

REPORT

Design Flood Hazard Mapping

Upper Red Deer River Hazard Study

Submitted to:

Alberta Environment and Parks

11th Floor, Oxbridge Place
9820 - 106 Street NW
Edmonton, AB
Canada T5K 2J6

Submitted by:

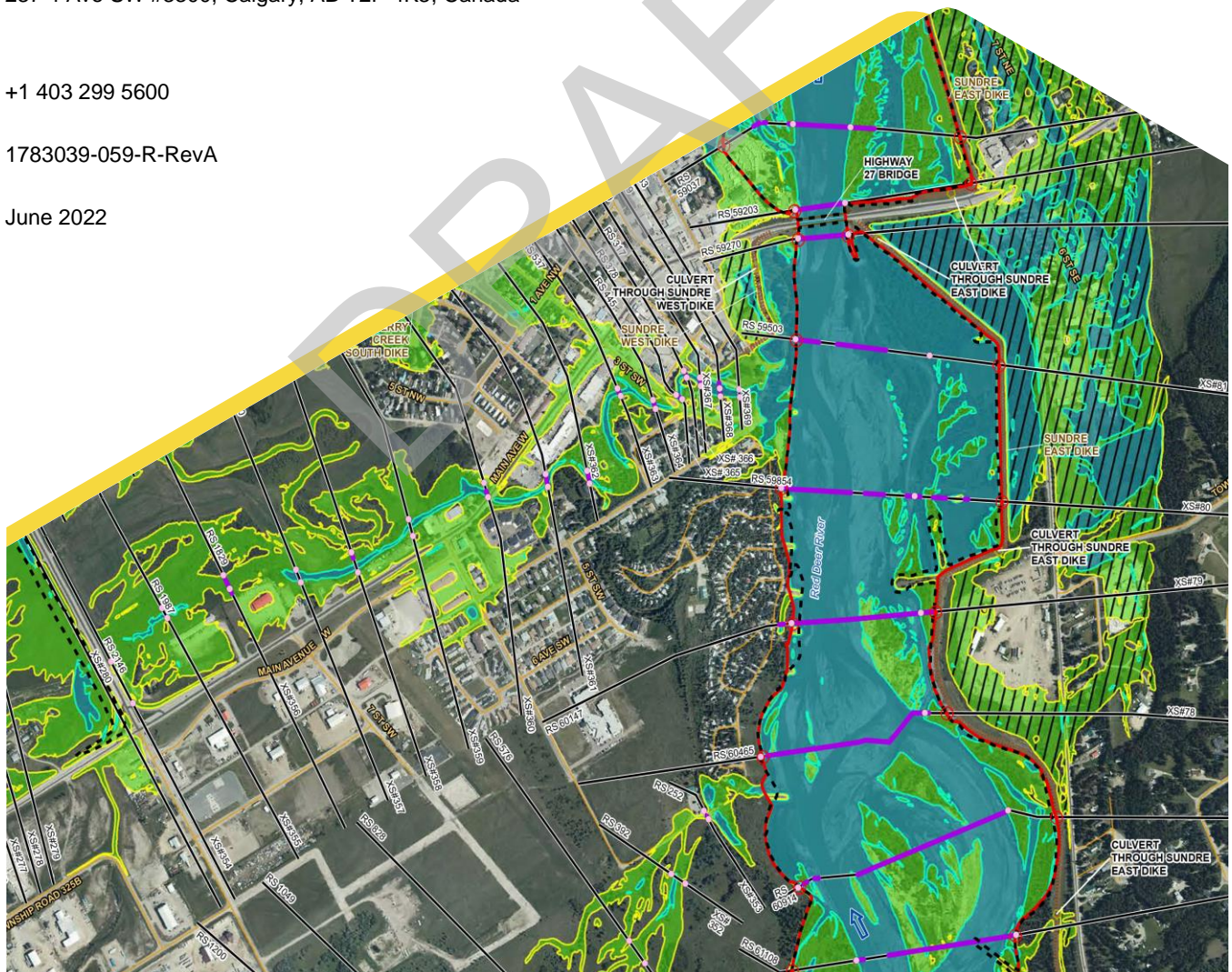
Golder Associates Ltd.

237 4 Ave SW #3300, Calgary, AB T2P 4K3, Canada

+1 403 299 5600

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Executive Summary

Alberta Environment and Parks (AEP) commissioned Golder Associates Ltd. (Golder) in September 2017 to conduct the Upper Red Deer River Hazard Study. The primary purpose of the study is to assess and identify river and flood hazards along the Red Deer River reach from Coal Camp to Gleniffer Lake and the Bearberry Creek reach from Range Road 62 to its confluence with the Red Deer River in Sundre.

The study is conducted 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 Town of Sundre, Mountain View County, Clearwater County, Red Deer County, and the public.

The study includes multiple components and deliverables. This report documents the methodology and results of the flood hazard identification and flood hazard map production components, which will support the flood risk assessment. The tasks associated with the flood hazard identification component include floodway delineation and floodway criteria mapping. The tasks associated with the flood hazard map production component include development of the design flood level profile, presentation of the design flood water levels, and production of the flood hazard maps.

The study area includes the river reaches listed in Table i.

Table i: River Reaches in the Study Area

River	Reach Description	Length (km)
Red Deer River	From Coal Camp to Gleniffer Lake outlet	85 km
Bearberry Creek	From Range Road 62 to its confluence with the Red Deer River in Sundre	17 km

The flood hazard maps show the floodway and flood fringe, including high hazard flood fringe and protected flood fringe areas, for the design flood event.

The floodway includes following notable areas:

- A portion of the residential area at the south end of Range Road 60.
- The south end of the Sundre Airstrip.
- Parts of the residential area on the right floodplain of the Red Deer River north and south of Highway 587.

The flood fringe includes following notable areas:

- Large portions of Bearberry Creek floodplain on both sides of the creek, including Wagons West RV Park and Storage.
- Residential areas in the McDougal Flats area, including the Coyote Creek Golf & RV Resort and the Arowen campground.
- The majority of the residential area in the vicinity of Highway 587 (east side of Range Road 42A).
- Some properties in Sundre along the Historic Bearberry Creek Channel.
- Parts of the residential area south of Bearberry Creek along Tamarack Crescent and 4th Street NW.

Acknowledgements

This component of the Upper Red Deer River Hazard Study was managed by Dr. Wolf Ploeger. The floodway identification was conducted by Amir Gharavi, Nancy Guo and Ummay Sumaiya under direction from Dr. Wolf Ploeger. The floodway criteria mapping, and flood hazard mapping was conducted by Peter Thiede, Brian Pendergast and Antonia Bilak.

The authors express their special thanks to Jane Eaket, Project Manager for Alberta Environment and Parks (AEP), who provided overall study management, background data, and technical guidance.

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Table of Contents

1.0 INTRODUCTION	1
1.1 Study Background and Objectives	1
1.2 Study Area & Reaches	1
2.0 AVAILABLE DATA	3
2.1 Flood Hydrology	3
2.2 Survey and DTM Details	3
2.3 HEC-RAS Model	4
2.4 Flood Control Structures	4
2.5 Other Features	4
2.6 Previous Flood Hazard Maps	4
3.0 DESIGN FLOOD HAZARD DETERMINATION	5
3.1 Design Flood Details	5
3.2 Floodway and Flood Fringe Terminology	5
3.3 Floodway Determination Criteria	5
4.0 DESIGN FLOOD HAZARD MAP PRODUCTION	20
4.1 Flood Mapping Methodology	20
4.2 Floodway Criteria Maps	20
4.3 Flood Hazard Maps	20
4.3.1 Overview	20
4.3.2 Areas in the Floodway	21
4.3.3 Areas in the High Hazard Flood Fringe	21
4.3.4 Areas in the Flood Fringe	21
4.3.5 Areas in the Protected Flood Fringe	21
5.0 DESIGN FLOOD GRIDS	22
6.0 POTENTIAL CLIMATE CHANGE IMPACTS	22
7.0 CONCLUSIONS	23

REFERENCES25

THIRD PARTY DISCLAIMER25

TABLES

Table 1: River Reaches in the Study Area 1

Table 2: Design Flood Flow Frequency Estimates 3

Table 3: Summary of Survey Features 3

Table 4: Flood Control Structures within the Study Area 4

Table 5: Floodway Criteria Table – Red Deer River 7

Table 6: Floodway Criteria Table - Bearberry Creek 15

Table 7: Floodway Criteria Table – McDougal South Channel 19

Figure 1: Location Map of Study Area 2

FIGURES

Figure 1: Location Map of Study Area 2

APPENDICES

APPENDIX A

Floodway Criteria Maps

APPENDIX B

Flood Hazard Maps

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1.0 INTRODUCTION

1.1 Study Background and Objectives

Alberta Environment and Parks (AEP) commissioned Golder Associates Ltd. (Golder) in September 2017 to conduct the Upper Red Deer River Hazard Study. The primary purpose of the study is to assess and identify river and flood hazards along the Red Deer River reach from Coal Camp to Gleniffer Lake and the Bearberry Creek reach from Range Road 62 to its confluence with the Red Deer River in Sundre.

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1.2 Study Area & Reaches

The study area includes about 85 km of the Red Deer River, and about 17 km of Bearberry Creek, (see Figure 1). The study reaches are summarized in Table 1.

Table 1: River Reaches in the Study Area

River	Reach Description	Length (km)
Red Deer River	From Coal Camp to Gleniffer Lake outlet	85 km
Bearberry Creek	From Range Road 62 to its confluence with the Red Deer River in Sundre	17 km

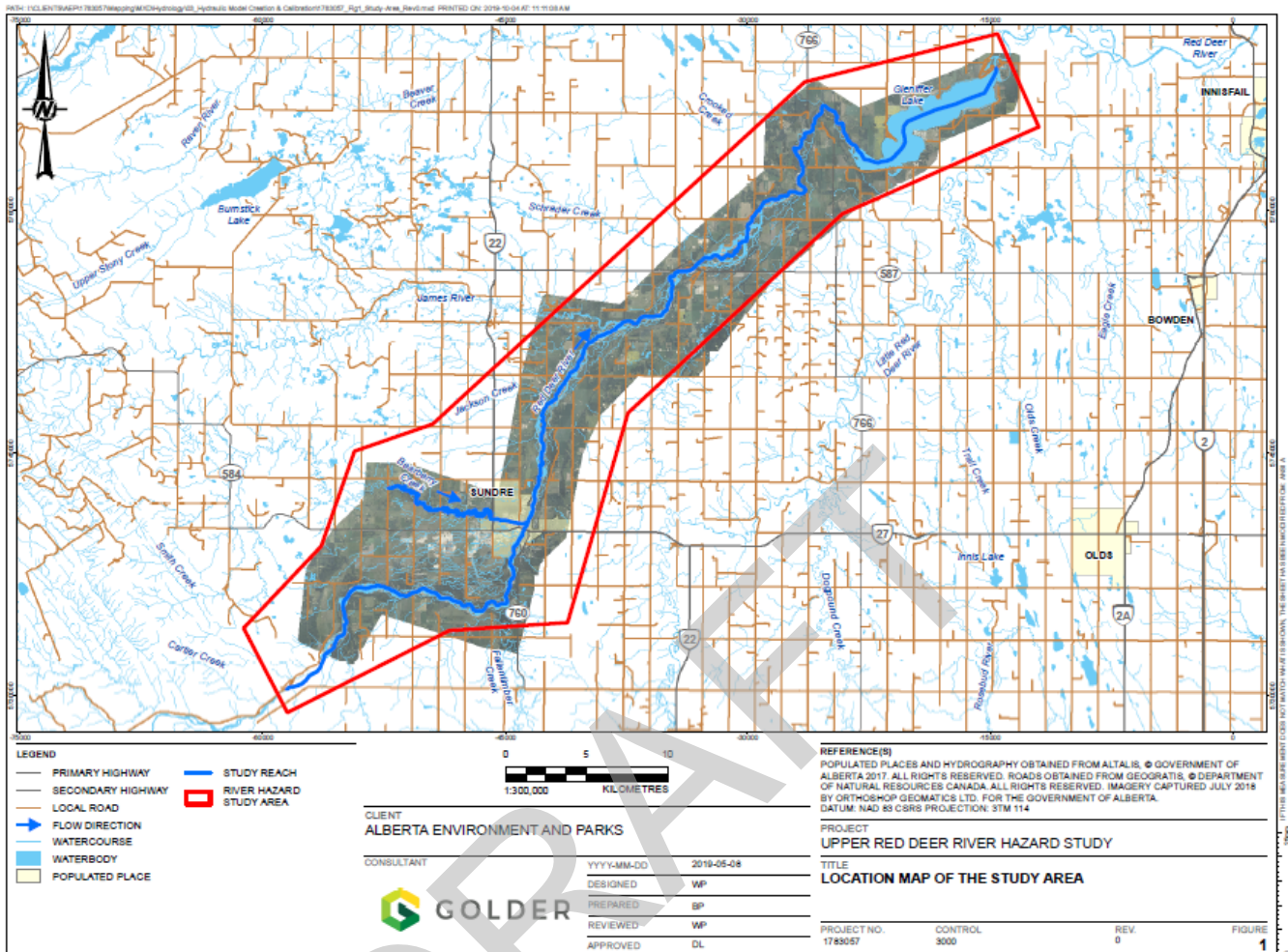


Figure 1: Location Map of Study Area

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2.0 AVAILABLE DATA

2.1 Flood Hydrology

The flood flow frequency estimates for the Red Deer River and Bearberry Creek are documented in a separate report entitled “Red Deer River and Upper Red Deer River Hazard Studies – Open Water Flood Hydrology Assessment” (Golder, 2019). The 100-year design flood flow estimates at key locations in the study area are summarized in Table 2.

Table 2: Design Flood Flow Frequency Estimates

River	Reach	100-Year Flood Peak Discharges (m ³ /s)
Red Deer River	Below Burnt Timber Creek	1,210
	Below Fallentimber Creek	1,310
	Below Bearberry Creek	1,390
	Below James River	1,670
	Below Raven River	1,850
Bearberry Creek	Below Range Road 62	214

2.2 Survey and DTM Details

Topographic, control point, and shallow-water surveys were performed using Real-time Kinematic (RTK) GPS units or a total station. Bathymetric surveys were conducted using an Acoustic Doppler Profiler (ADP) in combination with a boat-mounted RTK unit where flow depths were too deep to wade. Bridge survey data were collected using RTK or total station. A reflectorless total station was used to survey bridges that were unsafe to access due to traffic volumes. The features surveyed as part of this project are summarized in Table 3.

Table 3: Summary of Survey Features

Feature	Red Deer River	Gleniffer Lake	Bearberry Creek	Totals
Cross Sections	125 + 49 ⁽¹⁾	12	130	267 + 49⁽¹⁾
Bridges	2	-	4	6
Culverts	-	-	2	2
Flood Control Structures	3	-	2	5
Other Features	18 ⁽²⁾	-	-	18

Notes:

- 1) 49 cross sections were surveyed in 2013 as part of the McDougal Flats Flood Hazard Study (Golder 2015)
- 2) There are 11 culverts through Range Roads and the Sundre Airstrip within the McDougal Flats floodplain, one culvert with flaps through the Sundre West Dike, four culverts with flaps through the Sundre East Dike, one culvert with flaps through the Bearberry Creek North Dike, and one berm in McDougal Flats that is not considered a flood control structure

A detailed description of the survey data is provided in a separate report entitled “Upper Red Deer River Hazard Study – Survey and Base Data Collection Report” (Golder, 2022a).

The detailed Digital Terrain Model (DTM) for the study area was provided by AEP. It was developed using the 2017 LiDAR survey and is available as gridded raster with 0.5 m resolution, ESRI Terrain, and Triangulated Irregular Network (TIN). The DTM was delivered in the local study coordinate system and datum (3TM 114°, NAD83 CSRS).

2.3 HEC-RAS Model

All river reaches in the study area are integrated into one HEC-RAS model. The model was calibrated for the following:

- low flow conditions based on water levels and discharges measured in September and October 2017;
- high flow conditions based on high water marks collected by AEP for the 2005 and 2013 flood events; and
- the stage-discharge rating curves for the Water Survey of Canada (WSC) gauging stations in the study area.

A detailed description of the open water HEC-RAS model is provided in a separate report entitled “Upper Red Deer River Hazard Study – Hydraulic Modelling and Flood Inundation Mapping Report” (Golder, 2022b).

The calibrated model was used to determine the design flood levels and flow velocities required for the floodway criteria and flood hazard maps.

2.4 Flood Control Structures

A summary of flood control structures within the study area is provided in Table 4. The locations of the flood control structures and summary datasheets for the various flood control structures are provided in a separate report entitled “Survey and Base Data Collection Report” (Golder 2022a).

Table 4: Flood Control Structures within the Study Area

Stream	Name	Length (m)	Side of River ^(a)	Type
Red Deer River	Sundre East Dike (upstream of Highway 27)	2,725	Right	Earth Fill Barrier
Red Deer River	Sundre East Dike (downstream of Highway 27)	925	Right	Earth Fill Barrier
Red Deer River	Sundre West Dike (upstream of Highway 27)	326	Left	Earth Fill Barrier
Bearberry Creek	Bearberry Creek North Dike	1,007	Left	Earth Fill Barrier
Bearberry Creek	Bearberry Creek South Dike	916	Right	Earth Fill Barrier

a) Left or right refer to directions as seen by an observer looking downstream

2.5 Other Features

There is a weir on Bearberry Creek. It is a three-step concrete trapezoidal-shaped weir with the highest crest elevation of 1100.13 m. This weir was implemented in the model as an inline structure.

The Sundre Airstrip runs across the McDougal Flats floodplain. Its elevated runway acts like a weir that partially blocks overland flows. There are 2 culverts underneath the airstrip. The airstrip and the culverts are included in the model setup along the McDougal South side channel.

There are several additional culverts through Range Roads in the McDougal Flats area which are considered for inundation mapping but were not included in the hydraulic modelling (Golder 2022a, Golder 2022b).

2.6 Previous Flood Hazard Maps

The following previous flood hazard maps and floodway lines are available within the study area:

- Sundre Flood Risk Mapping Study (AEP, 1997)

- McDougal Flats Flood Hazard Study (Golder, 2015)

3.0 DESIGN FLOOD HAZARD DETERMINATION

3.1 Design Flood Details

For this study, the 100-year flood was selected as the open water design flood. The corresponding peak instantaneous flood frequency discharge estimates from Table 2 were used for each flow zone within the study reach.

3.2 Floodway and Flood Fringe Terminology

The flood hazard area is the area of land that will be flooded during the design flood event. The flood hazard area is typically divided into two zones: floodway and flood fringe.

The floodway and flood fringe zones are defined as follows:

- **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 areas where the water is 1 m deep or greater and the local velocities are 1 m/s or faster. The floodway typically 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. New development is discouraged in the floodway and may not be permitted in some communities
- **Flood Fringe:** The flood fringe is the portion of the flood hazard area outside of the floodway that has relatively shallow water (less than 1 m deep) with lower velocities (less than 1 m/s velocity). 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 control structures may also be mapped as protected flood fringe areas. New development in the flood fringe may be permitted in some communities.

3.3 Floodway Determination Criteria

In areas being mapped for the first time, the floodway typically represents the area of highest hazard where flows are deepest, fastest, and most destructive during the design flood. The following criteria, based on those described in current FHIP guidelines, are used to delineate the floodway in such cases:

- Areas in which the depth of water exceeds 1 m or the flow velocities are greater than 1 m/s shall be part of the floodway.
- Exceptions may be made for small backwater areas, ineffective flow areas, and to support creation of a hydraulically smooth floodway.
- The floodway must include the main river channel area.
- For reaches of supercritical flow, the floodway boundary should correspond to the edge of inundation or the main channel, whichever is larger.

When a flood hazard map is updated, an existing floodway will not change in most circumstances. Exceptions to this would be: (1) a floodway could get larger if a main channel shifts outside of a previously-defined floodway or (2) a floodway could get smaller if an area of previously-defined floodway is no longer flooded by the design flood.

Areas of deeper or faster moving water outside of the floodway are identified as high hazard flood fringe. These high hazard flood fringe zones are identified in all areas, whether they are newly-mapped or have an existing floodway. The depth and velocity criteria used to define high hazard flood fringe zones will be aligned with the 1 m depth and 1 m/s velocity floodway determination criteria for newly-mapped areas.

All areas protected by dedicated flood berms that are not overtopped during the design flood are excluded from the floodway. Areas behind flood berms will still be mapped as flooded if they are overtopped, but areas at risk of flooding behind dedicated flood berms that are not overtopped will be mapped as a protected flood fringe zone.

The floodway determination criteria for the left and right floodway limits at each cross section are provided in Tables 5, 6 and 7.

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Table 5: Floodway Criteria Table – Red Deer River

River	Reach	Cross Section	River Station	Design Flood Level (m)	Floodway Extents		Floodway Criteria	
					Left Station (m)	Right Station (m)	Left Station	Right Station
Red Deer River	Upper	XS 1	85553	1,203.01	112.90	196.51	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Red Deer River	Upper	XS 2	85257	1,202.02	146.11	296.17	Inundation Limit ⁽²⁾	Mixed
Red Deer River	Upper	XS 3	84954	1,200.77	350.65	442.72	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Red Deer River	Upper	XS 4	84651	1,199.12	560.09	706.90	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Upper	XS 5	84353	1,197.58	542.57	678.19	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Red Deer River	Upper	XS 6	84052	1,196.08	523.05	637.25	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	Upper	XS 7	83797	1,194.76	489.24	732.83	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	Upper	XS 8	83442	1,193.45	501.26	616.66	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Red Deer River	Upper	XS 9	83141	1,191.94	320.91	471.07	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Red Deer River	Upper	XS 10	82833	1,190.25	197.82	374.21	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Red Deer River	Upper	XS 11	82537	1,188.51	252.92	521.05	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Upper	XS 12	82232	1,186.74	309.52	839.62	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Upper	XS 13	81868	1,184.78	362.95	1396.70	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Red Deer River	Upper	XS 14	81601	1,183.19	534.83	1627.26	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Upper	XS 15	81177	1,180.99	736.77	1770.49	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Upper	XS 16	80912	1,179.26	501.04	1408.68	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Upper	XS 17	80692	1,177.91	547.39	1427.29	Inundation Limit ⁽²⁾	Mixed
Red Deer River	Upper	XS 18	80293	1,175.81	554.81	1468.97	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Red Deer River	Upper	XS 19	79929	1,173.83	711.07	1277.58	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	Upper	XS 20	79584	1,172.65	746.43	1186.37	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	Upper	XS 21	79266	1,171.24	784.88	1045.66	Main Channel	Inundation Limit ⁽²⁾
Red Deer River	Upper	XS 22	79053	1,170.16	776.51	991.16	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	Upper	XS 23	78691	1,168.67	587.10	998.31	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	Upper	XS 24	78423	1,167.38	723.03	1114.09	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	Upper	XS 25	78245	1,166.02	733.33	1137.20	1 m Depth	Inundation Limit ⁽²⁾

Table 5: Floodway Criteria Table – Red Deer River

River	Reach	Cross Section	River Station	Design Flood Level (m)	Floodway Extents		Floodway Criteria	
					Left Station (m)	Right Station (m)	Left Station	Right Station
Red Deer River	Upper	XS 26	77763	1,163.83	562.27	1164.89	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Red Deer River	Upper	XS 27	77304	1,161.59	501.45	953.67	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Red Deer River	Upper	XS 28	76976	1,159.50	458.87	866.53	Interior Boundary	Inundation Limit ⁽²⁾
Red Deer River	Upper	XS 29	76765	1,158.33	239.35	867.81	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Red Deer River	Upper	XS 30	76397	1,156.89	422.66	1074.82	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Red Deer River	Upper	XS 31	76217	1,156.04	580.14	1386.50	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Red Deer River	Upper	XS 32	76012	1,154.63	1451.88	2432.08	Inundation Limit ⁽²⁾	Previous Floodway
Red Deer River	Upper	XS 33	75667	1,153.02	2668.10	3570.90	Inundation Limit ⁽²⁾	Previous Floodway
Red Deer River	Upper	XS 34	75273	1,150.97	2746.10	3631.58	Inundation Limit ⁽²⁾	Previous Floodway
Red Deer River	Upper	XS 35	74830	1,148.23	3586.46	4273.69	Inundation Limit ⁽²⁾	Previous Floodway
Red Deer River	Upper	XS 36	74499	1,146.44	3719.55	4501.22	Inundation Limit ⁽²⁾	Previous Floodway
Red Deer River	Upper	XS 37	74141	1,144.28	3790.37	4639.38	Previous Floodway	Previous Floodway
Red Deer River	Upper	XS 38	73766	1,142.35	3817.85	4559.79	Inundation Limit ⁽¹⁾	Previous Floodway
Red Deer River	Upper	XS 39	73574	1,141.46	3757.76	4472.78	Previous Floodway	Previous Floodway
Red Deer River	Upper	XS 40	73255	1,139.57	3714.86	4307.55	Previous Floodway	Inundation Limit ⁽²⁾
Red Deer River	Upper	XS 41	73019	1,138.59	3672.20	4226.20	Previous Floodway	Inundation Limit ⁽²⁾
Red Deer River	Upper	XS 42	72812	1,137.63	3589.84	4089.05	Previous Floodway	Inundation Limit ⁽²⁾
Red Deer River	Upper	XS 43	72556	1,136.28	3485.73	4056.71	Inundation Limit ⁽²⁾	Previous Floodway
Red Deer River	Upper	XS 44	72381	1,135.19	3383.14	4005.54	Previous Floodway	Previous Floodway
Red Deer River	Upper	XS 45	72003	1,133.11	3301.28	4090.53	Previous Floodway	Previous Floodway
Red Deer River	McDougal1	XS 46	71434	1,130.98	n/a	734.79	No Floodway ⁽⁵⁾	Previous Floodway
Red Deer River	McDougal1	XS 47	70929	1,129.07	6.71	573.04	Mixed	Previous Floodway
Red Deer River	McDougal1	XS 48	70602	1,127.48	107.08	741.64	Mixed	Previous Floodway
Red Deer River	McDougal1	XS 49	70391	1,126.49	155.43	724.55	1 m Depth	Previous Floodway
Red Deer River	McDougal1	XS 50	69774	1,123.71	108.81	717.55	1 m Depth	Previous Floodway

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					Left Station (m)	Right Station (m)	Left Station	Right Station
Red Deer River	McDougal1	XS 51	69082	1,120.54	398.96	1152.45	Mixed	Inundation Limit ⁽²⁾
Red Deer River	McDougal1	XS 52	68891	1,119.93	391.45	1213.16	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	McDougal1	XS 53	68415	1,118.31	422.58	1175.52	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	McDougal1	XS 54	68216	1,117.55	168.79	955.30	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	McDougal1	XS 55	67894	1,116.09	242.99	970.42	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	McDougal1	XS 56	67547	1,115.09	346.69	1206.65	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	McDougal1	XS 57	66986	1,113.51	446.58	986.08	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	McDougal1	XS 58	66808	1,113.05	452.45	861.93	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	McDougal1	XS 59	66334	1,111.72	378.92	838.90	Interior Boundary	Previous Floodway
Red Deer River	McDougal1	XS 60	65958	1,110.38	150.84	787.02	1 m Depth	Inundation Limit ⁽¹⁾
Red Deer River	McDougal1	XS 61	65613	1,109.13	81.69	1083.01	Mixed	Previous Floodway
Red Deer River	McDougal1	XS 62	65138	1,107.90	n/a	1290.60	No Floodway ⁽⁵⁾	Previous Floodway
Red Deer River	McDougal1	XS 63	64872	1,107.28	n/a	987.34	No Floodway ⁽⁵⁾	Inundation Limit ⁽¹⁾
Red Deer River	McDougal1	XS 64	64302	1,105.83	n/a	565.84	No Floodway ⁽⁵⁾	Previous Floodway
Red Deer River	McDougal1	XS 65	64191	1,105.47	n/a	507.58	No Floodway ⁽⁵⁾	Previous Floodway
Red Deer River	McDougal1	XS 66	64032	1,105.09	n/a	508.40	No Floodway ⁽⁵⁾	Previous Floodway
Red Deer River	McDougal1	XS 67	63869	1,104.64	n/a	386.71	No Floodway ⁽⁵⁾	Inundation Limit ⁽¹⁾
Red Deer River	McDougal1	XS 68	63520	1,103.83	n/a	415.17	No Floodway ⁽⁵⁾	Previous Floodway
Red Deer River	McDougal1	XS 69	63110	1,102.97	163.92	641.86	Mixed	Inundation Limit ⁽²⁾
Red Deer River	McDougal1	XS 70	62634	1,101.79	390.53	707.16	1 m/s Velocity	Inundation Limit ⁽²⁾
Red Deer River	McDougal1	XS 71	62343	1,100.80	177.66	588.73	Main Channel ⁽⁴⁾	Inundation Limit ⁽²⁾
Red Deer River	McDougal1	XS 72	62083	1,099.88	13.79	637.38	Main Channel ⁽⁴⁾	Inundation Limit ⁽²⁾
Red Deer River	McDougal1	XS 73	61850	1,098.90	31.29	389.80	Mixed	Previous Floodway
Red Deer River	McDougal2	XS 74	61598	1,098.50	325.76	785.58	Inundation Limit ⁽¹⁾	Previous Floodway
Red Deer River	McDougal2	XS 75	61408	1,097.70	271.48	688.68	Previous Floodway	Previous Floodway

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River	Reach	Cross Section	River Station	Design Flood Level (m)	Floodway Extents		Floodway Criteria	
					Left Station (m)	Right Station (m)	Left Station	Right Station
Red Deer River	McDougal2	XS 76	61108	1,096.27	134.45	656.33	Previous Floodway	Previous Floodway
Red Deer River	McDougal2	XS 77	60914	1,095.86	33.87	659.56	Previous Floodway	Inundation Limit ⁽²⁾
Red Deer River	McDougal3	XS 78	60465	1,094.88	429.73	885.87	Inundation Limit ⁽¹⁾	Inundation Limit ⁽²⁾
Red Deer River	McDougal3	XS 79	60147	1,093.66	617.48	948.14	Main Channel ⁽⁴⁾	Inundation Limit ⁽²⁾
Red Deer River	McDougal3	XS 80	59854	1,093.24	258.70	769.09	Main Channel ⁽⁴⁾	Inundation Limit ⁽²⁾
Red Deer River	McDougal4	XS 81	59503	1,092.96	126.10	596.83	Previous Floodway	Inundation Limit ⁽²⁾
Red Deer River	McDougal4	XS 82	59270	1,092.12	223.12	339.14	Previous Floodway	Inundation Limit ⁽²⁾
Red Deer River	McDougal4	XS 83	59203	1,091.08	243.55	655.06	Previous Floodway	Inundation Limit ⁽²⁾
Red Deer River	McDougal4	XS 84	59037	1,090.47	156.73	716.42	Previous Floodway	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 85	58708	1,089.22	700.69	1208.68	Previous Floodway	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 86	58265	1,087.54	568.54	1152.52	Previous Floodway	Previous Floodway
Red Deer River	Lower	XS 87	57826	1,085.90	554.71	1437.73	Previous Floodway	Inundation Limit ⁽¹⁾
Red Deer River	Lower	XS 88	57379	1,083.95	755.19	1585.09	Previous Floodway	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 89	56999	1,082.52	917.62	1671.92	Previous Floodway	Previous Floodway
Red Deer River	Lower	XS 90	56477	1,080.79	1081.97	1926.47	Main Channel ⁽⁴⁾	Previous Floodway
Red Deer River	Lower	XS 91	56129	1,079.27	1092.81	1885.78	Main Channel ⁽⁴⁾	Inundation Limit ⁽¹⁾
Red Deer River	Lower	XS 92	55832	1,078.15	1090.96	1741.00	Main Channel ⁽⁴⁾	Previous Floodway
Red Deer River	Lower	XS 93	55297	1,076.21	828.06	1500.37	Previous Floodway	Previous Floodway
Red Deer River	Lower	XS 94	55036	1,075.23	886.24	1570.38	Main Channel ⁽⁴⁾	Previous Floodway
Red Deer River	Lower	XS 95	54356	1,073.08	784.23	1611.60	Previous Floodway	Previous Floodway
Red Deer River	Lower	XS 96	53975	1,071.17	593.02	1648.91	Inundation Limit ⁽²⁾	Previous Floodway
Red Deer River	Lower	XS 97	53360	1,068.54	357.18	1142.89	Inundation Limit ⁽²⁾	Mixed
Red Deer River	Lower	XS 98	52806	1,066.45	309.40	1615.24	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Lower	XS 99	52289	1,064.65	427.73	1462.56	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Lower	XS 100	51680	1,062.04	266.01	1334.35	1 m/s Velocity	Mixed

Table 5: Floodway Criteria Table – Red Deer River

River	Reach	Cross Section	River Station	Design Flood Level (m)	Floodway Extents		Floodway Criteria	
					Left Station (m)	Right Station (m)	Left Station	Right Station
Red Deer River	Lower	XS 101	51353	1,061.20	128.12	1099.94	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Lower	XS 102	50591	1,058.93	110.98	922.58	Inundation Limit ⁽²⁾	Main Channel
Red Deer River	Lower	XS 103	50055	1,056.86	80.36	759.48	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Lower	XS 104	49417	1,055.09	239.29	916.07	1 m/s Velocity	1 m Depth
Red Deer River	Lower	XS 105	48732	1,052.58	597.52	1277.41	1 m/s Velocity	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 106	48089	1,050.41	738.30	1549.88	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 107	47488	1,048.45	627.84	1456.11	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 108	46845	1,046.31	517.06	1463.19	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 109	46444	1,044.28	558.77	1646.89	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 110	46091	1,042.89	672.91	2014.59	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 111	45001	1,039.83	796.97	1547.99	1 m Depth	Mixed
Red Deer River	Lower	XS 112	44297	1,037.80	85.66	1015.39	Inundation Limit ⁽²⁾	Main Channel
Red Deer River	Lower	XS 113	43758	1,035.98	81.29	767.21	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Lower	XS 114	43204	1,033.35	973.83	1974.91	1 m/s Velocity	Mixed
Red Deer River	Lower	XS 115	42524	1,031.25	838.64	1875.43	1 m Depth	1 m Depth
Red Deer River	Lower	XS 116	41975	1,029.08	890.84	1961.69	1 m Depth	1 m Depth
Red Deer River	Lower	XS 117	41380	1,027.08	55.73	1207.68	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 118	40857	1,025.69	87.43	905.63	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 119	40329	1,024.16	90.77	740.00	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 120	39856	1,022.81	74.95	614.95	Inundation Limit ⁽²⁾	1 m/s Velocity
Red Deer River	Lower	XS 121	39448	1,021.29	83.07	564.02	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Lower	XS 122	38941	1,019.56	112.56	867.90	Main Channel	Interior Boundary
Red Deer River	Lower	XS 123	38401	1,017.95	376.76	1068.17	1 m Depth	1 m Depth
Red Deer River	Lower	XS 124	37868	1,016.55	324.48	1171.70	1 m Depth	1 m Depth
Red Deer River	Lower	XS 125	37222	1,014.85	317.78	1096.77	1 m Depth	1 m Depth

Table 5: Floodway Criteria Table – Red Deer River

River	Reach	Cross Section	River Station	Design Flood Level (m)	Floodway Extents		Floodway Criteria	
					Left Station (m)	Right Station (m)	Left Station	Right Station
Red Deer River	Lower	XS 126	36676	1,013.62	546.21	1432.69	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 127	36058	1,011.73	879.88	1295.80	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 128	35698	1,010.23	482.41	966.55	1 m Depth	1 m Depth
Red Deer River	Lower	XS 129	35330	1,009.13	94.33	1022.62	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Lower	XS 130	34968	1,008.38	116.18	814.60	Inundation Limit ⁽²⁾	Mixed
Red Deer River	Lower	XS 131	34512	1,006.75	73.38	365.40	Inundation Limit ⁽²⁾	1 m/s Velocity
Red Deer River	Lower	XS 132	33979	1,005.84	100.34	532.97	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Lower	XS 133	33675	1,004.93	143.59	1255.15	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Lower	XS 134	33595	1,004.21	148.55	1298.17	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Lower	XS 135	33049	1,001.49	135.42	915.33	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Lower	XS 136	32496	999.74	98.72	947.96	Inundation Limit ⁽²⁾	1 m/s Velocity
Red Deer River	Lower	XS 137	31995	997.27	289.50	1351.98	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Lower	XS 138	31541	995.89	276.30	1761.29	Inundation Limit ⁽²⁾	Mixed
Red Deer River	Lower	XS 139	30601	993.56	163.61	1600.40	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Lower	XS 140	30301	992.33	249.62	1769.08	Inundation Limit ⁽²⁾	1 m/s Velocity
Red Deer River	Lower	XS 141	29829	990.71	155.34	1445.81	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Lower	XS 142	29569	989.22	170.82	1195.45	1 m/s Velocity	Main Channel
Red Deer River	Lower	XS 143	29181	987.87	459.61	1458.81	Interior Boundary	1 m Depth
Red Deer River	Lower	XS 144	28612	986.41	242.44	1134.41	1 m Depth	1 m Depth
Red Deer River	Lower	XS 145	27993	984.51	155.46	1154.89	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Lower	XS 146	27484	983.31	160.52	986.43	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Lower	XS 147	26767	981.55	140.27	894.84	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Lower	XS 148	26292	980.14	155.63	1398.36	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Lower	XS 149	25890	978.81	234.81	1155.09	Inundation Limit ⁽²⁾	Mixed
Red Deer River	Lower	XS 150	25439	977.62	150.61	1377.46	Mixed	Mixed

Table 5: Floodway Criteria Table – Red Deer River

River	Reach	Cross Section	River Station	Design Flood Level (m)	Floodway Extents		Floodway Criteria	
					Left Station (m)	Right Station (m)	Left Station	Right Station
Red Deer River	Lower	XS 151	25018	976.52	544.92	1617.79	1 m/s Velocity	1 m Depth
Red Deer River	Lower	XS 152	24476	975.74	836.84	1898.12	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Lower	XS 153	24140	974.38	1361.31	2038.73	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Lower	XS 154	23649	973.21	1464.48	2167.88	Inundation Limit ⁽²⁾	1 m/s Velocity
Red Deer River	Lower	XS 155	23131	971.88	1369.42	2135.10	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 156	22461	970.53	1015.42	1625.85	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 157	21764	969.56	877.08	1397.77	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 158	21364	968.66	50.48	1234.55	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 159	20977	967.16	97.40	1295.51	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 160	20563	965.55	368.92	1433.30	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 161	20075	964.21	767.94	1687.56	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 162	19707	963.02	804.51	1852.13	Mixed	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 163	19254	962.10	228.66	1843.78	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 164	18542	960.76	97.42	1178.21	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 165	18025	959.82	116.40	915.80	1 m Depth	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 166	17586	958.64	271.29	1014.60	Mixed	1 m/s Velocity
Red Deer River	Lower	XS 167	17149	957.82	270.95	1473.27	Mixed	1 m Depth
Red Deer River	Lower	XS 168	16459	956.57	507.23	1020.82	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Lower	XS 169	16030	955.75	161.21	727.50	Inundation Limit ⁽²⁾	Mixed
Red Deer River	Lower	XS 170	15571	954.60	83.15	1082.95	Inundation Limit ⁽²⁾	1 m Depth
Red Deer River	Lower	XS 171	15060	953.51	122.46	1059.68	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 172	14154	951.55	90.43	727.38	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 173	13433	949.74	91.17	837.36	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 174	12807	948.52	93.39	899.01	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Red Deer River	Lower	XS 175	11664	948.10	132.52	687.30	Inundation Limit ⁽³⁾	Inundation Limit ⁽³⁾

Table 5: Floodway Criteria Table – Red Deer River

River	Reach	Cross Section	River Station	Design Flood Level (m)	Floodway Extents		Floodway Criteria	
					Left Station (m)	Right Station (m)	Left Station	Right Station
Red Deer River	Lower	XS 176	10543	948.04	908.95	2069.56	Inundation Limit ⁽³⁾	Inundation Limit ⁽³⁾
Red Deer River	Lower	XS 177	9112	948.03	986.37	2760.01	Inundation Limit ⁽³⁾	Inundation Limit ⁽³⁾
Red Deer River	Lower	XS 178	8082	948.02	933.45	2129.09	Inundation Limit ⁽³⁾	Inundation Limit ⁽³⁾
Red Deer River	Lower	XS 179	6624	948.02	1790.52	3262.40	Inundation Limit ⁽³⁾	Inundation Limit ⁽³⁾
Red Deer River	Lower	XS 180	5297	948.02	1608.27	3466.26	Inundation Limit ⁽³⁾	Inundation Limit ⁽³⁾
Red Deer River	Lower	XS 181	3592	948.02	1536.56	3044.97	Inundation Limit ⁽³⁾	Inundation Limit ⁽³⁾
Red Deer River	Lower	XS 182	2612	948.02	986.12	2589.67	Inundation Limit ⁽³⁾	Inundation Limit ⁽³⁾
Red Deer River	Lower	XS 183	1529	948.02	1084.60	2952.19	Inundation Limit ⁽³⁾	Inundation Limit ⁽³⁾
Red Deer River	Lower	XS 184	700	948.02	1270.46	2078.80	Inundation Limit ⁽³⁾	Inundation Limit ⁽³⁾
Red Deer River	Lower	XS 185	138	948.00	978.36	1430.20	Inundation Limit ⁽³⁾	Inundation Limit ⁽³⁾

Notes:

- 1) Previous floodway is outside the inundation limit
- 2) No viable flood fringe
- 3) No flood fringe at reservoir (Gleniffer Lake)
- 4) Previous floodway is inside current main channel, floodway was moved to include current main channel
- 5) No floodway station because end of cross section is adjacent to side channel

Table 6: Floodway Criteria Table - Bearberry Creek

River	Reach	Cross Section	River Station	Design Flood Level (m)	Floodway Extents		Floodway Criteria	
					Left Station (m)	Right Station (m)	Left	Right
Bearberry Creek	Upper	XS 186	17134	1,135.67	361.78	653.46	1 m Depth	1 m Depth
Bearberry Creek	Upper	XS 187	17013	1,135.49	542.96	649.15	1 m Depth	Mixed
Bearberry Creek	Upper	XS 188	16835	1,135.18	537.22	675.34	1 m Depth	1 m Depth
Bearberry Creek	Upper	XS 189	16665	1,134.82	389.33	669.31	1 m Depth	1 m Depth
Bearberry Creek	Upper	XS 190	16478	1,134.34	472.47	798.43	1 m Depth	1 m Depth
Bearberry Creek	Upper	XS 191	16314	1,134.16	482.96	784.87	1 m Depth	1 m Depth
Bearberry Creek	Upper	XS 192	16197	1,134.01	391.57	653.90	1 m Depth	1 m Depth
Bearberry Creek	Upper	XS 193	16091	1,133.71	377.49	599.24	1 m Depth	1 m Depth
Bearberry Creek	Upper	XS 194	15888	1,133.50	325.16	589.79	1 m Depth	Inundation Limit ⁽²⁾
Bearberry Creek	Upper	XS 195	15703	1,133.27	333.13	675.78	1 m Depth	Inundation Limit ⁽²⁾
Bearberry Creek	Upper	XS 196	15555	1,133.06	330.23	667.89	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Bearberry Creek	Upper	XS 197	15390	1,132.79	431.26	526.02	1 m Depth	1 m Depth
Bearberry Creek	Upper	XS 198	15273	1,132.55	415.80	495.56	1 m Depth	1 m Depth
Bearberry Creek	Upper	XS 199	15110	1,132.35	212.54	462.85	1 m Depth	1 m Depth
Bearberry Creek	Upper	XS 200	14933	1,132.18	202.62	447.59	1 m Depth	1 m Depth
Bearberry Creek	Upper	XS 201	14793	1,131.98	335.59	470.93	1 m Depth	1 m Depth
Bearberry Creek	Upper	XS 202	14596	1,131.66	333.75	494.77	1 m Depth	Inundation Limit ⁽²⁾
Bearberry Creek	Upper	XS 203	14449	1,131.38	325.80	695.20	1 m Depth	Inundation Limit ⁽²⁾
Bearberry Creek	Upper	XS 204	14317	1,131.26	223.27	645.11	1 m Depth	Inundation Limit ⁽²⁾
Bearberry Creek	Upper	XS 205	14170	1,131.21	229.12	657.93	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Bearberry Creek	Upper	XS 206	14001	1,131.02	326.55	699.61	Inundation Limit ⁽²⁾	1 m Depth
Bearberry Creek	Upper	XS 207	13846	1,130.89	345.95	708.97	Interior Boundary	1 m Depth
Bearberry Creek	Upper	XS 208	13693	1,130.63	819.23	1031.77	Main Channel	1 m Depth
Bearberry Creek	Upper	XS 209	13562	1,130.21	801.39	839.18	Main Channel	Main Channel
Bearberry Creek	Upper	XS 210	13395	1,129.91	838.03	922.49	1 m Depth	1 m Depth
Bearberry Creek	Upper	XS 211	13239	1,129.73	776.73	928.58	Mixed	Inundation Limit ⁽²⁾
Bearberry Creek	Upper	XS 212	13094	1,129.63	681.20	888.02	1 m Depth	Inundation Limit ⁽²⁾
Bearberry Creek	Upper	XS 213	12940	1,129.41	668.72	829.24	1 m Depth	Inundation Limit ⁽²⁾
Bearberry Creek	Upper	XS 214	12786	1,129.10	661.39	821.93	1 m Depth	Inundation Limit ⁽²⁾
Bearberry Creek	Upper	XS 215	12617	1,128.85	503.70	781.84	1 m Depth	Inundation Limit ⁽²⁾
Bearberry Creek	Upper	XS 216	12438	1,128.42	455.49	804.21	1 m Depth	Inundation Limit ⁽²⁾
Bearberry Creek	Upper	XS 217	12198	1,127.70	464.47	917.39	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Bearberry Creek	Upper	XS 218	12053	1,127.34	488.05	927.73	Inundation Limit ⁽²⁾	Inundation Limit ⁽²⁾
Bearberry Creek	Upper	XS 219	11907	1,126.82	608.42	858.06	Mixed	Main Channel
Bearberry Creek	Upper	XS 220	11804	1,126.48	600.34	921.94	Mixed	1 m Depth
Bearberry Creek	Upper	XS 221	11650	1,126.20	590.97	987.90	Mixed	1 m Depth

River	Reach	Cross Section	River Station	Design Flood Level (m)	Floodway Extents		Floodway Criteria	
					Left Station (m)	Right Station (m)	Left	Right
Bearberry Creek	Upper	XS 222	11464	1,125.82	585.56	915.40	Mixed	1 m Depth
Bearberry Creek	Upper	XS 223	11290	1,125.70	574.72	883.00	1 m Depth	1 m Depth
Bearberry Creek	Upper	XS 224	11225	1,124.51	628.08	826.74	1 m Depth	Interior Boundary
Bearberry Creek	Upper	XS 225	11076	1,124.27	481.48	695.84	1 m Depth	1 m Depth
Bearberry Creek	Upper	XS 226	10919	1,124.00	380.14	647.54	1 m Depth	1 m Depth
Bearberry Creek	Upper	XS 227	10809	1,123.80	464.75	650.77	1 m Depth	1 m Depth
Bearberry Creek	Upper	XS 228	10780	1,123.65	538.27	745.03	1 m Depth	Mixed
Bearberry Creek	Upper	XS 229	10652	1,123.05	476.27	784.59	1 m/s Velocity	1 m Depth
Bearberry Creek	Upper	XS 230	10582	1,122.62	444.39	779.11	Main Channel	1 m Depth
Bearberry Creek	Upper	XS 231	10350	1,122.07	521.39	804.26	Mixed	1 m Depth
Bearberry Creek	Upper	XS 232	10162	1,121.63	472.56	839.66	Main Channel	1 m Depth
Bearberry Creek	Upper	XS 233	9963	1,121.13	481.27	711.78	Mixed	Mixed
Bearberry Creek	Upper	XS 234	9814	1,120.90	536.74	829.64	Interior Boundary	Mixed
Bearberry Creek	Upper	XS 235	9653	1,120.72	530.55	765.00	Interior Boundary	Main Channel
Bearberry Creek	Upper	XS 236	9508	1,120.20	528.85	702.03	Interior Boundary	Interior Boundary
Bearberry Creek	Upper	XS 237	9306	1,119.46	448.52	673.16	1 m Depth	1 m Depth
Bearberry Creek	Upper	XS 238	9157	1,118.88	586.42	711.97	Interior Boundary	1 m/s Velocity
Bearberry Creek	Upper	XS 239	9046	1,118.40	589.99	848.26	Interior Boundary	1 m Depth
Bearberry Creek	Upper	XS 240	8920	1,118.04	573.19	847.74	Interior Boundary	1 m Depth
Bearberry Creek	Upper	XS 241	8770	1,117.86	537.36	863.55	Mixed	1 m Depth
Bearberry Creek	Upper	XS 242	8601	1,117.40	576.67	849.27	1 m Depth	1 m Depth
Bearberry Creek	Upper	XS 243	8454	1,117.08	571.21	939.14	1 m Depth	Inundation Limit ⁽²⁾
Bearberry Creek	Upper	XS 244	8289	1,116.85	569.83	915.40	1 m Depth	Inundation Limit ⁽²⁾
Bearberry Creek	Upper	XS 245	8124	1,116.57	575.28	883.36	Mixed	Main Channel
Bearberry Creek	Upper	XS 246	7909	1,115.85	482.99	891.09	1 m Depth	1 m/s Velocity
Bearberry Creek	Upper	XS 247	7736	1,115.15	514.82	1062.94	Mixed	1 m Depth
Bearberry Creek	Upper	XS 248	7571	1,114.89	528.27	1052.81	1 m Depth	1 m Depth
Bearberry Creek	Upper	XS 249	7404	1,114.41	606.42	950.80	Mixed	Mixed
Bearberry Creek	Upper	XS 250	7271	1,114.20	605.78	955.08	Mixed	Mixed
Bearberry Creek	Upper	XS 251	7112	1,113.82	458.64	686.41	Mixed	Mixed
Bearberry Creek	Upper	XS 252	6917	1,113.51	421.52	656.56	1 m Depth	1 m Depth
Bearberry Creek	Upper	XS 253	6742	1,112.97	454.36	566.85	Mixed	Mixed
Bearberry Creek	Upper	XS 254	6659	1,112.86	449.24	667.05	Mixed	1 m Depth
Bearberry Creek	Upper	XS 255	6573	1,112.68	426.18	731.71	1 m Depth	Mixed
Bearberry Creek	Upper	XS 256	6444	1,112.25	428.94	744.63	1 m Depth	1 m Depth
Bearberry Creek	Upper	XS 257	6297	1,111.94	342.08	650.71	Previous Floodway	Inundation Limit ⁽¹⁾
Bearberry Creek	Upper	XS 258	6178	1,111.68	269.63	723.75	Previous Floodway	Previous Floodway

River	Reach	Cross Section	River Station	Design Flood Level (m)	Floodway Extents		Floodway Criteria	
					Left Station (m)	Right Station (m)	Left	Right
Bearberry Creek	Upper	XS 259	6041	1,111.46	381.28	749.54	Previous Floodway	Previous Floodway
Bearberry Creek	Upper	XS 260	5752	1,111.15	609.61	724.58	Previous Floodway	Previous Floodway
Bearberry Creek	Upper	XS 261	5564	1,110.86	451.95	754.26	Previous Floodway	Previous Floodway
Bearberry Creek	Upper	XS 262	5354	1,110.52	540.07	835.94	Previous Floodway	Previous Floodway
Bearberry Creek	Upper	XS 263	5168	1,110.25	516.72	984.94	Main Channel ⁽³⁾	Previous Floodway
Bearberry Creek	Upper	XS 264	4943	1,110.02	506.72	998.54	Previous Floodway	Previous Floodway
Bearberry Creek	Upper	XS 265	4622	1,109.51	322.24	1085.67	Previous Floodway	Previous Floodway
Bearberry Creek	Upper	XS 266	4413	1,108.86	510.16	1125.76	Previous Floodway	Previous Floodway
Bearberry Creek	Upper	XS 267	4215	1,108.64	397.45	1006.01	Main Channel ⁽³⁾	Previous Floodway
Bearberry Creek	Upper	XS 268	4096	1,108.26	426.15	1038.51	Inundation Limit ⁽¹⁾	Previous Floodway
Bearberry Creek	Upper	XS 269	3929	1,107.98	375.65	1155.41	Previous Floodway	Previous Floodway
Bearberry Creek	Upper	XS 270	3805	1,107.87	276.92	1141.68	Main Channel ⁽³⁾	Previous Floodway
Bearberry Creek	Upper	XS 271	3626	1,107.71	162.80	854.33	Inundation Limit ⁽¹⁾	Previous Floodway
Bearberry Creek	Upper	XS 272	3487	1,107.51	158.72	780.50	Main Channel ⁽³⁾	Previous Floodway
Bearberry Creek	Upper	XS 273	3319	1,107.24	167.40	814.68	Main Channel ⁽³⁾	Previous Floodway
Bearberry Creek	Upper	XS 274	3118	1,106.97	357.91	937.65	Previous Floodway	Previous Floodway
Bearberry Creek	Upper	XS 275	2864	1,106.73	345.48	861.78	Main Channel ⁽³⁾	Previous Floodway
Bearberry Creek	Upper	XS 276	2635	1,106.24	476.93	806.16	Previous Floodway	Previous Floodway
Bearberry Creek	Upper	XS 277	2493	1,105.96	553.59	788.42	Main Channel ⁽³⁾	Previous Floodway
Bearberry Creek	Upper	XS 278	2347	1,105.68	631.48	707.18	Inundation Limit ⁽¹⁾	Inundation Limit ⁽¹⁾
Bearberry Creek	Upper	XS 279	2234	1,105.49	626.87	712.27	Previous Floodway	Main Channel ⁽³⁾
Bearberry Creek	Upper	XS 280	2141	1,105.09	599.79	638.74	Main Channel ⁽³⁾	Main Channel ⁽³⁾
Bearberry Creek	Upper	XS 281	2100	1,104.73	603.28	634.99	Inundation Limit ⁽¹⁾	Inundation Limit ⁽¹⁾
Bearberry Creek	Upper	XS 282	2042	1,104.52	592.99	626.38	Main Channel ⁽³⁾	Inundation Limit ⁽¹⁾
Bearberry Creek	Upper	XS 283	1936	1,104.18	595.18	628.51	Main Channel ⁽³⁾	Main Channel ⁽³⁾
Bearberry Creek	Upper	XS 284	1840	1,103.89	606.62	642.24	Main Channel ⁽³⁾	Inundation Limit ⁽¹⁾
Bearberry Creek	Upper	XS 285	1746	1,103.69	623.56	663.98	Main Channel ⁽³⁾	Previous Floodway
Bearberry Creek	Upper	XS 286	1660	1,103.60	635.32	672.23	Mixed	Previous Floodway
Bearberry Creek	Mid	XS 287	1542	1,103.12	22.44	53.54	Inundation Limit ⁽¹⁾	Main Channel ⁽³⁾
Bearberry Creek	Mid	XS 288	1424	1,102.87	13.31	61.92	Inundation Limit ⁽¹⁾	Inundation Limit ⁽²⁾
Bearberry Creek	Mid	XS 289	1404	1,099.99	1.01	44.33	Inundation Limit ⁽²⁾	Main Channel ⁽³⁾
Bearberry Creek	Lower	XS 290	1332	1,097.84	588.03	621.38	Main Channel ⁽³⁾	Main Channel ⁽³⁾
Bearberry Creek	Lower	XS 291	1224	1,096.73	573.88	599.37	Inundation Limit ⁽¹⁾	Main Channel ⁽³⁾
Bearberry Creek	Lower	XS 292	1135	1,096.61	500.24	529.44	Main Channel ⁽³⁾	Inundation Limit ⁽¹⁾
Bearberry Creek	Lower	XS 293	1038	1,096.24	497.06	529.28	Main Channel ⁽³⁾	Inundation Limit ⁽¹⁾
Bearberry Creek	Lower	XS 294	945	1,095.74	498.20	528.17	Main Channel ⁽³⁾	Inundation Limit ⁽¹⁾
Bearberry Creek	Lower	XS 295	829	1,095.29	513.61	544.57	Inundation Limit ⁽¹⁾	Inundation Limit ⁽¹⁾

River	Reach	Cross Section	River Station	Design Flood Level (m)	Floodway Extents		Floodway Criteria	
					Left Station (m)	Right Station (m)	Left	Right
Bearberry Creek	Lower	XS 296	805	1,094.73	512.35	542.28	Inundation Limit ⁽¹⁾	Inundation Limit ⁽¹⁾
Bearberry Creek	Lower	XS 297	734	1,094.35	534.10	567.97	Inundation Limit ⁽¹⁾	Inundation Limit ⁽¹⁾
Bearberry Creek	Lower	XS 298	636	1,093.49	576.13	609.62	Main Channel ⁽³⁾	Inundation Limit ⁽¹⁾
Bearberry Creek	Lower	XS 299	518	1,093.05	611.81	651.88	Main Channel ⁽³⁾	Inundation Limit ⁽¹⁾
Bearberry Creek	Lower	XS 300	468	1,092.97	668.79	704.60	Main Channel ⁽³⁾	Inundation Limit ⁽¹⁾
Bearberry Creek	Lower	XS 301	439	1,092.28	694.90	726.71	Previous Floodway	Inundation Limit ⁽¹⁾
Bearberry Creek	Lower	XS 302	386	1,091.91	750.27	782.64	Previous Floodway	Previous Floodway
Bearberry Creek	Lower	XS 303	281	1,090.95	807.55	836.98	Main Channel ⁽³⁾	Mixed
Bearberry Creek	Lower	XS 304	194	1,090.27	859.91	897.89	Inundation Limit ⁽¹⁾	Previous Floodway
Fishway	Fishway	XS 305	319	1,101.67	655.77	674.41	Inundation Limit ⁽¹⁾	Inundation Limit ⁽¹⁾
Fishway	Fishway	XS 306	299	1,101.42	632.08	642.52	Inundation Limit ⁽¹⁾	Inundation Limit ⁽¹⁾
Fishway	Fishway	XS 307	256	1,100.27	591.25	600.91	Inundation Limit ⁽¹⁾	Inundation Limit ⁽¹⁾
Fishway	Fishway	XS 308	214	1,099.24	569.88	579.38	Inundation Limit ⁽¹⁾	Inundation Limit ⁽¹⁾
Fishway	Fishway	XS 309	143	1,098.71	492.80	504.40	Inundation Limit ⁽¹⁾	Main Channel ⁽³⁾
Fishway	Fishway	XS 310	87	1,098.59	538.17	551.38	Inundation Limit ⁽¹⁾	Inundation Limit ⁽¹⁾

Notes:

- 1) Previous floodway is outside the inundation limit
- 2) No viable flood fringe
- 3) Previous floodway is inside current main channel, floodway was moved to include current main channel

Table 7: Floodway Criteria Table – McDougal South Channel

River	Reach	Cross Section	River Station	Design Flood Level (m)	Floodway Extents		Floodway Criteria	
					Left Station (m)	Right Station (m)	Left	Right
McDougal South	McDougal South	XS 312	6205	1130.43	3367.77	n/a	Previous Floodway	No Floodway ⁽²⁾
McDougal South	McDougal South	XS 313	5884	1128.92	3215.77	3636.43	Previous Floodway	Mixed
McDougal South	McDougal South	XS 314	5642	1127.24	3154.55	3592.71	Previous Floodway	1 m Depth
McDougal South	McDougal South	XS 315	5499	1126.14	3177.33	3558.18	Inundation Limit ⁽¹⁾	Mixed
McDougal South	McDougal South	XS 316	4955	1123.32	3030.02	3782.78	Previous Floodway	1 m Depth
McDougal South	McDougal South	XS 317	4462	1120.87	3082.40	3580.13	Inundation Limit ⁽¹⁾	1 m Depth
McDougal South	McDougal South	XS 318	4324	1120	3087.91	3521.58	Previous Floodway	1 m Depth
McDougal South	McDougal South	XS 319	4075	1118.91	3139.51	3530.39	Previous Floodway	Mixed
McDougal South	McDougal South	XS 320	3933	1118.34	2983.96	3515.00	Previous Floodway	Mixed
McDougal South	McDougal South	XS 321	3579	1116.16	2920.77	3514.80	Previous Floodway	Mixed
McDougal South	McDougal South	XS 322	3308	1114.6	2852.47	3509.21	Previous Floodway	1 m Depth
McDougal South	McDougal South	XS 323	3062	1113.22	511.59	1025.30	Mixed	1 m Depth
McDougal South	McDougal South	XS 324	2897	1112.38	563.56	1145.05	Previous Floodway	1 m Depth
McDougal South	McDougal South	XS 325	2742	1111.35	667.07	1272.84	Previous Floodway	1 m Depth
McDougal South	McDougal South	XS 326	2547	1110.4	804.60	1406.38	Previous Floodway	1 m Depth
McDougal South	McDougal South	XS 327	2260	1109.39	906.77	1338.00	Previous Floodway	1 m Depth
McDougal South	McDougal South	XS 328	1989	1107.92	1035.50	1668.19	Previous Floodway	Mixed
McDougal South	McDougal South	XS 329	1784	1106.94	1057.07	1732.08	Previous Floodway	1 m Depth
McDougal South	McDougal South	XS 330	1629	1106.16	1075.37	1873.69	Previous Floodway	1 m Depth
McDougal South	McDougal South	XS 331	1461	1105.01	1067.94	1131.78	Previous Floodway	Interior Boundary
McDougal South	McDougal South	XS 332	1329	1103.87	903.73	1153.56	Inundation Limit ⁽¹⁾	Interior Boundary
McDougal South	McDougal South	XS 333	1134	1103.29	749.80	960.68	Inundation Limit ⁽¹⁾	Mixed
McDougal South	McDougal South	XS 334	1030	1102.92	686.63	840.36	Inundation Limit ⁽¹⁾	Mixed
McDougal South	McDougal South	XS 335	853	1101.91	502.46	655.12	Inundation Limit ⁽¹⁾	Mixed
McDougal South	McDougal South	XS 336	633	1101.01	353.27	484.87	Inundation Limit ⁽¹⁾	1 m Depth
McDougal South	McDougal South	XS 337	345	1098.88	383.72	426.12	Inundation Limit ⁽¹⁾	Inundation Limit ⁽¹⁾

Notes:

1) No viable flood fringe

2) No floodway station because end of cross section is adjacent to side channel

4.0 DESIGN FLOOD HAZARD MAP PRODUCTION

4.1 Flood Mapping Methodology

The design flood hazard extent is generally the same as the 100-year open water inundation. The mapping method for the inundation mapping is described in detail in the hydraulic modelling and flood inundation mapping report prepared for this study (Golder 2022b). The floodway can cross over small areas of dry land for the purpose of smoothing and consistency with previous mapping, therefore deviating from the inundation extent in these select areas.

4.2 Floodway Criteria Maps

Floodway criteria maps are a tool for determining the floodway and flood fringe extents for the design flood and documenting the results of the floodway delineation. The open water floodway criteria maps include the following information:

- the location and extent of all cross sections used in the HEC-RAS model;
- the extent of the 100-year open water design flood;
- areas meeting or exceeding the 1 m depth floodway determination criteria for the design flood;
- portions along each model cross section where flow velocities are calculated to be 1 m/s or greater;
- the locations of the main channel top of bank along each model cross section;
- the proposed floodway boundary, as well as associated floodway stations corresponding to the floodway determination criteria;
- areas protected by flood control structures;
- the previous floodway boundaries (AEP 1997, Golder 2015);
- background aerial imagery collected during the study (Golder 2022a); and
- roads, bridges and flood control structures.

The floodway criteria maps were produced using the same template as the inundation maps. The maps are provided in Appendix A.

4.3 Flood Hazard Maps

4.3.1 Overview

The flood hazard maps show the floodway and flood fringe, including the high hazard flood fringe and protected flood fringe areas, for the design flood event. These maps have been developed in accordance with applicable provincial standards. The floodway shown was determined based on the floodway criteria mapping. The extent of the flood fringe includes all directly inundated areas outside the floodway at open water design flood levels, and may include high hazard flood fringe or protected flood fringe areas. All areas within the floodway boundary are shown as part of the floodway, even if the water levels of the design flood would not indicate a location as inundated (i.e., “islands” of dry ground within the floodway shown on the floodway criteria maps are not present on the flood hazard maps). 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 such as the 200-year and

500-year floods. Flood hazard mapping is typically used for long-term flood hazard area management and land-use planning.

The flood hazard maps were produced using the same template as the inundation maps. The maps are provided in Appendix B.

The following sections provide additional information on the areas within the study area that would be located within the floodway and flood fringe.

4.3.2 Areas in the Floodway

The following notable areas are located in the floodway:

- A portion of the residential area at the south end of Range Road 60
- The south end of the Sundre Airstrip
- Parts of the Woodland Estates residential area on the right floodplain of the Red Deer River north of Highway 587

4.3.3 Areas in the High Hazard Flood Fringe

The following areas are in the high hazard flood fringe:

- Parts of the Greenwood Campground in Sundre
- Gravel pit between Range Road 42 and 43 south of Highway 587
- Parts of the Woodland Estates and River Valley Estates residential areas north and south of Highway 587
- Parts of the Sundre River Resort on Range Road 60 on Bearberry Creek

4.3.4 Areas in the Flood Fringe

The following areas are in the flood fringe:

- Low lying floodplain areas along the Red Deer River
- Large portions of the McDougal Flats including the Coyote Creek Golf and RV Resort
- Large portions of Bearberry Creek floodplain on both sides of the creek, including Wagons West RV Park and Storage
- The majority of the residential area in the vicinity of Highway 587 (east side of Range Road 42A)
- Some properties in Sundre along the Historic Bearberry Creek Channel
- Parts of the residential area south of Bearberry Creek, in the vicinity of Tamarack Crescent and 4th Street NW

4.3.5 Areas in the Protected Flood Fringe

The following areas are in the protected flood fringe:

- Parts of the residential and commercial area in Sundre along 5 Street SE and 6 Street SE just south of Highway 27

- Parts of the residential area in Sundre along 7 Street NE north of Highway 27
- The residential and commercial area in Sundre east of Centre Street S and south of Highway 27

5.0 DESIGN FLOOD GRIDS

The following GIS data are provided for the floodway criteria and design flood hazard maps:

- floodway and flood fringe polygons
- Previous floodway limits
- design triangulated irregular network (TIN)
- design flood level raster
- design flood depths raster

All GIS data is created in ArcGIS 10.7 compatible format in the native study coordinate system [Canadian Spatial Reference System, North American Datum of 1983 (CSRS NAD83), Epoch 2002 and 3-Degree Transverse Mercator projection with the Central Meridian of 114° (3TM 114)]. All raster files have a spatial resolution of 0.5 m.

The floodway and flood fringe polygons, floodway limits, and raster files are stored in ArcGIS file geodatabases (Version 10.7). The flood level and depths rasters are clipped to the floodway and flood fringe extents.

6.0 POTENTIAL CLIMATE CHANGE IMPACTS

In addition to the design flood water levels, a cursory examination of potential increases in 100-year design water levels associated with climate change were performed in order to better understand the possible impacts of climate change on flood levels. The effect of more severe 100-year flood conditions was assessed under two additional flow scenarios:

- 1) 100-year open water discharge + 10%
- 2) 100-year open water discharge + 20%

No hydraulic modelling parameters were varied other than discharges. Water level profiles were produced along the study reaches for the two additional flow scenarios. If a lower flow profile results in higher water levels, or if numerical instabilities or unreasonable results occur, model parameters were adjusted to resolve these issues. Water level differences compared to the base 100-year open water discharge were calculated.

For the Red Deer River reach, the average increase in flood levels is 0.09 m for a 10% increase in flow and 0.17 m for a 20% increase in flow.

For the Bearberry Creek reach, the average increase in flood levels is 0.07 m for a 10% increase in flow and 0.12 m for a 20% increase in flow.

It is acknowledged that the above analyses are not based on a regional climate change impacts assessment but are based on a simplified assumption that climate change will result in increased peak flood flows. The presented values can be viewed as a general range of potential climate change “freeboard” that could be considered in addition to computed design flood water levels.

7.0 CONCLUSIONS

This report summarizes the work of the design flood hazard identification and mapping components of the Upper Red Deer River Hazard Study. The tasks associated with these components include floodway delineation, floodway criteria mapping, development of the design flood level profile, presentation of the design flood water levels, and production of the flood hazard maps.

The floodway generally includes areas where the water is 1 m deep or greater and the local velocities are 1 m/s or faster. The floodway typically 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.

Dedicated flood control structures are assumed to be effective and protected areas are not mapped as flooded unless these structures are overtopped. Low lying areas behind dedicated flood control structures that would potentially be flooded if the control structure would fail are designated as protected flood fringe. Flood hazard maps also show incremental areas that are at risk of flooding during the 200-year and 500-year open water floods.

The floodway includes the following notable areas:

- A portion of the residential area at the south end of Range Road 60.
- The south end of the Sundre Airstrip.
- Parts of the residential area on the right floodplain of the Red Deer River north and south of Highway 587.

The flood fringe includes the following notable areas:

- Low lying floodplain areas along the Red Deer River
- Large portions of McDougal Flats including parts of the Coyote Creek Golf and RV Resort, and AROWEN campground
- Parts of the Greenwood Campground in Sundre
- Parts of the residential and commercial area in Sundre along 5 Street SE and 6 Street SE just south of Highway 27
- Parts of the residential area in Sundre along 7 Street NE north of Highway 27
- The residential and commercial area in Sundre east of Centre Street S and south of Highway 27
- Gravel pit between Range Road 42 and 43 south of Highway 587
- Parts of the Woodland Estates and River Valley Estates residential areas north and south of Highway 587
- Large portions of the Bearberry Creek floodplain on both sides of the creek, including parts of the Sundre River Resort on Range Road 60, and Wagons West RV Park and Storage
- Parts of the residential area south of Bearberry Creek, in the vicinity of Tamarack Crescent and 4th Street NW and some properties in Sundre along the Historic Bearberry Creek Channel

Signature Page

This report was prepared and reviewed by the undersigned:

Golder Associates Ltd.

APEGA Permit to Practice #05122

Prepared by:

Reviewed by:

Original Signed by

Nancy Guo, B.Sc, P.Eng.
Water Resources Engineer

Original Signed by

Wolf Ploeger, Dr.-Ing., P.Eng.
Senior River Engineer

NG/WP

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- AEP (Alberta Environmental Protection). 1997. *Sundre Flood Risk Mapping Study*, January 1997
- AEP (Alberta Environment and Parks). 2011. *Flood Hazard Identification Program Guidelines*. July 2011
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- Golder (Golder Associates Ltd.). 2019. *Red Deer River and Upper Red Deer River Hazard Studies – Open Water Flood Hydrology Assessment*.
- Golder (Golder Associates Ltd.). 2022a. *Upper Red Deer River Hazard Study – Survey and Base Data Collection Report*. June 2022
- Golder (Golder Associates Ltd.). 2022b. *Upper Red Deer River Hazard Study – Hydraulic Modelling and Calibration Report*. June 2022

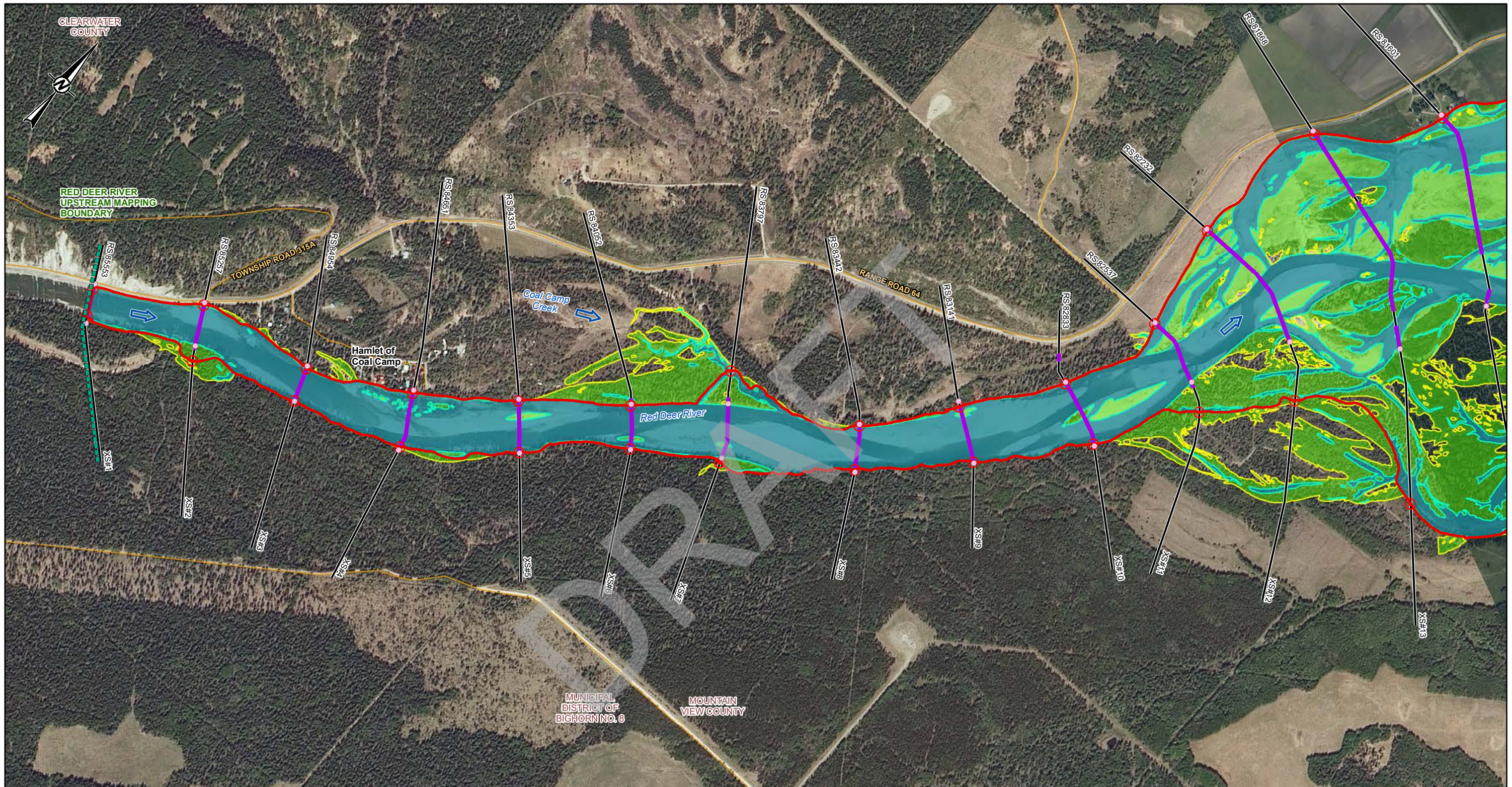
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APPENDIX A

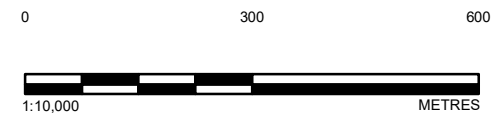
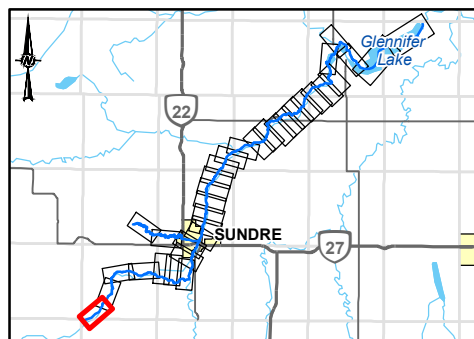
Floodway Criteria Maps

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SHEET 2 ↓

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▭	STUDY BOUNDARY	■	DEPTH ≥ 1 M
➔	FLOW DIRECTION	■	100-YEAR DESIGN FLOOD EXTENT
—	LOCAL ROAD	▨	PROTECTED FLOOD AREA
—	PRIMARY HIGHWAY	—	VELOCITY ≥ 1 M/S
—	SECONDARY HIGHWAY	▭	DESIGN DISCHARGE
▭	FLOOD CONTROL STRUCTURE	▭	RED DEER RIVER BELOW BURNT TIMBER CREEK = 1210 M ³ /S
○	CULVERT	▭	
△	DAM	▭	
○	OTHER	▭	
▭	WEIR	▭	
▭	BRIDGE	▭	
▭	PROPOSED FLOODWAY BOUNDARY	▭	



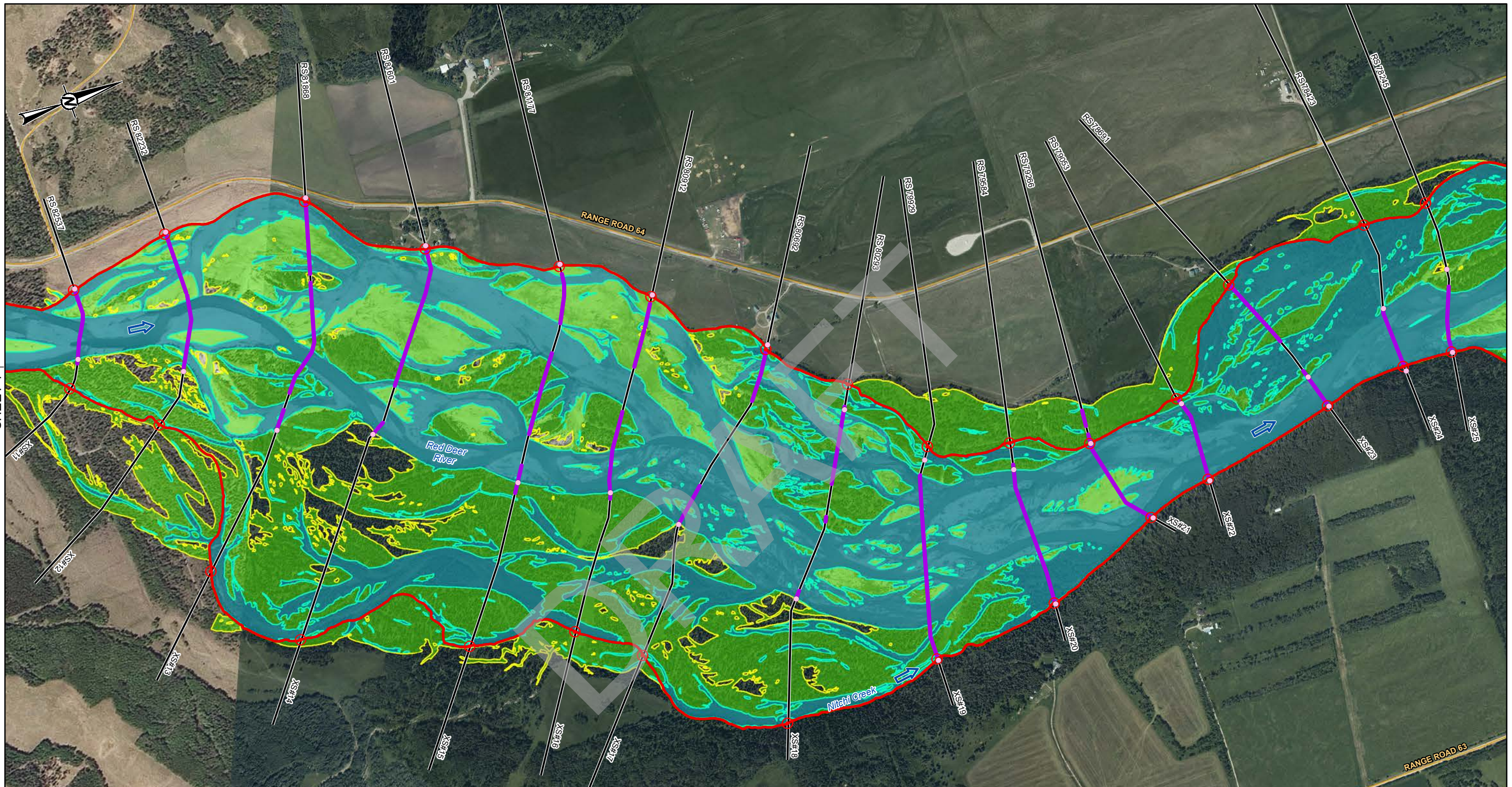
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CONSULTANT	GOLDER MEMBER OF WSP	
DATE	YYYY-MM-DD	2022-06-29
DESIGNED	WP	
PREPARED	SP	
REVIEWED	WP	
APPROVED	WP	

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 DATUM: NAD 83 CSRS PROJECTION: 3TM 114

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UPPER RED DEER RIVER HAZARD STUDY		
TITLE		
FLOODWAY CRITERIA MAP		
PROJECT NO.	CONTROL	REV.
1783057	5000	0
FIGURE		1 of 34

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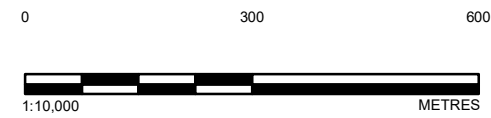
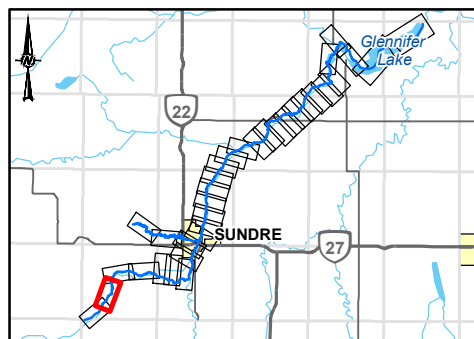


SHEET 1 ↑

↓ SHEET 3

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➔	FLOW DIRECTION
—	LOCAL ROAD
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
▬▬▬	FLOOD CONTROL STRUCTURE
◻	CULVERT
△	DAM
○	OTHER
▭	WEIR
▭	BRIDGE
▭	PROPOSED FLOODWAY BOUNDARY
●	BANK STATION
⊙	PROPOSED FLOODWAY STATION
▭	PREVIOUS FLOODWAY
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▭	100-YEAR DESIGN FLOOD EXTENT
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▭	VELOCITY ≥ 1 M/S

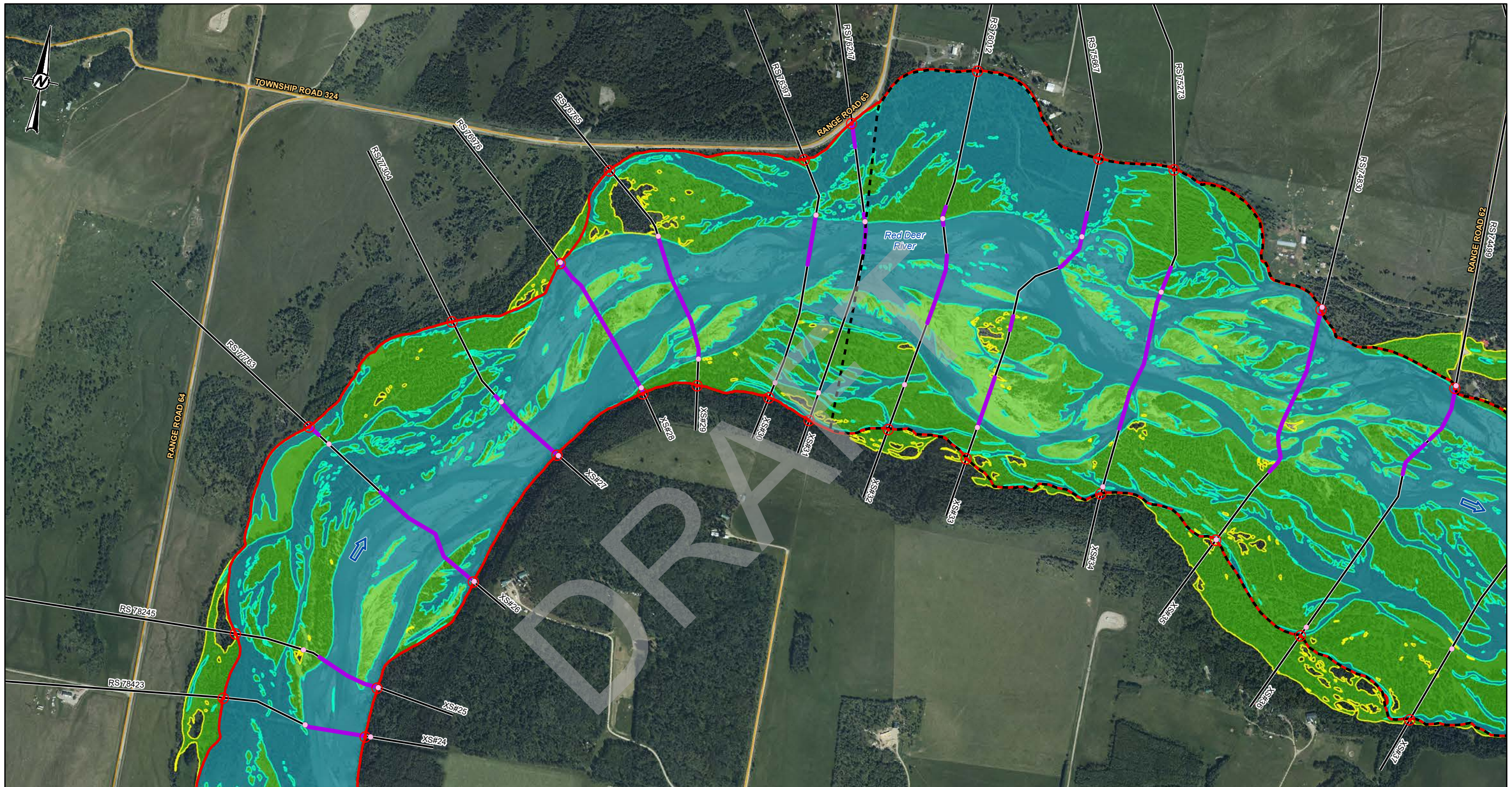
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DATE	2022-06-29	
DESIGNED	WP	
PREPARED	SP	
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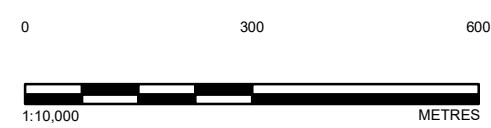
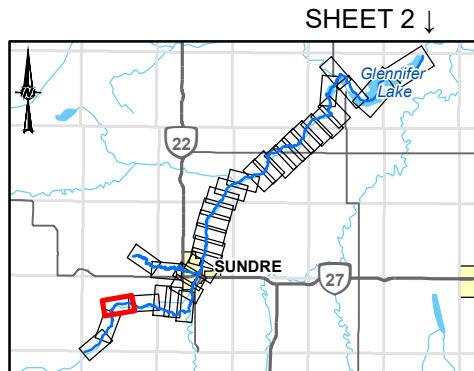
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PROJECT	UPPER RED DEER RIVER HAZARD STUDY	
TITLE	FLOODWAY CRITERIA MAP	
PROJECT NO.	CONTROL	REV.
1783057	5000	0
FIGURE	2 of 34	



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XS# 100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
—	STUDY BOUNDARY
→	FLOW DIRECTION
—	LOCAL ROAD
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
	FLOOD CONTROL STRUCTURE
◇	CULVERT
△	DAM
○	OTHER
□	WEIR
—	BRIDGE
□	PROPOSED FLOODWAY BOUNDARY
●	BANK STATION
○	PROPOSED FLOODWAY STATION
—	PREVIOUS FLOODWAY
■	DEPTH ≥ 1 M
■	100-YEAR DESIGN FLOOD EXTENT
///	PROTECTED FLOOD AREA
—	VELOCITY ≥ 1 M/S

DESIGN DISCHARGE
RED DEER RIVER BELOW BURNT TIMBER CREEK = 1210 M³/S



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DATE	2022-06-29	
DESIGNED	WP	
PREPARED	SP	
REVIEWED	WP	
APPROVED	WP	

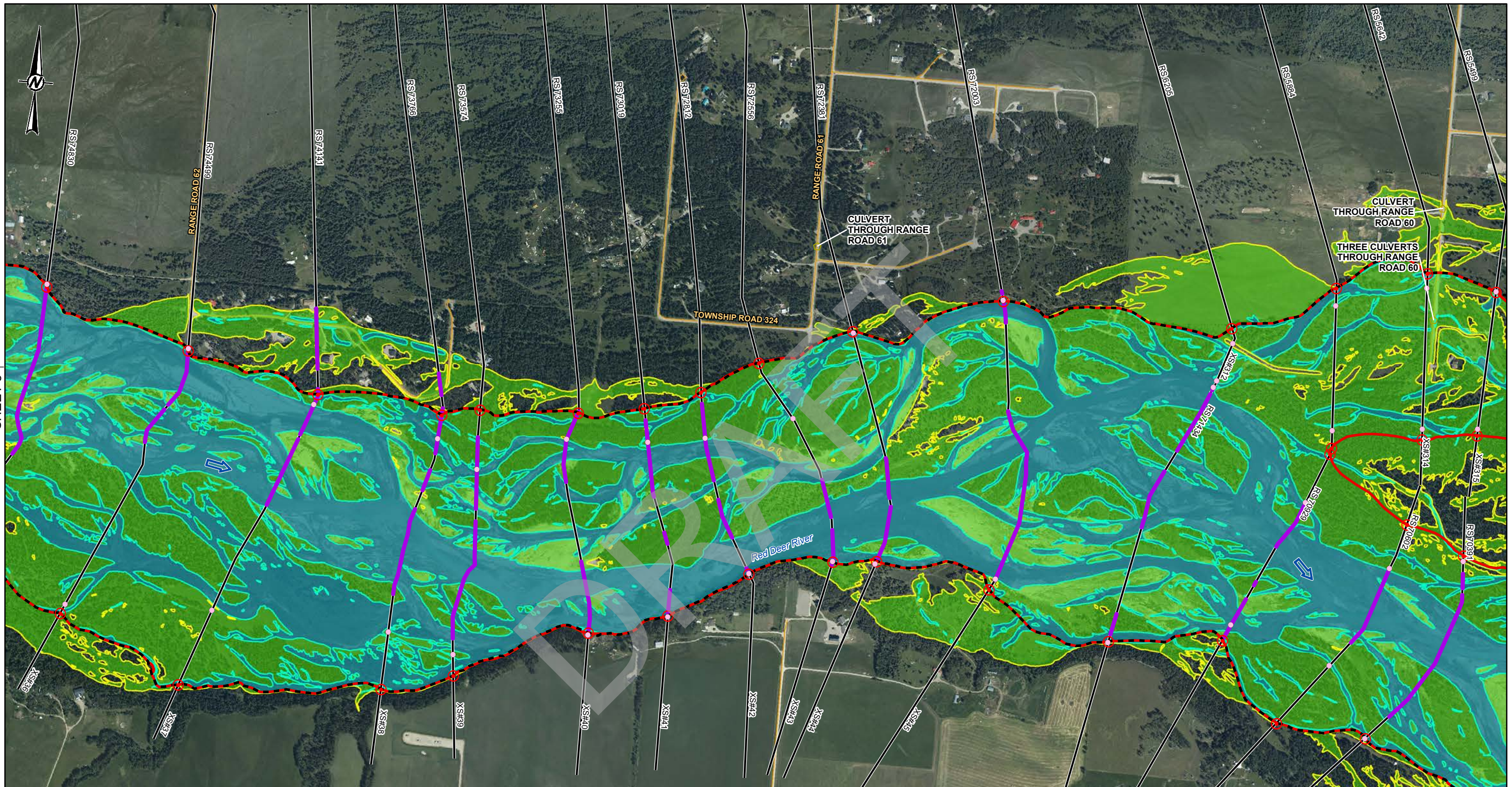
REFERENCE(S)
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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

PROJECT	UPPER RED DEER RIVER HAZARD STUDY	
TITLE	FLOODWAY CRITERIA MAP	
PROJECT NO.	CONTROL	REV.
1783057	5000	0
FIGURE	3 of 34	

C:\CLIENT\GOVERNMENT_OF_ALBERTA\1482576_Upper_Red_DeerMapping\05_Design_Flood_Hazard_Mapping\1482576_Floodway_Criteria_Rev0.mxd PRINTED ON: 2022-06-29 AT: 10:24:44 AM

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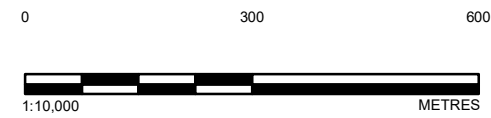
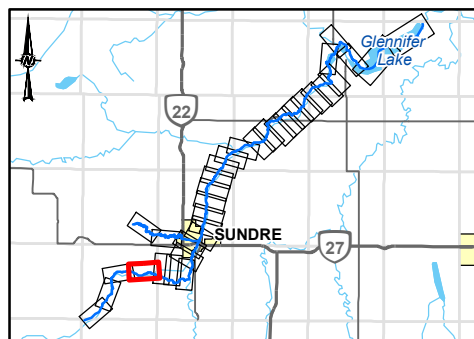


SHEET 3 ↑

↓ SHEET 5

LEGEND	
—	CROSS SECTION
XS# 100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
—	STUDY BOUNDARY
→	FLOW DIRECTION
—	LOCAL ROAD
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
	FLOOD CONTROL STRUCTURE
◇	CULVERT
△	DAM
○	OTHER
□	WEIR
—	BRIDGE
□	PROPOSED FLOODWAY BOUNDARY
●	BANK STATION
○	PROPOSED FLOODWAY STATION
—	PREVIOUS FLOODWAY
■	DEPTH ≥ 1 M
■	100-YEAR DESIGN FLOOD EXTENT
///	PROTECTED FLOOD AREA
—	VELOCITY ≥ 1 M/S

DESIGN DISCHARGE
 RED DEER RIVER BELOW BURNT TIMBER CREEK = 1210 M³/S
 MCDOUGAL SOUTH CHANNEL = 154.4 M³/S

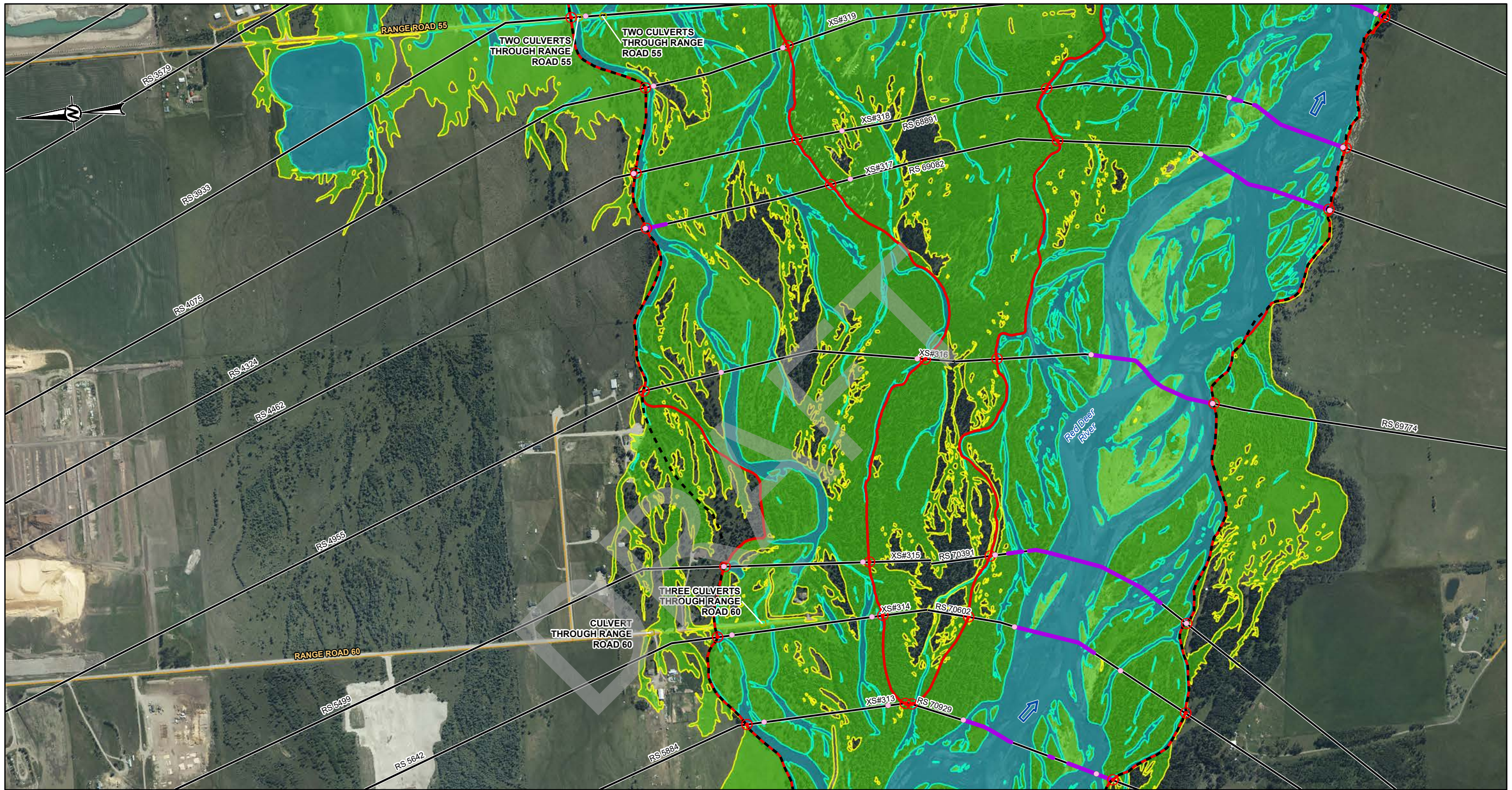


CLIENT	ALBERTA ENVIRONMENT AND PARKS	Alberta Government
CONSULTANT	GOLDER MEMBER OF WSP	
DATE	2022-06-29	
DESIGNED	WP	
PREPARED	SP	
REVIEWED	WP	
APPROVED	WP	

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

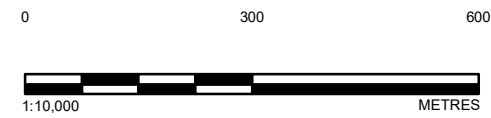
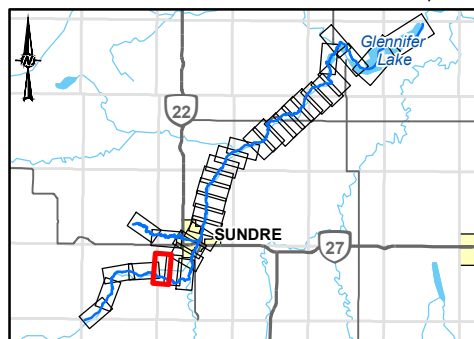
PROJECT	UPPER RED DEER RIVER HAZARD STUDY	
TITLE	FLOODWAY CRITERIA MAP	
PROJECT NO.	CONTROL	REV.
1783057	5000	0
FIGURE	4 of 34	

25mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



LEGEND	
—	CROSS SECTION
XS# 100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
—	STUDY BOUNDARY
→	FLOW DIRECTION
—	LOCAL ROAD
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
	FLOOD CONTROL STRUCTURE
◇	CULVERT
△	DAM
○	OTHER
□	WEIR
—	BRIDGE
—	PROPOSED FLOODWAY BOUNDARY
●	BANK STATION
⊙	PROPOSED FLOODWAY STATION
⊖	PREVIOUS FLOODWAY
■	DEPTH ≥ 1 M
■	100-YEAR DESIGN FLOOD EXTENT
///	PROTECTED FLOOD AREA
—	VELOCITY ≥ 1 M/S

DESIGN DISCHARGE
 RED DEER RIVER BELOW BURNT TIMBER CREEK = 1210 M³/S
 MCDOUGAL SOUTH CHANNEL = 154.4 M³/S



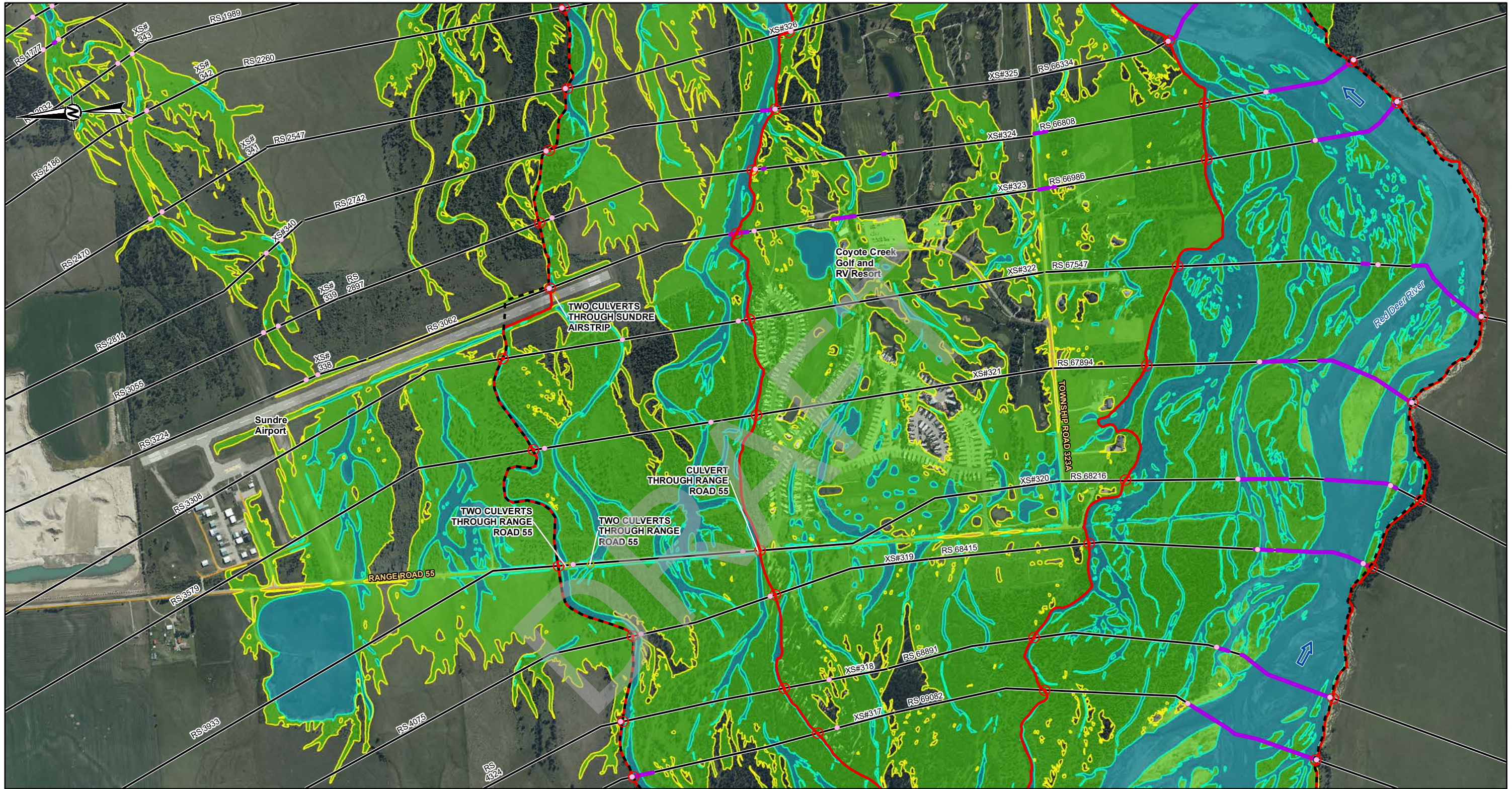
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 DATUM: NAD 83 CSRS PROJECTION: 3TM 114

CLIENT	ALBERTA ENVIRONMENT AND PARKS	Alberta Government
CONSULTANT	GOLDER MEMBER OF WSP	
DATE	2022-06-29	
DESIGNED	WP	
PREPARED	SP	
REVIEWED	WP	
APPROVED	WP	

PROJECT	UPPER RED DEER RIVER HAZARD STUDY		
TITLE	FLOODWAY CRITERIA MAP		
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	5000	0	5 of 34

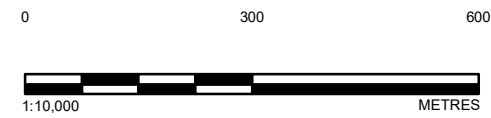
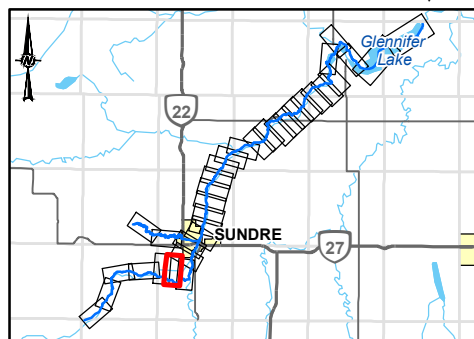
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



LEGEND	
—	CROSS SECTION
XS# 100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
—	STUDY BOUNDARY
→	FLOW DIRECTION
—	LOCAL ROAD
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
	FLOOD CONTROL STRUCTURE
HYDRAULIC STRUCTURES	
◻	CULVERT
△	DAM
○	OTHER
□	WEIR
—	BRIDGE
—	PROPOSED FLOODWAY BOUNDARY
●	BANK STATION
⊙	PROPOSED FLOODWAY STATION
⊖	PREVIOUS FLOODWAY
■	DEPTH ≥ 1 M
■	100-YEAR DESIGN FLOOD EXTENT
///	PROTECTED FLOOD AREA
—	VELOCITY ≥ 1 M/S

DESIGN DISCHARGE
 RED DEER RIVER BELOW BURNT TIMBER CREEK = 1210 M³/S
 MCDUGAL NORTH CHANNEL = 19.4 M³/S



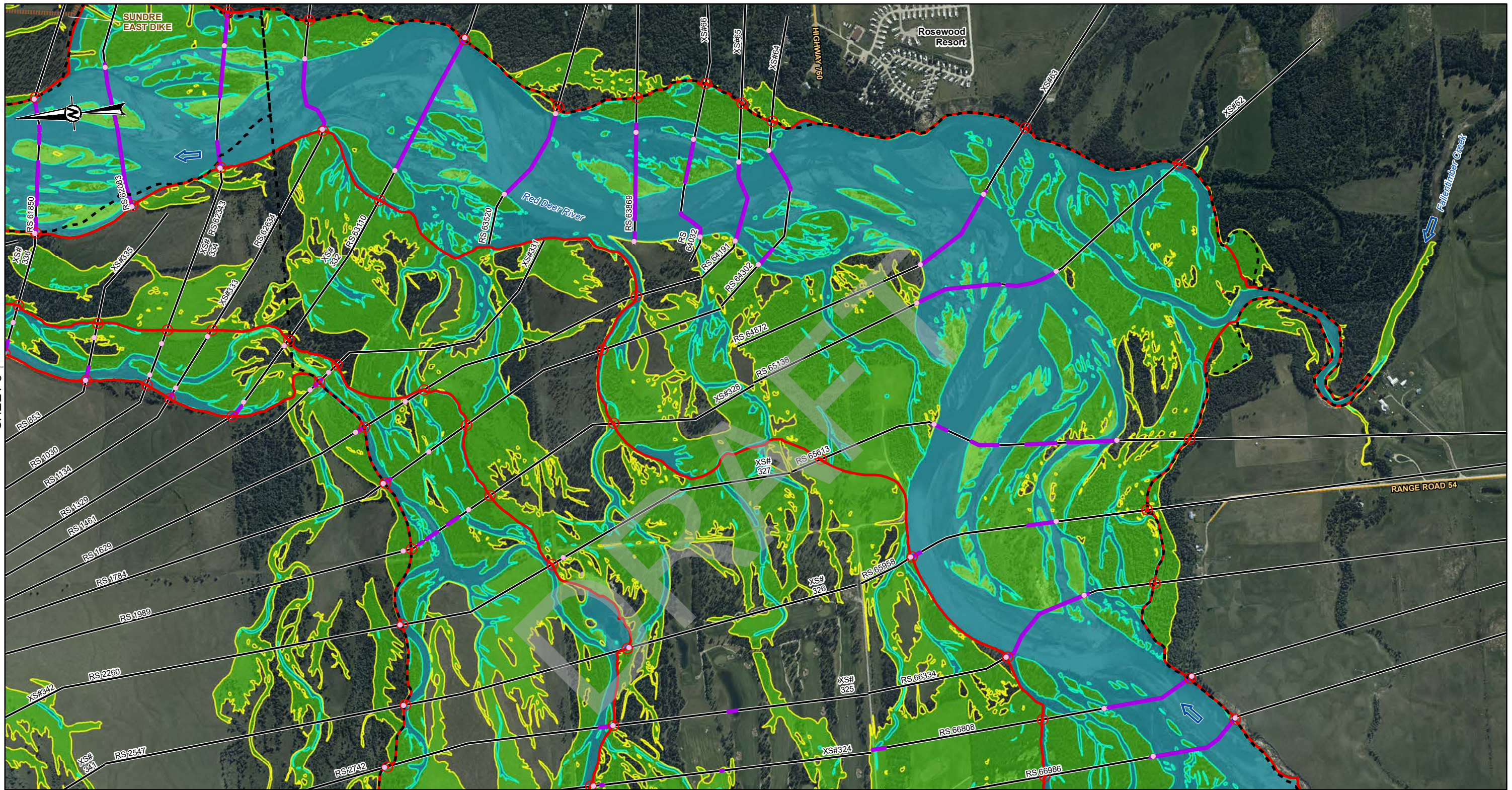
CLIENT	ALBERTA ENVIRONMENT AND PARKS	ALBERTA Government
CONSULTANT	GOLDER MEMBER OF WSP	
DATE	2022-06-29	
DESIGNED	WP	
PREPARED	SP	
REVIEWED	WP	
APPROVED	WP	

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 DATUM: NAD 83 CSRS PROJECTION: 3TM 114

PROJECT	UPPER RED DEER RIVER HAZARD STUDY	
TITLE	FLOODWAY CRITERIA MAP	
PROJECT NO.	CONTROL	REV.
1783057	5000	0
FIGURE	6 of 34	

WITH CLIENT GOVERNMENT OF ALBERTA 1425276 Upper Red Deer Mapping 05 Design Flood Hazard Mapping 21452576 Floodway Criteria Rev0.mxd PRINTED ON: 2022-06-29 AT: 10:40:33 AM

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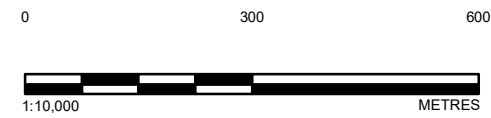
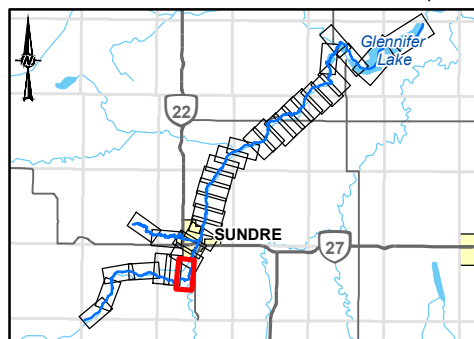


SHEET 8 ↑

SHEET 6 ↓

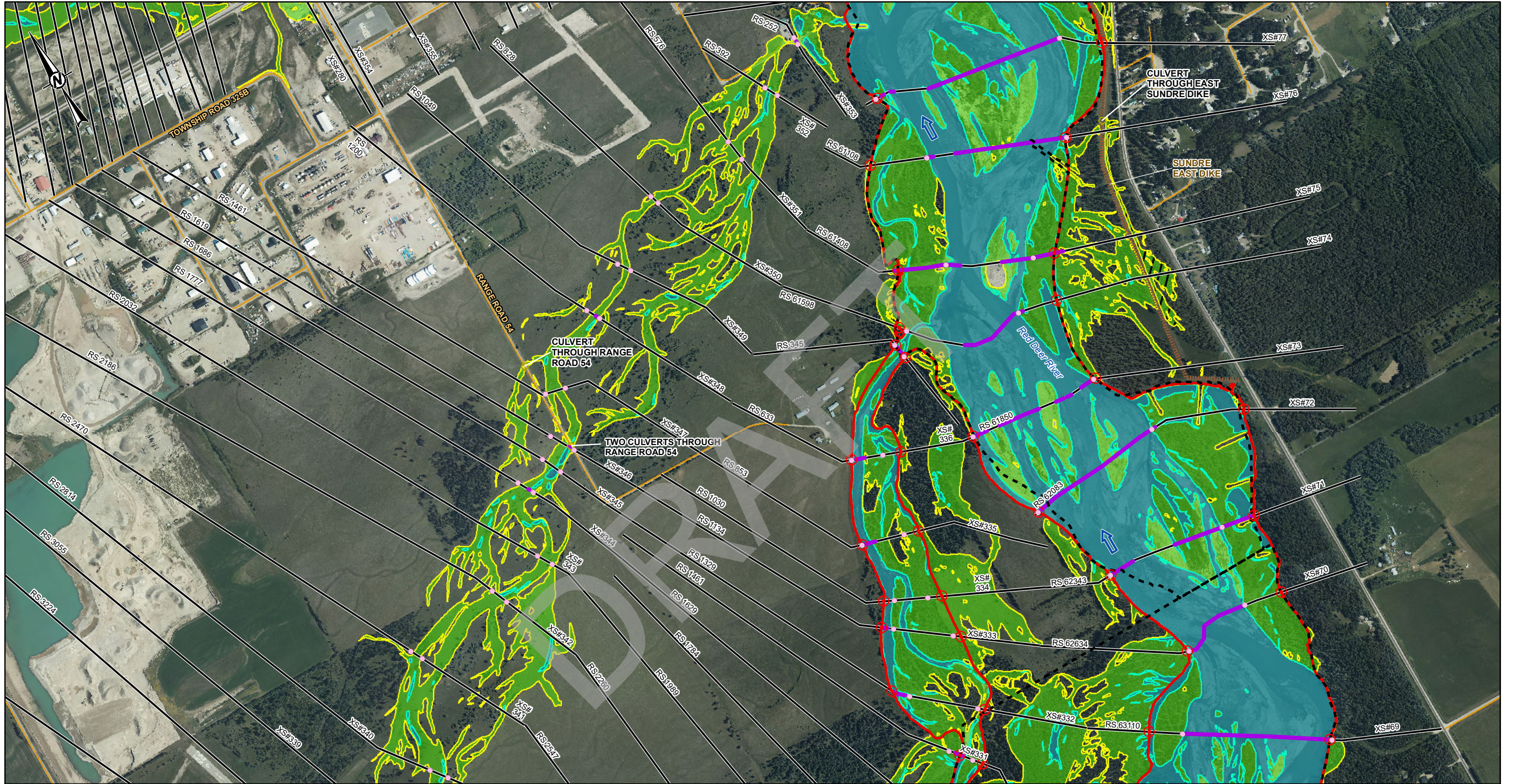
LEGEND	
—	CROSS SECTION
XS# 100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
—	STUDY BOUNDARY
→	FLOW DIRECTION
—	LOCAL ROAD
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
—	FLOOD CONTROL STRUCTURE
○	CULVERT
△	DAM
○	OTHER
□	WEIR
—	BRIDGE
—	PROPOSED FLOODWAY BOUNDARY
●	BANK STATION
○	PROPOSED FLOODWAY STATION
—	PREVIOUS FLOODWAY
—	DEPTH ≥ 1 M
—	100-YEAR DESIGN FLOOD EXTENT
—	PROTECTED FLOOD AREA
—	VELOCITY ≥ 1 M/S

DESIGN DISCHARGE
 RED DEER RIVER BELOW BURNT TIMBER CREEK = 1210 M³/S
 MCDUGAL NORTH CHANNEL = 19.4 M³/S
 MCDUGAL SOUTH CHANNEL = 154.4 M³/S
 RED DEER RIVER BELOW FALLENTIMBER CREEK = 1130.8 M³/S



CLIENT	ALBERTA ENVIRONMENT AND PARKS	ALBERTA Government
CONSULTANT	GOLDER MEMBER OF WSP	
DATE	2022-06-29	
DESIGNED	WP	
PREPARED	SP	
REVIEWED	WP	
APPROVED	WP	

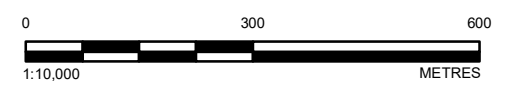
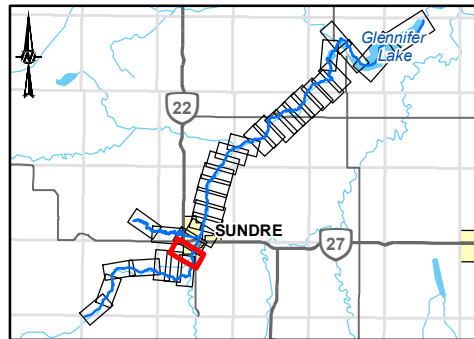
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PROJECT	UPPER RED DEER RIVER HAZARD STUDY
TITLE	FLOODWAY CRITERIA MAP
PROJECT NO.	1783057
CONTROL	5000
REV.	0
FIGURE	7 of 34



LEGEND

—	CROSS SECTION		FLOOD CONTROL STRUCTURE	●	BANK STATION
XS# 100	CROSS SECTION NUMBER	◇	CULVERT	⊙	PROPOSED FLOODWAY STATION
RS 304	RIVER STATION (M)	△	DAM	▨	PREVIOUS FLOODWAY
▭	STUDY BOUNDARY	○	OTHER	■	DEPTH ≥ 1 M
➔	FLOW DIRECTION	□	WEIR	■	100-YEAR DESIGN FLOOD EXTENT
—	LOCAL ROAD	⌈	BRIDGE	▨	PROTECTED FLOOD AREA
—	PRIMARY HIGHWAY	▭	PROPOSED FLOODWAY BOUNDARY	—	VELOCITY ≥ 1 M/S
—	SECONDARY HIGHWAY				

DESIGN DISCHARGE
 RED DEER RIVER BELOW FALLEN TIMBER CREEK = 1130.8 M³/S
 MCDUGAL NORTH CHANNEL = 19.4 M³/S



CLIENT
ALBERTA ENVIRONMENT AND PARKS

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-06-29
DESIGNED	WP
PREPARED	SP
REVIEWED	WP
APPROVED	WP

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 DATUM: NAD 83 CSRS PROJECTION: 3TM 114

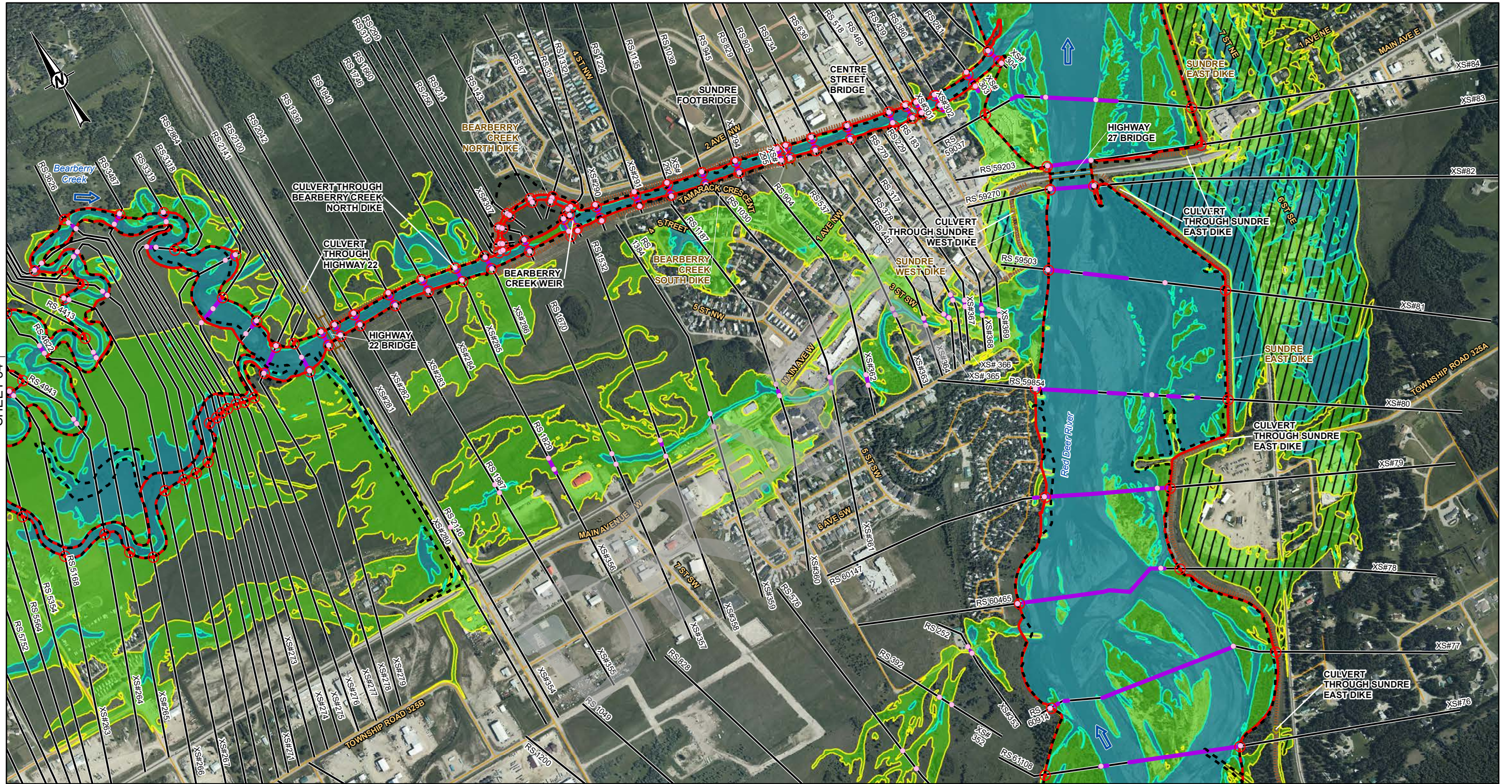
PROJECT
UPPER RED DEER RIVER HAZARD STUDY

TITLE
FLOODWAY CRITERIA MAP

PROJECT NO.	CONTROL	REV.	FIGURE
1783057	5000	0	8 of 34

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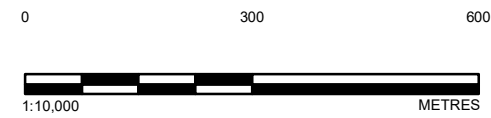
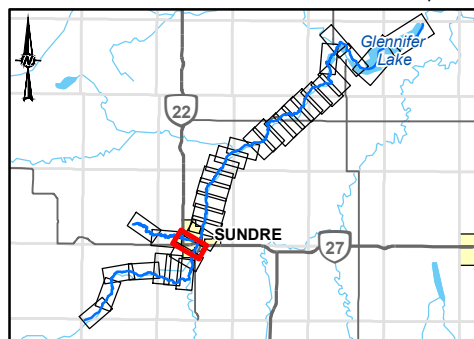


SHEET 34 ↑

LEGEND

—	CROSS SECTION		FLOOD CONTROL STRUCTURE	●	BANK STATION
XS# 100	CROSS SECTION NUMBER	○	CULVERT	⊙	PROPOSED FLOODWAY STATION
RS 304	RIVER STATION (M)	△	DAM	▭	PREVIOUS FLOODWAY
▭	STUDY BOUNDARY	○	OTHER	■	DEPTH ≥ 1 M
➔	FLOW DIRECTION	□	WEIR	▨	100-YEAR DESIGN FLOOD EXTENT
—	LOCAL ROAD	▭	BRIDGE	▨	PROTECTED FLOOD AREA
—	PRIMARY HIGHWAY	▭	PROPOSED FLOODWAY BOUNDARY	—	VELOCITY ≥ 1 M/S
—	SECONDARY HIGHWAY				

DESIGN DISCHARGE
 RED DEER RIVER BELOW FALLETIMBER CREEK = 1130.8 M³/S
 MCDUGAL NORTH CHANNEL = 19.4 M³/S
 BEARBERRY CREEK = 214 M³/S
 FISHWAY = 10.7 M³/S
 BEARBERRY HISTORIC CHANNEL = 32.1 M³/S



CLIENT
 ALBERTA ENVIRONMENT AND PARKS

CONSULTANT
GOLDER
 MEMBER OF WSP

DATE: 2022-06-29

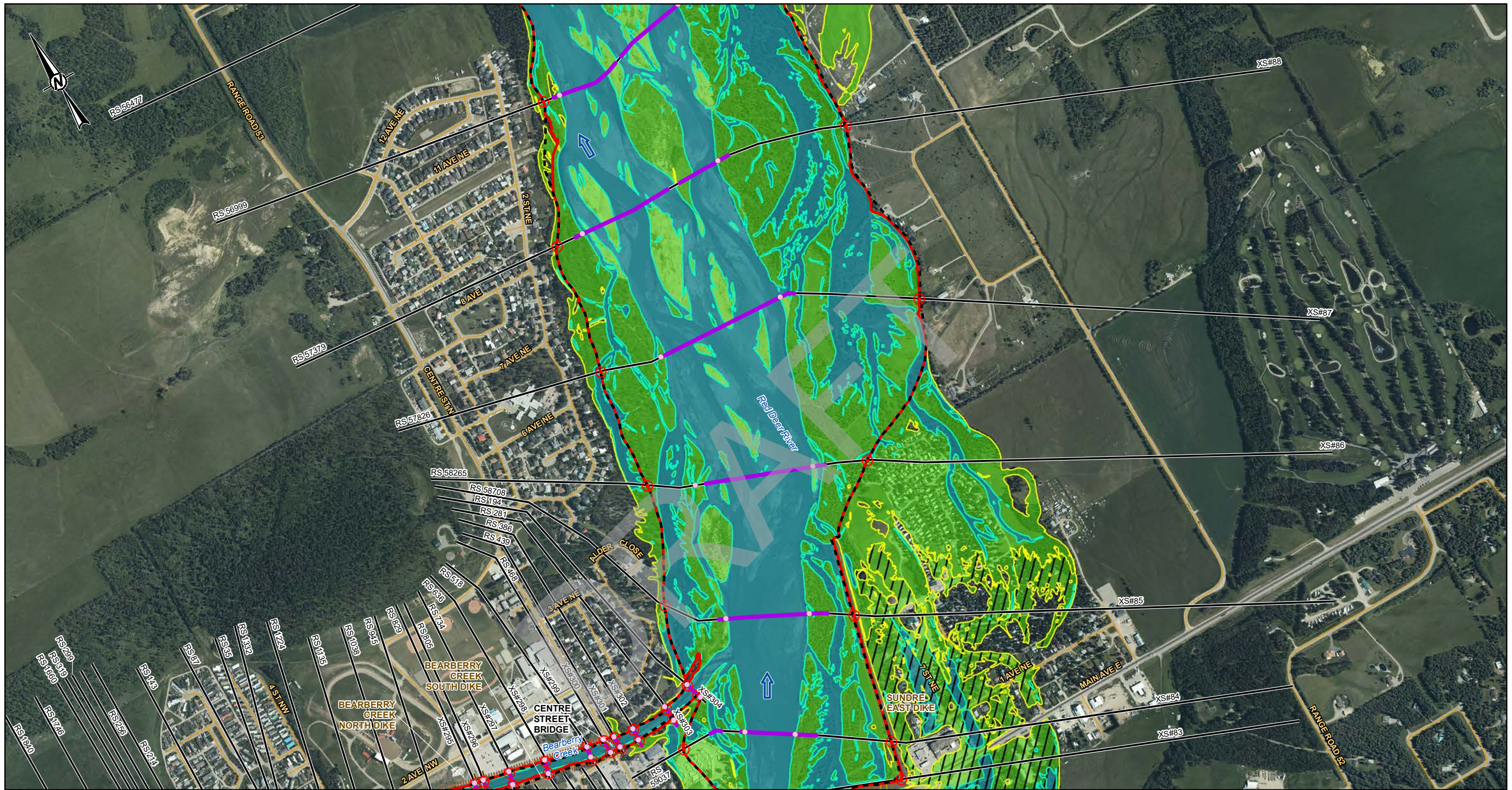
DESIGNED	WP
PREPARED	SP
REVIEWED	WP
APPROVED	WP

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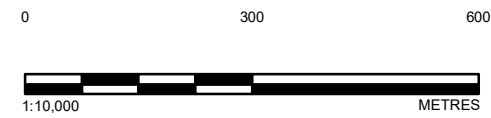
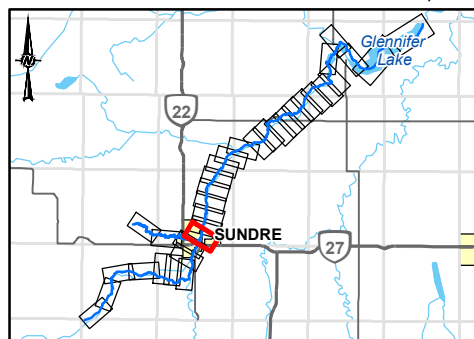
PROJECT
 UPPER RED DEER RIVER HAZARD STUDY

TITLE
FLOODWAY CRITERIA MAP

PROJECT NO.	CONTROL	REV.	FIGURE
1783057	5000	0	9 of 34



LEGEND	
—	CROSS SECTION
XS# 100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
—	STUDY BOUNDARY
→	FLOW DIRECTION
—	LOCAL ROAD
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
—	FLOOD CONTROL STRUCTURE
◻	HYDRAULIC STRUCTURES
◻	CULVERT
◻	DAM
◻	OTHER
◻	WEIR
◻	BRIDGE
◻	PROPOSED FLOODWAY BOUNDARY
●	BANK STATION
●	PROPOSED FLOODWAY STATION
◻	PREVIOUS FLOODWAY
◻	DEPTH ≥ 1 M
◻	100-YEAR DESIGN FLOOD EXTENT
◻	PROTECTED FLOOD AREA
◻	VELOCITY ≥ 1 M/S
DESIGN DISCHARGE RED DEER RIVER BELOW BEARBERRY CREEK= 1210 M ³ /S	



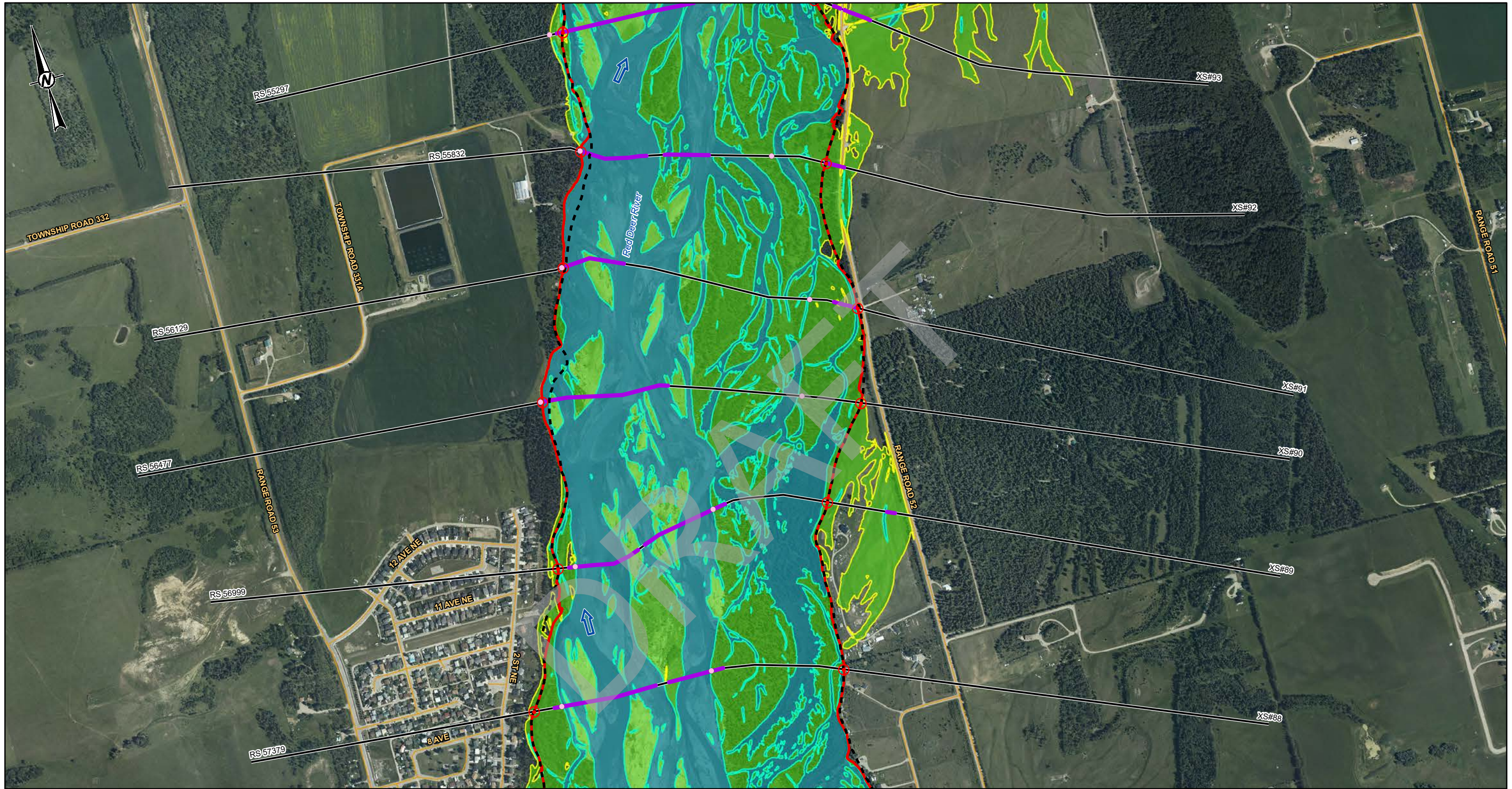
CLIENT	ALBERTA ENVIRONMENT AND PARKS	ALBERTA Government
CONSULTANT	GOLDER MEMBER OF WSP	
DATE	2022-06-29	
DESIGNED	WP	
PREPARED	SP	
REVIEWED	WP	
APPROVED	WP	

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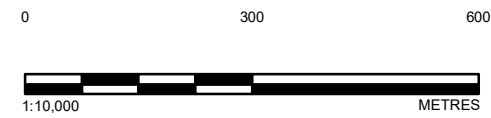
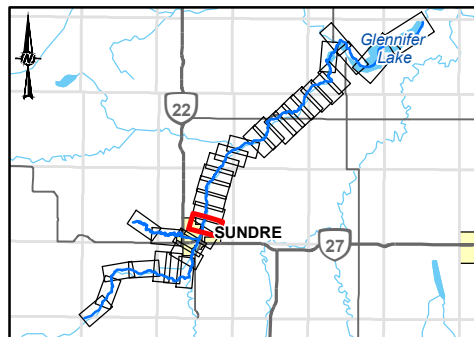
PROJECT	UPPER RED DEER RIVER HAZARD STUDY	
TITLE	FLOODWAY CRITERIA MAP	
PROJECT NO.	CONTROL	REV.
1783057	5000	0
FIGURE	10 of 34	

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



LEGEND	
—	CROSS SECTION
XS# 100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
—	STUDY BOUNDARY
→	FLOW DIRECTION
—	LOCAL ROAD
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
	FLOOD CONTROL STRUCTURE
◇	CULVERT
△	DAM
○	OTHER
□	WEIR
—	BRIDGE
□	PROPOSED FLOODWAY BOUNDARY
●	BANK STATION
⊙	PROPOSED FLOODWAY STATION
---	PREVIOUS FLOODWAY
■	DEPTH ≥ 1 M
■	100-YEAR DESIGN FLOOD EXTENT
///	PROTECTED FLOOD AREA
—	VELOCITY ≥ 1 M/S
DESIGN DISCHARGE RED DEER RIVER BELOW BEARBERRY CREEK= 1210 M ³ /S	



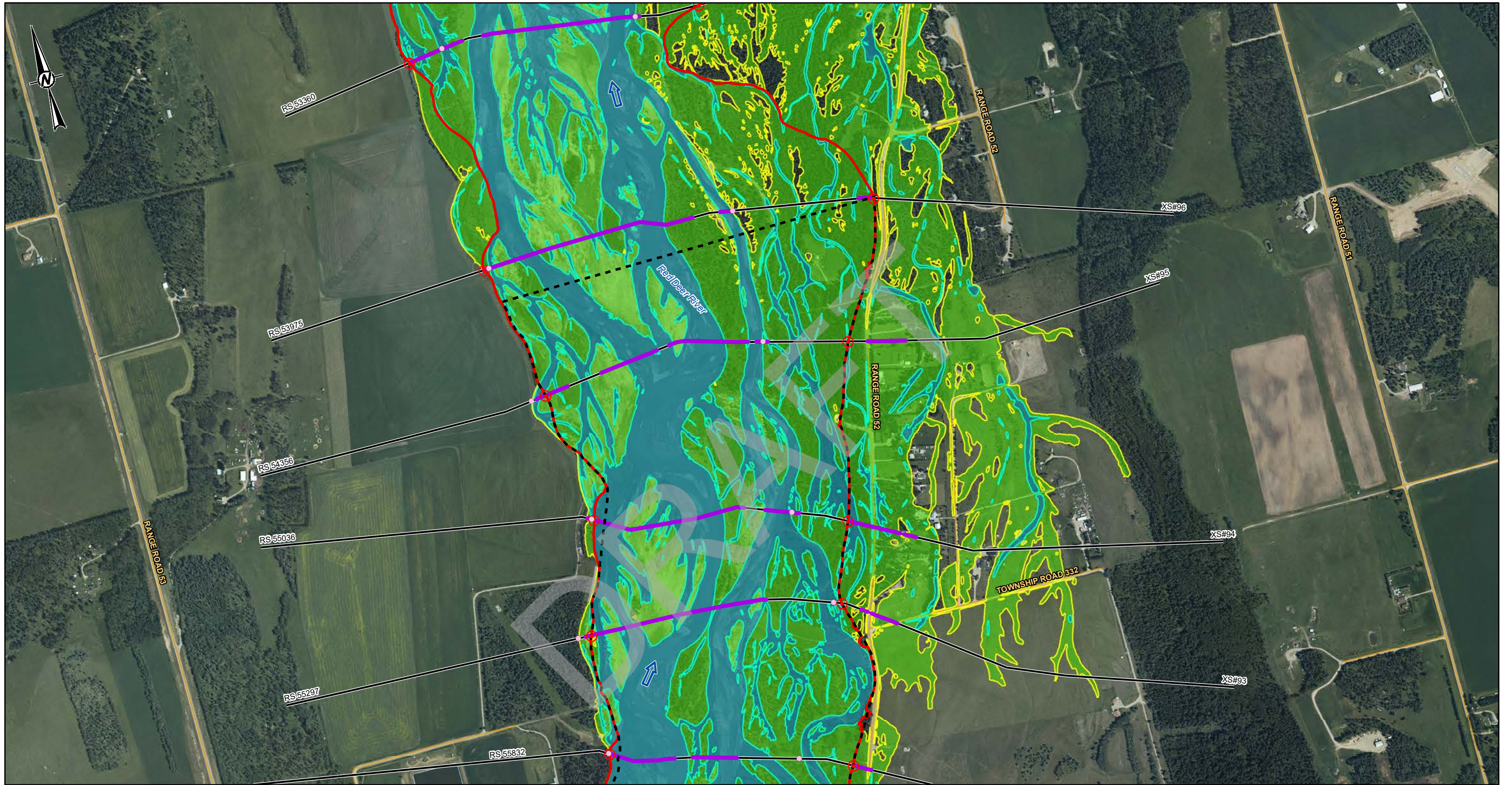
CLIENT
ALBERTA ENVIRONMENT
AND PARKS



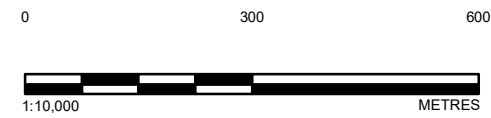
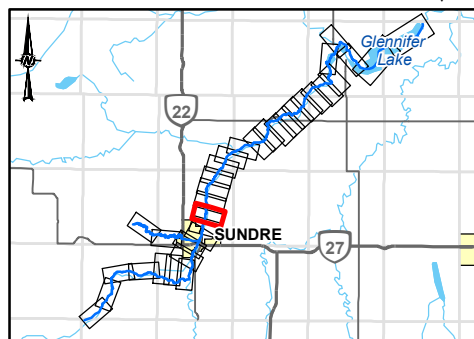
CONSULTANT	DATE	STATUS
GOLDER	2022-06-29	DESIGNED
MEMBER OF WSP		PREPARED
		REVIEWED
		APPROVED

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

PROJECT		TITLE	
ALBERTA ENVIRONMENT AND PARKS		UPPER RED DEER RIVER HAZARD STUDY	
		FLOODWAY CRITERIA MAP	
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	5000	0	11 of 34



LEGEND	
—	CROSS SECTION
XS# 100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
—	STUDY BOUNDARY
→	FLOW DIRECTION
—	LOCAL ROAD
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
	FLOOD CONTROL STRUCTURE
◇	CULVERT
△	DAM
○	OTHER
□	WEIR
—	BRIDGE
□	PROPOSED FLOODWAY BOUNDARY
●	BANK STATION
○	PROPOSED FLOODWAY STATION
---	PREVIOUS FLOODWAY
■	DEPTH ≥ 1 M
■	100-YEAR DESIGN FLOOD EXTENT
///	PROTECTED FLOOD AREA
—	VELOCITY ≥ 1 M/S
DESIGN DISCHARGE RED DEER RIVER BELOW BEARBERRY CREEK= 1210 M ³ /S	



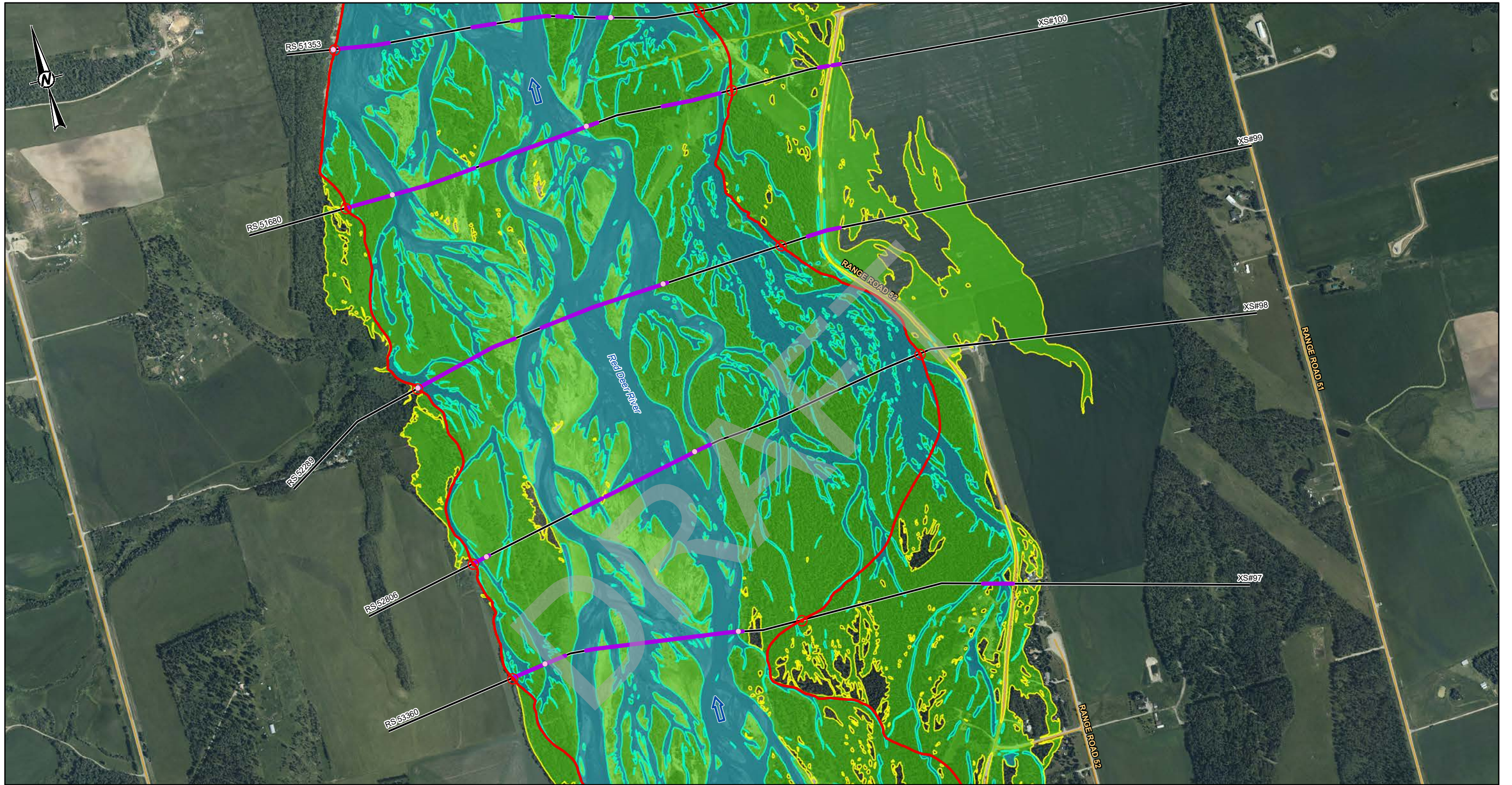
CLIENT	ALBERTA ENVIRONMENT AND PARKS
CONSULTANT	GOLDER MEMBER OF WSP
DATE	2022-06-29
DESIGNED	WP
PREPARED	SP
REVIEWED	WP
APPROVED	WP

REFERENCE(S)
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PROJECT	UPPER RED DEER RIVER HAZARD STUDY
TITLE	FLOODWAY CRITERIA MAP
PROJECT NO.	1783057
CONTROL	5000
REV.	0
FIGURE	12 of 34

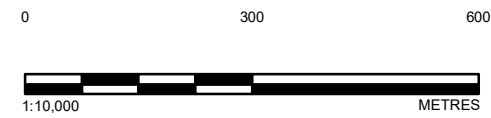
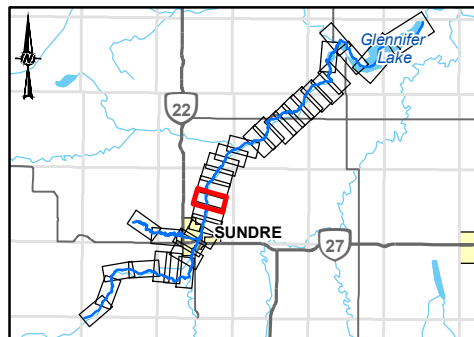
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



LEGEND	
—	CROSS SECTION
XS# 100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
▭	STUDY BOUNDARY
➔	FLOW DIRECTION
—	LOCAL ROAD
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
▬▬▬▬	FLOOD CONTROL STRUCTURE
◻	CULVERT
△	DAM
○	OTHER
▭	WEIR
▭	BRIDGE
▭	PROPOSED FLOODWAY BOUNDARY
●	BANK STATION
⊙	PROPOSED FLOODWAY STATION
▭	PREVIOUS FLOODWAY
▭	DEPTH ≥ 1 M
▭	100-YEAR DESIGN FLOOD EXTENT
▭	PROTECTED FLOOD AREA
▭	VELOCITY ≥ 1 M/S

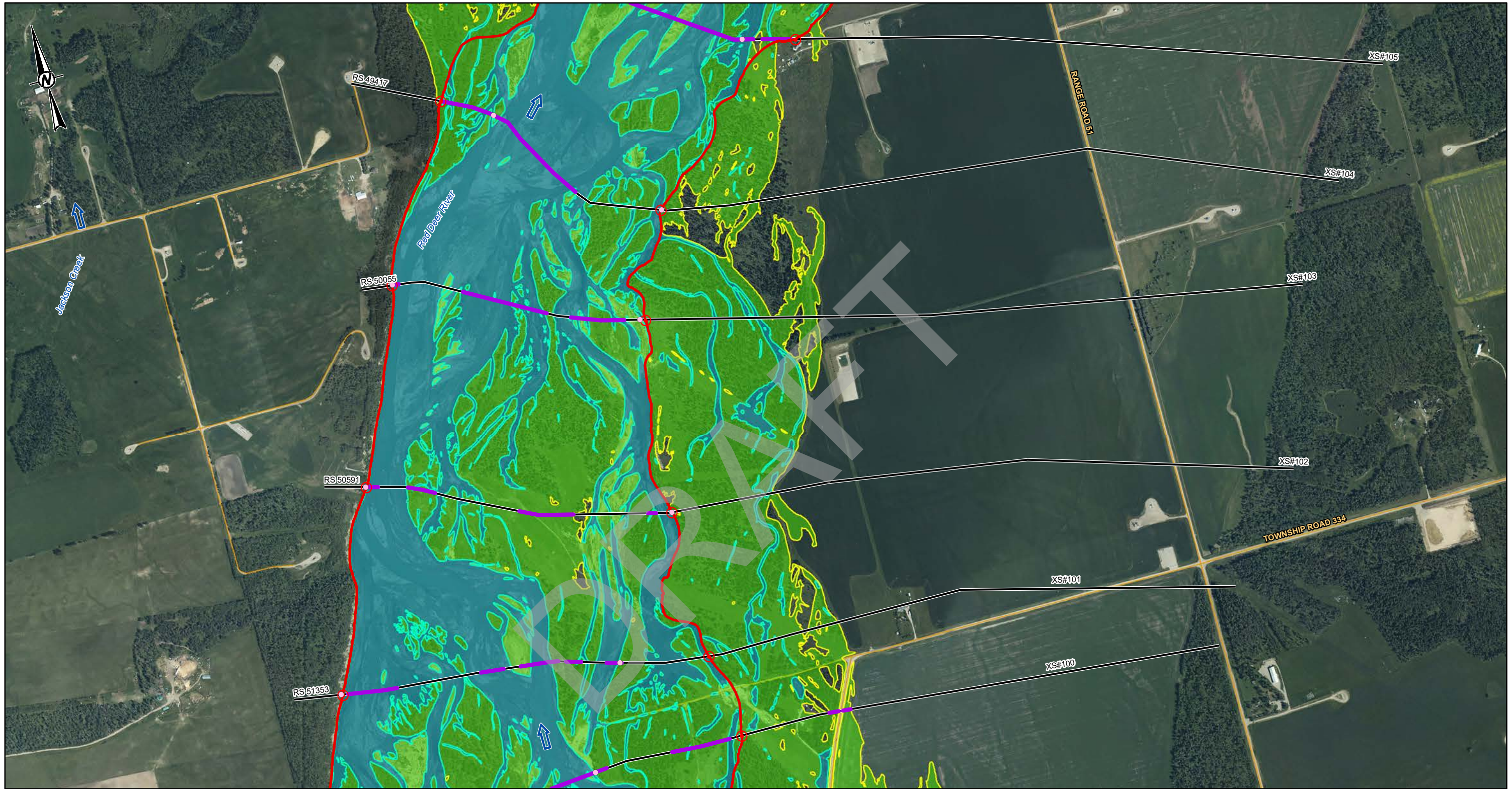
DESIGN DISCHARGE
RED DEER RIVER BELOW BEARBERRY CREEK= 1210 M³/S



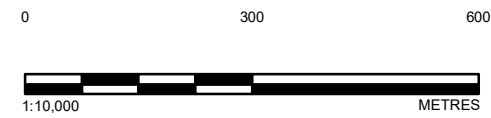
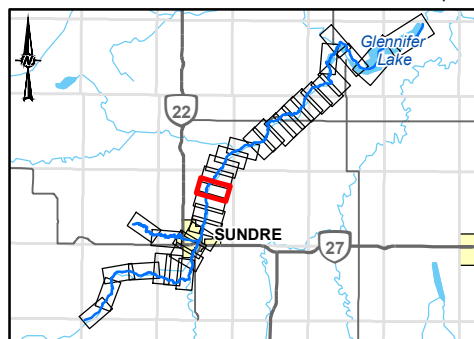
CLIENT	ALBERTA ENVIRONMENT AND PARKS
CONSULTANT	GOLDER MEMBER OF WSP
DATE	2022-06-29
DESIGNED	WP
PREPARED	SP
REVIEWED	WP
APPROVED	WP

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

PROJECT	UPPER RED DEER RIVER HAZARD STUDY
TITLE	FLOODWAY CRITERIA MAP
PROJECT NO.	1783057
CONTROL	5000
REV.	0
FIGURE	13 of 34



LEGEND	
—	CROSS SECTION
XS# 100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
▬▬▬	STUDY BOUNDARY
➔	FLOW DIRECTION
—	LOCAL ROAD
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
▬▬▬▬	FLOOD CONTROL STRUCTURE
◻	CULVERT
△	DAM
○	OTHER
▭	WEIR
▭	BRIDGE
▭	PROPOSED FLOODWAY BOUNDARY
●	BANK STATION
⊙	PROPOSED FLOODWAY STATION
⊖	PREVIOUS FLOODWAY
■	DEPTH ≥ 1 M
■	100-YEAR DESIGN FLOOD EXTENT
▨	PROTECTED FLOOD AREA
—	VELOCITY ≥ 1 M/S
DESIGN DISCHARGE RED DEER RIVER BELOW BEARBERRY CREEK= 1210 M ³ /S	



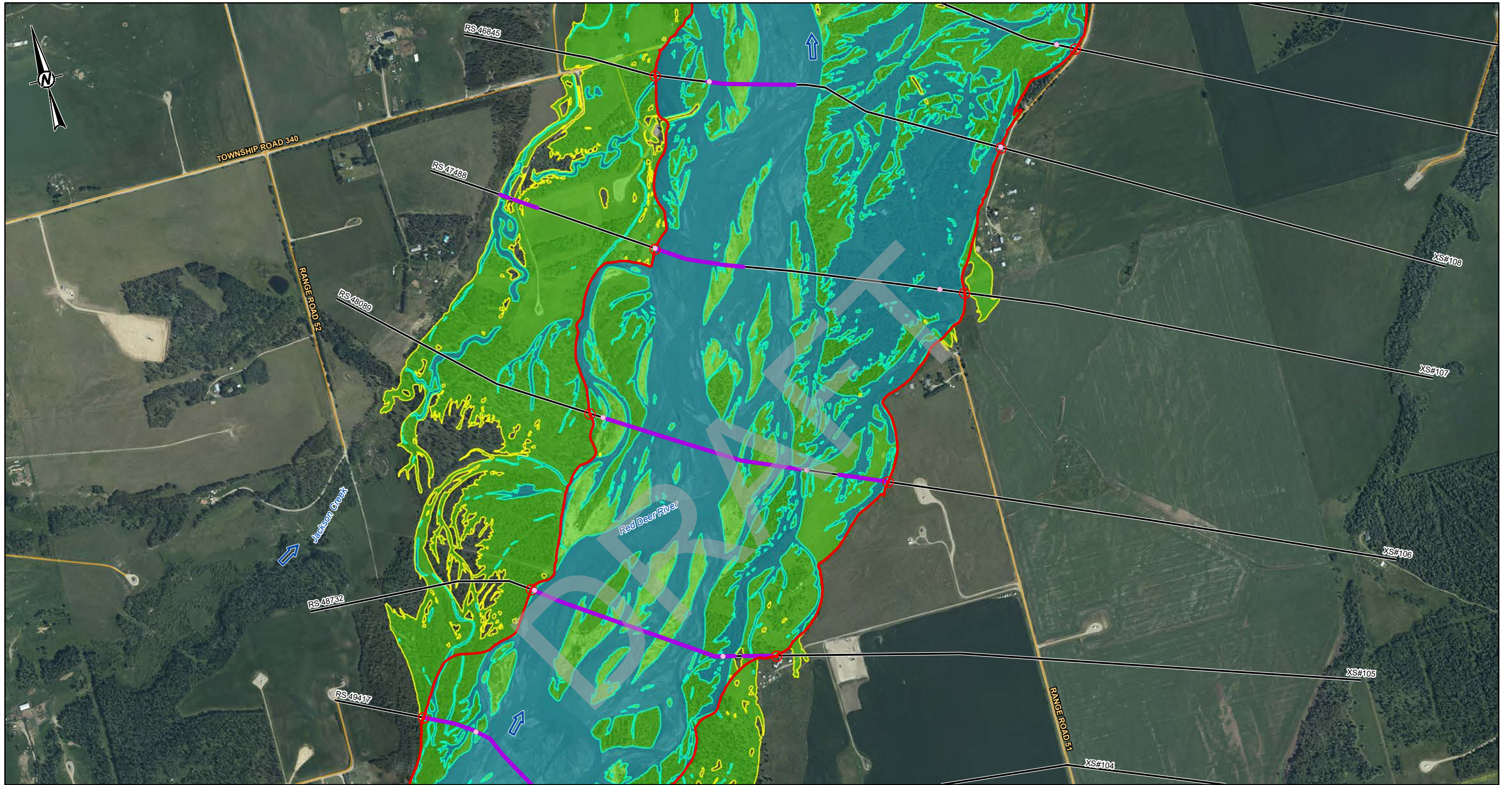
CLIENT	ALBERTA ENVIRONMENT AND PARKS	ALBERTA Government
CONSULTANT	GOLDER MEMBER OF WSP	
DATE	2022-06-29	
DESIGNED	WP	
PREPARED	SP	
REVIEWED	WP	
APPROVED	WP	

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

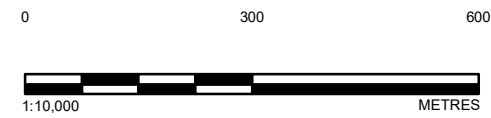
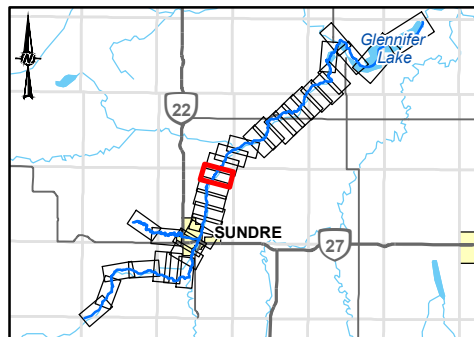
PROJECT		UPPER RED DEER RIVER HAZARD STUDY	
TITLE		FLOODWAY CRITERIA MAP	
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	5000	0	14 of 34

WITH CLIENT GOVERNMENT OF ALBERTA 1425276 Upper Red Deer Mapping 05 Design Flood Hazard Mapping 21452576 Floodway Criteria Rev0.mxd PRINTED ON: 2022-06-29 AT: 11:20:07 AM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



LEGEND	
—	CROSS SECTION
XS# 100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
—	STUDY BOUNDARY
→	FLOW DIRECTION
—	LOCAL ROAD
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
	FLOOD CONTROL STRUCTURE
◇	CULVERT
△	DAM
○	OTHER
□	WEIR
—	BRIDGE
□	PROPOSED FLOODWAY BOUNDARY
●	BANK STATION
⊙	PROPOSED FLOODWAY STATION
⊘	PREVIOUS FLOODWAY
■	DEPTH ≥ 1 M
■	100-YEAR DESIGN FLOOD EXTENT
///	PROTECTED FLOOD AREA
—	VELOCITY ≥ 1 M/S
DESIGN DISCHARGE RED DEER RIVER BELOW BEARBERRY CREEK= 1210 M ³ /S	



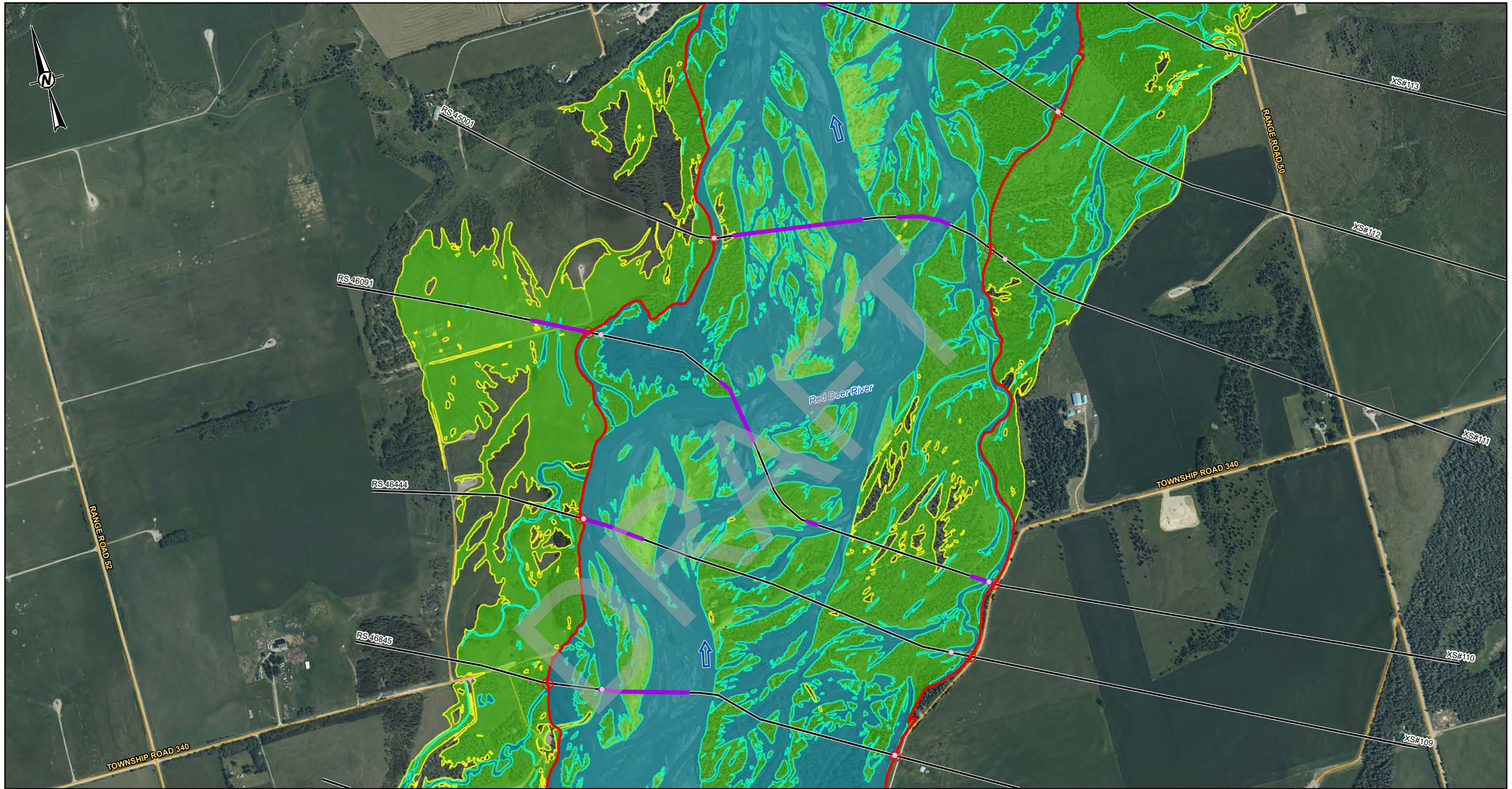
CLIENT	ALBERTA ENVIRONMENT AND PARKS	ALBERTA Government
CONSULTANT	GOLDER MEMBER OF WSP	
DATE	2022-06-29	
DESIGNED	WP	
PREPARED	SP	
REVIEWED	WP	
APPROVED	WP	

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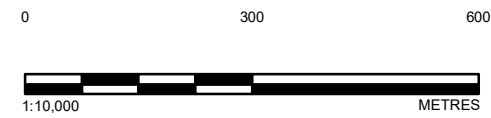
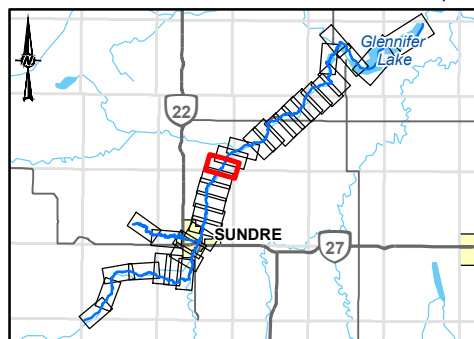
PROJECT	UPPER RED DEER RIVER HAZARD STUDY		
TITLE	FLOODWAY CRITERIA MAP		
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	5000	0	15 of 34

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



LEGEND	
—	CROSS SECTION
XS# 100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
—	STUDY BOUNDARY
→	FLOW DIRECTION
—	LOCAL ROAD
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
	FLOOD CONTROL STRUCTURE
HYDRAULIC STRUCTURES	
◊	CULVERT
△	DAM
○	OTHER
□	WEIR
—	BRIDGE
□	PROPOSED FLOODWAY BOUNDARY
●	BANK STATION
⊙	PROPOSED FLOODWAY STATION
⊘	PREVIOUS FLOODWAY
■	DEPTH ≥ 1 M
■	100-YEAR DESIGN FLOOD EXTENT
///	PROTECTED FLOOD AREA
—	VELOCITY ≥ 1 M/S
DESIGN DISCHARGE RED DEER RIVER BELOW BEARBERRY CREEK= 1210 M ³ /S	



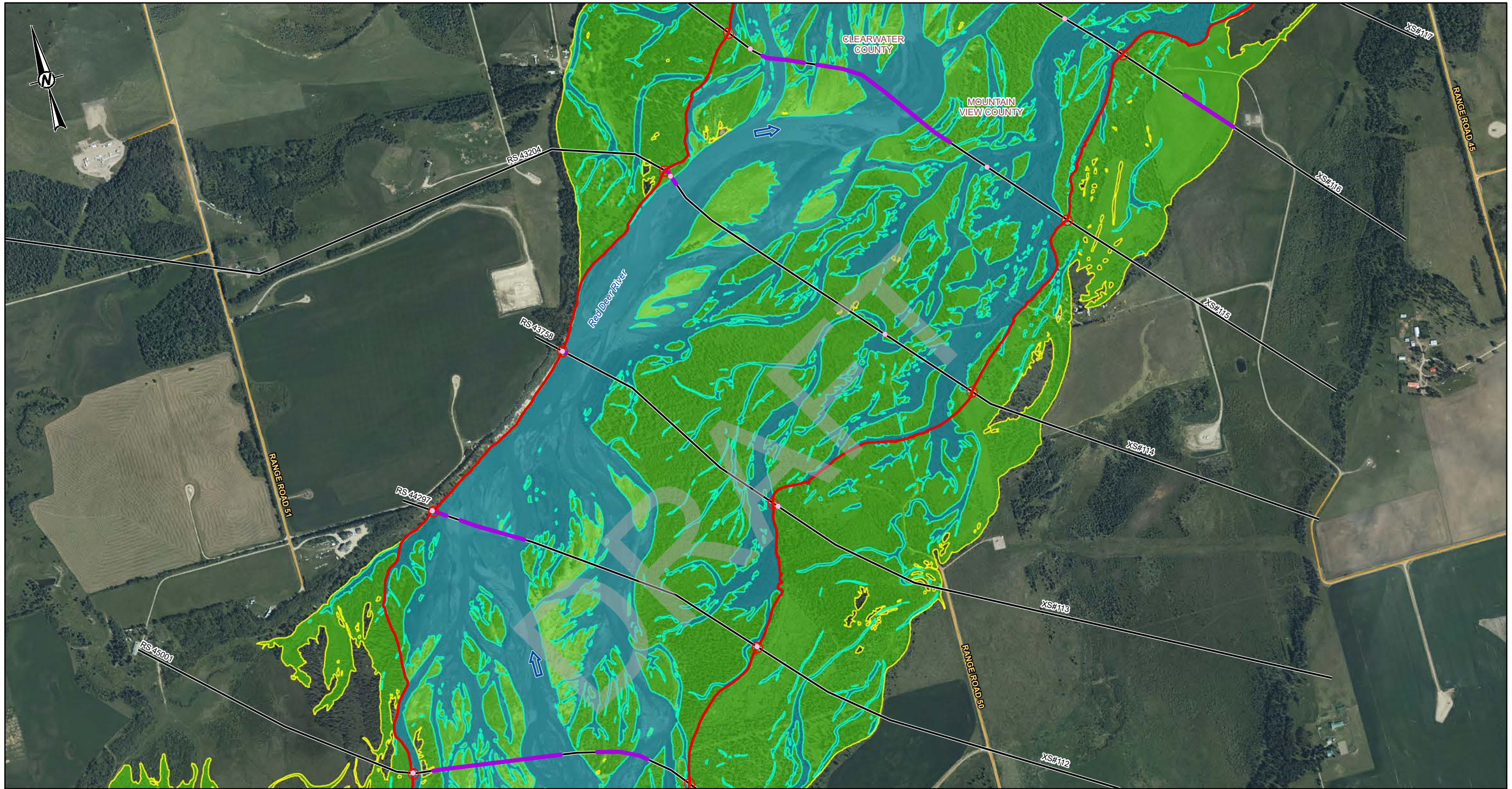
CLIENT	ALBERTA ENVIRONMENT AND PARKS
CONSULTANT	GOLDER MEMBER OF WSP
DATE	2022-06-29
DESIGNED	WP
PREPARED	SP
REVIEWED	WP
APPROVED	WP

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PROJECT	UPPER RED DEER RIVER HAZARD STUDY		
TITLE	FLOODWAY CRITERIA MAP		
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	5000	0	16 of 34

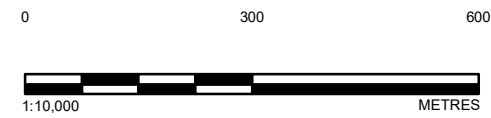
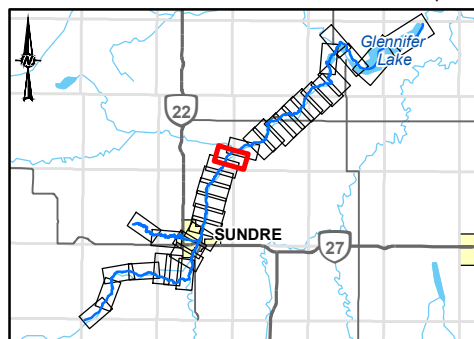
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



LEGEND	
—	CROSS SECTION
XS# 100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
▬▬▬	STUDY BOUNDARY
➔	FLOW DIRECTION
—	LOCAL ROAD
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
▬▬▬▬	FLOOD CONTROL STRUCTURE
◊	CULVERT
△	DAM
○	OTHER
▭	WEIR
▭▭▭	BRIDGE
▭▭▭	PROPOSED FLOODWAY BOUNDARY
●	BANK STATION
⊙	PROPOSED FLOODWAY STATION
▭▭▭	PREVIOUS FLOODWAY
■	DEPTH ≥ 1 M
■	100-YEAR DESIGN FLOOD EXTENT
▨▨▨	PROTECTED FLOOD AREA
—	VELOCITY ≥ 1 M/S

DESIGN DISCHARGE
RED DEER RIVER BELOW BEARBERRY CREEK= 1210 M³/S



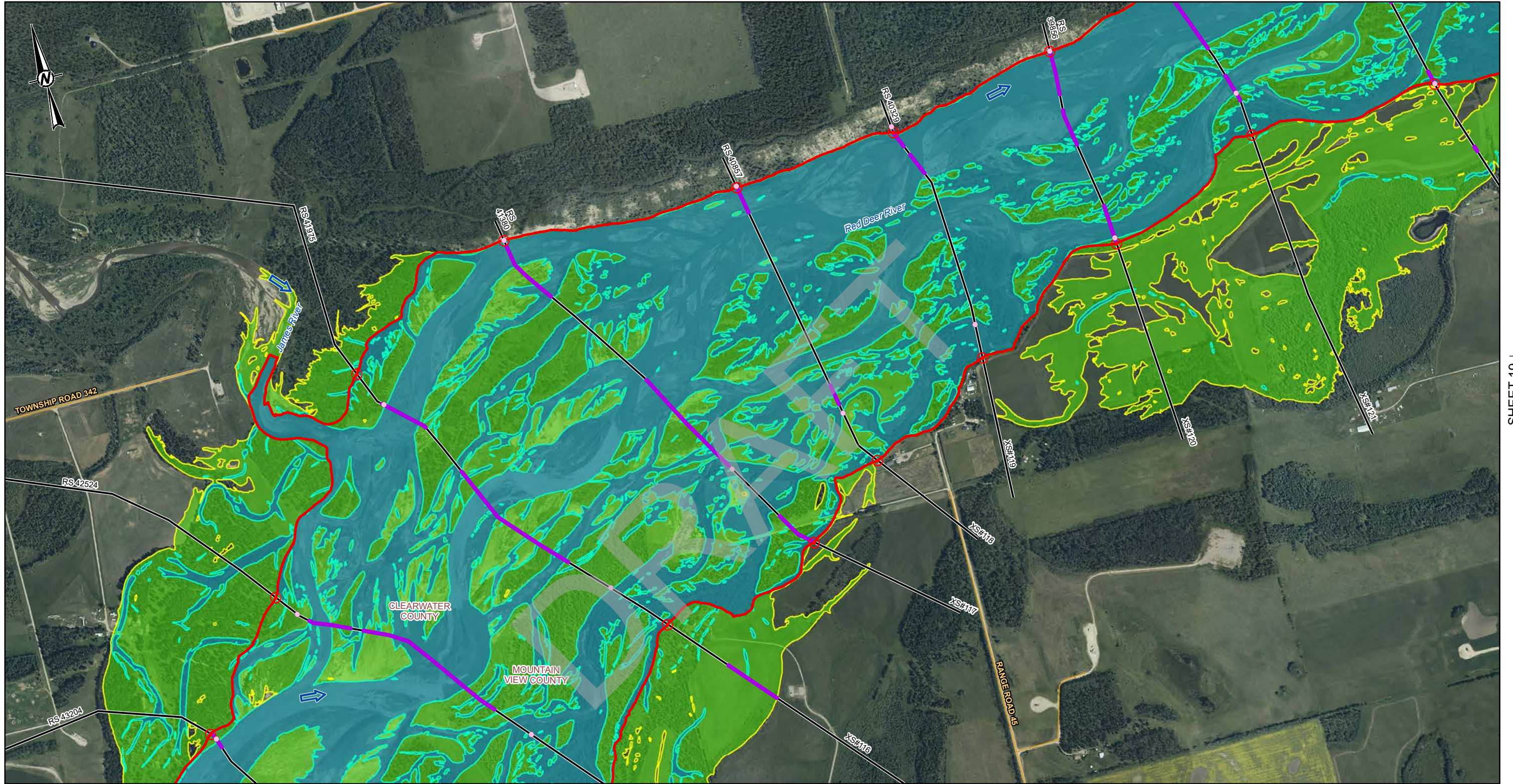
CLIENT	ALBERTA ENVIRONMENT AND PARKS	Alberta Government
CONSULTANT	GOLDER MEMBER OF WSP	
DATE	2022-06-29	
DESIGNED	WP	
PREPARED	SP	
REVIEWED	WP	
APPROVED	WP	

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

PROJECT	UPPER RED DEER RIVER HAZARD STUDY	
TITLE	FLOODWAY CRITERIA MAP	
PROJECT NO.	CONTROL	REV.
1783057	5000	0
FIGURE	17 of 34	

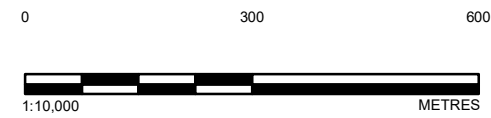
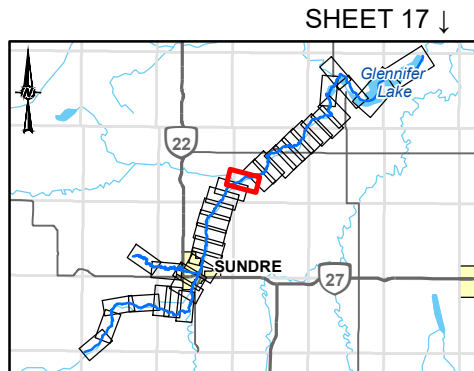
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



LEGEND	
—	CROSS SECTION
XS# 100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
—	STUDY BOUNDARY
→	FLOW DIRECTION
—	LOCAL ROAD
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
—	FLOOD CONTROL STRUCTURE
◻	CULVERT
△	DAM
○	OTHER
—	WEIR
—	BRIDGE
—	PROPOSED FLOODWAY BOUNDARY
●	BANK STATION
⊙	PROPOSED FLOODWAY STATION
⊖	PREVIOUS FLOODWAY
■	DEPTH ≥ 1 M
■	100-YEAR DESIGN FLOOD EXTENT
///	PROTECTED FLOOD AREA
—	VELOCITY ≥ 1 M/S

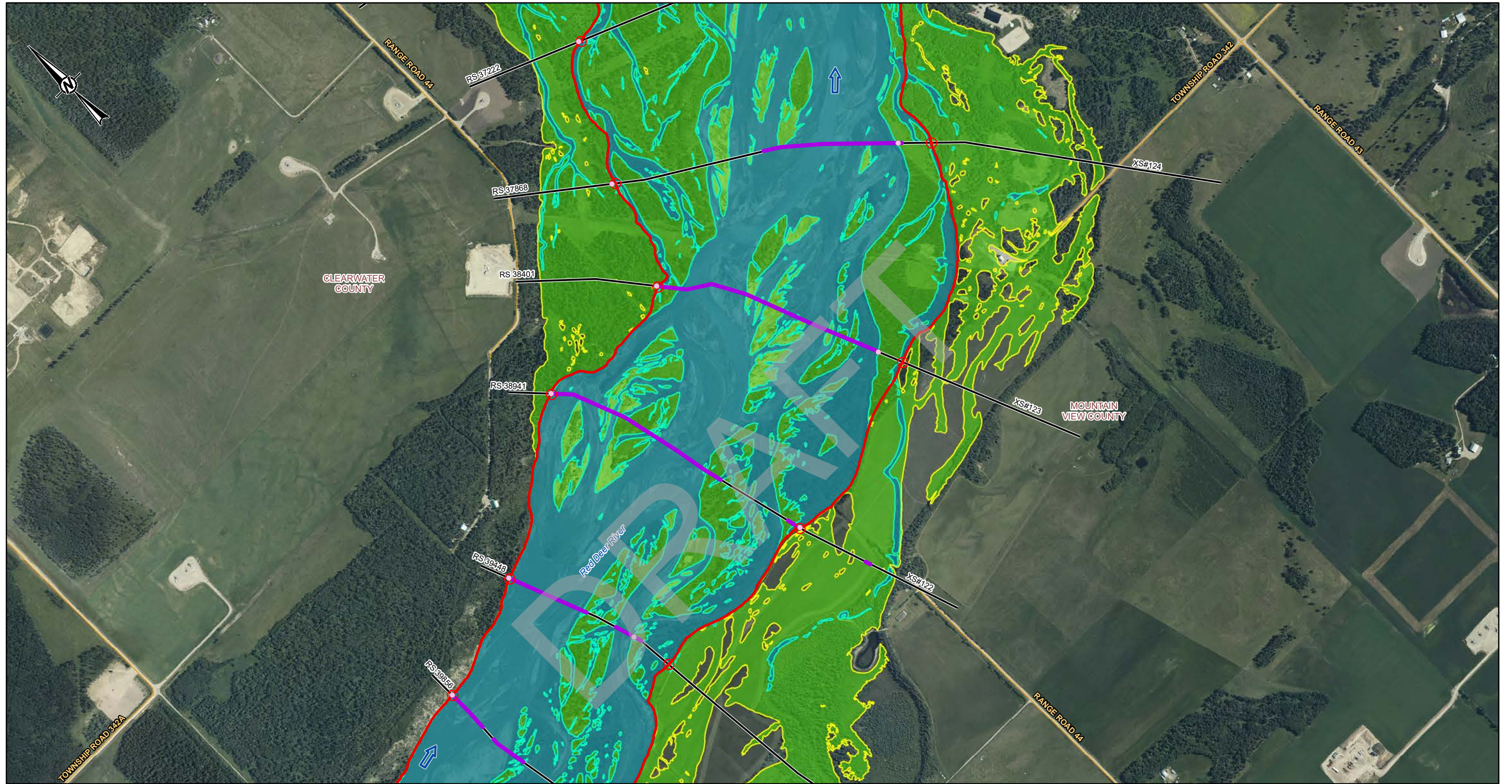
DESIGN DISCHARGE
 RED DEER RIVER BELOW BEARBERRY CREEK= 1390 M³/S
 RED DEER RIVER BELOW JAMES RIVER= 1670 M³/S



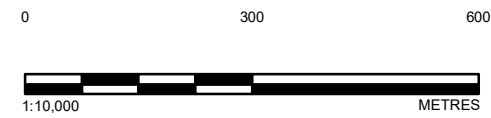
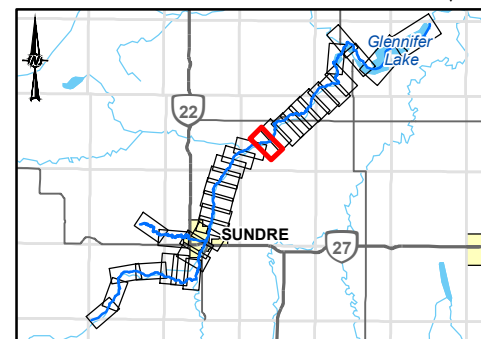
CLIENT	ALBERTA ENVIRONMENT AND PARKS
CONSULTANT	GOLDER MEMBER OF WSP
DATE	2022-06-29
DESIGNED	WP
PREPARED	SP
REVIEWED	WP
APPROVED	WP

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

PROJECT	UPPER RED DEER RIVER HAZARD STUDY
TITLE	FLOODWAY CRITERIA MAP
PROJECT NO.	1783057
CONTROL	5000
REV.	0
FIGURE	18 of 34



LEGEND	
—	CROSS SECTION
XS# 100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
—	STUDY BOUNDARY
→	FLOW DIRECTION
—	LOCAL ROAD
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
	FLOOD CONTROL STRUCTURE
◇	CULVERT
△	DAM
○	OTHER
□	WEIR
—	BRIDGE
□	PROPOSED FLOODWAY BOUNDARY
●	BANK STATION
○	PROPOSED FLOODWAY STATION
□	PREVIOUS FLOODWAY
■	DEPTH ≥ 1 M
■	100-YEAR DESIGN FLOOD EXTENT
///	PROTECTED FLOOD AREA
—	VELOCITY ≥ 1 M/S
DESIGN DISCHARGE RED DEER RIVER BELOW JAMES RIVER= 1670 M ³ /S	



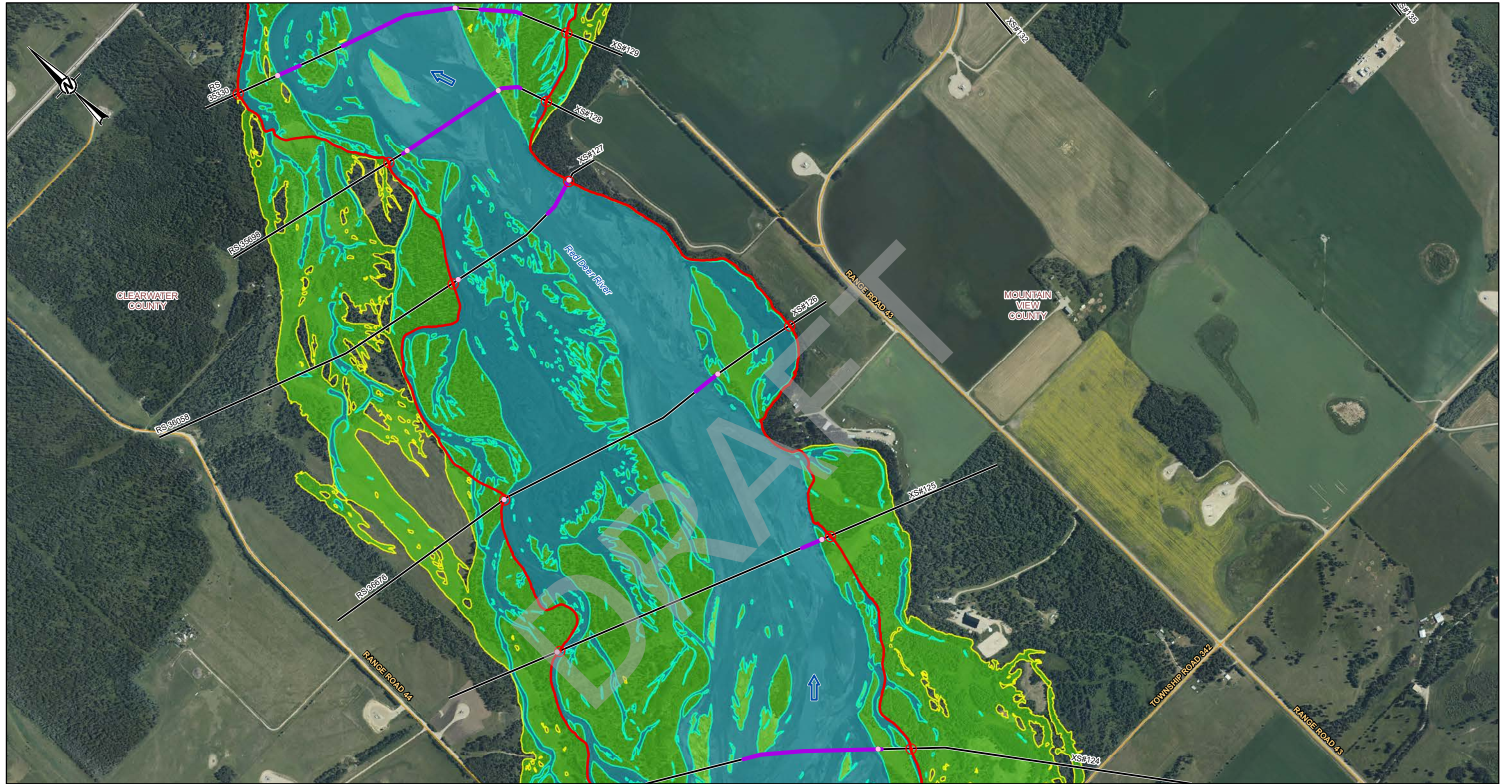
CLIENT	ALBERTA ENVIRONMENT AND PARKS	ALBERTA Government
CONSULTANT	GOLDER MEMBER OF WSP	
DATE	2022-06-29	
DESIGNED	WP	
PREPARED	SP	
REVIEWED	WP	
APPROVED	WP	

REFERENCE(S)
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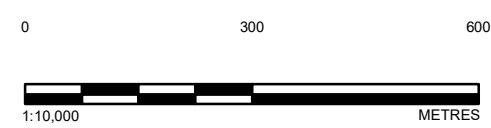
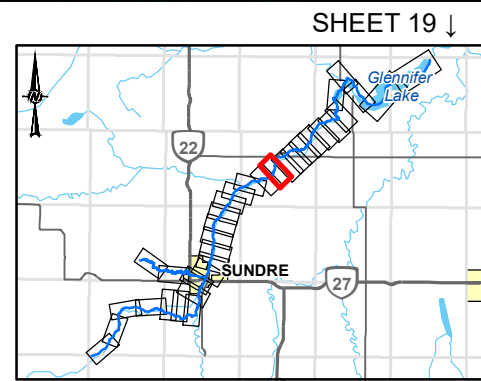
PROJECT	UPPER RED DEER RIVER HAZARD STUDY	
TITLE	FLOODWAY CRITERIA MAP	
PROJECT NO.	CONTROL	REV.
1783057	5000	0
FIGURE	19 of 34	

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



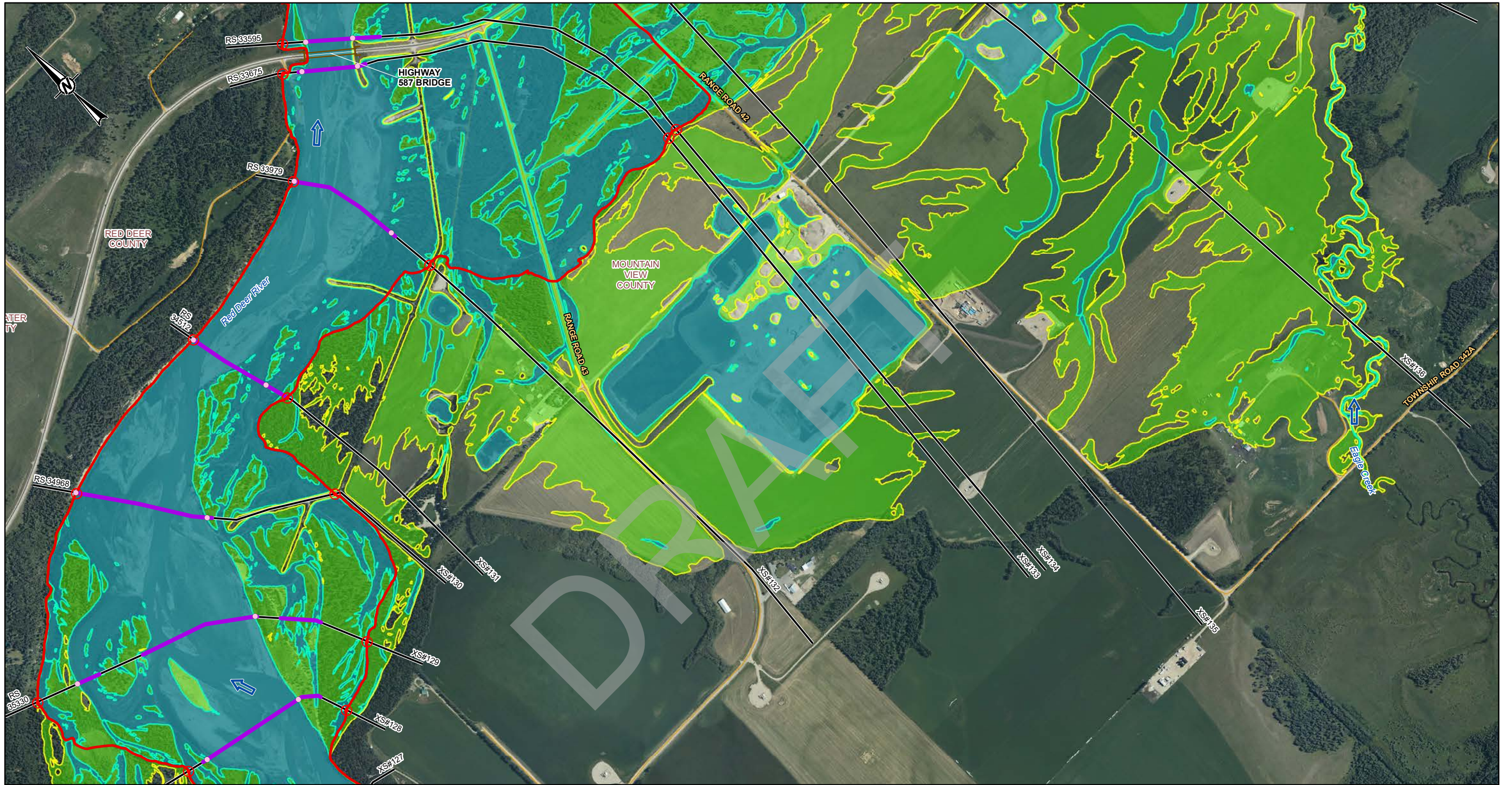
LEGEND			
—	CROSS SECTION	●	BANK STATION
XS# 100	CROSS SECTION NUMBER	○	PROPOSED FLOODWAY STATION
RS 304	RIVER STATION (M)	⊠	PREVIOUS FLOODWAY
▭	STUDY BOUNDARY	■	DEPTH ≥ 1 M
➔	FLOW DIRECTION	■	100-YEAR DESIGN FLOOD EXTENT
—	LOCAL ROAD	▨	PROTECTED FLOOD AREA
—	PRIMARY HIGHWAY	—	VELOCITY ≥ 1 M/S
—	SECONDARY HIGHWAY	—	DESIGN DISCHARGE RED DEER RIVER BELOW JAMES RIVER= 1670 M ³ /S
▨	FLOOD CONTROL STRUCTURE	○	CULVERT
▭	HYDRAULIC STRUCTURES	△	DAM
▭		○	OTHER
▭		▭	WEIR
▭		▭	BRIDGE
▭		▭	PROPOSED FLOODWAY BOUNDARY



CLIENT	ALBERTA ENVIRONMENT AND PARKS	Alberta Government
CONSULTANT	GOLDER MEMBER OF WSP	
DATE	2022-06-29	
DESIGNED	WP	
PREPARED	SP	
REVIEWED	WP	
APPROVED	WP	

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 IMAGERY CAPTURED JULY 2018 BY ORTHOSHOP GEOMATICS LTD. FOR THE GOVERNMENT OF ALBERTA.
 DATUM: NAD 83 CSRS PROJECTION: 3TM 114

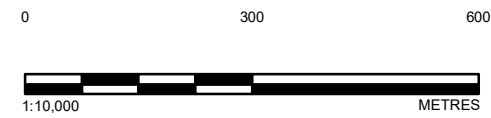
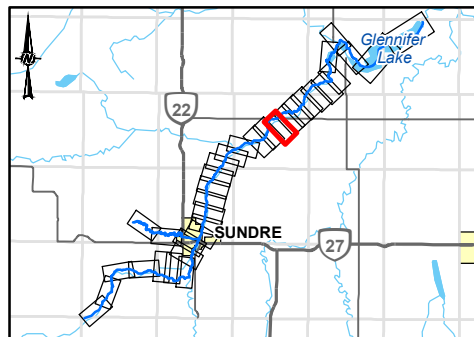
PROJECT	UPPER RED DEER RIVER HAZARD STUDY	
TITLE	FLOODWAY CRITERIA MAP	
PROJECT NO.	CONTROL	REV.
1783057	5000	0
FIGURE	20 of 34	



LEGEND

—	CROSS SECTION		FLOOD CONTROL STRUCTURE	●	BANK STATION
XS# 100	CROSS SECTION NUMBER	◻	HYDRAULIC STRUCTURES	⊙	PROPOSED FLOODWAY STATION
RS 304	RIVER STATION (M)	◻	CULVERT	⊞	PREVIOUS FLOODWAY
▭	STUDY BOUNDARY	△	DAM	■	DEPTH ≥ 1 M
➔	FLOW DIRECTION	○	OTHER	■	100-YEAR DESIGN FLOOD EXTENT
—	LOCAL ROAD	◻	WEIR	▨	PROTECTED FLOOD AREA
—	PRIMARY HIGHWAY	⌌	BRIDGE	—	VELOCITY ≥ 1 M/S
—	SECONDARY HIGHWAY	▭	PROPOSED FLOODWAY BOUNDARY		

DESIGN DISCHARGE
RED DEER RIVER BELOW JAMES RIVER= 1670 M³/S



CLIENT
ALBERTA ENVIRONMENT AND PARKS

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-06-29
DESIGNED	WP
PREPARED	SP
REVIEWED	WP
APPROVED	WP

REFERENCE(S)
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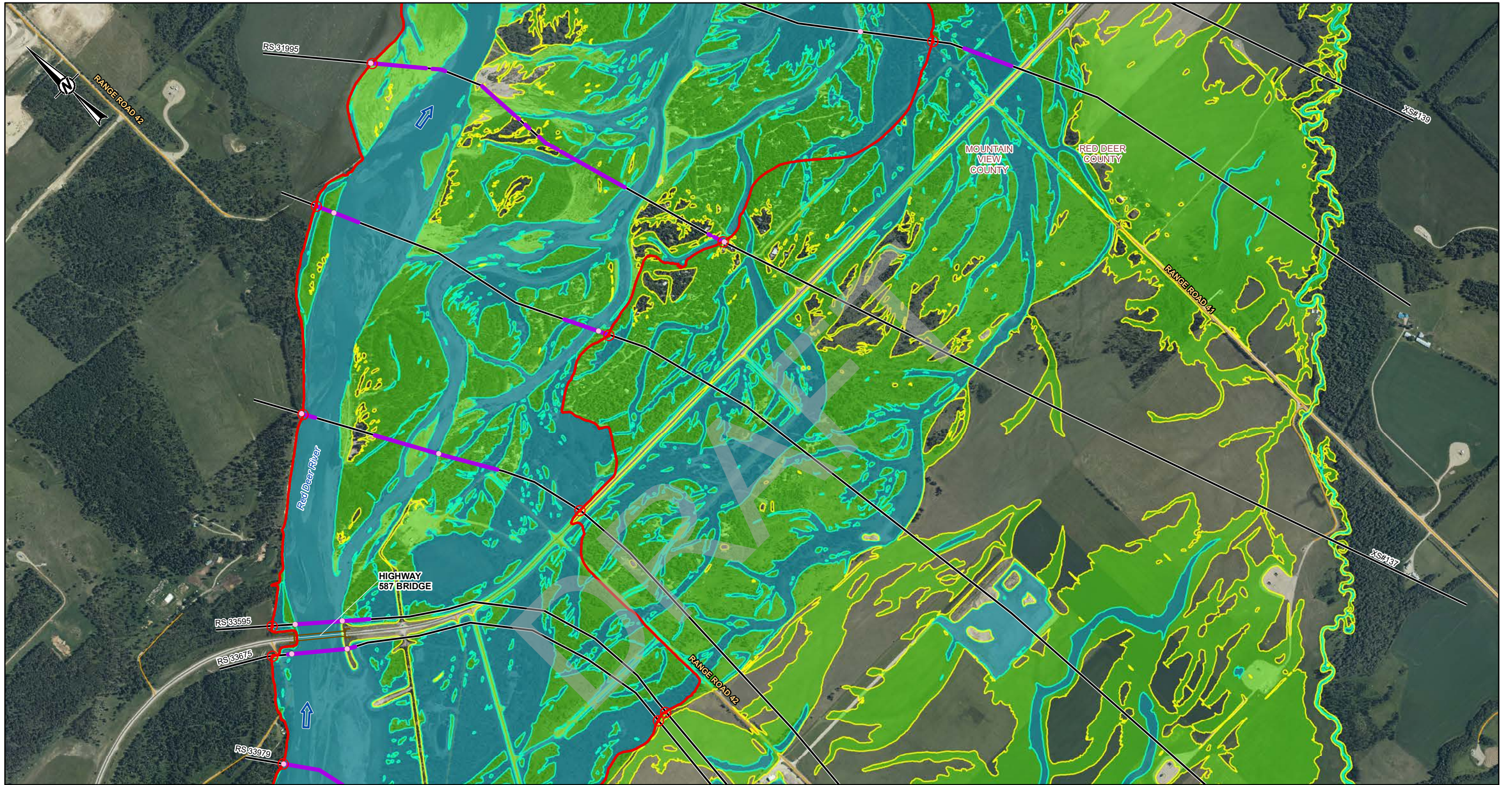
PROJECT
UPPER RED DEER RIVER HAZARD STUDY

TITLE
FLOODWAY CRITERIA MAP

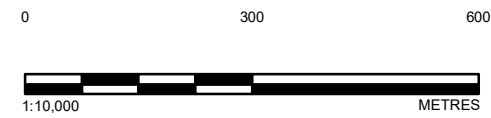
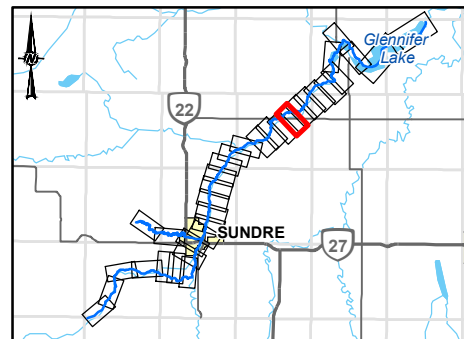
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	5000	0	21 of 34

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



LEGEND	
—	CROSS SECTION
XS# 100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
█	STUDY BOUNDARY
➔	FLOW DIRECTION
—	LOCAL ROAD
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
▤▤▤▤	FLOOD CONTROL STRUCTURE
◻	CULVERT
△	DAM
○	OTHER
▭	WEIR
▭	BRIDGE
▭	PROPOSED FLOODWAY BOUNDARY
●	BANK STATION
⊙	PROPOSED FLOODWAY STATION
▤▤▤▤	PREVIOUS FLOODWAY
■	DEPTH ≥ 1 M
■	100-YEAR DESIGN FLOOD EXTENT
▤▤▤▤	PROTECTED FLOOD AREA
—	VELOCITY ≥ 1 M/S
DESIGN DISCHARGE RED DEER RIVER BELOW JAMES RIVER= 1670 M ³ /S	



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 DATUM: NAD 83 CSRS PROJECTION: 3TM 114

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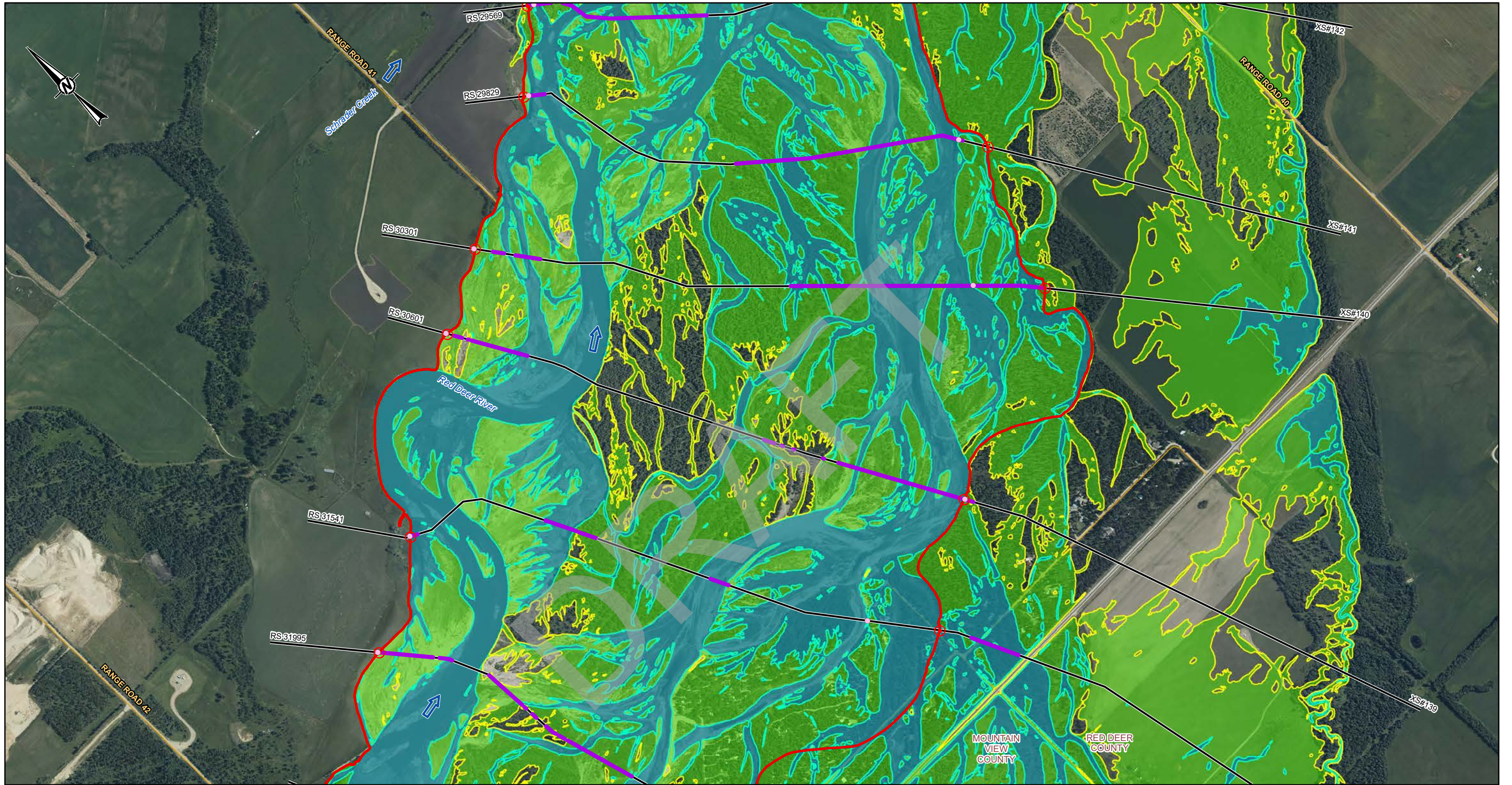


CONSULTANT	DATE	STATUS
GOLDER MEMBER OF WSP	YYYY-MM-DD	2022-06-29
	DESIGNED	WP
	PREPARED	SP
	REVIEWED	WP
	APPROVED	WP

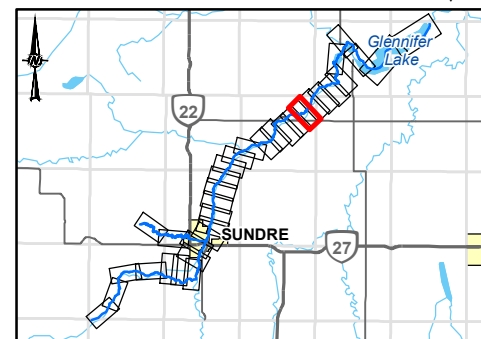
PROJECT		TITLE	
UPPER RED DEER RIVER HAZARD STUDY		FLOODWAY CRITERIA MAP	
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	5000	0	22 of 34

WITH CLIENT GOVERNMENT OF ALBERTA 1425276 Upper Red Deer Mapping 05 Design Flood Hazard Mapping 21452576 Floodway Criteria Rev0.mxd PRINTED ON: 2022-06-29 AT: 11:59:57 AM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



LEGEND	
—	CROSS SECTION
XS# 100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
—	STUDY BOUNDARY
→	FLOW DIRECTION
—	LOCAL ROAD
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
	FLOOD CONTROL STRUCTURE
HYDRAULIC STRUCTURES	
◻	CULVERT
△	DAM
○	OTHER
□	WEIR
—	BRIDGE
—	PROPOSED FLOODWAY BOUNDARY
●	BANK STATION
⊙	PROPOSED FLOODWAY STATION
⊖	PREVIOUS FLOODWAY
■	DEPTH ≥ 1 M
■	100-YEAR DESIGN FLOOD EXTENT
///	PROTECTED FLOOD AREA
—	VELOCITY ≥ 1 M/S
DESIGN DISCHARGE RED DEER RIVER BELOW JAMES RIVER= 1670 M ³ /S	



CLIENT
ALBERTA ENVIRONMENT AND PARKS

CONSULTANT
GOLDER
MEMBER OF WSP

DATE: 2022-06-29

DESIGNED	WP
PREPARED	SP
REVIEWED	WP
APPROVED	WP

ALBERTA Government

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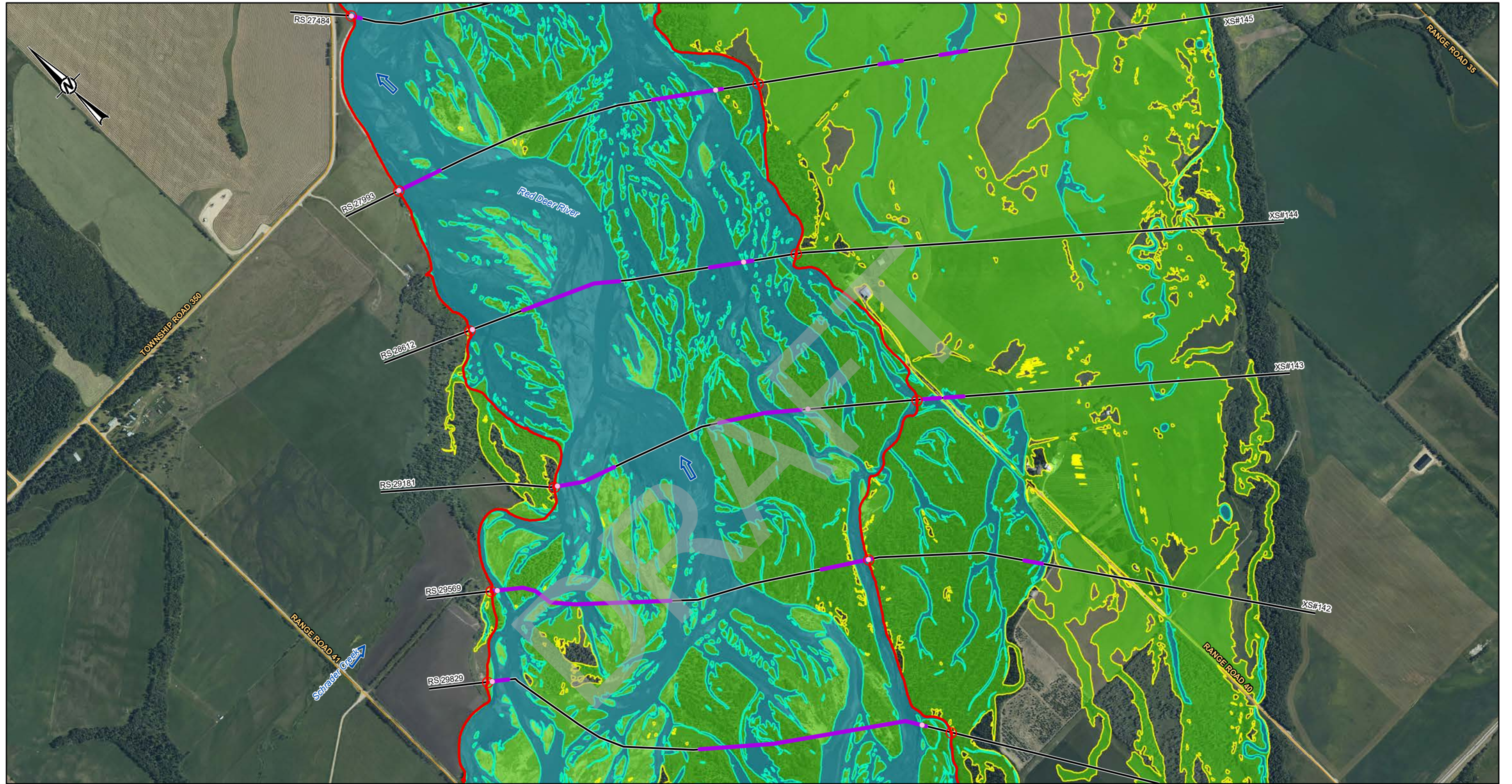
PROJECT
UPPER RED DEER RIVER HAZARD STUDY

TITLE
FLOODWAY CRITERIA MAP

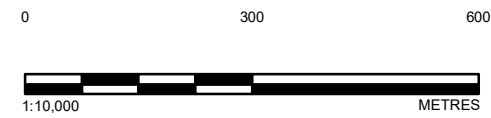
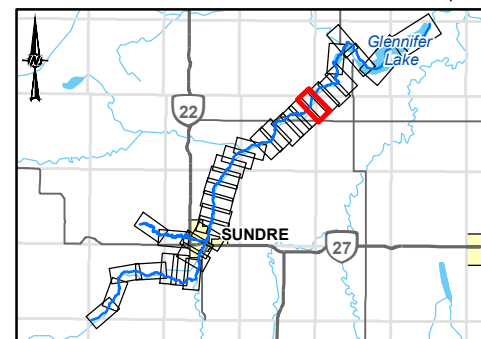
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	5000	0	23 of 34

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LEGEND	
—	CROSS SECTION
XS# 100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
▬▬▬	STUDY BOUNDARY
➔	FLOW DIRECTION
—	LOCAL ROAD
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
▬▬▬▬	FLOOD CONTROL STRUCTURE
◻	CULVERT
△	DAM
○	OTHER
▭	WEIR
▭▭	BRIDGE
▭▭▭	PROPOSED FLOODWAY BOUNDARY
●	BANK STATION
⊙	PROPOSED FLOODWAY STATION
▭▭▭	PREVIOUS FLOODWAY
■	DEPTH ≥ 1 M
▭▭▭	100-YEAR DESIGN FLOOD EXTENT
▭▭▭▭	PROTECTED FLOOD AREA
▭▭▭▭	VELOCITY ≥ 1 M/S
DESIGN DISCHARGE RED DEER RIVER BELOW JAMES RIVER= 1670 M ³ /S	



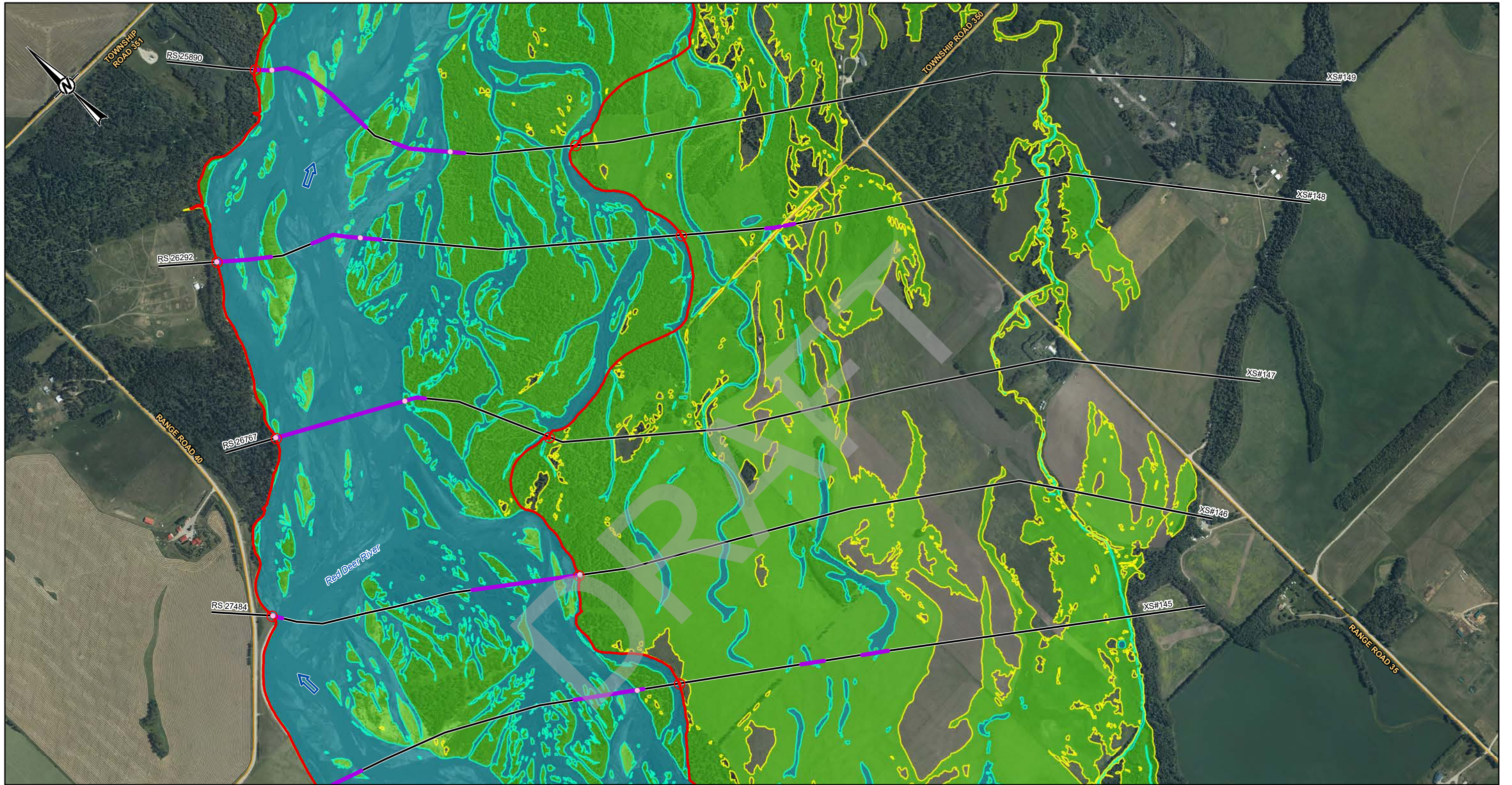
REFERENCE(S)
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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

CLIENT	ALBERTA ENVIRONMENT AND PARKS	ALBERTA Government
CONSULTANT	GOLDER MEMBER OF WSP	
DATE	2022-06-29	
DESIGNED	WP	
PREPARED	SP	
REVIEWED	WP	
APPROVED	WP	

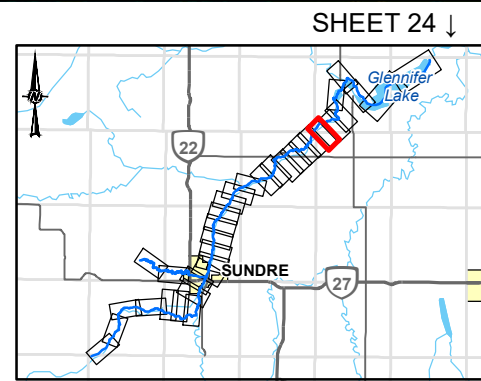
PROJECT	UPPER RED DEER RIVER HAZARD STUDY	
TITLE	FLOODWAY CRITERIA MAP	
PROJECT NO.	CONTROL	REV.
1783057	5000	0
FIGURE	24 of 34	

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LEGEND			
—	CROSS SECTION	●	BANK STATION
XS# 100	CROSS SECTION NUMBER	○	PROPOSED FLOODWAY STATION
RS 304	RIVER STATION (M)	▣	PREVIOUS FLOODWAY
▭	STUDY BOUNDARY	■	DEPTH ≥ 1 M
➔	FLOW DIRECTION	▨	PROTECTED FLOOD AREA
—	LOCAL ROAD	—	VELOCITY ≥ 1 M/S
—	PRIMARY HIGHWAY	▭	DESIGN DISCHARGE
—	SECONDARY HIGHWAY	▭	RED DEER RIVER BELOW JAMES RIVER= 1670 M ³ /S
▬▬▬	FLOOD CONTROL STRUCTURE	○	CULVERT
▭	HYDRAULIC STRUCTURES	△	DAM
▭		○	OTHER
▭		▭	WEIR
▭		▭	BRIDGE
▭		▭	PROPOSED FLOODWAY BOUNDARY



0 300 600
1:10,000 METRES

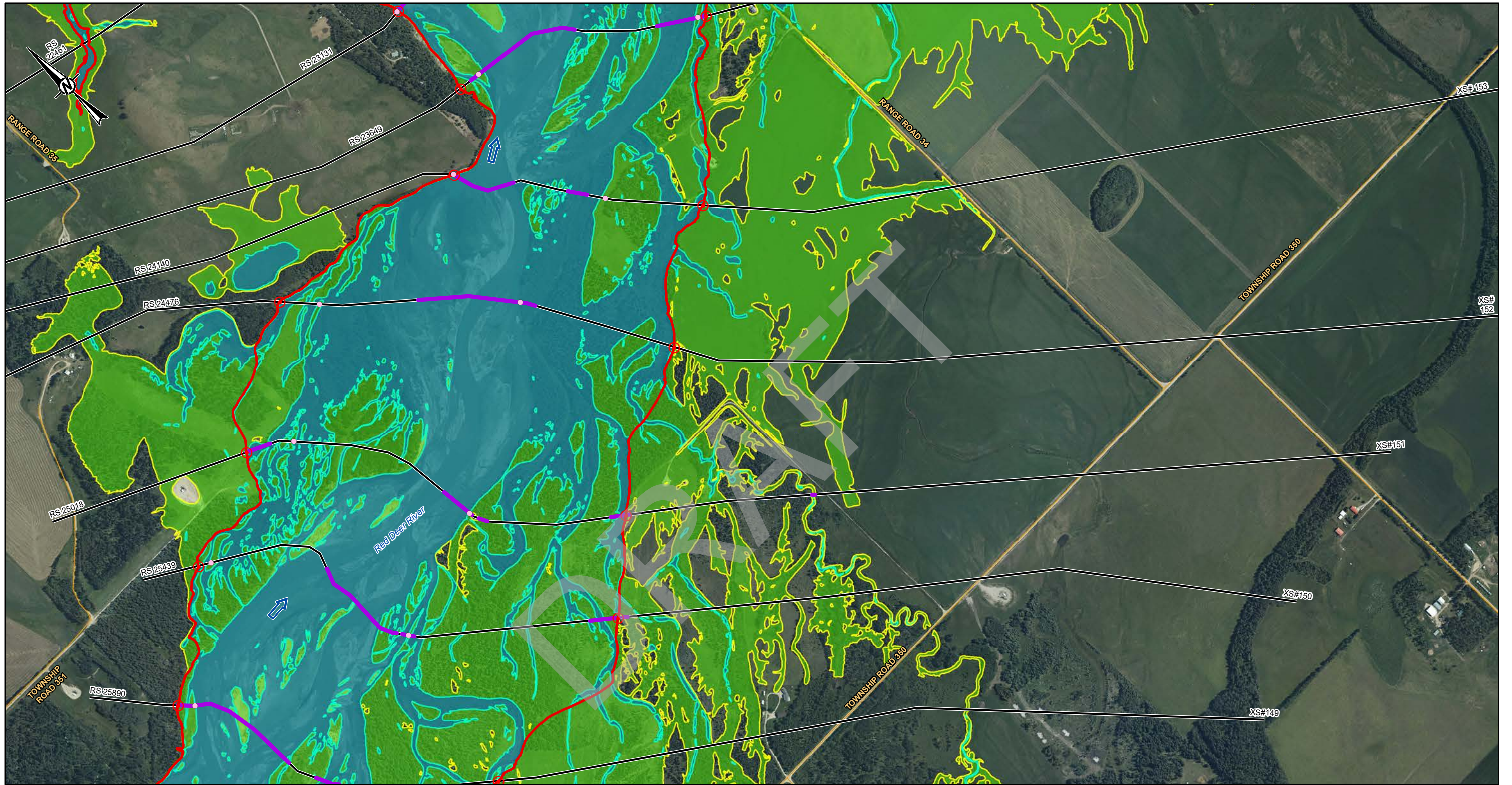
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GOLDER MEMBER OF WSP

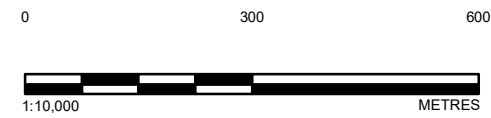
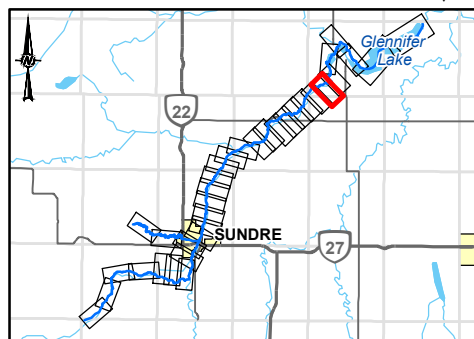
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YYYY-MM-DD	2022-06-29
DESIGNED	WP
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PROJECT	
UPPER RED DEER RIVER HAZARD STUDY	
TITLE	
FLOODWAY CRITERIA MAP	
PROJECT NO.	CONTROL
1783057	5000
REV.	FIGURE
0	25 of 34



LEGEND			
—	CROSS SECTION	●	BANK STATION
XS# 100	CROSS SECTION NUMBER	○	PROPOSED FLOODWAY STATION
RS 304	RIVER STATION (M)	▭	PREVIOUS FLOODWAY
▭	STUDY BOUNDARY	■	DEPTH ≥ 1 M
➔	FLOW DIRECTION	▨	PROTECTED FLOOD AREA
—	LOCAL ROAD	—	VELOCITY ≥ 1 M/S
—	PRIMARY HIGHWAY	▭	DESIGN DISCHARGE
—	SECONDARY HIGHWAY	▭	RED DEER RIVER BELOW JAMES RIVER= 1670 M ³ /S
▭	FLOOD CONTROL STRUCTURE	▭	
▭	HYDRAULIC STRUCTURES		
▭	CULVERT		
▭	DAM		
▭	OTHER		
▭	WEIR		
▭	BRIDGE		
▭	PROPOSED FLOODWAY BOUNDARY		



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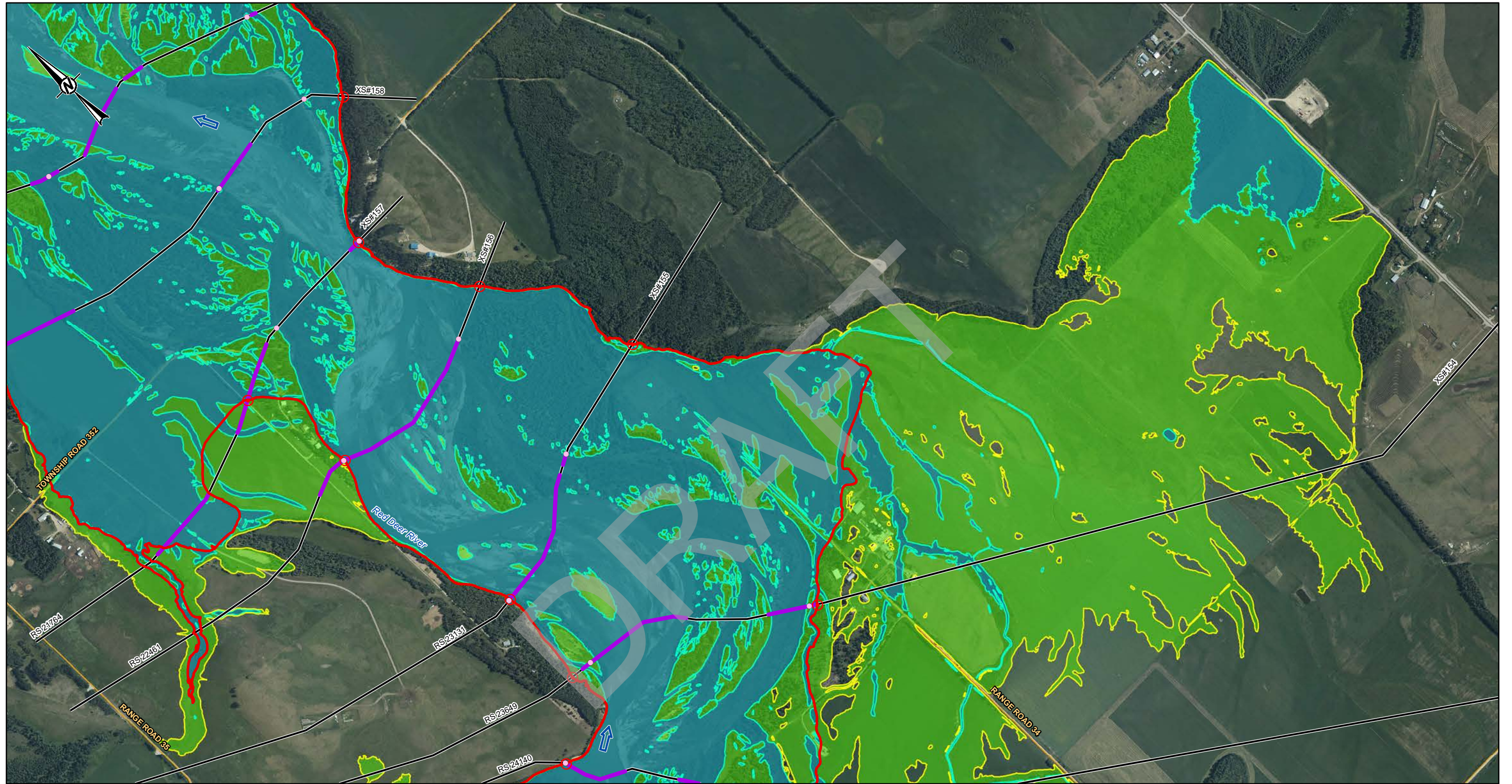
YYYY-MM-DD	2022-06-29
DESIGNED	WP
PREPARED	SP
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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

PROJECT
UPPER RED DEER RIVER HAZARD STUDY

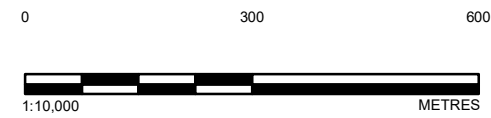
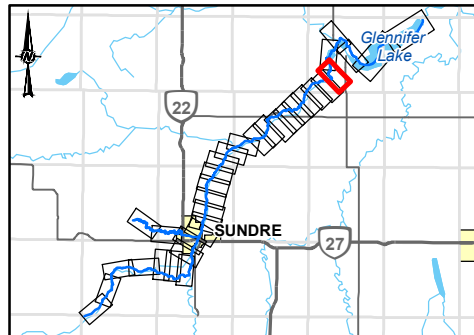
TITLE
FLOODWAY CRITERIA MAP

PROJECT NO.	CONTROL	REV.	FIGURE
1783057	5000	0	26 of 34



LEGEND	
—	CROSS SECTION
XS# 100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
—	STUDY BOUNDARY
→	FLOW DIRECTION
—	LOCAL ROAD
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
—	FLOOD CONTROL STRUCTURE
◻	CULVERT
△	DAM
○	OTHER
—	WEIR
—	BRIDGE
—	PROPOSED FLOODWAY BOUNDARY
●	BANK STATION
⊙	PROPOSED FLOODWAY STATION
⊖	PREVIOUS FLOODWAY
■	DEPTH ≥ 1 M
■	100-YEAR DESIGN FLOOD EXTENT
///	PROTECTED FLOOD AREA
—	VELOCITY ≥ 1 M/S

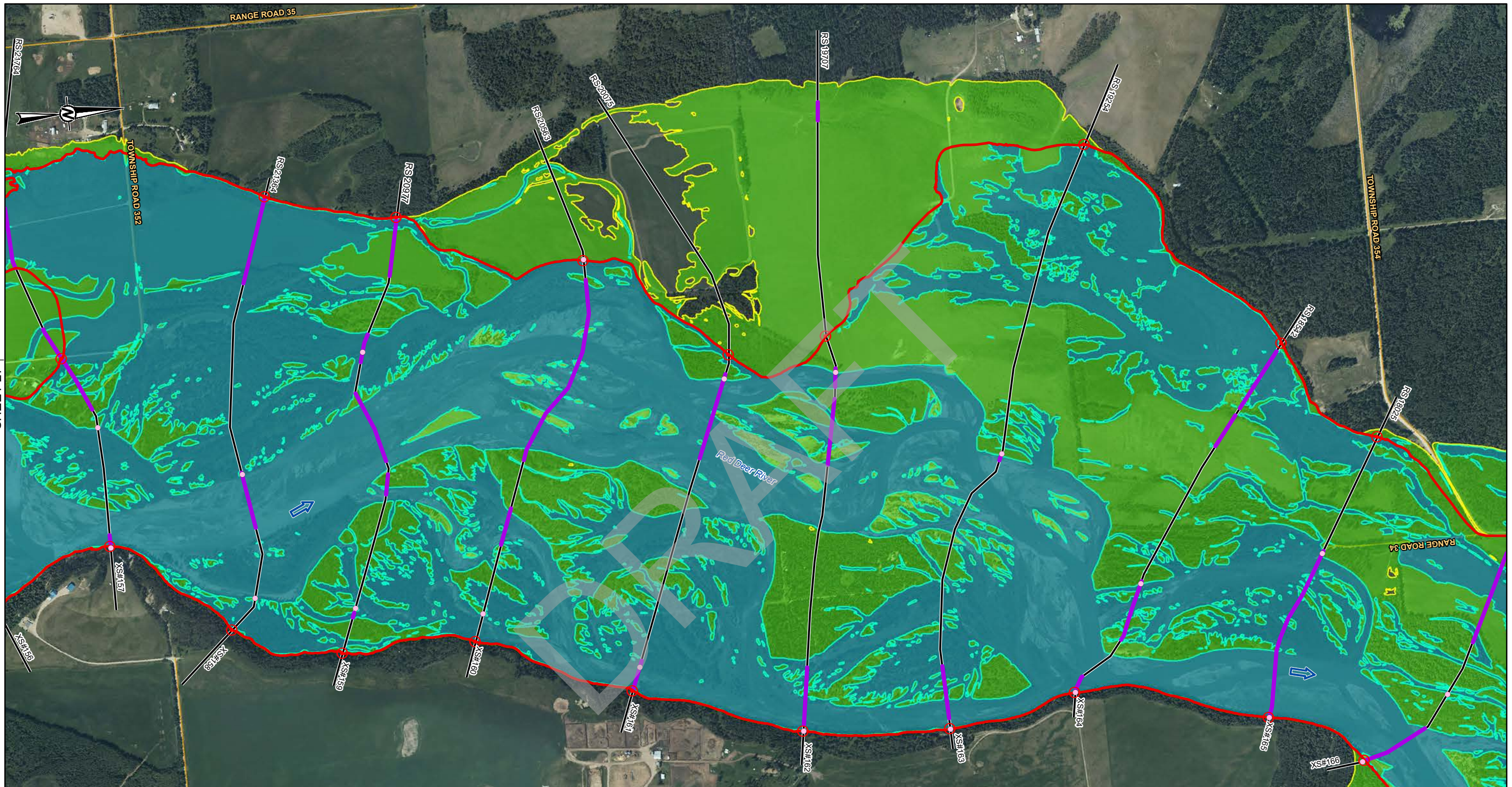
DESIGN DISCHARGE
RED DEER RIVER BELOW JAMES RIVER= 1670 M³/S



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CONSULTANT	GOLDER MEMBER OF WSP	
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PROJECT	UPPER RED DEER RIVER HAZARD STUDY	
TITLE	FLOODWAY CRITERIA MAP	
PROJECT NO.	CONTROL	REV.
1783057	5000	0
FIGURE	27 of 34	



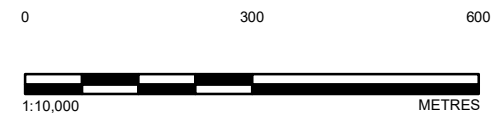
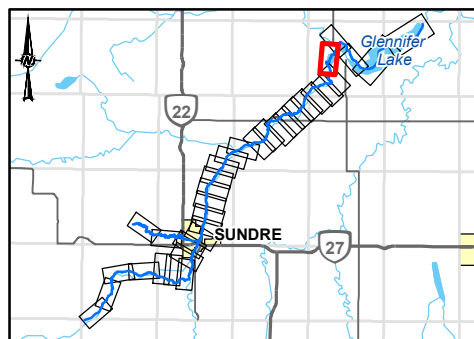
SHEET 27 ↑

↑ SHEET 29

WITH CLIENT GOVERNMENT OF ALBERTA 1425276 Upper Red Deer Mapping 05 Design Flood Hazard Mapping 21452576_E_Floodway Criteria_Rev0.mxd PRINTED ON: 2022-06-20 AT: 12:29:47 PM

25mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

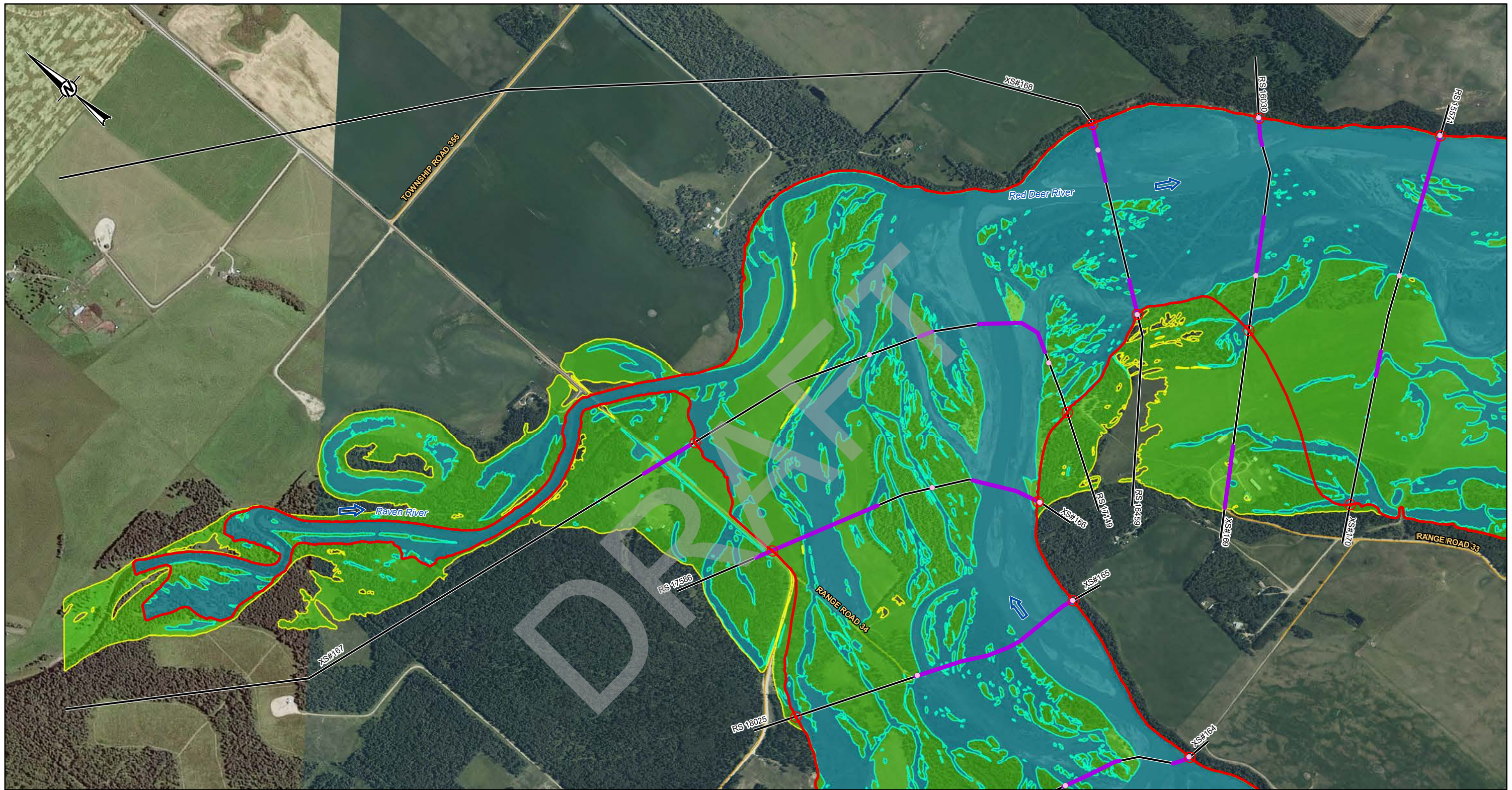
LEGEND			
	CROSS SECTION		BANK STATION
	FLOOD CONTROL STRUCTURE		PROPOSED FLOODWAY STATION
	CROSS SECTION NUMBER		PREVIOUS FLOODWAY
	RIVER STATION (M)		DEPTH ≥ 1 M
	STUDY BOUNDARY		100-YEAR DESIGN FLOOD EXTENT
	FLOW DIRECTION		PROTECTED FLOOD AREA
	LOCAL ROAD		VELOCITY ≥ 1 M/S
	PRIMARY HIGHWAY		DESIGN DISCHARGE
	SECONDARY HIGHWAY		RED DEER RIVER BELOW JAMES RIVER= 1670 M ³ /S
	CULVERT		
	DAM		
	OTHER		
	WEIR		
	BRIDGE		
	PROPOSED FLOODWAY BOUNDARY		



CLIENT	ALBERTA ENVIRONMENT AND PARKS	Alberta Government
CONSULTANT	GOLDER MEMBER OF WSP	
DATE	2022-06-29	
DESIGNED	WP	
PREPARED	SP	
REVIEWED	WP	
APPROVED	WP	

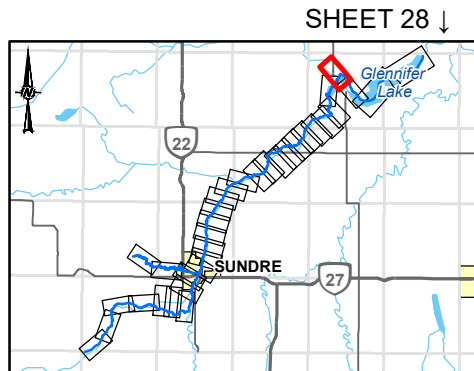
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 DATUM: NAD 83 CSRS PROJECTION: 3TM 114

PROJECT	UPPER RED DEER RIVER HAZARD STUDY	
TITLE	FLOODWAY CRITERIA MAP	
PROJECT NO.	CONTROL	REV.
1783057	5000	0
FIGURE	28 of 34	

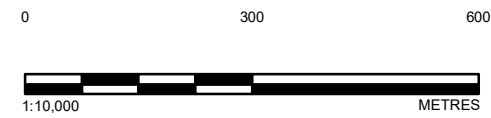


SHEET 30 ↓

LEGEND			
—	CROSS SECTION	●	BANK STATION
XS# 100	CROSS SECTION NUMBER	○	PROPOSED FLOODWAY STATION
RS 304	RIVER STATION (M)	▭	PREVIOUS FLOODWAY
▭	STUDY BOUNDARY	■	DEPTH ≥ 1 M
➔	FLOW DIRECTION	■	100-YEAR DESIGN FLOOD EXTENT
—	LOCAL ROAD	▨	PROTECTED FLOOD AREA
—	PRIMARY HIGHWAY	—	VELOCITY ≥ 1 M/S
—	SECONDARY HIGHWAY	▭	DESIGN DISCHARGE
▭	FLOOD CONTROL STRUCTURE	▭	RED DEER RIVER BELOW JAMES RIVER= 1670 M ³ /S
○	CULVERT	▭	RED DEER RIVER BELOW RAVEN RIVER= 1850 M ³ /S
△	DAM	▭	
○	OTHER	▭	
▭	WEIR	▭	
▭	BRIDGE	▭	
▭	PROPOSED FLOODWAY BOUNDARY		



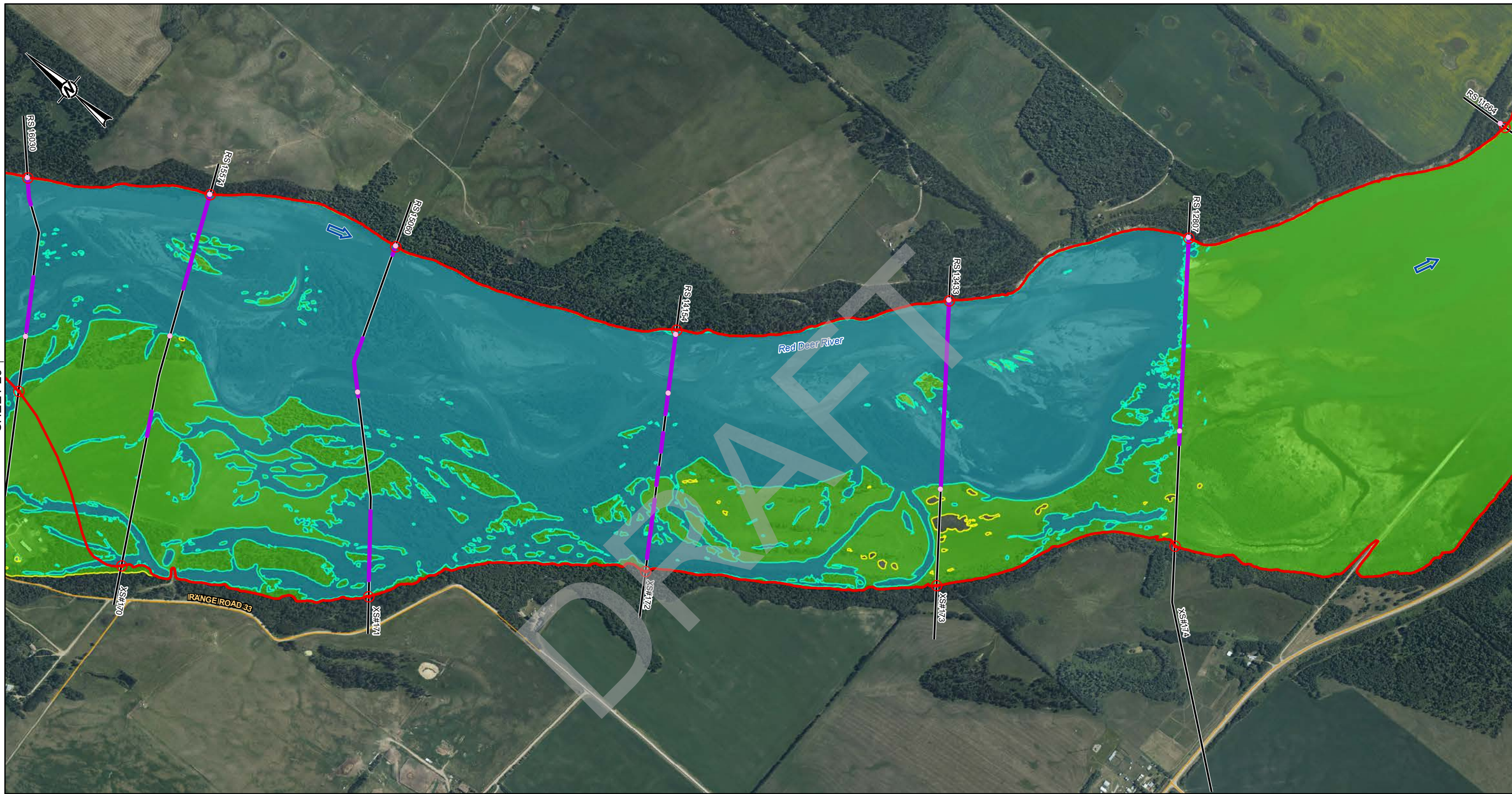
SHEET 28 ↓



CLIENT	ALBERTA ENVIRONMENT AND PARKS	Alberta Government
CONSULTANT	GOLDER MEMBER OF WSP	
DATE	2022-06-29	
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PROJECT	UPPER RED DEER RIVER HAZARD STUDY
TITLE	FLOODWAY CRITERIA MAP
PROJECT NO.	1783057
CONTROL	5000
REV.	0
FIGURE	29 of 34

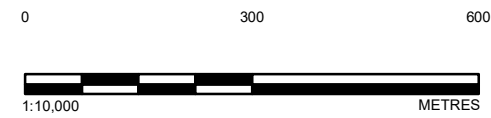
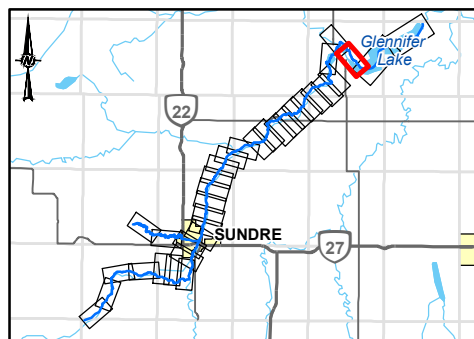


SHEET 29 ↑

↓ SHEET 31

LEGEND			
—	CROSS SECTION	●	BANK STATION
XS# 100	CROSS SECTION NUMBER	○	PROPOSED FLOODWAY STATION
RS 304	RIVER STATION (M)	▤	PREVIOUS FLOODWAY
▭	STUDY BOUNDARY	■	DEPTH ≥ 1 M
➔	FLOW DIRECTION	■	100-YEAR DESIGN FLOOD EXTENT
—	LOCAL ROAD	▨	PROTECTED FLOOD AREA
—	PRIMARY HIGHWAY	—	VELOCITY ≥ 1 M/S
—	SECONDARY HIGHWAY	—	
▤	FLOOD CONTROL STRUCTURE		
○	CULVERT		
△	DAM		
○	OTHER		
▭	WEIR		
▭	BRIDGE		
▭	PROPOSED FLOODWAY BOUNDARY		

DESIGN DISCHARGE
 RED DEER RIVER BELOW JAMES RIVER= 1670 M³/S
 RED DEER RIVER BELOW RAVEN RIVER= 1850 M³/S



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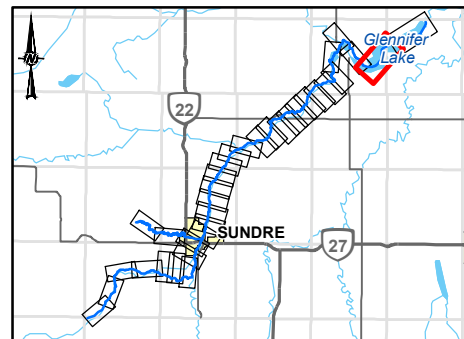
PROJECT
 UPPER RED DEER RIVER HAZARD STUDY

TITLE
FLOODWAY CRITERIA MAP

PROJECT NO.	CONTROL	REV.	FIGURE
1783057	5000	0	30 of 34



LEGEND	
—	CROSS SECTION
XS# 100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
■	STUDY BOUNDARY
➔	FLOW DIRECTION
—	LOCAL ROAD
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
	FLOOD CONTROL STRUCTURE
HYDRAULIC STRUCTURES	
◻	CULVERT
△	DAM
○	OTHER
□	WEIR
⌈	BRIDGE
□	PROPOSED FLOODWAY BOUNDARY
●	BANK STATION
⊙	PROPOSED FLOODWAY STATION
⊘	PREVIOUS FLOODWAY
■	DEPTH ≥ 1 M
■	100-YEAR DESIGN FLOOD EXTENT
///	PROTECTED FLOOD AREA
—	VELOCITY ≥ 1 M/S
DESIGN DISCHARGE RED DEER RIVER BELOW RAVEN RIVER= 1850 M ³ /S	



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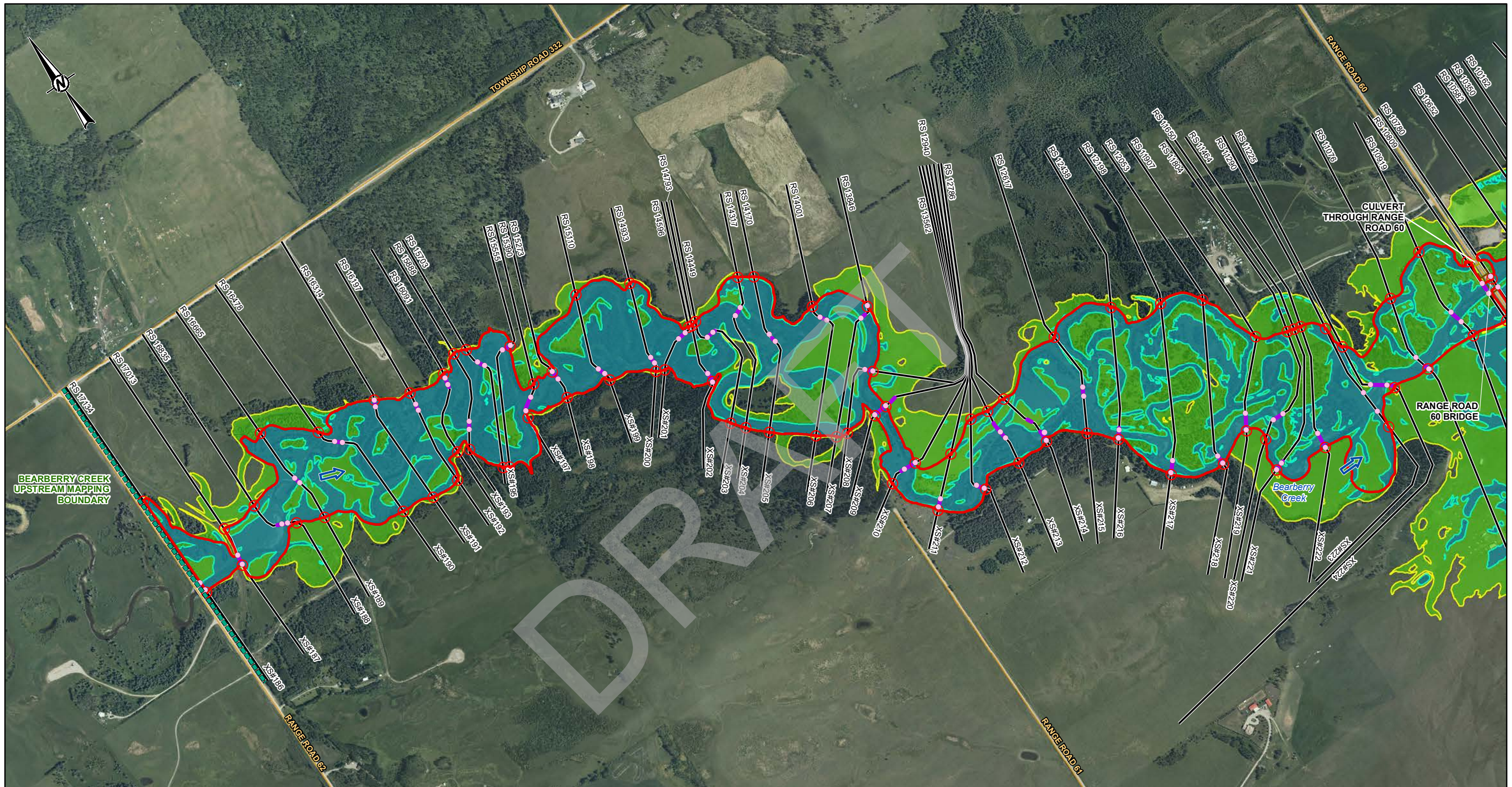
YYYY-MM-DD	2022-06-29
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PREPARED	SP
REVIEWED	WP
APPROVED	WP

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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

PROJECT
UPPER RED DEER RIVER HAZARD STUDY

TITLE
FLOODWAY CRITERIA MAP

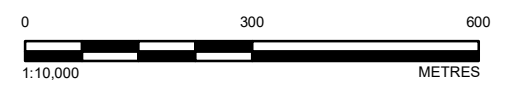
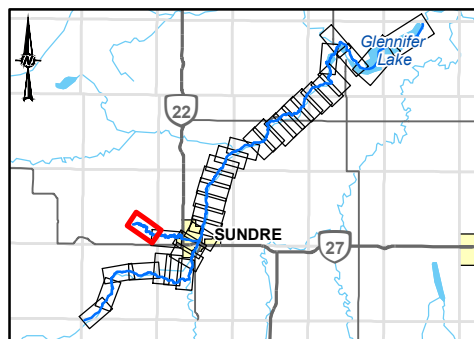
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	5000	0	31 of 34



LEGEND

—	CROSS SECTION		FLOOD CONTROL STRUCTURE	●	BANK STATION
XS# 100	CROSS SECTION NUMBER	○	CULVERT	⊙	PROPOSED FLOODWAY STATION
RS 304	RIVER STATION (M)	△	DAM	▨	PREVIOUS FLOODWAY
▬	STUDY BOUNDARY	○	OTHER	■	DEPTH ≥ 1 M
➔	FLOW DIRECTION	□	WEIR	■	100-YEAR DESIGN FLOOD EXTENT
—	LOCAL ROAD	⌈	BRIDGE	▨	PROTECTED FLOOD AREA
—	PRIMARY HIGHWAY	▬	PROPOSED FLOODWAY BOUNDARY	▨	VELOCITY ≥ 1 M/S
—	SECONDARY HIGHWAY				

DESIGN DISCHARGE
BEARBERRY CREEK = 214 M³/S



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ALBERTA ENVIRONMENT AND PARKS

CONSULTANT
GOLDER MEMBER OF WSP

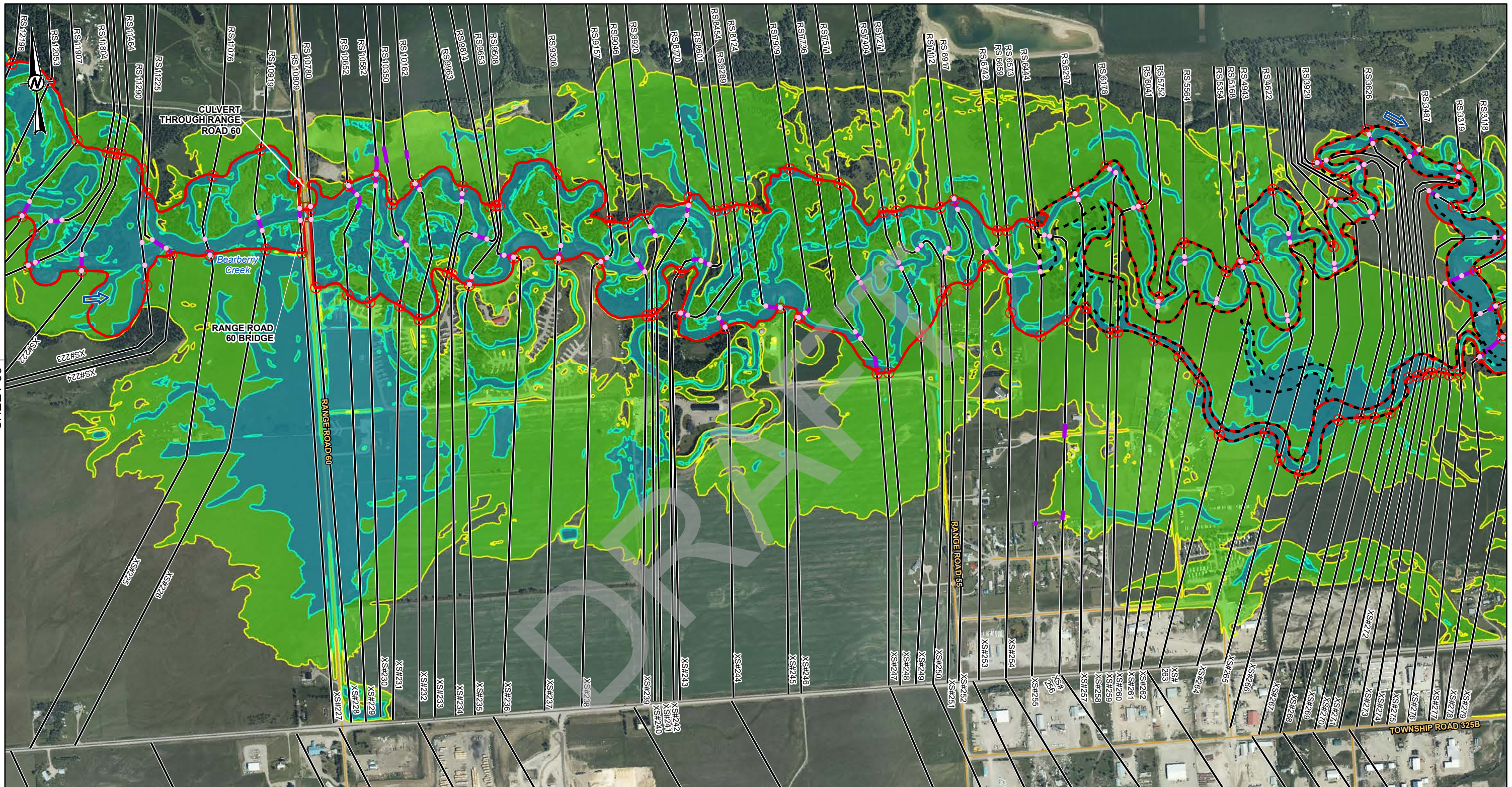
YYYY-MM-DD	2022-06-29
DESIGNED	WP
PREPARED	SP
REVIEWED	WP
APPROVED	WP

REFERENCE(S)
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PROJECT
UPPER RED DEER RIVER HAZARD STUDY

TITLE
FLOODWAY CRITERIA MAP

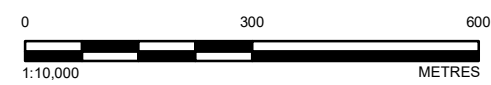
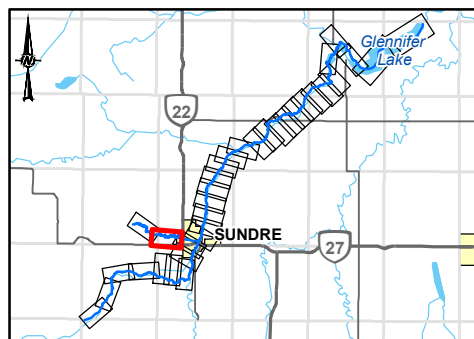
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	5000	0	33 of 34



SHEET 33 ↑

↑ SHEET 6

LEGEND			
— CROSS SECTION	FLOOD CONTROL STRUCTURE	● BANK STATION	
XS# 100 CROSS SECTION NUMBER	HYDRAULIC STRUCTURES	⊙ PROPOSED FLOODWAY STATION	
RS 304 RIVER STATION (M)	◇ CULVERT	▨ PREVIOUS FLOODWAY	
▭ STUDY BOUNDARY	△ DAM	■ DEPTH ≥ 1 M	
➔ FLOW DIRECTION	○ OTHER	■ 100-YEAR DESIGN FLOOD EXTENT	
— LOCAL ROAD	□ WEIR	▨ PROTECTED FLOOD AREA	
— PRIMARY HIGHWAY	▭ BRIDGE	— VELOCITY ≥ 1 M/S	
— SECONDARY HIGHWAY	▭ PROPOSED FLOODWAY BOUNDARY		
		DESIGN DISCHARGE	
		BEARBERRY CREEK = 214 M ³ /S	



CLIENT
ALBERTA ENVIRONMENT AND PARKS

CONSULTANT
GOLDER MEMBER OF WSP

DATE
2022-06-29

DESIGNED
PREPARED
REVIEWED
APPROVED

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SP
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ALBERTA Government

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PROJECT UPPER RED DEER RIVER HAZARD STUDY		TITLE FLOODWAY CRITERIA MAP	
PROJECT NO. 1783057	CONTROL 5000	REV. 0	FIGURE 34 of 34

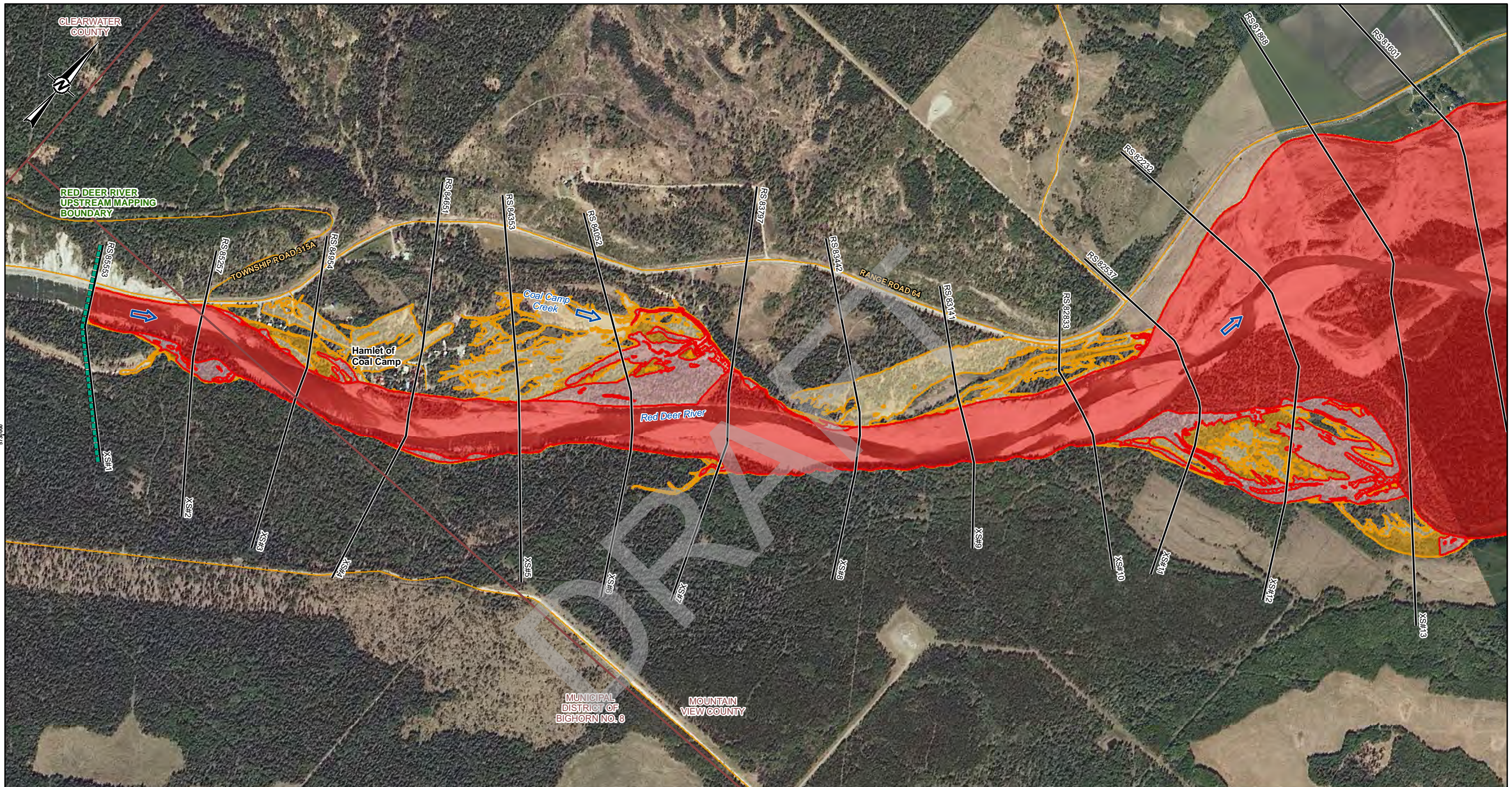
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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APPENDIX B

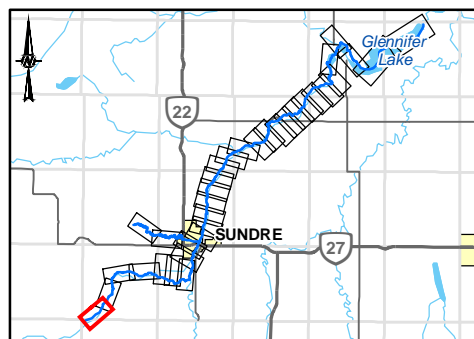
Flood Hazard Maps



SHEET 2 ↓

LEGEND						
—	CROSS SECTION	▬▬▬▬	FLOOD CONTROL STRUCTURE	■	FLOODWAY	
XS#100	CROSS SECTION NUMBER	▭	MUNICIPAL DISTRICT BOUNDARY	▨	HIGH HAZARD FLOOD FRINGE	
RS 304	RIVER STATION (M)	⬆	HYDRAULIC STRUCTURES	▨	FLOOD FRINGE	
▭	STUDY BOUNDARY	⬆	◇	CULVERT	▨	PROTECTED FLOOD FRINGE
➡	FLOW DIRECTION	⬆	△	DAM	▨	200-YEAR FLOOD EXTENT
—	LOCAL ROAD	⬆	○	OTHER	▨	500-YEAR FLOOD EXTENT
—	PATHWAY	⬆	□	WEIR	▨	
—	PRIMARY HIGHWAY	⬆	⌈	BRIDGE		
—	SECONDARY HIGHWAY					
+	RAILWAY					

DISCHARGE
RED DEER RIVER BELOW BURNT TIMBER CREEK = 1210 M³/S



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PROJECT	UPPER RED DEER RIVER HAZARD STUDY		
TITLE	FLOOD HAZARD MAP		
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	1 of 34

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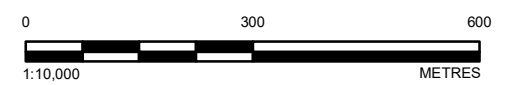
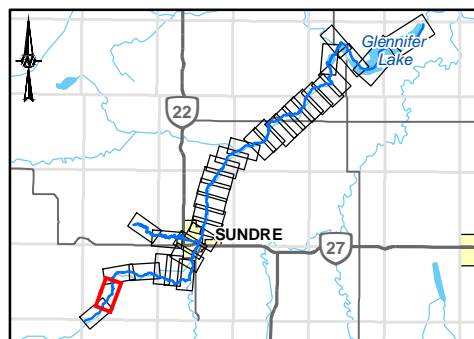


SHEET 1 ↑

↓ SHEET 3

LEGEND	
—	CROSS SECTION
XS#100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
—	STUDY BOUNDARY
→	FLOW DIRECTION
—	LOCAL ROAD
—	PATHWAY
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
+	RAILWAY
	FLOOD CONTROL STRUCTURE
▭	MUNICIPAL DISTRICT BOUNDARY
◇	CULVERT
△	DAM
○	OTHER
□	WEIR
—	BRIDGE
■	FLOODWAY
▨	HIGH HAZARD FLOOD FRINGE
▩	FLOOD FRINGE
▧	PROTECTED FLOOD FRINGE
■	200-YEAR FLOOD EXTENT
■	500-YEAR FLOOD EXTENT

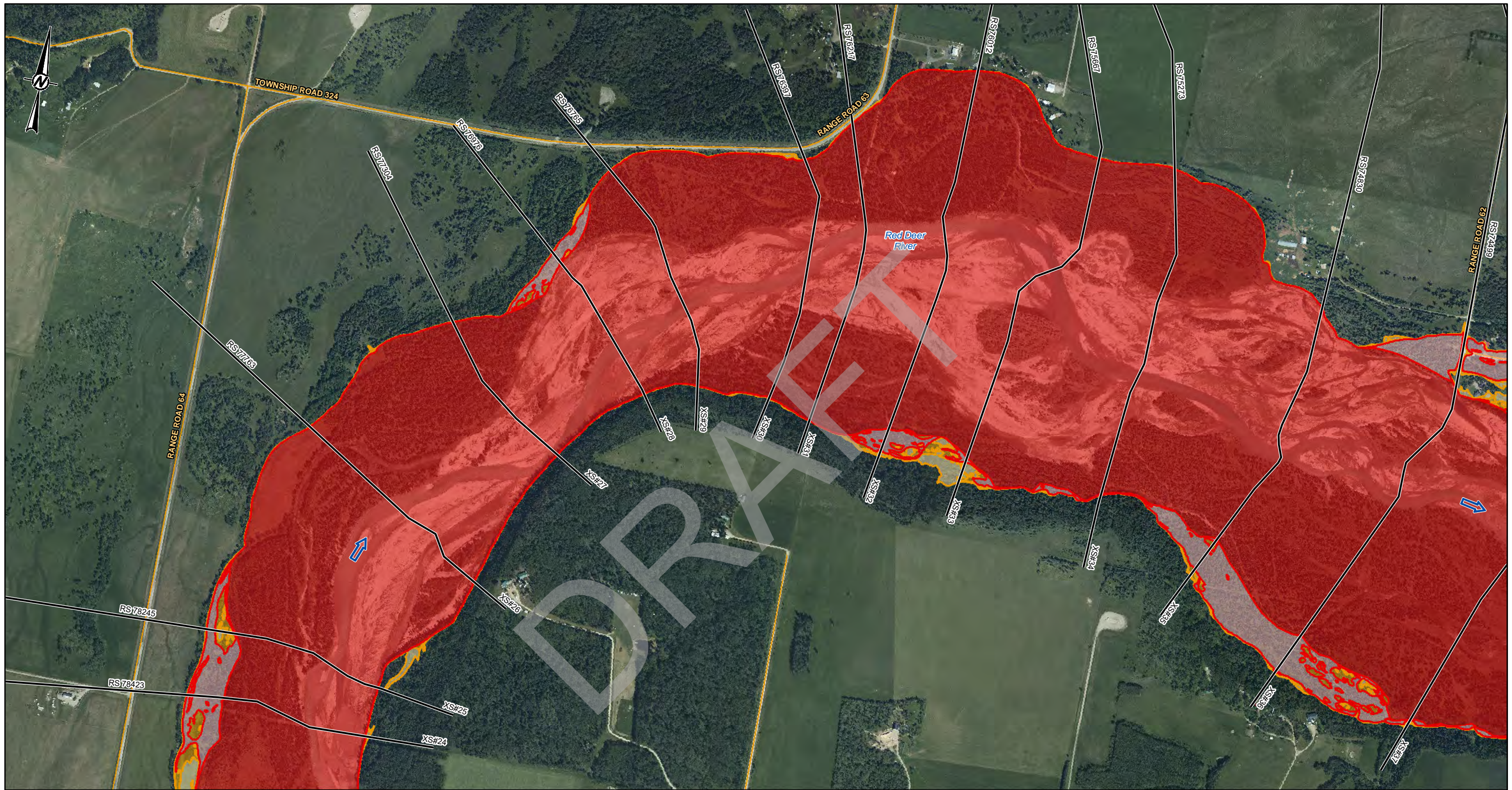
DISCHARGE
RED DEER RIVER BELOW BURNT TIMBER CREEK = 1210 M³/S



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PROJECT			
UPPER RED DEER RIVER HAZARD STUDY			
TITLE			
FLOOD HAZARD MAP			
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	2 of 34

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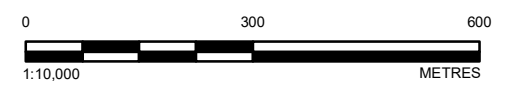
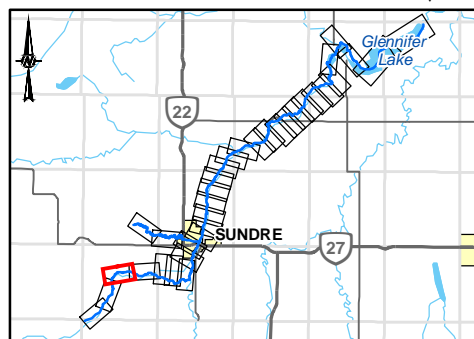


SHEET 4 ↓

LEGEND					
—	CROSS SECTION	■■■■■	FLOOD CONTROL STRUCTURE	■	FLOODWAY
XS#100	CROSS SECTION NUMBER	▭	MUNICIPAL DISTRICT BOUNDARY	▨	HIGH HAZARD FLOOD FRINGE
RS 304	RIVER STATION (M)	—	HYDRAULIC STRUCTURES	▨	FLOOD FRINGE
—	STUDY BOUNDARY	◇	CULVERT	▨	PROTECTED FLOOD FRINGE
➔	FLOW DIRECTION	△	DAM	■	200-YEAR FLOOD EXTENT
—	LOCAL ROAD	○	OTHER	■	500-YEAR FLOOD EXTENT
—	PATHWAY	□	WEIR		
—	PRIMARY HIGHWAY	—	BRIDGE		
—	SECONDARY HIGHWAY				
+	RAILWAY				

DISCHARGE
RED DEER RIVER BELOW BURNT TIMBER CREEK = 1210 M³/S

SHEET 2 ↓

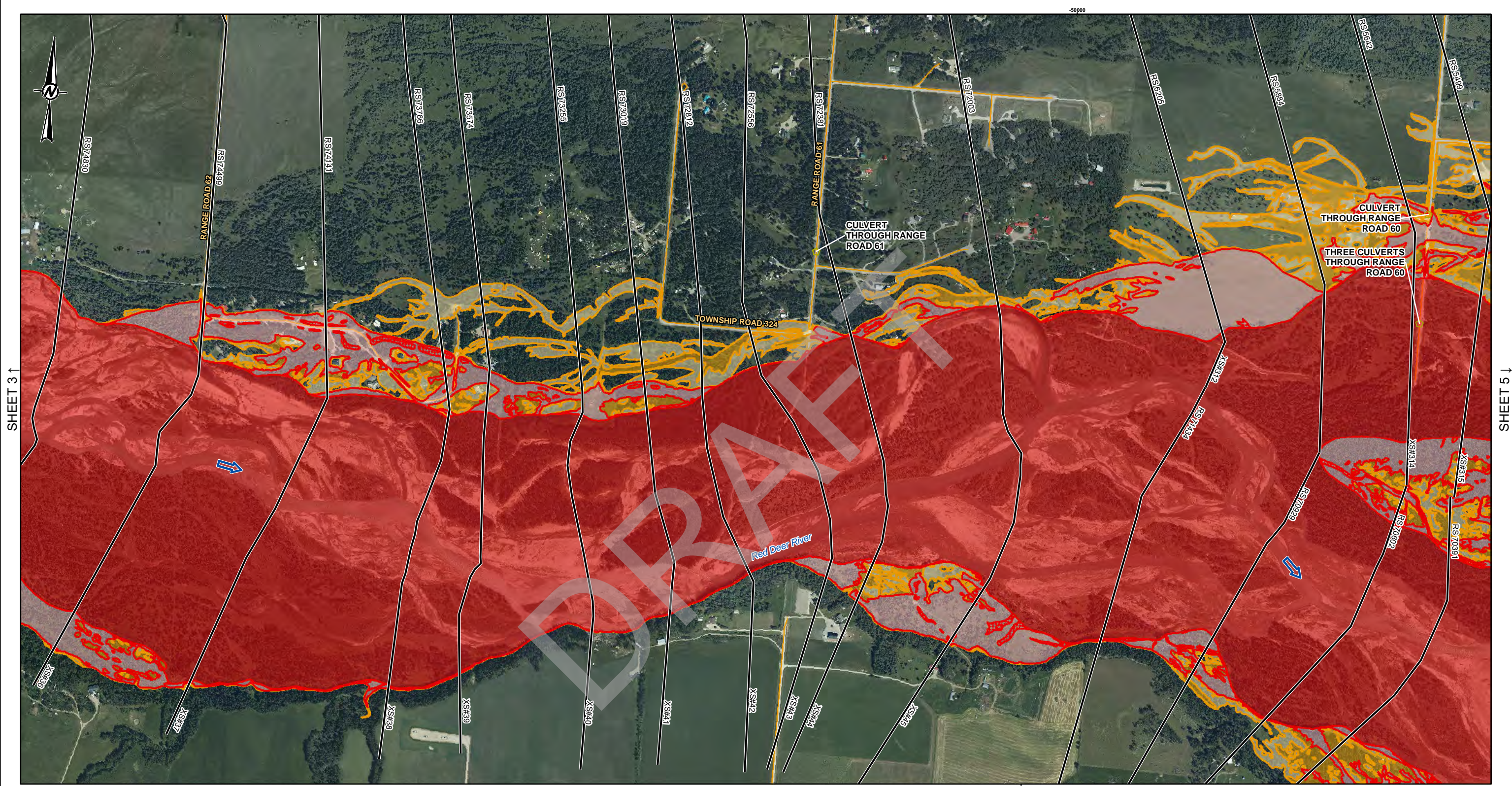


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PROJECT	UPPER RED DEER RIVER HAZARD STUDY		
TITLE	FLOOD HAZARD MAP		
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	3 of 34

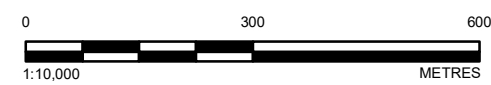
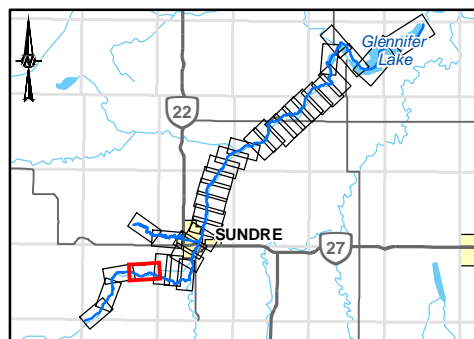
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SHEET 3 ↑

↓ SHEET 5

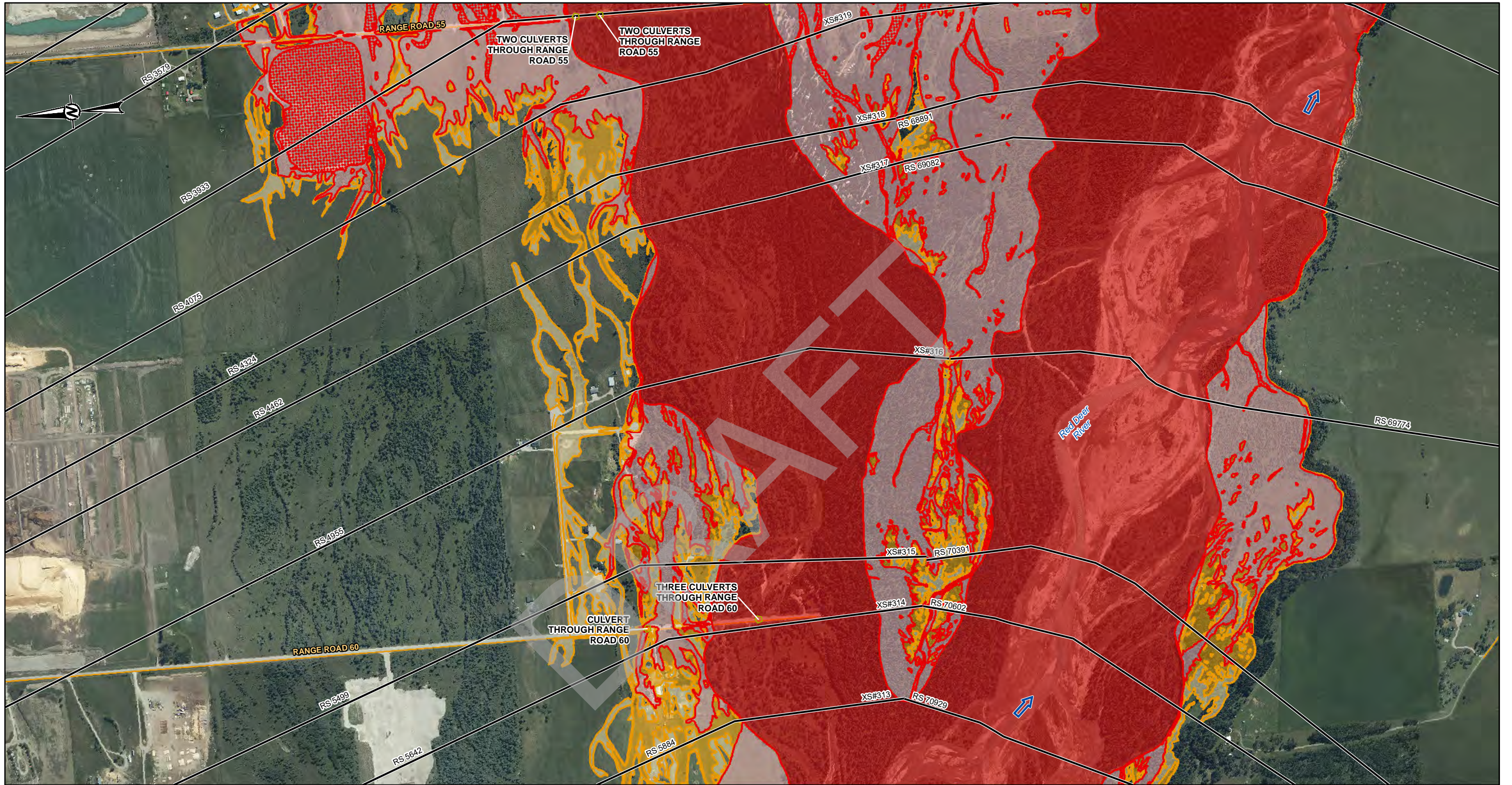
LEGEND			
	CROSS SECTION		FLOODWAY
	FLOOD CONTROL STRUCTURE		HIGH HAZARD FLOOD FRINGE
	CROSS SECTION NUMBER		FLOOD FRINGE
	RIVER STATION (M)		PROTECTED FLOOD FRINGE
	STUDY BOUNDARY		200-YEAR FLOOD EXTENT
	FLOW DIRECTION		500-YEAR FLOOD EXTENT
	LOCAL ROAD		
	PATHWAY		
	PRIMARY HIGHWAY		
	SECONDARY HIGHWAY		
	RAILWAY		
	CULVERT		
	DAM		
	OTHER		
	WEIR		
	BRIDGE		
		DISCHARGE RED DEER RIVER BELOW BURNT TIMBER CREEK = 1210 M ³ /S MCDUGAL SOUTH CHANNEL = 154.4 M ³ /S	



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PROJECT	UPPER RED DEER RIVER HAZARD STUDY	
TITLE	FLOOD HAZARD MAP	
PROJECT NO.	CONTROL	REV.
1783057	6000	0
FIGURE	4 of 34	

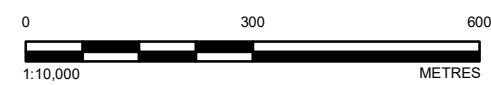
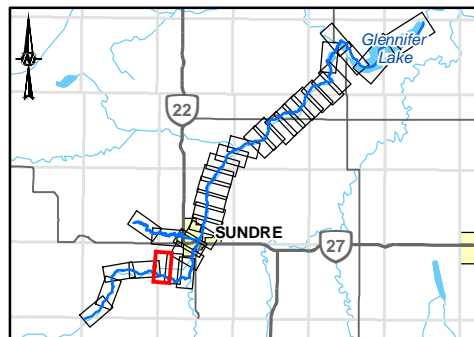
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LEGEND

—	CROSS SECTION		FLOOD CONTROL STRUCTURE	■	FLOODWAY
XS#100	CROSS SECTION NUMBER	▭	MUNICIPAL DISTRICT BOUNDARY	▨	HIGH HAZARD FLOOD FRINGE
RS 304	RIVER STATION (M)	—	HYDRAULIC STRUCTURES	▭	FLOOD FRINGE
—	STUDY BOUNDARY	◇	CULVERT	▨	PROTECTED FLOOD FRINGE
➔	FLOW DIRECTION	△	DAM	■	200-YEAR FLOOD EXTENT
—	LOCAL ROAD	○	OTHER	■	500-YEAR FLOOD EXTENT
—	PATHWAY	□	WEIR		
—	PRIMARY HIGHWAY	—	BRIDGE		
—	SECONDARY HIGHWAY				
+	RAILWAY				

DISCHARGE
 RED DEER RIVER BELOW BURNT TIMBER CREEK = 1210 M³/S
 MCDUGAL SOUTH CHANNEL = 154.4 M³/S



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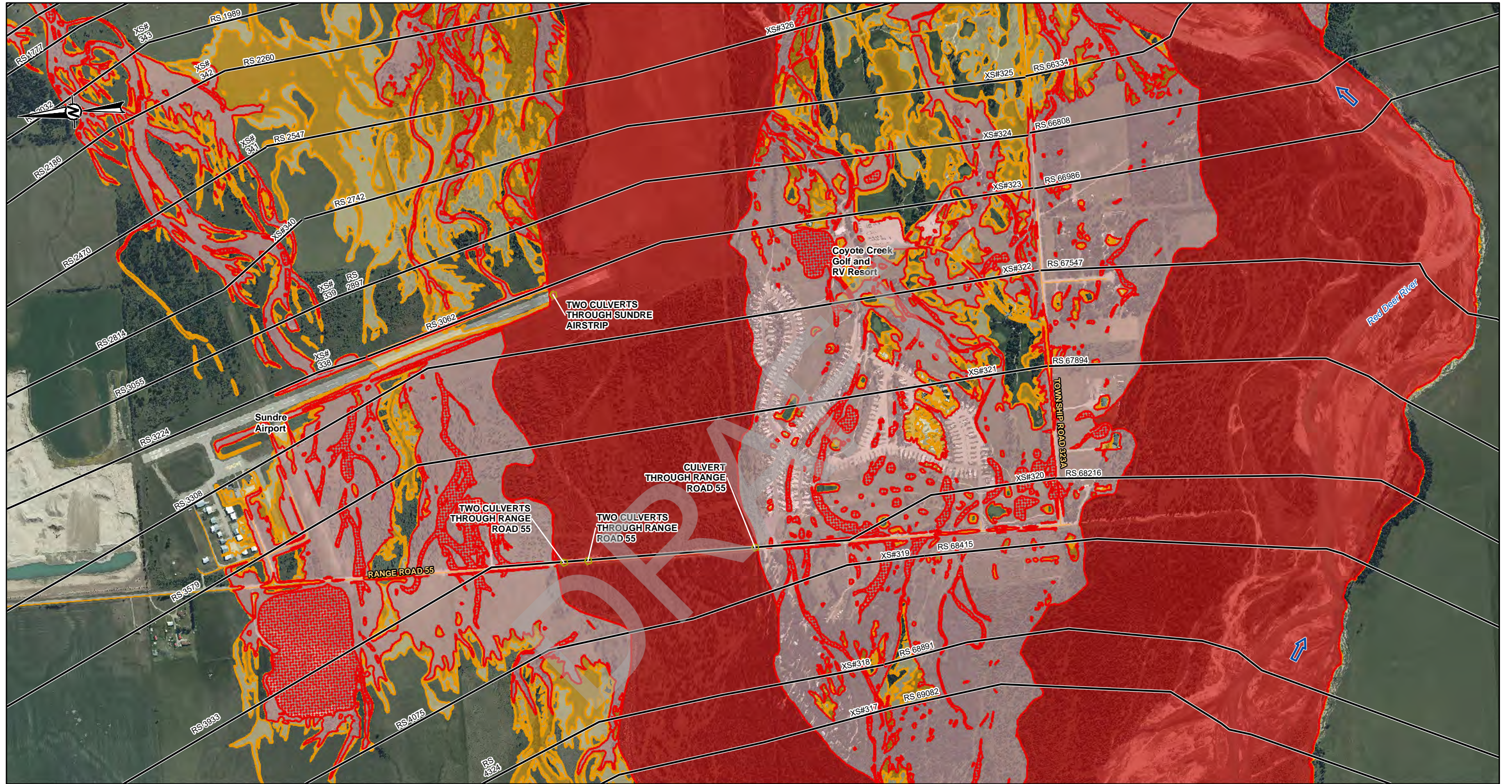
YYYY-MM-DD	2022-06-29
DESIGNED	WP
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PROJECT
 UPPER RED DEER RIVER HAZARD STUDY

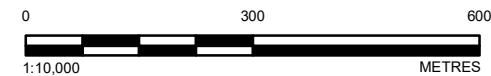
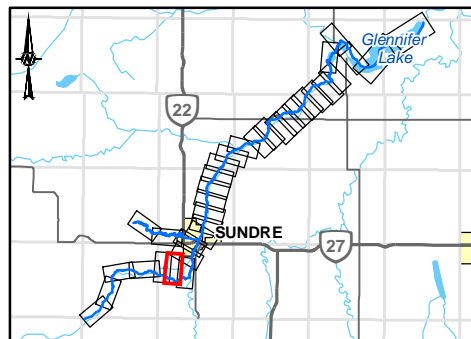
TITLE
FLOOD HAZARD MAP

PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	5 of 34



LEGEND					
—	CROSS SECTION		FLOOD CONTROL STRUCTURE	■	FLOODWAY
XS#100	CROSS SECTION NUMBER	▭	MUNICIPAL DISTRICT BOUNDARY	▨	HIGH HAZARD FLOOD FRINGE
RS 304	RIVER STATION (M)	▭	HYDRAULIC STRUCTURES	▨	FLOOD FRINGE
▭	STUDY BOUNDARY	◇	CULVERT	▨	PROTECTED FLOOD FRINGE
➔	FLOW DIRECTION	△	DAM	▨	200-YEAR FLOOD EXTENT
—	LOCAL ROAD	○	OTHER	▨	500-YEAR FLOOD EXTENT
—	PATHWAY	□	WEIR		
—	PRIMARY HIGHWAY	▭	BRIDGE		
—	SECONDARY HIGHWAY				
+	RAILWAY				

DISCHARGE
 RED DEER RIVER BELOW BURNT TIMBER CREEK = 1210 M³/S
 MCDUGAL NORTH CHANNEL = 19.4 M³/S



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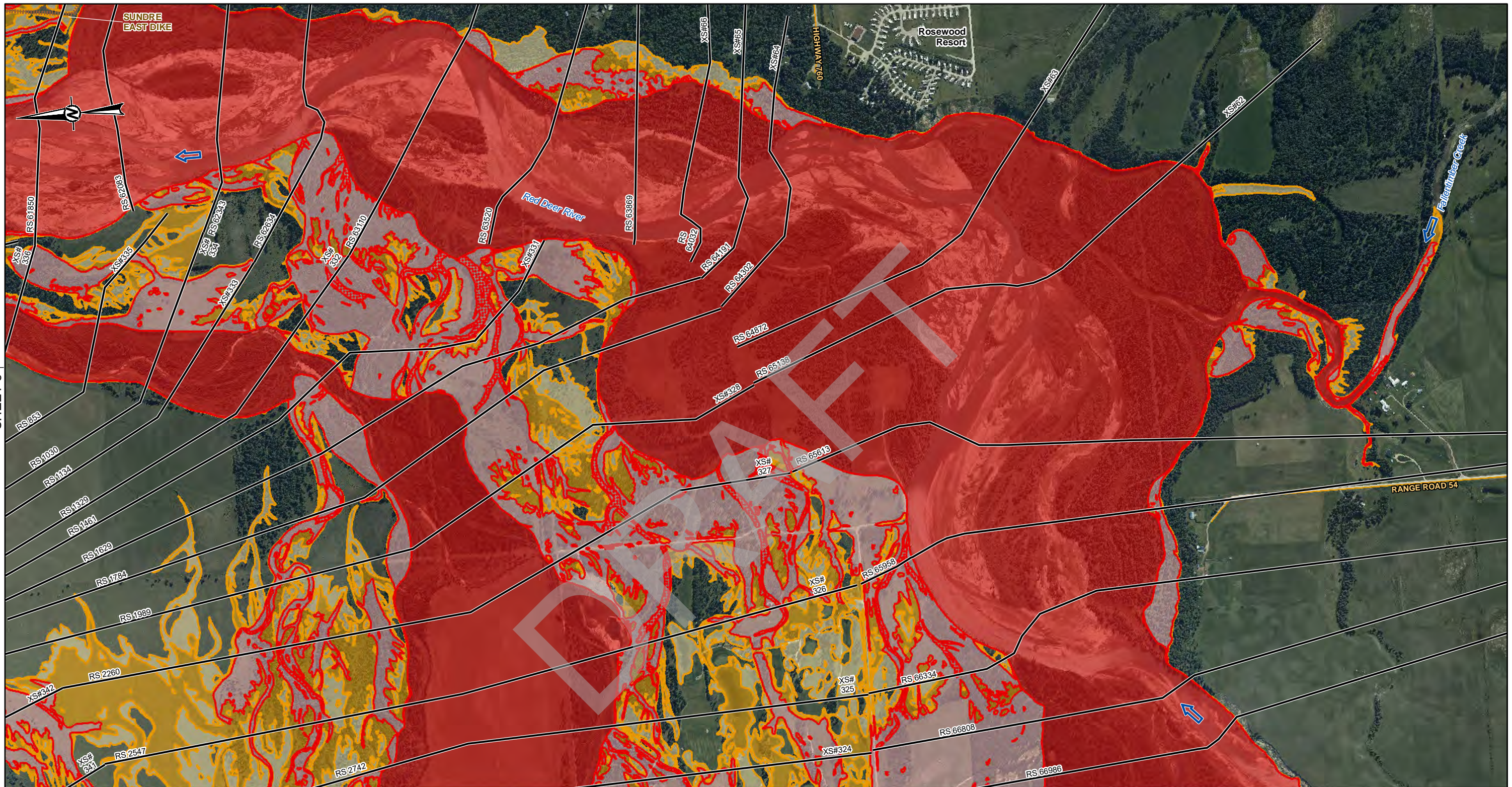
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PROJECT
 UPPER RED DEER RIVER HAZARD STUDY

TITLE
FLOOD HAZARD MAP

PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	6 of 34

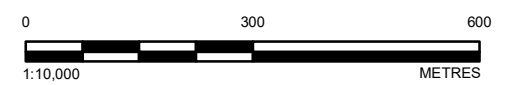
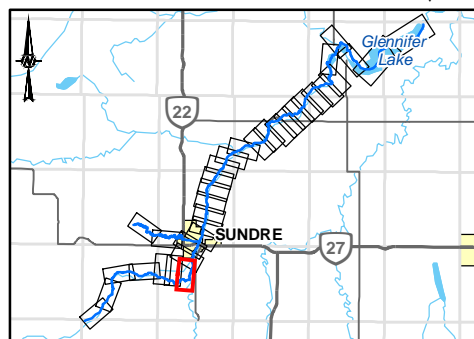


SHEET 8 ↑

SHEET 6 ↓

LEGEND	
—	CROSS SECTION
XS#100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
—	STUDY BOUNDARY
→	FLOW DIRECTION
—	LOCAL ROAD
—	PATHWAY
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
+	RAILWAY
	FLOOD CONTROL STRUCTURE
▭	MUNICIPAL DISTRICT BOUNDARY
HYDRAULIC STRUCTURES	
◇	CULVERT
△	DAM
○	OTHER
□	WEIR
—	BRIDGE
■	FLOODWAY
▨	HIGH HAZARD FLOOD FRINGE
▩	FLOOD FRINGE
▧	PROTECTED FLOOD FRINGE
■	200-YEAR FLOOD EXTENT
■	500-YEAR FLOOD EXTENT

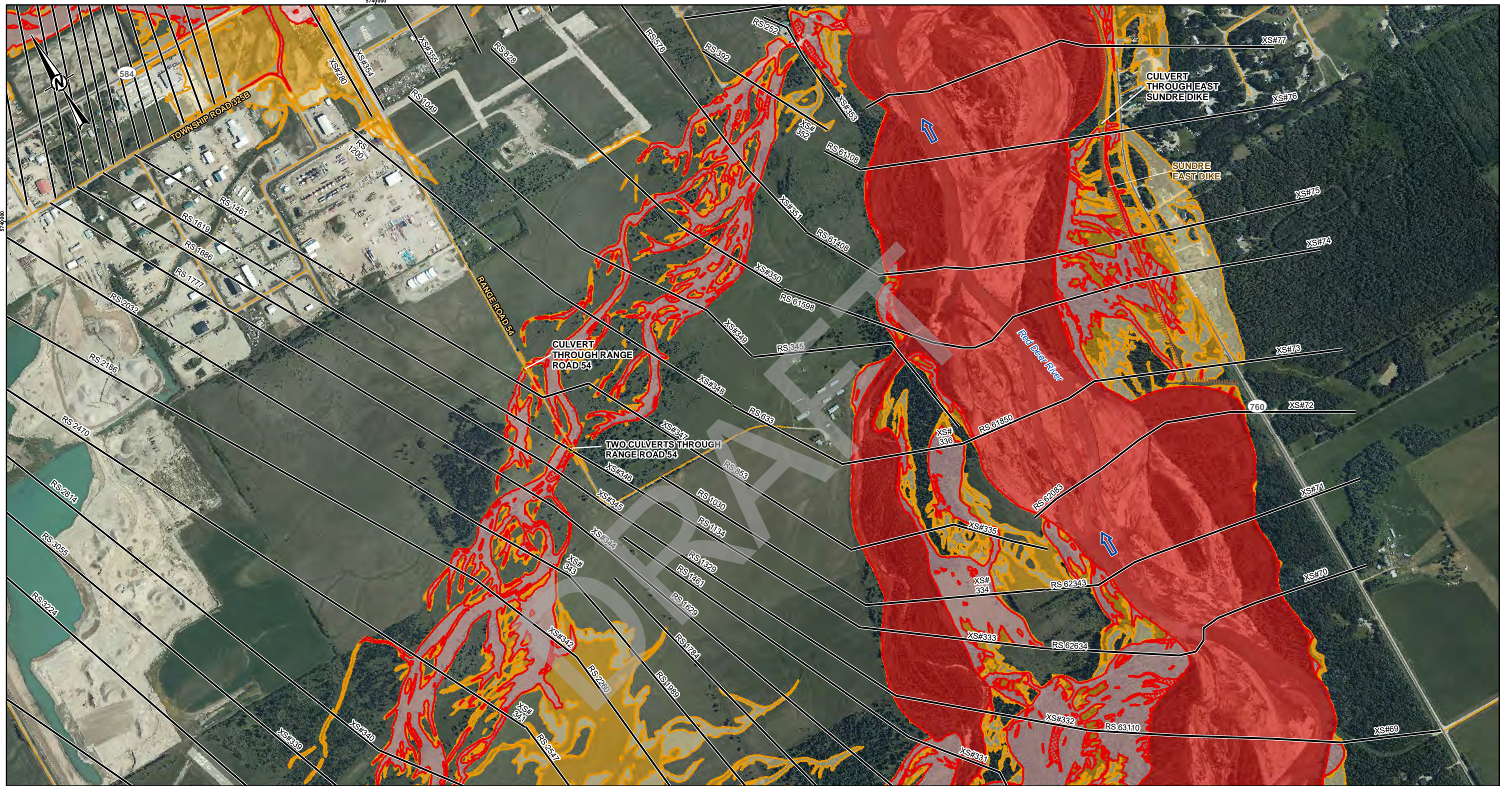
DISCHARGE
 RED DEER RIVER BELOW BURNT TIMBER CREEK = 1210 M³/S
 MCDUGAL NORTH CHANNEL = 19.4 M³/S
 MCDUGAL SOUTH CHANNEL = 154.4 M³/S
 RED DEER RIVER BELOW FALLETIMBER CREEK = 1130.8 M³/S



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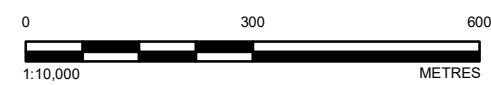
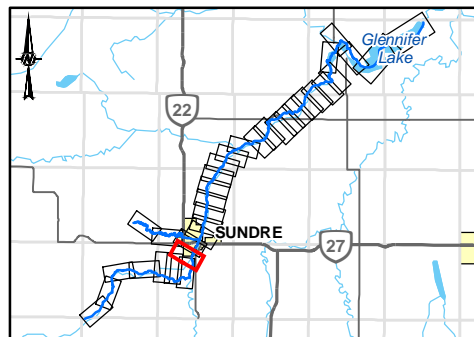
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PROJECT	UPPER RED DEER RIVER HAZARD STUDY		
TITLE	FLOOD HAZARD MAP		
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	7 of 34



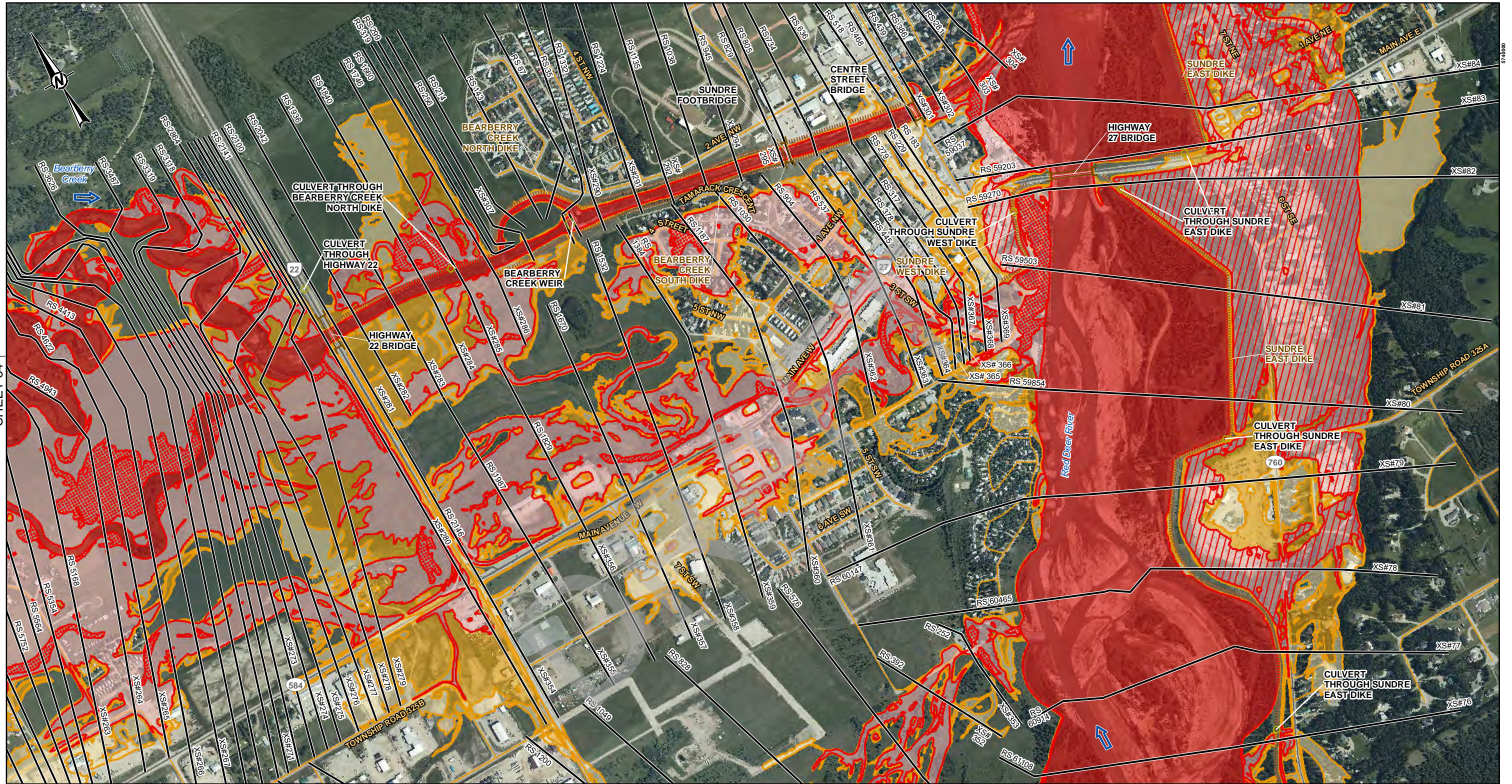
LEGEND	
—	CROSS SECTION
XS#100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
—	STUDY BOUNDARY
→	FLOW DIRECTION
—	LOCAL ROAD
—	PATHWAY
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
+	RAILWAY
	FLOOD CONTROL STRUCTURE
▭	MUNICIPAL DISTRICT BOUNDARY
◇	CULVERT
△	DAM
○	OTHER
□	WEIR
—	BRIDGE
■	FLOODWAY
▨	HIGH HAZARD FLOOD FRINGE
▩	FLOOD FRINGE
▧	PROTECTED FLOOD FRINGE
■	200-YEAR FLOOD EXTENT
■	500-YEAR FLOOD EXTENT

DISCHARGE
 RED DEER RIVER BELOW FALLEN TIMBER CREEK = 1130.8 M³/S
 MCDUGAL NORTH CHANNEL = 19.4 M³/S



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CONSULTANT	GOLDER MEMBER OF WSP
DATE	2022-06-29
DESIGNED	WP
PREPARED	SP
REVIEWED	WP
APPROVED	WP

REFERENCE(S)	
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PROJECT	UPPER RED DEER RIVER HAZARD STUDY
TITLE	FLOOD HAZARD MAP
PROJECT NO.	1783057
CONTROL	6000
REV.	0
FIGURE	8 of 34

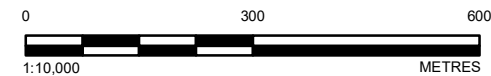
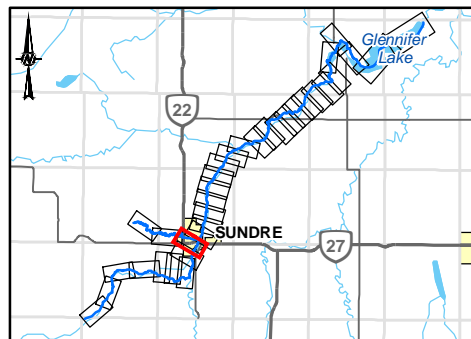


SHEET 34 ↑

LEGEND

—	CROSS SECTION		FLOOD CONTROL STRUCTURE	■	FLOODWAY
XS#100	CROSS SECTION NUMBER	▭	MUNICIPAL DISTRICT BOUNDARY	■	HIGH HAZARD FLOOD FRINGE
RS 304	RIVER STATION (M)	—	HYDRAULIC STRUCTURES	▭	FLOOD FRINGE
—	STUDY BOUNDARY	◇	CULVERT	▭	PROTECTED FLOOD FRINGE
→	FLOW DIRECTION	△	DAM	▭	200-YEAR FLOOD EXTENT
—	LOCAL ROAD	○	OTHER	▭	500-YEAR FLOOD EXTENT
—	PATHWAY	□	WEIR		
—	PRIMARY HIGHWAY	—	BRIDGE		
—	SECONDARY HIGHWAY				
+	RAILWAY				

DISCHARGE
 RED DEER RIVER BELOW FALLEN TIMBER CREEK = 1130.8 M³/S
 MCDUGAL NORTH CHANNEL = 19.4 M³/S
 BEARBERRY CREEK = 214 M³/S
 FISHWAY = 10.7 M³/S
 BEARBERRY HISTORIC CHANNEL = 32.1 M³/S



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ALBERTA ENVIRONMENT AND PARKS

CONSULTANT
GOLDER MEMBER OF WSP

DATE
2022-06-29

DESIGNED
WP

PREPARED
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REVIEWED
WP

APPROVED
WP

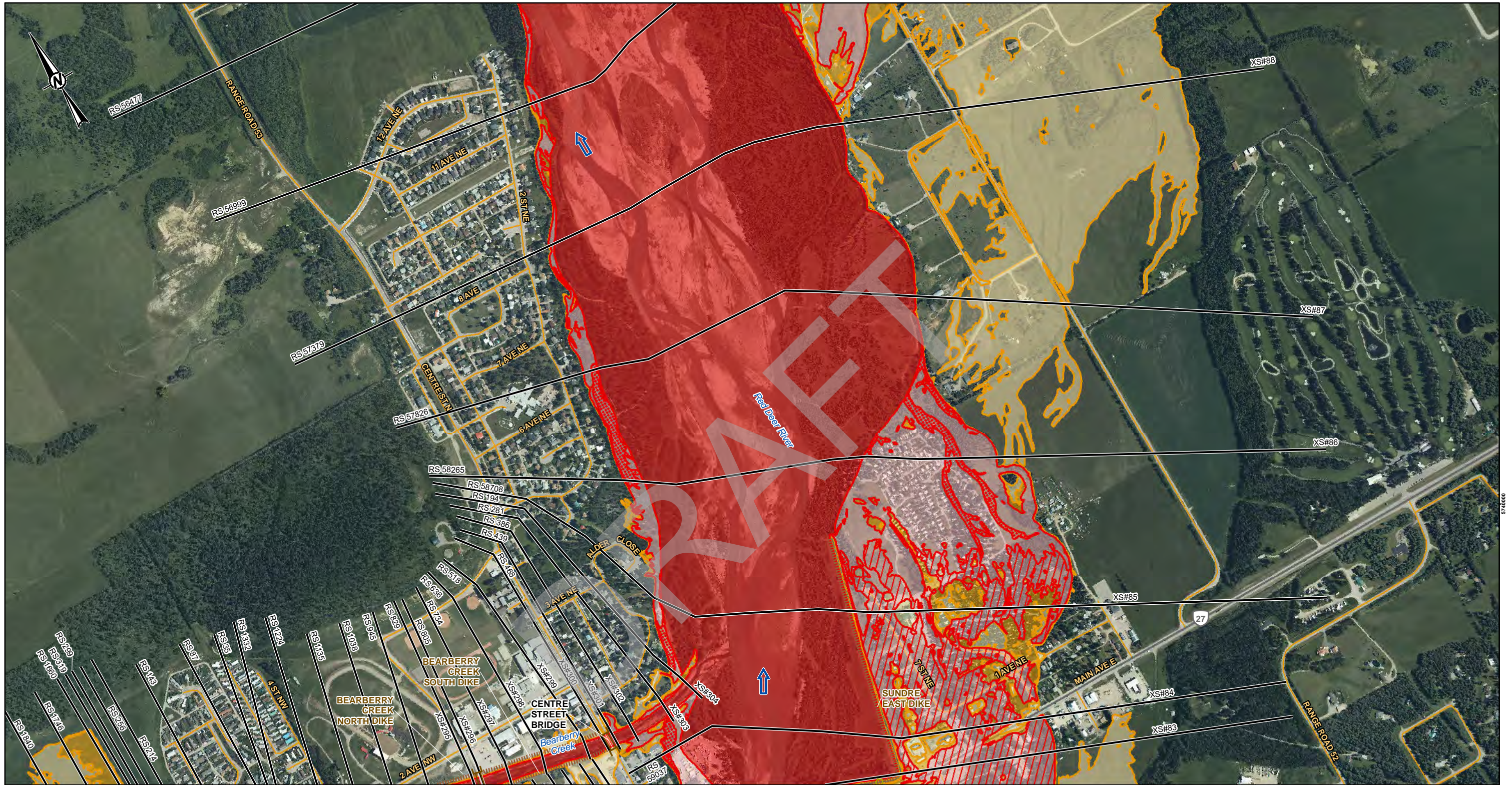
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PROJECT
UPPER RED DEER RIVER HAZARD STUDY

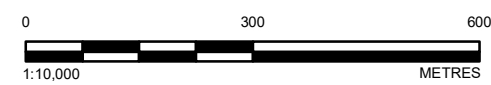
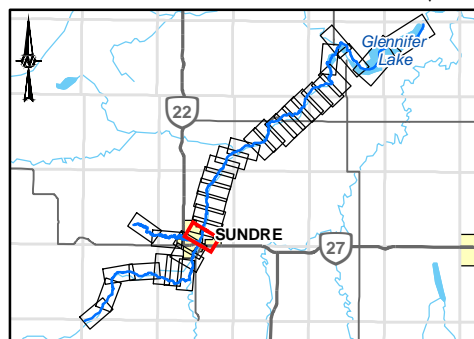
TITLE
FLOOD HAZARD MAP

PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	9 of 34



LEGEND			
	CROSS SECTION		FLOODWAY
	CROSS SECTION NUMBER		HIGH HAZARD FLOOD FRINGE
	RIVER STATION (M)		FLOOD FRINGE
	STUDY BOUNDARY		PROTECTED FLOOD FRINGE
	FLOW DIRECTION		200-YEAR FLOOD EXTENT
	LOCAL ROAD		500-YEAR FLOOD EXTENT
	PATHWAY		
	PRIMARY HIGHWAY		
	SECONDARY HIGHWAY		
	RAILWAY		
	FLOOD CONTROL STRUCTURE		
	MUNICIPAL DISTRICT BOUNDARY		
	HYDRAULIC STRUCTURES		
	CULVERT		
	DAM		
	OTHER		
	WEIR		
	BRIDGE		

DISCHARGE
RED DEER RIVER BELOW BEARBERRY CREEK= 1210 M³/S



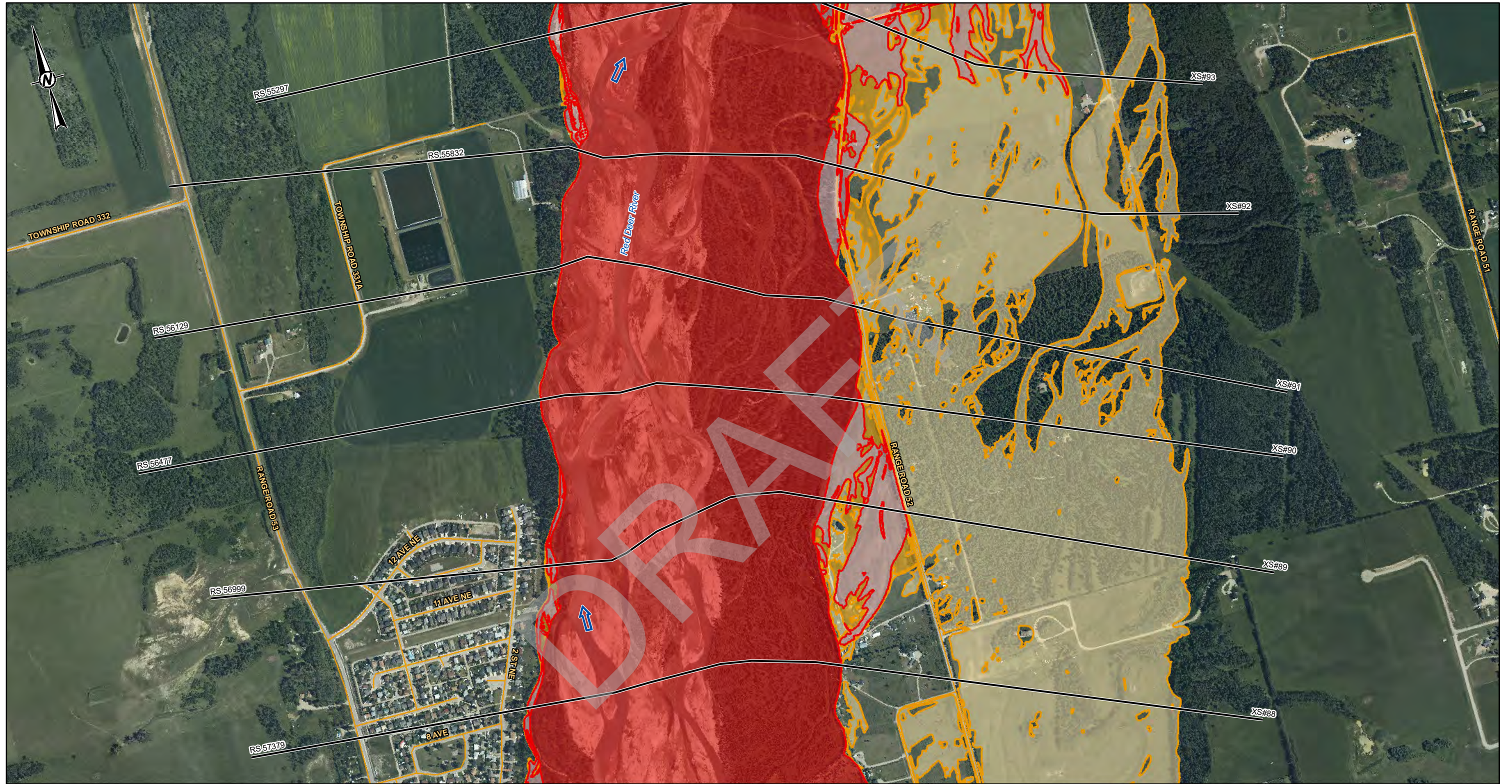
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CONSULTANT	GOLDER MEMBER OF WSP	
DESIGNED	YYYY-MM-DD	2022-06-29
PREPARED	WP	
REVIEWED	SP	
APPROVED	WP	

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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

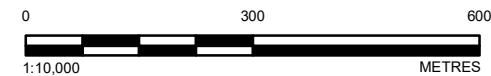
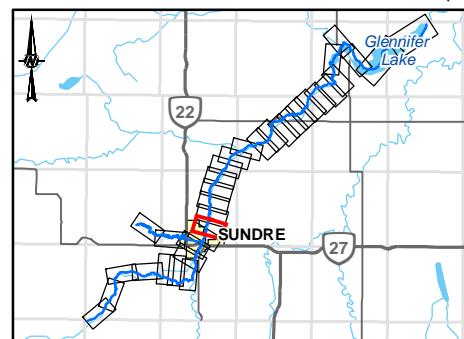
PROJECT	UPPER RED DEER RIVER HAZARD STUDY		
TITLE	FLOOD HAZARD MAP		
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	10 of 34

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: A4S B 26mm 5740000



LEGEND	
—	CROSS SECTION
XS#100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
—	STUDY BOUNDARY
→	FLOW DIRECTION
—	LOCAL ROAD
—	PATHWAY
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
+	RAILWAY
	FLOOD CONTROL STRUCTURE
▭	MUNICIPAL DISTRICT BOUNDARY
◇	CULVERT
△	DAM
○	OTHER
□	WEIR
—	BRIDGE
■	FLOODWAY
▨	HIGH HAZARD FLOOD FRINGE
▩	FLOOD FRINGE
▧	PROTECTED FLOOD FRINGE
▦	200-YEAR FLOOD EXTENT
▤	500-YEAR FLOOD EXTENT
DISCHARGE RED DEER RIVER BELOW BEARBERRY CREEK= 1210 M ³ /S	



CLIENT
ALBERTA ENVIRONMENT
AND PARKS



CONSULTANT



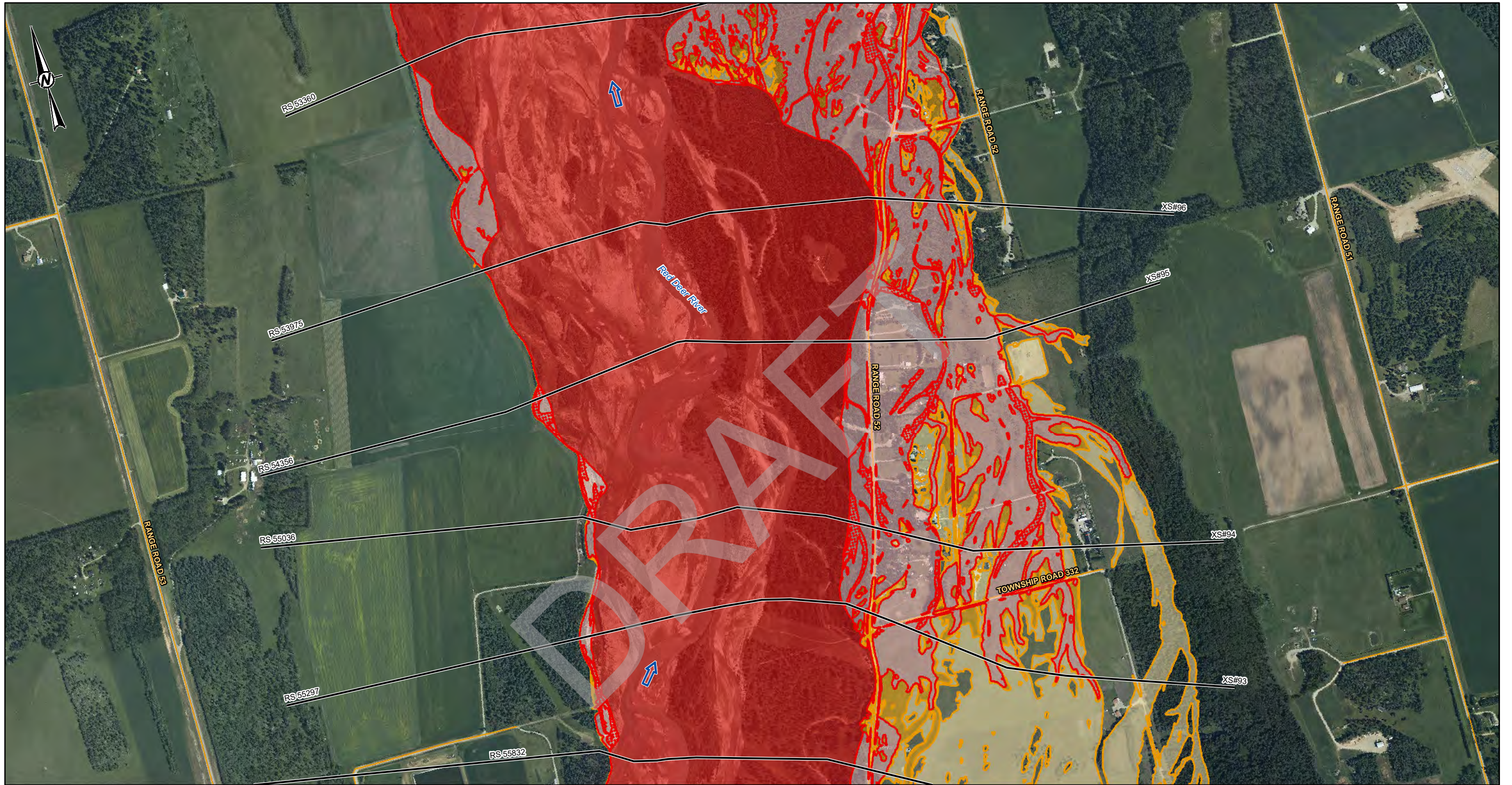
YYYY-MM-DD	2022-06-29
DESIGNED	WP
PREPARED	SP
REVIEWED	WP
APPROVED	WP

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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

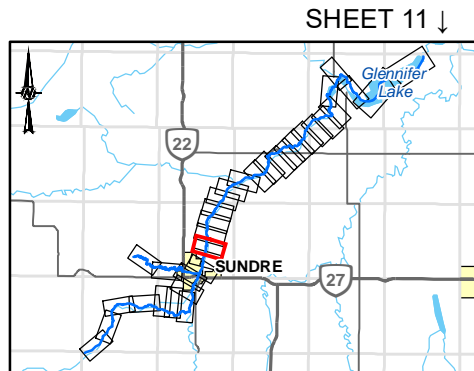
PROJECT
UPPER RED DEER RIVER HAZARD STUDY

TITLE
FLOOD HAZARD MAP

PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	11 of 34



LEGEND			
	CROSS SECTION		FLOODWAY
	CROSS SECTION NUMBER		HIGH HAZARD FLOOD FRINGE
	RIVER STATION (M)		FLOOD FRINGE
	STUDY BOUNDARY		PROTECTED FLOOD FRINGE
	FLOW DIRECTION		200-YEAR FLOOD EXTENT
	LOCAL ROAD		500-YEAR FLOOD EXTENT
	PATHWAY		DISCHARGE
	PRIMARY HIGHWAY		RED DEER RIVER BELOW BEARBERRY CREEK= 1210 M ³ /S
	SECONDARY HIGHWAY		
	RAILWAY		
	FLOOD CONTROL STRUCTURE		
	MUNICIPAL DISTRICT BOUNDARY		
HYDRAULIC STRUCTURES			
	CULVERT		
	DAM		
	OTHER		
	WEIR		
	BRIDGE		



CLIENT	ALBERTA ENVIRONMENT AND PARKS	
CONSULTANT	GOLDER MEMBER OF WSP	
DESIGNED	YYYY-MM-DD	2022-06-29
PREPARED	WP	
REVIEWED	SP	
APPROVED	WP	

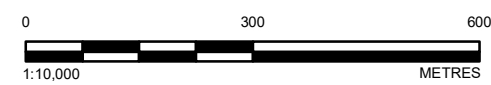
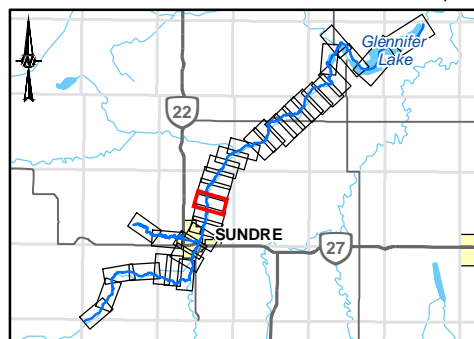
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 DATUM: NAD 83 CSRS PROJECTION: 3TM 114

PROJECT	UPPER RED DEER RIVER HAZARD STUDY		
TITLE	FLOOD HAZARD MAP		
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	12 of 34



LEGEND					
—	CROSS SECTION		FLOOD CONTROL STRUCTURE	■	FLOODWAY
XS#100	CROSS SECTION NUMBER	▭	MUNICIPAL DISTRICT BOUNDARY	▨	HIGH HAZARD FLOOD FRINGE
RS 304	RIVER STATION (M)	—	HYDRAULIC STRUCTURES	▨	FLOOD FRINGE
—	STUDY BOUNDARY	◊	CULVERT	▨	PROTECTED FLOOD FRINGE
➔	FLOW DIRECTION	△	DAM	■	200-YEAR FLOOD EXTENT
—	LOCAL ROAD	○	OTHER	■	500-YEAR FLOOD EXTENT
—	PATHWAY	□	WEIR		
—	PRIMARY HIGHWAY	—	BRIDGE		
—	SECONDARY HIGHWAY				
+	RAILWAY				

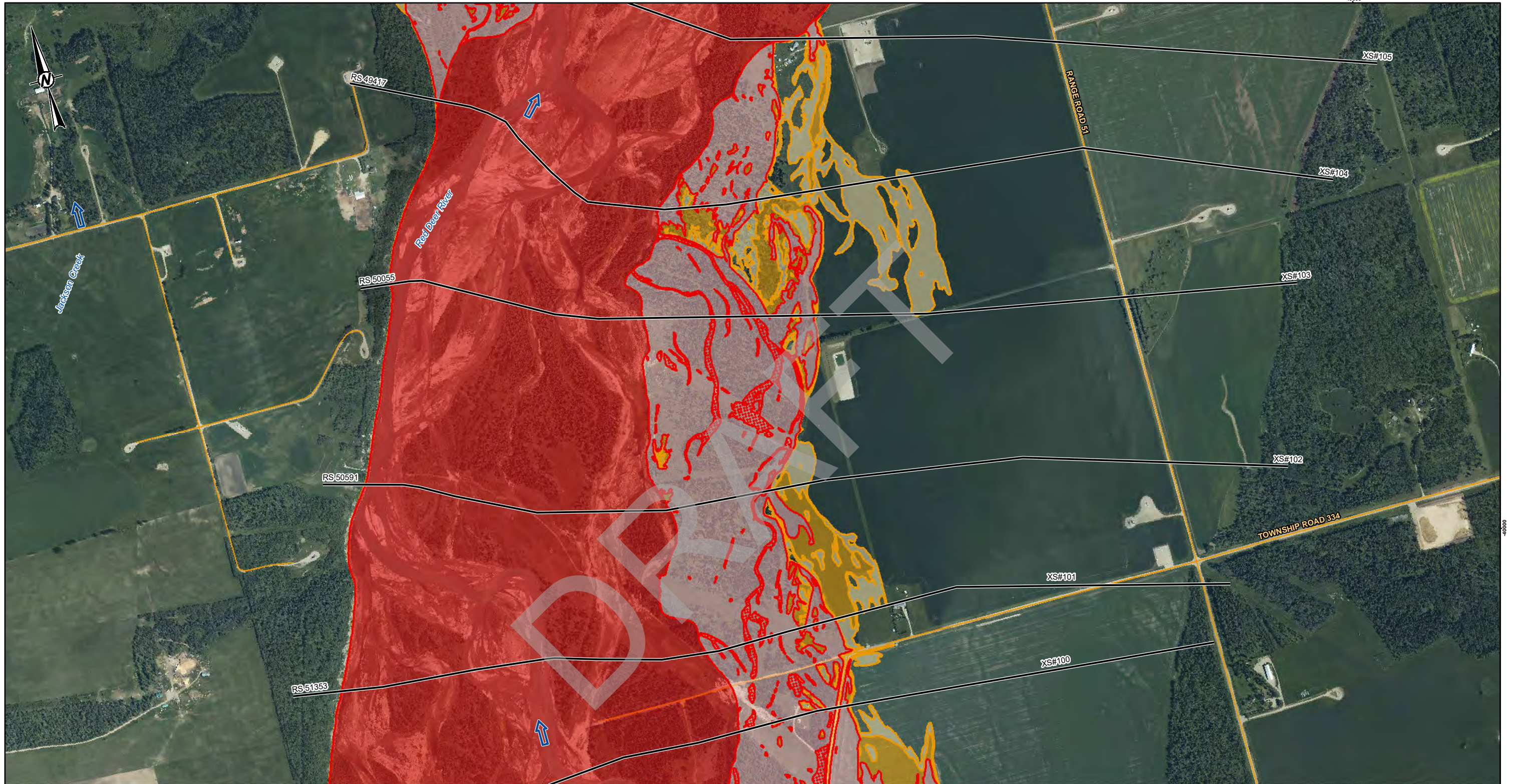
DISCHARGE
RED DEER RIVER BELOW BEARBERRY CREEK= 1210 M³/S



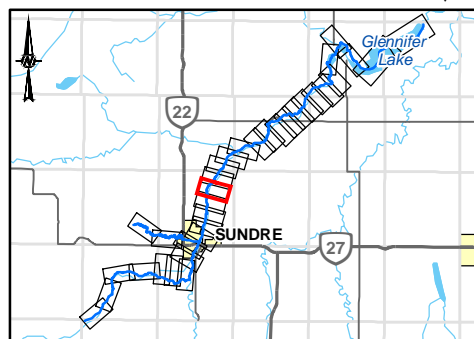
CLIENT	ALBERTA ENVIRONMENT AND PARKS	
CONSULTANT	GOLDER MEMBER OF WSP	
DESIGNED	YYYY-MM-DD	2022-06-29
PREPARED	WP	
REVIEWED	SP	
APPROVED	WP	

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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

PROJECT		UPPER RED DEER RIVER HAZARD STUDY	
TITLE		FLOOD HAZARD MAP	
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	13 of 34



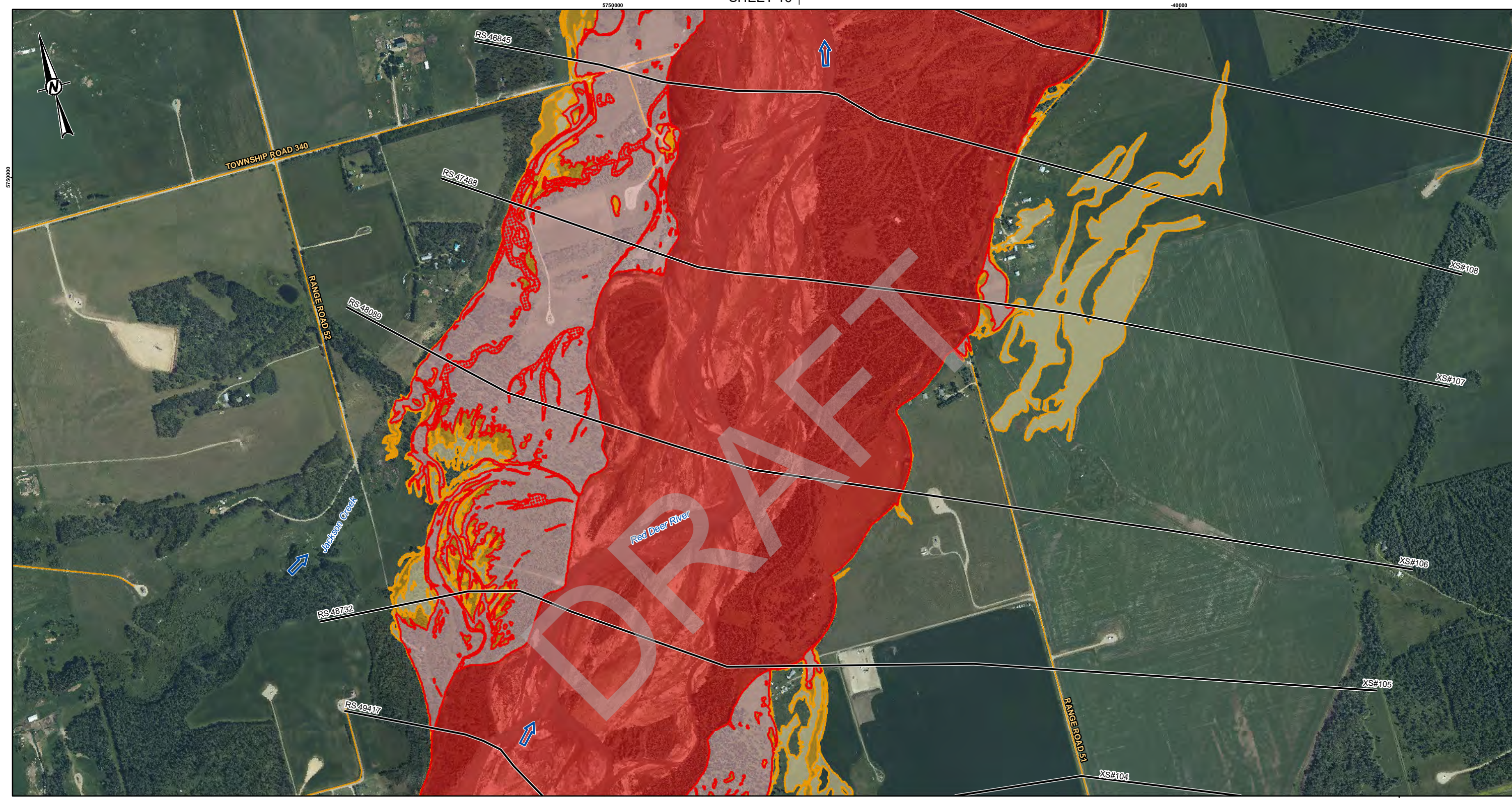
LEGEND			
	CROSS SECTION		FLOODWAY
	FLOOD CONTROL STRUCTURE		HIGH HAZARD FLOOD FRINGE
	CROSS SECTION NUMBER		FLOOD FRINGE
	RIVER STATION (M)		PROTECTED FLOOD FRINGE
	STUDY BOUNDARY		200-YEAR FLOOD EXTENT
	FLOW DIRECTION		500-YEAR FLOOD EXTENT
	LOCAL ROAD		DISCHARGE
	PATHWAY		RED DEER RIVER BELOW BEARBERRY CREEK= 1210 M ³ /S
	PRIMARY HIGHWAY		
	SECONDARY HIGHWAY		
	RAILWAY		
	MUNICIPAL DISTRICT BOUNDARY		CULVERT
			DAM
			OTHER
			WEIR
			BRIDGE



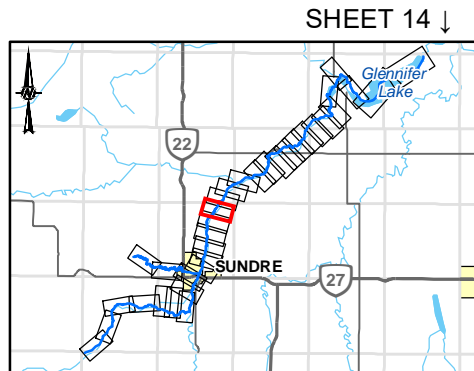
CLIENT	ALBERTA ENVIRONMENT AND PARKS	ALBERTA Government
CONSULTANT	GOLDER MEMBER OF WSP	
DATE	2022-06-29	
DESIGNED	WP	
PREPARED	SP	
REVIEWED	WP	
APPROVED	WP	

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 DATUM: NAD 83 CSRS PROJECTION: 3TM 114

PROJECT	UPPER RED DEER RIVER HAZARD STUDY		
TITLE	FLOOD HAZARD MAP		
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	14 of 34



LEGEND			
—	CROSS SECTION	■	FLOODWAY
XS#100	CROSS SECTION NUMBER	▨	HIGH HAZARD FLOOD FRINGE
RS 304	RIVER STATION (M)	▭	FLOOD FRINGE
▭	STUDY BOUNDARY	▨	PROTECTED FLOOD FRINGE
➔	FLOW DIRECTION	■	200-YEAR FLOOD EXTENT
—	LOCAL ROAD	■	500-YEAR FLOOD EXTENT
—	PATHWAY	■	DISCHARGE
—	PRIMARY HIGHWAY	■	RED DEER RIVER BELOW BEARBERRY CREEK= 1210 M ³ /S
—	SECONDARY HIGHWAY	■	
+	RAILWAY	■	
▨	FLOOD CONTROL STRUCTURE	■	
▭	MUNICIPAL DISTRICT BOUNDARY	■	
⬡	CULVERT	■	
⬡	DAM	■	
⬡	OTHER	■	
⬡	WEIR	■	
⬡	BRIDGE	■	

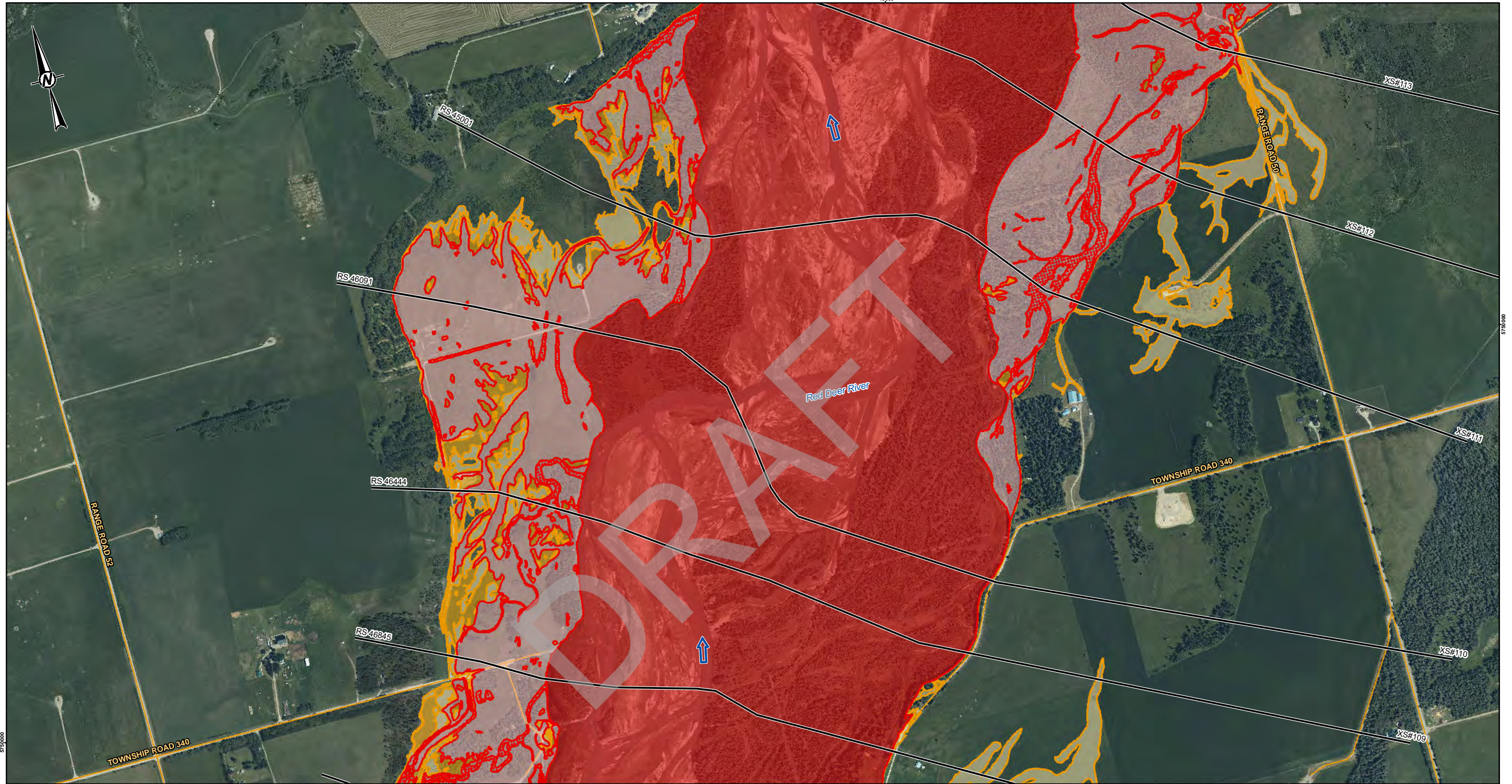


CLIENT	ALBERTA ENVIRONMENT AND PARKS	ALBERTA Government
CONSULTANT	GOLDER MEMBER OF WSP	
DATE	2022-06-29	
DESIGNED	WP	
PREPARED	SP	
REVIEWED	WP	
APPROVED	WP	

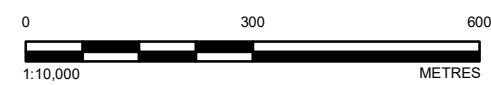
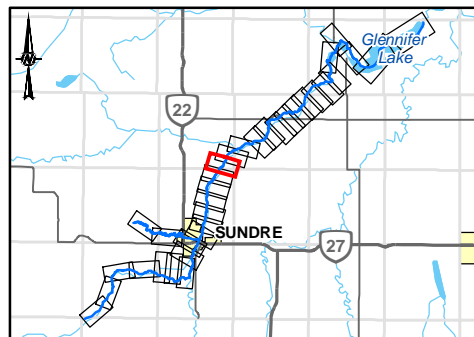
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PROJECT			
UPPER RED DEER RIVER HAZARD STUDY			
TITLE			
FLOOD HAZARD MAP			
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	15 of 34

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



LEGEND			
	CROSS SECTION		FLOODWAY
	CROSS SECTION NUMBER		HIGH HAZARD FLOOD FRINGE
	RIVER STATION (M)		FLOOD FRINGE
	STUDY BOUNDARY		PROTECTED FLOOD FRINGE
	FLOW DIRECTION		200-YEAR FLOOD EXTENT
	LOCAL ROAD		500-YEAR FLOOD EXTENT
	PATHWAY		
	PRIMARY HIGHWAY		
	SECONDARY HIGHWAY		
	RAILWAY		
	FLOOD CONTROL STRUCTURE		
	MUNICIPAL DISTRICT BOUNDARY		
HYDRAULIC STRUCTURES			
	CULVERT		
	DAM		
	OTHER		
	WEIR		
	BRIDGE		
DISCHARGE RED DEER RIVER BELOW BEARBERRY CREEK= 1210 M ³ /S			



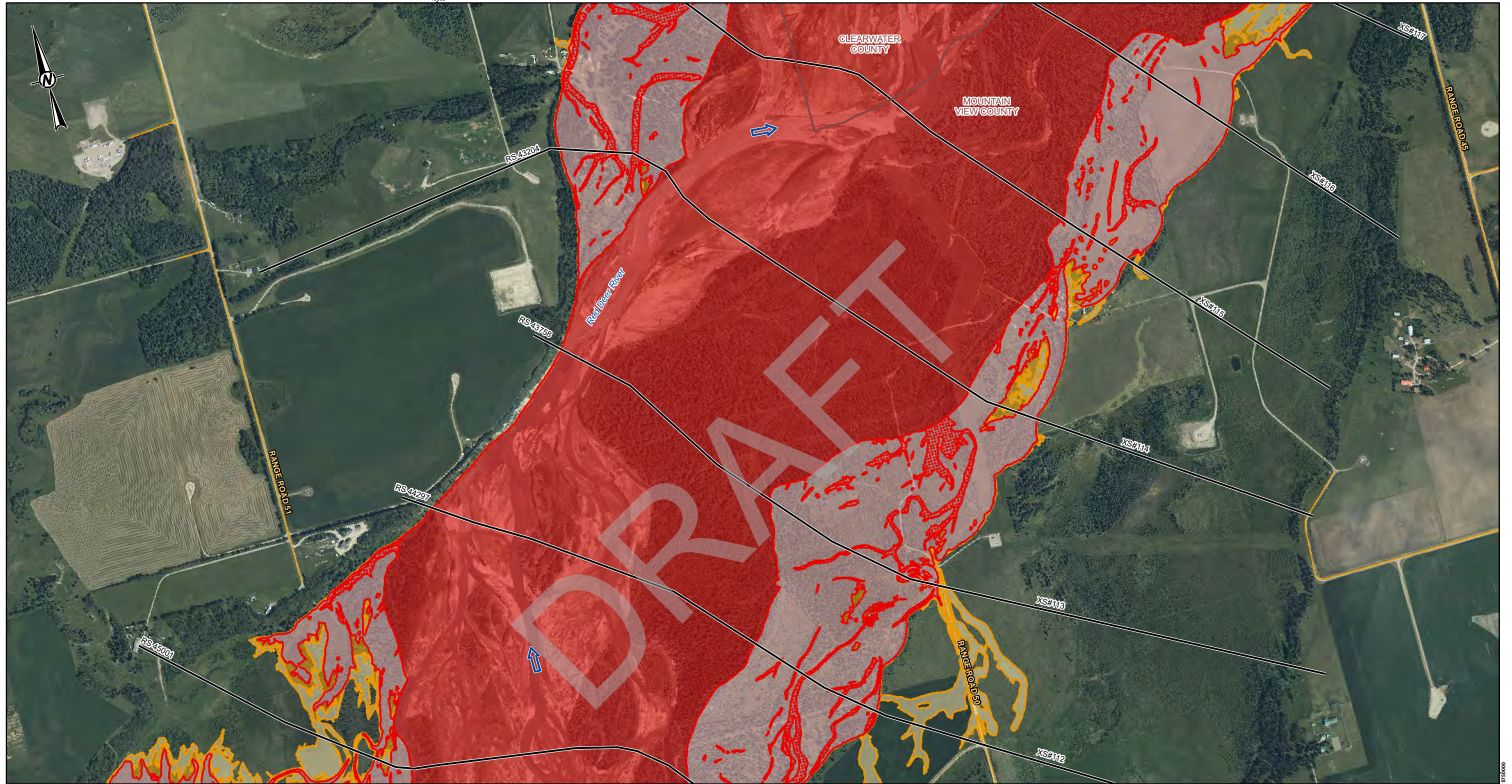
CLIENT	ALBERTA ENVIRONMENT AND PARKS	
CONSULTANT	GOLDER MEMBER OF WSP	
DESIGNED	YYYY-MM-DD	2022-06-29
PREPARED	WP	
REVIEWED	SP	
APPROVED	WP	

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PROJECT	UPPER RED DEER RIVER HAZARD STUDY		
TITLE	FLOOD HAZARD MAP		
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	16 of 34

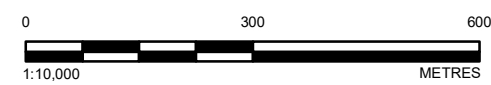
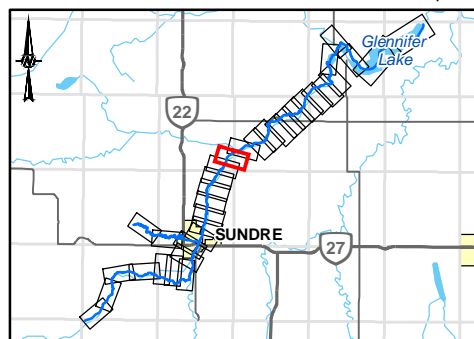
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: A4S B



LEGEND			
	CROSS SECTION		FLOODWAY
	FLOOD CONTROL STRUCTURE		HIGH HAZARD FLOOD FRINGE
	MUNICIPAL DISTRICT BOUNDARY		FLOOD FRINGE
	STUDY BOUNDARY		PROTECTED FLOOD FRINGE
	FLOW DIRECTION		200-YEAR FLOOD EXTENT
	LOCAL ROAD		500-YEAR FLOOD EXTENT
	PATHWAY		
	PRIMARY HIGHWAY		
	SECONDARY HIGHWAY		
	RAILWAY		
	CULVERT		
	DAM		
	OTHER		
	WEIR		
	BRIDGE		

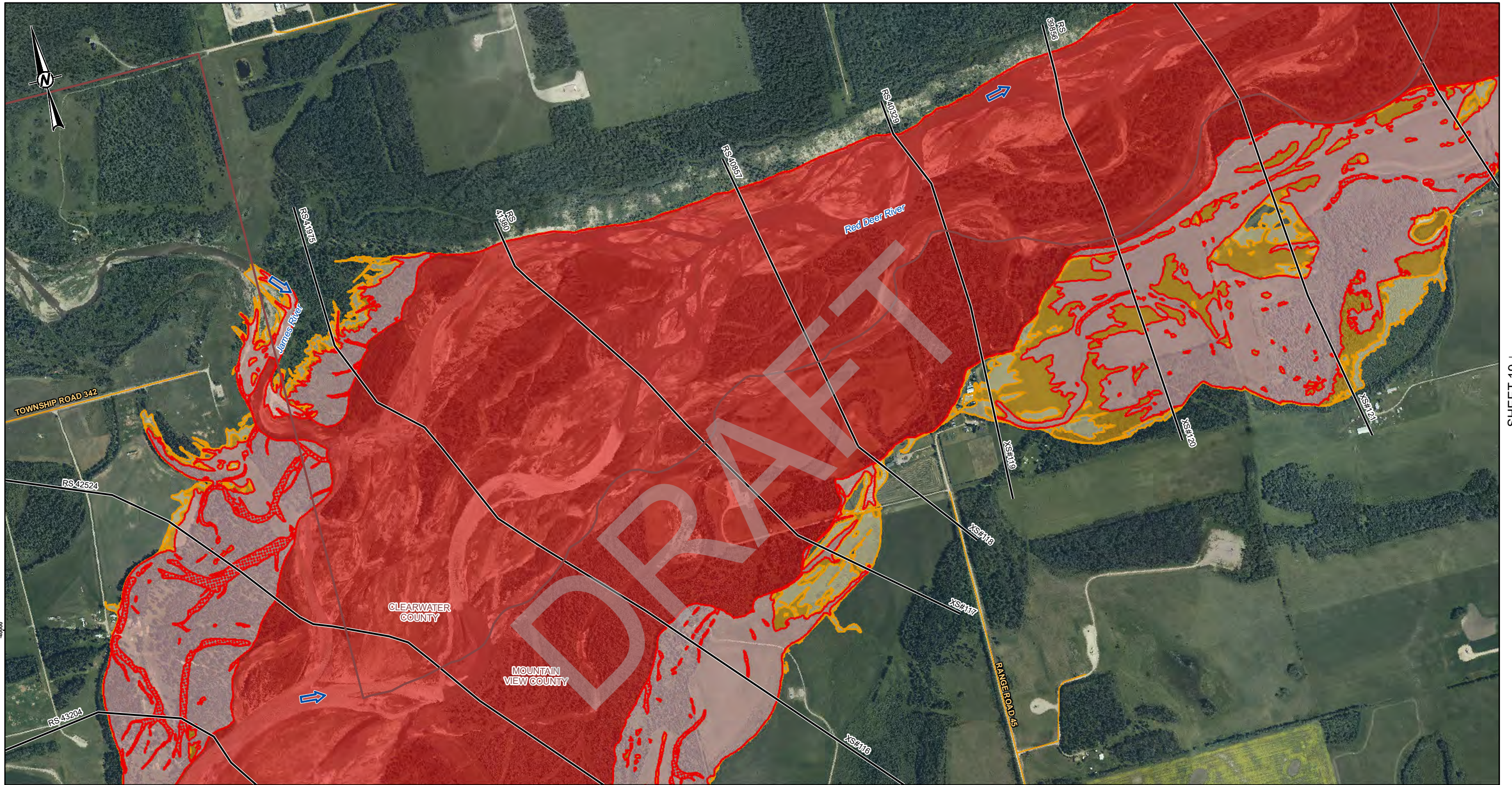
DISCHARGE
RED DEER RIVER BELOW BEARBERRY CREEK= 1210 M³/S



CLIENT	ALBERTA ENVIRONMENT AND PARKS	ALBERTA Government
CONSULTANT	GOLDER MEMBER OF WSP	
DATE	2022-06-29	
DESIGNED	WP	
PREPARED	SP	
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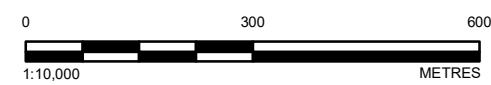
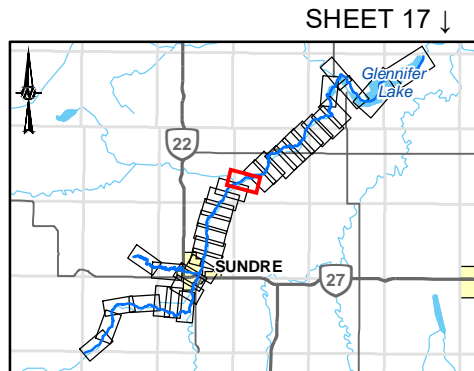
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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

PROJECT	UPPER RED DEER RIVER HAZARD STUDY	
TITLE	FLOOD HAZARD MAP	
PROJECT NO.	CONTROL	REV.
1783057	6000	0
FIGURE	17 of 34	



LEGEND			
	CROSS SECTION		FLOODWAY
	FLOOD CONTROL STRUCTURE		HIGH HAZARD FLOOD FRINGE
	MUNICIPAL DISTRICT BOUNDARY		FLOOD FRINGE
	STUDY BOUNDARY		PROTECTED FLOOD FRINGE
	FLOW DIRECTION		200-YEAR FLOOD EXTENT
	LOCAL ROAD		500-YEAR FLOOD EXTENT
	PATHWAY		
	PRIMARY HIGHWAY		
	SECONDARY HIGHWAY		
	RAILWAY		
	CULVERT		
	DAM		
	OTHER		
	WEIR		
	BRIDGE		

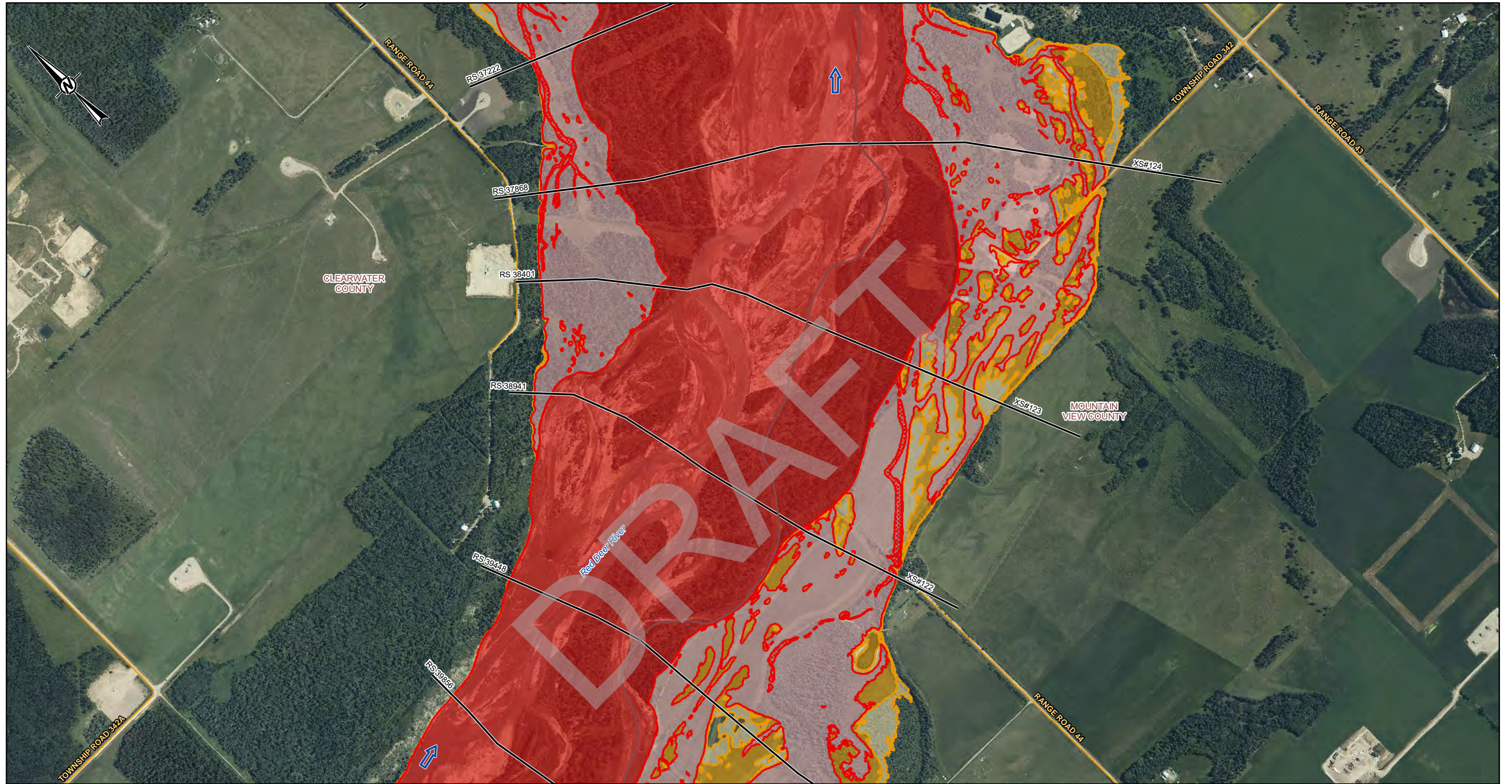
DISCHARGE
 RED DEER RIVER BELOW BEARBERRY CREEK= 1390 M³/S
 RED DEER RIVER BELOW JAMES RIVER= 1670 M³/S



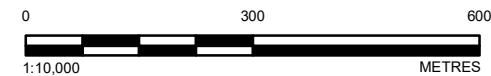
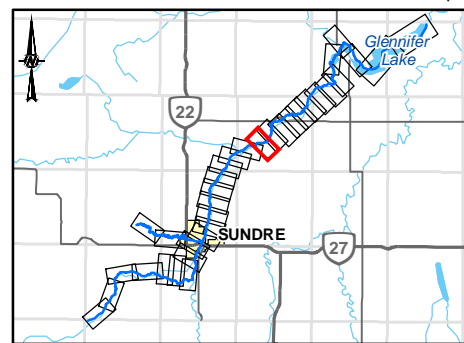
CLIENT	ALBERTA ENVIRONMENT AND PARKS	
CONSULTANT	GOLDER MEMBER OF WSP	
DESIGNED	YYYY-MM-DD	2022-06-29
PREPARED	WP	
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 DATUM: NAD 83 CSRS PROJECTION: 3TM 114

PROJECT	UPPER RED DEER RIVER HAZARD STUDY		
TITLE	FLOOD HAZARD MAP		
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	18 of 34



LEGEND	
—	CROSS SECTION
XS#100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
—	STUDY BOUNDARY
→	FLOW DIRECTION
—	LOCAL ROAD
—	PATHWAY
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
+	RAILWAY
	FLOOD CONTROL STRUCTURE
▭	MUNICIPAL DISTRICT BOUNDARY
⬡	CULVERT
⬠	DAM
○	OTHER
□	WEIR
⌌	BRIDGE
■	FLOODWAY
▨	HIGH HAZARD FLOOD FRINGE
▩	FLOOD FRINGE
▧	PROTECTED FLOOD FRINGE
■	200-YEAR FLOOD EXTENT
■	500-YEAR FLOOD EXTENT
DISCHARGE RED DEER RIVER BELOW JAMES RIVER= 1670 M ³ /S	



CLIENT
ALBERTA ENVIRONMENT
AND PARKS



CONSULTANT



YYYY-MM-DD	2022-06-29
DESIGNED	WP
PREPARED	SP
REVIEWED	WP
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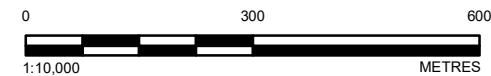
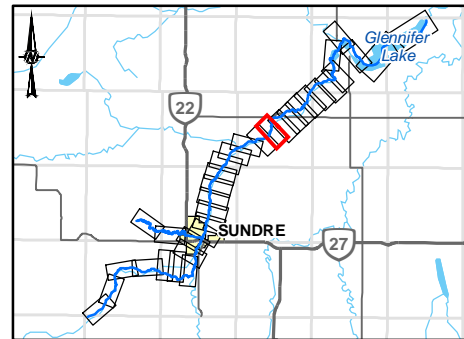
PROJECT
UPPER RED DEER RIVER HAZARD STUDY

TITLE
FLOOD HAZARD MAP

PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	19 of 34



LEGEND	
—	CROSS SECTION
XS#100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
—	STUDY BOUNDARY
→	FLOW DIRECTION
—	LOCAL ROAD
—	PATHWAY
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
+	RAILWAY
	FLOOD CONTROL STRUCTURE
▭	MUNICIPAL DISTRICT BOUNDARY
⬡	CULVERT
⬠	DAM
○	OTHER
□	WEIR
▭	BRIDGE
▭	FLOODWAY
▭	HIGH HAZARD FLOOD FRINGE
▭	FLOOD FRINGE
▭	PROTECTED FLOOD FRINGE
▭	200-YEAR FLOOD EXTENT
▭	500-YEAR FLOOD EXTENT
DISCHARGE RED DEER RIVER BELOW JAMES RIVER= 1670 M ³ /S	



CLIENT
ALBERTA ENVIRONMENT
AND PARKS



CONSULTANT



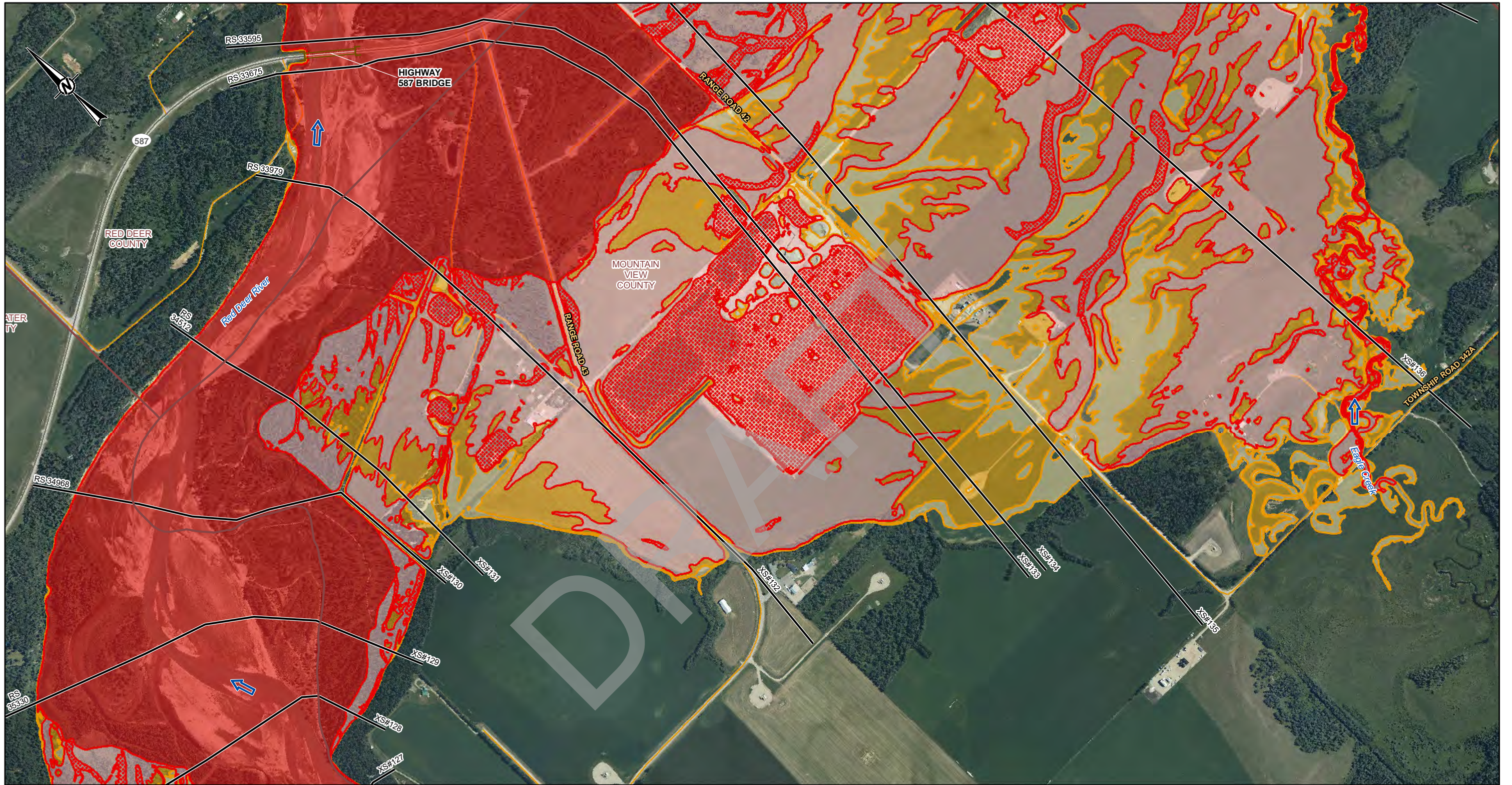
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DESIGNED	WP
PREPARED	SP
REVIEWED	WP
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PROJECT
UPPER RED DEER RIVER HAZARD STUDY

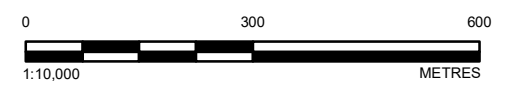
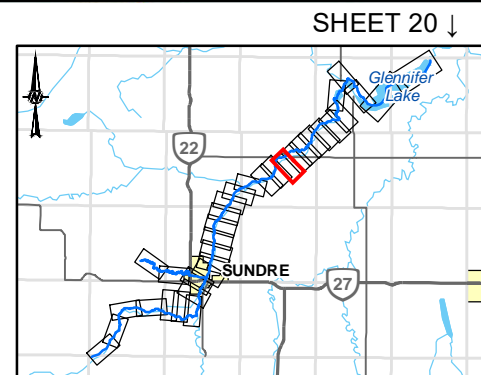
TITLE
FLOOD HAZARD MAP

PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	20 of 34



LEGEND					
—	CROSS SECTION		FLOOD CONTROL STRUCTURE	■	FLOODWAY
XS#100	CROSS SECTION NUMBER	▭	MUNICIPAL DISTRICT BOUNDARY	▨	HIGH HAZARD FLOOD FRINGE
RS 304	RIVER STATION (M)	—	HYDRAULIC STRUCTURES	▨	FLOOD FRINGE
—	STUDY BOUNDARY	◇	CULVERT	▨	PROTECTED FLOOD FRINGE
→	FLOW DIRECTION	△	DAM	■	200-YEAR FLOOD EXTENT
—	LOCAL ROAD	○	OTHER	■	500-YEAR FLOOD EXTENT
—	PATHWAY	□	WEIR		
—	PRIMARY HIGHWAY	—	BRIDGE		
—	SECONDARY HIGHWAY				
+	RAILWAY				

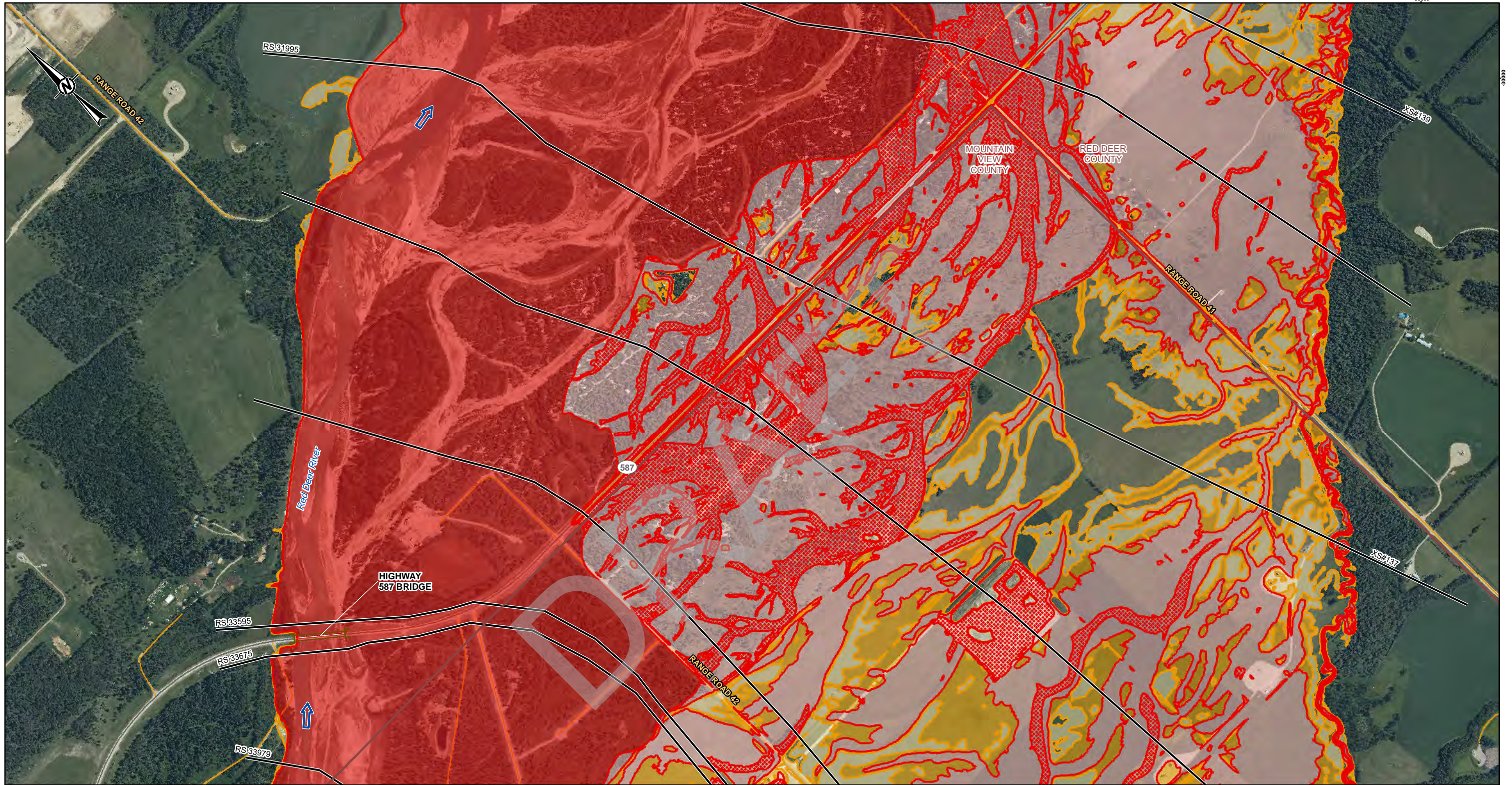
DISCHARGE
RED DEER RIVER BELOW JAMES RIVER= 1670 M³/S



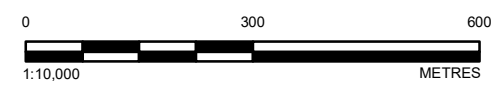
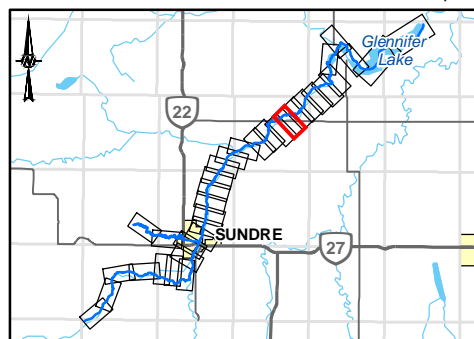
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CONSULTANT	GOLDER MEMBER OF WSP	
DESIGNED	YYYY-MM-DD	2022-06-29
PREPARED	WP	
REVIEWED	SP	
APPROVED	WP	

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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

PROJECT	UPPER RED DEER RIVER HAZARD STUDY	
TITLE	FLOOD HAZARD MAP	
PROJECT NO.	CONTROL	REV.
1783057	6000	0
FIGURE	21 of 34	



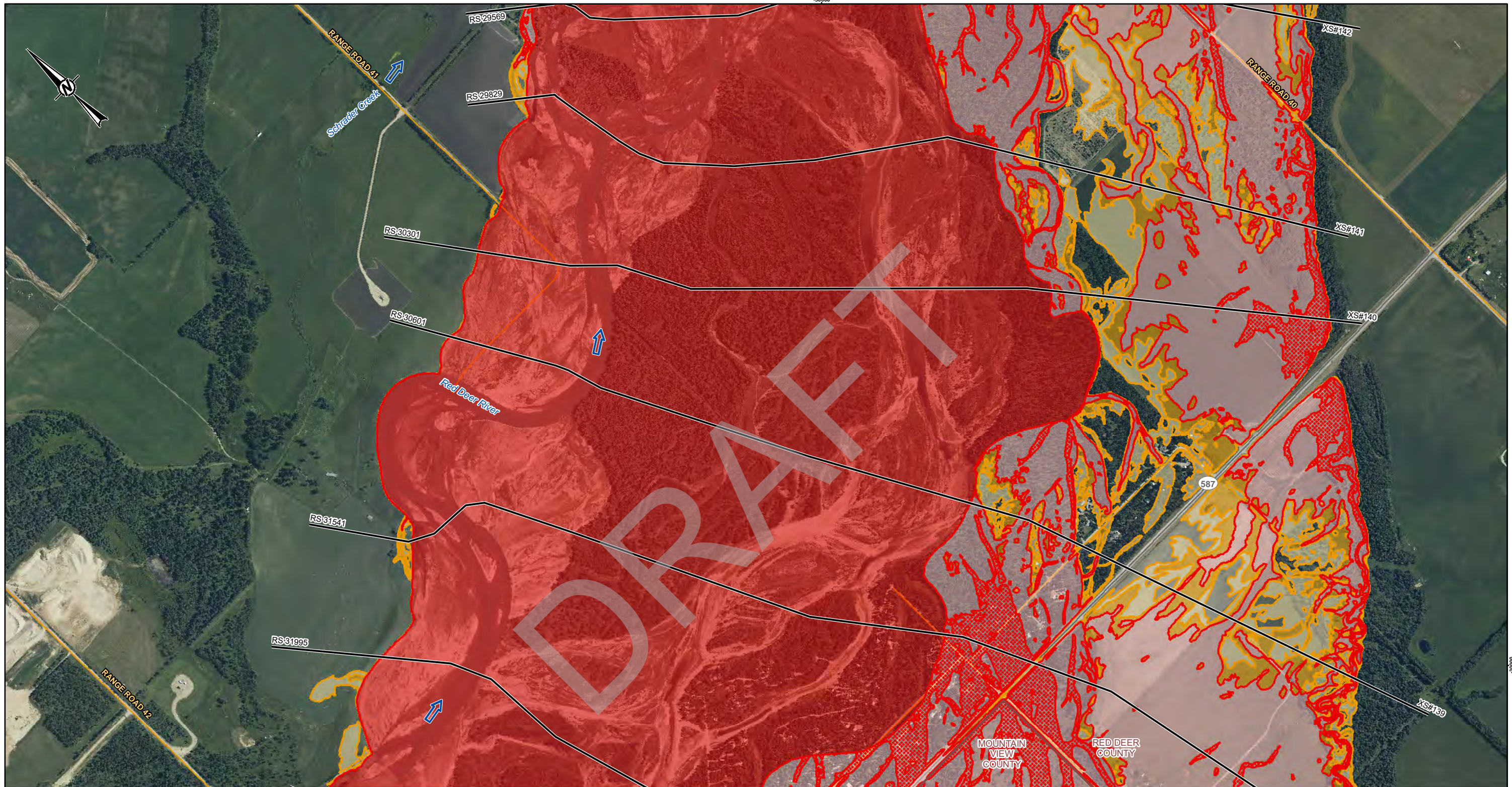
LEGEND	
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X#100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
	STUDY BOUNDARY
	FLOW DIRECTION
	LOCAL ROAD
	PATHWAY
	PRIMARY HIGHWAY
	SECONDARY HIGHWAY
	RAILWAY
	FLOODWAY
	HIGH HAZARD FLOOD FRINGE
	FLOOD FRINGE
	PROTECTED FLOOD FRINGE
	200-YEAR FLOOD EXTENT
	500-YEAR FLOOD EXTENT
	FLOOD CONTROL STRUCTURE
	MUNICIPAL DISTRICT BOUNDARY
HYDRAULIC STRUCTURES	
	CULVERT
	DAM
	OTHER
	WEIR
	BRIDGE
DISCHARGE RED DEER RIVER BELOW JAMES RIVER= 1670 M ³ /S	



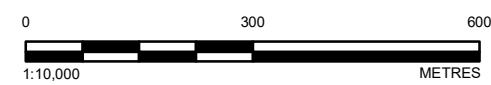
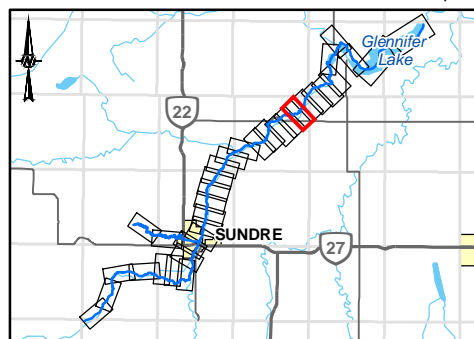
CLIENT	ALBERTA ENVIRONMENT AND PARKS	Alberta Government
CONSULTANT	GOLDER MEMBER OF WSP	
DATE	YYYY-MM-DD	2022-06-29
DESIGNED	WP	
PREPARED	SP	
REVIEWED	WP	
APPROVED	WP	

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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

PROJECT	UPPER RED DEER RIVER HAZARD STUDY	
TITLE	FLOOD HAZARD MAP	
PROJECT NO.	CONTROL	REV.
1783057	6000	0
FIGURE	22 of 34	



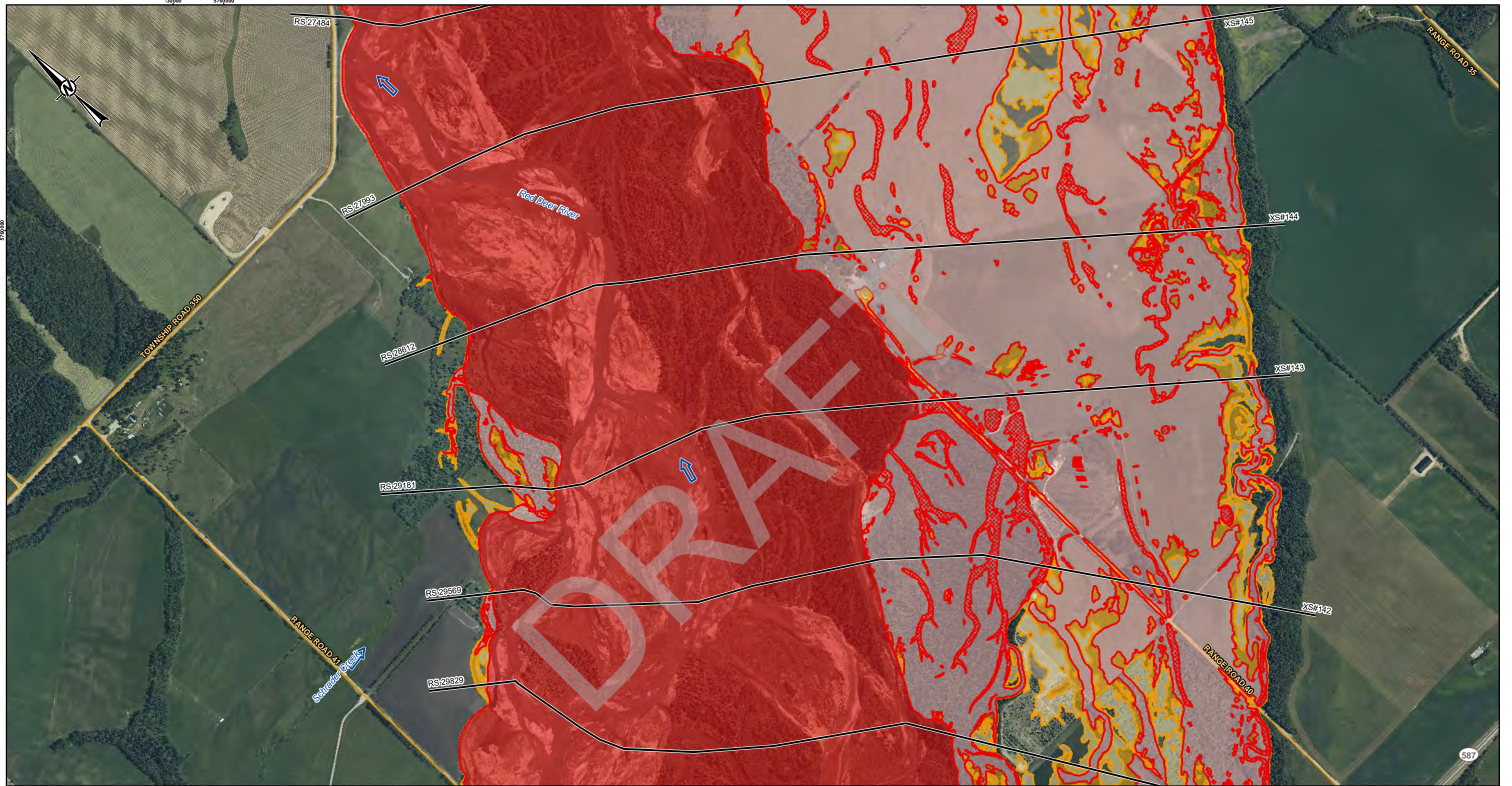
LEGEND	
—	CROSS SECTION
XS#100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
—	STUDY BOUNDARY
→	FLOW DIRECTION
—	LOCAL ROAD
—	PATHWAY
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
+	RAILWAY
	FLOOD CONTROL STRUCTURE
▭	MUNICIPAL DISTRICT BOUNDARY
⬡	CULVERT
⬠	DAM
○	OTHER
□	WEIR
⌌	BRIDGE
■	FLOODWAY
▨	HIGH HAZARD FLOOD FRINGE
▩	FLOOD FRINGE
▧	PROTECTED FLOOD FRINGE
■	200-YEAR FLOOD EXTENT
■	500-YEAR FLOOD EXTENT
DISCHARGE RED DEER RIVER BELOW JAMES RIVER= 1670 M ³ /S	



CLIENT	ALBERTA ENVIRONMENT AND PARKS	Alberta Government
CONSULTANT	GOLDER MEMBER OF WSP	
DATE	YYYY-MM-DD	2022-06-29
DESIGNED	WP	
PREPARED	SP	
REVIEWED	WP	
APPROVED	WP	

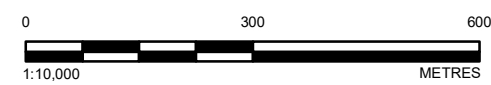
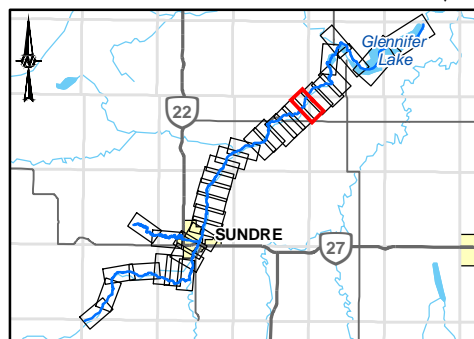
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 DATUM: NAD 83 CSRS PROJECTION: 3TM 114

PROJECT	UPPER RED DEER RIVER HAZARD STUDY		
TITLE	FLOOD HAZARD MAP		
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	23 of 34



LEGEND						
—	CROSS SECTION	■■■■■	FLOOD CONTROL STRUCTURE	■	FLOODWAY	
XS#100	CROSS SECTION NUMBER	▭	MUNICIPAL DISTRICT BOUNDARY	▨	HIGH HAZARD FLOOD FRINGE	
RS 304	RIVER STATION (M)	⬆	HYDRAULIC STRUCTURES	▨	FLOOD FRINGE	
▭	STUDY BOUNDARY	⬆	◇	CULVERT	▨	PROTECTED FLOOD FRINGE
➡	FLOW DIRECTION	⬆	△	DAM	■	200-YEAR FLOOD EXTENT
—	LOCAL ROAD	○	○	OTHER	■	500-YEAR FLOOD EXTENT
—	PATHWAY	□	□	WEIR		
—	PRIMARY HIGHWAY	⌈	⌈	BRIDGE		
—	SECONDARY HIGHWAY					
+	RAILWAY					

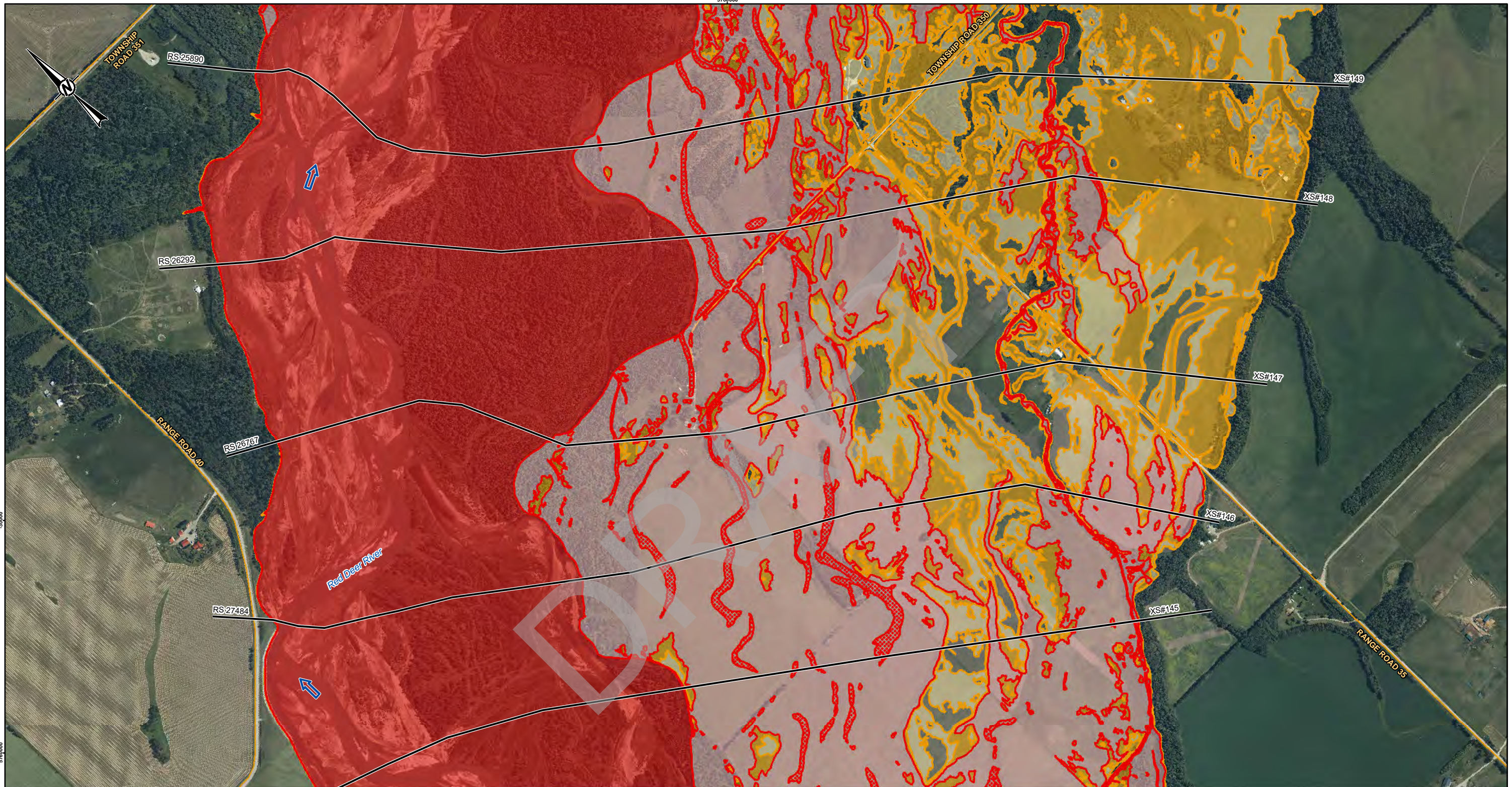
DISCHARGE
RED DEER RIVER BELOW JAMES RIVER= 1670 M³/S



CLIENT	ALBERTA ENVIRONMENT AND PARKS	Alberta Government
CONSULTANT	GOLDER MEMBER OF WSP	
DATE	2022-06-29	
DESIGNED	WP	
PREPARED	SP	
REVIEWED	WP	
APPROVED	WP	

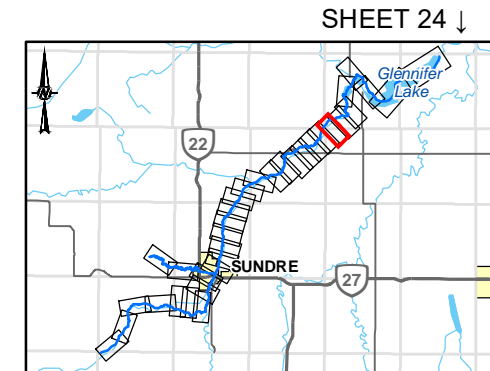
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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

PROJECT	UPPER RED DEER RIVER HAZARD STUDY		
TITLE	FLOOD HAZARD MAP		
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	24 of 34

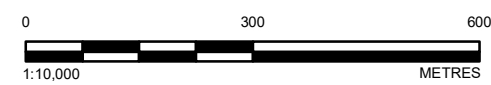


LEGEND					
—	CROSS SECTION	■■■■■	FLOOD CONTROL STRUCTURE	■	FLOODWAY
XS#100	CROSS SECTION NUMBER	▭	MUNICIPAL DISTRICT BOUNDARY	▨	HIGH HAZARD FLOOD FRINGE
RS 304	RIVER STATION (M)	—	HYDRAULIC STRUCTURES	▨	FLOOD FRINGE
▭	STUDY BOUNDARY	◇	CULVERT	▨	PROTECTED FLOOD FRINGE
➔	FLOW DIRECTION	△	DAM	■	200-YEAR FLOOD EXTENT
—	LOCAL ROAD	○	OTHER	■	500-YEAR FLOOD EXTENT
—	PATHWAY	□	WEIR		
—	PRIMARY HIGHWAY	—	BRIDGE		
—	SECONDARY HIGHWAY				
+	RAILWAY				

Red Deer River



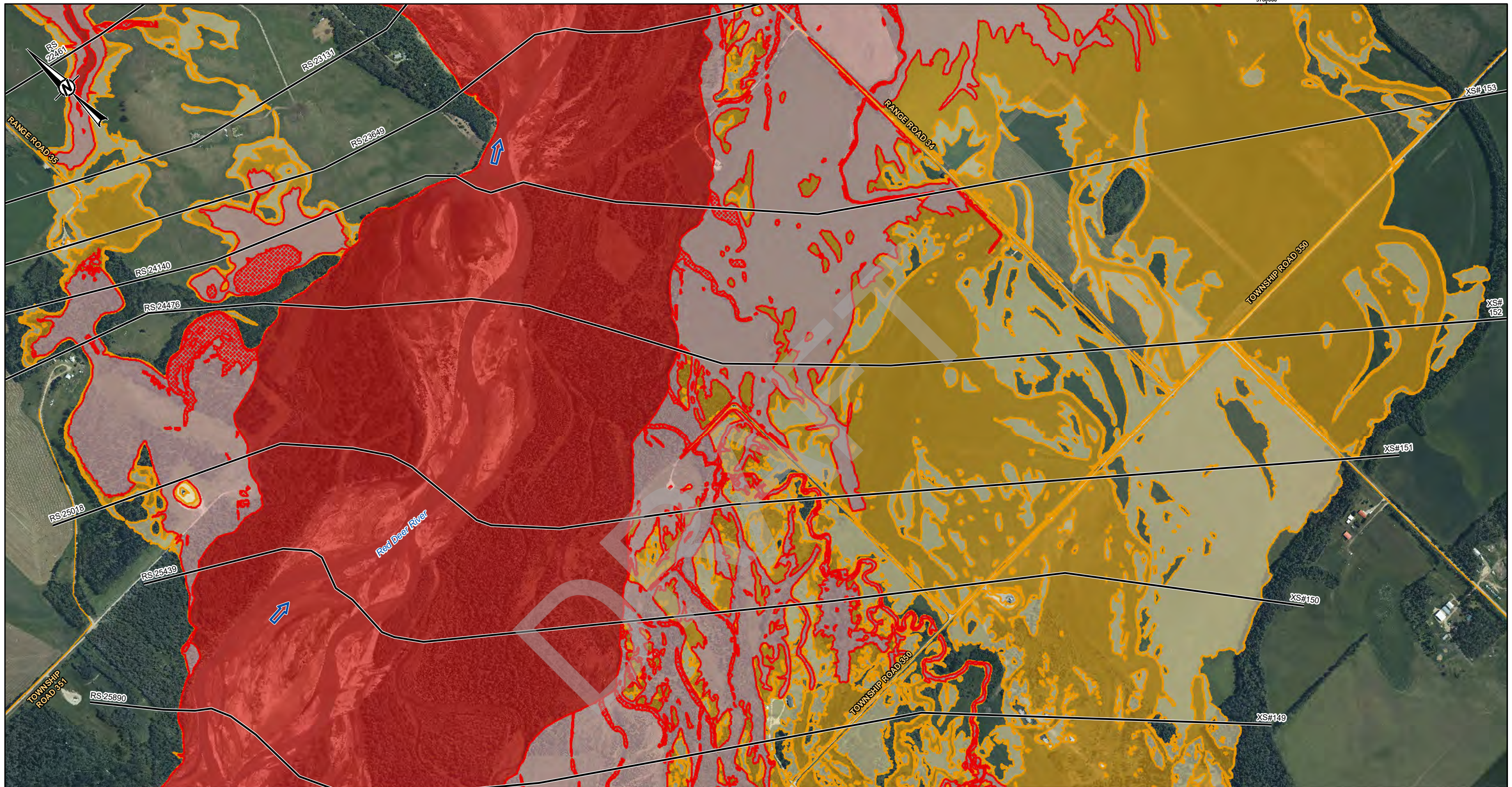
DISCHARGE
RED DEER RIVER BELOW JAMES RIVER= 1670 M³/S



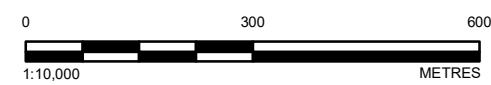
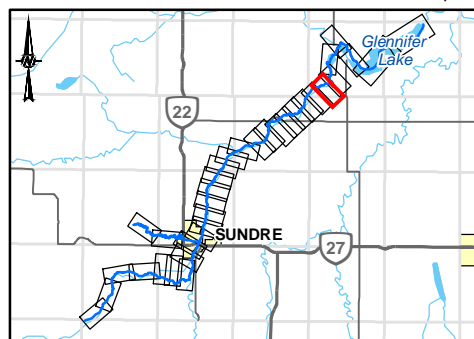
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CONSULTANT	GOLDER MEMBER OF WSP	
DATE	2022-06-29	
DESIGNED	WP	
PREPARED	SP	
REVIEWED	WP	
APPROVED	WP	

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PROJECT	UPPER RED DEER RIVER HAZARD STUDY		
TITLE	FLOOD HAZARD MAP		
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	25 of 34



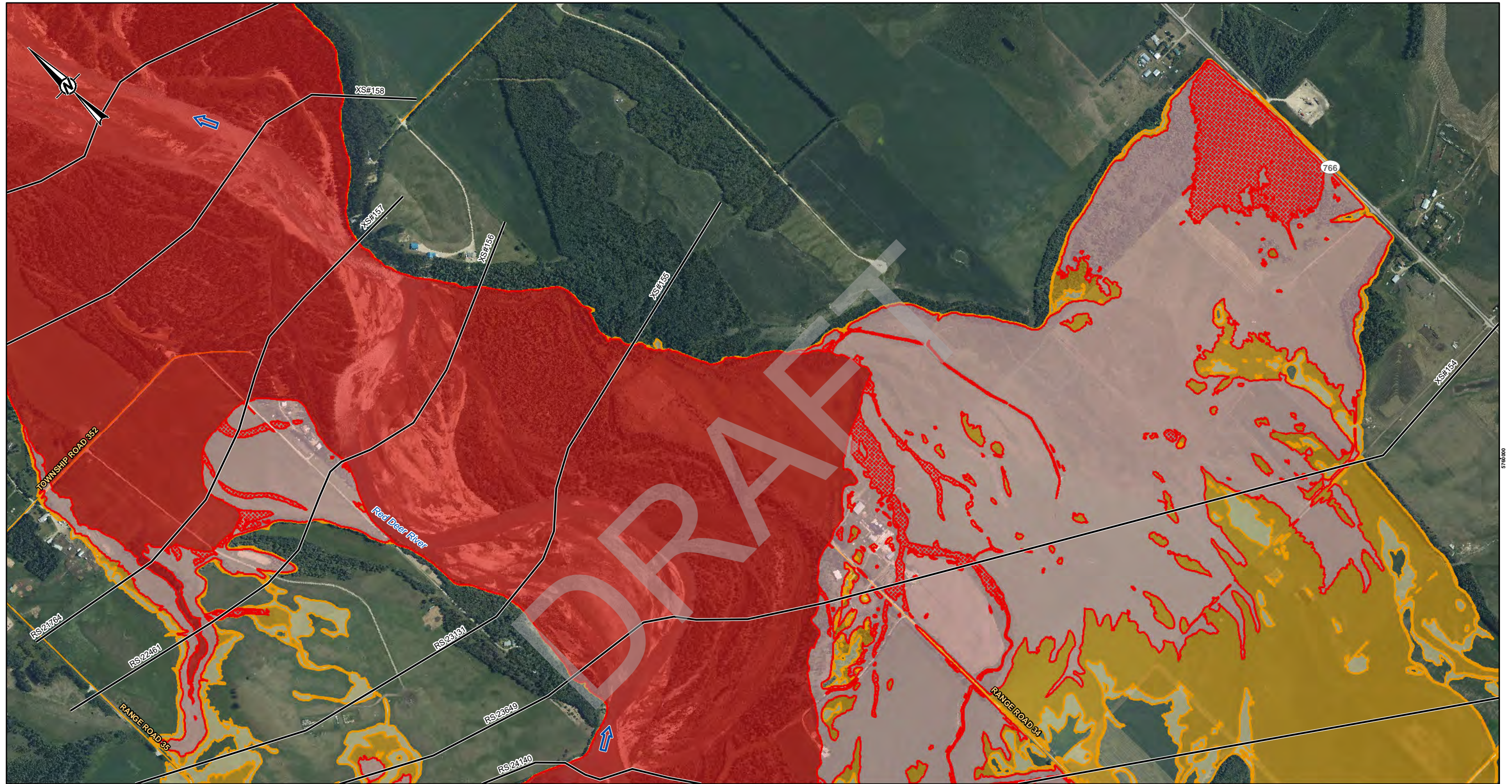
LEGEND	
—	CROSS SECTION
XS#100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
—	STUDY BOUNDARY
→	FLOW DIRECTION
—	LOCAL ROAD
—	PATHWAY
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
+	RAILWAY
	FLOOD CONTROL STRUCTURE
—	MUNICIPAL DISTRICT BOUNDARY
⬡	CULVERT
⬢	DAM
○	OTHER
□	WEIR
—	BRIDGE
■	FLOODWAY
▨	HIGH HAZARD FLOOD FRINGE
□	FLOOD FRINGE
▨	PROTECTED FLOOD FRINGE
■	200-YEAR FLOOD EXTENT
■	500-YEAR FLOOD EXTENT
DISCHARGE RED DEER RIVER BELOW JAMES RIVER= 1670 M ³ /S	



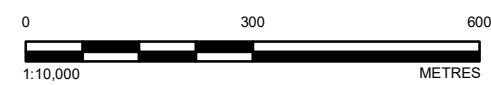
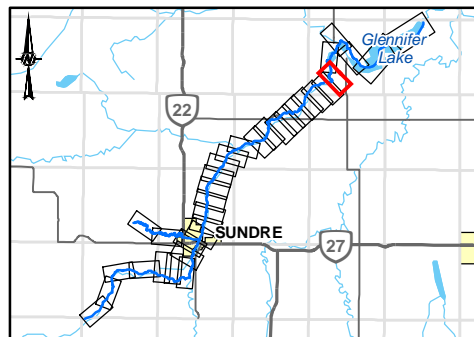
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CONSULTANT	GOLDER MEMBER OF WSP	
DATE	2022-06-29	
DESIGNED	WP	
PREPARED	SP	
REVIEWED	WP	
APPROVED	WP	

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 DATUM: NAD 83 CSRS PROJECTION: 3TM 114

PROJECT	UPPER RED DEER RIVER HAZARD STUDY		
TITLE	FLOOD HAZARD MAP		
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	26 of 34



LEGEND	
—	CROSS SECTION
XS#100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
▭	STUDY BOUNDARY
➔	FLOW DIRECTION
—	LOCAL ROAD
—	PATHWAY
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
+	RAILWAY
▬▬▬▬	FLOOD CONTROL STRUCTURE
▭	MUNICIPAL DISTRICT BOUNDARY
⬡	CULVERT
⬠	DAM
○	OTHER
▭	WEIR
▭	BRIDGE
▭	FLOODWAY
▭	HIGH HAZARD FLOOD FRINGE
▭	FLOOD FRINGE
▭	PROTECTED FLOOD FRINGE
▭	200-YEAR FLOOD EXTENT
▭	500-YEAR FLOOD EXTENT
DISCHARGE RED DEER RIVER BELOW JAMES RIVER= 1670 M ³ /S	



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CONSULTANT	GOLDER MEMBER OF WSP	
DATE	2022-06-29	
DESIGNED	WP	
PREPARED	SP	
REVIEWED	WP	
APPROVED	WP	

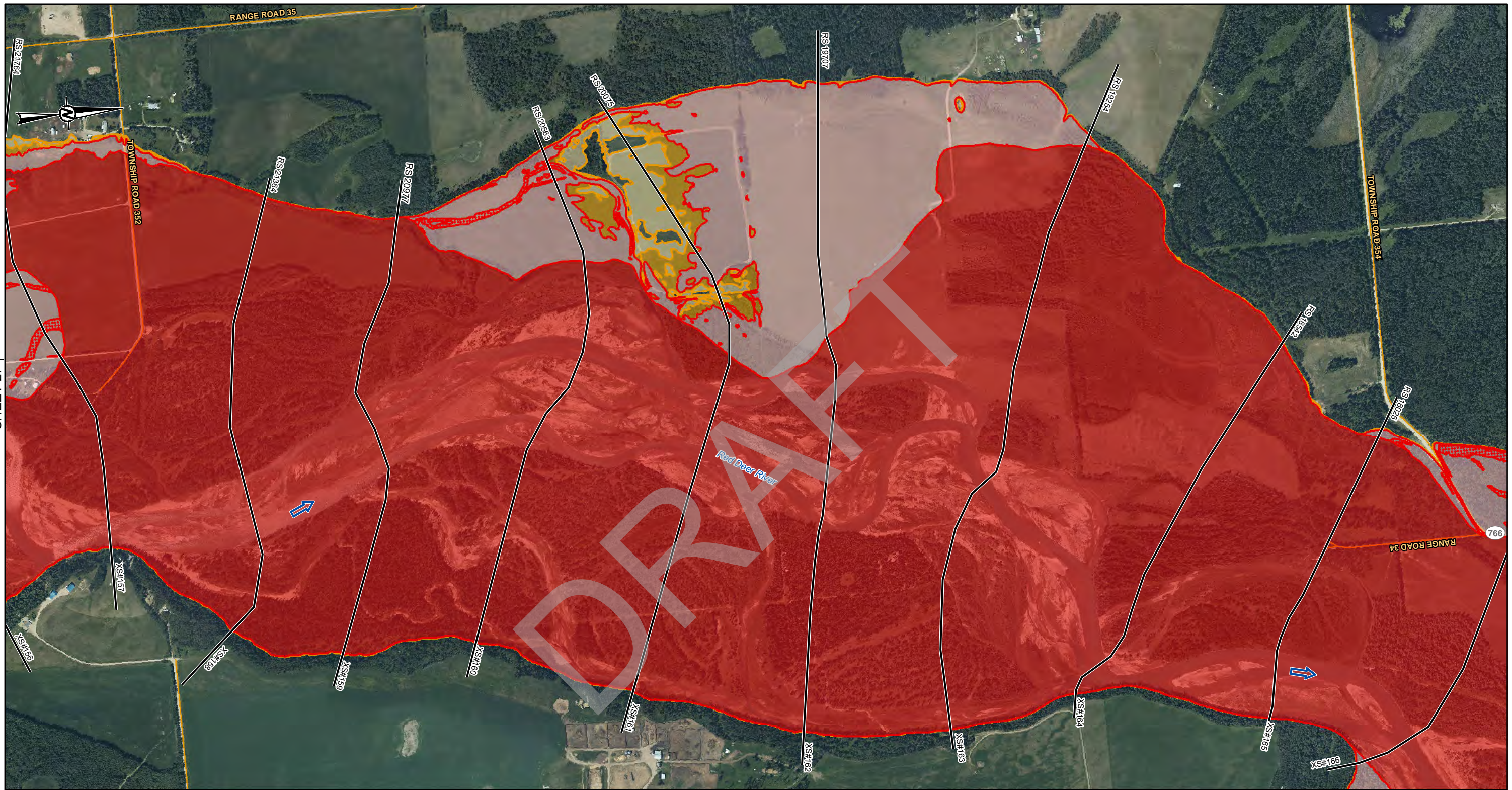
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PROJECT	UPPER RED DEER RIVER HAZARD STUDY		
TITLE	FLOOD HAZARD MAP		
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	27 of 34

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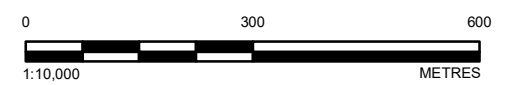
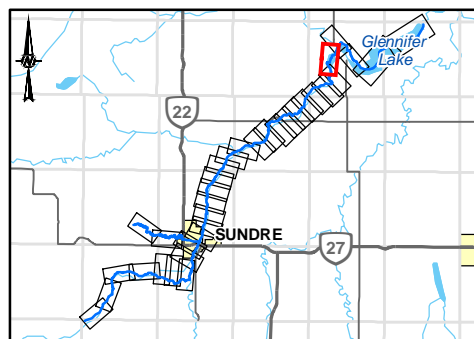
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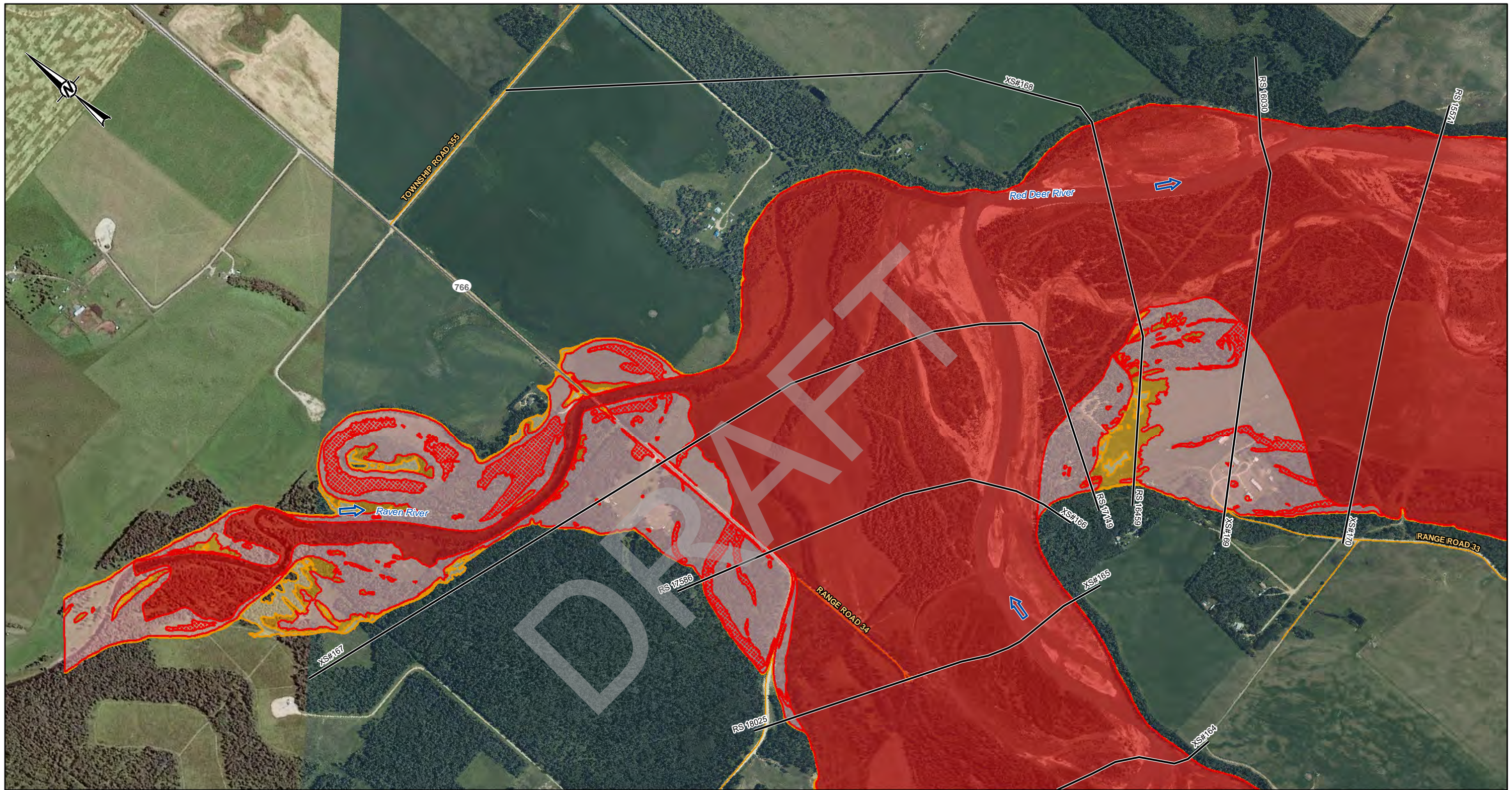
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LEGEND			
	CROSS SECTION		FLOODWAY
XS#100	CROSS SECTION NUMBER		HIGH HAZARD FLOOD FRINGE
RS 304	RIVER STATION (M)		FLOOD FRINGE
	STUDY BOUNDARY		PROTECTED FLOOD FRINGE
	FLOW DIRECTION		200-YEAR FLOOD EXTENT
	LOCAL ROAD		500-YEAR FLOOD EXTENT
	PATHWAY	DISCHARGE RED DEER RIVER BELOW JAMES RIVER= 1670 M ³ /S	
	PRIMARY HIGHWAY		FLOOD CONTROL STRUCTURE
	SECONDARY HIGHWAY		MUNICIPAL DISTRICT BOUNDARY
	RAILWAY	HYDRAULIC STRUCTURES	
			CULVERT
			DAM
			OTHER
			WEIR
			BRIDGE



CLIENT	ALBERTA ENVIRONMENT AND PARKS	
CONSULTANT	GOLDER MEMBER OF WSP	
DESIGNED	YYYY-MM-DD	2022-06-29
PREPARED	WP	
REVIEWED	SP	
APPROVED	WP	

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PROJECT			
UPPER RED DEER RIVER HAZARD STUDY			
TITLE			
FLOOD HAZARD MAP			
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	28 of 34

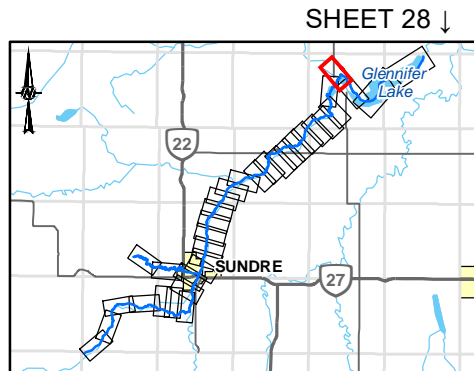


SHEET 30 ↓

LEGEND

—	CROSS SECTION		FLOOD CONTROL STRUCTURE	■	FLOODWAY
XS#100	CROSS SECTION NUMBER	□	MUNICIPAL DISTRICT BOUNDARY	▨	HIGH HAZARD FLOOD FRINGE
RS 304	RIVER STATION (M)	HYDRAULIC STRUCTURES		□	FLOOD FRINGE
—	STUDY BOUNDARY	◇	CULVERT	▨	PROTECTED FLOOD FRINGE
⇒	FLOW DIRECTION	△	DAM	■	200-YEAR FLOOD EXTENT
—	LOCAL ROAD	○	OTHER	■	500-YEAR FLOOD EXTENT
—	PATHWAY	□	WEIR		
—	PRIMARY HIGHWAY	—	BRIDGE		
—	SECONDARY HIGHWAY				
+	RAILWAY				

DISCHARGE
 RED DEER RIVER BELOW JAMES RIVER= 1670 M³/S
 RED DEER RIVER BELOW RAVEN RIVER= 1850 M³/S



CLIENT
ALBERTA ENVIRONMENT AND PARKS

CONSULTANT
GOLDER MEMBER OF WSP

YYYY-MM-DD	2022-06-29
DESIGNED	WP
PREPARED	SP
REVIEWED	WP
APPROVED	WP

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PROJECT
UPPER RED DEER RIVER HAZARD STUDY

TITLE
FLOOD HAZARD MAP

PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	29 of 34

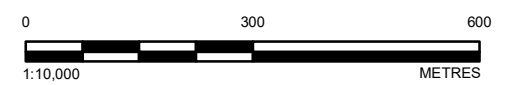
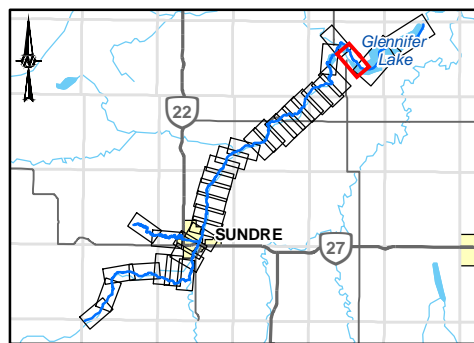
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SHEET 29 ↑

↓ SHEET 31

LEGEND					
—	CROSS SECTION	■■■■■	FLOOD CONTROL STRUCTURE	■	FLOODWAY
XS#100	CROSS SECTION NUMBER	▭	MUNICIPAL DISTRICT BOUNDARY	▨	HIGH HAZARD FLOOD FRINGE
RS 304	RIVER STATION (M)	—	HYDRAULIC STRUCTURES	▨	FLOOD FRINGE
—	STUDY BOUNDARY	◇	CULVERT	▨	PROTECTED FLOOD FRINGE
➔	FLOW DIRECTION	△	DAM	■	200-YEAR FLOOD EXTENT
—	LOCAL ROAD	○	OTHER	■	500-YEAR FLOOD EXTENT
—	PATHWAY	□	WEIR		
—	PRIMARY HIGHWAY	▭	BRIDGE		
—	SECONDARY HIGHWAY				
+	RAILWAY				
DISCHARGE					
RED DEER RIVER BELOW JAMES RIVER= 1670 M ³ /S					
RED DEER RIVER BELOW RAVEN RIVER= 1850 M ³ /S					



CLIENT	ALBERTA ENVIRONMENT AND PARKS	Alberta Government
CONSULTANT	GOLDER MEMBER OF WSP	
DATE	2022-06-29	
DESIGNED	WP	
PREPARED	SP	
REVIEWED	WP	
APPROVED	WP	

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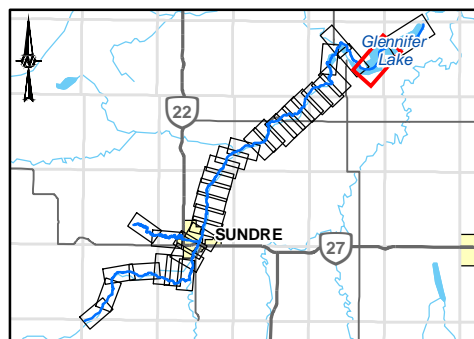
PROJECT	UPPER RED DEER RIVER HAZARD STUDY		
TITLE	FLOOD HAZARD MAP		
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	30 of 34

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LEGEND	
	CROSS SECTION
	FLOOD CONTROL STRUCTURE
	FLOODWAY
	HIGH HAZARD FLOOD FRINGE
	FLOOD FRINGE
	PROTECTED FLOOD FRINGE
	200-YEAR FLOOD EXTENT
	500-YEAR FLOOD EXTENT
	STUDY BOUNDARY
	FLOW DIRECTION
	LOCAL ROAD
	PATHWAY
	PRIMARY HIGHWAY
	SECONDARY HIGHWAY
	RAILWAY
	CULVERT
	DAM
	OTHER
	WEIR
	BRIDGE
DISCHARGE RED DEER RIVER BELOW RAVEN RIVER= 1850 M ³ /S	



CLIENT
ALBERTA ENVIRONMENT
AND PARKS



CONSULTANT



YYYY-MM-DD	2022-06-29
DESIGNED	WP
PREPARED	SP
REVIEWED	WP
APPROVED	WP

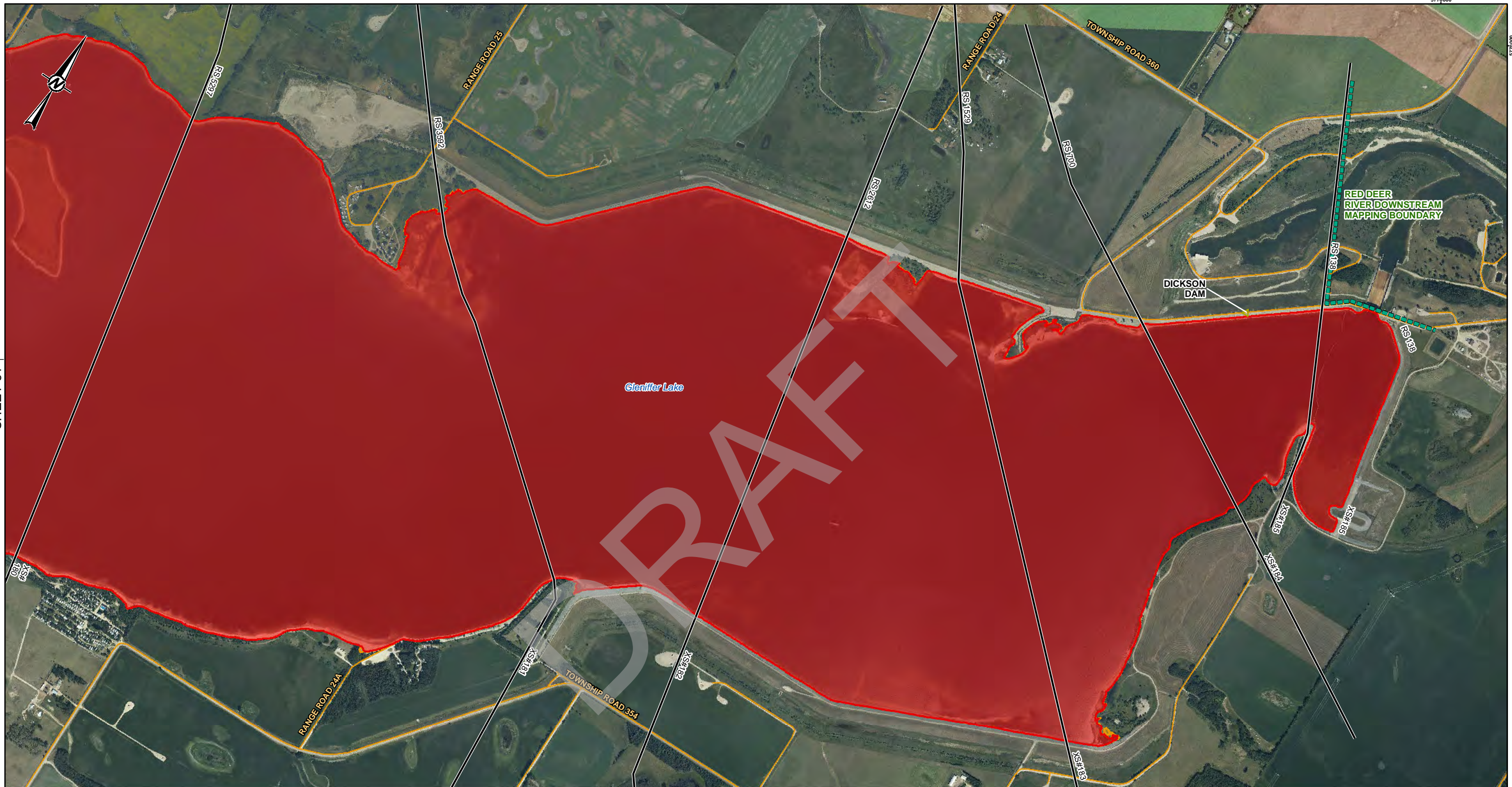
REFERENCE(S)
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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

PROJECT
UPPER RED DEER RIVER HAZARD STUDY

TITLE
FLOOD HAZARD MAP

PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	31 of 34

25mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANS B

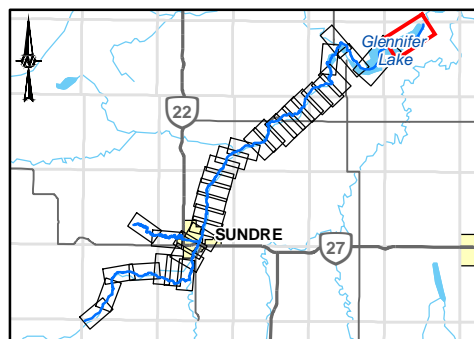


SHEET 31 ↑

LEGEND

—	CROSS SECTION		FLOOD CONTROL STRUCTURE	■	FLOODWAY
XS#100	CROSS SECTION NUMBER	▭	MUNICIPAL DISTRICT BOUNDARY	▨	HIGH HAZARD FLOOD FRINGE
RS 304	RIVER STATION (M)	—	HYDRAULIC STRUCTURES	▭	FLOOD FRINGE
—	STUDY BOUNDARY	◇	CULVERT	▨	PROTECTED FLOOD FRINGE
→	FLOW DIRECTION	△	DAM	▭	200-YEAR FLOOD EXTENT
—	LOCAL ROAD	○	OTHER	▭	500-YEAR FLOOD EXTENT
—	PATHWAY	□	WEIR		
—	PRIMARY HIGHWAY	—	BRIDGE		
—	SECONDARY HIGHWAY				
+	RAILWAY				

DISCHARGE
RED DEER RIVER BELOW RAVEN RIVER= 1850 M³/S



CLIENT
ALBERTA ENVIRONMENT
AND PARKS



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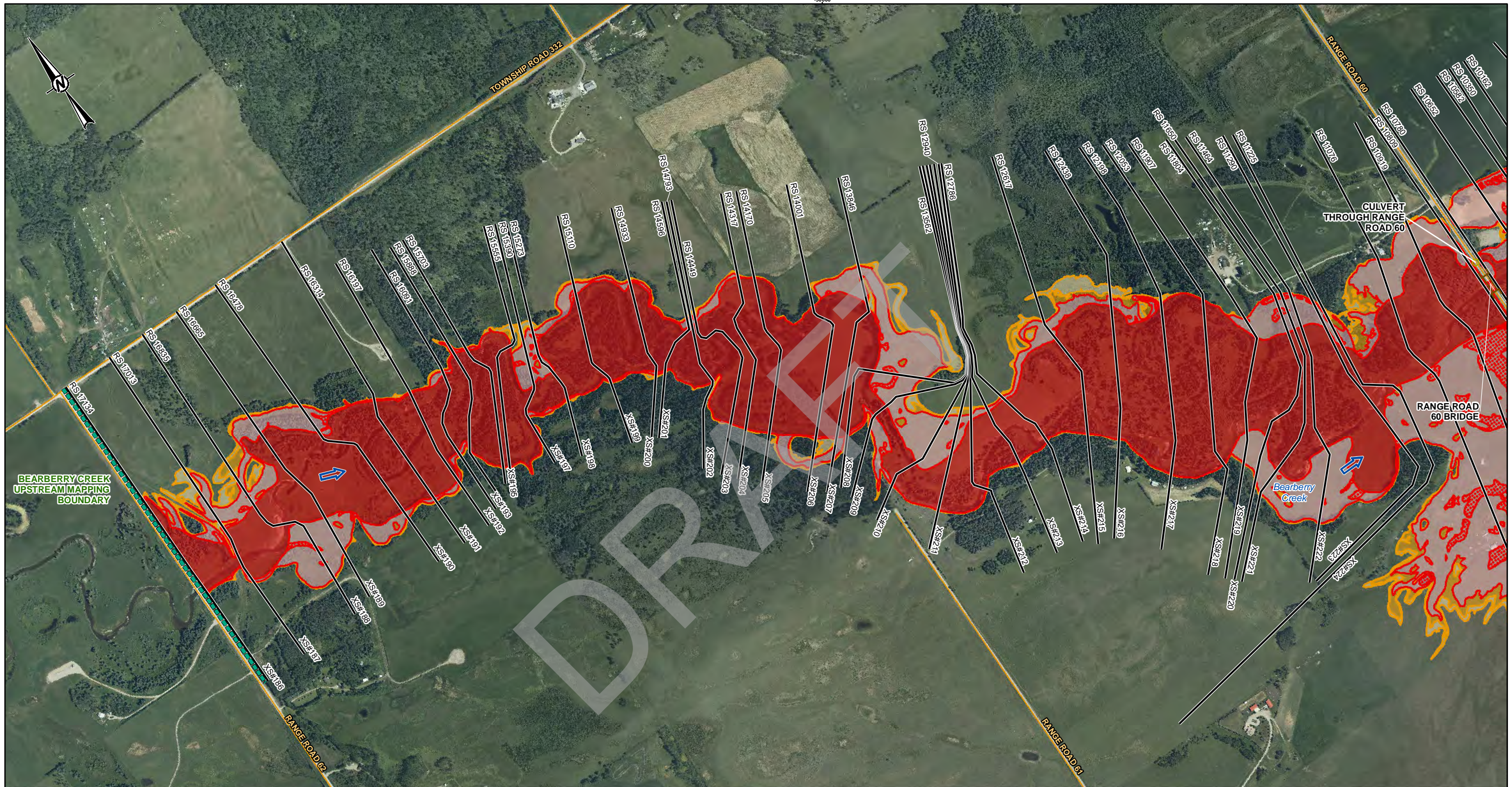
YYYY-MM-DD	2022-06-29
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PROJECT
UPPER RED DEER RIVER HAZARD STUDY

TITLE
FLOOD HAZARD MAP

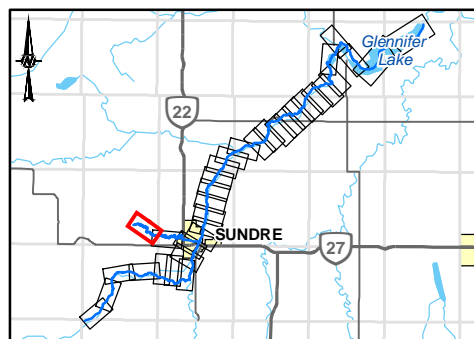
PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	32 of 34



LEGEND

CROSS SECTION	FLOOD CONTROL STRUCTURE	FLOODWAY
XS#100 CROSS SECTION NUMBER	MUNICIPAL DISTRICT BOUNDARY	HIGH HAZARD FLOOD FRINGE
RS 304 RIVER STATION (M)	HYDRAULIC STRUCTURES	FLOOD FRINGE
STUDY BOUNDARY	CULVERT	PROTECTED FLOOD FRINGE
FLOW DIRECTION	DAM	200-YEAR FLOOD EXTENT
LOCAL ROAD	OTHER	500-YEAR FLOOD EXTENT
PATHWAY	WEIR	
PRIMARY HIGHWAY	BRIDGE	
SECONDARY HIGHWAY		
RAILWAY		

DISCHARGE
BEARBERRY CREEK = 214 M³/S



CLIENT
ALBERTA ENVIRONMENT AND PARKS

CONSULTANT
GOLDER
MEMBER OF WSP

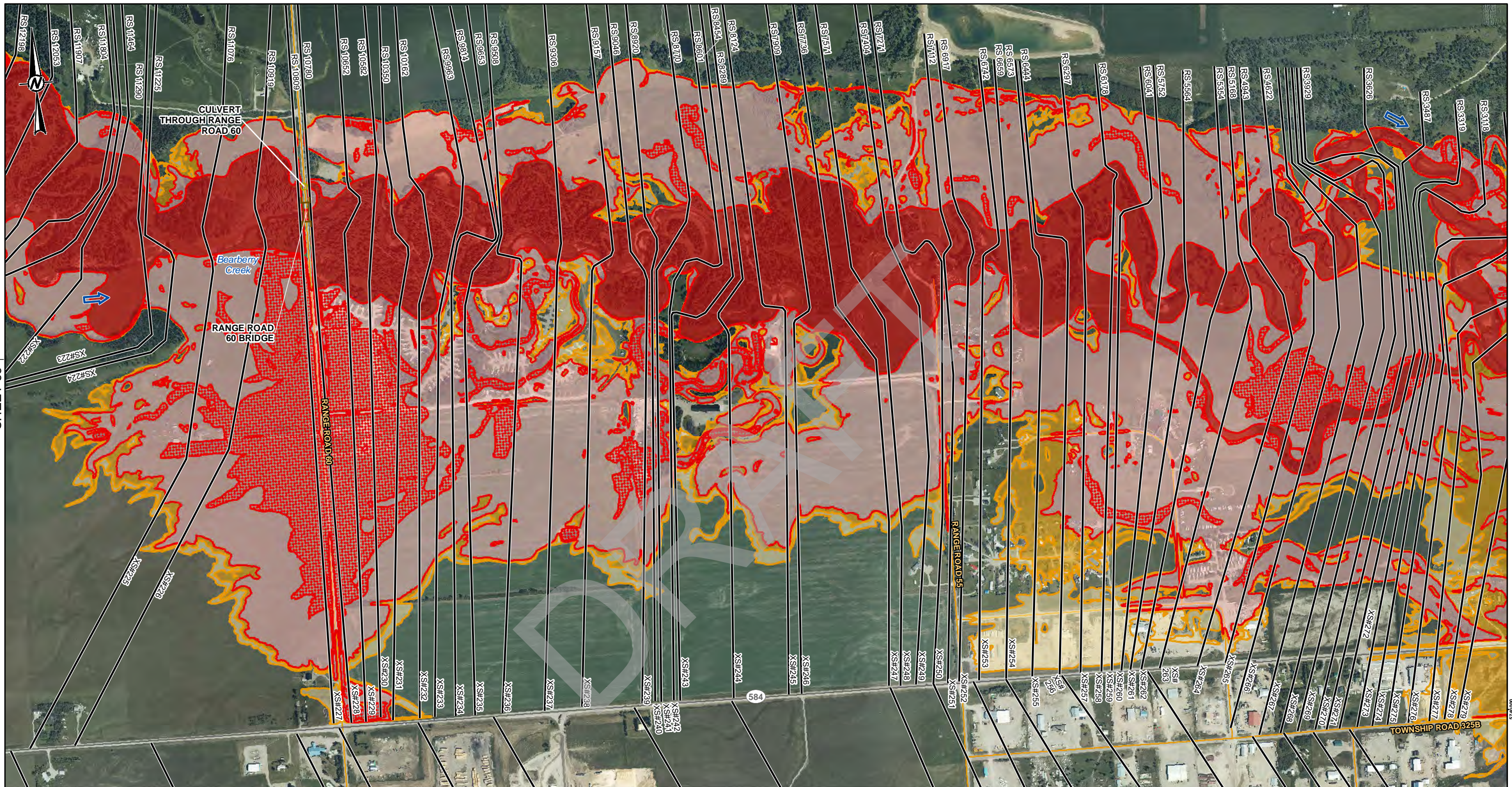
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APPROVED	WP

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DATUM: NAD 83 CSRS PROJECTION: 3TM 114

PROJECT
UPPER RED DEER RIVER HAZARD STUDY

TITLE
FLOOD HAZARD MAP

PROJECT NO.	CONTROL	REV.	FIGURE
1783057	6000	0	33 of 34

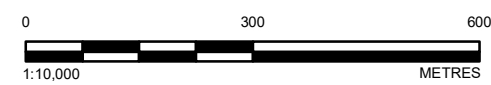
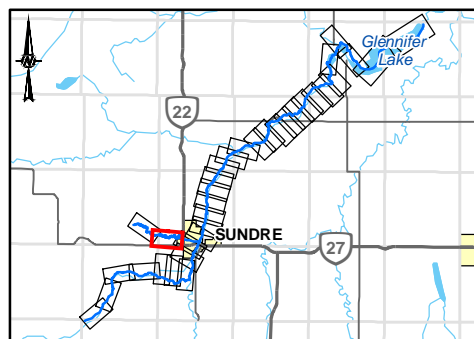


SHEET 33 ↑

↑ SHEET 6

LEGEND	
—	CROSS SECTION
XS#100	CROSS SECTION NUMBER
RS 304	RIVER STATION (M)
▭	STUDY BOUNDARY
➔	FLOW DIRECTION
—	LOCAL ROAD
—	PATHWAY
—	PRIMARY HIGHWAY
—	SECONDARY HIGHWAY
+	RAILWAY
▨	FLOOD CONTROL STRUCTURE
▭	MUNICIPAL DISTRICT BOUNDARY
⬠	CULVERT
⬠	DAM
⬠	OTHER
⬠	WEIR
⬠	BRIDGE
■	FLOODWAY
▨	HIGH HAZARD FLOOD FRINGE
▨	FLOOD FRINGE
▨	PROTECTED FLOOD FRINGE
▨	200-YEAR FLOOD EXTENT
▨	500-YEAR FLOOD EXTENT

DISCHARGE
BEARBERRY CREEK = 214 M³/S



CLIENT	ALBERTA ENVIRONMENT AND PARKS	ALBERTA Government
CONSULTANT	GOLDER MEMBER OF WSP	
DATE	2022-06-29	
DESIGNED	WP	
PREPARED	SP	
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PROJECT	UPPER RED DEER RIVER HAZARD STUDY
TITLE	FLOOD HAZARD MAP
PROJECT NO.	1783057
CONTROL	6000
REV.	0
FIGURE	34 of 34

DRAFT



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