



Calgary



Prepared for: City of Calgary - Water Resources

Confederation Park Regional Drainage Study

Final Report



**Associated
Engineering**

*GLOBAL PERSPECTIVE,
LOCAL FOCUS.*

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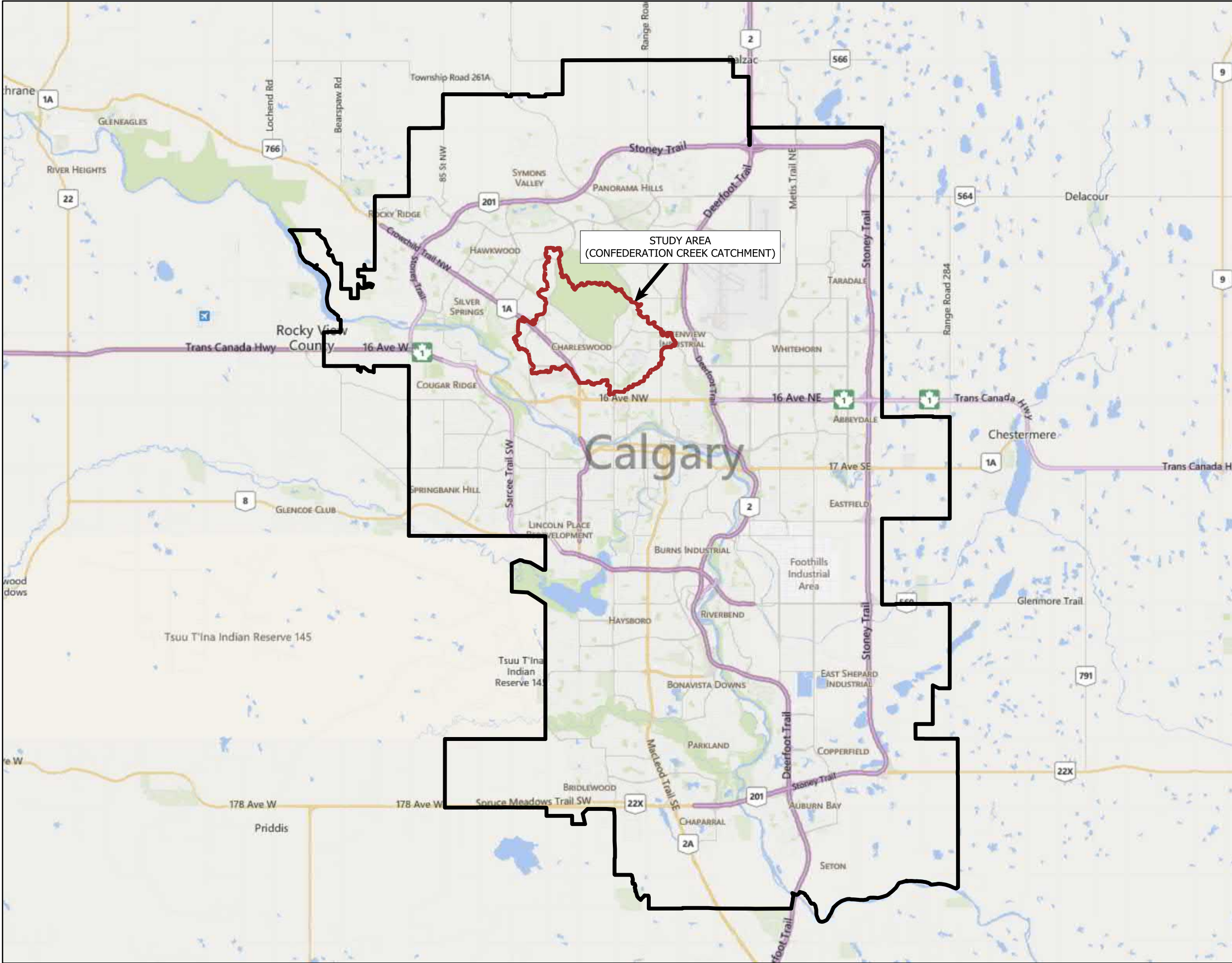
March 7, 2019




REPORT

Appendix A - Figures

Time: 1:31:34 PM | Date: 2/1/2019 | Scale: [Scale] | Map File: P:\20173915\00_Dam_Safety_Assess\Engineering\03.02_Conceptual_Feasibility_Master_Plan_Report\2018-12 - Final Report\map_report\figures_V3.map



LEGEND

 STUDY AREA
CITY OF CALGARY LIMITS

PROJECT NO.	2017-3915	INITIAL	DATE
DRAWN		AR	31-01-19
DESIGNED		AR	31-01-19
CHECKED		CA	31-01-19
APPROVED		NL	31-01-19




Projection: Mercator WGS84

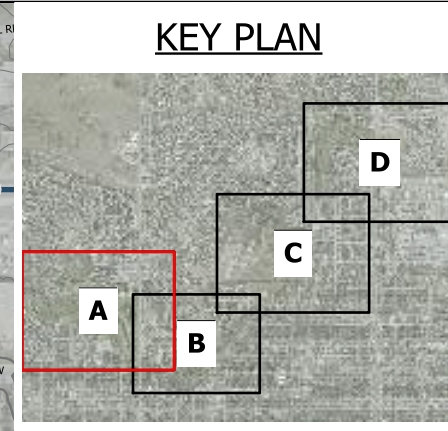


**CONFEDERATION PARK
REGIONAL DRAINAGE STUDY**

LOCATION PLAN

DRAWING NUMBER	REV. NO.	SHEET
FIGURE 2-1	A	

Time: 1:31:53 PM | Date: 2/1/2019 | Scale: [Scale] | Map File: P:\20173915\00_Dam_Safety_Assess\Engineering\03.02_Conceptual_Feasibility_Master_Plan_Report\2018-12 - Final Report\map_report\figures_V3.map



- ### LEGEND
- CONTOURS
 - EXISTING STORM PIPES
 - MANHOLE
 - CATCHBASIN
 - OUTFALL
 - CONFEDERATION CREEK
 - CONFEDERATION VALLEY
 - CONFEDERATION TRUNK
 - FLOW COMPARISON POINT
- ### AREA OUTLINES
- CONFEDERATION PARK GOLF COURSE
 - CONFEDERATION PARK
 - QUEEN'S PARK CEMETERY
 - GREENVIEW PARK
 - FORMER HIGHLAND PARK GOLF COURSE

PROJECT NO.	2017-3915	INITIAL	DATE
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Projection: 3TM114	
CONFEDERATION PARK REGIONAL DRAINAGE STUDY	
STUDY AREA	

DRAWING NUMBER	REV. NO.	SHEET
FIGURE 2-2	A	A

**14 ST NW EMBANKMENT (EXISTING)
2.7m x 2.7m CULVERT
2.4m x 2.4m PEDESTRIAN UNDERPASS**



Projection: 3TM114

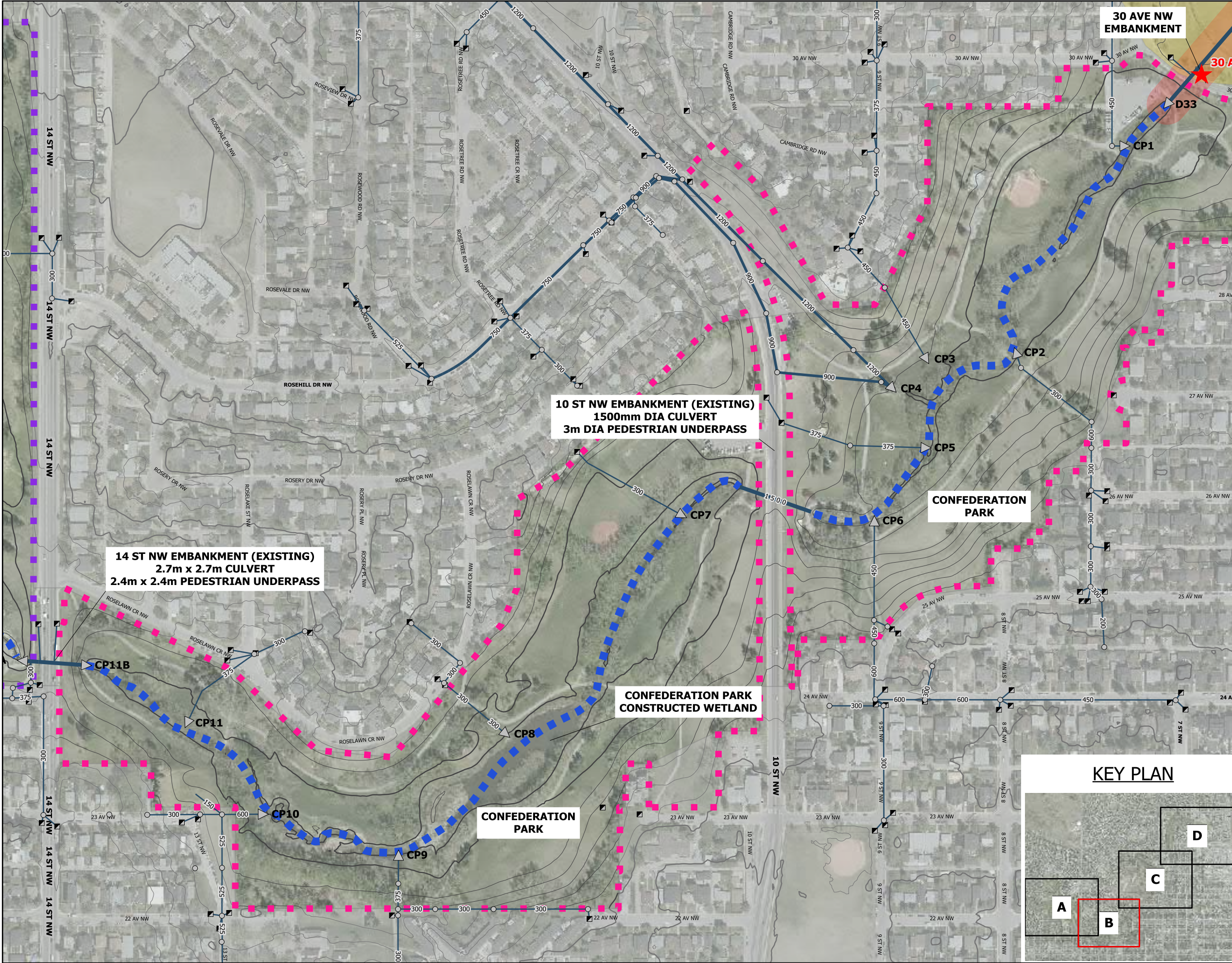


CONFEDERATION PARK REGIONAL DRAINAGE STUDY

STUDY AREA

DRAWING NUMBER	REV. NO.	SHEET
FIGURE 2-2	A	A

Time: 1:31:57 PM | Date: 2/1/2019 | Scale: [Scale] | Map File: P:\20173915\00_Dam_Safety_Assess\Engineering\03.02_Conceptual_Feasibility_Master_Plan_Report\2018-12 - Final Report\map_report\figures_V3.map



LEGEND

- CONTOURS
- EXISTING STORM PIPES
- MANHOLE
- CATCHBASIN
- OUTFALL
- CONFEDERATION CREEK
- CONFEDERATION VALLEY
- CONFEDERATION TRUNK
- FLOW COMPARISON POINT

AREA OUTLINES

- CONFEDERATION PARK
- GOLF COURSE
- CONFEDERATION PARK
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Projection: 3TM114

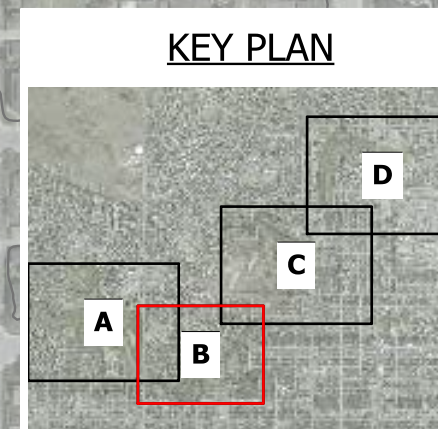


CONFEDERATION PARK
REGIONAL DRAINAGE STUDY

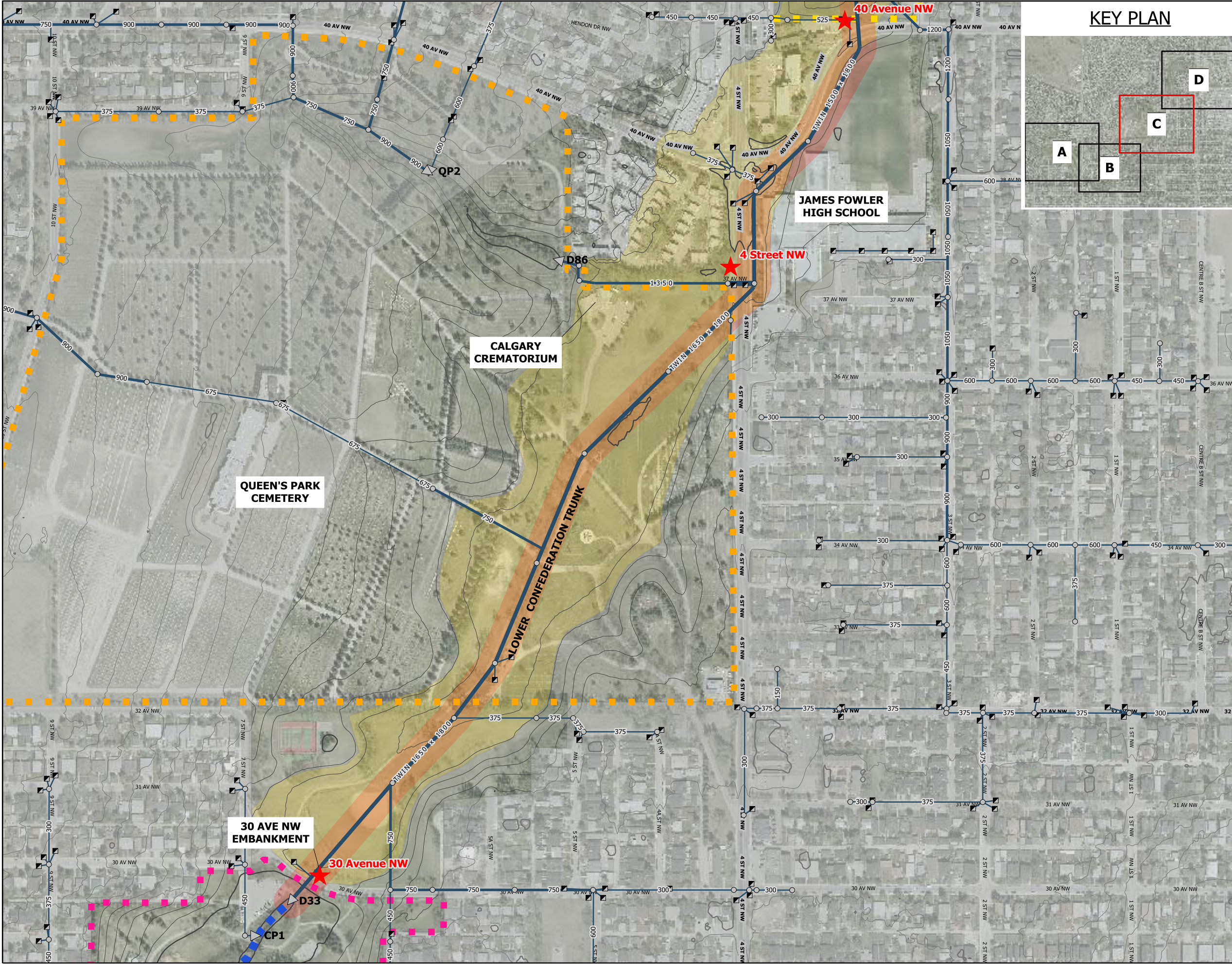
STUDY AREA

DRAWING NUMBER	REV. NO.	SHEET
FIGURE 2-2	A	B

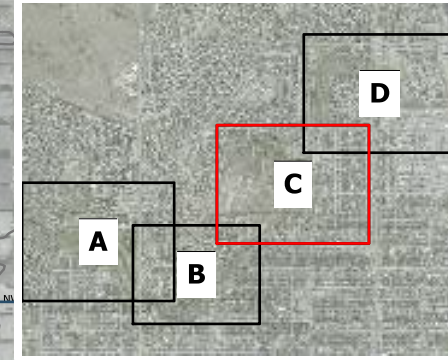
KEY PLAN



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KEY PLAN



LEGEND

- CONTOURS
- EXISTING STORM PIPES
- MANHOLE
- CATCHBASIN
- OUTFALL
- CONFEDERATION CREEK
- CONFEDERATION VALLEY
- CONFEDERATION TRUNK
- FLOW COMPARISON POINT

- AREA OUTLINES**
- CONFEDERATION PARK
- GOLF COURSE
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Projection: 3TM114

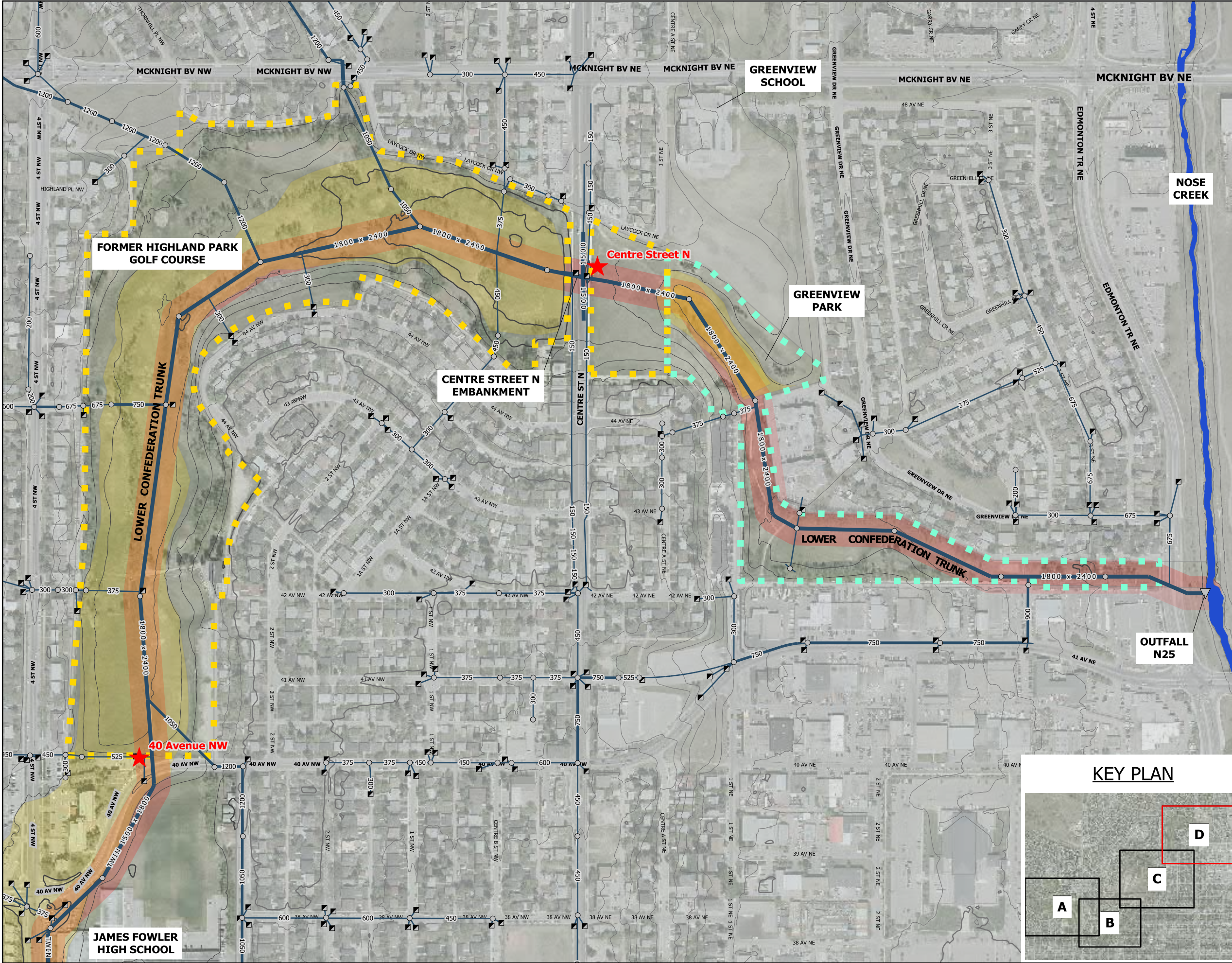


CONFEDERATION PARK REGIONAL DRAINAGE STUDY

STUDY AREA

DRAWING NUMBER	REV. NO.	SHEET
FIGURE 2-2	A	C

Time: 1:32:07 PM | Date: 2/1/2019 | Scale: [Scale] | Map File: P:\20173915\00_Dam_Safety_Assess\Engineering\03_02_Conceptual_Feasibility_Master_Plan_Report\2018-12 - Final Report\map_report\figures_V3.map



LEGEND

- CONTOURS
- EXISTING STORM PIPES
- MANHOLE
- CATCHBASIN
- OUTFALL
- CONFEDERATION CREEK
- CONFEDERATION VALLEY
- CONFEDERATION TRUNK
- FLOW COMPARISON POINT

AREA OUTLINES

- CONFEDERATION PARK GOLF COURSE
- CONFEDERATION PARK
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Projection: 3TM114

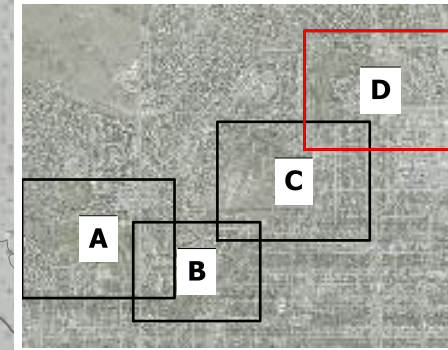


CONFEDERATION PARK REGIONAL DRAINAGE STUDY

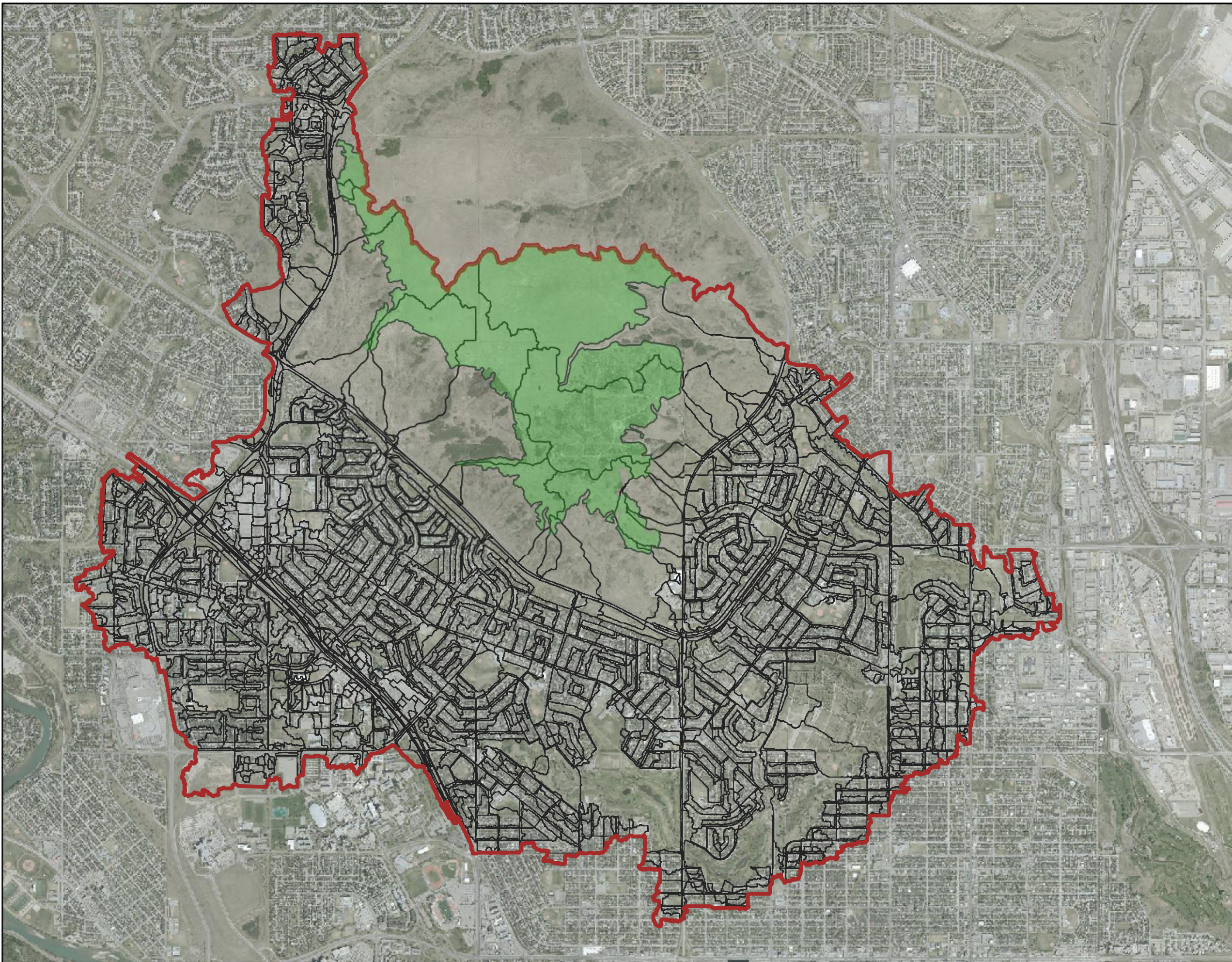
STUDY AREA

DRAWING NUMBER	REV. NO.	SHEET
FIGURE 2-2	A	D




KEY PLAN



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LEGEND

-  STUDY AREA
-  NOSE HILL PLATEAU CATCHMENTS
- 

PROJECT NO.	2017-3915	INITIAL	DATE
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CHECKED		AR	-
APPROVED		NL	-



Projection: 3TM114

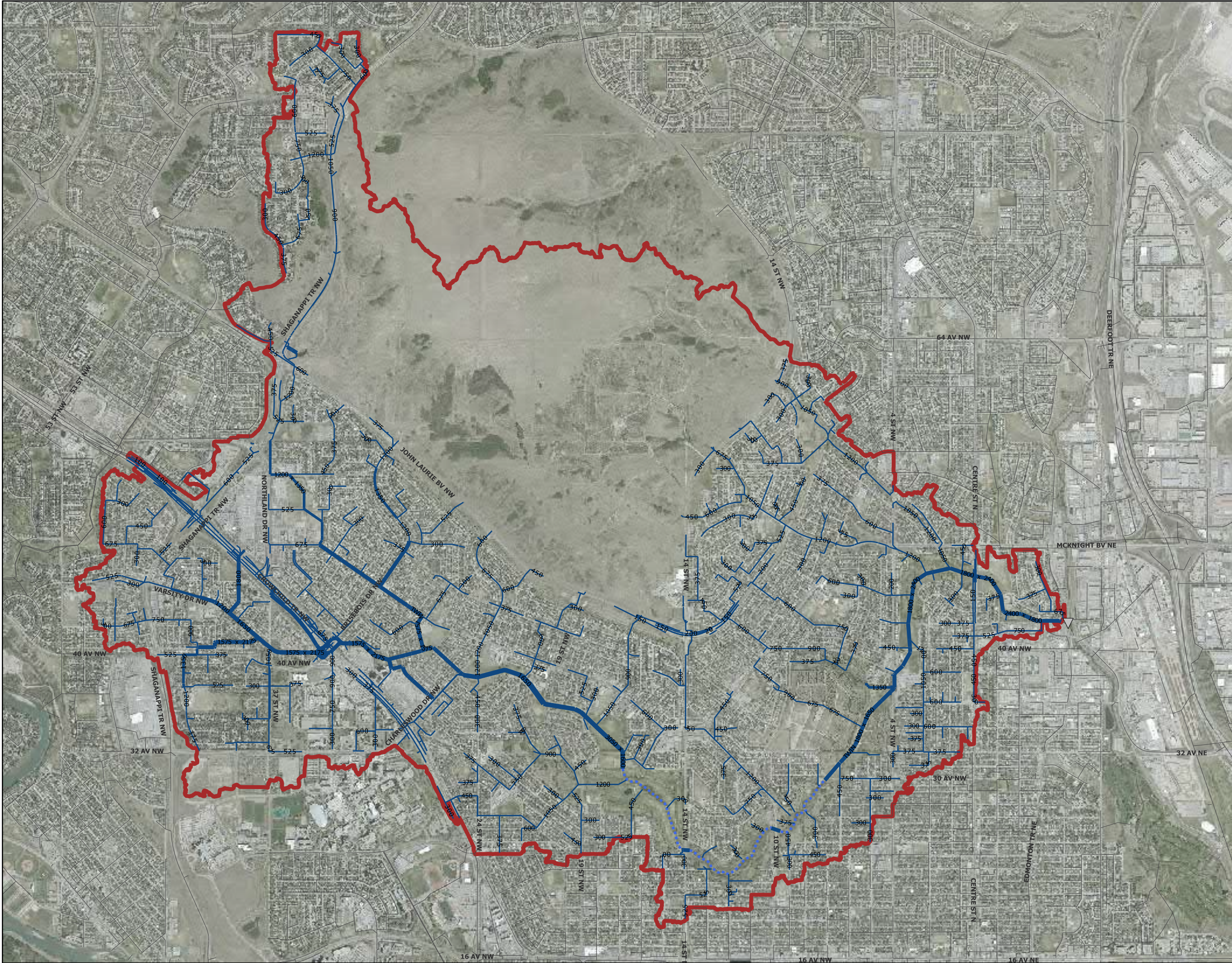


CONFEDERATION PARK
REGIONAL DRAINAGE STUDY

CATCHMENT AREAS

DRAWING NUMBER	REV. NO.	SHEET
FIGURE 3-1	A	

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LEGEND

- STUDY AREA
- CONFEDERATION CREEK
- PIPE < 900mm
- PIPE > 900mm
- PIPE > 1350mm
- ▽ N25 Outfall
- 700 PIPE SIZE (mm)

PROJECT NO.	2017-3915	INITIAL	DATE
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APPROVED		NL	-



Projection: 3TM114

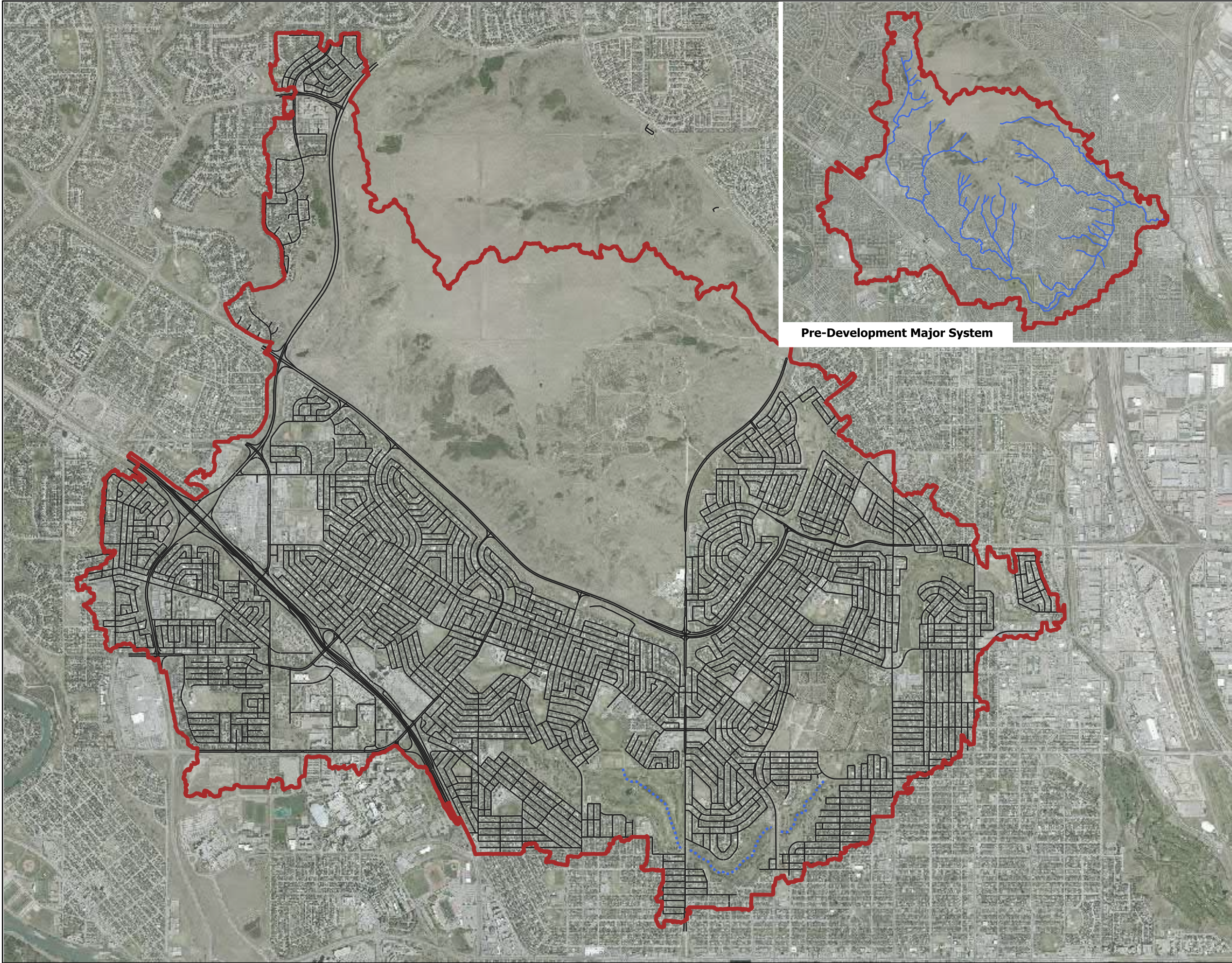


CONFEDERATION PARK REGIONAL DRAINAGE STUDY

MINOR SYSTEM

DRAWING NUMBER	REV. NO.	SHEET
FIGURE 3-2	A	

Time: 1:26:03 PM | Date: 2/1/2019 | Scale: [Scale] | Map File: P:\20173915\00_Dam_Safety_Assess\Engineering\03.02_Conceptual_Feasibility_Master_Plan_Report\2018-12 - Final Report\map_report\figures_kp.map



LEGEND

- STUDY AREA
- - - - CONFEDERATION CREEK
- MAJOR SYSTEM
- PRE-DEVELOPMENT CREEKS

PROJECT NO.	2017-3915	INITIAL	DATE
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DESIGNED		AR	31-01-19
CHECKED		AR	-
APPROVED		NL	-



Projection: 3TM114

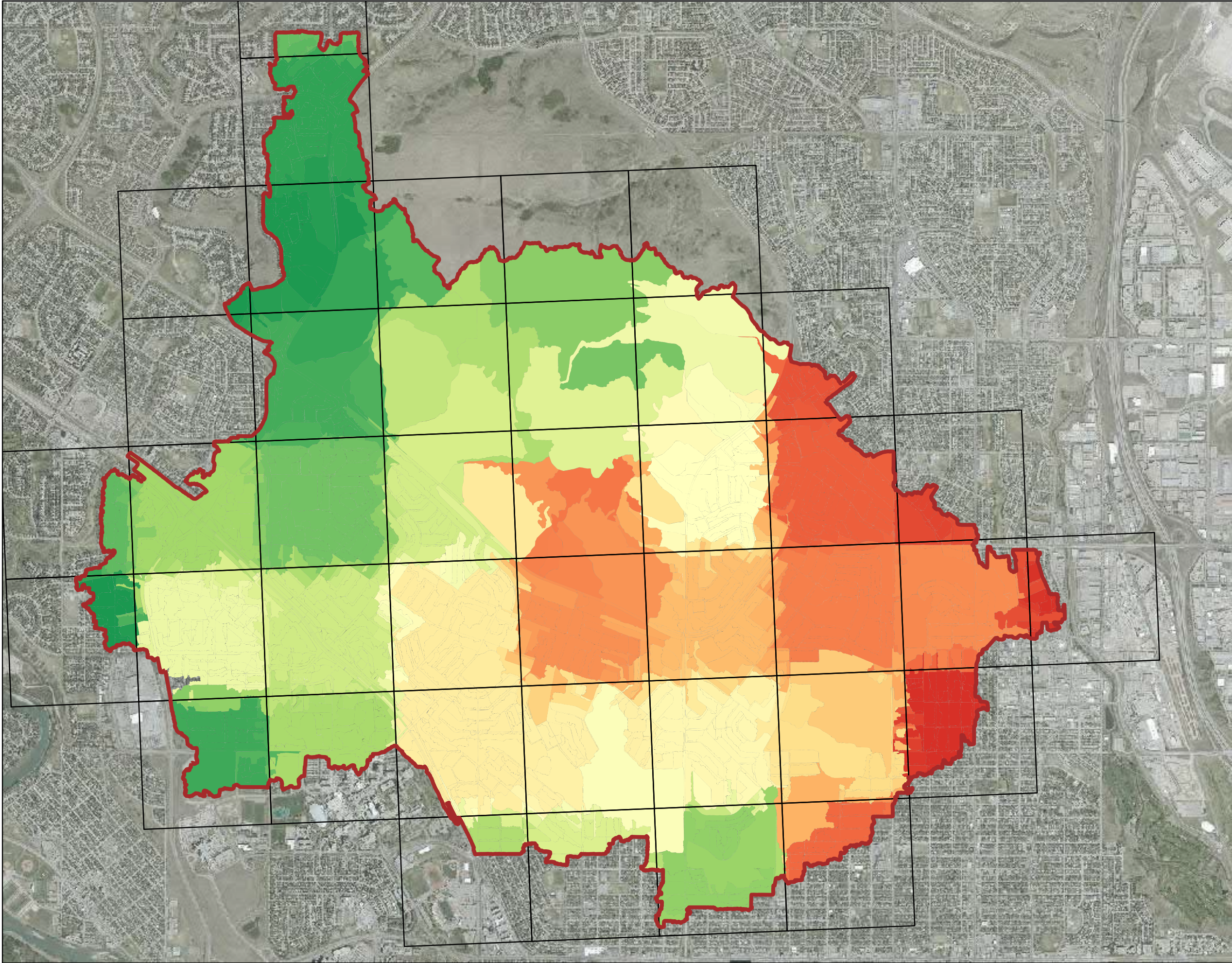


CONFEDERATION PARK REGIONAL DRAINAGE STUDY

MAJOR SYSTEM

DRAWING NUMBER	REV. NO.	SHEET
FIGURE 3-3	A	

Time: 1:26:25 PM | Date: 2/1/2019 | Scale: [Scale] | Map File: P:\20173915\00_Dam_Safety_Assess\Engineering\03.02_Conceptual_Feasibility_Master_Plan_Report\2018-12 - Final Report\map_report\figures_kp.map



LEGEND

- STUDY AREA
- RADAR GRID
- 0 - 16 mm
- 16 - 20mm
- 20 - 24mm
- 24 - 28mm
- 28 - 32mm
- 32 - 43mm

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Projection: 3TM114

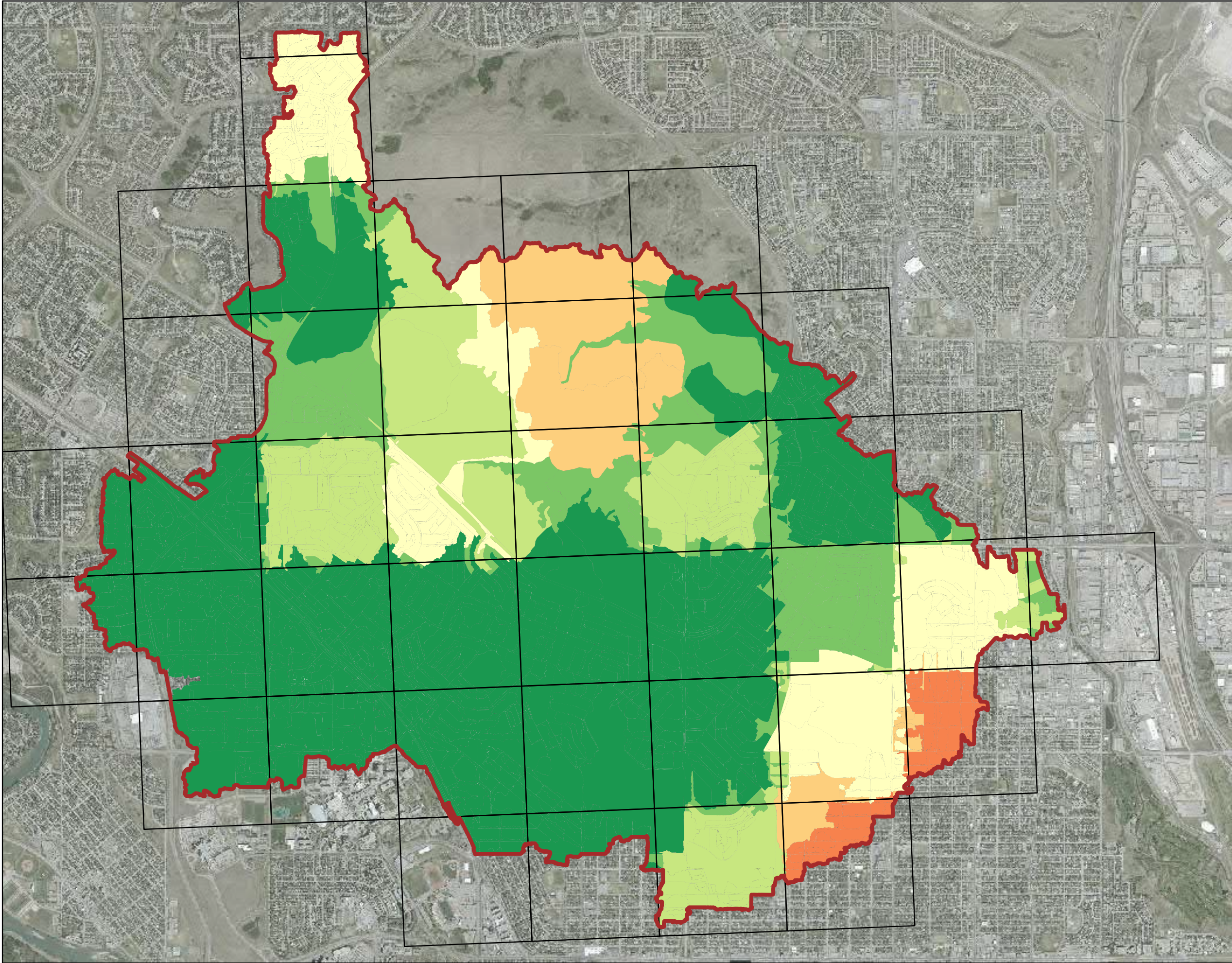


CONFEDERATION PARK REGIONAL DRAINAGE STUDY









JUNE 2007 STORM RADAR RAINFALL TOTAL VOLUME

DRAWING NUMBER	REV. NO.	SHEET
FIGURE 3-4	A	

Time: 1:26:31 PM | Date: 2/1/2019 | Scale: [Scale] | Map File: P:\20173915\00_Dam_Safety_Assess\Engineering\03.02_Conceptual_Feasibility_Master_Plan_Report\2018-12 - Final Report\map_report\figures_kp.map



LEGEND

-  STUDY AREA
-  RADAR GRID
-  0 - 16mm
-  16 - 20mm
-  20 - 24mm
-  24 - 28mm
-  28 - 32mm
-  32 - 43mm

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APPROVED		NL	-



Projection: 3TM114

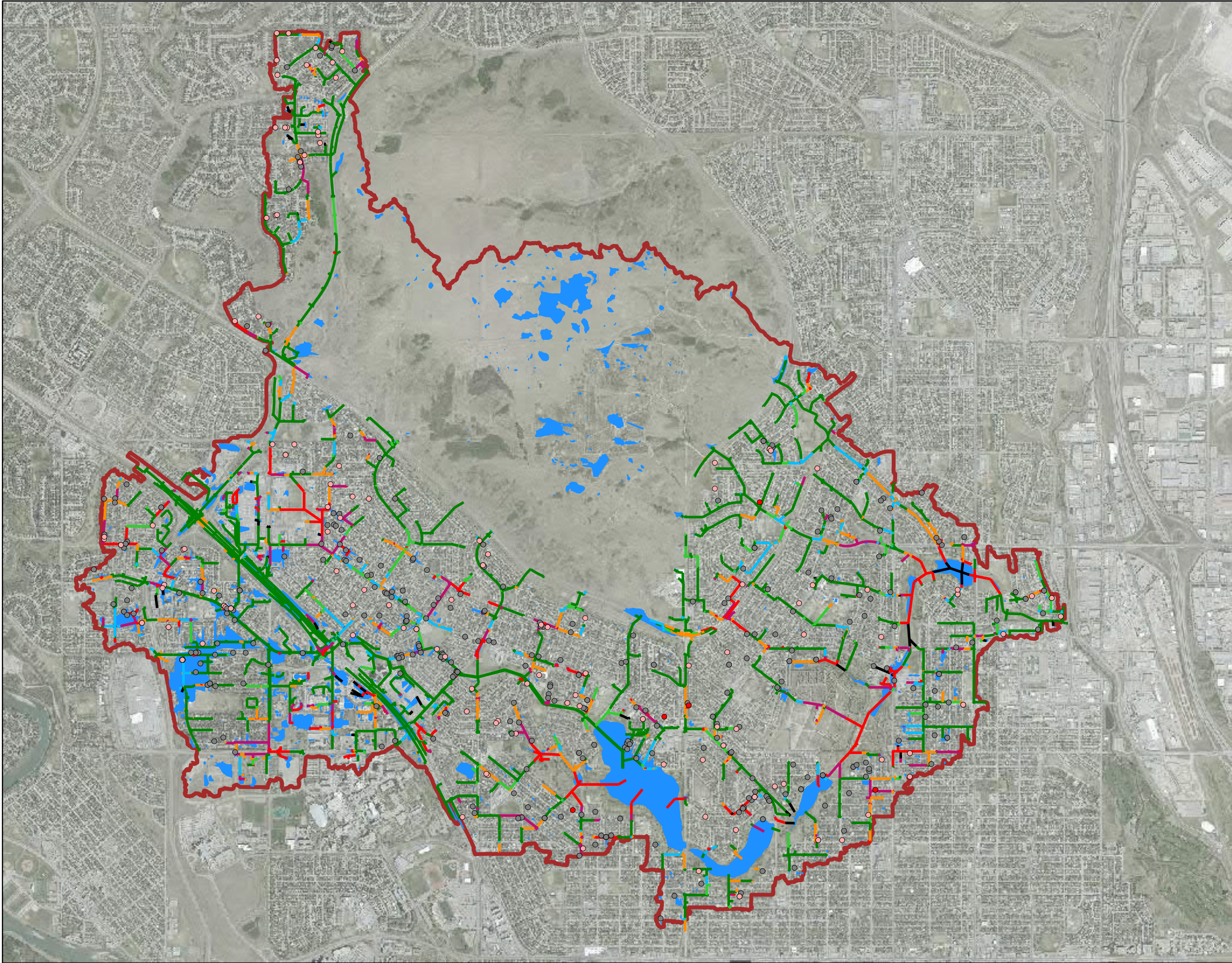


**CONFEDERATION PARK
REGIONAL DRAINAGE STUDY**

**AUGUST 2016 STORM
RADAR RAINFALL
TOTAL VOLUME**

DRAWING NUMBER	REV. NO.	SHEET
FIGURE 3-5	A	

Time: 1:26:38 PM | Date: 2/1/2019 | Scale: [Scale] | Map File: P:\20173915\00_Dam_Safety_Assess\Engineering\03.02_Conceptual_Feasibility_Master_Plan_Report\2018-12 - Final Report\map_report\figures_kp.map



LEGEND

- STUDY AREA
 - < 0 YR LOS
 - > 2 YR LOS
 - > 5 YR LOS
 - > 10 YR LOS
 - > 25 YR LOS
 - > 50 YR LOS
 - > 100 YR LOS
 - STATUS OPEN
 - STATUS UNKNOWN
 - STATUS CLOSED
- LOS = "LEVEL OF SERVICE"

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APPROVED		NL	-



Projection: 3TM114



CONFEDERATION PARK REGIONAL DRAINAGE STUDY

HISTORICAL DRAINAGE NOTIFICATIONS EXISTING CONDITION LOS RESULTS

DRAWING NUMBER	REV. NO.	SHEET
FIGURE 3-6	A	

Figure 4-1: Scenario 1 and 2 Discharge to Nose Creek Comparison

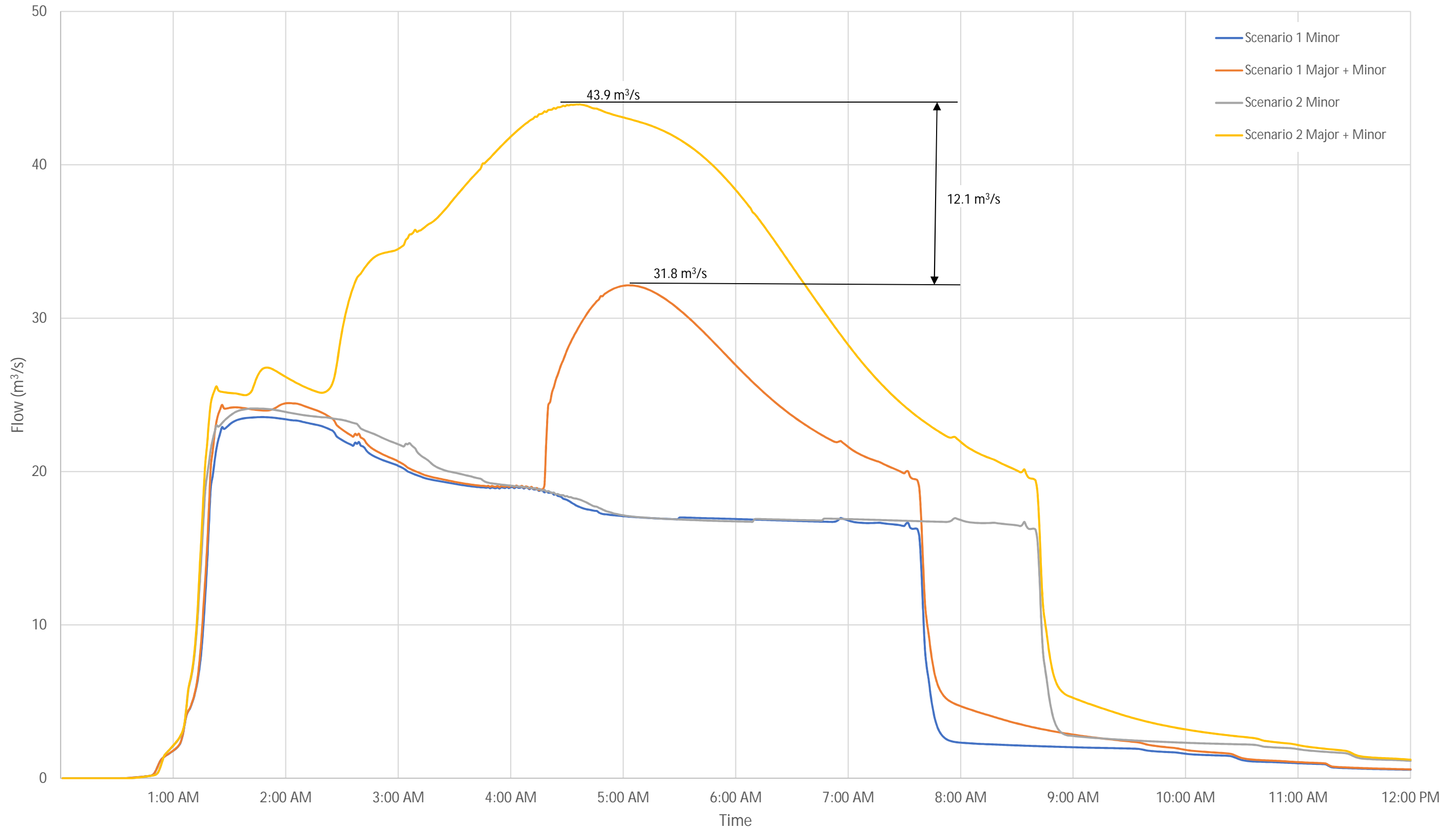


Figure 4-2: Scenario 1 and 3 Discharge to Nose Creek Comparison

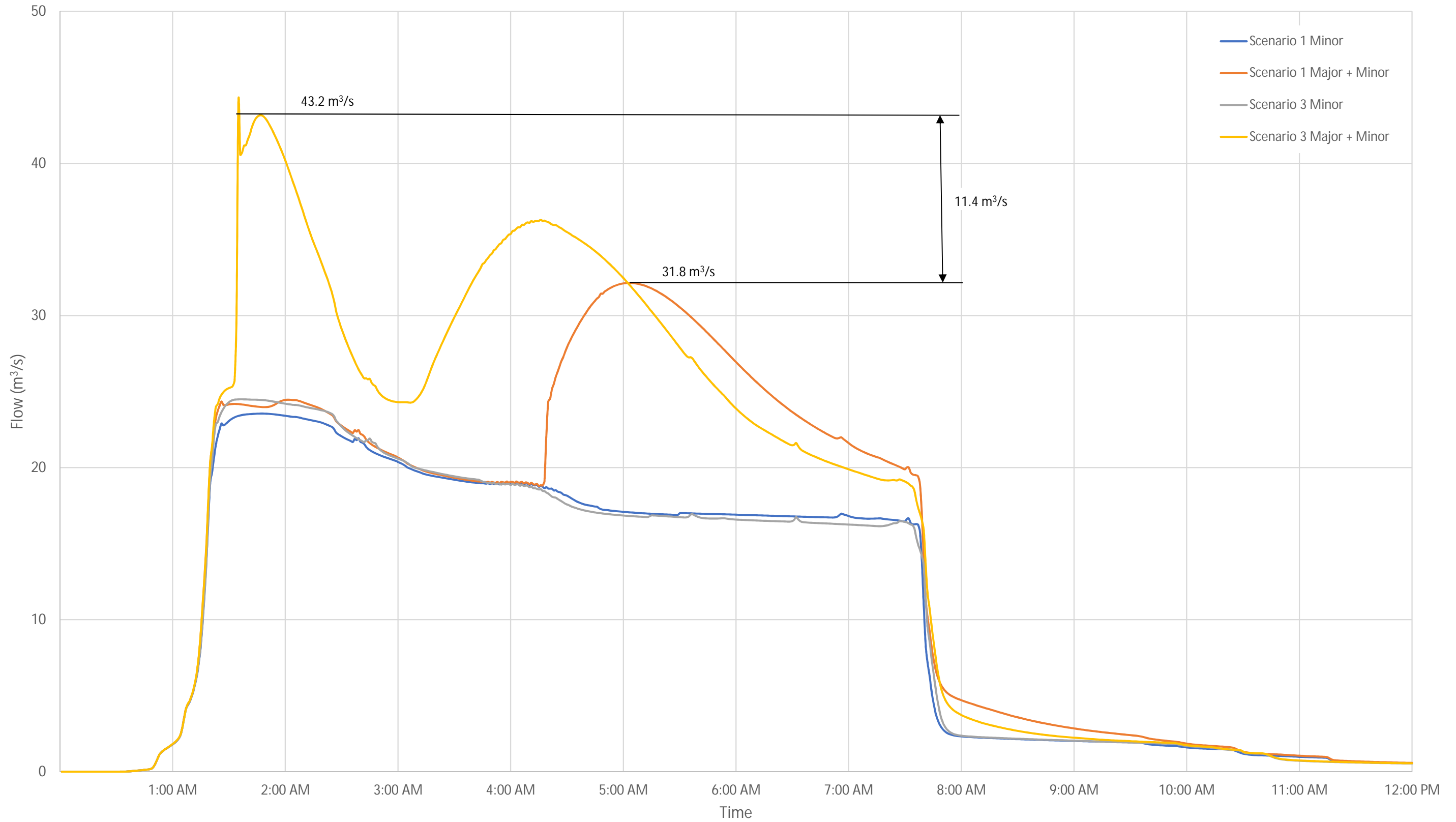
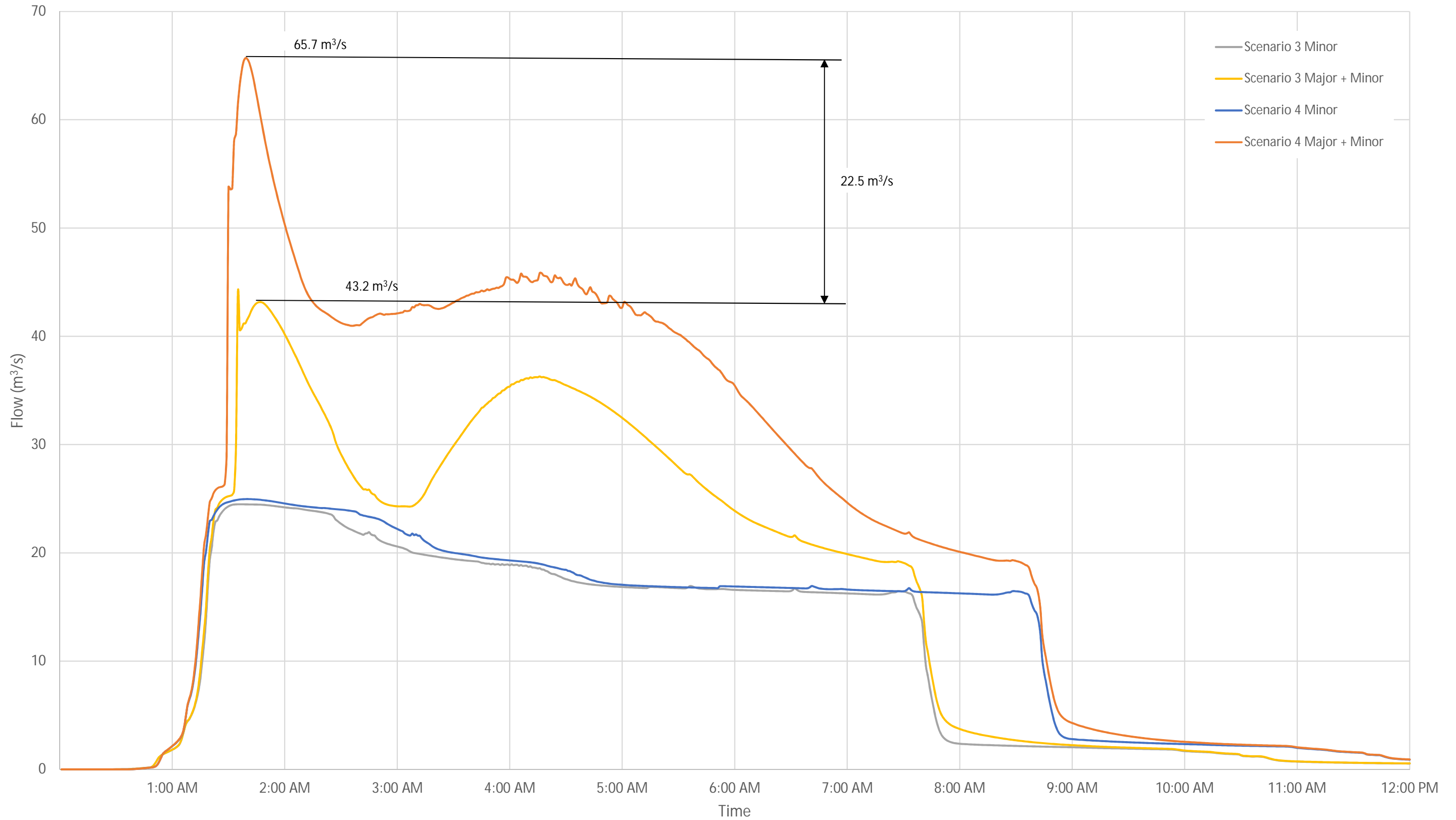
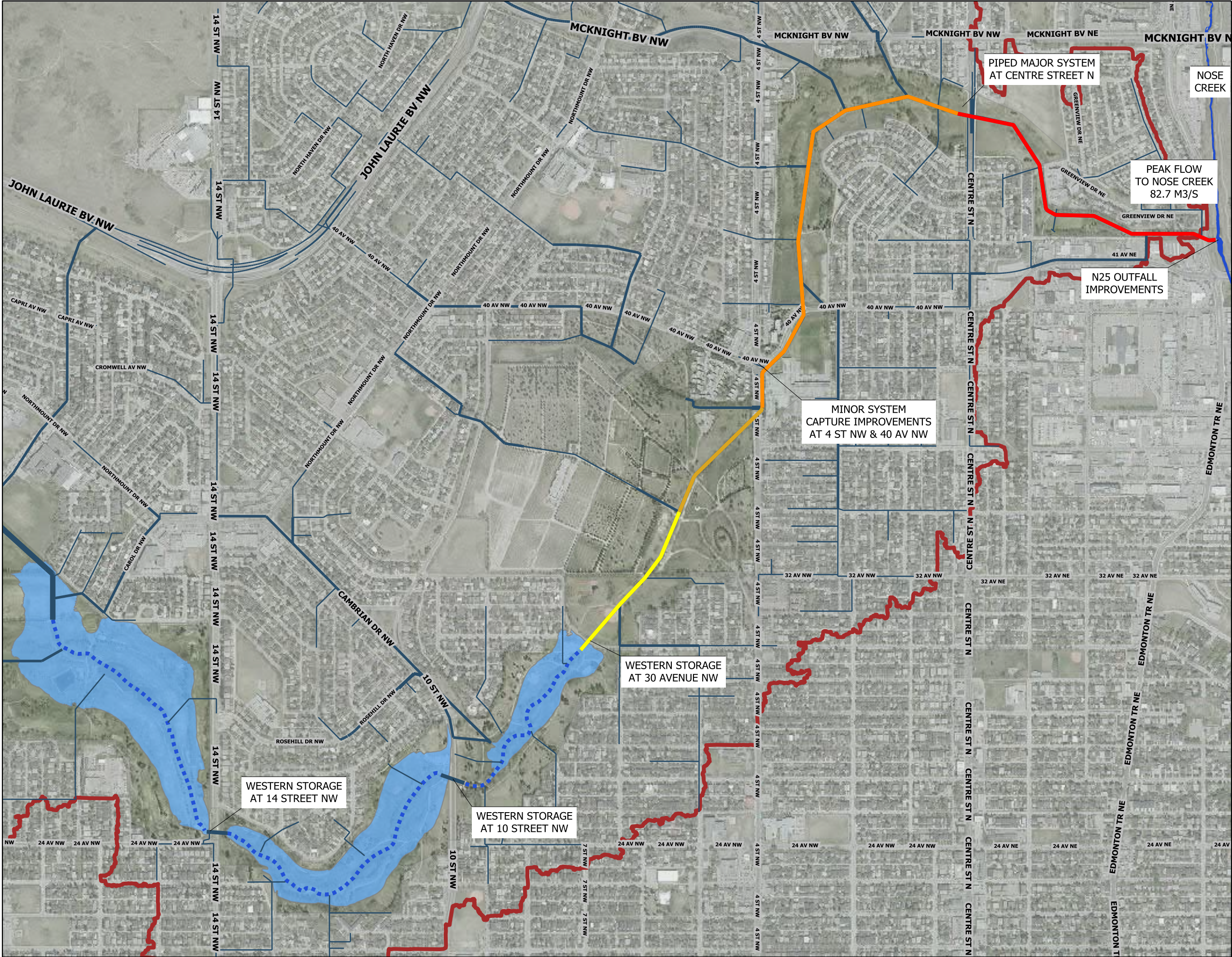


Figure 4-3: Scenario 3 and 4 Discharge to Nose Creek Comparison



Time: 1:31:38 PM | Date: 2/1/2019 | Scale: [Scale] | Map File: P:\20173915\00_Dam_Safety_Assess\Engineering\03.02_Conceptual_Feasibility_Master_Plan_Report\2018-12 - Final Report\map_report\figures_V3.map



LEGEND

- STUDY AREA
- EXISTING STORM PIPES
- - - CONFEDERATION CREEK
- LOWER CONFEDERATION TRUNK CAPACITY INCREASES**
- 1.8 X 2.4 DUCT
- 2.4 X 2.4 DUCT
- 2.4 X 3.0 DUCT
- 2.4 X 2.4 DOUBLE DUCT
- POTENTIAL INUNDATION AREAS SUBJECT TO CHANGE

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Projection: 3TM114

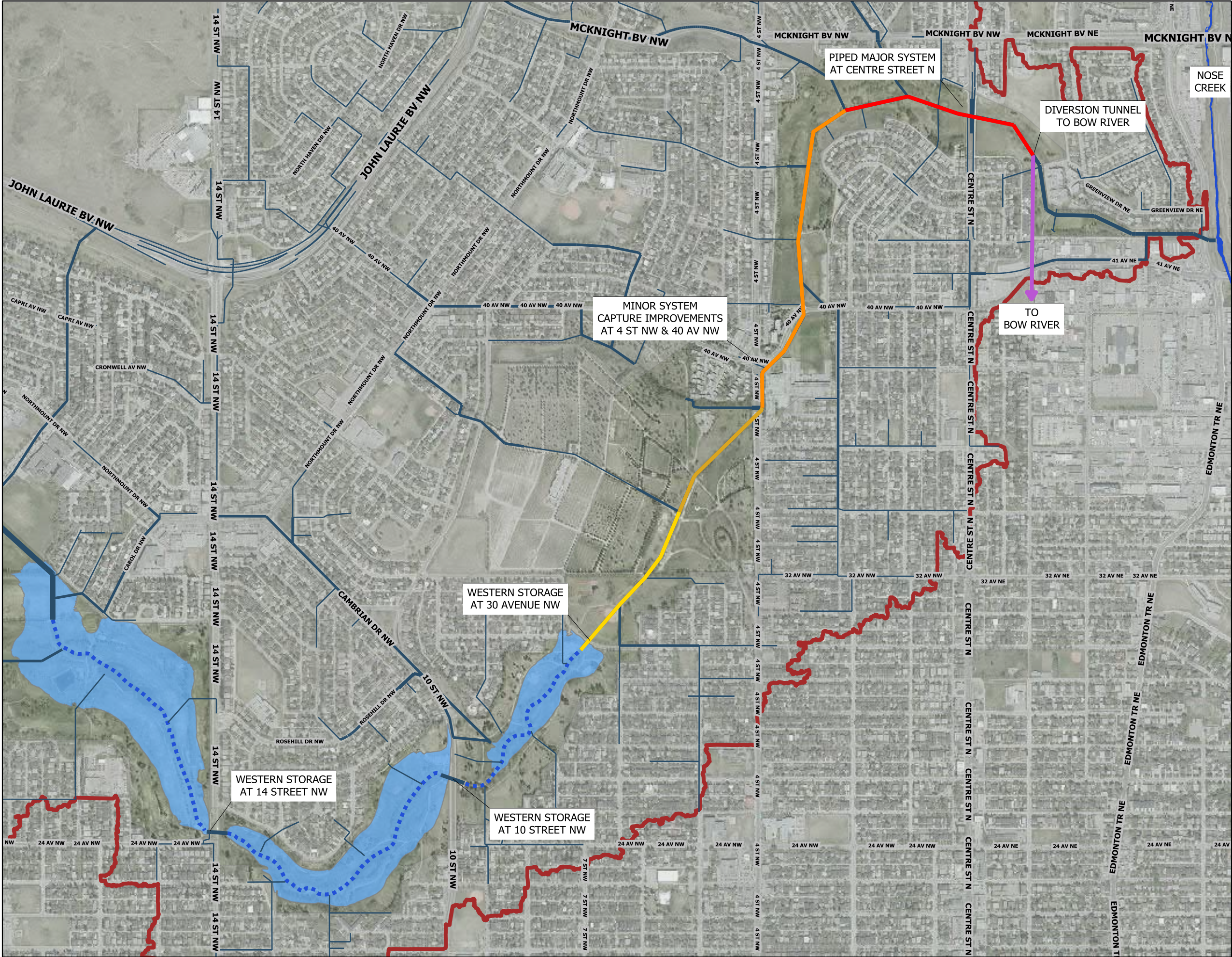


CONFEDERATION PARK REGIONAL DRAINAGE STUDY

OPTION 2 WEST STORAGE & CONVEYANCE TO NOSE CREEK

DRAWING NUMBER	REV. NO.	SHEET
FIGURE 5-2	A	

Time: 1:31:41 PM | Date: 2/1/2019 | Scale: [Scale] | Map File: P:\20173915\00_Dam_Safety_Assess\Engineering\03.02_Conceptual_Feasibility_Master_Plan_Report\2018-12 - Final Report\map_report\figures_V3.map



LEGEND

- STUDY AREA
- EXISTING STORM PIPES
- - - CONFEDERATION CREEK
- LOWER CONFEDERATION TRUNK CAPACITY INCREASES**
- 1.8 X 2.4 DUCT
- 2.4 X 2.4 DUCT
- 2.4 X 3.0 DUCT
- 2.4 X 2.4 DOUBLE DUCT
- BOW RIVER DIVERSION**
- POTENTIAL TUNNEL ALIGNMENT SUBJECT TO FEASIBILITY ASSESSMENT
- POTENTIAL INUNDATION AREAS SUBJECT TO CHANGE

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Projection: 3TM114

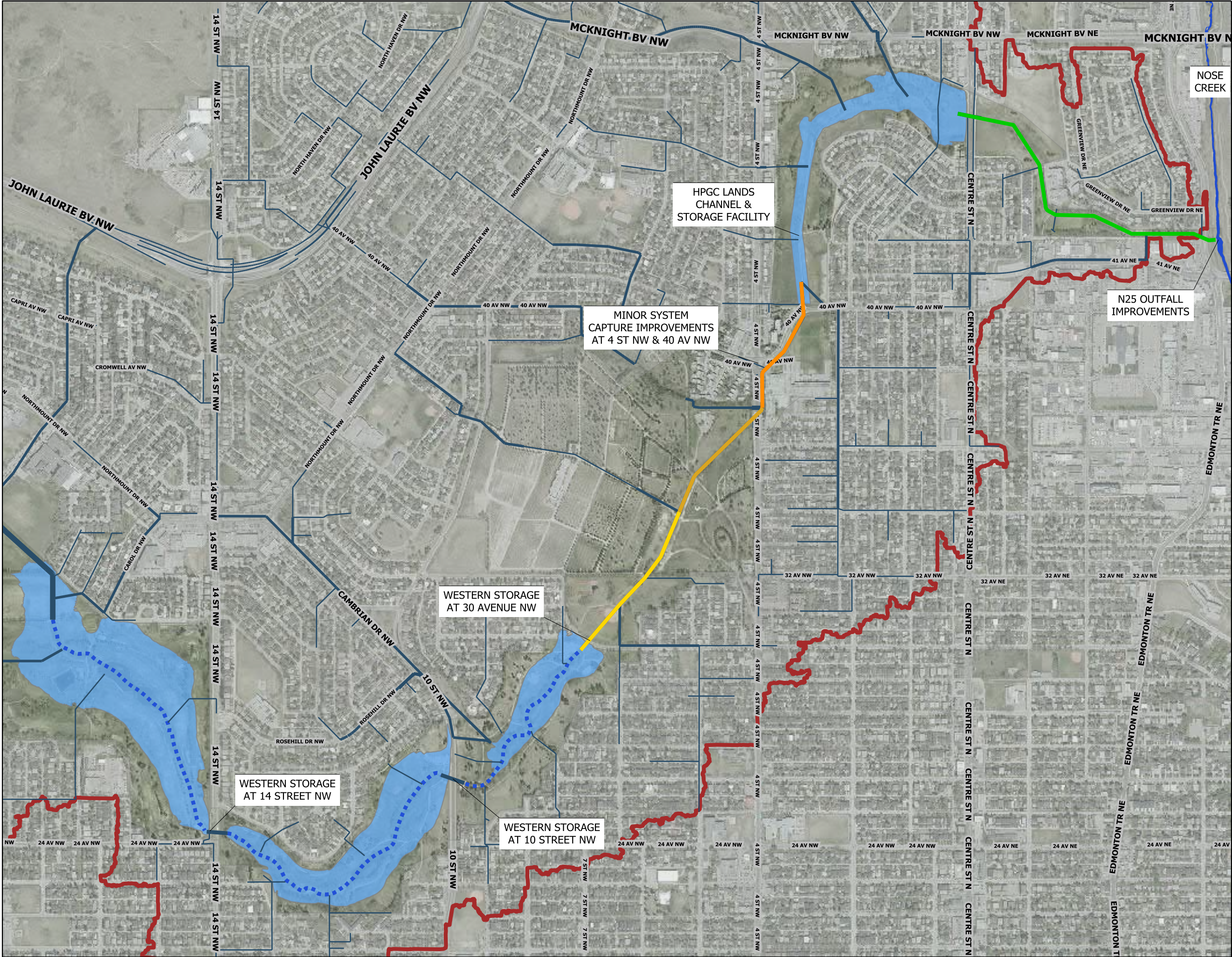


CONFEDERATION PARK REGIONAL DRAINAGE STUDY

OPTION 3 WEST STORAGE & DIVERSION TO THE BOW RIVER

DRAWING NUMBER	REV. NO.	SHEET
FIGURE 5-3	A	

Time: 1:31:45 PM | Date: 2/1/2019 | Scale: [Scale] | Map File: P:\20173915\00_Dam_Safety_Assess\Engineering\03.02_Conceptual_Feasibility_Master_Plan_Report\2018-12 - Final Report\map_report\figures_V3.map



LEGEND

- STUDY AREA
- EXISTING STORM PIPES
- - - CONFEDERATION CREEK
- LOWER CONFEDERATION TRUNK CAPACITY INCREASES**
- 1.8 X 2.4 DUCT
- 2.4 X 2.4 DUCT
- 2.4 X 3.0 DUCT
- 1.5 DIAMETER PIPE
- POTENTIAL INUNDATION AREAS SUBJECT TO CHANGE

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Projection: 3TM114

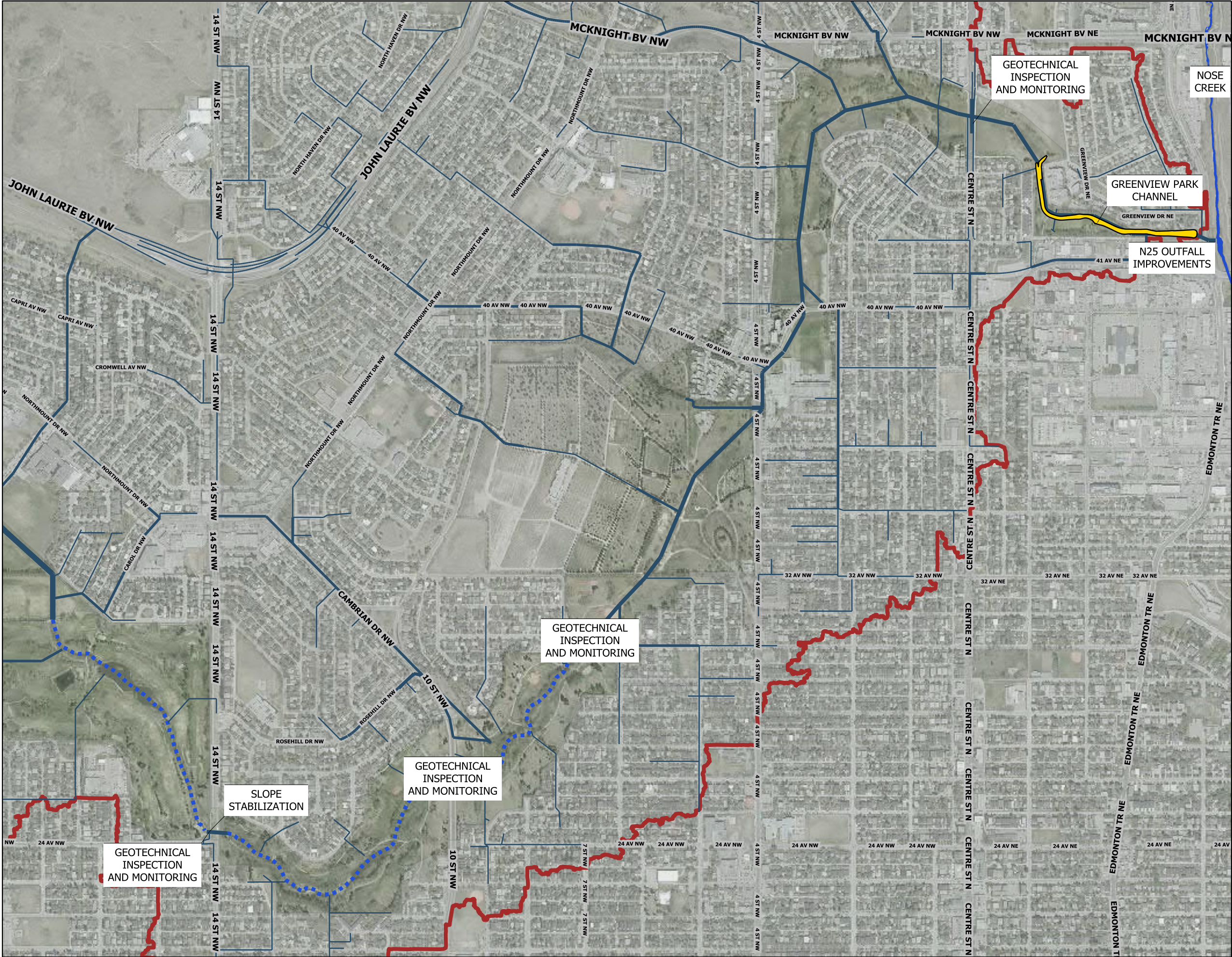


CONFEDERATION PARK REGIONAL DRAINAGE STUDY

OPTION 4 ULTIMATE WEST STORAGE & EAST STORAGE

DRAWING NUMBER	REV. NO.	SHEET
FIGURE 5-4	A	

Time: 1:32:08 PM | Date: 2/17/2019 | Scale: [Scale] | Map File: P:\20173915\00_Dam_Safety_Assess\Engineering\03.02_Conceptual_Feasibility_Master_Plan_Report\2018-12 - Final Report\map_report\figures_V3.map



LEGEND

- STUDY AREA
- EXISTING STORM PIPES
- ⋯ CONFEDERATION CREEK
- PROPOSED GREENVIEW PARK CHANNEL

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Projection: 3TM114

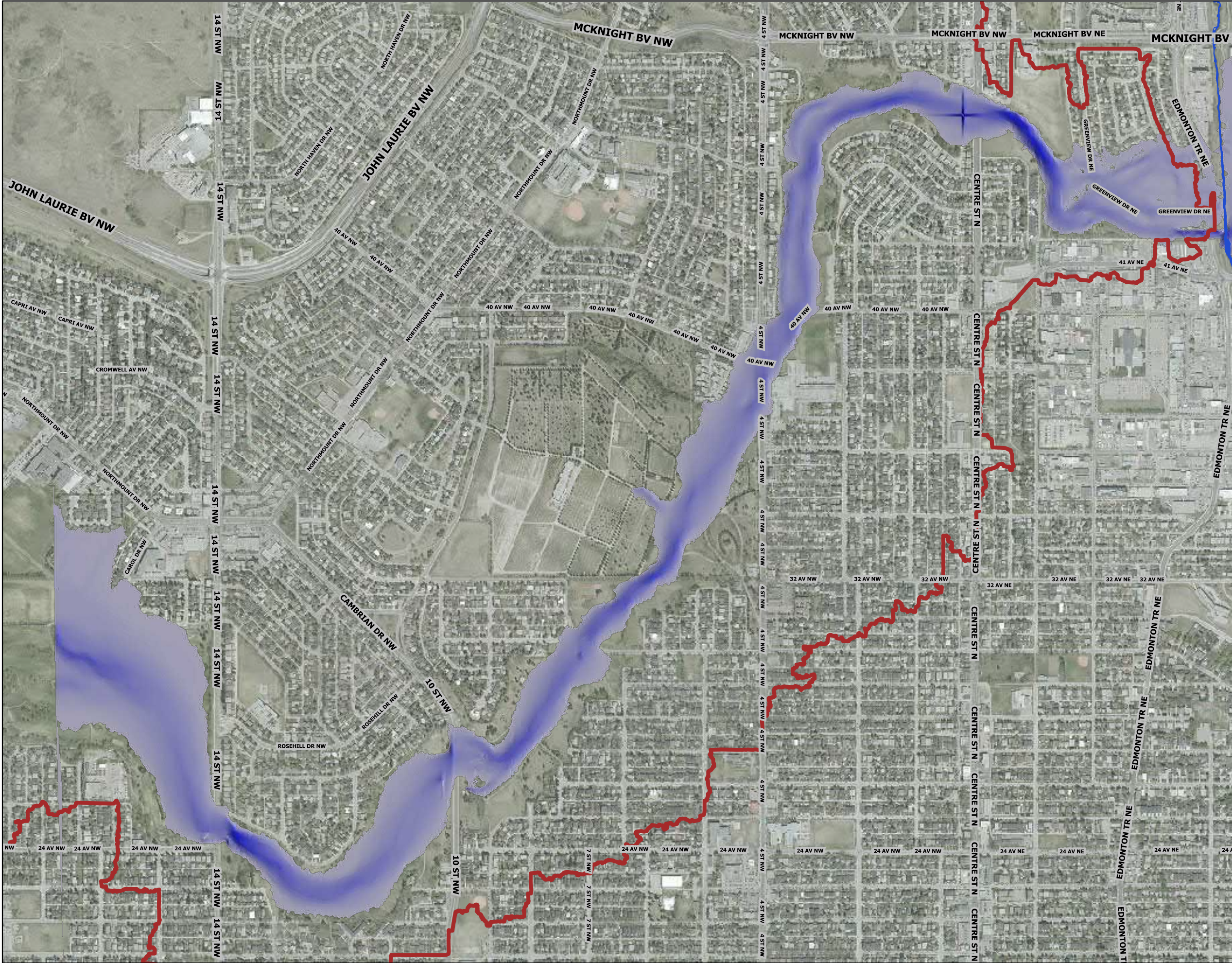


CONFEDERATION PARK REGIONAL DRAINAGE STUDY

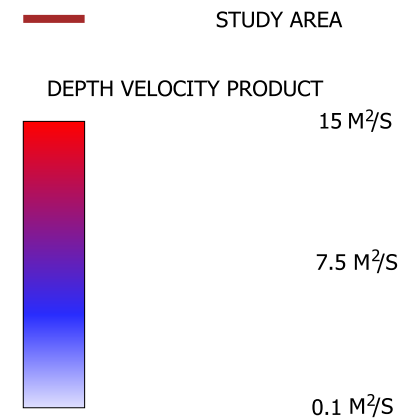
OPTION 4 INTERIM WEST STORAGE & EAST STORAGE

DRAWING NUMBER	REV. NO.	SHEET
FIGURE 5-5	A	

Time: 1:32:11 PM | Date: 2/17/2019 | Scale: [Scale] | Map File: P:\20173915\00_Dam_Safety_Assess\Engineering\03.02_Conceptual_Feasibility_Master_Plan_Report\2018-12 - Final Report\map_report\figures_V3.map



LEGEND



Note: Dam breach analysis assumes a worst case scenario where dam failures are simulated consecutively at 14 Street NW, 10 Street NW and Centre Street N.

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Projection: 3TM114

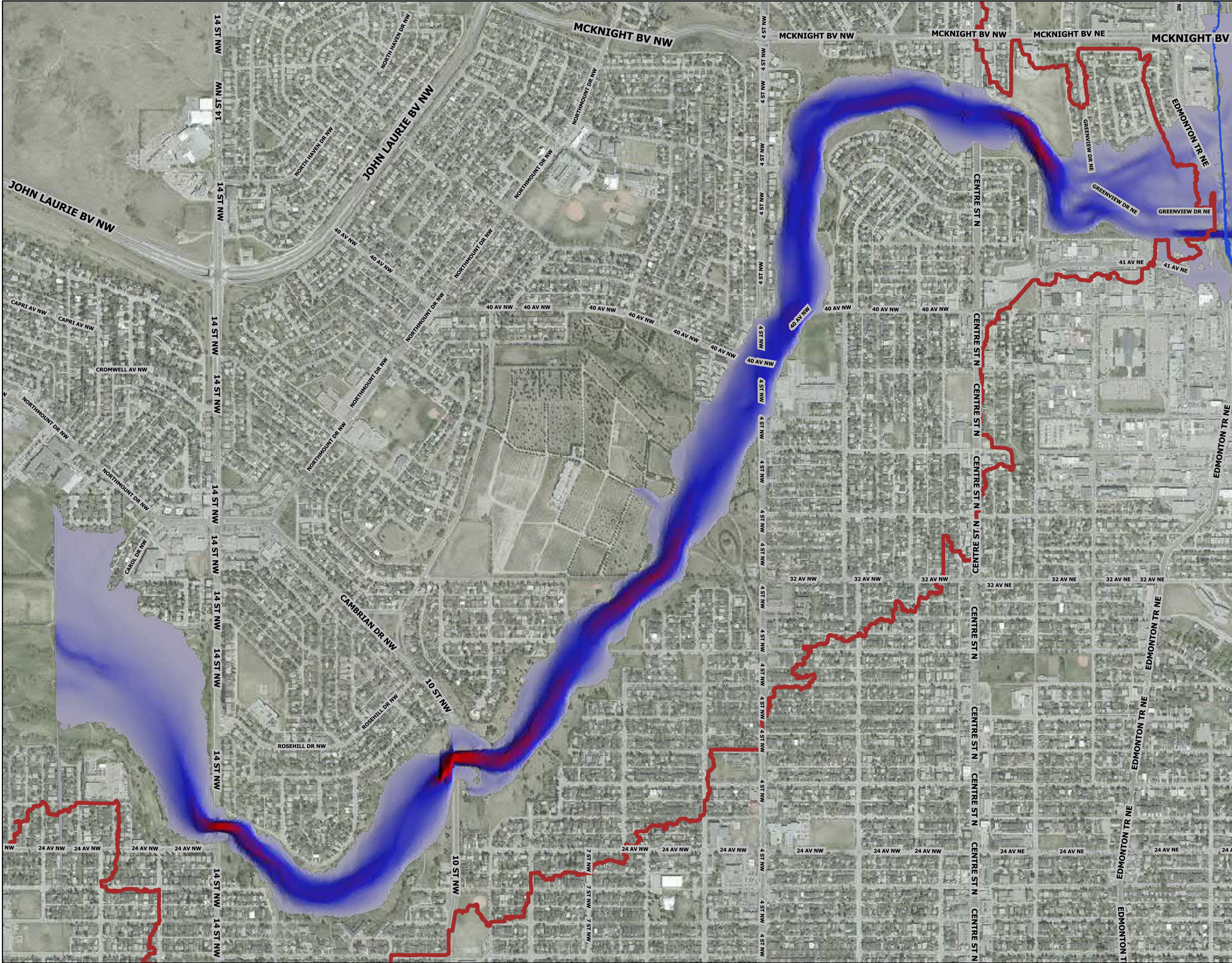


CONFEDERATION PARK REGIONAL DRAINAGE STUDY

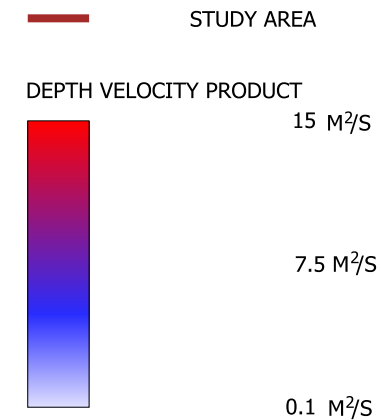
DAM BREACH ANALYSIS DEPTH VELOCITY PRODUCT OPTION 2 - NO BREACH

DRAWING NUMBER	REV. NO.	SHEET
FIGURE 6-1	A	

Time: 1:32:14 PM | Date: 2/17/2019 | Scale: [Scale] | Map File: P:\20173915\00_Dam_Safety_Assess\Engineering\03.02_Conceptual_Feasibility_Master_Plan_Report\2018-12 - Final Report\map_report\figures_V3.map



LEGEND



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Projection: 3TM114

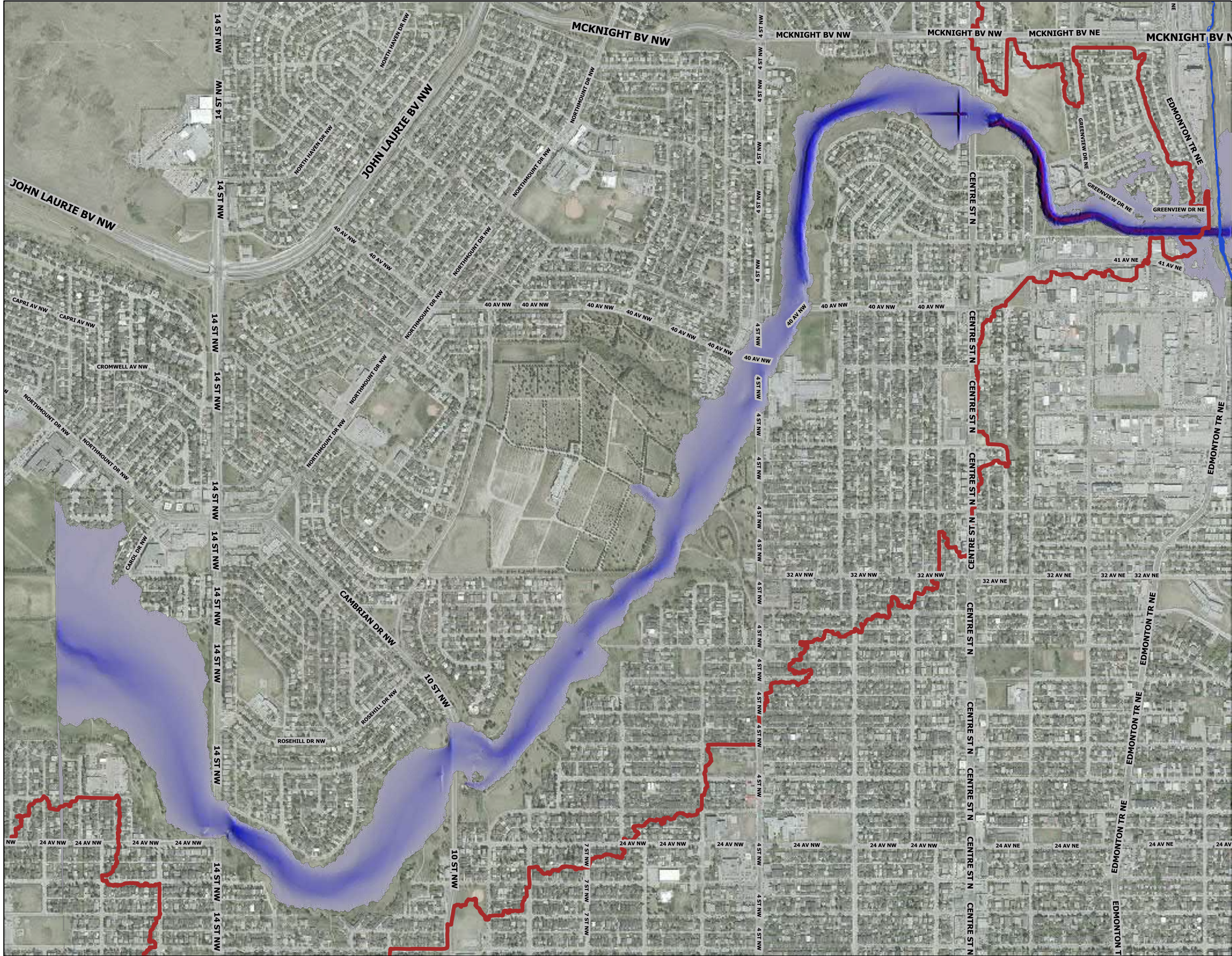


**CONFEDERATION PARK
REGIONAL DRAINAGE STUDY**

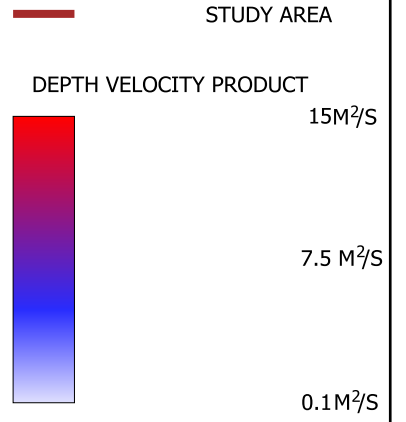
**DAM BREACH ANALYSIS
DEPTH VELOCITY PRODUCT
OPTION 2 - BREACH**

DRAWING NUMBER	REV. NO.	SHEET
FIGURE 6-2	A	

Time: 1:32:17 PM | Date: 2/1/2019 | Scale: [Scale] | Map File: P:\20173915\00_Dam_Safety_Assess\Engineering\03_02_Conceptual_Feasibility_Master_Plan_Report\2018-12 - Final Report\map_report\figures_V3.map



LEGEND



Note: Dam breach analysis assumes a worst case scenario where dam failures are simulated consecutively at 14 Street NW, 10 Street NW and Centre Street N.

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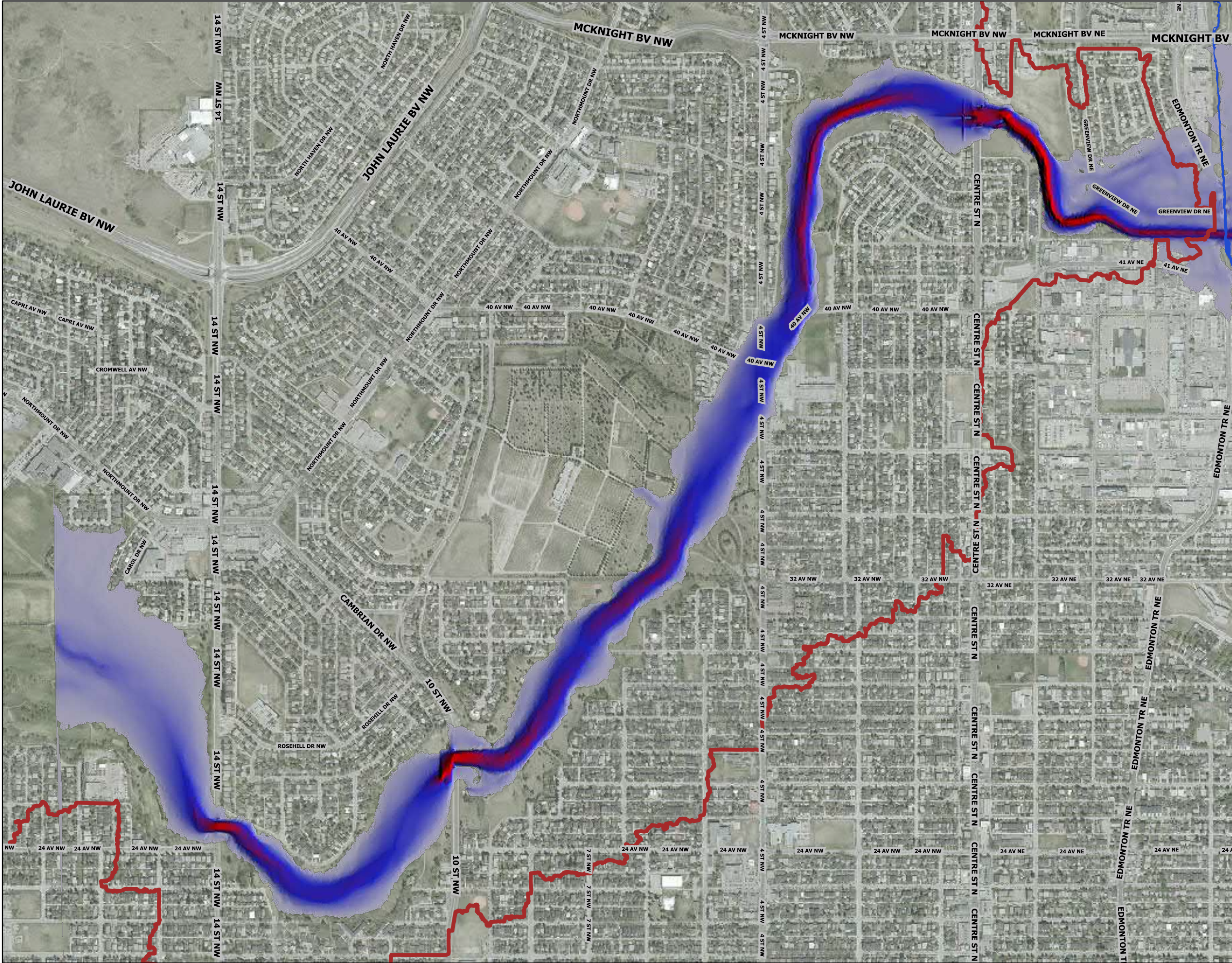


**CONFEDERATION PARK
REGIONAL DRAINAGE STUDY**

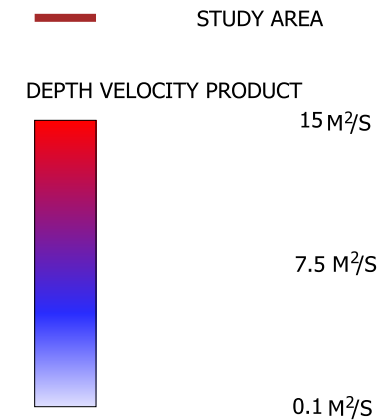
**DAM BREACH ANALYSIS
DEPTH VELOCITY PRODUCT
OPTION 4 ULTIMATE - NO BREACH**

DRAWING NUMBER	REV. NO.	SHEET
FIGURE 6-3	A	

Time: 1:32:21 PM | Date: 2/1/2019 | Scale: [Scale] | Map File: P:\20173915\00_Dam_Safety_Assess\Engineering\03.02_Conceptual_Feasibility_Master_Plan_Report\2018-12 - Final Report\map_report\figures_V3.map



LEGEND



Note: Dam breach analysis assumes a worst case scenario where dam failures are simulated consecutively at 14 Street NW, 10 Street NW and Centre Street N.

PROJECT NO.	2017-3915	INITIAL	DATE
DRAWN		AR	31-01-19
DESIGNED		AR	31-01-19
CHECKED		CA	31-01-19
APPROVED		NL	31-01-19



Projection: 3TM114



**CONFEDERATION PARK
REGIONAL DRAINAGE STUDY**

**DAM BREACH ANALYSIS
DEPTH VELOCITY PRODUCT
OPTION 4 ULTIMATE - BREACH**

DRAWING NUMBER	REV. NO.	SHEET
FIGURE 6-4	A	