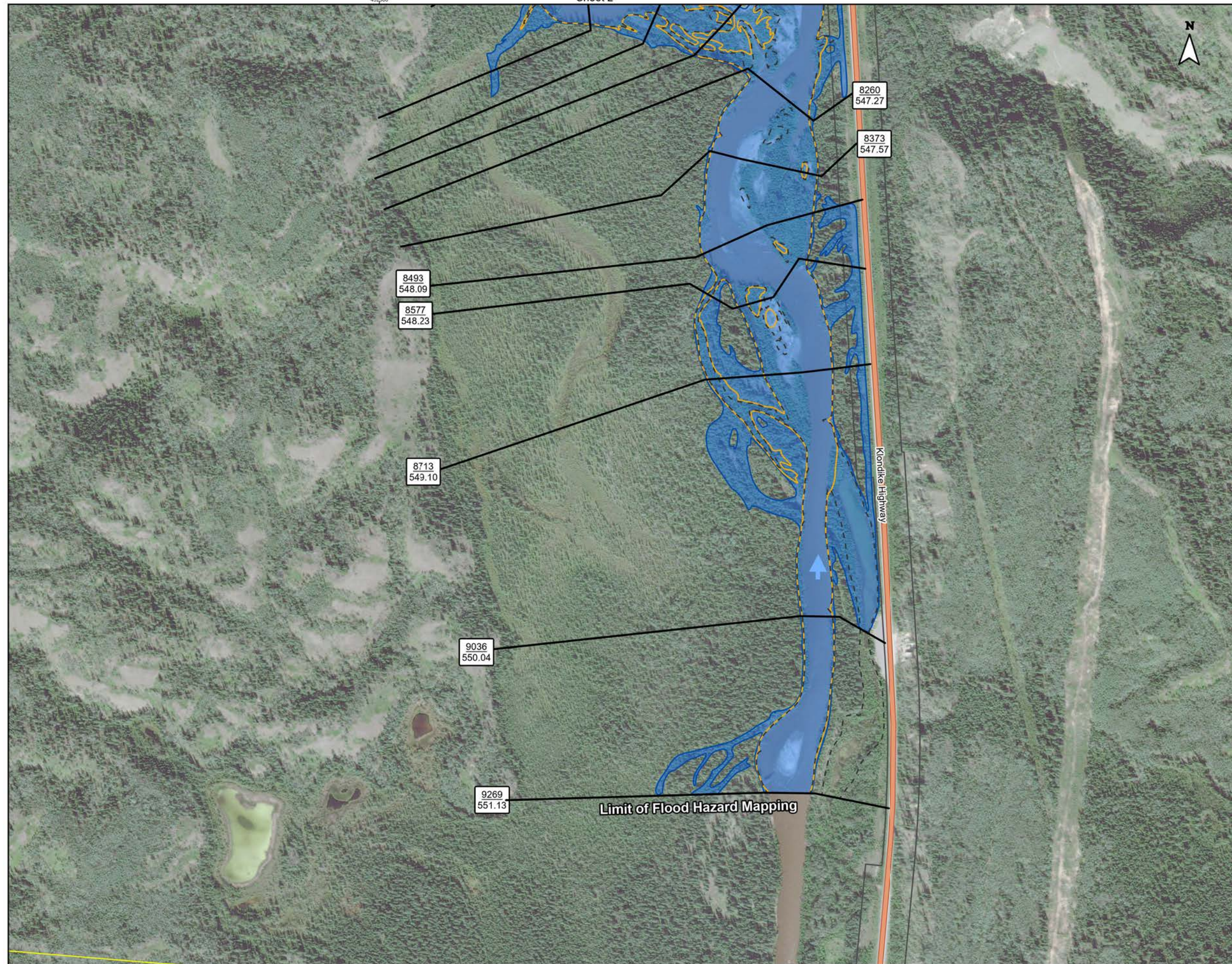


432500

Sheet 2



432500

Figure No.

E.2.1

Sheet 1 of 17

**Title:** Carmacks Flood Mapping Study  
**Composite Flood Hazard Extents**  
**5% Annual Exceedance Probability (AEP) with Factor of Safety for Climate Change**

**Client/Project:**

Government of Yukon  
 Department of Environment  
 Water Resources Branch

**Project:** 123222320

**Project Location:**

Carmacks, Yukon

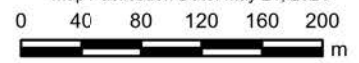
Prepared by MANDERSON on 2024-05-21

Requested by JMUIRHEAD on 2024-01-07

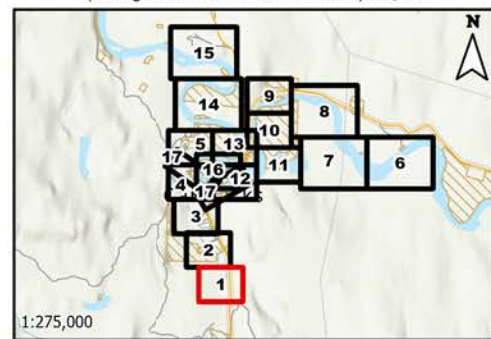
Review by JMUIRHEAD on 2024-05-21

- |   |  |
|---|--|
| Flow Direction  | Hydraulic Model Cross-Sections                                   |
| Point of Interest                                     | Inundation under Modelled Ice Jam Runs                           |
| Bridge  | Inundation under Modelled Open Water Runs                        |
| Highway   | Composite Flood Hazard Extent                                    |
| Local Road  | Ice Jam Location (toe of jam)                                    |
| Little Salmon / Carmacks First Nation Settlement Land | 50 % AEP Extent  |
| Land Parcels  | Hydraulic Model Cross-Sections                                   |
| Municipal Boundary                                    | Cross-Section Number<br>WSE (m) in Main Channel of Cross-Section |
| Study Area  |  |

Map Publication Date: May 21, 2024



(At original document size of 11x 17) 1:5,000



**Notes**

- Coordinate System: NAD 1983 UTM Zone 8N  
Vertical Datum: CGVD2013, Geoid: CGG2013a
- Data Sources: GeoYukon, Canada Lands Survey (CLS) CCM 982, Carvec.
- Background: Yukon Satellites HighRes: Government of Yukon  
World Topographic Map: Northwest Territories, State of Alaska, Esri Canada, Esri, TomTom, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA, NRCAN, Parks Canada  
World Hillshade: Esri, USGS
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- Flood hazard extents shown on these maps are based on LIDAR collected on June 8 - 10 of 2019, and bathymetric/topographic survey collected in July and August of 2023.

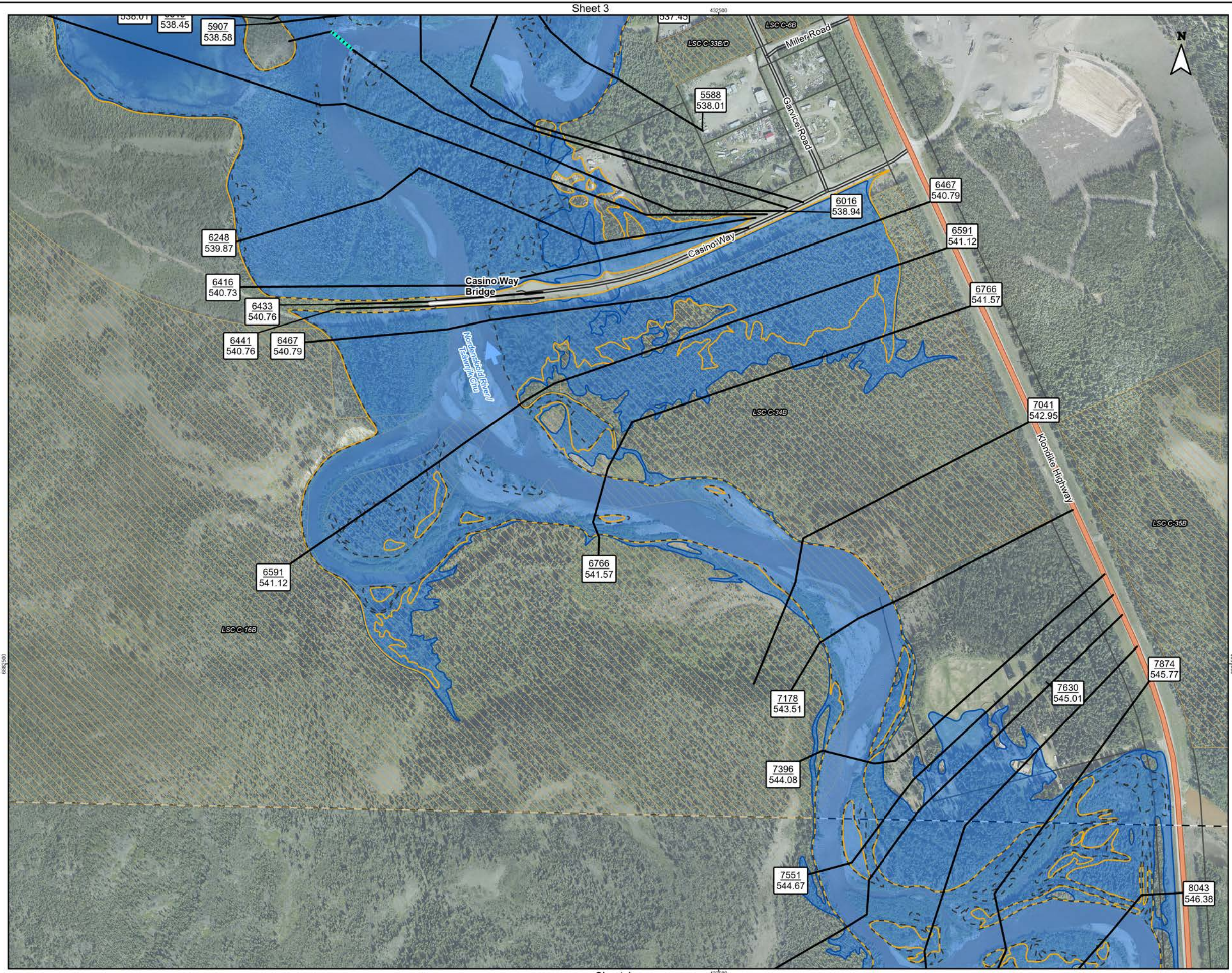


This project is funded in part by the Government of Canada



Disclaimer: The content of these Maps is based on the methods, assumptions, limitations, and analysis documented in the Carmacks Flood Mapping Study Final Report (Stantec 2024). Any unauthorized use or reliance of Maps is at the User's own risk. Stantec disclaims any legal duty based upon warranty, reliance or any other theory to any User, and will not be liable to any User for any damages or losses of any kind that may result.





**Title:** Carmacks Flood Mapping Study  
**Composite Flood Hazard Extents**  
**5% Annual Exceedance Probability (AEP) with Factor of Safety for Climate Change**

**Client/Project:**  
 Government of Yukon  
 Department of Environment  
 Water Resources Branch

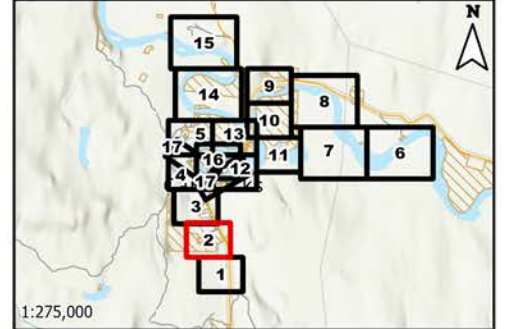
**Project:** 123222320

**Project Location:** Carmacks, Yukon

Prepared by MANDERSON on 2024-05-21  
 Requested by JMUJIRHEAD on 2024-01-07  
 Review by JMUJIRHEAD on 2024-05-21

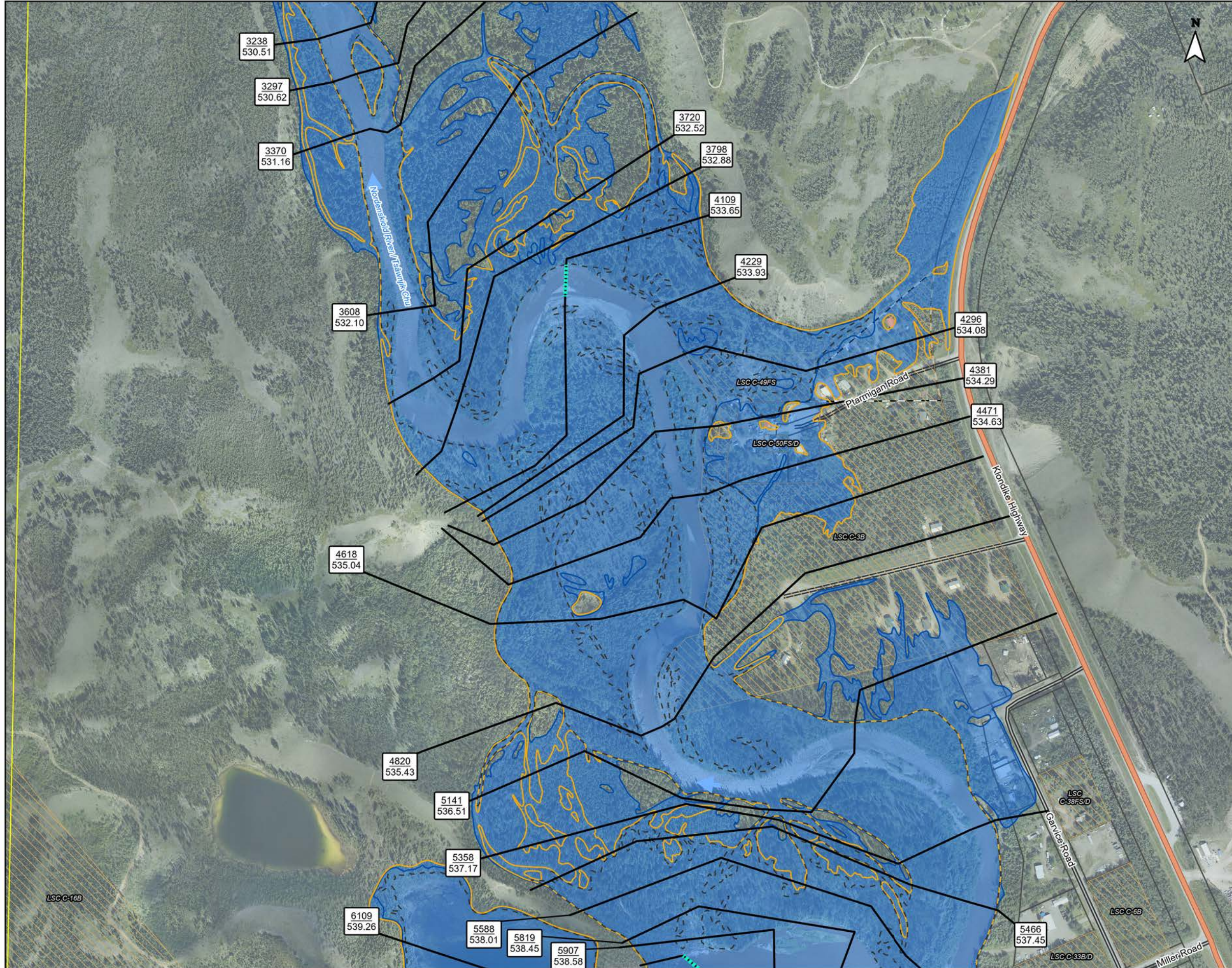
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| Flow Direction  | Hydraulic Model Cross-Sections                                   |
| Point of Interest                                     | Inundation under Modelled Ice Jam Runs                           |
| Bridge  | Inundation under Modelled Open Water Runs                        |
| Highway   | Composite Flood Hazard Extent                                    |
| Local Road  | Ice Jam Location (toe of jam)                                    |
| Little Salmon / Carmacks First Nation Settlement Land | 50 % AEP Extent  |
| Land Parcels  | Hydraulic Model Cross-Sections                                   |
| Municipal Boundary                                    | Cross-Section Number<br>WSE (m) in Main Channel of Cross-Section |
| Study Area  |  |

Map Publication Date: May 21, 2024  
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 (At original document size of 11x 17) 1:5,000



- Notes**
- Coordinate System: NAD 1983 UTM Zone 8N  
 Vertical Datum: CGVD2013, Geoid: CGG2013a
  - Data Sources: GeoYukon, Canada Lands Survey (CLS) CCM 982, Carvec.
  - Background: World Topographic Map: Northwest Territories, State of Alaska, Esri Canada, Esri, TomTom, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA, NRCAN, Parks Canada  
 World Hillshade: Esri, USGS
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  - Flood hazard extents shown on these maps are based on LIDAR collected on June 8 - 10 of 2019, and bathymetric/topographic survey collected in July and August of 2023.





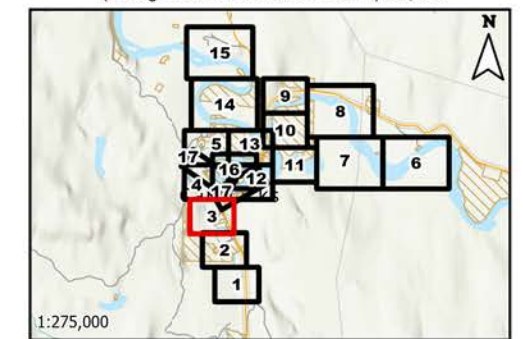
**Title:** Carmacks Flood Mapping Study  
Composite Flood Hazard Extents  
5% Annual Exceedance Probability (AEP) with Factor of Safety for Climate Change

**Client/Project:**  
Government of Yukon  
Department of Environment  
Water Resources Branch

**Project:** 12322320  
**Project Location:** Carmacks, Yukon  
Prepared by MANDERSON on 2024-05-21  
Requested by JMUIRHEAD on 2024-01-07  
Review by JMUIRHEAD on 2024-05-21

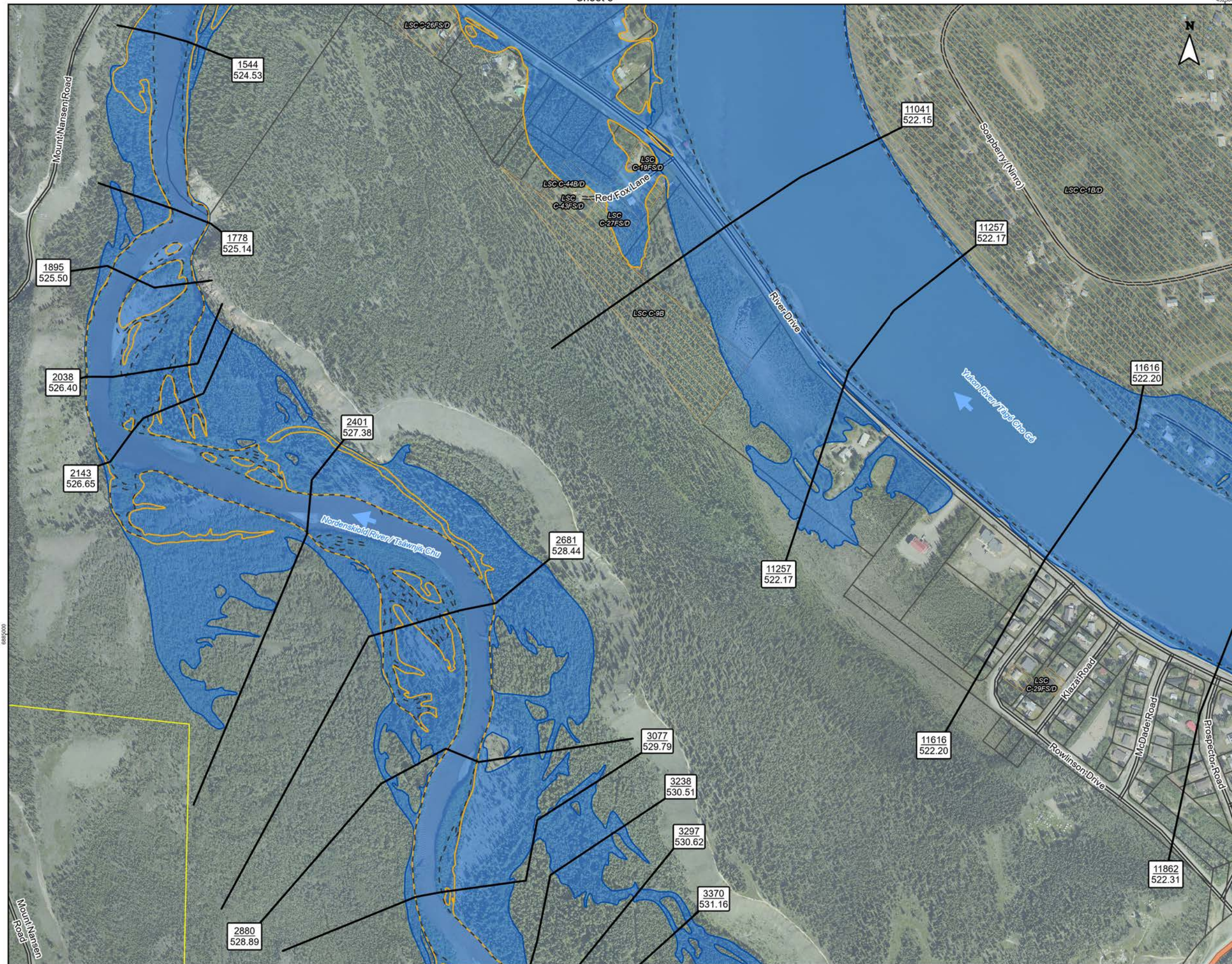
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| Flow Direction  | Hydraulic Model Cross-Sections                                   |
| Point of Interest                                     | Inundation under Modelled Ice Jam Runs                           |
| Bridge  | Inundation under Modelled Open Water Runs                        |
| Highway   | Composite Flood Hazard Extent                                    |
| Local Road  | Ice Jam Location (toe of jam)                                    |
| Little Salmon / Carmacks First Nation Settlement Land | 50 % AEP Extent  |
| Land Parcels  | Hydraulic Model Cross-Sections                                   |
| Municipal Boundary                                    | Cross-Section Number<br>WSE (m) in Main Channel of Cross-Section |
| Study Area  |  |

Map Publication Date: May 21, 2024  
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(At original document size of 11x 17) 1:5,000



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 8N  
Vertical Datum: CGVD2013, Geoid: CGG2013a
  2. Data Sources: GeoYukon, Canada Lands Survey (CLS) CCM 982, Canvec.
  3. Background: World Topographic Map: Northwest Territories, State of Alaska, Esri Canada, Esri, TomTom, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA, NRCAN, Parks Canada  
World Hillshade: Esri, USGS
  4. Nordenskiöld River Climate Change Factor of Safety = 1.2 and Yukon River Climate Change Factor of Safety = 1.1 as identified during meetings with YG, NRCAN, ECCO on September 8, 2023 and November 6, 2023
  5. Flood hazard extents shown on these maps are based on LIDAR collected on June 8 - 10 of 2019, and bathymetric/topographic survey collected in July and August of 2023.





**Title:** Carmacks Flood Mapping Study  
Composite Flood Hazard Extents  
5% Annual Exceedance Probability (AEP) with Factor of Safety for Climate Change

**Client/Project:**  
Government of Yukon  
Department of Environment  
Water Resources Branch

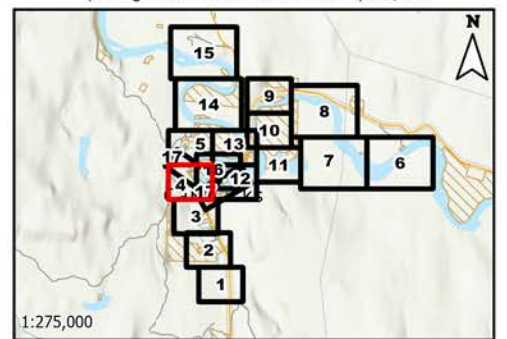
**Project:** 123222320

**Project Location:** Carmacks, Yukon  
Prepared by MANDERSON on 2024-05-21  
Requested by JMUIRHEAD on 2024-01-07  
Review by JMUIRHEAD on 2024-05-21

- |   |   |
|---|---|
| Flow Direction  | Hydraulic Model Cross-Sections            |
| Point of Interest                                     | Inundation under Modelled Ice Jam Runs    |
| Bridge  | Inundation under Modelled Open Water Runs |
| Highway   | Composite Flood Hazard Extent             |
| Local Road  | Ice Jam Location (toe of jam)             |
| Little Salmon / Carmacks First Nation Settlement Land | 50 % AEP Extent                           |
| Land Parcels  | Hydraulic Model Cross-Sections            |
| Municipal Boundary                                    | Cross-Section Number                      |
| Study Area  | WSE (m) in Main Channel of Cross-Section  |

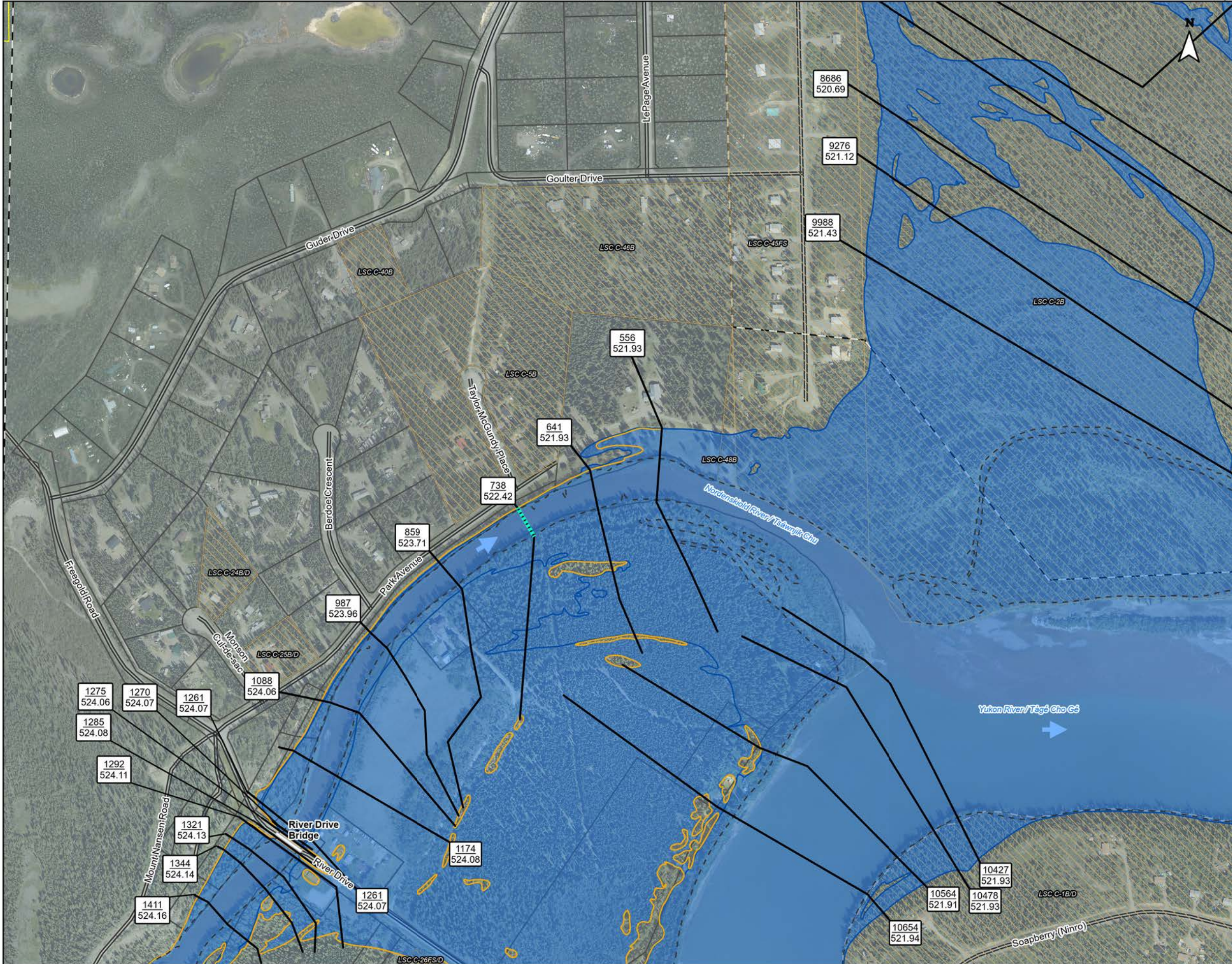
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Map Publication Date: May 21, 2024  
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(At original document size of 11x 17) 1:5,000



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 8N  
Vertical Datum: CGVD2013, Geoid: CGG2013a
  2. Data Sources: GeoYukon, Canada Lands Survey (CLS) CCM 982, Carvec.
  3. Background: World Topographic Map: Northwest Territories, State of Alaska, Esri Canada, Esri, TomTom, Garmin, SafeGraph, MET/NASA, USGS, EPA, NPS, USDA, NRCAN, Parks Canada  
World Hillshade: Esri, USGS
  4. Nordskiold River Climate Change Factor of Safety = 1.2 and Yukon River Climate Change Factor of Safety = 1.1 as identified during meetings with YG, NRCAN, ECCO on September 8, 2023 and November 6, 2023
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Sheet 13

**Title:** Carmacks Flood Mapping Study  
Composite Flood Hazard Extents  
5% Annual Exceedance Probability (AEP) with Factor of Safety for Climate Change

**Client/Project:**  
Government of Yukon  
Department of Environment  
Water Resources Branch

**Project:** 12322320

**Project Location:** Carmacks, Yukon

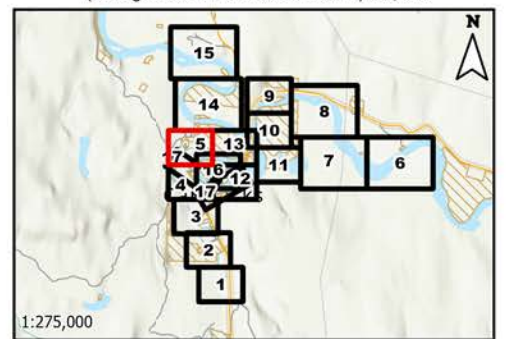
Prepared by MANDERSON on 2024-05-21  
Requested by JMUIRHEAD on 2024-01-07  
Review by JMUIRHEAD on 2024-05-21

- |   |   |
|---|---|
| Flow Direction  | Hydraulic Model Cross-Sections            |
| Point of Interest                                     | Inundation under Modelled Ice Jam Runs    |
| Bridge  | Inundation under Modelled Open Water Runs |
| Highway   | Composite Flood Hazard Extent             |
| Local Road  | Ice Jam Location (toe of jam)             |
| Little Salmon / Carmacks First Nation Settlement Land | 50 % AEP Extent                           |
| Land Parcels  | Hydraulic Model Cross-Sections            |
| Municipal Boundary                                    | Cross-Section Number                      |
| Study Area  | WSE (m) in Main Channel of Cross-Section  |

Map Publication Date: May 21, 2024

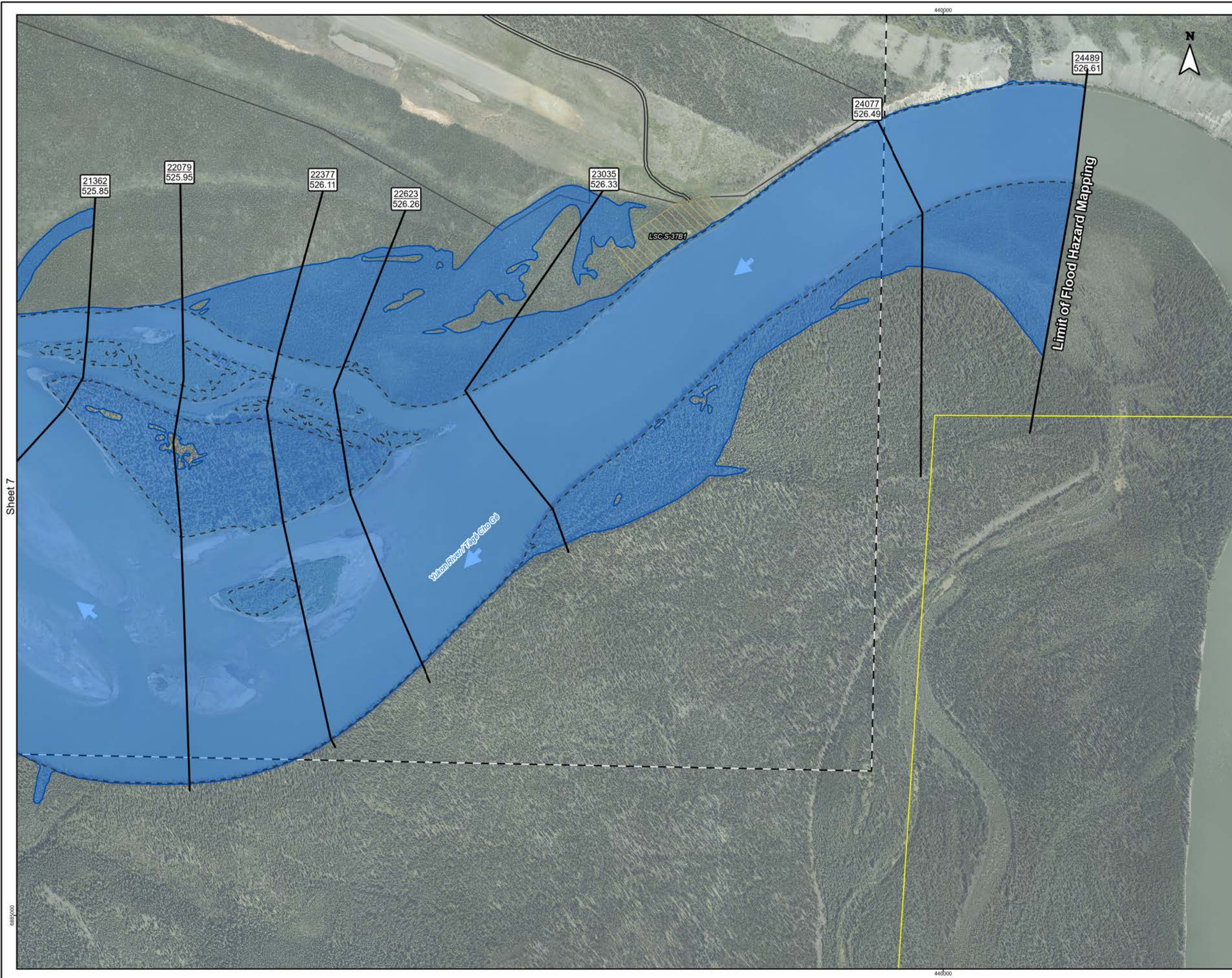
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(At original document size of 11x 17) 1:5,000



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 8N  
Vertical Datum: CGVD2013, Geoid: CGG2013a
  2. Data Sources: GeoYukon, Canada Lands Survey (CLS) CCM 982, Canvec.
  3. Background: World Topographic Map: Northwest Territories, State of Alaska, Esri Canada, Esri, TomTom, Garmin, SafeGraph, MET/NASA, USGS, EPA, NPS, USDA, NRCAN, Parks Canada  
World Hillshade: Esri, USGS
  4. Nordenstöld River Climate Change Factor of Safety = 1.2 and Yukon River Climate Change Factor of Safety = 1.1 as identified during meetings with YG, NRCAN, ECCO on September 8, 2023 and November 6, 2023
  5. Flood hazard extents shown on these maps are based on LIDAR collected on June 8 - 10 of 2019, and bathymetric/topographic survey collected in July and August of 2023.





Sheet 7

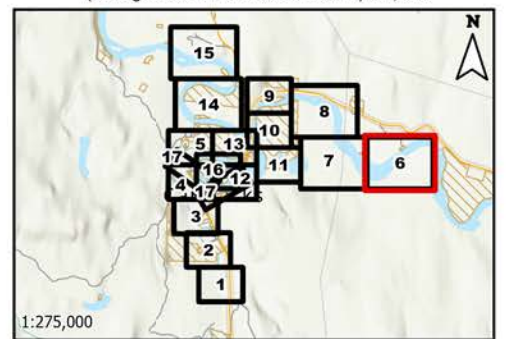
**Title:** Carmacks Flood Mapping Study  
Composite Flood Hazard Extents  
5% Annual Exceedance Probability (AEP) with Factor of Safety for Climate Change

**Client/Project:**  
Government of Yukon  
Department of Environment  
Water Resources Branch  
  
Project: 123222320

**Project Location:** Carmacks, Yukon  
Prepared by MANDERSON on 2024-05-21  
Requested by JMUIRHEAD on 2024-01-07  
Review by JMUIRHEAD on 2024-05-21

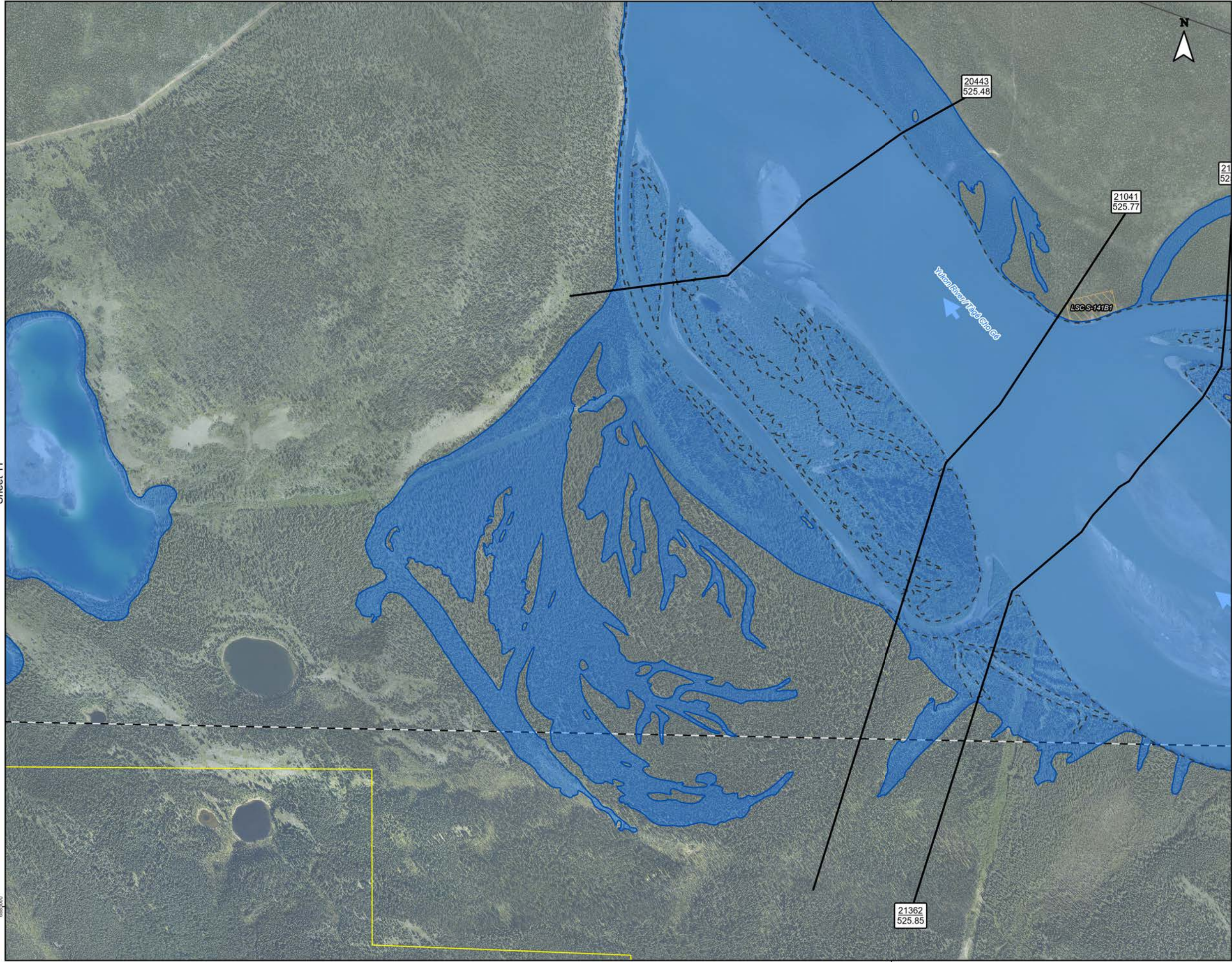
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| ➔ Flow Direction                                      | — Hydraulic Model Cross-Sections               |
| ★ Point of Interest                                   | — Inundation under Modelled Ice Jam Runs       |
| — Bridge  | — Inundation under Modelled Open Water Runs    |
| — Highway   | — Composite Flood Hazard Extent                |
| — Local Road  | — Ice Jam Location (toe of jam)                |
| Little Salmon / Carmacks First Nation Settlement Land | — 50 % AEP Extent                              |
| — Land Parcels  | — Hydraulic Model Cross-Sections               |
| — Municipal Boundary                                  | 57 Cross-Section Number                        |
| — Study Area  | 517.2 WSE (m) in Main Channel of Cross-Section |

Map Publication Date: May 21, 2024  
0 70 140 210 280 350  
m  
(At original document size of 11x 17) 1:8,000



- Notes**
- Coordinate System: NAD 1983 UTM Zone 8N  
Vertical Datum: CGVD2013, Geoid: CGG2013a
  - Data Sources: GeoYukon, Canada Lands Survey (CLS) CCM 982, Carvec.
  - Background: World Topographic Map: Northwest Territories, State of Alaska, Esri Canada, Esri, TomTom, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA, NRCAN, Parks Canada  
World Hillshade: Esri, USGS
  - Nordenskiöld River Climate Change Factor of Safety = 1.2 and Yukon River Climate Change Factor of Safety = 1.1 as identified during meetings with YG, NRCAN, ECCO on September 8, 2023 and November 6, 2023
  - Flood hazard extents shown on these maps are based on LIDAR collected on June 8 - 10 of 2019, and bathymetric/topographic survey collected in July and August of 2023.





Sheet 11

Sheet 6

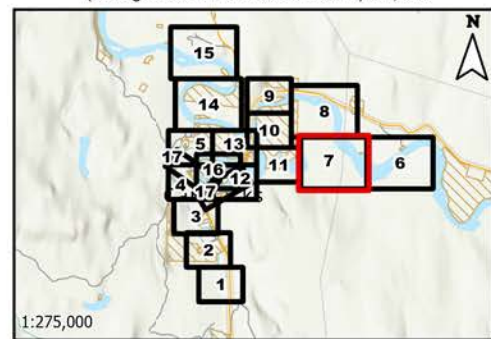
Figure No. **E.2.7** Sheet 7 of 17  
 Title: **Carmacks Flood Mapping Study  
 Composite Flood Hazard Extents  
 5% Annual Exceedance Probability (AEP) with Factor of  
 Safety for Climate Change**

Client/Project:  
 Government of Yukon  
 Department of Environment  
 Water Resources Branch  
 Project: 12322320

Project Location: Carmacks, Yukon  
 Prepared by MANDERSON on 2024-05-21  
 Requested by JMUIRHEAD on 2024-01-07  
 Review by JMUIRHEAD on 2024-05-21

- |   |  |
|---|--|
| ➔ Flow Direction                                      | — Hydraulic Model Cross-Sections               |
| ★ Point of Interest                                   | — Inundation under Modelled Ice Jam Runs       |
| — Bridge  | — Inundation under Modelled Open Water Runs    |
| — Highway   | — Composite Flood Hazard Extent                |
| — Local Road  | — Ice Jam Location (toe of jam)                |
| Little Salmon / Carmacks First Nation Settlement Land | — 50% AEP Extent                               |
| Land Parcels  | — Hydraulic Model Cross-Sections               |
| Municipal Boundary                                    | 57 Cross-Section Number                        |
| Study Area  | 517.2 WSE (m) in Main Channel of Cross-Section |

Map Publication Date: May 21, 2024  
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 (At original document size of 11x 17) 1:8,000



**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 8N  
 Vertical Datum: CGVD2013, Geoid: CGG2013a  
 2. Data Sources: GeoYukon, Canada Lands Survey (CLS) CCM 982, Carvec.  
 3. Background: World Topographic Map: Northwest Territories, State of Alaska, Esri Canada, Esri, TomTom, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA, NRCAN, Parks Canada  
 World Hillshade: Esri, USGS  
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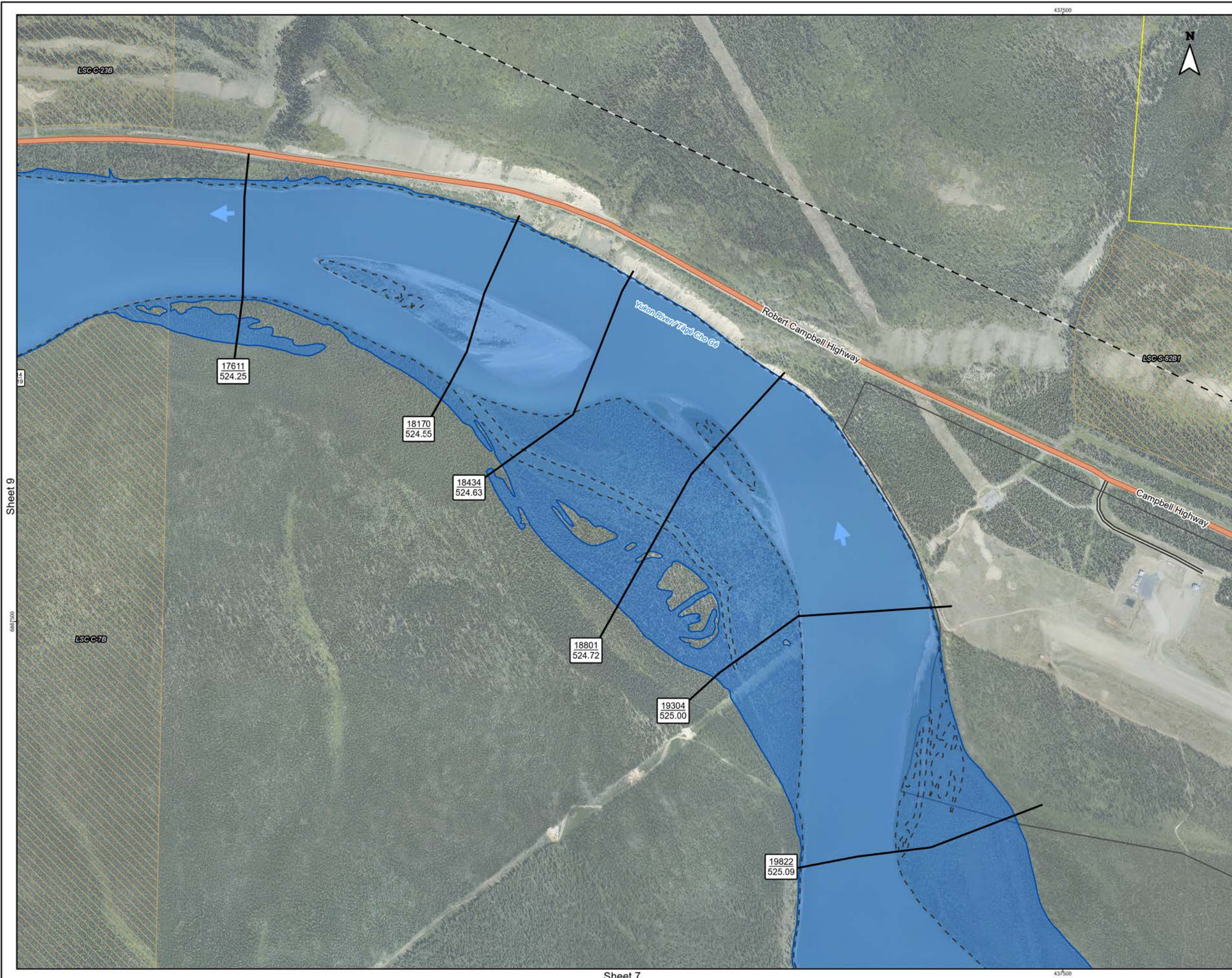


Figure No. **E.2.8** Sheet 8 of 17

Title: **Carmacks Flood Mapping Study  
Composite Flood Hazard Extents  
5% Annual Exceedance Probability (AEP) with Factor of  
Safety for Climate Change**

Client/Project:  
Government of Yukon  
Department of Environment  
Water Resources Branch

Project: 123222320

Project Location: Carmacks, Yukon

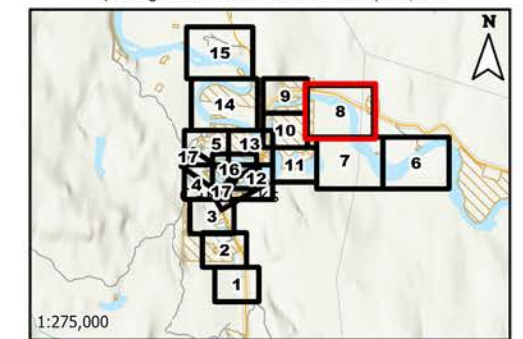
Prepared by MANDERSON on 2024-05-21  
Requested by JMUIRHEAD on 2024-01-07  
Review by JMUIRHEAD on 2024-05-21

- |   |   |
|---|---|
| Flow Direction  | Hydraulic Model Cross-Sections                                      |
| Point of Interest                                     | Inundation under Modelled Ice Jam Runs                              |
| Bridge  | Inundation under Modelled Open Water Runs                           |
| Highway   | Composite Flood Hazard Extent                                       |
| Local Road  | Ice Jam Location (toe of jam)                                       |
| Little Salmon / Carmacks First Nation Settlement Land | 50 % AEP Extent   |
| Land Parcels  | Hydraulic Model Cross-Sections                                      |
| Municipal Boundary                                    | Cross-Section Number<br>WSE (m) in Main Channel<br>of Cross-Section |
| Study Area  |   |

Map Publication Date: May 21, 2024

0 70 140 210 280 350 m

(At original document size of 11x 17) 1:8,000



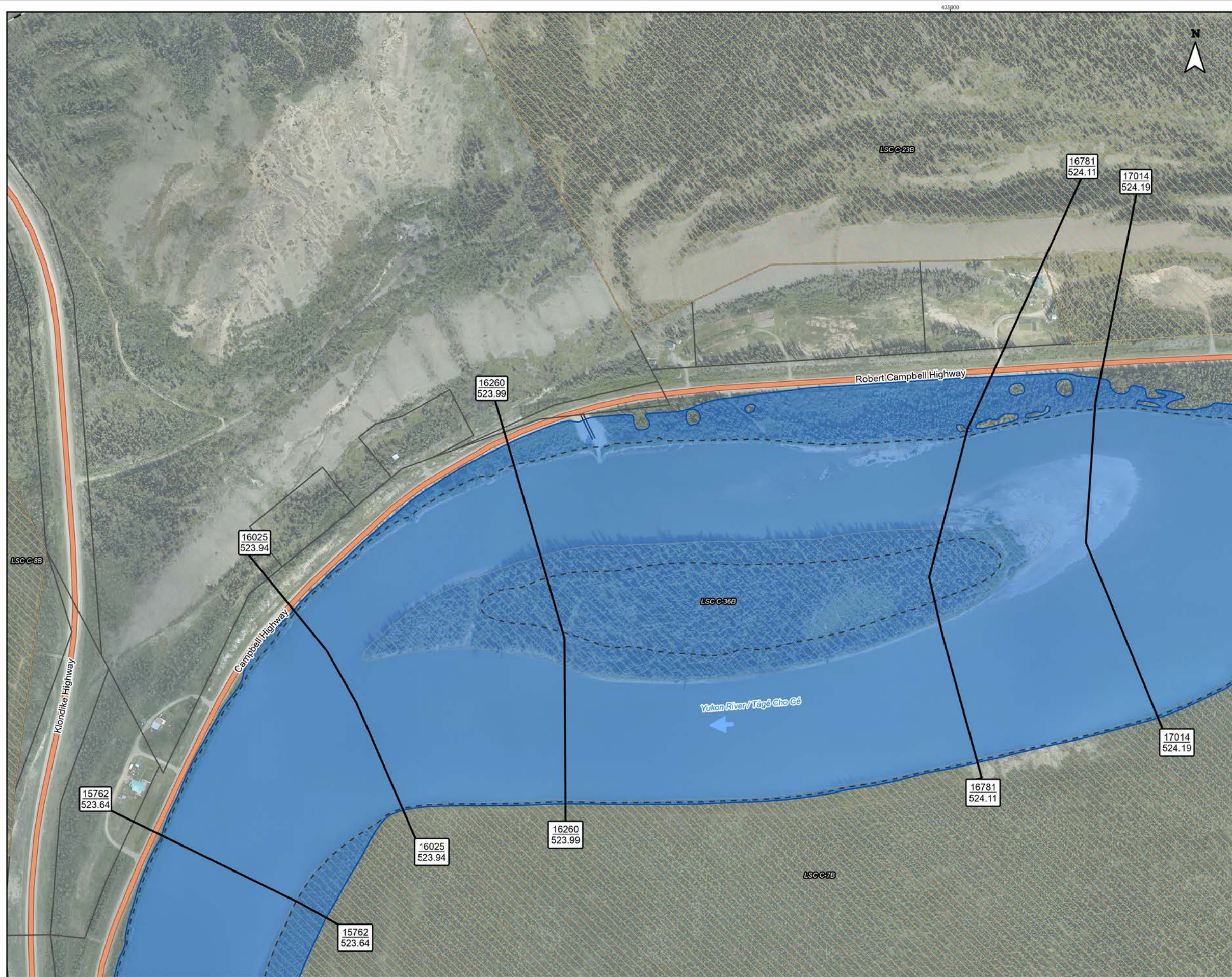
**Notes**

- Coordinate System: NAD 1983 UTM Zone 8N  
Vertical Datum: CGVD2013, Geoid: CGG2013a
- Data Sources: GeoYukon, Canada Lands Survey (CLS) CCM 982, Carvec.
- Background: World Topographic Map: Northwest Territories, State of Alaska, Esri Canada, Esri, TomTom, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA, NRCAN, Parks Canada  
World Hillshade: Esri, USGS
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**Carmacks Flood Mapping Study  
Composite Flood Hazard Extents  
5% Annual Exceedance Probability (AEP) with Factor of  
Safety for Climate Change**

Client/Project:  
Government of Yukon  
Department of Environment  
Water Resources Branch

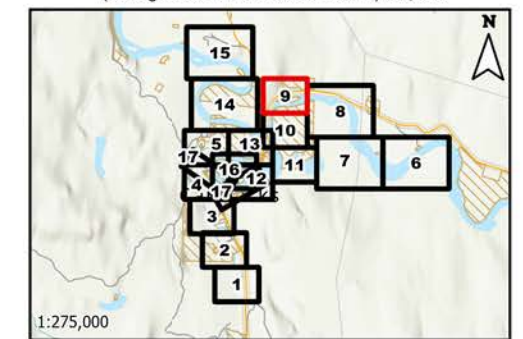
Project: 123222320

Project Location: Carmacks, Yukon  
Prepared by MANDERSON on 2024-05-21  
Requested by JMUIRHEAD on 2024-01-07  
Review by JMUIRHEAD on 2024-05-21

- |   |   |
|---|---|
| Flow Direction  | Hydraulic Model Cross-Sections            |
| Point of Interest                                     | Inundation under Modelled Ice Jam Runs    |
| Bridge  | Inundation under Modelled Open Water Runs |
| Highway   | Composite Flood Hazard Extent             |
| Local Road  | Ice Jam Location (toe of jam)             |
| Little Salmon / Carmacks First Nation Settlement Land | 50 % AEP Extent                           |
| Land Parcels  | Hydraulic Model Cross-Sections            |
| Municipal Boundary                                    | Cross-Section Number                      |
| Study Area  | WSE (m) in Main Channel of Cross-Section  |

Sheet 8

Map Publication Date: May 21, 2024  
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(At original document size of 11x 17) 1:5,000



- Notes**
- Coordinate System: NAD 1983 UTM Zone 8N  
Vertical Datum: CGVD2013, Geoid: CGG2013a
  - Data Sources: GeoYukon, Canada Lands Survey (CLS) CCM 982, Canvec.
  - Background: World Topographic Map: Northwest Territories, State of Alaska, Esri Canada, Esri, TomTom, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA, NRCAN, Parks Canada  
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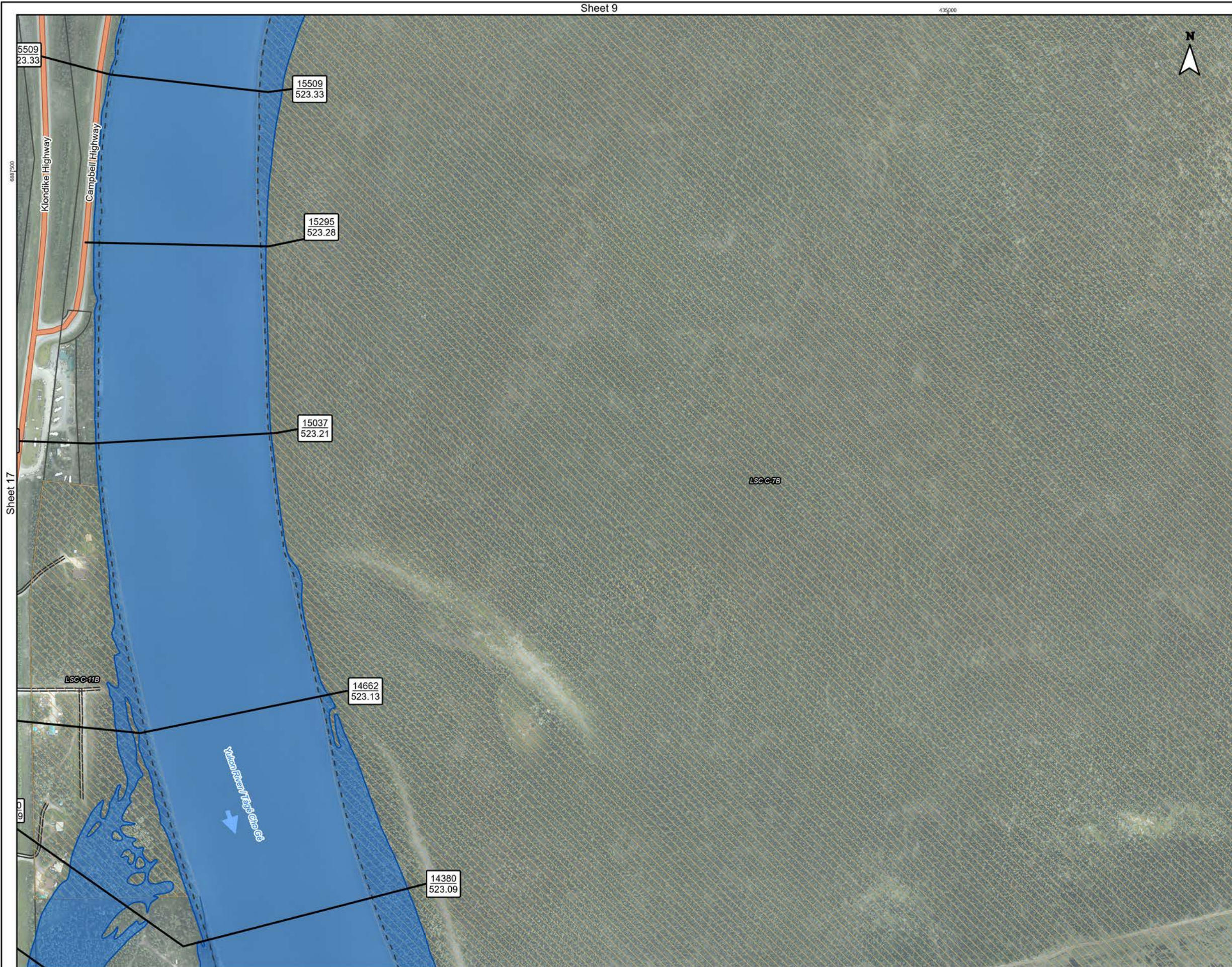


Figure No.

E.2.10

Sheet 10 of 17

**Title:**  
**Carmacks Flood Mapping Study**  
**Composite Flood Hazard Extents**  
**5% Annual Exceedance Probability (AEP) with Factor of**  
**Safety for Climate Change**

**Client/Project:**

Government of Yukon  
 Department of Environment  
 Water Resources Branch

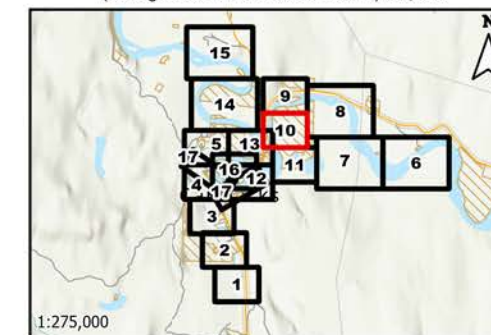
**Project:** 123222320

**Project Location:**  
 Carmacks, Yukon

Prepared by MANDERSON on 2024-05-21  
 Requested by JMUJIRHEAD on 2024-01-07  
 Review by JMUJIRHEAD on 2024-05-21

- |   |  |
|---|--|
| Flow Direction  | Hydraulic Model Cross-Sections                                   |
| Point of Interest                                     | Inundation under Modelled Ice Jam Runs                           |
| Bridge  | Inundation under Modelled Open Water Runs                        |
| Highway   | Composite Flood Hazard Extent                                    |
| Local Road  | Ice Jam Location (toe of jam)                                    |
| Little Salmon / Carmacks First Nation Settlement Land | 50 % AEP Extent  |
| Land Parcels  | Hydraulic Model Cross-Sections                                   |
| Municipal Boundary                                    | Cross-Section Number<br>WSE (m) in Main Channel of Cross-Section |
| Study Area  |  |

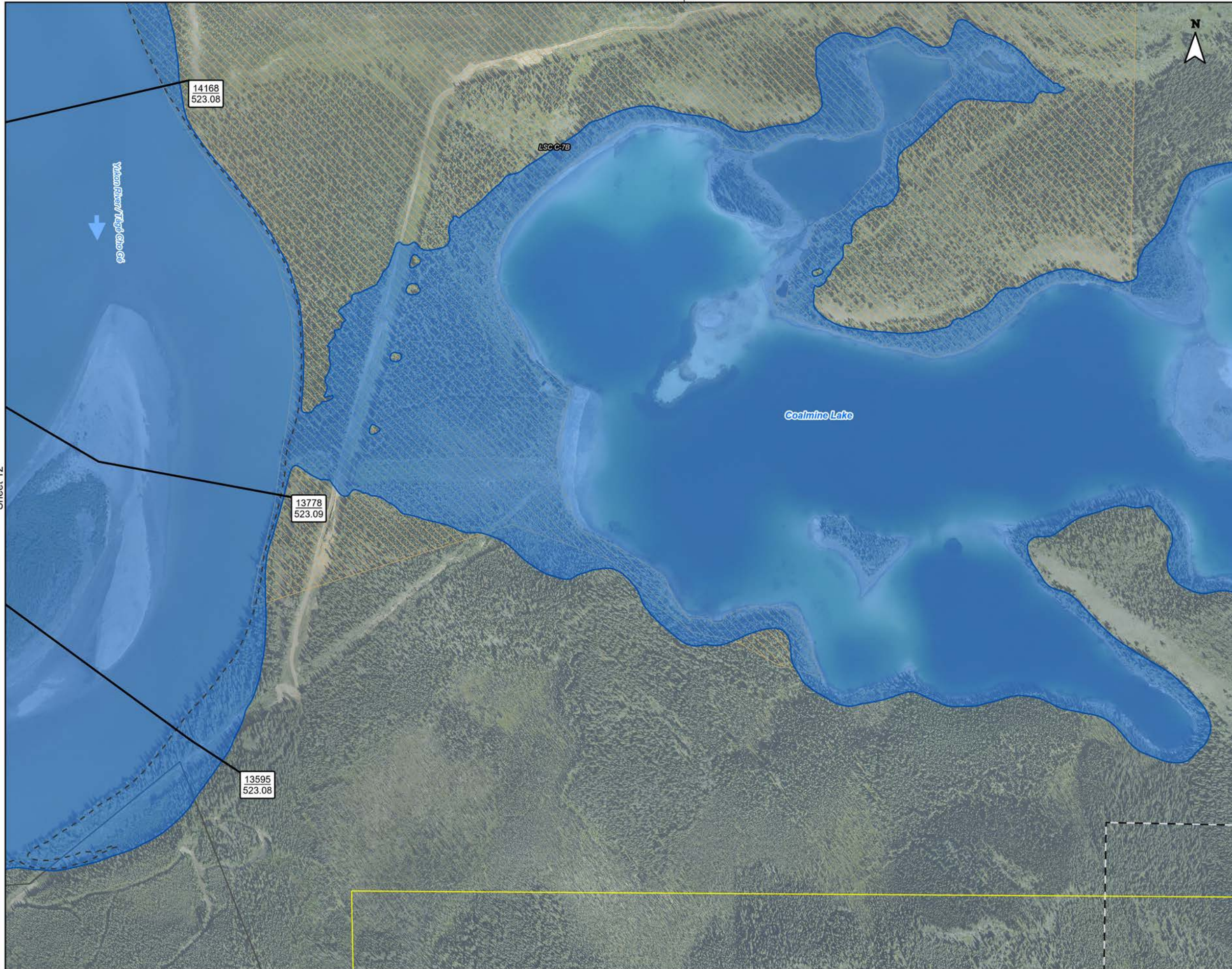
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- Notes**
- Coordinate System: NAD 1983 UTM Zone 8N  
Vertical Datum: CGVD2013, Geoid: CGG2013a
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  - Background: World Topographic Map: Northwest Territories, State of Alaska, Esri Canada, Esri, TomTom, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA, NRCAN, Parks Canada  
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  - Nordenskiöld River Climate Change Factor of Safety = 1.2 and Yukon River Climate Change Factor of Safety = 1.1 as identified during meetings with YG, NRCAN, ECCO on September 8, 2023 and November 6, 2023
  - Flood hazard extents shown on these maps are based on LIDAR collected on June 8 - 10 of 2019, and bathymetric/topographic survey collected in July and August of 2023.







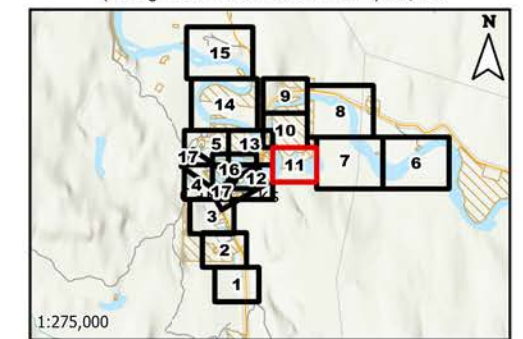
Sheet 12

Sheet 7

Figure No. **E.2.11** Sheet 11 of 17  
 Title: **Carmacks Flood Mapping Study Composite Flood Hazard Extents 5% Annual Exceedance Probability (AEP) with Factor of Safety for Climate Change**  
 Client/Project: Government of Yukon, Department of Environment, Water Resources Branch  
 Project: 123222320  
 Project Location: Carmacks, Yukon  
 Prepared by MANDERSON on 2024-05-21  
 Requested by JMUIRHEAD on 2024-01-07  
 Review by JMUIRHEAD on 2024-05-21

- |   |   |
|---|---|
| Flow Direction  | Hydraulic Model Cross-Sections            |
| Point of Interest                                     | Inundation under Modelled Ice Jam Runs    |
| Bridge  | Inundation under Modelled Open Water Runs |
| Highway   | Composite Flood Hazard Extent             |
| Local Road  | Ice Jam Location (toe of jam)             |
| Little Salmon / Carmacks First Nation Settlement Land | 50 % AEP Extent                           |
| Land Parcels  | Hydraulic Model Cross-Sections            |
| Municipal Boundary                                    | Cross-Section Number                      |
| Study Area  | WSE (m) in Main Channel of Cross-Section  |

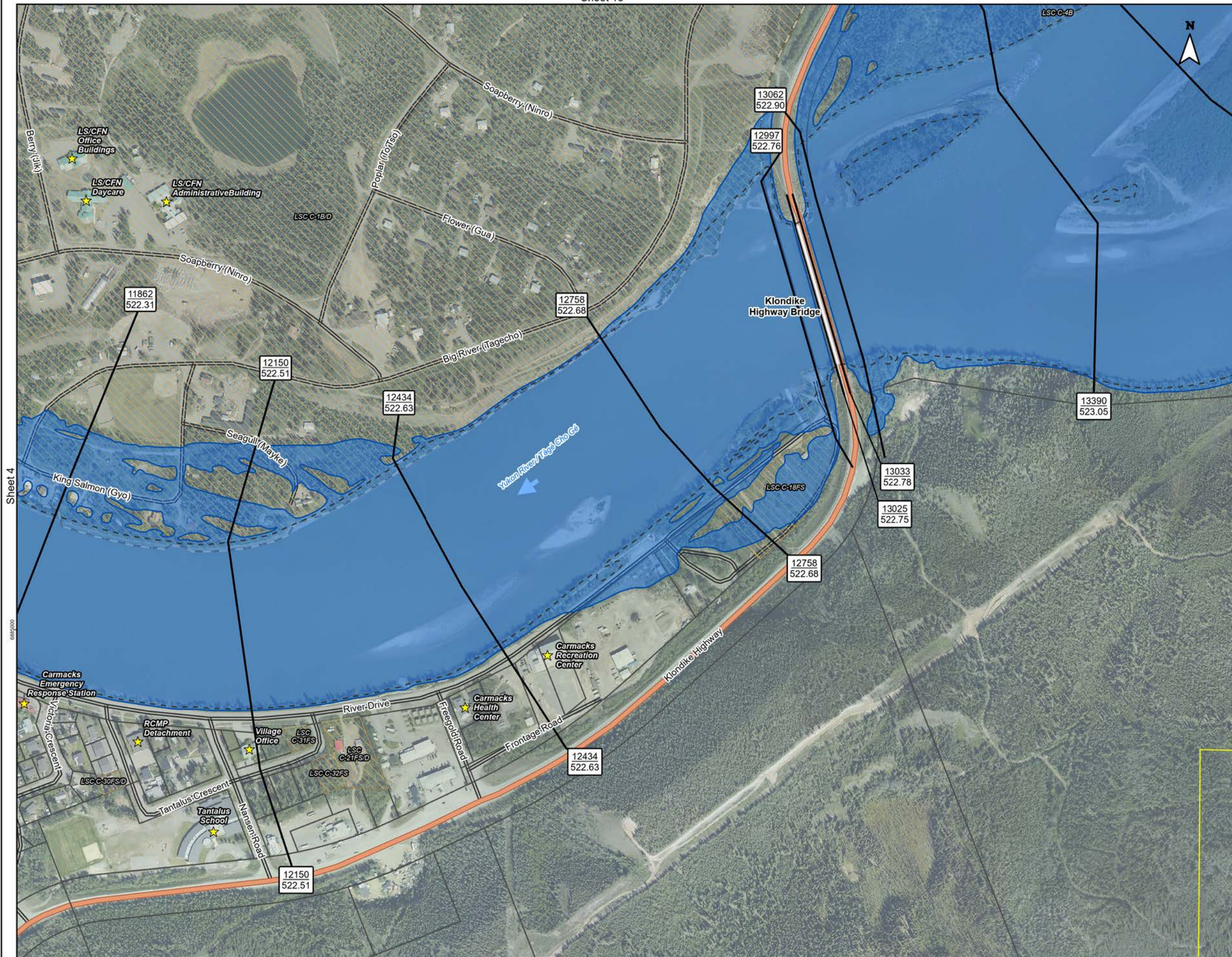
Map Publication Date: May 21, 2024  
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 (At original document size of 11x 17) 1:5,000



**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 8N  
 Vertical Datum: CGVD2013, Geoid: CGG2013a  
 2. Data Sources: GeoYukon, Canada Lands Survey (CLS) CCM 982, Carvec.  
 3. Background: World Topographic Map: Northwest Territories, State of Alaska, Esri Canada, Esri, TomTom, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA, NRCAN, Parks Canada  
 World Hillshade: Esri, USGS  
 4. Nordenskiöld River Climate Change Factor of Safety = 1.2 and Yukon River Climate Change Factor of Safety = 1.1 as identified during meetings with YG, NRCAN, ECCO on September 8, 2023 and November 6, 2023  
 5. Flood hazard extents shown on these maps are based on LIDAR collected on June 8 - 10 of 2019, and bathymetric/topographic survey collected in July and August of 2023.







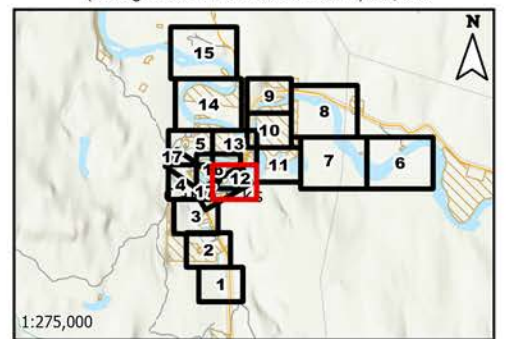
**Title:** Carmacks Flood Mapping Study  
Composite Flood Hazard Extents  
5% Annual Exceedance Probability (AEP) with Factor of Safety for Climate Change

**Client/Project:**  
Government of Yukon  
Department of Environment  
Water Resources Branch

**Project:** 123222320  
**Project Location:** Carmacks, Yukon  
Prepared by MANDERSON on 2024-05-21  
Requested by JMUIRHEAD on 2024-01-07  
Review by JMUIRHEAD on 2024-05-21

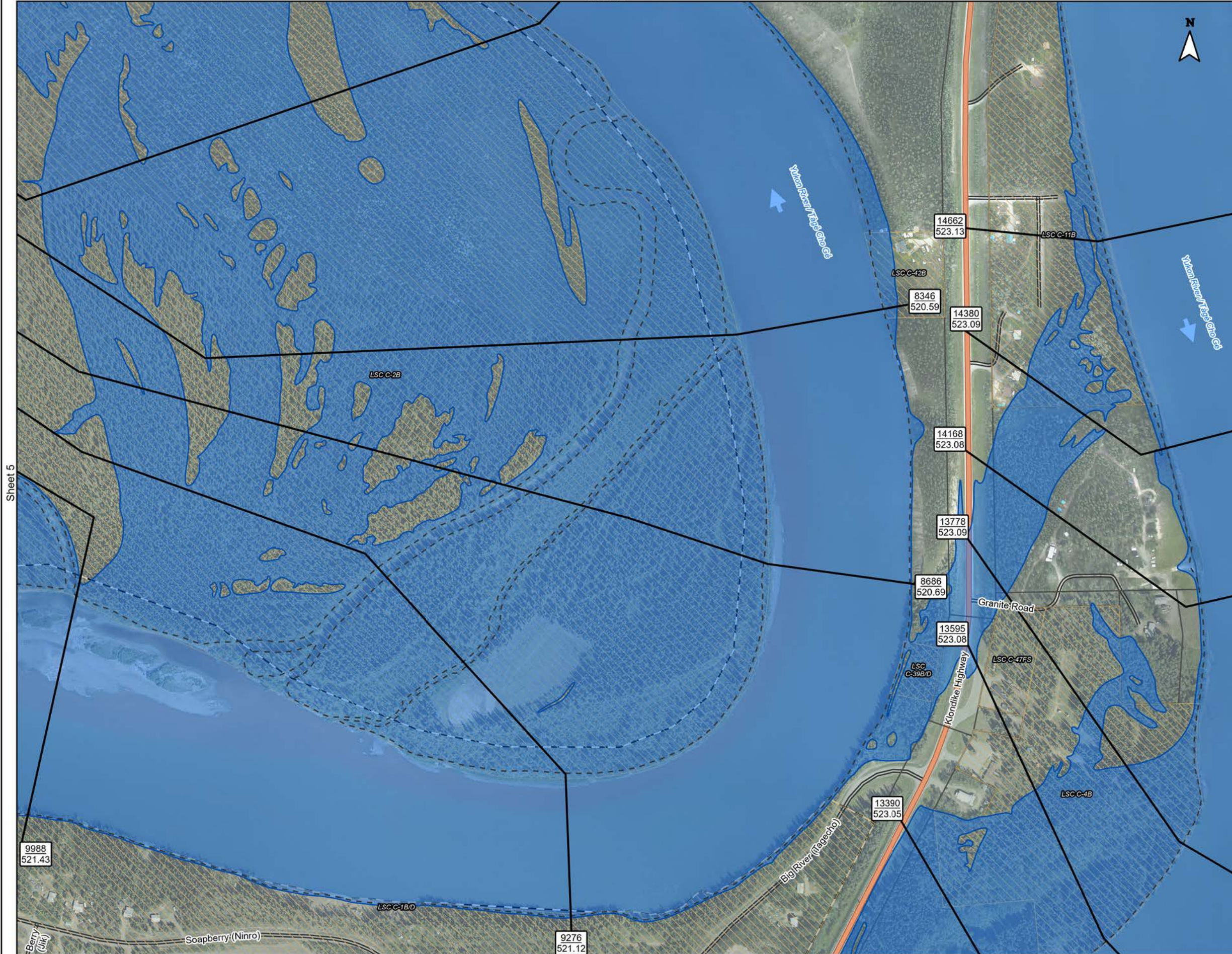
- |   |  |
|---|--|
| Flow Direction  | Hydraulic Model Cross-Sections                                   |
| Point of Interest                                     | Inundation under Modelled Ice Jam Runs                           |
| Bridge  | Inundation under Modelled Open Water Runs                        |
| Highway   | Composite Flood Hazard Extent                                    |
| Local Road  | Ice Jam Location (toe of jam)                                    |
| Little Salmon / Carmacks First Nation Settlement Land | 50 % AEP Extent  |
| Land Parcels  | Hydraulic Model Cross-Sections                                   |
| Municipal Boundary                                    | Cross-Section Number<br>WSE (m) in Main Channel of Cross-Section |
| Study Area  |  |

Map Publication Date: May 21, 2024  
0 40 80 120 160 200 m  
(At original document size of 11x 17) 1:5,000



- Notes**
- Coordinate System: NAD 1983 UTM Zone 8N  
Vertical Datum: CGVD2013, Geoid: CGG2013a
  - Data Sources: GeoYukon, Canada Lands Survey (CLS) CCM 982, Canvec.
  - Background: World Topographic Map: Northwest Territories, State of Alaska, Esri Canada, Esri, TomTom, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA, NRCAN, Parks Canada  
World Hillshade: Esri, USGS
  - Nordenskiöld River Climate Change Factor of Safety = 1.2 and Yukon River Climate Change Factor of Safety = 1.1 as identified during meetings with YG, NRCAN, ECCO on September 8, 2023 and November 6, 2023
  - Flood hazard extents shown on these maps are based on LIDAR collected on June 8 - 10 of 2019, and bathymetric/topographic survey collected in July and August of 2023.





Sheet 5

Sheet 11

Figure No. **E.2.13** Sheet 13 of 17

Title: **Carmacks Flood Mapping Study  
Composite Flood Hazard Extents  
5% Annual Exceedance Probability (AEP) with Factor of  
Safety for Climate Change**

Client/Project:  
Government of Yukon  
Department of Environment  
Water Resources Branch

Project: 123222320

Project Location: Carmacks, Yukon

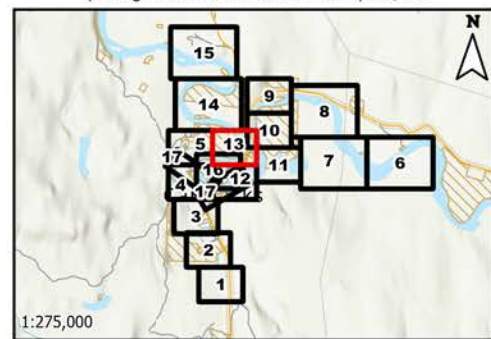
Prepared by MANDERSON on 2024-05-21  
Requested by JMUIRHEAD on 2024-01-07  
Review by JMUIRHEAD on 2024-05-21

- |   |   |
|---|---|
| Flow Direction  | Hydraulic Model Cross-Sections            |
| Point of Interest                                     | Inundation under Modelled Ice Jam Runs    |
| Bridge  | Inundation under Modelled Open Water Runs |
| Highway   | Composite Flood Hazard Extent             |
| Local Road  | Ice Jam Location (toe of jam)             |
| Little Salmon / Carmacks First Nation Settlement Land | 50 % AEP Extent                           |
| Land Parcels  | Hydraulic Model Cross-Sections            |
| Municipal Boundary                                    | Cross-Section Number                      |
| Study Area  | WSE (m) in Main Channel of Cross-Section  |

Map Publication Date: May 21, 2024

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(At original document size of 11x 17) 1:5,000



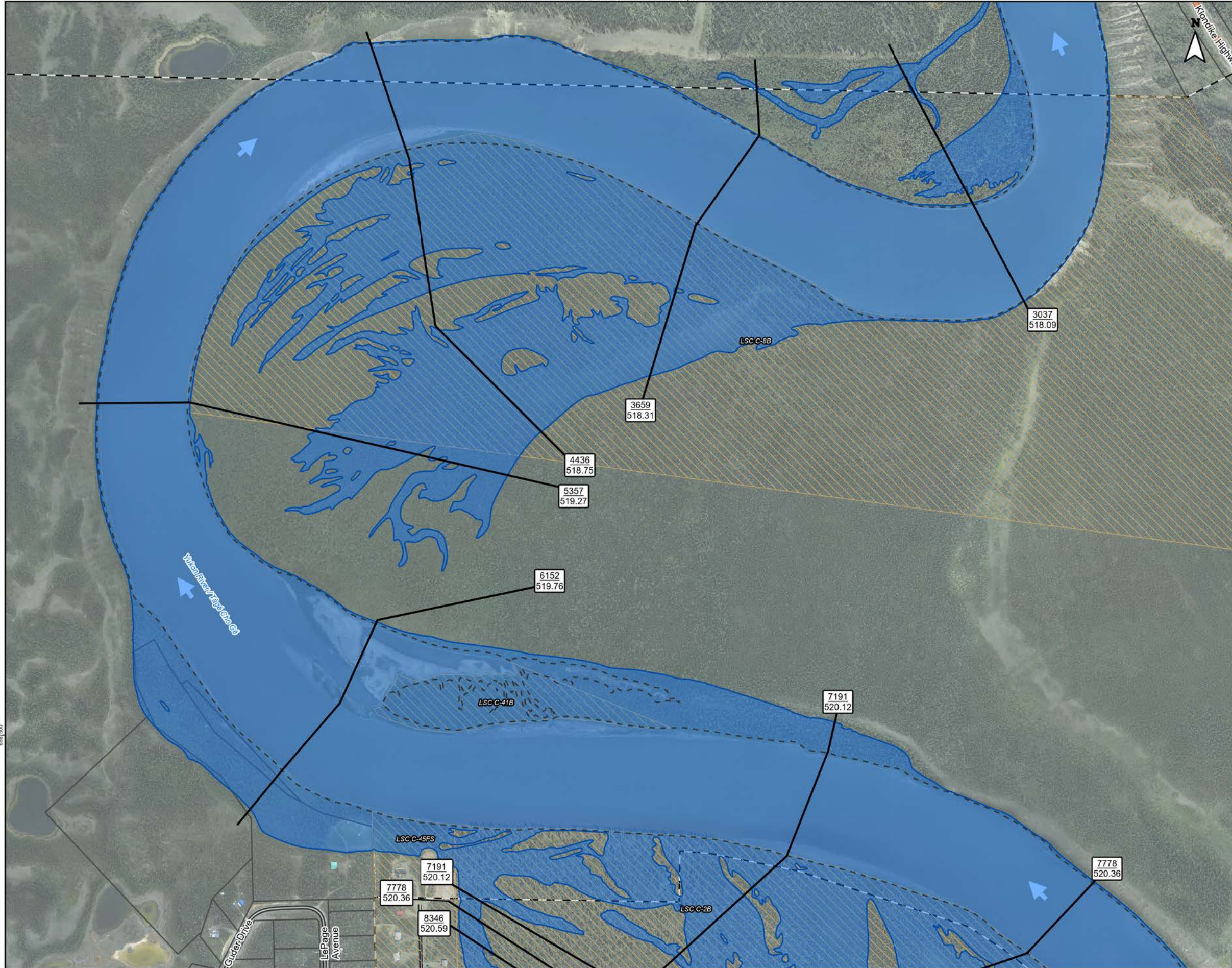
**Notes**

- Coordinate System: NAD 1983 UTM Zone 8N  
Vertical Datum: CGVD2013, Geoid: CGG2013a
- Data Sources: GeoYukon, Canada Lands Survey (CLS) CCM 982, Carvec.
- Background: World Topographic Map: Northwest Territories, State of Alaska, Esri Canada, Esri, TomTom, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA, NRCAN, Parks Canada  
World Hillshade: Esri, USGS
- Nordenskiöld River Climate Change Factor of Safety = 1.2 and Yukon River Climate Change Factor of Safety = 1.1 as identified during meetings with YG, NRCAN, ECCO on September 8, 2023 and November 6, 2023
- Flood hazard extents shown on these maps are based on LIDAR collected on June 8 - 10 of 2019, and bathymetric/topographic survey collected in July and August of 2023.



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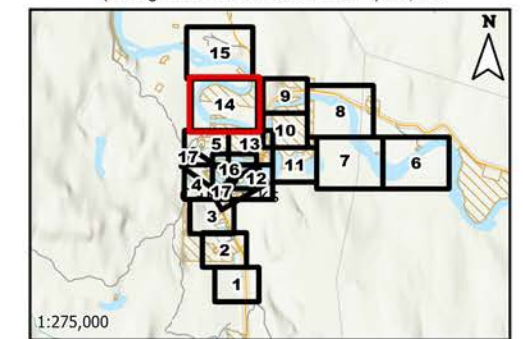
**Title:** Carmacks Flood Mapping Study  
Composite Flood Hazard Extents  
5% Annual Exceedance Probability (AEP) with Factor of  
Safety for Climate Change

**Client/Project:**  
Government of Yukon  
Department of Environment  
Water Resources Branch  
  
Project: 123222320

**Project Location:** Carmacks, Yukon  
Prepared by MANDERSON on 2024-05-21  
Requested by JMUIRHEAD on 2024-01-07  
Review by JMUIRHEAD on 2024-05-21

- |   |   |
|---|---|
| Flow Direction  | Hydraulic Model Cross-Sections                                      |
| Point of Interest                                     | Inundation under Modelled Ice Jam Runs                              |
| Bridge  | Inundation under Modelled Open Water Runs                           |
| Highway   | Composite Flood Hazard Extent                                       |
| Local Road  | Ice Jam Location (toe of jam)                                       |
| Little Salmon / Carmacks First Nation Settlement Land | 50 % AEP Extent   |
| Land Parcels  | Hydraulic Model Cross-Sections                                      |
| Municipal Boundary                                    | Cross-Section Number<br>WSE (m) in Main Channel<br>of Cross-Section |
| Study Area  |   |

Map Publication Date: May 21, 2024  
0 70 140 210 280 350  
m  
(At original document size of 11x 17) 1:8,000



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 8N  
Vertical Datum: CGVD2013, Geoid: CGG2013a
  2. Data Sources: GeoYukon, Canada Lands Survey (CLS) CCM 982, Carvec.
  3. Background: World Topographic Map: Northwest Territories, State of Alaska, Esri Canada, Esri, TomTom, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA, NRCAN, Parks Canada  
World Hillshade: Esri, USGS
  4. Nordskiold River Climate Change Factor of Safety = 1.2 and Yukon River Climate Change Factor of Safety = 1.1 as identified during meetings with YG, NRCAN, ECCO on September 8, 2023 and November 6, 2023
  5. Flood hazard extents shown on these maps are based on LIDAR collected on June 8 - 10 of 2019, and bathymetric/topographic survey collected in July and August of 2023.



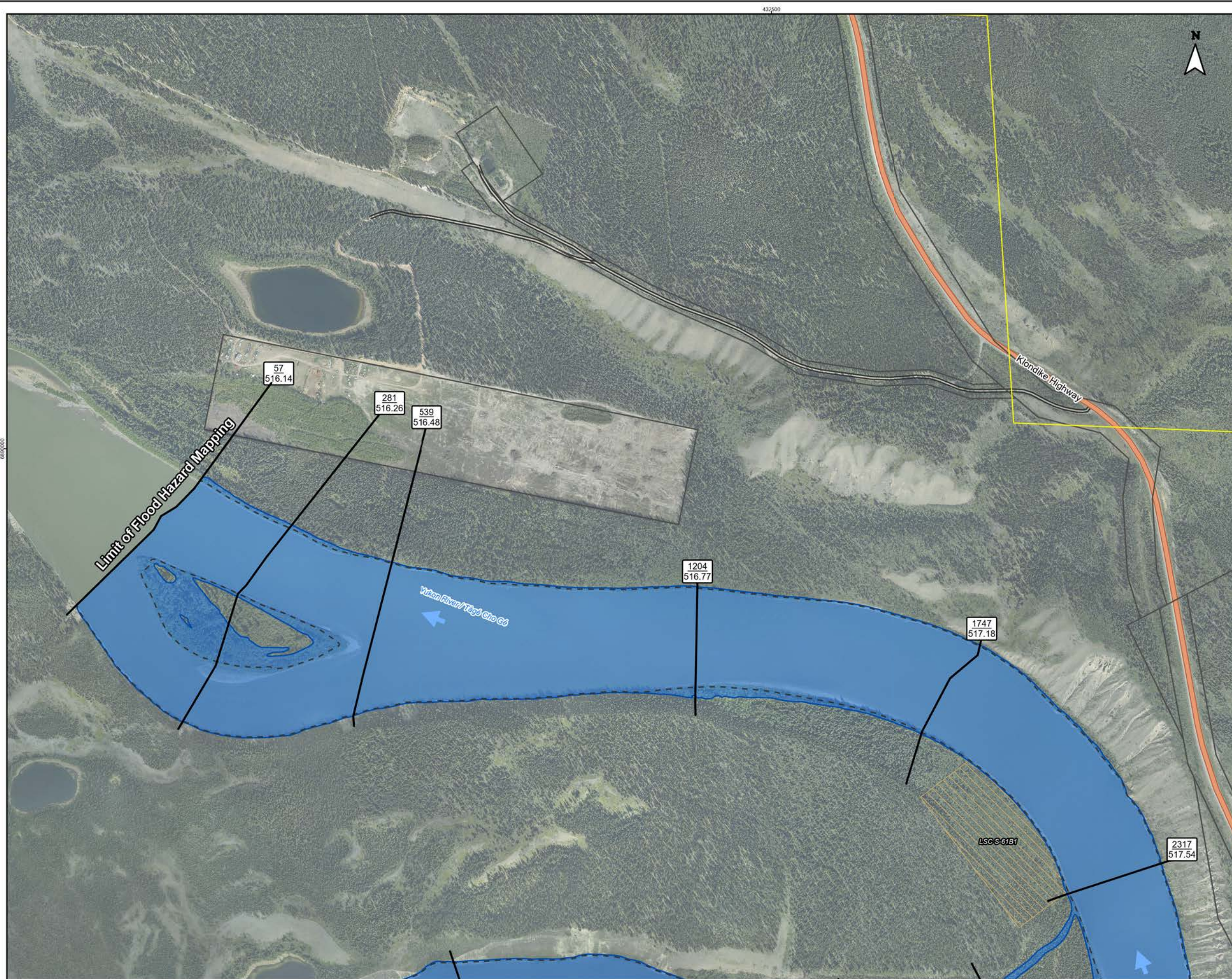


Figure No. **E.2.15** Sheet 15 of 17

Title: **Carmacks Flood Mapping Study  
Composite Flood Hazard Extents  
5% Annual Exceedance Probability (AEP) with Factor of  
Safety for Climate Change**

Client/Project:  
Government of Yukon  
Department of Environment  
Water Resources Branch

Project: 12322320

Project Location: Carmacks, Yukon

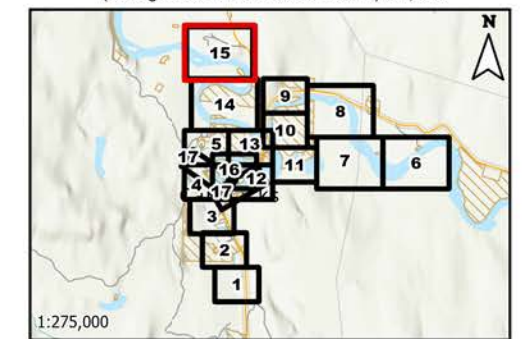
Prepared by MANDERSON on 2024-05-21  
Requested by JMUIRHEAD on 2024-01-07  
Review by JMUIRHEAD on 2024-05-21

- |   |  |
|---|--|
| ➔ Flow Direction  | — Hydraulic Model Cross-Sections               |
| ★ Point of Interest                                     | — Inundation under Modelled Ice Jam Runs       |
| — Bridge  | — Inundation under Modelled Open Water Runs    |
| — Highway   | — Composite Flood Hazard Extent                |
| — Local Road  | — Ice Jam Location (toe of jam)                |
| ▨ Little Salmon / Carmacks First Nation Settlement Land | — 50 % AEP Extent                              |
| ▭ Land Parcels  | — Hydraulic Model Cross-Sections               |
| ▭ Municipal Boundary                                    | 57 Cross-Section Number                        |
| ▭ Study Area  | 517.2 WSE (m) in Main Channel of Cross-Section |

Map Publication Date: May 21, 2024

0 70 140 210 280 350 m

(At original document size of 11x 17) 1:8,000



**Notes**

- Coordinate System: NAD 1983 UTM Zone 8N  
Vertical Datum: CGVD2013, Geoid: CGG2013a
- Data Sources: GeoYukon, Canada Lands Survey (CLS) CCM 982, Carvec.
- Background: World Topographic Map: Northwest Territories, State of Alaska, Esri Canada, Esri, TomTom, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA, NRCAN, Parks Canada  
World Hillshade: Esri, USGS
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- Flood hazard extents shown on these maps are based on LIDAR collected on June 8 - 10 of 2019, and bathymetric/topographic survey collected in July and August of 2023.



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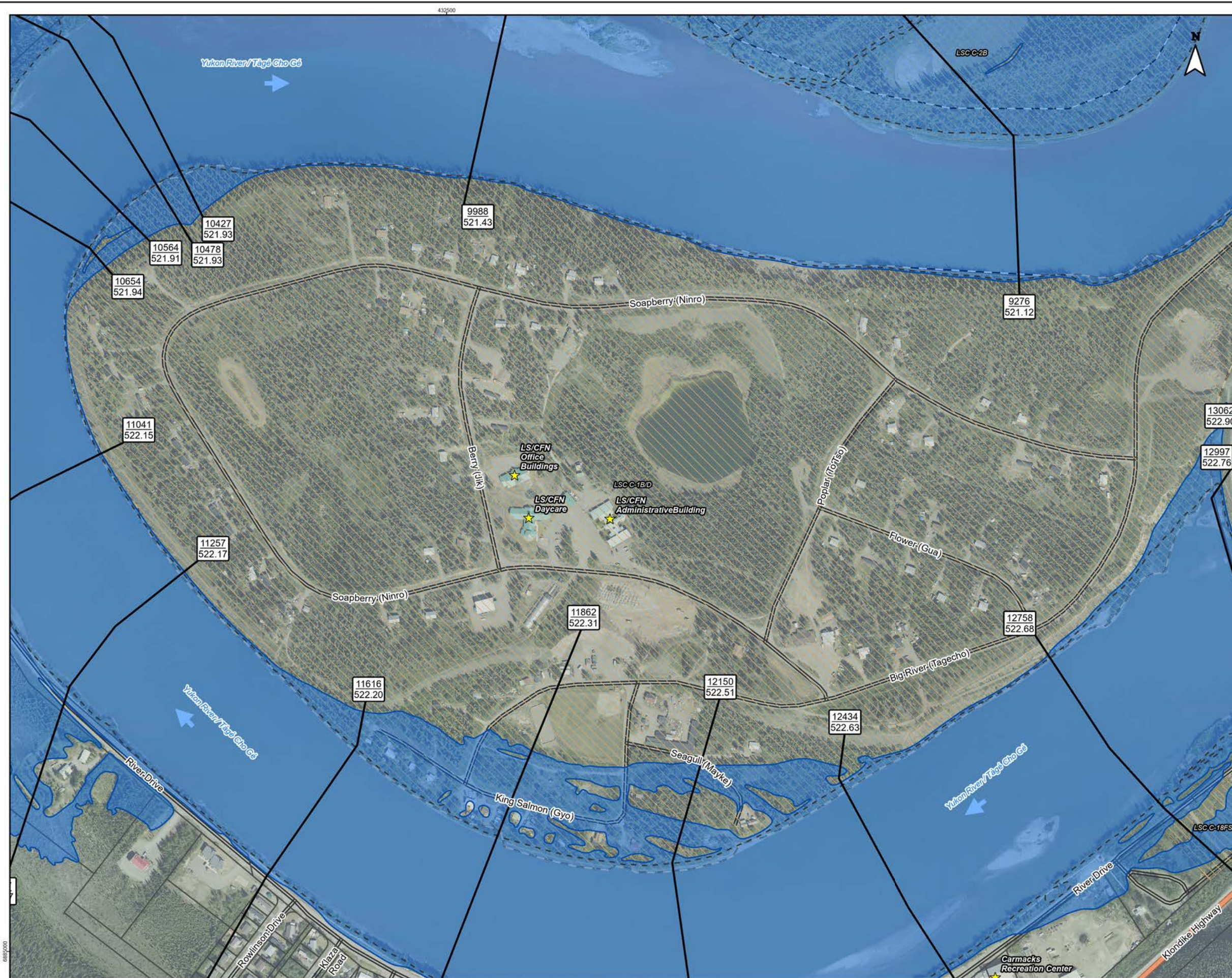


Figure No. **E.2.16** Sheet 16 of 17

Title: **Carmacks Flood Mapping Study  
Composite Flood Hazard Extents  
5% Annual Exceedance Probability (AEP) with Factor of  
Safety for Climate Change**

Client/Project:  
Government of Yukon  
Department of Environment  
Water Resources Branch

Project: 123222320

Project Location: Carmacks, Yukon

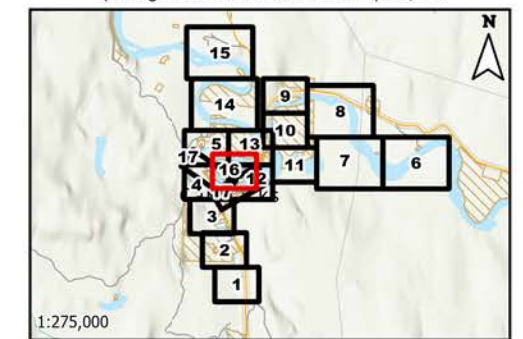
Prepared by MANDERSON on 2024-05-21  
Requested by JMUIRHEAD on 2024-01-07  
Review by JMUIRHEAD on 2024-05-21

- |   |   |
|---|---|
| Flow Direction  | Hydraulic Model Cross-Sections            |
| Point of Interest                                     | Inundation under Modelled Ice Jam Runs    |
| Bridge  | Inundation under Modelled Open Water Runs |
| Highway   | Composite Flood Hazard Extent             |
| Local Road  | Ice Jam Location (toe of jam)             |
| Little Salmon / Carmacks First Nation Settlement Land | 50 % AEP Extent                           |
| Land Parcels  | Hydraulic Model Cross-Sections            |
| Municipal Boundary                                    | Cross-Section Number                      |
| Study Area  | WSE (m) in Main Channel of Cross-Section  |

Map Publication Date: May 21, 2024

0 40 80 120 160 200 m

(At original document size of 11x 17) 1:5,000

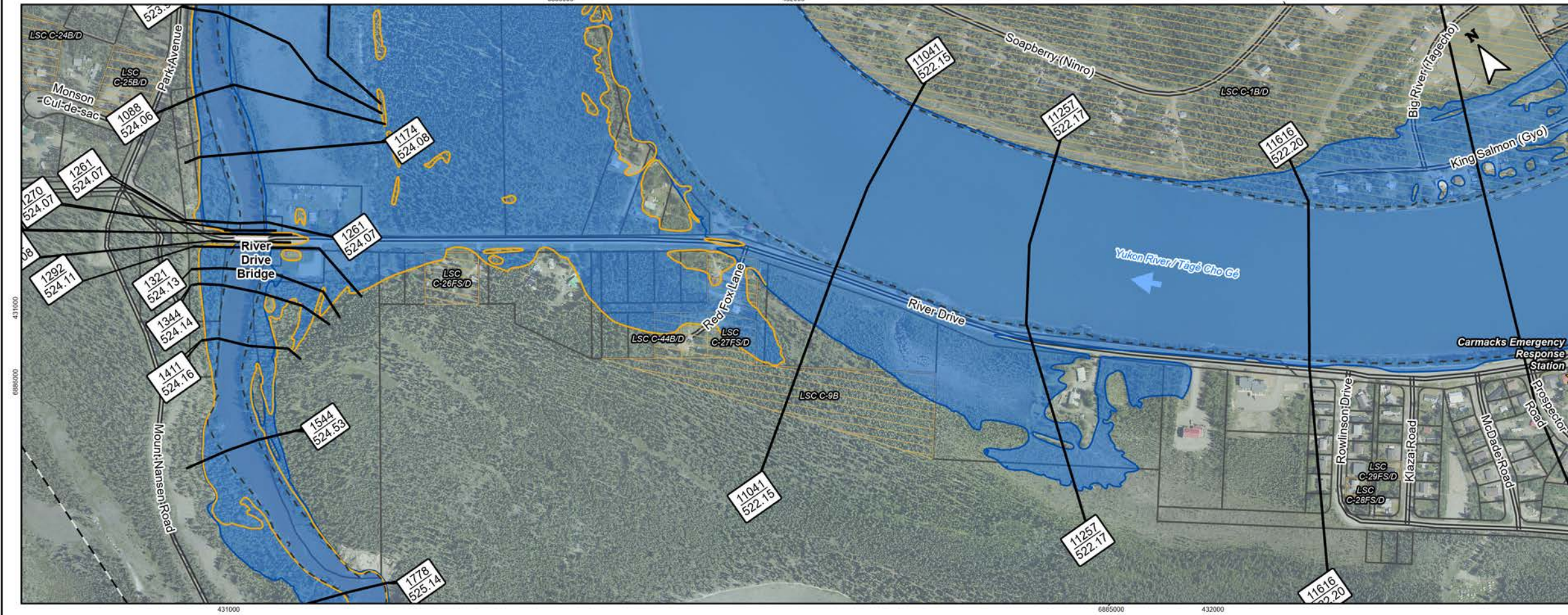
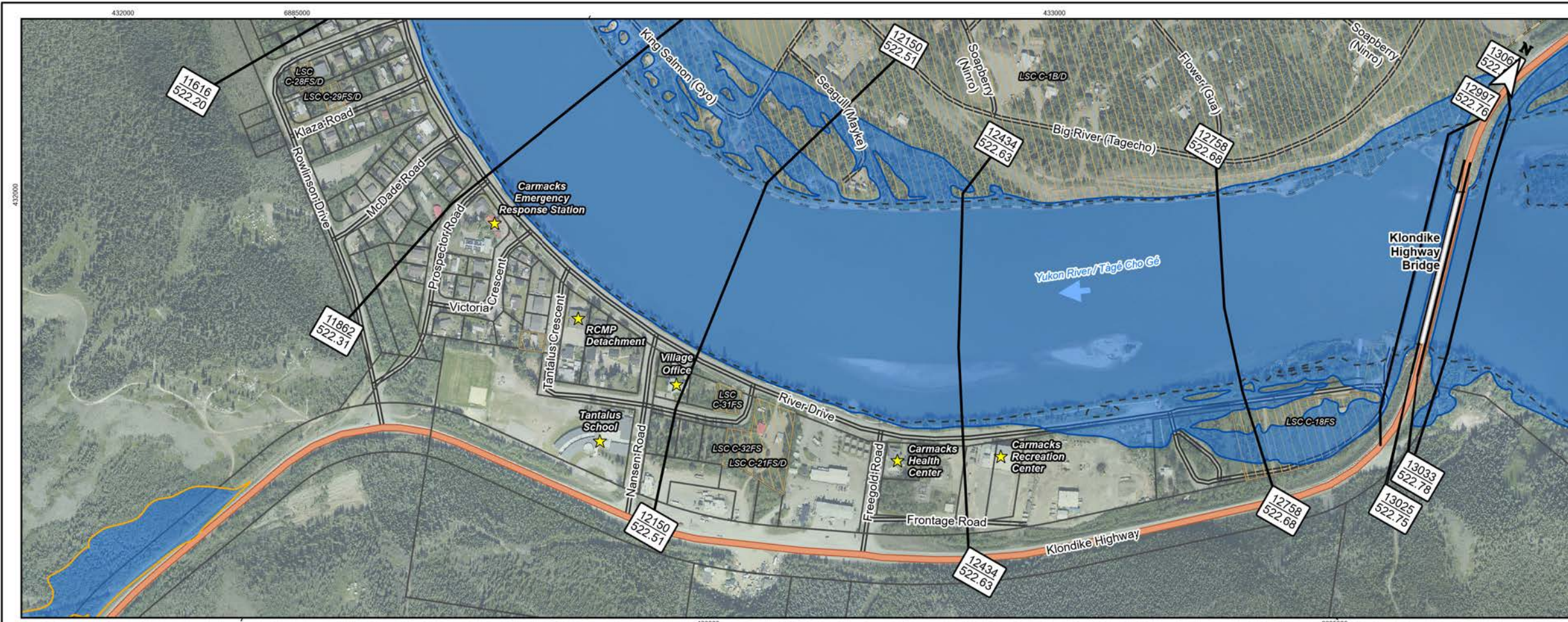


**Notes**

- Coordinate System: NAD 1983 UTM Zone 8N  
Vertical Datum: CGVD2013, Geoid: CGG2013a
- Data Sources: GeoYukon, Canada Lands Survey (CLS) CCM 982, Carvec.
- Background: World Topographic Map: Northwest Territories, State of Alaska, Esri Canada, Esri, TomTom, Garmin, SafeGraph, MET/INASA, USGS, EPA, NPS, USDA, NRCAN, Parks Canada  
World Hillshade: Esri, USGS
- Nordenskiöld River Climate Change Factor of Safety = 1.2 and Yukon River Climate Change Factor of Safety = 1.1 as identified during meetings with YG, NRCAN, ECCO on September 8, 2023 and November 6, 2023
- Flood hazard extents shown on these maps are based on LIDAR collected on June 8 - 10 of 2019, and bathymetric/topographic survey collected in July and August of 2023.

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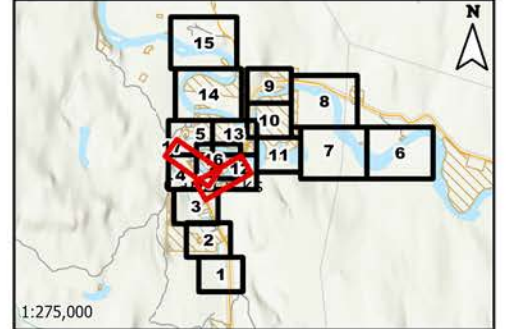
**Carmacks Flood Mapping Study  
Composite Flood Hazard Extents  
5% Annual Exceedance Probability (AEP) with Factor of  
Safety for Climate Change**

Client/Project:  
Government of Yukon  
Department of Environment  
Water Resources Branch

Project: 123222320  
Project Location: Carmacks, Yukon  
Prepared by MANDERSON on 2024-05-21  
Requested by JMUIRHEAD on 2024-01-07  
Review by JMUIRHEAD on 2024-05-21

- |   |   |
|---|---|
| Flow Direction  | Hydraulic Model Cross-Sections                                      |
| Point of Interest                                     | Inundation under Modelled Ice Jam Runs                              |
| Bridge  | Inundation under Modelled Open Water Runs                           |
| Highway   | Composite Flood Hazard Extent                                       |
| Local Road  | Ice Jam Location (toe of jam)                                       |
| Little Salmon / Carmacks First Nation Settlement Land | 50 % AEP Extent   |
| Land Parcels  | Hydraulic Model Cross-Sections                                      |
| Municipal Boundary                                    | Cross-Section Number<br>WSE (m) in Main Channel<br>of Cross-Section |
| Study Area  |   |

Map Publication Date: May 21, 2024  
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(At original document size of 11x 17) 1:6,000



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 8N  
Vertical Datum: CGVD2013, Geoid: CGG2013a
  2. Data Sources: GeoYukon, Canada Lands Survey (CLS) CCM 982, Canvec.
  3. Background: World Topographic Map: Northwest Territories, State of Alaska, Esri Canada, Esri, TomTom, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA, NRCAN, Parks Canada  
World Hillshade: Esri, USGS
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