MEMORANDUM

Date:	June 1, 2020
To:	Yogi Bhalla
From:	Dylan Houlihan
File:	1093.0052.01
Subject:	Evacuation Routes Plan

1.0 COMMUNITY EVACUATION NEEDS

In 2019, the Village of Ashcroft received funding from UBCM to undertake an evacuation routes plan. The development of this plan is in response to the recent history with the potential need to evacuate portions of the community due to wildfire. The most recent example was during the 2017 Elephant Hill wildfire when the community, particularly North Ashcroft, could have been in danger. While ultimately no areas of the community needed to be evacuated at that time, there was a strong desire to reduce the vulnerabilities in the community, including ensuring there were alternative routes out of neighbourhoods and developments in the event of an emergency. Some specific areas of concern include:

Mesa Vista Neighbourhood – the Mesa Vista neighbourhood is one of Ashcroft's largest neighbourhoods but it only has one route in and out of the neighbourhood leaving it particularly vulnerable in the event of an emergency.

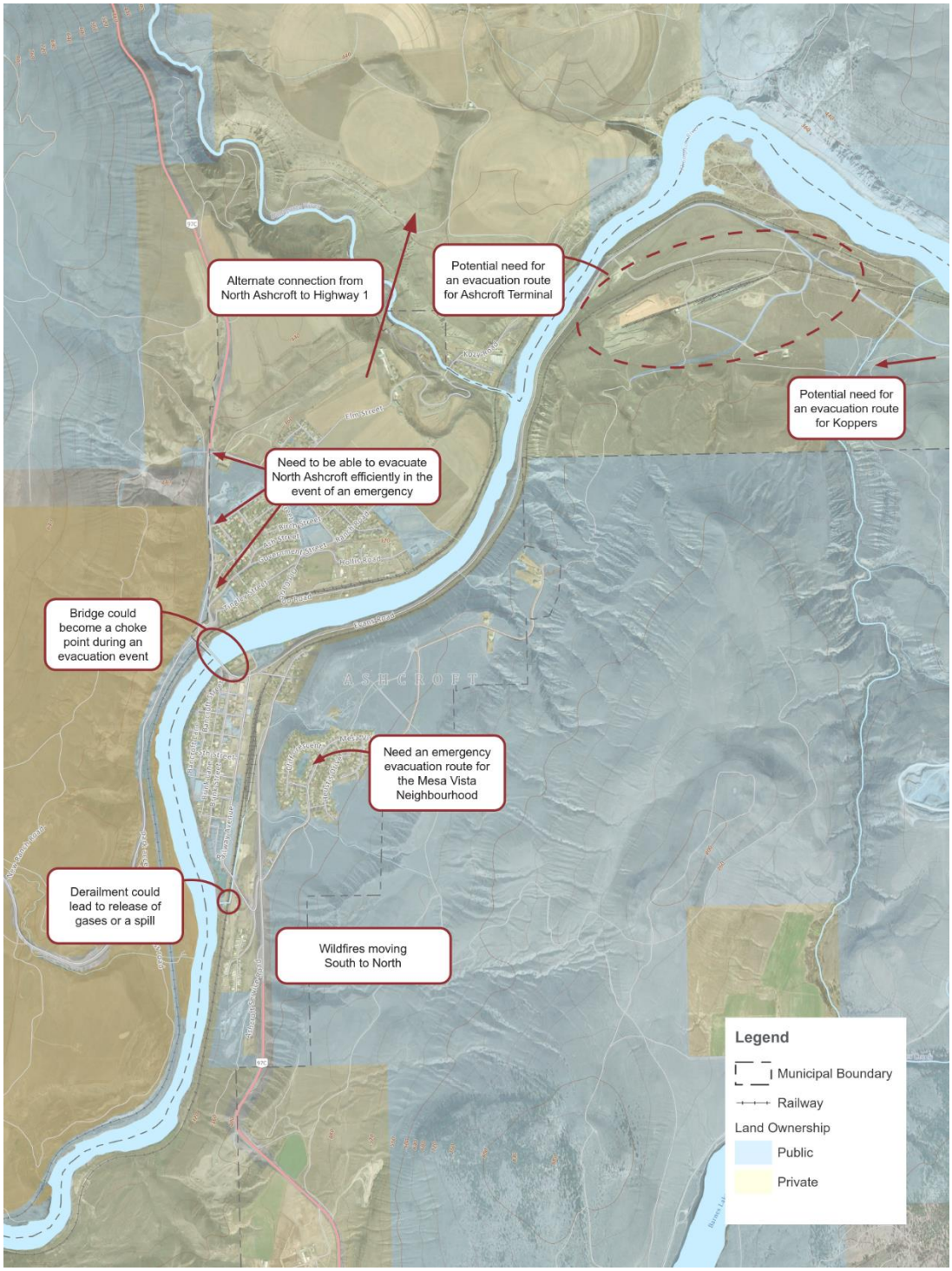
North Ashcroft – there has been significant concern about evacuating North Ashcroft in light of the 2017 wildfire. While there are several egress points in North Ashcroft to Highway 97C, there is a potential desire to have an egress to Highway 1 east of Cache Creek.

Ashcroft Terminal – while it is likely that the Terminal has an evacuation plan as part of their emergency management planning, it is important to recognize that the Terminal has one way in and out which is particularly important given the nature of the heavy truck traffic generated by the facility.

Ashcroft Treating Plant (Koppers) – the Ashcroft Treating Plant is located at the end of Evans Road. This area could be difficult to evacuate in the event of a wildfire. While there is likely an evacuation plan in place, it will be important to consider how this site could be evacuated in the event of a wildfire or a rail emergency given the distance from the Village.

Figure 1 illustrates these evacuation route issues. The key priority for the Village of Ashcroft is to develop an evacuation route for the Mesa Vista Neighbourhood.

Figure 1: Evacuation Route Issues



2.0 MESA VISTA NEIGHBOURHOOD EVACUATION ROUTE

The Mesa Vista neighbourhood is a residential neighbourhood located in south Ashcroft. There are approximately 155 predominantly single-family residential units, with approximately 350 people living there. The neighbourhood is accessed via Mesa Vista Drive from Highway 97C. The main residential area in Mesa Vista is approximately 750 m from the Mesa Vista Drive/Highway 97C intersection though the full length of Mesa Vista Drive is 2.7 km. Mesa Vista Drive is the only way of accessing and egressing the neighbourhood which is a concern from the perspective of emergency evacuation.

Evacuation Needs

There are three predominant issues that could result in people needing to evacuate the Mesa Vista neighbourhood quickly. These include:

- Threat of wildfire – Ashcroft is located in a very hot and dry region. Wildfires can start and spread very quickly in the grasslands which was an issue that was brought home in the 2017 wildfires in the area. A wildfire in the area could create a need to evacuate the neighbourhood very quickly. Having multiple options to evacuate people out of the neighbourhood would be very important. A secondary desire would be to ensure that emergency vehicles and personnel can access the neighbourhood.
- Train derailment/chemical spill – there is concern that a train derailment in Ashcroft could lead to a chemical spill or gaseous leak that could impact the neighbourhood.
- Closure of Mesa Vista Drive – while likely less of an issue than the previous two, there could be concerns rising from the potential closure of Mesa Vista Drive due to a collision on the road.

The primary goal would be to get people out of the neighbourhood quickly with a secondary goal of moving vehicles in and out of the neighbourhood.

Potential Usage

The evacuation route options were reviewed based on two types of vehicles, including:

- ATV – an ATV-based evacuation route would likely be cheaper to construct and could have steeper grades. The pace of evacuation may be slower in the event of an emergency. It would be important to consider how wide to make the route, particularly if two-way traffic is to be enabled.
- Truck – a gravel route could be developed to accommodate a truck or similar vehicle. It would need to have shallower grades than the ATV route and would likely require a stronger road base. Similar to the ATV route, it would be important to consider how wide to make the route, particularly if two-way traffic is to be enabled.

Potential Evacuation Routes

Potential evacuation routes include:

- Sage Hills Route – this route would follow a current trail through a gully that starts at the Sage Hills Church and connects to the reservoir and eventually outlets at Highway 97C/Barnes Road.
- Reservoir Trail Route – this route would follow a current trail alignment that is fairly wide and starts fairly flat on the plateau area and then follows a switchback that comes out at the reservoir and comes out at Highway 97C/Barnes Road.
- Barnes Lake Route – the Barnes Lake Trail starts at the end of Mesa Vista Drive and runs south towards Barnes Lake connecting to Barnes Lake Road. It would terminate in the vicinity of the Barnes Lake Recreational Site which could serve as a muster point and provides another option to

connect back to Highway 97C via Barnes Lake Road. It would require traversing steep ridges which may be difficult to travel with a motor vehicle.

- Bradner Farms Route – this evacuation route is similar to the Barnes Lake but rather than connecting to Barnes Lake, it connects to an area south of Bradner Farms on Highway 97C.
- Slope Trail Route – this route would follow the Slope Trail and would cut across the hillside outletting at Highway 97C/Barnes Road.

Figure 2 illustrates the evacuation routes.

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Ashcroft Evacuation Routes Plan

Evacuation Route Options

Emergency Access Routes

- Barnes Lake Route
- Bradner Farms Route
- Reservoir Route - Alternate Route
- Sage Hills Trail Route
- Slope Trail Route

The accuracy & completeness of information shown on this drawing is not guaranteed. It will be the responsibility of the user of the information shown on this drawing to locate & establish the precise location of all existing information whether shown or not.

0 200 400 600
Meters

N

Coordinate System:
NAD 1983 UTM Zone 10N

Scale: 1:15,000
(When plotted at 11"x17")

Data Sources:

Base data provided by NRCAN

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FIGURE 2

Evaluation

In order to compare the options, evaluation criteria were established, including:

- Length – what is the length of the route?
- Alternative uses – does the evacuation route have other uses such as an enhanced trail or potentially evolved into an actual road?
- Ease of Construction/Use – does the route result in significant grades? Does the route require retaining walls or other components that need to be maintained?
- Jurisdiction – does the route remain within the Village's jurisdiction or would there need to be agreement with other jurisdictions? Does the route cross private land?
- Evacuation Risks – are there any risks associated with relying on the route as an evacuation route? For example, could the evacuation route take the evacuees back in the direction that you are trying to evacuate?
- Muster areas – is there space to create a muster area if they are needed?
- Evacuation complexity – can people drive out in their own vehicles? Do they need to muster and wait for a vehicle to take them?

Table 1 summarizes the evaluation of each of the routes.

Each of these routes were drawn in a program called Infraworks and analyzed based on the topography of the land utilizing 20 m contour data obtained from Natural Resources Canada. More detailed LiDAR data for this project was not available at this time. Some of the key issues with each of the routes:

- Sage Hills Route – the principal concern with this route is narrowness of the gulley that it traverses which would preclude any motorized access without significant structural engineering. The advantage of this route is that it is short and close to the majority of residents in Mesa Vista. This route may potentially be suitable for ATV use.
- Reservoir Trail – the principal concern with this route is the steepness associated with the route The advantage of this route is that there is more space for a muster area at the top, and could utilize the existing fire break on the Mesa Vista as part of the route. It would also potentially be advantageous as the access road could be the centre of a new road servicing a new subdivision in the Mesa Vista neighbourhood.
- Barnes Lake/Bradner Farms Routes – these two routes have similar concerns relating to length and steep slopes and cost of development. Given the length, evacuees would have to use their own vehicles. Due to the extreme slopes in some locations, it would not be practical to use this route. The Barnes Lake Route would be preferable given that it does not double back to the south, unlike the Bradner Farms Route.
- Slope Trail Route – the principal concern with this route would be the cut into the slope that would be required and the suitability of the soils for construction. In addition, there would be concerns about slope stability for the people living directly below the proposed route. The advantage is that this route would have shallower grades.

Based on the evaluation of the routes, the Slope Trail Route and the Reservoir Trail Route were advanced for Class D cost estimation based on route widths of 3 m and 5 m. **Figures 3** to **6** illustrate the routes in more detail. In the diagram, areas of blue represent fills and areas of red represent areas of cuts.

Table 1: Evaluation Framework

Option	Length	Alternative Uses	Ease of Construction/Use	Jurisdiction	Evacuation Risks	Muster Areas	Evacuation Complexity
Sage Hills Route	450 m	Yes – trail from Mesa Vista to Downtown	Route would need to follow the bottom of the existing drainage course which is very narrow. Due to the possibility of extreme weather events this route would be problematic. Potential for damage due to erosion and washout would be high.	All in Village Starts on church property	Route would not be suitable for car and trucks but could be made suitable for ATVs though it will need to be made safe to enable ATVs to pass any pedestrians.	Could use the church parking lot and use the access for the reservoir as a muster area	Larger vehicles (cars and trucks) would not be accommodated
Reservoir Trail Route	1,300 m	Yes – trail from Mesa Vista to Downtown. Could be part of future residential development of the area.	Alternative course possible with multiple switchbacks. Route would require retaining walls to reduce the impact of the cut/fill slopes. Geotechnical slope stability due to type of soils will need to be considered	All in Village May go through private property	Steeper slopes which may make vehicle travel more difficult	Lots of space to build one at Mesa Vista and at the reservoir	Could be developed to allow trucks and other motor vehicles, while also being suitable for pedestrians and ATVs
Barnes Lake Route	4,100 m	Potentially – could provide access into range land. Could support tourism, mountain biking, ATVing	Challenging due to steep grades and long distance. Could be difficult to maintain due to length and lack of use	TNRD Crosses private land on a public road	If wildfire comes from south, it would potentially result in people evacuating in the direction of the threat though this would be mitigated somewhat by evacuees travelling southeast on Barnes Lake Road towards Highland Valley Copper. This route also has several areas that are very steep which will limit the ability to use as an evacuation route.	N/A	Long distance to drive but would allow people to be spread out
Bradner Farms Route	5,200 m	Potentially – could provide access into range land. Could support tourism, mountain biking, ATVing	Challenging due to steep grades and long distance. Could be difficult to maintain due to length and lack of use	TNRD Crosses private land	If wildfire comes from south, it would potentially result in people evacuating in the direction of the threat. This route also has several areas that are very steep which will limit the ability to use as an evacuation route.	N/A	Long distance to drive but would allow people to be spread out
Slope Trail Route	1,200 m	Yes – trail from Mesa Vista to Downtown. Could be part of future residential development of the area	Similar to Reservoir Trail route, slopes, drainage and slope stability will likely be an issue, particularly given the existing development down slope along Barnes Road/Highway 97C	Mostly public land	This alignment could be adjusted to keep the road grades between 10-12%. This would allow for full vehicle (including emergency vehicles) to use.	Lots of space to build one at Mesa Vista but a location for a muster area is needed at the bottom along Barnes Road/Highway 97C	Could be developed to allow trucks and other motor vehicles, while also being suitable for pedestrians and ATVs

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Ashcroft Evacuation Routes Plan

Reservoir Trail Route (3m width)

Reservoir Trail Route

- Cut Material
- Fill Material

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Coordinate System:

NAD 1983 UTM Zone 10N

Data Sources:

Base data provided by NRCAN

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FIGURE 3

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Ashcroft Evacuation Routes Plan

Reservoir Trail Route (5m width)

Reservoir Trail Route
- Cut Material
- Fill Material

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FIGURE 4

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Ashcroft Evacuation Routes Plan

Slope Trail Route (3m width)

Reservoir Trail Route

- Cut Material
- Fill Material

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FIGURE 5

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Village of Ashcroft

Ashcroft Evacuation Routes Plan

Slope Trail Route (5m width)

Reservoir Trail Route
- Cut Material
- Fill Material

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Coordinate System:

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FIGURE 6

These cost estimates also assume that the road will need to be improved all the way to Mesa Vista Drive. **Table 2** summarizes the cost estimates while Attachment A contains a more detailed breakdown of the costs.

Table 2: Class D Cost Estimates

Route	3 m Cross Section	5 m Cross Section
Reservoir	$998,180	$1,219,695
Slope Trail	$1,038,570	$1,415,491

3.0 DISCUSSION AND RECOMMENDATION

The Reservoir Route is slightly longer but more cost-effective option than the Slope Trail Route. It also appears to be less technically challenging than the Slope Trail Route due to soil conditions and fewer cuts and fills required. The one advantage that the Slope Trail Route would have is shallower grades overall thus allowing easier use by vehicles than the Reservoir Trail Route. Given the likely infrequency of use, however, it is questionable whether this is enough of an advantage in comparison to the greater costs and likely greater technical challenges and the potential impacts on existing houses downslope from the route. The Sage Hills trail would be a suitable alternative evacuation route for pedestrians, cyclists and people on ATVs provided that some maintenance concerns were addressed.

4.0 NEXT STEPS

Potential next steps would include:

- Acquire LiDAR data and update conceptual designs to confirm constructability of the preferred route options
- Develop a detailed design for the preferred evacuation route option, including detailed geotechnical assessment
- Develop evacuation route plans for the North Ashcroft area
- Undertake maintenance of the Sage Hills trail to remove brush, rocks, and other debris and consider how to widen the trail without causing slope stability concerns
- Ensure evacuation routes are in place for Ashcroft Terminal and Koppers

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Dylan Houlihan, MCIP
Community Planner

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Attachment A:
Class D Cost Estimates

Village of Ashcroft
Reservoir Access 3.0m Wide Option
CLASS D - SCHEDULE OF QUANTITIES AND PRICES

Total Length = 1,310m

					Engineer's Estimate	
Section	**Paragraph**	**Specification Title**	**Unit**	**Estimated Quantity**	**Unit Price**	**Amount**
Division 31 - Earthwork						
Section 31 24 13 - Roadway Excavation, Embankment and Compaction						
31 24 13	1.8.5	Common Excavation - On-Site Re-Use	m^3	4,500	$ 20.00	$ 90,000.00
31 24 13	1.8.9	Subgrade Preparation	m^2	3,200	$ 1.00	$ 3,200.00
Section 31 36 13 - Gabions						
31 36 13	1.4.1	Gabions	m	350	$ 350.00	$ 122,500.00
Division 32 - Roads and Site Improvements						
Section 32 11 16.1 - Granular Subbase						
32 11 16.1	1.4.3	75mm minus Select Granular Subbase - 400mm Thickness	m^2	5,300	$ 30.00	$ 159,000.00
Section 32 11 23 - Granular Base						
32 11 23	1.4.2	19mm minus Granular Base 100mm Thickness	m^2	4,600	$ 12.00	$ 55,200.00
Section 32 12 16 - Hot-Mix Asphalt Concrete Paving						
32 12 16	1.5.1S, 1.5.2S	Upper Course #1 - Hot-Mix Asphalt Concrete Paving - 50mm **(Optional)**	m^2	4,600	$ 22.00	$ 101,200.00
Section 32 92 19 - Hydraulic Seeding						
32 92.19	1.8.1	Hydro-seeding	m^2	2,500	$ 2.00	$ 5,000.00
Division 33 - Utilities						
Section 33 42 13 - Pipe Culverts						
33 42 13	1.5.1, 1.5.2	Culvert Pipe CSP 400 mm diameter, Imported Backfill	lm	10	$ 300.00	$ 3,000.00
33 42 13	1.5.1, 1.5.2	Culvert Pipe CSP 1000 mm diameter, Imported Backfill	lm	20	$ 600.00	$ 12,000.00
				SUBTOTAL		**$551,100.00**
				CONTINGENCY	**50%**	**$ 275,550.00**
				SUBTOTAL		**$826,650.00**
				15% Professional Services (including detailed design, geotechnical engineering, construction inspection, contract management)		**$123,997.50**
				5% GST		**$47,532.38**
				Reservoir Access - 3.0m Wide Option Total		**$998,179.88**

Village of Ashcroft
Reservoir Access 5.0m Wide Option
CLASS D - SCHEDULE OF QUANTITIES AND PRICES

Total Length = 1,310m

					Engineer's Estimate	
Section	**Paragraph**	**Specification Title**	**Unit**	**Estimated Quantity**	**Unit Price**	**Amount**
Division 31 - Earthwork						
Section 31 24 13 - Roadway Excavation, Embankment and Compaction						
31 24 13	1.8.5	Common Excavation - On-Site Re-Use	m^3	6,000	$ 20.00	$ 120,000.00
31 24 13	1.8.9	Subgrade Preparation	m^2	4,600	$ 1.00	$ 4,600.00
Section 31 36 13 - Gabions						
31 36 13	1.4.1	Gabions	m	350	$ 350.00	$ 122,500.00
Division 32 - Roads and Site Improvements						
Section 32 11 16.1 - Granular Subbase						
32 11 16.1	1.4.3	75mm minus Select Granular Subbase - 400mm Thickness	m^2	7,900	$ 20.00	$ 158,000.00
Section 32 11 23 - Granular Base						
32 11 23	1.4.2	19mm minus Granular Base 100mm Thickness	m^2	7,200	$ 12.00	$ 86,400.00
Section 32 12 16 - Hot-Mix Asphalt Concrete Paving						
32 12 16	1.5.1S, 1.5.2S	Upper Course #1 - Hot-Mix Asphalt Concrete Paving - 50mm **(Optional)**	m^2	7,200	$ 22.00	$ 158,400.00
Section 32 92 19 - Hydraulic Seeding						
32 92.19	1.8.1	Hydro-seeding	m^2	3,500	$ 2.00	$ 7,000.00
Division 33 - Utilities						
Section 33 42 13 - Pipe Culverts						
33 42 13	1.5.1, 1.5.2	Culvert Pipe CSP 400 mm diameter, Imported Backfill	lm	15	$ 300.00	$ 4,500.00
33 42 13	1.5.1, 1.5.2	Culvert Pipe CSP 1000 mm diameter, Imported Backfill	lm	20	$ 600.00	$ 12,000.00
				SUBTOTAL		**$673,400.00**
				CONTINGENCY	**50%**	**$ 336,700.00**
				SUBTOTAL		**$1,010,100.00**
				15% Professional Services (including detailed design, geotechnical engineering, construction inspection, contract management)		**$151,515.00**
				5% GST		**$58,080.75**
				Reservoir Access - 5.0m Wide Option Total		**$1,219,695.75**

Village of Ashcroft
Slope Trail Access 3.0m Wide Option
CLASS D - SCHEDULE OF QUANTITIES AND PRICES

Total Length = 1200m

				Engineer's Estimate		
Section	**Paragraph**	**Specification Title**	**Unit**	**Estimated Quantity**	**Unit Price**	**Amount**
Division 31 - Earthwork						
Section 31 24 13 - Roadway Excavation, Embankment and Compaction						
31 24 13	1.8.5	Common Excavation - On-Site Re-Use	m^3	7,000	$ 20.00	$ 140,000.00
31 24 13	1.8.9	Subgrade Preparation	m^2	4,600	$ 1.00	$ 4,600.00
Section 31 36 13 - Gabions						
31 36 13	1.4.1	Gabions	m	480	$ 350.00	$ 168,000.00
Division 32 - Roads and Site Improvements						
Section 32 11 16.1 - Granular Subbase						
32 11 16.1	1.4.3	75mm minus Select Granular Subbase - 400mm Thickness	m^2	4,800	$ 20.00	$ 96,000.00
Section 32 11 23 - Granular Base						
32 11 23	1.4.2	19mm minus Granular Base 100mm Thickness	m^2	4,200	$ 12.00	$ 50,400.00
Section 32 12 16 - Hot-Mix Asphalt Concrete Paving						
32 12 16	1.5.1S, 1.5.2S	Upper Course #1 - Hot-Mix Asphalt Concrete Paving - 50mm **(Optional)**	m^2	4,200	$ 22.00	$ 92,400.00
Section 32 92 19 - Hydraulic Seeding						
32 92.19	1.8.1	Hydro-seeding	m^2	3,500	$ 2.00	$ 7,000.00
Division 33 - Utilities						
Section 33 42 13 - Pipe Culverts						
33 42 13	1.5.1, 1.5.2	Culvert Pipe CSP 400 mm diameter, Imported Backfill	lm	10	$ 300.00	$ 3,000.00
33 42 13	1.5.1, 1.5.2	Culvert Pipe CSP 1000 mm diameter, Imported Backfill	lm	20	$ 600.00	$ 12,000.00
				SUBTOTAL		**$573,400.00**
				CONTINGENCY	**50%**	**$ 286,700.00**
				SUBTOTAL		**$860,100.00**
				15% Professional Services (including detailed design, geotechnical engineering, construction inspection, contract management)		**$129,015.00**
				5% GST		**$49,455.75**
				Slope Trail Access - 3.0m Wide Option Total		**$1,038,570.75**

Village of Ashcroft
Slope Trail Access 5.0m Wide Option
CLASS D - SCHEDULE OF QUANTITIES AND PRICES

Total Length = 1200m

				Engineer's Estimate		
Section	**Paragraph**	**Specification Title**	**Unit**	**Estimated Quantity**	**Unit Price**	**Amount**
Division 31 - Earthwork						
Section 31 24 13 - Roadway Excavation, Embankment and Compaction						
31 24 13	1.8.5	Common Excavation - On-Site Re-Use	m^3	11,000	$ 20.00	$ 220,000.00
31 24 13	1.8.9	Subgrade Preparation	m^2	6,000	$ 1.00	$ 6,000.00
Section 31 36 13 - Gabions						
31 36 13	1.4.1	Gabions	m	480	$ 350.00	$ 168,000.00
Division 32 - Roads and Site Improvements						
Section 32 11 16.1 - Granular Subbase						
32 11 16.1	1.4.3	75mm minus Select Granular Subbase - 400mm Thickness	m^2	7,100	$ 20.00	$ 142,000.00
Section 32 11 23 - Granular Base						
32 11 23	1.4.2	19mm minus Granular Base 100mm Thickness	m^2	6,500	$ 12.00	$ 78,000.00
Section 32 12 16 - Hot-Mix Asphalt Concrete Paving						
32 12 16	1.5.1S, 1.5.2S	Upper Course #1 - Hot-Mix Asphalt Concrete Paving - 50mm **(Optional)**	m^2	6,500	$ 22.00	$ 143,000.00
Section 32 92 19 - Hydraulic Seeding						
32 92.19	1.8.1	Hydro-seeding	m^2	4,000	$ 2.00	$ 8,000.00
Division 33 - Utilities						
Section 33 42 13 - Pipe Culverts						
33 42 13	1.5.1, 1.5.2	Culvert Pipe CSP 400 mm diameter, Imported Backfill	lm	15	$ 300.00	$ 4,500.00
33 42 13	1.5.1, 1.5.2	Culvert Pipe CSP 1000 mm diameter, Imported Backfill	lm	20	$ 600.00	$ 12,000.00
				SUBTOTAL		**$781,500.00**
				CONTINGENCY	**50%**	**$ 390,750.00**
				SUBTOTAL		**$1,172,250.00**
				15% Professional Services (including detailed design, geotechnical engineering, construction inspection, contract management)		**$175,837.50**
				5% GST		**$67,404.38**
				Slope Trail Access - 5.0m Wide Option Total		**$1,415,491.88**