COUNTY OF VERMILION RIVER

Blackfoot Lagoon Upgrade Project Summary

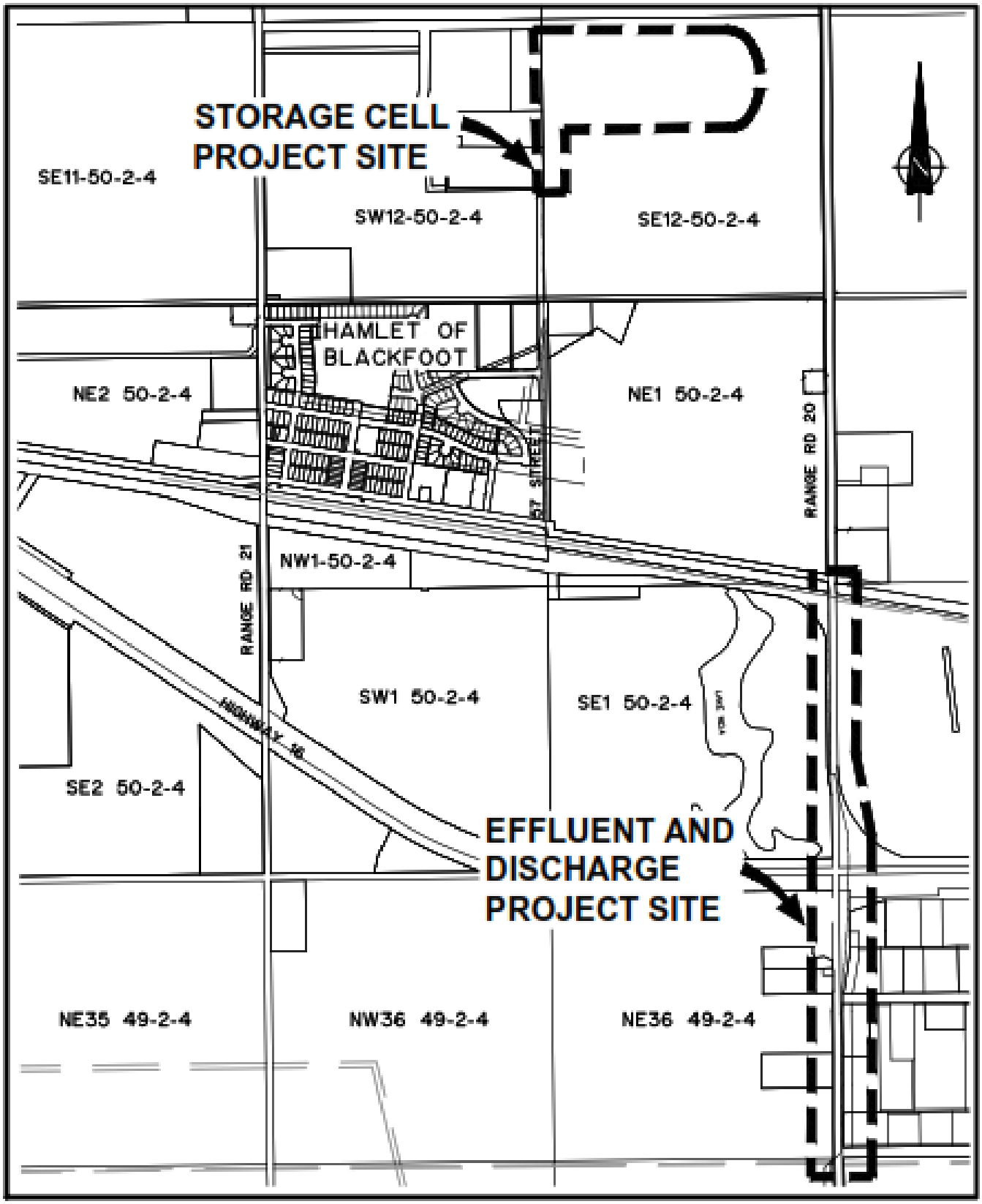
BLACKFOOT LAGOON UPGRADE PROJECT SUMMARY

As part of providing sustainable wastewater treatment for the Hamlet of Blackfoot that can accommodate population and density increases within the Hamlet, the County of Vermilion River is upgrading the Hamlets lagoon facility. Discharging treated water to open surface water has been identified as a solution that will support the upgraded facility for a considerable amount of time.

The treated water from the proposed 60,000 m^3 storage cell is currently planned to be discharged at a rate not to exceed 24.8 l/s over a 21 day period. This discharge will not exceed the 1240 l/s rate that is approved for the ditch road right of way and drainage channel. The treated water will continue south within the Blackfoot-Devonia ditch system to west of Devonia Lake. From there, it will continue southwest within the drainage system and transition into Blackfoot Creek. Initial water samples have been taken to maintain consistency throughout the approved drainage channel at sample locations noted on the attached map.

The treatment of waste water will meet (and exceed) the Wastewater Systems Effluent Regulations (WSER) as regulated by the federal government, and the Alberta Environment and Parks Standards and Guidelines. The facility has already been designed to exceed these requirements. The WSER outlines maximum allowable concentrations, which are BOD (biochemical oxygen demand), TSS (total suspended solids), and ammonia. Initial testing has been completed by the County at seven different locations along the proposed discharge route in three different seasons (fall 2015, spring 2016, and summer 2016), as shown in Map 2 (attached). The results can be found in Graph 1 (attached). The results of the surface water sampling show that the designs of the lagoon and the treated water proposed to be discharged are of a higher quality and standard than WSER requirements. It is expected that discharging the treated water into the Blackfoot-Devonia ditch system will improve the overall water quality of existing runoff in the ditch system. Other discharge options have been looked at and are provided on the attached maps for reference.

Providing a sustainable wastewater system to the Hamlet of Blackfoot is paramount to the longevity of the community and the County is looking at the proposed design upgrades to further enhance the capabilities of the community and surrounding areas.

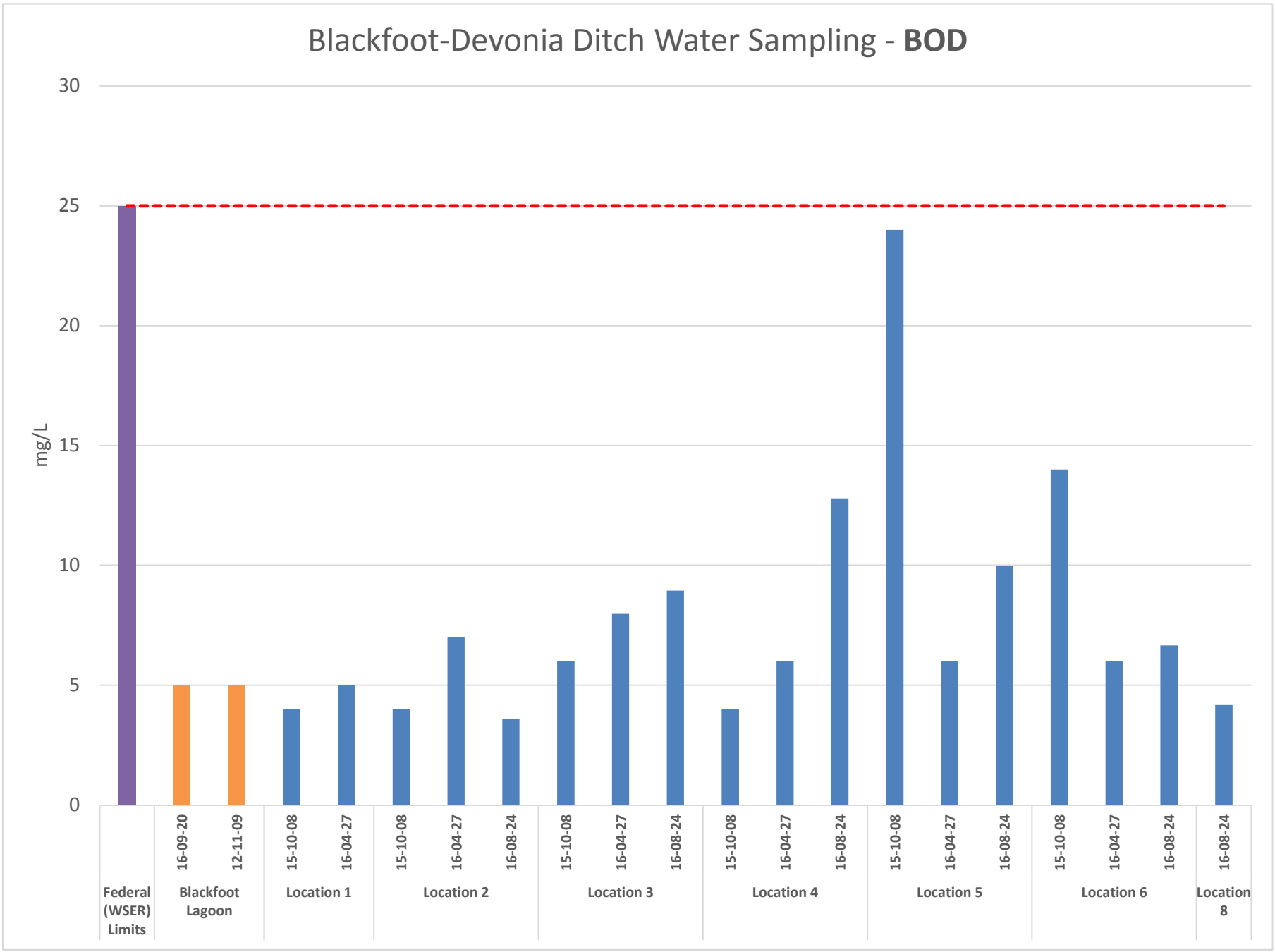

STORAGE CELL
PROJECT SITE
SE11-50-2-4
SW12-50-2-4
SE12-50-2-4
HAMLET OF
BLACKFOOT
NE2 50-2-4
NE1 50-2-4
RANGE RD 20
RANGE RD 21
NW1-50-2-4
SW1 50-2-4
SE1 50-2-4
SE2 50-2-4
EFFLUENT AND
DISCHARGE
PROJECT SITE
NE35 49-2-4
NW36 49-2-4
NE36 49-2-4

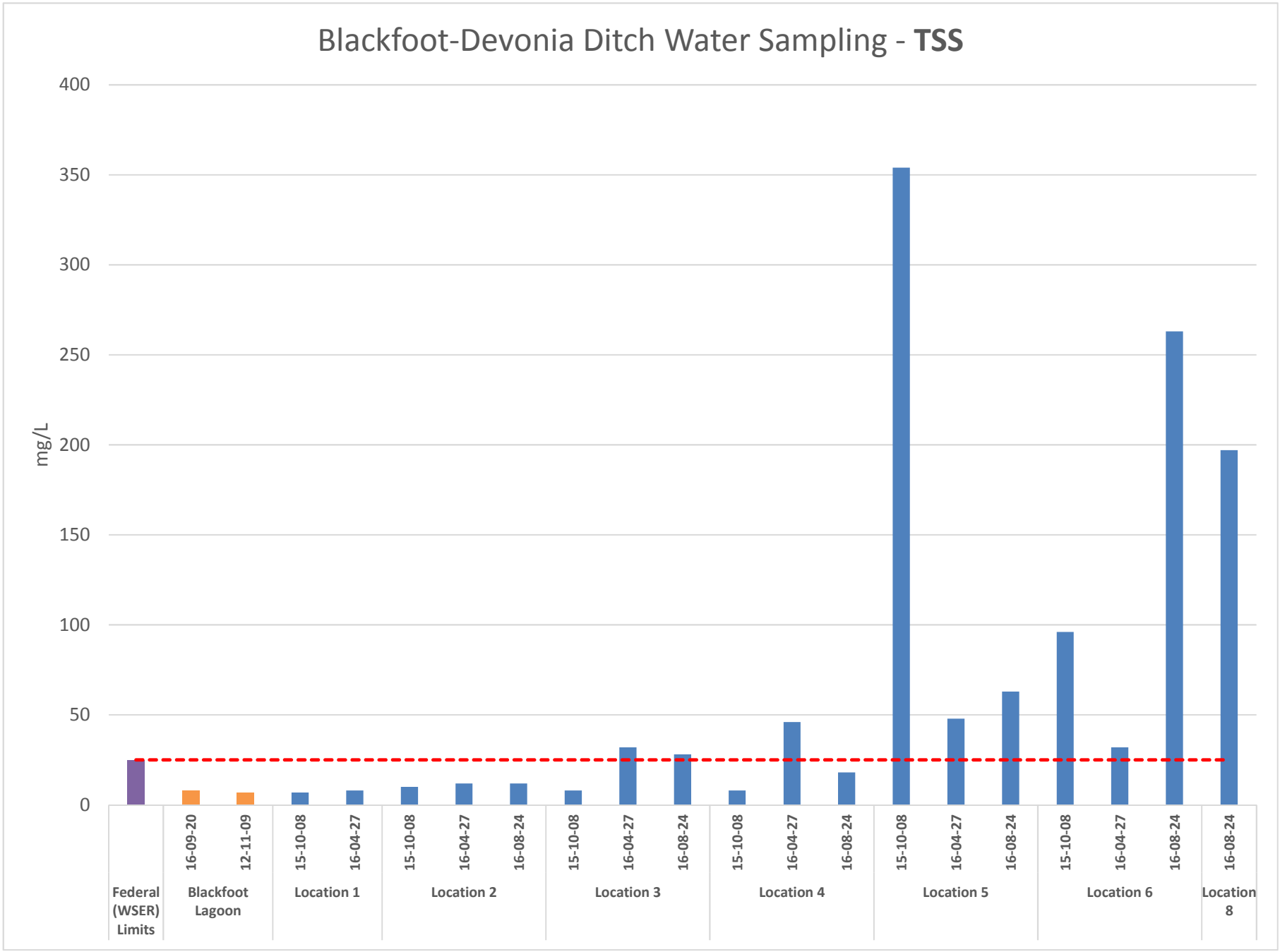
SITE PLAN

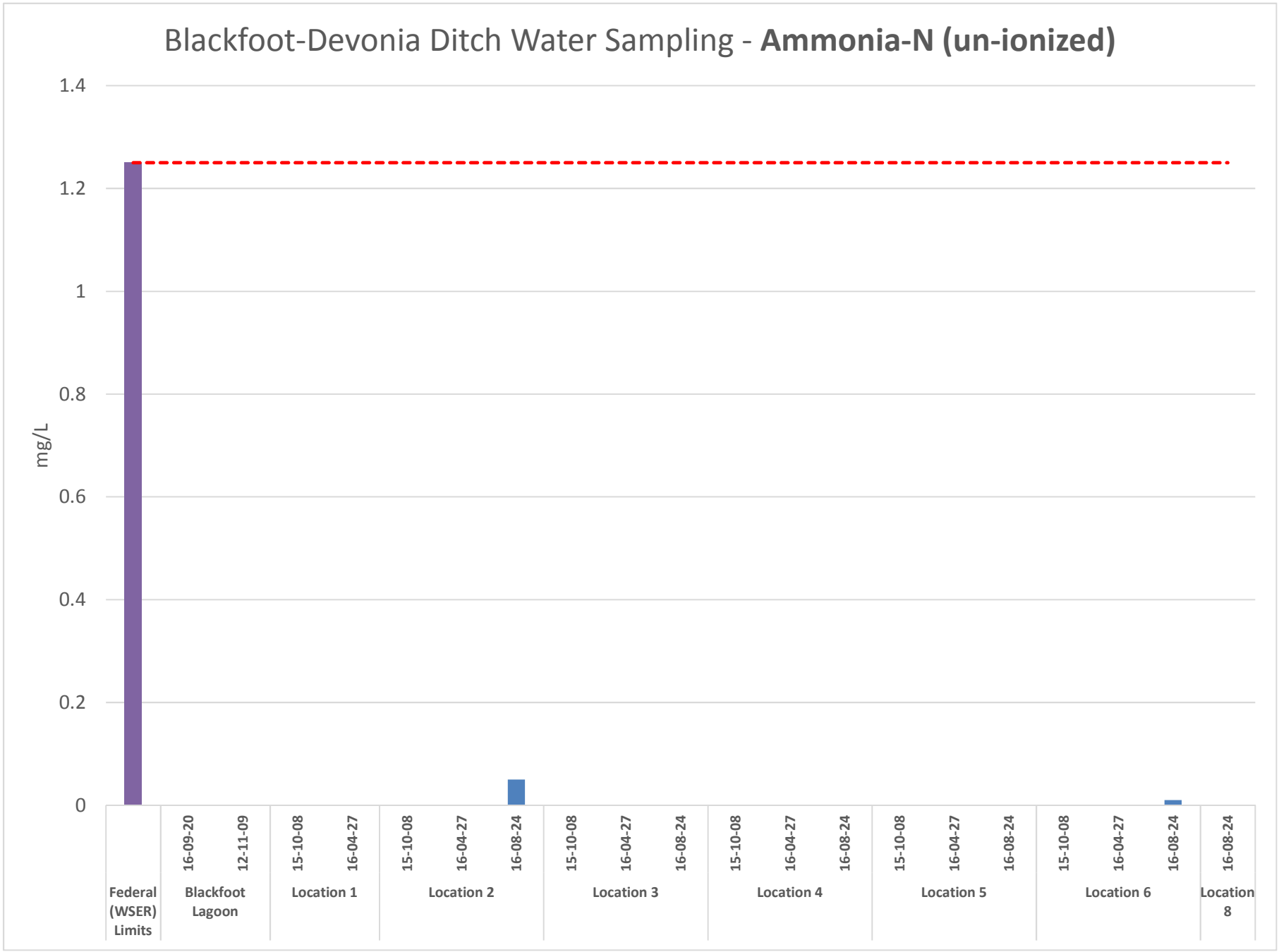
Table 1: Blackfoot-Devonia Ditch Water Sampling Results

		Parameter (mg/L)		
	Date (YY-MM-DD)	**BOD**	**TSS**	**Ammonia-N (un-ionized)**
Federal (WSER) Limits		**25**	**25**	**1.25**
Blackfoot Lagoon	16-09-20	**5**	**8**	-
	12-11-09	**5**	**7**	-
Location 1	15-10-08	4	7	<0.01
	16-04-27	5	8	<0.01
Location 2	15-10-08	4	10	<0.01
	16-04-27	7	12	<0.01
	16-08-24	4	12	0.05
Location 3	15-10-08	6	8	<0.01
	16-04-27	8	**32**	<0.01
	16-08-24	9	**28**	<0.01
Location 4	15-10-08	4	8	<0.01
	16-04-27	6	**46**	<0.01
	16-08-24	13	18	<0.01
Location 5	15-10-08	24	**354**	<0.01
	16-04-27	6	**48**	<0.01
	16-08-24	10	**63**	<0.01
Location 6	15-10-08	14	**96**	<0.01
	16-04-27	6	**32**	<0.01
	16-08-24	7	**263**	0.01
Location 8	16-08-24	4	**197**	<0.01

Acronym	**Definition**
BOD	Biological Oxygen Demand
TSS	Total Suspended Solids
WSER	Wastewater Systems Effluent Regulations


Blackfoot-Devonia Ditch Water Sampling - BOD
mg/L
30
25
20
15
10
5
0
16-09-20
12-11-09
15-10-08
16-04-27
15-10-08
16-04-27
16-08-24
15-10-08
16-04-27
16-08-24
15-10-08
16-04-27
16-08-24
15-10-08
16-04-27
16-08-24
15-10-08
16-04-27
16-08-24
16-08-24
Federal (WSER) Limits
Blackfoot Lagoon
Location 1
Location 2
Location 3
Location 4
Location 5
Location 6
Location 8


Blackfoot-Devonia Ditch Water Sampling - TSS
mg/L
400
350
300
250
200
150
100
50
0
16-09-20
12-11-09
15-10-08
16-04-27
15-10-08
16-04-27
16-08-24
15-10-08
16-04-27
16-08-24
15-10-08
16-04-27
16-08-24
15-10-08
16-04-27
16-08-24
15-10-08
16-04-27
16-08-24
16-08-24
Federal (WSER) Limits
Blackfoot Lagoon
Location 1
Location 2
Location 3
Location 4
Location 5
Location 6
Location 8


Blackfoot-Devonia Ditch Water Sampling - Ammonia-N (un-ionized)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
mg/L
Federal (WSER) Limits
16-09-20
12-11-09
Blackfoot Lagoon
15-10-08
16-04-27
Location 1
15-10-08
16-04-27
16-08-24
Location 2
15-10-08
16-04-27
16-08-24
Location 3
15-10-08
16-04-27
16-08-24
Location 4
15-10-08
16-04-27
16-08-24
Location 5
15-10-08
16-04-27
16-08-24
Location 6
16-08-24
Location 8

Blackfoot Discharge Line - Current Design

2015 Aerial

Blackfoot Discharge Line - Option 1

2015 Aerial

0 0.5 1 2 Kilometers

N

Blackfoot Discharge Line - Option 2

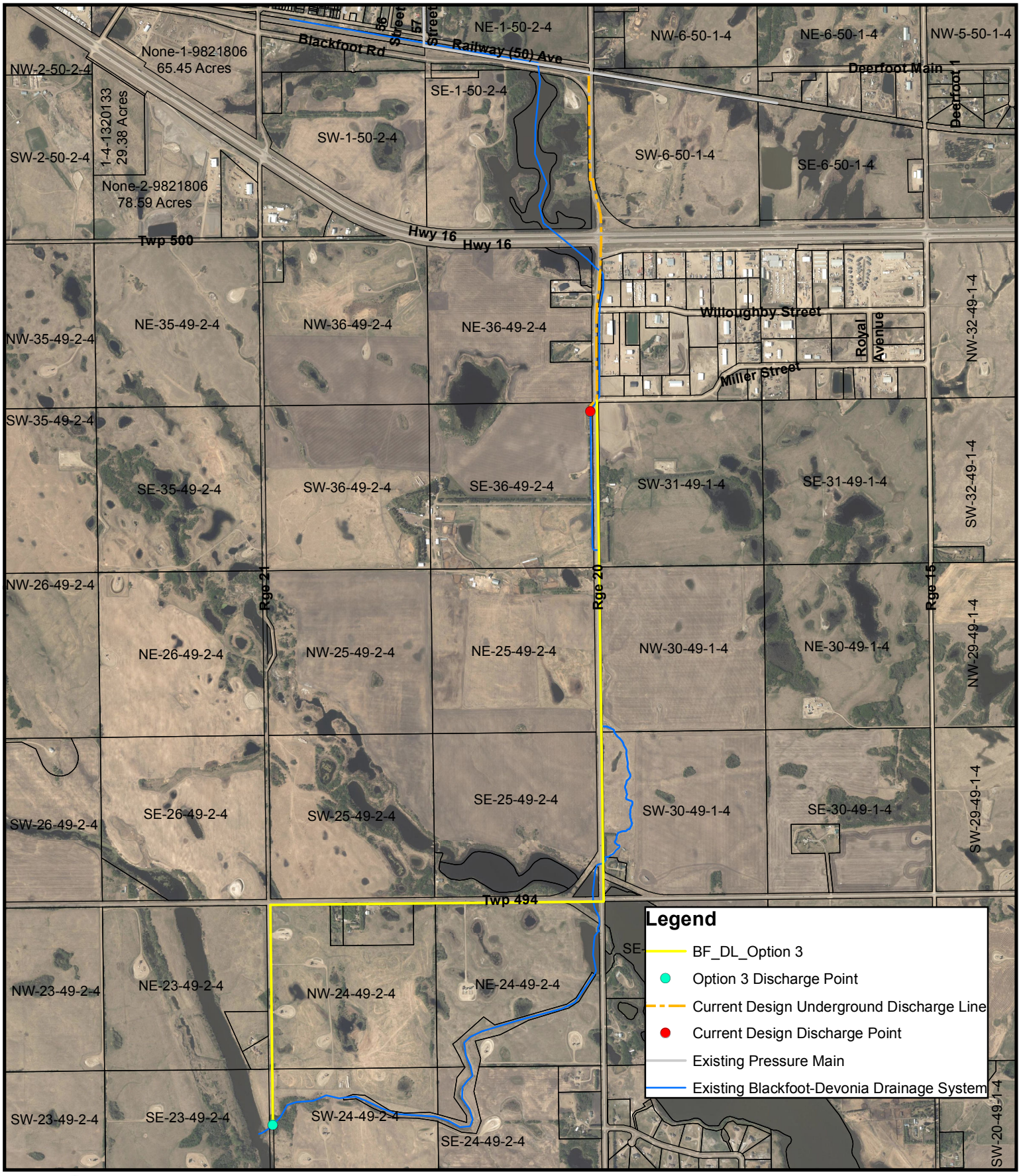
2015 Aerial

0 0.5 1 2 Kilometers

N

Blackfoot Discharge Line - Option 3

2015 Aerial

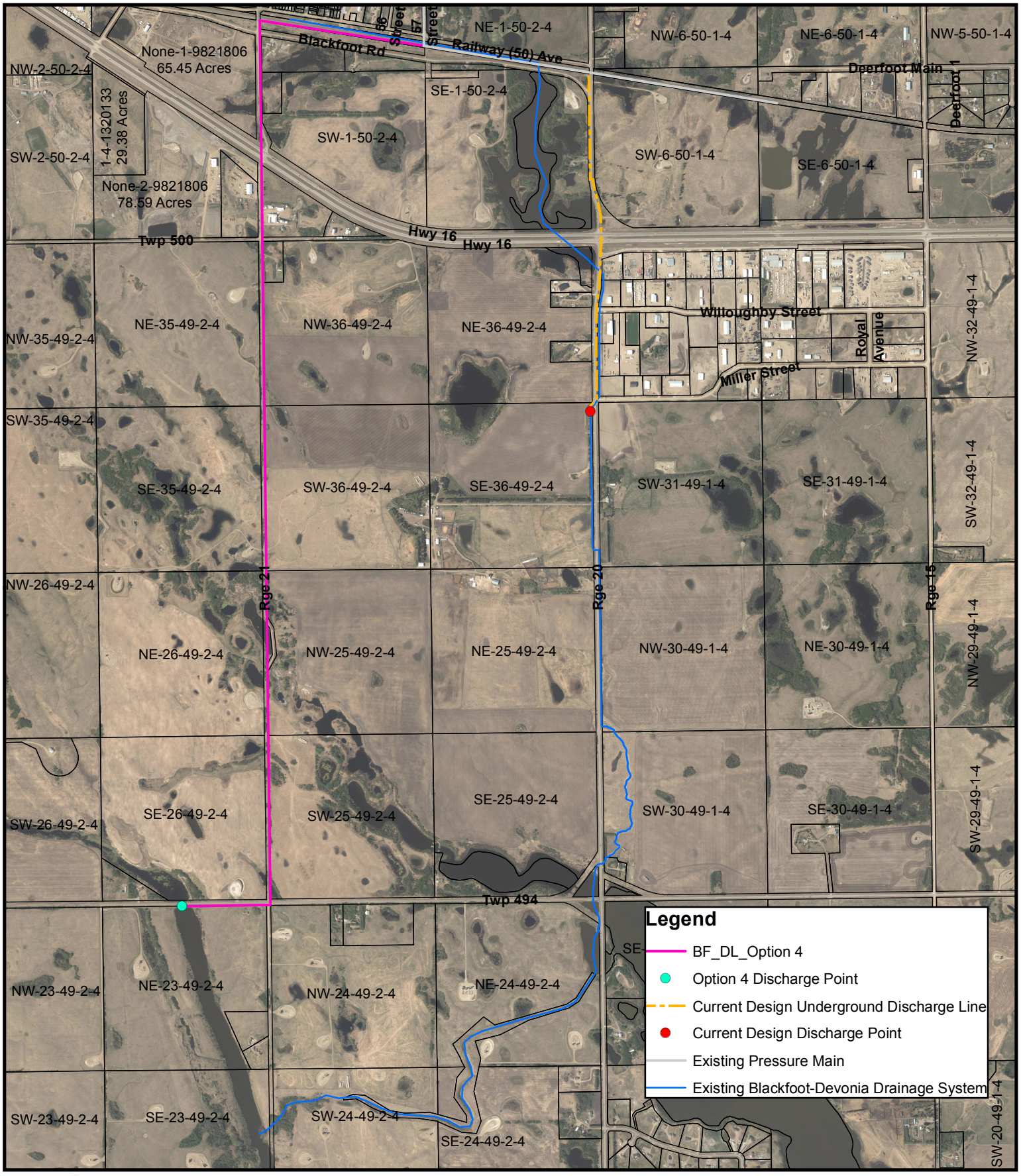


0 0.5 1 2 Kilometers

N

Blackfoot Discharge Line - Option 4

2015 Aerial

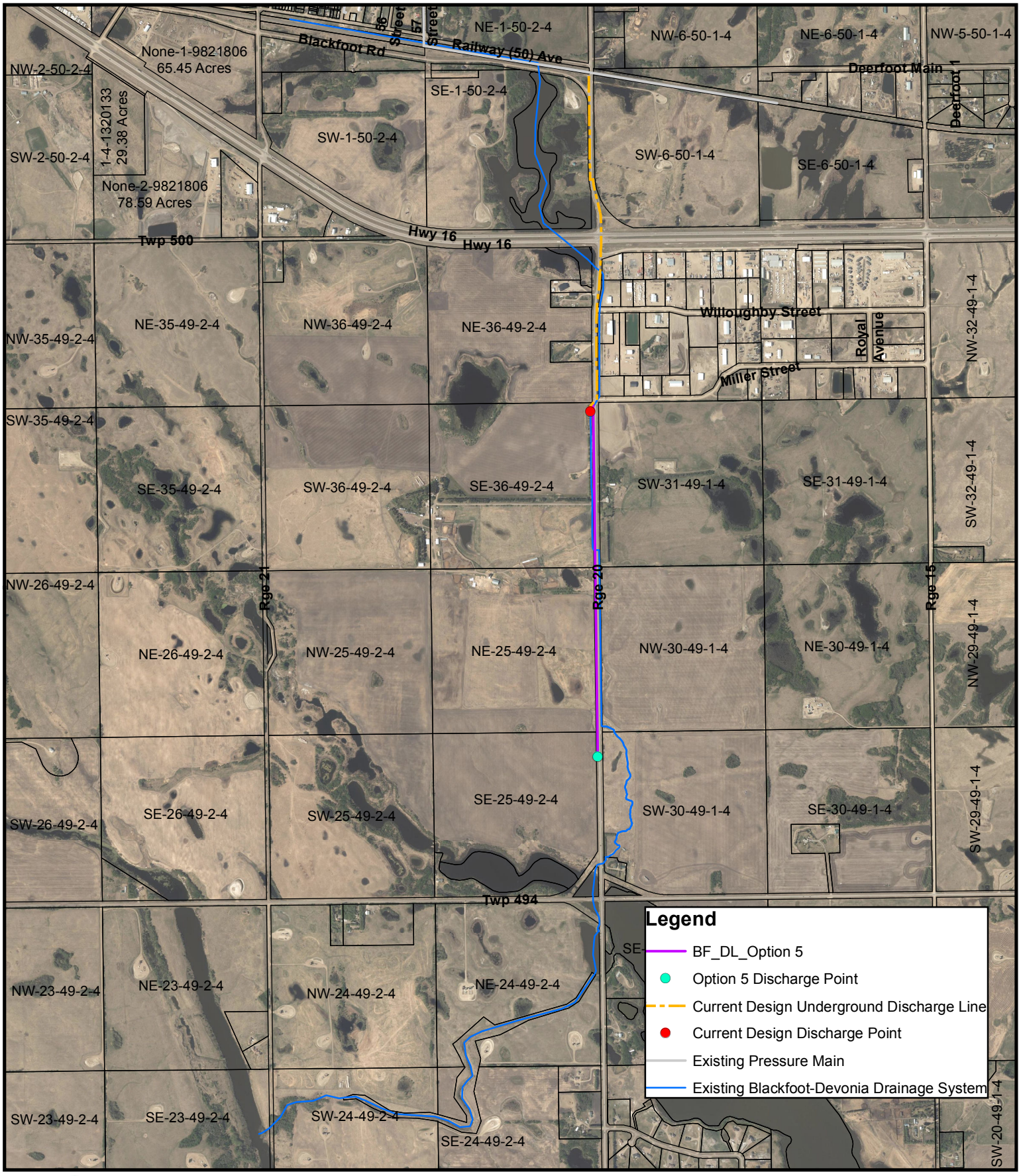


0 0.5 1 2 Kilometers

N

Blackfoot Discharge Line - Option 5

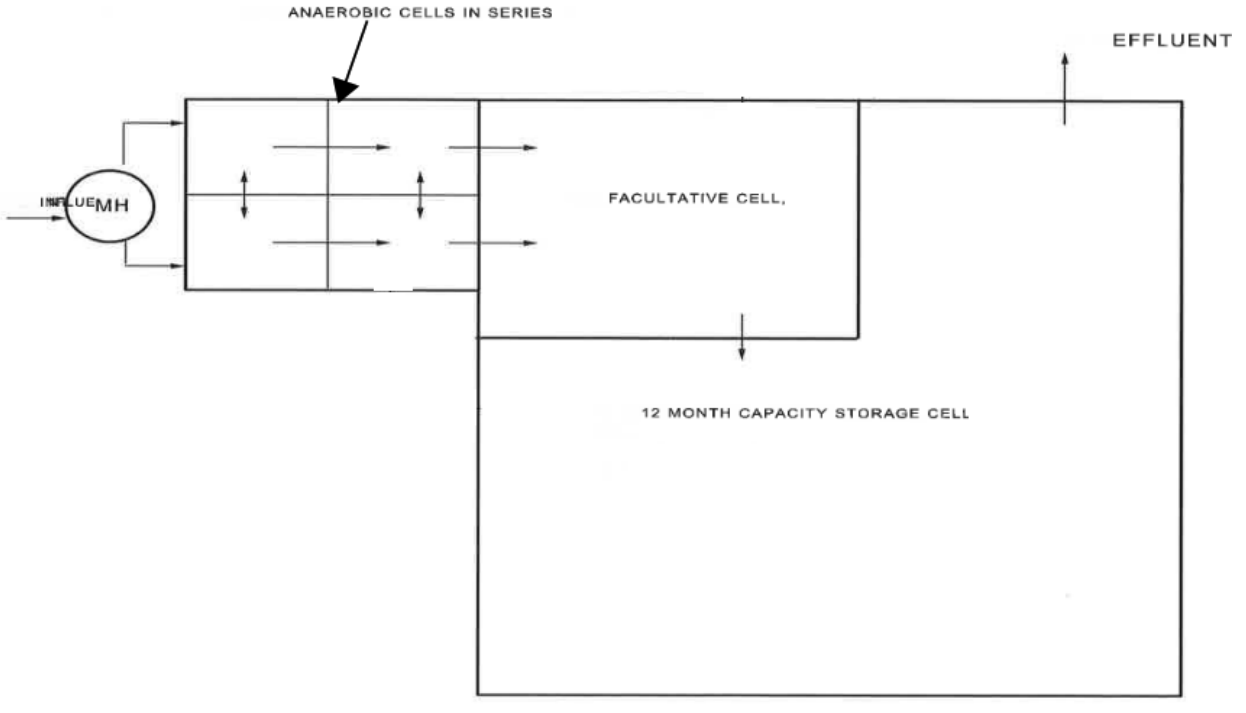
2015 Aerial



0 0.5 1 2 Kilometers

N

Figure 3.1 – Typical Wastewater Lagoon



4. Section 3.4.7.1 *(Part 3 Wastewater System Standards for Performance and Design, AEP, March 2013*)

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Where drainage course improvements are required to handle a seasonal pond discharge, prior approval must be obtained under the Water Act in Alberta. In addition, the owner of the facility should obtain easements across privately owned land along the drainage course in areas where flooding problems are foreseen.

5. “Water” & “Water Body” means (as defined by the Water Act)

   All water on or under the surface of the ground, whether in liquid or solid state;

   Any location where water flows or is present, whether or not the flow or the presence of water is continuous, intermittent or occurs only during a flood, and includes but is not limited to wetlands and aquifers but does not include except for clause (nn) and section 99 “water body” that is part of an irrigation works if the works is owned by the licensee, unless the regulations specify that the location is included in the definition of water body.

6. “Watercourse” means (as defined by EPEA)

   (i) the bed and shore of a river, stream, lake, creek, lagoon, swamp, marsh or other natural body of water; or

   (ii) a canal, ditch, reservoir or other artificial surface feature made by humans,

   whether it contains or conveys water continuously or intermittently.