

### 3 Drainage Concepts

Two alternative drainage concepts were developed to address the constraints identified above. These concepts involve the following

- Channel improvement (lowering) to facilitate drainage of the worst flood-impacted areas and development of the adjacent lands.
- A trunk storm sewer system that would parallel the existing stream channels, connecting the various SWMFs and draining to a defined stream channel that has sufficient depth and capacity. In this scenario, the existing stream courses would convey the runoff from un-developed portions of the basin.

#### 3.1 CHANNEL IMPROVEMENT

The main goal of channel improvements would be to lower the creek channel in places to facilitate drainage of the adjacent, tributary lands. The existing channels of Irvine Creek and Deer Creek would be lowered to provide an outlet of sufficient capacity for an underground piped system. Lowering the channels would also lower the flood levels and reduce the extent of flooding which would facilitate development of the benefitting lands.

**Figure 3-1** illustrates the drainage parkway concept in plan view and cross-section. It involves deepening the existing channel or constructing a new channel within the floodplain to provide the required conveyance. The channel would be aligned to preserve existing treed areas wherever possible and would meander to mimic a natural channel. The existing floodplain would be preserved to provide wildlife habitat and migration corridors.

**Figure 3-2** shows the extent of the proposed channel improvements. Drainage parkways would extend along Irvine Creek and Deer Creek from the CRB boundary to their confluences with Blackmud and Whitemud Creek, respectively. LeBlanc Canal would also be deepened to provide more capacity. Drainage parkways would also be constructed along two existing channels carrying runoff into Whitemud Creek southwest of the Edmonton International Airport and west of the City of Leduc.

Several local trunk mains are required to facilitate drainage from connected SWMFs into the proposed parkways (not all are shown).

Cawes Lake would be provided with an outlet channel to Irvine Creek to control the lake levels and convey the outflow from developing areas to the north. Current development plans call for the Decoteau Neighborhood to the north and east to drain to Cawes Lake through an inter-connected system of stormwater management facilities. Further study of Cawes Lake will be required to determine the optimum water level for wildlife habitat and to prevent flooding of adjacent lands.

## Blackmud/Whitemud Creek Surface Water Management Group

A large regional wetland is also proposed at the junction of the LeBlanc Canal and Irvine Creek. Its main purpose will be to replace the flood storage that would otherwise be lost if the Irvine Creek channel is deepened and thus to prevent increasing peak flows downstream.

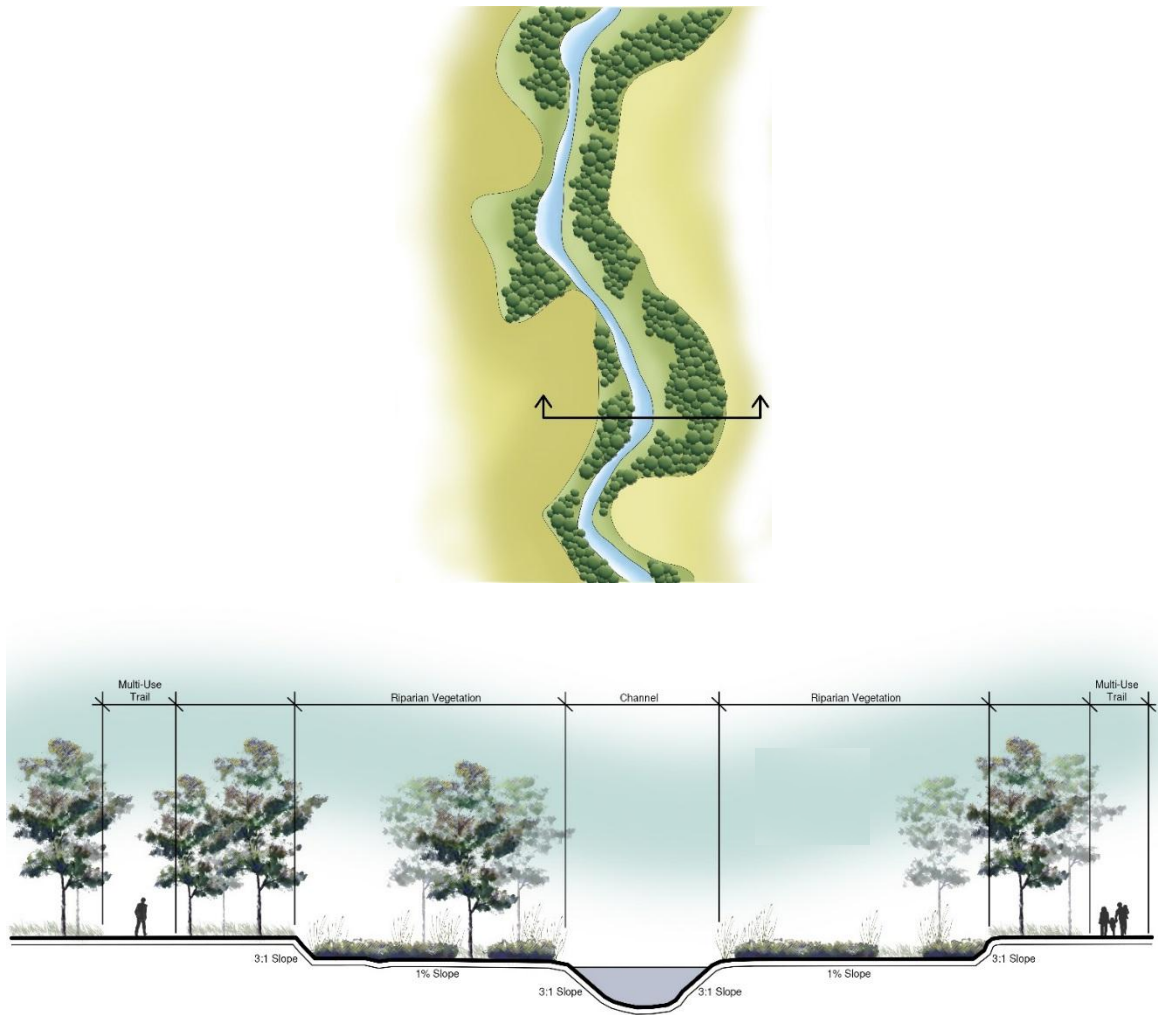
**Figure 3-3** and **3-4** show longitudinal profiles of Deer Creek and Irvine Creek, respectively, with channel improvement locations noted.

Preliminary modeling was adopted to better understand the impacts of the proposed channel improvements along Deer and Irvine Creeks. Sections of Deer Creek were modified in the MIKE 11 model by dropping the channel bottom by 1.5 m. The Irvine Creek channel was modified to a rectangular channel to accommodate the peak flow. Simulation was carried out for the 3.0 L/s/ha release rate during a 1:100 year design event.

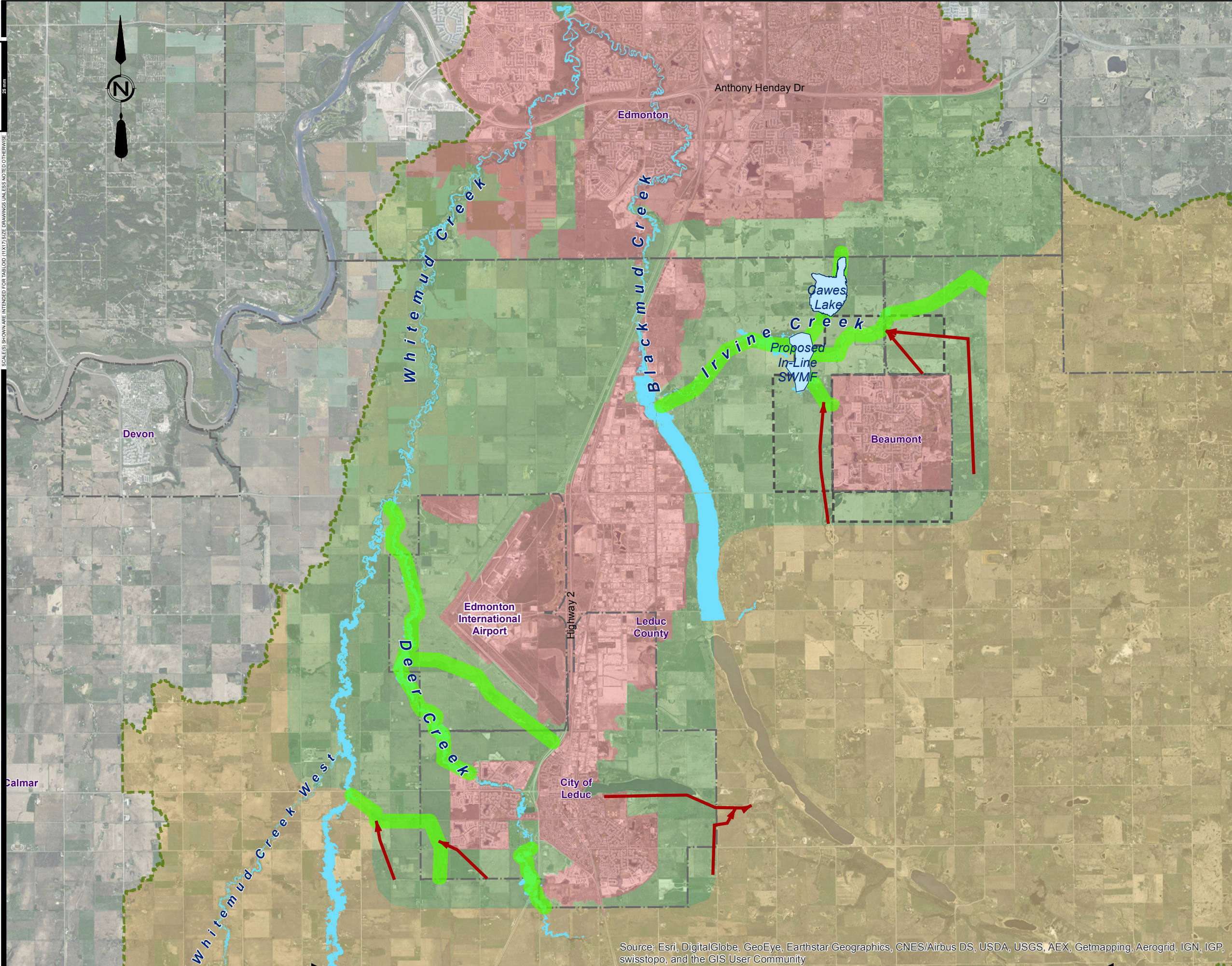
Preliminary flood maps are presented in **Figure 3-5** for Deer Creek and **Figure 3-6** for Irvine Creek. They indicate that the flood extent would not be significantly reduced along Deer Creek and that some reduction in flooding would occur along Irvine Creek near Beaumont. Note that some flooding is still observed along LeBlanc Canal that could be mitigated with the proposed improvements to this reach and with the proposed regional wetland at the junction with Deer Creek. Also note that the channel improvements are intended to facilitate drainage, not necessarily to reduce flooding.

Channel improvements must be done in an environmentally sensitive manner. Detailed environmental impact studies will be required to establish the appropriate environmental design measures to minimize the environmental impacts and provide a valuable amenity to the development.

Figure 3-1  
Proposed Drainage Parkway Concept







- Legend:**
- Outfall
  - 3.0 l/s /ha Extent
  - Channel Improvement
  - Beaumont Annexation
- Classification**
- Existing Development
  - Future Development
  - Rural



**FIGURE No. 3-2**  
 BLACKMUD/WHITEMUD CREEK  
 WATERSHED MANAGEMENT STUDY  
 PARKWAY CONCEPT

<b>AE PROJECT No.</b>	2016-3785
<b>SCALE</b>	1:100,000
<b>APPROVED DATE</b>	2017 MARCH
<b>REV DESCRIPTION</b>	ISSUED FOR REPORT

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



Figure 3-3:  
Deer Creek Proposed Longitudinal Profile

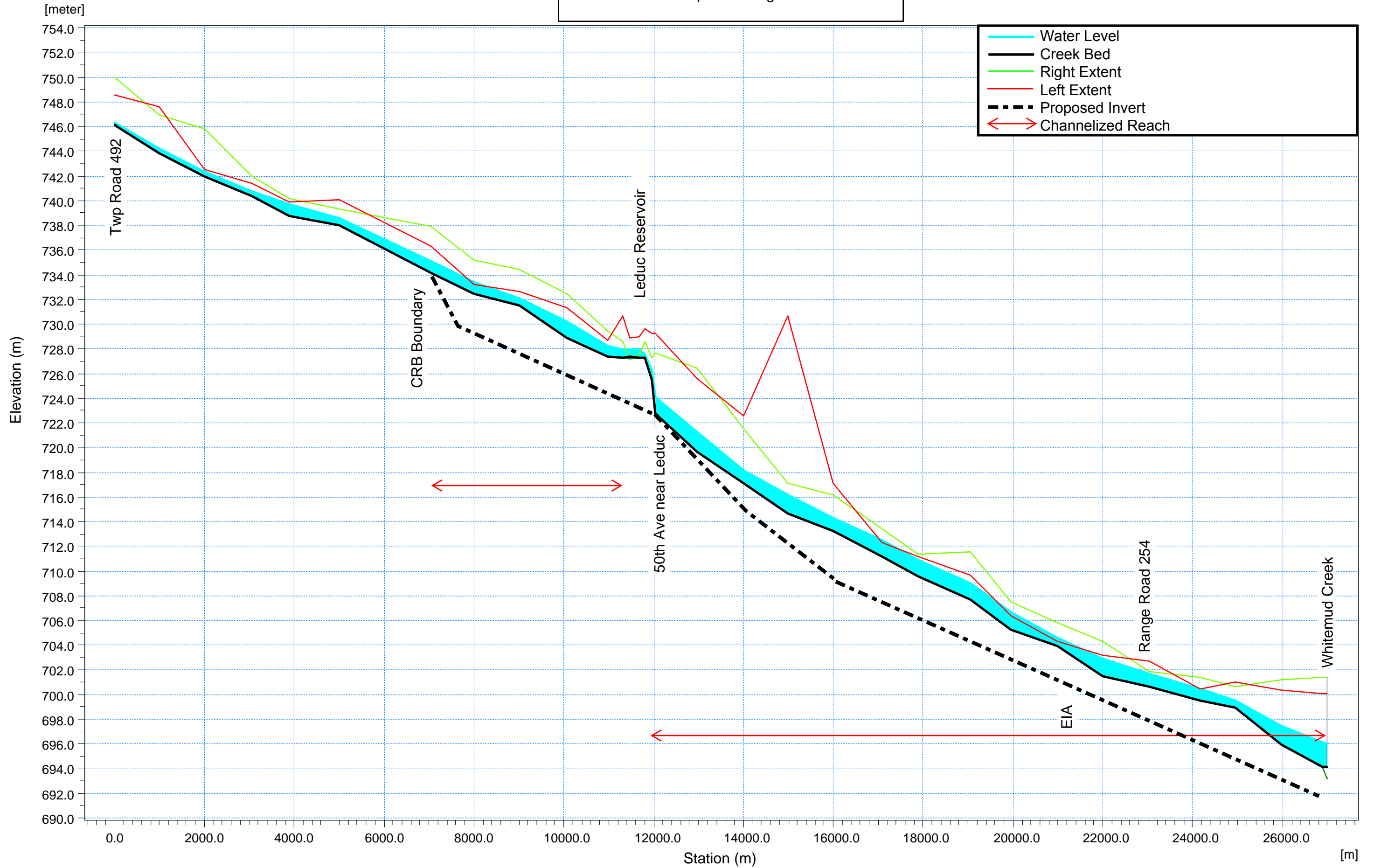
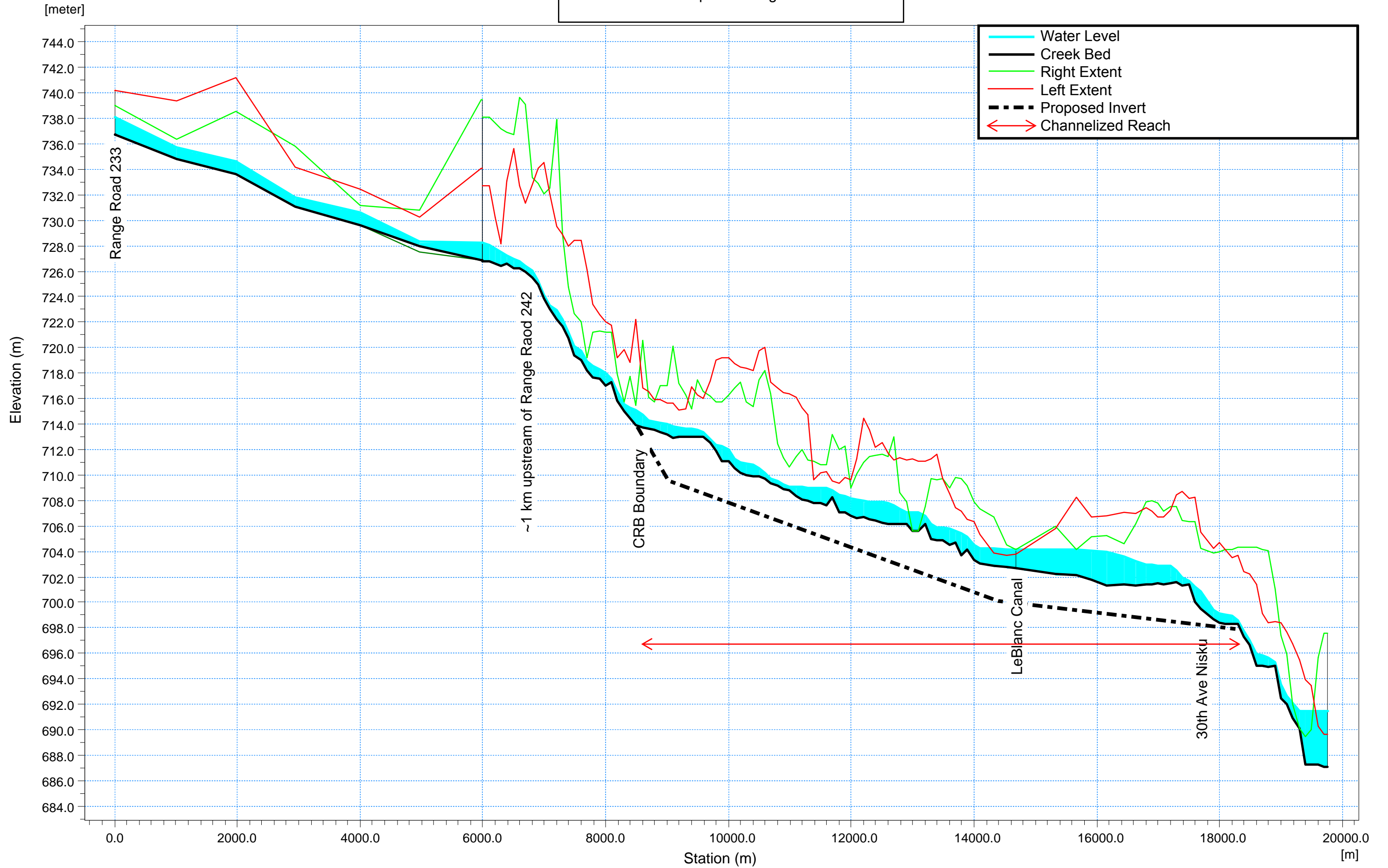
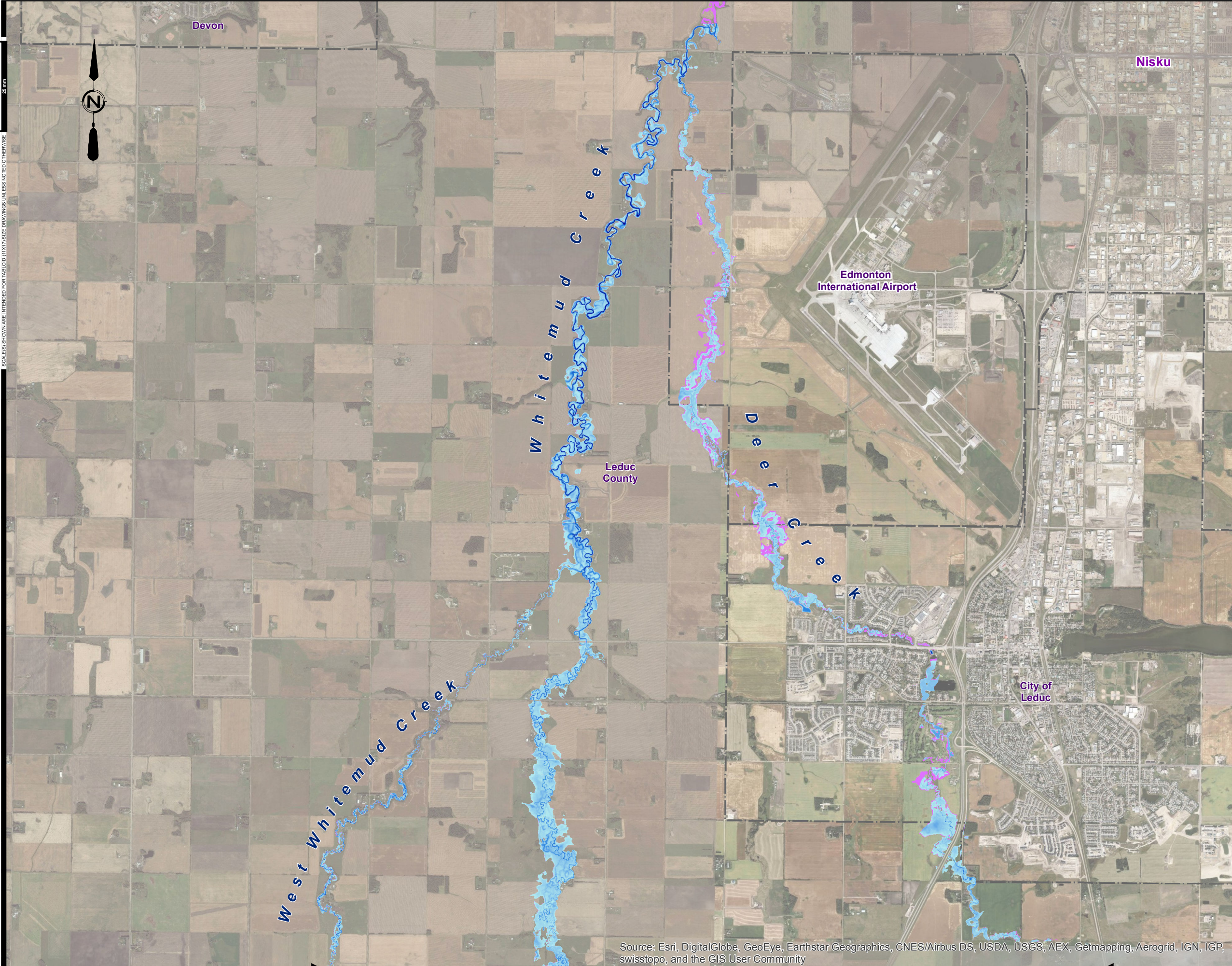




Figure 3-4:  
Irvine Creek Proposed Longitudinal Profile







SCALE(S) SHOWN ARE INTENDED FOR TABLOID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE  
IF NOT 20 mm AS SHOWN SCALES

Legend:  
**Creek Depth (m)**  
High : 4.0333  
Low : 0  
3.0 L/s /ha Extent

Note: Maps are preliminary and subject to change.

FIGURE No. 3-5  
BLACKMUD/WHITEMUD CREEK  
WATERSHED MANAGEMENT STUDY  
DEER CREEK DRAINAGE PARKWAY CONCEPT

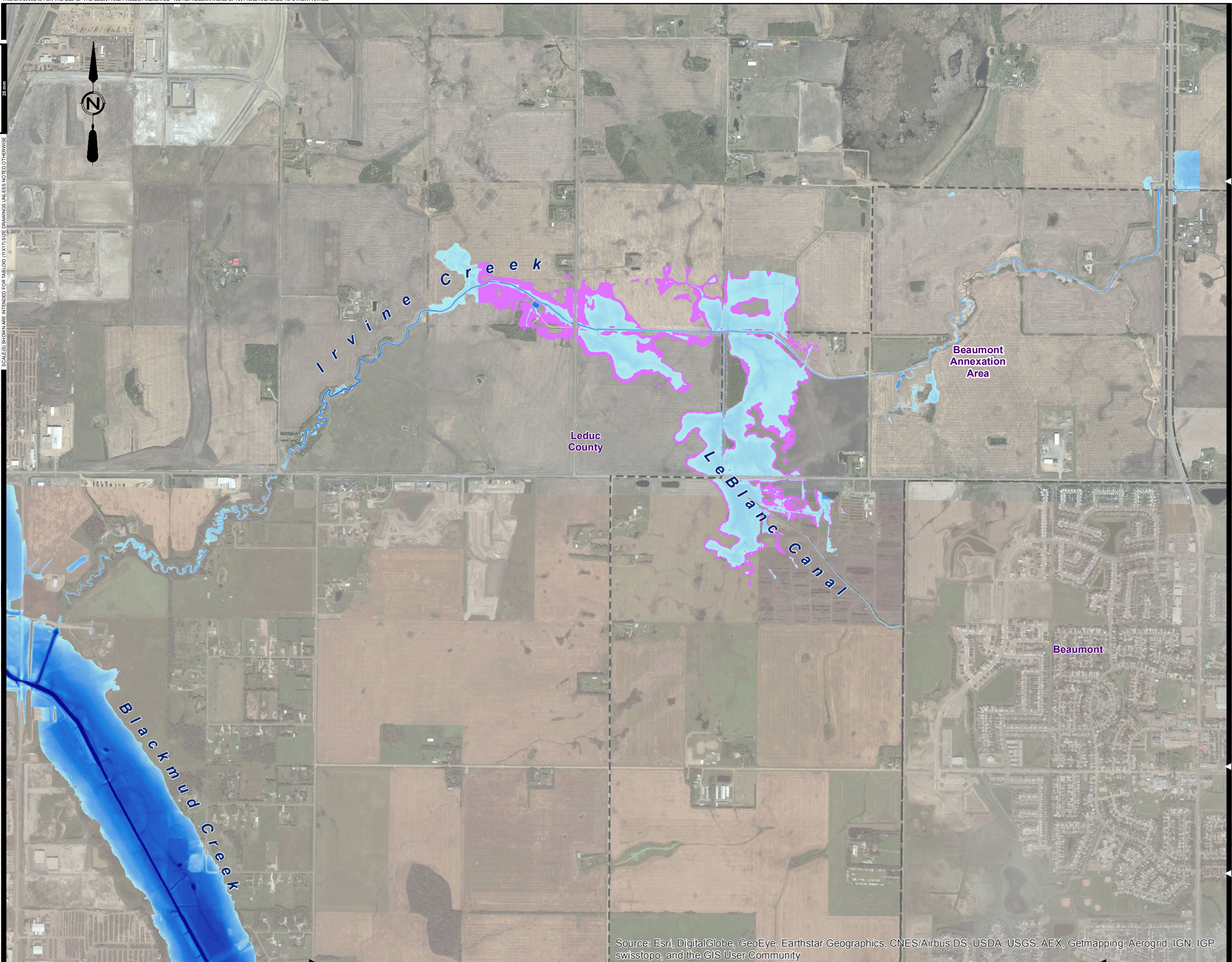
AE PROJECT No.	2016-3785
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SCALE(S) SHOWN ARE INTENDED FOR TABLOID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE

IF NOT 20 mm AS JUST SCALES

P:\2016378500\_Blackmud\WhitemudWorking\_Dwg\010\_GIS\Act\Map\02\_WaterResources\IrvineCreek\_DrainageConcept.mxd  
DATE: 5/11/2017



Legend:  
Creek Depth (m)  
High : 3.9203  
Low : 0  
3.0 L/s /ha Extent

Note: Maps are preliminary and subject to change.

FIGURE No. 3-6  
BLACKMUD/WHITEMUD CREEK  
WATERSHED MANAGEMENT STUDY  
IRVINE CREEK DRAINAGE PARKWAY CONCEPT

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APPROVED  
DATE 2017 MARCH  
REV  
DESCRIPTION ISSUED FOR REPORT



### 3.2 TRUNK SEWER OUTFALLS

**Figure 3-7** illustrates the trunk outfall concept for the Blackmud/Whitemud basin.

This concept provides drainage and discharge at downstream creek locations where there is more capacity for increased flow. In the cases of Deer Creek and Irvine Creek where existing capacity is limited, trunks will be required to bypass drainage.

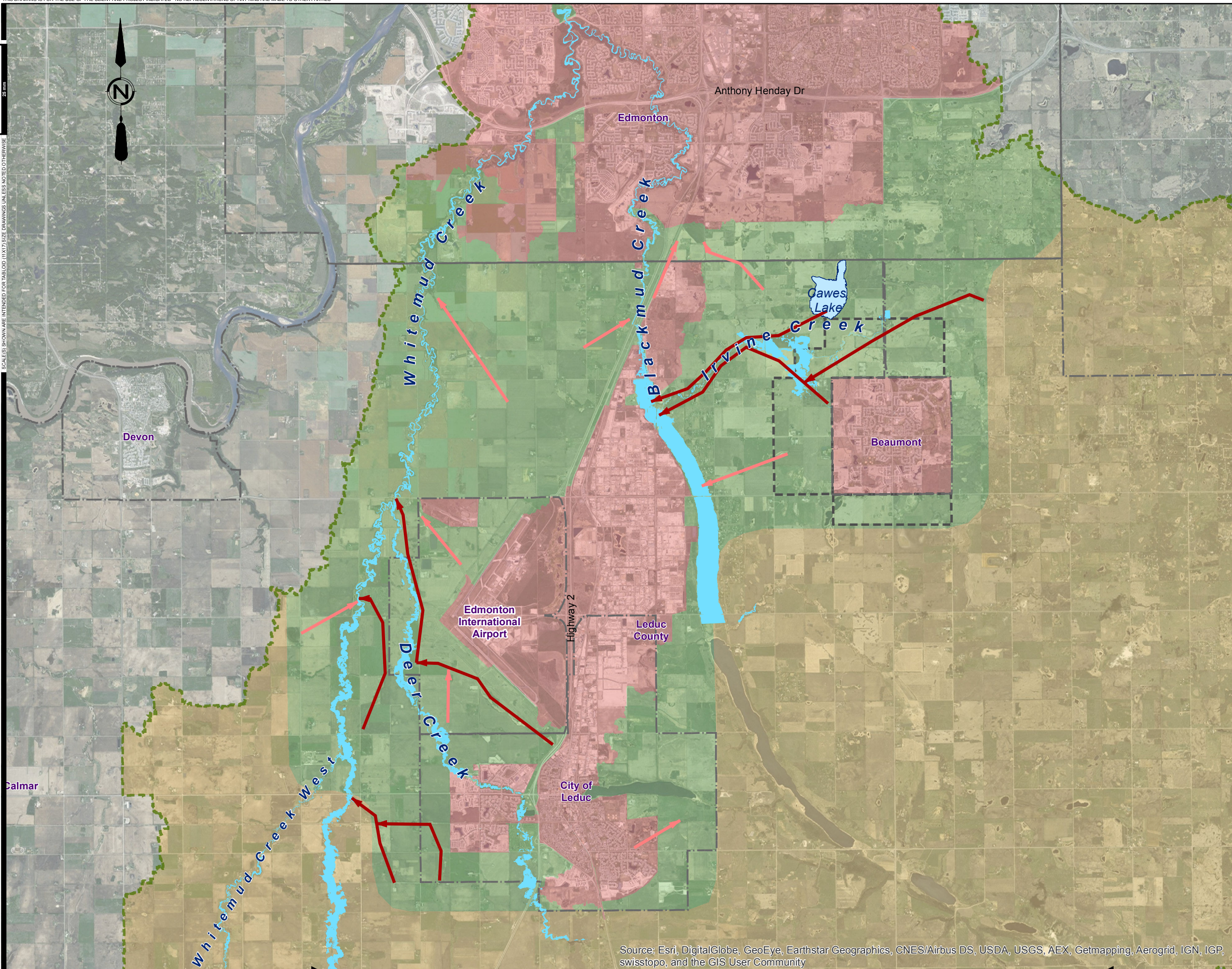
This concept also provided for a defined outlet from Cawes Lake to maintain a controlled water level and an outlet to Irvine Creek. Further study of the Cawes Lake will be required to define the appropriate managed water levels for waterfowl and to prevent flooding of the adjacent lands. Cawes Lake will receive runoff from southeast Edmonton (Decoteau Neighborhood) and discharge into the proposed trunk.

Preliminary modeling was conducted to better understand the effects of the proposed trunks on the adjacent reaches of stream channels. Simulations were carried out for the 3.0 L/s/ha release rate during a 1:100 year design event. **Figures 3-8** and **3-9** show the simulated flood depth and extents for Deer Creek and Irvine Creek, respectively. Results indicate that flood levels and extent would not be significantly reduced. Again, note that this scheme is intended primarily to provide drainage and not necessarily to reduce flooding. Flood areas will need to be protected from development as Environmental Reserve.

The main advantage of this option would be to avoid disturbing the channels of Irvine and Deer Creeks and to avoid the associated environmental impacts.



SCALE(S) SHOWN ARE INTENDED FOR TABLORD (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE  
 1" = 2000' AS SHOWN  
 1:200,000



- Legend:**
- Proposed Trunk
  - Drainage Direction
  - 3.0 l/s /ha Extent
  - Beaumont Annexation
- Classification**
- Existing Development
  - Future Development
  - Rural



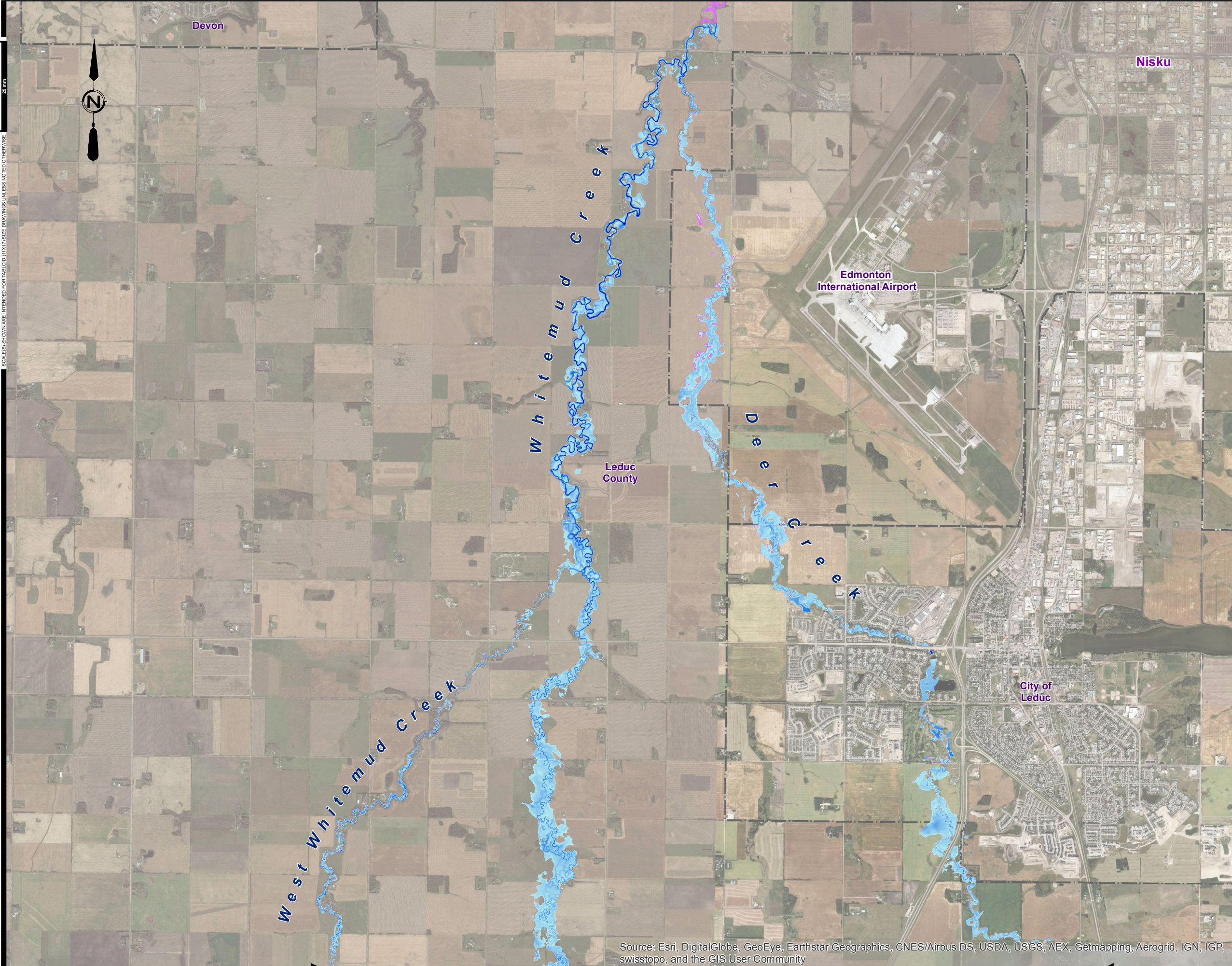
**FIGURE No. 3-7**  
 BLACKMUD/WHITEMUD CREEK  
 WATERSHED MANAGEMENT STUDY  
 TRUNK CONCEPT

<b>AE PROJECT No.</b>	2016-3785
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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



SCALE(S) SHOWN ARE INTENDED FOR TABLOID (11X17) SIZE DRAWINGS UNLESS NOTED OTHERWISE  
IF NOT 20 mm AS JUST SCALES  
20 mm



Legend:

- Creek Depth (m)**
  - High : 4.0362
  - Low : 0
- 3.0 L/s /ha Extent

Note: Maps are preliminary and subject to change.

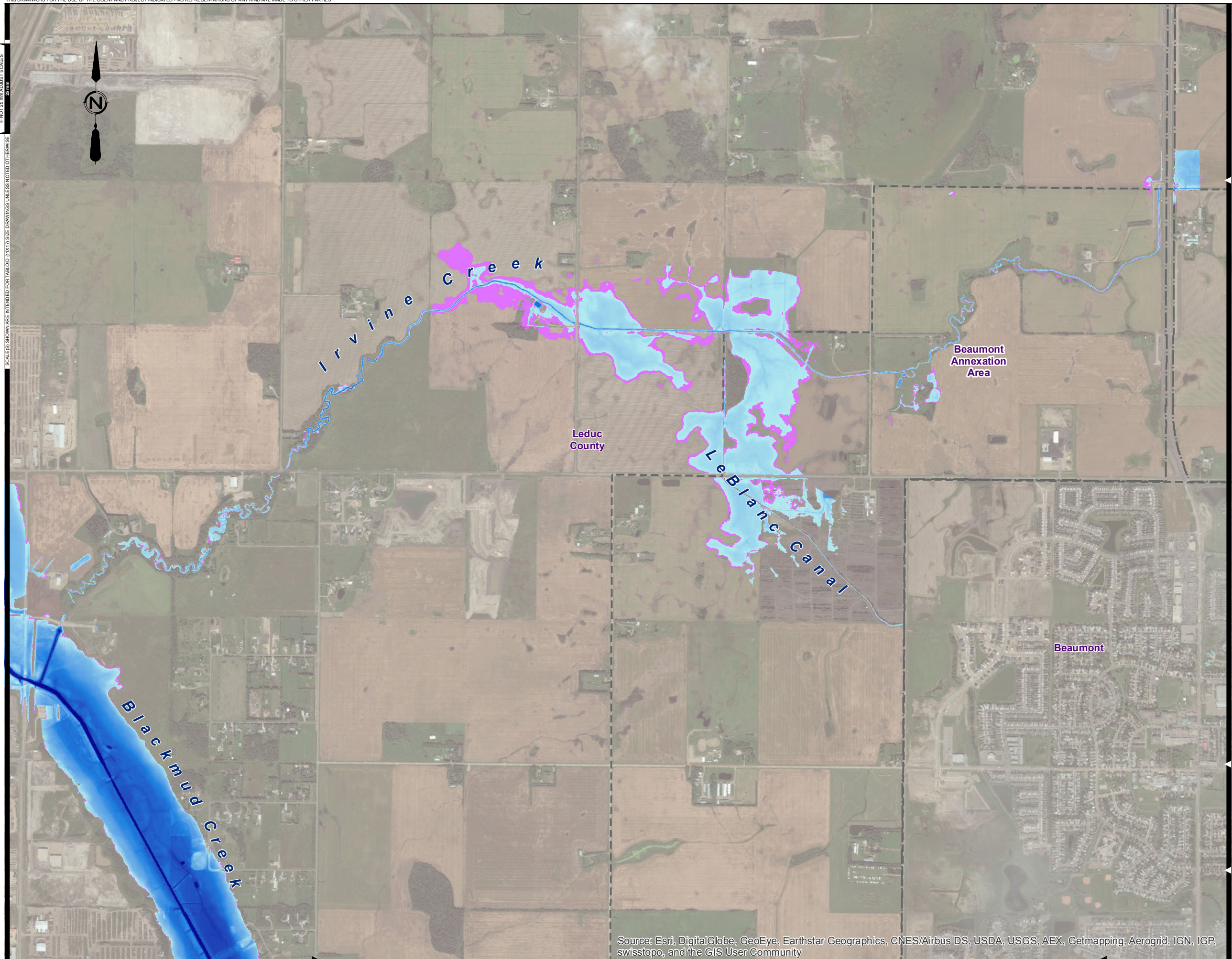
**FIGURE No. 3-8**  
 BLACKMUD/WHITEMUD CREEK  
 WATERSHED MANAGEMENT STUDY  
 DEER CREEK DRAINAGE TRUNK CONCEPT

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<b>REV DESCRIPTION</b>	ISSUED FOR REPORT



IF NOT 25 mm AS SHOWN SCALES

SCALES (S) SHOWN ARE INTENDED FOR TABLED (1:1) SIZE DRAWINGS UNLESS NOTED OTHERWISE



Legend:

- Creek Depth (m)**
  - High : 3.798
  - Low : 0
- 3.0 L/s /ha Extent

Note: Maps are preliminary and subject to change.

FIGURE No. 3-9

BLACKMUD/WHITEMUD CREEK WATERSHED MANAGEMENT STUDY

IRVINE CREEK TRUNK CONCEPT

AE PROJECT No.	2016-3785
SCALE	1:20,000
APPROVED DATE	2017 MARCH
REV DESCRIPTION	ISSUED FOR REPORT