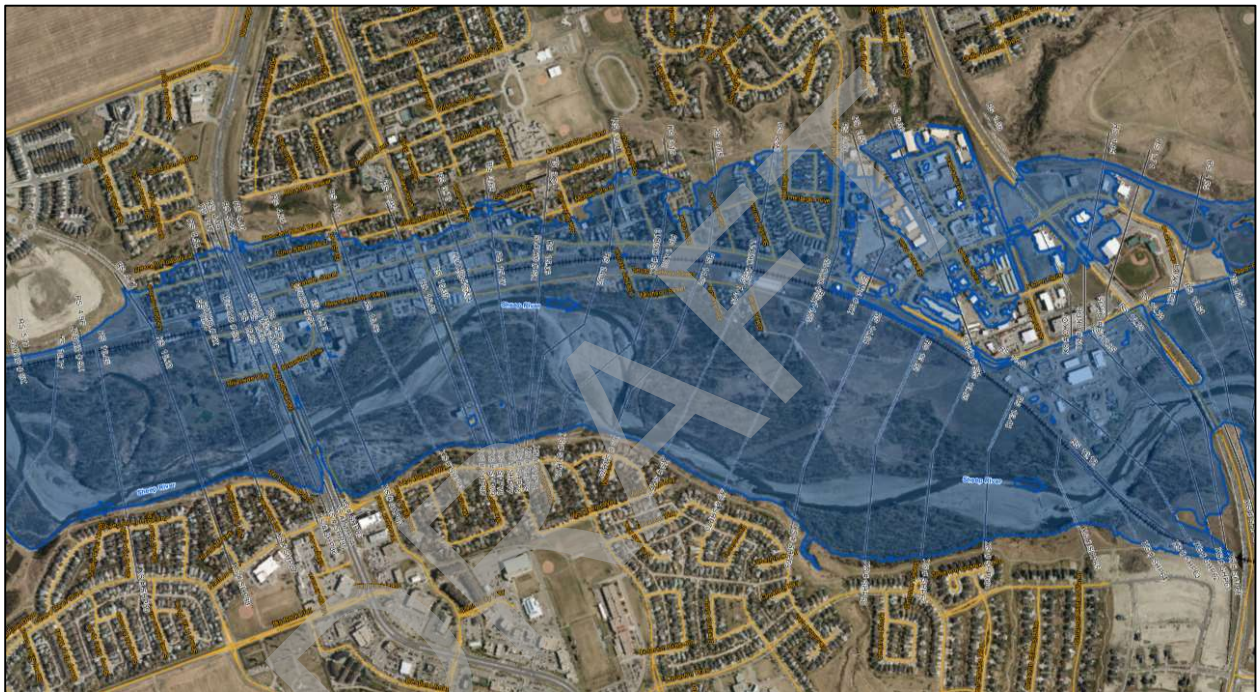


March 2023

Sheep River Flood Hazard Study

## Design Flood Hazard Mapping



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**Sheep River Hazard Study Design Flood Hazard Mapping**

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2023-03-31	1	Final	S. Zare/N. Langenberg	J. Groeneveld	J. Groeneveld
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				Discipline Director	Functional Director

## Executive Summary

Alberta Environment and Parks retained Hatch to complete a flood hazard study for a reach of the Sheep River (the Study). The primary purpose of the Study is to assess and identify river and flood hazards along an approximately 60-kilometer-long reach of the Sheep River, and a 35-kilometer-long reach of Threepoint Creek in the Municipal District of Foothills No. 31. This includes the Towns of Black Diamond, Turner Valley, Okotoks and the Hamlet of Millarville.

The study is being completed under the provincial Flood Hazard Identification Program (FHIP), the goals of which include enhancement of public safety and reduction of future flood damages through the identification of river and flood hazards. Project stakeholders include the government of Alberta, the towns of Okotoks, Turner Valley, and Black Diamond, the Municipal District of Foothills No. 31, and the public.

The Sheep River Hazard Study includes multiple components and deliverables. This report summarizes the work of the design flood hazard mapping component of the study. A summary of the work related to the determination of the governing design flood and flood hazard mapping production is provided. Flood hazard areas are utilized for the open water design flood, composed of floodway and flood fringe zones.

The design flood event for the study area is a scenario involving passage of the 100-year open water flood, and this reflects the most severe flood hazard in each reach.

Impacts during this event would include:

- Inundation of 337 residential buildings, resulting in a population at risk of approximately 1029 residents.
- Inundation of 87 non-residential buildings, including flooding of the waste water treatment facility in Okotoks. Inundation will also isolate the water treatment facility in Okotoks, but actual flooding within the facility would be limited.
- Transportation infrastructure impacts would consist of:
  - Inundation of an 800 m stretch of Highway 2A adjacent to the Sheep River
  - Impacts to an approximately 25 km length of roadway in the study area.

The lower chords would be submerged on two bridges on the Sheep River – the Highway 2A crossing in Okotoks and the Highway 22 crossing in Black Diamond.

## Acknowledgements

The authors express their special thanks to Kurt Morrison, Peter Bezeau, and Pat Stevenson of Alberta Environment and Parks (AEP), who provided overall study management, background data, and technical guidance for this study.

The following members of Hatch completed the hydraulic modelling component of this study:

- Joe Groeneveld, Project Manager and technical advisor
- Babak Alinejad, Project Engineer and flood risk assessment inventory
- Soheil Zare, Hydraulic modelling and mapping
- Mark Orton, Hydrology review
- Shayla Murphy, Mapping
- Nadia Langenberg, Mapping
- Rachel Groeneveld, Mapping and flood risk assessment inventory

The study team would also like to thank the following agencies, each of which provided valuable information and assistance in the completion of this portion of the study:

- Municipal District of Foothills No. 31;
- Town of Black Diamond;
- Town of Okotoks;
- Town of Turner Valley;
- Water Survey of Canada; and
- Informatics Branch of Alberta Environment and Parks
- Amec Foster Wheeler (initial investigator, who supplied the surveys and cross sectional data)



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## 1. Introduction

Alberta Environment and Parks retained Hatch to complete a flood hazard study for a reach of the Sheep River (the Study). The primary purpose of the Study is to assess and identify river and flood hazards along an approximately 60 kilometer long reach of the Sheep River, and a 35 kilometer long reach of Threepoint Creek in the Municipal District of Foothills No. 31. This includes the Towns of Black Diamond, Turner Valley, Okotoks and the Hamlet of Millarville.

The upstream limit of the study reach is located approximately 60 km upstream of the Highwood confluence, just to the west of section 20-19-3-W5M. This is approximately 8 km southwest of Turner Valley. The Threepoint Creek study reach extends from its confluence with the Sheep River, 35 km upstream, to its confluence with Ware Creek (just to the northwest quarter of 23-20-04-W5M).

### 1.1 Study Background

As described by AEP, “the study will be completed under the provincial Flood Hazard Identification Program (FHIP), the goals of which include enhancement of public safety and reduction of future flood damages through the identification of river and flood hazards. Project stakeholders include the provincial government, local authorities, and the public.”

This project was originally awarded to Amec Foster Wheeler (AFW) in 2015, and AFW completed a portion of the scope before their contract ended. Hatch was retained to complete the remainder of the study.

### 1.2 Study Objectives

Similar to other flood hazard studies undertaken by the Province, the Sheep River Study includes multiple components and deliverables:

- Survey and Base Data Collection Report (Previously completed by AFW)- Volume 1;
- Hydraulic Model Creation, Calibration, and Open Water Flood Inundation Map Production Report - Volume 2;
- Open Water Flood Hazard Identification Report – Volume 3;
- Governing Design Flood Hazard Mapping Report – Volume 4 (not required for this study, since open water flood conditions govern for this reach);
- Flood Risk Assessment and Inventory Report – Volume 5; and
- Channel Stability Investigation Report – Volume 6.

This document represents Volume 3 and provides details of the Design Flood Hazard mapping assessment.

### 1.3 Study Area & Reach

Figure 1-1 summarizes the study area. As shown, the downstream end of this study reach is the confluence of Highwood River and Sheep River downstream of the Town of Okotoks. The upstream limit of the study reach is located approximately 60 km upstream of the Highwood confluence, just to the west of section 20-19-3-W5M. This is approximately 8 km southwest of Turner Valley. The Threepoint Creek study reach extends from its confluence with the Sheep River, 35 km upstream, to its confluence with Ware Creek (just to the northwest quarter of 23-20-04-W5M).

The 60 km Sheep River study reach includes the key points listed below. The stationing shown is listed in kilometers, as measured from the downstream end of the study reach and extending upstream.

- Confluence with the Highwood River - km 0.0
- Highway 2 Bridge - km 6.98
- Town of Okotoks – between km 11.25 and km 17.45
- Confluence with Threepoint Creek - km 34.52
- Town of Black Diamond - between km 39.9 and km 42.5
- Town of Turner Valley - between km 43.9 and km 48.2

The 35 km Threepoint Creek study reach includes the key points listed below.

- Confluence with the Sheep River - km 0.0
- 192 Street W Bridge Crossing (in the vicinity of the Millarville Race Track) - km 11.36
- Highway 22 Bridge Crossing (in the vicinity of the community of Millarville) - km 20.2
- Confluence with Fisher Creek - km 26.3
- Confluence with Ware Creek and upstream end of study area - km 34.79

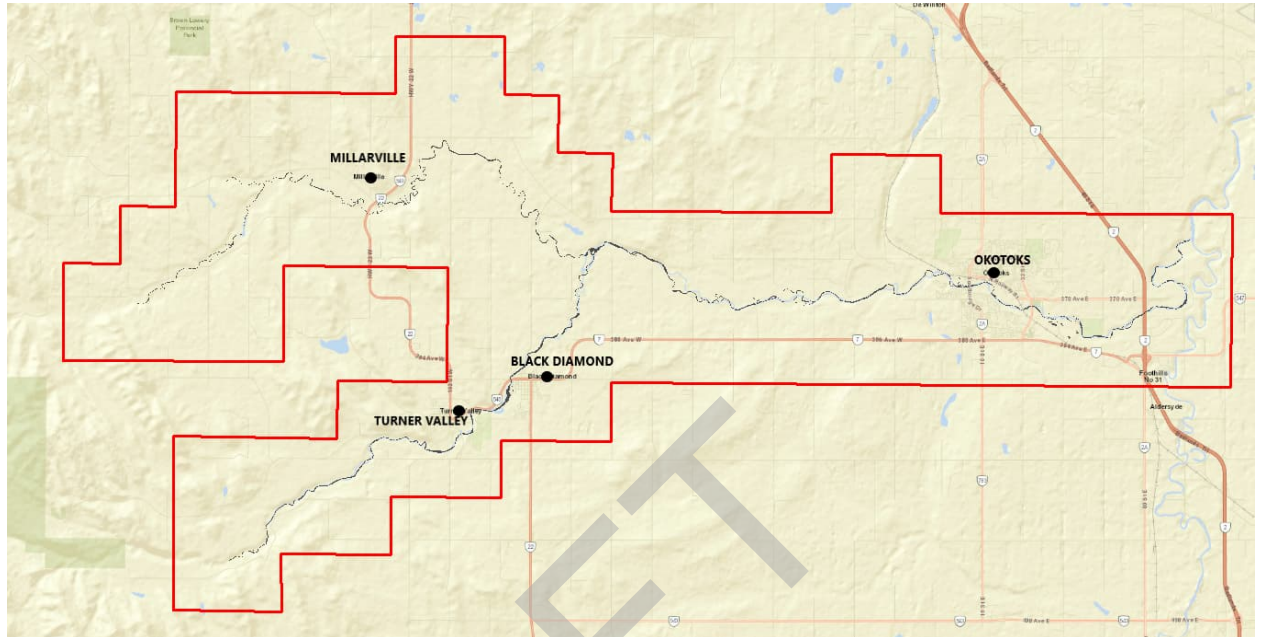


Figure 1-1: Study Reach

## 2. Available Data

As a first step in this assessment, it was necessary to compile all readily available spatial data representing development in the study area. This included the collection of available cadastral data, infrastructure data, and census data. Each data source is further described below.

### 2.1 Flood Hydrology

Table 2-1 shows the maximum annual instantaneous discharge adopted for different return periods for the project area. These flows were applied to the hydraulic model at the locations described in the hydraulic model report. The 100-yr flood was adopted as the open water design flood hazard flood.

**Table 2-1 – Annual maximum instantaneous discharge values applied to the model**

Estimated Average Recurrence Interval (Years)	Sheep River at Black Diamond (05BL014)	Sheep River at Okotoks (05BL012)	Sheep River at Mouth (Node 344)	Threepoint + Ware Creek (Nodes 338 and 339)	Threepoint Creek at Millarville (05BL013)	Threepoint Creek at Mouth (Node 341)	Okotoks North of CPR
2	61.5	158	166	26.8	39.8	48.7	0.1*
5	148	338	355	58.1	98.2	118	0.1*
10	240	504	530	88.2	158	192	0.1*
20	361	701	737	125.3	235	290	0.1*
35	484	886	931	161.2	312	387	0.1*
50	576	1020	1070	187.4	368	457	0.1*
75	693	1180	1240	221	439	545	4
100	787	1300	1370	246	495	616	14
200	1050	1640	1720	317	650	810	18
350	1310	1950	2050	386	803	1000	52
500	1500	2180	2290	436	914	1140	85
750	1720	2420	2540	496	1040	1300	112
1000	1900	2620	2750	543	1140	1430	139

\* These values are placeholders, needed for the model to run - actual expected flows are zero.

The cadastral information required for the study includes recent data on building footprints and land parcels. This data has been provided by AEP.

Building footprint data were available for the town of Okotoks. This dataset covers potentially impacted areas in the community. Aerial photos have also been collected by AEP and were provided to complete this assessment. Google Earth aerial imagery and Bing Aerial Imagery (available through ARC-GIS) have been used to interpret building utilization where the AEP-supplied aerial photos were not clear or complete.

## 2.2 Survey and DTM Data

Digital Terrain Model (DTM) data was provided by AEP. LiDAR information was gathered in 2016 by AEP with a 0.5 m spacing. The horizontal accuracy of the LiDAR information at this resolution is generally within 20 cm and the vertical accuracy for bare earth information is about 10 to 20 cm.

All coordinate information and mapping is in three-degree Transverse Mercator (3TM) plane coordinates based on the Canadian Spatial Reference System 1983 North American Datum (NAD83 [CSRS]); vertical control is referenced to Canadian Geodetic Vertical Datum of 1928 (CGVD28).

Channel cross section survey data was collected and prepared by AFW and provided by AEP for use in this study. AFW's survey report has been finalized and is included in volume 1 of this study report. Both data sets were used to create the hydraulic model.



The aerial imagery has also been provided by AEP. There are two datasets available for the aerial imagery. The most recent dataset was gathered as a part of previous work completed by AFW and was finalized in 2016. AEP also provided an older dataset collected in the 1950's which was used to support other study components.

## 2.3 HEC-RAS Model

A one-dimensional model of the project reach was developed using the HEC-RAS program (Version 5.0.3) and current diking configurations in each community. The HEC-RAS model was set up to represent hydraulic conditions on an approximately 60 kilometer long reach of the Sheep River, and a 35 kilometer long reach of Threepoint Creek in the Municipal District of Foothills No. 31. This reach includes the Towns of Black Diamond, Turner Valley, Okotoks and the Hamlet of Millarville. The model was calibrated based on the available low flow, high flow, and rating curve data. Using the calibrated HEC-RAS model, surface water profiles were then simulated for the 2-, 5-, 10-, 20-, 35-, 50-, 75-, 100-, 200-, 350-, 500-, 750- and 1,000-year flood events. A detailed description of this work can be found in Volume 2 of the study.

## 3. Design Flood Hazard Determination

### 3.1 Design Flood

The 100-yr flood was selected as the open water design flood in accordance with the flood Hazard Identification Program (FHIP) Guidelines (AEP 2011).

### 3.2 Floodway and Flood Fringe Terminology

#### Flood Hazard Area

The flood hazard area is the area of land that would be flooded during the design flood. It is composed of the floodway and the flood fringe zones, which are defined below.

#### Flood Hazard Mapping

Flood hazard mapping identifies the area flooded for the design flood and is typically divided into floodway and flood fringe zones. Flood hazard maps can also show additional flood hazard information, including areas of high hazard within the flood fringe and incremental areas at risk for more severe floods, like the 200-year and 500-year floods. Flood hazard mapping is typically used for long-term flood hazard area management and land-use planning.

#### Floodway

When a floodway is first defined on a flood hazard map, it typically represents the area of highest flood hazard where flows are deepest, fastest, and most destructive during the 100-

year design flood . The floodway generally includes the main channel of a stream and a portion of the adjacent overbank area. Previously mapped floodways do not typically become larger when a flood hazard map is updated, even if the flood hazard area gets larger or design flood levels get higher, but there may be areas of high hazard outside of either an updated or newly-mapped floodway.

### **Flood Fringe**

The flood fringe is the portion of the flood hazard area outside of the floodway. The flood fringe typically represents areas with shallower, slower, and less destructive flooding during the 100-year design flood. However, areas with deep or fast moving water may also be identified as high hazard flood fringe within the flood fringe. Areas at risk behind flood berms may also be mapped as protected flood fringe areas.

### **Design Flood Levels**

Design flood levels are the computed water levels associated with the design flood.

## **3.3 Design Flood Profile**

The final floodway stationing for each cross section on Threepoint Creek is summarized in **Table 3-1**. The final floodway stationing for each cross section on Sheep River is summarized in **Table 3-2**. **Table 3-3** and **Table 3-4** provide a summary of the design flood profiles for Threepoint Creek and Sheep River respectively.

**Table 3-1 – Floodway Limit Stations and Governing Criteria – Threepoint Creek**

Reach	River Station (km)	Left Floodway Station (m)	Criteria	Right Floodway Station (m)	Criteria
US Millarville	34.48	373.67	Depth	398.60	Depth
US Millarville	34.21	287.63	Velocity	361.57	Depth
US Millarville	34.11	291.46	Velocity	325.77	Velocity
US Millarville	33.621	159.99	Depth	242.23	Velocity
US Millarville	33.3	100.99	Depth	354.06	Depth
US Millarville	33.041	135.20	Depth	289.08	Depth
US Millarville	32.75	292.08	Depth	351.56	Depth
US Millarville	32.515	239.84	Depth	356.23	Depth
US Millarville	32.39	202.25	Depth	247.64	Depth
US Millarville	32.36	225.30	Depth	283.27	Velocity
US Millarville	32.16	206.50	Depth	229.68	Depth
US Millarville	31.95	29.41	Depth	61.42	Velocity
US Millarville	31.68	160.24	Velocity	209.89	Velocity
US Millarville	31.58	110.81	Depth	153.65	Velocity
US Millarville	31.454	108.65	Velocity	176.39	Velocity
US Millarville	31.3	24.30	Velocity	139.14	Velocity
US Millarville	31.03	19.53	Velocity	509.40	Depth
US Millarville	30.75	40.62	Depth	407.35	Depth
US Millarville	30.49	59.80	Depth	403.65	Depth
US Millarville	30.21	59.51	Velocity	324.83	Depth
US Millarville	30	18.71	Depth	197.04	Depth
US Millarville	29.85	25.65	Depth	390.60	Depth
US Millarville	29.61	28.64	Depth	427.95	Depth
US Millarville	29.31	270.61	Velocity	478.01	Depth
US Millarville	29.19	289.97	Velocity	381.51	Depth
US Millarville	29	261.37	Depth	353.47	Depth
US Millarville	28.77	259.35	Depth	296.91	Depth
US Millarville	28.36	291.24	Depth	517.24	Velocity
US Millarville	27.98	242.49	Depth	415.88	Depth
US Millarville	27.68	364.59	Depth	557.25	Depth
US Millarville	27.37	152.62	Depth	278.03	Depth
US Millarville	26.86	187.35	Depth	217.92	Depth
US Millarville	26.51	67.62	Velocity	92.78	Velocity
US Millarville	26.2	869.96	Depth	1502.17	Depth
US Millarville	25.93	195.51	Depth	819.59	Depth

Reach	River Station (km)	Left Floodway Station (m)	Criteria	Right Floodway Station (m)	Criteria
US Millarville	25.52	326.39	Depth	865.93	Depth
US Millarville	25.32	176.69	Depth	643.43	Depth
US Millarville	25.13	188.25	Depth	550.53	Depth
US Millarville	24.85	151.86	Depth	761.84	Depth
US Millarville	24.73	64.64	Depth	697.79	Depth
US Millarville	24.56	63.47	Depth	737.79	Velocity
US Millarville	24.33	31.57	Depth	759.64	Velocity
US Millarville	23.97	394.68	Depth	785.20	Velocity
US Millarville	23.72	348.28	Depth	830.11	Depth
US Millarville	23.37	276.36	Depth	883.25	Depth
US Millarville	23.02	305.70	Depth	844.71	Depth
US Millarville	22.71	437.07	Depth	916.56	Depth
US Millarville	22.41	463.04	Depth	933.88	Depth
US Millarville	22.07	335.63	Depth	1102.67	Depth
US Millarville	21.78	489.22	Depth	1365.51	Depth
US Millarville	21.51	710.29	Depth	1266.38	Depth
US Millarville	21.23	672.97	Depth	1117.39	Depth
US Millarville	20.95	743.32	Velocity	1039.60	Velocity
US Millarville	20.72	50.14	Depth	833.90	Depth
US Millarville	20.44	39.97	Depth	780.27	Depth
US Millarville	20.344	61.13	Depth	904.72	Depth
US Millarville	20.216	56.24	Depth	998.11	Depth
US Millarville	20.17	89.78	Depth	1033.48	Depth
US Millarville	19.98	176.95	Depth	1176.27	Depth
US Millarville	19.95	143.88	Depth	1237.81	Depth
US Millarville	19.73	137.85	Depth	998.69	Depth
US Millarville	19.49	132.12	Depth	971.44	Depth
US Millarville	19.35	114.35	Depth	937.35	Depth
US Millarville	18.43	68.98	Depth	730.07	Depth
US Millarville	18.229	30.52	Depth	649.46	Depth
US Millarville	18.071	21.38	Depth	682.57	Depth
US Millarville	17.8	24.65	Depth	605.87	Depth
US Millarville	17.68	100.66	Depth	609.05	Depth
US Millarville	17.54	92.76	Depth	681.85	Depth
US Millarville	17.31	109.99	Depth	723.75	Velocity
US Millarville	16.87	147.56	Depth	952.59	Depth
US Millarville	16.63	183.96	Depth	776.51	Velocity

Reach	River Station (km)	Left Floodway Station (m)	Criteria	Right Floodway Station (m)	Criteria
US Millarville	16.44	136.61	Depth	689.35	Depth
US Millarville	16.15	233.32	Depth	761.82	Depth
US Millarville	15.93	178.13	Depth	802.84	Depth
US Millarville	15.74	245.88	Depth	736.24	Depth
US Millarville	15.34	200.20	Depth	702.47	Depth
US Millarville	14.98	15.11	Depth	366.42	Depth
US Millarville	14.88	241.03	Depth	517.66	Depth
US Millarville	14.74	262.34	Depth	601.70	Depth
US Millarville	14.47	246.18	Depth	731.93	Depth
US Millarville	14.33	247.88	Depth	913.25	Depth
US Millarville	14.11	259.65	Depth	924.13	Depth
US Millarville	14.02	210.16	Depth	991.02	Depth
US Millarville	13.821	180.61	Depth	1099.38	Depth
US Millarville	13.6	15.28	Velocity	937.21	Depth
US Millarville	13.45	12.53	Depth	1005.25	Depth
US Millarville	13.3	10.17	Velocity	920.87	Depth
US Millarville	12.94	88.72	Depth	751.52	Depth
US Millarville	12.69	48.46	Depth	551.79	Depth
US Millarville	12.4	15.63	Velocity	604.78	Depth
US Millarville	12.12	72.95	Depth	335.91	Depth
US Millarville	11.91	25.89	Depth	214.03	Depth
US Millarville	11.72	112.90	Depth	384.37	Depth
US Millarville	11.42	43.42	Depth	245.76	Depth
US Millarville	11.13	232.63	Velocity	282.42	Velocity
US Millarville	11.09	206.98	Velocity	301.58	Velocity
US Millarville	10.79	1160.92	Depth	1220.12	Depth
US Millarville	10.36	712.03	Depth	759.77	Depth
US Millarville	10.01	811.54	Depth	1231.72	Depth
US Millarville	9.73	493.83	Depth	1098.38	Depth
US Millarville	9.44	346.14	Depth	965.82	Depth
US Millarville	9.11	588.35	Depth	1241.23	Depth
US Millarville	8.81	280.59	Depth	999.78	Depth
US Millarville	8.65	74.86	Depth	725.21	Depth
US Millarville	8.46	335.00	Depth	974.38	Depth
US Millarville	8.28	358.70	Depth	939.40	Depth
US Millarville	8.06	389.43	Depth	1068.19	Depth
US Millarville	7.89	370.63	Depth	1075.34	Depth

Reach	River Station (km)	Left Floodway Station (m)	Criteria	Right Floodway Station (m)	Criteria
US Millarville	7.65	330.33	Depth	1115.27	Depth
US Millarville	7.33	105.73	Depth	984.71	Depth
US Millarville	7.021	81.61	Depth	950.86	Depth
US Millarville	6.82	73.86	Depth	1069.03	Depth
US Millarville	6.44	111.16	Depth	876.69	Depth
US Millarville	6.14	222.65	Depth	872.16	Depth
US Millarville	5.85	66.95	Depth	619.05	Depth
US Millarville	5.55	72.53	Depth	718.17	Depth
US Millarville	5.25	93.81	Depth	747.34	Depth
US Millarville	4.9	129.29	Depth	454.36	Depth
US Millarville	4.66	90.25	Depth	266.42	Depth
US Millarville	4.33	238.43	Depth	374.13	Depth
US Millarville	4.29	300.22	Depth	425.89	Depth
US Millarville	4.05	257.68	Depth	812.47	Depth
US Millarville	3.932	285.42	Depth	930.62	Depth
US Millarville	3.79	213.41	Depth	877.66	Depth
US Millarville	3.67	202.76	Depth	875.39	Velocity
US Millarville	3.47	119.35	Depth	962.66	Depth
US Millarville	3.15	117.78	Depth	1112.67	Velocity
US Millarville	2.77	160.58	Depth	967.16	Depth
US Millarville	2.56	98.77	Depth	413.13	Depth
US Millarville	2.38	56.85	Velocity	326.80	Depth
US Millarville	2.17	76.16	Depth	373.72	Depth
US Millarville	1.98	155.42	Depth	321.49	Depth
US Millarville	1.715	202.74	Depth	289.51	Depth
US Millarville	1.42	252.85	Depth	379.21	Depth
US Millarville	1.22	70.42	Depth	166.69	Velocity
US Millarville	1.01	49.55	Depth	183.44	Depth
US Millarville	0.81	126.13	Depth	See Note 1	
US Millarville	0.63	173.43	Depth	See Note 1	
US Millarville	0.48	159.09	Depth	See Note 1	
US Millarville	0.2	81.58	Depth	See Note 1	

NOTE 1: This cross section only includes one side of the floodway. Please refer to the Floodway Criteria Maps Sheets 7 to 9 to identify opposite floodway station.



**Table 3-2 – Floodway Limit Stations and Governing Criteria – Sheep River**

Reach	River Station (km)	Left Floodway Station (m)	Criteria	Right Floodway Station (m)	Criteria
US Threepoint	59.66	22.2	Depth	63.9	Depth
US Threepoint	59.46	35.7	Depth	88.8	Depth
US Threepoint	59.23	6.2	Velocity	101.8	Depth
US Threepoint	59	58.5	Depth	126.7	Depth
US Threepoint	58.69	29.5	Depth	139.6	Depth
US Threepoint	58.33	37.0	Depth	191.6	Depth
US Threepoint	58.08	29.0	Depth	180.7	Velocity
US Threepoint	57.82	27.5	Velocity	173.5	Depth
US Threepoint	57.56	21.5	Depth	176.5	Depth
US Threepoint	57.32	11.6	Depth	59.9	Depth
US Threepoint	57.04	23.0	Depth	60.4	Velocity
US Threepoint	56.53	23.9	Depth	68.8	Depth
US Threepoint	56.353	20.1	Depth	158.1	Depth
US Threepoint	56.12	23.1	Depth	62.4	Depth
US Threepoint	55.74	59.6	Depth	100.2	Depth
US Threepoint	55.47	90.3	Velocity	145.0	Depth
US Threepoint	55.27	36.4	Depth	91.4	Velocity
US Threepoint	55.08	46.2	Velocity	136.4	Velocity
US Threepoint	54.55	70.0	Depth	129.1	Velocity
US Threepoint	54.33	18.8	Depth	175.2	Velocity
US Threepoint	54.1	50.0	Depth	145.6	Depth
US Threepoint	53.67	86.1	Depth	200.3	Depth
US Threepoint	53.35	101.1	Depth	175.8	Depth
US Threepoint	52.95	97.5	Depth	206.3	Depth
US Threepoint	52.7	139.9	Depth	328.6	Depth
US Threepoint	52.4	192.4	Depth	291.2	Depth
US Threepoint	52.1	145.8	Depth	351.4	Depth
US Threepoint	51.74	37.6	Depth	238.2	Depth
US Threepoint	51.44	235.4	Depth	387.1	Depth
US Threepoint	51.17	221.6	Depth	323.3	Depth
US Threepoint	50.96	31.8	Depth	181.9	Depth
US Threepoint	50.606	100.0	Depth	296.4	Depth
US Threepoint	50.51	62.0	Depth	153.2	Depth
US Threepoint	50.21	30.4	Velocity	102.2	Depth
US Threepoint	49.83	74.4	Depth	135.9	Velocity

Reach	River Station (km)	Left Floodway Station (m)	Criteria	Right Floodway Station (m)	Criteria
US Threepoint	49.54	46.8	Depth	187.9	Depth
US Threepoint	49.18	44.3	Depth	117.1	Depth
US Threepoint	48.94	41.6	Depth	96.1	Depth
US Threepoint	48.69	31.8	Depth	74.8	Depth
US Threepoint	48.44	118.2	Depth	182.2	Depth
US Threepoint	48.19	58.5	Velocity	111.3	Velocity
US Threepoint	48.15	103.1	Velocity	143.6	Depth
US Threepoint	48.08	54.5	Depth	110.3	Depth
US Threepoint	47.92	94.9	Orig Floodway	327.7	Depth
US Threepoint	47.88	25.8	Orig Floodway	168.4	Orig Floodway
US Threepoint	47.62	34.0	Depth	99.3	Orig Floodway
US Threepoint	47.35	20.9	Orig Floodway	137.9	Depth
US Threepoint	47.08	50.2	Depth	135.9	Orig Floodway
US Threepoint	46.78	130.6	Depth	244.7	Depth
US Threepoint	46.63	268.9	Orig Floodway	453.1	Depth
US Threepoint	46.46	355.3	Orig Floodway	565.3	Depth
US Threepoint	46.2	154.4	Orig Floodway	306.2	Orig Floodway
US Threepoint	46.1	142.8	Orig Floodway	262.5	Depth
US Threepoint	46.06	172.3	Flood Structure	225.7	Flood Structure
US Threepoint	46.01	133.2	Flood Structure	210.9	Depth
US Threepoint	45.97	92.9	Orig Floodway	144.6	Flood Structure
US Threepoint	45.94	119.6	Orig Floodway	177.8	Depth
US Threepoint	45.88	141.5	Flood Structure	229.2	Orig Floodway
US Threepoint	45.73	185.5	Orig Floodway	274.4	Orig Floodway
US Threepoint	45.53	290.4	Flood Structure	396.9	Depth
US Threepoint	45.29	341.8	Flood Structure	413.4	Depth
US Threepoint	45.05	331.8	Depth	519.0	Orig Floodway
US Threepoint	44.78	99.2	Orig Floodway	368.4	Orig Floodway
US Threepoint	44.41	154.2	Orig Floodway	265.3	Orig Floodway
US Threepoint	44.13	191.5	Orig Floodway	277.6	Orig Floodway
US Threepoint	44	103.9	Depth	191.3	Orig Floodway
US Threepoint	43.91	122.2	Orig Floodway	218.6	Orig Floodway
US Threepoint	43.47	218.2	Orig Floodway	545.1	Orig Floodway
US Threepoint	43.28	249.9	Depth	553.0	Depth
US Threepoint	43.04	198.9	Depth	696.1	Orig Floodway
US Threepoint	42.82	113.8	Depth	591.7	Orig Floodway
US Threepoint	42.62	133.1	Orig Floodway	490.2	Orig Floodway

Reach	River Station (km)	Left Floodway Station (m)	Criteria	Right Floodway Station (m)	Criteria		
US Threepoint	42.45	51.6	Depth	291.6	Mixed		
US Threepoint	42.29	54.5	Orig Floodway	209.5	Mixed		
US Threepoint	42.24	82.2	Orig Floodway	145.4	Mixed		
US Threepoint	42.21	207.7	Orig Floodway	258.2	Orig Floodway		
US Threepoint	42.12	152.5	Orig Floodway	329.3	Orig Floodway		
US Threepoint	41.94	290.1	Depth	405.7	Orig Floodway		
US Threepoint	41.8	387.5	Orig Floodway	559.7	Orig Floodway		
US Threepoint	41.63	540.0	Orig Floodway	673.8	Orig Floodway		
US Threepoint	41.36	432.1	Orig Floodway	753.9	Orig Floodway		
US Threepoint	41.13	317.0	Orig Floodway	672.1	Orig Floodway		
US Threepoint	40.81	468.2	Depth	677.7	Depth		
US Threepoint	40.51	618.0	Orig Floodway	895.6	Depth		
US Threepoint	40.23	521.9	Depth	1169.3	Orig Floodway		
US Threepoint	39.85	615.1	Depth	903.4	Depth		
US Threepoint	39.5	187.6	Depth	995.8	Depth		
US Threepoint	39.23	49.8	Depth	861.0	Depth		
US Threepoint	39.12	43.8	Depth	776.8	Depth		
US Threepoint	38.84	37.5	Depth	471.7	Depth		
US Threepoint	38.65	12.2	Depth	397.7	Depth		
US Threepoint	38.35	13.0	Depth	409.1	Depth		
US Threepoint	38.17	58.8	Depth	567.3	Depth		
US Threepoint	37.99	55.7	Depth	708.5	Depth		
US Threepoint	37.74	40.0	Velocity	785.7	Depth		
US Threepoint	37.58	53.0	Depth	579.5	Depth		
US Threepoint	37.4	176.6	Depth	626.5	Depth		
US Threepoint	37.25	72.7	Depth	See Note 1			
US Threepoint	36.93	105.3	Depth	See Note 1			
US Threepoint	36.64	268.5	Depth	See Note 1			
US Threepoint	36.534	266.2	Depth	See Note 1			
US Threepoint	36.31	282.9	Depth	See Note 1			
US Threepoint	35.91	185.0	Depth	See Note 1			
US Threepoint	35.61	115.0	Depth	See Note 1			
US Threepoint	35.37	See Note 2					
US Threepoint	35.27	See Note 2					
US Threepoint	35.02	See Note 2					
US Threepoint	34.89	See Note 2					
128 St Overflow	0.12	See Note 1		375.0	Velocity		

Reach	River Station (km)	Left Floodway Station (m)	Criteria	Right Floodway Station (m)	Criteria
128 St Overflow	0.23		See Note 1	386.3	Velocity
128 St Overflow	0.28		See Note 1	480.5	Velocity
128 St Overflow	0.31		See Note 1	467.6	Velocity
128 St Overflow	0.43		See Note 1	409.7	Depth
128 St Overflow	0.53		See Note 1	289.7	Velocity
128 St Overflow	0.70		See Note 1	217.7	Depth
128 St Overflow	0.94		See Note 1	258.1	Velocity
128 St Overflow	1.21		See Note 1	181.0	Velocity
128 St Overflow	1.24		See Note 1	201.9	Depth
128 St Overflow	1.32		See Note 1	529.6	Depth
128 St Overflow	1.42		See Note 1	424.6	Depth
128 St Overflow	1.56		See Note 1	243.8	Depth
128 St Overflow	1.71		See Note 1	249.3	Depth
128 St Overflow	2.05		See Note 1	280.4	Depth
128 St Overflow	2.16		See Note 1	306.0	Depth
128 St Overflow	2.23		See Note 1	157.5	Velocity
128 St Overflow	2.33		See Note 1	155.0	Depth
128 St Overflow	2.39		See Note 1	136.5	Depth
128 St Overflow	2.46		See Note 1	97.8	Depth
128 St Overflow	2.53		See Note 1	118.6	Depth
128 St Overflow	2.57		See Note 1	124.4	Depth
128 St Overflow	2.67		See Note 1	171.8	Depth
128 St Overflow	2.72		See Note 1	214.5	Depth
128 St Overflow	2.78		See Note 1	228.9	Depth
DS Threepoint	34.28	48.9	Velocity	See Note 1	
DS Threepoint	34.12	30.3	Velocity	See Note 1	
DS Threepoint	33.83	23.5	Velocity	See Note 1	
DS Threepoint	33.62	22.5	Depth	See Note 1	
DS Threepoint	33.44	18.2	Depth	See Note 1	
DS Threepoint	33.23	44.1	Depth	See Note 1	
DS Threepoint	33.04	12.2	Depth	See Note 1	
DS Threepoint	32.89	11.0	Depth	See Note 1	
DS 128 Street	32.68	7.9	Velocity	373.8	Depth
DS 128 Street	32.51	32.9	Depth	503.7	Depth
DS 128 Street	32.32	84.7	Depth	594.9	Depth
DS 128 Street	32	68.2	Depth	570.4	Depth
DS 128 Street	31.63	51.3	Depth	698.5	Depth

Reach	River Station (km)	Left Floodway Station (m)	Criteria	Right Floodway Station (m)	Criteria
DS 128 Street	31.27	25.1	Depth	857.2	Depth
DS 128 Street	30.87	24.4	Depth	990.0	Depth
DS 128 Street	30.44	134.2	Depth	1010.0	Depth
DS 128 Street	30.09	258.1	Depth	1080.7	Depth
DS 128 Street	29.73	450.1	Depth	1166.9	Depth
DS 128 Street	29.463	736.3	Depth	1466.5	Depth
DS 128 Street	29.12	570.9	Depth	1414.0	Depth
DS 128 Street	28.89	404.3	Depth	1424.7	Depth
DS 128 Street	28.66	428.3	Depth	1374.2	Velocity
DS 128 Street	28.38	380.4	Depth	1334.4	Depth
DS 128 Street	28.02	279.5	Velocity	1276.2	Depth
DS 128 Street	27.79	128.4	Depth	1427.5	Depth
DS 128 Street	27.53	140.4	Depth	1204.4	Depth
DS 128 Street	27.25	126.6	Depth	1125.1	Depth
DS 128 Street	26.88	390.3	Depth	1056.7	Depth
DS 128 Street	26.47	484.8	Velocity	1176.1	Velocity
DS 128 Street	26.24	396.1	Depth	1107.5	Depth
DS 128 Street	25.82	543.2	Depth	1197.4	Depth
DS 128 Street	25.5	631.7	Depth	1326.3	Depth
DS 128 Street	25.21	675.6	Depth	1313.6	Depth
DS 128 Street	24.99	847.4	Depth	1718.2	Depth
DS 128 Street	24.78	846.6	Depth	1731.4	Depth
DS 128 Street	24.54	957.4	Depth	1696.5	Depth
DS 128 Street	24.4	877.8	Depth	1649.4	Depth
DS 128 Street	24.12	852.1	Depth	1613.4	Depth
DS 128 Street	23.85	874.9	Depth	1424.5	Depth
DS 128 Street	23.58	851.1	Depth	1267.2	Depth
DS 128 Street	23.27	838.2	Depth	1159.8	Depth
DS 128 Street	22.98	630.9	Depth	1007.6	Depth
DS 128 Street	22.77	487.9	Depth	864.4	Depth
DS 128 Street	22.46	309.7	Depth	701.7	Depth
DS 128 Street	22.17	35.1	Depth	352.6	Depth
DS 128 Street	21.85	92.9	Depth	386.7	Depth
DS 128 Street	21.8	108.2	Depth	362.6	Depth
DS 128 Street	21.49	587.2	Depth	733.2	Depth
DS 128 Street	21.06	856.1	Depth	1014.8	Depth
DS 128 Street	20.81	1108.0	Depth	1527.9	Depth

Reach	River Station (km)	Left Floodway Station (m)	Criteria	Right Floodway Station (m)	Criteria
DS 128 Street	20.69	815.2	Depth	1408.3	Depth
DS 128 Street	20.41	305.3	Velocity	1026.7	Depth
DS 128 Street	20.09	38.0	Depth	651.1	Depth
DS 128 Street	19.71	44.9	Velocity	332.7	Velocity
DS 128 Street	19.29	41.7	Depth	382.5	Depth
DS 128 Street	18.99	37.6	Depth	399.1	Depth
DS 128 Street	18.69	81.8	Depth	622.0	Depth
DS 128 Street	18.34	77.4	Depth	943.9	Mixed
DS 128 Street	18.206	480.9	Depth	1335.2	Mixed
DS 128 Street	18.15	791.4	Depth	1519.9	Mixed
DS 128 Street	18.07	324.0	Depth	1022.3	Depth
DS 128 Street	18.01	62.3	Depth	1038.6	Depth
DS 128 Street	17.65	414.0	Orig Floodway	836.5	Orig Floodway
DS 128 Street	17.45	354.9	Orig Floodway	705.5	Orig Floodway
DS 128 Street	17.22	240.7	Orig Floodway	569.9	Orig Floodway
DS 128 Street	17.04	56.0	Orig Floodway	414.9	Orig Floodway
DS 128 Street	16.77	20.3	Orig Floodway	513.8	Orig Floodway
DS 128 Street	16.45	59.9	Orig Floodway	466.3	Orig Floodway
DS 128 Street	16.22	174.0	Orig Floodway	455.7	Orig Floodway
DS 128 Street	16.07	243.5	Orig Floodway	461.2	Orig Floodway
DS 128 Street	15.95	283.1	Orig Floodway	621.3	Mixed
DS 128 Street	15.91	296.1	Orig Floodway	543.7	Mixed
DS 128 Street	15.883	299.0	Orig Floodway	407.8	Orig Floodway
DS 128 Street	15.86	284.0	Orig Floodway	391.5	Orig Floodway
DS 128 Street	15.73	207.0	Orig Floodway	426.0	Orig Floodway
DS 128 Street	15.56	120.8	Mixed	496.4	Orig Floodway
DS 128 Street	15.4	90.6	Mixed	497.7	Orig Floodway
DS 128 Street	15.36	109.7	Mixed	511.3	Orig Floodway
DS 128 Street	15.35	123.9	Mixed	525.3	Orig Floodway
DS 128 Street	15.24	87.3	Mixed	508.9	Orig Floodway
DS 128 Street	15.17	82.5	Mixed	503.1	Orig Floodway
DS 128 Street	15.06	101.9	Mixed	523.0	Orig Floodway
DS 128 Street	14.92	136.7	Mixed	608.2	Orig Floodway
DS 128 Street	14.78	98.8	Mixed	622.1	Orig Floodway
DS 128 Street	14.62	104.5	Mixed	578.3	Mixed
DS 128 Street	14.45	166.6	Mixed	596.3	Mixed
DS 128 Street	14.25	179.6	Mixed	636.7	Mixed



Reach	River Station (km)	Left Floodway Station (m)	Criteria	Right Floodway Station (m)	Criteria
DS 128 Street	14.04	2.7	Mixed	641.2	Mixed
DS 128 Street	13.82	7.3	Mixed	679.4	Mixed
DS 128 Street	13.65	3.4	Mixed	565.4	Mixed
DS 128 Street	13.48	8.8	Mixed	422.6	Mixed
DS 128 Street	13.25	11.6	Mixed	259.7	Mixed
DS 128 Street	13.13	70.5	Mixed	170.3	Mixed
DS 128 Street	13.12	78.8	Mixed	355.1	Mixed
DS 128 Street	13.01	366.9	Orig Floodway	641.6	Mixed
DS 128 Street	12.85	195.4	Orig Floodway	586.2	Mixed
DS 128 Street	12.75	200.4	Orig Floodway	619.4	Mixed
DS 128 Street	12.73	270.9	Orig Floodway	381.0	Orig Floodway
DS 128 Street	12.64	98.4	Orig Floodway	387.6	Orig Floodway
DS 128 Street	12.554	150.0	Orig Floodway	651.7	Orig Floodway
DS 128 Street	12.47	246.4	Orig Floodway	708.7	Orig Floodway
DS 128 Street	12.343	336.9	Orig Floodway	725.7	Orig Floodway
DS 128 Street	12.25	269.5	Orig Floodway	725.5	Orig Floodway
DS Okotoks	12.02	62.5	Depth	782.4	Depth
DS Okotoks	11.90	110.0	Depth	893.3	Depth
DS Okotoks	11.75	126.6	Depth	826.2	Depth
DS Okotoks	11.54	100.3	Depth	912.7	Depth
DS Okotoks	11.47	140.8	Depth	905.9	Depth
DS Okotoks	11.25	78.1	Depth	705.4	Depth
DS Okotoks	10.93	12.1	Depth	658.0	Depth
DS Okotoks	10.63	50.4	Depth	654.1	Depth
DS Okotoks	10.45	43.5	Velocity	561.8	Depth
DS Okotoks	10.15	28.3	Depth	410.4	Depth
DS Okotoks	9.87	87.8	Depth	364.9	Depth
DS Okotoks	9.58	271.7	Depth	635.2	Depth
DS Okotoks	9.31	359.9	Depth	538.6	Depth
DS Okotoks	9.09	124.2	Depth	446.6	Depth
DS Okotoks	8.79	96.2	Depth	484.1	Depth
DS Okotoks	8.44	60.1	Depth	535.4	Depth
DS Okotoks	8.20	47.8	Depth	497.8	Depth
DS Okotoks	7.94	182.0	Depth	433.8	Depth
DS Okotoks	7.71	53.2	Depth	321.1	Depth

Reach	River Station (km)	Left Floodway Station (m)	Criteria	Right Floodway Station (m)	Criteria
DS Okotoks	7.52	23.1	Depth	275.5	Depth
DS Okotoks	7.30	32.2	Velocity	253.0	Depth
DS Okotoks	7.13	42.9	Depth	225.7	Depth
DS Okotoks	7.02	271.7	Depth	546.9	Depth
DS Okotoks	6.98	227.0	Depth	329.3	Depth
DS Okotoks	6.94	241.7	Depth	358.5	Depth
DS Okotoks	6.85	188.5	Depth	465.5	Depth
DS Okotoks	6.60	256.9	Depth	549.1	Depth
DS Okotoks	6.32	329.3	Depth	632.7	Depth
DS Okotoks	6.01	276.1	Depth	636.2	Depth
DS Okotoks	5.77	291.0	Depth	593.2	Depth
DS Okotoks	5.59	330.8	Depth	593.5	Velocity
DS Okotoks	5.29	157.5	Depth	388.0	Depth
DS Okotoks	5.16	127.2	Depth	372.8	Depth
DS Okotoks	5.00	61.9	Depth	281.1	Velocity
DS Okotoks	4.83	22.8	Depth	245.2	Depth
DS Okotoks	4.64	131.7	Depth	358.0	Depth
DS Okotoks	4.40	182.8	Depth	380.2	Velocity
DS Okotoks	4.00	107.2	Depth	295.9	Depth
DS Okotoks	3.64	80.2	Depth	217.7	Depth
DS Okotoks	3.25	15.0	Velocity	137.4	Depth
DS Okotoks	2.98	22.3	Depth	160.0	Depth
DS Okotoks	2.74	42.6	Depth	178.2	Depth
DS Okotoks	2.55	78.6	Velocity	215.3	Depth
DS Okotoks	2.37	35.9	Depth	103.5	Depth
DS Okotoks	1.99	99.8	Depth	244.6	Depth
DS Okotoks	1.70	321.1	Depth	395.9	Velocity
DS Okotoks	1.40	409.7	Depth	507.3	Depth
DS Okotoks	1.12	427.0	Depth	548.1	Depth
DS Okotoks	0.87	266.5	Depth	413.0	Depth
DS Okotoks	0.65	21.4	Depth	165.3	Depth
DS Okotoks	0.53	21.9	Velocity	120.0	Velocity
DS Okotoks	0.24	186.1	Depth	264.6	Depth
DS Okotoks	0.01	475.8	Depth	545.1	Depth

NOTE 1: This cross section only includes one side of the floodway. Please refer to the Floodway Criteria Maps Sheets 7 to 9 to identify opposite floodway station.

**NOTE 2:** This cross section is entirely contained within the floodway. Please refer to the Floodway Criteria Maps Sheets 7 to 9 to identify opposite floodway station.

**Table 3-3 – Design Flood Profile for Threepoint Creek**

River	Reach	River Station (km)	Min Channel El. (m)	WSE (m) for 100-year Flood
Threepoint Creek	US Millarville	34.48	1262.61	1265.47
Threepoint Creek	US Millarville	34.21	1261.47	1264.08
Threepoint Creek	US Millarville	34.11	1259.44	1263.42
Threepoint Creek	US Millarville	33.62	1258.73	1260.65
Threepoint Creek	US Millarville	33.30	1255.94	1258.84
Threepoint Creek	US Millarville	33.04	1254.46	1257.30
Threepoint Creek	US Millarville	32.75	1252.75	1255.01
Threepoint Creek	US Millarville	32.51	1250.37	1253.92
Threepoint Creek	US Millarville	32.39	1250.42	1253.57
Threepoint Creek	US Millarville	32.36	1250.18	1252.95
Threepoint Creek	US Millarville	32.16	1247.39	1250.87
Threepoint Creek	US Millarville	31.95	1246.32	1249.80
Threepoint Creek	US Millarville	31.68	1245.60	1248.32
Threepoint Creek	US Millarville	31.58	1245.09	1247.79
Threepoint Creek	US Millarville	31.45	1244.59	1247.01
Threepoint Creek	US Millarville	31.30	1243.81	1246.14
Threepoint Creek	US Millarville	31.03	1242.70	1244.71
Threepoint Creek	US Millarville	30.75	1241.11	1242.70
Threepoint Creek	US Millarville	30.49	1238.52	1240.82
Threepoint Creek	US Millarville	30.21	1237.09	1239.55
Threepoint Creek	US Millarville	30.00	1236.17	1238.41
Threepoint Creek	US Millarville	29.85	1235.56	1237.68
Threepoint Creek	US Millarville	29.61	1234.16	1235.48
Threepoint Creek	US Millarville	29.31	1231.30	1233.15
Threepoint Creek	US Millarville	29.19	1230.10	1232.38
Threepoint Creek	US Millarville	29.00	1228.70	1231.19
Threepoint Creek	US Millarville	28.77	1227.52	1229.98
Threepoint Creek	US Millarville	28.36	1225.14	1227.48
Threepoint Creek	US Millarville	27.98	1222.67	1224.47
Threepoint Creek	US Millarville	27.68	1219.62	1222.15
Threepoint Creek	US Millarville	27.37	1218.07	1220.33

River	Reach	River Station (km)	Min Channel El. (m)	WSE (m) for 100-year Flood
Threepoint Creek	US Millarville	26.86	1214.52	1216.78
Threepoint Creek	US Millarville	26.51	1212.71	1214.05
Threepoint Creek	US Millarville	26.20	1210.93	1211.99
Threepoint Creek	US Millarville	25.93	1209.44	1210.56
Threepoint Creek	US Millarville	25.52	1206.76	1209.03
Threepoint Creek	US Millarville	25.32	1205.39	1208.16
Threepoint Creek	US Millarville	25.13	1204.64	1207.41
Threepoint Creek	US Millarville	24.85	1203.53	1205.76
Threepoint Creek	US Millarville	24.73	1203.16	1205.45
Threepoint Creek	US Millarville	24.56	1201.71	1204.63
Threepoint Creek	US Millarville	24.33	1200.62	1203.94
Threepoint Creek	US Millarville	23.97	1199.59	1202.24
Threepoint Creek	US Millarville	23.72	1197.59	1201.17
Threepoint Creek	US Millarville	23.37	1195.92	1199.63
Threepoint Creek	US Millarville	23.02	1195.41	1198.64
Threepoint Creek	US Millarville	22.71	1194.04	1196.55
Threepoint Creek	US Millarville	22.41	1192.35	1195.33
Threepoint Creek	US Millarville	22.07	1191.27	1193.19
Threepoint Creek	US Millarville	21.78	1190.10	1191.63
Threepoint Creek	US Millarville	21.51	1188.74	1190.67
Threepoint Creek	US Millarville	21.23	1187.49	1189.43
Threepoint Creek	US Millarville	20.95	1186.27	1188.74
Threepoint Creek	US Millarville	20.72	1185.15	1188.24
Threepoint Creek	US Millarville	20.44	1184.53	1187.21
Threepoint Creek	US Millarville	20.34	1184.18	1186.98
Threepoint Creek	US Millarville	20.22	1183.57	1186.55
Threepoint Creek	US Millarville	20.17	1183.15	1186.58
Threepoint Creek	US Millarville	19.98	1182.35	1186.58
Threepoint Creek	US Millarville	19.95	1181.88	1185.92
Threepoint Creek	US Millarville	19.73	1182.52	1183.54
Threepoint Creek	US Millarville	19.49	1180.81	1183.19
Threepoint Creek	US Millarville	19.35	1181.31	1182.69
Threepoint Creek	US Millarville	18.43	1178.94	1181.97
Threepoint Creek	US Millarville	18.23	1178.14	1181.68
Threepoint Creek	US Millarville	18.07	1177.60	1180.79
Threepoint Creek	US Millarville	17.80	1177.34	1179.94
Threepoint Creek	US Millarville	17.68	1177.32	1179.56

River	Reach	River Station (km)	Min Channel El. (m)	WSE (m) for 100-year Flood
Threepoint Creek	US Millarville	17.54	1176.98	1179.33
Threepoint Creek	US Millarville	17.31	1175.89	1178.65
Threepoint Creek	US Millarville	16.87	1175.35	1178.39
Threepoint Creek	US Millarville	16.63	1173.80	1177.85
Threepoint Creek	US Millarville	16.44	1174.30	1177.56
Threepoint Creek	US Millarville	16.15	1174.41	1176.89
Threepoint Creek	US Millarville	15.93	1173.60	1176.15
Threepoint Creek	US Millarville	15.74	1172.42	1175.67
Threepoint Creek	US Millarville	15.34	1172.23	1175.10
Threepoint Creek	US Millarville	14.98	1170.52	1174.16
Threepoint Creek	US Millarville	14.88	1170.26	1174.07
Threepoint Creek	US Millarville	14.74	1169.53	1173.27
Threepoint Creek	US Millarville	14.47	1168.99	1172.26
Threepoint Creek	US Millarville	14.33	1168.12	1171.58
Threepoint Creek	US Millarville	14.11	1167.47	1170.43
Threepoint Creek	US Millarville	14.02	1167.43	1170.03
Threepoint Creek	US Millarville	13.82	1165.94	1169.92
Threepoint Creek	US Millarville	13.60	1165.08	1169.09
Threepoint Creek	US Millarville	13.45	1164.75	1169.03
Threepoint Creek	US Millarville	13.30	1164.30	1168.85
Threepoint Creek	US Millarville	12.94	1163.09	1166.87
Threepoint Creek	US Millarville	12.69	1162.40	1166.27
Threepoint Creek	US Millarville	12.40	1160.87	1165.99
Threepoint Creek	US Millarville	12.12	1160.88	1164.68
Threepoint Creek	US Millarville	11.91	1160.31	1164.56
Threepoint Creek	US Millarville	11.72	1159.34	1164.39
Threepoint Creek	US Millarville	11.42	1158.63	1163.72
Threepoint Creek	US Millarville	11.13	1156.91	1163.07
Threepoint Creek	US Millarville	11.09	1157.27	1162.58
Threepoint Creek	US Millarville	10.79	1156.66	1162.00
Threepoint Creek	US Millarville	10.36	1155.34	1159.82
Threepoint Creek	US Millarville	10.01	1154.32	1158.35
Threepoint Creek	US Millarville	9.73	1154.33	1157.68
Threepoint Creek	US Millarville	9.44	1152.97	1156.32
Threepoint Creek	US Millarville	9.11	1151.61	1154.90
Threepoint Creek	US Millarville	8.81	1151.38	1153.80
Threepoint Creek	US Millarville	8.65	1150.05	1152.82

River	Reach	River Station (km)	Min Channel El. (m)	WSE (m) for 100-year Flood
Threepoint Creek	US Millarville	8.46	1149.57	1152.32
Threepoint Creek	US Millarville	8.28	1149.67	1151.96
Threepoint Creek	US Millarville	8.06	1148.80	1151.41
Threepoint Creek	US Millarville	7.89	1147.57	1150.83
Threepoint Creek	US Millarville	7.65	1147.37	1150.29
Threepoint Creek	US Millarville	7.33	1146.24	1149.68
Threepoint Creek	US Millarville	7.02	1145.33	1148.60
Threepoint Creek	US Millarville	6.82	1145.23	1148.41
Threepoint Creek	US Millarville	6.44	1144.15	1147.85
Threepoint Creek	US Millarville	6.14	1143.80	1147.04
Threepoint Creek	US Millarville	5.85	1142.26	1146.09
Threepoint Creek	US Millarville	5.55	1141.98	1145.46
Threepoint Creek	US Millarville	5.25	1141.11	1145.15
Threepoint Creek	US Millarville	4.90	1140.09	1144.78
Threepoint Creek	US Millarville	4.66	1139.31	1144.02
Threepoint Creek	US Millarville	4.33	1138.83	1143.16
Threepoint Creek	US Millarville	4.29	1138.77	1142.95
Threepoint Creek	US Millarville	4.05	1138.37	1142.43
Threepoint Creek	US Millarville	3.93	1138.23	1142.06
Threepoint Creek	US Millarville	3.79	1137.94	1141.84
Threepoint Creek	US Millarville	3.67	1137.94	1140.64
Threepoint Creek	US Millarville	3.47	1137.48	1140.31
Threepoint Creek	US Millarville	3.15	1136.69	1140.02
Threepoint Creek	US Millarville	2.77	1134.83	1139.21
Threepoint Creek	US Millarville	2.56	1134.77	1138.65
Threepoint Creek	US Millarville	2.38	1134.38	1138.30
Threepoint Creek	US Millarville	2.17	1133.95	1138.09
Threepoint Creek	US Millarville	1.98	1133.14	1137.69
Threepoint Creek	US Millarville	1.71	1132.16	1136.67
Threepoint Creek	US Millarville	1.42	1131.79	1135.11
Threepoint Creek	US Millarville	1.22	1130.89	1134.31
Threepoint Creek	US Millarville	1.01	1130.10	1133.48
Threepoint Creek	US Millarville	0.81	1129.45	1132.91
Threepoint Creek	US Millarville	0.63	1128.33	1132.37
Threepoint Creek	US Millarville	0.48	1127.88	1131.36
Threepoint Creek	US Millarville	0.20	1126.88	1130.43



**Table 3-4 – Design Flood Profile for Sheep River**

River	Reach	River Station (km)	Min Channel El. (m)	WSE (m) for 100-year Flood
Sheep River	US Threepoint	59.66	1272.02	1277.16
Sheep River	US Threepoint	59.46	1271.27	1275.53
Sheep River	US Threepoint	59.23	1269.57	1274.28
Sheep River	US Threepoint	59.00	1268.94	1273.04
Sheep River	US Threepoint	58.69	1267.60	1271.61
Sheep River	US Threepoint	58.33	1265.73	1268.40
Sheep River	US Threepoint	58.08	1263.56	1267.08
Sheep River	US Threepoint	57.82	1262.40	1264.98
Sheep River	US Threepoint	57.56	1260.45	1264.15
Sheep River	US Threepoint	57.32	1257.53	1262.81
Sheep River	US Threepoint	57.04	1256.23	1260.83
Sheep River	US Threepoint	56.53	1253.98	1258.11
Sheep River	US Threepoint	56.35	1253.02	1258.48
Sheep River	US Threepoint	56.12	1251.50	1256.07
Sheep River	US Threepoint	55.74	1249.61	1253.71
Sheep River	US Threepoint	55.47	1248.06	1251.41
Sheep River	US Threepoint	55.27	1246.63	1250.33
Sheep River	US Threepoint	55.08	1245.66	1249.46
Sheep River	US Threepoint	54.55	1242.53	1245.95
Sheep River	US Threepoint	54.33	1239.90	1244.87
Sheep River	US Threepoint	54.10	1239.41	1243.24
Sheep River	US Threepoint	53.67	1236.66	1240.80
Sheep River	US Threepoint	53.35	1234.36	1238.46
Sheep River	US Threepoint	52.95	1232.82	1236.01
Sheep River	US Threepoint	52.70	1231.34	1234.95
Sheep River	US Threepoint	52.40	1229.51	1232.99
Sheep River	US Threepoint	52.10	1228.08	1231.67
Sheep River	US Threepoint	51.74	1226.19	1229.27
Sheep River	US Threepoint	51.44	1224.39	1228.60
Sheep River	US Threepoint	51.17	1223.15	1226.85
Sheep River	US Threepoint	50.96	1221.78	1225.57
Sheep River	US Threepoint	50.61	1219.23	1224.15

River	Reach	River Station (km)	Min Channel El. (m)	WSE (m) for 100-year Flood
Sheep River	US Threepoint	50.51	1218.53	1223.91
Sheep River	US Threepoint	50.21	1217.65	1222.83
Sheep River	US Threepoint	49.83	1215.71	1220.05
Sheep River	US Threepoint	49.54	1214.09	1218.97
Sheep River	US Threepoint	49.18	1211.47	1217.14
Sheep River	US Threepoint	48.94	1210.53	1215.91
Sheep River	US Threepoint	48.69	1208.88	1213.62
Sheep River	US Threepoint	48.44	1207.09	1212.78
Sheep River	US Threepoint	48.19	1205.74	1212.02
Sheep River	US Threepoint	48.15	1205.93	1211.06
Sheep River	US Threepoint	48.08	1205.62	1209.89
Sheep River	US Threepoint	47.92	1203.76	1208.74
Sheep River	US Threepoint	47.88	1203.23	1208.75
Sheep River	US Threepoint	47.62	1203.81	1206.75
Sheep River	US Threepoint	47.35	1201.82	1206.08
Sheep River	US Threepoint	47.08	1199.95	1204.38
Sheep River	US Threepoint	46.78	1198.84	1202.21
Sheep River	US Threepoint	46.63	1197.65	1201.83
Sheep River	US Threepoint	46.46	1197.09	1200.98
Sheep River	US Threepoint	46.20	1195.55	1200.31
Sheep River	US Threepoint	46.10	1194.45	1199.75
Sheep River	US Threepoint	46.06	1194.37	1198.35
Sheep River	US Threepoint	46.01	1194.33	1198.23
Sheep River	US Threepoint	45.97	1193.87	1197.21
Sheep River	US Threepoint	45.94	1193.51	1196.91
Sheep River	US Threepoint	45.88	1193.08	1196.90
Sheep River	US Threepoint	45.73	1191.92	1196.04
Sheep River	US Threepoint	45.53	1191.40	1195.53
Sheep River	US Threepoint	45.29	1190.01	1193.97
Sheep River	US Threepoint	45.05	1189.23	1192.71
Sheep River	US Threepoint	44.78	1187.21	1191.47
Sheep River	US Threepoint	44.41	1184.74	1189.52
Sheep River	US Threepoint	44.13	1184.28	1188.45
Sheep River	US Threepoint	44.00	1183.31	1187.25
Sheep River	US Threepoint	43.91	1182.47	1186.40
Sheep River	US Threepoint	43.47	1180.57	1183.36
Sheep River	US Threepoint	43.28	1179.42	1181.94

River	Reach	River Station (km)	Min Channel El. (m)	WSE (m) for 100-year Flood
Sheep River	US Threepoint	43.04	1178.15	1180.35
Sheep River	US Threepoint	42.82	1175.80	1178.56
Sheep River	US Threepoint	42.62	1174.68	1177.78
Sheep River	US Threepoint	42.45	1173.23	1177.26
Sheep River	US Threepoint	42.29	1172.09	1176.96
Sheep River	US Threepoint	42.24	1171.12	1176.72
Sheep River	US Threepoint	42.21	1171.16	1175.85
Sheep River	US Threepoint	42.12	1170.64	1174.73
Sheep River	US Threepoint	41.94	1170.11	1173.86
Sheep River	US Threepoint	41.80	1169.79	1173.43
Sheep River	US Threepoint	41.63	1168.99	1171.77
Sheep River	US Threepoint	41.36	1166.79	1169.67
Sheep River	US Threepoint	41.13	1165.31	1168.39
Sheep River	US Threepoint	40.81	1162.66	1165.99
Sheep River	US Threepoint	40.51	1160.71	1164.30
Sheep River	US Threepoint	40.23	1159.26	1162.39
Sheep River	US Threepoint	39.85	1157.02	1159.87
Sheep River	US Threepoint	39.50	1155.15	1157.03
Sheep River	US Threepoint	39.23	1152.76	1155.39
Sheep River	US Threepoint	39.12	1152.08	1154.84
Sheep River	US Threepoint	38.84	1149.74	1153.20
Sheep River	US Threepoint	38.65	1149.49	1152.38
Sheep River	US Threepoint	38.35	1147.39	1151.00
Sheep River	US Threepoint	38.17	1147.09	1149.79
Sheep River	US Threepoint	37.99	1145.72	1148.35
Sheep River	US Threepoint	37.74	1144.10	1147.02
Sheep River	US Threepoint	37.58	1143.55	1146.51
Sheep River	US Threepoint	37.40	1142.68	1146.01
Sheep River	US Threepoint	37.25	1141.57	1143.76
Sheep River	US Threepoint	36.93	1139.51	1142.03
Sheep River	US Threepoint	36.64	1138.80	1140.80
Sheep River	US Threepoint	36.53	1138.34	1140.27
Sheep River	US Threepoint	36.31	1136.56	1138.66
Sheep River	US Threepoint	35.91	1133.84	1136.41
Sheep River	US Threepoint	35.61	1132.24	1134.14
Sheep River	US Threepoint	35.37	1131.46	1133.45
Sheep River	US Threepoint	35.27	1130.87	1133.06

River	Reach	River Station (km)	Min Channel El. (m)	WSE (m) for 100-year Flood
Sheep River	US Threepoint	35.02	1129.22	1131.24
Sheep River	US Threepoint	34.89	1128.98	1130.76
Sheep River	DS Threepoint	34.28	1126.03	1129.22
Sheep River	DS Threepoint	34.12	1125.01	1128.74
Sheep River	DS Threepoint	33.83	1124.45	1127.60
Sheep River	DS Threepoint	33.62	1124.00	1126.93
Sheep River	DS Threepoint	33.44	1122.42	1126.53
Sheep River	DS Threepoint	33.23	1122.14	1125.96
Sheep River	DS Threepoint	33.04	1121.41	1125.15
Sheep River	DS Threepoint	32.89	1120.48	1124.53
Sheep River	128 St Overflow	2.78	1140.31	1142.86
Sheep River	128 St Overflow	2.72	1139.73	1142.45
Sheep River	128 St Overflow	2.67	1139.63	1141.77
Sheep River	128 St Overflow	2.57	1139.27	1141.5
Sheep River	128 St Overflow	2.53	1138.82	1141.39
Sheep River	128 St Overflow	2.46	1138.51	1140.52
Sheep River	128 St Overflow	2.39	1138.12	1139.65
Sheep River	128 St Overflow	2.33	1137.61	1139.63
Sheep River	128 St Overflow	2.23	1136.98	1138.48
Sheep River	128 St Overflow	2.16	1135.43	1137.68
Sheep River	128 St Overflow	2.05	1135.19	1136.59
Sheep River	128 St Overflow	1.71	1132.24	1133.72
Sheep River	128 St Overflow	1.56	1131.56	1133.52
Sheep River	128 St Overflow	1.42	1130.99	1133.49
Sheep River	128 St Overflow	1.32	1129.42	1133.47
Sheep River	128 St Overflow	1.24	1128.58	1133.45
Sheep River	128 St Overflow	1.21	1128.74	1131.26
Sheep River	128 St Overflow	0.94	1126.34	1130.13
Sheep River	128 St Overflow	0.70	1126.84	1128.72
Sheep River	128 St Overflow	0.53	1124.76	1126.92
Sheep River	128 St Overflow	0.43	1122.15	1127.03
Sheep River	128 St Overflow	0.31	1126.00	1126.89
Sheep River	128 St Overflow	0.28	1125.71	1126.65
Sheep River	128 St Overflow	0.23	1125.38	1126.42
Sheep River	128 St Overflow	0.12	1124.47	1125.94
Sheep River	DS 128 Street	32.68	1119.92	1124.02
Sheep River	DS 128 Street	32.51	1119.08	1123.65

River	Reach	River Station (km)	Min Channel El. (m)	WSE (m) for 100-year Flood
Sheep River	DS 128 Street	32.32	1118.41	1122.83
Sheep River	DS 128 Street	32.00	1117.55	1121.58
Sheep River	DS 128 Street	31.63	1115.99	1120.00
Sheep River	DS 128 Street	31.27	1115.19	1118.50
Sheep River	DS 128 Street	30.87	1114.01	1116.93
Sheep River	DS 128 Street	30.44	1112.43	1114.96
Sheep River	DS 128 Street	30.09	1110.34	1113.79
Sheep River	DS 128 Street	29.73	1109.08	1112.35
Sheep River	DS 128 Street	29.46	1107.80	1109.98
Sheep River	DS 128 Street	29.12	1105.65	1108.51
Sheep River	DS 128 Street	28.89	1104.27	1107.58
Sheep River	DS 128 Street	28.66	1103.25	1106.27
Sheep River	DS 128 Street	28.38	1102.37	1105.19
Sheep River	DS 128 Street	28.02	1099.38	1103.39
Sheep River	DS 128 Street	27.79	1099.01	1101.83
Sheep River	DS 128 Street	27.53	1097.72	1101.37
Sheep River	DS 128 Street	27.25	1094.84	1100.54
Sheep River	DS 128 Street	26.88	1094.03	1098.87
Sheep River	DS 128 Street	26.47	1093.01	1096.80
Sheep River	DS 128 Street	26.24	1091.71	1095.52
Sheep River	DS 128 Street	25.82	1090.61	1093.94
Sheep River	DS 128 Street	25.50	1088.13	1092.78
Sheep River	DS 128 Street	25.21	1087.57	1091.51
Sheep River	DS 128 Street	24.99	1086.24	1090.24
Sheep River	DS 128 Street	24.78	1085.32	1089.27
Sheep River	DS 128 Street	24.54	1085.20	1088.75
Sheep River	DS 128 Street	24.40	1084.68	1088.60
Sheep River	DS 128 Street	24.12	1083.50	1087.78
Sheep River	DS 128 Street	23.85	1082.67	1086.46
Sheep River	DS 128 Street	23.58	1080.78	1085.46
Sheep River	DS 128 Street	23.27	1080.11	1084.00
Sheep River	DS 128 Street	22.98	1078.69	1083.00
Sheep River	DS 128 Street	22.77	1078.06	1082.12
Sheep River	DS 128 Street	22.46	1076.93	1081.09
Sheep River	DS 128 Street	22.17	1075.89	1079.96
Sheep River	DS 128 Street	21.85	1074.81	1078.36
Sheep River	DS 128 Street	21.80	1072.52	1078.35

River	Reach	River Station (km)	Min Channel El. (m)	WSE (m) for 100-year Flood
Sheep River	DS 128 Street	21.49	1071.75	1077.14
Sheep River	DS 128 Street	21.06	1070.39	1075.19
Sheep River	DS 128 Street	20.81	1070.05	1073.96
Sheep River	DS 128 Street	20.69	1069.83	1073.08
Sheep River	DS 128 Street	20.41	1069.40	1072.01
Sheep River	DS 128 Street	20.09	1067.02	1071.10
Sheep River	DS 128 Street	19.71	1064.98	1069.98
Sheep River	DS 128 Street	19.29	1063.47	1068.59
Sheep River	DS 128 Street	18.99	1062.68	1067.62
Sheep River	DS 128 Street	18.69	1061.97	1065.66
Sheep River	DS 128 Street	18.34	1060.09	1063.87
Sheep River	DS 128 Street	18.21	1059.43	1063.55
Sheep River	DS 128 Street	18.15	1059.20	1063.14
Sheep River	DS 128 Street	18.07	1058.49	1062.77
Sheep River	DS 128 Street	18.01	1058.19	1062.59
Sheep River	DS 128 Street	17.65	1056.47	1061.01
Sheep River	DS 128 Street	17.45	1056.42	1060.97
Sheep River	DS 128 Street	17.22	1054.82	1060.03
Sheep River	DS 128 Street	17.04	1055.24	1058.73
Sheep River	DS 128 Street	16.77	1053.81	1057.90
Sheep River	DS 128 Street	16.45	1052.57	1057.39
Sheep River	DS 128 Street	16.22	1051.81	1056.40
Sheep River	DS 128 Street	16.07	1051.12	1056.30
Sheep River	DS 128 Street	15.95	1050.80	1056.22
Sheep River	DS 128 Street	15.91	1051.09	1055.90
Sheep River	DS 128 Street	15.88	1050.91	1055.52
Sheep River	DS 128 Street	15.86	1050.68	1054.44
Sheep River	DS 128 Street	15.73	1050.03	1054.09
Sheep River	DS 128 Street	15.56	1049.37	1053.30
Sheep River	DS 128 Street	15.40	1049.23	1052.94
Sheep River	DS 128 Street	15.36	1048.39	1052.81
Sheep River	DS 128 Street	15.35	1048.29	1052.71
Sheep River	DS 128 Street	15.24	1047.97	1052.18
Sheep River	DS 128 Street	15.17	1047.58	1051.66
Sheep River	DS 128 Street	15.06	1048.02	1051.37
Sheep River	DS 128 Street	14.92	1046.92	1050.37
Sheep River	DS 128 Street	14.78	1046.43	1050.21



River	Reach	River Station (km)	Min Channel El. (m)	WSE (m) for 100-year Flood
Sheep River	DS 128 Street	14.62	1044.77	1049.83
Sheep River	DS 128 Street	14.45	1045.00	1049.00
Sheep River	DS 128 Street	14.25	1043.50	1048.09
Sheep River	DS 128 Street	14.04	1042.91	1047.44
Sheep River	DS 128 Street	13.82	1042.17	1046.45
Sheep River	DS 128 Street	13.65	1041.71	1045.76
Sheep River	DS 128 Street	13.48	1041.02	1045.67
Sheep River	DS 128 Street	13.25	1040.03	1045.43
Sheep River	DS 128 Street	13.13	1038.93	1044.75
Sheep River	DS 128 Street	13.12	1039.27	1044.52
Sheep River	DS 128 Street	13.01	1039.34	1044.59
Sheep River	DS 128 Street	12.85	1038.42	1044.58
Sheep River	DS 128 Street	12.75	1037.61	1044.26
Sheep River	DS 128 Street	12.73	1037.28	1042.44
Sheep River	DS 128 Street	12.64	1037.53	1041.56
Sheep River	DS 128 Street	12.55	1037.50	1041.35
Sheep River	DS 128 Street	12.47	1037.30	1040.62
Sheep River	DS 128 Street	12.34	1036.69	1040.25
Sheep River	DS 128 Street	12.25	1035.85	1039.82
Sheep River	DS Okotoks	12.02	1033.51	1038.05
Sheep River	DS Okotoks	11.90	1033.66	1037.72
Sheep River	DS Okotoks	11.75	1032.12	1036.74
Sheep River	DS Okotoks	11.54	1031.95	1036.63
Sheep River	DS Okotoks	11.47	1031.81	1035.41
Sheep River	DS Okotoks	11.25	1030.10	1034.07
Sheep River	DS Okotoks	10.93	1029.44	1033.16
Sheep River	DS Okotoks	10.63	1027.53	1032.31
Sheep River	DS Okotoks	10.45	1027.98	1031.83
Sheep River	DS Okotoks	10.15	1026.10	1031.09
Sheep River	DS Okotoks	9.87	1024.20	1028.92
Sheep River	DS Okotoks	9.58	1023.59	1028.59
Sheep River	DS Okotoks	9.31	1022.73	1026.81
Sheep River	DS Okotoks	9.09	1021.23	1025.74
Sheep River	DS Okotoks	8.79	1018.83	1025.41
Sheep River	DS Okotoks	8.44	1017.78	1024.01
Sheep River	DS Okotoks	8.2	1017.84	1022.40
Sheep River	DS Okotoks	7.94	1016.12	1021.39



River	Reach	River Station (km)	Min Channel El. (m)	WSE (m) for 100-year Flood
Sheep River	DS Okotoks	7.71	1014.85	1021.27
Sheep River	DS Okotoks	7.52	1013.47	1019.99
Sheep River	DS Okotoks	7.3	1013.29	1019.45
Sheep River	DS Okotoks	7.13	1013.06	1019.31
Sheep River	DS Okotoks	7.02	1011.83	1019.39
Sheep River	DS Okotoks	6.9789	1011.58	1018.25
Sheep River	DS Okotoks	6.94	1012.22	1017.37
Sheep River	DS Okotoks	6.85	1011.82	1016.79
Sheep River	DS Okotoks	6.6	1010.33	1015.54
Sheep River	DS Okotoks	6.32	1009.22	1014.07
Sheep River	DS Okotoks	6.01	1008.85	1013.58
Sheep River	DS Okotoks	5.77	1007.23	1012.98
Sheep River	DS Okotoks	5.59	1006.32	1012.15
Sheep River	DS Okotoks	5.29	1006.27	1010.04
Sheep River	DS Okotoks	5.16	1005.09	1009.87
Sheep River	DS Okotoks	5	1003.74	1009.12
Sheep River	DS Okotoks	4.83	1003.61	1007.92
Sheep River	DS Okotoks	4.64	1002.87	1007.38
Sheep River	DS Okotoks	4.4	1001.59	1006.85
Sheep River	DS Okotoks	4	1000.54	1005.32
Sheep River	DS Okotoks	3.64	998.64	1003.69
Sheep River	DS Okotoks	3.25	996.67	1002.48
Sheep River	DS Okotoks	2.98	995.93	1001.12
Sheep River	DS Okotoks	2.74	995.19	999.51
Sheep River	DS Okotoks	2.55	994.30	999.67
Sheep River	DS Okotoks	2.37	993.17	997.83
Sheep River	DS Okotoks	1.99	991.28	997.45
Sheep River	DS Okotoks	1.7	990.74	995.60
Sheep River	DS Okotoks	1.4	988.88	994.32
Sheep River	DS Okotoks	1.12	986.96	993.45
Sheep River	DS Okotoks	0.87	986.95	992.99
Sheep River	DS Okotoks	0.65	985.71	993.03
Sheep River	DS Okotoks	0.53	985.52	991.31
Sheep River	DS Okotoks	0.24	984.57	989.67
Sheep River	DS Okotoks	0	982.85	988.07

## 4. Design Flood Hazard Map Production

### 4.1 Floodway Mapping Methodology

The following procedure was used in ArcGIS to develop inundation extents for the design flood:

1. Assigned design flood water levels at each cross section
2. Created a continuous water surface elevation Triangulated Irregular Network (TIN) between cross sections
3. Manually adjusted the water surface elevation TIN in special areas.
4. Converted the adjusted TIN into a water surface elevation raster
5. The DTM raster was subtracted from water surface elevation raster to define wet areas
6. A code of "NoData" was assigned to all dry raster cells
7. Conversion of wet areas into a flood inundation polygon dataset and deletion of all features not related to main river channels
8. Overall cleanup and simplification of polygons
9. Smoothing of polygon outlines using the PAEK algorithm

In addition to the above procedure, backwater inundation for any large tributary areas was included based on the design water levels at the main channel at the confluences of these tributaries.

### 4.2 Floodway Criteria Maps

Floodway criteria maps show the basis for determining the floodway and flood fringe extents for the design flood, and document the results of the model simulations of water level, depths, and flow velocities in a reach. The open water floodway criteria maps included the following:

- The extent of the open water design flood
- Areas meeting or exceeding the 1 m depth floodway criterion for the design flood
- The locations along each model cross section where flow velocities estimated to meet the 1 m/s velocity criterion
- The locations of the main channel top of bank
- The floodway boundary for the open water design flood

- The location and extent of all cross sections used in the HEC-RAS models with appropriate labels
- Background aerial imagery
- Roads, bridges, and flood control structures.

The governing floodway criteria maps were prepared in a scale of 1:7,500 in the study datum and coordinate system (CSRS NAD83, 111° 3TM). The maps are provided in Appendix A.

## 4.3 Flood Hazard Maps

### 4.3.1 Overview

The flood hazard maps provide a display of the areas along each river reach that are either in the floodway and/or the flood fringe. The floodway was determined in accordance with the criteria listed above, and the flood fringe includes all other directly inundated areas that lie outside of the floodway. The maps are provided in Appendix B.

### 4.3.2 Areas in the Floodway

The key development areas and structures that lie within the Floodway are briefly summarized below.

#### Sheep River

- The west end of 2430 Drive West (map sheet 3).
- Low lying areas of the floodplain at Calkins Place South East near Turner Valley (map sheet 5).
- Low lying areas of the floodplain at North Royalite Way North East near Turner Valley (map sheet 5).
- Flood control dike at km 41.95 just downstream of Black Diamond (map sheet 6).
- The lower chords would be submerged on two bridges on the Sheep River – the Highway 2A crossing in Okotoks (map sheet 14) and the Highway 22 crossing in Black Diamond (map sheet 6).
- Flood control dike at km 37.25 (map sheet 7).
- Large floodplain area and a number of low lying residences and roads at the Threepoint Creek and Sheep River confluence (map sheet 8).
- Large areas of the floodplain, and a rural residence at km 32 (map sheet 9).
- Meridian Street and sections low lying floodplain areas to the west of Meridian Street (map sheet 13).
- Various residences and infrastructure between km 11.89 and km 10.93 downstream of Okotoks (map sheet 15).

- Access road to Okotoks water treatment facility (map sheet 15).
- Northern sections of the Country Lanes Estates RV park just upstream of Highway 2 (map sheet 16).

#### **Threepoint Creek**

- Residences located at km 31.9 (map sheets 19-20).
- Sections of the 2338 Drive West roadway (map sheets 19-20).
- Sections of the 256 Street West roadway (map sheet 21-22).
- Low lying floodplain areas around Millerville Landing, and overtopping of both highways 22 and 549 (map sheet 23).
- Flooding of low lying areas of the Millerville Racing and Agricultural society grounds at km 11.72 (map sheet 25).

#### **4.3.3 Areas in the Flood Fringe**

The key development areas and structures that lie within the Flood Fringe are briefly summarized below.

##### **Sheep River**

- Low lying areas of the floodplain at Calkins Place South East near Turner Valley (map sheet 5).
- Low lying areas of the floodplain at North Royalite Way North East near Turner Valley (map sheet 5).
- Areas of Black Diamond to the south of the 22 Highway bridge crossing (high hazard) up to 1 St Northwest (map sheet 6).
- Low lying areas and roads at the Threepoint Creek and Sheep River confluence (map sheet 8).
- The Okotoks waste water treatment facility and Eco Center, located just upstream of the 32nd St E bridge crossing (map sheets 14-15).
- Okotoks Lions Campground (high hazard flood fringe) (map sheet 14).
- Numerous areas within Okotoks, particularly along the north bank of the river, where the river overflows through a section of the downtown area (map sheets 13-15).
- Southern sections of the Country Lanes Estates RV park just upstream of Highway 2 (map sheet 16).

##### **Threepoint Creek**

- Sections of the 2338 Drive West roadway (map sheets 19-20)

- Low lying floodplain areas and residences to the south of Highway 529, south of Millarville Landing (map sheet 23)
- Flooding of low lying areas of the Millarville Racing and Agricultural society grounds at km 11.72 (map sheet 25)

## 5. Design Flood Grids

Flood risk inventory studies have been completed to define and quantify flood risks in the Sheep River study.

### 5.1 Water Surface Elevation Grids

A water surface elevation grid was created by converting the water surface elevation TIN into a raster file with the same resolution as the DTM.

### 5.2 Flood Depth Grids

A flood depth grid was created by subtracting the water surface elevation grid from the DTM. The flood depth grid has the same resolution and alignment as the DTM, and includes all inundated areas.

## 6. Conclusions

The boundary between the floodway and flood fringe was determined using the calibrated HEC-RAS model and in consideration of the criteria for floodway determination. The floodway typically includes areas where water depths are greater than 1 m or where flow velocities are greater than 1 m/s. Exceptions may be made for ineffective flow areas, backwater areas or to accommodate a hydraulically smooth floodway line.

The governing floodway and flood fringe areas were then delineated for the Sheep River and Threepoint Creek, and are summarized in the mapping series included in Appendix B of this report.

## 7. References

AEP (Alberta Environment and Parks). 2011. *Flood Hazard Identification Program Guidelines*. July 2011

AFW (WOOD), 2017. *Sheep River Hazard Study Survey and Base Data Collection Report*

Hatch. 2019a. *Sheep River Hazard Study – Hydraulic Model Creation, Calibration and Inundation Mapping Report, July 2019.*

Hatch. 2019b. *Sheep River Hazard Study – Open Water Flood Hazard Identification Report, July 2019.*

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# Appendix A

## Flood Criteria Mapping

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March.2023

## SHEEP RIVER FLOOD HAZARD STUDY

# FLOODWAY CRITERIA MAP LIBRARY

### Definitions

**Flood Hazard Map** - A flood hazard map is a specific type of flood map that identifies the area flooded for the 1:100 design flood, and divides that flood hazard area into floodway and flood fringe zones. Flood hazard maps can also show additional flood hazard information, including the incremental areas at risk for more severe floods like the 1:200 and 1:500 floods. Flood hazard maps are typically used for long-term flood hazard area management and land-use planning.

**Design Flood** - The design flood standard in Alberta is the 1:100 flood, which is a flood that has a 1% chance of being equaled or exceeded in any given year. The design flood is typically based on the 1:100 open water flood, but it can also reflect 1:100 ice jam flood levels or be based on a historical flood event. Different sized floods have different chances of occurring – for example, a 1:200 flood has a 0.5% chance of occurring in any given year and a 1:500 flood has a 0.2% chance of occurring in any given year – but only the 1:100 design flood is used to define the floodway and flood fringe zones on flood hazard maps.

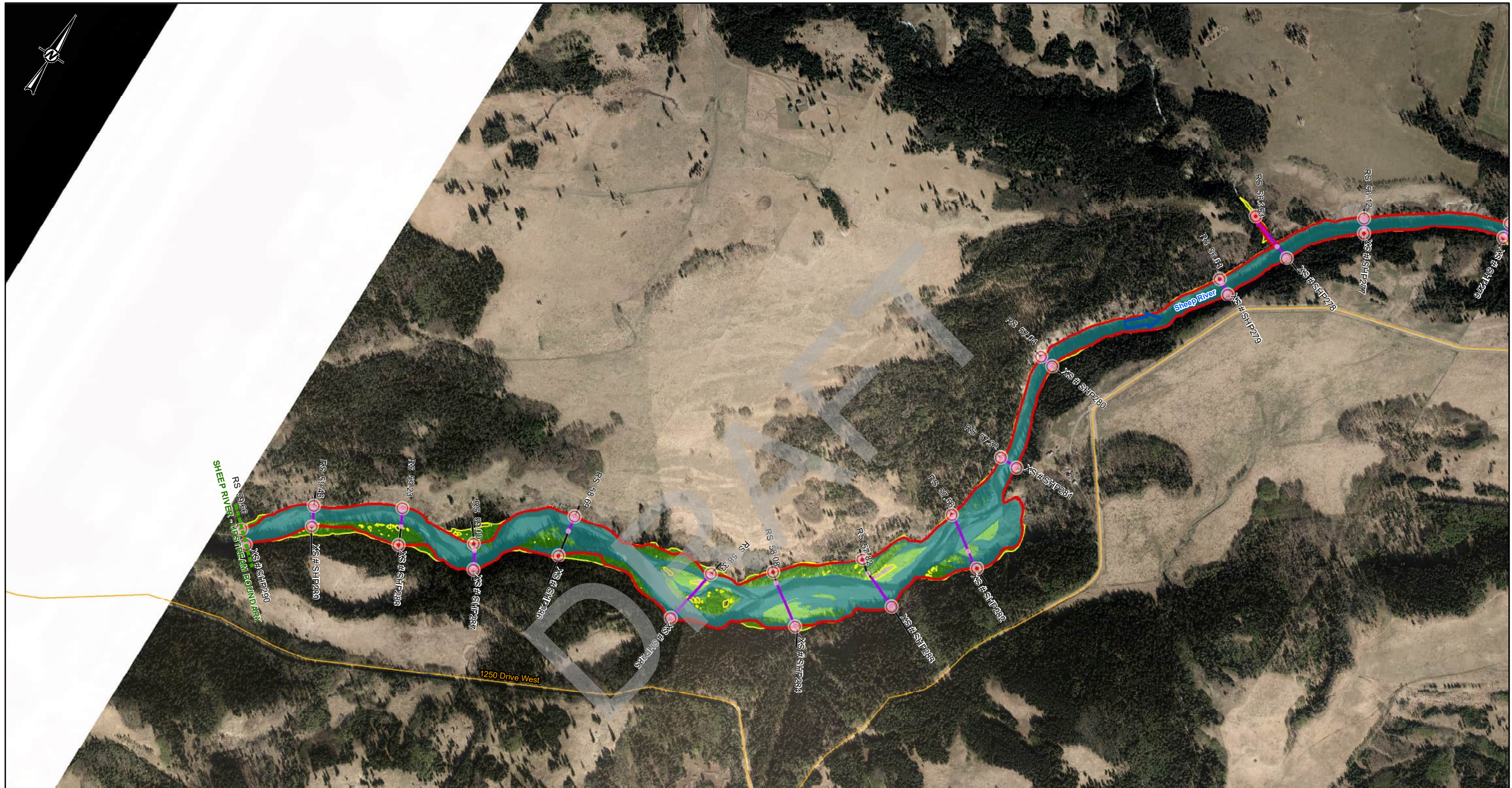
**Floodway** - When a floodway is first defined on a flood hazard map, it typically represents the area of highest flood hazard where flows are deepest, fastest, and most destructive during the 1:100 design flood. When a flood hazard map is updated, the floodway will not get larger in most circumstances to maintain long-term regulatory certainty, even if the flood hazard area gets larger or design flood levels get higher.

**Flood Fringe** - The flood fringe is the area outside of the floodway that is flooded or could be flooded during the 1:100 design flood. The flood fringe typically represents areas with shallower, slower, and less destructive flooding, but it may also include “high hazard flood fringe” areas. Areas at risk of flooding behind flood berms may also be mapped as “protected flood fringe” areas.

**High Hazard Flood Fringe** - The high hazard flood fringe identifies areas within the flood fringe with deeper or faster moving water than the rest of the flood fringe. High hazard flood fringe areas are likely to be most significant for flood maps that are being updated, but they may also be included in new flood maps.

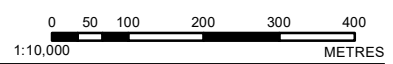
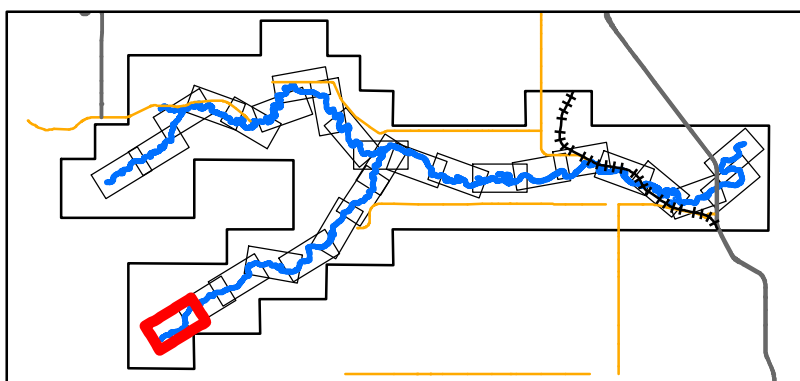
**Protected Flood Fringe** - The protected flood fringe identifies areas that could be flooded if dedicated flood berms fail or do not work as designed during the 1:100 design flood, even if they are not overtopped. Protected flood fringe areas are part of the flood fringe and do not differentiate between areas with deeper or faster moving water and shallower or slower moving water.





SHEET 2 ↓

- LEGEND**
- CROSS SECTION
  - XS#110 CROSS SECTION NUMBER
  - ➔ FLOW DIRECTION
  - STUDY\_BOUNDARY
  - ▬ FLOOD CONTROL STRUCTURES
  - ▬ BRIDGES
  - PRIMARY HIGHWAY
  - LOCAL ROAD; LOCAL STREET
  - RAILWAY
  - BANK STATION
  - ⊙ FLOODWAY STATION
  - - - PREVIOUS FLOODWAY
  - VELOCITY ≥ 1m/s
  - PROPOSED FLOODWAY
  - FLOOD EXTENT- 100 YEAR
  - DEPTH ≥ 1m
- DISCHARGE  
SHEEP RIVER= 787 m<sup>3</sup>/s



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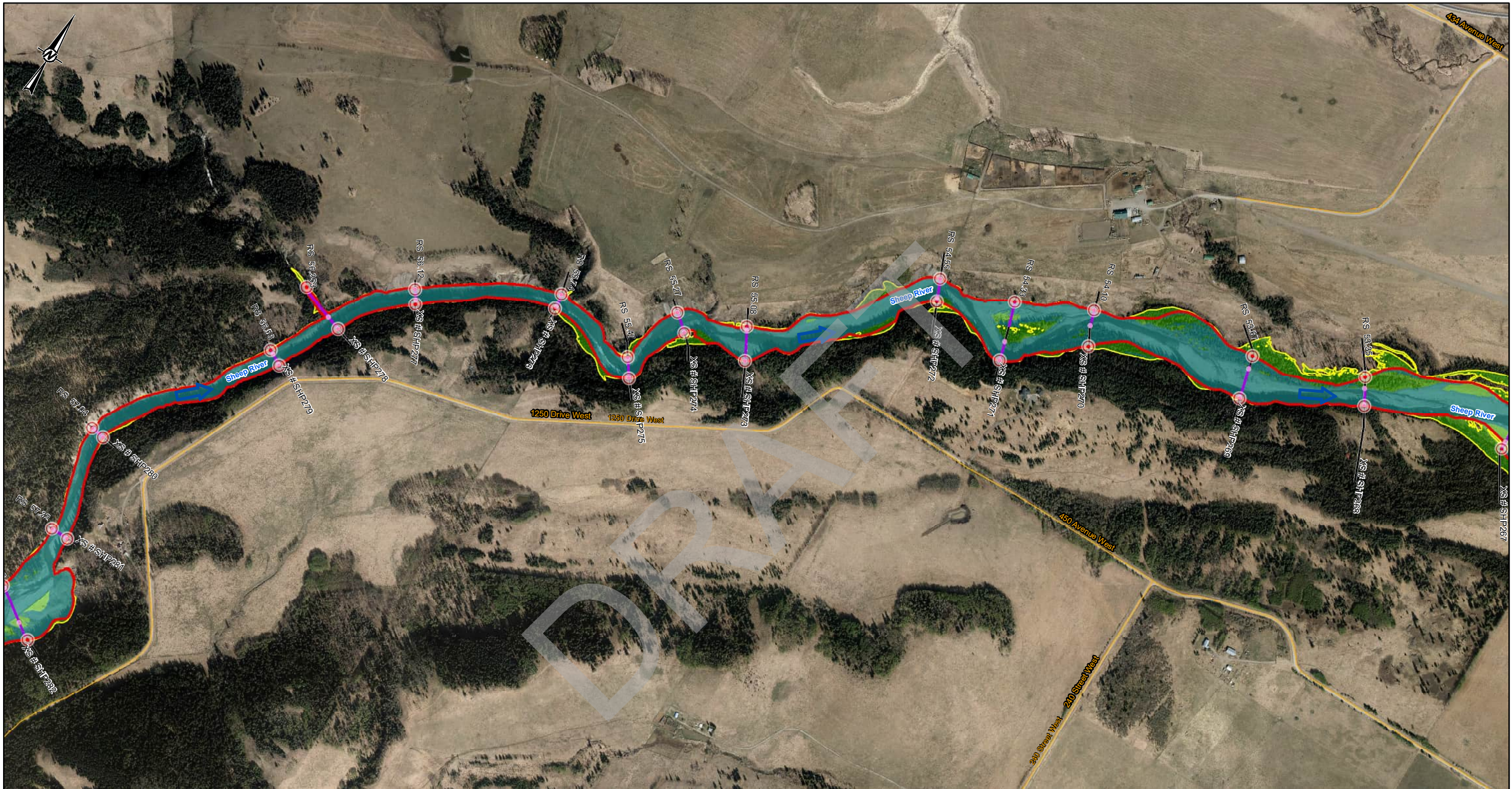
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PREPARED	R. GROENEVELD	2023-03-31
REVIEWED	N. LANGENBERG	2023-03-31
APPROVED	J. GROENEVELD	2023-03-31

PROJECT NO.	CONTROL	REV.	FIGURE
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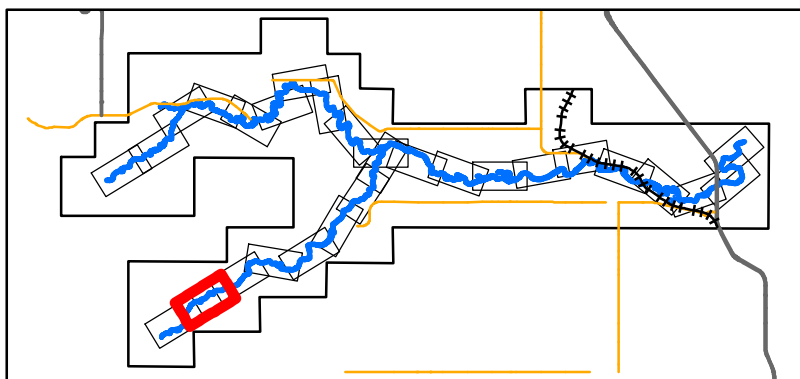




SHEET 1 ↑

↓ SHEET 3

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—	FLOOD CONTROL STRUCTURES
—	BRIDGES
—	PRIMARY HIGHWAY
—	LOCAL ROAD; LOCAL STREET
—	RAILWAY
●	BANK STATION
⊙	FLOODWAY STATION
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—	VELOCITY ≥ 1m/s
—	PROPOSED FLOODWAY
—	FLOOD EXTENT- 100 YEAR
—	DEPTH ≥ 1m
DISCHARGE SHEEP RIVER= 787 m <sup>3</sup> /s	



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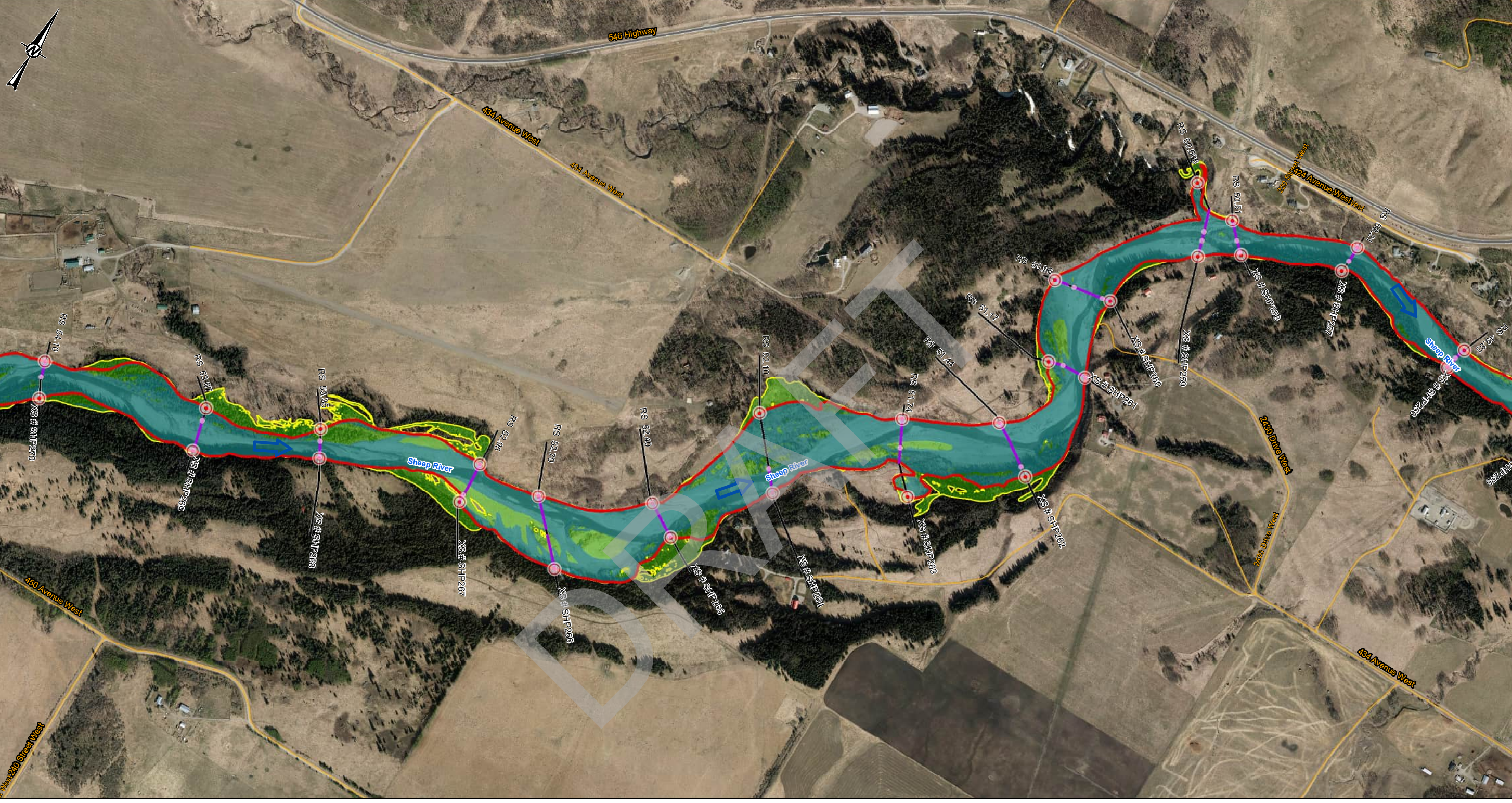
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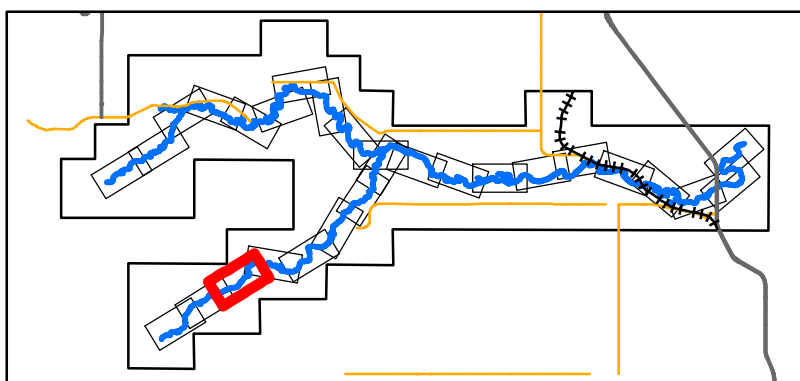
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	BRIDGES		FLOOD EXTENT- 100 YEAR
	PRIMARY HIGHWAY		DEPTH ≥ 1m
	LOCAL ROAD; LOCAL STREET		
	RAILWAY		

DISCHARGE  
SHEEP RIVER= 787 m<sup>3</sup>/s



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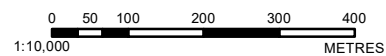
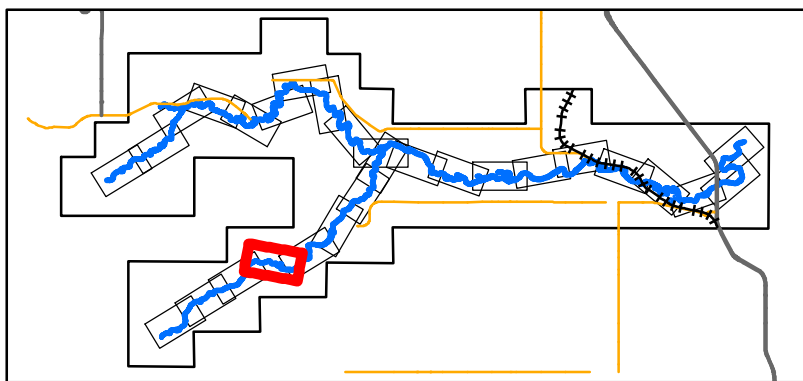




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	LOCAL ROAD; LOCAL STREET		
	RAILWAY		

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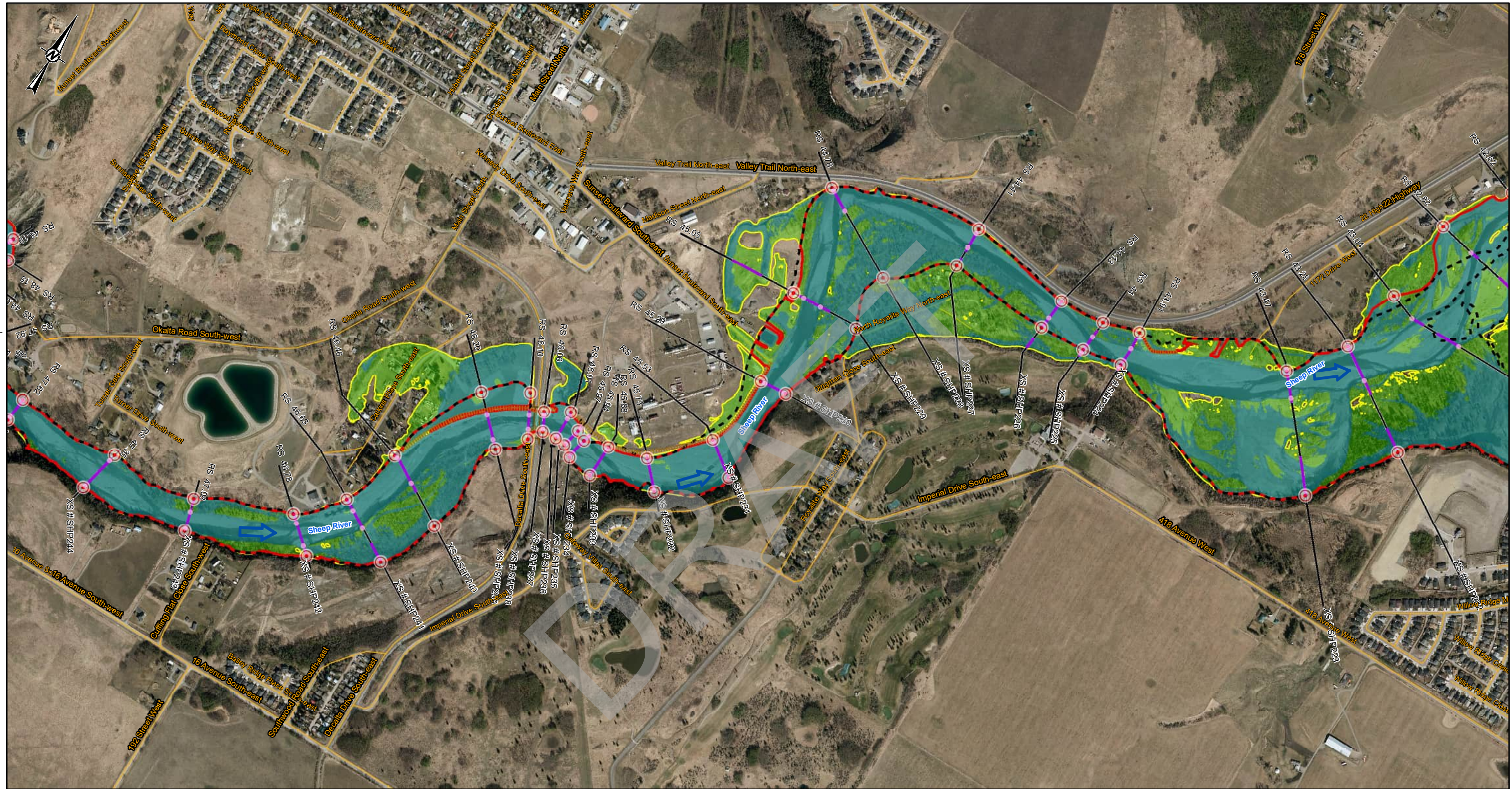
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TITLE  
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PROJECT NO. H/355730	CONTROL 228-272-0008-3321	REV. 0	FIGURE Sheet 4 of 28
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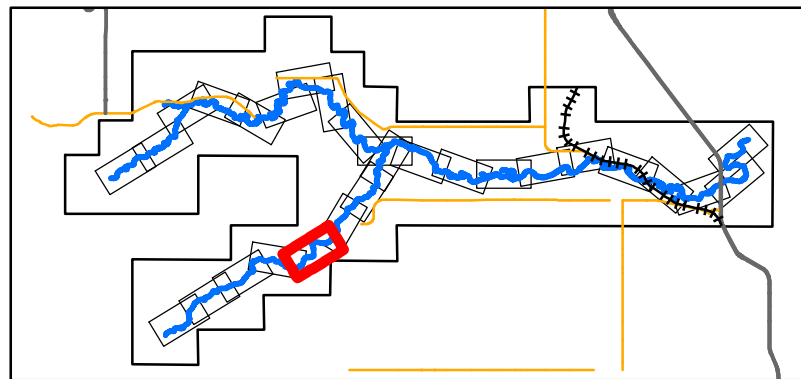




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—	BRIDGES	—	FLOOD EXTENT- 100 YEAR
—	PRIMARY HIGHWAY	—	DEPTH ≥ 1m
—	LOCAL ROAD; LOCAL STREET		DISCHARGE SHEEP RIVER= 787 m <sup>3</sup> /s
—	RAILWAY		



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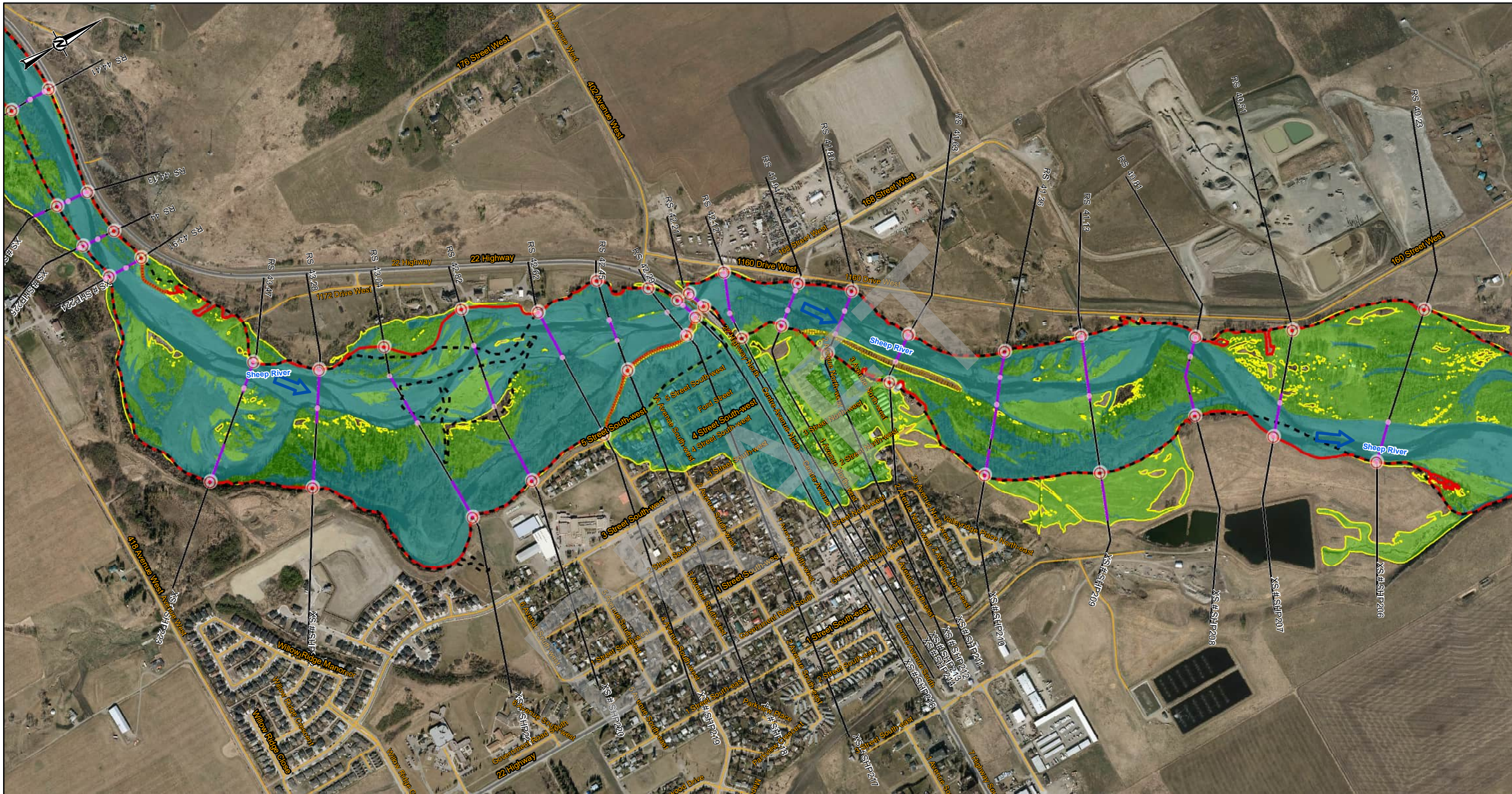
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SHEEP RIVER FLOOD HAZARD STUDY

TITLE  
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H/355730	228-272-0008-3321	0	Sheet 5 of 28

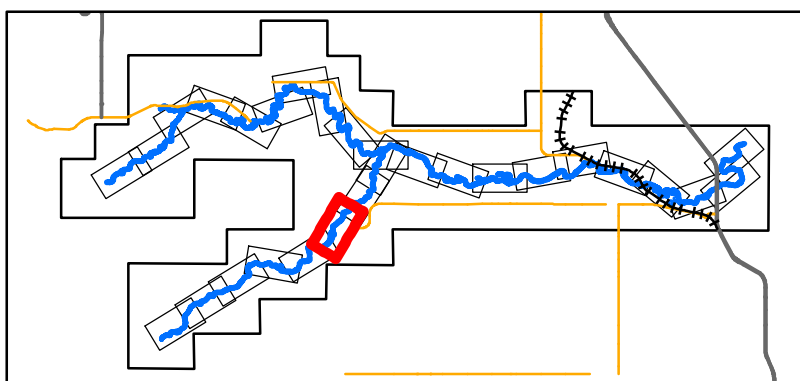




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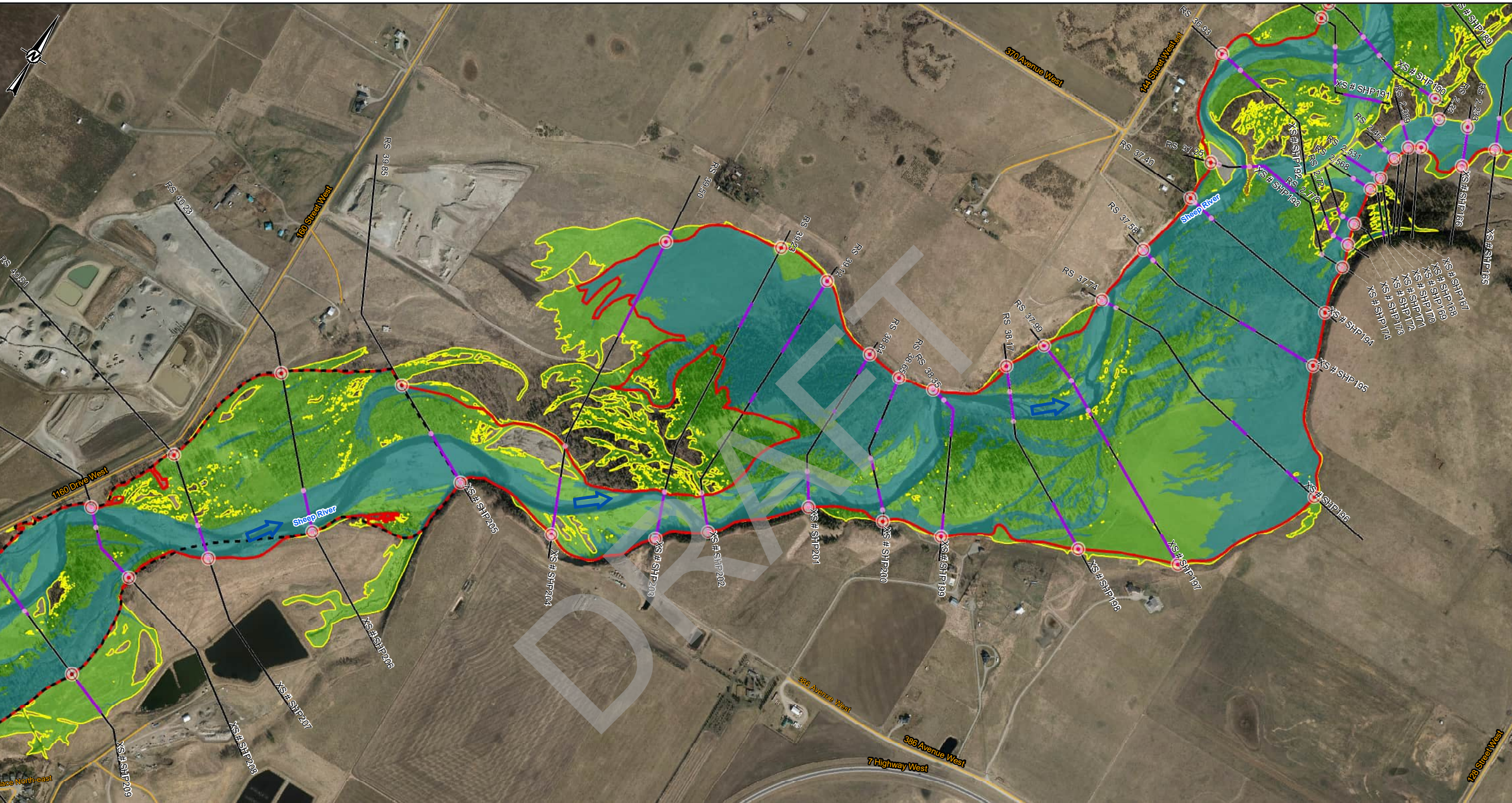
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PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	0	Sheet 6 of 28

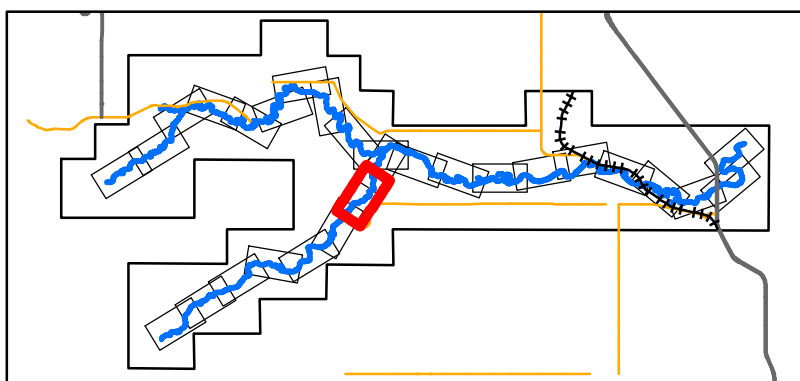




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  - ▭ BRIDGES
  - PRIMARY HIGHWAY
  - LOCAL ROAD; LOCAL STREET
  - ⚡ RAILWAY
  - BANK STATION
  - ⊙ FLOODWAY STATION
  - PREVIOUS FLOODWAY
  - VELOCITY ≥ 1m/s
  - PROPOSED FLOODWAY
  - FLOOD EXTENT- 100 YEAR
  - DEPTH ≥ 1m
  - DISCHARGE SHEEP RIVER= 787 m<sup>3</sup>/s



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**ALBERTA ENVIRONMENT AND PARKS**

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DESIGNED	N. LANGENBERG	2023-03-31
PREPARED	R. GROENEVELD	2023-03-31
REVIEWED	N. LANGENBERG	2023-03-31
APPROVED	J. GROENEVELD	2023-03-31

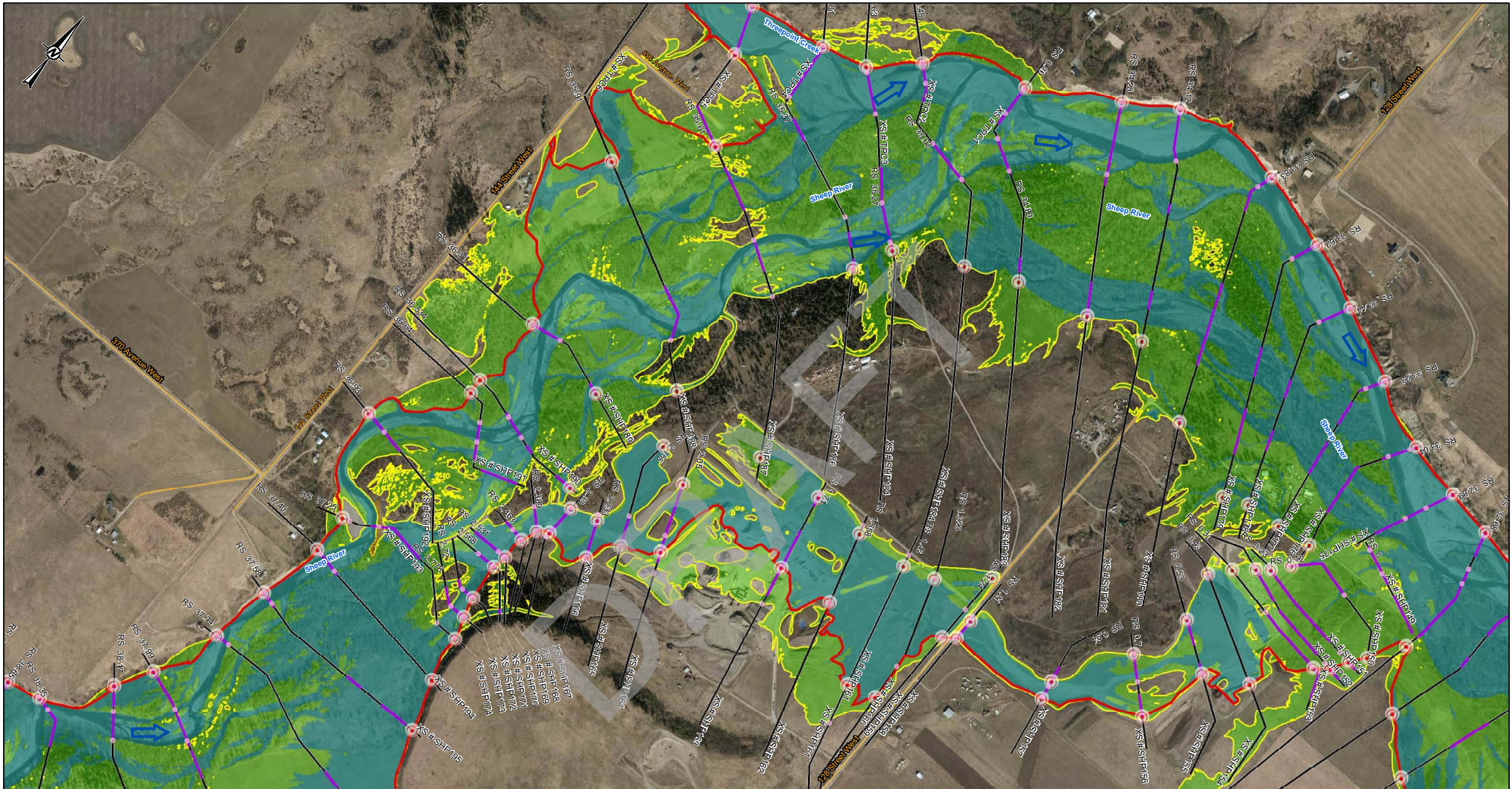
**REFERENCE(S)**  
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**PROJECT**  
SHEEP RIVER FLOOD HAZARD STUDY

**TITLE**  
DESIGN FLOODWAY CRITERIA MAP

PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	0	Sheet 7 of 28

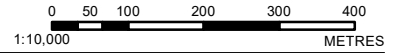
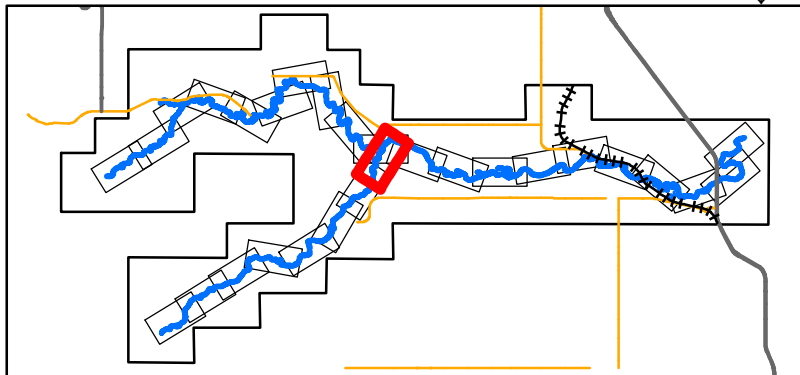




**LEGEND**

- CROSS SECTION
- XS#110 CROSS SECTION NUMBER
- ➡ FLOW DIRECTION
- STUDY\_BOUNDARY
- FLOOD CONTROL STRUCTURES
- BRIDGES
- PRIMARY HIGHWAY
- LOCAL ROAD; LOCAL STREET
- RAILWAY
- BANK STATION
- ⊙ FLOODWAY STATION
- - - PREVIOUS FLOODWAY
- VELOCITY ≥ 1m/s
- PROPOSED FLOODWAY
- FLOOD EXTENT- 100 YEAR
- DEPTH ≥ 1m

DISCHARGE  
 THREEPOINT CREEK= 616 m<sup>3</sup>/s  
 SHEEP RIVER= 787 m<sup>3</sup>/s  
 SHEEP RIVER= 1403 m<sup>3</sup>/s (DS- RS 34.28)



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PROJECT  
 SHEEP RIVER FLOOD HAZARD STUDY

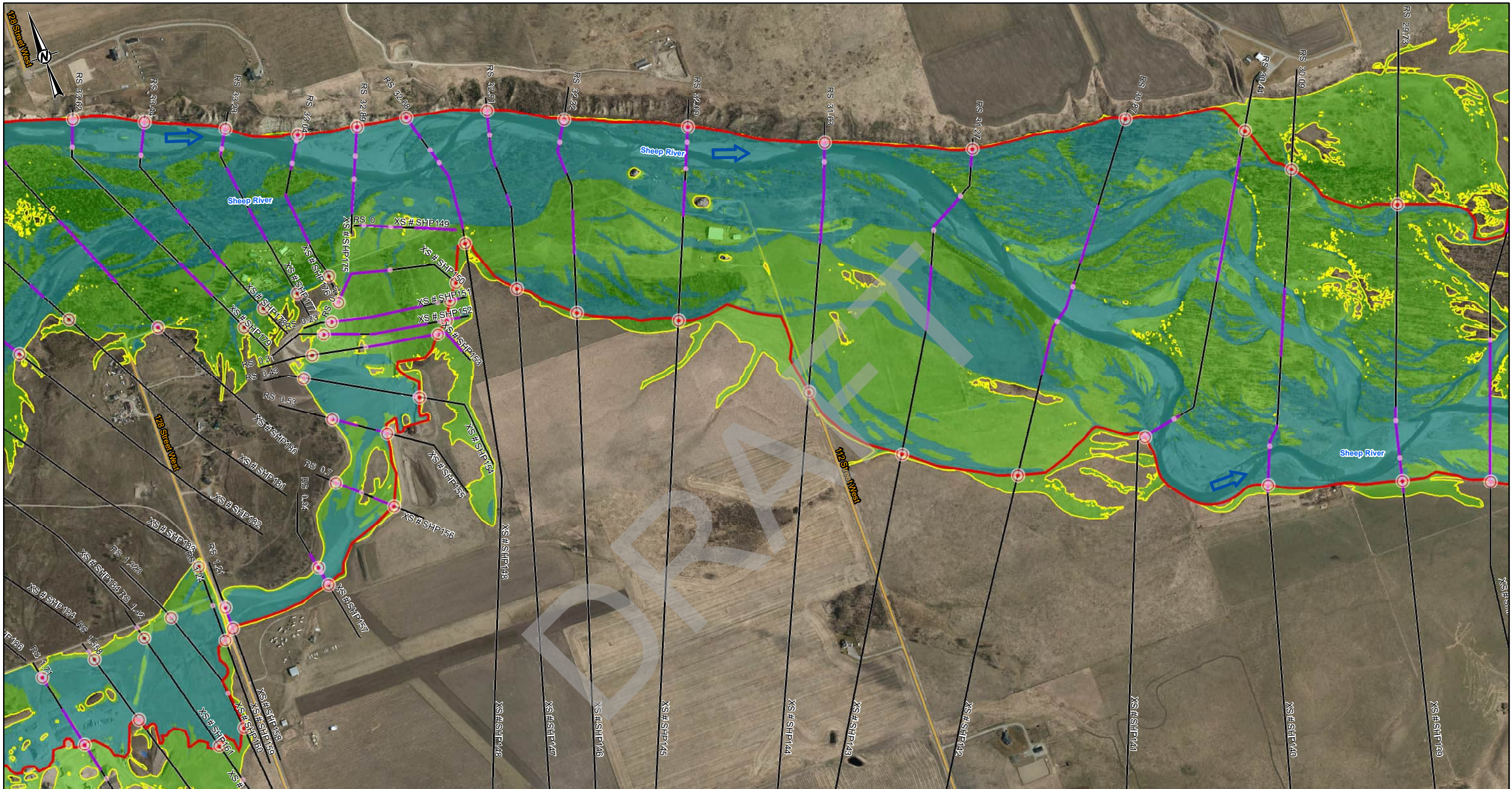
TITLE  
**DESIGN FLOODWAY CRITERIA MAP**

DESIGNED	N. LANGENBERG	2023-03-31
PREPARED	R. GROENEVELD	2023-03-31
REVIEWED	N. LANGENBERG	2023-03-31
APPROVED	J. GROENEVELD	2023-03-31

PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	0	Sheet 8 of 28

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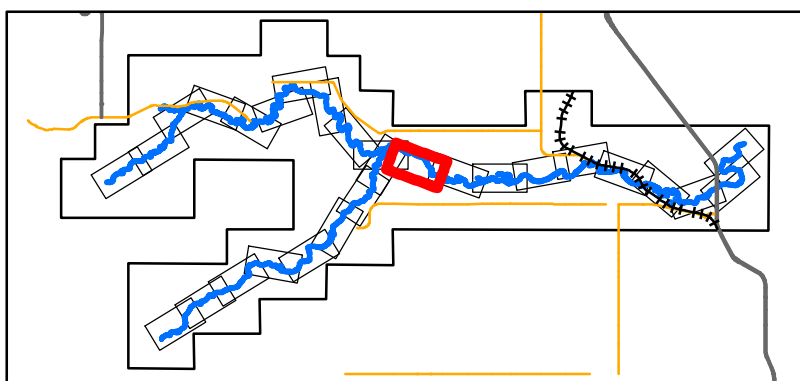


SHEET 8 ↑

↓ SHEET 10

**LEGEND**

—	CROSS SECTION	●	BANK STATION
XS#110	CROSS SECTION NUMBER	⊙	FLOODWAY STATION
➡	FLOW DIRECTION	- - -	PREVIOUS FLOODWAY
—	STUDY BOUNDARY	—	VELOCITY ≥ 1m/s
—	FLOOD CONTROL STRUCTURES	—	PROPOSED FLOODWAY
—	BRIDGES	—	FLOOD EXTENT- 100 YEAR
—	PRIMARY HIGHWAY	—	DEPTH ≥1m
—	LOCAL ROAD; LOCAL STREET	—	DISCHARGE SHEEP RIVER= 1300 m³/s
—	RAILWAY		



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PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

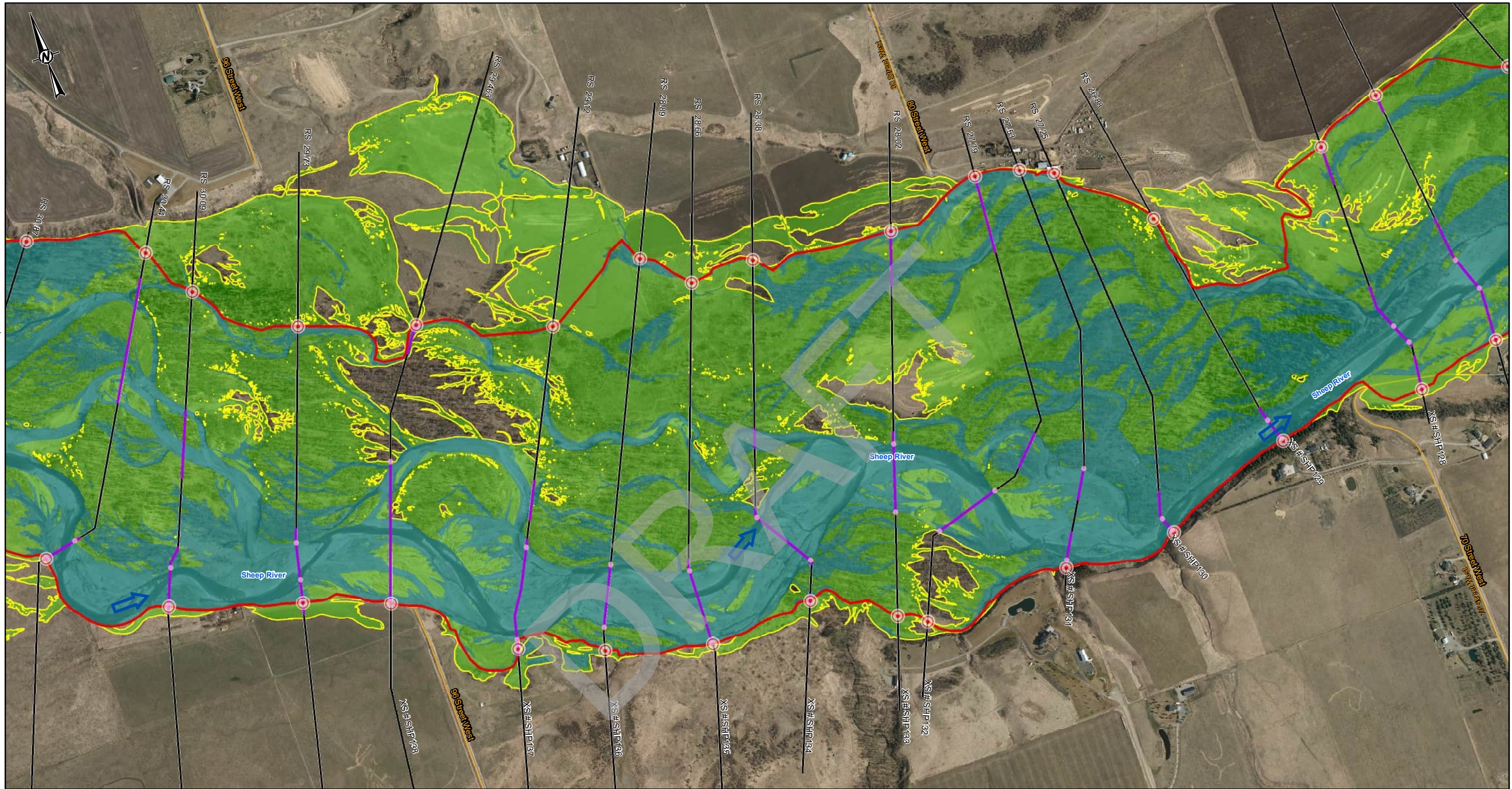
TITLE  
**DESIGN FLOODWAY CRITERIA MAP**

PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	0	Sheet 9 of 28



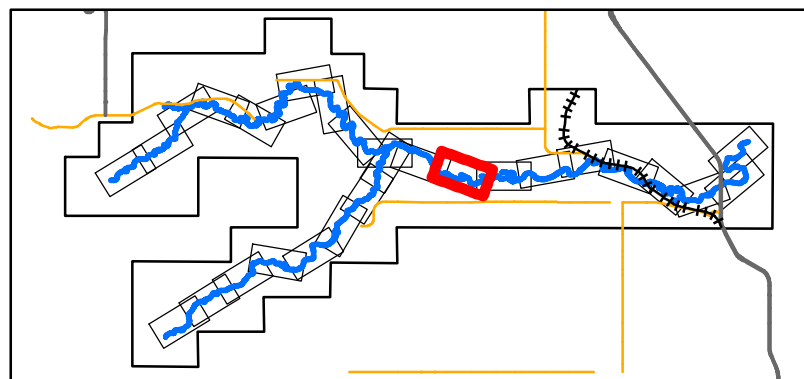
SHEET 9 ↑

↑ SHEET 11



**LEGEND**

- CROSS SECTION
  - XS#110 CROSS SECTION NUMBER
  - ➔ FLOW DIRECTION
  - STUDY\_BOUNDARY
  - ▬ FLOOD CONTROL STRUCTURES
  - ▬ BRIDGES
  - PRIMARY HIGHWAY
  - LOCAL ROAD; LOCAL STREET
  - RAILWAY
  - BANK STATION
  - ⊙ FLOODWAY STATION
  - - - PREVIOUS FLOODWAY
  - VELOCITY ≥ 1m/s
  - PROPOSED FLOODWAY
  - FLOOD EXTENT- 100 YEAR
  - DEPTH ≥ 1m
- DISCHARGE  
SHEEP RIVER= 1300 m<sup>3</sup>/s



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PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

TITLE  
**DESIGN FLOODWAY CRITERIA MAP**

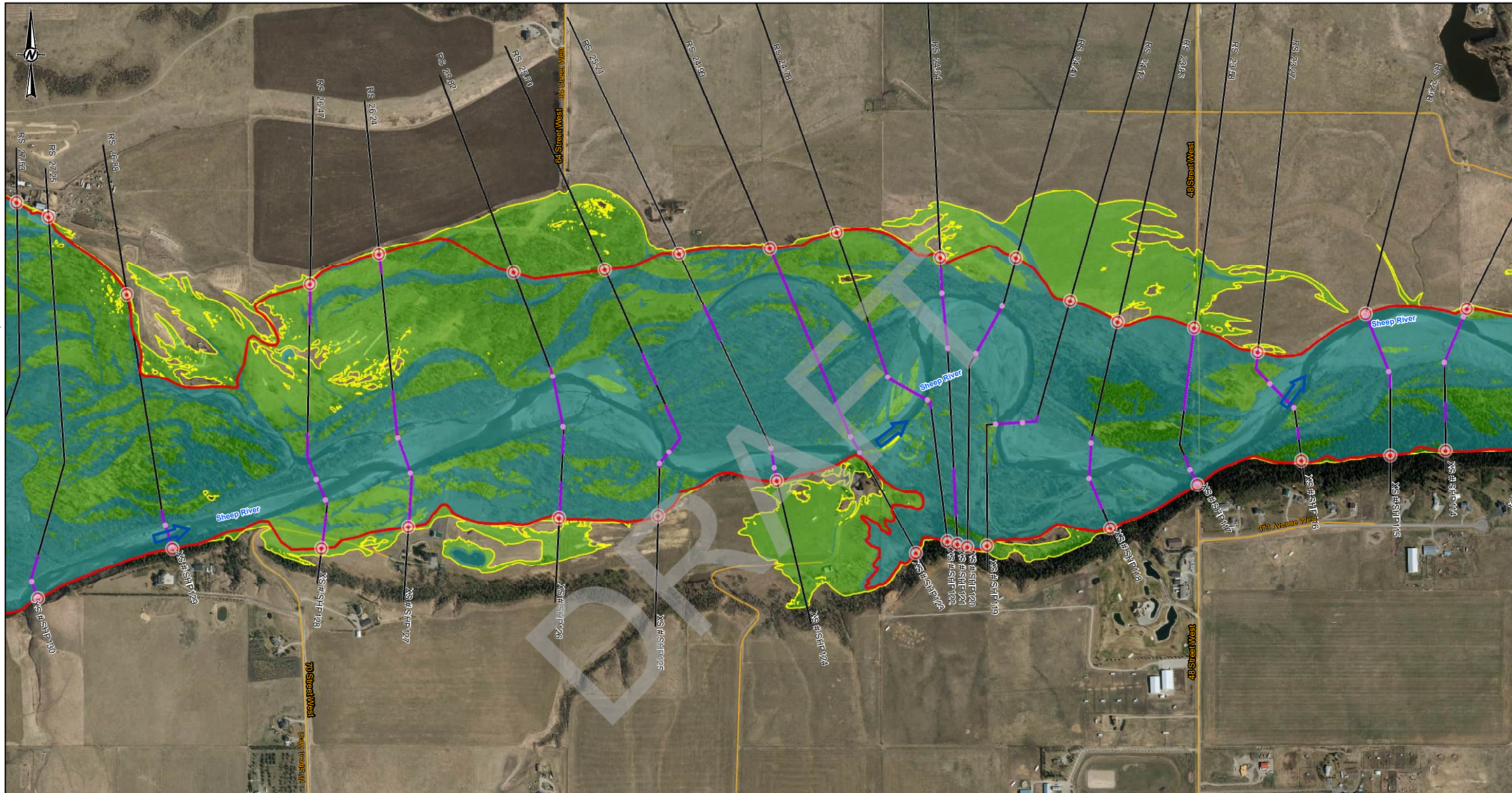
PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	0	Sheet 10 of 28

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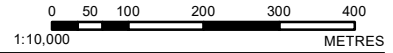
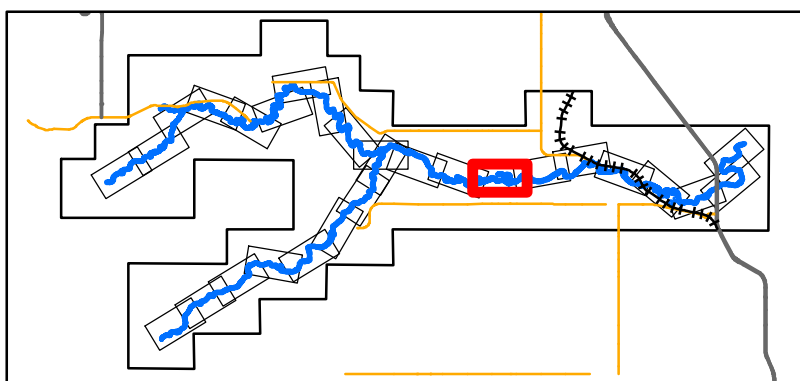
SHEET 10 ↑

↑ SHEET 12



**LEGEND**

—	CROSS SECTION	○	BANK STATION
XS#110	CROSS SECTION NUMBER	⊙	FLOODWAY STATION
➔	FLOW DIRECTION	- - -	PREVIOUS FLOODWAY
—	STUDY_BOUNDARY	—	VELOCITY ≥ 1m/s
—	FLOOD CONTROL STRUCTURES	—	PROPOSED FLOODWAY
—	BRIDGES	—	FLOOD EXTENT- 100 YEAR
—	PRIMARY HIGHWAY	—	DEPTH ≥ 1m
—	LOCAL ROAD; LOCAL STREET		DISCHARGE SHEEP RIVER= 1300 m³/s
—	RAILWAY		



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ALBERTA ENVIRONMENT AND PARKS

PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

CONSULTANT  
**HATCH**

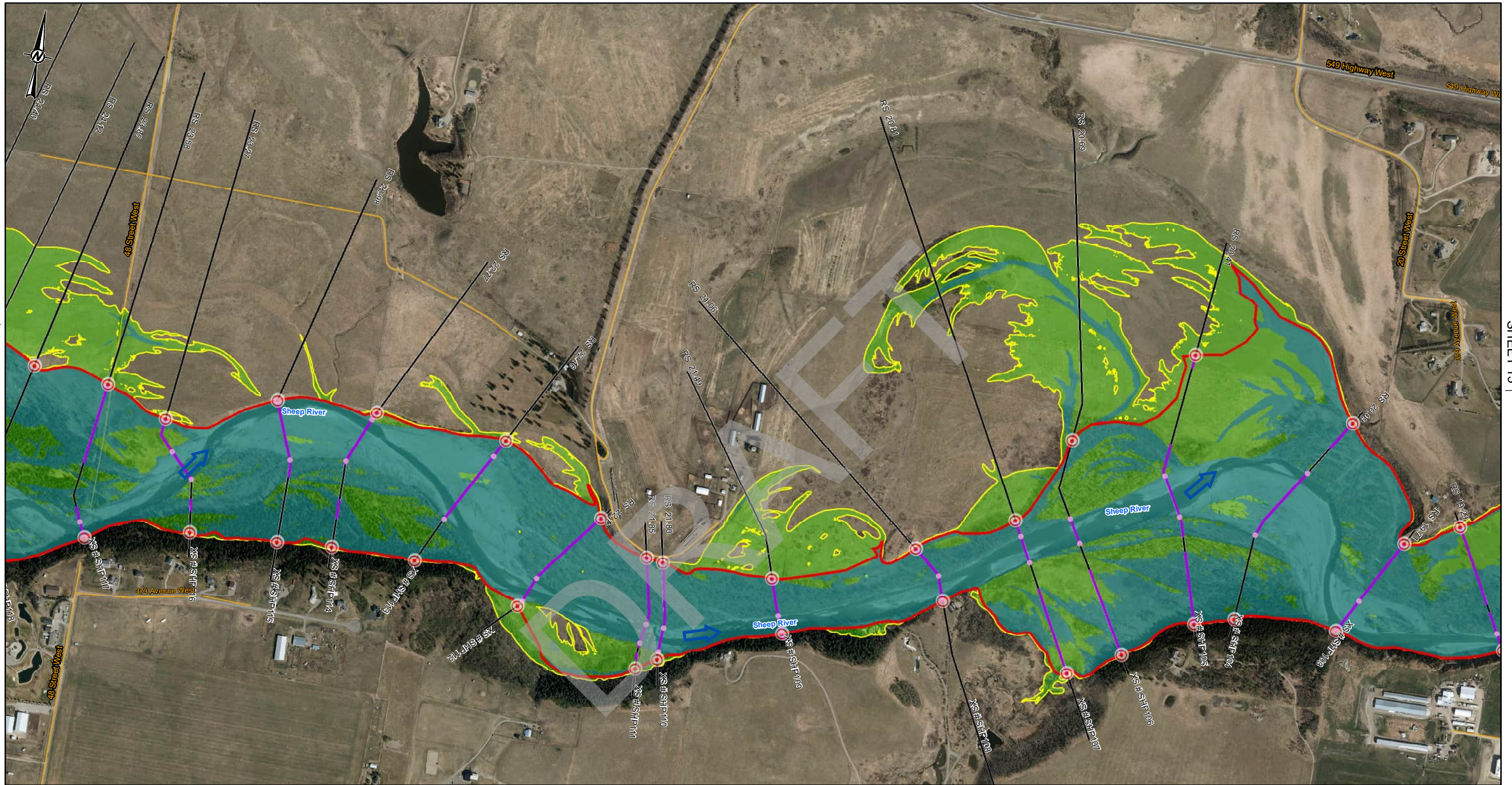
DESIGNED N. LANGENBERG 2023-03-31  
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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

TITLE  
**DESIGN FLOODWAY CRITERIA MAP**

PROJECT NO. H/355730	CONTROL 228-272-0008-3321	REV. 0	FIGURE Sheet 11 of 28
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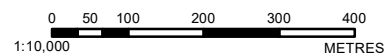
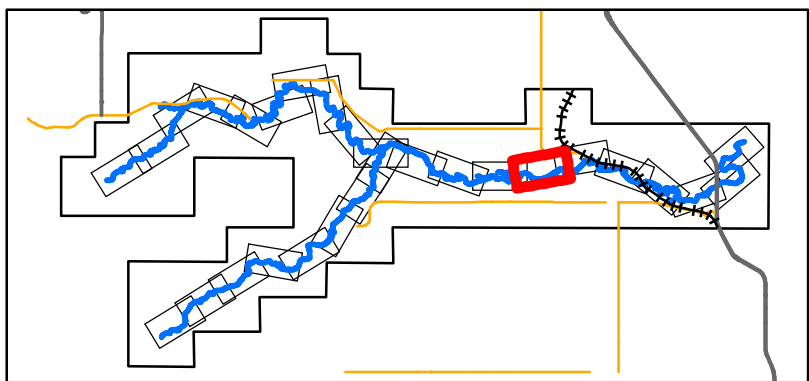




**LEGEND**

—	CROSS SECTION	●	BANK STATION
XS#110	CROSS SECTION NUMBER	⊙	FLOODWAY STATION
➔	FLOW DIRECTION	- - -	PREVIOUS FLOODWAY
—	STUDY BOUNDARY	—	VELOCITY ≥ 1m/s
—	FLOOD CONTROL STRUCTURES	—	PROPOSED FLOODWAY
—	BRIDGES	—	FLOOD EXTENT- 100 YEAR
—	PRIMARY HIGHWAY	—	DEPTH ≥ 1m
—	LOCAL ROAD; LOCAL STREET		
—	RAILWAY		

DISCHARGE  
SHEEP RIVER= 1300 m<sup>3</sup>/s



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**HATCH**

PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

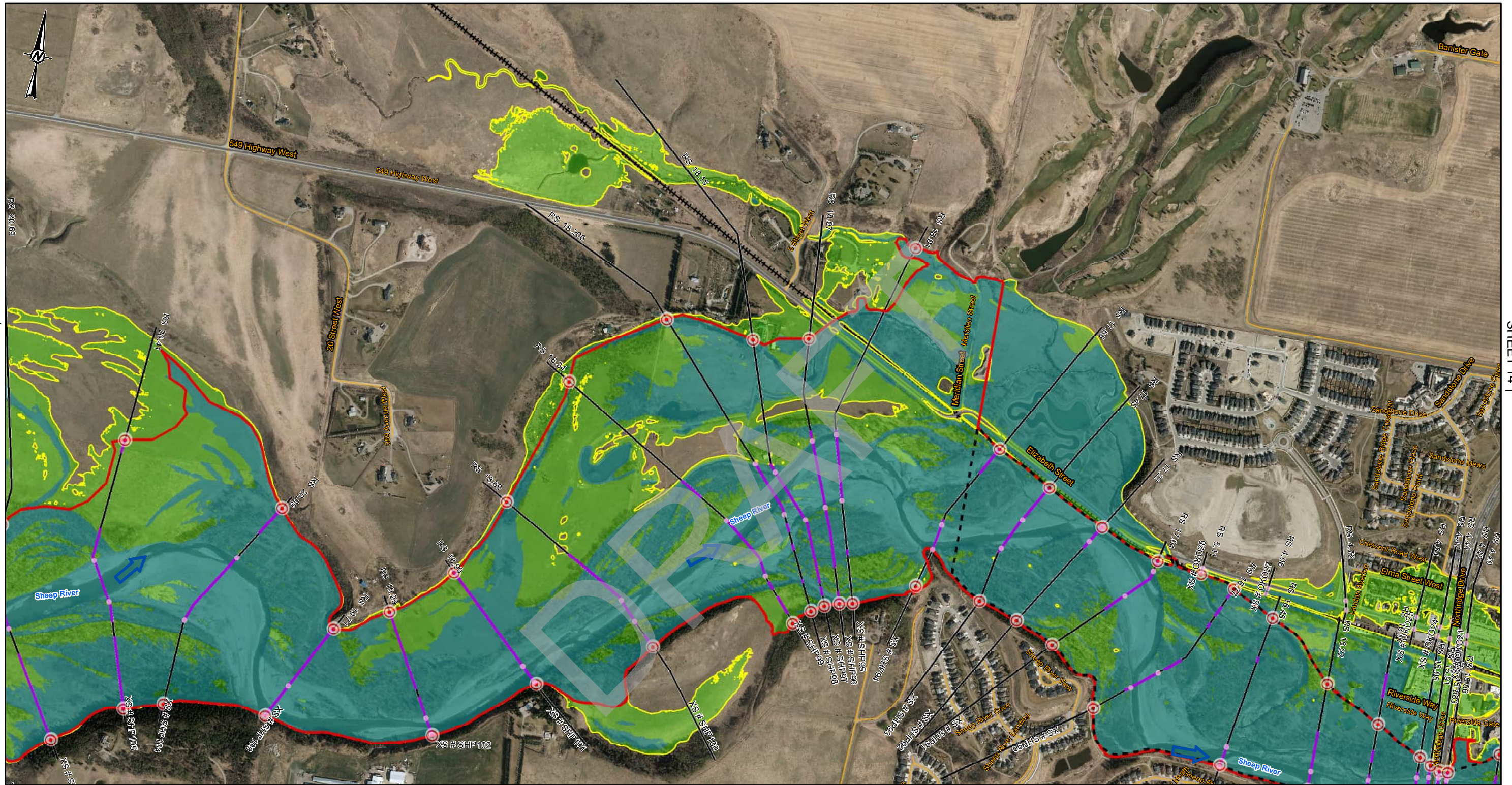
TITLE  
**DESIGN FLOODWAY CRITERIA MAP**

DESIGNED	N. LANGENBERG	2023-03-31
PREPARED	R. GROENEVELD	2023-03-31
REVIEWED	N. LANGENBERG	2023-03-31
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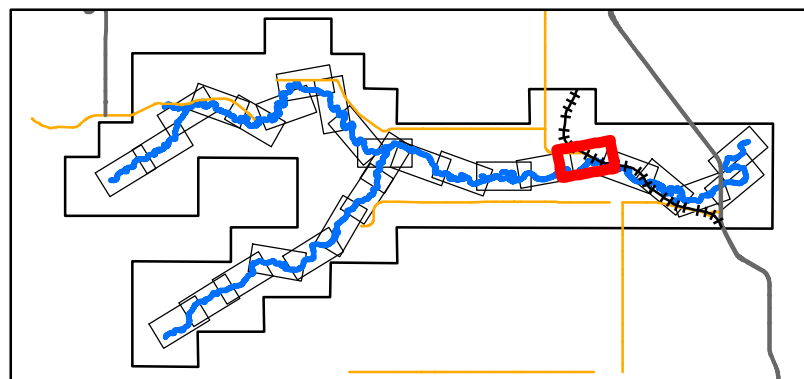
PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	0	Sheet 12 of 28





**LEGEND**

—	CROSS SECTION	●	BANK STATION
XS#110	CROSS SECTION NUMBER	○	FLOODWAY STATION
➔	FLOW DIRECTION	- - -	PREVIOUS FLOODWAY
—	STUDY BOUNDARY	—	VELOCITY ≥ 1m/s
—	FLOOD CONTROL STRUCTURES	—	PROPOSED FLOODWAY
—	BRIDGES	—	FLOOD EXTENT- 100 YEAR
—	PRIMARY HIGHWAY	—	DEPTH ≥ 1m
—	LOCAL ROAD; LOCAL STREET	—	DISCHARGE SHEEP RIVER= 1300 m³/s
—	RAILWAY		



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**HATCH**

PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

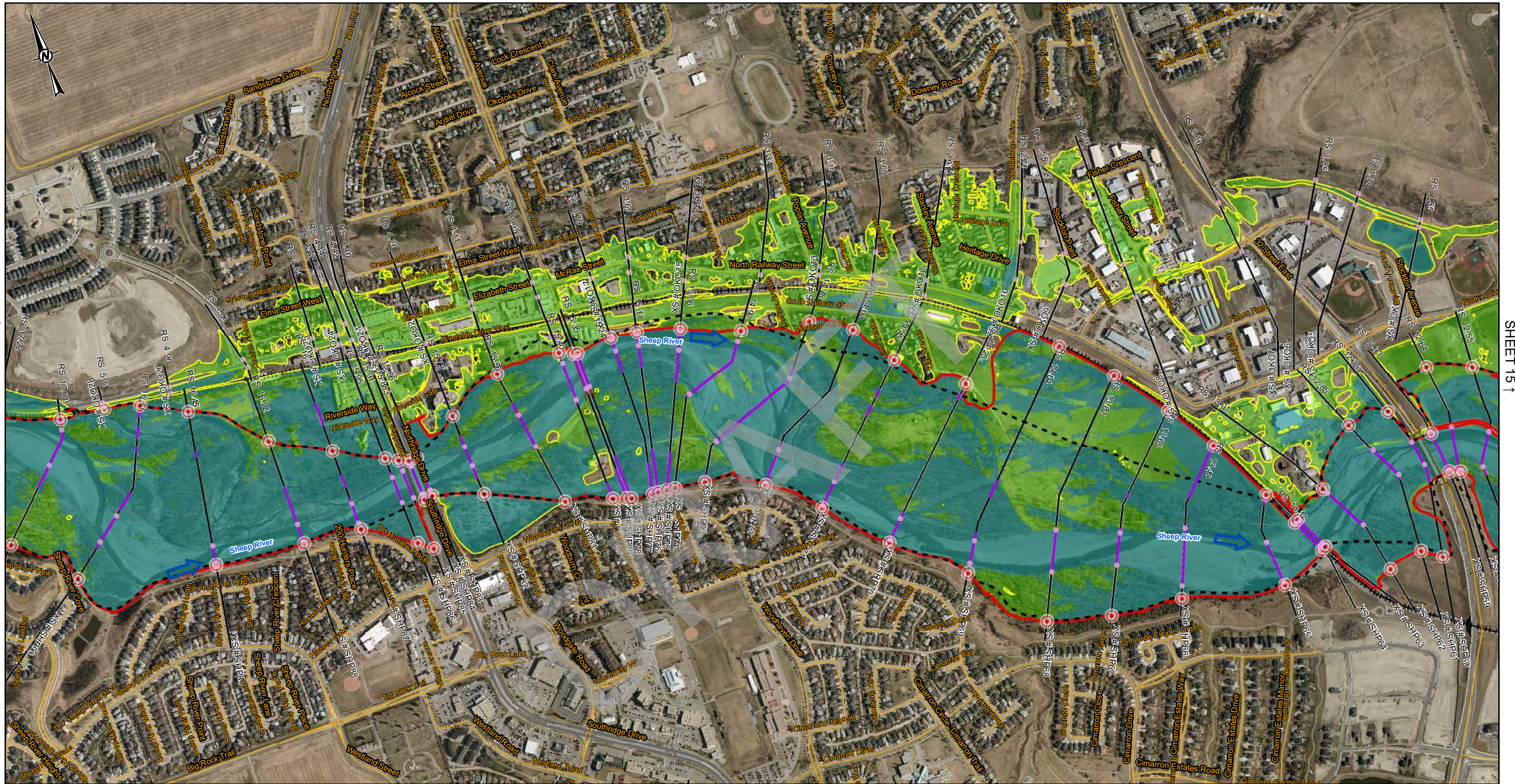
TITLE  
**DESIGN FLOODWAY CRITERIA MAP**

DESIGNED	N. LANGENBERG	2023-03-31
PREPARED	R. GROENEVELD	2023-03-31
REVIEWED	N. LANGENBERG	2023-03-31
APPROVED	J. GROENEVELD	2023-03-31

PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	0	Sheet 13 of 28

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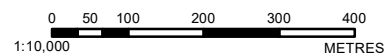
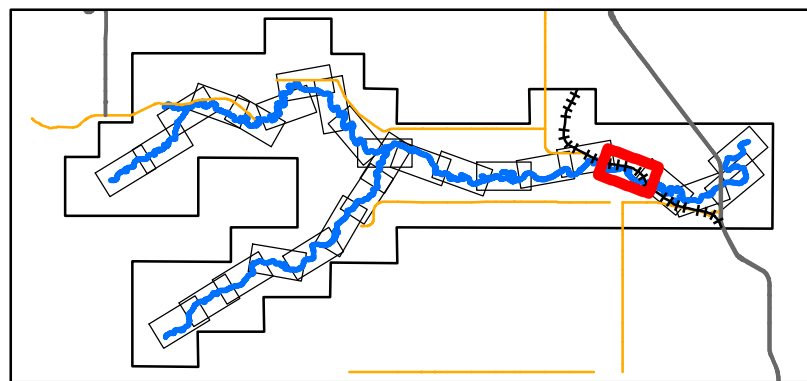




**LEGEND**

—	CROSS SECTION	●	BANK STATION
XS#110	CROSS SECTION NUMBER	⊙	FLOODWAY STATION
➔	FLOW DIRECTION	- - -	PREVIOUS FLOODWAY
—	STUDY BOUNDARY	—	VELOCITY ≥ 1m/s
—	FLOOD CONTROL STRUCTURES	—	PROPOSED FLOODWAY
—	BRIDGES	—	FLOOD EXTENT- 100 YEAR
—	PRIMARY HIGHWAY	—	DEPTH ≥ 1m
—	LOCAL ROAD; LOCAL STREET		
—	RAILWAY		

DISCHARGE  
SHEEP RIVER= 1300 m<sup>3</sup>/s



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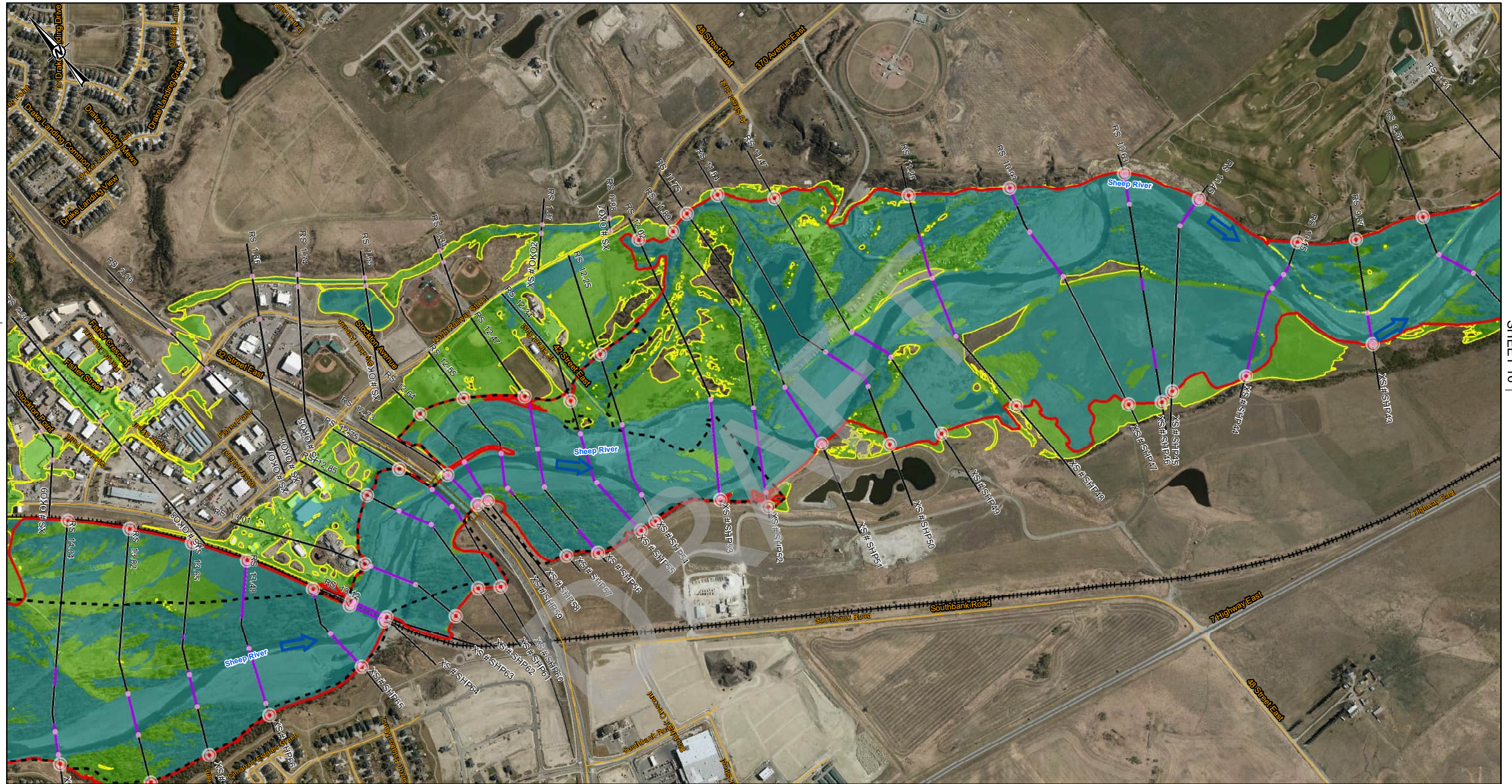
REFERENCE(S)  
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PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

TITLE  
DESIGN FLOODWAY CRITERIA MAP

PROJECT NO. H/355730	CONTROL 228-272-0008-3321	REV. 0	FIGURE Sheet 14 of 28
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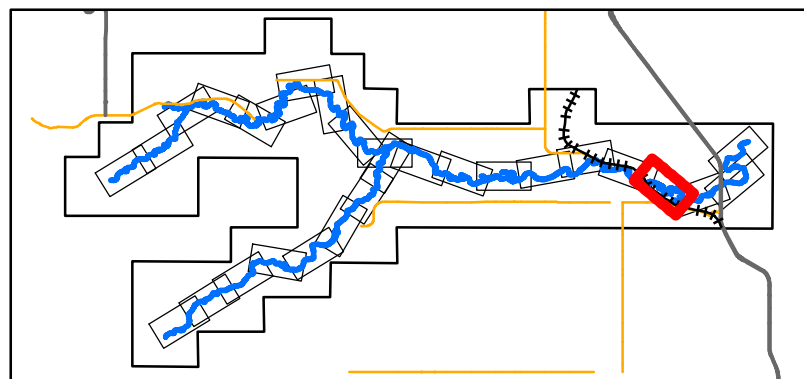




**LEGEND**

CROSS SECTION	BANK STATION
CROSS SECTION NUMBER	FLOODWAY STATION
FLOW DIRECTION	PREVIOUS FLOODWAY
STUDY BOUNDARY	VELOCITY ≥ 1m/s
FLOOD CONTROL STRUCTURES	PROPOSED FLOODWAY
BRIDGES	FLOOD EXTENT- 100 YEAR
PRIMARY HIGHWAY	DEPTH ≥ 1m
LOCAL ROAD; LOCAL STREET	
RAILWAY	

DISCHARGE  
 SHEEP RIVER= 1300 m³/s  
 SHEEP RIVER= 1314 m³/s (DS- RS 12.02)  
 SHEEP RIVER= 1370 m³/s (DS- RS 11.25)



CLIENT  
**ALBERTA ENVIRONMENT AND PARKS**

PROJECT  
**SHEEP RIVER FLOOD HAZARD STUDY**

CONSULTANT  
**Alberta Government**

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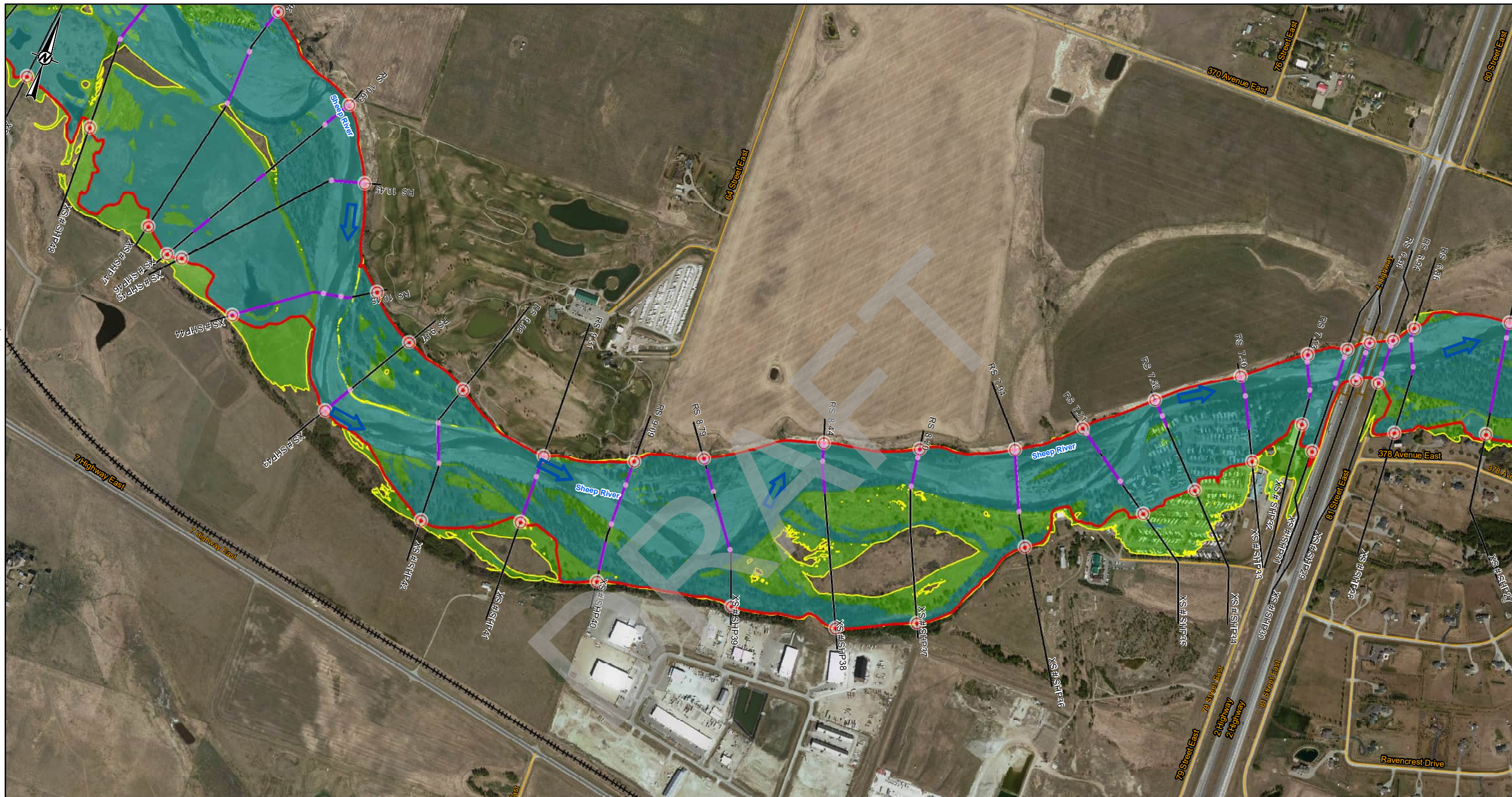
**TITLE**  
**DESIGN FLOODWAY CRITERIA MAP**

PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	0	Sheet 15 of 28



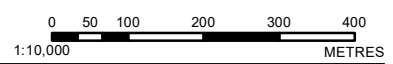
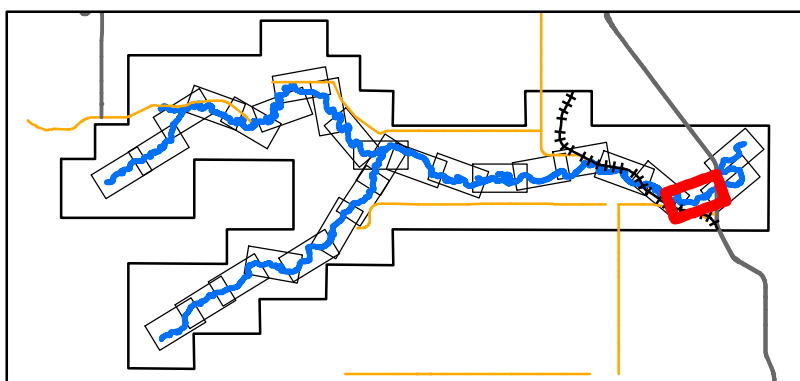
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SHEET 15 ↑



↓ SHEET 17

LEGEND	
—	CROSS SECTION
XS#110	CROSS SECTION NUMBER
→	FLOW DIRECTION
—	STUDY BOUNDARY
—	FLOOD CONTROL STRUCTURES
—	BRIDGES
—	PRIMARY HIGHWAY
—	LOCAL ROAD; LOCAL STREET
—	RAILWAY
●	BANK STATION
○	FLOODWAY STATION
- - -	PREVIOUS FLOODWAY
—	VELOCITY ≥ 1m/s
—	PROPOSED FLOODWAY
■	FLOOD EXTENT- 100 YEAR
■	DEPTH ≥ 1m
DISCHARGE SHEEP RIVER= 1370 m <sup>3</sup> /s	



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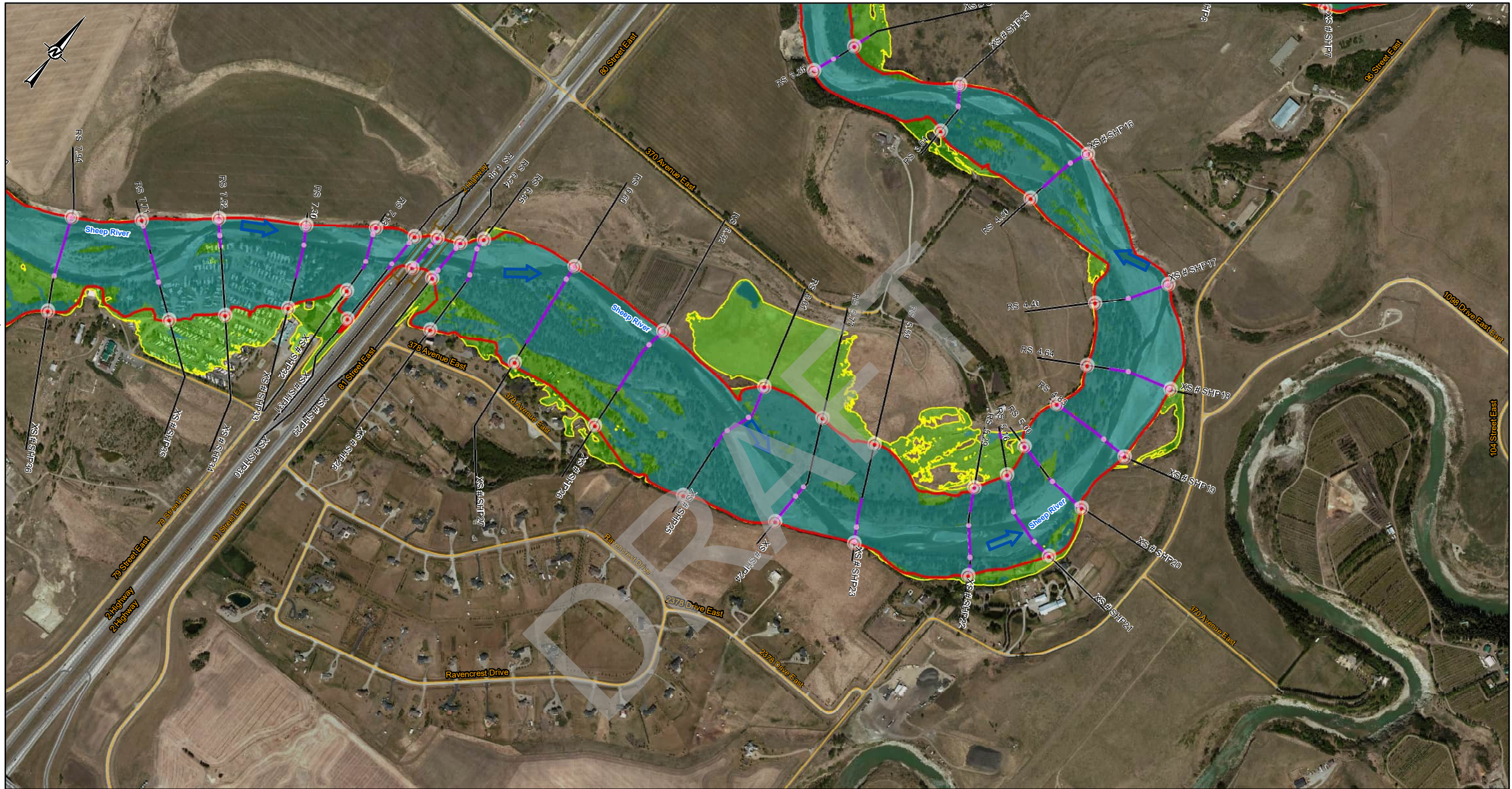
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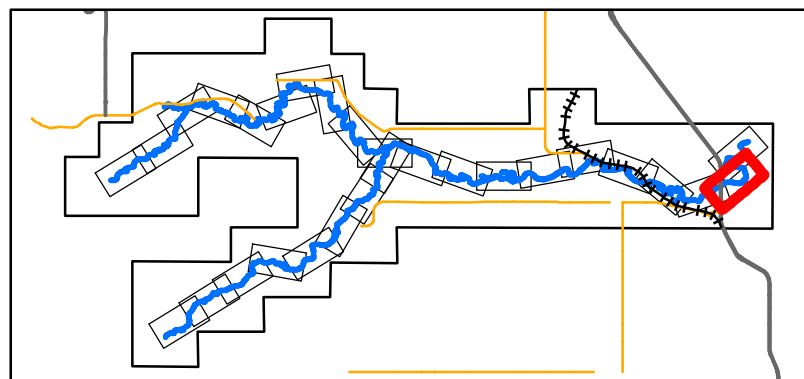
DESIGNED	N. LANGENBERG	2023-03-31
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PROJECT			
SHEEP RIVER FLOOD HAZARD STUDY			
TITLE			
DESIGN FLOODWAY CRITERIA MAP			
PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	0	Sheet 16 of 28





LEGEND	
—	CROSS SECTION
XS#110	CROSS SECTION NUMBER
→	FLOW DIRECTION
—	STUDY_BOUNDARY
—	FLOOD CONTROL STRUCTURES
—	BRIDGES
—	PRIMARY HIGHWAY
—	LOCAL ROAD; LOCAL STREET
—	RAILWAY
●	BANK STATION
○	FLOODWAY STATION
- - -	PREVIOUS FLOODWAY
—	VELOCITY ≥ 1m/s
—	PROPOSED FLOODWAY
—	FLOOD EXTENT- 100 YEAR
—	DEPTH ≥ 1m
DISCHARGE SHEEP RIVER= 1370 m <sup>3</sup> /s	



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PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

TITLE  
DESIGN FLOODWAY CRITERIA MAP

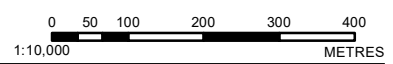
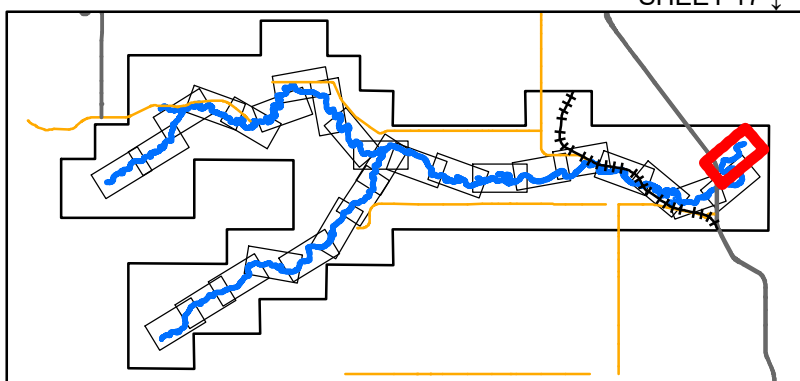
PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	0	Sheet 17 of 28





SHEET 17 ↓

LEGEND	
—	CROSS SECTION
XS#110	CROSS SECTION NUMBER
→	FLOW DIRECTION
---	STUDY_BOUNDARY
	FLOOD CONTROL STRUCTURES
—	BRIDGES
—	PRIMARY HIGHWAY
—	LOCAL ROAD; LOCAL STREET
—+—+—	RAILWAY
●	BANK STATION
⊙	FLOODWAY STATION
- - -	PREVIOUS FLOODWAY
—	VELOCITY ≥ 1m/s
—	PROPOSED FLOODWAY
■	FLOOD EXTENT- 100 YEAR
■	DEPTH ≥ 1m
DISCHARGE SHEEP RIVER= 1370 m <sup>3</sup> /s	



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**HATCH**

PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

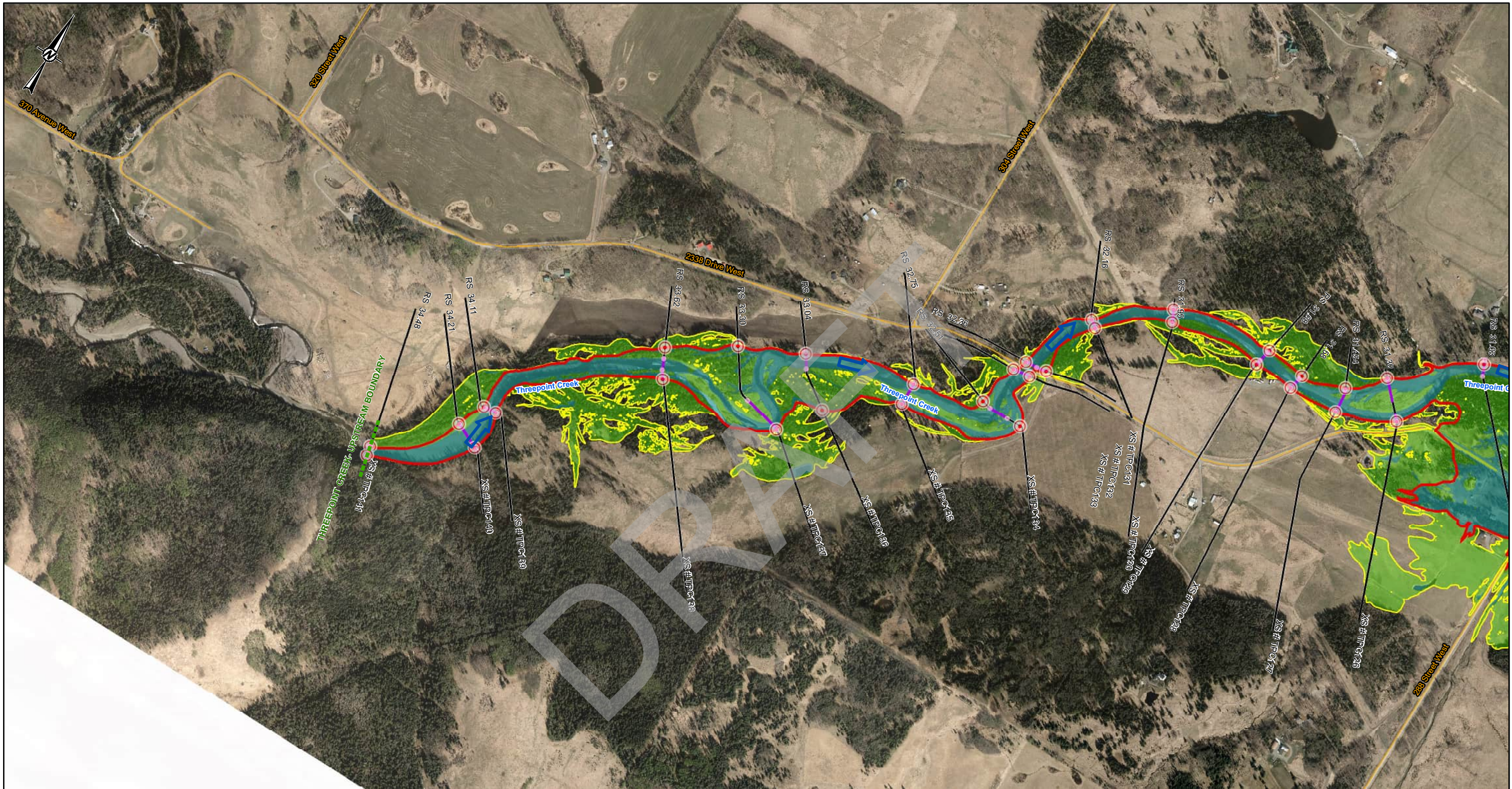
TITLE  
**DESIGN FLOODWAY CRITERIA MAP**

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APPROVED	J. GROENEVELD	2023-03-31

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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	0	Sheet 18 of 28

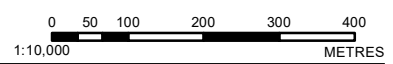
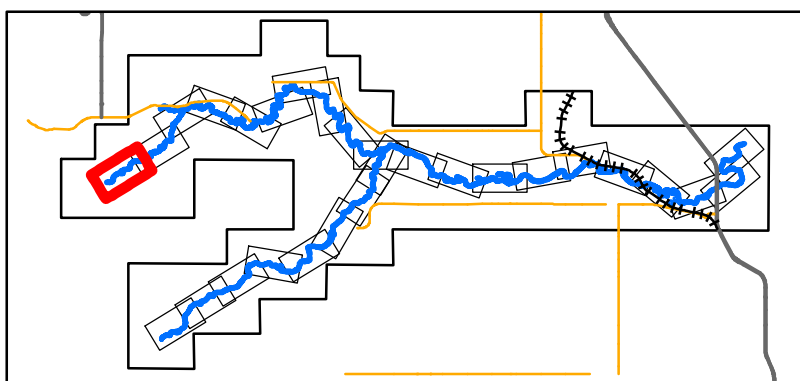




SHEET 20 ↓

**LEGEND**

—	CROSS SECTION	●	BANK STATION
XS#110	CROSS SECTION NUMBER	⊙	FLOODWAY STATION
➔	FLOW DIRECTION	- - -	PREVIOUS FLOODWAY
—	STUDY_BOUNDARY	—	VELOCITY ≥ 1m/s
—	FLOOD CONTROL STRUCTURES	—	PROPOSED FLOODWAY
—	BRIDGES	—	FLOOD EXTENT- 100 YEAR
—	PRIMARY HIGHWAY	—	DEPTH ≥ 1m
—	LOCAL ROAD; LOCAL STREET		DISCHARGE THREEPPOINT CREEK= 246 m <sup>3</sup> /s
—	RAILWAY		



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PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

TITLE  
**DESIGN FLOODWAY CRITERIA MAP**

DESIGNED	N. LANGENBERG	2023-03-31
PREPARED	R. GROENEVELD	2023-03-31
REVIEWED	N. LANGENBERG	2023-03-31
APPROVED	J. GROENEVELD	2023-03-31

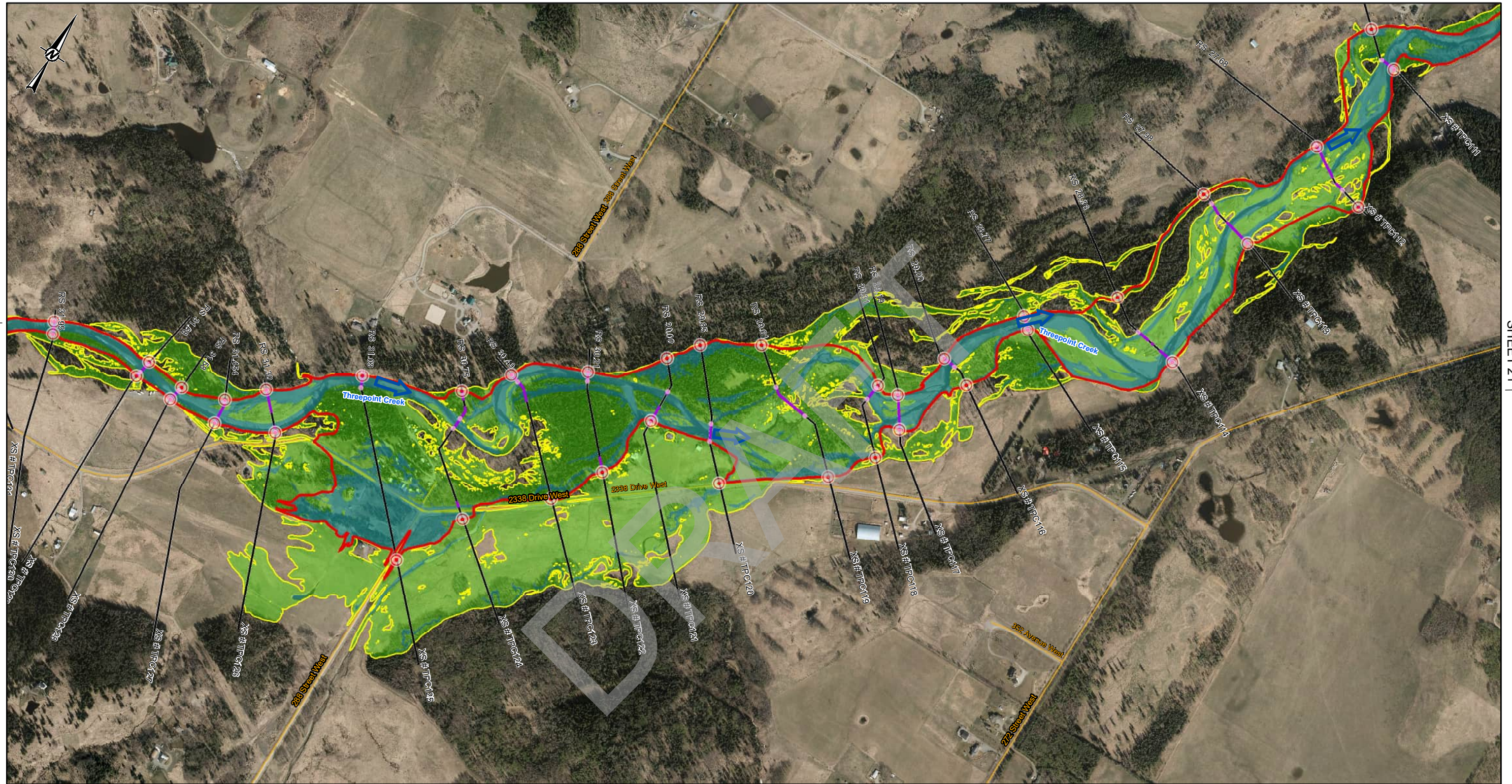
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PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	0	Sheet 19 of 28



SHEET 19 ↑

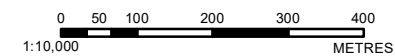
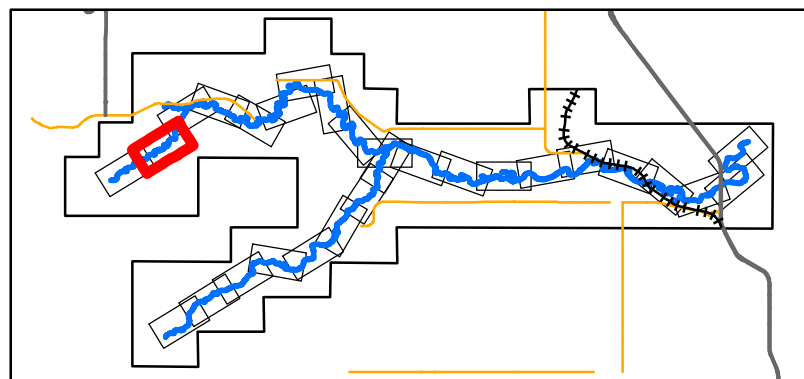
↑ SHEET 21



**LEGEND**

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CROSS SECTION NUMBER	FLOODWAY STATION
FLOW DIRECTION	PREVIOUS FLOODWAY
STUDY_BOUNDARY	VELOCITY ≥ 1m/s
FLOOD CONTROL STRUCTURES	PROPOSED FLOODWAY
BRIDGES	FLOOD EXTENT- 100 YEAR
PRIMARY HIGHWAY	DEPTH ≥ 1m
LOCAL ROAD; LOCAL STREET	
RAILWAY	

DISCHARGE  
THREPOINT CREEK= 246 m<sup>3</sup>/s



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REVIEWED	N. LANGENBERG	2023-03-31
APPROVED	J. GROENEVELD	2023-03-31

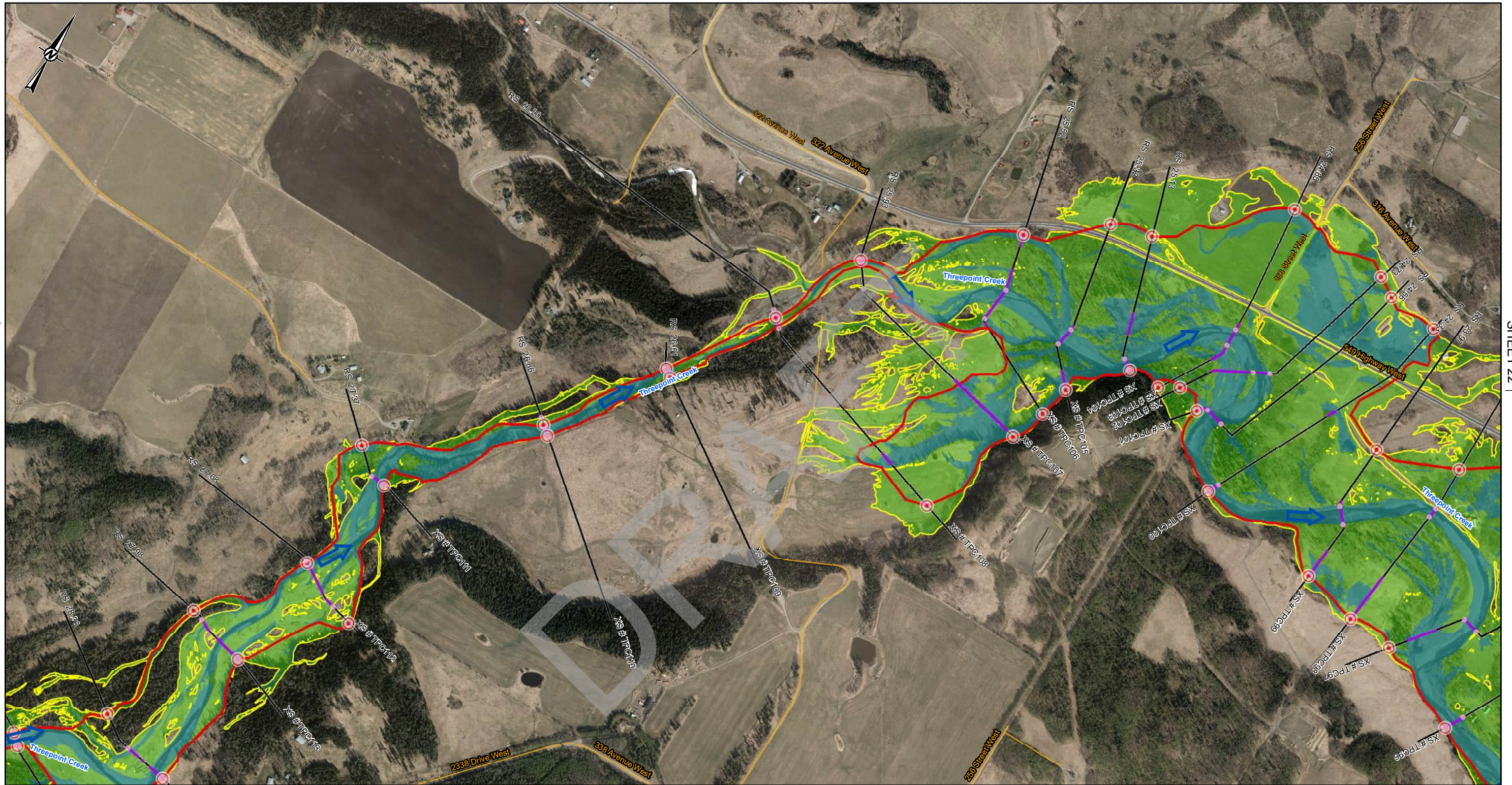
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PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

TITLE  
**DESIGN FLOODWAY CRITERIA MAP**

PROJECT NO. H/355730	CONTROL 228-272-0008-3321	REV. 0	FIGURE Sheet 20 of 28
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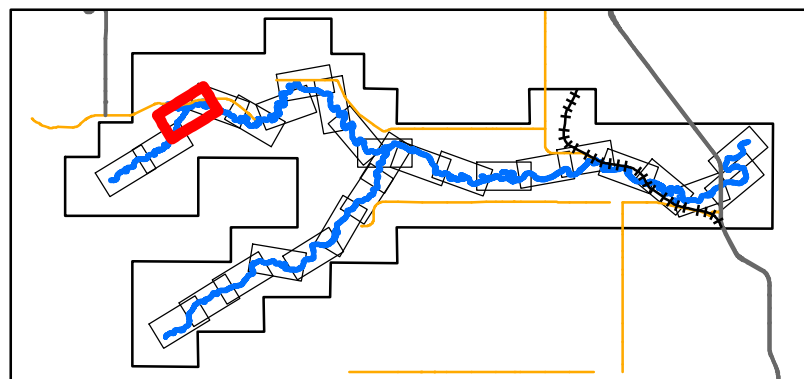




**LEGEND**

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XS#110	CROSS SECTION NUMBER	⊙	FLOODWAY STATION
➔	FLOW DIRECTION	- - -	PREVIOUS FLOODWAY
—	STUDY_BOUNDARY	—	VELOCITY ≥ 1m/s
—	FLOOD CONTROL STRUCTURES	—	PROPOSED FLOODWAY
—	BRIDGES	—	FLOOD EXTENT- 100 YEAR
—	PRIMARY HIGHWAY	—	DEPTH ≥ 1m
—	LOCAL ROAD; LOCAL STREET		
—	RAILWAY		

DISCHARGE  
 THREEPOINT CREEK= 246 m<sup>3</sup>/s  
 THREEPOINT CREEK= 495 m<sup>3</sup>/s (DS- RS 25.93)



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REVIEWED	N. LANGENBERG	2023-03-31
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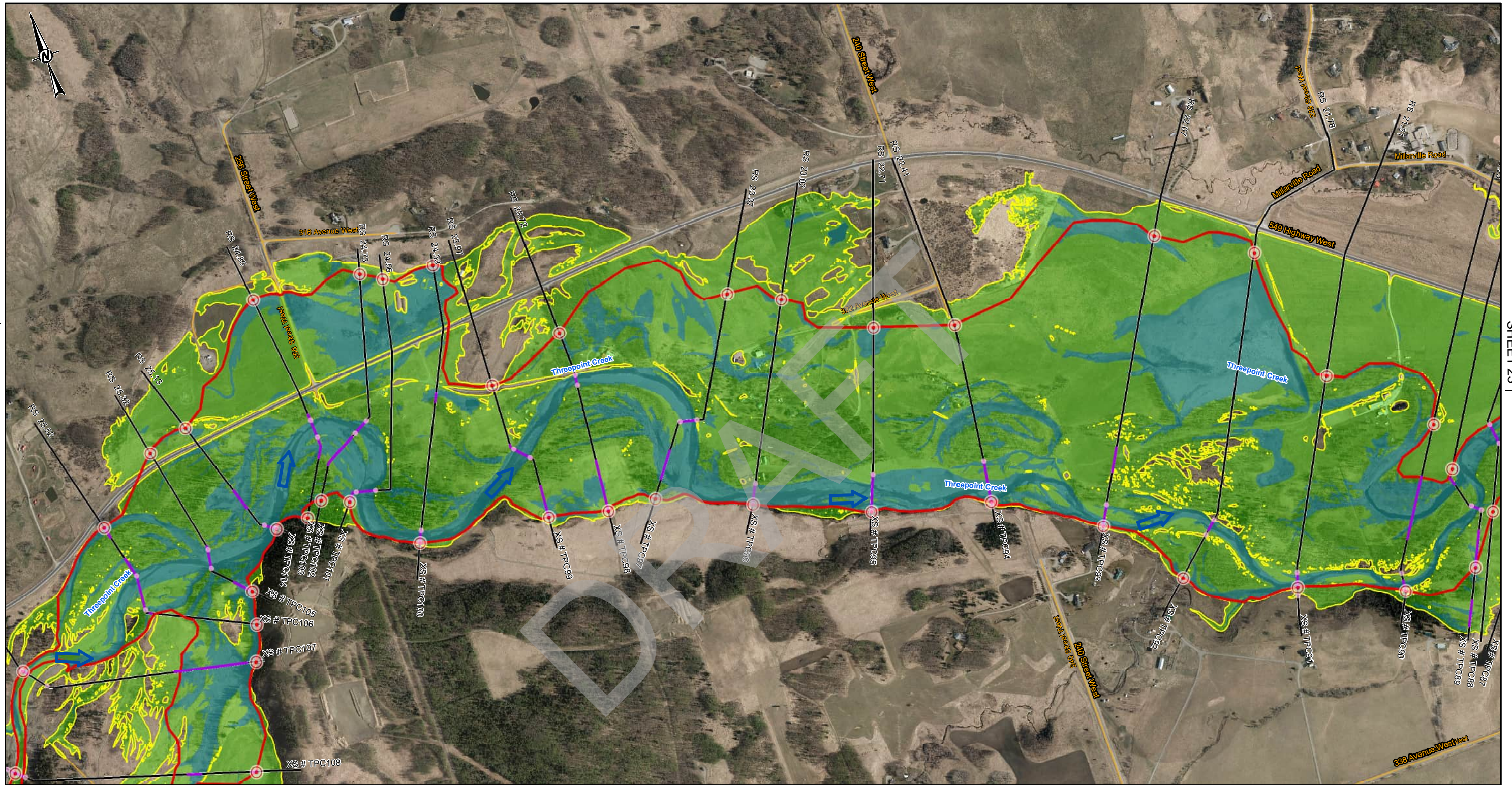
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PROJECT  
 SHEEP RIVER FLOOD HAZARD STUDY

TITLE  
 DESIGN FLOODWAY CRITERIA MAP

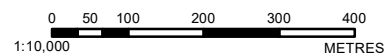
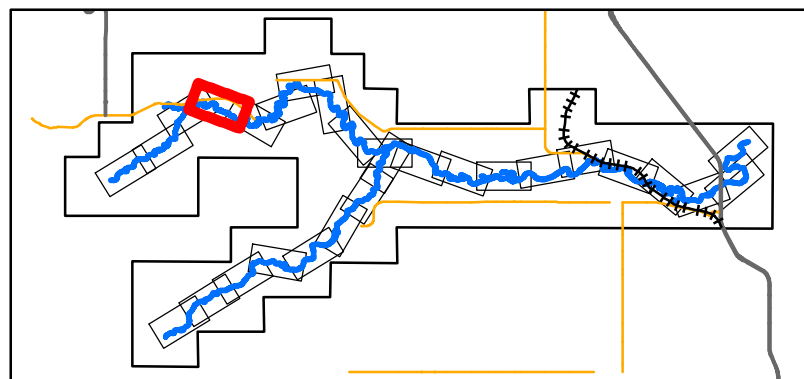
PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	0	Sheet 21 of 28





**LEGEND**

—	CROSS SECTION	●	BANK STATION
XS#110	CROSS SECTION NUMBER	⊙	FLOODWAY STATION
➔	FLOW DIRECTION	- - -	PREVIOUS FLOODWAY
▬▬▬	STUDY_BOUNDARY	▬▬▬	VELOCITY ≥ 1m/s
▬▬▬▬▬	FLOOD CONTROL STRUCTURES	▬▬▬	PROPOSED FLOODWAY
⌈	BRIDGES	▬▬▬	FLOOD EXTENT- 100 YEAR
—	PRIMARY HIGHWAY	▬▬▬	DEPTH ≥ 1m
—	LOCAL ROAD; LOCAL STREET		DISCHARGE THREPOINT CREEK= 495 m <sup>3</sup> /s
—+—+—	RAILWAY		



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PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

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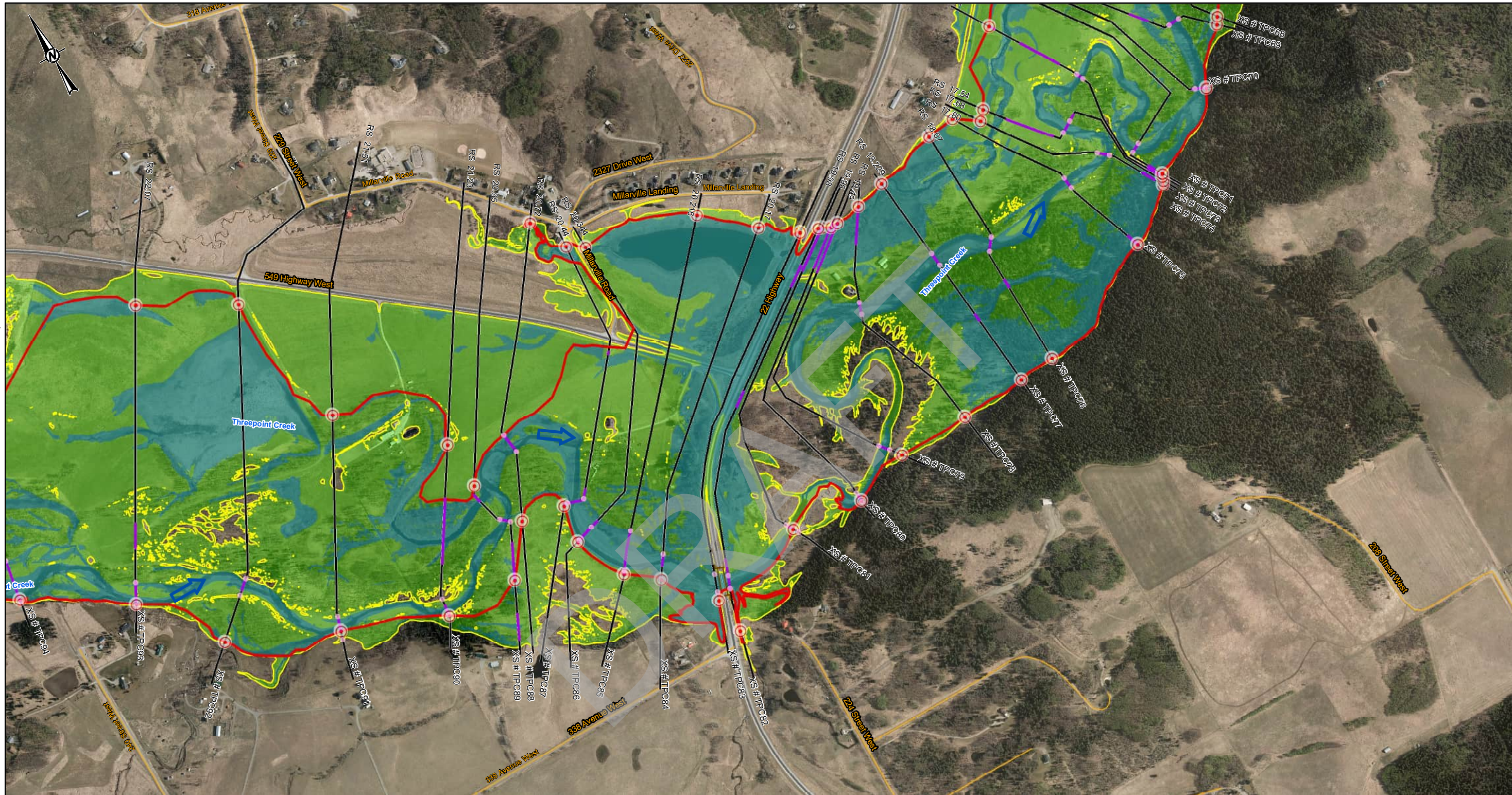
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DESIGNED	N. LANGENBERG	2023-03-31
PREPARED	R. GROENEVELD	2023-03-31
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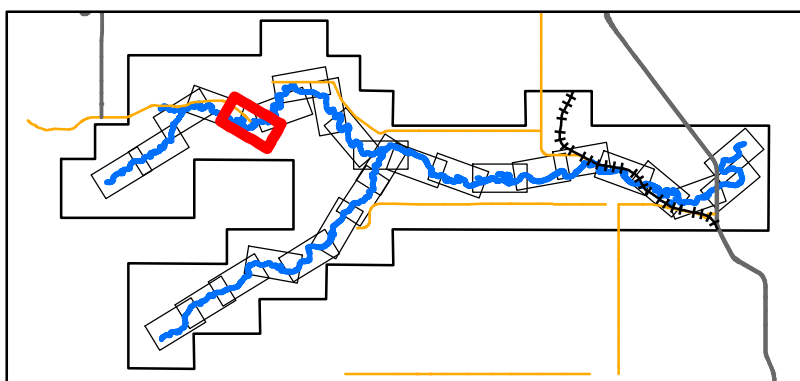
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<b>TITLE</b> DESIGN FLOODWAY CRITERIA MAP	
PROJECT NO. H/355730	CONTROL 228-272-0008-3321
REV. 0	FIGURE Sheet 22 of 28





LEGEND	
—	CROSS SECTION
XS#110	CROSS SECTION NUMBER
→	FLOW DIRECTION
---	STUDY BOUNDARY
	FLOOD CONTROL STRUCTURES
—	BRIDGES
—	PRIMARY HIGHWAY
—	LOCAL ROAD; LOCAL STREET
—+—+—	RAILWAY
●	BANK STATION
⊙	FLOODWAY STATION
- - -	PREVIOUS FLOODWAY
—	VELOCITY ≥ 1m/s
—	PROPOSED FLOODWAY
■	FLOOD EXTENT- 100 YEAR
■	DEPTH ≥ 1m
DISCHARGE THREEPOINT CREEK= 495 m <sup>3</sup> /s	



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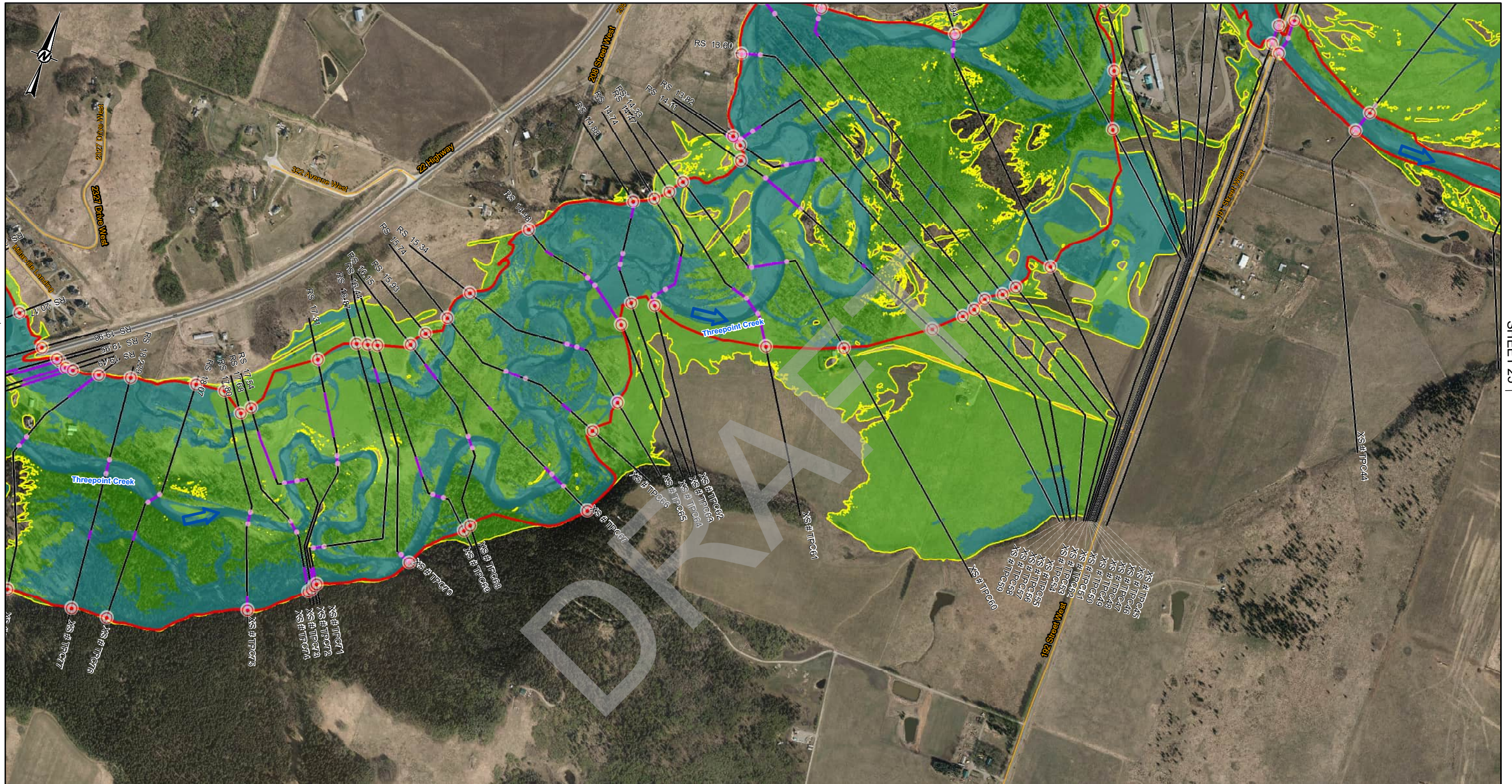
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PROJECT		TITLE	
SHEEP RIVER FLOOD HAZARD STUDY		DESIGN FLOODWAY CRITERIA MAP	
PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	0	Sheet 23 of 28



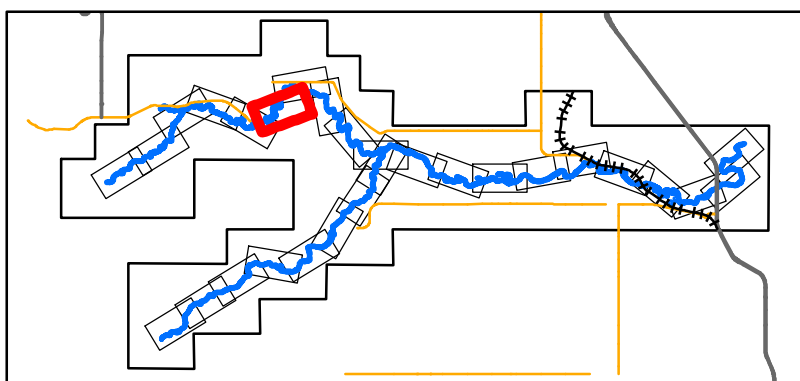
SHEET 23 ↑

↑ SHEET 25



**LEGEND**

	CROSS SECTION		BANK STATION
	CROSS SECTION NUMBER		FLOODWAY STATION
	FLOW DIRECTION		PREVIOUS FLOODWAY
	STUDY_BOUNDARY		VELOCITY ≥ 1m/s
	FLOOD CONTROL STRUCTURES		PROPOSED FLOODWAY
	BRIDGES		FLOOD EXTENT- 100 YEAR
	PRIMARY HIGHWAY		DEPTH ≥ 1m
	LOCAL ROAD, LOCAL STREET	<b>DISCHARGE</b>	
	RAILWAY	THREEPPOINT CREEK= 495 m <sup>3</sup> /s	
		THREEPPOINT CREEK= 616 m <sup>3</sup> (DS- RS 14.98)	



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PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

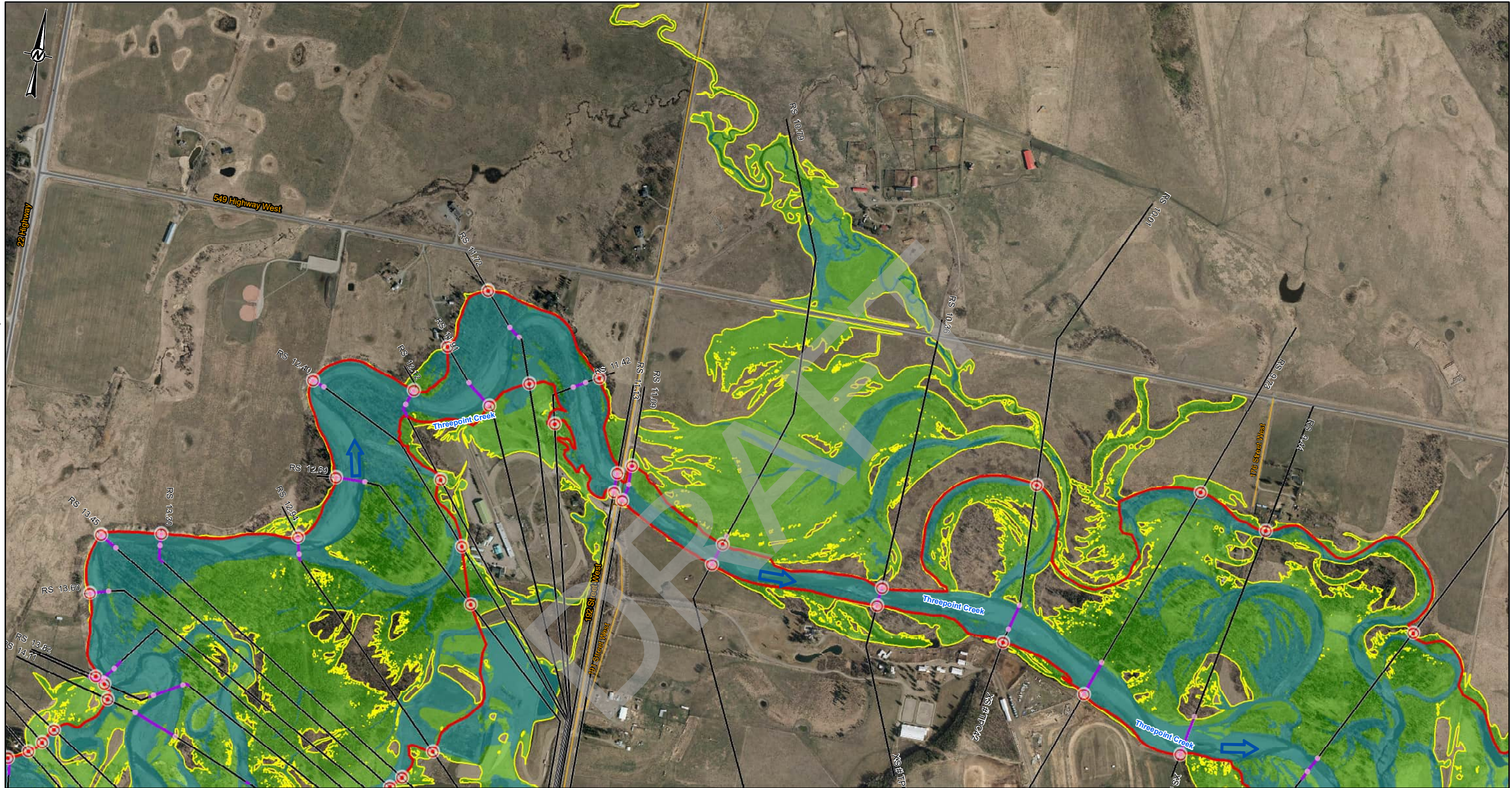
TITLE  
**DESIGN FLOODWAY CRITERIA MAP**

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PREPARED	R. GROENEVELD	2023-03-31
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APPROVED	J. GROENEVELD	2023-03-31

PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	0	Sheet 24 of 28

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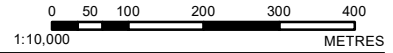
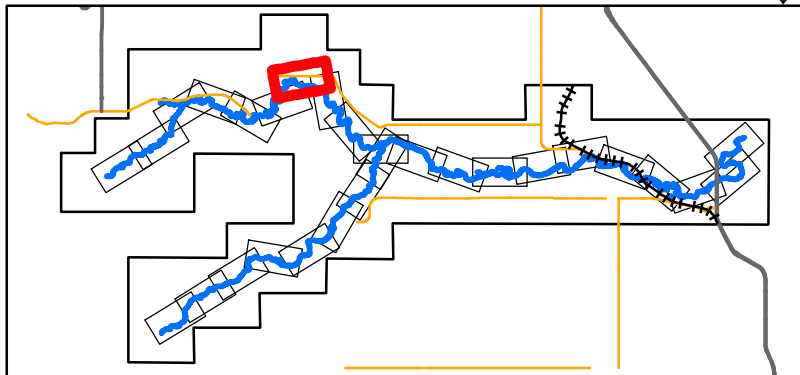




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XS#110	CROSS SECTION NUMBER	⊙	FLOODWAY STATION
➔	FLOW DIRECTION	- - -	PREVIOUS FLOODWAY
---	STUDY BOUNDARY	—	VELOCITY ≥ 1m/s
	FLOOD CONTROL STRUCTURES	—	PROPOSED FLOODWAY
—	BRIDGES	—	FLOOD EXTENT- 100 YEAR
—	PRIMARY HIGHWAY	—	DEPTH ≥ 1m
—	LOCAL ROAD; LOCAL STREET		
—+—+—	RAILWAY		

DISCHARGE  
THREEPPOINT CREEK= 616 m<sup>3</sup>/s



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PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

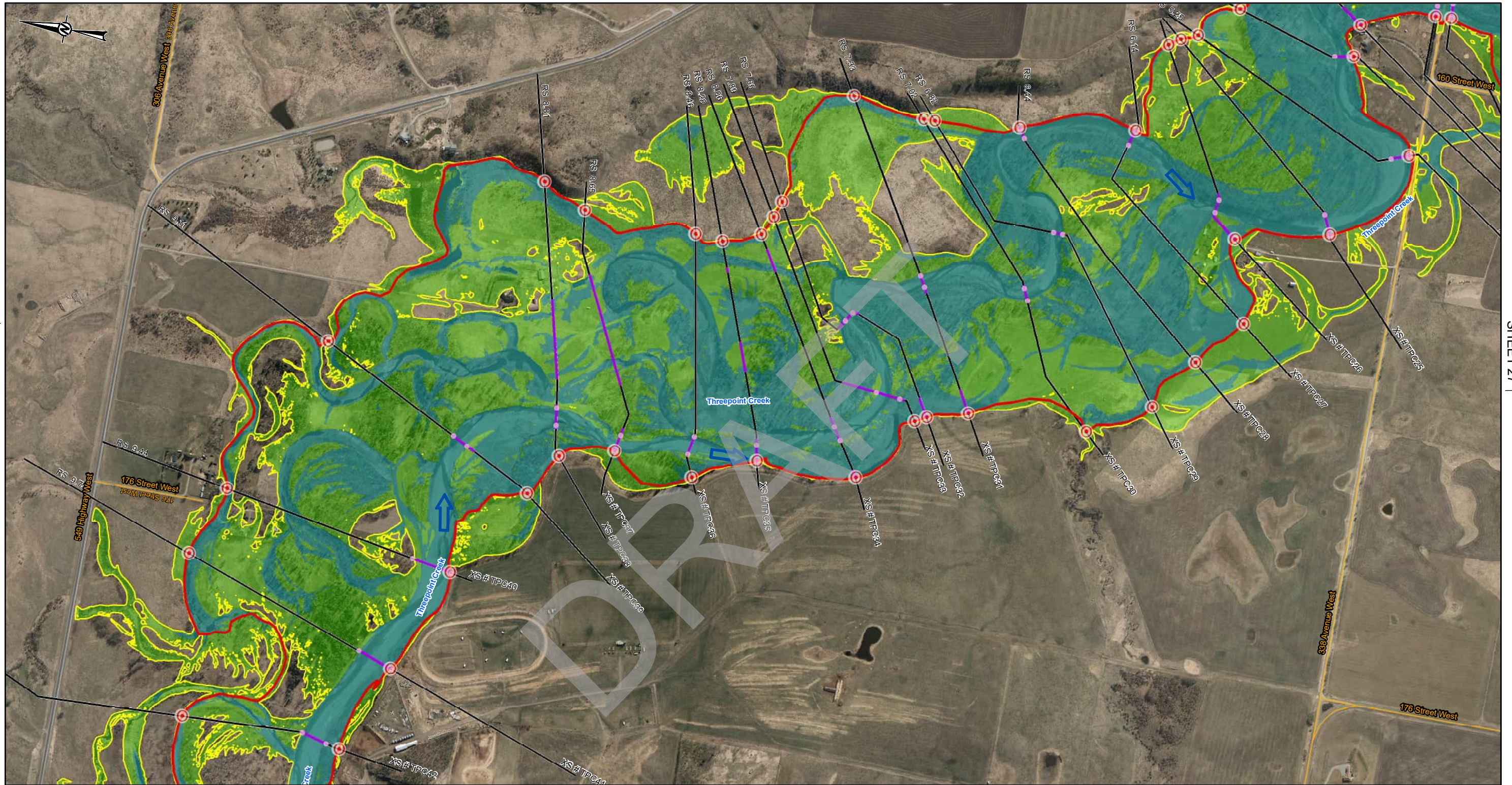
TITLE  
**DESIGN FLOODWAY CRITERIA MAP**

DESIGNED	N. LANGENBERG	2023-03-31
PREPARED	R. GROENEVELD	2023-03-31
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APPROVED	J. GROENEVELD	2023-03-31

PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	0	Sheet 25 of 28

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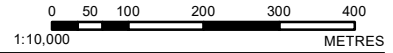
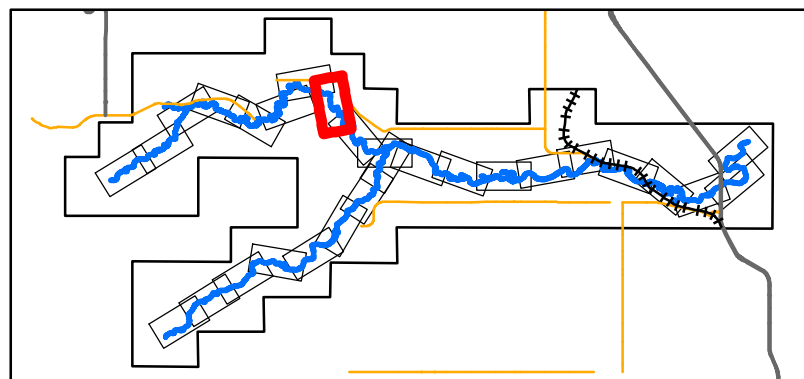




**LEGEND**

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XS#110	CROSS SECTION NUMBER	⊙	FLOODWAY STATION
➡	FLOW DIRECTION	- - -	PREVIOUS FLOODWAY
▬▬▬	STUDY_BOUNDARY	—	VELOCITY ≥ 1m/s
▬▬▬▬	FLOOD CONTROL STRUCTURES	▬▬▬	PROPOSED FLOODWAY
⌈⌋	BRIDGES	■	FLOOD EXTENT- 100 YEAR
—	PRIMARY HIGHWAY	■	DEPTH ≥ 1m
—	LOCAL ROAD; LOCAL STREET		
—+—+—	RAILWAY		

DISCHARGE  
THREEPOINT CREEK= 616 m<sup>3</sup>/s



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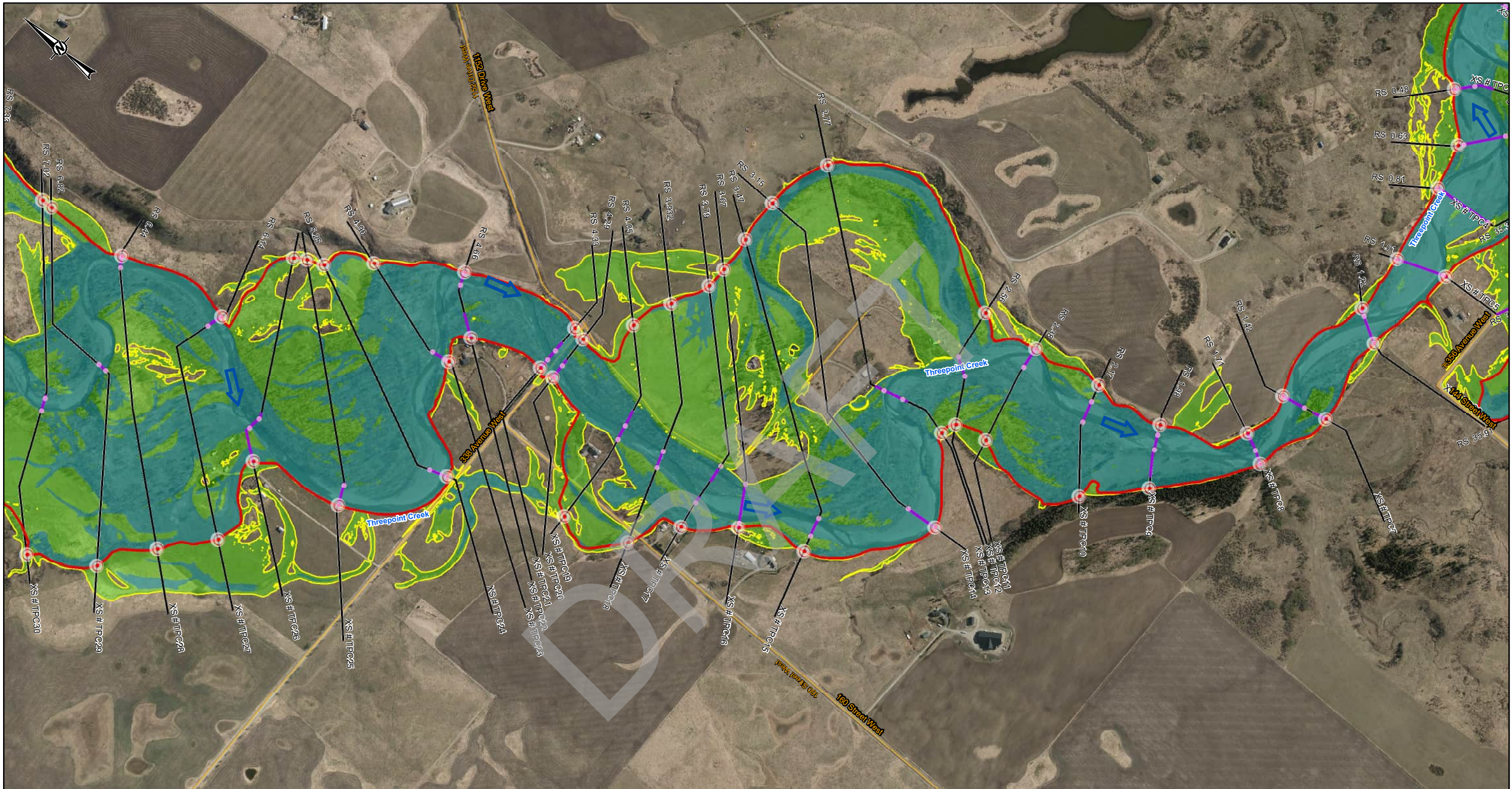
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PROJECT  
**SHEEP RIVER FLOOD HAZARD STUDY**

TITLE  
**DESIGN FLOODWAY CRITERIA MAP**

PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	0	Sheet 26 of 28



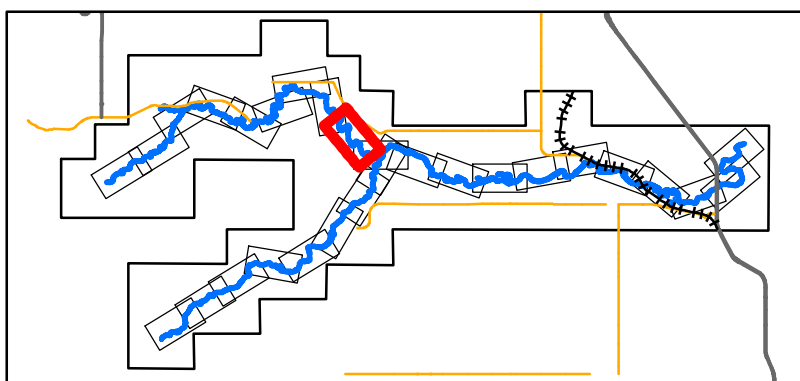


SHEET 26 ↑

↑ SHEET 28

**LEGEND**

—	CROSS SECTION	●	BANK STATION
XS#110	CROSS SECTION NUMBER	⊙	FLOODWAY STATION
➔	FLOW DIRECTION	- - -	PREVIOUS FLOODWAY
—	STUDY_BOUNDARY	—	VELOCITY ≥ 1m/s
—	FLOOD CONTROL STRUCTURES	—	PROPOSED FLOODWAY
—	BRIDGES	—	FLOOD EXTENT- 100 YEAR
—	PRIMARY HIGHWAY	—	DEPTH ≥ 1m
—	LOCAL ROAD; LOCAL STREET		DISCHARGE THREPOINT CREEK= 616 m <sup>3</sup> /s
—	RAILWAY		



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PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

TITLE  
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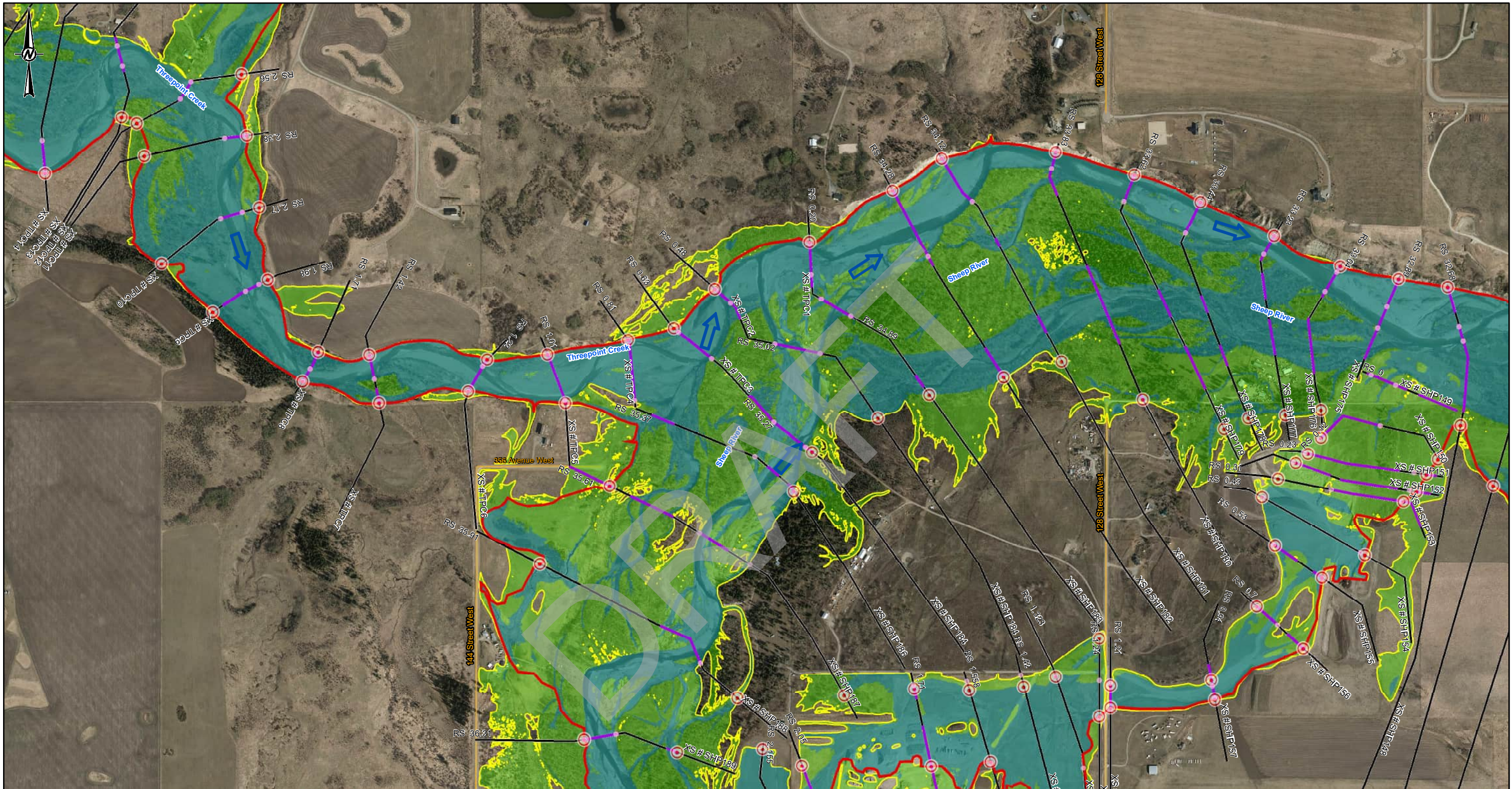
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PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

TITLE  
**DESIGN FLOODWAY CRITERIA MAP**

PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	0	Sheet 27 of 28





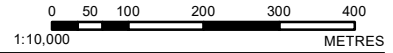
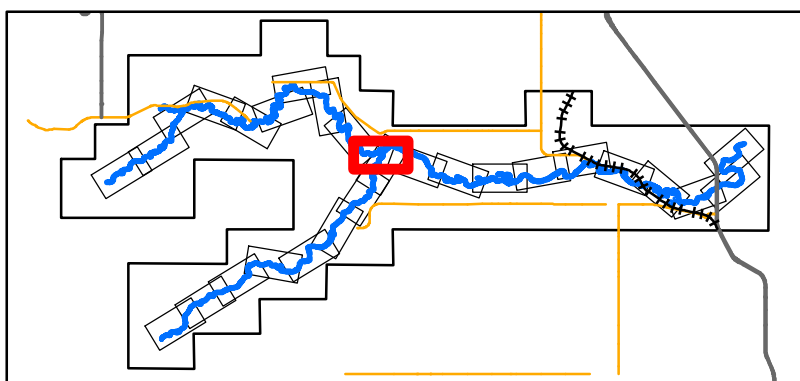
SHEET 27 ↑

↓ SHEET 9

**LEGEND**

- CROSS SECTION
- XS#110 CROSS SECTION NUMBER
- ➡ FLOW DIRECTION
- STUDY\_BOUNDARY
- ▬ FLOOD CONTROL STRUCTURES
- ▬ BRIDGES
- PRIMARY HIGHWAY
- LOCAL ROAD; LOCAL STREET
- RAILWAY
- BANK STATION
- ⊙ FLOODWAY STATION
- - - PREVIOUS FLOODWAY
- VELOCITY ≥ 1m/s
- PROPOSED FLOODWAY
- FLOOD EXTENT- 100 YEAR
- DEPTH ≥ 1m

DISCHARGE  
 THREEPOINT CREEK= 616 m<sup>3</sup>/s  
 SHEEP RIVER= 787 m<sup>3</sup>/s  
 SHEEP RIVER= 1403 m<sup>3</sup>/s (DS- RS 34.28)



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PROJECT  
 SHEEP RIVER FLOOD HAZARD STUDY

TITLE  
**DESIGN FLOODWAY CRITERIA MAP**

PROJECT NO. H/355730	CONTROL 228-272-0008-3321	REV. 0	FIGURE Sheet 28 of 28
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# Appendix B Flood Hazard Mapping

DRAFT



March.2023

## SHEEP RIVER FLOOD HAZARD STUDY

# DESIGN FLOOD HAZARD MAP LIBRARY

### Definitions

**Flood Hazard Map** - A flood hazard map is a specific type of flood map that identifies the area flooded for the 1:100 design flood, and divides that flood hazard area into floodway and flood fringe zones. Flood hazard maps can also show additional flood hazard information, including the incremental areas at risk for more severe floods like the 1:200 and 1:500 floods. Flood hazard maps are typically used for long-term flood hazard area management and land-use planning.

**Design Flood** - The design flood standard in Alberta is the 1:100 flood, which is a flood that has a 1% chance of being equaled or exceeded in any given year. The design flood is typically based on the 1:100 open water flood, but it can also reflect 1:100 ice jam flood levels or be based on a historical flood event. Different sized floods have different chances of occurring – for example, a 1:200 flood has a 0.5% chance of occurring in any given year and a 1:500 flood has a 0.2% chance of occurring in any given year – but only the 1:100 design flood is used to define the floodway and flood fringe zones on flood hazard maps.

**Floodway** - When a floodway is first defined on a flood hazard map, it typically represents the area of highest flood hazard where flows are deepest, fastest, and most destructive during the 1:100 design flood. When a flood hazard map is updated, the floodway will not get larger in most circumstances to maintain long-term regulatory certainty, even if the flood hazard area gets larger or design flood levels get higher.

**Flood Fringe** - The flood fringe is the area outside of the floodway that is flooded or could be flooded during the 1:100 design flood. The flood fringe typically represents areas with shallower, slower, and less destructive flooding, but it may also include “high hazard flood fringe” areas. Areas at risk of flooding behind flood berms may also be mapped as “protected flood fringe” areas.

**High Hazard Flood Fringe** - The high hazard flood fringe identifies areas within the flood fringe with deeper or faster moving water than the rest of the flood fringe. High hazard flood fringe areas are likely to be most significant for flood maps that are being updated, but they may also be included in new flood maps.

**Protected Flood Fringe** - The protected flood fringe identifies areas that could be flooded if dedicated flood berms fail or do not work as designed during the 1:100 design flood, even if they are not overtopped. Protected flood fringe areas are part of the flood fringe and do not differentiate between areas with deeper or faster moving water and shallower or slower moving water.

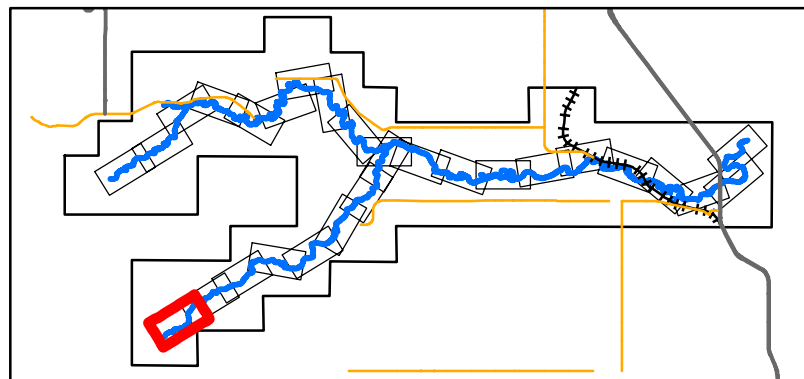




SHEET 2 ↓

**LEGEND**

- CROSS SECTION
  - XS#110 CROSS SECTION NUMBER
  - ➡ FLOW DIRECTION
  - STUDY BOUNDARY
  - ▤ FLOOD CONTROL STRUCTURES
  - ▭ BRIDGES
  - PRIMARY HIGHWAY
  - LOCAL ROAD; LOCAL STREET
  - RAILWAY
  - FLOODWAY
  - ▨ FLOOD FRINGE
  - ▧ HIGH HAZARD FLOOD FRINGE
  - ▩ PROTECTED FLOOD FRINGE
  - FLOOD EXTENT- 200 YEAR
  - FLOOD EXTENT- 500 YEAR
- DISCHARGE  
SHEEP RIVER= 787 m<sup>3</sup>/s



CLIENT  
**ALBERTA ENVIRONMENT AND PARKS**

CONSULTANT  
**HATCH**

PROJECT  
**ALBERTA Government**

DESIGNED	N. LANGENBERG	2023-03-31
PREPARED	R. GROENEVELD	2023-03-31
REVIEWED	N. LANGENBERG	2023-03-31
APPROVED	J. GROENEVELD	2023-03-31

**REFERENCE(S)**

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IMAGERY CAPTURED APRIL 2017 BY GEODESY GROUP INC. FOR THE GOVERNMENT OF ALBERTA.  
DATUM: NAD 83 CSRS PROJECTION: 3TM 114

PROJECT  
**SHEEP RIVER FLOOD HAZARD STUDY**

TITLE  
**DESIGN FLOOD HAZARD MAP**

PROJECT NO. H/355730	CONTROL 228-272-0008-3321	REV. A	FIGURE Sheet 1 of 28
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SHEET 1 ↑

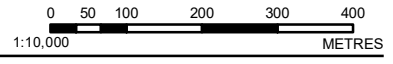
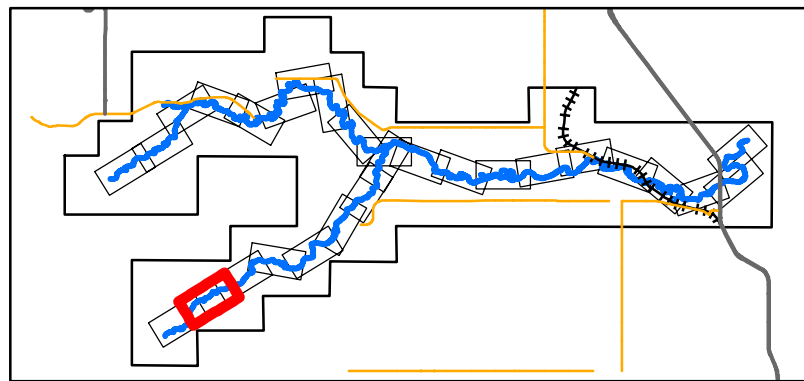
↑ SHEET 3



**LEGEND**

—	CROSS SECTION	■	FLOODWAY
XS#110	CROSS SECTION NUMBER	■	FLOOD FRINGE
➔	FLOW DIRECTION	■	HIGH HAZARD FLOOD FRINGE
—	STUDY BOUNDARY	■	PROTECTED FLOOD FRINGE
—	FLOOD CONTROL STRUCTURES	■	FLOOD EXTENT- 200 YEAR
—	BRIDGES	■	FLOOD EXTENT- 500 YEAR
—	PRIMARY HIGHWAY		
—	LOCAL ROAD; LOCAL STREET		
—	RAILWAY		

DISCHARGE  
SHEEP RIVER= 787 m<sup>3</sup>/s



CLIENT  
ALBERTA ENVIRONMENT AND PARKS

CONSULTANT  
**HATCH**

PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

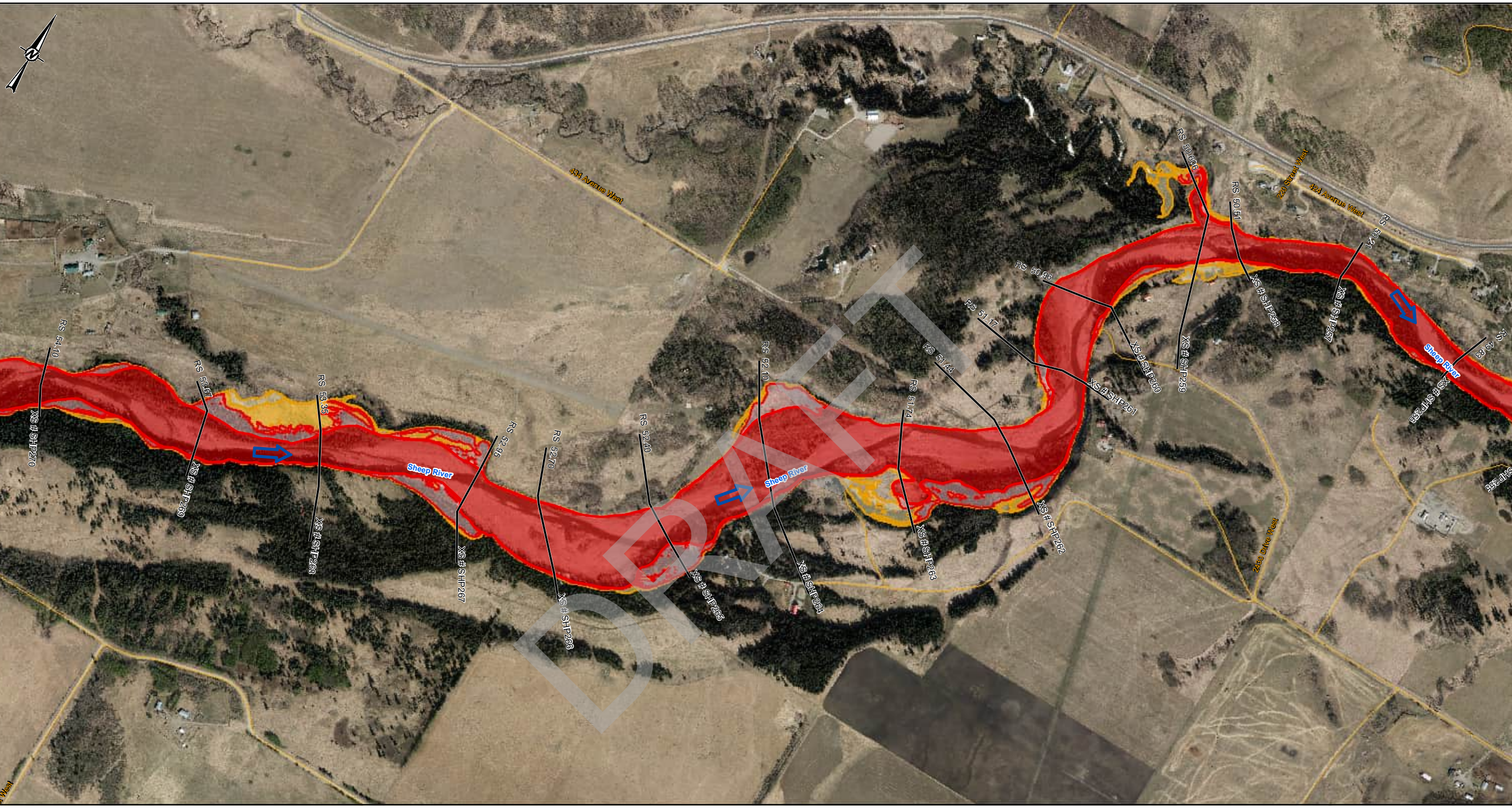
TITLE  
**DESIGN FLOOD HAZARD MAP**

**REFERENCE(S)**  
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PREPARED	R. GROENEVELD	2023-03-31
REVIEWED	N. LANGENBERG	2023-03-31
APPROVED	J. GROENEVELD	2023-03-31

PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	A	Sheet 2 of 28



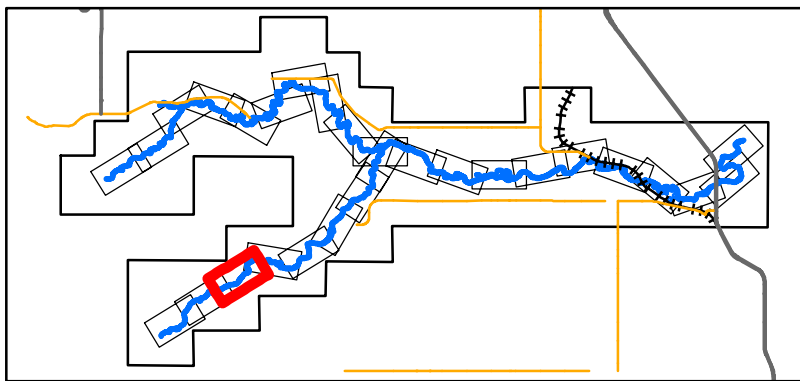


SHEET 2 ↑

↓ SHEET 4

LEGEND	
	CROSS SECTION
	CROSS SECTION NUMBER
	FLOW DIRECTION
	STUDY BOUNDARY
	FLOOD CONTROL STRUCTURES
	BRIDGES
	PRIMARY HIGHWAY
	LOCAL ROAD; LOCAL STREET
	RAILWAY
	FLOODWAY
	FLOOD FRINGE
	HIGH HAZARD FLOOD FRINGE
	PROTECTED FLOOD FRINGE
	FLOOD EXTENT- 200 YEAR
	FLOOD EXTENT- 500 YEAR

DISCHARGE  
SHEEP RIVER= 787 m<sup>3</sup>/s



CLIENT  
**ALBERTA ENVIRONMENT AND PARKS**

CONSULTANT  
**HATCH**

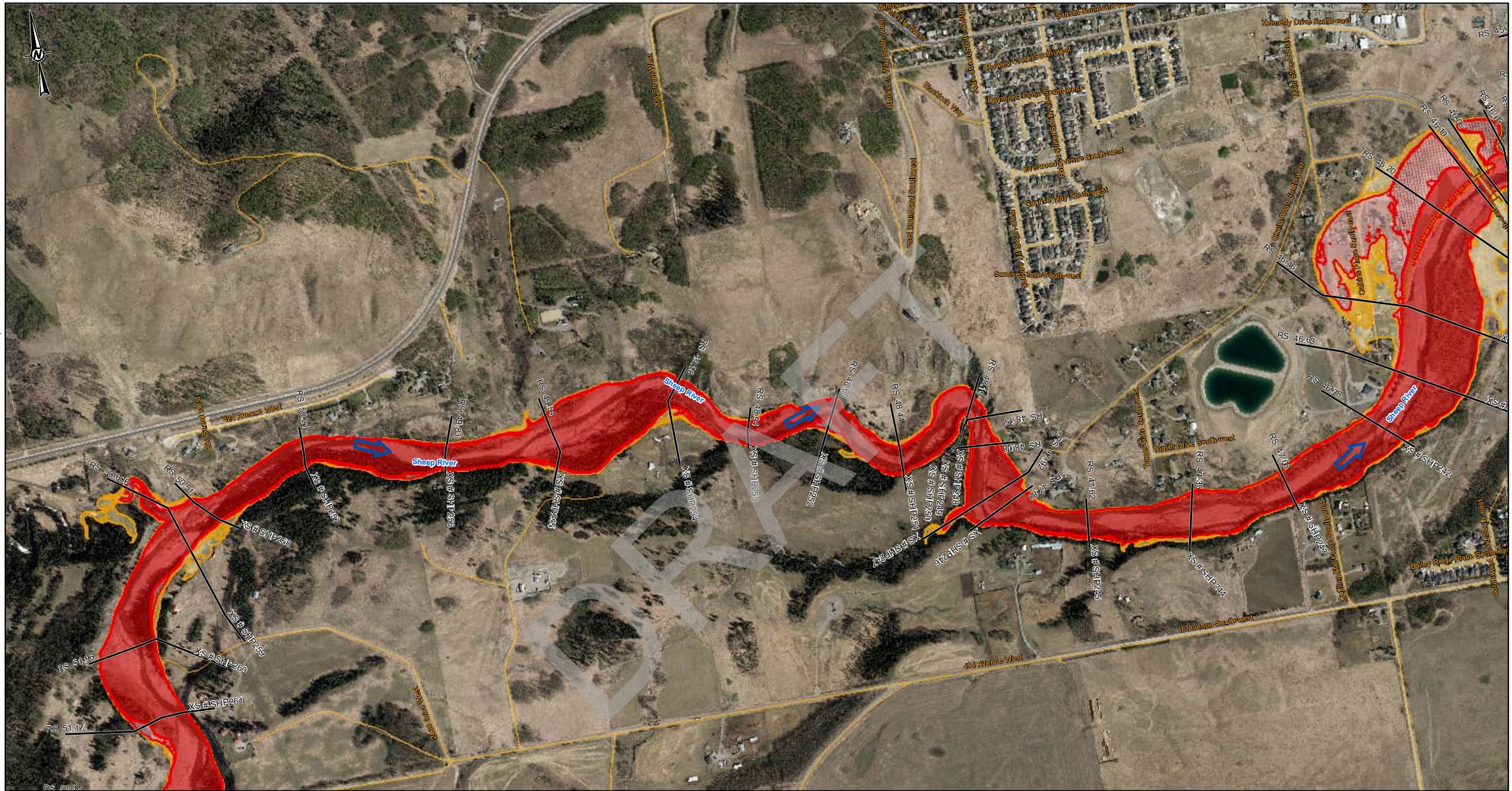
PROJECT  
**ALBERTA Government**

REFERENCE(S)  
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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

PROJECT		TITLE	
<b>SHEEP RIVER FLOOD HAZARD STUDY</b>		<b>DESIGN FLOOD HAZARD MAP</b>	
PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	A	Sheet 3 of 28

DESIGNED	N. LANGENBERG	2023-03-31
PREPARED	R. GROENEVELD	2023-03-31
REVIEWED	N. LANGENBERG	2023-03-31
APPROVED	J. GROENEVELD	2023-03-31

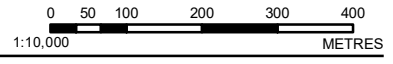
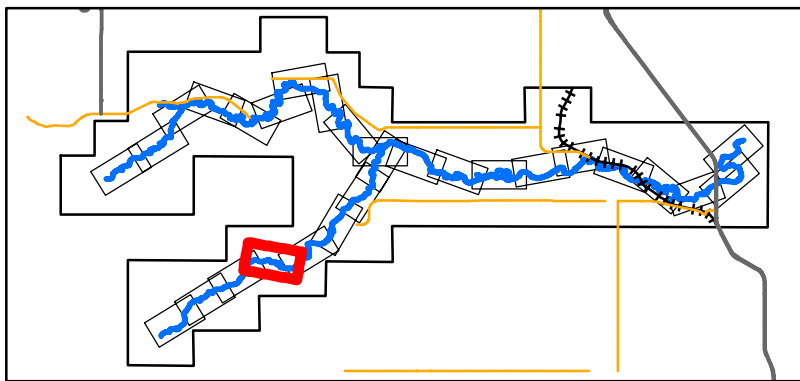




**LEGEND**

CROSS SECTION	FLOODWAY
CROSS SECTION NUMBER	FLOOD FRINGE
FLOW DIRECTION	HIGH HAZARD FLOOD FRINGE
STUDY BOUNDARY	PROTECTED FLOOD FRINGE
FLOOD CONTROL STRUCTURES	FLOOD EXTENT- 200 YEAR
BRIDGES	FLOOD EXTENT- 500 YEAR
PRIMARY HIGHWAY	
LOCAL ROAD; LOCAL STREET	
RAILWAY	

DISCHARGE  
SHEEP RIVER= 787 m<sup>3</sup>/s



CLIENT  
ALBERTA ENVIRONMENT AND PARKS

PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

CONSULTANT  
HATCH

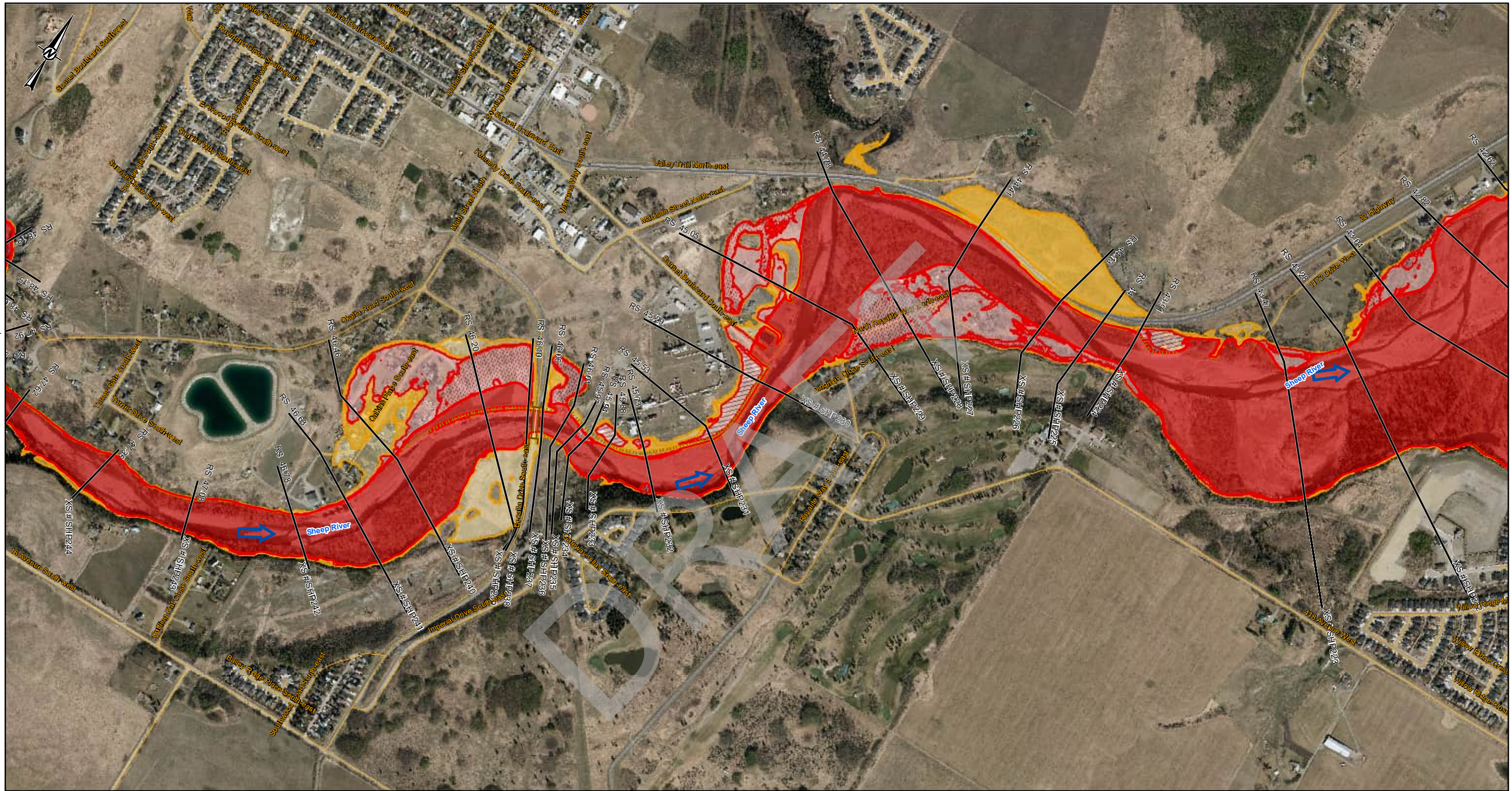
DESIGNED N. LANGENBERG 2023-03-31  
PREPARED R. GROENEVELD 2023-03-31  
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**TITLE**  
DESIGN FLOOD HAZARD MAP

PROJECT NO. H/355730	CONTROL 228-272-0008-3321	REV. A	FIGURE Sheet 4 of 28
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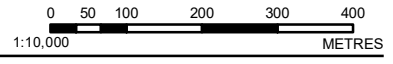
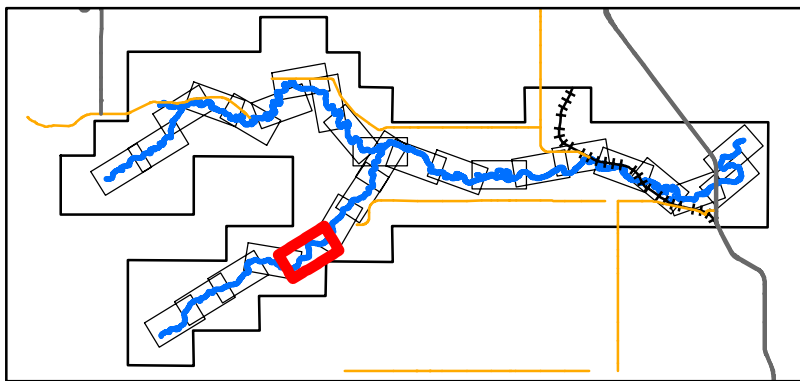




**LEGEND**

CROSS SECTION	FLOODWAY
CROSS SECTION NUMBER	FLOOD FRINGE
FLOW DIRECTION	HIGH HAZARD FLOOD FRINGE
STUDY BOUNDARY	PROTECTED FLOOD FRINGE
FLOOD CONTROL STRUCTURES	FLOOD EXTENT- 200 YEAR
BRIDGES	FLOOD EXTENT- 500 YEAR
PRIMARY HIGHWAY	
LOCAL ROAD; LOCAL STREET	
RAILWAY	

DISCHARGE  
SHEEP RIVER= 787 m<sup>3</sup>/s



CLIENT  
ALBERTA ENVIRONMENT AND PARKS

PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

CONSULTANT  
HATCH

DESIGNED N. LANGENBERG 2023-03-31  
PREPARED R. GROENEVELD 2023-03-31  
REVIEWED N. LANGENBERG 2023-03-31  
APPROVED J. GROENEVELD 2023-03-31

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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

**TITLE**  
DESIGN FLOOD HAZARD MAP

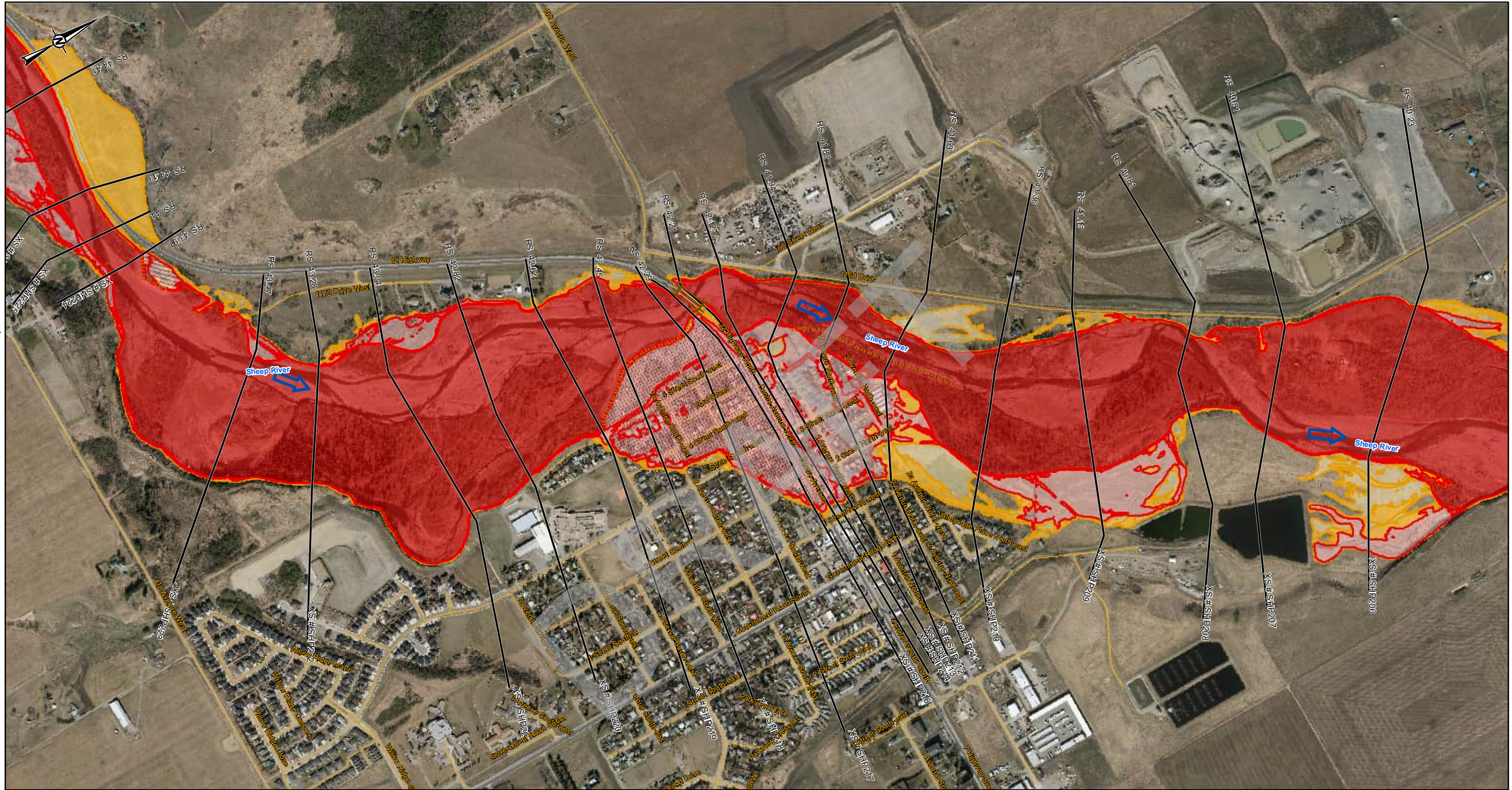
PROJECT NO. H/355730 CONTROL 228-272-0008-3321 REV. A

FIGURE  
Sheet 5 of 28



SHEET 5 ↑

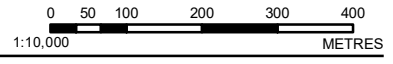
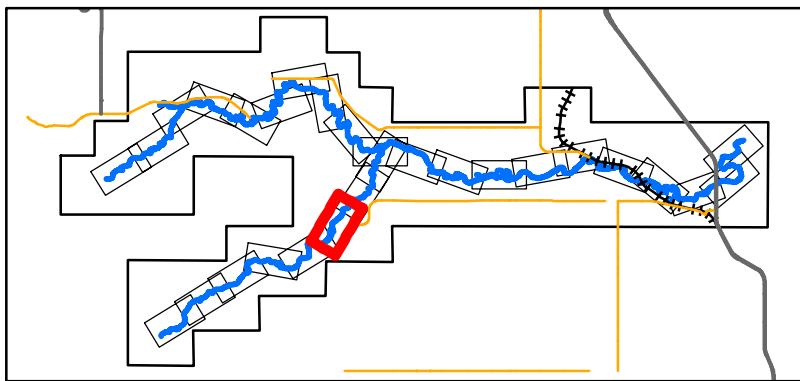
↑ SHEET 7



**LEGEND**

—	CROSS SECTION	■	FLOODWAY
XS#110	CROSS SECTION NUMBER	■	FLOOD FRINGE
➡	FLOW DIRECTION	■	HIGH HAZARD FLOOD FRINGE
---	STUDY BOUNDARY	■	PROTECTED FLOOD FRINGE
	FLOOD CONTROL STRUCTURES	■	FLOOD EXTENT- 200 YEAR
— —	BRIDGES	■	FLOOD EXTENT- 500 YEAR
—	PRIMARY HIGHWAY		
—	LOCAL ROAD; LOCAL STREET		
—+—+—	RAILWAY		

DISCHARGE  
SHEEP RIVER= 787 m<sup>3</sup>/s



CLIENT  
**ALBERTA ENVIRONMENT AND PARKS**

PROJECT  
**SHEEP RIVER FLOOD HAZARD STUDY**

CONSULTANT  
**Alberta Government**

**HATCH**

DESIGNED	N. LANGENBERG	2023-03-31
PREPARED	R. GROENEVELD	2023-03-31
REVIEWED	N. LANGENBERG	2023-03-31
APPROVED	J. GROENEVELD	2023-03-31

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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

TITLE  
**DESIGN FLOOD HAZARD MAP**

PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	A	Sheet 6 of 28

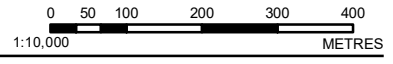
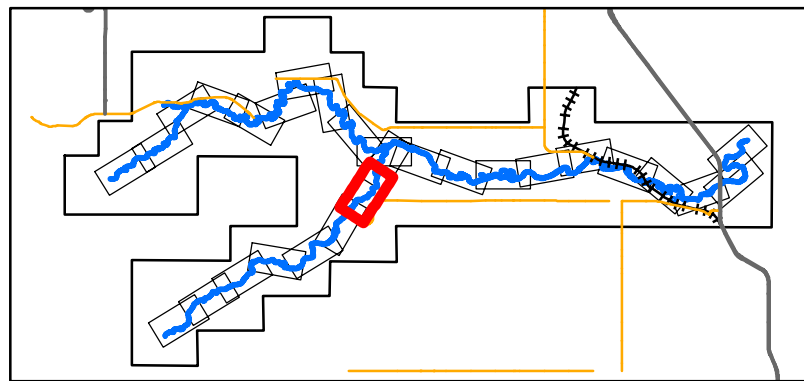




**LEGEND**

—	CROSS SECTION	■	FLOODWAY
XS#110	CROSS SECTION NUMBER	■	FLOOD FRINGE
➡	FLOW DIRECTION	■	HIGH HAZARD FLOOD FRINGE
—	STUDY BOUNDARY	■	PROTECTED FLOOD FRINGE
—	FLOOD CONTROL STRUCTURES	■	FLOOD EXTENT- 200 YEAR
—	BRIDGES	■	FLOOD EXTENT- 500 YEAR
—	PRIMARY HIGHWAY		
—	LOCAL ROAD; LOCAL STREET		
—	RAILWAY		

DISCHARGE  
SHEEP RIVER= 787 m<sup>3</sup>/s



CLIENT  
ALBERTA ENVIRONMENT AND PARKS

PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

CONSULTANT  
HATCH

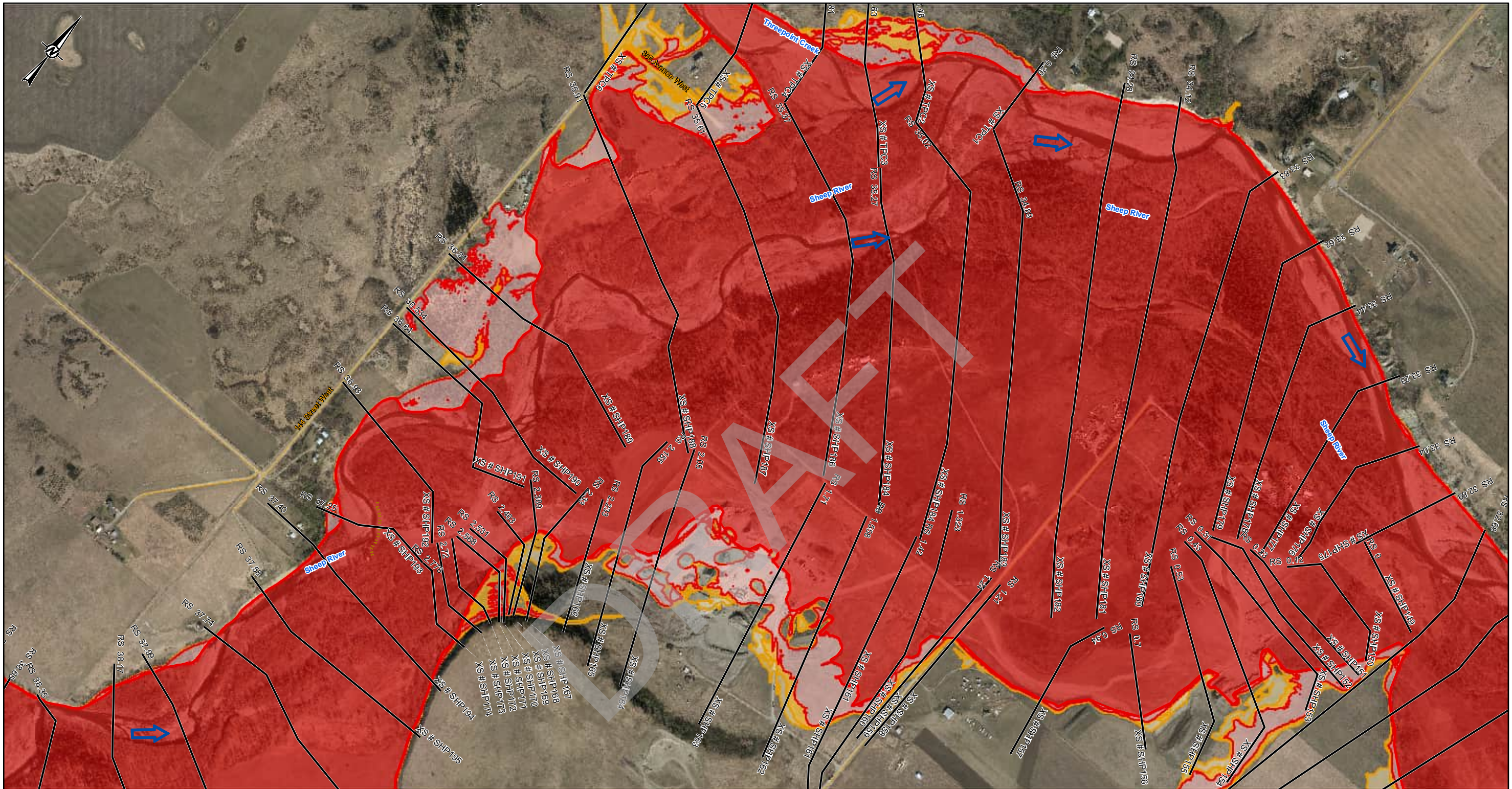
DESIGNED N. LANGENBERG 2023-03-31  
PREPARED R. GROENEVELD 2023-03-31  
REVIEWED N. LANGENBERG 2023-03-31  
APPROVED J. GROENEVELD 2023-03-31

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**TITLE**  
DESIGN FLOOD HAZARD MAP

PROJECT NO. H/355730	CONTROL 228-272-0008-3321	REV. A	FIGURE Sheet 7 of 28
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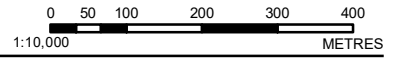
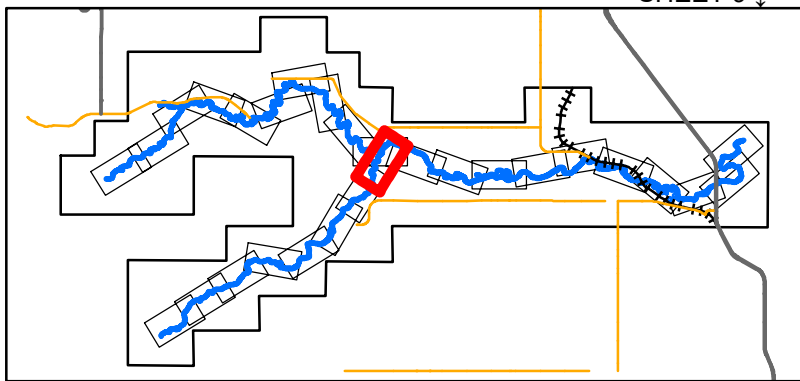




**LEGEND**

- CROSS SECTION
- XS#110 CROSS SECTION NUMBER
- ➡ FLOW DIRECTION
- STUDY BOUNDARY
- ▤ FLOOD CONTROL STRUCTURES
- BRIDGES
- PRIMARY HIGHWAY
- LOCAL ROAD; LOCAL STREET
- RAILWAY
- FLOODWAY
- FLOOD FRINGE
- ▨ HIGH HAZARD FLOOD FRINGE
- ▧ PROTECTED FLOOD FRINGE
- FLOOD EXTENT- 200 YEAR
- FLOOD EXTENT- 500 YEAR

DISCHARGE  
 THREEPOINT CREEK= 616 m<sup>3</sup>/s  
 SHEEP RIVER= 787 m<sup>3</sup>/s  
 SHEEP RIVER= 1403 m<sup>3</sup>/s (DS- RS 34.28)



CLIENT  
 ALBERTA ENVIRONMENT AND PARKS

PROJECT  
 SHEEP RIVER FLOOD HAZARD STUDY

CONSULTANT  
**HATCH**

DESIGNED	N. LANGENBERG	2023-03-31
PREPARED	R. GROENEVELD	2023-03-31
REVIEWED	N. LANGENBERG	2023-03-31
APPROVED	J. GROENEVELD	2023-03-31

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 DATUM: NAD 83 CSRS PROJECTION: 3TM 114

PROJECT  
 SHEEP RIVER FLOOD HAZARD STUDY

TITLE  
**DESIGN FLOOD HAZARD MAP**

PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	A	Sheet 8 of 28





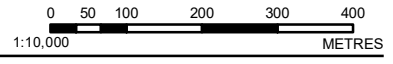
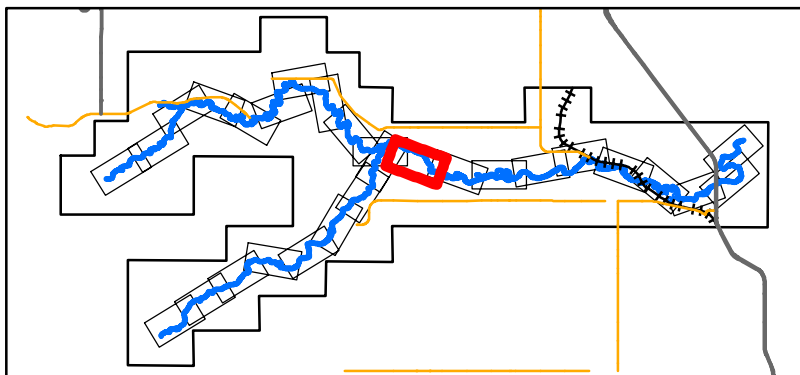
SHEET 8 ↑

↓ SHEET 10

**LEGEND**

CROSS SECTION	FLOODWAY
CROSS SECTION NUMBER	FLOOD FRINGE
FLOW DIRECTION	HIGH HAZARD FLOOD FRINGE
STUDY BOUNDARY	PROTECTED FLOOD FRINGE
FLOOD CONTROL STRUCTURES	FLOOD EXTENT- 200 YEAR
BRIDGES	FLOOD EXTENT- 500 YEAR
PRIMARY HIGHWAY	
LOCAL ROAD; LOCAL STREET	
RAILWAY	

DISCHARGE  
SHEEP RIVER= 1300 m<sup>3</sup>/s



CLIENT  
ALBERTA ENVIRONMENT AND PARKS

CONSULTANT  
**HATCH**

Alberta Government

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PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

TITLE  
**DESIGN FLOOD HAZARD MAP**

PROJECT NO. H/355730	CONTROL 228-272-0008-3321	REV. A	FIGURE Sheet 9 of 28
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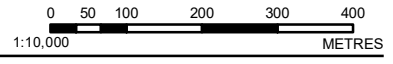
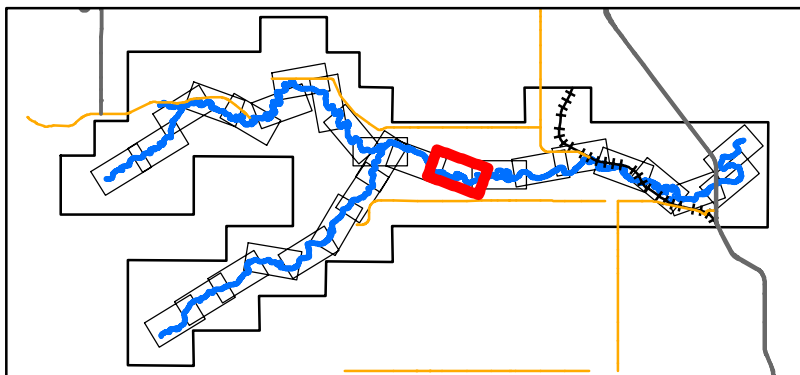
SHEET 9 ↑

↑ SHEET 11

**LEGEND**

CROSS SECTION	FLOODWAY
CROSS SECTION NUMBER	FLOOD FRINGE
FLOW DIRECTION	HIGH HAZARD FLOOD FRINGE
STUDY BOUNDARY	PROTECTED FLOOD FRINGE
FLOOD CONTROL STRUCTURES	FLOOD EXTENT- 200 YEAR
BRIDGES	FLOOD EXTENT- 500 YEAR
PRIMARY HIGHWAY	
LOCAL ROAD; LOCAL STREET	
RAILWAY	

DISCHARGE  
SHEEP RIVER= 1300 m<sup>3</sup>/s



CLIENT  
ALBERTA ENVIRONMENT AND PARKS

CONSULTANT  
**HATCH**

PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

TITLE  
**DESIGN FLOOD HAZARD MAP**

DESIGNED	N. LANGENBERG	2023-03-31
PREPARED	R. GROENEVELD	2023-03-31
REVIEWED	N. LANGENBERG	2023-03-31
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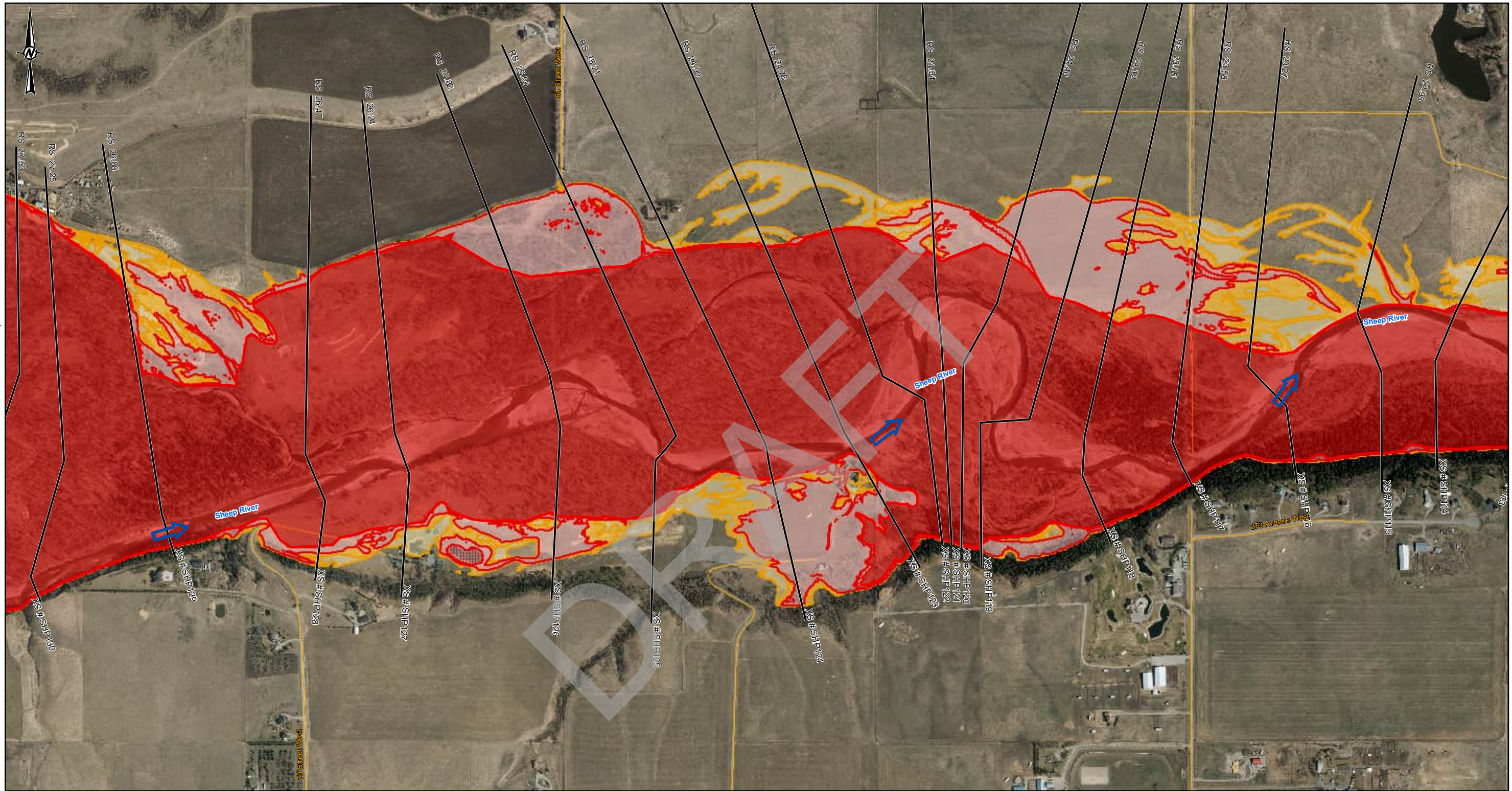
PROJECT NO. H/355730	CONTROL 228-272-0008-3321	REV. A	FIGURE Sheet 10 of 28
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DATUM: NAD 83 CSRS PROJECTION: 3TM 114



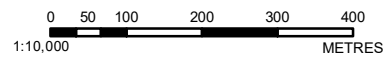
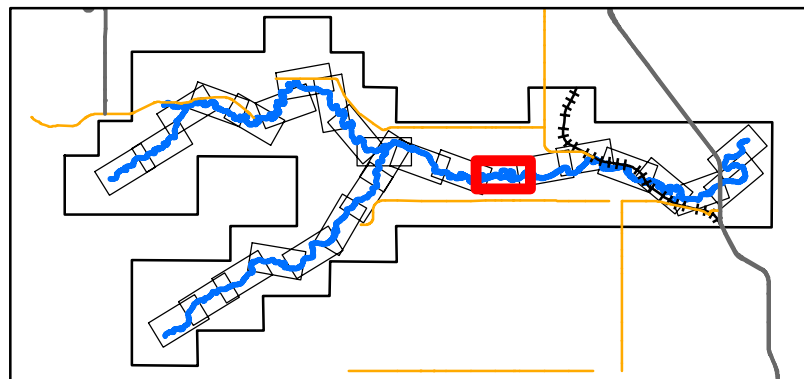
SHEET 10 ↑

↓ SHEET 12



**LEGEND**

- CROSS SECTION
  - XS#110 CROSS SECTION NUMBER
  - ➔ FLOW DIRECTION
  - STUDY BOUNDARY
  - ▤ FLOOD CONTROL STRUCTURES
  - ▭ BRIDGES
  - PRIMARY HIGHWAY
  - LOCAL ROAD; LOCAL STREET
  - RAILWAY
  - FLOODWAY
  - FLOOD FRINGE
  - ▨ HIGH HAZARD FLOOD FRINGE
  - ▨ PROTECTED FLOOD FRINGE
  - FLOOD EXTENT- 200 YEAR
  - FLOOD EXTENT- 500 YEAR
- DISCHARGE  
SHEEP RIVER= 1300 m<sup>3</sup>/s



CLIENT  
ALBERTA ENVIRONMENT AND PARKS

PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

CONSULTANT  
**HATCH**

DESIGNED N. LANGENBERG 2023-03-31  
PREPARED R. GROENEVELD 2023-03-31  
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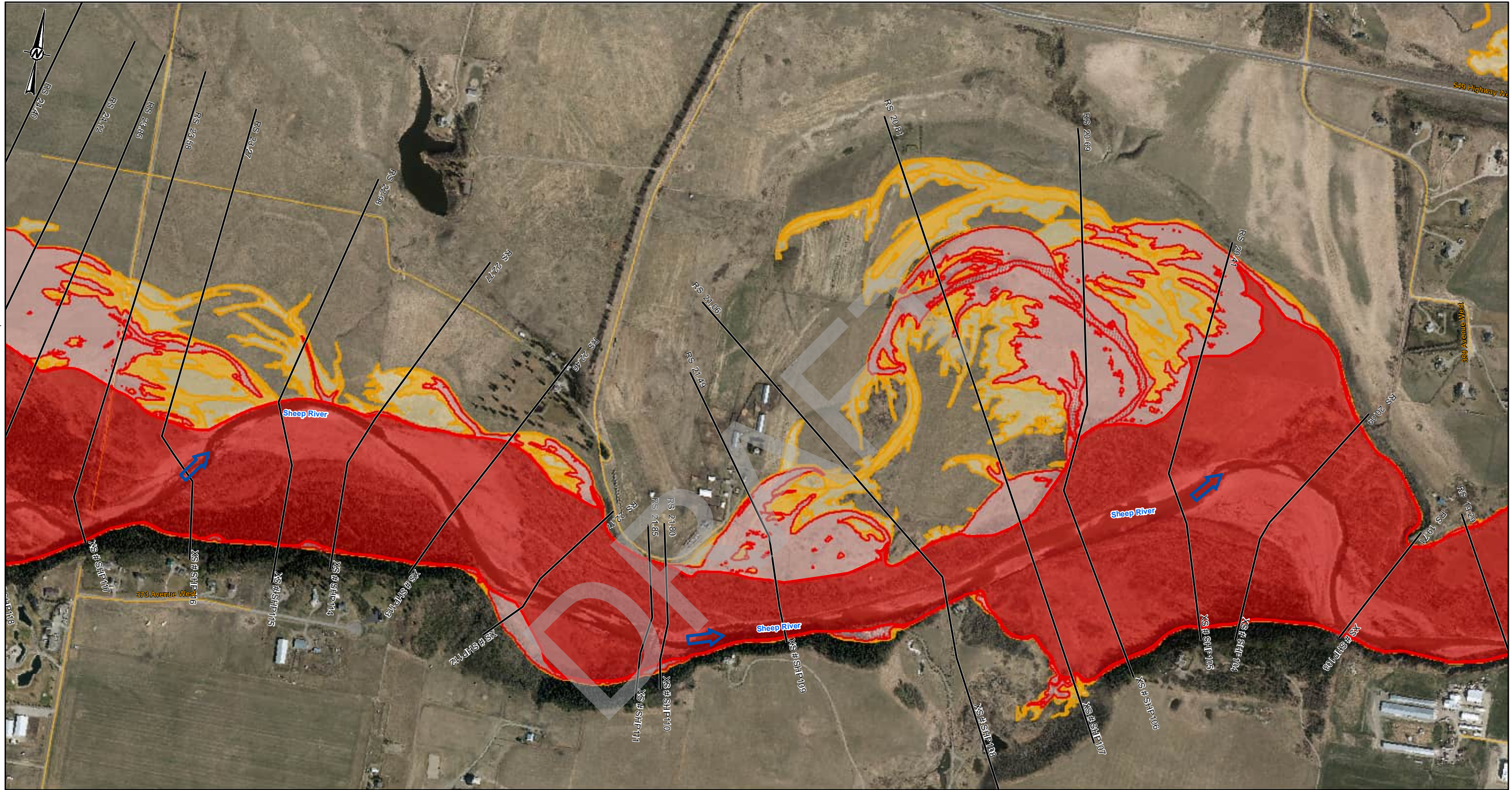
REFERENCE(S)  
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PROJECT		TITLE	
SHEEP RIVER FLOOD HAZARD STUDY		DESIGN FLOOD HAZARD MAP	
PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	A	Sheet 11 of 28



SHEET 11 ↑

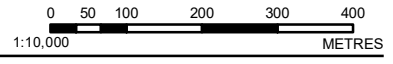
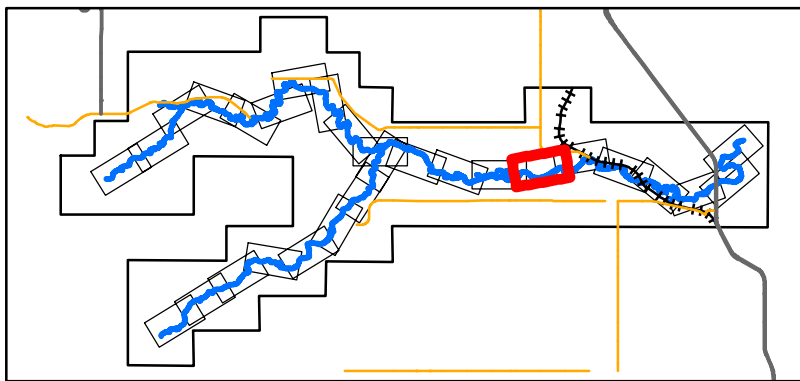
↓ SHEET 13



**LEGEND**

CROSS SECTION	FLOODWAY
CROSS SECTION NUMBER	FLOOD FRINGE
FLOW DIRECTION	HIGH HAZARD FLOOD FRINGE
STUDY BOUNDARY	PROTECTED FLOOD FRINGE
FLOOD CONTROL STRUCTURES	FLOOD EXTENT- 200 YEAR
BRIDGES	FLOOD EXTENT- 500 YEAR
PRIMARY HIGHWAY	
LOCAL ROAD; LOCAL STREET	
RAILWAY	

DISCHARGE  
SHEEP RIVER= 1300 m<sup>3</sup>/s



CLIENT  
ALBERTA ENVIRONMENT AND PARKS

CONSULTANT  
**HATCH**

Alberta Government

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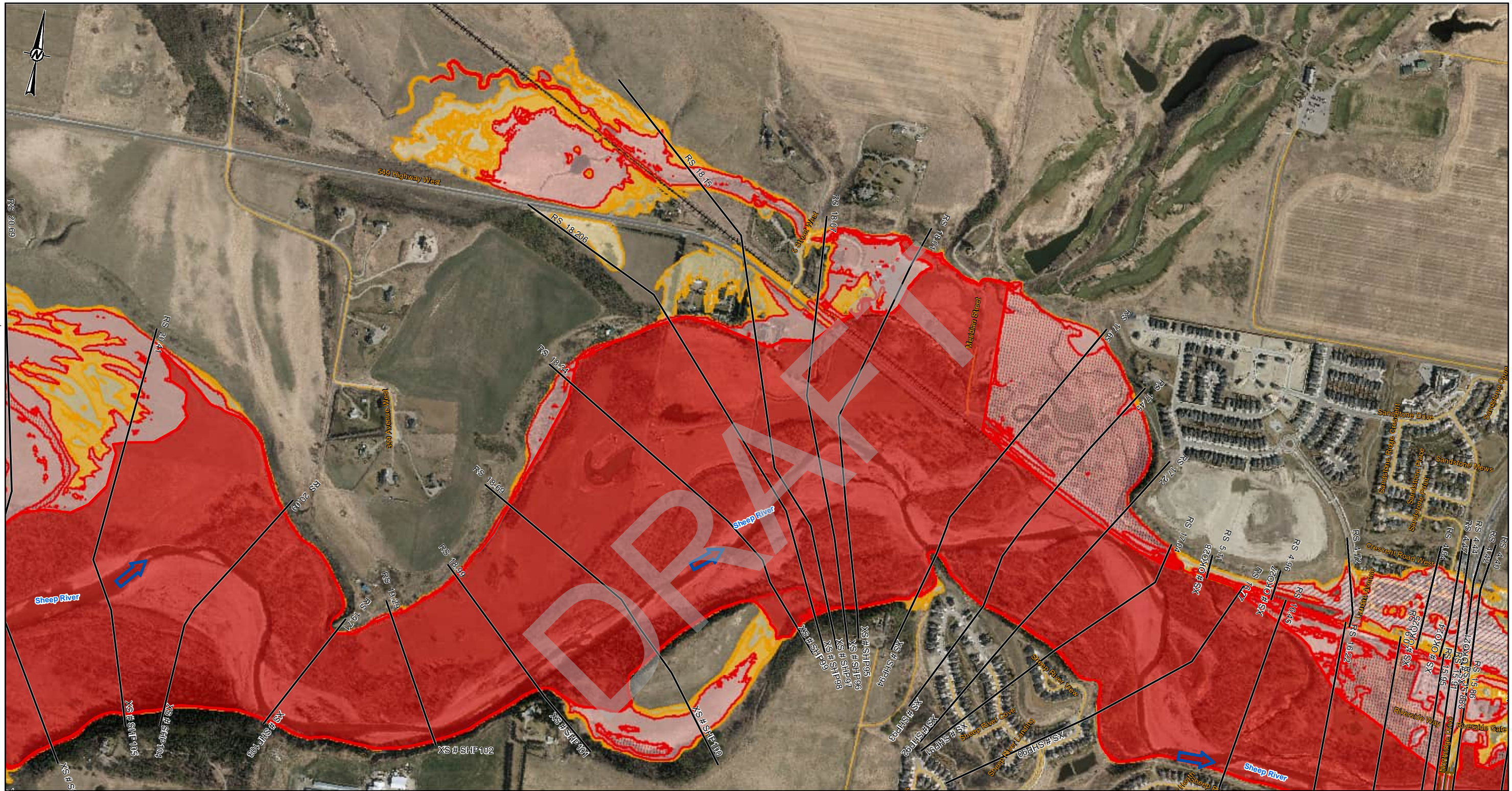
PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

DESIGNED	N. LANGENBERG	2023-03-31
PREPARED	R. GROENEVELD	2023-03-31
REVIEWED	N. LANGENBERG	2023-03-31
APPROVED	J. GROENEVELD	2023-03-31

TITLE  
**DESIGN FLOOD HAZARD MAP**

PROJECT NO. H/355730	CONTROL 228-272-0008-3321	REV. A	FIGURE Sheet 12 of 28
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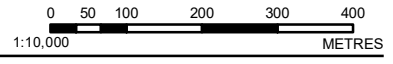
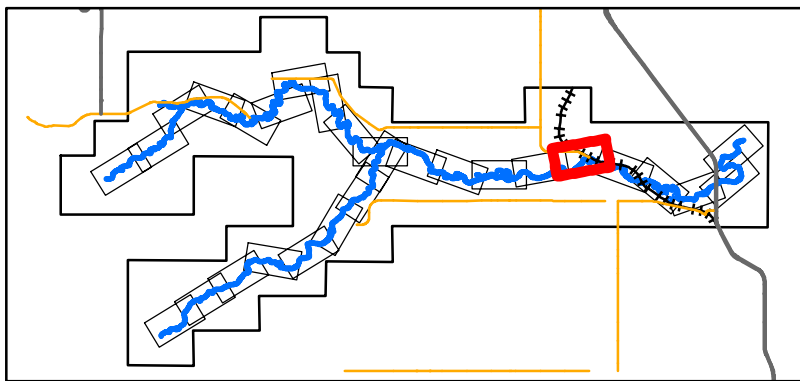




**LEGEND**

CROSS SECTION	FLOODWAY
CROSS SECTION NUMBER	FLOOD FRINGE
FLOW DIRECTION	HIGH HAZARD FLOOD FRINGE
STUDY BOUNDARY	PROTECTED FLOOD FRINGE
FLOOD CONTROL STRUCTURES	FLOOD EXTENT- 200 YEAR
BRIDGES	FLOOD EXTENT- 500 YEAR
PRIMARY HIGHWAY	
LOCAL ROAD; LOCAL STREET	
RAILWAY	

DISCHARGE  
SHEEP RIVER= 1300 m³/s



CLIENT  
**ALBERTA ENVIRONMENT AND PARKS**

CONSULTANT  
**HATCH**

PROJECT  
**ALBERTA Government**

TITLE  
**DESIGN FLOOD HAZARD MAP**

DESIGNED	N. LANGENBERG	2023-03-31
PREPARED	R. GROENEVELD	2023-03-31
REVIEWED	N. LANGENBERG	2023-03-31
APPROVED	J. GROENEVELD	2023-03-31

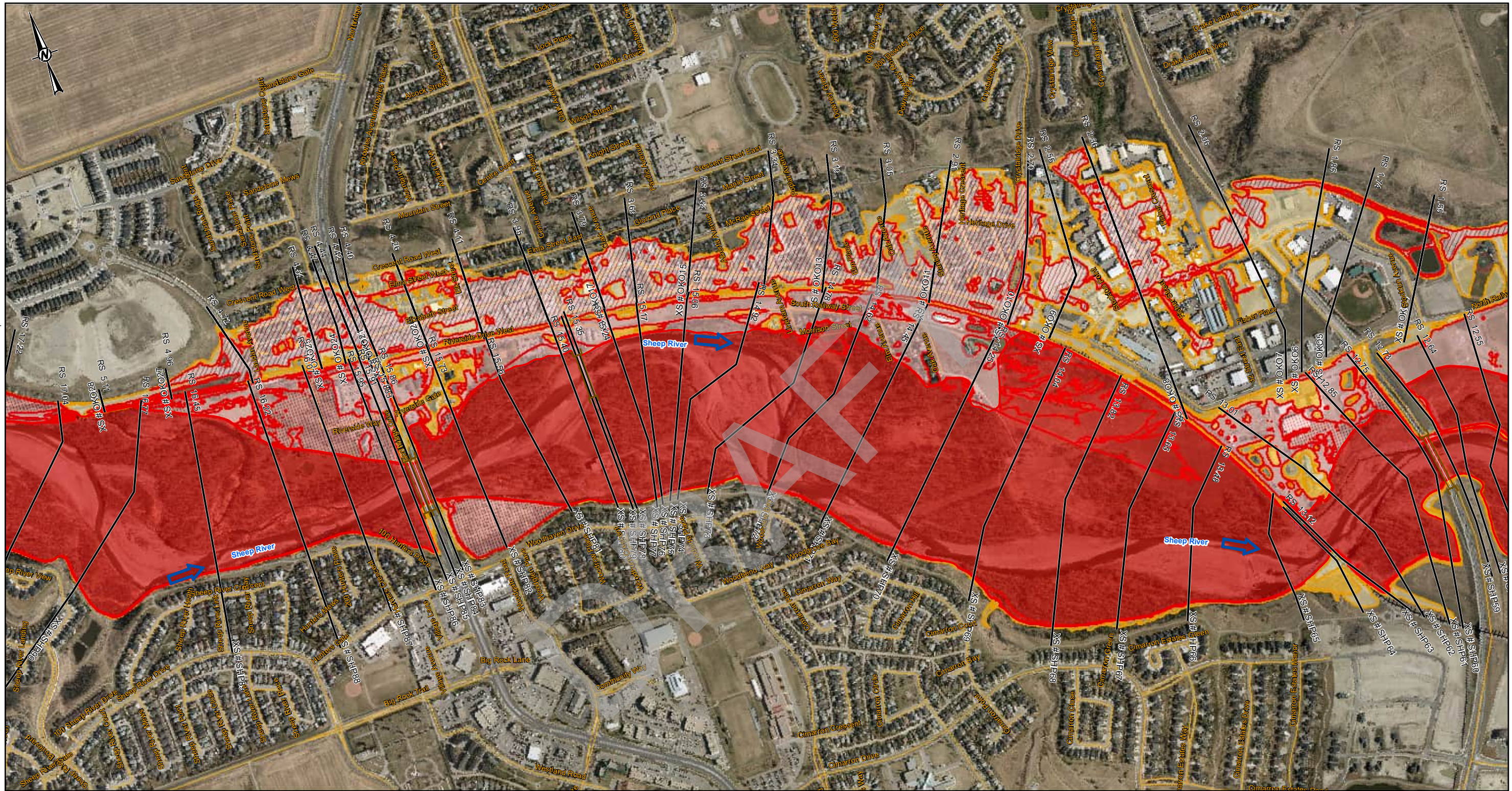
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PROJECT  
**SHEEP RIVER FLOOD HAZARD STUDY**

TITLE  
**DESIGN FLOOD HAZARD MAP**

PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	A	Sheet 13 of 28

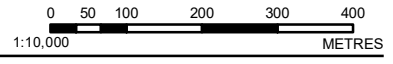
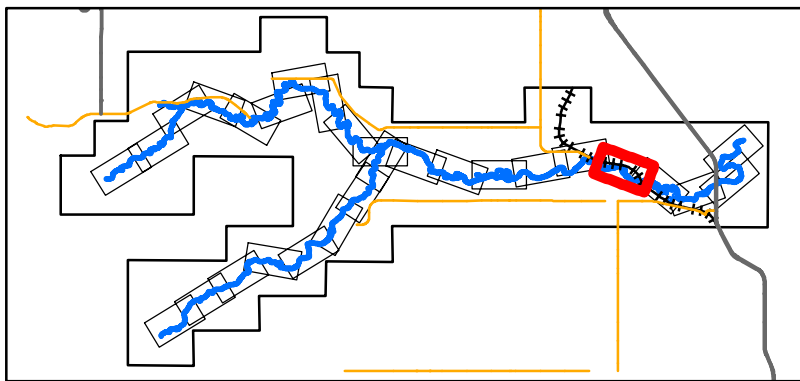




**LEGEND**

CROSS SECTION	FLOODWAY
CROSS SECTION NUMBER	FLOOD FRINGE
FLOW DIRECTION	HIGH HAZARD FLOOD FRINGE
STUDY BOUNDARY	PROTECTED FLOOD FRINGE
FLOOD CONTROL STRUCTURES	FLOOD EXTENT- 200 YEAR
BRIDGES	FLOOD EXTENT- 500 YEAR
PRIMARY HIGHWAY	
LOCAL ROAD, LOCAL STREET	
RAILWAY	

DISCHARGE  
SHEEP RIVER= 1300 m<sup>3</sup>/s



CLIENT  
ALBERTA ENVIRONMENT AND PARKS

PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

CONSULTANT  
**HATCH**

DESIGNED N. LANGENBERG 2023-03-31  
PREPARED R. GROENEVELD 2023-03-31  
REVIEWED N. LANGENBERG 2023-03-31  
APPROVED J. GROENEVELD 2023-03-31

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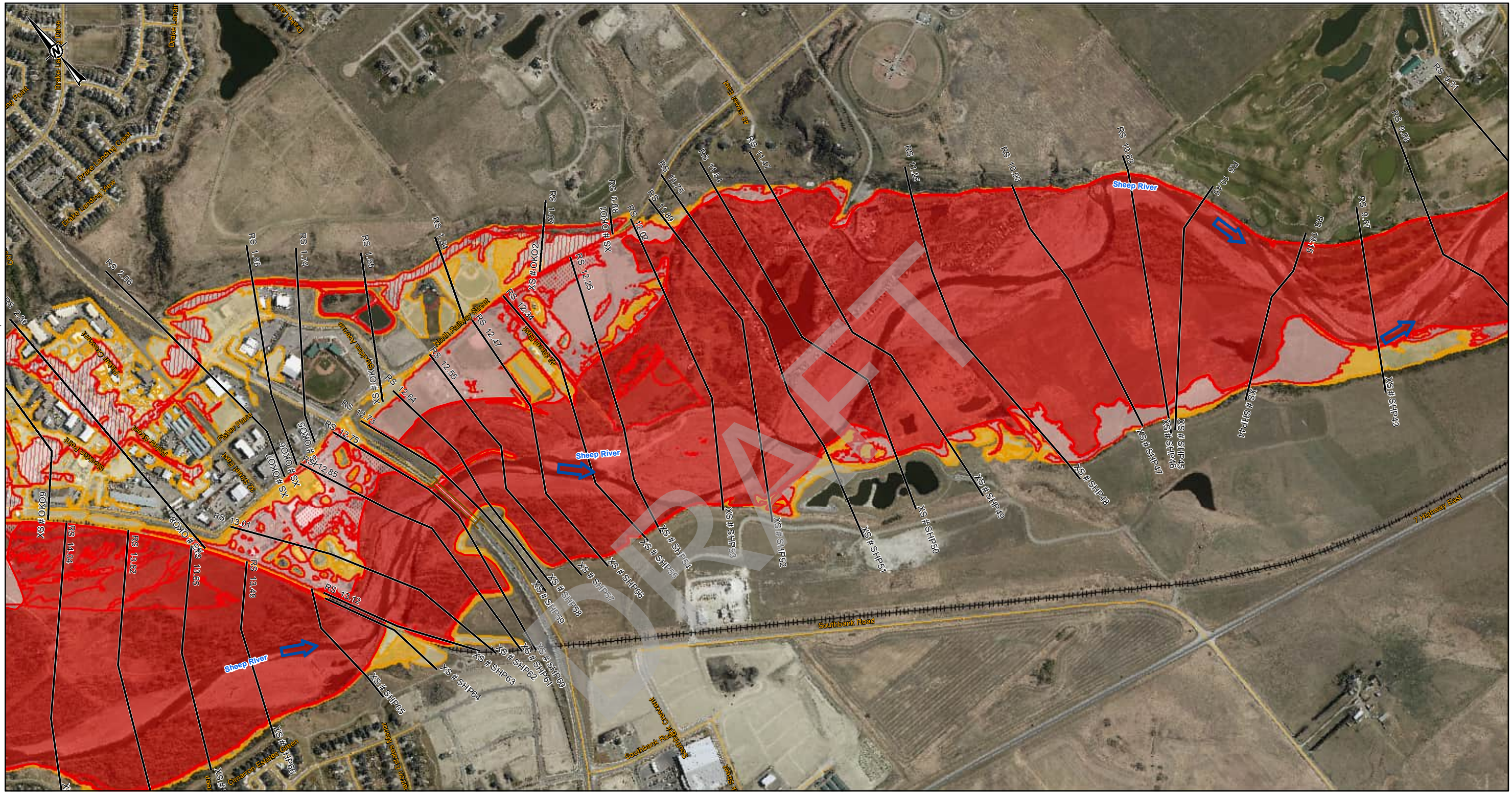
**TITLE**  
DESIGN FLOOD HAZARD MAP

PROJECT NO. H/355730	CONTROL 228-272-0008-3321	REV. A	FIGURE Sheet 14 of 28
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SHEET 14 ↑

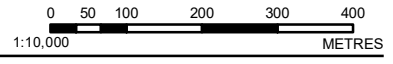
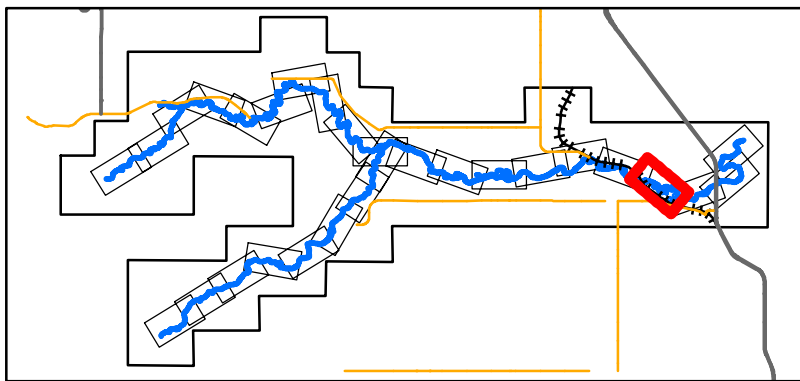
↑ SHEET 16



**LEGEND**

CROSS SECTION	FLOODWAY
CROSS SECTION NUMBER	FLOOD FRINGE
FLOW DIRECTION	HIGH HAZARD FLOOD FRINGE
STUDY BOUNDARY	PROTECTED FLOOD FRINGE
FLOOD CONTROL STRUCTURES	FLOOD EXTENT- 200 YEAR
BRIDGES	FLOOD EXTENT- 500 YEAR
PRIMARY HIGHWAY	
LOCAL ROAD; LOCAL STREET	
RAILWAY	

**DISCHARGE**  
 SHEEP RIVER= 1300 m³/s  
 SHEEP RIVER= 1314 m³/s (DS- RS 12.02)  
 SHEEP RIVER= 1370 m³/s (DS- RS 11.25)



CLIENT  
**ALBERTA ENVIRONMENT AND PARKS**

PROJECT  
**SHEEP RIVER FLOOD HAZARD STUDY**

CONSULTANT  
**Alberta Government**

**HATCH**

DESIGNED	N. LANGENBERG	2023-03-31
PREPARED	R. GROENEVELD	2023-03-31
REVIEWED	N. LANGENBERG	2023-03-31
APPROVED	J. GROENEVELD	2023-03-31

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 DATUM: NAD 83 CSRS PROJECTION: 3TM 114

**TITLE**  
**DESIGN FLOOD HAZARD MAP**

PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	A	Sheet 15 of 28

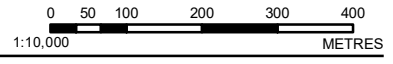
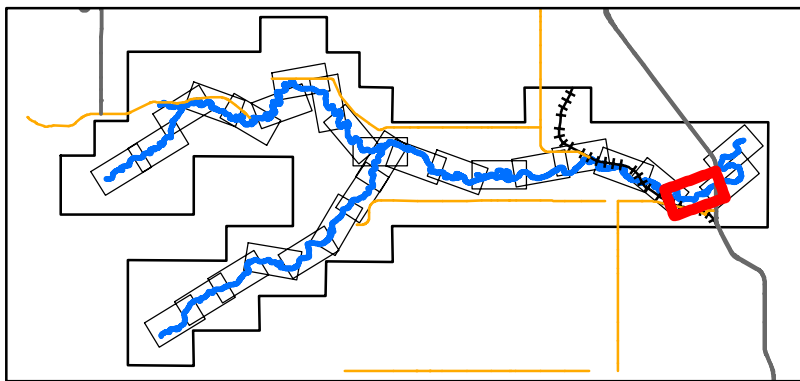




**LEGEND**

CROSS SECTION	FLOODWAY
CROSS SECTION NUMBER	FLOOD FRINGE
FLOW DIRECTION	HIGH HAZARD FLOOD FRINGE
STUDY BOUNDARY	PROTECTED FLOOD FRINGE
FLOOD CONTROL STRUCTURES	FLOOD EXTENT- 200 YEAR
BRIDGES	FLOOD EXTENT- 500 YEAR
PRIMARY HIGHWAY	
LOCAL ROAD; LOCAL STREET	
RAILWAY	

DISCHARGE  
SHEEP RIVER= 1370 m³/s



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**ALBERTA ENVIRONMENT AND PARKS**

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**HATCH**

PROJECT  
**ALBERTA Government**

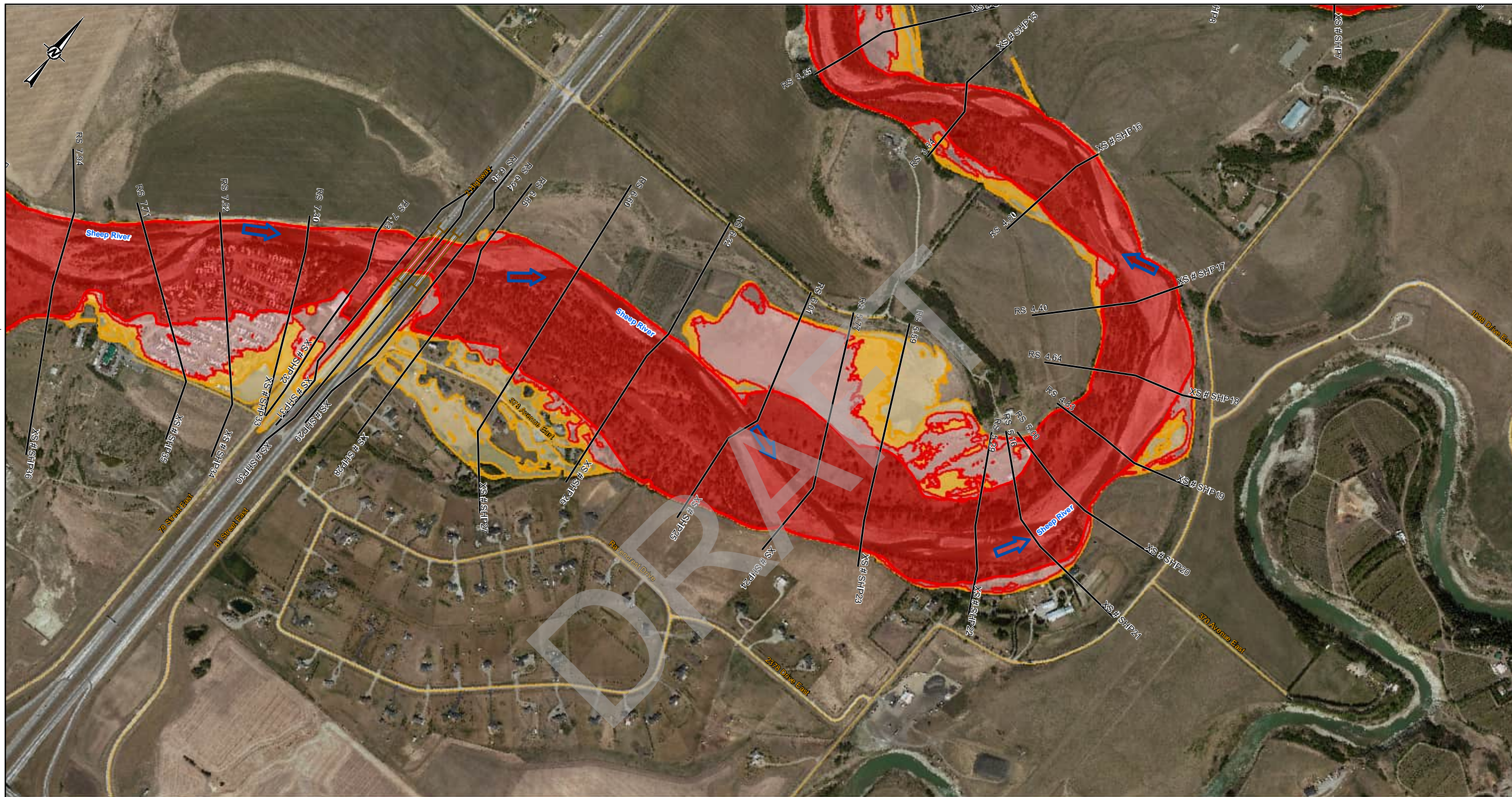
TITLE  
**DESIGN FLOOD HAZARD MAP**

DESIGNED	N. LANGENBERG	2023-03-31
PREPARED	R. GROENEVELD	2023-03-31
REVIEWED	N. LANGENBERG	2023-03-31
APPROVED	J. GROENEVELD	2023-03-31

PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	A	Sheet 16 of 28

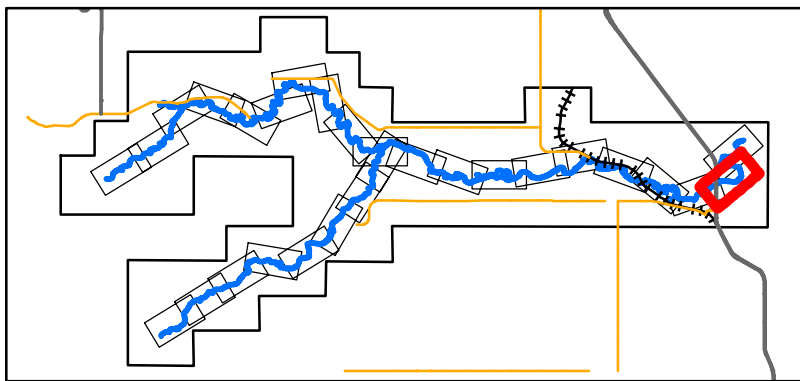
**REFERENCE(S)**  
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LEGEND	
	CROSS SECTION
	CROSS SECTION NUMBER
	FLOW DIRECTION
	STUDY BOUNDARY
	FLOOD CONTROL STRUCTURES
	BRIDGES
	PRIMARY HIGHWAY
	LOCAL ROAD; LOCAL STREET
	RAILWAY
	FLOODWAY
	FLOOD FRINGE
	HIGH HAZARD FLOOD FRINGE
	PROTECTED FLOOD FRINGE
	FLOOD EXTENT- 200 YEAR
	FLOOD EXTENT- 500 YEAR

DISCHARGE  
SHEEP RIVER= 1370 m<sup>3</sup>/s



CLIENT  
ALBERTA ENVIRONMENT AND PARKS

PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

CONSULTANT  
Alberta Government

**HATCH**

DESIGNED	N. LANGENBERG	2023-03-31
PREPARED	R. GROENEVELD	2023-03-31
REVIEWED	N. LANGENBERG	2023-03-31
APPROVED	J. GROENEVELD	2023-03-31

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TITLE  
**DESIGN FLOOD HAZARD MAP**

PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	A	Sheet 17 of 28

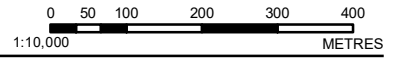
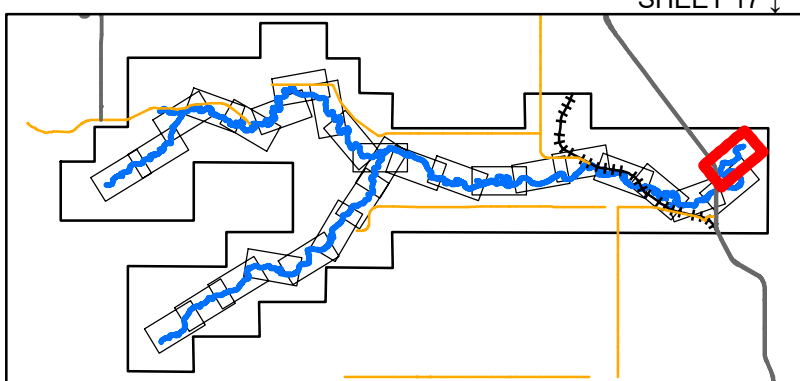




**LEGEND**

—	CROSS SECTION	■	FLOODWAY
XS#110	CROSS SECTION NUMBER	■	FLOOD FRINGE
➔	FLOW DIRECTION	■	HIGH HAZARD FLOOD FRINGE
---	STUDY BOUNDARY	■	PROTECTED FLOOD FRINGE
	FLOOD CONTROL STRUCTURES	■	FLOOD EXTENT- 200 YEAR
—	BRIDGES	■	FLOOD EXTENT- 500 YEAR
—	PRIMARY HIGHWAY		
—	LOCAL ROAD; LOCAL STREET		
—+—+—	RAILWAY		

DISCHARGE  
SHEEP RIVER= 1370 m<sup>3</sup>/s



CLIENT  
**ALBERTA ENVIRONMENT AND PARKS**

CONSULTANT  
**HATCH**

PROJECT  
**ALBERTA Government**

DESIGNED	N. LANGENBERG	2023-03-31
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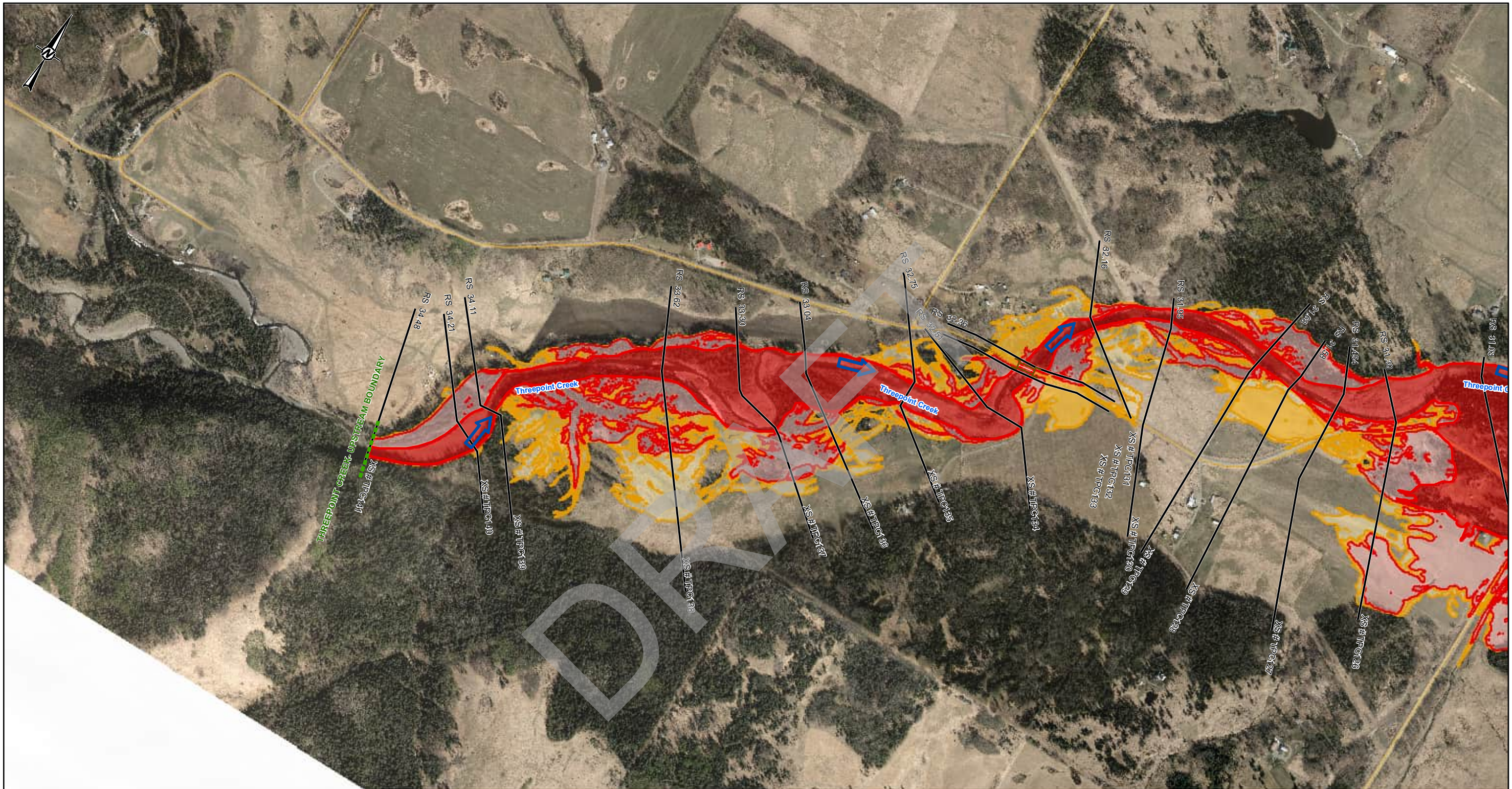
**REFERENCE(S)**  
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PROJECT  
**SHEEP RIVER FLOOD HAZARD STUDY**

TITLE  
**DESIGN FLOOD HAZARD MAP**

PROJECT NO. H/355730	CONTROL 228-272-0008-3321	REV. A	FIGURE Sheet 18 of 28
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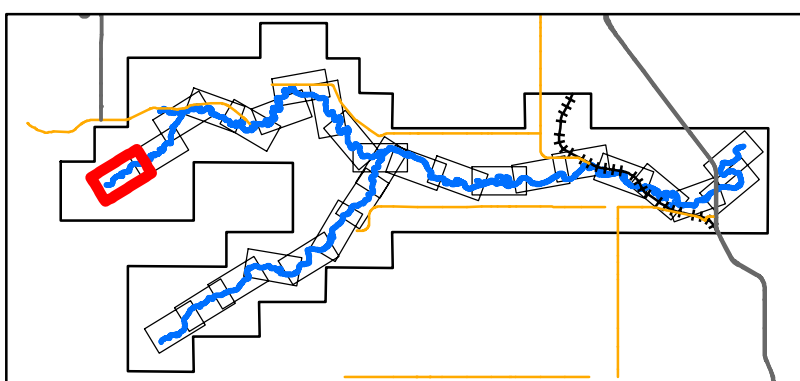


SHEET 20 ↓

**LEGEND**

—	CROSS SECTION	■	FLOODWAY
XS#110	CROSS SECTION NUMBER	■	FLOOD FRINGE
➔	FLOW DIRECTION	■	HIGH HAZARD FLOOD FRINGE
---	STUDY BOUNDARY	■	PROTECTED FLOOD FRINGE
	FLOOD CONTROL STRUCTURES	■	FLOOD EXTENT- 200 YEAR
— — —	BRIDGES	■	FLOOD EXTENT- 500 YEAR
—	PRIMARY HIGHWAY		
—	LOCAL ROAD; LOCAL STREET		
—+—+—	RAILWAY		

DISCHARGE  
THREEPPOINT CREEK= 246 m<sup>3</sup>/s



CLIENT  
ALBERTA ENVIRONMENT AND PARKS

PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

CONSULTANT  
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PREPARED	R. GROENEVELD	2023-03-31
REVIEWED	N. LANGENBERG	2023-03-31
APPROVED	J. GROENEVELD	2023-03-31

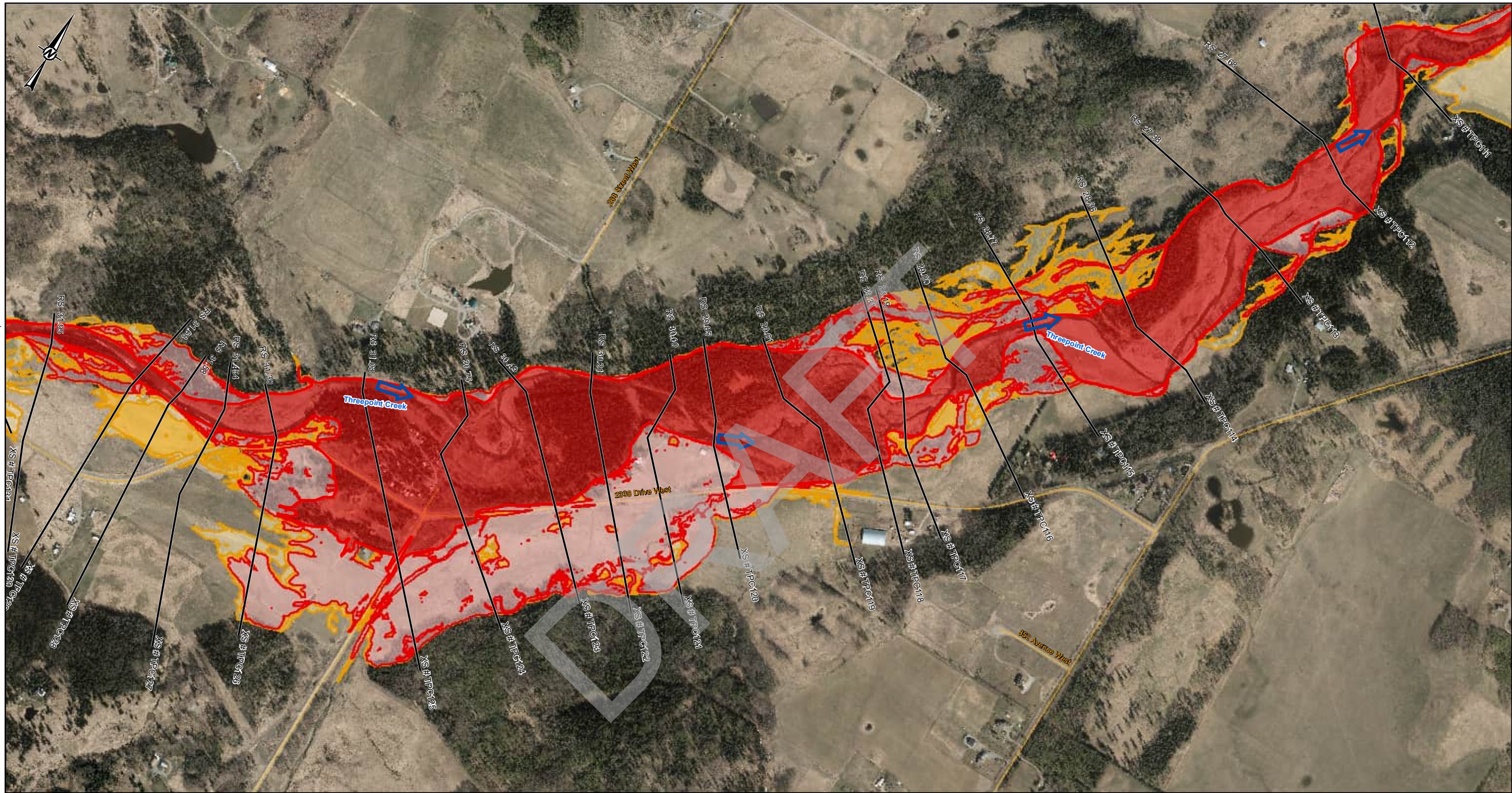
**TITLE**  
DESIGN FLOOD HAZARD MAP

PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	A	Sheet 19 of 28



SHEET 19 ↑

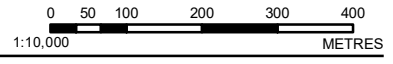
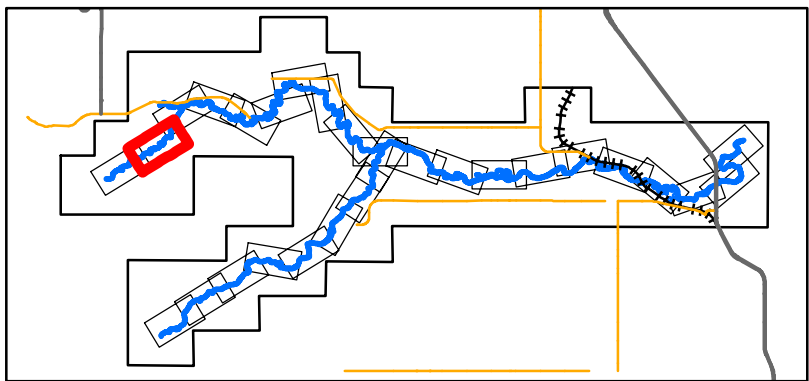
↓ SHEET 21



**LEGEND**

CROSS SECTION	FLOODWAY
CROSS SECTION NUMBER	FLOOD FRINGE
FLOW DIRECTION	HIGH HAZARD FLOOD FRINGE
STUDY BOUNDARY	PROTECTED FLOOD FRINGE
FLOOD CONTROL STRUCTURES	FLOOD EXTENT- 200 YEAR
BRIDGES	FLOOD EXTENT- 500 YEAR
PRIMARY HIGHWAY	
LOCAL ROAD; LOCAL STREET	
RAILWAY	

DISCHARGE  
THREPOINT CREEK= 246 m<sup>3</sup>/s



CLIENT  
**ALBERTA ENVIRONMENT AND PARKS**

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**HATCH**

PROJECT  
**ALBERTA Government**  
SHEEP RIVER FLOOD HAZARD STUDY

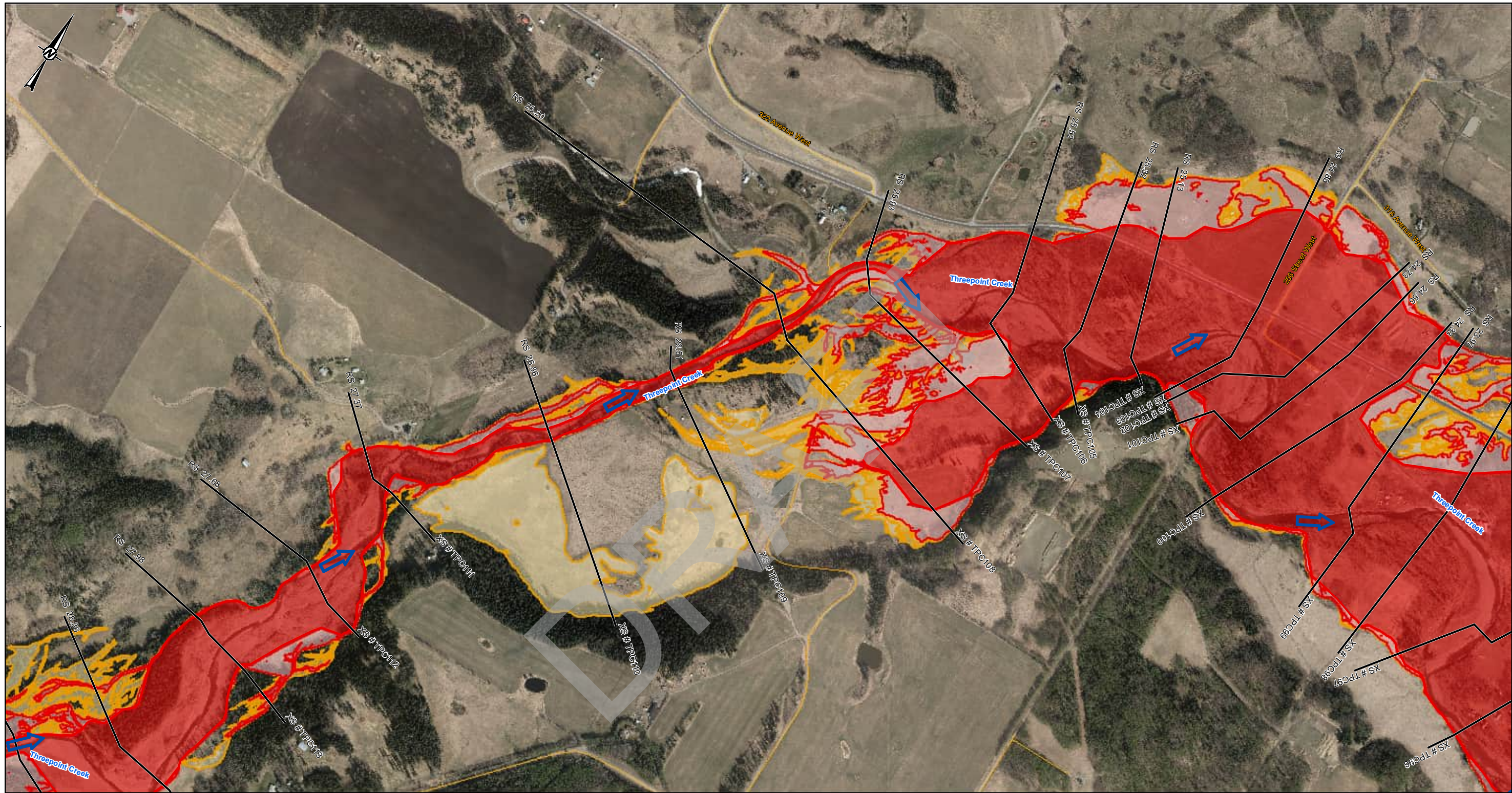
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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

TITLE  
**DESIGN FLOOD HAZARD MAP**

DESIGNED	N. LANGENBERG	2023-03-31
PREPARED	R. GROENEVELD	2023-03-31
REVIEWED	N. LANGENBERG	2023-03-31
APPROVED	J. GROENEVELD	2023-03-31

PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	A	Sheet 20 of 28

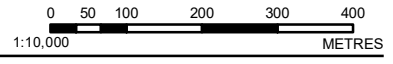
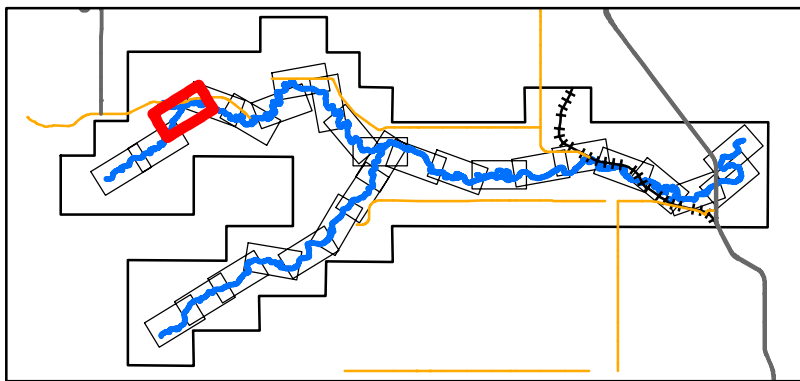




**LEGEND**

—	CROSS SECTION	■	FLOODWAY
XS#110	CROSS SECTION NUMBER	■	FLOOD FRINGE
➡	FLOW DIRECTION	■	HIGH HAZARD FLOOD FRINGE
—	STUDY BOUNDARY	■	PROTECTED FLOOD FRINGE
—	FLOOD CONTROL STRUCTURES	■	FLOOD EXTENT- 200 YEAR
—	BRIDGES	■	FLOOD EXTENT- 500 YEAR
—	PRIMARY HIGHWAY		
—	LOCAL ROAD; LOCAL STREET		
—	RAILWAY		

DISCHARGE  
 THREEPOINT CREEK= 246 m<sup>3</sup>/s  
 THREEPOINT CREEK= 495 m<sup>3</sup>/s (DS- RS 25.93)



CLIENT  
**ALBERTA ENVIRONMENT AND PARKS**

PROJECT  
**ALBERTA** Government  
 SHEEP RIVER FLOOD HAZARD STUDY

CONSULTANT  
**HATCH**

**REFERENCE(S)**  
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 DATUM: NAD 83 CSRS PROJECTION: 3TM 114

**TITLE**  
**DESIGN FLOOD HAZARD MAP**

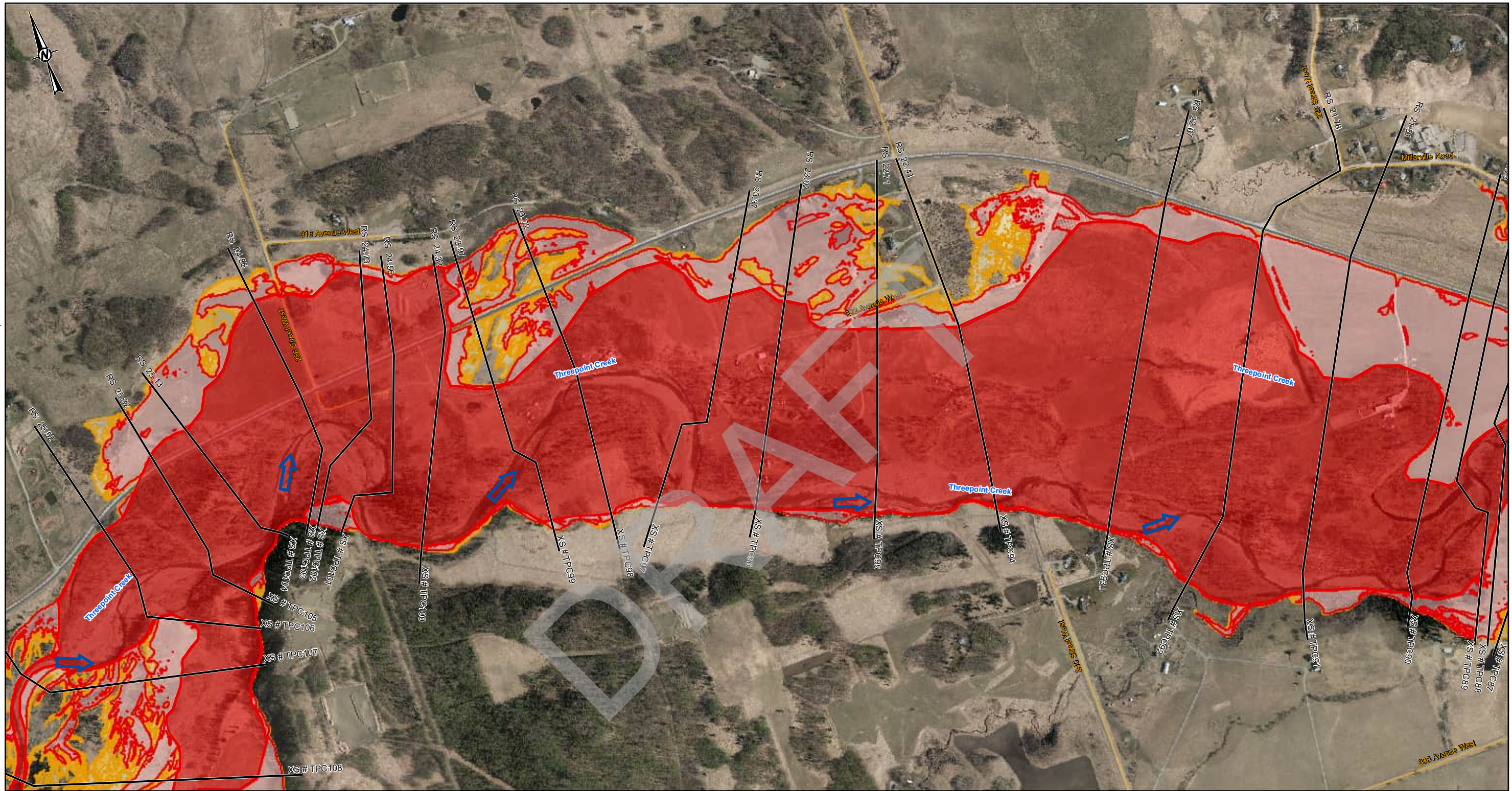
DESIGNED	N. LANGENBERG	2023-03-31
PREPARED	R. GROENEVELD	2023-03-31
REVIEWED	N. LANGENBERG	2023-03-31
APPROVED	J. GROENEVELD	2023-03-31

PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	A	Sheet 21 of 28



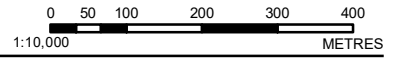
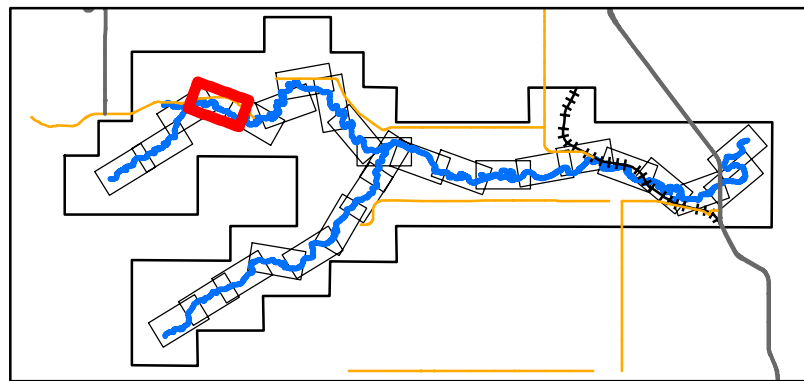
SHEET 21 ↑

↑ SHEET 23



LEGEND	
	CROSS SECTION
	CROSS SECTION NUMBER
	FLOW DIRECTION
	STUDY BOUNDARY
	FLOOD CONTROL STRUCTURES
	BRIDGES
	PRIMARY HIGHWAY
	LOCAL ROAD; LOCAL STREET
	RAILWAY
	FLOODWAY
	FLOOD FRINGE
	HIGH HAZARD FLOOD FRINGE
	PROTECTED FLOOD FRINGE
	FLOOD EXTENT- 200 YEAR
	FLOOD EXTENT- 500 YEAR

DISCHARGE  
THREPOINT CREEK= 495 m<sup>3</sup>/s



CLIENT  
ALBERTA ENVIRONMENT AND PARKS

PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

CONSULTANT  
HATCH

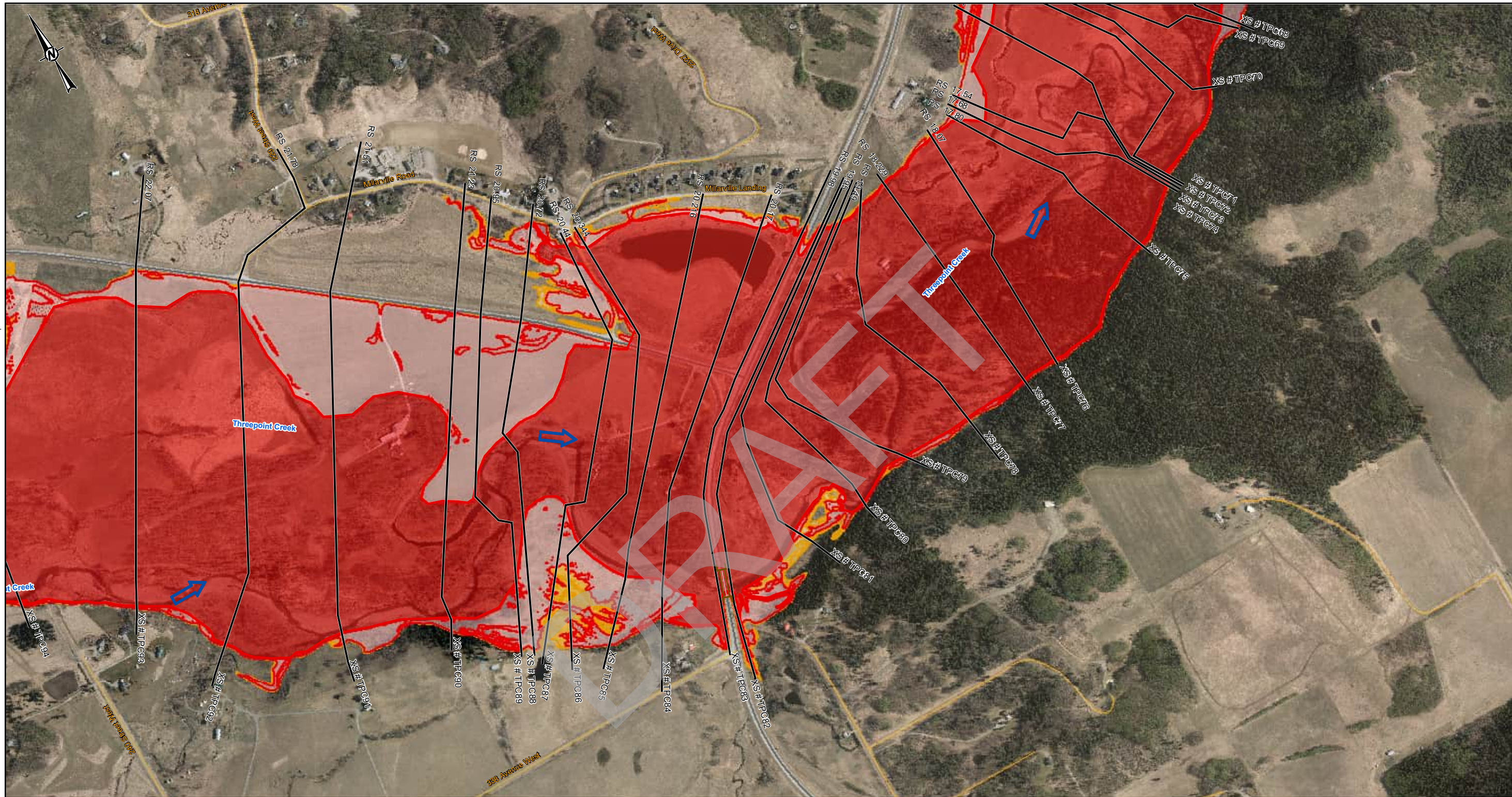
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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

DESIGNED	N. LANGENBERG	2023-03-31
PREPARED	R. GROENEVELD	2023-03-31
REVIEWED	N. LANGENBERG	2023-03-31
APPROVED	J. GROENEVELD	2023-03-31

PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	A	Sheet 22 of 28

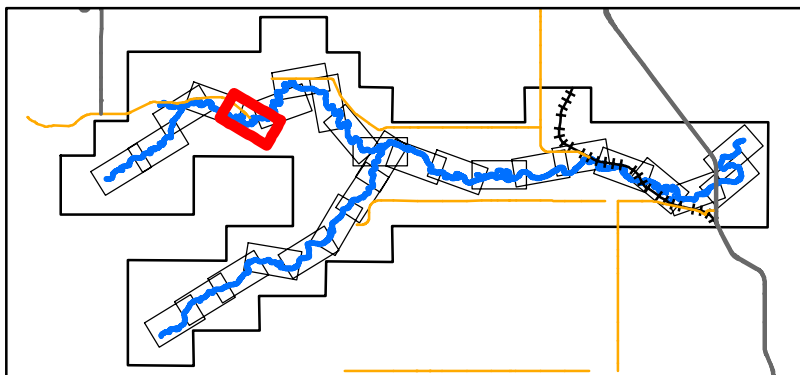




SHEET 22 ↑

LEGEND	
	CROSS SECTION
	FLOW DIRECTION
	STUDY BOUNDARY
	FLOOD CONTROL STRUCTURES
	BRIDGES
	PRIMARY HIGHWAY
	LOCAL ROAD; LOCAL STREET
	RAILWAY
	FLOODWAY
	FLOOD FRINGE
	HIGH HAZARD FLOOD FRINGE
	PROTECTED FLOOD FRINGE
	FLOOD EXTENT- 200 YEAR
	FLOOD EXTENT- 500 YEAR

DISCHARGE  
THREEPOINT CREEK= 495 m<sup>3</sup>/s



CLIENT  
ALBERTA ENVIRONMENT AND PARKS

PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

CONSULTANT  
**HATCH** Alberta Government

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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

DESIGNED	N. LANGENBERG	2023-03-31
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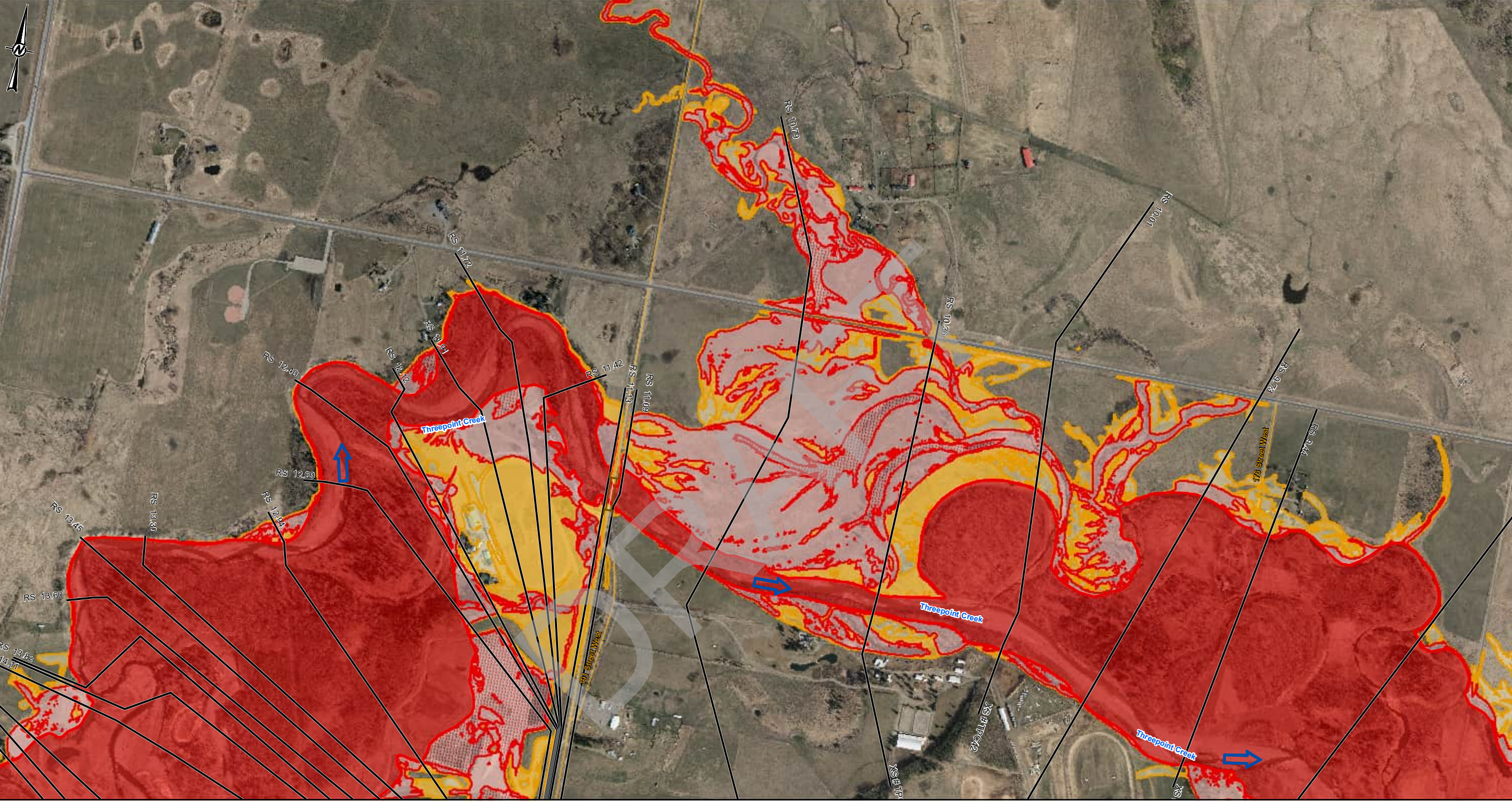
TITLE  
**DESIGN FLOOD HAZARD MAP**

PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	A	Sheet 23 of 28









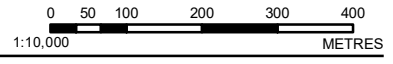
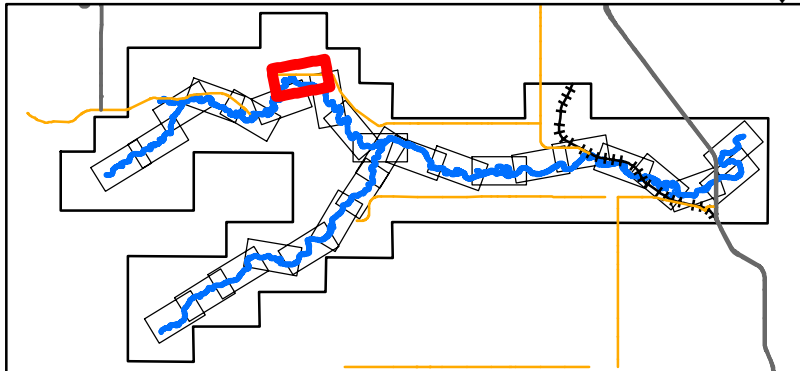
SHEET 24 ↑

↓ SHEET 26

**LEGEND**

—	CROSS SECTION	■	FLOODWAY
XS#110	CROSS SECTION NUMBER	■	FLOOD FRINGE
➡	FLOW DIRECTION	■	HIGH HAZARD FLOOD FRINGE
---	STUDY BOUNDARY	■	PROTECTED FLOOD FRINGE
	FLOOD CONTROL STRUCTURES	■	FLOOD EXTENT- 200 YEAR
— — —	BRIDGES	■	FLOOD EXTENT- 500 YEAR
—	PRIMARY HIGHWAY		
—	LOCAL ROAD; LOCAL STREET		
—+—+—	RAILWAY		

DISCHARGE  
THREEPOINT CREEK= 616 m<sup>3</sup>/s



CLIENT  
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CONSULTANT  
**HATCH**

PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

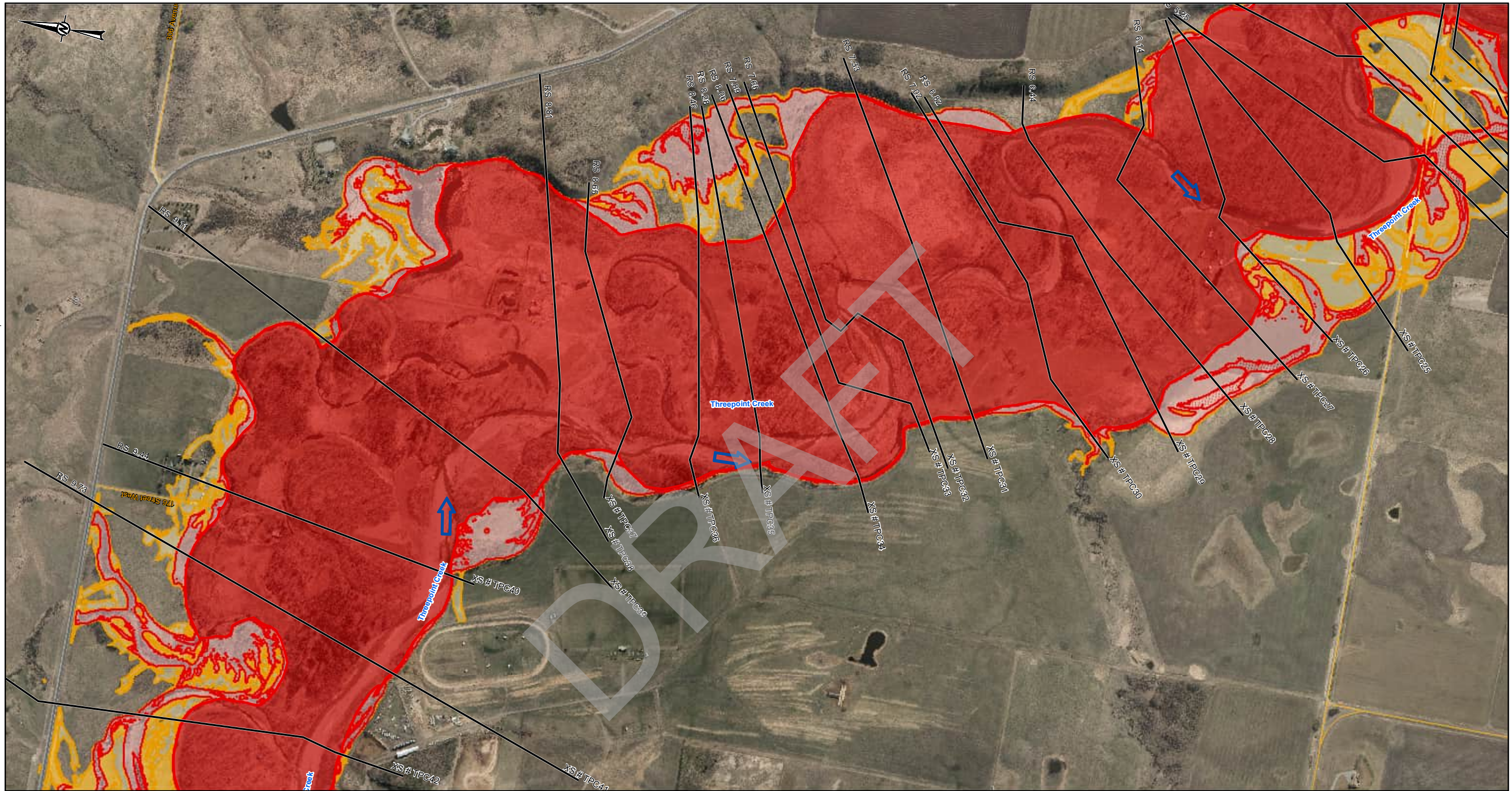
TITLE  
**DESIGN FLOOD HAZARD MAP**

DESIGNED	N. LANGENBERG	2023-03-31
PREPARED	R. GROENEVELD	2023-03-31
REVIEWED	N. LANGENBERG	2023-03-31
APPROVED	J. GROENEVELD	2023-03-31

PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	A	Sheet 25 of 28

**REFERENCE(S)**  
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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

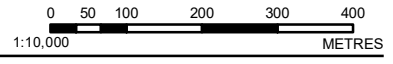
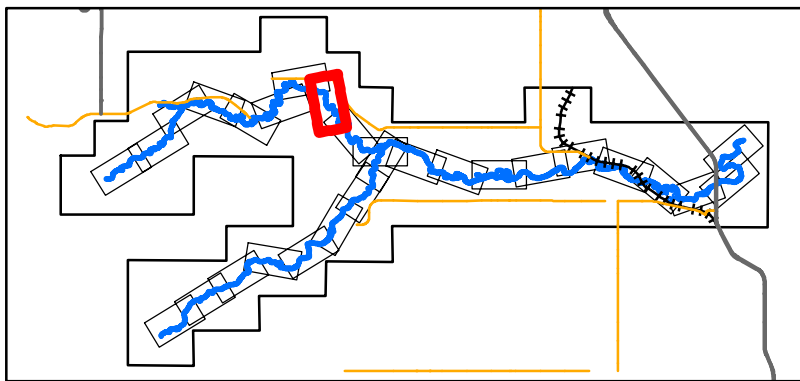




**LEGEND**

—	CROSS SECTION	■	FLOODWAY
XS#110	CROSS SECTION NUMBER	□	FLOOD FRINGE
➔	FLOW DIRECTION	▨	HIGH HAZARD FLOOD FRINGE
⋯	STUDY BOUNDARY	▧	PROTECTED FLOOD FRINGE
⋯	FLOOD CONTROL STRUCTURES	■	FLOOD EXTENT- 200 YEAR
⌈	BRIDGES	■	FLOOD EXTENT- 500 YEAR
—	PRIMARY HIGHWAY		
—	LOCAL ROAD; LOCAL STREET		
—+—	RAILWAY		

DISCHARGE  
THREEPOINT CREEK= 616 m<sup>3</sup>/s



CLIENT  
ALBERTA ENVIRONMENT AND PARKS

PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

CONSULTANT  
HATCH

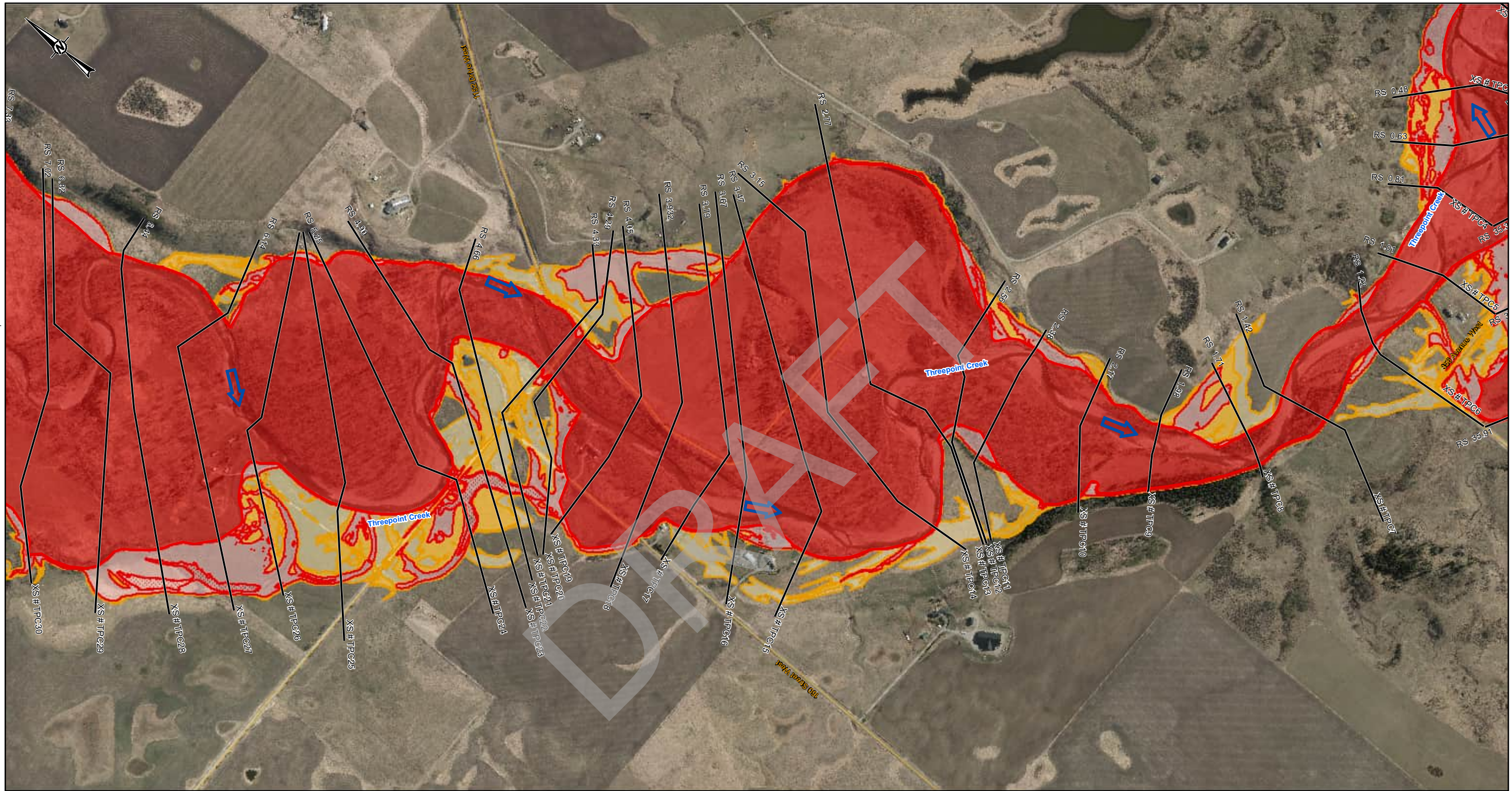
DESIGNED	N. LANGENBERG	2023-03-31
PREPARED	R. GROENEVELD	2023-03-31
REVIEWED	N. LANGENBERG	2023-03-31
APPROVED	J. GROENEVELD	2023-03-31

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TITLE  
**DESIGN FLOOD HAZARD MAP**

PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	A	Sheet 26 of 28

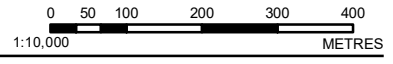
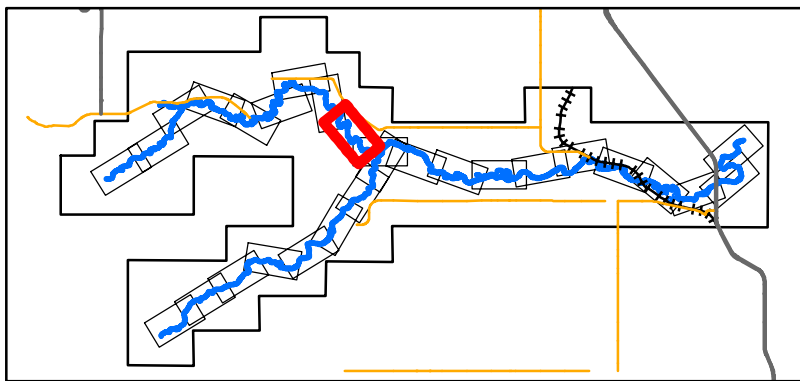




**LEGEND**

CROSS SECTION	FLOODWAY
CROSS SECTION NUMBER	FLOOD FRINGE
FLOW DIRECTION	HIGH HAZARD FLOOD FRINGE
STUDY BOUNDARY	PROTECTED FLOOD FRINGE
FLOOD CONTROL STRUCTURES	FLOOD EXTENT- 200 YEAR
BRIDGES	FLOOD EXTENT- 500 YEAR
PRIMARY HIGHWAY	
LOCAL ROAD; LOCAL STREET	
RAILWAY	

DISCHARGE  
THREEPOINT CREEK= 616 m<sup>3</sup>/s



CLIENT  
ALBERTA ENVIRONMENT AND PARKS

CONSULTANT  
**HATCH**

Alberta Government

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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

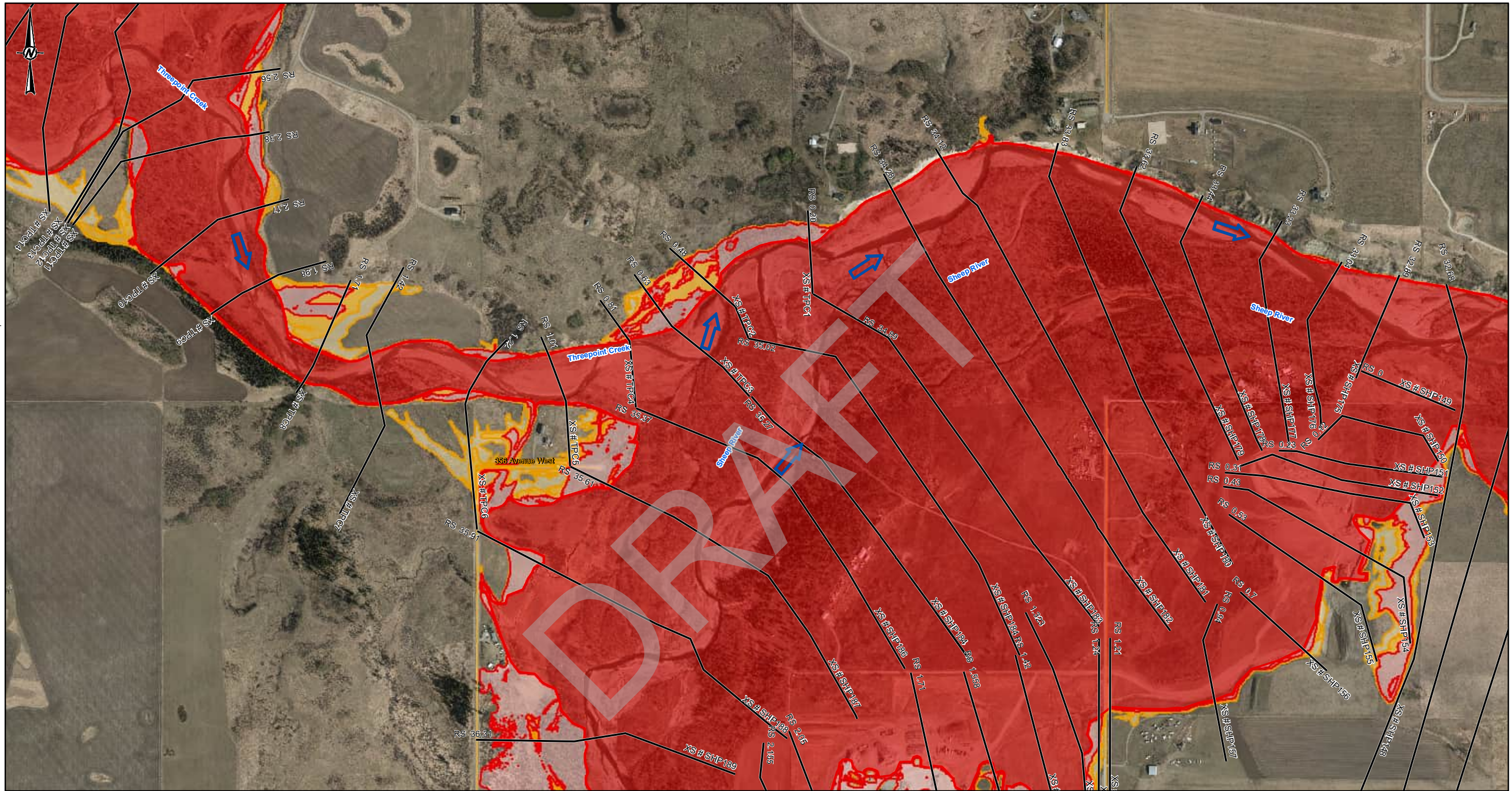
PROJECT  
SHEEP RIVER FLOOD HAZARD STUDY

DESIGNED	N. LANGENBERG	2023-03-31
PREPARED	R. GROENEVELD	2023-03-31
REVIEWED	N. LANGENBERG	2023-03-31
APPROVED	J. GROENEVELD	2023-03-31

TITLE  
**DESIGN FLOOD HAZARD MAP**

PROJECT NO.	CONTROL	REV.	FIGURE
H/355730	228-272-0008-3321	A	Sheet 27 of 28

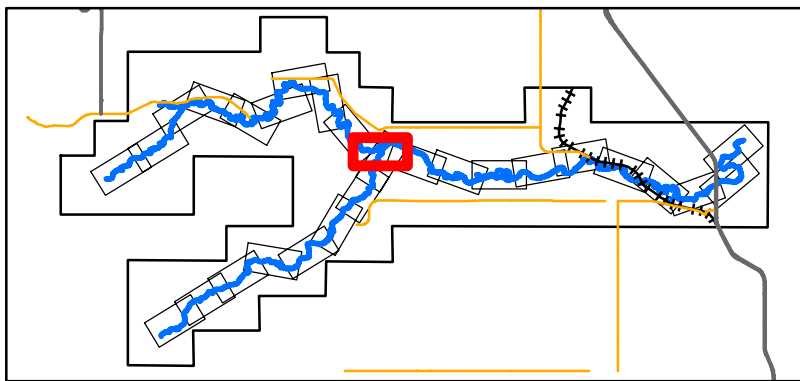




**LEGEND**

- CROSS SECTION
- XS#110 CROSS SECTION NUMBER
- FLOW DIRECTION
- STUDY BOUNDARY
- FLOOD CONTROL STRUCTURES
- BRIDGES
- PRIMARY HIGHWAY
- LOCAL ROAD; LOCAL STREET
- RAILWAY
- FLOODWAY
- FLOOD FRINGE
- HIGH HAZARD FLOOD FRINGE
- PROTECTED FLOOD FRINGE
- FLOOD EXTENT- 200 YEAR
- FLOOD EXTENT- 500 YEAR

DISCHARGE  
 THREEPOINT CREEK= 616 m<sup>3</sup>/s  
 SHEEP RIVER= 787 m<sup>3</sup>/s  
 SHEEP RIVER= 1403 m<sup>3</sup>/s (DS- RS 34.28)



CLIENT  
 ALBERTA ENVIRONMENT AND PARKS

PROJECT  
 SHEEP RIVER FLOOD HAZARD STUDY

CONSULTANT  
**HATCH**

DESIGNED N. LANGENBERG 2023-03-31  
 PREPARED R. GROENEVELD 2023-03-31  
 REVIEWED N. LANGENBERG 2023-03-31  
 APPROVED J. GROENEVELD 2023-03-31

ALBERTA Government

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TITLE  
**DESIGN FLOOD HAZARD MAP**

PROJECT NO. H/355730 CONTROL 228-272-0008-3321 REV. A FIGURE Sheet 28 of 28