

Appendix S Rock Creek Conceptual Flood Mitigation Design Options

S.1 Existing Conditions

The existing conditions presented in this section provide a brief summary of characteristics of the Study Area that are pertinent to the development of mitigation options and their evaluation. The contents of this section are not a comprehensive review of all existing conditions for Rock Creek.

S.1.1 POPULATION

Census data specific to Rock Creek is not available from Statistics Canada (2023c). Based on available aerial imagery, there are approximately 36 private properties with structures on them within the Study Area.

S.1.2 STUDY AREA

The Study Area in Figure S2 outlines the areas that are considered in this Project at Rock Creek. The boundaries of the Study Area are based on Stantec's understanding that the flood mitigations are to be designed for communities, and that individual properties outside of the main community consolidation are not included.

S.1.3 FIRST NATIONS

Rock Creek is within the Traditional Territories of the Tr'ondëk Hwëch'in First Nation (TH). The TH have parcels of Category B Settlement Lands on the along the Klondike River near Rock Creek. The land claim selections include: R-64B and S-122B1. This means that TH has surface ownership of these parcels of land (Government of Yukon 2022). Figure S2 illustrates the TH settlement lands within the Study Area.

S.1.4 BATHYMETRY AND TOPOGRAPHY

Bathymetry data for the Klondike River at Rock Creek was not provided to Stantec.

The following data sources were provided to or obtained by Stantec:

- 2019 LiDAR derivative 1m horizontal resolution Digital Elevation Model (DEM), UTM Zone 7 CSRS NAD1983, CGVD1928 (Government of Yukon 2022d)

All elevations are reported CGVD2013. The LiDAR accuracy is assumed to be sufficient for the preliminary flood inundation analysis and conceptual design presented in this Report. There is insufficient metadata to determine whether the LiDAR meets the base requirement in terms of accuracy or precision for flood mapping as per NRCan (2022b).

S.1.5 GEOLOGY

Based on the surficial geology mapping (Yukon Geological Survey 2020), the Study Area likely consists of colluvium deposits, generally made up of gravel and sands containing angular local bedrock clasts. The community of Rock Creek is shaped by mass wasting events from landslides, snow avalanches, and other gravity driven processes. A veneer of fluvial deposits, consisting of resedimented silts and sands and minor gravel, exists to the east and west of Rock Creek. The terrain within the Study Area consists of undulating non-linear rises and hollows with slopes generally less than 15° (26%).

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Based on the Permafrost Probability Model (Bonnaventure et al. 2020), the Study Area is located within a region of extensive discontinuous permafrost (80-90% by land area underlain by permafrost). The Canada Permafrost Map (National Atlas of Canada 1995) shows the Study Area is in a region of extensive discontinuous permafrost (50-90% by land area underlain by permafrost) with a low to medium (<10-20% by volume of visible ice) ground ice content in the upper 10-20 m of the ground.

S.1.6 HYDROGEOLOGY

The colluvium deposits, generally made up of gravel and encountered within the Study Area are likely to result in relatively fast rates of groundwater flow. The fluvial deposits encompassing most of shoreline are likely to result in a groundwater table that would be highly dependent on the Klondike River water levels. During flooding, the high-water levels would result in high groundwater levels and after flood waters recede, it is likely that the groundwater levels would recede relatively quickly based on the permeability of the soil conditions in the area.

Based on the anticipated soils at this site, the need for seepage control measures (i.e. seepage cut-off below flood mitigation option, toe drains, sump pits and pumping, etc.) may be required for the proposed flood mitigation options and should be further evaluated in preliminary and detailed designs.

S.1.7 PAST FLOODING EVENTS AND RESPONSE

The Rock Creek subdivision has been subject to flood events in recent decades. A summary of the documented flood events at Rock Creek are provided below. The flood events summarized below do not represent a comprehensive review of flooding history in the Study Area; rather, they are a summary of the flooding documentation provided to Stantec at the time of writing. Historical water surface elevations (WSEs) at Water Survey of Canada (WSC) Station 09EA006 (Klondike River at Rock Creek) are illustrated in Figure S1.

1999 and 2000 Flood Events

YG (2003) documents flood events at Rock Creek in both 1999 and 2000. The 2000 flood event occurred in mid-June and was a rainfall-induced flood event (YG 2000).

2023 Flood Event

Rock Creek experienced two separate episodes of extreme flooding in May of 2023 due to i) ice jams and ii) high open-water flows in the Klondike River. The ice jam peak WSE at WSC Station 09EA003 occurred on May 8, 2023 (WSE not directly applicable to the Rock Creek site given the WSC Station's downstream location). The open-water flow peak at WSC Station 09AE003 was 1,070 m³/s and occurred on May 24, 2023. Comprehensive review of the flood events have not been completed and therefore could not be included in this Report. It is possible (and even likely) that the data, observations, and documentation from the 2023 flood would have an impact on the preliminary inundation analysis (Section S.1.11) and mitigation options (Section S.2) for the Study Area. Therefore, it is recommended that the contents of this report be reviewed and (if necessary) amended following comprehensive review of the 2023 flood event.

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S.1.8 EXISTING FLOOD MITIGATION INFRASTRUCTURE

Rock Creek currently has no existing permanent flood mitigation infrastructure documented within the Study Area.

S.1.9 WIND, WAVES, AND EROSION

While floodplain mapping and hydraulic modelling of the Design Flood Service Level (DFSL) has not been completed for Rock Creek to date, it is likely that flow velocities in the Klondike River during flood conditions would require flood mitigations to include erosion mitigations. In addition, bank erosion and river migration should be studied and considered in preliminary and detailed design phases of flood mitigations.

Wind and wave effects are not anticipated to occur at a scale which would impact flood mitigation design at Rock Creek.

S.1.10 HYDROLOGY

The Klondike River initiates in the Ogilvie Mountains and flows to the West, draining snowmelt and rainfall induced runoff into the Yukon River. The confluence of the Yukon River and Klondike River is at the south end of Dawson City.

WSC Station 09EA006 (Klondike River at Rock Creek) is located on the south side of the Klondike River towards the east end of the Rock Creek subdivision (Figure S1). Gross drainage area to WSC Station 09EA006 is not reported by GoC (2023). WSC Station 09EA006 is a relatively new WSC station, with data available from 2014 to present.

Hydrologic studies (including WSE or flow flood frequency analyses) and hydraulic modelling have not been completed to date for the Study Area. Completing these studies are beyond the scope of this Project. In the absence of existing hydrologic and ice jam studies, the 1:200-year open water WSE is estimated using the 1:200-year flow at a downstream location (970 m³/s at WSC Station 09EA003 – Klondike River above Bonanza Creek, per Turcotte and Saal 2021) and an provisional open-water rating curve for WSC Station 09EA006 (Klondike River at Rock Creek). The rating curve for WSC Station 09EA006 is based on open water flow measurements during the station's period of record (2014 – present) using stage from WSC Station 09EA006 and flows from WSC Station 09EA003. The resulting estimate for the 1:200-year open water WSE is 375.3 m.

Figure S1 illustrates the on-record daily minimum, mean, and maximum WSEs as well as WSE during the 2023 flood event (to date). While there is documented history of flooding during open-water conditions (YG 2000), breakup ice jam events (as in 2023) are more likely to cause extreme flooding in the community and should be studied in the future.

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WSC Station 09EA006 - Klondike River at Rock Creek (CGVD 2013)

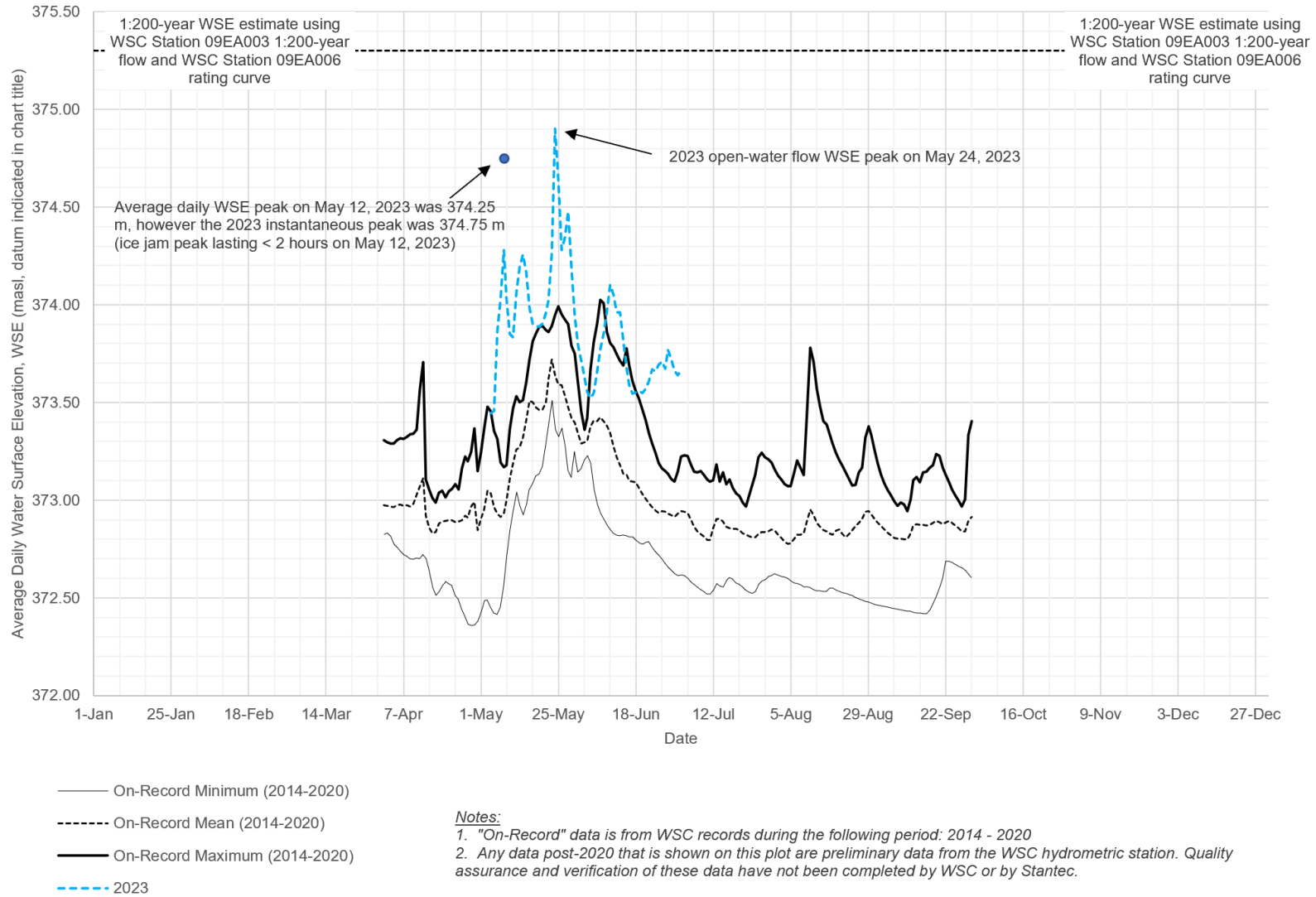


Figure S1 Historical Water Surface Elevations at WSC 09EA006 (Klondike River at Rock Creek)

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S.1.11 PRELIMINARY INUNDATION MAPPING

Floodplain mapping and the associated flood policy is ultimately what is required for design and implementation of flood mitigations at communities. Hydraulic analysis and floodplain mapping have not been completed to date at Rock Creek and is not within the scope of this Project. However, an understanding of inundation extents under 1:200-year event is required for conceptual design of flood mitigations.

In lieu of floodplain mapping, Stantec performed preliminary existing conditions (no mitigation) open water inundation analysis for Rock Creek shore using WSEs. This analysis considered an open water WSE slope of 0.28% based on survey from Underhill (2022) and the open water 1:200-year WSE (375.30 m) estimated using the 1:200-year flow from WSC Station 09EA003 and the provisional open water WSC Station 09EA006 rating curve. The resulting water surface was overlain on the existing conditions topographic/bathymetric elevation data (GeoYukon 2023) and the limits of inundation were mapped (Figure S2). The inundation analysis performed herein is provided for information only and is considered a high-level estimate of the flood inundation under a potential representation of the 1:200-year open-water event. Ice jam processes at Rock Creek should be studied as they may result in a more severe overall 1:200-year inundation at Rock Creek than is produced under the 1:200-year open water scenario presented here. The preliminary inundation analysis does not take into account flow pathways and blockages. That is, if the land in a given location is below the 1:200 WSE surface, it presents as inundated whether or not there is an overland flow path for the water to arrive there.

The preliminary inundation analysis does not take into account flow pathways and blockages. That is, if the land in a given location is below the 1:200 WSE surface, it presents as inundated whether or not there is an overland flow path for the water to arrive there.

Inundated areas under the preliminary analysis include approximately 3 different sections of Rock Creek Road totalling approximately 940 m in length, along with two private properties along Rock Creek Road (Figure S2). The number of properties that would have at least 25% of their area inundated under the preliminary inundation scenario (and therefore classified as “inundated properties”) is therefore 5.

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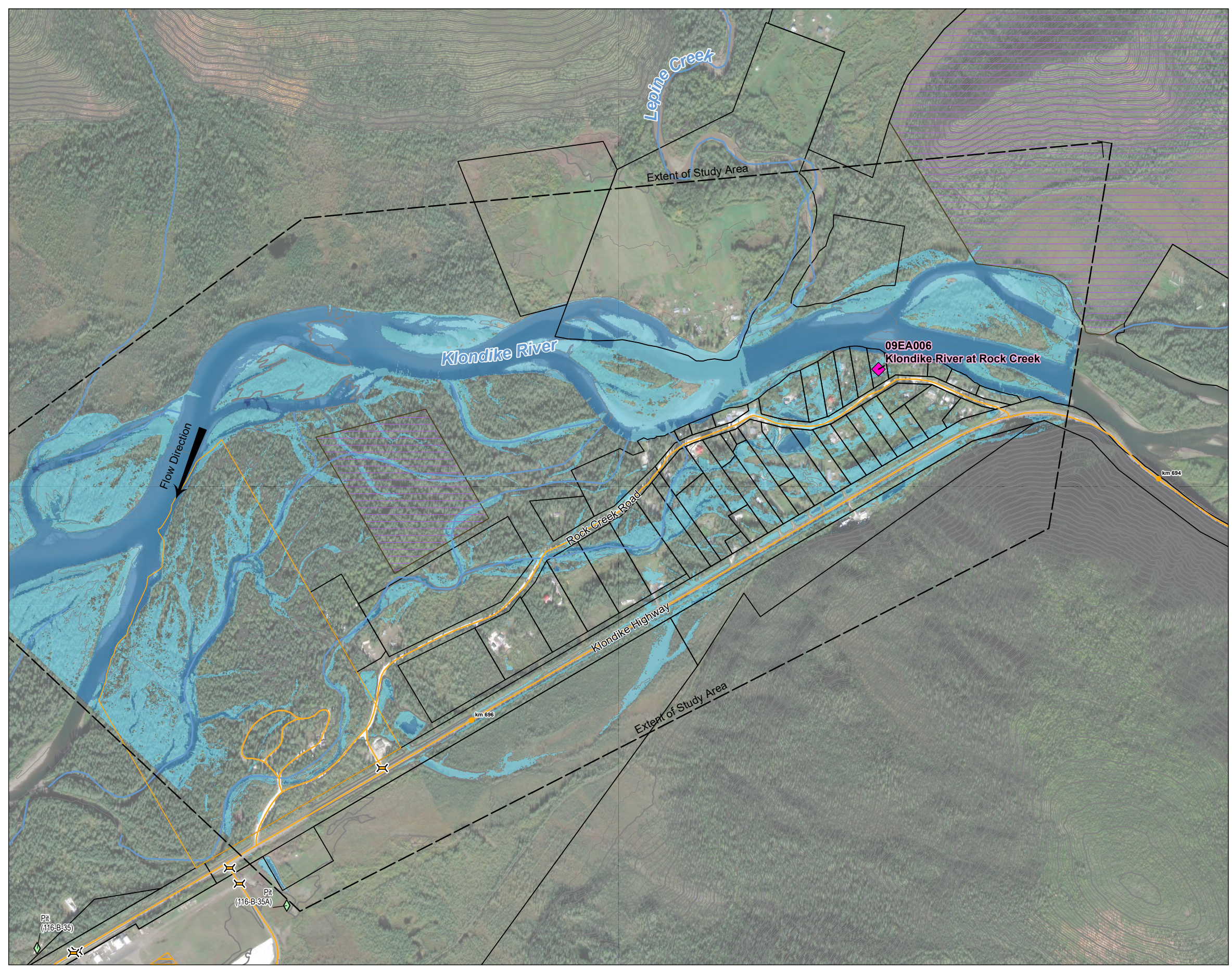
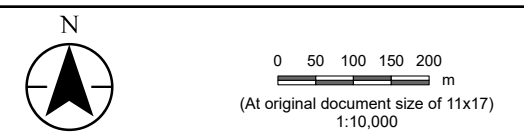
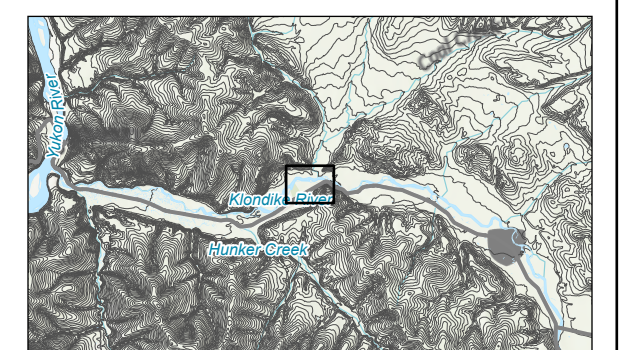


Figure No. **S2**
 Title **Existing Conditions and Preliminary Flood Inundation at Rock Creek**
 Client/Project **Government of Yukon** 144903232
 Community Services | Infrastructure Development Branch
 Yukon Territory Flood Mitigation Conceptual Design Options
 Project Location **Rock Creek, Yukon** Prepared by LLT on 2023-05-08
 TR by JM on 2023-05-08



- ◆ WSC Station
 - ✕ Culvert/ Bridge
 - ◇ Community Infrastructure and Points of Interest
 - Highway Kilometre Post
 - Road
 - Parks Campgrounds Surveyed
 - Runway
 - Topographic Contour (10 m)
 - Topographic Contour (2 m)
 - Land Parcel - Surveyed
 - First Nation Settlement Lands - Surveyed
- Water Depth at 1:200 WSE Inundation (m)
- 0 - 1
 - 1 - 2
 - > 2
- Water Depth at 1:200-year Open Water WSE Inundation (m)
- 0 - 1
 - 1 - 2
 - > 2

The preliminary inundation analysis does not take into account flow pathways and blockages. That is, if the land in a given location is below the 1:200 WSE surface, it presents as inundated whether or not there is an overland flow path for the water to arrive there.



- Notes**
1. Coordinate System: NAD 1983 Yukon Albers
 2. Data Sources: Government of Yukon; Government of Canada
 3. Imagery Government of Yukon Geomatics Yukon; ESRI World Imagery



S.2 Mitigation Options and Evaluation

The scope of this Project is to develop conceptual engineered flood mitigation options; these options for Rock Creek are presented in this section. Non-engineered options presented in Section 3.3.1 of the main body of this Report (emergency response-based, mitigation funding to property owners, land purchase/exchange, regulation of flow, management of ice, nature-based approaches) should be considered as part of a comprehensive approach to flood mitigation in the Yukon.

Based on the objectives and assumptions presented in the main body of this Report, two conceptual flood mitigation options were developed for Rock Creek (Table) using the typical engineered flood mitigation designs from Section 3.3.2. Flood mitigations in the options were provided for areas which are inundated under the 1:200-year open water WSE (375.30 m) in the preliminary inundation mapping (Figure S2). The top elevation of the flood mitigations is described to reach the DFSL which in the case of Rock Creek (river site) is assumed to be 375.80 m (i.e., 0.5 m of free board above the 1:200-year open water WSE as outlined for river sites in Section 3.2).

Areas which are above the 1:200-year WSE in the preliminary inundation analysis but below the DFSL are not included in this Project. These areas may need to be included in future design advancements depending on the requirements of future territorial flood policy.

Table S1 Summary of Conceptual Options

Location	Option 1	Option 2
	<i>lower capital costs, higher response/maintenance</i>	<i>higher capital costs, lower response/maintenance</i>
Rock Creek Road (3 Locations)	Road as Platform for Temporary Sandbag Dikes	Road Raising
Private Properties Along Rock Creek Road	Temporary Sandbag Dikes	

Section S.2.1, and S.2.2 provide a description, Class D OPC, and qualitative evaluation of conceptual options specified in Table .

S.2.1 OPTION 1

Description

The conceptual flood mitigations for Option 1 are illustrated in Figure S3.

Each of the three inundated sections of Rock Creek Road would be used as a platform for temporary single superbag dikes on either side of the road which would reach the DFSL. Temporary superbag dikes are likely required on both sides of the road due to the relatively fast groundwater rates in the Klondike River valley, meaning WSEs on the inside of the road may equalize with Klondike River WSEs even if overland flow connections are blocked. The total length of road requiring temporary single superbag dikes would be 950 m, meaning there would be 1900 m of total temporary single superbag dikes in Option 1.

There are two private properties in Rock Creek that are located within areas inundated under the preliminary analysis and would require a temporary sandbag dike around the structures during flood

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conditions. The depth of flooding around these properties is less than 2 m. The temporary sandbags would be up to 2.5 m high to meet the DFSL with a total length of approximately 240 m.

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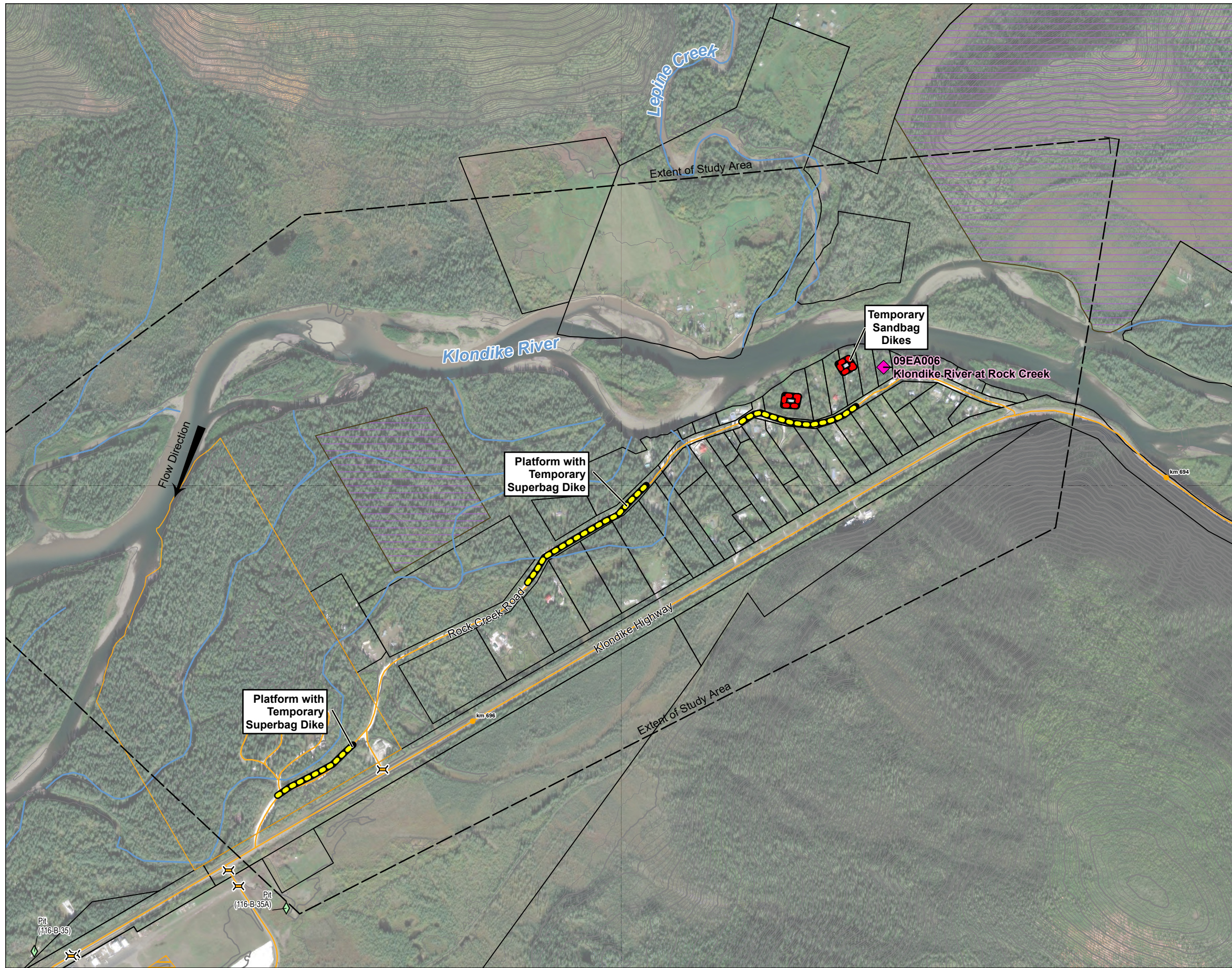
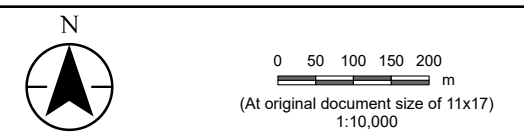
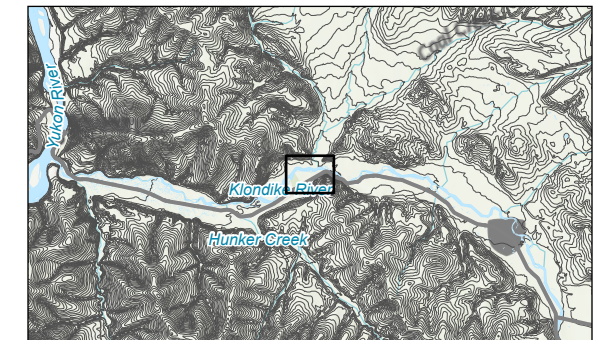


Figure No. **S3**
 Title **Rock Creek Conceptual Flood Mitigation Design - Option 1**
 Client/Project Government of Yukon 144903232
 Community Services | Infrastructure Development Branch
 Yukon Territory Flood Mitigation Conceptual Design Options
 Project Location Rock Creek, Yukon Prepared by LLT on 2023-04-11
 TR by JM on 2023-04-11



- ◆ WSC Station
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- Land Parcel - Surveyed
- First Nation Settlement Lands - Surveyed
- Proposed Mitigation Feature**
- Earthen Dike
- Platform with Temporary Superbag Dike
- Road Raising
- Structural Dike
- Temporary Sandbag Dike

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Notes
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Class D OPC

The Class D OPC's for capital and annual costs are summarized in Table , considering the Class D level of accuracy (+/-50%). Table also provides the Class D OPCs on a per inundated property basis (from Section S.1.11).

Table S2 Option 1 Summary of Class D OPCs

	Class D OPC	Number of Inundated Properties (Section S.1.11) 1	Class D OPC per Inundated Property
Capital Cost	None	5	None
Annual Cost (Flood Year)	\$2,194,500 - \$3,291,750		\$438,900 - \$658,350
Annual Cost (Non-Flood Year)	\$900 - \$1,350		\$180 - \$270
¹ As described in Section S.1.11, the inundated properties from the preliminary inundation analysis consist of two private properties and three different sections of Rock Creek Road			

The components, assumed unit costs, and estimated quantities which produce the Class D OPCs are detailed in Table S3 (annual cost, flood year) and Table S4 (annual cost, non-flood year).

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Table S3 Option 1 Annual Costs During Flood Year Class D OPC

Item No.	Description of Work	Units	Qty.	Unit Price	Amount
Section 1A Option 1: Annual Costs, Flood Year					
a)	Inspections	LS	1	\$50,000.00	\$50,000.00
b)	Minor Repairs & Vegetation Management	LS	1	\$5,000.00	\$5,000.00
c)	Storage of Sandbags and Superbags	LS	1	\$500.00	\$500.00
d)	Sandbags c/w Sandfill (up to 2.5 m high)	M	240	\$695.00	\$166,800.00
e)	Superbags c/w Sandfill (1.0m - 2.0m)	M	1900	\$500.00	\$950,000.00
				<i>Total 1A</i>	\$1,172,300.00
				<i>Contingency (20%)</i>	\$234,460.00
				<i>Subtotal</i>	\$1,406,760.00
				<i>Location Adjustment Factor (LCAF)</i>	1.56
				Annual Cost Flood Year Base Price	\$2,194,500.00
				Annual Cost, Flood Year Upper Bound	\$3,291,750.00

Table S4 Option 1 Annual Costs During a Non-Flood Year Class D OPC

Item No.	Description of Work	Units	Qty.	Unit Price	Amount
Section 1B Option 1: Annual Costs, Non-Flood Year					
a)	Storage of Sandbags and Superbags	LS	1	\$500.00	\$500.00
				<i>Total 1B</i>	\$500.00
				<i>Contingency (20%)</i>	\$100.00
				<i>Subtotal</i>	\$600.00
				<i>Location Adjustment Factor (LCAF)</i>	1.56
				Annual Cost, Non-Flood Year Base Price	\$900.00
				Annual Cost, Non-Flood Year Upper Bound	\$1,350.00

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Qualitative Evaluation

Table S5 summarizes the performance of Option 1 with respect to the evaluation criteria which were previously outlined in the main body of this Report.

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Table S5 Option 1 Qualitative Evaluation

Criteria No.	Criteria Title	Evaluation	Anticipated Performance Rating
1	Viability and Reliability under Extreme Conditions	temporary superbag and sandbag dikes are vulnerable to damage from ice and debris in Klondike River; risk of vandalism and degradation risk increases with duration that the temporary dikes are deployed; seepage control measures (e.g., pumping seepage back over dike) likely required given underlying soils and groundwater flow rates; dike effectiveness may be significantly reduced given the seepage through underlying tailings material	Low Performance
2	Time to Implementation	hydraulic modelling (including ice jam studies and modelling) required to evaluate impact to water and ice flow; low regulatory risk; generally low anticipated design effort; no construction of permanent features	High Performance
3	Capital Cost Per Inundated Property	No capital cost associated with this option.	High Performance
4	Maintenance and Storage	storage required for relatively small quantity of superbags and sandbags; stockpiling of material required for superbags; inspections, maintenance, and vegetation clearing required	Medium Performance
5	Response and Activation	temporary superbag dikes require training, labour, and a timely response in a flood scenario to be effective - this is likely assisted by Rock Creek being close to Dawson which is a larger center within the Yukon	Medium Performance
6	Aesthetics and Community Function	temporary and small impact to community use and aesthetics during flood conditions mostly related to personal property function and transportation on Rock Creek Road (likely reduced to one lane in areas with temporary superbag dikes)	High Performance
7	Future Adaptability	three-high temporary superbag dikes are possible; additional raising of roads is possible but will require engineering study and are likely to require widening of structure	High Performance
8	Alteration of Existing Hydraulics, Erosion/ Sedimentation, Ice Processes, and Slope Stability	Rock Creek subdivision is low-lying and provides evacuation capacity for ice and water during flood events - blocking this evacuation capacity is likely to alter existing hydraulics, ice, and river processes including potential raising of flood WSEs due to constriction and loss of floodplain conveyance capacity	Low Performance
9	Disaster Mitigation and Adaptation Function (DMAF) Applicability	low ROI given the small number of private properties impacted; critical infrastructure not impacted	Low Performance

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S.2.2 OPTION 2

Description

The conceptual flood mitigations for Option 2 are illustrated in Figure S4.

Each of the three inundated sections of Rock Creek Road would be permanently raised by up to 1.0 m to reach the DFSL. The total length of raised road would be 950 m. Riprap would be included on the river side of the road to mitigate erosion.

The two private properties in Rock Creek that are inundated would have temporary sandbag dikes as described in Option 1.

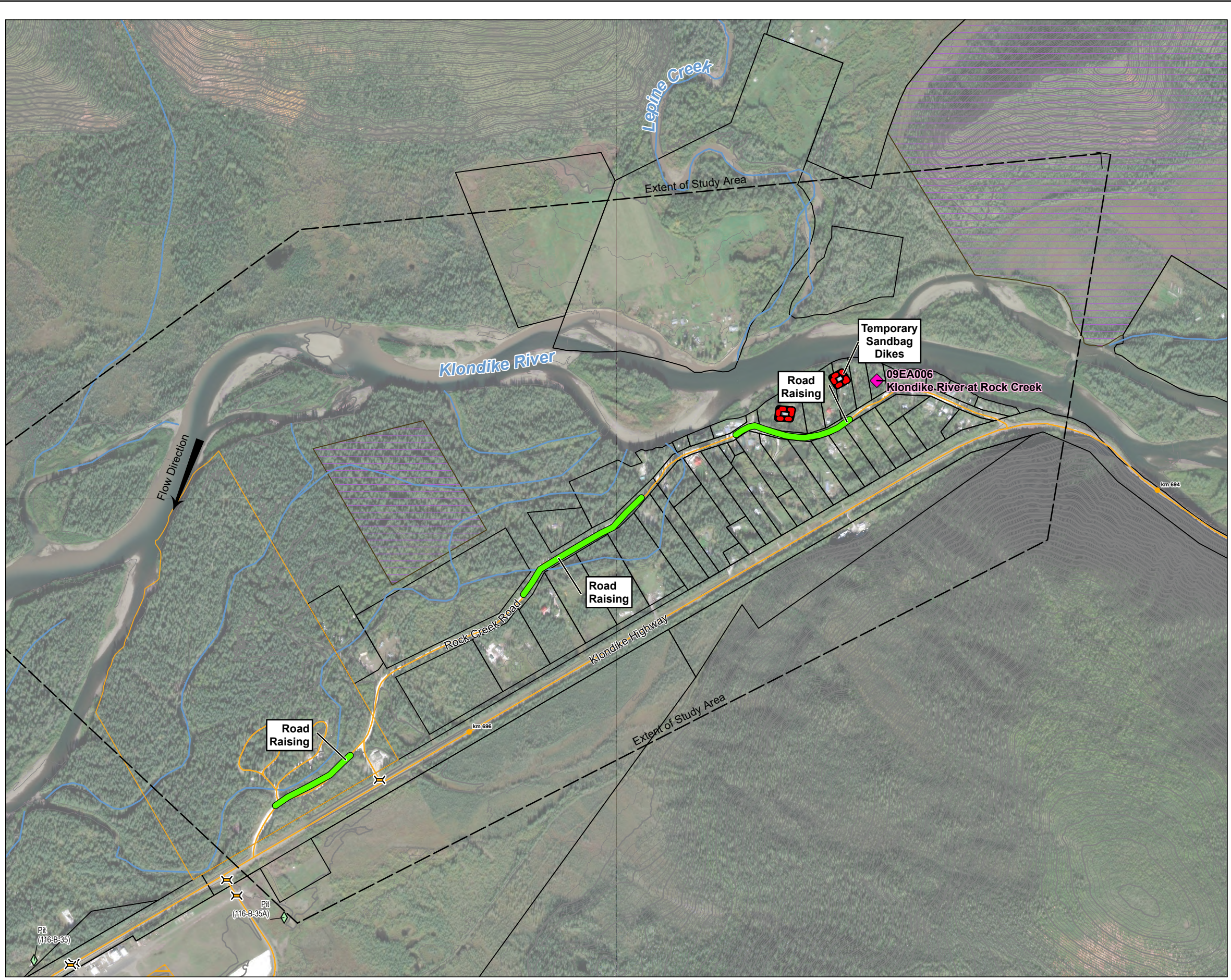
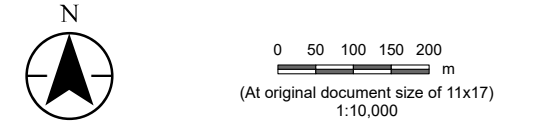


Figure No. **S4**
Rock Creek Conceptual Flood Mitigation Design - Option 2

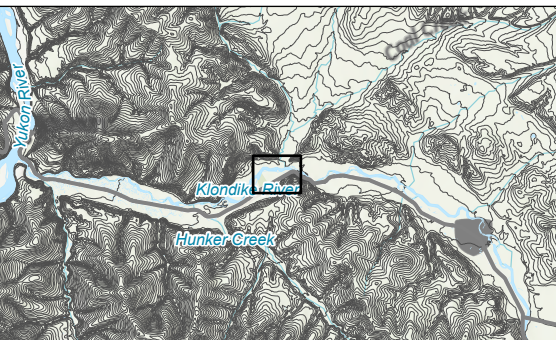
Client/Project: Government of Yukon
 Community Services | Infrastructure Development Branch
 Yukon Territory Flood Mitigation Conceptual Design Options

Project Location: Rock Creek, Yukon
 Prepared by LLT on 2023-04-11
 TR by JM on 2023-04-11



- ◆ WSC Station
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Class D OPC

The Class D OPC's for capital and annual costs are summarized in Table S6, considering the Class D level of accuracy (+/-50%). Table S6 also provides the Class D OPCs on a per inundated property basis (from Section S.1.11).

Table S6 Option 2 Summary of Class D OPCs

	Class D OPC	Number of Inundated Properties (Section S.1.11) ¹	Class D OPC per Inundated Property
Capital Cost	\$1,262,100 - \$1,893,150	5	\$252,420 - \$378,630
Annual Cost (Flood Year)	\$369,300 - \$553,950		\$73,860 - \$110,790
Annual Cost (Non-Flood Year)	\$900 - \$1,350		\$180 - \$270
¹ As described in Section S.1.11, the inundated properties from the preliminary inundation analysis consist of two private properties and three different sections of Rock Creek Road			

The components, assumed unit costs, and estimated quantities which produce the Class D OPCs are detailed in Table S7 (capital costs), Table S8 (annual cost, flood year), and Table S9 (annual cost, non-flood year).

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Table S7 Option 2 Capital Costs Class D OPC

Item No.	Description of Work	Units	Qty.	Unit Price	Amount
Section 2A Option 2: General Conditions					
a)	Mobilization/Demobilization	LS	1	\$60,190.00	\$60,190.00
b)	Site Preparation/Restoration	LS	1	\$12,100.00	\$12,100.00
<i>Total 2A</i>					\$72,290.00
Section 2B Option 2: Road Raising					
a)	Rough Grading	M2	11280	\$5.00	\$56,400.00
b)	Subgrade Preparation	M2	11280	\$5.00	\$56,400.00
c)	80mm Minus Granular Subbase, Variable Depth	M3	2640	\$40.00	\$105,600.00
d)	100mm Minus Granular Base, 100mm Depth	M3	880	\$50.00	\$44,000.00
e)	BST Surfacing	M2	6790	\$50.00	\$339,500.00
f)	Riprap	MT	3600	\$141.00	\$507,600.00
<i>Total 2B</i>					\$601,900.00
Section 2C Option 2: Floodboxes, Road Raising					
a)	Reinforced Concrete Pipe	M	200	\$1,000.00	\$200,000.00
b)	Gateway Manhole c/w Sluice Gate	EA	10	\$17,500.00	\$175,000.00
c)	Concrete Headwall	EA	20	\$5,000.00	\$100,000.00
d)	Slide Gate	EA	10	\$3,000.00	\$30,000.00
e)	Riprap	MT	200	\$141.00	\$28,200.00
<i>Total 2C</i>					\$533,200.00
<i>Contingency (20%)</i>					\$134,838.00
<i>Subtotal</i>					\$809,028.00
<i>Location Adjustment Factor (LCAF)</i>					1.56
Capital Costs Base Price					\$1,262,100.00
Capital Costs Upper Bound					\$1,893,150.00

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Table S8 Option 2 Annual Costs During Flood Year Class D OPC

Item No.	Description of Work	Units	Qty.	Unit Price	Amount
Section 2D Option 2: Annual Costs, Flood Year					
a)	Inspections	LS	1	\$25,000.00	\$25,000.00
b)	Minor Repairs & Vegetation Management	LS	1	\$5,000.00	\$5,000.00
c)	Storage of Sandbags	LS	1	\$500.00	\$500.00
d)	Sandbags c/w Sandfill (up to 2.5 m high)	M	240	\$695.00	\$166,800.00
				<i>Total 2D</i>	\$197,300.00
				<i>Contingency (20%)</i>	\$39,460.00
				<i>Subtotal</i>	\$236,760.00
				<i>Location Adjustment Factor (LCAF)</i>	1.56
				Annual Cost Flood Year Base Price	\$369,300.00
				Annual Cost, Flood Year Upper Bound	\$553,950.00

Table S9 Option 2 Annual Costs During a Non-Flood Year Class D OPC

Item No.	Description of Work	Units	Qty.	Unit Price	Amount
Section 2E Option 2: Annual Costs, Non-Flood Year					
a)	Storage of Sandbags	LS	1	\$500.00	\$500.00
				<i>Total 2E</i>	\$500.00
				<i>Contingency (20%)</i>	\$100.00
				<i>Subtotal</i>	\$600.00
				<i>Location Adjustment Factor (LCAF)</i>	1.56
				Annual Cost, Non-Flood Year Base Price	\$900.00
				Annual Cost, Non-Flood Year Upper Bound	\$1,350.00

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Qualitative Evaluation

Table S10 summarizes the performance of Option 2 with respect to the evaluation criteria which were previously outlined in the main body of this Report.

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Table S10 Option 2 Qualitative Evaluation

Criteria No.	Criteria Title	Evaluation	Anticipated Performance Rating
1	Viability and Reliability under Extreme Conditions	temporary sandbag dikes are vulnerable to damage from ice and debris in Klondike River; permanent road raising with riprap on river side would withstand erosion and damage risks from ice/debris; seepage control measures (e.g., pumping seepage back over dike) likely required given underlying soils and groundwater flow rates; dike effectiveness may be significantly reduced given the seepage through underlying tailings material	Low Performance
2	Time to Implementation	hydraulic modelling (including ice jam studies and modelling) required to evaluate impact to water and ice flow; low regulatory risk; moderate anticipated design effort; generally moderate and straightforward construction of permanent features	Low Performance
3	Capital Cost Per Inundated Property	increased capital costs in exchange for decreased operational and maintenance costs when compared to options requiring substantial temporary deployments (Option 1); per-inundated-property capital cost is \$252,420/property	High Performance
4	Maintenance and Storage	reduced storage requirements (only sandbags); relatively short lengths of road raising will require inspections, maintenance, and vegetation clearing; floodbox maintenance will be required	High Performance
5	Response and Activation	temporary superbag dikes require training, labour, and a timely response in a flood scenario to be effective - this is likely assisted by Rock Creek being close to Dawson which is a larger center within the Yukon; floodbox slide gates would need to be manually closed prior to arrival of flood and opened following abatement of the flood	Medium Performance
6	Aesthetics and Community Function	temporary and small impact to community use and aesthetics during flood conditions mostly related to personal property function	High Performance
7	Future Adaptability	temporary superbag dike may be deployed on road crests for enhanced flood mitigation; additional sandbags may be provided for raising temporary sandbag dikes; permanent increases in height possible but will require engineering study and are likely to require widening of structure	High Performance
8	Alteration of Existing Hydraulics, Erosion/ Sedimentation, Ice Processes, and Slope Stability	Rock Creek subdivision is low-lying and provides evacuation capacity for ice and water during flood events - blocking this evacuation capacity is likely to alter existing hydraulics, ice, and river processes including potential raising of flood WSEs due to constriction and loss of floodplain conveyance capacity	Low Performance
9	Disaster Mitigation and Adaptation Function (DMAF) Applicability	low ROI given the small number of private properties impacted; critical infrastructure not impacted	Low Performance

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S.2.3 SUMMARY TABLES

Table S11 summarizes the Class D OPC for the conceptual design option.

Table S11 Summary of Class D OPCs

	Option 1 Class D OPCs	Option 2 Class D OPCs
Capital Cost	None	\$1,262,100 - \$1,893,150
Annual Cost (Flood Year)	\$2,194,500 - \$3,291,750	\$369,300 - \$553,950
Annual Cost (Non-Flood Year)	\$900 - \$1,350	\$900 - \$1,350

Table S12 provides a summary of the evaluation of the conceptual design option.

Table S12 Summary of Qualitative Evaluation of Conceptual Options

Criteria No.	Criteria Title	Option 1	Option 2
1	Viability and Reliability under Extreme Conditions	Low Performance	Low Performance
2	Time to Implementation	High Performance	Low Performance
3	Capital Cost Per Inundated Property	High Performance	High Performance
4	Maintenance and Storage	Medium Performance	High Performance
5	Response and Activation	Medium Performance	Medium Performance
6	Aesthetics and Community Function	High Performance	High Performance
7	Future Adaptability	High Performance	High Performance
8	Alteration of Existing Hydraulics, Erosion/ Sedimentation, Ice Processes, and Slope Stability	Low Performance	Low Performance
9	Disaster Mitigation and Adaptation Function (DMAF) Applicability	Low Performance	Low Performance

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