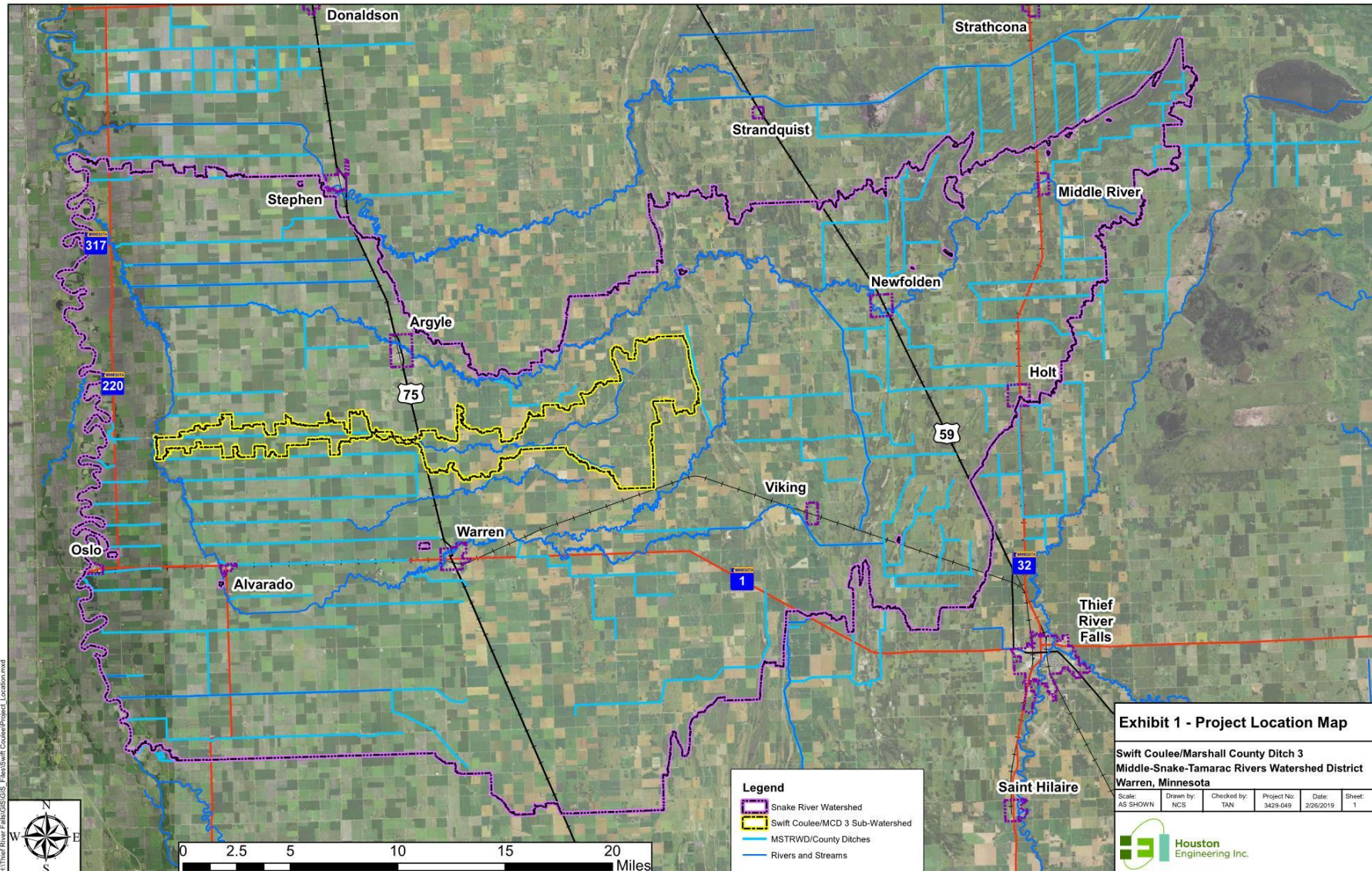


# SWIFT COULEE / MARSHALL COUNTY DITCH #3

MIDDLE-SNAKE-TAMARAC RIVERS WATERSHED DISTRICT

NOVEMBER 18, 2021





- Project Update on Task Completed
- Technical Review of Preferred Alternative (Channel restoration, setback levees, culvert sizing)
- Review of Preliminary Project Boundaries (Minimum Easement Needs)
- Questions/Comments (Technical Information of Preferred Alt.)
- Overview of Reinvest in Minnesota (RIM) Program
- Questions/Comments (RIM Program)



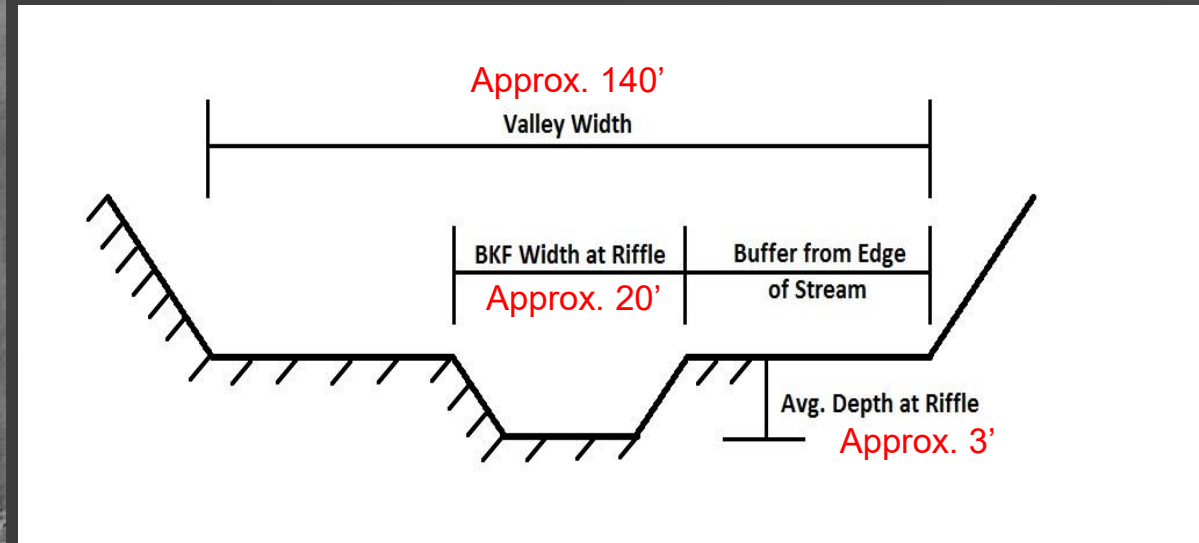
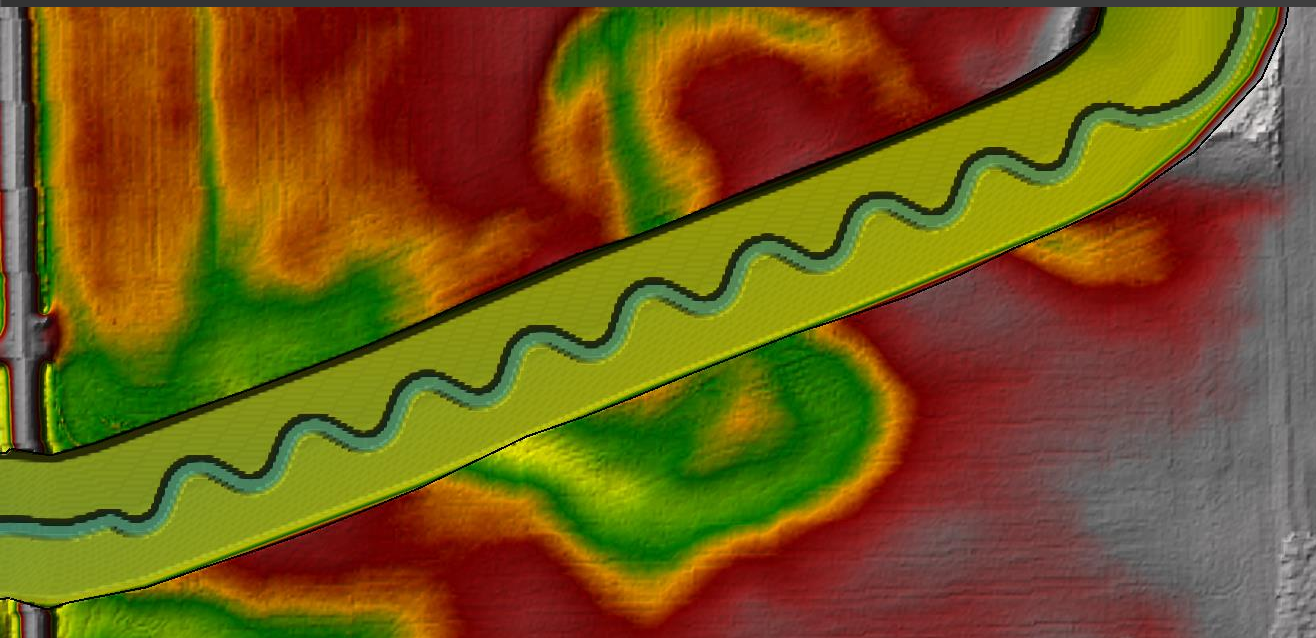
## ■ Tasks completed

- Purpose and Need of Project – Concurrence Point #1
- Potential Alternatives and Alternatives to Carry Forward – Concurrence Point #2
- Individual Meetings with Majority Landowners where Alternatives were Identified
- Identification of the Selected Alternative – Concurrence Point #3
  - 13 Alternatives screened through the Concurrence Point process
  - Alt.11 – Restoration with Impoundment showed the most benefit meeting the purpose and need
  - Landowner Unwillingness – Alt. 11 – August 19, 2020 Project Team Meeting – Landowners Suggest Share Flooding Burden
  - Alt. 13 – Channel Restoration/Setback Levees/Culvert Sizing/SWI's – Share Flooding Burden
- Alt. 13 – Selected as Preferred Alternative on February 11, 2021 Project Team Meeting

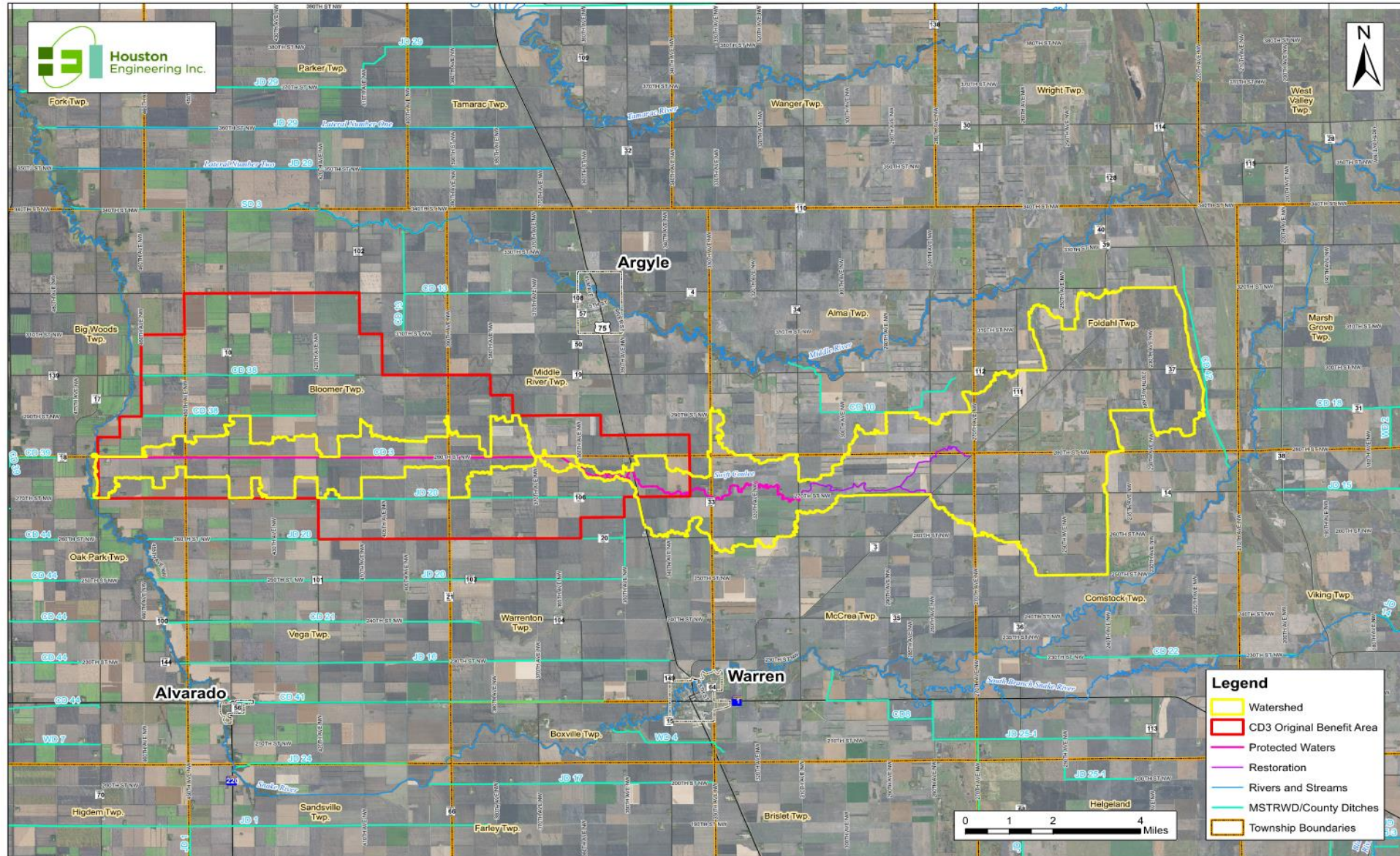
## Review Hydraulic & Hydrologic Modeling Results

### E- Channel Restoration

- Culvert to Culvert Profile – Multiple Centerline Culverts Modified to Simulate Existing 10-yr Peak Flows
- Historic Aerial Photography – Add Meander Back into Channel Alignment with Set Back Levees
- Image of 1.5-yr Meandering Channel with 10-yr Floodplain and Set Back Levees



# CHANNEL RESTORATION/SETBACK LEVELLEE EXTENT



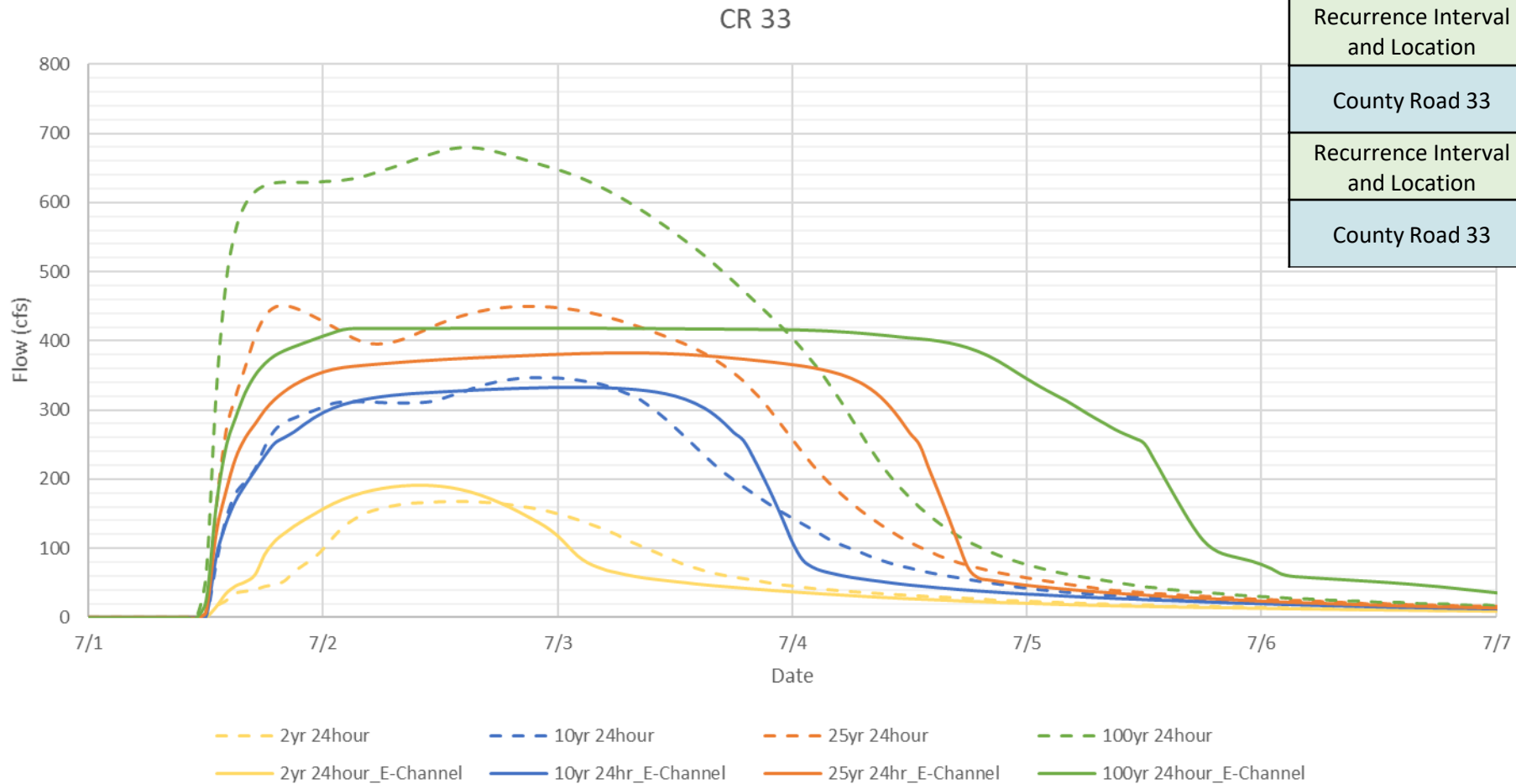
# CHANNEL RESTORATION CULVERT CHANGES



Location	Existing	Proposed
◆ County Ditch 3	Box Culverts 2- 12'X6'	Box Culvert 10'X5'
US Highway 75	Box Culverts 3 - 10'X5'	Box Culverts 3 - 10'X5'
◆ 340 <sup>th</sup> Ave NW	Box Culverts 2- 10'X6'	Box Culvert 8'X5'
◆ County Road 33	Box Culvert 12'X8'	Box Culvert - 6'X5'
◆ 320 <sup>th</sup> Ave NW	CMP 6' 5' & 5'	CMP 5' & 4'
◆ County Road 34	CMPA 2 - 6.08'X4.5'	CMPA 2 - 5.58'X3.4'
◆ 270 <sup>th</sup> St NW	CMP 2 - 5.5'	CMP 5' & 5'
◆ 300 <sup>th</sup> Ave NW	CMP 5' 4' & 3'	CMP 5' 3' & 2'
◆ 290 <sup>th</sup> Ave NW	CMP 5' & 3'	CMP 5' 3' & 2'
County Road 1	CMPA 6'X3.7'	CMPA 6'X3.7'
Driveway	CMP 6'	CMP 6'



# CHANNEL RESTORATION RESULTS –CR 33



Scenario	Existing Conditions	Alternative 13: E-Channel Restoration with Floodplain/Centerline Culvert Sizing
Recurrence Interval and Location	Peak Flow - 10-Year, 24-Hour cfs (% change)	
County Road 33	347 -	333 -4.0%
Recurrence Interval and Location	Peak Flow - 100-Year, 24-Hour cfs (% change)	
County Road 33	680 -	419 -38.4%



# CHANNEL RESTORATION RESULTS –HWY 75

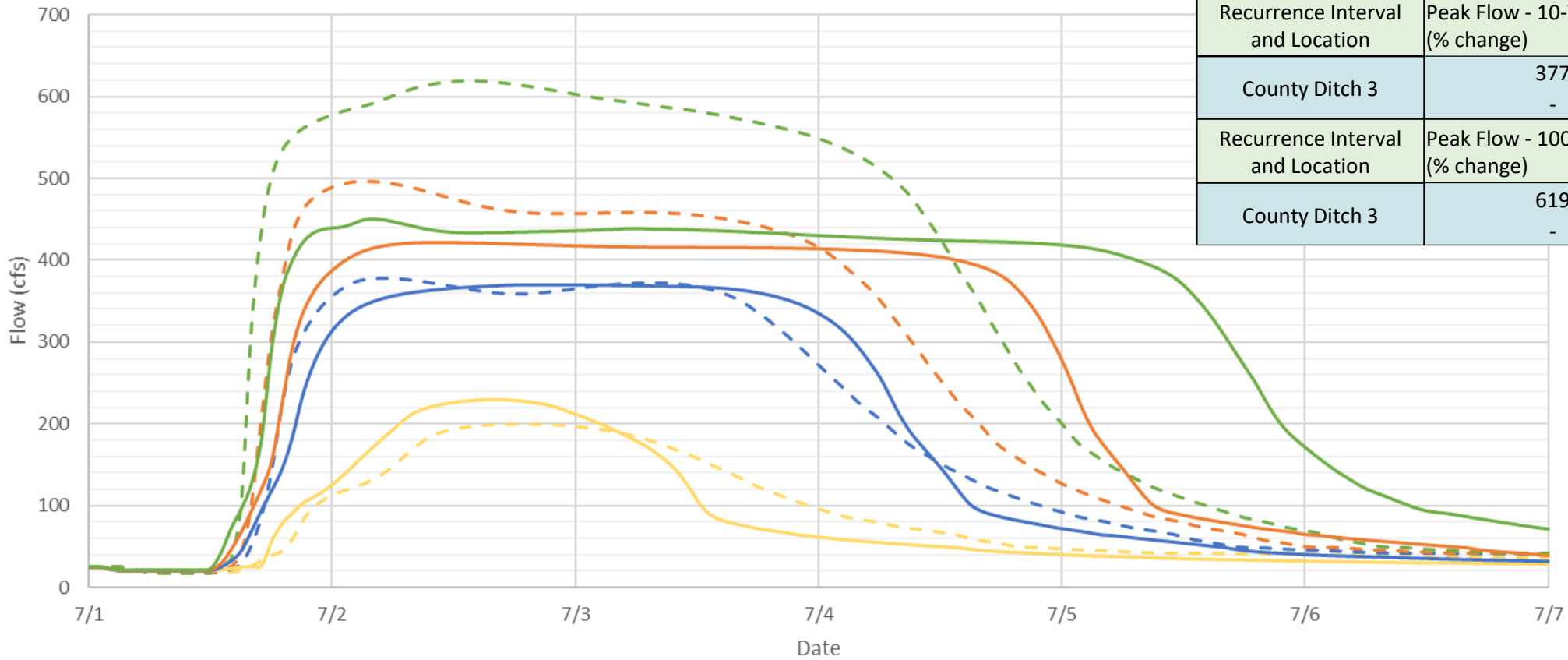


Scenario	Existing Conditions	Alternative 13: E-Channel Restoration with Floodplain/Centerline Culvert Sizing
Recurrence Interval and Location	Peak Flow - 10-Year, 24-Hour cfs (% change)	
US HWY 75	384	371 -3.4%
Recurrence Interval and Location	Peak Flow - 100-Year, 24-Hour cfs (% change)	
US HWY 75	859	690 -19.7%

# CHANNEL RESTORATION RESULTS –BEGINNING OF CD 3



CD3



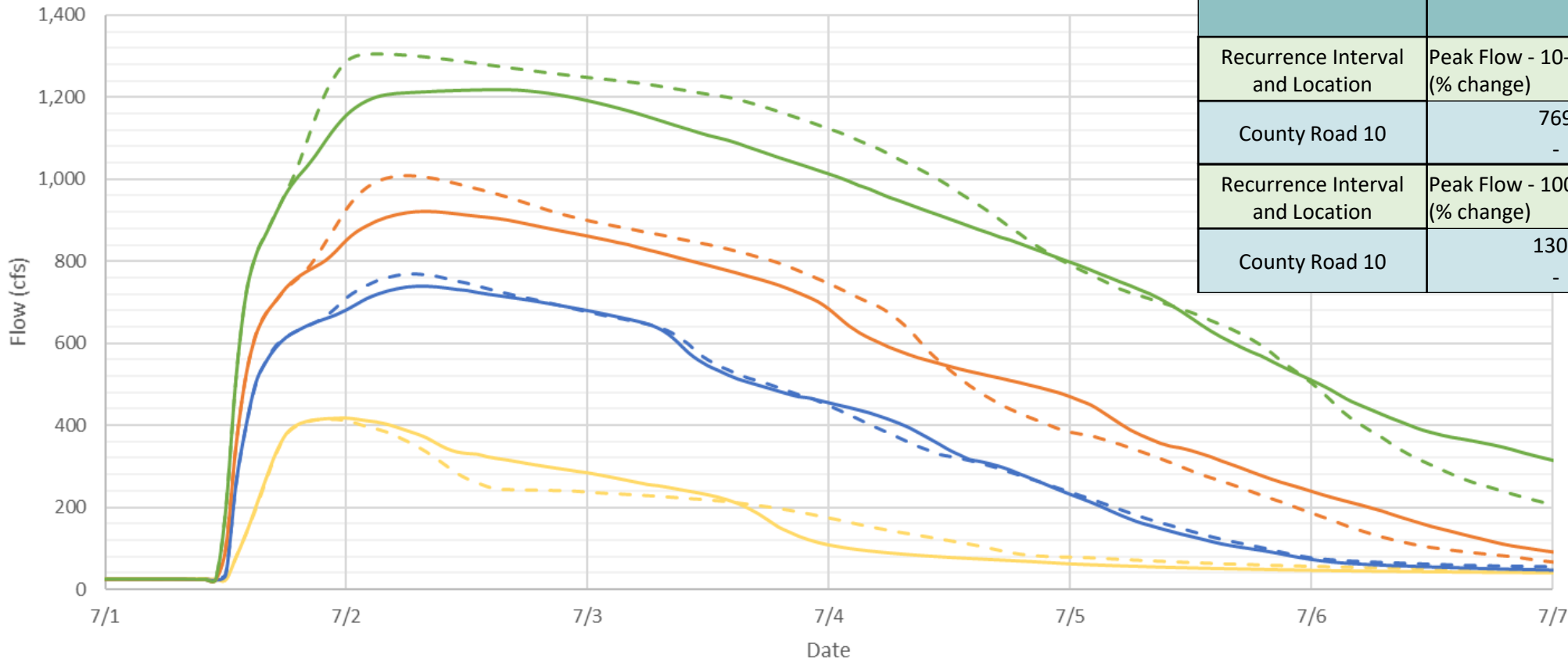
--- 2yr 24hour      --- 10yr 24hour      --- 25yr 24hour      --- 100yr 24hour  
— 2yr 24hour\_E-Channel      — 10yr 24hr\_E-Channel      — 25yr 24hr\_E-Channel      — 100yr 24hour\_E-Channel

Scenario	Existing Conditions	Alternative 13: E-Channel Restoration with Floodplain/Centerline Culvert Sizing
Recurrence Interval and Location	Peak Flow - 10-Year, 24-Hour cfs (% change)	
County Ditch 3	377 -	369 -2.1%
Recurrence Interval and Location	Peak Flow - 100-Year, 24-Hour cfs (% change)	
County Ditch 3	619 -	450 -27.3%

# CHANNEL RESTORATION RESULTS –CR 10



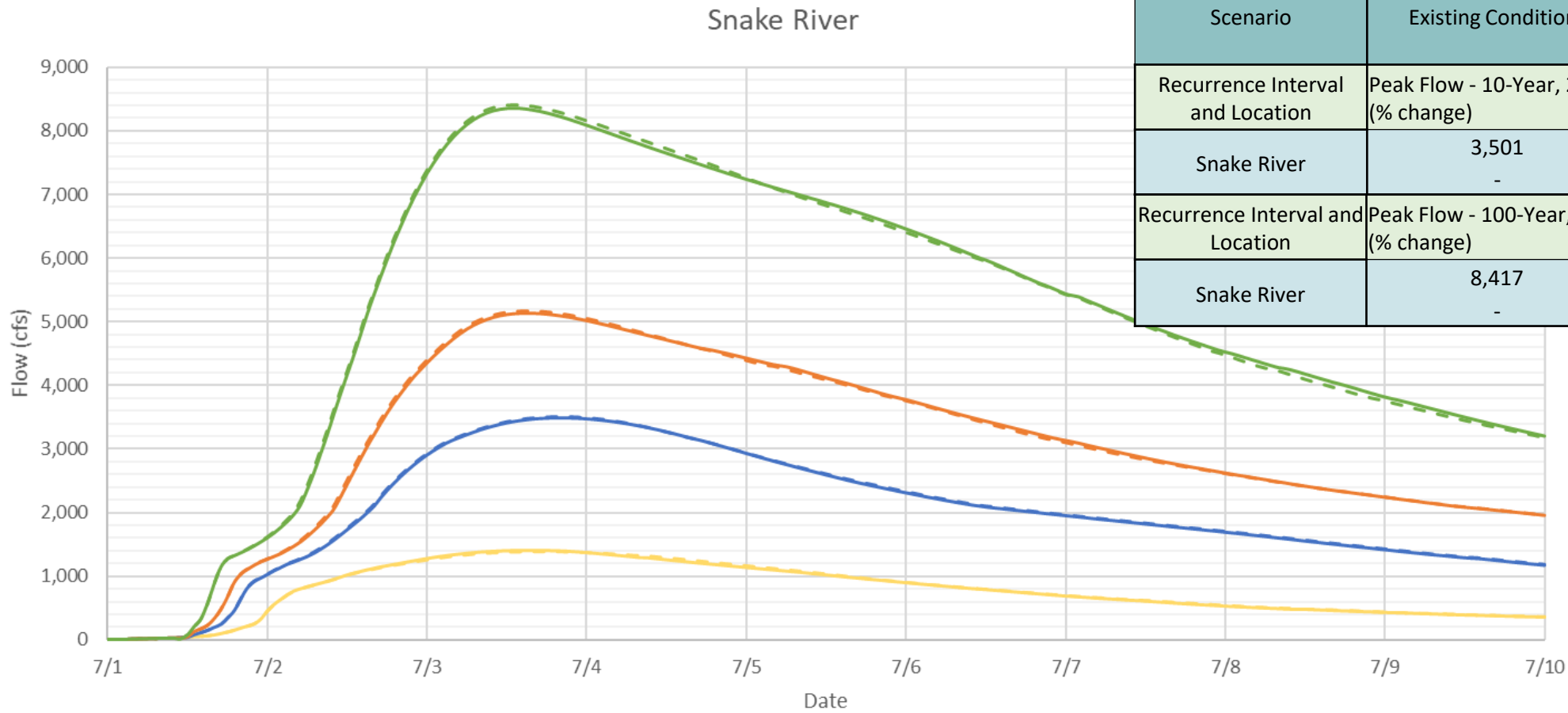
CR 10 (Full Transect)



--- 2yr 24hour      --- 10yr 24hour      --- 25yr 24hour      --- 100yr 24hour  
— 2yr 24hour\_E-Channel      — 10yr 24hr\_E-Channel      — 25yr 24hr\_E-Channel      — 100yr 24hour\_E-Channel

Scenario	Existing Conditions	Alternative 13: E-Channel Restoration with Floodplain/Centerline Culvert Sizing
Recurrence Interval and Location	Peak Flow - 10-Year, 24-Hour cfs (% change)	
County Road 10	769 -	739 -3.9%
Recurrence Interval and Location	Peak Flow - 100-Year, 24-Hour cfs (% change)	
County Road 10	1305 -	1219 -6.6%

# CHANNEL RESTORATION RESULTS – CONFLUENCE SNAKE RIVER

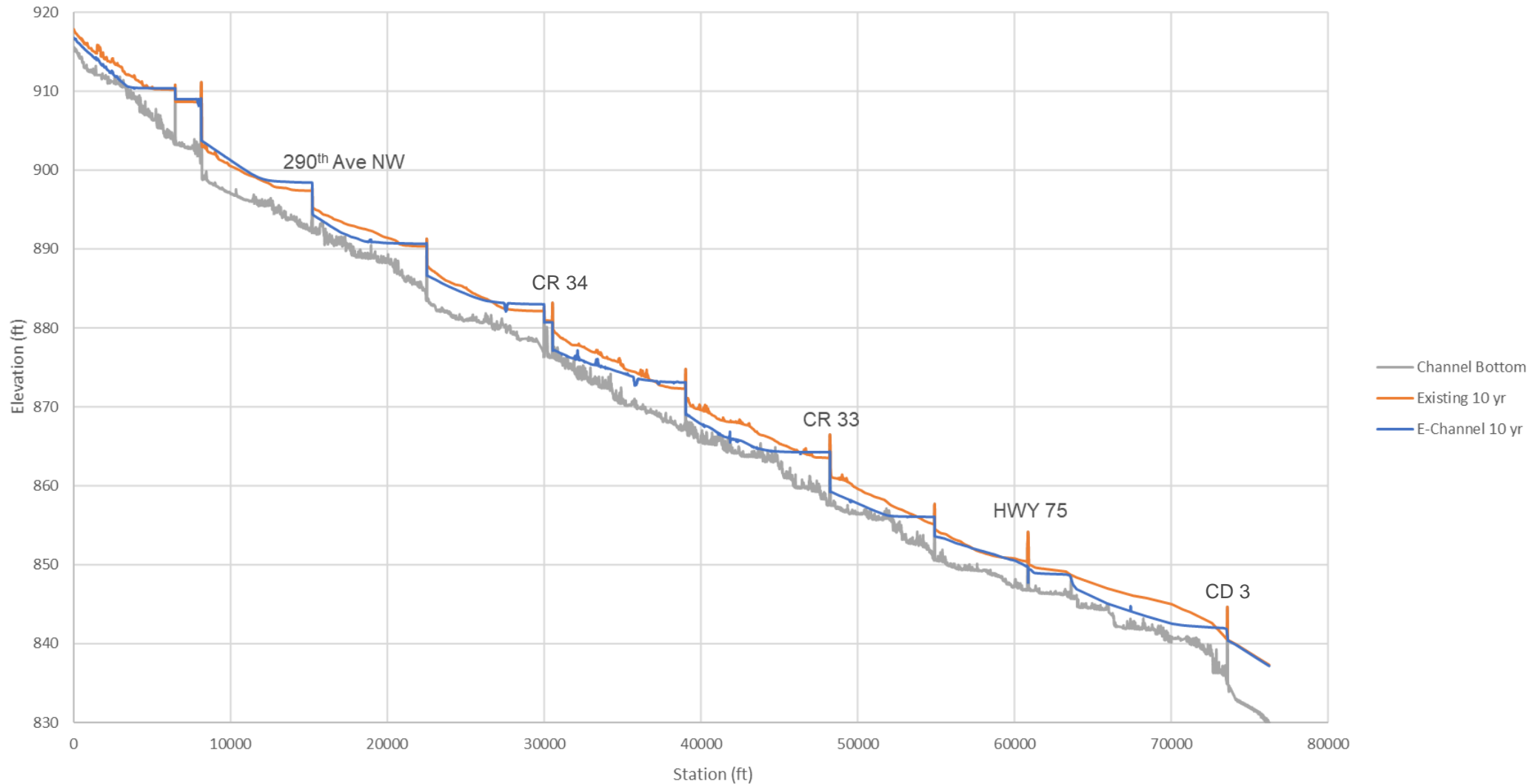


Scenario	Existing Conditions	Alternative 13: E-Channel Restoration with Floodplain/Centerline Culvert Sizing
Recurrence Interval and Location	Peak Flow - 10-Year, 24-Hour cfs (% change)	
Snake River	3,501	3,497 -0.1%
Recurrence Interval and Location	Peak Flow - 100-Year, 24-Hour cfs (% change)	
Snake River	8,417	8,358 -0.7%

# CHANNEL RESTORATION 10-YEAR PROFILE COMPARISON RESULTS



Profile Comparison Existing vs Proposed



# CHANNEL RESTORATION 10-YEAR DURATION RESULTS



Duration (Hours)	Existing Conditions		Alternative 13	
	Inundated Acres <b>Upstream of County Ditch 3</b> 10-Year, 24-Hour (% Change)			
	Cropland	Total	Cropland	Total
0-24	2350	2719	2449	2818
	-	-	4.2%	3.6%
24-48	813	998	690	885
	-	-	-15.0%	-11.4%
48-72	448	570	337	484
	-	-	-24.9%	-15.1%
72-96	157	226	140	198
	-	-	-10.8%	-12.4%
96-120	70	107	62	94
	-	-	-11.7%	-12.5%
>120	295	479	299	478
	-	-	1.6%	-0.1%
TOTAL	4133	5099	3978	4957
	-	-	-3.8%	-2.8%
Duration (Hours)	Cropland	Total	Cropland	
24-120 (sum of durations 24-120)	1488		1229	
	-		-17.4%	
>24 hours (sum of durations > 24 hrs)		2380		2139
		-		-10.1%

Duration (Hours)	Existing Conditions		Alternative 13	
	Inundated Acres <b>County Ditch 3 to County Road 10</b> 10-Year, 24-Hour (% Change)			
	Cropland	Total	Cropland	Total
0-24	1869	1923	1895	1951
	-	-	1.4%	1.4%
24-48	699	723	678	700
	-	-	-3.0%	-3.2%
48-72	473	503	422	457
	-	-	-10.7%	-9.0%
72-96	376	402	404	431
	-	-	7.5%	7.2%
96-120	85	96	89	99
	-	-	4.5%	3.5%
>120	146	191	143	185
	-	-	-2.3%	-3.0%
TOTAL	3648	3838	3631	3823
	-	-	-0.5%	-0.4%
Duration (Hours)	Cropland	Total	Cropland	
24-120 (sum of durations 24-120)	1633		1593	
	-		-2.4%	
>24 hours (sum of durations > 24 hrs)		1915		1873
		-		-2.2%

# CHANNEL RESTORATION 25-YEAR DURATION RESULTS



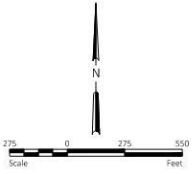
Duration (Hours)	Existing Conditions		Alternative 13	
	Cropland	Total	Cropland	Total
<b>Inundated Acres Upstream of County Ditch 3 25-Year, 24-Hour (% Change)</b>				
0-24	3085	3575	3264	3759
	-	-	5.8%	5.2%
24-48	1003	1236	870	1089
	-	-	-13.3%	-11.9%
48-72	679	824	499	654
	-	-	-26.4%	-20.7%
72-96	243	327	231	339
	-	-	-5.0%	3.7%
96-120	83	126	109	146
	-	-	30.7%	16.4%
>120	309	502	334	523
	-	-	8.1%	4.3%
TOTAL	5403	6589	5309	6511
	-	-	-1.8%	-1.2%
Duration (Hours)	Cropland	Total	Cropland	Total
24-120 (sum of durations 24-120)	2009		1710	
	-		-14.9%	
>24 hours (sum of durations > 24 hrs)		3014		2751
		-		-8.7%

Duration (Hours)	Existing Conditions		Alternative 13	
	Cropland	Total	Cropland	Total
<b>Inundated Acres County Ditch 3 to County Road 10 25-Year, 24-Hour (% Change)</b>				
0-24	2285	2349	2322	2387
	-	-	1.6%	1.6%
24-48	797	819	801	824
	-	-	0.6%	0.5%
48-72	667	699	562	584
	-	-	-15.8%	-16.4%
72-96	668	704	525	564
	-	-	-21.4%	-19.8%
96-120	380	400	477	501
	-	-	25.6%	25.3%
>120	221	273	304	358
	-	-	37.1%	31.2%
TOTAL	5019	5245	4992	5218
	-	-	-0.5%	-0.5%
Duration (Hours)	Cropland	Total	Cropland	Total
24-120 (sum of durations 24-120)	2512		2366	
	-		-5.8%	
>24 hours (sum of durations > 24 hrs)		2895		2831
		-		-2.2%

# PRELIMINARY EASEMENT BOUNDARY MAPS



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No.	Revision	Date	By

SWIFT COULLEE RESTORATION EASEMENTS  
MIDDLE-SNAKE-TAMARAC RIVERS WATERSHED DISTRICT  
WARRENTON, OR

SITE MAP



Drawn By  
ELB

Checked By  
TAN

Date  
4-12-2021

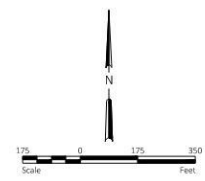
Scale  
As Shown

Project No.  
3429-049

SHEET  
1 OF 9



# PRELIMINARY EASEMENT BOUNDARY MAPS



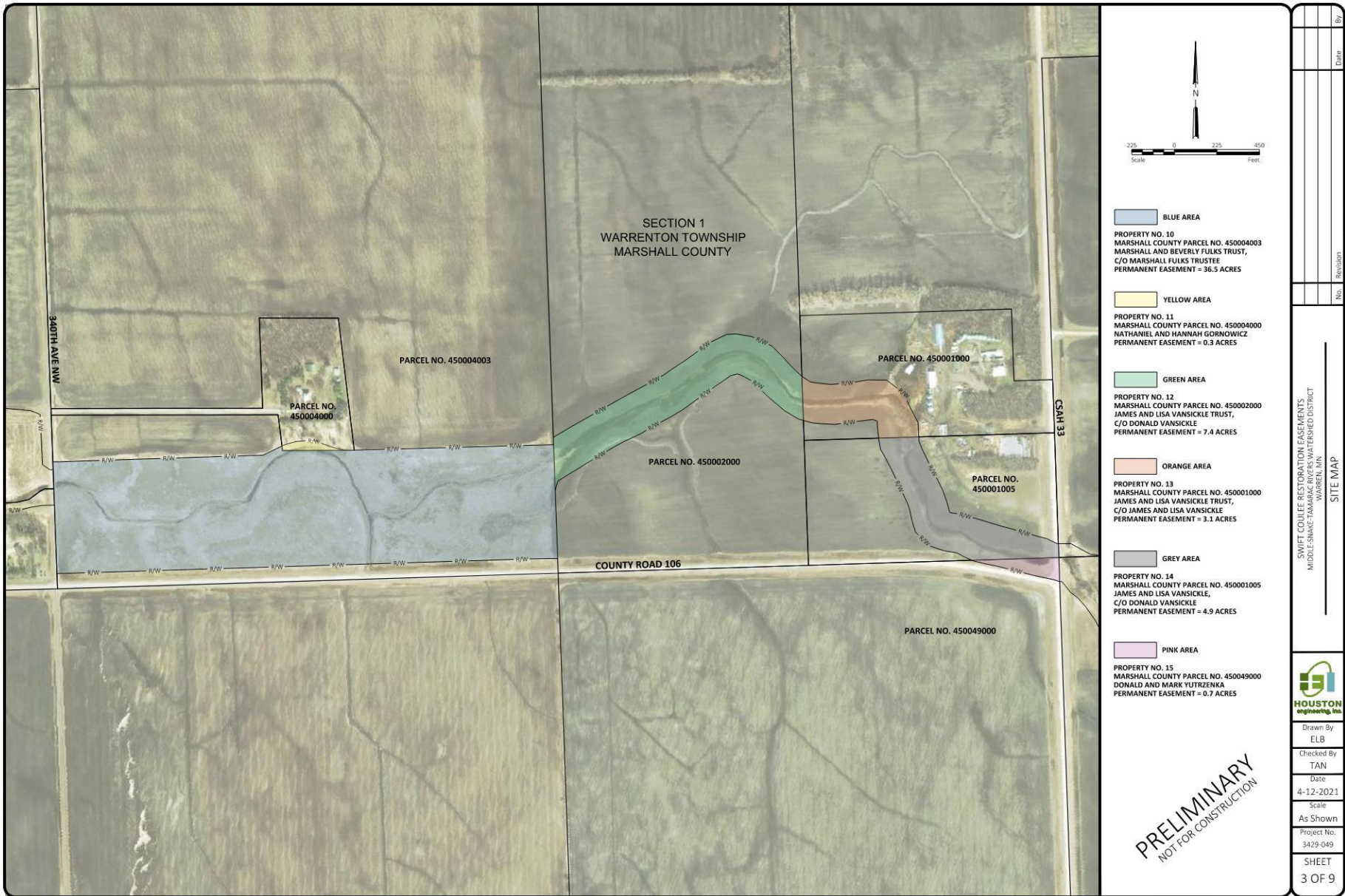
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PROPERTY NO. 5  
MARSHALL COUNTY PARCEL NO. 450008001  
DONALD AND MARK YUTRZENKA  
PERMANENT EASEMENT = 1.6 ACRES
  
- YELLOW AREA**  
PROPERTY NO. 6  
MARSHALL COUNTY PARCEL NO. 450005001  
DONALD AND MARK YUTRZENKA  
PERMANENT EASEMENT = 3.3 ACRES
  
- GREEN AREA**  
PROPERTY NO. 7  
MARSHALL COUNTY PARCEL NO. 450009000  
RUTH ANN SLEIF ETAL, C/O SHARON NICHOLLS  
PERMANENT EASEMENT = 10.1 ACRES
  
- ORANGE AREA**  
PROPERTY NO. 8  
MARSHALL COUNTY PARCEL NO. 450010000  
KENNETH JOHNSON  
PERMANENT EASEMENT = 25.8 ACRES
  
- PINK AREA**  
PROPERTY NO. 9  
MARSHALL COUNTY PARCEL NO. 450010001  
ERIC LARSON  
PERMANENT EASEMENT = 1.0 ACRES

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**PRELIMINARY**  
NOT FOR CONSTRUCTION

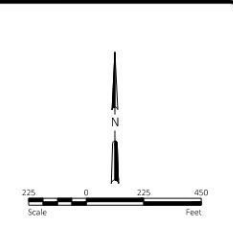
	Date
	Rev
SWIFT COULLEE RESTORATION EASEMENTS MIDDLE-SNAKE-TAMARAC RIVERS WATERSHED DISTRICT WARRENTON, OR <b>SITE MAP</b>	
 Houston engineering, inc.	
Drawn By ELB	
Checked By TAN	
Date 4-12-2021	
Scale As Shown	
Project No. 3429-049	
SHEET 2 OF 9	

# PRELIMINARY EASEMENT BOUNDARY MAPS



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# PRELIMINARY EASEMENT BOUNDARY MAPS



- BLUE AREA**  
PROPERTY NO. 16  
MARSHALL COUNTY PARCEL NO. 25002003  
SIGVART AND MARLENE SILNES  
PERMANENT EASEMENT = 9.8 ACRES
- YELLOW AREA**  
PROPERTY NO. 17  
MARSHALL COUNTY PARCEL NO. 250023000  
DONALD AND MARK YUTRZENKA  
PERMANENT EASEMENT = 14.6 ACRES
- GREEN AREA**  
PROPERTY NO. 18  
MARSHALL COUNTY PARCEL NO. 250021000  
LYNN AND SHELLY SAFRANSKI  
PERMANENT EASEMENT = 19.8 ACRES

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**PRELIMINARY**  
NOT FOR CONSTRUCTION

No.	Revision	Date	R/W

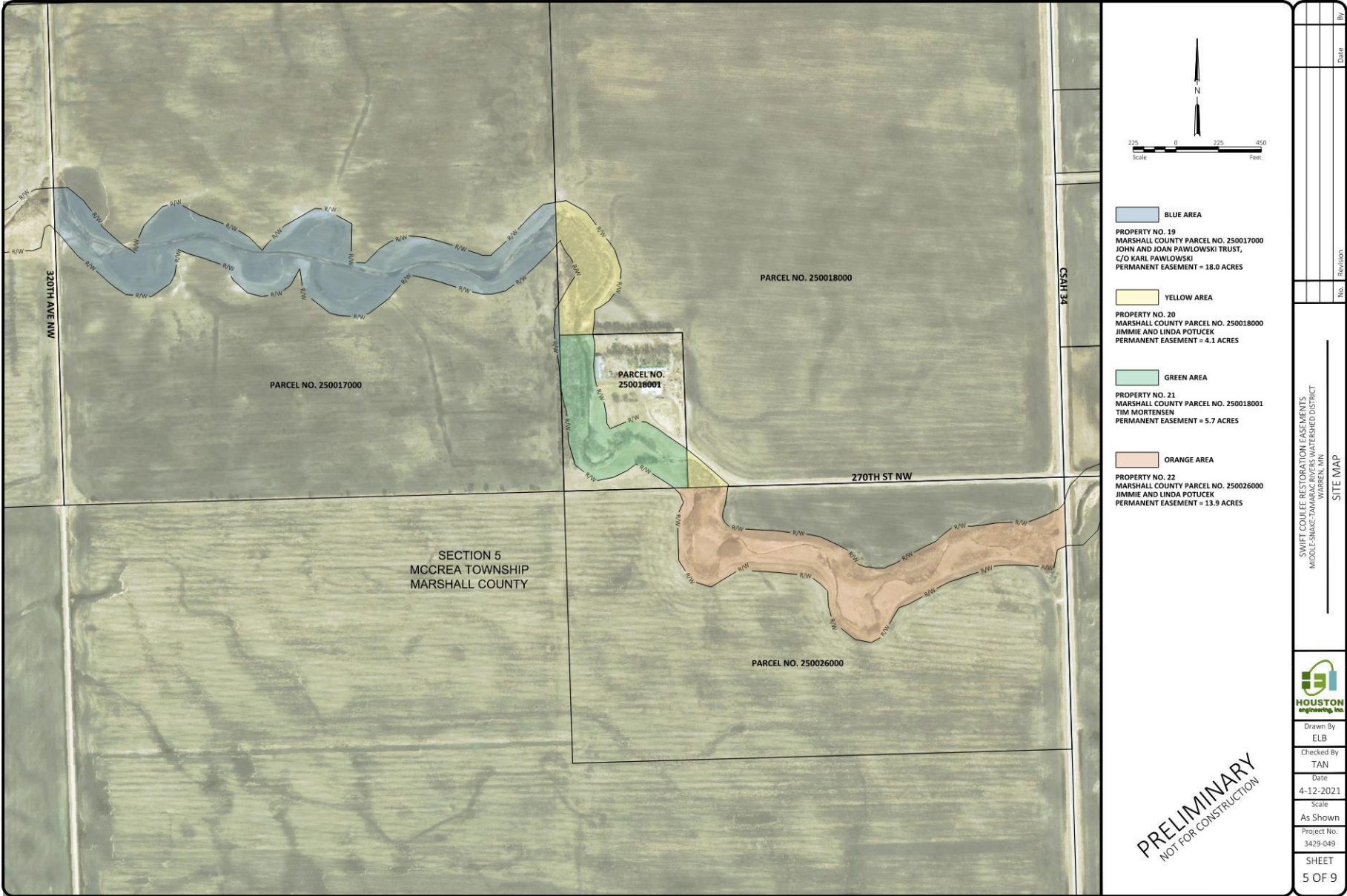
SWIFT COULLEE RESTORATION EASEMENTS  
MIDDLE-SNAKE-TAMARAC RIVERS WATERSHED DISTRICT  
WARREN, MN  
SITE MAP



Drawn By  
ELB  
Checked By  
TAN  
Date  
4-12-2021  
Scale  
As Shown  
Project No.  
3429-049

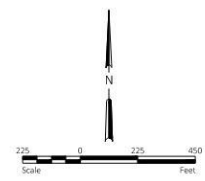
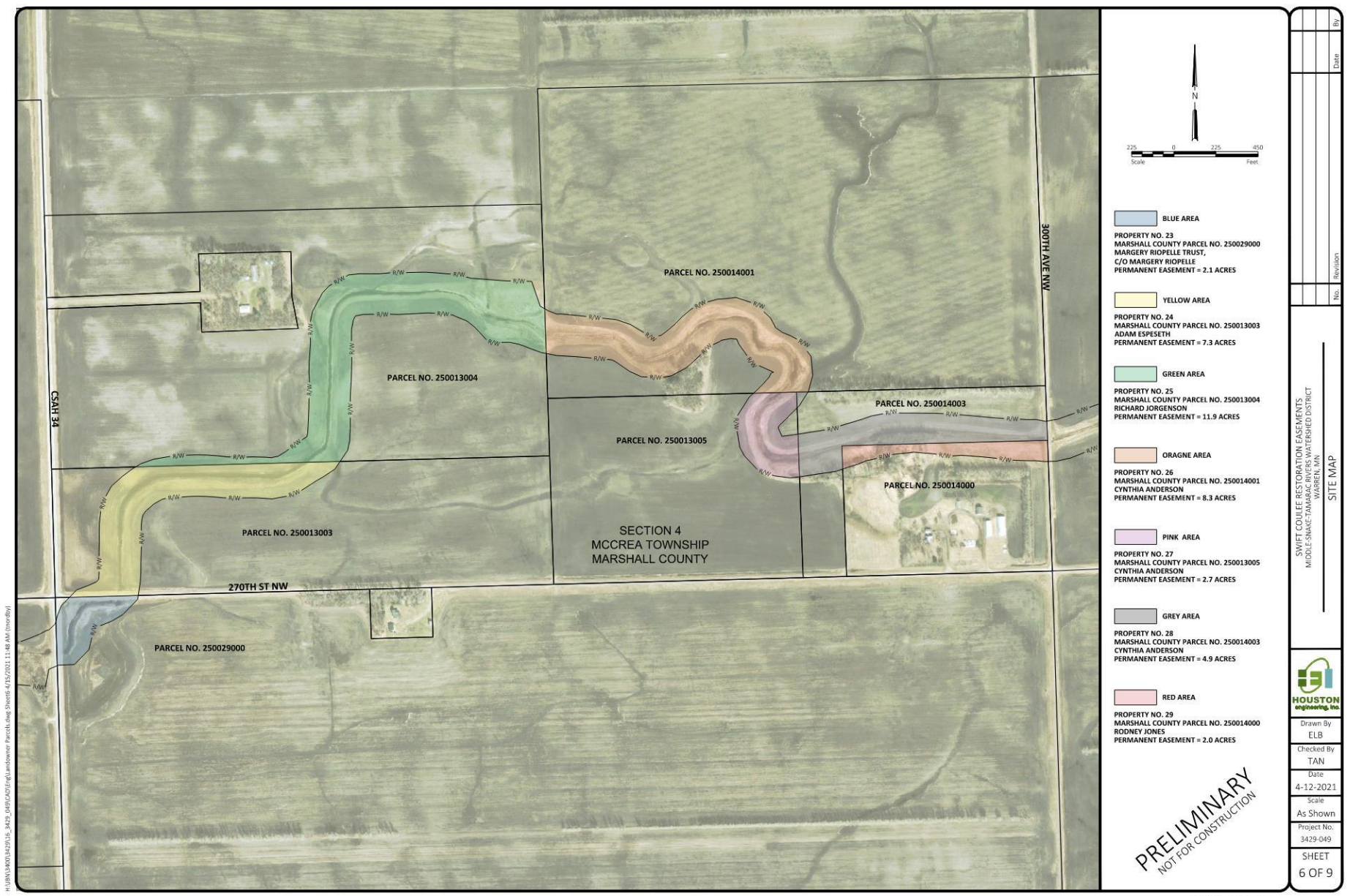
SHEET  
4 OF 9

# PRELIMINARY EASEMENT BOUNDARY MAPS



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# PRELIMINARY EASEMENT BOUNDARY MAPS



No.	Revision	Date	By

SWIFT COULLEE RESTORATION EASEMENTS  
 MIDDLE-SNAKE-TAMARAC RIVERS WATERSHED DISTRICT  
 WARREN, MN  
 SITE MAP



Drawn By  
 ELB  
 Checked By  
 TAN  
 Date  
 4-12-2021  
 Scale  
 As Shown  
 Project No.  
 3429-049

SHEET  
 6 OF 9

**PRELIMINARY**  
 NOT FOR CONSTRUCTION

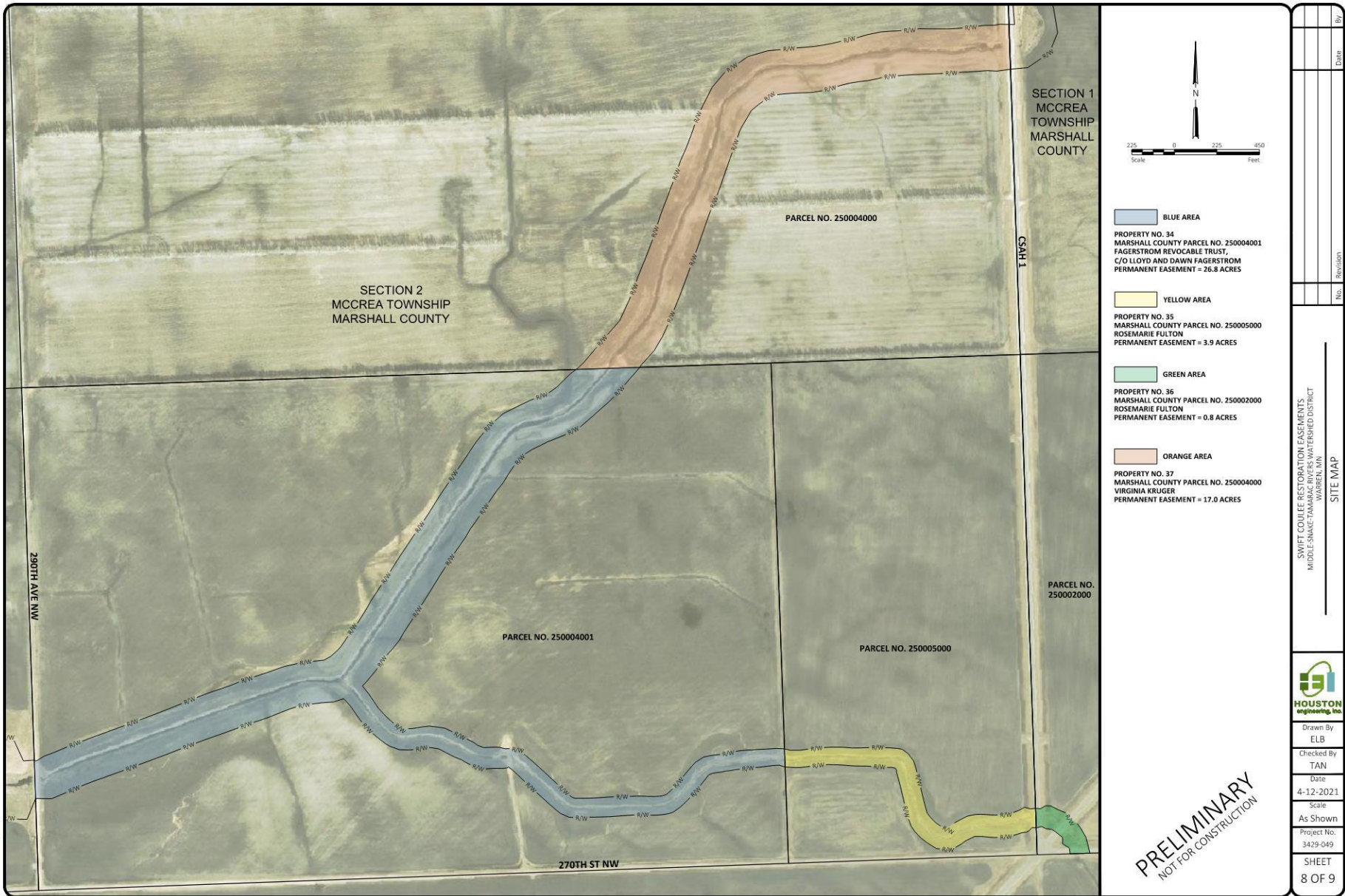
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# PRELIMINARY EASEMENT BOUNDARY MAPS



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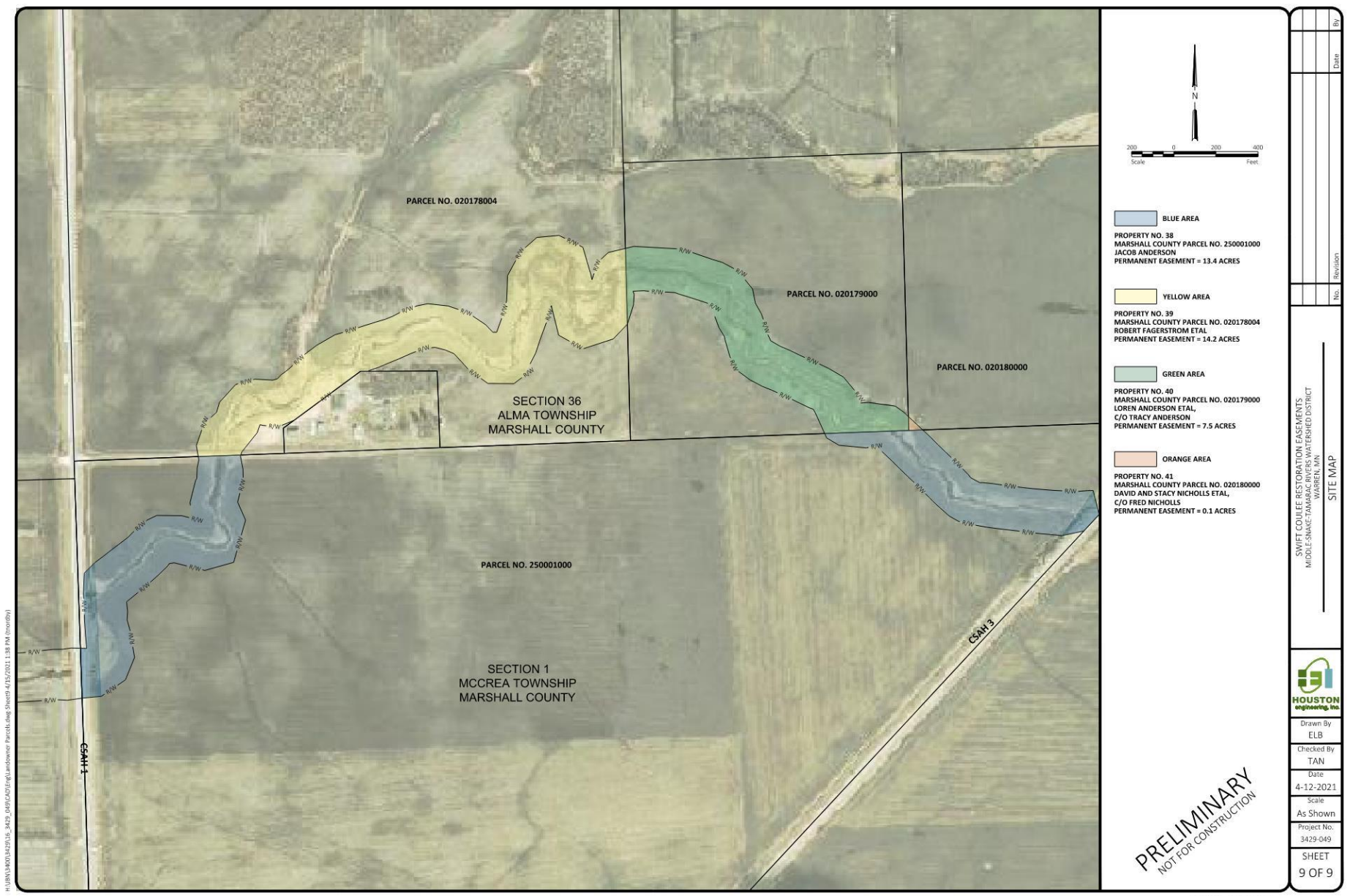
# PRELIMINARY EASEMENT BOUNDARY MAPS



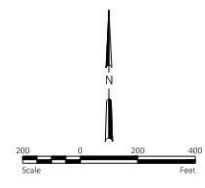
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No.	Revision	Date	R/W
SWIFT COULLEE RESTORATION EASEMENTS MIDDLE-SNAKE-TAMARAC RIVERS WATERSHED DISTRICT WARREN, MN SITE MAP			
 Houston Engineering, Inc.			
Drawn By ELB			
Checked By TAN			
Date 4-12-2021			
Scale As Shown			
Project No. 3429-049			
SHEET 8 OF 9			

# PRELIMINARY EASEMENT BOUNDARY MAPS



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- BLUE AREA**  
PROPERTY NO. 38  
MARSHALL COUNTY PARCEL NO. 250001000  
JACOB ANDERSON  
PERMANENT EASEMENT = 13.4 ACRES
- YELLOW AREA**  
PROPERTY NO. 39  
MARSHALL COUNTY PARCEL NO. 020178004  
ROBERT FAGERSTROM ETAL  
PERMANENT EASEMENT = 14.2 ACRES
- GREEN AREA**  
PROPERTY NO. 40  
MARSHALL COUNTY PARCEL NO. 020179000  
LOREN ANDERSON ETAL,  
C/O TRACY ANDERSON  
PERMANENT EASEMENT = 7.5 ACRES
- ORANGE AREA**  
PROPERTY NO. 41  
MARSHALL COUNTY PARCEL NO. 020180000  
DAVID AND STACY NICHOLLS ETAL,  
C/O FRED NICHOLLS  
PERMANENT EASEMENT = 0.1 ACRES

No.	Revision	Date	BY

SWIFT COULEE RESTORATION EASEMENTS  
MIDDLE-SNAKE-TAMARAC RIVERS WATERSHED DISTRICT  
WARREN, MN  
SITE MAP



Drawn By  
ELB  
Checked By  
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Date  
4-12-2021  
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As Shown  
Project No.  
3429-049

**PRELIMINARY**  
NOT FOR CONSTRUCTION

SHEET  
9 OF 9





- Can easement be adjusted to more practicable shape?
- How are field drains to the coulee going to be addressed with levee in place?
- Preliminary design route of project corridor not set in stone
- Work with landowners as much as possible to avoid impacts.



# Questions/Discussion