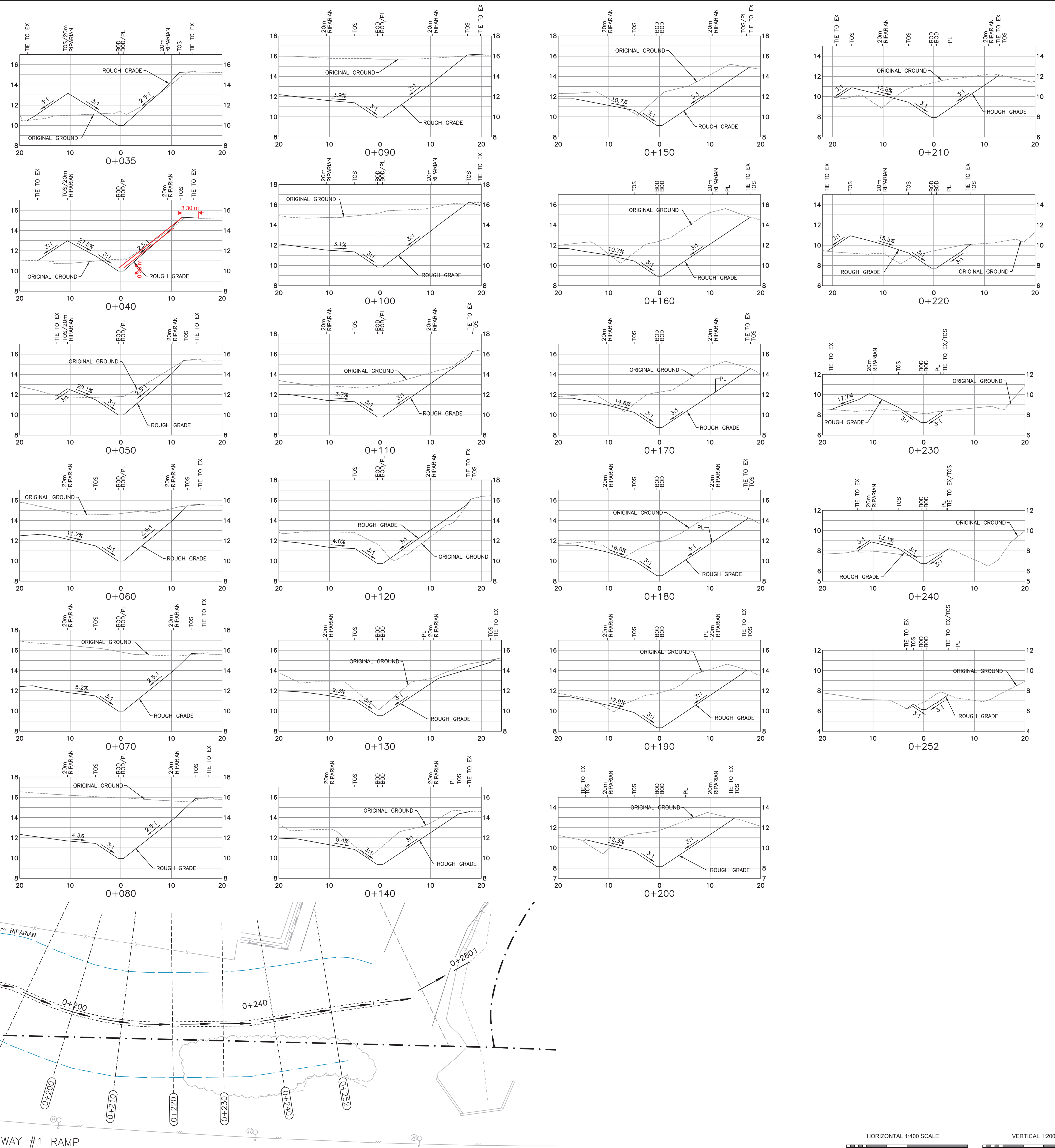


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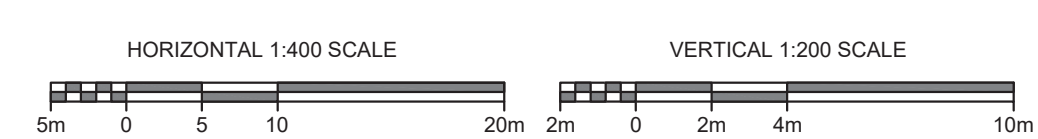
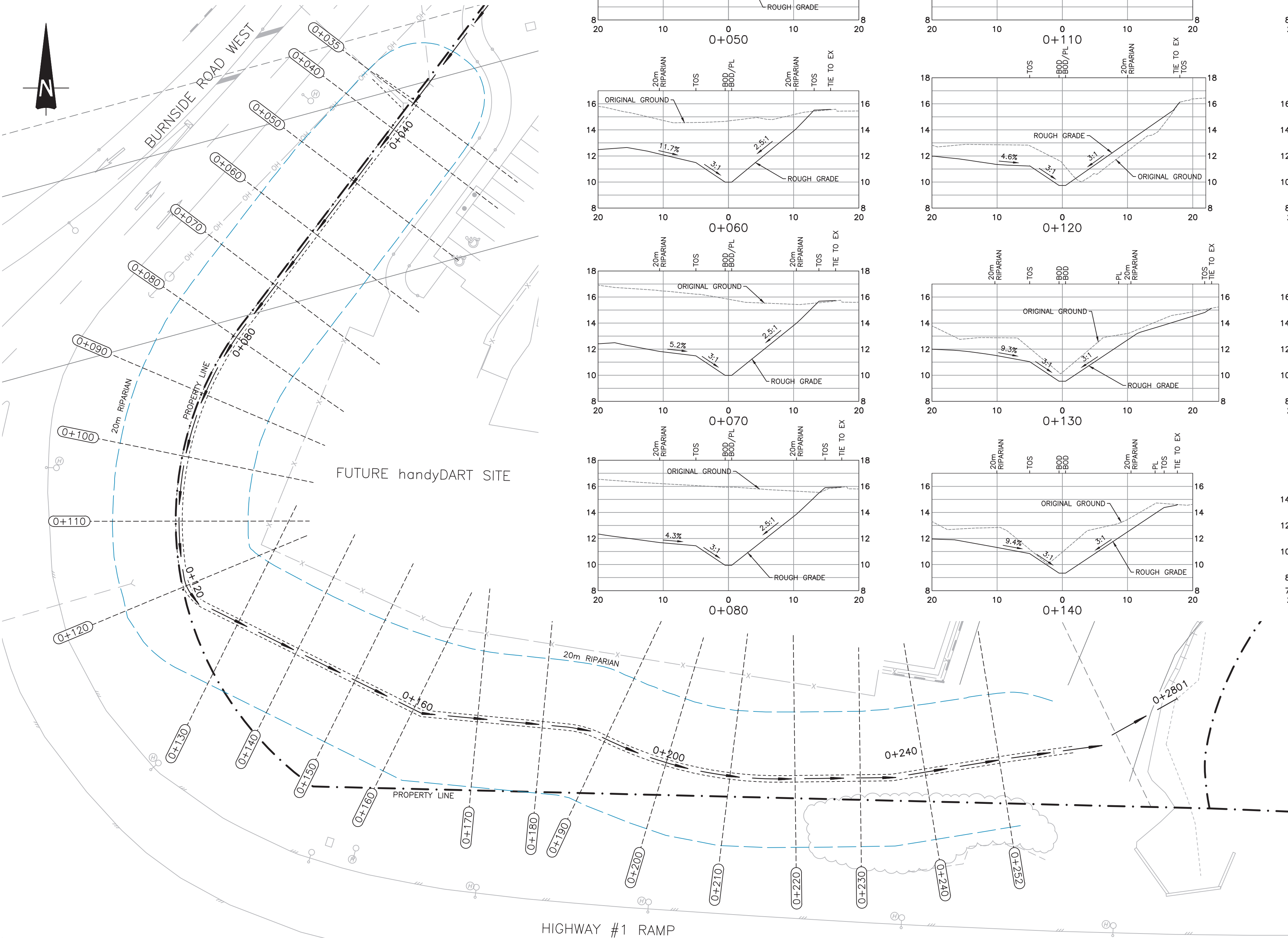
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**DITCH 1 SECTIONS**

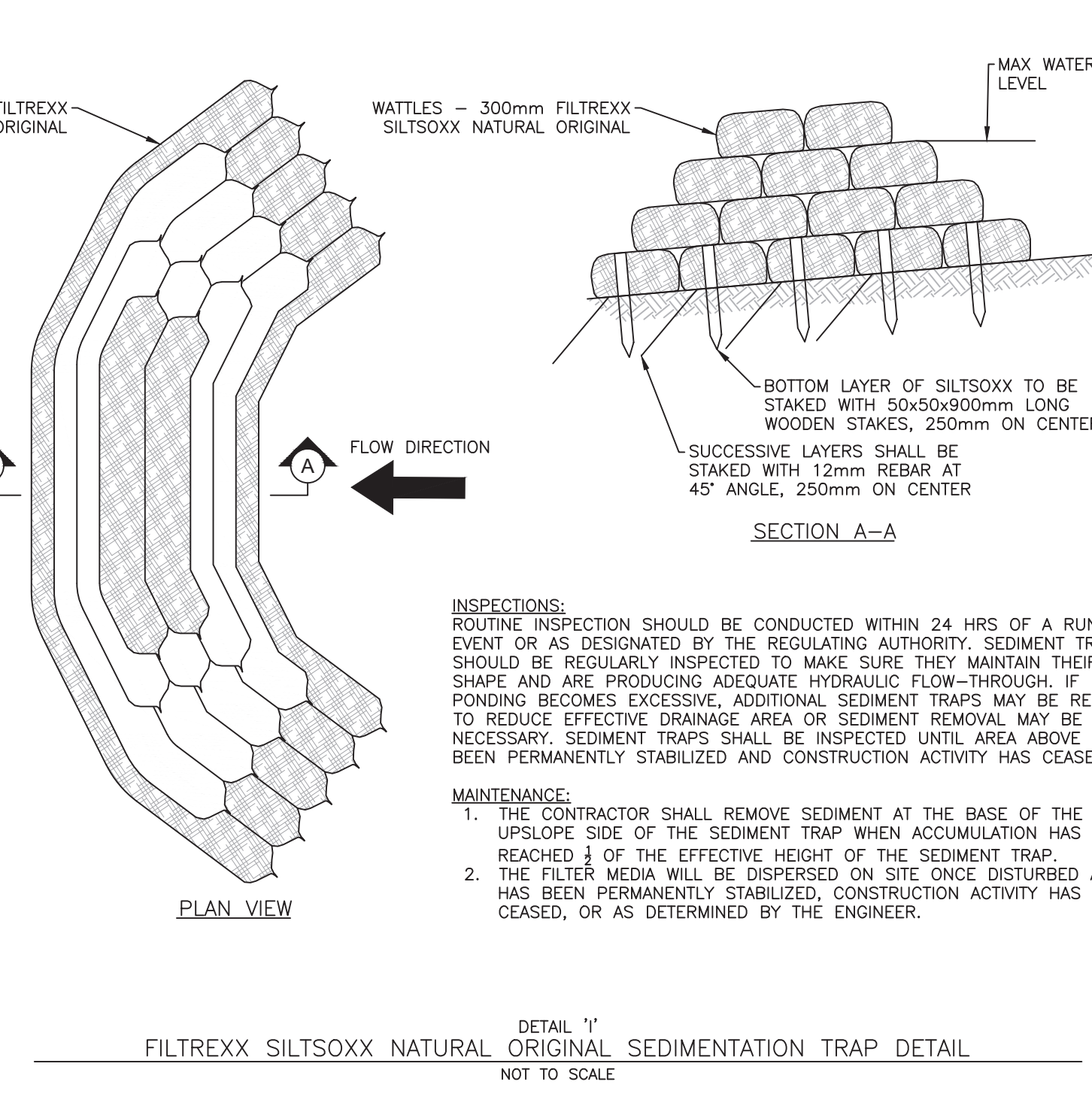
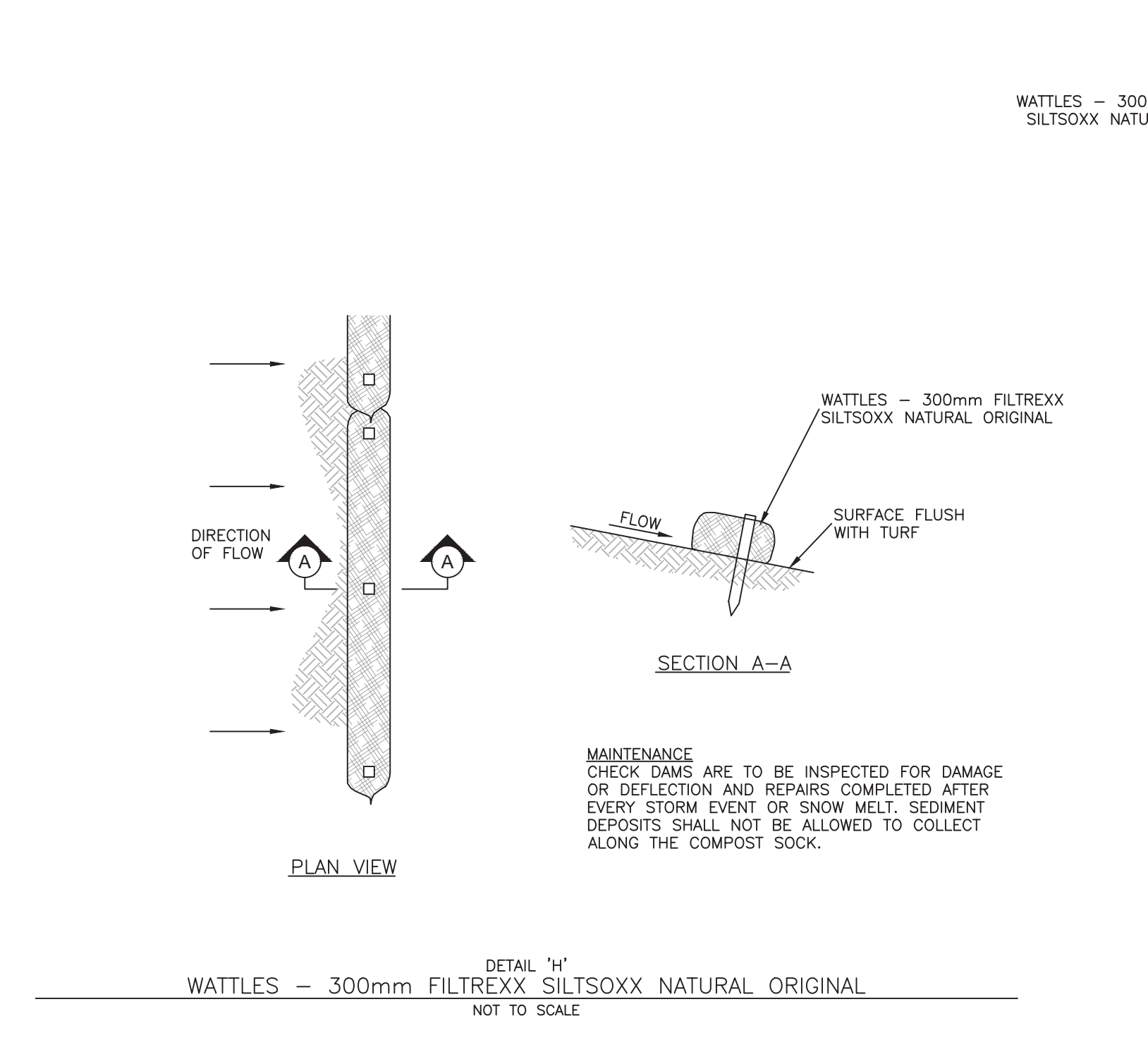
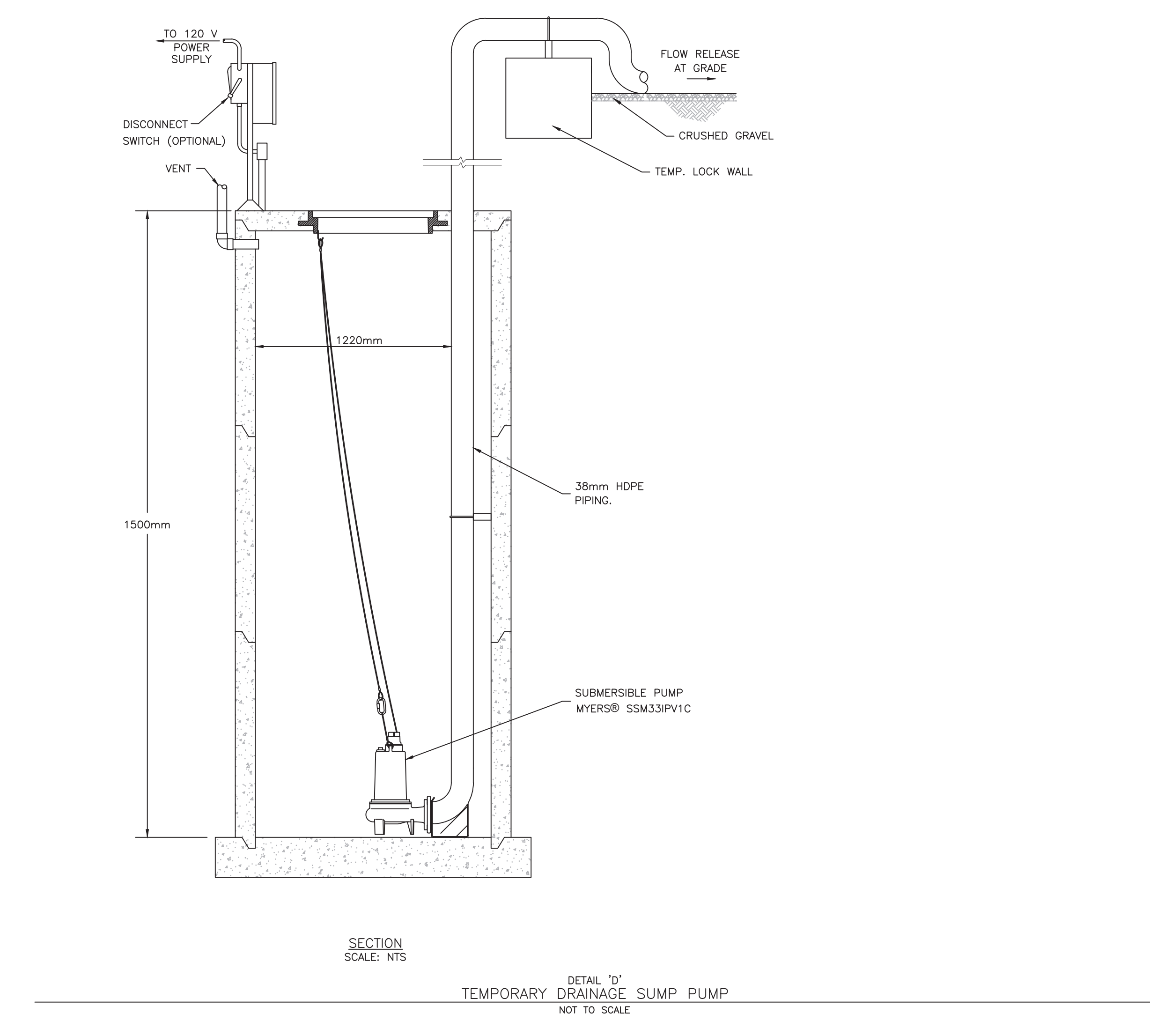
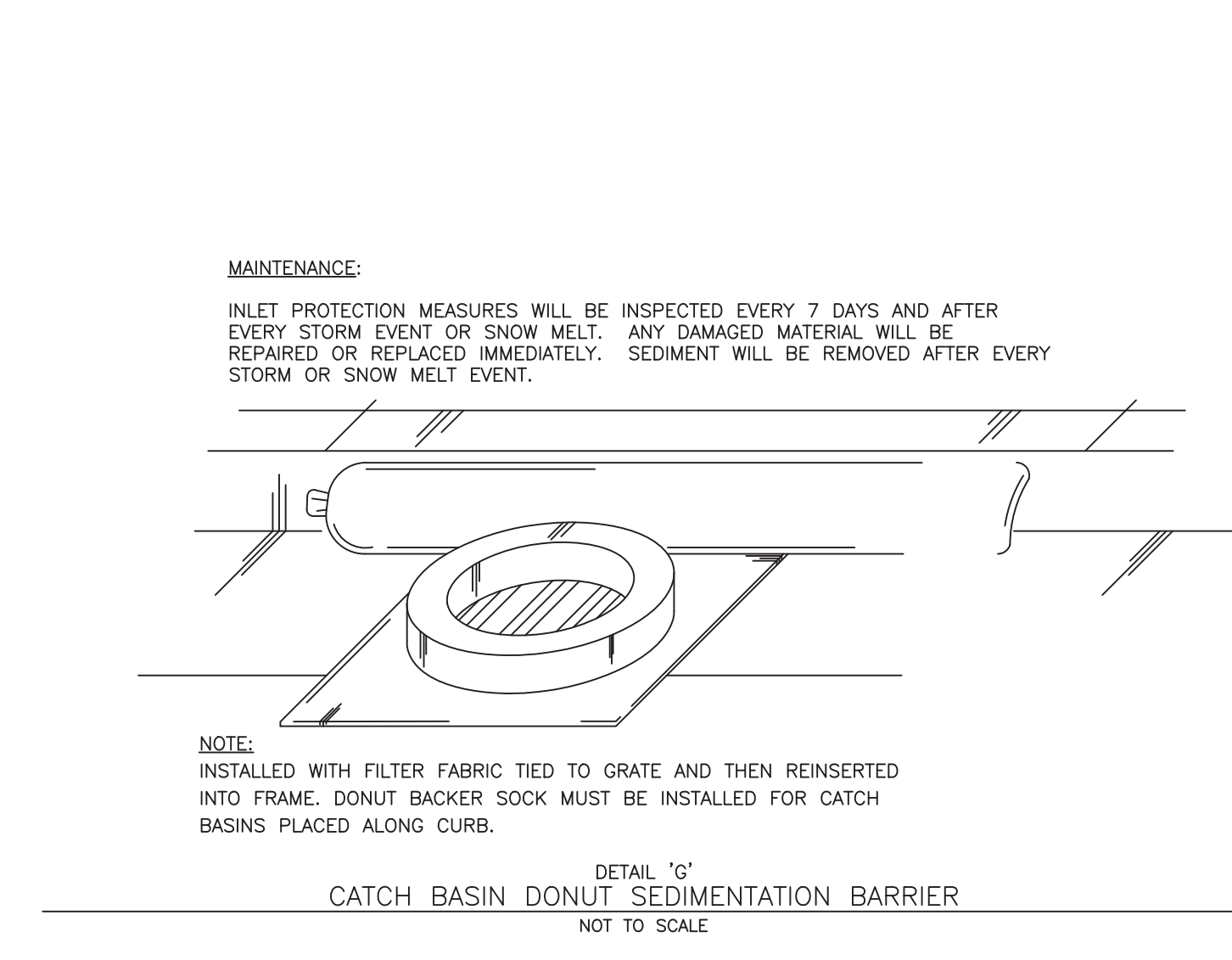
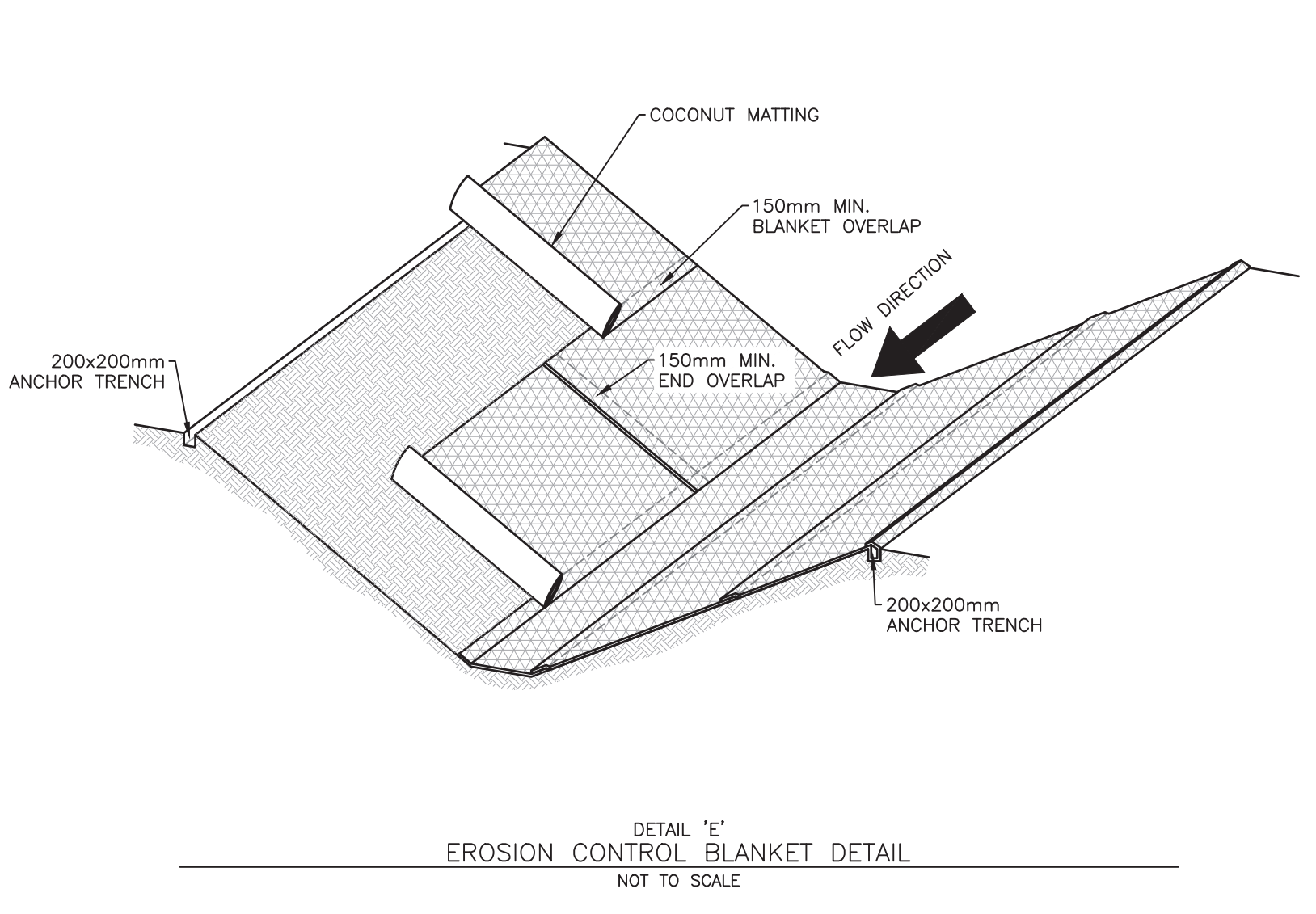
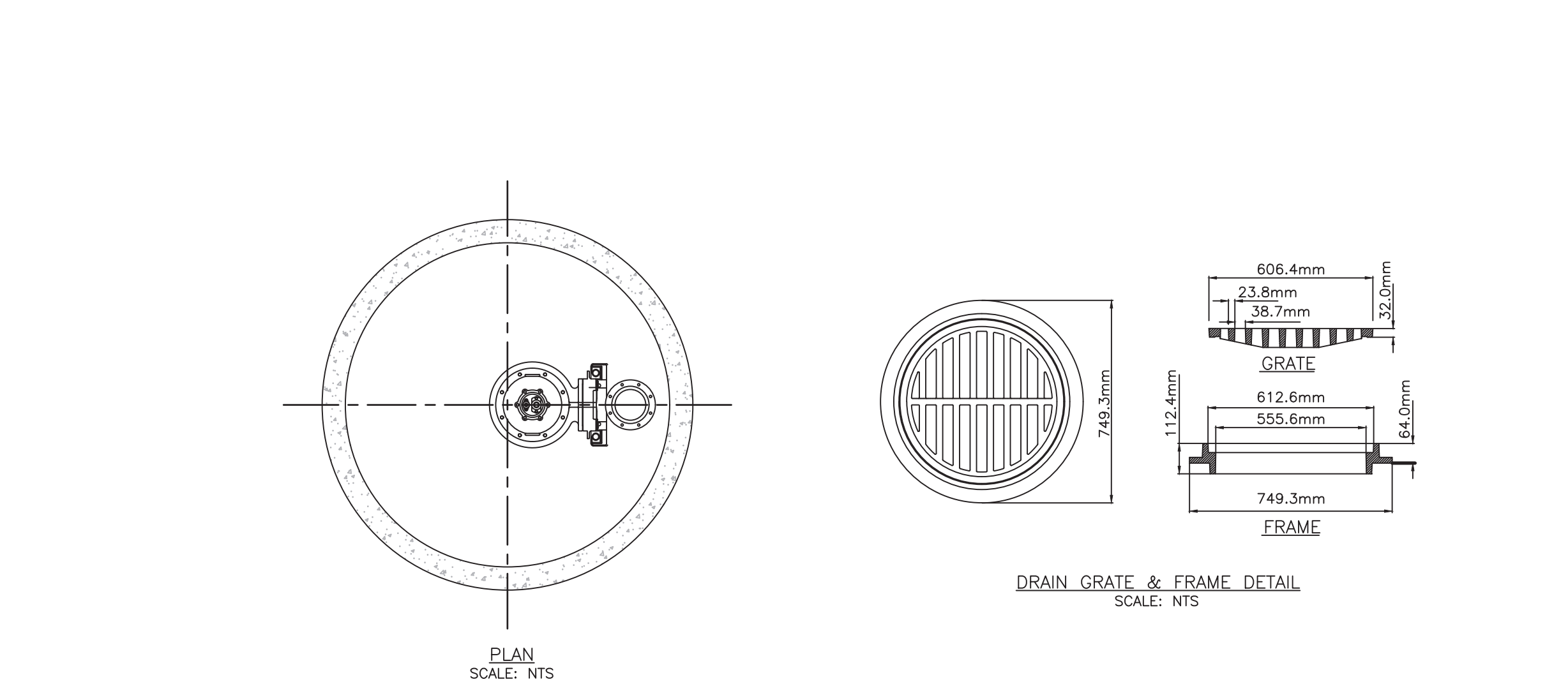
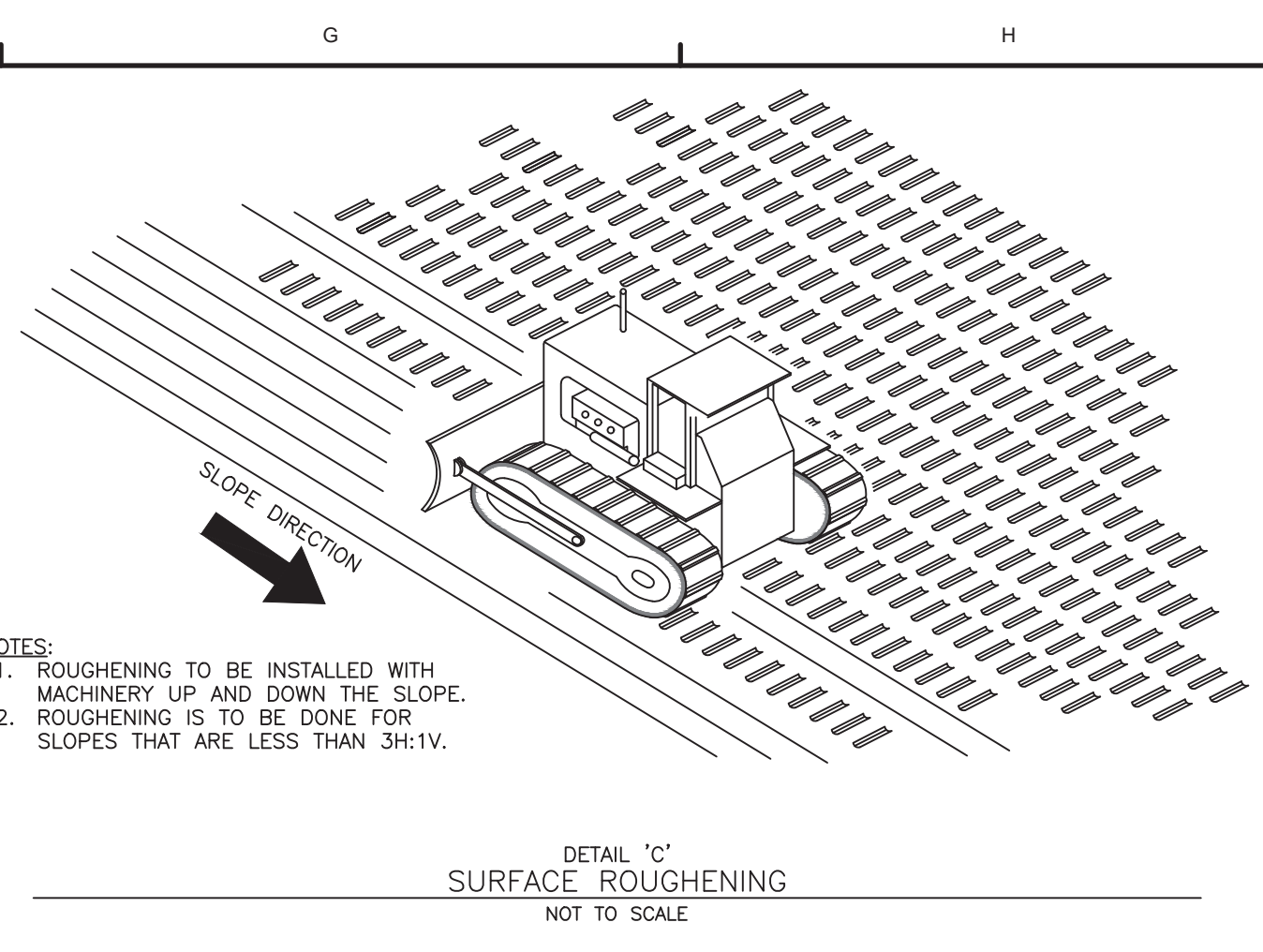
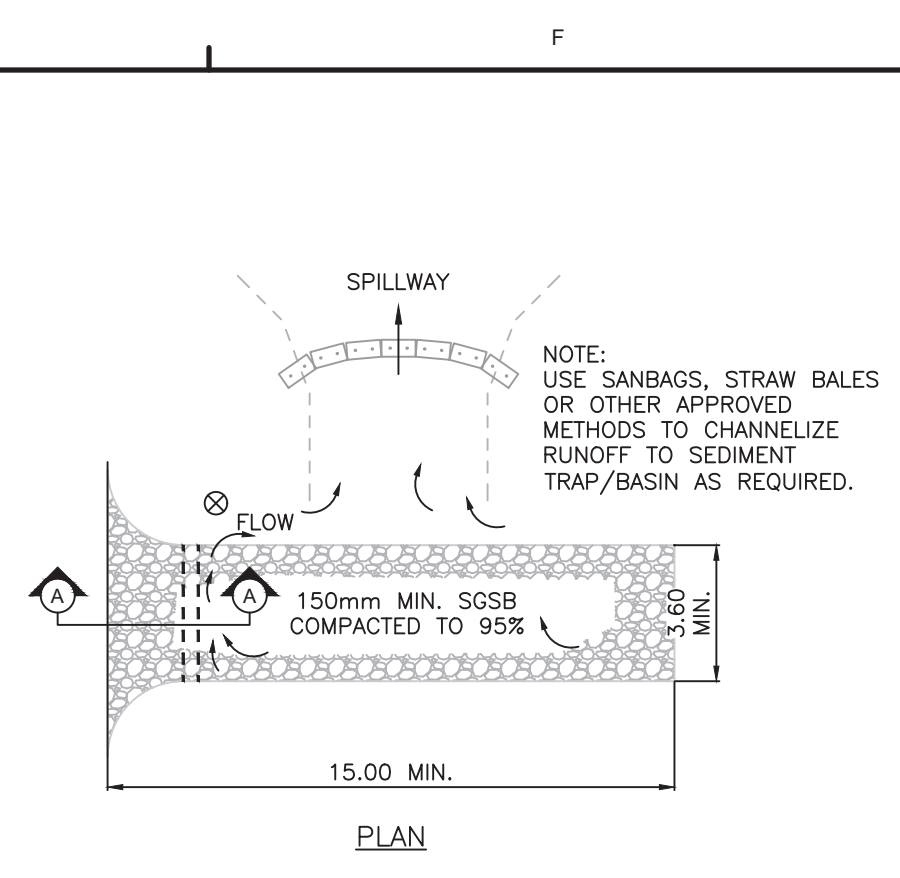
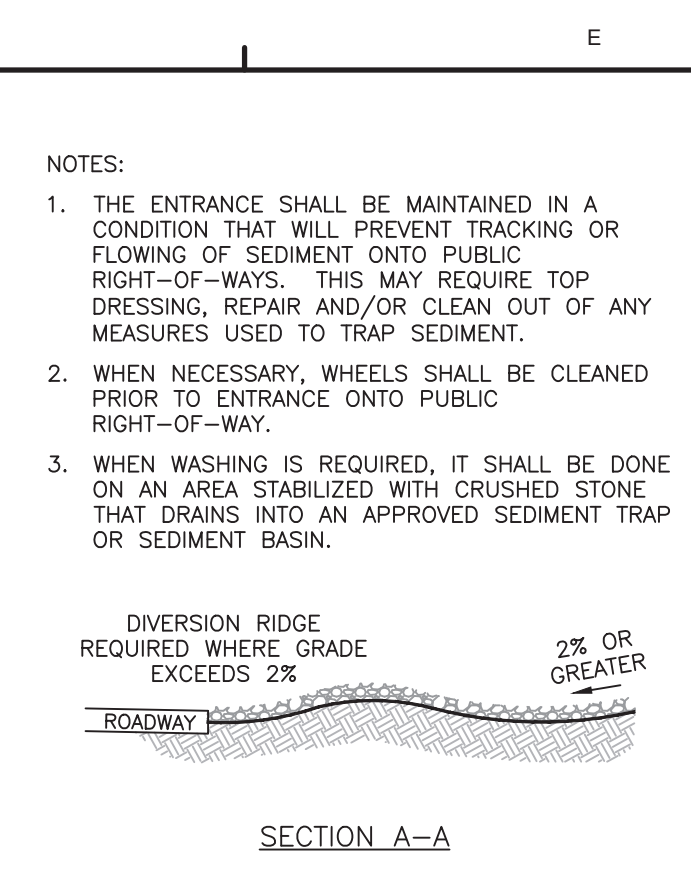
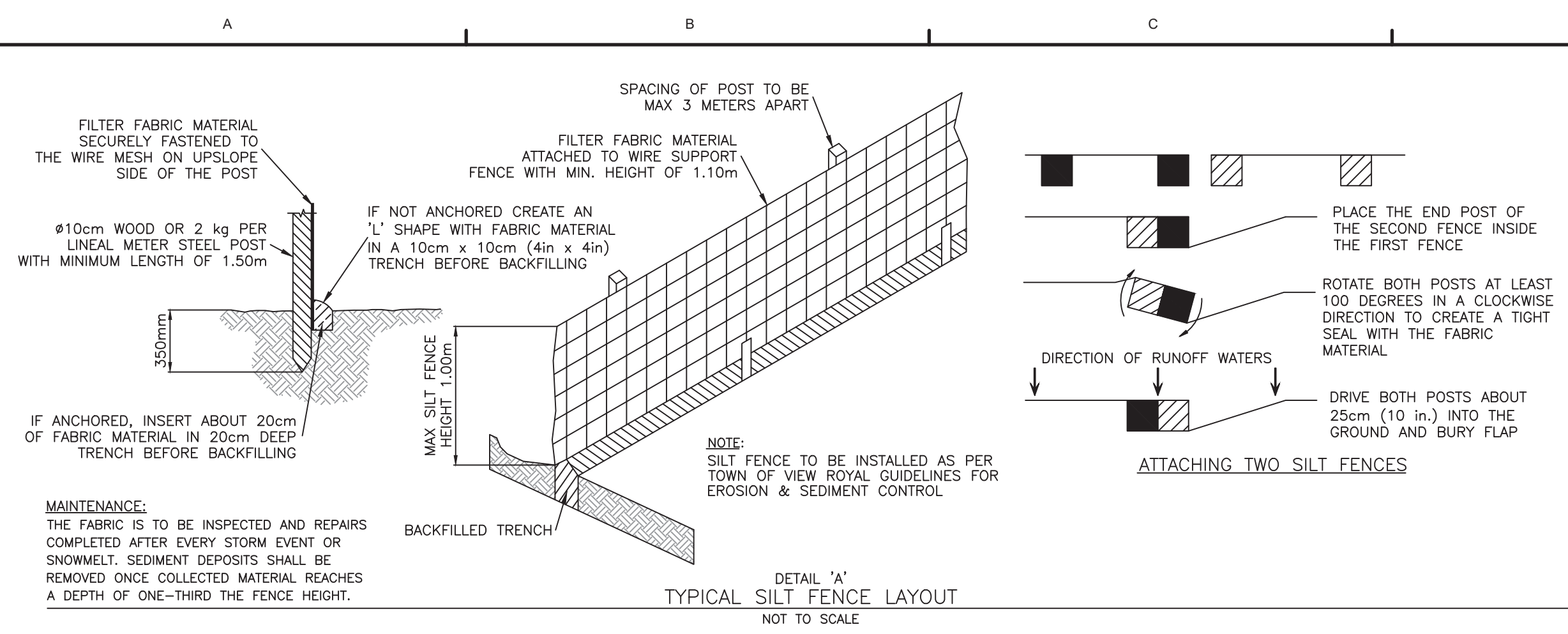
SCALE:	PROJECT NO.	
1:400	201919500	
DWG.#	REV	DATE:
<b>TP2-C232</b>	C	2021/07/02



TYPICAL SECTION SHOWING CONCRETE ROADSIDE BARRIER FROM STA 0+030m TO STA 0+110m N.T.S.



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STAMPS



CLIENT: BC TRANSIT

PROJECT: VICTORIA handyDART CENTRE

ESC NOTES & DETAILS

SCALE:	PROJECT NO.	
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DWG#	REV	DATE:
TP2-C700	C	2021/07/02

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# **APPENDIX F**

## **Construction Environmental Management Plan**





**Victoria handyDART Transit  
Centre**

Construction Environmental  
Management Plan

June 2, 2021

Prepared for:

BC Transit

Prepared by:

Stantec Consulting Ltd.  
Suite 11-2042 Mills Road  
Sidney BC

Project Number: 123221593

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# VICTORIA HANDYDART TRANSIT CENTRE

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## Abbreviations

AIA	Archaeological Impact Assessment
BMP	Best Management Practice
CDC	Conservation Data Centre
CEMP	Construction Environmental Management Plan
DFO	Fisheries and Oceans Canada
ECCC	Environment and Climate Change Canada
EM	Environmental Monitor
FLNRO	Ministry of Forests, Lands and Natural Resource Operations
FLNRORD	Ministry of Forests, Lands, Natural Resource Operations and Rural Development
HADD	harmful alteration, disruption or destruction
MOE	Ministry of Environment
MWLAP	Ministry of Water, Land and Air Protection
NTU	nephelometric turbidity units
QEP	qualified environmental professional
RAPP	Report All Poachers and Polluters
RAPR	Riparian Areas Protection Regulation
SARA	<i>Species at Risk Act</i>
TCOMM	Transit Communication Centre
TSS	Total Suspended Solids
WMU	Wildlife Management Unit
WSA	<i>Water Sustainability Act</i>



## 1.0 INTRODUCTION

BC Transit is planning to develop a handyDART bus facility at 2401 Burnside Rd W (Figure 1). This facility would include a total building area of approximately 2,380 m<sup>2</sup>, divided between Operations (415 m<sup>2</sup>), Service/Delivery (482 m<sup>2</sup>) and Maintenance (1,483 m<sup>2</sup>). A paved area covering 13,605 m<sup>2</sup>, with a total of 109 bus parking stalls, 10 employee parking stalls, two visitor parking stalls and driving lanes, will also be included in this development. This is referred to as “the Project” throughout this document.

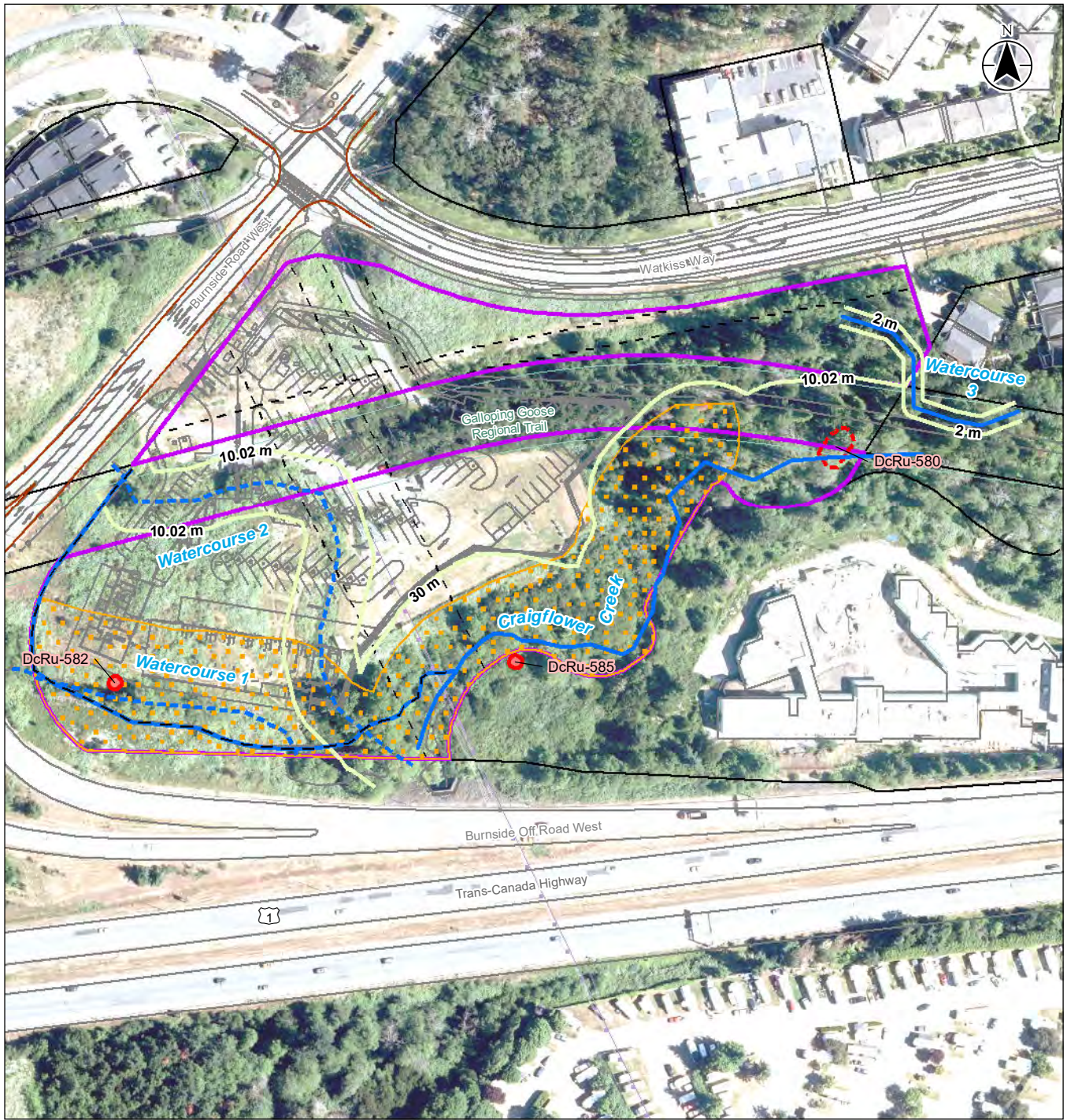
Various environmental features are supported on the property, including the mainstem of Craigflower Creek, a known fish-bearing watercourse, and three constructed watercourses, two of which are confluent with Craigflower Creek. In addition, portions of the property support young forest or low-lying shrubs. Given the diversity of environmental features on the site, Stantec Consulting Ltd. (Stantec) has been retained by BC Transit to prepare this Construction Environmental Management Plan (CEMP). This CEMP describes the Project, outlines the regulatory context, and provides a series of site-specific Best Management Practices (BMPs) applicable to the proposed construction work. These BMPs will be applied by a Contractor as overseen by an Environmental Monitor (EM) assigned to the Project.

### 1.1 INTENTION OF ENVIRONMENTAL MANAGEMENT PLAN

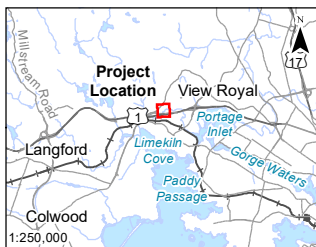
This CEMP is intended to mitigate environmental impacts and reduce the risk of unforeseen environmental incidents from the Project. The Contractor working on the Project must comply with this CEMP and/or provide suitable alternative approaches, which have been pre-approved by the EM, and complete this Project in accordance with applicable legislation. This document outlines the following:

- Roles and responsibilities for the BC Transit Project Manager, the Contractor, and the EM.
- Regulatory requirements and permits for the Project.
- Key construction activities and schedule.
- Existing environmental conditions and resources.
- Potential Project effects and mitigation measures.
- Management measures to mitigate potential Project effects.
- Environmental monitoring, reporting, and compliance requirements.
- The CEMP is a living document that will be reviewed and updated prior to and during construction activities. The management plans and monitoring protocols outlined in this CEMP may be re-evaluated and updated where deficiencies are identified and to improve overall environmental management and protection. Revisions may also be required should the Project design change significantly prior to the initiation of construction.





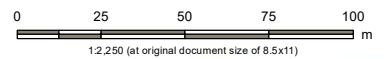
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**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 10N  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada  
 3. Imagery: CRD Orthoimagery 2019

- Transmission Line
  - Cadastral Parcels
  - Edge of Road
  - Right-of-Way
  - Local Greenspace
  - Property Boundary
  - Watercourse
  - Watercourse - to be removed
  - LWD, Bank & Channel Stability
- SPEA ZOS**

- Development Plan
- Proposed Watercourse
- Archaeological Site - Previously Recorded
- Archaeological Site - New
- Construction Monitoring Recommended if Development Depth Exceeds Fill Depth



Project Location: Victoria, British Columbia  
 Project Number: 123220971  
 Prepared by LTRUDEL on 20210408  
 Requested by SNABESS on 20210408

Client/Project/Report  
 BC Transit  
 Greater Victoria HandyDART Facility  
 Construction Environmental Management Plan

Figure No.  
**1**  
 Title  
**Project Area Overview Map**

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## 1.2 PROJECT SCHEDULE AND TIMING

BC Transit is proposing to complete the site development and construction between November 2021 and July 2023. It is anticipated that the following phases will be applicable to construction:

- Mobilization and establishment of environmental controls – November to December 2021
- Construction of new Watercourse 2, grading and installation of wick drains – December 2021 to March 2022
- General Site Construction – April 2022 to July 2023

## 1.3 ROLES AND RESPONSIBILITIES

Table 1.1 describes the roles and responsibilities of the Project team.

**Table 1.1 Roles and Responsibilities of the Project Team**

Role	Responsibilities
BC Transit Project Manager	<ul style="list-style-type: none"> <li>• Project Owner with overall responsibility for delivery of works associated with this Project.</li> <li>• Responsible for overall environmental management and performance of the Project.</li> <li>• Provides the Contractor and EM with Project-specific details, such as background information, municipal permits, and this CEMP.</li> <li>• Authorizes Stop Work authority to Project personnel (e.g., EM) for non-compliance with this CEMP, contravention of regulatory permits and standards, and allows them to suspend Project activities that are at risk of causing or potentially causing serious harm to fish, wildlife or the environment (e.g., water quality, terrestrial habitat, air quality).</li> <li>• Determines monitoring frequency in consultation with the EM.</li> <li>• Advises EM(s) as required.</li> <li>• Reviews and provides comment to the EM reports.</li> <li>• Conducts regular audits during construction, if determined to be required.</li> <li>• Works collaboratively with the EM to resolve differences of perspective regarding compliance with the CEMP and permits.</li> <li>• Times site visits and auditing activities (if required) for when work is occurring during conditions (e.g., heavy rainfall) that could potentially cause adverse environmental effects.</li> </ul>



# VICTORIA HANDYDART TRANSIT CENTRE

Introduction  
June 2, 2021

**Table 1.1 Roles and Responsibilities of the Project Team**

Role	Responsibilities
Environmental Monitor	<ul style="list-style-type: none"> <li>• Regularly liaises with the BC Transit Project Manager and the Contractor to provide updates and discuss Project deficiencies, if any.</li> <li>• Attends meetings with the BC Transit Project Manager and the Contractor to discuss impact mitigation.</li> <li>• Determines monitoring frequency in consultation with the BC Transit Project Manager.</li> <li>• Confirms frequency of maintenance and revision of mitigation measures based on site conditions.</li> <li>• Monitors construction activity to verify that works are undertaken in compliance with the appropriate sections of this CEMP, permits and regulatory requirements.</li> <li>• Addresses and closely monitors non-compliance issues immediately.</li> <li>• Liaises with regulatory agencies, as necessary.</li> <li>• Notifies regulatory agencies or authorizes notification of environmental non-compliance or environmental incidences, where applicable.</li> <li>• Attends environmental pre-job meeting(s) with the Contractor.</li> <li>• Attends health and safety meetings and Contractor tailgate meetings where appropriate, to communicate potential environmental concerns / requirements.</li> <li>• Maintains a current version of the CEMP and is familiar with all aspects of the document.</li> <li>• Communicates requirements of this CEMP to the BC Transit Project Manager and the Contractor.</li> <li>• Evaluates and reports on the effectiveness of the environmental mitigation measures and on Contractor work procedures through regular site visits.</li> <li>• Advises the Contractor of non-compliance and of any emerging environmental issues and assists in addressing them.</li> <li>• Provides corrective advice to the Contractor, where appropriate, such as when non-compliances are observed or imminent.</li> <li>• Has the authority to issue a Stop Work order where activities are impacting, or will impact the environment (e.g., water quality, terrestrial habitat, air quality), fish and/or wildlife.</li> <li>• Measures and monitors water quality as determined by this CEMP or regulatory requirements.</li> <li>• Maintains records of site visits and regularly updates the BC Transit Project Manager.</li> <li>• Writes environmental monitoring report to be submitted to BC Transit.</li> <li>• Provides guidance and direction as needed during clean-up and restoration activities (e.g., after a spill or hydraulic leak) according to the requirements in this CEMP.</li> </ul>





# VICTORIA HANDYDART TRANSIT CENTRE

Introduction  
June 2, 2021

**Table 1.1 Roles and Responsibilities of the Project Team**

Role	Responsibilities
Contractor	<ul style="list-style-type: none"><li>• Understands details of the Project by reviewing relevant documentation supplied by BC Transit and the EM (e.g., CEMP).</li><li>• Determines the most effective method of installing environmental protection measures including phasing to match the work being undertaken on site.</li><li>• Installs and maintains the environmental protection and mitigation measures.</li><li>• Designates a responsible person to oversee the environmental protection and mitigation measures.</li><li>• Conducts work according to approved designs and standards, regulatory requirements/approvals, and this CEMP.</li><li>• Verifies that personnel are appropriately trained and competent in the use of environmental protection and mitigation measures, such as sediment, waste, spill and noise control measures.</li><li>• Is responsible for site safety measures to protect site personnel, including any measures associated with hazardous materials and spill response.</li><li>• Notifies BC Transit Project Manager and EM(s) of any observed or potential non-compliances with this CEMP.</li><li>• Immediately reports incidents to the BC Transit Project Manager and EM(s) and initiates an appropriate response.</li><li>• Corrects deficiencies and any non-compliance upon direction from the BC Transit Project Manager, EM(s), and/or regulators.</li></ul>



## **1.4 PROJECT COMMUNICATION**

Communication between all parties involved during each phase of construction is paramount to the timely and efficient implementation of the CEMP. The following communication measures will be implemented:

- The CEMP will be made available as part of the Tender Package to ensure bidders are familiar with the terms and requirements of the Project prior to commencement of the proposed work and will be available at the work site throughout construction.
- A pre-construction meeting(s) will be convened between BC Transit, the Stantec environmental monitor and those undertaking the construction of the Project to review the CEMP and to outline the roles and responsibilities of each party.
- The Project/Contractor team will confirm that the CEMP is on site and accessible to their employees throughout the construction period.

A construction and environmental monitoring report outlining site activities will be prepared by the environmental monitor at the end of each week during which a monitoring visit was conducted; it will be forwarded to the BC Transit Project Manager. A draft monitoring template is attached as Appendix A.

Environmental incidents will be reported to BC Transit's Project Manager and the EM immediately, so that appropriate notifications can be made, and site management personnel can appropriately handle incidents. Spills will be promptly cleaned up and reported in accordance with regulatory agency requirements. For response to spill emergencies, refer to Section 6.5.

The EM will be responsible for notification of the appropriate agencies in the event of a spill or other environmental incident. Representatives of nearby Indigenous communities and stakeholders will be informed by the BC Transit Project Manager in the event of a spill, accident or malfunction potentially affecting the environment, as required. The BC Transit Project Manager will maintain an internal list of contacts to be informed.

## **2.0 REGULATORY AND LEGISLATIVE REQUIREMENTS**

The environmental legislation applicable to the Project is listed in Table 2.1. Required permits, notifications, and approval requirements are summarized therein.



# VICTORIA HANDYDART TRANSIT CENTRE

Regulatory and Legislative Requirements  
June 2, 2021

**Table 2.1 Construction Environmental Permits and Notifications**

Environmental Permits for Construction	Regulatory Agency	Description	Status*
<b>Federal</b>			
<i>Fisheries Act</i> Authorization	DFO	An Authorization is required when it is determined that construction will result in a harmful alteration, disruption or destruction (HADD) of fish habitat.	An Authorization will be required.
<i>Migratory Birds Convention Act</i>	Environment and Climate Change Canada (ECCC)	Prohibits impacts to migratory birds and their habitats except where permitted under this legislation.	Impact mitigation (e.g., Project timing) likely precludes the requirement for a permit.
<i>Species at Risk Act (SARA)</i>	ECCC	Requires a permit if impacts to rare species (i.e., on Schedule 1 of SARA) may result from development.	A permit will be required if a Schedule 1 species or their critical habitat is identified onsite.
Scientific Fish Collection Permit	DFO	A Scientific Fish Collection Permit is required to salvage and relocate anadromous salmonids if instream work is required.	A Scientific Fish Collection Permit will be required.
<b>Provincial</b>			
<i>Water Sustainability Act (WSA)</i> Section 11 Change Approval	Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD)	Under the WSA, channel relocation requires a Change Approval (i.e., a permit) to relocate a watercourse.	A WSA Section 11 Change Approval will be required.
Riparian Areas Protection Regulation (RAPR)	FLNRORD	Under the RAPR, development triggers the requirement to conduct an assessment if it is proposed within 30 metres of a creek. The assessment of the creek establishes a Streamside Protection and Enhancement Area (setback) within which development is not permitted.	A RAPR was undertaken and used in development of the site design plan.
Wildlife Relocation Permit	FLNRORD	A Wildlife Relocation Permit is required to salvage and relocate wildlife (including amphibians) during the proposed work if wildlife is confirmed to be present.	The requirement for a Wildlife Relocation Permit is anticipated due to likely presence of amphibians.
Scientific Fish Collection Permit	FLNRORD	A Scientific Fish Collection Permit is required to salvage and relocate “coarse” and resident (non-anadromous) fish if instream work is required.	A submission will be required.
<i>Weed Control Act</i>	FLNRORD	Requires property owners or those in control of a property to control the spread of noxious weeds	A permit is not required. Land occupier has a duty to control noxious weeds.



# VICTORIA HANDYDART TRANSIT CENTRE

Construction Activities  
June 2, 2021

**Table 2.1 Construction Environmental Permits and Notifications**

<b>Environmental Permits for Construction</b>	<b>Regulatory Agency</b>	<b>Description</b>	<b>Status*</b>
<i>Environmental Management Act</i>	Ministry of Environment and Climate Change Strategy	Regulates contaminated sites remediation and response if contamination is noted at a project site	A permit may be required if contamination is present.
<i>Heritage Conservation Act</i>	FLNRORD	Authorization in the form of an HCA Section 12.4 Alteration Permit and a Section 12.2 Inspection Permit must be obtained prior to commencing ground disturbing activities within an archaeological site.	A permit is required.
<b>Municipal<sup>1</sup></b>			
Noise Bylaw No. 523	Town of View Royal	Construction will be permitted from 7:00 am to 7:00 pm except on Sundays and statutory holidays.	A permit will be required if a variance to these hours is required.
Tree Bylaw No. 695	Town of View Royal	Permits will be required to remove trees designated as protected under the bylaw.	Permitting requirements will be determined upon completion of final design.
Soil Bylaw No. 869	Town of View Royal	Permits will be required to remove soil from the property unless removal meets one of the exemptions outlined in Section 5.0.	Permitting requirements will be determined upon completion of final design.
<p><b>NOTES</b></p> <p>* Status will be updated in advance of construction if required</p> <p>1. Additional site specific requirements may be developed by the Town of View Royal during the Environmental Development Permit approval process, currently in progress.</p>			

## 3.0 CONSTRUCTION ACTIVITIES

A preliminary schedule of construction has been developed for the Project (Section 1.2). This schedule will be subject to change based on design revisions, environmental permitting requirements, and other Project-related activities.

After mobilization, the Contractor will establish environmental controls for the site. It is anticipated that this will include the establishment of stockpile and laydown areas situated away from creeks. Silt fences will also be established at select locations where site topography could convey sediment and other deleterious substances to local watercourses.

Given the year-round nature of the work, the Contractor must also ensure an adequate stockpile of materials including silt fence, straw, fully biodegradable erosion control blankets, polyethylene sheeting, sandbags, pea gravel, hand tools etc. is available on site at all times in a secure location.



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Subsequently, partial clearing and grubbing of the site in proximity to Watercourses 1 and 2 (see Section 4.1 for additional information) will be initiated. This will preclude the installation of silt fence and, as such, alternative mitigation will be required. This will likely consist of conducting the work at drier periods of the year and downstream isolation to avoid discharges to Craigflower Creek.

Instream work will be initiated after the completion of clearing to access the two watercourses. This will consist of isolation of both watercourses from flow, if present. A new channel will be constructed along the east road shoulder of Burnside Road from the point where Watercourse 2 outlets to the property to the upstream reach of Watercourse 1, along the approximate path of the current Watercourse 1 and then to a connection with Craigflower Creek. The majority of Watercourse 2 within the proposed facility's footprint will be infilled.

After the watercourse improvements and infill are completed, silt fence or other measures (e.g., swales or temporary berms) will be established for any remaining location where flow could be conveyed to aquatic habitat. Clearing and grubbing will be completed, after which the remainder of the facility will be constructed. The site will be stabilized before demobilization from the site.

With respect to environmental mitigation, it is anticipated that the greatest potential for impacts being conveyed offsite is related to high channel flow, spills of deleterious substances, and sediment transport. These are addressed in Sections 6.4 to 6.6, respectively.

## 4.0 EXISTING ENVIRONMENTAL AND CULTURAL FEATURES

The Project will occur within an area that has been partially cleared for an archery range although extensive habitat remains onsite. This habitat is dominated by low-lying shrubs but also includes a section of young forest as well as several watercourses, including Craigflower Creek. A discussion of the habitat supported onsite is provided in the sections below.

### 4.1 FISH AND FISH HABITAT

Four watercourses are located onsite. These consist of Craigflower Creek and three unnamed watercourses designated Watercourse 1, Watercourse 2, and Watercourse 3.

#### 4.1.1 Craigflower Creek

Craigflower Creek is the primary watercourse on the property. It will not be directly impacted by construction although site topography could allow for the transport of deleterious substances to it during construction. Craigflower Creek roughly follows the southeast boundary of the property. It is wide (10.4 m on average at the site) and largely in a natural state. It displays high complexity and provides good to excellent rearing and overwintering habitat for salmonids. Fish presence is known to include coho salmon (*Oncorhynchus kisutch*), rainbow trout/steelhead (*Oncorhynchus mykiss*), coastal cutthroat trout (*Oncorhynchus clarkii clarkia*), sculpin (general), and three introduced species – smallmouth bass (*Micropterus dolomieu*), pumpkinseed (*Lepomis gibbosus*), and brown catfish (*Ameiurus nebulosus*).



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#### 4.1.2 Watercourse 1

Watercourse 1 is a constructed channel approximately 110 m long that flows west to east on the southwest side of the property, parallel to Highway 1. It terminates near the right bank of Craigflower Creek but does not discharge into the creek as surface flow. It ends in an area of pooling water between Watercourse 2 and Highway 1. The watercourse is heavily overgrown with Himalayan blackberry (*Rubus armeniacus*). A riprap berm surrounds this pool of water and no connectivity, culverts, or water flow was observed that would connect Watercourse 1 to either Craigflower Creek or Watercourse 2. Habitat values are considered to be poor. Fish presence is not anticipated given the lack of connectivity to Craigflower Creek and Watercourse 2.

#### 4.1.3 Watercourse 2

Watercourse 2 is a modified stream that enters the property from a culvert flowing under Burnside Road on the west side of the property. The watercourse flows to the east, south of the access road, and flows south near a transmission line tower. It enters Craigflower Creek north of Watercourse 1. Within the Project area, most of the watercourse is overgrown with reed canary grass while some sections are scoured with constructed gravel and angular shot rock substrates. Flow is seasonal, typically from October to May. The channel is considered a modified stream and not a ditch as defined under the RAPR.

Watercourse 2 is approximately 200 m long and connects to Craigflower Creek. It may therefore contain the same species of fishes as Craigflower Creek although fish presence was not confirmed and has not been observed on any surveys. Spawning values are nil to poor whereas rearing habitat values are considered poor to moderate.

#### 4.1.4 Watercourse 3

Watercourse 3 is a constructed stormwater drainage channel (no natural channel) that is approximately 100 m long and originates at a culvert flowing below Watkiss Way at the north end of the property. Flow is conveyed southeast towards the Galloping Goose Trail and then continues east along the trail until it crosses below the trail via a culvert near Talcott Road and connects to Craigflower Creek. There is no available information indicating fish presence and no fish were observed during the assessment, with barriers to fish passage observed (perched culverts). If fish are present, habitat values are low with the watercourse providing no spawning habitat value and only poor habitat for rearing. However, this watercourse will not be affected by the Project as it is outside of the construction footprint.



## 4.2 TERRESTRIAL HABITAT AND WILDLIFE

An assessment of the terrestrial habitat and potential wildlife presence was completed for the site in December 2020.

The riparian vegetation adjacent to the Project area is fragmented as a result of the existing infrastructure, local roads and access points to the archery range. Riparian vegetation within and adjacent to the Project area is comprised predominantly of red-osier dogwood (*Cornus stolonifera*), willow (*Salix* sp.) and a mixture of deciduous and coniferous trees. The lower portion of watercourse 2 is dominated by red alder (*Alnus rubra*) with almost no understory shrubs and no coniferous trees. Himalayan blackberry (*Rubus armeniacus*), an invasive species, was widely observed throughout the Project area. Other species of concern include gorse (*Ulex europaeus*), thistle (species to be confirmed), teasel (*Dipsacus* sp.), English ivy (*Hedera helix*) and reed canary grass (*Phalaris arundinacea* – potentially non-native). Gorse is listed as a noxious species per the Weed Control Regulation of the *Weed Control Act*. Teasel has been identified as an “alert” species by the Invasive Species Council of BC.

Typical vegetation included trees such as Douglas-fir (*Pseudotsuga menziesii*), western redcedar (*Thuja plicata*), grand fir (*Abies grandis*), black cottonwood (*Populus balsamifera*) and big leaf maple (*Acer marcophyllum*) with an understory shrub layer species dominated by dull Oregon grape (*Mahonia aquifolium*), ocean-spray (*Holodiscus discolor*), and Oregon beaked moss (*Kindbergia oregana*). Less prominent species include snowberry (*Symphoricarpos albus*), vanilla-leaf (*Carphephorus odoratissimus*), and big shaggy moss (*Rhytidiadelphus triquetrus*). Drier sites are characterized by the presence of Garry oak (*Quercus garryana*) and arbutus (*Arbutus menziesii*), as well as numerous members of the lily family.

There are 27 wildlife species of management concern that were identified as potentially occurring in the Project area including 18 birds, four mammals, three amphibians, and two reptiles (BC Conservation Data Centre [CDC] 2020). A review of publicly available data from CDC iMap showed no known occurrences of SARA-listed wildlife species that overlap the Project area. Additional discussion of rare species is provided in Section 4.3 below.

The Project area lies within Wildlife Management Unit (WMU) 1-1 and does not coincide with Wildlife Habitat Areas, or Ungulate Winter Ranges (BC CDC 2020). At present, the Project area does not overlap critical habitat for wildlife species at risk, although there is overlap with an area of proposed critical habitat for western painted turtle – Pacific coast population. (BC CDC 2020). Additional discussion of the western painted turtle is provided in Section 4.3. The study area does not intersect other key wildlife ranges or Important Bird Areas (Birdlife International, 2020).

## 4.3 RARE SPECIES

None of the fish species with confirmed presence in Craigflower Creek are considered at risk under SARA. The coastal cutthroat trout is blue-listed provincially (*i.e.*, it is a species of special concern). Some sculpin species are also blue- or red-listed (endangered or threatened) but given that the specific sculpin species has not been identified, the presence of a rare species cannot be confirmed.



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A search of the CDC iMap tool of known rare species occurrences indicated that their presence has not previously been recorded at the Project site. However, a masked occurrence does overlap the Project area although this may not indicate presence onsite. A request will be made to the CDC to determine if this masked occurrence has the potential to be present.

A review of federally and provincially listed plant species at risk showed that there are six listed plant species which have potential to occur in habitats that are generally represented by the Project site and adjacent and surrounding areas (e.g., mixed forest/riparian/anthropogenic) (BC CDC 2020). These consist of green-sheathed sedge (*Carex feta*), green-fruited sedge (*Carex interrupta*), small bedstraw (*Galium trifidum* ssp. *trifidum*), pointed rush (*Juncus oxymersis*), streambank lupine (*Lupinus rivularis*), and water-pepper (*Persicaria hydropiperoides*). A rare plants field survey has not been conducted at the Project location and no confirmed records of these species were found.

As referenced in Section 4.2, none of the 27 species of management concern with the potential to occur have been confirmed as being present in the Project area. However, much of the property intersects proposed critical habitat for western painted turtle (BC CDC 2020). The critical habitat polygon is intersected by the property, centered on Craigflower Creek, and includes a 150 m buffer on either side of the watercourse. Occurrences of western painted turtle in the region are primarily confined to lakes and ponds with the closest recorded occurrence being more than 2 km from the property in a different watershed. The closest occurrence in the same watershed as the property is more than 3 km to the northwest in McKenzie Lake (BC CDC 2020).

Overall, the property provides poor habitat for western painted turtle. The area around the Highway 1 culvert outlet and upstream of a beaver dam potentially provides moderate western painted turtle habitat, as this area has deeper, slower moving water, and is more exposed to sunlight. Most of this area is outside of the property. The remaining ditches within the property have insufficient water depth and flow to provide aquatic habitat for western painted turtle.

Riparian areas surrounding Craigflower Creek have poor nesting habitat for western painted turtles. Outside of the Craigflower Creek riparian area, much of the site is disturbed. Approximately half is covered in invasive species such as Himalayan blackberry, which does not provide good nesting habitat for turtles. The remaining portion of the property includes the gravel access and parking off Burnside Road West and the lawn used for archery, which could provide potential nesting habitat for western painted turtles. However, as no nesting in the area has been recorded and the property is more than 3 km away from the nearest recorded occurrences of western painted turtle (BC CDC 2020), it is unlikely that the property is used for nesting.

Craigflower Creek may provide a dispersal corridor or connectivity between waterbodies for western painted turtle, as the natural riparian habitat provides adequate flow and cover for migration.

This CEMP will be revised to reflect the presence of rare species if confirmed to be present during upcoming site surveys.





## 4.4 CULTURAL FEATURES

An Archaeological Impact Assessment (AIA) has been conducted for the property and Section 12.4 and 12.2 permits (Alteration and Inspection permits) have been applied for under the *Heritage Conservation Act*. Chance find procedures during construction will be implemented (Section 6.9)

## 5.0 POTENTIAL PROJECT EFFECTS

Potential Project effects to fish and fish habitat, terrestrial habitat, and wildlife were assessed in support of this CEMP. Table 5.1 and Table 5.2 summarize the identified potential Project effects to fish and fish habitat and to terrestrial habitat and wildlife, respectively.

**Table 5.1 Potential Project Effects to Fish and Fish Habitat**

Project Component	Pathway of Effect	Potential Effects
Direct impacts to fish	Instream work necessitating channel isolation and dewatering	Fish stress and potential mortality
Loss of riparian vegetation	Clearing required to access a watercourse, or during construction of tie-ins to new Watercourse 2	Loss of riparian function Degraded water quality from increased sun exposure and sedimentation Fish stress and potential mortality
Sedimentation of adjacent watercourses	Local topography could direct sediment overland to Craigflower Creek or Watercourses 1–3; sediment can subsequently be conveyed offsite to downstream fish habitat	Fish stress and potential mortality
Spill of hydrocarbon or other deleterious substance	Discharge of oils due to equipment malfunction or accident could be conveyed overland to watercourses	

**Table 5.2 Potential Project Effects to Terrestrial Habitat and Wildlife**

Project Component	Pathway of Effect	Potential Effects
Interaction with wildlife	Interaction with Contractor personnel	Wildlife become acclimatized to people
Disturbance of wildlife	Construction noise	Disturbance of birds potentially present in nearby vegetation
Wildlife mortality	Clearing for construction	Vegetation removal during nesting causing nest failure
Impacts to wildlife	Vehicle impact	Death or injury of wildlife
Loss of terrestrial habitat	Clearing for construction	Long-term loss of available habitat

Effects to both aquatic and terrestrial habitat are anticipated for this Project. These effects can be limited through the implementation of the mitigation measures outlined in Section 6.0.



## **6.0 PROJECT ENVIRONMENTAL PROTECTION MEASURES**

Without the implementation of mitigation measures, construction activities associated with the Project have the potential to affect fish, fish habitat, terrestrial habitat, and wildlife (Table 5.1 and Table 5.2). The implementation of the mitigation measures outlined below are designed to reduce the potential effects associated with the Project to the extent possible while still allowing for construction of the facility as it is currently designed.

### **6.1 GENERAL BEST MANAGEMENT PRACTICES**

Mitigation and management measures that avoid and/or mitigate environmental impacts associated with the Project are based on BMPs and standard industry procedures. The mitigation and management measures included in these documents have been created, modified, and enhanced for the purposes of this CEMP. Examples of BMPs used to develop this CEMP include, but are not limited to:

- Field Guide to Fuel Handling, Transportation and Storage (Ministry of Water, Land and Air Protection (MWLAP) 2002)
- Standards and Best Practices for Instream Works (MWLAP 2004)
- Land Development Guidelines for the Protection of Aquatic Habitat (DFO 1993)
- Develop with Care: Environmental Guidelines for Urban and Rural Land Development in British Columbia (Ministry of Environment (MOE) 2014)
- Ministry of Forests, Lands and Natural Resource Operations Regional Timing Windows for the West Coast Region (FLNRO 2011)

### **6.2 GENERAL CONSTRUCTION PRACTICES**

Many environmental mitigation measures are common to all construction components and activities. Table 6.1 provides general environmental mitigation measures applicable to all Project activities.



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**Table 6.1 General Mitigation Measures**

Category	Mitigation Measure
CEMP and Permits	1. A copy of the CEMP and applicable permits will be onsite and readily available.
Project Timing	2. The majority of new channel construction will occur in isolation of existing connected watercourses and is scheduled from December 2021 to March 2022. Tie-ins of the new habitat to existing fish accessible habitat will also be conducted at the end of this time frame. Given the time of the year, the work will be completed under the supervision of a qualified environmental professional to confirm that the work can be completed with appropriate mitigation in place.
	3. Instream and/or near-stream work within 30 m of a fish bearing watercourse will be conducted at a time of favourable weather (i.e., avoidance of work during storm events).
	4. Works will be timed to avoid Vancouver Island's Bird Nesting Window (March 28 to August 8). It should be noted that this window is a guideline and nesting can be ongoing before or after this window. A qualified environmental professional (QEP) will determine the requirement for nest sweeps upon receipt of the proposed clearing schedule from the Contractor.
Pre-construction Meeting	5. A pre-construction meeting with the Project team, including onsite supervisors and the EM(s) will be held to promote an understanding of the Project, environmentally sensitive areas, restricted no-go zones, reporting responsibilities, and emergency response plans.
Training	6. Personnel involved with construction activities will be adequately trained and will utilize appropriate personal protective equipment.
Stop Work	7. The Contractor will stop work and contact the EM for assistance prior to commencing or continuing any activities that may pose any environmental risk not addressed in this document.
	8. The EM will have authority to issue a Stop Work order where activities are adversely affecting, or will adversely affect, water/sediment quality and/or habitat. The EM will also make recommendations in the field for avoiding and mitigating impacts where measures in this CEMP are not effective.
Construction Footprint	9. The Construction footprint will be reduced to the extent feasible.
	10. Construction limits will be flagged, and where necessary fenced with temporary fencing and signage, to identify work areas, sensitive habitats, and no-go zones, as required.
Site Cleanliness	11. The site will be kept tidy during activities and left in a good condition at the end of the Project.
	12. Construction equipment arriving onsite will be washed prior to arrival to reduce the potential for the spread of invasive species. Equipment will also be washed prior to leaving the site.
Stockpiles/Laydown Areas	13. Stockpiling of material and laydown areas will be in accordance with BMPs (e.g., erosion and sediment control measures) and limited to approved areas.
Deleterious substances	14. To the extent practical, construction materials will be free of deleterious substances that may be harmful to fish or fish habitat (e.g., fine sediments, hydrocarbons, contaminants).
	15. Machinery will be in good working condition (free of leaks) and cleaned prior to arriving on site; machinery will be inspected/maintained for the duration of the Project to limit leaks/spills. Equipment will not be washed on site.



**Table 6.1 General Mitigation Measures**

Category	Mitigation Measure
Deleterious substances (cont'd)	16. No washing of equipment used in concrete placement will be allowed on site other than with full containment. All concrete trucks entering the site must be equipped with a 'snout' to permit the delivery chute and equipment to be washed into a contained tank and recycled back into the drum. Concrete wash water is highly toxic to aquatic life and must not be allowed to enter watercourses or riparian areas.
	17. A dedicated area will be designated for fueling and servicing equipment, well away from riparian areas, watercourses, and drainage pathways. The fuel storage area will be equipped with appropriate containment of at least 120% of stored volume.
Water Quality: Hydrocarbons	18. Hydrocarbons (e.g., hydraulic fluids detectable by sight or smell) will not be released to the aquatic environment.
Flora and Fauna	19. Activities should be completed in such a way as to limit stress and disturbance to resident flora and fauna.
Air and Noise Quality	20. Limit equipment and machine idling.
	21. Turn off heavy equipment when inactive for more than 30 minutes.
	22. Verify that equipment and machinery are in good operating condition prior to work.
	23. Carry out regular maintenance on equipment and machinery.
	24. Equipment and machinery will have noise abatement equipment (e.g., mufflers) in good working order.
Wildfire Prevention	25. Smoking will only be permitted in designated areas.
	26. Fire suppressing equipment must be present at the work site and at designated smoking areas. Each piece of heavy equipment must be equipped with a fire extinguisher.
	27. Fires and burning of rubbish and vegetation are not permitted on site.

### 6.3 SITE ACCESS, MOBILIZATION AND LAYDOWN

The site will be accessed from Burnside Road. Laydown and stockpile areas will be situated within the footprint of construction for the facility and located away from watercourses. Vegetated areas will not be cleared for laydown and stockpiling.

### 6.4 WORK IN AND NEAR WATER

Work will be required both within and adjacent to the onsite watercourses. Work will be able to proceed with the implementation of the measures outlined in Table 6.2. Mitigation must function such that the turbidity and Total Suspended Solids (TSS) limits outlined in Table 6.3 (MOE 2001) are not exceeded.



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**Table 6.2 Work In and Near Water**

Category	Mitigation Measure
Equipment	1. Equipment and machines are to work from the banks of all watercourses and not within the channel unless the channel is dry.
Vegetation	2. Limit disturbance to existing riparian vegetation to the extent required for access and working space. This will likely be limited to the connection of Watercourse 2 to Craigflower Creek. Construction access will not encroach within creek setbacks unless specifically authorized in environmental permits.
Site Isolation	3. Instream work must be isolated from flow. This will consist of the use of inert material to isolate the work zone.
	4. The intakes of pumps used for dewatering or bypass pumping located in fish-bearing areas must be screened to be consistent with DFO’s Interim Code of Practice for end of pipe fish screens (DFO 2020).
Site Isolation (cont’d)	5. The outlets of all hoses must discharge to a hard surface to provide energy dissipation.
	6. The Contractor will not commence instream work until after the channels are isolated and fish and amphibian salvages are completed.
Water Quality	7. If turbidity levels approach threshold values contrary to applicable guidelines (see Table 6-3 below), the onsite EM and construction personnel will work to develop corrective actions. If corrective actions are not successful, construction activities will be temporarily suspended until environmentally effective solutions can be identified and the EM indicates that work can continue.
Release of Deleterious Substance	8. A release of a deleterious substance (e.g., sediment, hydrocarbons, concrete wash water) into the aquatic environment will be reported without undue delay to the EM. From there, the EM will notify the BC Transit Project Manager. Reporting to regulatory agencies will be conducted by BC Transit unless a delegate has been approved. If the EM cannot reach the BC Transit Project Manager they will contact the Victoria Transit Communication Centre (TCOMM) who will complete any required immediate spill reporting.
Spill Prevention, Response, and Control	9. The spill prevention, response and control measures described in Section 6.5 will be followed.

The background levels outlined in Table 6.3 will be measured on Craigflower Creek immediately upstream of the point of discharge of the site to the creek. Comparison will be made to water quality readings approximately 10 m downstream of the confluence.



**Table 6.3 BC Approved Water Quality Guidelines for Turbidity and TSS**

Water Use	Turbidity	Total Suspended Solids (TSS)
Aquatic Life (Freshwater, Marine, Estuarine)	Change from background of 8 nephelometric turbidity units (NTU) at any one time for a duration of 24 hours in all waters during clear flows or in clear waters	Change from background of 25 mg/L at any one time for a duration of 24 hours in all waters during clear flows or in clear waters
	Change from background of 2 NTU at any one time for a duration of 30 days in all waters during clear flows or in clear waters	Change from background of 5 mg/L at any one time for a duration of 30 days in all waters during clear flows or in clear waters
	Change from background of 5 NTU at any one time when background is 8–50 NTU during high flows or in turbid waters	Change from background of 10 mg/L at any one time when background is 25–100 mg/L during high flows or in turbid waters
	Change from background of 10% when background is >50 NTU at any time during high flows or in turbid waters	Change from background of 10% when background is >100 mg/L at any time during high flows or in turbid waters
<p>NOTE: Background values should be measured within Craigflower Creek upstream of the project site during each monitoring event to capture current natural conditions within the watercourse.</p>		

## 6.5 SPILL PREVENTION, RESPONSE AND REPORTING

Substances that are deleterious to the aquatic environment (*i.e.*, fish and fish habitat) and may pose a spill risk for this Project include:

- gasoline
- diesel
- hydraulic fluid
- transmission fluid
- engine oil
- lubricants (grease, etc.)
- sediment
- concrete wash water

Table 6.4 outlines procedures for prevention and control of spills including responsibilities, storage, and equipment.



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**Table 6.4 Spill Prevention, Mitigation Measures, Response, and Reporting**

Category	Mitigation Measure
Spill Coordinator	1. The Contractor's supervisor will be knowledgeable in spill mitigation, containment, and reporting procedures.
	2. The supervisor will keep an inventory of all hazardous materials on site.
Training	3. The Contractor will provide staff with training in the use of hazardous materials and the location and use of spill kits.
	4. The Contractor will confirm on-site personnel know the location of spill kits, containment berms, and other spill control materials and that they are readily accessible.
Fuel Handling Guide	5. Fuel handling, storage and labelling procedures shall be consistent with <i>A Field Guide to Fuel Handling, Transportation and Storage</i> (MWLAP 2002). If there are discrepancies between this CEMP and the Fuel Handling Guide, the Project will err on the side of the more stringent standard unless approved by BC Transit.
Fuel	6. Where possible, fuel storage, equipment, or machinery refueling and servicing will occur a minimum of 30 m from any waterbody within a designated area. Where operational constraints require fuel storage, equipment or machinery refueling and servicing within 30 m of a waterbody, measures to prevent the release or spill of hazardous materials must be discussed and approved by BC Transit and the EM.
	7. Storage of fuels and petroleum products will comply with safe operating procedures, including containment facilities in case of a spill. Fuel will be stored in a designated area that does not have a topography that would convey spills to aquatic habitat. The area will be bermed or isolated in such a way as to contain spills should they occur. Containment areas should be inspected frequently to confirm they are operating as intended.
Fuel (cont'd)	8. All portable fuel tanks (e.g., jerry cans) will be stored within leak-proof secondary containment with absorbent pads with a capacity of 120% of its volume.
	9. Fuel storage, including secondary containment, will be kept free and clear of collected rainwater and snowfall. Accumulated water in the containment will be removed regularly so as not to diminish the capacity of the containment.
	10. While refueling, the operator must stay with the fuel nozzle.
	11. Vehicles and equipment must be shut off while refueling.
	12. Smoking will not be permitted during refueling.
Environmentally Sensitive Oil	13. Where possible, environmentally sensitive (e.g., biodegradable /food-grade/environmentally friendly) oils, hydraulic fluids and lubricants that are non-toxic to aquatic life and that are readily or inherently biodegradable will be used in equipment and machines unless the Contractor can demonstrate that it is not feasible because of: <ul style="list-style-type: none"> <li>a) Unavailable biodegradable/food-grade/environmentally friendly oils and lubricants</li> <li>b) Technical performance issues/constraints</li> <li>c) Negative impacts on equipment</li> <li>d) Other reasons deemed acceptable to BC Transit</li> </ul>



**Table 6.4 Spill Prevention, Mitigation Measures, Response, and Reporting**

Category	Mitigation Measure
Concrete Wash Water	14. Uncured concrete will be covered for a period of 72 hours to prevent the conveyance of wash water to nearby watercourses.
	15. Concrete wash water will not be allowed to discharge to aquatic habitat or any area that may transmit flow to aquatic habitat.
	16. It is recommended that the contractor monitor wash water and implement treatment (i.e., use of a CO <sub>2</sub> bubbler or other treatment) in the event that there is a discharge to aquatic habitat and if pH levels approach 9.0.
Equipment	17. Equipment will be maintained in proper running order to prevent leaking or spilling of potentially hazardous or toxic products. This includes hydraulic fluid, diesel, gasoline, and other petroleum products.
	18. Containers, hoses, and nozzles will be free of leaks.
	19. Small machinery (e.g., pumps, generators) should be placed in secondary containment, such as within drip trays with sorbent pads.
	20. Hydraulic hoses and couplings should be inspected and free of leaks and excess hydrocarbons prior to use.
	21. Containers not in use will be sealed with a proper fitting cap or lid.
	22. Impervious materials, such as tarps, drip pans, or spill trays must be placed underneath equipment and machinery during servicing when there is a potential for accidental drips or spills.
Equipment Maintenance/ Servicing	23. In the event of a leak, all fueling/filling operations will be stopped until the cause of the leak has been identified and it has been repaired.
Spills	24. Spills must be reported to the EM immediately, regardless of volume.

In the event of a spill, the mitigation measures presented in Table 6.5 should be implemented.





**Table 6.5 Spill Response and Reporting Mitigation Measures**

Category	Mitigation Measure
Spill Response Materials	1. Spill response materials are required to be readily available when working at the Project site. These materials include, but are not limited to: <ul style="list-style-type: none"> <li>a) Spill kits</li> <li>b) Containment booms</li> <li>c) Personal protective equipment (e.g., nitrile gloves, safety glasses, suits)</li> <li>d) Fire extinguishers</li> <li>e) Shovels</li> </ul>
Spill Kits	2. The Contractor will provide an appropriate number of spill kits on site. The suggested contents of a spill kit for working near water is as follows: <ul style="list-style-type: none"> <li>a) 5 sorbent pads (oil, gas, and diesel)</li> <li>b) 5 universal sorbent pads suitable for water-based fluids (e.g., coolant)</li> <li>c) 25 kg of dry oil sorbent</li> <li>d) 4 x 4' (~1.2 m) sorbent linkable socks (oil, gas and diesel)</li> <li>e) 4 x 4' (~1.2 m) universal sorbent linkable socks (e.g., coolant)</li> <li>f) 4 x 10' (3 m) sorbent linkable floating booms</li> <li>g) 4 rolls of 25 x 4 m polyethylene sheeting (for underlay)</li> <li>h) 25 heavy-duty plastic garbage bags</li> <li>i) Personal protective gear as required</li> </ul> 3. Spill kits will be inspected by the Contractor on a regular basis and will be re-filled immediately after use.
Backup supplies	4. The Contractor will have adequate spill response supplies to maintain spill kits.
Response	5. The initial response to the spill may include: <ul style="list-style-type: none"> <li>a) Stop work</li> <li>b) Ensure your own safety and the safety of others</li> <li>c) On-site personnel wear personal protective equipment, such as nitrile gloves and safety glasses</li> <li>d) Identify the spilled materials and refer to the Material Data Safety Sheet(s) to determine if human health or ignition hazards exist</li> <li>e) If possible and safe to do so, contain the spill by any safe means possible (e.g., plug leak, close/isolate leaking valve, etc.)</li> <li>f) Obtain assistance of others</li> <li>g) Begin containment of the spill and stop it from spreading</li> <li>h) Clean up the spilled substance using available supplies from the on-site spill kits</li> <li>i) If the spill is to water, use measures such as installing sorbent rolls as floating booms to contain the spill and sorbent pads to soak up the material</li> <li>j) Report the spill to the EM; the EM will notify BC Transit's Project Manager. If the EM cannot reach the BC Transit Project Manager they will contact the Victoria Transit Communication Centre (TCOMM) who will complete any required immediate spill reporting.</li> <li>k) The EM will determine if notification to regulatory agencies is required.</li> </ul>



**Table 6.5 Spill Response and Reporting Mitigation Measures**

Category	Mitigation Measure
Clean-Up	6. Final clean-up and reclamation will be conducted following an assessment (by a qualified professional) of soil and/or water conditions. Conduct <i>in situ</i> remediation only if approved by BC Transit and appropriate regulatory agencies. Specific clean-up measures will be determined in consultation with BC Transit, regulatory agencies, and appropriately qualified professionals.
Reporting	7. BC Transit is responsible for notifying regulatory agencies or authorizing notification on their behalf (e.g., EM) to regulatory agencies of all hazardous spills and for meeting spill reporting provincial and federal requirements. <b>BC Transit should report all spills to water to Emergency Management BC (1-800-663-3456).</b>
	8. The Spill Reporting Regulation under the British Columbia <i>Environmental Management Act</i> identifies externally reportable quantities for certain substances. Reportable quantities by substance are provided in Appendix C.
Environmental Incident / Non-Compliance Report	9. The EM will prepare an Environmental Incident/Non-Compliance Report in the event of a spill.
	10. The following information should be collected as it may be required when reporting a spill to regulatory agencies and should be included in the Environmental Incident/Non-Compliance Report: A draft template for spill reports is provided in Appendix B. a) Reporting person’s name and telephone number b) Name of the owner of the product that spilled or leaked and phone number c) Name and phone number of the person who identified the spill or leak d) Date and time of the spill or leak e) Description of the spill or leak f) Location of the spill or leak g) Receiving environment description h) Type of material spilled and quantity i) Source of spill or leak j) If the spill or leaked product is contained, and if not, where is it flowing k) Description of the response and when it occurred l) Percent of material recovered m) Details of further action required n) Recommendations for preventative/mitigation measures o) Names of other persons or agencies advised concerning the spill or leak

In the event that potential contamination is observed during excavation (e.g., hydrocarbon sheen, oily smell, soil with a “wet” appearance), work at that location will be stopped and the EM contacted. The EM will collect soil samples for analysis at an approved laboratory. A site-specific approach to addressing contamination will be developed based on the results of the analysis.



## 6.6 EROSION AND SEDIMENT CONTROL

Construction mitigation measures designed to protect freshwater resources from the potential adverse effects associated with erosion and sedimentation are provided in Table 6.6. Sediment inputs to the aquatic environment can increase turbidity levels, directly affecting the quality of fish habitat should it be conveyed to fish-occupied channels.

**Table 6.6 Sediment and Erosion Control**

Category	Mitigation Measure
Work	1. Activities should be completed in such a way as to limit the volume of fines and organic debris that may enter nearby aquatic environments.
Rain Events	2. The Contractor shall be prepared for rain events and have sediment and erosion control materials readily available and in sufficient quantity.
	3. Work will be stopped during heavy rain events (i.e., >25 mm in a 24-hr period) and site conditions assessed to determine if mitigation is functioning. Work will only resume once mitigation is confirmed to be effective.
	4. Work should be avoided during forecasted periods of high rainfall to limit the potential for sedimentation events.
Vegetation	5. Limit disturbance to existing vegetation as part of sediment and erosion control measures to reduce the potential for a sediment release.
Supplies	6. The Contractor will maintain an appropriate amount of ESC supplies on site. The suggested materials that should be on hand are as follows: a) Silt fencing b) Stakes c) Straw bales d) Filter cloth e) Sand bags f) Dewatering bags g) Flexible piping h) Appropriately sized pumps i) Personal protective gear as required
Erosion and Sediment Control Measures	7. The Contractor shall employ a precautionary approach to erosion and sediment control. Sediment control measures will be in place before starting any works that may result in sediment mobilization or cause erosion. Construction will not start until sediment and erosion control measures are in place and deemed functional by the EM.
	8. The Contractor will stage the work site such that exposed soil is limited to that which is required to undertake construction. Clearing of the entire site prior to construction should be avoided to the extent possible.
	9. Silt fence will be installed adjacent to watercourses where local topography can direct runoff to open water. Silt fence will be toed into the ground to a depth of 30 cm with the toe oriented upslope. The ends of sections of silt fence will overlap by a minimum of 15 cm. A silt fence installation schematic is provided in Appendix D



**Table 6.6 Sediment and Erosion Control**

Category	Mitigation Measure
Erosion and Sediment Control Measures (cont'd)	10. When Project activities have the potential to release sediment, erosion and sediment control measures (e.g., erosion control fabric, plastic sheeting, silt fences, gravel check dams, etc.) will be installed by the Contractor. Additional site-specific protection measures may be required at the direction of the EM.
	11. The Contractor shall make use of coverings to limit exposed erodible material (e.g., straw mats, poly sheeting).
	12. Rock used for constructing and enhancing watercourses will be non-acid generating, clean and free of silt and sediment that could discharge to adjacent watercourses.
Erosion and Sediment Control Measures (cont'd)	13. Soil that is placed amongst riprap as a growing medium will be seeded to promote grass cover and reduce the potential for sedimentation downslope.
	14. Erosion and sediment control measures will be maintained and repaired regularly by the Contractor and functionality and effectiveness will be monitored by the EM until the site is stabilized.
	15. Erosion and sediment control measures will remain in place and be maintained throughout construction regardless of weather conditions, and will only be removed once construction is complete, ground conditions have stabilized, and water quality (measured by turbidity) downstream of the control measures meets background conditions or water quality guidelines as measured by BC Transit or the EM.
	16. Catch basins (CBs) on local roads will use CB protection (socks, silt bags, etc.) to prevent sediment entry to the storm sewer system.
	17. Track-out of vehicles from the site will be managed (e.g., wheel wash station and cleaning of roadways) to reduce dispersion of sediment.
Spoil Piles	18. Excavated soils / spoil piles will be trucked off-site for disposal at an approved facility. If piles are required onsite, they will be situated as far from aquatic habitat as conditions permit.
	19. Spoil piles that will be maintained onsite for more than 24 hours will be covered with weighed down poly-sheeting to reduce the runoff potential.

## 6.7 VEGETATION MANAGEMENT

Vegetation at the site is dominated by low-lying shrubs although some sections are forested with young trees. Mitigation measures that will be implemented to limit vegetation disturbance are outlined in Table 6.7.



**Table 6.7 Vegetation Mitigation Measures**

Category	Mitigation Measure
Access	1. Limit access to the site from Burnside Road. Do not create alternate access routes unless required for safety reasons.
Laydown	2. Construction materials will not be stored on vegetated areas, unless approved by the EM.
Traffic	3. Vehicle and equipment traffic will avoid vegetated areas, except where specified by construction plans and authorized by the EM.
	4. Snow fencing or an approved alternate barrier will be placed along the dripline of trees and other significant vegetation that is to be retained onsite. Tree fencing recommendations are provided in Appendix E
Tree Injury	5. Physical injury to the roots, bark, trunks, and crowns of trees from machinery or vehicles will be avoided.
Parking	6. Designated parking areas will be identified away from significant vegetation.
Rare Plants	7. If a previously unidentified rare plant is found prior to or during construction, those areas will be flagged and avoided where possible. If not possible, then a QEP will determine appropriate mitigation.
Revegetation	8. All soil covered areas will be hydroseeded with a coastal reclamation mixture approved by BC Transit as soon as weather permits.

## 6.8 INVASIVE SPECIES CONTROL

The Project has the potential to alter the environment such that the establishment and spread of invasive terrestrial vegetation species is increased. Invasive species have the potential to alter ecosystems to the detriment of native wildlife and plants. Mitigation and management measures to reduce, prevent, and control invasive species proliferation during and after Project construction are described in Table 6.8.

Lists of invasive species may be found in the Weed Control Regulation of the *Weed Control Act* and the Invasive Species Council of BC website (ISPBC, 2021). Species of concern at this location include Himalayan blackberry, gorse, teasel, and English ivy. The land occupier has a duty to control noxious weeds. While no permit is required, measures should be implemented to make sure material is handled and disposed of properly, so the removal effort does not spread the invasive plant. In cases where herbicide application is required, a pesticide applicator license would be required.



**Table 6.8 Invasive Species Mitigation Measures**

<b>Category</b>	<b>Mitigation Measure</b>
Equipment	1. Equipment, vehicles, and machines will arrive to site clean, paying special attention to undercarriages, tracks, tires, and blades prior to arrival at the Project site.
	2. Equipment and machines used to remove invasive species will be washed in a designated area prior to leaving the site.
Material	3. Imported material must be free of invasive species.
Transportation	4. If invasive species are found to be located within the construction footprint, removal will require special attention to contain the vegetation and prevent its spread. Species-specific removal plans will be developed by a QEP.
	5. Removed invasive species and associated soils must be transported to an appropriate disposal facility approved by BC Transit.

## **6.9 ARCHAEOLOGICAL AND HERITAGE RESOURCE PROTECTION**

As referenced in Section 4.4, an AIA has been completed for the site. Provincial archaeological standards and practices (FLNRO 1998), including implementation of a chance find protocol, will be in place for this Project. A chance find protocol is under development for the project.

Evidence of what is thought to be a heritage resource may include the following:

- artefacts of stone or other material
- shell deposits
- charred wood or rock
- human remains

**If an archaeological or heritage resource is encountered during construction, the work must be stopped in the vicinity of the find and the EM will notify the BC Transit Project Manager.**

**From there, BC Transit or their delegate will contact the BC Archaeological Branch and/or a professional archaeologist immediately.**

## **6.10 WASTE CONTROL**

Waste from Project activities has the potential to adversely affect the aquatic and terrestrial environments; therefore, the mitigation measures outline in Table 6.9 will be implemented:



**Table 6.9 Waste Control Mitigation Measures**

Category	Mitigation Measure
Waste	1. Waste or any miscellaneous unused materials will be recovered for either disposal in a designated facility or placed in storage. Under no circumstances will materials be deliberately thrown into the aquatic or terrestrial environment.
	2. All on-site personnel will make best efforts to prevent debris from entering the aquatic environment.
	3. Litter in the form of coffee cups, lunch wrappers, cigarette butts, and other such items will be stored and secured in such a way as to prevent attracting wildlife.
	4. Construction debris/waste will be collected, transported, and disposed of off-site and in accordance with applicable legislation, guidelines, and BMPs.
Portable Toilets	5. Portable toilets, if required, will be located a minimum of 30 m from any waterbody. Sewage from portable toilets will be disposed of in an approved sewage disposal facility on an as-needed basis.
Hazardous Waste	6. Although hazardous waste is not anticipated for this Project, it should be noted that sorbent materials or soils saturated with hydrocarbons (greater than or equal to 3 percent by weight) are classified as hazardous waste under the <i>British Columbia Environmental Management Act</i> and must be managed accordingly.
	7. Used petroleum products, including their empty containers, will be collected and transported to a licensed recycling facility in approved storage containers following applicable regulations.

## 6.11 AIR QUALITY

Construction activities can cause adverse impacts to local air quality. The mitigation measures outlined in Table 6.10 will be implemented to mitigate concerns regarding the potential degradation of local air quality during construction:

**Table 6.10 Air Quality Mitigation Measures**

Category	Mitigation Measure
Equipment	1. Mechanical equipment that is required on-site will be in good working order.
	2. Idling of vehicles and equipment will be kept to a minimum.
	3. Low-sulphur fuels will be used for on-site machinery.
	4. The Contractor will visually inspect vehicles and equipment. Vehicles or equipment producing excessive exhaust pollution will be repaired or replaced prior to being used on the Project.
Burning	5. No on-site burning of cleared vegetation or other construction-related materials will be permitted.
Dust Management	6. Loads of dusty material will be covered when entering or leaving the site.
	7. Water or some other environmentally acceptable dust suppressant and appropriate application equipment will be available to be used as needed. Chemical dust suppressants will not be used.



## 6.12 CONSTRUCTION NOISE

Short-term noise generation will result from construction equipment and associated activities during Project construction. The general mitigation measures outlined in Table 6.11 will limit the potential for construction-related noise effects:

**Table 6.11 Construction Noise Mitigation Measures**

Category	Mitigation Measure
Equipment	1. Equipment will be properly maintained to limit noise generation and fitted with functioning exhaust and muffler systems.
	2. Equipment and machinery will be turned off (as appropriate and in compliance with Section 6.11 Air Quality) when not in use.
Timing	3. As much as possible, construction activities will be coordinated with daytime periods.
	4. The work will occur in compliance with the Town of View Royal Noise Control Bylaw No. 523.

## 6.13 WILDLIFE MANAGEMENT

Activities associated with this Project, such as vegetation clearing and heavy equipment operations, have the potential to directly and/or indirectly affect wildlife. The following measures (Table 6.12) will be implemented to mitigate potential impacts and effects:

**Table 6.12 Wildlife Mitigation Measures**

Category	Mitigation Measure
Wildlife Feature Pre-Construction Survey	1. Prior to construction, the site will be inspected by a QEP for wildlife features, such as occupied bird nests or amphibian egg masses. If wildlife and/or wildlife habitat features are observed on site, guidance documents for wildlife and wildlife habitat features will be followed.
Birds and Bird Nests	2. The Contractor is not permitted to fall trees or clear areas with bird nests without approval from the EM and, if applicable, regulatory agencies.
	3. If clearing is proposed during a nesting window, a nest sweep will be required beforehand. Clearing must commence within seven days of completion of the sweep but ideally within 24–48 hours.
Feeding	4. Feeding of wildlife shall not be permitted. All meals and food waste shall be securely stored in vehicles, offices, or appropriate disposal facilities to prevent attraction of wildlife.
Dead, Sick, or Injured Animals	5. If dead, sick, or injured animals are observed, report to the EM immediately.





**Table 6.12 Wildlife Mitigation Measures**

Category	Mitigation Measure
Site Access and Footprint	6. The Contractor should consult with the EM when selecting site access routes, as they should consider resident flora and fauna, especially during times of the year when they are most sensitive.
	7. The Project footprint should be clearly defined by the Contractor. Equipment presence will be restricted to the immediate work area. The establishment of approved work areas will limit disturbance and the potential to alter, damage, and/or destroy fish and wildlife habitat and sensitive ecosystems.
Wildlife Stress	8. All activities should be completed in such a way as to reduce stress and disturbance to resident fauna.
	9. Prior to construction, the active work footprint should be inspected for sensitive habitats and routinely inspected during work.
	10. Project activities should only be conducted where entirely necessary. This will reduce effects to nearby soils, vegetation, and resident species.

## 7.0 ENVIRONMENTAL MONITORING, REPORTING AND COMPLIANCE

### 7.1 GENERAL ENVIRONMENTAL MONITORING

An EM will perform environmental monitoring as part of the Project to verify that all ongoing Project components are monitored against this CEMP, construction-specific BMPs, and applicable regulatory and legal requirements. If this CEMP is followed, the potential for environmental impacts and adverse environmental effects will be limited; however, an on-site EM will be required regularly (i.e., at least once per week and more frequently during high risk activities such as work within or adjacent to watercourses) to inspect erosion and sediment control measures, attend tailgate meetings, complete machinery inspections, conduct water quality sampling (if required), and provide support/advice as required to advance construction activities. If the EM is not on-site, the Contractor will communicate with the EM to discuss the on-site construction activities, potential environmental risks, and specific mitigation measures. In addition, the EM will confirm with the Contractor that any new on-site personnel understand their environmental responsibilities and the requirements of the CEMP.

### 7.2 STOP WORK ORDER

The EM will have authority to alter the work methodology and/or issue stop work orders to prevent environmental impacts and/or adverse environmental effects, whether probable, imminent, or occurring. The EM may also stop work if circumstances are likely to result in a non-compliance with legislation, Project approvals, Project-specific mitigation measures, or this CEMP.



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Environmental Monitoring, Reporting and Compliance  
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Once corrective actions have been implemented and deemed appropriate by the EM or BC Transit Project Manager, suspended Project activity will be allowed to resume under their guidance.

### 7.3 MONITORING REPORTS

The EM is responsible for keeping notes of site activities and for preparing a final monitoring report upon completion of construction. This report will be submitted as draft to BC Transit for review and comment. The EM will be provided time to address BC Transit's comments on the draft report. Once the EM has addressed BC Transit's comments, the report will be finalized and submitted.

The monitoring report will summarize the following at minimum:

- construction activities
- monitoring period
- mitigation measures and activities that were implemented or recommended
- non-compliances and environmental incidents
- details and results of water quality testing, if required
- photographs
- overall compliance or non-compliance with the CEMP and/or regulatory permits/authorizations

Non-compliances and incidents will be reported to BC Transit (and regulators where required) as soon as possible, but a minimum within 24 hours of occurrence. Water quality incidents or exceedances are to be reported to BC Transit immediately.

### 7.4 NON-COMPLIANCE AND INCIDENT REPORTING

Non-compliances and incidents must be reported to BC Transit. Non-compliances include non-compliance with this CEMP, Project-specific mitigation plans, or Project permits/authorizations/legislation (e.g., fish kills or spills). Incidents include workplace incidents such as spills, hazards, injuries etc.

The Non-compliance and Incident Reports should include:

- Reporting person's name and telephone number
- Date and time of the non-compliance or incident, including major steps (such as when the incident occurred, when did response occur)
- Description and cause of the non-compliance or incident (if a spill—including type, source, and quantity of material)
- Receiving environment description
- Names of other persons or government agencies notified
- Description of the response and when it occurred
- If a spill, percent of material recovered



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Post-Construction

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- Details of further action required
- Recommendations for preventative/mitigation measures

### 7.4.1 Issue Resolution

Issues such as non-compliances and incidents must be resolved immediately by the BC Transit Project Manager, the EM and the Contractor. When a non-compliance or incident occurs, remedial actions must be taken as soon as possible (i.e., as soon as the site is safe).

## 7.5 EMERGENCY RESPONSE AND COMMUNICATION

Emergency contacts for the Project are provided in Table 7.1.

**Table 7.1 Emergency Contact List for Project**

Contact	Phone Number
BC Transit Project Manager, Lori Beaulieu	250-217-3869
Victoria Transit Communications Centre	TBD
Environmental Monitor	TBD
Contractor Supervisor	Office: TBD Mobile: TBD
Emergency Management BC, 24-hour Spill Reporting	1-800-663-3456
BC Archaeology Branch	250-953-3334
Island Health – Environmental Health Officer	TBD
DFO, Violations and Reporting, Report All Poachers and Polluters (RAPP)	1-877-952-RAPP (7277)
Medical Emergency	Use 911
Work Safe British Columbia	1-866-621-7233

## 8.0 POST-CONSTRUCTION

A post-construction environmental monitoring report (see Section 7.3) will be prepared after the site has been stabilized and equipment demobilizes. The report will outline construction as it relates to environmental protection, the efficacy of mitigation, adherence to the CEMP, environmental incidents and responses (if any), and areas of concern to focus on during post-construction, as required.



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Closure  
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It is anticipated that post-construction habitat monitoring requirements will be outlined in the Project's environmental permits issued by FLNRORD and DFO. A post-construction monitoring program will be developed upon receipt of the applicable permits. Post-construction assessment of the site will be required to confirm that the site remains stable, restored habitat is functioning, and any installed vegetation is being maintained and is establishing. Post-construction will continue until these goals are achieved and/or as required under environmental permits for the site.

### 9.0 CLOSURE

We trust that this information meets with your present requirements. Should you have any questions or require additional information, please do not hesitate to contact the undersigned.

Regards,

**Stantec Consulting Ltd.**

Prepared By:

Reviewed By:

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## VICTORIA HANDYDART TRANSIT CENTRE

### References

June 2, 2021

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# **APPENDIX A**

## **Monitoring Report Template**

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To:	Recipient's Name Recipient's Office	From:	Sender's Name Stantec Consulting Ltd. 500-4730 Kingsway Burnaby BC V5H 0C6
File:	Victoria handyDART Transit Centre	Date:	Date

---

**Reference: Victoria handyDART Transit Centre – Environmental Summary Report  
Water Sustainability Act, Section 11(1) Change Approval, File No. XXXX**

## **INTRODUCTION**

## **SITE DESCRIPTION**

## **SUMMARY OF CONSTRUCTION WORKS**

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Construction Phase	Date	Construction Activities	Environmental Monitoring Inspections	Mitigation Measures



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**CONSTRUCTION AND ENVIRONMENTAL MONITORING ACTIVITIES****CLOSURE**

Regards,

**Stantec Consulting Ltd.**

**Author**

Phone: Sender's Phone

Email: Sender's email

:

Attachment:           Site Photographs

cc. **XXX**

# **APPENDIX B**

## **Spill Reporting Form**



**INITIAL SPILL REPORT**

---

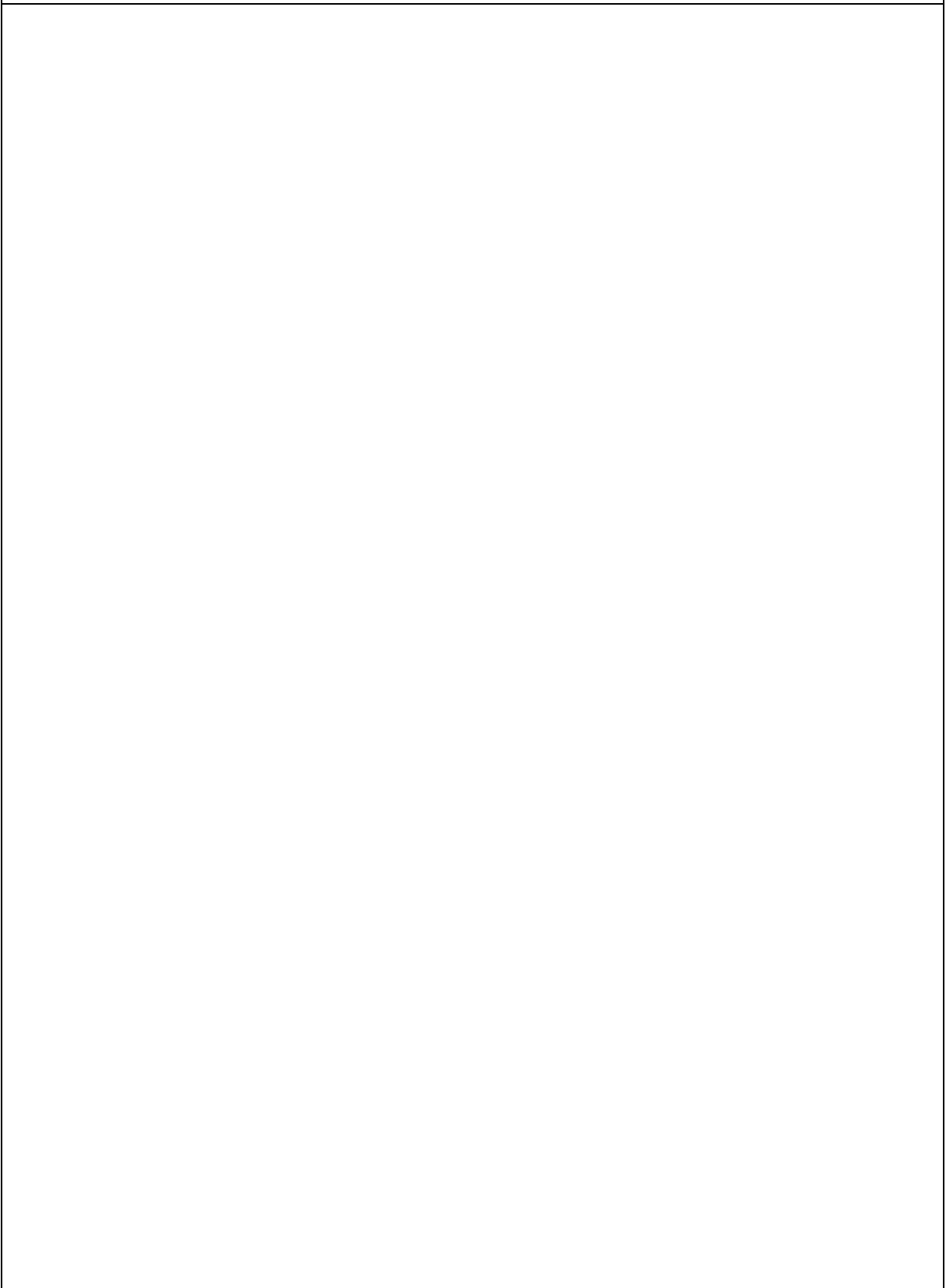
Client:		Project Name:	
Client File#:		Project Number:	
Insured:		Report Number:	1
DGIR#:		Site Visit Date:	
Weather:			
Prepared by:			

---

*Interim update only, information has not been verified at the time of document preparation*

<b>1.0</b>	<b>Safety</b>
<b>2.0</b>	<b>Site Personnel</b>
	<ul style="list-style-type: none"><li>•</li><li>•</li><li>•</li><li>•</li></ul>
<b>3.0</b>	<b>Equipment on Site</b>

<b>4.0</b>	<b>Background</b>	
4.1	Site Location	
4.2	Release Specifics	
4.3	Release Mechanism	
4.4	Actions to Date	
<b>5.0</b>	<b>Work Completed During Assessment</b>	
5.1	<b>Material Disposal (trucking companies, disposal location + approx. volume)</b>	
	Vac truck	
	Vehicle debris	
	Excavated material	
	Other	

5.2	<p><b>Site Sketch (include sample locations, physical features, slope direction, waterbodies, etc.)</b></p> 
-----	--

<b>6.0</b>		<b>Delineation of Impacted Site</b>				
6.1	Receptors	Currently Impacted	Potential for Impacts	Approximate Distance/direction from spill		
	Surface Water					
	Storm Drain					
	Storm Sewer					
6.2	Land Use (residential, agricultural, etc.)	North	South	East	West	
6.3	Surface Cover	Grass	Soil	Gravel	Asphalt	Concrete
		%	%	%	%	%
6.4	Comments					
<b>7.0</b>		<b>Planned Actions</b>				

<b>8.0</b>	<b>Additional Information</b> (fill in each box yes, no, or N/A add information as required)		
	Saddle Tanks Damaged	<input type="checkbox"/>	
	Product Identified	<input type="checkbox"/>	
	Land Use Identified	<input type="checkbox"/>	
	Property Damage	<input type="checkbox"/>	
	Reported to EMBC	<input type="checkbox"/>	Incident #
	Property Owner Contact	<input type="checkbox"/>	
	SiteContact	<input type="checkbox"/>	
		<input type="checkbox"/>	
		<input type="checkbox"/>	
<b>9.0</b>	<b>Photographs</b>		
	Spill Site	<input type="checkbox"/>	
	Adjacent N	<input type="checkbox"/>	
	Adjacent S	<input type="checkbox"/>	
	Adjacent E	<input type="checkbox"/>	
	Adjacent W	<input type="checkbox"/>	
	Water features	<input type="checkbox"/>	
	Screenshot of location	<input type="checkbox"/>	
	Any product?	<input type="checkbox"/>	
	Location of samples	<input type="checkbox"/>	
		<input type="checkbox"/>	

# **APPENDIX C**

## **Spill Reporting Quantities**



## Appendix 2: Prescribed substances and quantities for immediate spill reporting

Item	Column 1 Substance Spilled	Column 2 Specified Amount
1	Class 1, Explosives as defined in section 2.9 of the Federal Regulations <sup>1</sup>	Any quantity that could pose a danger to public safety or 50 kg
2	Class 2.1, Flammable Gases, other than natural gas, as defined in section 2.14 (a) of the Federal Regulations	10 kg
3	Class 2.2 Non-Flammable and Non-Toxic Gases as defined in section 2.14 (b) of the Federal Regulations	10 kg
4	Class 2.3, Toxic Gases as defined in section 2.14 (c) of the Federal Regulations	5 kg
5	Class 3, Flammable Liquids as defined in section 2.18 of the Federal Regulations	100 L
6	Class 4, Flammable Solids as defined in section 2.20 of the Federal Regulations	25 kg
7	Class 5.1, Oxidizing Substances as defined in section 2.24 (a) of the Federal Regulations	50 kg or 50 L
8	Class 5.2, Organic Peroxides as defined in section 2.24 (b) of the Federal Regulations	1 kg or 1 L
9	Class 6.1, Toxic Substances as defined in section 2.27 (a) of the Federal Regulations	5 kg or 5 L
10	Class 6.2, Infectious Substances as defined in section 2.27 (b) of the Federal Regulations	1 kg or 1 L, or less if the waste poses a danger to public safety or the environment
11	Class 7, Radioactive Materials as defined in section 2.37 of the Federal Regulations	Any quantity that could pose a danger to public safety and an emission level greater than the emission level established in section 20 of the "Packaging and Transport of Nuclear Substances Regulations"
12	Class 8, Corrosives as defined in section 2.40 of the Federal Regulations	5 kg or 5 L
13	Class 9, Miscellaneous Products, Substances or Organisms as defined in section 2.43 of the Federal Regulations	25 kg or 25 L
14	Waste containing dioxin as defined in section 1 of the Hazardous Waste Regulation	1 kg or 1 L, or less if the waste poses a danger to public safety or the environment
15	Leachable toxic waste as defined in section 1 of the Hazardous Waste Regulation	25 kg or 25 L
16	Waste containing polycyclic aromatic hydrocarbons as defined in section 1 of the hazardous Waste Regulation	5 kg or 5 L
17	Waste asbestos as defined in section 1 of the Hazardous Waste Regulation	50 kg
18	Waste oil as defined in section 1 of the Hazardous Waste Regulation	100 L
19	Waste containing a pest control product as defined in section 1 of the Hazardous Waste Regulation	5 kg or 5 L

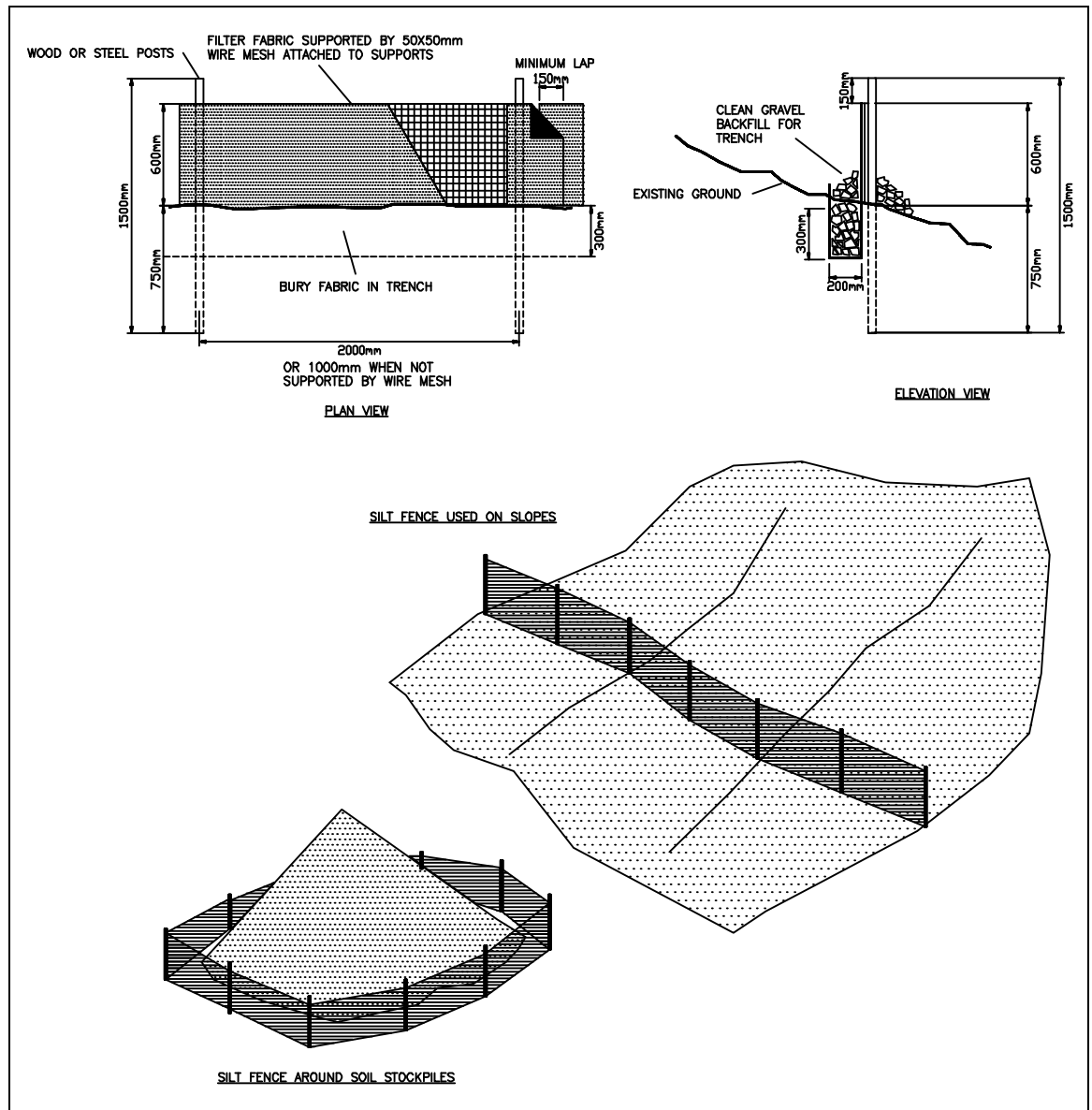
<sup>1</sup> "Federal Regulations" means the Transportation of Dangerous Goods Regulations made under the Transportation of Dangerous Goods Act (Canada); "Hazardous Waste Regulation" means B.C. Reg. 63/88.

20	PCB Wastes as defined in section 1 of the Hazardous Waste Regulation	25 kg or 25 L
21	Waste containing tetrachloroethylene as defined in section 1 of the Hazardous Waste Regulation	50 kg or 50 L
22	Biomedical waste as defined in section 1 of the Hazardous Waste Regulation	1 kg or 1 L, or less if the waste poses a danger to public safety or the environment
23	A hazardous waste as defined in section 1 of the Hazardous Waste Regulation and not covered under items 1 - 22	25 kg or 25 L
24	A substance, not covered by items 1 to 23, that can cause pollution	200 kg or 200 L
<b>NEW</b>	<b>Items 1-24 if spilled to a body of water -marine and fresh waters whether or not it usually contains water or ice including stream, lake, pond, river, creek, spring, aquifer, ravine, gulch, wetland or glacier, and ditch that is not self-contained and connects to a body of water.</b>	<b>Any quantity</b>
25	Natural gas	10 kg, if there is a breakage in a pipeline or fitting operated above 100 psi that results in a sudden and uncontrolled release of natural gas

# **APPENDIX D**

## **Silt Fence Schematic (DFO 1993)**

**Figure 3.3 Typical Silt Fence Construction and Applications**



# **APPENDIX E**

## **Tree Fencing Recommendation**

## Appendix C: Tree Protection Recommendations

TRUNK DIAMETER X (cm)	MINIMUM PROTECTION REQUIRED AROUND TREE- DISTANCE FROM TRUNK Y (m)
20 cm	1.2 m
25 cm	1.5 m
30 cm	1.8 m
35 cm	2.1 m
40 cm	2.4 m
45 cm	2.7 m
50 cm	3.0 m
55 cm	3.3 m
60 cm	3.6 m
75 cm	4.5 m
90 cm	5.0 m
100 cm	6.0 m

