APPENDIX G
Preliminary Stormwater Management Plan

Castle Rock Solar Project
January 2025
IP7137/GS-24-267

Preliminary Stormwater Management Report

Castle Rock Solar Project

Dakota County, MN

August 23, 2024

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PRELIMINARY STORMWATER MANAGEMENT REPORT

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1.0 INTRODUCTION

The purpose of this report is to summarize the stormwater management required for the Castle Rock Solar Project (Project or Site). This report was prepared to follow the guidance of the local and state performance standards, to minimize or limit the discharge of pollutants carried off by stormwater runoff.

Castle Rock Solar LLC is proposing to construct a 150-MW solar energy generation facility. The Project is proposed on approximately 1,350 acres and is located approximately 0.8 miles southeast of the Town of Farmington in Dakota County, Minnesota. The Site's current use is agricultural.

The proposed use of the Site will be a solar facility consisting of 375,360 solar modules mounted on trackers and new impervious surface including gravel access roads and associated solar infrastructure.

The proposed site has been designed with minimal grading to maintain existing drainage patterns. Stormwater management practices for the Site will be vegetated swales with ditch checks and land cover improvements to reduce runoff. These practices are proposed to meet the requirements of MPCA. Post-Construction stormwater management evaluation results and regulatory compliance considerations and analysis are presented in this report.

2.0 DATA SOURCES

Table 1. Data Sources.

Data Source Type	Format	Source	Use
Topography	1M DEM	Minnesota Geospatial Commons, LiDAR flown in June 2011	Existing Surface
Land Use Data	Shapefile	National Land Cover Database 2021	Land Cover
Soils	Shapefile	NRCS Websoil Survey	Hydrology Soil Group
Precipitation	PDF	NOAA Atlas 14	Design Storms
Layout	193709215_Layout.dwg	Stantec	Layout

3.0 SITE CONDITIONS

3.1 LOCATION

The project area is located approximately 0.8 miles southeast of the City of Farmington in Castle Rock Township, Dakota County, Minnesota. Location of the project area is shown in Appendix A.1

3.2 LAND USE

A review of aerial photographs show that the site is currently used for agricultural purposes, typically corn or soybeans. The data sources used to determine the land cover was the 2021 National Land Cover Database and digitized data using the USA NAIP 2021 Aerial.

The proposed use of the site will be a solar facility consisting of solar modules and limited amounts of new impervious surface including gravel access roads and associated solar infrastructure. All pervious areas within the fence line within the project boundary will be reestablished as perennial herbaceous vegetation. This includes the areas beneath the modules.

The land cover is shown in Appendix A.4.

3.3 TOPOGRAPHY

Existing topographic information used in this analysis was obtained from the Minnesota Elevation Portal called MnTOPO. The LiDAR elevation data (Twin Cities Metro Region) was flown in 2011 and 2012.

The Site is generally flat near the outlet points, otherwise the Site ranges from 2-10% slope. Site elevations range from 960 at the drainage divide to 875 at the South Branch Vermillion River outlet.

3.4 DRAINAGE PATTERNS

The Site discharges in two directions, approximately 10 percent of the site discharges to the north towards the Vermillion River and the other approximately 90 percent of the site discharges to the south and east towards to the South Branch of the Vermillion River (SBVR). Site drainage to SBVR discharges at three separate outlet locations.

The SBVR just downstream of the site is classified as a State designated trout stream. Special considerations for discharge to trout streams are discussed in Section 4.4 below.

The site was split into 14 drainage basin areas based on discharge location and existing flow patterns. The existing flow patterns and drainage areas will not be altered with this Project. The drainage areas are shown in Appendix A.4

3.5 SOILS

Soil data for the project site was obtained from the National Resources Conservation Service (NRCS) Soil Survey Geographic Database (SSURGO). The Site was predominately hydrologic soil group (HSG) A and HSG B soils with HSG D soils located at the low points near the South Branch Vermillion River (SBVR). The soils were mainly classified as loam, silt loam or sandy loam.

The NRSC soil report, see Appendix A.3, provided approximate depths to water table for the project as groundwater monitoring was not completed at this time. The majority of the Site, where HSG A and B soils were located, has a groundwater table separation of three feet or greater from the ground surface. The areas located near the SBVR has less than a three-foot separation between the ground surface and the groundwater table. The areas with shallow groundwater were typically located in areas of HSG D soil types.

See Appendix A.3 for the soil data obtained from NRCS.

The soil data is used to determine the hydrologic soil groups (HSG) which provides information on the runoff potential and infiltration potential. HSGs are assigned a letter classification where:

- ‘A’ soils have the highest infiltration potential (lowest runoff potential),
- ‘B’ soils have a moderate infiltration potential (middling runoff potential),
- ‘C’ soils have a low infiltration potential (high runoff potential), and;
- ‘D’ soils have a very low infiltration potential (very high runoff potential).

Some soils are assigned a dual-letter classification, such as A/D, B/D, or C/D, meaning these soils behave as the first lettered soil in drained conditions and a HSG D soil in undrained conditions. For modeling purposes, dual-letter classification soils were assumed to be undrained when determining infiltration potential.

3.6 ENVIRONMENTAL CONSTRAINTS

Portions of the Site adjacent to the SBVR are within a FEMA Zone AE mapped floodplain. The base flood elevation (BFE) for the mapped floodplain and defined floodway boundary is provided on the FIRM panels in Appendix A.2.

According to MNDNR the following apply to a FEMA Zone AE mapped floodplain:

- There shall be no structures within the mapped Floodway area.
- If structures are placed within the floodplain a H&H model shall be completed for the site to confirm the development will not cause a stage increase or increase velocities, also known as “no-rise certification”.

- A vertical buffer of 1.5 feet from the FEMA mapped floodplain base floodplain elevation (BFE) is recommended as an area to avoid. The vertical buffer is required within the mapped floodplain but a recommendation for areas outside of the floodplain.

Accordingly, there are no structures within the floodway or floodplain area. The proposed electrical structures (i.e. substation and switchyard) and the solar module placement is planned to follow the MNDNR requirements.

The vertical buffer will be taken into consideration in the design of solar modules and trackers to avoid having electrical components within potential flood buffer elevations. The vertical buffer elevation was based on the mapped base flood elevation plus 1.5 feet. Other electrical components, i.e., inverters, are recommended to either have waterproof containers or raised using an equipment pad.

To reduce impacts on the project, earthwork/fill and structures are not planned within the FEMA Zone AE mapped floodplain. A H&H study of existing conditions was completed to determine where ponding within the project area would be located to avoid those areas as well. The H&H is in an appendix in the overall Site Permit application.

4.0 STORMWATER MANAGEMENT REQUIREMENTS

The Project Site is regulated by the State of Minnesota, Minnesota Pollution Control Agency (MPCA), Vermillion River Watershed Joint Powers Organization (VRWJPO) and Dakota County. The stormwater management requirements for the project will use the most stringent of the above listed regulations. Individual stormwater management requirements used for the project are listed in greater detail below.

4.1 RATE CONTROL

Rate control requirements for the project are regulated by VRWJPO standards 8.3.C which state that runoff rate for proposed activities shall not exceed existing runoff rates for the 1-year, 10-year, and 100-year critical duration storm events. The critical duration was based on the 24-hour storm duration.

4.2 VOLUME ANALYSIS

New developments with one or more acres of new impervious surface must incorporate volume control practices into the design to control the increase in the runoff volume for the 2-year, 24-hour storm event from existing to proposed conditions.

4.3 WATER QUALITY

Section 15.4 from MPCA construction stormwater general permit requires the project to treat 1.0” of runoff from the net increase of impervious surfaces created for the project. The impervious surfaces would consist of the access roads, inverter pads, substation, and solar modules.

MPCA has developed a spreadsheet to calculate the impervious percent of the solar modules (MPCA spreadsheet). The spreadsheet MPCA developed accounts for solar panels to be partially pervious based on the HSG soil classification. The spreadsheet calculates the amount of water quality volume that the solar panels will provide water quality volume credit and the remaining water quality volume that should still be accounted for on site.

4.4 SPECIAL WATERS

The SBVR is a restricted water under the National Pollutant Discharge Elimination System (NPDES) / State Disposal System (SDS) permit for construction. Section 23.1 from MPCA construction stormwater general permit states the requirements for projects that discharge to Special Waters. The permit states any project that has a discharge point within one (1) mile of and flow to a special or impaired water is required to incorporate additional erosion control best management practices (BMPs) listed under section 23.9, 23.10 and 23.11. A summary of the requirements in these sections are listed below.

- Section 23.9: Immediate stabilization of exposed soil areas and complete stabilization within seven calendar days after the construction activity in that portion of the site (temporarily or permanently completed).
- Section 23.10: Temporary sediment basin for drainage locations that server an area of five or more acres disturbed at one time.
- Section 23.11: Undisturbed buffer zone of not less than 100 linear feet from special water.

The portion of the site discharging to the South Branch Vermillion River is within one (1) aerial mile of a State designated trout stream; therefore, the above criteria is required for the Project Site. In addition, Section 23.12 will also apply.

- Section 23.12: A permanent stormwater treatment system must be designed so that the discharge from the project minimizes any increase in the temperature of trout streams resulting from the 1-year and 2-year, 24-hour precipitation events.

In addition, a mandatory Storm Water Pollution Plan (SWPPP) review is required by the MPCA.

5.0 METHODOLOGY

Existing and proposed conditions are modeled in HydroCAD software. HydroCAD used SCS TR-20 method to calculate the stormwater runoff for the overall site hydrology.

5.1 RATE AND VOLUME CONTROL

The rate and volume control analysis were completed using TR 55 method with curve number (CN) methodology. Curve numbers were selected based on the soil and landcover for each drainage basin.

Time of concentrations were calculated for each drainage basin in HydroCAD.

Rainfall data was used from NOAA Atlas 14 for the 1-year, 2-year, 10-year, and 100-year 24-hour storm events. See Appendix B.1 for the rainfall data.

5.2 WATER QUALITY

According to Section 16.17 and 16.18 of the MPCA construction stormwater general permit prohibits constructing infiltration systems for the following reasons:

- If there is less than 3 feet of separation distance from the bottom of the system to the elevation of the seasonally saturated soils.
- If the soils are predominately HSG type D soils.

Portions of the site have poor soils (HSG D) and/or less than three (3) feet separation from seasonally saturated soils (see Appendix A.3). There are six basins that are impacted by these conditions: S01, S04, and S11-S14. Infiltration will not be feasible in these areas.

Proposed infiltration measure is planned to be a vegetated swale with ditch checks which will be sized to draw down within 48-hours.

If infiltration systems are prohibited, then filtration options or sedimentation options shall be considered. According to Section 17.8 and 17.9, filtration systems need to discharge through the soil surface or filter media within 48 hours and have a three (3) foot separation between the seasonally saturated soils. The proposed design for these systems to meet the three (3) foot separation would be to berm the swale up instead of digging into the ground. If this method is used with engineering media, the filtration system shall meet Section 17.8 and 17.9 criteria.

According to Section 15.6, if full volume reduction cannot be met, documentation of the reasons must be noted. If the proposed filtration system is not approved, then groundwater monitoring could be used to document that the water quality reduction would not be able to be met due to poor soils and shallow groundwater.

Analysis shows that the required volume reduction practices cannot be met through infiltration for all drainage basins, however project wide volume reduction is met through a combination of infiltration and filtration practices.

6.0 MODELING ANALYSIS

6.1 RATE AND VOLUME ANALYSIS

6.1.1 Land Use

The existing land use consists of row crops, wooded areas and lowland floodplains associated with the South Branch Vermillion River. Curve numbers were assigned based on the land cover and soil types,

see Table 2 below for the existing conditions land use summary. See Appendix A.3 and A.4 for figures that show the location of the land use and soils within the project boundary.

Table 2. Existing Conditions Land Cover.

Cover	HSG	CN	Area (ac)	% of Total
Forest Good	A	30	0.50	0.4%
Forest Good	B	55	0.39	
Forest Poor	A	45	0.30	
Forest Poor	B	66	0.93	
Forest Poor	D	83	3.06	
Gravel Road (w/ ROW)	A	72	7.07	2.3%
Gravel Road (w/ ROW)	B	82	12.54	
Gravel Road (w/ ROW)	D	89	11.29	
Meadow	A	30	8.63	6.8%
Meadow	B	58	0.93	
Meadow	C	71	0.39	
Meadow	D	78	81.91	
Paved; open ditches (w/ ROW)	A	83	0.13	0.06%
Paved; open ditches (w/ ROW)	B	89	0.64	
Residential-Low Density	A	57	0.65	0.2%
Residential-Low Density	B	72	2.00	
Residential-Low Density	D	86	0.31	
Residential-Medium Density	A	77	1.40	0.2%
Residential-Medium Density	B	85	0.83	
Row Crop	A	67	438.78	90.0%
Row Crop	B	78	457.20	
Row Crop	C	85	12.80	
Row Crop	D	89	310.46	
Water	D	99	1.78	0.1%
Total			**1,354.90**	**100.0%**

The proposed use of the Site will be a solar facility. The Site will consist of approximately 273 acres of solar modules mounted above grade on a racking system and approximately 25 acres of access roads, electrical equipment, switchyard and a substation. Table 3 below provides a summary of the land use under proposed conditions. See Appendix A.3 and A.4 for figures that show the location of the land use and soils within the project boundary.

Table 3. Proposed Conditions Land Cover.

Cover	HSG	CN	Area (ac)	% of Total
Access Road	D	98	12.77	0.9%
Meadow with Mounted Solar	A	30	109.10	20.1%
Meadow with Mounted Solar	B	58	113.52	
Meadow with Mounted Solar	C	71	4.07	
Meadow with Mounted Solar	D	78	46.16	
Forest Good	A	30	0.36	0.4%
Forest Good	B	55	0.39	
Forest Poor	A	45	0.20	
Forest Poor	B	66	0.81	
Forest Poor	D	83	2.99	
Gravel Road (w/ ROW)	A	72	7.05	2.3%
Gravel Road (w/ ROW)	B	82	12.36	
Gravel Road (w/ ROW)	D	89	11.21	
Inverter	D	98	0.16	0.01%
Meadow	A	30	257.40	53.5%
Meadow	B	58	253.75	
Meadow	C	71	8.74	
Meadow	D	78	204.45	
O&M	D	98	0.13	0.01%
Paved; open ditches (w/ ROW)	A	83	0.13	0.05%
Paved; open ditches (w/ ROW)	B	89	0.60	
Residential-Low Density	A	57	0.65	0.2%
Residential-Low Density	B	72	2.00	
Residential-Low Density	D	86	0.31	
Residential-Medium Density	A	77	1.22	0.2%
Residential-Medium Density	B	85	0.83	
Row Crop	A	67	73.61	21.4%
Row Crop	B	78	77.19	
Row Crop	C	85	0.38	
Row Crop	D	89	138.60	
Substation	D	98	6.02	0.4%
Switchyard	D	98	5.99	0.4%
Water	D	99	1.78	0.1%
Total			**1354.90**	**100.0%**

The proposed substation will be a raised gravel pad. The runoff from this area will sheet flow over proposed meadow grasses and into a vegetated swale with ditch checks.

Minimal grading is proposed to meet the tolerances of the proposed solar array criteria and to keep the drainage patterns similar to existing conditions.

The net impervious area on site will be 297.42 acres. The breakdown of existing conditions to proposed conditions of impervious area on site is shown in Table 4.

Table 4. Impervious Area Breakdown – Existing vs. Proposed Conditions.

Condition	Impervious	Area (ac)	Total Area (ac)
Existing	Gravel Road (w/ ROW)	30.90	36.84
	Paved; open ditches (w/ ROW)	0.77	
	Residential (Low and Medium Density)	5.17	
Proposed	Gravel Road (w/ ROW)	30.62	334.26
	Paved; open ditches (w/ ROW)	0.73	
	Residential (Low and Medium Density)	5.00	
	Solar Panel Arrays	272.84	
	Access Roads	12.77	
	Inverter	0.16	
	O&M Building	0.13	
	Substation	6.02	
	Switchyard	5.99	
Net Impervious Area (ac)			**297.42**

6.1.2 Rate and Volume Results

Stormwater quantity calculations for the Site were prepared using HydroCAD. The proposed site meets the rate control requirements. The rate control requirements were met due to the land cover change from row crops to planting perennial herbaceous vegetation (noted as meadow in modeling), which provided the runoff reduction.

See Appendix B.2 and B.3 for the HydroCAD reports for the existing and proposed conditions. Table 5 shows a summary of the runoff rate analysis for the individual drainage basins for each storm event.

Table 5. Runoff Rate Summary - Drainage Basins.

Drainage Basin	Drainage Basin Outlet	Drainage Area (ac)	
		Existing	Proposed
S01	South to SBVR	184.15	184.15
S02		157.93	157.93
S03	Northeast to SBVR	83.51	83.51
S04*	Northwest to Vermillion R.	131.22	130.51

Drainage Basin	Drainage Basin Outlet	Drainage Area (ac)	
		Existing	Proposed
S05*	Northeast to SBVR	74.44	75.15
S06		13.69	13.69
S07		20.43	20.43
S08		58.67	58.67
S09		46.96	46.96
S10		132.66	132.66
S11	North to SBVR	123.10	123.10
S12		199.62	199.62
S13		116.44	116.44
S14		12.07	12.07
Total		1,354.90	1,354.90

*Area was adjusted from S04 to S05 to account for potential regrading of the substation to go toward a stormwater BMP.

Table 6 shows a summary of the runoff rates at each discharge point on site for each storm event.

Table 6. Rate Control Summary – Drainage Basin Outlets.

Drainage Basin Outlets	Storm Recurrence Interval – Runoff Rate (cfs)					
	1-Year		10-Year		100-Year	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
North to SBVR	192.36	110.40	485.10	324.07	1,105.39	836.13
Northeast to SBVR	160.50	0.72	537.05	53.67	1,419.00	444.89
Northwest to Vermillion R.	41.61	1.34	121.12	10.10	299.53	41.24
South to SBVR	164.52	38.39	532.43	146.92	1,391.38	554.76
Total	558.99	150.85	1,675.70	534.76	4,215.30	1,877.02

Table 7 shows a summary of the runoff volume analysis at each discharge point on site for the 2-year storm event.

Table 7. 2-Year, 24-Hour Runoff Volume Summary

Drainage Basin Outlets	Runoff Volume (ac-ft)	
	Existing	Proposed
North to SBVR	43.98	27.72
Northeast to SBVR	21.73	1.49
Northwest to Vermillion R.	10.22	2.05
South to SBVR	29.41	10.00
Total	105.34	41.26

6.2 WATER QUALITY ANALYSIS

6.2.1 Water Quality Volume Required

The water quality (WQ) volume required for the Site was calculated using two methods. The MPCA Solar spreadsheet was used to determine the water quality volume of the solar panels. The spreadsheet determined the BMP volume credit based on the HSG soil type and the remaining WQ volume that still needed to be treated. Table 8 below shows the remaining WQ volume needed to be treated below the solar panels is 7.71 ac-ft.

Table 8. Solar Panel Water Quality Volume.

HSG Soil	Average Annual Runoff Depth (in)	Performance Goal Summary						
		Performance Goal (cf)	BMP Volume Credit (cf)	% of Performance goal achieved (%)	Remaining WQ volume to be treated per panel (cf)	No. Panels	Total Remaining WQ Volume	
							cf	ac-ft
A	4.75	2.51	1.87	74.4	0.64	150,089	96,057	2.21
B	6.45	2.51	1.55	61.8	0.96	156,171	149,924	3.44
C	7.10	2.51	1.4	55.7	1.11	5,603	6,220	0.14
D	8.40	2.51	1.19	47.4	1.32	63,497	83,816	1.92
Total						375,360	336,017	7.71

Then to determine the remaining water quality volume was based on 1.0” of runoff from the net increase of impervious area for the access roads, substation, O&M Building, and inverters. The breakdown of the water quality volume required for the site is provided in Table 9.

Table 9. Water Quality Volume Required.

Impervious Type	New Impervious Area (acre)	Required Water Quality Volume (ac-ft)	Required Water Quality Volume (cf)
Solar Panels	272.84	7.71	336,017
Impervious (not array)	25.07	2.09	90,997
-Access Roads	12.77		
-Inverters	0.16		
-O&M Building	0.13		
-Substation	6.02		
-Switchyard	5.99		
Total			427,014

6.2.2 Soil Analysis

A soil type breakdown was completed for the drainage basins as part of the water quality analysis, see Table 10. The drainage basins that were impacted the most by poor soils was S11, S12, S13 and S14, which were located along the SVBR. Two other basins (S01 and S04) were impacted by poor soils as well, even through the percent of HSG D soil was below majority. This was due to the fact, that the drainage basins low point was located in HSG D soils.

Table 10. Percent of Soil Types by Drainage Basins.

Drainage Basin	Within Solar Module Area				Within Project Boundary			
	A	B	C	D	A	B	C	D
S01	47%	44%	3%	7%	47%	44%	3%	7%
S02	60%	30%	1%	9%	56%	29%	1%	14%
S03	39%	56%	0%	5%	35%	51%	0%	14%
S04	18%	75%	0%	7%	18%	70%	0%	12%
S05	19%	63%	0%	18%	12%	46%	0%	42%
S06	35%	65%	0%	0%	34%	56%	0%	10%
S07	88%	6%	0%	6%	77%	9%	0%	14%
S08	86%	14%	0%	0%	77%	22%	0%	1%
S09	52%	45%	3%	0%	53%	42%	4%	1%
S10	58%	41%	0%	0%	45%	33%	0%	21%
S11	5%	24%	0%	71%	3%	23%	0%	74%
S12	22%	18%	0%	60%	15%	14%	0%	71%
S13	25%	30%	11%	34%	22%	16%	5%	57%
S14	24%	42%	2%	33%	14%	63%	1%	22%
Total	40%	42%	1%	17%	33%	34%	1%	32%

The vegetated swales were designed to collect the impervious surface runoff and drain to the low point of the drainage basin. The challenges with this design were that some of the drainage basin's low point were in soil and groundwater conditions that prohibited infiltration and filtration features. Table 11 shows a breakdown of the vegetated swale placement in relation to the soil type. In the table the approximate groundwater depth at the outlet is noted when the outlet point is within the HSG D soil type.

Table 11. Vegetated Swale Design Per Soil Type.

Drainage Basin	Swale Water Quality Volume Designed (cf)		Groundwater Depth at Outlet (ft)
	HSG A/B	HSG D	
S01	62,994	10,302	<1.5
S02	53,366	0	
S03	33,363	0	
S04	19,839	37,940	<1.5
S05	72,938	0	
S06	5,903	0	
S07	5,627	2,912	>3
S08	16,545	0	
S09	20,157	0	
S10	34,322	0	
S11	0	21,989	<0.5
S12	21,854	13,706	<1
S13	13,496	13,972	<1
S14	3,978	3,800	<1.5
Total	364,380	104,620	

6.2.3 Water Quality Results

The water quality volume designed for the Site was able to meet the water quality volume required by utilizing volume retained in vegetated swales with ditch checks. Swales were sized to meet the NPDES drawdown requirements based on the MPCA Stormwater Manual design infiltration rates corresponding to the HSG soil type provided in the NRCS soils report. Table 12 below shows the stormwater volume estimate for the vegetated swales. While not all the individual drainage areas on the project were able to meet the volume requirements based on site constraints and the limitations with the soil and groundwater conditions, the volume requirements were met based on total volume retained on the site.

Table 12. Drainage Swale Volume Estimate.

Drainage Basin	Water Quality Volume Required (cf)	Swale Water Quality Volume Designed (cf)	Difference* (cf)
S01	65,596	73,296	7,699
S02	46,952	53,366	6,414

Drainage Basin	Water Quality Volume Required (cf)	Swale Water Quality Volume Designed (cf)	Difference* (cf)
S03	24,978	33,363	8,384
S04	54,528	57,779	3,251
S05	64,478	72,938	8,461
S06	3,406	5,903	2,497
S07	4,344	8,539	4,194
S08	12,888	16,545	3,657
S09	16,861	20,157	3,296
S10	24,385	34,322	9,937
S11	25,385	21,989	-3,396
S12	53,800	35,560	-18,240
S13	25,408	27,468	2,059
S14	4,004	7,778	3,774
Total	427,014	73,296	41,986

*Negative results indicate volume shortage

6.3 PROPOSED STORMWATER MANAGEMENT

Solar energy generation projects are designed differently than other land development projects. One significant goal of a solar energy project is to design and construct the project with minimum impact to the site. The work included in a solar energy project includes installing; mounted solar panels, at-grade gravel access roads, gravel substation, inverter pads, and other electrical equipment.

The panels are mounted between 1.5 to 3.0 feet above grade (when at maximum tilt). According to MPCA, the lowest vertical clearance to prevent/control erosion and scour along the drip line is an elevation of 10 feet or less from the ground. The ground below the panels will be a low grow perennial native grass/forb mixed meadow growing under the panels. The existing topography is adjusted to meet the slope requirements for the trackers the panels are mounted to. The grading is kept to a minimum so that the drainage path of the existing topography is maintained. The proposed land cover (meadow) slows the runoff down compared to the existing land cover (row crops), which reduces the runoff rate from the site. The land cover also allows for water to filter as it goes though the meadow cover which provides water quality treatment.

Access roads are installed at grade next to proposed land cover of meadow which allows for a disconnected impervious treatment process. The runoff from the access roads is able to sheet flow to the meadow cover which allow water to filter as it goes through the meadow cover which provided water quality treatment of the impervious surface.

Water quality volume for the overall development will be met through the use of vegetated swales with ditch checks. There are individual basins that do not meet the minimum water quality volume, but this can also be offset by the benefits from an improvement in land cover change from pre-development to post development conditions. The land cover went from row crop with a higher runoff rate to meadow grass with a lower runoff rate. The project is also designed to have any impervious surface to be

disconnected. This means the impervious surface runoff filters through meadow land cover before discharging from the site.

7.0 CONCLUSION

The project Site is regulated by MPCA, Dakota County, and VRWJPO with project specific design requirements outlined in Section 4.0. The proposed change in land use and BMP recommendations satisfy the Project design parameters. Vegetated swales with ditch checks provide the required stormwater rate and volume control due to the conversion from agriculture to a more densely vegetated meadow helps to reduce runoff rates from existing conditions for the 1-, 2-, 10-, and 100-year, 24-hour storm events.

The project site has limitations on meeting the MPCA water quality requirements for individual drainage basins due to poor soil conditions and shallow groundwater (limited to 32% of the project area) but these shortfalls are compensated by over-design in other drainage basins. The project Site does meet the criteria for the water quality criteria for the whole Site.

One of the main Stormwater benefits of the project is due to the land cover change from row crops to planting perennial herbaceous vegetation (noted as meadow in modeling), which provides both the benefit of runoff reduction and treatment. Other benefits provided by the solar project include the following: disconnected runoff from impervious surfaces to reduce runoff, and minimizing the amount of grading to promote sheet flow to provide both runoff reduction.

Before the site goes to final design, the site limitations and challenges shall be discussed with MPCA to determine if the suggested approach is acceptable. One item that can assist in displaying the benefits of the project is by completing a MIDS volume reduction calculation which can show volume reduction and water quality reductions in TSS and Phosphorus. Since the project is in the preliminary stage, this calculation has not been completed.

Appendix A EXHIBITS

Appendix A Exhibits

A.1 LOCATION MAP

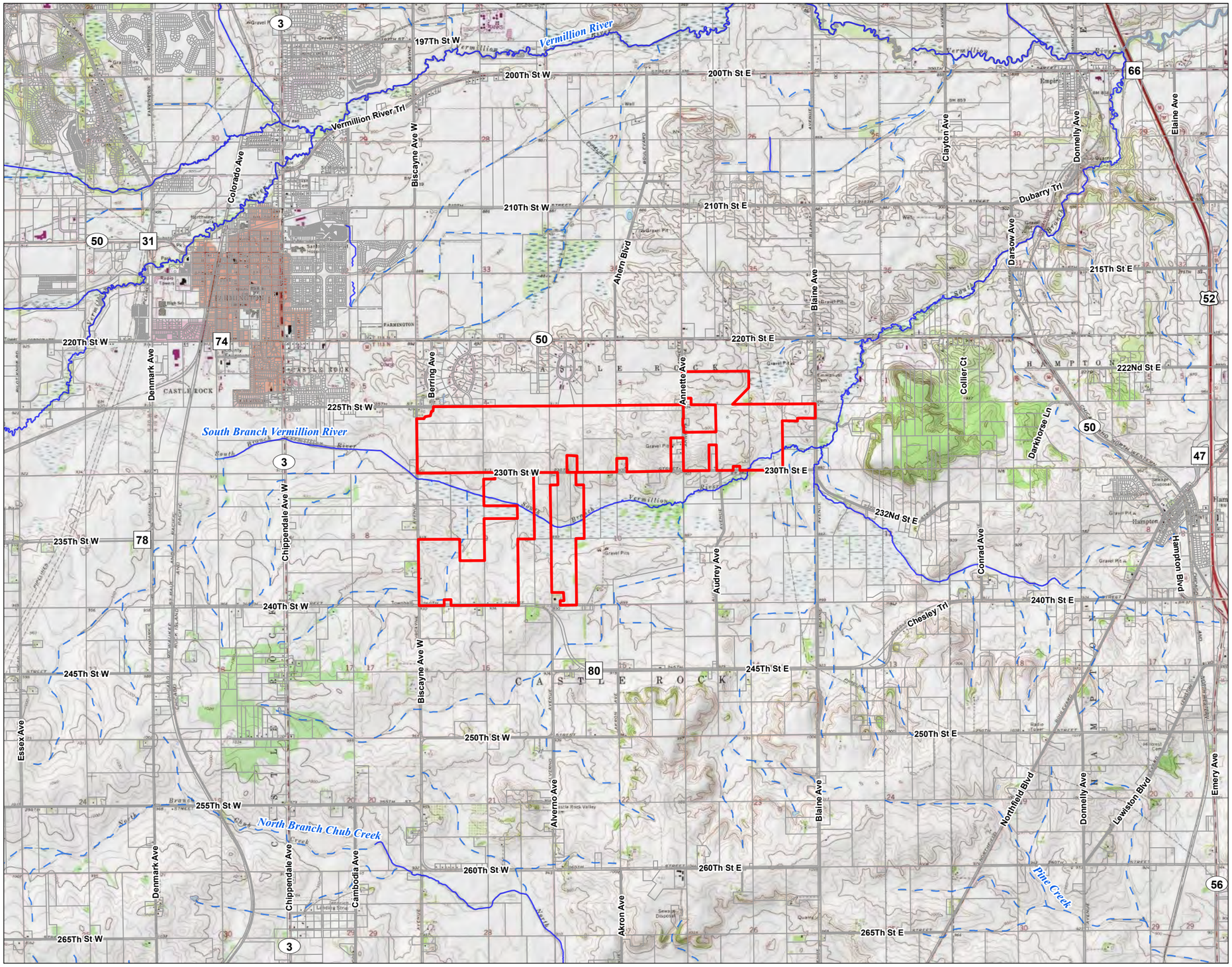


Figure No.
1

DRAFT

Title
Location Map

Client/Project 193709215
Matrix Renewables USA LLC
Solar Stone Castle Rock

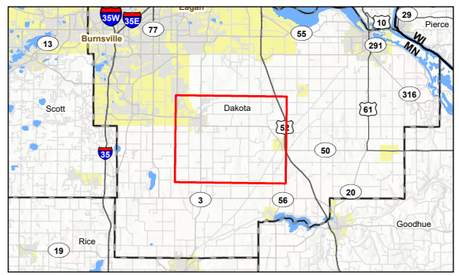
Project Location
T. of Castle Rock
Dakota Co., MN

Prepared by KNT on 2024-08-02
TR by JMD on 2024-08-02
IR by JK on 2024-08-02

N

0 2,000 4,000 Feet
(At original document size of 11x17)
1:48,000

Legend
- Project Boundary
- Parcel Boundary
- Perennial Stream
- Intermittent Stream
- Waterbody



Notes
1. Coordinate System: NAD 1983 StatePlane Minnesota South FIPS 2203 Feet
2. Data Sources: Stantec, Matrix Renewables, USA, NADS, Dakota Co., FEMA, USGS, HIFLD, NPMS
3. Background: NAIP 2023

Stantec

A.2 FIRM PANEL

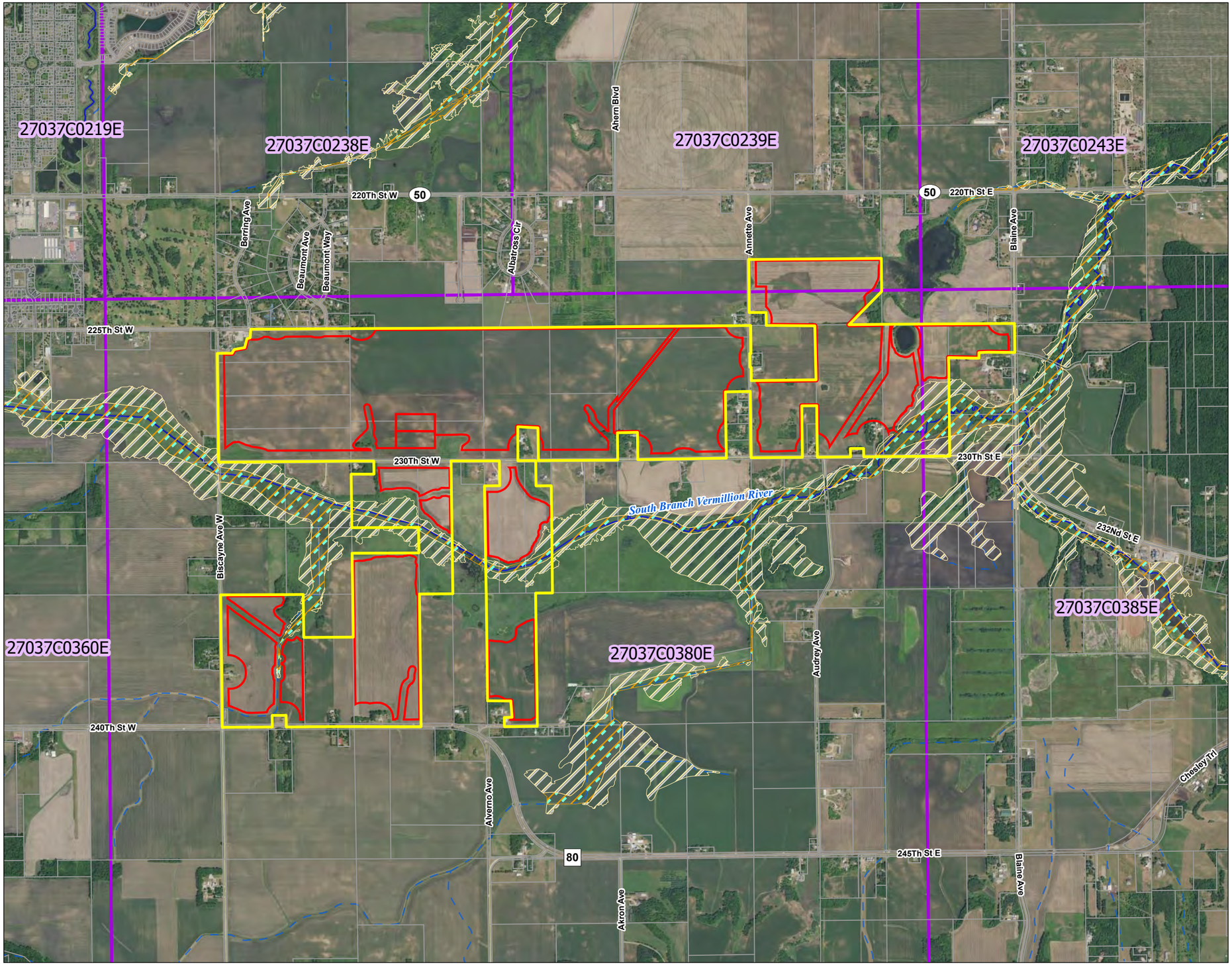


Figure No.
2

DRAFT

Title
Floodplain Location Map to Project Boundary

Client/Project 193709215
Matrix Renewables USA LLC
Solar Stone Castle Rock

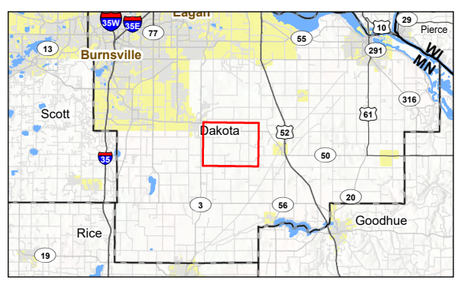
Project Location
T. of Castle Rock
Dakota Co., MN

Prepared by KNT on 2024-08-02
TR by JMD on 2024-08-02
IR by JK on 2024-08-02

N

0 1,000 2,000 Feet
(At original document size of 11x17)
1:24,000

Legend
- Project Boundary
- Parcel Boundary
- Perennial Stream
- Intermittent Stream
- Waterbody
- FIRM Panels
- Floodway
- 100-year Floodplain
- Fence



Notes
1. Coordinate System: NAD 1983 StatePlane Minnesota South FIPS 2203 Feet
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Stantec

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The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 15. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

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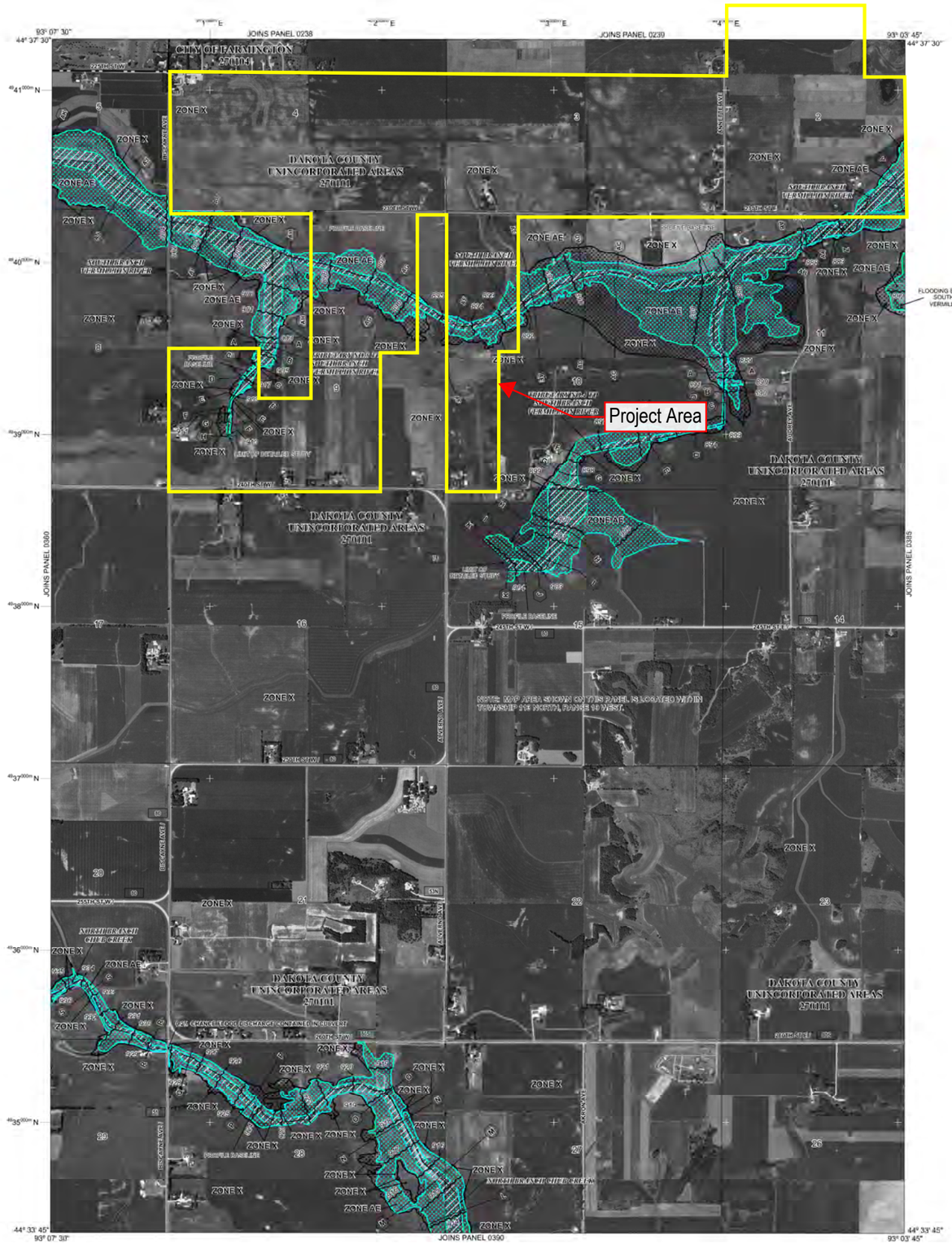

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
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COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
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- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

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- 4989000mN — 1000-meter Universal Transverse Mercator grid values, zone 15
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
DECEMBER 2, 2011

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction

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MAP SCALE 1" = 1000'

500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0380E

FIRM

FLOOD INSURANCE RATE MAP

DAKOTA COUNTY, MINNESOTA
AND INCORPORATED AREAS

PANEL 380 OF 525

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
DAKOTA COUNTY	270101	0380	E
FARMINGTON, CITY OF	270104	0380	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
27037C0380E

EFFECTIVE DATE
DECEMBER 2, 2011

Federal Emergency Management Agency

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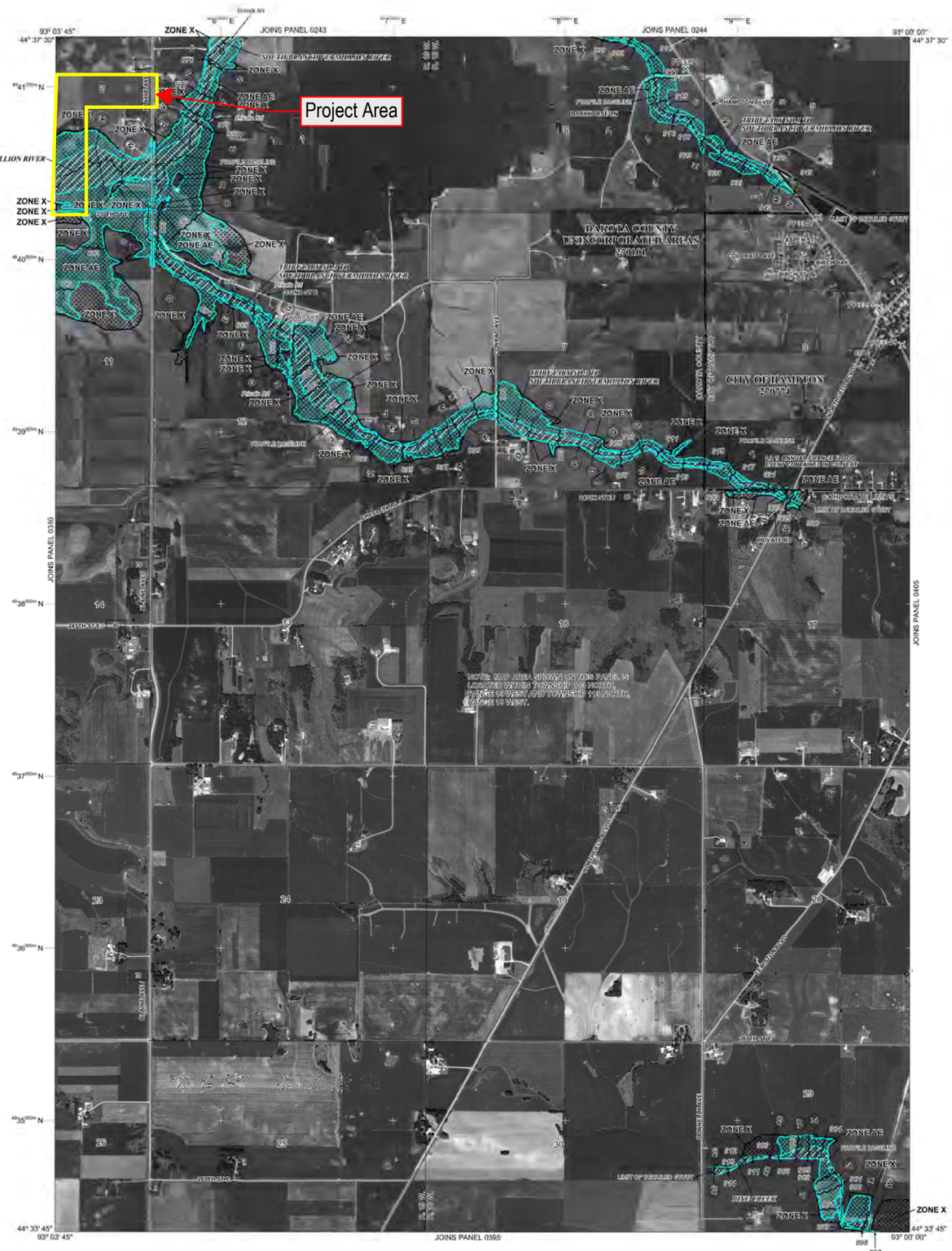

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ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

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OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

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300 0 300 600 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0385E

FIRM

FLOOD INSURANCE RATE MAP

DAKOTA COUNTY, MINNESOTA
AND INCORPORATED AREAS

PANEL 385 OF 525

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
DAKOTA COUNTY	270101	0385	E
HAMPTON, CITY OF	270774	0385	E

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MAP NUMBER
27037C0385E

EFFECTIVE DATE
DECEMBER 2, 2011

Federal Emergency Management Agency

A.3 NRCS SOIL MAP AND REPORT

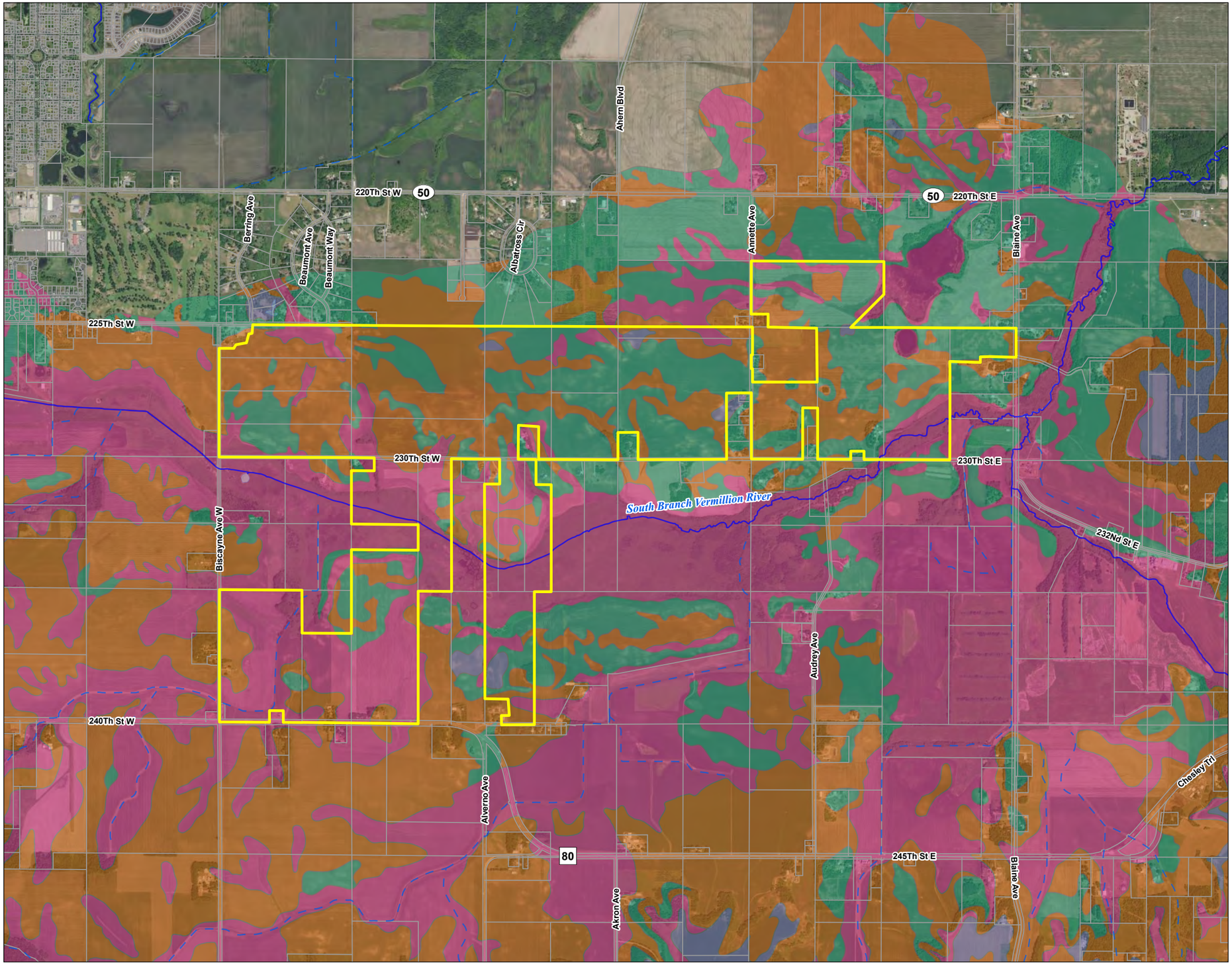

Figure No.
3

DRAFT

Title
NRCS Soil Map

Client/Project
Matrix Renewables USA LLC
Solar Stone Castle Rock

193709215

Project Location
T. of Castle Rock
Dakota Co., MN

Prepared by KNT on 2024-08-02
TR by JMD on 2024-08-02
IR by JK on 2024-08-02

N

0 1,000 2,000 Feet
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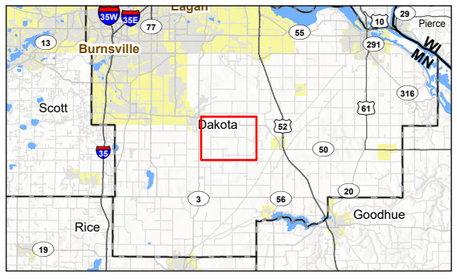
1:24,000

Legend
- Project Boundary
- Parcel Boundary
- Perennial Stream
- Intermittent Stream
- Waterbody

NRCS Soil Rating
- HSG A
- HSG B
- HSG C
- HSG D



Notes
1. Coordinate System: NAD 1983 StatePlane Minnesota South FIPS 2203 Feet
2. Data Sources: Stantec, Matrix Renewables, USA, NADS, Dakota Co., FEMA, USGS
3. Background: NAIP 2023

Stantec

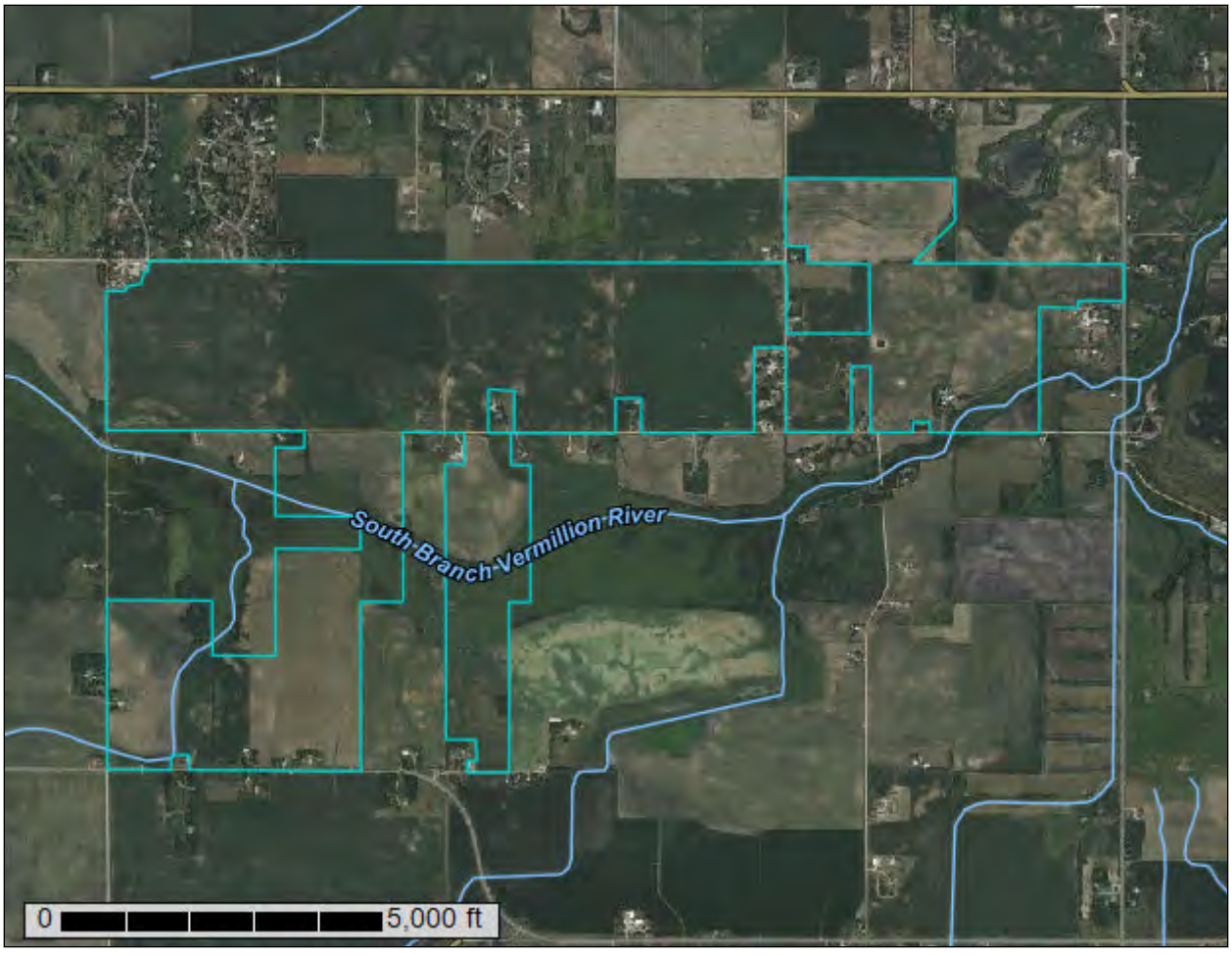
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Dakota County, Minnesota



July 25, 2024

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

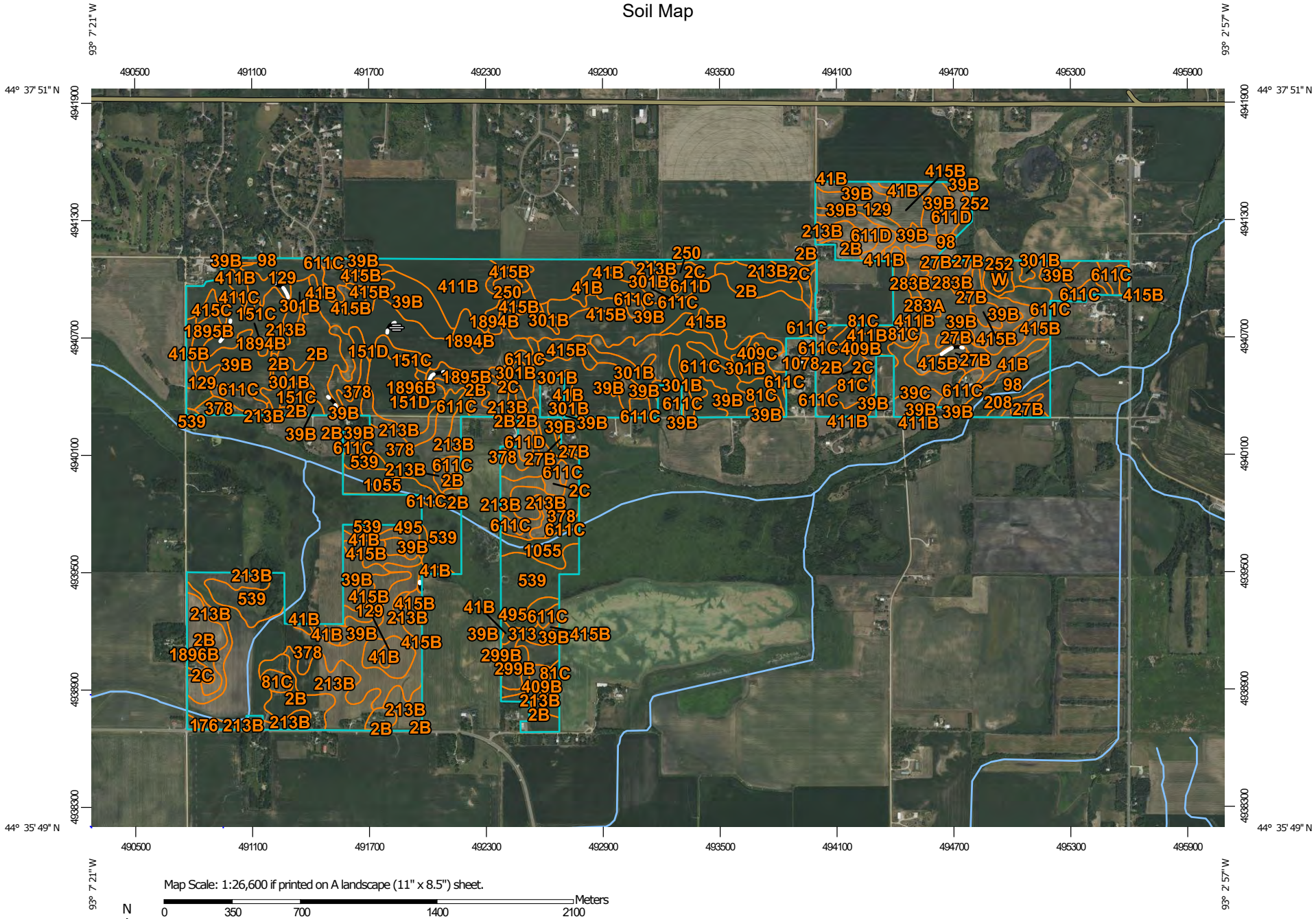
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Dakota County, Minnesota
Survey Area Data: Version 19, Sep 9, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 29, 2023—Sep 13, 2023

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
2B	Ostrander loam, 1 to 6 percent slopes	110.5	8.2%
2C	Ostrander loam, 6 to 12 percent slopes	28.1	2.1%
27B	Dickinson sandy loam, 2 to 6 percent slopes	15.8	1.2%
39B	Wadena loam, 2 to 6 percent slopes	244.2	18.0%
39C	Wadena loam, 6 to 12 percent slopes	4.8	0.4%
41B	Estherville sandy loam, 2 to 6 percent slopes	33.7	2.5%
81B	Boone loamy fine sand, 2 to 6 percent slopes	8.0	0.6%
81C	Boone loamy fine sand, 6 to 12 percent slopes	25.5	1.9%
98	Colo silt loam, occasionally flooded	17.4	1.3%
129	Cylinder loam, 0 to 2 percent slopes	28.2	2.1%
151C	Burkhardt sandy loam, 6 to 12 percent slopes	6.5	0.5%
151D	Burkhardt sandy loam, 12 to 18 percent slopes	7.1	0.5%
176	Garwin silty clay loam	0.6	0.0%
208	Kato silty clay loam	5.6	0.4%
213B	Klinger silt loam, 1 to 5 percent slopes	98.0	7.2%
250	Kennebec silt loam	5.9	0.4%
252	Marshan silty clay loam	6.3	0.5%
283A	Plainfield loamy sand, 0 to 2 percent slopes	2.7	0.2%
283B	Plainfield loamy sand, 2 to 6 percent slopes	4.9	0.4%
299B	Rockton loam, 2 to 6 percent slopes	5.5	0.4%
301B	Lindstrom silt loam, till plain, 2 to 6 percent slopes	46.1	3.4%
313	Spillville loam, 0 to 2 percent slopes, occasionally flooded	4.6	0.3%
378	Maxfield silty clay loam	131.5	9.7%
409B	Etter fine sandy loam, 2 to 6 percent slopes	13.0	1.0%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
409C	Etter fine sandy loam, 6 to 12 percent slopes	6.0	0.4%
411B	Waukegan silt loam, 1 to 6 percent slopes	76.9	5.7%
411C	Waukegan silt loam, 6 to 12 percent slopes	2.4	0.2%
415B	Kanaranzi loam, 2 to 6 percent slopes	87.9	6.5%
415C	Kanaranzi loam, 6 to 12 percent slopes	3.2	0.2%
495	Zumbro fine sandy loam	9.8	0.7%
539	Klossner muck, 0 to 1 percent slopes	56.6	4.2%
611C	Hawick gravelly sandy loam, 6 to 12 percent slopes	114.8	8.5%
611D	Hawick gravelly sandy loam, 12 to 20 percent slopes	13.5	1.0%
1055	Aquolls and Histosols, ponded	24.5	1.8%
1078	Anthroportic Udorthents, 2 to 9 percent slopes	1.7	0.1%
1894B	Winnebago loam, 2 to 6 percent slopes	26.5	2.0%
1895B	Carmi loam, 2 to 8 percent slopes	7.1	0.5%
1896B	Ostrander-Carmi loams, 2 to 6 percent slopes	67.8	5.0%
W	Water	1.9	0.1%
Totals for Area of Interest		**1,355.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion

of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Dakota County, Minnesota

2B—Ostrander loam, 1 to 6 percent slopes

Map Unit Setting

National map unit symbol: f9xz
Elevation: 850 to 1,120 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Ostrander and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ostrander

Setting

Landform: Moraines
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over till

Typical profile

Ap,A,AB - 0 to 17 inches: loam
2Bw - 17 to 53 inches: loam
2C - 53 to 60 inches: loam

Properties and qualities

Slope: 1 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Available water supply, 0 to 60 inches: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: R104XY005IA - Loamy Upland Prairie
Forage suitability group: Sloping Upland, Neutral (G104XN002MN)
Other vegetative classification: Sloping Upland, Neutral (G104XN002MN)
Hydric soil rating: No

Minor Components

Dickinson

Percent of map unit: 8 percent

Hydric soil rating: No

Klinger

Percent of map unit: 7 percent
Hydric soil rating: No

2C—Ostrander loam, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: f9y0
Elevation: 840 to 1,120 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Ostrander and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ostrander

Setting

Landform: Moraines
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over till

Typical profile

Ap,A - 0 to 13 inches: loam
2Bw - 13 to 53 inches: loam
2C - 53 to 60 inches: loam

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B

Ecological site: R104XY005IA - Loamy Upland Prairie
Forage suitability group: Sloping Upland, Neutral (G104XN002MN)
Other vegetative classification: Sloping Upland, Neutral (G104XN002MN)
Hydric soil rating: No

Minor Components

Dickinson
Percent of map unit: 8 percent
Hydric soil rating: No

Klinger
Percent of map unit: 7 percent
Hydric soil rating: No

27B—Dickinson sandy loam, 2 to 6 percent slopes

Map Unit Setting
National map unit symbol: f9xn
Elevation: 800 to 1,500 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Dickinson and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dickinson

Setting
Landform: Outwash plains
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Outwash

Typical profile
Ap,A,AB - 0 to 15 inches: sandy loam
Bw - 15 to 24 inches: sandy loam
BC,C - 24 to 60 inches: sand

Properties and qualities
Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Ecological site: R104XY010IA - Sandy Upland Prairie
Forage suitability group: Sloping Upland, Low AWC, Acid (G091XN008MN)
Other vegetative classification: Sloping Upland, Low AWC, Acid (G091XN008MN)
Hydric soil rating: No

Minor Components

Hubbard

Percent of map unit: 4 percent
Hydric soil rating: No

Sparta

Percent of map unit: 3 percent
Hydric soil rating: No

Zumbro

Percent of map unit: 3 percent
Hydric soil rating: No

39B—Wadena loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2wd86
Elevation: 690 to 1,840 feet
Mean annual precipitation: 24 to 37 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 140 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Wadena and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wadena

Setting

Landform: Outwash plains, terraces
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy glaciofluvial deposits over sandy and gravelly outwash

Typical profile

Ap - 0 to 7 inches: loam
A - 7 to 17 inches: loam
Bw - 17 to 30 inches: loam
2C - 30 to 79 inches: gravelly loamy coarse sand

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: R103XY003MN - Sandy Upland Prairies
Forage suitability group: Sloping Upland, Neutral (G103XS002MN)
Other vegetative classification: Sloping Upland, Neutral (G103XS002MN)
Hydric soil rating: No

Minor Components

Estherville

Percent of map unit: 10 percent
Landform: Outwash plains, terraces
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R103XY003MN - Sandy Upland Prairies
Other vegetative classification: Sandy (G103XS022MN)
Hydric soil rating: No

Dickinson

Percent of map unit: 5 percent
Landform: Outwash plains, terraces
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R103XY003MN - Sandy Upland Prairies
Other vegetative classification: Sloping Upland, Neutral (G103XS002MN)
Hydric soil rating: No

39C—Wadena loam, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: 2wd87
Elevation: 690 to 1,840 feet
Mean annual precipitation: 24 to 37 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Wadena and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wadena

Setting

Landform: Outwash plains, terraces
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy glaciofluvial deposits over sandy and gravelly outwash

Typical profile

Ap - 0 to 7 inches: loam
A - 7 to 17 inches: loam
Bw - 17 to 30 inches: loam
2C - 30 to 79 inches: gravelly loamy coarse sand

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: R103XY003MN - Sandy Upland Prairies
Forage suitability group: Sloping Upland, Neutral (G103XS002MN)

Other vegetative classification: Sloping Upland, Neutral (G103XS002MN)
Hydric soil rating: No

Minor Components

Estherville

Percent of map unit: 10 percent
Landform: Outwash plains, terraces
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R103XY003MN - Sandy Upland Prairies
Other vegetative classification: Sandy (G103XS022MN)
Hydric soil rating: No

Dickinson

Percent of map unit: 5 percent
Landform: Outwash plains, terraces
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R103XY003MN - Sandy Upland Prairies
Other vegetative classification: Sloping Upland, Neutral (G103XS002MN)
Hydric soil rating: No

41B—Estherville sandy loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2tsjp
Elevation: 690 to 1,840 feet
Mean annual precipitation: 24 to 37 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Estherville and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Estherville

Setting

Landform: Outwash plains, terraces
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Linear

Parent material: Loamy glaciofluvial deposits over sandy and gravelly outwash

Typical profile

Ap - 0 to 8 inches: sandy loam
A - 8 to 13 inches: sandy loam
Bw - 13 to 19 inches: sandy loam
2C - 19 to 79 inches: gravelly loamy coarse sand

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: R103XY003MN - Sandy Upland Prairies
Forage suitability group: Sandy (G103XS022MN)
Other vegetative classification: Sandy (G103XS022MN)
Hydric soil rating: No

Minor Components

Dickinson

Percent of map unit: 8 percent
Landform: Outwash plains, terraces
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R103XY003MN - Sandy Upland Prairies
Other vegetative classification: Sloping Upland, Neutral (G103XS002MN)
Hydric soil rating: No

Wadena

Percent of map unit: 6 percent
Landform: Outwash plains, terraces
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R103XY003MN - Sandy Upland Prairies
Other vegetative classification: Sloping Upland, Neutral (G103XS002MN)
Hydric soil rating: No

Biscay

Percent of map unit: 1 percent
Landform: Outwash plains, terraces

Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R103XY007MN - Sandy Wet Prairies
Other vegetative classification: Level Swale, Neutral (G103XS001MN)
Hydric soil rating: Yes

81B—Boone loamy fine sand, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: f9zr
Elevation: 700 to 1,400 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Boone and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Boone

Setting

Landform: Hills
Landform position (two-dimensional): Summit
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Siliceous sandy residuum

Typical profile

A - 0 to 3 inches: loamy fine sand
AC - 3 to 8 inches: loamy fine sand
C - 8 to 24 inches: fine sand
Cr - 24 to 60 inches: weathered bedrock

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s

Hydrologic Soil Group: A
Ecological site: F105XY019WI - Dry Upland
Forage suitability group: Sandy (G104XN022MN)
Other vegetative classification: Sandy (G104XN022MN)
Hydric soil rating: No

Minor Components

Etter
Percent of map unit: 10 percent
Hydric soil rating: No

81C—Boone loamy fine sand, 6 to 12 percent slopes

Map Unit Setting
National map unit symbol: f9zs
Elevation: 700 to 1,400 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition
Boone and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Boone

Setting
Landform: Hills
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Siliceous sandy residuum

Typical profile
A - 0 to 3 inches: loamy fine sand
AC - 3 to 8 inches: loamy fine sand
C - 8 to 24 inches: fine sand
Cr - 24 to 60 inches: weathered bedrock

Properties and qualities
Slope: 6 to 12 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Available water supply, 0 to 60 inches: Very low (about 1.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Ecological site: F105XY019WI - Dry Upland
Forage suitability group: Sandy (G104XN022MN)
Other vegetative classification: Sandy (G104XN022MN)
Hydric soil rating: No

Minor Components

Etter

Percent of map unit: 10 percent
Hydric soil rating: No

98—Colo silt loam, occasionally flooded

Map Unit Setting

National map unit symbol: fb0m
Elevation: 500 to 1,400 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: Prime farmland if protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Colo, occasionally flooded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Colo, Occasionally Flooded

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A1,A2 - 0 to 20 inches: silt loam
A3,A4,A5 - 20 to 54 inches: silty clay loam
C - 54 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very high (about 12.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Ecological site: R108XC527IA - Wet Floodplain Sedge Meadow
Forage suitability group: Level Swale, Neutral (G105XN001MN)
Other vegetative classification: Level Swale, Neutral (G105XN001MN)
Hydric soil rating: Yes

Minor Components

Lawson

Percent of map unit: 5 percent
Hydric soil rating: No

Garwin

Percent of map unit: 5 percent
Landform: Drainageways on moraines
Hydric soil rating: Yes

Maxfield

Percent of map unit: 5 percent
Landform: Drainageways on moraines
Hydric soil rating: Yes

129—Cylinder loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2wd84
Elevation: 690 to 1,840 feet
Mean annual precipitation: 24 to 37 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 140 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Cylinder and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cylinder

Setting

Landform: Outwash plains, terraces

Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Fine-loamy glaciofluvial deposits over sandy and gravelly outwash

Typical profile

Ap - 0 to 8 inches: loam
A - 8 to 19 inches: loam
Bg - 19 to 34 inches: sandy loam
2C - 34 to 79 inches: gravelly loamy coarse sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: B/D
Ecological site: R103XY003MN - Sandy Upland Prairies
Forage suitability group: Level Swale, Neutral (G103XS001MN)
Other vegetative classification: Level Swale, Neutral (G103XS001MN)
Hydric soil rating: No

Minor Components

Biscay

Percent of map unit: 10 percent
Landform: Outwash plains, terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R103XY007MN - Sandy Wet Prairies
Other vegetative classification: Level Swale, Neutral (G103XS001MN)
Hydric soil rating: Yes

Biscay, depressional

Percent of map unit: 5 percent
Landform: Depressions on outwash plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Ecological site: R103XY015MN - Depressional Marsh
Other vegetative classification: Ponded If Not Drained (G103XS013MN)
Hydric soil rating: Yes

151C—Burkhardt sandy loam, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: f9wd
Elevation: 700 to 1,900 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Burkhardt and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Burkhardt

Setting

Landform: Outwash plains
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Outwash

Typical profile

A,AB - 0 to 12 inches: sandy loam
Bw,BC - 12 to 22 inches: sandy loam
2C - 22 to 60 inches: gravelly coarse sand

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: R104XY010IA - Sandy Upland Prairie
Forage suitability group: Sandy (G104XN022MN)
Other vegetative classification: Sandy (G104XN022MN)
Hydric soil rating: No

Minor Components

Carmi

Percent of map unit: 5 percent
Hydric soil rating: No

151D—Burkhardt sandy loam, 12 to 18 percent slopes

Map Unit Setting

National map unit symbol: f9wf
Elevation: 700 to 1,900 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Burkhardt and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Burkhardt

Setting

Landform: Outwash plains
Landform position (two-dimensional): Shoulder
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Outwash

Typical profile

A,AB - 0 to 12 inches: sandy loam
Bw,BC - 12 to 22 inches: sandy loam
2C - 22 to 60 inches: gravelly coarse sand

Properties and qualities

Slope: 12 to 18 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A

Ecological site: R104XY010IA - Sandy Upland Prairie
Forage suitability group: Sandy (G104XN022MN)
Other vegetative classification: Sandy (G104XN022MN)
Hydric soil rating: No

Minor Components

Carmi
Percent of map unit: 5 percent
Hydric soil rating: No

176—Garwin silty clay loam

Map Unit Setting
National map unit symbol: f9wl
Elevation: 700 to 1,400 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: Prime farmland if drained

Map Unit Composition
Garwin and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Garwin

Setting
Landform: Swales on moraines
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loess

Typical profile
Ap,A - 0 to 14 inches: silty clay loam
Bwg - 14 to 37 inches: silty clay loam
BCg,Cg - 37 to 60 inches: silt loam

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Very high (about 12.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Ecological site: R104XY006IA - Wet Loamy Upland Prairie
Forage suitability group: Level Swale, Neutral (G104XN001MN)
Other vegetative classification: Level Swale, Neutral (G104XN001MN)
Hydric soil rating: Yes

Minor Components

Colo

Percent of map unit: 5 percent
Landform: Flood plains
Hydric soil rating: Yes

Joy

Percent of map unit: 5 percent
Hydric soil rating: No

208—Kato silty clay loam

Map Unit Setting

National map unit symbol: f9x7
Elevation: 750 to 1,100 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Kato and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kato

Setting

Landform: Flats on outwash plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Outwash

Typical profile

Ap,A,ABg - 0 to 23 inches: silty clay loam
Bg - 23 to 30 inches: silt loam
2BCg - 30 to 33 inches: loamy sand
2Cg - 33 to 60 inches: sand

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Ecological site: F090AY004WI - Loamy Floodplain
Forage suitability group: Level Swale, Neutral (G104XN001MN)
Other vegetative classification: Level Swale, Neutral (G104XN001MN)
Hydric soil rating: Yes

Minor Components

Cylinder

Percent of map unit: 5 percent
Hydric soil rating: No

213B—Klinger silt loam, 1 to 5 percent slopes

Map Unit Setting

National map unit symbol: f9x8
Elevation: 1,200 to 1,400 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Klinger and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Klinger

Setting

Landform: Moraines
Landform position (two-dimensional): Footslope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loess over till

Typical profile

Ap,A - 0 to 13 inches: silt loam

Bt - 13 to 28 inches: silt loam
2Bt,2Bw - 28 to 55 inches: loam
2C - 55 to 60 inches: loam

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B/D
Forage suitability group: Sloping Upland, Acid (G104XN006MN)
Other vegetative classification: Sloping Upland, Acid (G104XN006MN)
Hydric soil rating: No

Minor Components

Maxfield

Percent of map unit: 5 percent
Landform: Drainageways on moraines
Hydric soil rating: Yes

Ostrander

Percent of map unit: 5 percent
Hydric soil rating: No

250—Kennebec silt loam

Map Unit Setting

National map unit symbol: f9xc
Elevation: 600 to 1,300 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Kennebec and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kennebec

Setting

Landform: Outwash plains
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

Ap,A1,A2 - 0 to 41 inches: silt loam
C - 41 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very high (about 13.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: C
Ecological site: F090AY004WI - Loamy Floodplain
Forage suitability group: Sloping Upland, Acid (G104XN006MN)
Other vegetative classification: Sloping Upland, Acid (G104XN006MN)
Hydric soil rating: No

252—Marshan silty clay loam

Map Unit Setting

National map unit symbol: f9xg
Elevation: 670 to 1,100 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Marshan and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Marshan

Setting

Landform: Flats on stream terraces, flats on outwash plains
Down-slope shape: Linear

Across-slope shape: Linear
Parent material: Glaciolacustrine sediments over outwash

Typical profile

A1,A2 - 0 to 14 inches: silty clay loam
BA,Bg - 14 to 32 inches: loam
2C - 32 to 60 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Ecological site: F090AY006WI - Wet Loamy Lowland
Forage suitability group: Level Swale, Neutral (G104XN001MN)
Other vegetative classification: Level Swale, Neutral (G104XN001MN)
Hydric soil rating: Yes

Minor Components

Cylinder

Percent of map unit: 10 percent
Hydric soil rating: No

283A—Plainfield loamy sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: f9xp
Elevation: 700 to 1,200 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Plainfield and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Plainfield

Setting

Landform: Stream terraces, outwash plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Outwash

Typical profile

A - 0 to 4 inches: loamy sand
Bw,BC,C - 4 to 60 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.2 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Ecological site: F090AY019WI - Dry Sandy Uplands
Forage suitability group: Sandy (G104XN022MN)
Other vegetative classification: Sandy (G104XN022MN)
Hydric soil rating: No

Minor Components

Dickinson

Percent of map unit: 5 percent
Hydric soil rating: No

283B—Plainfield loamy sand, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: f9xq
Elevation: 700 to 1,200 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Plainfield and similar soils: 95 percent

Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Plainfield

Setting
Landform: Stream terraces, outwash plains
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Outwash

Typical profile
A - 0 to 4 inches: loamy sand
Bw,BC,C - 4 to 60 inches: sand

Properties and qualities
Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.2 inches)

Interpretive groups
Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Ecological site: F090AY019WI - Dry Sandy Uplands
Forage suitability group: Sandy (G091XN022MN)
Other vegetative classification: Sandy (G091XN022MN)
Hydric soil rating: No

Minor Components

Dickinson
Percent of map unit: 5 percent
Hydric soil rating: No

299B—Rockton loam, 2 to 6 percent slopes

Map Unit Setting
National map unit symbol: f9xx
Elevation: 690 to 1,050 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Rockton and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rockton

Setting

Landform: Hills
Landform position (two-dimensional): Summit
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Alluvial sediments over bedrock

Typical profile

A,AB - 0 to 16 inches: loam
Bt - 16 to 35 inches: clay loam
2R - 35 to 60 inches: weathered bedrock

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R104XY002IA - Bedrock Prairie
Forage suitability group: Sloping Upland, Low AWC, Acid (G104XN008MN)
Other vegetative classification: Sloping Upland, Low AWC, Acid (G104XN008MN)
Hydric soil rating: No

301B—Lindstrom silt loam, till plain, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2zwnx
Elevation: 520 to 1,310 feet
Mean annual precipitation: 11 to 41 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 155 to 210 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Lindstrom and similar soils: 85 percent
Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lindstrom

Setting

Landform: Alluvial fans, stream terraces, drainageways
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Silty slope alluvium

Typical profile

Ap - 0 to 9 inches: silt loam
A1 - 9 to 16 inches: silt loam
A2 - 16 to 29 inches: silt loam
Bw - 29 to 60 inches: silt loam
C - 60 to 79 inches: silt loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very high (about 13.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: R104XY015IA - Terrace Savanna
Forage suitability group: Sloping Upland, Neutral (G104XS002MN)
Other vegetative classification: Sloping Upland, Neutral (G104XS002MN)
Hydric soil rating: No

Minor Components

Littleton, till substratum

Percent of map unit: 5 percent
Landform: Stream terraces, drainageways
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: R108XC519IA - Wet Upland Drainageway Prairie
Other vegetative classification: Sloping Upland, Neutral (G104XS002MN)
Hydric soil rating: No

Clyde, frequently flooded

Percent of map unit: 5 percent
Landform: Drainageways, alluvial fans, stream terraces
Landform position (two-dimensional): Footslope, toeslope

Landform position (three-dimensional): Base slope, tread
Down-slope shape: Concave, convex
Across-slope shape: Concave, linear
Ecological site: R104XY012IA - Wet Upland Drainageway Sedge Meadow
Other vegetative classification: Level Swale, Neutral (G104XS001MN)
Hydric soil rating: Yes

Terril

Percent of map unit: 5 percent
Landform: Alluvial fans, stream terraces, drainageways
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Convex, concave, linear
Across-slope shape: Linear
Ecological site: R104XY015IA - Terrace Savanna
Other vegetative classification: Sloping Upland, Neutral (G104XS002MN)
Hydric soil rating: No

313—Spillville loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 2xl22
Elevation: 520 to 1,310 feet
Mean annual precipitation: 23 to 41 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 155 to 210 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Spillville, occasionally flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Spillville, Occasionally Flooded

Setting

Landform: Flood-plain steps
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Fine-loamy alluvium

Typical profile

Ap - 0 to 8 inches: loam
A - 8 to 54 inches: loam
C - 54 to 79 inches: sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained

Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: About 12 to 42 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Ecological site: F104XY020IA - Loamy Floodplain Forest
Hydric soil rating: No

Minor Components

Sigglekov, frequently flooded
Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F104XY021IA - Sandy Floodplain Forest
Hydric soil rating: Yes

Coland, occasionally flooded
Percent of map unit: 5 percent
Landform: Flood-plain steps
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R104XY018IA - Wet Floodplain Sedge Meadow
Hydric soil rating: Yes

378—Maxfield silty clay loam

Map Unit Setting
National map unit symbol: f9yf
Elevation: 800 to 1,200 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: Prime farmland if drained

Map Unit Composition
Maxfield and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Maxfield

Setting

Landform: Swales on moraines
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loess over till

Typical profile

Ap,A,AB - 0 to 21 inches: silty clay loam
Bg - 21 to 27 inches: silty clay loam
2Bg - 27 to 30 inches: loam
2C - 30 to 60 inches: loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Available water supply, 0 to 60 inches: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Ecological site: R104XY006IA - Wet Loamy Upland Prairie
Forage suitability group: Level Swale, Neutral (G104XN001MN)
Other vegetative classification: Level Swale, Neutral (G104XN001MN)
Hydric soil rating: Yes

Minor Components

Colo

Percent of map unit: 5 percent
Landform: Flood plains
Hydric soil rating: Yes

Klinger

Percent of map unit: 5 percent
Hydric soil rating: No

409B—Etter fine sandy loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: f9yq
Elevation: 850 to 1,030 feet

Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Etter and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Etter

Setting

Landform: Hills
Landform position (two-dimensional): Summit
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Glacial drift over sandy residuum

Typical profile

Ap,A - 0 to 15 inches: fine sandy loam
Bw - 15 to 21 inches: fine sandy loam
2C - 21 to 60 inches: fine sand

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: R104XY010IA - Sandy Upland Prairie
Forage suitability group: Sloping Upland, Acid (G104XN006MN)
Other vegetative classification: Sloping Upland, Acid (G104XN006MN)
Hydric soil rating: No

Minor Components

Wadena

Percent of map unit: 10 percent
Hydric soil rating: No

409C—Etter fine sandy loam, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: f9yr
Elevation: 850 to 1,070 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Etter and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Etter

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Glacial drift over sandy residuum

Typical profile

Ap,A - 0 to 15 inches: fine sandy loam
Bw - 15 to 21 inches: fine sandy loam
2C - 21 to 60 inches: fine sand

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R104XY010IA - Sandy Upland Prairie
Forage suitability group: Sloping Upland, Acid (G104XN006MN)
Other vegetative classification: Sloping Upland, Acid (G104XN006MN)
Hydric soil rating: No

Minor Components

Wadena

Percent of map unit: 10 percent
Hydric soil rating: No

411B—Waukegan silt loam, 1 to 6 percent slopes

Map Unit Setting

National map unit symbol: f9yt
Elevation: 900 to 1,400 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Waukegan and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Waukegan

Setting

Landform: Stream terraces, outwash plains
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Glaciofluvial sediments over outwash

Typical profile

Ap,AB - 0 to 13 inches: silt loam
Bt - 13 to 28 inches: silt loam
2BC - 28 to 42 inches: gravelly sand
2C - 42 to 60 inches: gravelly sand

Properties and qualities

Slope: 1 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F090AY014WI - Loamy Bedrock Upland
Forage suitability group: Sloping Upland, Acid (G091XN006MN)
Other vegetative classification: Sloping Upland, Acid (G091XN006MN)
Hydric soil rating: No

Minor Components

Estherville
Percent of map unit: 5 percent
Hydric soil rating: No

Kanaranzi
Percent of map unit: 5 percent
Hydric soil rating: No

411C—Waukegan silt loam, 6 to 12 percent slopes

Map Unit Setting
National map unit symbol: f9yv
Elevation: 900 to 1,400 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Waukegan and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Waukegan

Setting
Landform: Stream terraces, outwash plains
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Glaciofluvial sediments over outwash

Typical profile
Ap,AB - 0 to 13 inches: silt loam
Bt - 13 to 28 inches: silt loam
2BC - 28 to 42 inches: gravelly sand
2C - 42 to 60 inches: gravelly sand

Properties and qualities
Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F090AY014WI - Loamy Bedrock Upland
Forage suitability group: Sloping Upland, Acid (G091XN006MN)
Other vegetative classification: Sloping Upland, Acid (G091XN006MN)
Hydric soil rating: No

Minor Components

Kanaranzi

Percent of map unit: 10 percent
Hydric soil rating: No

415B—Kanaranzi loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: f9yy
Elevation: 700 to 1,600 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Kanaranzi and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kanaranzi

Setting

Landform: Outwash plains
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Outwash

Typical profile

Ap - 0 to 9 inches: loam
Bw - 9 to 19 inches: silt loam
2BC - 19 to 23 inches: loamy sand
2C - 23 to 60 inches: coarse sand

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: R103XY003MN - Sandy Upland Prairies
Forage suitability group: Sloping Upland, Low AWC, Acid (G104XN008MN)
Other vegetative classification: Sloping Upland, Low AWC, Acid (G104XN008MN)
Hydric soil rating: No

415C—Kanaranzi loam, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: f9yz
Elevation: 700 to 1,600 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Kanaranzi and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kanaranzi

Setting

Landform: Outwash plains
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Outwash

Typical profile

Ap - 0 to 9 inches: loam
Bw - 9 to 19 inches: silt loam
2BC - 19 to 23 inches: loamy sand
2C - 23 to 60 inches: coarse sand

Properties and qualities

Slope: 6 to 12 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R103XY003MN - Sandy Upland Prairies
Forage suitability group: Sloping Upland, Low AWC, Acid (G104XN008MN)
Other vegetative classification: Sloping Upland, Low AWC, Acid (G104XN008MN)
Hydric soil rating: No

495—Zumbro fine sandy loam

Map Unit Setting

National map unit symbol: f9z9
Elevation: 680 to 1,570 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Zumbro and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Zumbro

Setting

Landform: Flood plains, outwash plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

Ap,A1 - 0 to 18 inches: fine sandy loam
A2,A3 - 18 to 56 inches: loamy fine sand
Bw - 56 to 60 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: Moderate (about 7.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: F090AY003WI - Sandy Floodplain
Forage suitability group: Sloping Upland, Low AWC, Neutral (G104XN004MN)
Other vegetative classification: Sloping Upland, Low AWC, Neutral (G104XN004MN)
Hydric soil rating: No

539—Klossner muck, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2s8wz
Elevation: 690 to 1,840 feet
Mean annual precipitation: 24 to 37 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Klossner, drained, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Klossner, Drained

Setting

Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Organic material over alluvium

Typical profile

Oap - 0 to 9 inches: muck
Oa - 9 to 27 inches: muck
2A - 27 to 46 inches: silty clay loam
2Cg - 46 to 79 inches: silty clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 2.00 in/hr)
Depth to water table: About 0 to 6 inches

Frequency of flooding: None
Frequency of ponding: Occasional
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very high (about 17.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: R103XY016MN - Organic Marsh
Forage suitability group: Organic (G103XS014MN)
Other vegetative classification: Organic (G103XS014MN)
Hydric soil rating: Yes

Minor Components

Canisteo

Percent of map unit: 5 percent
Landform: Rims on depressions, ground moraines
Landform position (three-dimensional): Talf
Down-slope shape: Concave, linear
Across-slope shape: Linear
Ecological site: R103XY001MN - Loamy Wet Prairies
Other vegetative classification: Level Swale, Calcareous (G103XS009MN)
Hydric soil rating: Yes

Okoboji

Percent of map unit: 5 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R103XY015MN - Depressional Marsh
Other vegetative classification: Ponded If Not Drained (G103XS013MN)
Hydric soil rating: Yes

611C—Hawick gravelly sandy loam, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: 2wd89
Elevation: 690 to 1,840 feet
Mean annual precipitation: 24 to 37 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Hawick and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hawick

Setting

Landform: Outwash plains, terraces
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy glaciofluvial deposits over sandy and gravelly outwash

Typical profile

Ap - 0 to 7 inches: gravelly sandy loam
Bw - 7 to 11 inches: gravelly loamy coarse sand
C - 11 to 79 inches: gravelly coarse sand

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (2.00 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Ecological site: R103XY003MN - Sandy Upland Prairies
Forage suitability group: Sandy (G103XS022MN)
Other vegetative classification: Sandy (G103XS022MN)
Hydric soil rating: No

Minor Components

Estherville

Percent of map unit: 10 percent
Landform: Outwash plains, terraces
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R103XY003MN - Sandy Upland Prairies
Other vegetative classification: Sandy (G103XS022MN)
Hydric soil rating: No

611D—Hawick gravelly sandy loam, 12 to 20 percent slopes

Map Unit Setting

National map unit symbol: 2wd8b
Elevation: 690 to 1,840 feet
Mean annual precipitation: 24 to 37 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Hawick and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hawick

Setting

Landform: Outwash plains, terraces
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy glaciofluvial deposits over sandy and gravelly outwash

Typical profile

Ap - 0 to 7 inches: gravelly sandy loam
Bw - 7 to 11 inches: gravelly loamy coarse sand
C - 11 to 79 inches: gravelly coarse sand

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (2.00 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: R103XY003MN - Sandy Upland Prairies
Forage suitability group: Sandy (G103XS022MN)
Other vegetative classification: Sandy (G103XS022MN)

Hydric soil rating: No

Minor Components

Estherville

Percent of map unit: 10 percent
Landform: Outwash plains, terraces
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R103XY003MN - Sandy Upland Prairies
Other vegetative classification: Sandy (G103XS022MN)
Hydric soil rating: No

1055—Aquolls and Histosols, ponded

Map Unit Setting

National map unit symbol: f9w0
Elevation: 670 to 1,030 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Aquolls, ponded, and similar soils: 55 percent
Histosols, ponded, and similar soils: 45 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Aquolls, Ponded

Setting

Landform: Depressions on moraines
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Mineral sediments

Typical profile

A - 0 to 42 inches: silty clay loam
Bg - 42 to 50 inches: clay loam
Cg - 50 to 60 inches: loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None

Frequency of ponding: Frequent
Calcium carbonate, maximum content: 20 percent
Gypsum, maximum content: 1 percent
Available water supply, 0 to 60 inches: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: B/D
Ecological site: R103XY015MN - Depressional Marsh
Forage suitability group: Not Suited (G104XN024MN)
Other vegetative classification: Not Suited (G104XN024MN)
Hydric soil rating: Yes

Description of Histosols, Ponded

Setting

Landform: Depressions on moraines
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Organic material

Typical profile

Oa1 - 0 to 8 inches: muck
Oa2 - 8 to 60 inches: muck

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: Very high (about 23.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: A/D
Ecological site: R103XY016MN - Organic Marsh
Forage suitability group: Not Suited (G104XN024MN)
Other vegetative classification: Not Suited (G104XN024MN)
Hydric soil rating: Yes

1078—Anthroportic Udorthents, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2xm97
Elevation: 520 to 1,310 feet

Mean annual precipitation: 23 to 41 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 155 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition
Anthroportic udorthents and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Anthroportic Udorthents

Setting
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Human-transported material

Typical profile
^A - 0 to 6 inches: loam
^C - 6 to 79 inches: loam

Properties and qualities
Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 1.42 in/hr)
Depth to water table: About 48 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to slightly saline (1.0 to 4.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 12.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Hydric soil rating: Unranked

1894B—Winnebago loam, 2 to 6 percent slopes

Map Unit Setting
National map unit symbol: f9x1
Elevation: 680 to 1,360 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Winnebago and similar soils: 90 percent
Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Winnebago

Setting

Landform: Moraines
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over till

Typical profile

Ap,A - 0 to 15 inches: loam
2Bt,2BC - 15 to 44 inches: sandy clay loam
2C - 44 to 60 inches: sandy loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Forage suitability group: Sloping Upland, Acid (G104XN006MN)
Other vegetative classification: Sloping Upland, Acid (G104XN006MN)
Hydric soil rating: No

Minor Components

Carmi

Percent of map unit: 5 percent
Hydric soil rating: No

Burkhardt

Percent of map unit: 5 percent
Hydric soil rating: No

1895B—Carmi loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: f9x2
Elevation: 340 to 1,300 feet
Mean annual precipitation: 23 to 35 inches

Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Carmi and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Carmi

Setting

Landform: Moraines
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Glaciofluvial sediments

Typical profile

Ap,A - 0 to 13 inches: loam
Bw,Bt - 13 to 25 inches: sandy loam
2Bw - 25 to 48 inches: gravelly sandy loam
2C - 48 to 60 inches: gravelly loamy sand

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: R104XY010IA - Sandy Upland Prairie
Forage suitability group: Sloping Upland, Low AWC, Acid (G104XN008MN)
Other vegetative classification: Sloping Upland, Low AWC, Acid (G104XN008MN)
Hydric soil rating: No

Minor Components

Winnebago

Percent of map unit: 5 percent
Hydric soil rating: Yes

Burkhardt

Percent of map unit: 5 percent
Hydric soil rating: No

1896B—Ostrander-Carmi loams, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: f9x3
Elevation: 340 to 1,300 feet
Mean annual precipitation: 23 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 155 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Ostrander and similar soils: 55 percent
Carmi and similar soils: 35 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ostrander

Setting

Landform: Moraines
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over till

Typical profile

Ap,A,AB - 0 to 17 inches: loam
2Bw - 17 to 53 inches: loam
2C - 53 to 60 inches: loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 25 percent
Available water supply, 0 to 60 inches: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: R104XY005IA - Loamy Upland Prairie
Forage suitability group: Sloping Upland, Neutral (G104XN002MN)
Other vegetative classification: Sloping Upland, Neutral (G104XN002MN)
Hydric soil rating: No

Description of Carmi

Setting

Landform: Moraines
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Glaciofluvial sediments

Typical profile

Ap,A - 0 to 13 inches: loam
Bw,Bt - 13 to 25 inches: sandy loam
2Bw - 25 to 48 inches: gravelly sandy loam
2C - 48 to 60 inches: gravelly loamy sand

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: R104XY010IA - Sandy Upland Prairie
Forage suitability group: Sloping Upland, Neutral (G104XN002MN)
Other vegetative classification: Sloping Upland, Neutral (G104XN002MN)
Hydric soil rating: No

Minor Components

Klinger

Percent of map unit: 5 percent
Hydric soil rating: No

Dickinson

Percent of map unit: 5 percent
Hydric soil rating: No

W—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

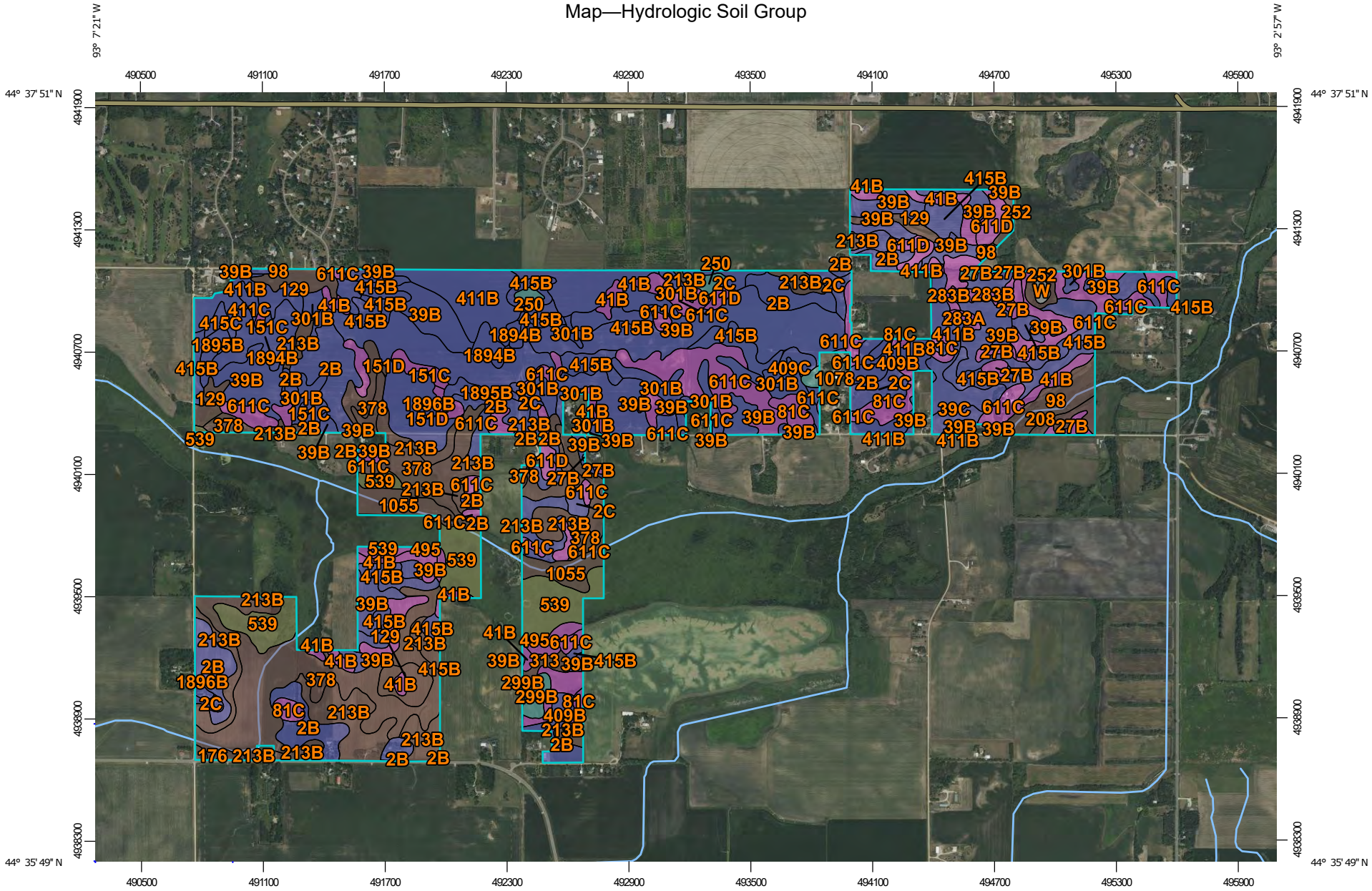
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Map—Hydrologic Soil Group



Map Scale: 1:26,600 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 350 700 1400 2100

Feet: 0 1000 2000 4000 6000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Dakota County, Minnesota
Survey Area Data: Version 19, Sep 9, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 29, 2023—Sep 13, 2023

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
2B	Ostrander loam, 1 to 6 percent slopes	B	110.5	8.2%
2C	Ostrander loam, 6 to 12 percent slopes	B	28.1	2.1%
27B	Dickinson sandy loam, 2 to 6 percent slopes	A	15.8	1.2%
39B	Wadena loam, 2 to 6 percent slopes	B	244.2	18.0%
39C	Wadena loam, 6 to 12 percent slopes	B	4.8	0.4%
41B	Estherville sandy loam, 2 to 6 percent slopes	A	33.7	2.5%
81B	Boone loamy fine sand, 2 to 6 percent slopes	A	8.0	0.6%
81C	Boone loamy fine sand, 6 to 12 percent slopes	A	25.5	1.9%
98	Colo silt loam, occasionally flooded	B/D	17.4	1.3%
129	Cylinder loam, 0 to 2 percent slopes	B/D	28.2	2.1%
151C	Burkhardt sandy loam, 6 to 12 percent slopes	A	6.5	0.5%
151D	Burkhardt sandy loam, 12 to 18 percent slopes	A	7.1	0.5%
176	Garwin silty clay loam	B/D	0.6	0.0%
208	Kato silty clay loam	B/D	5.6	0.4%
213B	Klinger silt loam, 1 to 5 percent slopes	B/D	98.0	7.2%
250	Kennebec silt loam	C	5.9	0.4%
252	Marshan silty clay loam	B/D	6.3	0.5%
283A	Plainfield loamy sand, 0 to 2 percent slopes	A	2.7	0.2%
283B	Plainfield loamy sand, 2 to 6 percent slopes	A	4.9	0.4%
299B	Rockton loam, 2 to 6 percent slopes	C	5.5	0.4%
301B	Lindstrom silt loam, till plain, 2 to 6 percent slopes	B	46.1	3.4%
313	Spillville loam, 0 to 2 percent slopes, occasionally flooded	B/D	4.6	0.3%
378	Maxfield silty clay loam	B/D	131.5	9.7%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
409B	Etter fine sandy loam, 2 to 6 percent slopes	B	13.0	1.0%
409C	Etter fine sandy loam, 6 to 12 percent slopes	B	6.0	0.4%
411B	Waukegan silt loam, 1 to 6 percent slopes	B	76.9	5.7%
411C	Waukegan silt loam, 6 to 12 percent slopes	B	2.4	0.2%
415B	Kanaranzi loam, 2 to 6 percent slopes	B	87.9	6.5%
415C	Kanaranzi loam, 6 to 12 percent slopes	B	3.2	0.2%
495	Zumbro fine sandy loam	A	9.8	0.7%
539	Klossner muck, 0 to 1 percent slopes	C/D	56.6	4.2%
611C	Hawick gravelly sandy loam, 6 to 12 percent slopes	A	114.8	8.5%
611D	Hawick gravelly sandy loam, 12 to 20 percent slopes	A	13.5	1.0%
1055	Aquolls and Histosols, ponded	B/D	24.5	1.8%
1078	Anthroportic Udorthents, 2 to 9 percent slopes	C	1.7	0.1%
1894B	Winnebago loam, 2 to 6 percent slopes	B	26.5	2.0%
1895B	Carmi loam, 2 to 8 percent slopes	B	7.1	0.5%
1896B	Ostrander-Carmi loams, 2 to 6 percent slopes	B	67.8	5.0%
W	Water		1.9	0.1%
Totals for Area of Interest			**1,355.1**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Depth to Bedrock

The term bedrock in soil survey refers to a continuous root and water restrictive layer of rock that occurs within the soil profile.

There are many types of restrictions that can occur within the soil profile but this theme only includes the three restrictions that use the term bedrock. These are:

1) Lithic Bedrock

2) Paralithic Bedrock

3) Densic Bedrock

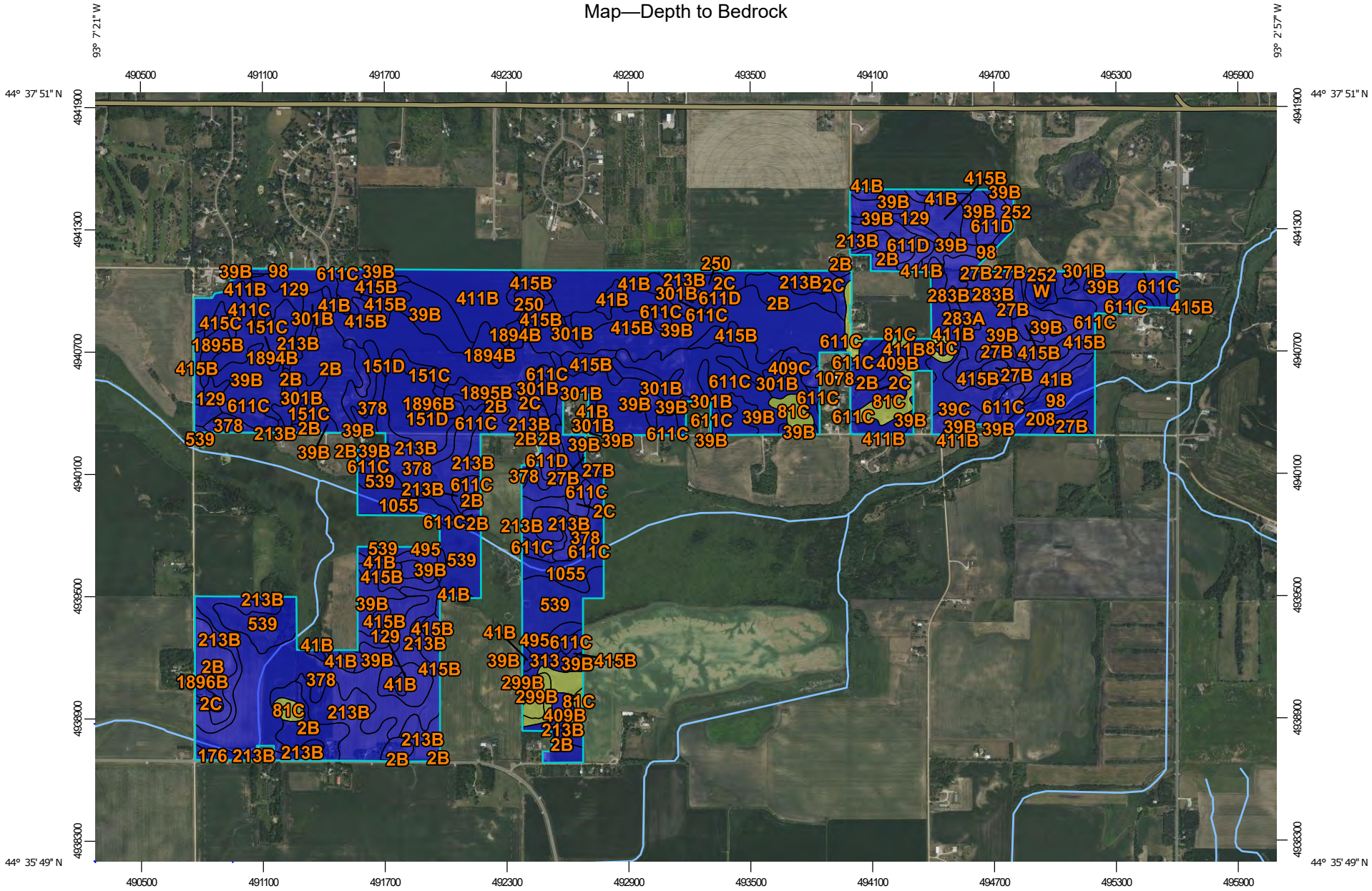
Lithic bedrock and paralithic bedrock are comprised of igneous, metamorphic, and sedimentary rocks, which are coherent and consolidated into rock through pressure, heat, cementation, or fusion. Lithic bedrock represents the hardest type of bedrock, with a hardness of strongly coherent to indurated. Paralithic bedrock has a hardness of extremely weakly coherent to moderately coherent. It can occur as a thin layer of weathered bedrock above harder lithic bedrock. Paralithic bedrock can also be much thicker, extending well below the soil profile.

Densic bedrock represents a unique kind of bedrock recognized within the soil survey. It is non-coherent and consolidated, dense root restrictive material, formed by pressure, heat, and dewatering of earth materials or sediments. Densic bedrock differs from densic materials, which formed under the compaction of glaciers, mudflows, and or human-caused compaction.

If more than one type of bedrock is described for an individual soil type, the depth to the shallowest one is given. If no bedrock is described in a map unit, it is represented by the "greater than 200" depth class.

Depth to bedrock is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Map—Depth to Bedrock



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Soil Rating Lines

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Soil Rating Points

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Dakota County, Minnesota
Survey Area Data: Version 19, Sep 9, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 29, 2023—Sep 13, 2023

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Depth to Bedrock

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
2B	Ostrander loam, 1 to 6 percent slopes	>200	110.5	8.2%
2C	Ostrander loam, 6 to 12 percent slopes	>200	28.1	2.1%
27B	Dickinson sandy loam, 2 to 6 percent slopes	>200	15.8	1.2%
39B	Wadena loam, 2 to 6 percent slopes	>200	244.2	18.0%
39C	Wadena loam, 6 to 12 percent slopes	>200	4.8	0.4%
41B	Estherville sandy loam, 2 to 6 percent slopes	>200	33.7	2.5%
81B	Boone loamy fine sand, 2 to 6 percent slopes	61	8.0	0.6%
81C	Boone loamy fine sand, 6 to 12 percent slopes	61	25.5	1.9%
98	Colo silt loam, occasionally flooded	>200	17.4	1.3%
129	Cylinder loam, 0 to 2 percent slopes	>200	28.2	2.1%
151C	Burkhardt sandy loam, 6 to 12 percent slopes	>200	6.5	0.5%
151D	Burkhardt sandy loam, 12 to 18 percent slopes	>200	7.1	0.5%
176	Garwin silty clay loam	>200	0.6	0.0%
208	Kato silty clay loam	>200	5.6	0.4%
213B	Klinger silt loam, 1 to 5 percent slopes	>200	98.0	7.2%
250	Kennebec silt loam	>200	5.9	0.4%
252	Marshan silty clay loam	>200	6.3	0.5%
283A	Plainfield loamy sand, 0 to 2 percent slopes	>200	2.7	0.2%
283B	Plainfield loamy sand, 2 to 6 percent slopes	>200	4.9	0.4%
299B	Rockton loam, 2 to 6 percent slopes	89	5.5	0.4%
301B	Lindstrom silt loam, till plain, 2 to 6 percent slopes	>200	46.1	3.4%
313	Spillville loam, 0 to 2 percent slopes, occasionally flooded	>200	4.6	0.3%
378	Maxfield silty clay loam	>200	131.5	9.7%

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
409B	Etter fine sandy loam, 2 to 6 percent slopes	>200	13.0	1.0%
409C	Etter fine sandy loam, 6 to 12 percent slopes	>200	6.0	0.4%
411B	Waukegan silt loam, 1 to 6 percent slopes	>200	76.9	5.7%
411C	Waukegan silt loam, 6 to 12 percent slopes	>200	2.4	0.2%
415B	Kanaranzi loam, 2 to 6 percent slopes	>200	87.9	6.5%
415C	Kanaranzi loam, 6 to 12 percent slopes	>200	3.2	0.2%
495	Zumbro fine sandy loam	>200	9.8	0.7%
539	Klossner muck, 0 to 1 percent slopes	>200	56.6	4.2%
611C	Hawick gravelly sandy loam, 6 to 12 percent slopes	>200	114.8	8.5%
611D	Hawick gravelly sandy loam, 12 to 20 percent slopes	>200	13.5	1.0%
1055	Aquolls and Histosols, ponded	>200	24.5	1.8%
1078	Anthroportic Udorthents, 2 to 9 percent slopes	>200	1.7	0.1%
1894B	Winnebago loam, 2 to 6 percent slopes	>200	26.5	2.0%
1895B	Carmi loam, 2 to 8 percent slopes	>200	7.1	0.5%
1896B	Ostrander-Carmi loams, 2 to 6 percent slopes	>200	67.8	5.0%
W	Water	>200	1.9	0.1%
Totals for Area of Interest			**1,355.1**	**100.0%**

Rating Options—Depth to Bedrock

Units of Measure: centimeters

Aggregation Method: Weighted Average

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Depth to a Selected Soil Restrictive Layer: Lithic bedrock

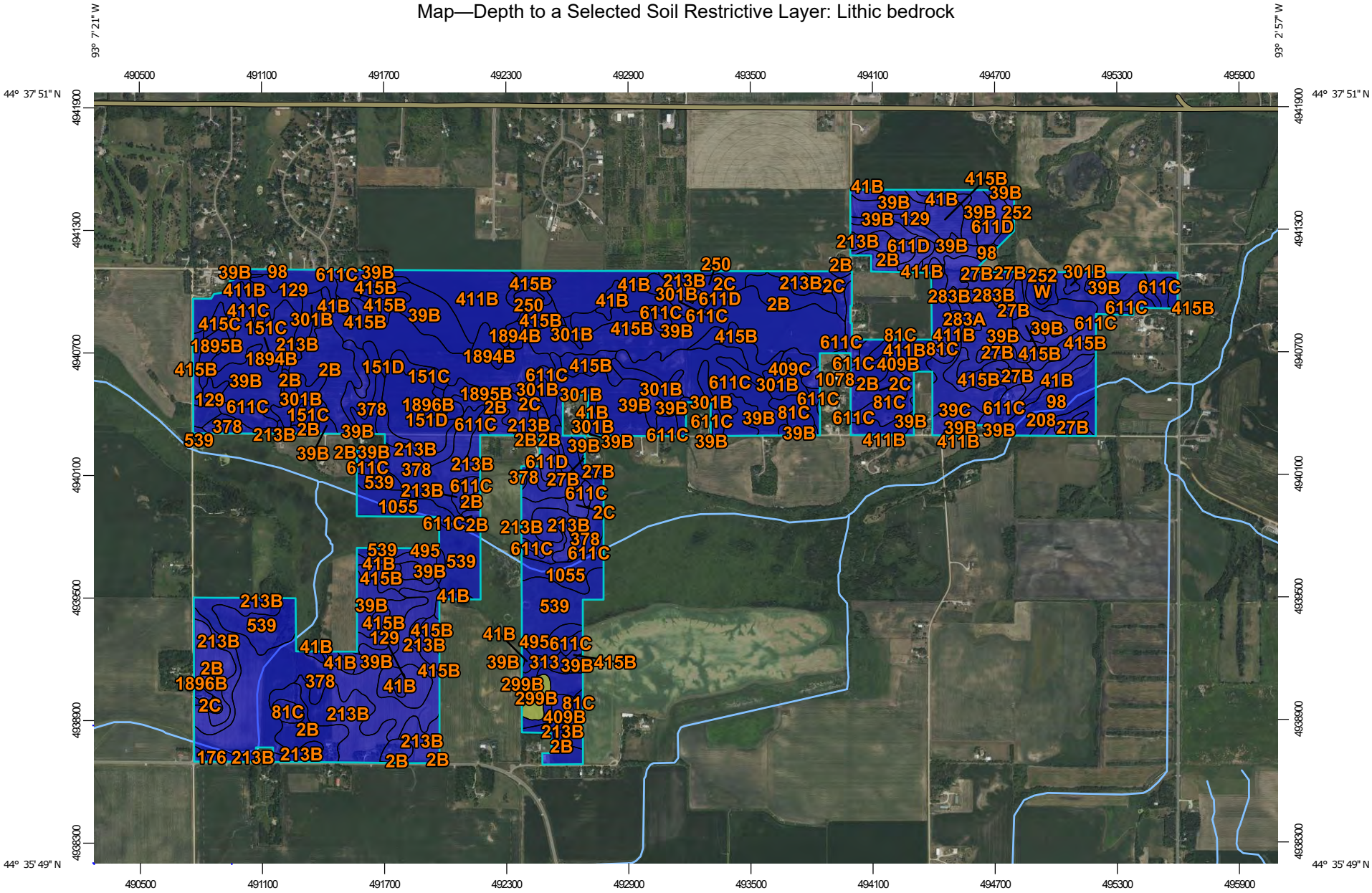
A "restrictive layer" is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers.

This theme presents the depth to the user selected type of restrictive layer as described in for each map unit. If no restrictive layer is described in a map unit, it is represented by the "greater than 200" depth class.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report

Map—Depth to a Selected Soil Restrictive Layer: Lithic bedrock



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Soil Rating Lines

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Soil Rating Points

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Dakota County, Minnesota
Survey Area Data: Version 19, Sep 9, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 29, 2023—Sep 13, 2023

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Depth to a Selected Soil Restrictive Layer: Lithic bedrock

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
2B	Ostrander loam, 1 to 6 percent slopes	>200	110.5	8.2%
2C	Ostrander loam, 6 to 12 percent slopes	>200	28.1	2.1%
27B	Dickinson sandy loam, 2 to 6 percent slopes	>200	15.8	1.2%
39B	Wadena loam, 2 to 6 percent slopes	>200	244.2	18.0%
39C	Wadena loam, 6 to 12 percent slopes	>200	4.8	0.4%
41B	Estherville sandy loam, 2 to 6 percent slopes	>200	33.7	2.5%
81B	Boone loamy fine sand, 2 to 6 percent slopes	>200	8.0	0.6%
81C	Boone loamy fine sand, 6 to 12 percent slopes	>200	25.5	1.9%
98	Colo silt loam, occasionally flooded	>200	17.4	1.3%
129	Cylinder loam, 0 to 2 percent slopes	>200	28.2	2.1%
151C	Burkhardt sandy loam, 6 to 12 percent slopes	>200	6.5	0.5%
151D	Burkhardt sandy loam, 12 to 18 percent slopes	>200	7.1	0.5%
176	Garwin silty clay loam	>200	0.6	0.0%
208	Kato silty clay loam	>200	5.6	0.4%
213B	Klinger silt loam, 1 to 5 percent slopes	>200	98.0	7.2%
250	Kennebec silt loam	>200	5.9	0.4%
252	Marshan silty clay loam	>200	6.3	0.5%
283A	Plainfield loamy sand, 0 to 2 percent slopes	>200	2.7	0.2%
283B	Plainfield loamy sand, 2 to 6 percent slopes	>200	4.9	0.4%
299B	Rockton loam, 2 to 6 percent slopes	89	5.5	0.4%
301B	Lindstrom silt loam, till plain, 2 to 6 percent slopes	>200	46.1	3.4%
313	Spillville loam, 0 to 2 percent slopes, occasionally flooded	>200	4.6	0.3%
378	Maxfield silty clay loam	>200	131.5	9.7%

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
409B	Etter fine sandy loam, 2 to 6 percent slopes	>200	13.0	1.0%
409C	Etter fine sandy loam, 6 to 12 percent slopes	>200	6.0	0.4%
411B	Waukegan silt loam, 1 to 6 percent slopes	>200	76.9	5.7%
411C	Waukegan silt loam, 6 to 12 percent slopes	>200	2.4	0.2%
415B	Kanaranzi loam, 2 to 6 percent slopes	>200	87.9	6.5%
415C	Kanaranzi loam, 6 to 12 percent slopes	>200	3.2	0.2%
495	Zumbro fine sandy loam	>200	9.8	0.7%
539	Klossner muck, 0 to 1 percent slopes	>200	56.6	4.2%
611C	Hawick gravelly sandy loam, 6 to 12 percent slopes	>200	114.8	8.5%
611D	Hawick gravelly sandy loam, 12 to 20 percent slopes	>200	13.5	1.0%
1055	Aquolls and Histosols, ponded	>200	24.5	1.8%
1078	Anthroportic Udorthents, 2 to 9 percent slopes	>200	1.7	0.1%
1894B	Winnebago loam, 2 to 6 percent slopes	>200	26.5	2.0%
1895B	Carmi loam, 2 to 8 percent slopes	>200	7.1	0.5%
1896B	Ostrander-Carmi loams, 2 to 6 percent slopes	>200	67.8	5.0%
W	Water	>200	1.9	0.1%
Totals for Area of Interest			**1,355.1**	**100.0%**

Rating Options—Depth to a Selected Soil Restrictive Layer: Lithic bedrock

Units of Measure: centimeters

Restriction Kind: Lithic bedrock

Aggregation Method: Weighted Average

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

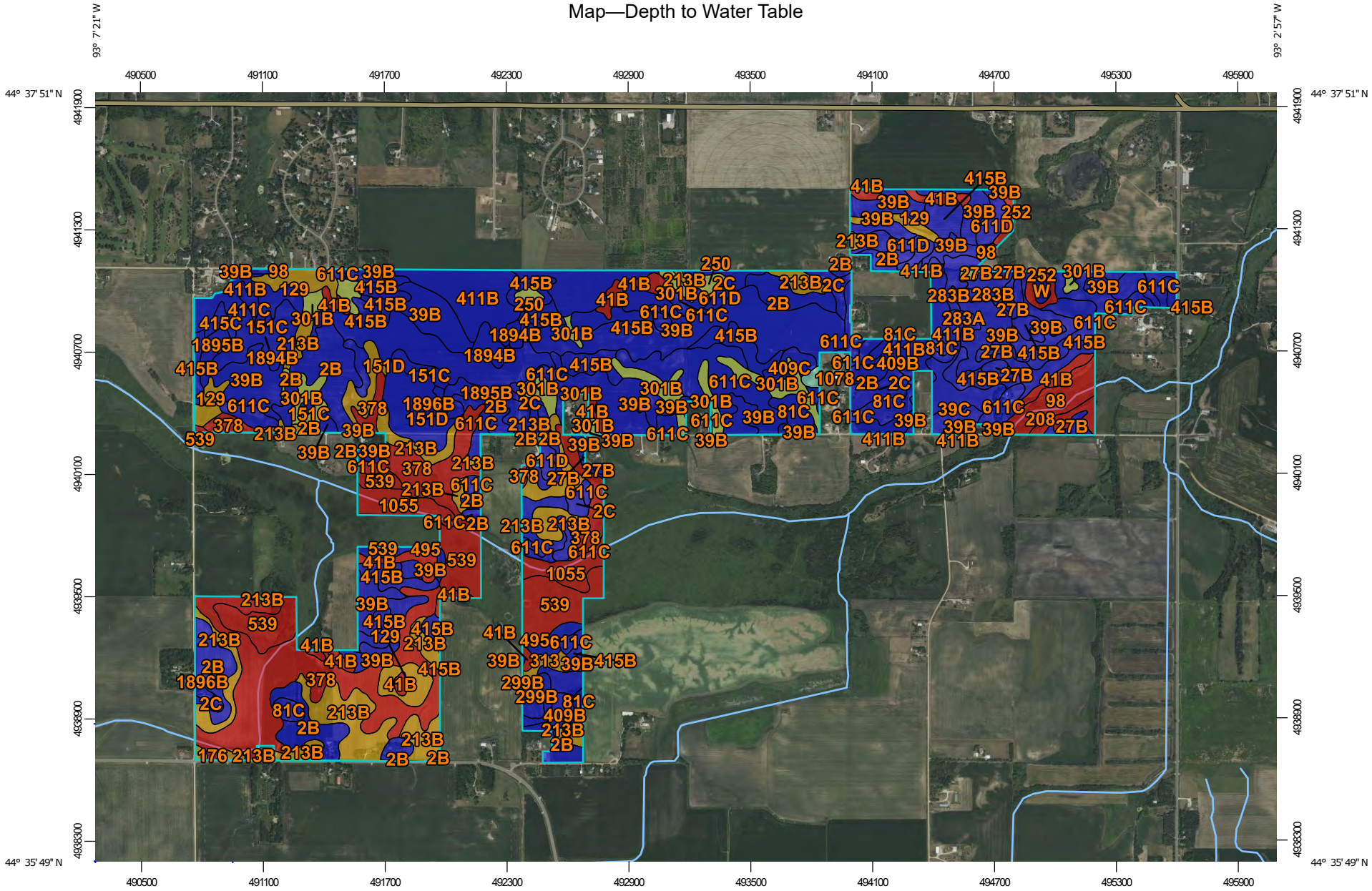
Water Features

Water Features include ponding frequency, flooding frequency, and depth to water table.

Depth to Water Table

"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.


93° 7' 21" W
93° 2' 57" W
44° 37' 51" N
44° 35' 49" N
490500
491100
491700
492300
492900
493500
494100
494700
495300
495900
4941900
4941300
4940700
4940100
4939500
4938900
4938300
Map Scale: 1:26,600 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0 350 700 1400 2100
Feet
0 1000 2000 4000 6000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Soil Rating Lines

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Soil Rating Points

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Dakota County, Minnesota
Survey Area Data: Version 19, Sep 9, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 29, 2023—Sep 13, 2023

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Depth to Water Table

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
2B	Ostrander loam, 1 to 6 percent slopes	>200	110.5	8.2%
2C	Ostrander loam, 6 to 12 percent slopes	>200	28.1	2.1%
27B	Dickinson sandy loam, 2 to 6 percent slopes	>200	15.8	1.2%
39B	Wadena loam, 2 to 6 percent slopes	>200	244.2	18.0%
39C	Wadena loam, 6 to 12 percent slopes	>200	4.8	0.4%
41B	Estherville sandy loam, 2 to 6 percent slopes	10	33.7	2.5%
81B	Boone loamy fine sand, 2 to 6 percent slopes	>200	8.0	0.6%
81C	Boone loamy fine sand, 6 to 12 percent slopes	>200	25.5	1.9%
98	Colo silt loam, occasionally flooded	15	17.4	1.3%
129	Cylinder loam, 0 to 2 percent slopes	35	28.2	2.1%
151C	Burkhardt sandy loam, 6 to 12 percent slopes	>200	6.5	0.5%
151D	Burkhardt sandy loam, 12 to 18 percent slopes	>200	7.1	0.5%
176	Garwin silty clay loam	15	0.6	0.0%
208	Kato silty clay loam	15	5.6	0.4%
213B	Klinger silt loam, 1 to 5 percent slopes	45	98.0	7.2%
250	Kennebec silt loam	91	5.9	0.4%
252	Marshan silty clay loam	15	6.3	0.5%
283A	Plainfield loamy sand, 0 to 2 percent slopes	>200	2.7	0.2%
283B	Plainfield loamy sand, 2 to 6 percent slopes	>200	4.9	0.4%
299B	Rockton loam, 2 to 6 percent slopes	>200	5.5	0.4%
301B	Lindstrom silt loam, till plain, 2 to 6 percent slopes	56	46.1	3.4%
313	Spillville loam, 0 to 2 percent slopes, occasionally flooded	29	4.6	0.3%
378	Maxfield silty clay loam	15	131.5	9.7%

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
409B	Etter fine sandy loam, 2 to 6 percent slopes	>200	13.0	1.0%
409C	Etter fine sandy loam, 6 to 12 percent slopes	>200	6.0	0.4%
411B	Waukegan silt loam, 1 to 6 percent slopes	>200	76.9	5.7%
411C	Waukegan silt loam, 6 to 12 percent slopes	>200	2.4	0.2%
415B	Kanaranzi loam, 2 to 6 percent slopes	>200	87.9	6.5%
415C	Kanaranzi loam, 6 to 12 percent slopes	>200	3.2	0.2%
495	Zumbro fine sandy loam	>200	9.8	0.7%
539	Klossner muck, 0 to 1 percent slopes	0	56.6	4.2%
611C	Hawick gravelly sandy loam, 6 to 12 percent slopes	>200	114.8	8.5%
611D	Hawick gravelly sandy loam, 12 to 20 percent slopes	>200	13.5	1.0%
1055	Aquolls and Histosols, ponded	0	24.5	1.8%
1078	Anthroportic Udorthents, 2 to 9 percent slopes	122	1.7	0.1%
1894B	Winnebago loam, 2 to 6 percent slopes	>200	26.5	2.0%
1895B	Carmi loam, 2 to 8 percent slopes	>200	7.1	0.5%
1896B	Ostrander-Carmi loams, 2 to 6 percent slopes	>200	67.8	5.0%
W	Water	>200	1.9	0.1%
Totals for Area of Interest			**1,355.1**	**100.0%**

Rating Options—Depth to Water Table

Units of Measure: centimeters

Aggregation Method: Weighted Average

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Beginning Month: January

Ending Month: December

References

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A.4 LAND COVER AND DRAINAGE PLANS

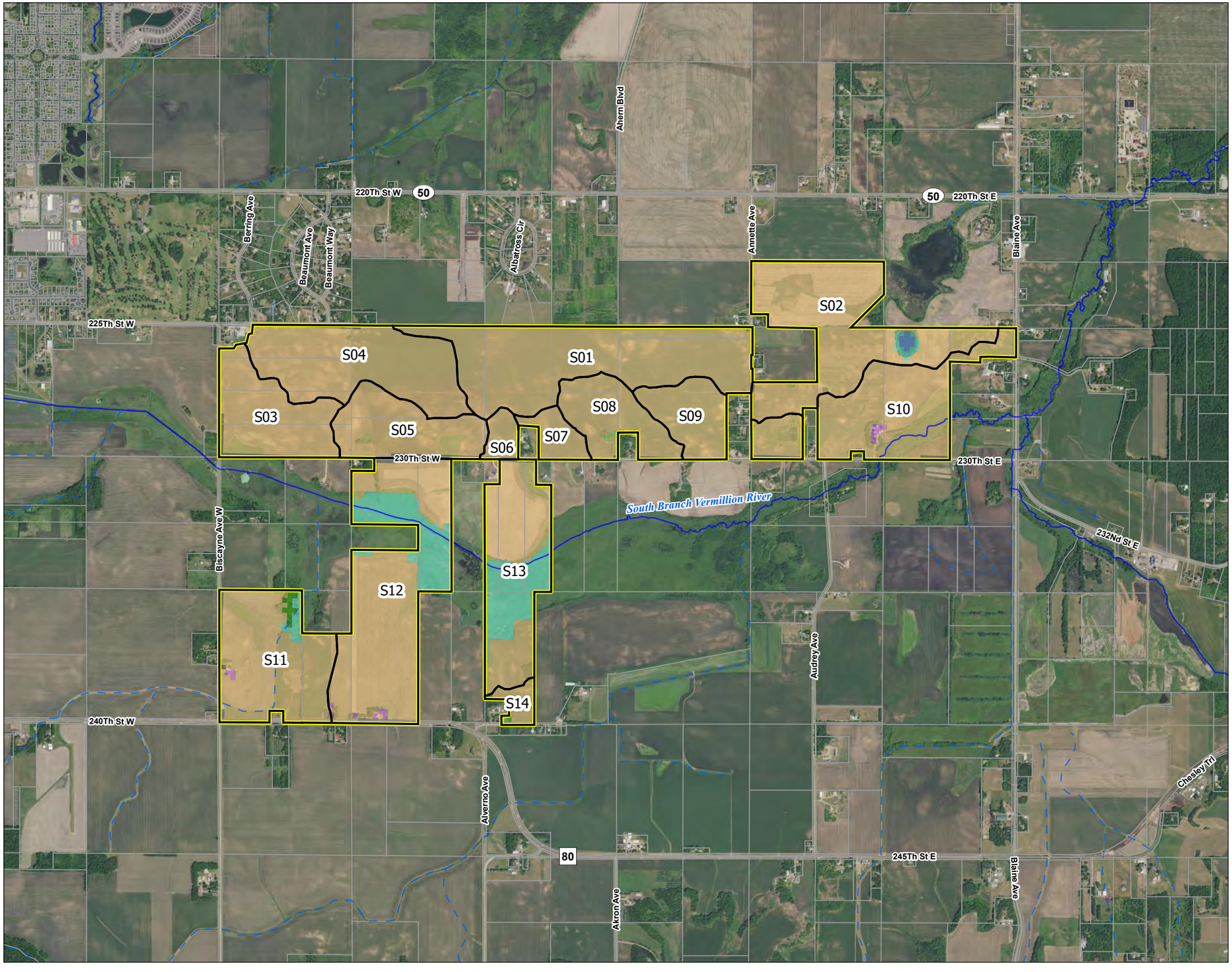


Figure No.
4

DRAFT

Title
Existing Land Cover and Drainage Map

Client/Project
Matrix Renewables USA LLC
Solar Stone Castle Rock

193709215

Project Location
T. of Castle Rock
Dakota Co., MN

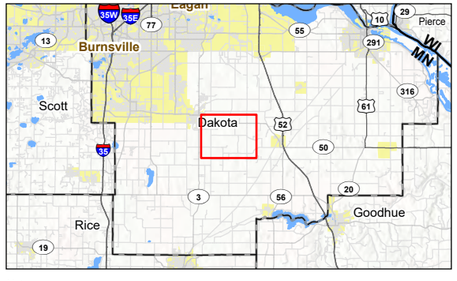
Prepared by KNT on 2024-08-02
TR by JMD on 2024-08-02
IR by JK on 2024-08-02

N

0 1,000 2,000 Feet
(At original document size of 11x17)
1:24,000

Legend
- Project Boundary
- Parcel Boundary
- Perennial Stream
- Intermittent Stream
- Waterbody
- Drainage Basin

Existing Land Cover
- Forest Good
- Forest Poor
- Meadow
- Residential
- Road
- Row Crop
- Water



Notes
1. Coordinate System: NAD 1983 StatePlane Minnesota South FIPS 2203 Feet
2. Data Sources: Stantec, Matrix Renewables, USA, NADS, Dakota Co., FEMA, USGS
3. Background: NAIP 2023

Stantec

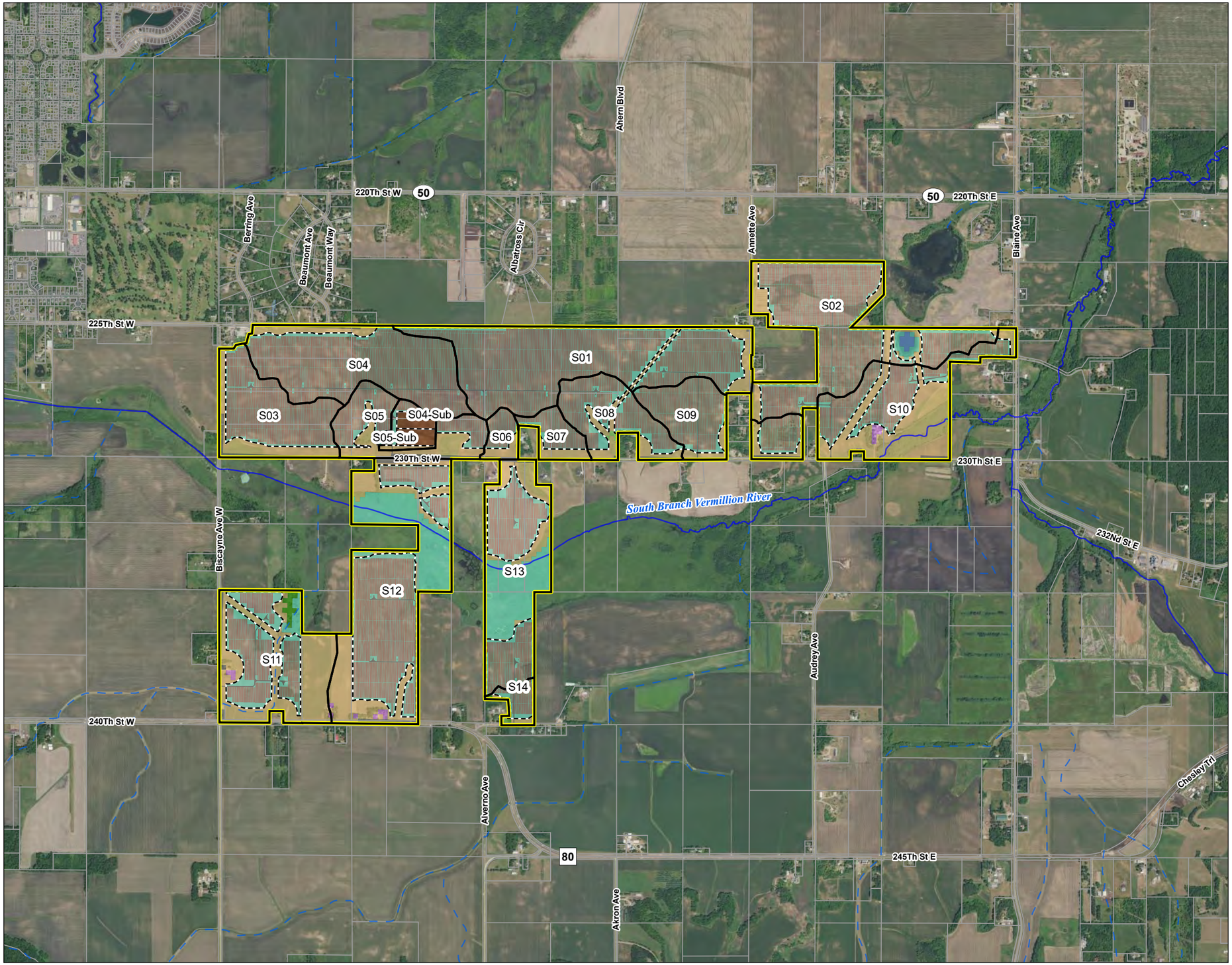


Figure No.
5

DRAFT

Title
Proposed Land Cover and Drainage Map

Client/Project
Matrix Renewables USA LLC
Solar Stone Castle Rock

193709215

Project Location
T. of Castle Rock
Dakota Co., MN

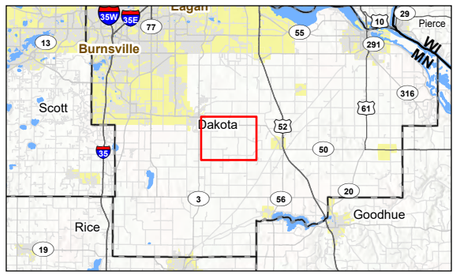
Prepared by KNT on 2024-08-02
TR by JMD on 2024-08-02
IR by JK on 2024-08-02

N

0 1,000 2,000 Feet
(At original document size of 11x17)
1:24,000

Legend
- Project Boundary
- Parcel Boundary
- Perennial Stream
- Intermittent Stream
- Waterbody
- Drainage Basin
- Fence

Existing Land Cover
- Forest Good
- Forest Poor
- Meadow
- Residential
- Road/Access Road
- Row Crop
- Water
- Meadow with Solar Above
- Inverter/O&M/Substation/Switchyard

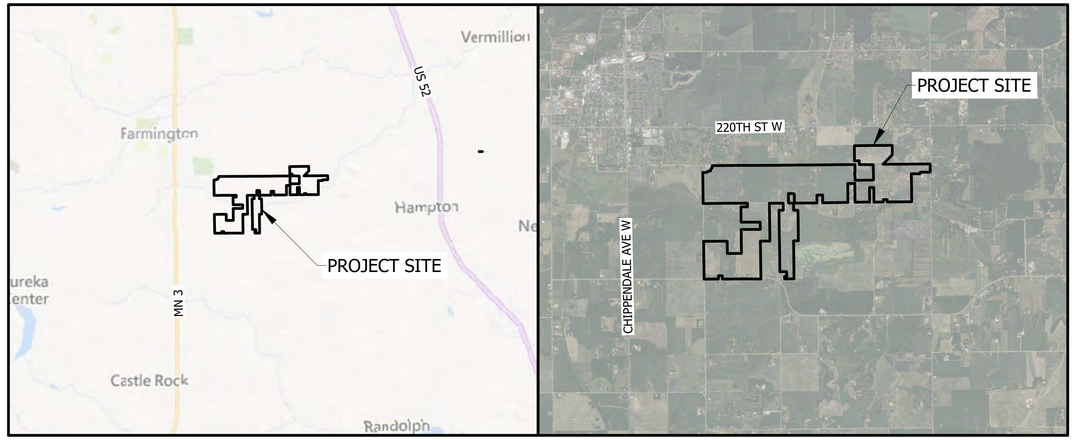


Notes
1. Coordinate System: NAD 1983 StatePlane Minnesota South FIPS 2203 Feet
2. Data Sources: Stantec, Matrix Renewables, USA, NADS, Dakota Co., FEMA, USGS
3. Background: NAIP 2023

Stantec

A.5 PRELIMINARY SITE AND GRADING PLAN SET

CASTLE ROCK SOLAR
DAKOTA COUNTY, MINNESOTA



VICINITY MAP
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LOCATION MAP
NO SCALE

STATE OF MINNESOTA
NO SCALE

SHEET INDEX

SHEET NO	SHEET TITLE
G0.01	TITLE AND PROJECT INFORMATION
C3.01	GRADING PLAN
C3.02	GRADING PLAN
C3.03	GRADING PLAN
E1.00	CASTLE ROCK OVERALL PV LAYOUT
E1.01	CASTLE ROCK PV LAYOUT
E1.02	CASTLE ROCK PV LAYOUT
E1.03	CASTLE ROCK PV LAYOUT
E1.04	CASTLE ROCK PV LAYOUT
E1.05	CASTLE ROCK PV LAYOUT
E1.06	CASTLE ROCK PV LAYOUT
E1.07	CASTLE ROCK PV LAYOUT

APPLICANTS

DEVELOPER:	CASTLE ROCK SOLAR LLC
Primary Contact	DEREK HASEK
	3316 HIGHLAND AVE
	WAYZATA, MN 55391
	612-655-5807
	DEREK.HASEK@SOLARSTONEPARTNERS.COM
ENGINEER:	STANTEC CONSULTING SERVICES, INC.
Primary Contact	CARL BROBERG
	209 COMMERCE PARKWAY
	COTTAGE GROVE, WI 53527
	608-698-6717
	CARL.BROBERG@STANTEC.COM

DESIGN PARAMETERS

PILES	
HEIGHT NOMINAL	5 FT
HEIGHT MINIMUM	5.5 FT
HEIGHT MAXIMUM	6.5 FT
TOP OF PILE TO LEADING EDGE	4 FT
MINIMUM LEADING EDGE	1.5 FT
MAXIMUM EAST, WEST SLOPE	15%
MAXIMUM SOUTH SLOPE	6%
MAXIMUM NORTH SLOPE	6%
TRACKERS	
MANUFACTURER	-
MODEL	-
STYLE 1	2-STRING
LENGTH	55.5 FT
NO. PILES	3
STYLE 2	4-STRING
LENGTH	105.3 FT
NO. PILES	5
STYLE 3	6-STRING
LENGTH	154 FT
NO. PILES	5
STYLE 4	8-STRING
LENGTH	203.7 FT
NO. PILES	7
STYLE 5	12-STRING
LENGTH	303.2 FT
NO. PILES	11
STYLE 6	16-STRING
LENGTH	401.62 FT
NO. PILES	13
EARTH WORK	
FILL FACTOR	1.0
FILL DAYLIGHT SLOPE	3:1
CUT FACTOR	1.0
CUT DAYLIGHT SLOPE	3:1

SYSTEM DETAILS

AC CAPACITY AT POI	163 MW
DC CAPACITY	203 MW
DC:AC RATIO AT POI	1.35
DESIGN TEMPERATURE	-28-34°C
MODULE COUNT	375,360
STRING SIZE	6
PITCH	24°
INTER-ROW SPACING (MODULE TO MODULE) (FT)	16.5
PV PCS NAMEPLATE RATING	162.96 Mwac
RACKING TYPE	Trackers-TF
TRACKER MOTOR COUNT	4,635
2-STRING TRACKING SYSTEMS	293
4-STRING TRACKING SYSTEMS	21
6-STRING TRACKING SYSTEMS	65
8-STRING TRACKING SYSTEMS	438
12-STRING TRACKING SYSTEMS	773
16-STRING TRACKING SYSTEMS	3,045
INTERIOR ROADS (LF)	30,215
LENGTH OF GEN. TIE (LF)	500
# OF STEEL PILES	52,463
# OF INVERTERS	40
ELECTRIC CABLING (LF)	64,774
ARRAY FENCE (LF)	113,335
FACILITY FENCE (LF)	3,675

REFERENCED FILES

DESCRIPTION	FILE NAME	DATE RECEIVED	INSERTION	DATE GENERATED	EDITS BY STANTEC
TOPO SURFACE	193709215_EG_Reduced.dwg		0,0,0	3/20/2024	NONE (GENERATED FROM MINNESOTA GEOSPATIAL COMMONS FLOWN IN 2011, 1M DEM)
LAYOUT	193709215_Layout.dwg		0,0,0		NONE
PROPOSED MODEL	193709215_R1FG.dwg			6/17/2024	BEACON RUN
PILE REPORT					EXPORT

The locations of existing utility installations as shown on this plan are approximate. There may be other underground utility installations within the project area that are not shown.

Stantec assumes no responsibility for damages, liability or costs resulting from changes or alterations made to this plan without written consent of Stantec.

These drawings have been prepared based on information provided by others. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result.

Stantec
209 Commerce Parkway
Cottage Grove, WI 53527
www.stantec.com

PRELIMINARY
NOT FOR CONSTRUCTION

TITLE AND PROJECT INFORMATION

CASTLE ROCK SOLAR PROJECT
MATRIX RENEWABLES USA LLC
DAKOTA COUNTY, MINNESOTA

DATE OF ISSUANCE
August 20, 2024

NO.	REVISION	DATE

SURVEY	---
DRAWN	AMF
DESIGNED	DKJ
CHECKED	JMD
APPROVED	CRB
PROJ. NO.	193709215

SHEET NUMBER
G0.01

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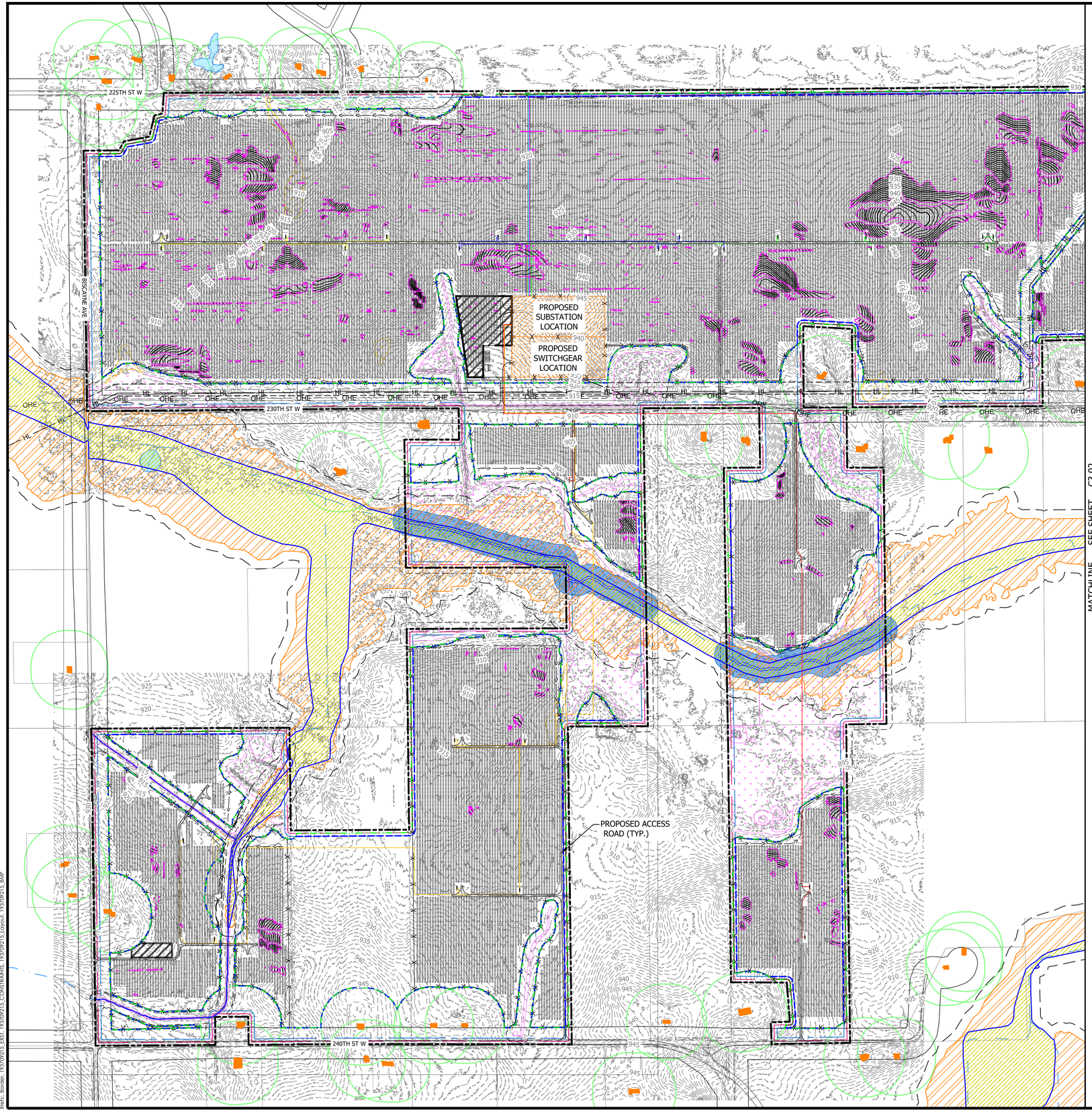

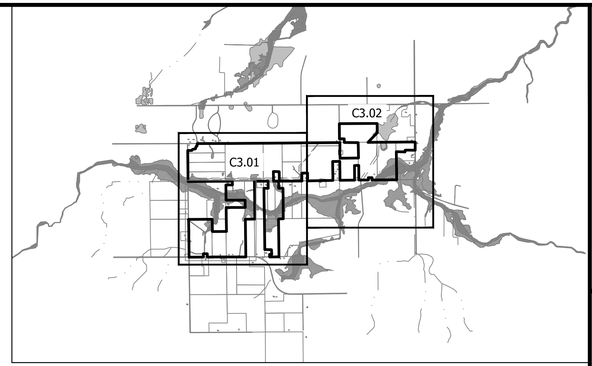

LEGEND

EXISTING

- PARCEL
- RESIDENTIAL BUILDING
- ROAD
- OHE — OVERHEAD ELECTRICAL TRANSMISSION LINE
- OVERHEAD ELECTRICAL TRANSMISSION LINE EASEMENT
- HL — HAZARDOUS LIQUID PIPELINE
- HAZARDOUS LIQUID PIPELINE EASEMENT
- STREAM CENTERLINE
- FIELD DELINEATED WETLAND FARMED
- FIELD DELINEATED WETLAND NOT FARMED
- WATERBODY
- FIELD DELINEATED WATERWAY
- FEMA FLOODWAY
- FEMA FLOOD FRINGE

CONSTRAINTS

- 50' PROJECT SETBACK (PV ASSETS)
- 25' PROJECT SETBACK (FENCE AND ROAD)
- 50' STREAM/OPEN WATER/ WETLAND BUFFER
- 75' FLOODPLAIN BUFFER
- 50' WATER COURSE BUFFER
- 130' ROAD ROW
- 300' RESIDENTIAL BUFFER

PROPOSED

- PROJECT BOUNDARY
- BUILDABLE AREA (PV ASSESTS)
- BUILDABLE AREA (FENCE AND ROAD)
- CHAIN LINK FENCE
- ACCESS ROAD
- PVCASE TRACKERS
- INVERTERS
- MV CABLES
- SUBSTATION
- LAYDOWN YARD
- STORMWATER DRAINAGE DITCH

GRADING

- 440 — EXISTING MAJOR CONTOUR
- 442 — EXISTING MINOR CONTOUR
- 440 — PROPOSED MAJOR CONTOUR
- 442 — PROPOSED MINOR CONTOUR
- LIMITS OF DISTURBANCE

N

0 400' 800'

Stantec
209 Commerce Parkway
Cottage Grove, WI 53527
www.stantec.com

PRELIMINARY
NOT FOR CONSTRUCTION

GRADING PLAN

CASTLE ROCK SOLAR PROJECT
MATRIX RENEWABLES USA LLC
DAKOTA COUNTY, MINNESOTA

DATE OF ISSUANCE
August 20, 2024

NO.	REVISION	DATE

SURVEY	—
DRAWN	AMF
DESIGNED	DKJ
CHECKED	JMD
APPROVED	CRB
PROJ. NO.	193709215

SHEET NUMBER
C3.01

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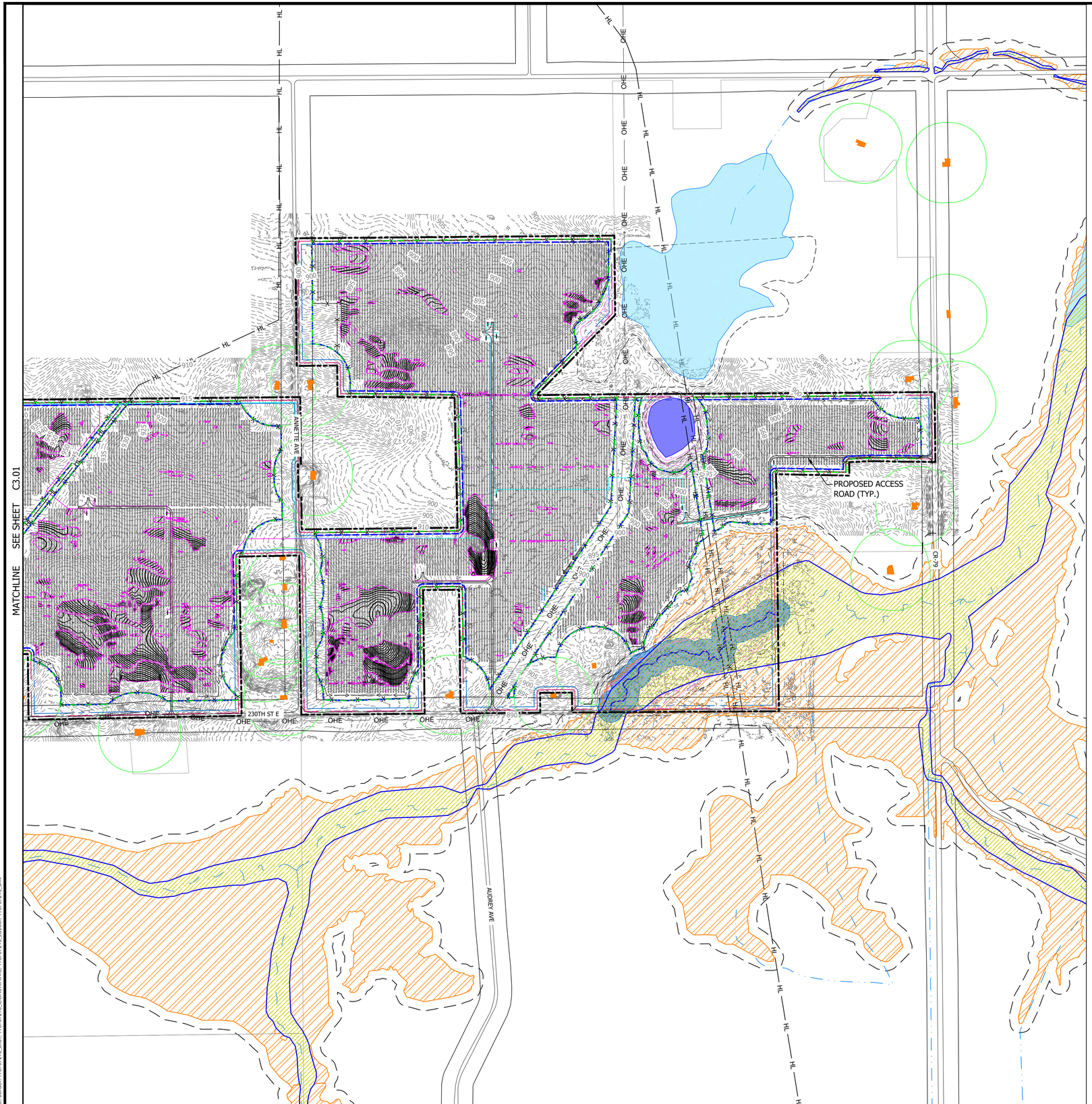
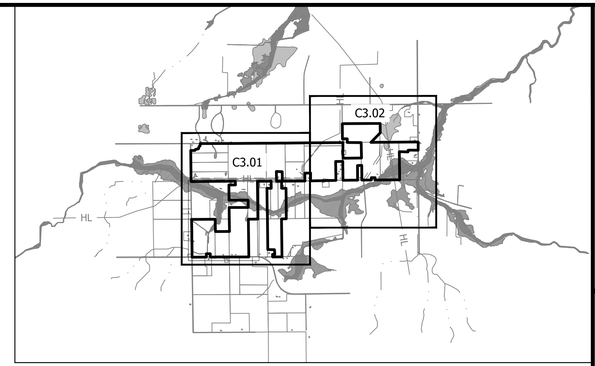
SEE SHEET C3.01





LEGEND

EXISTING

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- FIELD DELINEATED WATERWAY
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- PVCASE TRACKERS
- INVERTERS
- MV CABLES
- SUBSTATION
- LAYDOWN YARD
- STORMWATER DRAINAGE DITCH

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- 440 — EXISTING MAJOR CONTOUR
- 442 — EXISTING MINOR CONTOUR
- 440 — PROPOSED MAJOR CONTOUR
- 442 — PROPOSED MINOR CONTOUR
- LIMITS OF DISTURBANCE

N

0 400' 800'

Stantec
209 Commerce Parkway
Cottage Grove, WI 53527
www.stantec.com

PRELIMINARY
NOT FOR CONSTRUCTION

GRADING PLAN

CASTLE ROCK SOLAR PROJECT
MATRIX RENEWABLES USA LLC
DAKOTA COUNTY, MINNESOTA

DATE OF ISSUANCE
August 20, 2024

NO.	REVISION	DATE

SURVEY	---
DRAWN	AMF
DESIGNED	DKJ
CHECKED	JMD
APPROVED	CRB
PROJ. NO.	193709215

SHEET NUMBER
C3.02

Plot Date: 08/20/2024 - 9:01 pm
Drawing Name: C:\Users\jdam\Stantec\SolarStone Portfolio - 10_Castlerock (MN)\CAD\dwg\sheets\193709215_grading plans.dwg
Xrefs: Border: 193709215_EXST: 193709215_CONSTRAINTS: 193709215_Layout: 193709215_BAP

NOTES:

1. PRELIMINARY DRAWINGS TO BE USED FOR PLANNING PURPOSES ONLY. ACCURACY OF DRAWINGS BASED ON FILES PROVIDED BY THE SURVEYOR AND CLIENT.
2. GRADING SHOWN IS PRELIMINARY AND SHOULD BE USED ONLY FOR GAUGING LEVEL OF EFFORT AND DISTURBANCE AT THIS TIME.
3. THE QUALITY OF EARTHWORK ESTIMATES, AND PILE ESTIMATES (IF PROVIDED) IS DEPENDENT UPON THE QUALITY OF THE SURVEY DATA AND OWNER PROVIDED EQUIPMENT INFORMATION.
4. STORMWATER FEATURES, DRAINAGE WAYS, DIVERSION DITCHES, ROADWAYS, CULVERTS ETC, HAVE NOT BEEN MODELED AT THIS TIME AND WILL BE REQUIRED FOR FINAL ENGINEERING EFFORTS.
5. NO CUT OR FILL FACTORS HAVE BEEN APPLIED TO EARTHWORK ESTIMATES.
6. ATTEMPTS HAVE BEEN MADE TO OPTIMIZE GRADING IN ORDER TO BALANCE THE OVERALL PROJECT AREA, HOWEVER THIS OPTIMIZATION SHOULD BE REEVALUATED THROUGH THE SITE DESIGN AND GRADING PROCESS.
7. MINOR SURFACE SMOOTHING MAY BE REQUIRED FOR PANEL INSTALLATION.
8. CONTRACTOR SHALL INSTALL ALL EROSION CONTROL DEVICES PRIOR TO CONSTRUCTION.
9. SITE PREPARATION WILL INCLUDE BUT IS NOT LIMITED TO CLEARING, GRUBBING, GRADING, COMPACTION, MOWING OF VEGETATION AND RESTABILIZATION OF DISTURBED AREA.
10. ACCESS ROADS ARE TO BE CONSTRUCTED TO MATCH EXISTING GRADES AND NOT TO IMPEDE DRAINAGE ROUTES.
11. OVERALL DRAINAGE PATTERNS ARE NOT TO BE ALTERED WITH SOLAR DEVELOPMENT.
12. A SITE SPECIFIC SWPPP AND STORMWATER DESIGN WILL BE PROVIDED WITH THE FINAL DESIGN.
13. THE DESIGN PARAMETERS USED TO ASSESS GRADING WERE PRELIMINARY AND ARE SUBJECT TO CHANGE DURING DETAILED DESIGN.
14. STORMWATER MANAGEMENT, INUNDATION, AND VELOCITIES, HAVE NOT BEEN INCLUDED IN THE EVALUATION AT THIS TIME.

TOP SOIL NOTES:

1. TOPSOIL TO BE STOCKPILED AND REUSED ON SITE.
2. LONGER TERM STOCKPILES (IN PLACE MORE THAN 30 DAYS) SHALL BE COVERED OR STABILIZED WITH MULCH AND TACKIFIER VEGETATION COVER, OR OTHER SUITABLE MEASURES. STOCKPILES IN PLACE LESS THAN 30 DAYS SHALL HAVE FUNCTIONAL SEDIMENT CONTROL PRACTICES INSTALLED A MINIMUM OF 6 FEET FROM THE TOE OF SLOPE, ON THE DOWN - GRADIENT SIDE OF THE PILE (E.G. SEDIMENT RETENTION FIBER ROLLS). SOIL WINDROWED DURING UTILITY EXCAVATIONS SHOULD BE PLACED UP GRADIENT OF THE TRENCH.
3. POST STRIPPING PHASE: DISTURBED AREAS ARE MORE LIKELY TO ERODE, RESULTING IN POTENTIAL SEDIMENT RELEASES AT A MINIMUM, BEST MANAGEMENT PRACTICES (BMP) MEASURES REQUIRED FOR THIS SITE INCLUDE:
   A. CONSTRUCTION SCHEDULING AND STAGING SCHEDULING AND STAGING SHALL ALLOW FOR THE IDENTIFICATION AND CORRECT SELECTION OF ESC BMPS PRIOR TO THE START OF PROJECT CONSTRUCTION AND DIFFERENT STAGES. THIS WILL REDUCE THE LENGTH OF TIME DISTURBED SOIL WILL BE LEFT EXPOSED TO POTENTIAL EROSION AGENTS SUCH AS RAIN AND WIND.
   B. CLEARING, STRIPPING, STOCKPILING, AND SEEDING DEVELOPMENT AT THE SITE SHOULD BE LIMITED TO CLEARING EXTENTS IDENTIFIED IN THE PROJECT CIVIL DRAWINGS, LIMIT CLEARING TO AREAS OF GRASS, HERBACEOUS VEGETATION, AND OTHER LOW COVER AS MUCH AS POSSIBLE. DURING CONSTRUCTION, TEMPORARY ESC MEASURE SUCH AS PERIMETER SILT FENCE, SEDIMENT RETENTION FIVER ROLLS, AND ROLLED EROSION CONTROL PRODUCT WILL BE APPLIED. ONCE SOIL STRIPPING AND INITIAL GRADING ACTIVITIES HAVE BEEN COMPLETED, TOPSOIL WILL BE SPREAD TO AREAS REQUIRING REVEGETATION AND TO REDUCE POTENTIAL SOIL LOSS. CONTRACTOR IS TO REFER AND ADHERE TO THE PROJECTS ENVIRONMENTAL DESIGN GUIDELINES FOR VEGETATION.
   C. RUN-OFF DIVERSION SILT FENCE OR SEDIMENT RETENTION FIBER ROLLS (OR APPROVED ALTERNATE) WILL BE INSTALLED IN DESIGNATED LOCATIONS PRIOR TO CONSTRUCTION ACTIVITIES.
   D. CONTRACTOR IS TO MEET AND FOLLOW THE TOPSOIL AND UPPER SUBSOIL STRIPPING AND RESTORATION REQUIREMENTS OF LOCAL ORDINANCE.
   E. TOP SOIL AND UPPER SUBSOIL MUST BE STORED SEPARATELY (IF REQUIRED). WHERE STORAGE IS REQUIRED AND LASTS LONGER THAN SIX (6) MONTHS THE TOPSOIL AND UPPER SUBSOIL STOCKPILES MUST BE A MINIMUM OF TEN (10) FEET APART, SLOPED, AND SEEDED TO PREVENT WIND AND/OR WATER EROSION. STOCKPILES MUST HAVE PROPER MAINTAINED SIGNAGE.
   F. RESTORATION AND RECLAMATION OF ALL DISTURBED AREAS ARE TO BE DE-COMPACTED AND RESTORED PER THE LOCAL ORDINANCE.

PRELIMINARY EARTHWORK SUMMARY:

TO PRELIMINARILY IDENTIFY APPROXIMATE EARTHWORK NEED, STANTEC COMPLETED A TWO STEP PROCESS, WHICH INCLUDED SEVERAL ITERATIONS OF ARRAY AND ARRAY AREA DAYLIGHTING ESTIMATES USING STANTEC'S IN-HOUSE PROPRIETARY BEACON GRADING MODELING PROGRAM. THE ESTIMATED EARTHWORK VOLUMES FROM THE BEACON MODELING FOCUSED ON THE ARRAY AREA ARE SUMMARIZED IN THE TABLE BELOW:

ESTIMATED EARTHWORK STATISTICS

ARRAY GRADING		
CUT	40,001	CY
FILL	51,085	CY
NET (FILL)	11,084	CY
NET (FILL) CONTINGENCY (20%)*	13,300	CY
DAYLIGHT GRADING		
CUT	238	CY
FILL	244	CY
NET (FILL)	6	CY
NET (FILL) CONTINGENCY (20%)*	8	CY

*WITH THE 20% CONTINGENCY ADDED.
1. IMPERVIOUS GRADING ACCOUNTS FOR ROADWAYS, LAYDOWN YARDS, AND SUBSTATION, PLUS AN ADDITIONAL 15% FOR DAYLIGHTING.
2. AREAS OUTSIDE OF SOLAR ARRAYS, SUCH AS ROADS, LAYDOWN AREAS, SUBSTATION, ETC., WAS NOT ANALYZED AT THIS TIME. THESE GRADING VOLUMES AND AREAS WERE COUNTED FOR IN GRADING CONTINGENCIES.

APPROXIMATE AREAS		
PROJECT SITE	1,355	AC
TOTAL DISTURBED AREA	120.0	AC
ARRAY GRADING	75	AC
ARRAY GRADING CONTINGENCY (20%)	15	AC
ARRAY DAYLIGHT GRADING	0.41	AC
ARRAY DAYLIGHT GRADING CONTINGENCY (20%)	0.08	AC
TOTAL IMPERVIOUS GRADING1	30.1	AC
FACILITY AND CONSTRUCTION LAYDOWN	5.0	AC
INVERTERS	0.2	AC
O&M FACILITY	0.1	AC
SUBSTATION	6.0	AC
SWITCHYARD	6.0	AC
ACCESS ROAD AREA	12.8	AC
PERCENT OF AREA TO BE GRADED	8.9%	

BASED ON EXPERIENCE THIS ESTIMATE SHOULD REMAIN CONSERVATIVE, AND UNDER DETAILED DESIGN IT IS ANTICIPATED THAT THE EARTHWORK VOLUMES WITHIN THE ARRAY AREA MAY BE OPTIMIZED TO BE BALANCED ONSITE BETWEEN STRATEGIC CUTS AND FILLS IN CONCERT WITH ARRAY AREA AND DAYLIGHTING GRADING.

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PRELIMINARY
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GRADING PLAN

CASTLE ROCK SOLAR PROJECT
MATRIX RENEWABLES USA LLC
DAKOTA COUNTY, MINNESOTA

DATE OF ISSUANCE
August 20, 2024

NO.	REVISION	DATE

SURVEY	---
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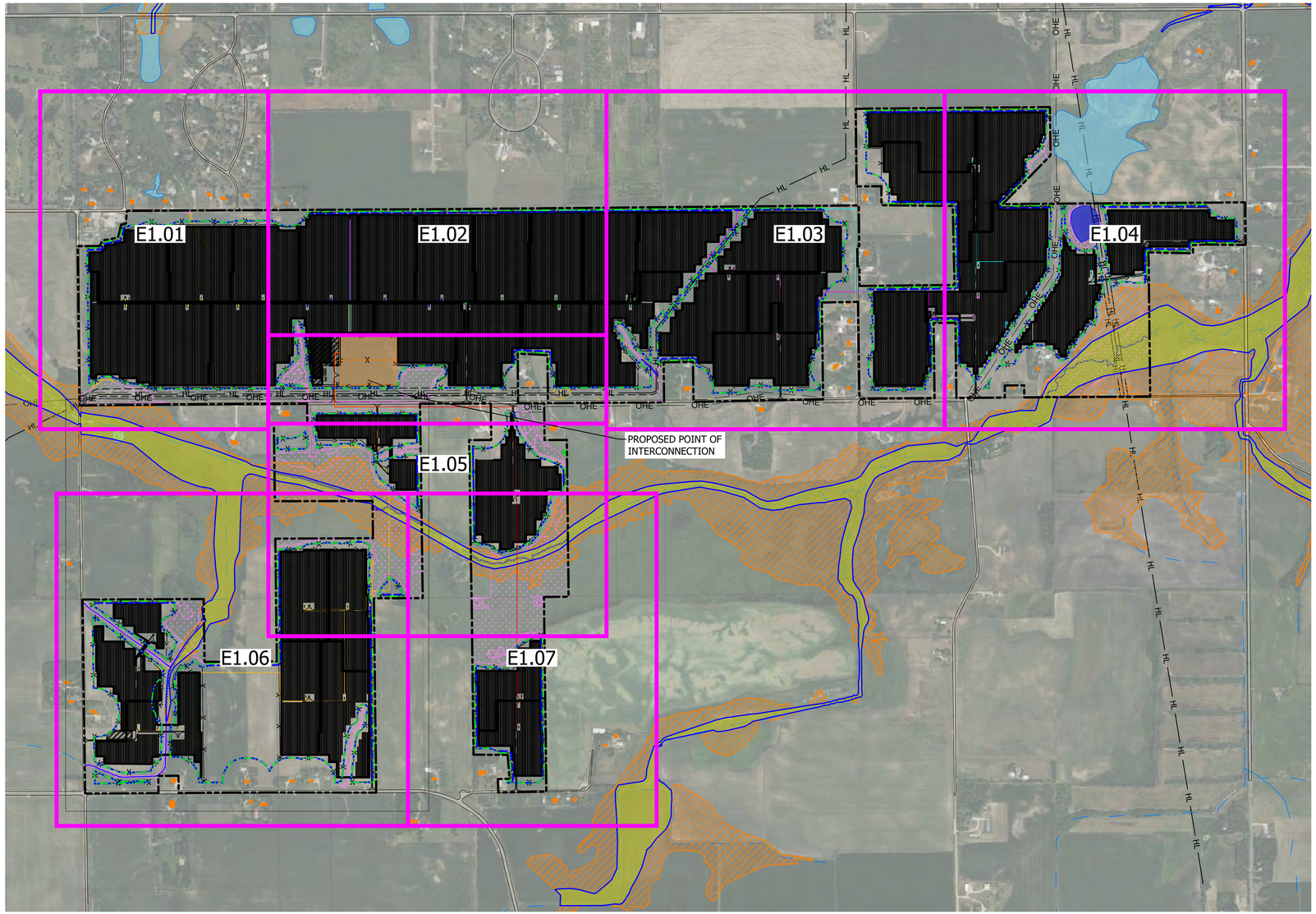
DESIGNED	DKJ
CHECKED	JMD
APPROVED	CRB
PROJ. NO.	193709215

SHEET NUMBER
C3.03

Plot Date: 08/20/2024 - 9:01 pm
Drawing Name: C:\Users\jdam\Stantec\SolarStone Portfolio - 10_Castlerock (MN)\CAD\dwg\sheets\193709215_grading plans.dwg
Xrefs: Border, 193709215_EXST, 193709215_CONSTRAINTS, 193709215_Layout, 193709215_BMP



Primary PV System Power Summary

Array Area	Inverter ID	AC Power (MW)	PV Module Rating (W)	Qty Of Modules	Qty of Strings	Qty 16-String Trackers	Qty 12-String Trackers	Qty 8-String Trackers	Qty 6-String Trackers	Qty 4-String Trackers	Qty 2-String Trackers	DC Power (MW)	DC/AC Ratio
1	INV-1	4.2	540	9,744	1624	73	14	22	14	0	14	5.26	1.25
	INV-2	4.2	540	9,600	1600	78	2	41	0	0	0	5.18	1.23
	INV-3	4.2	540	9,996	1666	83	2	31	11	0	0	5.40	1.29
	INV-4	4.2	540	9,996	1666	72	35	4	0	0	31	5.40	1.29
	INV-5	4.2	540	10,068	1678	71	39	0	0	0	37	5.44	1.29
	INV-6	4.2	540	10,080	1680	72	38	0	0	0	36	5.44	1.30
	INV-7	4.2	540	9,852	1642	88	17	0	0	0	15	5.32	1.27
	INV-8	4.2	540	9,648	1608	99	2	0	0	0	0	5.21	1.24
	INV-9	4.2	540	9,648	1608	96	6	0	0	0	0	5.21	1.24
	INV-10	4.2	540	9,648	1608	91	8	7	0	0	0	5.21	1.24
	INV-11	4.2	540	9,648	1608	61	38	22	0	0	0	5.21	1.24
	INV-12	4.2	540	8,904	1484	66	23	19	0	0	0	4.81	1.14
	INV-13	4.2	540	8,904	1484	67	31	5	0	0	0	4.81	1.14
	INV-14	4.2	540	9,312	1552	91	8	0	0	0	0	5.03	1.20
	INV-15	4.2	540	9,408	1568	83	10	15	0	0	0	5.08	1.21
	INV-16	4.2	540	9,528	1588	70	39	0	0	0	0	5.15	1.23
	INV-17	4.2	540	9,384	1564	70	37	0	0	0	0	5.07	1.21
	INV-18	4.2	540	10,032	1672	83	5	23	14	0	8	5.42	1.29
2	INV-19	2.52	540	6,360	1060	27	51	2	0	0	0	3.43	1.36
3	INV-20	4.2	540	12,336	2056	89	36	25	0	0	0	6.66	1.59
4	INV-21	4.2	540	8,664	1444	85	7	0	0	0	0	4.68	1.11
	INV-22	4.2	540	8,688	1448	87	4	1	0	0	0	4.69	1.12
	INV-23	4.2	540	8,784	1464	69	30	0	0	0	0	4.74	1.13
	INV-24	4.2	540	8,640	1440	70	16	16	0	0	0	4.67	1.11
5	INV-25	2.52	540	6,144	1024	54	12	2	0	0	0	3.32	1.32
	INV-26	2.52	540	6,120	1020	43	1	40	0	0	0	3.30	1.31
6	INV-27	4.2	540	8,760	1460	63	17	31	0	0	0	4.73	1.13
	INV-28	4.2	540	8,688	1448	55	38	14	0	0	0	4.69	1.12
7	INV-29	4.2	540	10,200	1700	95	7	12	0	0	0	5.51	1.31
	INV-30	4.2	540	10,128	1688	77	34	6	0	0	0	5.47	1.30
	INV-31	4.2	540	10,200	1700	94	9	11	0	0	0	5.51	1.31
	INV-32	4.2	540	10,272	1712	63	46	19	0	0	0	5.55	1.32
8	INV-33	4.2	540	8,676	1446	57	17	19	10	11	37	4.69	1.12
	INV-34	4.2	540	9,732	1622	84	6	12	0	0	55	5.26	1.25
9	INV-35	4.2	540	9,996	1666	99	2	5	0	0	9	5.40	1.29
	INV-36	4.2	540	9,096	1516	91	4	1	0	1	0	4.91	1.17
	INV-37	4.2	540	10,344	1724	94	8	7	6	4	8	5.59	1.33
	INV-38	4.2	540	9,864	1644	77	33	2	0	0	0	5.33	1.27
	INV-39	4.2	540	10,080	1680	98	3	2	0	0	30	5.44	1.30
	INV-40	4.2	540	10,188	1698	60	38	22	10	5	13	5.50	1.31
Total		162.96		375,360	62560	3045	773	438	65	21	293	202.69	1.35

LEGEND

EXISTING

- PARCEL
- RESIDENTIAL BUILDING
- ROAD
- OHE — OVERHEAD ELECTRICAL TRANSMISSION LINE
- OVERHEAD ELECTRICAL TRANSMISSION LINE EASEMENT
- HL — HAZARDOUS LIQUID PIPELINE
- HAZARDOUS LIQUID PIPELINE EASEMENT
- STREAM CENTERLINE
- FIELD DELINEATED WETLAND FARMED
- FIELD DELINEATED WETLAND NOT FARMED
- WATERBODY
- FIELD DELINEATED WATERWAY
- FEMA FLOODWAY
- FEMA FLOOD FRINGE

PROPOSED

- PROJECT BOUNDARY
- BUILDABLE AREA (PV ASSESTS)
- BUILDABLE AREA (FENCE AND ROAD)
- CHAIN LINK FENCE
- ACCESS ROAD
- PVCASE TRACKERS
- INVERTERS
- MV CABLES
- SUBSTATION
- LAYDOWN YARD
- STORMWATER DRAINAGE DITCH

N

0 800' 1600'

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CASTLE ROCK OVERALL PV LAYOUT

CASTLE ROCK SOLAR PROJECT
MATRIX RENEWABLES USA LLC
DAKOTA COUNTY, MINNESOTA

DATE OF ISSUANCE
August 20, 2024

NO.	REVISION	DATE

SURVEY	---
DRAWN	AMF
DESIGNED	DKJ
CHECKED	JMD
APPROVED	CRB
PROJ. NO.	193709215

SHEET NUMBER
E1.00

Plot Date: 08/20/2024 - 9:04pm
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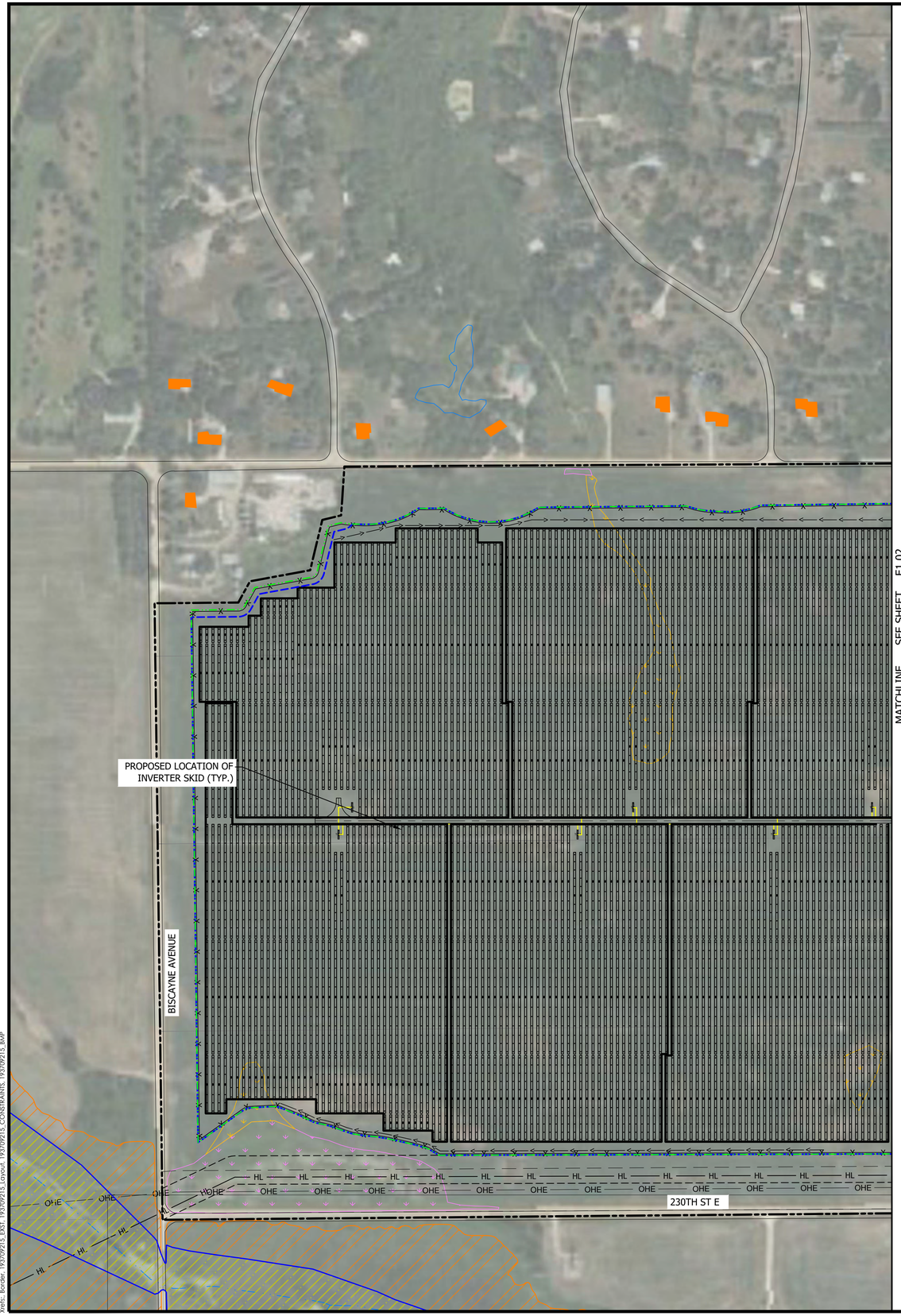
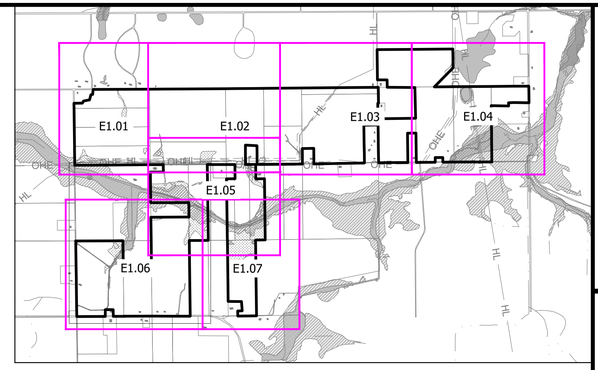
Xrefs: Border_193709215_EXS1_193709215_Layout_193709215_CONSTRAINTS_193709215_BxP





LEGEND

EXISTING	*PROPOSED*
PARCEL	PROJECT BOUNDARY
RESIDENTIAL BUILDING	BUILDABLE AREA (PV ASSESTS)
ROAD	BUILDABLE AREA (FENCE AND ROAD)
OVERHEAD ELECTRICAL TRANSMISSION LINE	CHAIN LINK FENCE
OVERHEAD ELECTRICAL TRANSMISSION LINE EASEMENT	ACCESS ROAD
HAZARDOUS LIQUID PIPELINE	PVCASE TRACKERS
HAZARDOUS LIQUID PIPELINE EASEMENT	INVERTERS
STREAM CENTERLINE	MV CABLES
FIELD DELINEATED WETLAND FARMED	SUBSTATION
FIELD DELINEATED WETLAND NOT FARMED	LAYDOWN YARD
WATERBODY	STORMWATER DRAINAGE DITCH
FIELD DELINEATED WATERWAY	
FEMA FLOODWAY	
FEMA FLOOD FRINGE	

N

0 200' 400'

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SHEET NUMBER
E1.01

Plot Date: 08/20/2024 - 9:05pm
Drawing Name: C:\Users\jdam.Stantec\SolaStone Portfolio - 10_Castlerock (MN)\CAD\dwg\sheets\193709215_electricalplans Option 1.dwg
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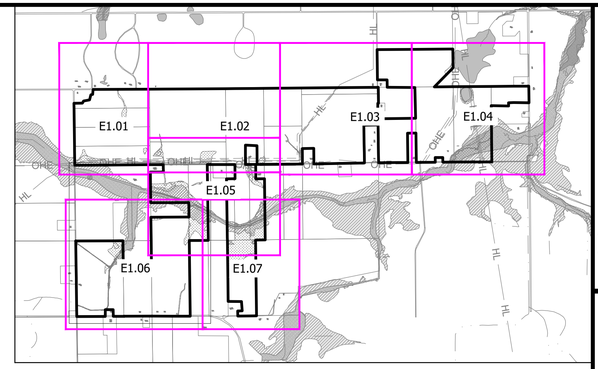

LEGEND

EXISTING	*PROPOSED*
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FEMA FLOOD FRINGE	

N

0 200' 400'

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CASTLE ROCK PV LAYOUT

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SHEET NUMBER
E1.02

Plot Date: 08/20/2024 - 9:06am
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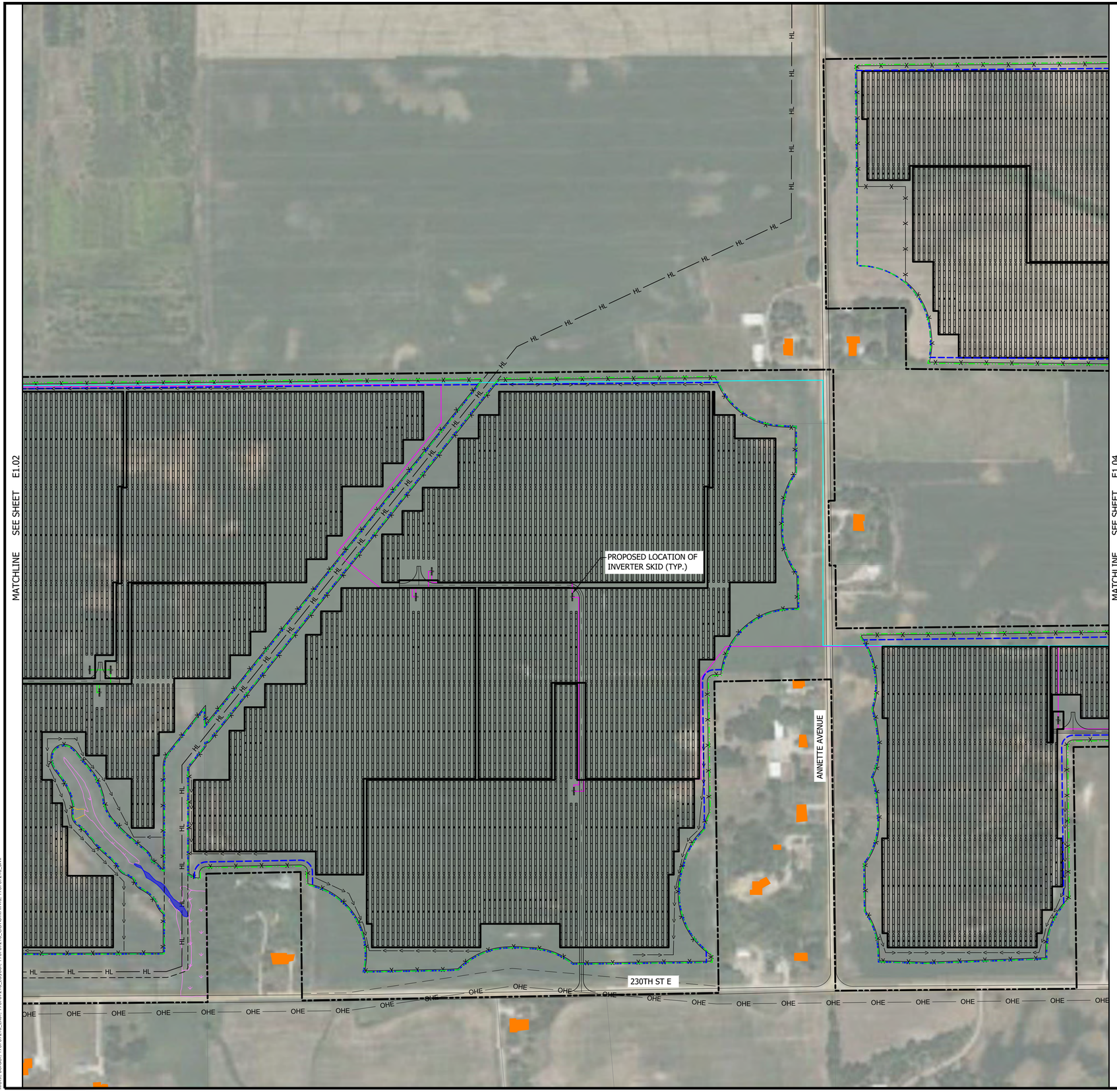

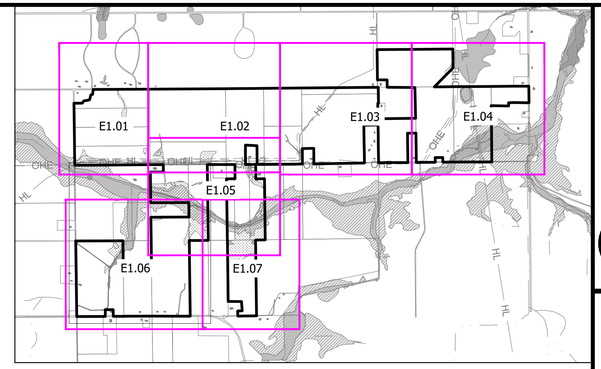

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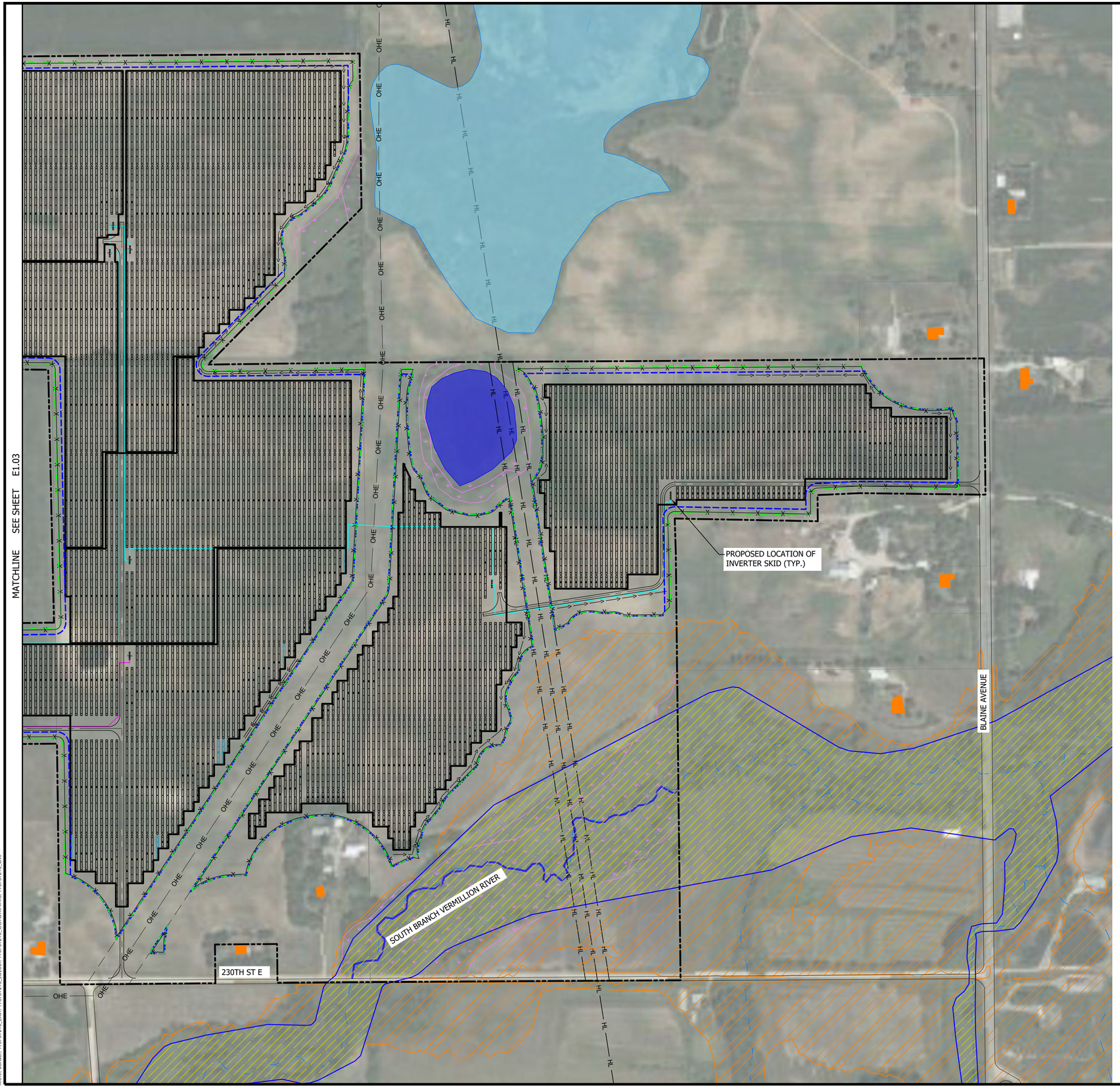

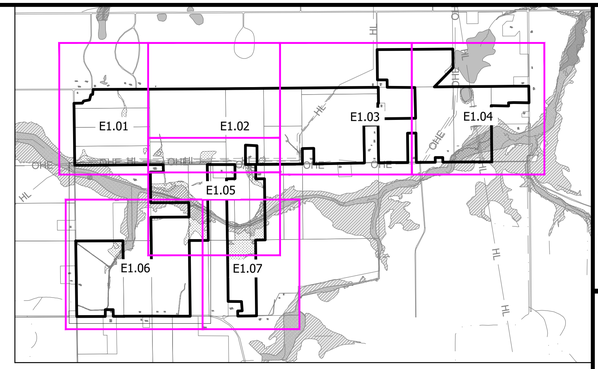

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0 200' 400'

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SHEET NUMBER
E1.04

Plot Date: 08/20/2024 - 9:07pm
Drawing name: C:\Users\jdorn\Stantec\SolarStone Portfolio - 10_Castlerock (MN)\CAD\dwg\sheets\193709215_electricalplans Option 1.dwg
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MATCHLINE SEE SHEET E1.02

TEMPORARY LAYDOWN YARD

PROPOSED SUBSTATION LOCATION

PROPOSED SWITCHGEAR LOCATION

230TH ST W

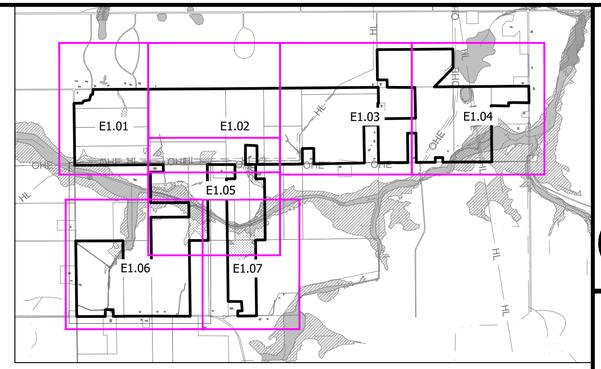
PROPOSED O&M BUILDING

PROPOSED LOCATION OF INVERTER SKID (TYP.)

SOUTH BRANCH VERMILLION RIVER

MATCHLINE SEE SHEET E1.06

MATCHLINE SEE SHEET E1.07



LEGEND

EXISTING

- PARCEL
- RESIDENTIAL BUILDING
- ROAD
- OVERHEAD ELECTRICAL TRANSMISSION LINE
- OVERHEAD ELECTRICAL TRANSMISSION LINE EASEMENT
- HAZARDOUS LIQUID PIPELINE
- HAZARDOUS LIQUID PIPELINE EASEMENT
- STREAM CENTERLINE
- FIELD DELINEATED WETLAND FARMED
- FIELD DELINEATED WETLAND NOT FARMED
- WATERBODY
- FIELD DELINEATED WATERWAY
- FEMA FLOODWAY
- FEMA FLOOD FRINGE

PROPOSED

- PROJECT BOUNDARY
- BUILDABLE AREA (PV ASSESTS)
- BUILDABLE AREA (FENCE AND ROAD)
- CHAIN LINK FENCE
- ACCESS ROAD
- PVCASE TRACKERS
- INVERTERS
- MV CABLES
- SUBSTATION
- LAYDOWN YARD
- STORMWATER DRAINAGE DITCH

N

0 200' 400'

Stantec
209 Commerce Parkway
Cottage Grove, WI 53527
www.stantec.com

PRELIMINARY
NOT FOR CONSTRUCTION

CASTLE ROCK PV LAYOUT

CASTLE ROCK SOLAR PROJECT
MATRIX RENEWABLES USA LLC
DAKOTA COUNTY, MINNESOTA

DATE OF ISSUANCE
August 20, 2024

NO.	REVISION	DATE

SURVEY	---
DRAWN	AMF
DESIGNED	DKJ
CHECKED	JMD
APPROVED	CRB
PROJ. NO.	193709215

SHEET NUMBER
E1.05

Plot Date: 08/20/2024 - 9:08pm
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Xref's: Border, 193709215_EXST, 193709215_Layout, 193709215_CONSTRAINTS, 193709215_BWP

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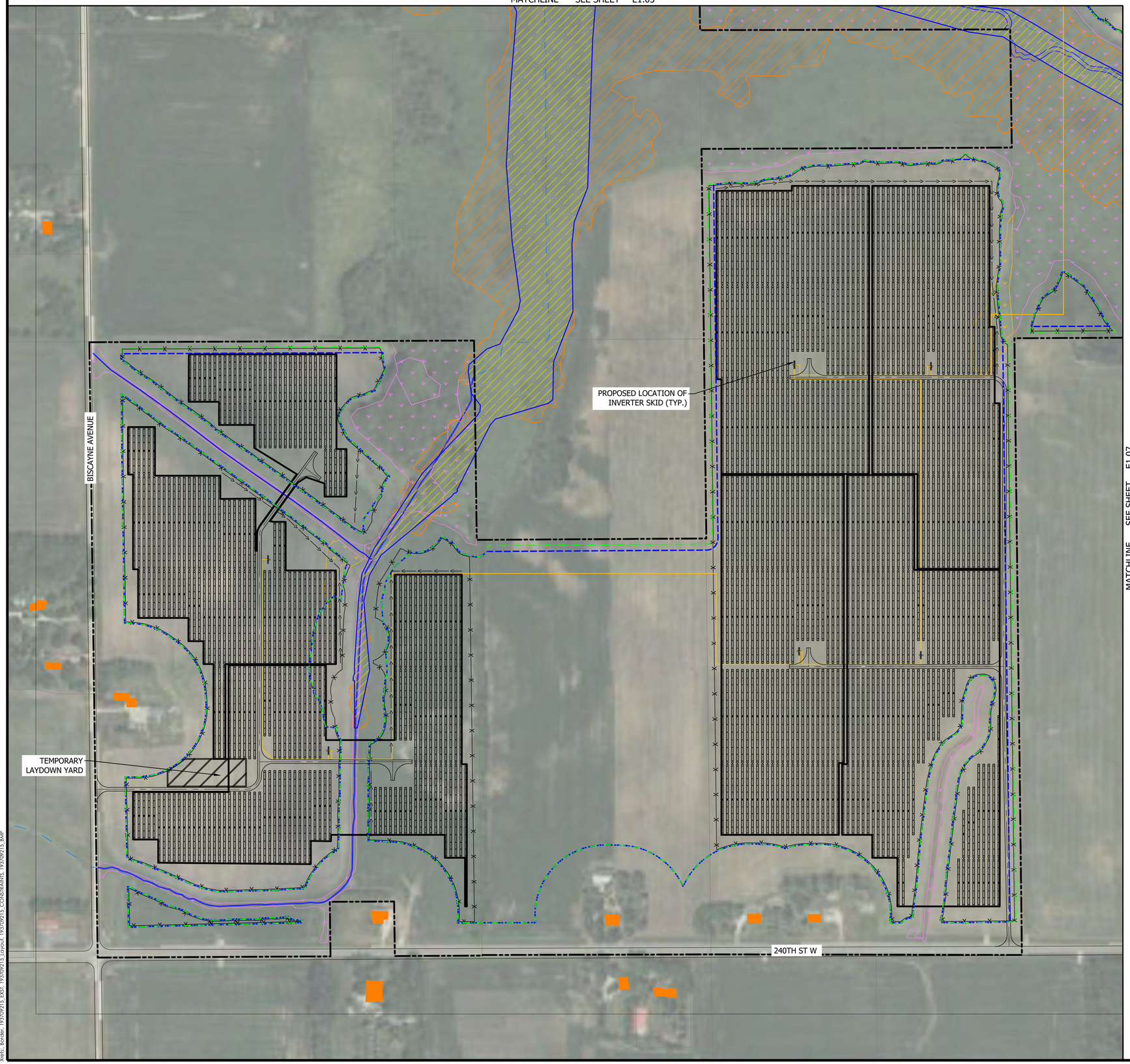

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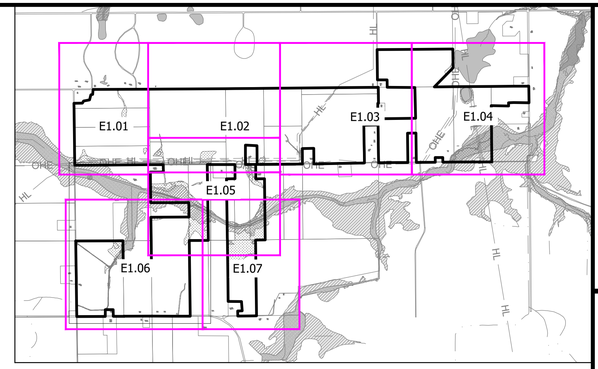

LEGEND

EXISTING	*PROPOSED*
PARCEL	PROJECT BOUNDARY
RESIDENTIAL BUILDING	BUILDABLE AREA (PV ASSESTS)
ROAD	BUILDABLE AREA (FENCE AND ROAD)
OHE — OVERHEAD ELECTRICAL TRANSMISSION LINE	CHAIN LINK FENCE
OVERHEAD ELECTRICAL TRANSMISSION LINE EASEMENT	ACCESS ROAD
HL — HAZARDOUS LIQUID PIPELINE	PVCASE TRACKERS
HAZARDOUS LIQUID PIPELINE EASEMENT	INVERTERS
STREAM CENTERLINE	MV CABLES
FIELD DELINEATED WETLAND FARMED	SUBSTATION
FIELD DELINEATED WETLAND NOT FARMED	LAYDOWN YARD
WATERBODY	STORMWATER DRAINAGE DITCH
FIELD DELINEATED WATERWAY	
FEMA FLOODWAY	
FEMA FLOOD FRINGE	

N

0 200' 400'

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DATE OF ISSUANCE
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NO.	REVISION	DATE

SURVEY	---
DRAWN	AMF
DESIGNED	DKJ
CHECKED	JMD
APPROVED	CRB
PROJ. NO.	193709215

SHEET NUMBER
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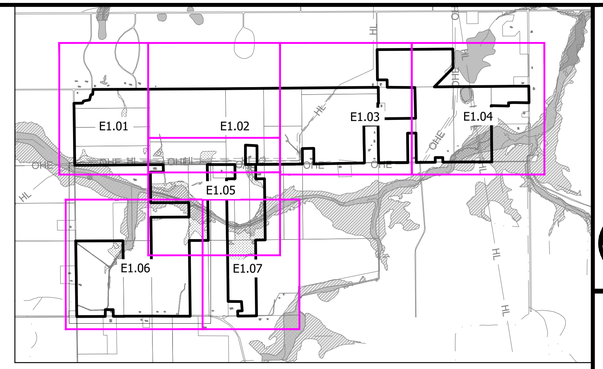
Xrefs: Border_193709215_EXS1, 193709215_Layout, 193709215_CONSTRAINTS, 193709215_BxP

MATCHLINE SEE SHEET E1.05

MATCHLINE SEE SHEET E1.06

PROPOSED LOCATION OF INVERTER SKID (TYP.)

240TH ST W



LEGEND

EXISTING	*PROPOSED*
PARCEL	PROJECT BOUNDARY
RESIDENTIAL BUILDING	BUILDABLE AREA (PV ASSESTS)
ROAD	BUILDABLE AREA (FENCE AND ROAD)
OVERHEAD ELECTRICAL TRANSMISSION LINE	CHAIN LINK FENCE
OVERHEAD ELECTRICAL TRANSMISSION LINE EASEMENT	ACCESS ROAD
HAZARDOUS LIQUID PIPELINE	PVCASE TRACKERS
HAZARDOUS LIQUID PIPELINE EASEMENT	INVERTERS
STREAM CENTERLINE	MV CABLES
FIELD DELINEATED WETLAND FARMED	SUBSTATION
FIELD DELINEATED WETLAND NOT FARMED	LAYDOWN YARD
WATERBODY	STORMWATER DRAINAGE DITCH
FIELD DELINEATED WATERWAY	
FEMA FLOODWAY	
FEMA FLOOD FRINGE	

N

0 200' 400'

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MATRIX RENEWABLES USA LLC
DAKOTA COUNTY, MINNESOTA

DATE OF ISSUANCE
August 20, 2024

NO.	REVISION	DATE

SURVEY	---
DRAWN	DKJ
DESIGNED	JMD
CHECKED	XXX
APPROVED	CRB
PROJ. NO.	193709215

SHEET NUMBER
E1.07

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Xrefs: Border_193709215_EXST_193709215_Layout_193709215_CONSTRAINTS_193709215_BVP

Appendix B APPENDICES

Appendix B Appendices

B.1 RAINFALL EVENTS

NOAA Atlas 14, Volume 8, Version 2
Location name: Farmington, Minnesota, USA*
Latitude: 44.6177°, Longitude: -93.0889°
Elevation: 925 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.352 (0.276-0.454)	0.420 (0.329-0.541)	0.537 (0.419-0.694)	0.641 (0.497-0.831)	0.794 (0.599-1.07)	0.919 (0.676-1.25)	1.05 (0.746-1.46)	1.19 (0.811-1.70)	1.39 (0.908-2.02)	1.54 (0.981-2.27)
10-min	0.516 (0.404-0.664)	0.615 (0.481-0.792)	0.786 (0.614-1.02)	0.939 (0.728-1.22)	1.16 (0.877-1.57)	1.35 (0.989-1.83)	1.54 (1.09-2.14)	1.74 (1.19-2.48)	2.03 (1.33-2.96)	2.26 (1.44-3.32)
15-min	0.629 (0.493-0.810)	0.750 (0.587-0.966)	0.959 (0.748-1.24)	1.14 (0.888-1.48)	1.42 (1.07-1.91)	1.64 (1.21-2.23)	1.88 (1.33-2.61)	2.13 (1.45-3.03)	2.48 (1.62-3.61)	2.76 (1.75-4.05)
30-min	0.890 (0.698-1.15)	1.07 (0.835-1.38)	1.37 (1.07-1.78)	1.65 (1.28-2.13)	2.05 (1.54-2.76)	2.38 (1.75-3.23)	2.72 (1.93-3.78)	3.09 (2.10-4.40)	3.61 (2.36-5.25)	4.02 (2.55-5.90)
60-min	1.16 (0.912-1.50)	1.39 (1.09-1.79)	1.80 (1.40-2.32)	2.18 (1.69-2.83)	2.76 (2.10-3.76)	3.26 (2.41-4.47)	3.80 (2.71-5.32)	4.39 (3.00-6.28)	5.24 (3.44-7.66)	5.93 (3.76-8.70)
2-hr	1.44 (1.14-1.83)	1.71 (1.35-2.18)	2.22 (1.75-2.84)	2.71 (2.12-3.48)	3.48 (2.68-4.72)	4.15 (3.10-5.66)	4.89 (3.52-6.79)	5.70 (3.93-8.10)	6.87 (4.56-9.99)	7.84 (5.03-11.4)
3-hr	1.60 (1.27-2.03)	1.90 (1.50-2.40)	2.47 (1.95-3.14)	3.03 (2.38-3.87)	3.94 (3.06-5.34)	4.74 (3.56-6.45)	5.63 (4.08-7.81)	6.63 (4.61-9.40)	8.09 (5.40-11.7)	9.30 (6.00-13.5)
6-hr	1.88 (1.50-2.35)	2.20 (1.76-2.76)	2.86 (2.28-3.59)	3.51 (2.79-4.43)	4.59 (3.60-6.18)	5.55 (4.22-7.50)	6.63 (4.86-9.14)	7.84 (5.51-11.1)	9.64 (6.50-13.9)	11.1 (7.25-16.0)
12-hr	2.13 (1.72-2.65)	2.49 (2.01-3.09)	3.19 (2.57-3.97)	3.87 (3.10-4.84)	4.97 (3.93-6.60)	5.95 (4.56-7.93)	7.03 (5.20-9.57)	8.24 (5.84-11.5)	10.0 (6.82-14.3)	11.5 (7.55-16.4)
24-hr	2.46 (2.01-3.02)	2.80 (2.28-3.44)	3.48 (2.82-4.28)	4.16 (3.36-5.14)	5.28 (4.21-6.94)	6.28 (4.86-8.30)	7.40 (5.53-9.99)	8.66 (6.21-12.0)	10.5 (7.25-14.9)	12.1 (8.03-17.1)
2-day	2.86 (2.35-3.46)	3.17 (2.61-3.86)	3.83 (3.14-4.67)	4.51 (3.67-5.51)	5.62 (4.54-7.32)	6.64 (5.19-8.69)	7.78 (5.87-10.4)	9.07 (6.57-12.4)	11.0 (7.65-15.4)	12.6 (8.46-17.7)
3-day	3.12 (2.58-3.76)	3.45 (2.85-4.16)	4.13 (3.40-4.99)	4.81 (3.94-5.85)	5.94 (4.82-7.67)	6.97 (5.48-9.05)	8.12 (6.16-10.8)	9.42 (6.86-12.8)	11.3 (7.94-15.8)	13.0 (8.76-18.1)
4-day	3.34 (2.77-4.00)	3.69 (3.06-4.44)	4.40 (3.64-5.30)	5.10 (4.20-6.18)	6.25 (5.07-8.01)	7.28 (5.74-9.40)	8.43 (6.42-11.1)	9.72 (7.10-13.2)	11.6 (8.16-16.1)	13.2 (8.96-18.4)
7-day	3.88 (3.25-4.62)	4.33 (3.62-5.15)	5.15 (4.29-6.15)	5.92 (4.91-7.10)	7.12 (5.78-8.95)	8.14 (6.44-10.3)	9.25 (7.07-12.0)	10.5 (7.69-14.0)	12.2 (8.64-16.8)	13.7 (9.36-18.9)
10-day	4.39 (3.69-5.19)	4.92 (4.13-5.82)	5.84 (4.89-6.93)	6.67 (5.55-7.95)	7.90 (6.42-9.82)	8.93 (7.08-11.2)	10.0 (7.68-12.9)	11.2 (8.24-14.8)	12.8 (9.10-17.5)	14.2 (9.75-19.5)
20-day	5.97 (5.06-6.98)	6.68 (5.66-7.82)	7.87 (6.64-9.23)	8.86 (7.44-10.4)	10.2 (8.33-12.4)	11.3 (9.00-14.0)	12.4 (9.55-15.7)	13.5 (10.0-17.6)	15.0 (10.7-20.1)	16.1 (11.2-22.0)
30-day	7.36 (6.28-8.55)	8.24 (7.02-9.58)	9.64 (8.19-11.2)	10.8 (9.10-12.6)	12.3 (10.0-14.8)	13.4 (10.7-16.4)	14.5 (11.2-18.2)	15.6 (11.6-20.2)	17.0 (12.2-22.7)	18.0 (12.6-24.5)
45-day	9.19 (7.88-10.6)	10.3 (8.81-11.9)	12.0 (10.2-13.9)	13.3 (11.3-15.5)	15.0 (12.3-17.9)	16.3 (13.1-19.7)	17.4 (13.5-21.7)	18.5 (13.8-23.7)	19.8 (14.3-26.2)	20.7 (14.6-28.0)
60-day	10.8 (9.29-12.4)	12.1 (10.4-13.9)	14.1 (12.1-16.2)	15.6 (13.3-18.0)	17.5 (14.3-20.6)	18.8 (15.1-22.6)	20.0 (15.6-24.7)	21.1 (15.8-26.8)	22.3 (16.1-29.3)	23.1 (16.4-31.2)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

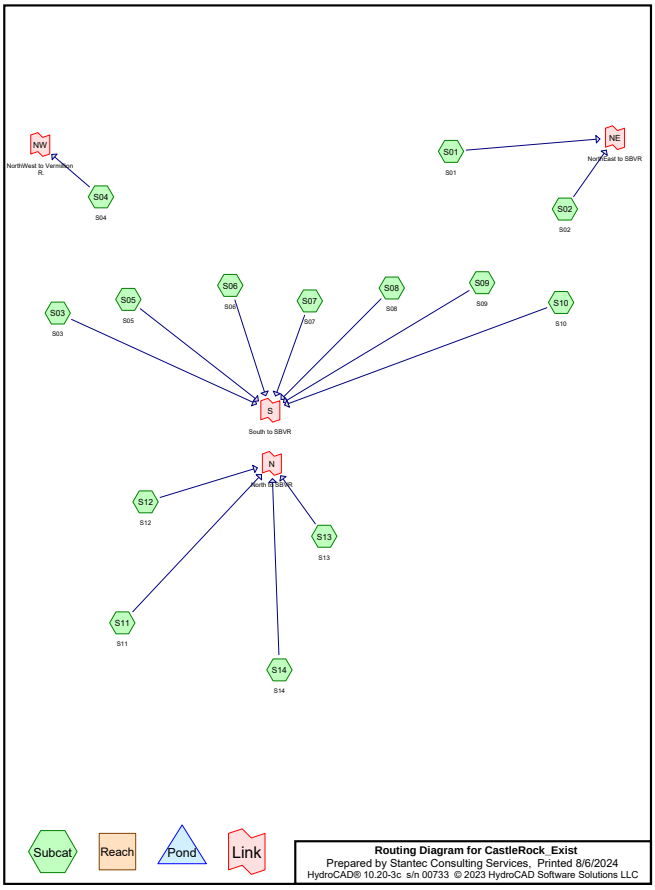
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical

B.2 EXISTING HYDROCAD RESULTS



Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-Year	MSE 24-hr	3	Default	24.00	1	2.46	2
2	2-Year	MSE 24-hr	3	Default	24.00	1	2.80	2
3	10-Year	MSE 24-hr	3	Default	24.00	1	4.16	2
4	100-Year	MSE 24-hr	3	Default	24.00	1	7.40	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.503	30	Forest Good, HSG A (S08)
0.391	55	Forest Good, HSG B (S08, S14)
0.297	45	Forest Poor, HSG A (S08, S13, S14)
0.928	66	Forest Poor, HSG B (S14)
3.061	83	Forest Poor, HSG D (S02, S11, S13)
7.069	72	Gr-Road, HSG A (S01, S02, S03, S04, S05, S06, S07, S08, S09, S10, S13)
12.538	82	Gr-Road, HSG B (S01, S02, S03, S04, S05, S06, S07, S08, S09, S10, S11, S12, S13, S14)
11.289	89	Gr-Road, HSG D (S02, S03, S04, S05, S06, S07, S10, S11, S12, S13)
8.631	30	Meadow, HSG A (S02, S12, S13)
0.931	58	Meadow, HSG B (S02, S12, S13)
0.389	71	Meadow, HSG C (S13)
81.910	78	Meadow, HSG D (S02, S10, S11, S12, S13)
0.131	83	Pav-Road, HSG A (S10)
0.643	89	Pav-Road, HSG B (S10)
0.649	57	Residential, HSG A (S01, S04, S05, S08, S10)
1.995	72	Residential, HSG B (S02, S03, S08, S11, S12, S14)
0.305	86	Residential, HSG D (S05, S11, S12)
1.397	77	Residential-Med, HSG A (S10)
0.827	85	Residential-Med, HSG B (S10, S11)
438.780	67	Row Crop, HSG A (S01, S02, S03, S04, S05, S06, S07, S08, S09, S10, S11, S12, S13, S14)
457.203	78	Row Crop, HSG B (S01, S02, S03, S04, S05, S06, S07, S08, S09, S10, S11, S12, S13, S14)
12.798	85	Row Crop, HSG C (S01, S02, S09, S13, S14)
310.458	89	Row Crop, HSG D (S01, S02, S03, S04, S05, S06, S07, S10, S11, S12, S13, S14)
1.779	99	Water, HSG D (S02)
1,354.900	**77**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
457.456	HSG A	S01, S02, S03, S04, S05, S06, S07, S08, S09, S10, S11, S12, S13, S14
475.456	HSG B	S01, S02, S03, S04, S05, S06, S07, S08, S09, S10, S11, S12, S13, S14
13.187	HSG C	S01, S02, S09, S13, S14
408.801	HSG D	S01, S02, S03, S04, S05, S06, S07, S10, S11, S12, S13, S14
0.000	Other	
1,354.900		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.503	0.391	0.000	0.000	0.000	0.895	Forest Good	S08, S14
0.297	0.928	0.000	3.061	0.000	4.285	Forest Poor	S02, S08, S11, S13, S14
7.069	12.538	0.000	11.289	0.000	30.895	Gr-Road	S01, S02, S03, S04, S05, S06, S07, S08, S09, S10, S11, S12, S13, S14
8.631	0.931	0.389	81.910	0.000	91.860	Meadow	S02, S10, S11, S12, S13
0.131	0.643	0.000	0.000	0.000	0.774	Pav-Road	S10
0.649	1.995	0.000	0.305	0.000	2.949	Residential	S01, S02, S03, S04, S05, S08, S10, S11, S12, S14
1.397	0.827	0.000	0.000	0.000	2.224	Residential-Med	S10, S11
438.780	457.203	12.798	310.458	0.000	1,219.239	Row Crop	S01, S02, S03, S04, S05, S06, S07, S08, S09, S10, S11, S12, S13, S14
0.000	0.000	0.000	1.779	0.000	1.779	Water	S02
457.456	**475.456**	**13.187**	**408.801**	**0.000**	**1,354.900**	**TOTAL AREA**	

Time span=1.00-72.00 hrs, dt=0.05 hrs, 1421 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment S01: S01 Runoff Area=184.155 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=1,941' Tc=29.1 min CN=74 Runoff=86.22 cfs 8.991 af

Subcatchment S02: S02 Runoff Area=157.929 ac 1.13% Impervious Runoff Depth=0.55"
Flow Length=2,628' Tc=22.5 min CN=73 Runoff=78.45 cfs 7.187 af

Subcatchment S03: S03 Runoff Area=83.513 ac 0.00% Impervious Runoff Depth=0.67"
Flow Length=2,187' Tc=36.5 min CN=76 Runoff=40.57 cfs 4.666 af

Subcatchment S04: S04 Runoff Area=131.221 ac 0.00% Impervious Runoff Depth=0.72"
Flow Length=4,429' Tc=78.3 min CN=77 Runoff=41.61 cfs 7.823 af

Subcatchment S05: S05 Runoff Area=74.439 ac 0.00% Impervious Runoff Depth=0.81"
Flow Length=2,690' Tc=17.8 min CN=79 Runoff=68.48 cfs 5.029 af

Subcatchment S06: S06 Runoff Area=13.695 ac 0.00% Impervious Runoff Depth=0.67"
Flow Length=1,071' Tc=12.8 min CN=76 Runoff=11.75 cfs 0.765 af

Subcatchment S07: S07 Runoff Area=20.432 ac 0.00% Impervious Runoff Depth=0.47"
Flow Length=1,073' Tc=18.0 min CN=71 Runoff=9.35 cfs 0.803 af

Subcatchment S08: S08 Runoff Area=58.666 ac 0.00% Impervious Runoff Depth=0.40"
Flow Length=1,871' Tc=25.6 min CN=69 Runoff=17.65 cfs 1.969 af

Subcatchment S09: S09 Runoff Area=46.961 ac 0.00% Impervious Runoff Depth=0.51"
Flow Length=2,350' Tc=33.3 min CN=72 Runoff=16.84 cfs 1.988 af

Subcatchment S10: S10 Runoff Area=132.656 ac 0.00% Impervious Runoff Depth=0.63"
Flow Length=3,210' Tc=46.3 min CN=75 Runoff=50.93 cfs 6.935 af

Subcatchment S11: S11 Runoff Area=123.100 ac 0.00% Impervious Runoff Depth=1.15"
Flow Length=3,503' Tc=20.4 min CN=85 Runoff=155.54 cfs 11.763 af

Subcatchment S12: S12 Runoff Area=199.618 ac 0.00% Impervious Runoff Depth=0.91"
Flow Length=4,996' Tc=86.4 min CN=81 Runoff=78.18 cfs 15.204 af

Subcatchment S13: S13 Runoff Area=116.440 ac 0.00% Impervious Runoff Depth=0.72"
Flow Length=3,702' Tc=50.0 min CN=77 Runoff=50.16 cfs 6.942 af

Subcatchment S14: S14 Runoff Area=12.075 ac 0.00% Impervious Runoff Depth=0.76"
Flow Length=885' Tc=12.8 min CN=78 Runoff=12.19 cfs 0.767 af

Link N: North to SBVR Inflow=192.36 cfs 34.676 af
Primary=192.36 cfs 34.676 af

Link NE: NorthEast to SBVR Inflow=160.50 cfs 16.178 af
Primary=160.50 cfs 16.178 af

Link NW: NorthWest to Vermillion R. Inflow=41.61 cfs 7.823 af
Primary=41.61 cfs 7.823 af

Link S: South to SBVR Inflow=164.52 cfs 22.154 af
Primary=164.52 cfs 22.154 af

Total Runoff Area = 1,354.900 ac Runoff Volume = 80.831 af Average Runoff Depth = 0.72"
99.87% Pervious = 1,353.121 ac 0.13% Impervious = 1.779 ac

Summary for Subcatchment S01: S01

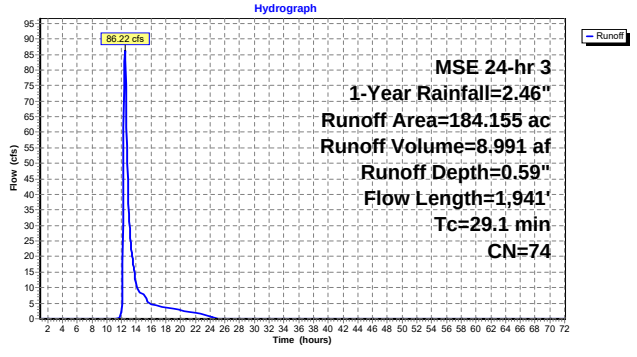
Runoff = 86.22 cfs @ 12.47 hrs, Volume= 8.991 af, Depth= 0.59"
Routed to Link NE : NorthEast to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	0.685	72	Gr-Road, HSG A
*	0.238	82	Gr-Road, HSG B
*	0.368	57	Residential, HSG A
*	86.249	67	Row Crop, HSG A
*	80.405	78	Row Crop, HSG B
*	4.641	85	Row Crop, HSG C
*	11.567	89	Row Crop, HSG D
	184.155	74	Weighted Average
	184.155		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	109	0.1237	0.70		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
26.5	1,832	0.0164	1.15		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
29.1	1,941	Total			

Subcatchment S01: S01



Summary for Subcatchment S02: S02

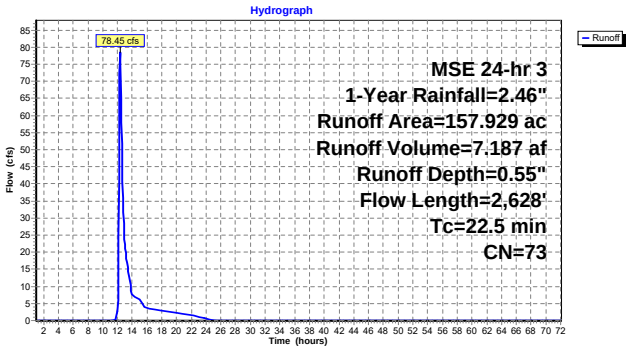
Runoff = 78.45 cfs @ 12.37 hrs, Volume= 7.187 af, Depth= 0.55"
Routed to Link NE : NorthEast to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	0.007	83	Forest Poor, HSG D
*	0.964	72	Gr-Road, HSG A
*	0.356	82	Gr-Road, HSG B
*	0.310	89	Gr-Road, HSG D
*	0.308	30	Meadow, HSG A
*	0.113	58	Meadow, HSG B
*	2.914	78	Meadow, HSG D
*	0.484	72	Residential, HSG B
*	88.631	67	Row Crop, HSG A
*	44.435	78	Row Crop, HSG B
*	1.300	85	Row Crop, HSG C
*	16.328	89	Row Crop, HSG D
*	1.779	99	Water, HSG D
	157.929	73	Weighted Average
	156.150		98.87% Pervious Area
	1.779		1.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	107	0.0756	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.80"
5.9	691	0.0473	1.96		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
2.4	1,830	0.0059	12.95	4,040.29	**Channel Flow,** Area= 312.0 sf Perim= 50.0' r= 6.24' n= 0.030
22.5	2,628	Total			

Subcatchment S02: S02



Summary for Subcatchment S03: S03

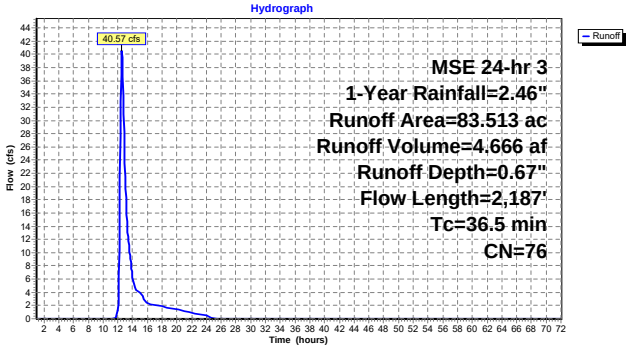
Runoff = 40.57 cfs @ 12.56 hrs, Volume= 4.666 af, Depth= 0.67"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	0.189	72	Gr-Road, HSG A
*	1.911	82	Gr-Road, HSG B
*	3.261	89	Gr-Road, HSG D
*	0.001	72	Residential, HSG B
*	29.050	67	Row Crop, HSG A
*	40.714	78	Row Crop, HSG B
*	8.387	89	Row Crop, HSG D
	83.513	76	Weighted Average
	83.513		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	108	0.0425	0.45		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
32.5	2,079	0.0140	1.07		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
36.5	2,187	Total			

Subcatchment S03: S03



Summary for Subcatchment S04: S04

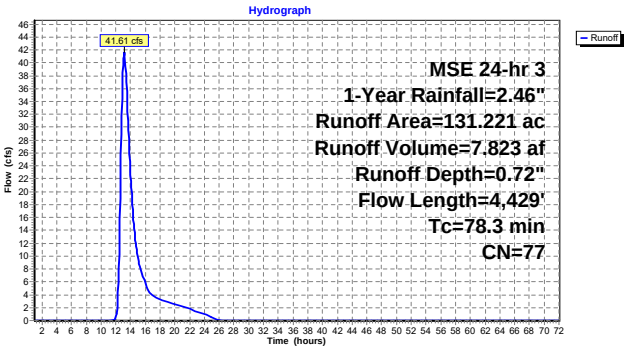
Runoff = 41.61 cfs @ 13.15 hrs, Volume= 7.823 af, Depth= 0.72"
Routed to Link NW : NorthWest to Vermillion R.

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	0.737	72	Gr-Road, HSG A
*	0.606	82	Gr-Road, HSG B
*	0.915	89	Gr-Road, HSG D
*	0.076	57	Residential, HSG A
*	22.979	67	Row Crop, HSG A
*	92.532	78	Row Crop, HSG B
*	13.376	89	Row Crop, HSG D
	131.221	77	Weighted Average
	131.221		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	100	0.0260	0.37		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
73.6	4,220	0.0113	0.96		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
0.2	110	0.0073	8.38	326.77	**Channel Flow,** Area= 39.0 sf Perim= 14.0' r= 2.79' n= 0.030
78.3	4,429	Total			

Subcatchment S04: S04



Summary for Subcatchment S05: S05

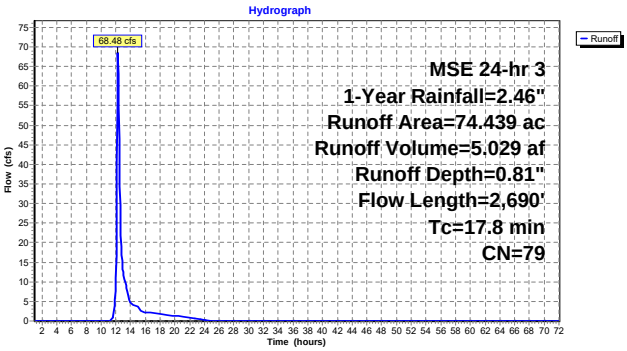
Runoff = 68.48 cfs @ 12.29 hrs, Volume= 5.029 af, Depth= 0.81"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	0.624	72	Gr-Road, HSG A
*	1.843	82	Gr-Road, HSG B
*	0.773	89	Gr-Road, HSG D
*	0.029	57	Residential, HSG A
*	0.057	86	Residential, HSG D
*	12.466	67	Row Crop, HSG A
*	41.510	78	Row Crop, HSG B
*	17.138	89	Row Crop, HSG D
	74.439	79	Weighted Average
	74.439		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	100	0.0560	1.94		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.80"
11.9	1,141	0.0315	1.60		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
5.0	1,449	0.0077	4.81	67.27	**Channel Flow,** Area= 14.0 sf Perim= 12.0' r= 1.17' n= 0.030
17.8	2,690	Total			

Subcatchment S05: S05



Summary for Subcatchment S06: S06

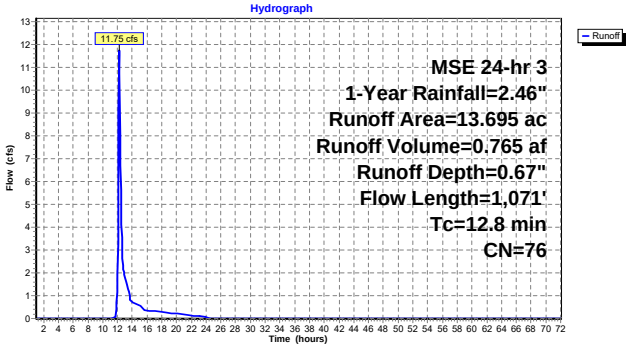
Runoff = 11.75 cfs @ 12.23 hrs, Volume= 0.765 af, Depth= 0.67"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	0.146	72	Gr-Road, HSG A
*	0.586	82	Gr-Road, HSG B
*	0.164	89	Gr-Road, HSG D
*	4.514	67	Row Crop, HSG A
*	7.168	78	Row Crop, HSG B
*	1.116	89	Row Crop, HSG D
	13.695	76	Weighted Average
	13.695		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	100	0.0830	0.59		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
10.0	971	0.0320	1.61		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
12.8	1,071	Total			

Subcatchment S06: S06



Summary for Subcatchment S07: S07

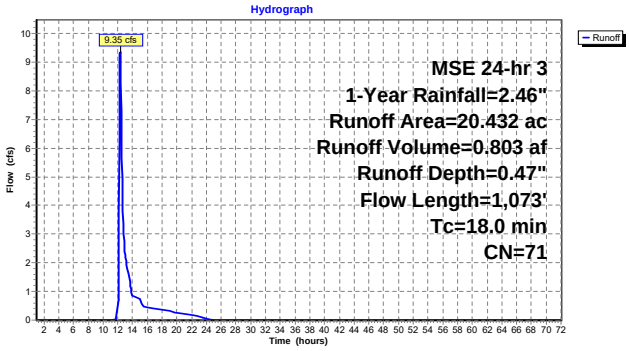
Runoff = 9.35 cfs @ 12.32 hrs, Volume= 0.803 af, Depth= 0.47"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	0.256	72	Gr-Road, HSG A
*	0.093	82	Gr-Road, HSG B
*	0.067	89	Gr-Road, HSG D
*	15.387	67	Row Crop, HSG A
*	1.790	78	Row Crop, HSG B
*	2.839	89	Row Crop, HSG D
	20.432	71	Weighted Average
	20.432		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	100	0.0180	0.32		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
12.8	973	0.0197	1.26		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
18.0	1,073	Total			

Subcatchment S07: S07



Summary for Subcatchment S08: S08

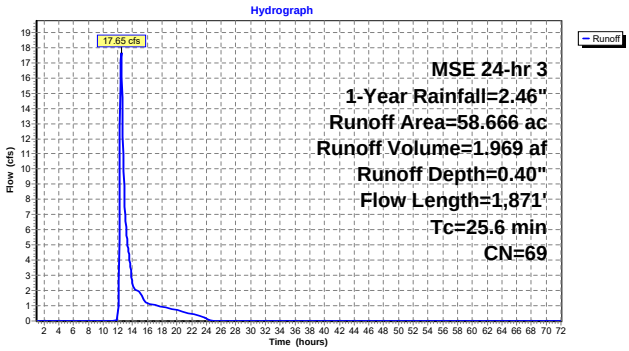
Runoff = 17.65 cfs @ 12.45 hrs, Volume= 1.969 af, Depth= 0.40"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	0.503	30	Forest Good, HSG A
*	0.287	55	Forest Good, HSG B
*	0.135	45	Forest Poor, HSG A
*	0.880	72	Gr-Road, HSG A
*	0.458	82	Gr-Road, HSG B
*	0.044	57	Residential, HSG A
*	0.076	72	Residential, HSG B
*	44.270	67	Row Crop, HSG A
*	12.013	78	Row Crop, HSG B
	58.666	69	Weighted Average
	58.666		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	100	0.0530	0.49		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
22.2	1,771	0.0217	1.33		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
25.6	1,871	Total			

Subcatchment S08: S08



Summary for Subcatchment S09: S09

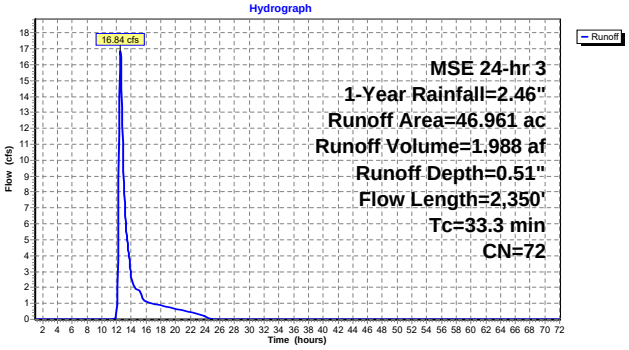
Runoff = 16.84 cfs @ 12.55 hrs, Volume= 1.988 af, Depth= 0.51"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	0.456	72	Gr-Road, HSG A
*	0.006	82	Gr-Road, HSG B
*	24.877	67	Row Crop, HSG A
*	19.903	78	Row Crop, HSG B
*	1.720	85	Row Crop, HSG C
	46.961	72	Weighted Average
	46.961		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	100	0.0350	0.41		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
29.3	2,250	0.0202	1.28		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
33.3	2,350	Total			

Subcatchment S09: S09



Summary for Subcatchment S10: S10

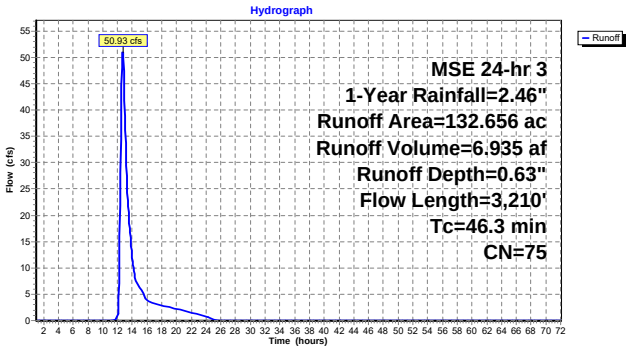
Runoff = 50.93 cfs @ 12.71 hrs, Volume= 6.935 af, Depth= 0.63"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	1.687	72	Gr-Road, HSG A
*	2.314	82	Gr-Road, HSG B
*	0.233	89	Gr-Road, HSG D
*	0.154	78	Meadow, HSG D
*	0.131	83	Pav-Road, HSG A
*	0.643	89	Pav-Road, HSG B
*	0.133	57	Residential, HSG A
*	1.397	77	Residential-Med, HSG A
*	0.160	85	Residential-Med, HSG B
*	57.816	67	Row Crop, HSG A
*	41.673	78	Row Crop, HSG B
*	26.317	89	Row Crop, HSG D
	132.656	75	Weighted Average
	132.656		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	100	0.0690	0.54		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
34.9	2,180	0.0134	1.04		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
8.3	930	0.0012	1.86	66.90	**Channel Flow,** Area= 36.0 sf Perim= 30.9' r= 1.16' n= 0.030
46.3	3,210	Total			

Subcatchment S10: S10



Summary for Subcatchment S11: S11

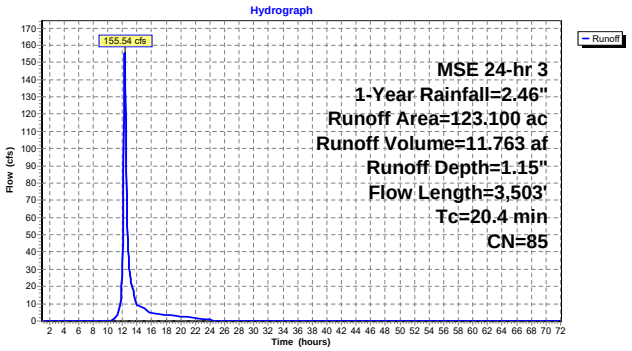
Runoff = 155.54 cfs @ 12.31 hrs, Volume= 11.763 af, Depth= 1.15"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	3.023	83	Forest Poor, HSG D
*	1.907	82	Gr-Road, HSG B
*	2.976	89	Gr-Road, HSG D
*	4.775	78	Meadow, HSG D
*	0.119	72	Residential, HSG B
*	0.027	86	Residential, HSG D
*	0.667	85	Residential-Med, HSG B
*	3.317	67	Row Crop, HSG A
*	25.681	78	Row Crop, HSG B
*	80.608	89	Row Crop, HSG D
	123.100	85	Weighted Average
	123.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	100	0.0280	1.47		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.80"
12.7	1,150	0.0281	1.51		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
6.6	2,253	0.0040	5.67	589.90	**Channel Flow,** Area= 104.0 sf Perim= 43.0' r= 2.42' n= 0.030
20.4	3,503	Total			

Subcatchment S11: S11



Summary for Subcatchment S12: S12

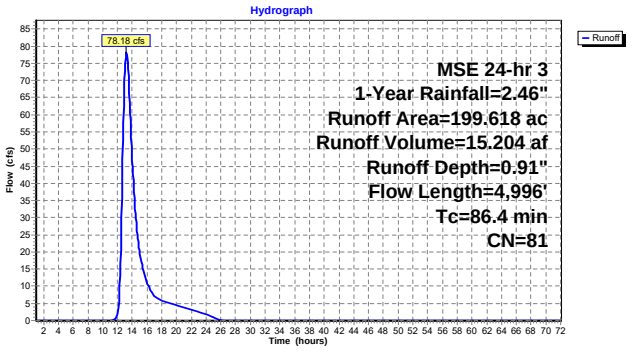
Runoff = 78.18 cfs @ 13.20 hrs, Volume= 15.204 af, Depth= 0.91"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	1.634	82	Gr-Road, HSG B
*	2.224	89	Gr-Road, HSG D
*	3.465	30	Meadow, HSG A
*	0.640	58	Meadow, HSG B
*	39.407	78	Meadow, HSG D
*	1.215	72	Residential, HSG B
*	0.222	86	Residential, HSG D
*	27.039	67	Row Crop, HSG A
*	24.619	78	Row Crop, HSG B
*	99.153	89	Row Crop, HSG D
	199.618	81	Weighted Average
	199.618		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	100	0.0460	1.80		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.80"
80.5	4,519	0.0108	0.94		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
5.0	377	0.0005	1.26	45.43	**Channel Flow,** Area= 36.0 sf Perim= 30.9' r= 1.16' n= 0.030
86.4	4,996	Total			

Subcatchment S12: S12



Summary for Subcatchment S13: S13

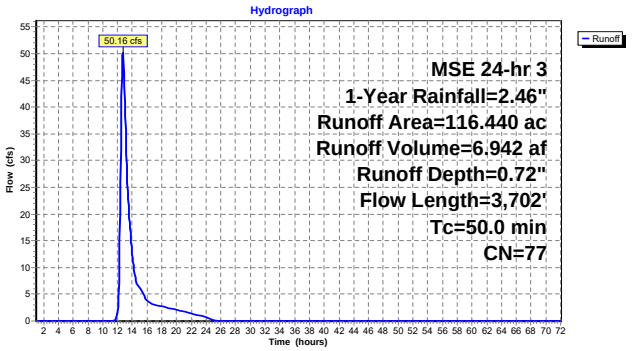
Runoff = 50.16 cfs @ 12.75 hrs, Volume= 6.942 af, Depth= 0.72"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	0.128	45	Forest Poor, HSG A
*	0.030	83	Forest Poor, HSG D
*	0.446	72	Gr-Road, HSG A
*	0.132	82	Gr-Road, HSG B
*	0.366	89	Gr-Road, HSG D
*	4.858	30	Meadow, HSG A
*	0.178	58	Meadow, HSG B
*	0.389	71	Meadow, HSG C
*	34.659	78	Meadow, HSG D
*	20.485	67	Row Crop, HSG A
*	18.556	78	Row Crop, HSG B
*	5.044	85	Row Crop, HSG C
*	31.169	89	Row Crop, HSG D
	116.440	77	Weighted Average
	116.440		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	100	0.0390	0.43		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
39.7	2,697	0.0158	1.13		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
6.4	905	0.0018	2.34	84.24	**Channel Flow,** Area= 36.0 sf Perim= 30.9' r= 1.16' n= 0.030
50.0	3,702	Total			

Subcatchment S13: S13



Summary for Subcatchment S14: S14

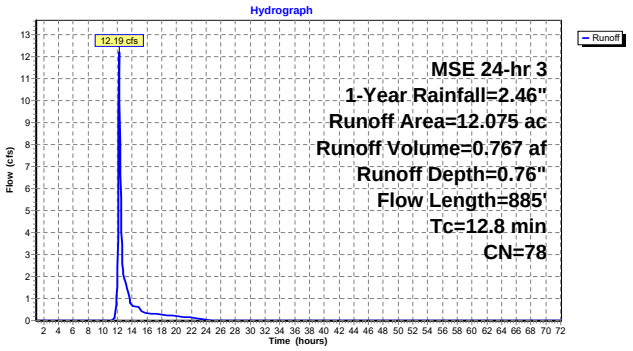
Runoff = 12.19 cfs @ 12.22 hrs, Volume= 0.767 af, Depth= 0.76"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	0.105	55	Forest Good, HSG B
*	0.033	45	Forest Poor, HSG A
*	0.928	66	Forest Poor, HSG B
*	0.454	82	Gr-Road, HSG B
*	0.101	72	Residential, HSG B
*	1.700	67	Row Crop, HSG A
*	6.203	78	Row Crop, HSG B
*	0.093	85	Row Crop, HSG C
*	2.458	89	Row Crop, HSG D
	12.075	78	Weighted Average
	12.075		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	100	0.0440	0.45		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
9.1	785	0.0257	1.44		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
12.8	885	Total			

Subcatchment S14: S14

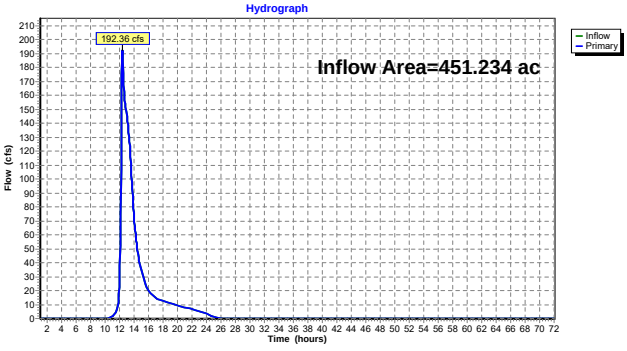


Summary for Link N: North to SBVR

Inflow Area = 451.234 ac, 0.00% Impervious, Inflow Depth = 0.92" for 1-Year event
Inflow = 192.36 cfs @ 12.33 hrs, Volume= 34.676 af
Primary = 192.36 cfs @ 12.33 hrs, Volume= 34.676 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link N: North to SBVR

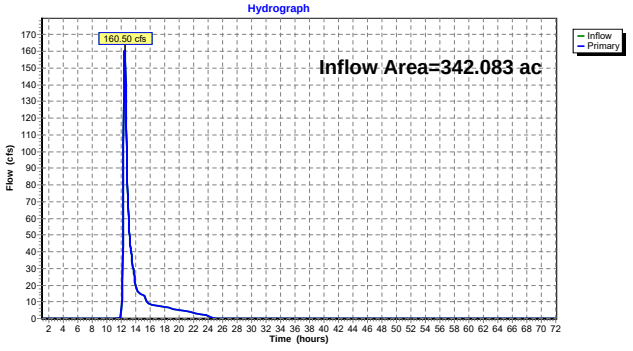


Summary for Link NE: NorthEast to SBVR

Inflow Area = 342.083 ac, 0.52% Impervious, Inflow Depth = 0.57" for 1-Year event
Inflow = 160.50 cfs @ 12.42 hrs, Volume= 16.178 af
Primary = 160.50 cfs @ 12.42 hrs, Volume= 16.178 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link NE: NorthEast to SBVR

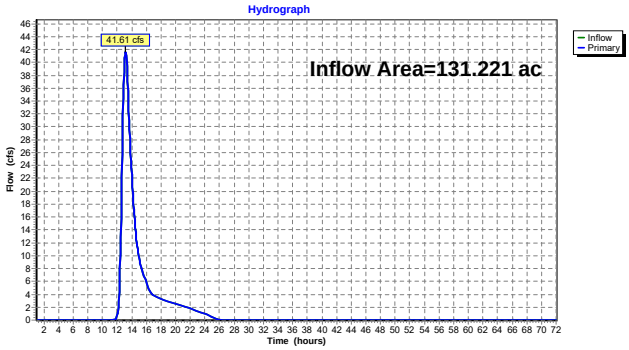


Summary for Link NW: NorthWest to Vermillion R.

Inflow Area = 131.221 ac, 0.00% Impervious, Inflow Depth = 0.72" for 1-Year event
Inflow = 41.61 cfs @ 13.15 hrs, Volume= 7.823 af
Primary = 41.61 cfs @ 13.15 hrs, Volume= 7.823 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link NW: NorthWest to Vermillion R.

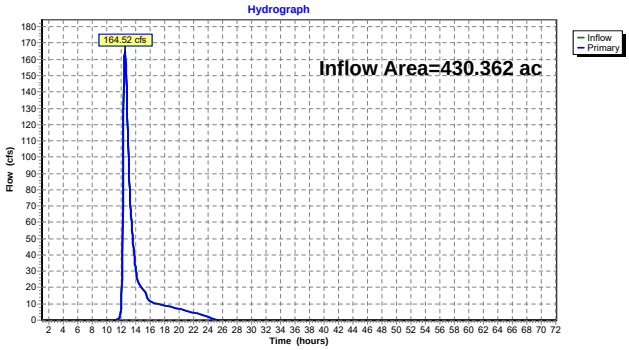


Summary for Link S: South to SBVR

Inflow Area = 430.362 ac, 0.00% Impervious, Inflow Depth = 0.62" for 1-Year event
Inflow = 164.52 cfs @ 12.48 hrs, Volume= 22.154 af
Primary = 164.52 cfs @ 12.48 hrs, Volume= 22.154 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link S: South to SBVR



Time span=1.00-72.00 hrs, dt=0.05 hrs, 1421 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment S01: S01 Runoff Area=184.155 ac 0.00% Impervious Runoff Depth=0.78"
Flow Length=1,941' Tc=29.1 min CN=74 Runoff=120.58 cfs 12.031 af

Subcatchment S02: S02 Runoff Area=157.929 ac 1.13% Impervious Runoff Depth=0.74"
Flow Length=2,628' Tc=22.5 min CN=73 Runoff=111.49 cfs 9.700 af

Subcatchment S03: S03 Runoff Area=83.513 ac 0.00% Impervious Runoff Depth=0.88"
Flow Length=2,187' Tc=36.5 min CN=76 Runoff=55.19 cfs 6.144 af

Subcatchment S04: S04 Runoff Area=131.221 ac 0.00% Impervious Runoff Depth=0.93"
Flow Length=4,429' Tc=78.3 min CN=77 Runoff=55.89 cfs 10.222 af

Subcatchment S05: S05 Runoff Area=74.439 ac 0.00% Impervious Runoff Depth=1.04"
Flow Length=2,690' Tc=17.8 min CN=79 Runoff=89.80 cfs 6.479 af

Subcatchment S06: S06 Runoff Area=13.695 ac 0.00% Impervious Runoff Depth=0.88"
Flow Length=1,071' Tc=12.8 min CN=76 Runoff=16.07 cfs 1.007 af

Subcatchment S07: S07 Runoff Area=20.432 ac 0.00% Impervious Runoff Depth=0.65"
Flow Length=1,073' Tc=18.0 min CN=71 Runoff=13.77 cfs 1.104 af

Subcatchment S08: S08 Runoff Area=58.666 ac 0.00% Impervious Runoff Depth=0.57"
Flow Length=1,871' Tc=25.6 min CN=69 Runoff=27.02 cfs 2.764 af

Subcatchment S09: S09 Runoff Area=46.961 ac 0.00% Impervious Runoff Depth=0.69"
Flow Length=2,350' Tc=33.3 min CN=72 Runoff=24.26 cfs 2.707 af

Subcatchment S10: S10 Runoff Area=132.656 ac 0.00% Impervious Runoff Depth=0.83"
Flow Length=3,210' Tc=46.3 min CN=75 Runoff=70.15 cfs 9.203 af

Subcatchment S11: S11 Runoff Area=123.100 ac 0.00% Impervious Runoff Depth=1.42"
Flow Length=3,503' Tc=20.4 min CN=85 Runoff=193.56 cfs 14.585 af

Subcatchment S12: S12 Runoff Area=199.618 ac 0.00% Impervious Runoff Depth=1.16"
Flow Length=4,996' Tc=86.4 min CN=81 Runoff=101.31 cfs 19.325 af

Subcatchment S13: S13 Runoff Area=116.440 ac 0.00% Impervious Runoff Depth=0.93"
Flow Length=3,702' Tc=50.0 min CN=77 Runoff=67.48 cfs 9.071 af

Subcatchment S14: S14 Runoff Area=12.075 ac 0.00% Impervious Runoff Depth=0.99"
Flow Length=885' Tc=12.8 min CN=78 Runoff=16.13 cfs 0.995 af

Link N: North to SBVR Inflow=246.58 cfs 43.976 af
Primary=246.58 cfs 43.976 af

Link NE: NorthEast to SBVR Inflow=226.26 cfs 21.731 af
Primary=226.26 cfs 21.731 af

Link NW: NorthWest to Vermillion R. Inflow=55.89 cfs 10.222 af
Primary=55.89 cfs 10.222 af

Link S: South to SBVR Inflow=228.48 cfs 29.409 af
Primary=228.48 cfs 29.409 af

Total Runoff Area = 1,354.900 ac Runoff Volume = 105.338 af Average Runoff Depth = 0.93"
99.87% Pervious = 1,353.121 ac 0.13% Impervious = 1.779 ac

Summary for Subcatchment S01: S01

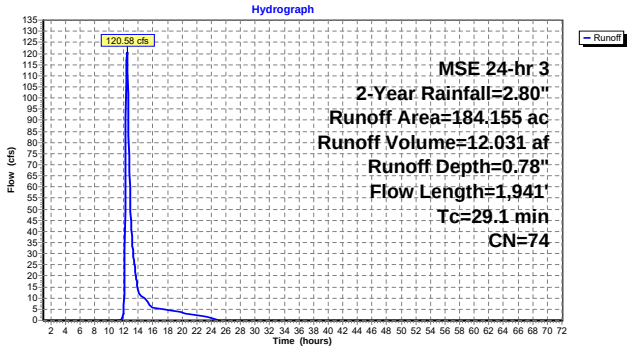
Runoff = 120.58 cfs @ 12.45 hrs, Volume= 12.031 af, Depth= 0.78"
Routed to Link NE : NorthEast to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	0.685	72	Gr-Road, HSG A
*	0.238	82	Gr-Road, HSG B
*	0.368	57	Residential, HSG A
*	86.249	67	Row Crop, HSG A
*	80.405	78	Row Crop, HSG B
*	4.641	85	Row Crop, HSG C
*	11.567	89	Row Crop, HSG D
	184.155	74	Weighted Average
	184.155		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	109	0.1237	0.70		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
26.5	1,832	0.0164	1.15		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
29.1	1,941	Total			

Subcatchment S01: S01



Summary for Subcatchment S02: S02

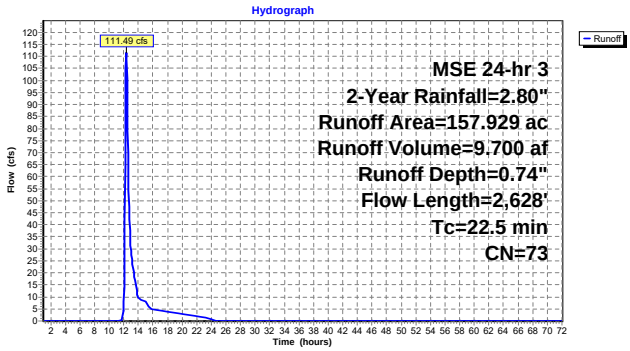
Runoff = 111.49 cfs @ 12.36 hrs, Volume= 9.700 af, Depth= 0.74"
Routed to Link NE : NorthEast to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	0.007	83	Forest Poor, HSG D
*	0.964	72	Gr-Road, HSG A
*	0.356	82	Gr-Road, HSG B
*	0.310	89	Gr-Road, HSG D
*	0.308	30	Meadow, HSG A
*	0.113	58	Meadow, HSG B
*	2.914	78	Meadow, HSG D
*	0.484	72	Residential, HSG B
*	88.631	67	Row Crop, HSG A
*	44.435	78	Row Crop, HSG B
*	1.300	85	Row Crop, HSG C
*	16.328	89	Row Crop, HSG D
*	1.779	99	Water, HSG D
	157.929	73	Weighted Average
	156.150		98.87% Pervious Area
	1.779		1.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	107	0.0756	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.80"
5.9	691	0.0473	1.96		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
2.4	1,830	0.0059	12.95	4,040.29	**Channel Flow,** Area= 312.0 sf Perim= 50.0' r= 6.24' n= 0.030
22.5	2,628	Total			

Subcatchment S02: S02



Summary for Subcatchment S03: S03

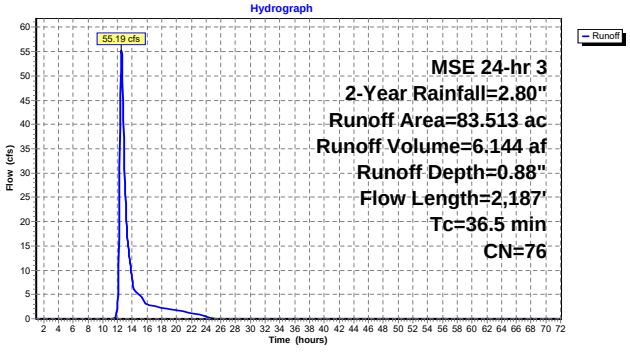
Runoff = 55.19 cfs @ 12.55 hrs, Volume= 6.144 af, Depth= 0.88"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	0.189	72	Gr-Road, HSG A
*	1.911	82	Gr-Road, HSG B
*	3.261	89	Gr-Road, HSG D
*	0.001	72	Residential, HSG B
*	29.050	67	Row Crop, HSG A
*	40.714	78	Row Crop, HSG B
*	8.387	89	Row Crop, HSG D
	83.513	76	Weighted Average
	83.513		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	108	0.0425	0.45		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
32.5	2,079	0.0140	1.07		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
36.5	2,187	Total			

Subcatchment S03: S03



Summary for Subcatchment S04: S04

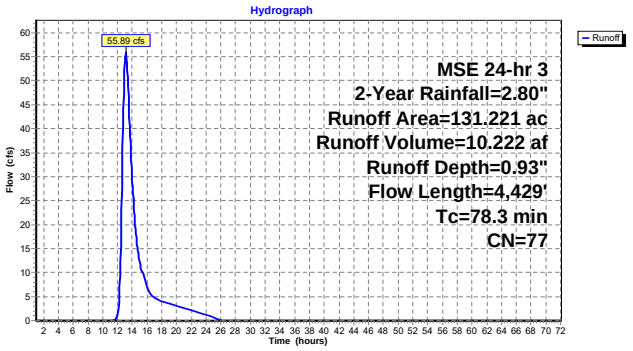
Runoff = 55.89 cfs @ 13.14 hrs, Volume= 10.222 af, Depth= 0.93"
Routed to Link NW : NorthWest to Vermillion R.

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	0.737	72	Gr-Road, HSG A
*	0.606	82	Gr-Road, HSG B
*	0.915	89	Gr-Road, HSG D
*	0.076	57	Residential, HSG A
*	22.979	67	Row Crop, HSG A
*	92.532	78	Row Crop, HSG B
*	13.376	89	Row Crop, HSG D
	131.221	77	Weighted Average
	131.221		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	100	0.0260	0.37		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
73.6	4,220	0.0113	0.96		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
0.2	110	0.0073	8.38	326.77	**Channel Flow,** Area= 39.0 sf Perim= 14.0' r= 2.79' n= 0.030
78.3	4,429	Total			

Subcatchment S04: S04



Summary for Subcatchment S05: S05

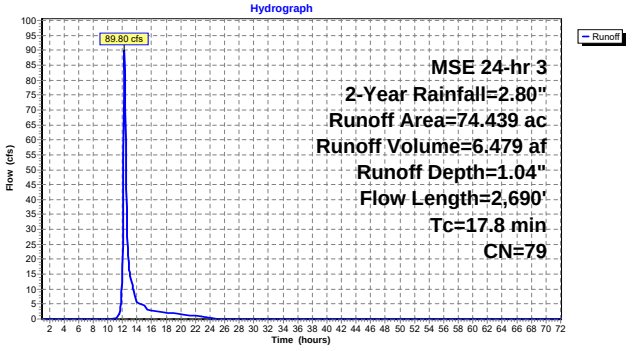
Runoff = 89.80 cfs @ 12.28 hrs, Volume= 6.479 af, Depth= 1.04"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	0.624	72	Gr-Road, HSG A
*	1.843	82	Gr-Road, HSG B
*	0.773	89	Gr-Road, HSG D
*	0.029	57	Residential, HSG A
*	0.057	86	Residential, HSG D
*	12.466	67	Row Crop, HSG A
*	41.510	78	Row Crop, HSG B
*	17.138	89	Row Crop, HSG D
	74.439	79	Weighted Average
	74.439		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	100	0.0560	1.94		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.80"
11.9	1,141	0.0315	1.60		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
5.0	1,449	0.0077	4.81	67.27	**Channel Flow,** Area= 14.0 sf Perim= 12.0' r= 1.17' n= 0.030
17.8	2,690	Total			

Subcatchment S05: S05



Summary for Subcatchment S06: S06

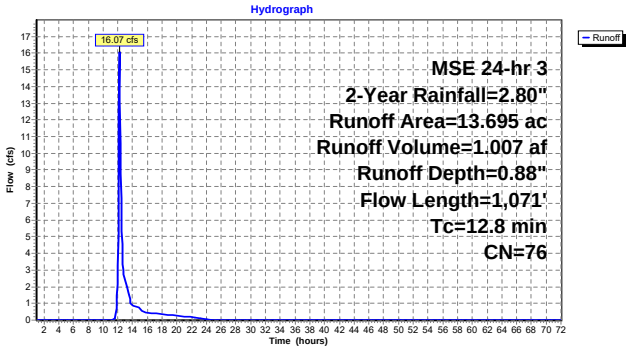
Runoff = 16.07 cfs @ 12.22 hrs, Volume= 1.007 af, Depth= 0.88"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	0.146	72	Gr-Road, HSG A
*	0.586	82	Gr-Road, HSG B
*	0.164	89	Gr-Road, HSG D
*	4.514	67	Row Crop, HSG A
*	7.168	78	Row Crop, HSG B
*	1.116	89	Row Crop, HSG D
	13.695	76	Weighted Average
	13.695		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	100	0.0830	0.59		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
10.0	971	0.0320	1.61		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
12.8	1,071	Total			

Subcatchment S06: S06



Summary for Subcatchment S07: S07

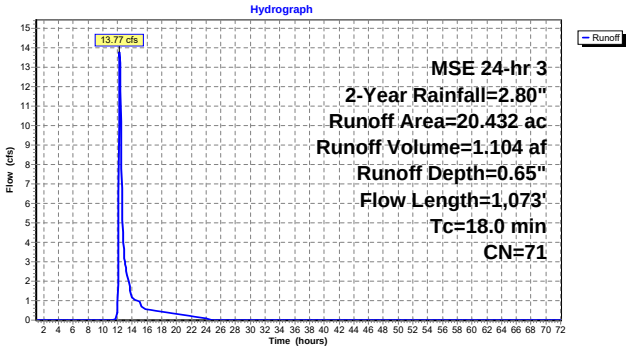
Runoff = 13.77 cfs @ 12.31 hrs, Volume= 1.104 af, Depth= 0.65"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	0.256	72	Gr-Road, HSG A
*	0.093	82	Gr-Road, HSG B
*	0.067	89	Gr-Road, HSG D
*	15.387	67	Row Crop, HSG A
*	1.790	78	Row Crop, HSG B
*	2.839	89	Row Crop, HSG D
	20.432	71	Weighted Average
	20.432		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	100	0.0180	0.32		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
12.8	973	0.0197	1.26		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
18.0	1,073	Total			

Subcatchment S07: S07



Summary for Subcatchment S08: S08

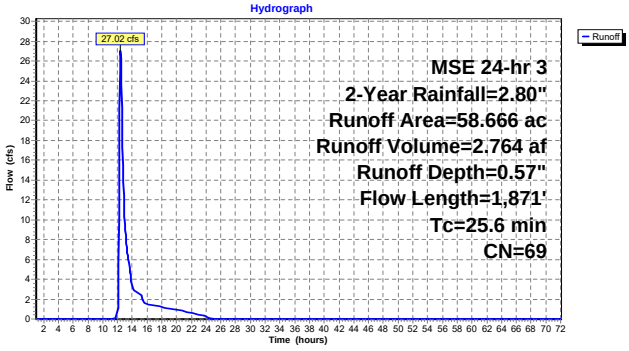
Runoff = 27.02 cfs @ 12.43 hrs, Volume= 2.764 af, Depth= 0.57"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	0.503	30	Forest Good, HSG A
*	0.287	55	Forest Good, HSG B
*	0.135	45	Forest Poor, HSG A
*	0.880	72	Gr-Road, HSG A
*	0.458	82	Gr-Road, HSG B
*	0.044	57	Residential, HSG A
*	0.076	72	Residential, HSG B
*	44.270	67	Row Crop, HSG A
*	12.013	78	Row Crop, HSG B
	58.666	69	Weighted Average
	58.666		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	100	0.0530	0.49		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
22.2	1,771	0.0217	1.33		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
25.6	1,871	Total			

Subcatchment S08: S08



Summary for Subcatchment S09: S09

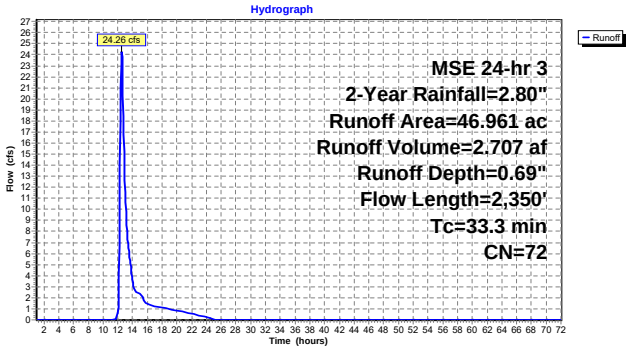
Runoff = 24.26 cfs @ 12.53 hrs, Volume= 2.707 af, Depth= 0.69"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	0.456	72	Gr-Road, HSG A
*	0.006	82	Gr-Road, HSG B
*	24.877	67	Row Crop, HSG A
*	19.903	78	Row Crop, HSG B
*	1.720	85	Row Crop, HSG C
	46.961	72	Weighted Average
	46.961		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	100	0.0350	0.41		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
29.3	2,250	0.0202	1.28		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
33.3	2,350	Total			

Subcatchment S09: S09



Summary for Subcatchment S10: S10

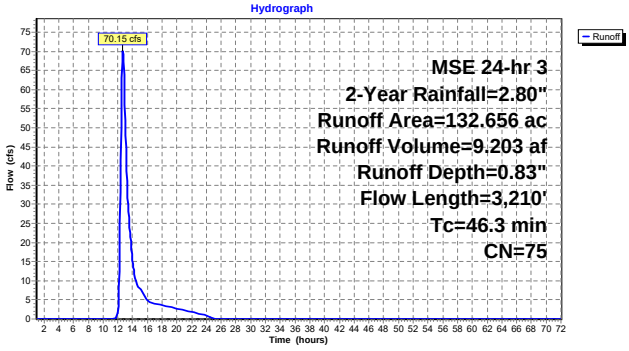
Runoff = 70.15 cfs @ 12.70 hrs, Volume= 9.203 af, Depth= 0.83"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	1.687	72	Gr-Road, HSG A
*	2.314	82	Gr-Road, HSG B
*	0.233	89	Gr-Road, HSG D
*	0.154	78	Meadow, HSG D
*	0.131	83	Pav-Road, HSG A
*	0.643	89	Pav-Road, HSG B
*	0.133	57	Residential, HSG A
*	1.397	77	Residential-Med, HSG A
*	0.160	85	Residential-Med, HSG B
*	57.816	67	Row Crop, HSG A
*	41.673	78	Row Crop, HSG B
*	26.317	89	Row Crop, HSG D
	132.656	75	Weighted Average
	132.656		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	100	0.0690	0.54		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
34.9	2,180	0.0134	1.04		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
8.3	930	0.0012	1.86	66.90	**Channel Flow,** Area= 36.0 sf Perim= 30.9' r= 1.16' n= 0.030
46.3	3,210	Total			

Subcatchment S10: S10



Summary for Subcatchment S11: S11

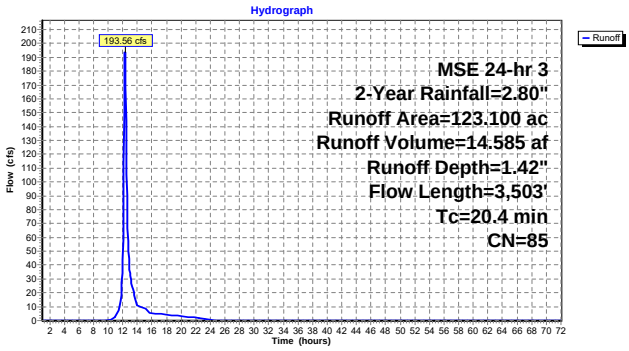
Runoff = 193.56 cfs @ 12.31 hrs, Volume= 14.585 af, Depth= 1.42"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	3.023	83	Forest Poor, HSG D
*	1.907	82	Gr-Road, HSG B
*	2.976	89	Gr-Road, HSG D
*	4.775	78	Meadow, HSG D
*	0.119	72	Residential, HSG B
*	0.027	86	Residential, HSG D
*	0.667	85	Residential-Med, HSG B
*	3.317	67	Row Crop, HSG A
*	25.681	78	Row Crop, HSG B
*	80.608	89	Row Crop, HSG D
	123.100	85	Weighted Average
	123.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	100	0.0280	1.47		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.80"
12.7	1,150	0.0281	1.51		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
6.6	2,253	0.0040	5.67	589.90	**Channel Flow,** Area= 104.0 sf Perim= 43.0' r= 2.42' n= 0.030
20.4	3,503	Total			

Subcatchment S11: S11



Summary for Subcatchment S12: S12

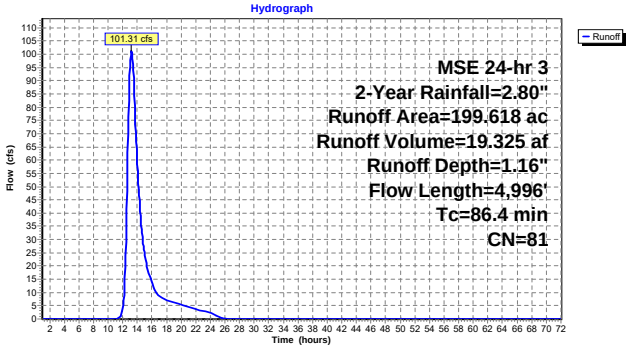
Runoff = 101.31 cfs @ 13.17 hrs, Volume= 19.325 af, Depth= 1.16"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	1.634	82	Gr-Road, HSG B
*	2.224	89	Gr-Road, HSG D
*	3.465	30	Meadow, HSG A
*	0.640	58	Meadow, HSG B
*	39.407	78	Meadow, HSG D
*	1.215	72	Residential, HSG B
*	0.222	86	Residential, HSG D
*	27.039	67	Row Crop, HSG A
*	24.619	78	Row Crop, HSG B
*	99.153	89	Row Crop, HSG D
	199.618	81	Weighted Average
	199.618		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	100	0.0460	1.80		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.80"
80.5	4,519	0.0108	0.94		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
5.0	377	0.0005	1.26	45.43	**Channel Flow,** Area= 36.0 sf Perim= 30.9' r= 1.16' n= 0.030
86.4	4,996	Total			

Subcatchment S12: S12



Summary for Subcatchment S13: S13

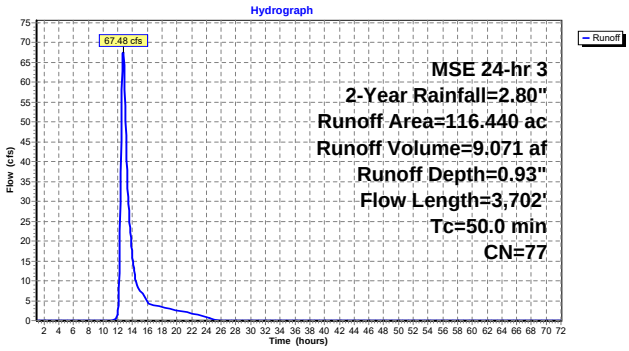
Runoff = 67.48 cfs @ 12.73 hrs, Volume= 9.071 af, Depth= 0.93"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	0.128	45	Forest Poor, HSG A
*	0.030	83	Forest Poor, HSG D
*	0.446	72	Gr-Road, HSG A
*	0.132	82	Gr-Road, HSG B
*	0.366	89	Gr-Road, HSG D
*	4.858	30	Meadow, HSG A
*	0.178	58	Meadow, HSG B
*	0.389	71	Meadow, HSG C
*	34.659	78	Meadow, HSG D
*	20.485	67	Row Crop, HSG A
*	18.556	78	Row Crop, HSG B
*	5.044	85	Row Crop, HSG C
*	31.169	89	Row Crop, HSG D
	116.440	77	Weighted Average
	116.440		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	100	0.0390	0.43		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
39.7	2,697	0.0158	1.13		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
6.4	905	0.0018	2.34	84.24	**Channel Flow,** Area= 36.0 sf Perim= 30.9' r= 1.16' n= 0.030
50.0	3,702	Total			

Subcatchment S13: S13



Summary for Subcatchment S14: S14

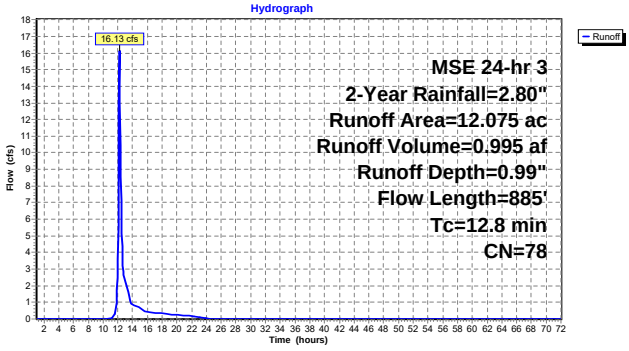
Runoff = 16.13 cfs @ 12.22 hrs, Volume= 0.995 af, Depth= 0.99"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	0.105	55	Forest Good, HSG B
*	0.033	45	Forest Poor, HSG A
*	0.928	66	Forest Poor, HSG B
*	0.454	82	Gr-Road, HSG B
*	0.101	72	Residential, HSG B
*	1.700	67	Row Crop, HSG A
*	6.203	78	Row Crop, HSG B
*	0.093	85	Row Crop, HSG C
*	2.458	89	Row Crop, HSG D
	12.075	78	Weighted Average
	12.075		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	100	0.0440	0.45		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
9.1	785	0.0257	1.44		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
12.8	885	Total			

Subcatchment S14: S14

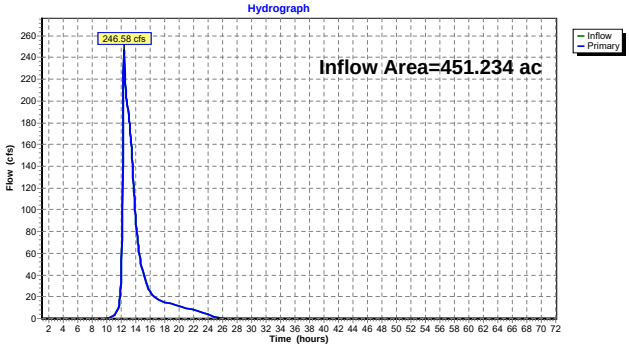


Summary for Link N: North to SBVR

Inflow Area = 451.234 ac, 0.00% Impervious, Inflow Depth = 1.17" for 2-Year event
Inflow = 246.58 cfs @ 12.33 hrs, Volume= 43.976 af
Primary = 246.58 cfs @ 12.33 hrs, Volume= 43.976 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link N: North to SBVR

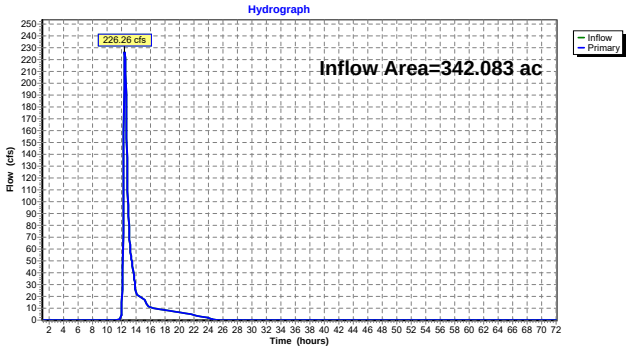


Summary for Link NE: NorthEast to SBVR

Inflow Area = 342.083 ac, 0.52% Impervious, Inflow Depth = 0.76" for 2-Year event
Inflow = 226.26 cfs @ 12.41 hrs, Volume= 21.731 af
Primary = 226.26 cfs @ 12.41 hrs, Volume= 21.731 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link NE: NorthEast to SBVR

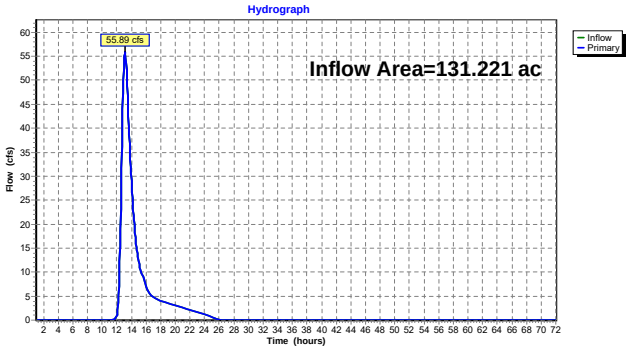


Summary for Link NW: NorthWest to Vermillion R.

Inflow Area = 131.221 ac, 0.00% Impervious, Inflow Depth = 0.93" for 2-Year event
Inflow = 55.89 cfs @ 13.14 hrs, Volume= 10.222 af
Primary = 55.89 cfs @ 13.14 hrs, Volume= 10.222 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link NW: NorthWest to Vermillion R.

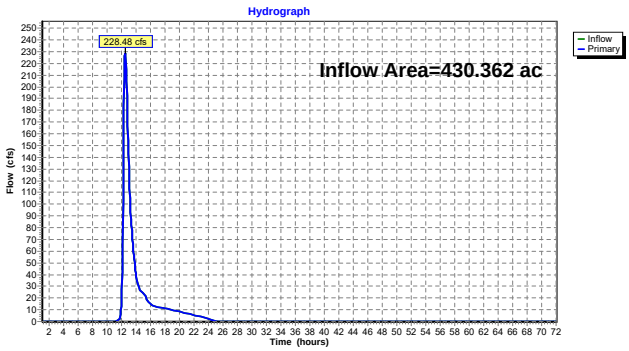


Summary for Link S: South to SBVR

Inflow Area = 430.362 ac, 0.00% Impervious, Inflow Depth = 0.82" for 2-Year event
Inflow = 228.48 cfs @ 12.46 hrs, Volume= 29.409 af
Primary = 228.48 cfs @ 12.46 hrs, Volume= 29.409 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link S: South to SBVR



Time span=1.00-72.00 hrs, dt=0.05 hrs, 1421 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment S01: S01 Runoff Area=184.155 ac 0.00% Impervious Runoff Depth=1.71"
Flow Length=1,941' Tc=29.1 min CN=74 Runoff=282.05 cfs 26.314 af

Subcatchment S02: S02 Runoff Area=157.929 ac 1.13% Impervious Runoff Depth=1.64"
Flow Length=2,628' Tc=22.5 min CN=73 Runoff=268.04 cfs 21.627 af

Subcatchment S03: S03 Runoff Area=83.513 ac 0.00% Impervious Runoff Depth=1.86"
Flow Length=2,187' Tc=36.5 min CN=76 Runoff=122.34 cfs 12.958 af

Subcatchment S04: S04 Runoff Area=131.221 ac 0.00% Impervious Runoff Depth=1.94"
Flow Length=4,429' Tc=78.3 min CN=77 Runoff=121.12 cfs 21.190 af

Subcatchment S05: S05 Runoff Area=74.439 ac 0.00% Impervious Runoff Depth=2.09"
Flow Length=2,690' Tc=17.8 min CN=79 Runoff=185.07 cfs 12.990 af

Subcatchment S06: S06 Runoff Area=13.695 ac 0.00% Impervious Runoff Depth=1.86"
Flow Length=1,071' Tc=12.8 min CN=76 Runoff=35.17 cfs 2.125 af

Subcatchment S07: S07 Runoff Area=20.432 ac 0.00% Impervious Runoff Depth=1.50"
Flow Length=1,073' Tc=18.0 min CN=71 Runoff=35.16 cfs 2.562 af

Subcatchment S08: S08 Runoff Area=58.666 ac 0.00% Impervious Runoff Depth=1.37"
Flow Length=1,871' Tc=25.6 min CN=69 Runoff=74.97 cfs 6.706 af

Subcatchment S09: S09 Runoff Area=46.961 ac 0.00% Impervious Runoff Depth=1.57"
Flow Length=2,350' Tc=33.3 min CN=72 Runoff=60.31 cfs 6.157 af

Subcatchment S10: S10 Runoff Area=132.656 ac 0.00% Impervious Runoff Depth=1.79"
Flow Length=3,210' Tc=46.3 min CN=75 Runoff=159.70 cfs 19.761 af

Subcatchment S11: S11 Runoff Area=123.100 ac 0.00% Impervious Runoff Depth=2.60"
Flow Length=3,503' Tc=20.4 min CN=85 Runoff=353.07 cfs 26.685 af

Subcatchment S12: S12 Runoff Area=199.618 ac 0.00% Impervious Runoff Depth=2.26"
Flow Length=4,996' Tc=86.4 min CN=81 Runoff=202.58 cfs 37.539 af

Subcatchment S13: S13 Runoff Area=116.440 ac 0.00% Impervious Runoff Depth=1.94"
Flow Length=3,702' Tc=50.0 min CN=77 Runoff=146.54 cfs 18.804 af

Subcatchment S14: S14 Runoff Area=12.075 ac 0.00% Impervious Runoff Depth=2.02"
Flow Length=885' Tc=12.8 min CN=78 Runoff=33.65 cfs 2.028 af

Link N: North to SBVR Inflow=485.10 cfs 85.056 af
Primary=485.10 cfs 85.056 af

Link NE: NorthEast to SBVR Inflow=537.05 cfs 47.941 af
Primary=537.05 cfs 47.941 af

Link NW: NorthWest to Vermillion R. Inflow=121.12 cfs 21.190 af
Primary=121.12 cfs 21.190 af

Link S: South to SBVR Inflow=532.43 cfs 63.260 af
Primary=532.43 cfs 63.260 af

Total Runoff Area = 1,354.900 ac Runoff Volume = 217.447 af Average Runoff Depth = 1.93"
99.87% Pervious = 1,353.121 ac 0.13% Impervious = 1.779 ac

Summary for Subcatchment S01: S01

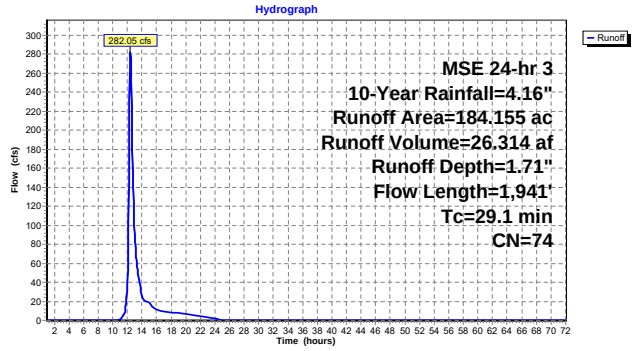
Runoff = 282.05 cfs @ 12.43 hrs, Volume= 26.314 af, Depth= 1.71"
Routed to Link NE : NorthEast to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	0.685	72	Gr-Road, HSG A
*	0.238	82	Gr-Road, HSG B
*	0.368	57	Residential, HSG A
*	86.249	67	Row Crop, HSG A
*	80.405	78	Row Crop, HSG B
*	4.641	85	Row Crop, HSG C
*	11.567	89	Row Crop, HSG D
	184.155	74	Weighted Average
	184.155		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	109	0.1237	0.70		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
26.5	1,832	0.0164	1.15		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
29.1	1,941	Total			

Subcatchment S01: S01



Summary for Subcatchment S02: S02

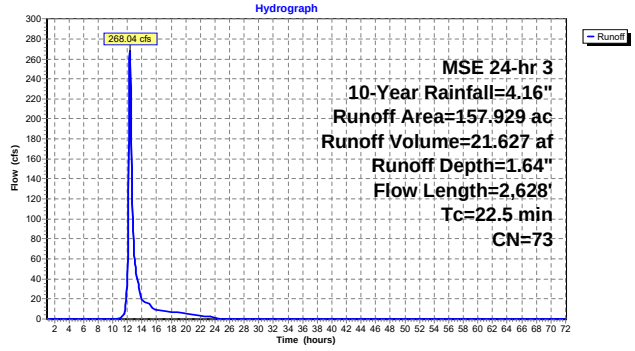
Runoff = 268.04 cfs @ 12.34 hrs, Volume= 21.627 af, Depth= 1.64"
Routed to Link NE : NorthEast to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	0.007	83	Forest Poor, HSG D
*	0.964	72	Gr-Road, HSG A
*	0.356	82	Gr-Road, HSG B
*	0.310	89	Gr-Road, HSG D
*	0.308	30	Meadow, HSG A
*	0.113	58	Meadow, HSG B
*	2.914	78	Meadow, HSG D
*	0.484	72	Residential, HSG B
*	88.631	67	Row Crop, HSG A
*	44.435	78	Row Crop, HSG B
*	1.300	85	Row Crop, HSG C
*	16.328	89	Row Crop, HSG D
*	1.779	99	Water, HSG D
	157.929	73	Weighted Average
	156.150		98.87% Pervious Area
	1.779		1.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	107	0.0756	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.80"
5.9	691	0.0473	1.96		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
2.4	1,830	0.0059	12.95	4,040.29	**Channel Flow,** Area= 312.0 sf Perim= 50.0' r= 6.24' n= 0.030
22.5	2,628	Total			

Subcatchment S02: S02



Summary for Subcatchment S03: S03

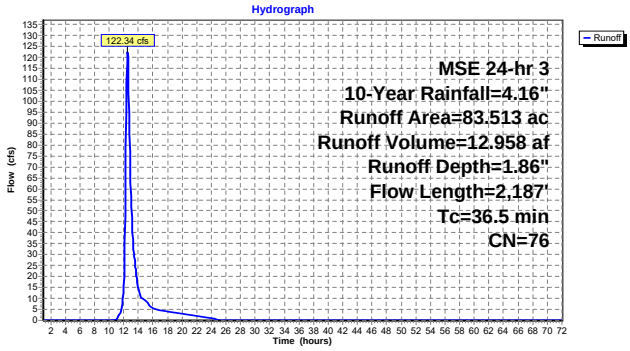
Runoff = 122.34 cfs @ 12.53 hrs, Volume= 12.958 af, Depth= 1.86"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	0.189	72	Gr-Road, HSG A
*	1.911	82	Gr-Road, HSG B
*	3.261	89	Gr-Road, HSG D
*	0.001	72	Residential, HSG B
*	29.050	67	Row Crop, HSG A
*	40.714	78	Row Crop, HSG B
*	8.387	89	Row Crop, HSG D
	83.513	76	Weighted Average
	83.513		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	108	0.0425	0.45		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
32.5	2,079	0.0140	1.07		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
36.5	2,187	Total			

Subcatchment S03: S03



Summary for Subcatchment S04: S04

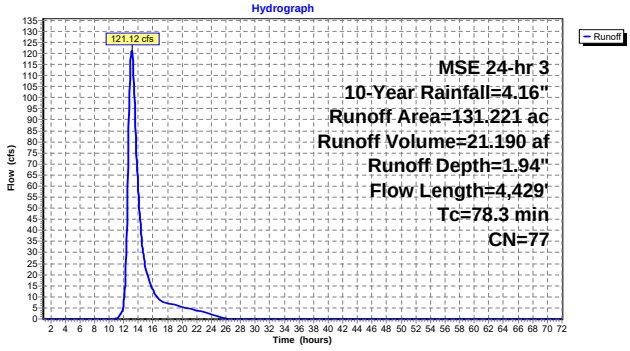
Runoff = 121.12 cfs @ 13.10 hrs, Volume= 21.190 af, Depth= 1.94"
Routed to Link NW : NorthWest to Vermillion R.

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	0.737	72	Gr-Road, HSG A
*	0.606	82	Gr-Road, HSG B
*	0.915	89	Gr-Road, HSG D
*	0.076	57	Residential, HSG A
*	22.979	67	Row Crop, HSG A
*	92.532	78	Row Crop, HSG B
*	13.376	89	Row Crop, HSG D
	131.221	77	Weighted Average
	131.221		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	100	0.0260	0.37		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
73.6	4,220	0.0113	0.96		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
0.2	110	0.0073	8.38	326.77	**Channel Flow,** Area= 39.0 sf Perim= 14.0' r= 2.79' n= 0.030
78.3	4,429	Total			

Subcatchment S04: S04



Summary for Subcatchment S05: S05

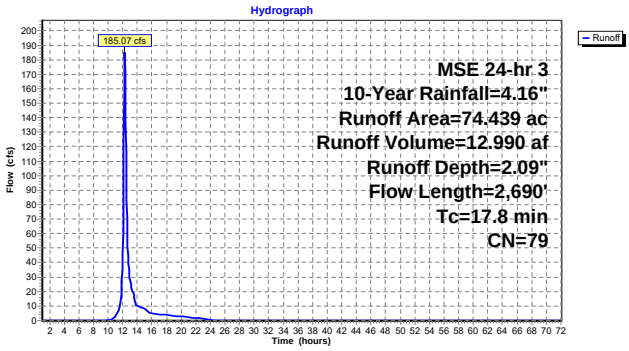
Runoff = 185.07 cfs @ 12.27 hrs, Volume= 12.990 af, Depth= 2.09"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	0.624	72	Gr-Road, HSG A
*	1.843	82	Gr-Road, HSG B
*	0.773	89	Gr-Road, HSG D
*	0.029	57	Residential, HSG A
*	0.057	86	Residential, HSG D
*	12.466	67	Row Crop, HSG A
*	41.510	78	Row Crop, HSG B
*	17.138	89	Row Crop, HSG D
	74.439	79	Weighted Average
	74.439		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	100	0.0560	1.94		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.80"
11.9	1,141	0.0315	1.60		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
5.0	1,449	0.0077	4.81	67.27	**Channel Flow,** Area= 14.0 sf Perim= 12.0' r= 1.17' n= 0.030
17.8	2,690	Total			

Subcatchment S05: S05



Summary for Subcatchment S06: S06

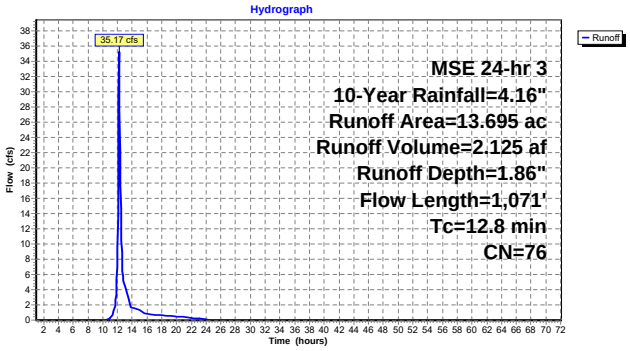
Runoff = 35.17 cfs @ 12.21 hrs, Volume= 2.125 af, Depth= 1.86"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	0.146	72	Gr-Road, HSG A
*	0.586	82	Gr-Road, HSG B
*	0.164	89	Gr-Road, HSG D
*	4.514	67	Row Crop, HSG A
*	7.168	78	Row Crop, HSG B
*	1.116	89	Row Crop, HSG D
	13.695	76	Weighted Average
	13.695		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	100	0.0830	0.59		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
10.0	971	0.0320	1.61		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
12.8	1,071	Total			

Subcatchment S06: S06



Summary for Subcatchment S07: S07

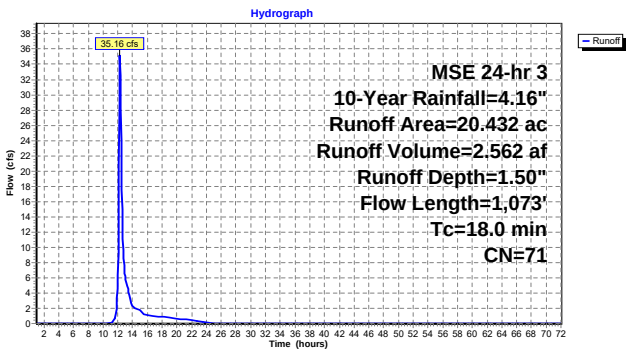
Runoff = 35.16 cfs @ 12.29 hrs, Volume= 2.562 af, Depth= 1.50"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	0.256	72	Gr-Road, HSG A
*	0.093	82	Gr-Road, HSG B
*	0.067	89	Gr-Road, HSG D
*	15.387	67	Row Crop, HSG A
*	1.790	78	Row Crop, HSG B
*	2.839	89	Row Crop, HSG D
	20.432	71	Weighted Average
	20.432		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	100	0.0180	0.32		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
12.8	973	0.0197	1.26		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
18.0	1,073	Total			

Subcatchment S07: S07



Summary for Subcatchment S08: S08

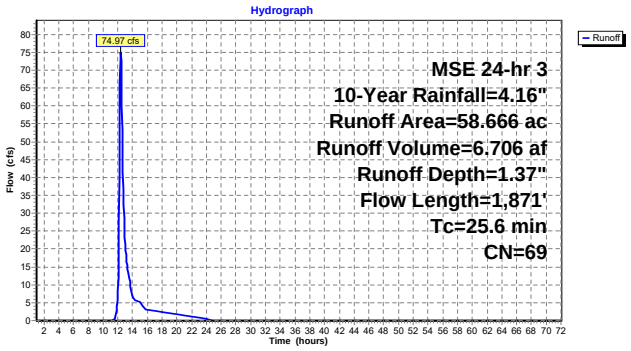
Runoff = 74.97 cfs @ 12.40 hrs, Volume= 6.706 af, Depth= 1.37"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	0.503	30	Forest Good, HSG A
*	0.287	55	Forest Good, HSG B
*	0.135	45	Forest Poor, HSG A
*	0.880	72	Gr-Road, HSG A
*	0.458	82	Gr-Road, HSG B
*	0.044	57	Residential, HSG A
*	0.076	72	Residential, HSG B
*	44.270	67	Row Crop, HSG A
*	12.013	78	Row Crop, HSG B
	58.666	69	Weighted Average
	58.666		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	100	0.0530	0.49		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
22.2	1,771	0.0217	1.33		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
25.6	1,871	Total			

Subcatchment S08: S08



Summary for Subcatchment S09: S09

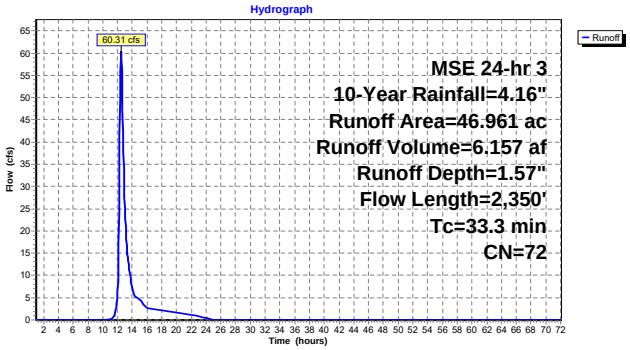
Runoff = 60.31 cfs @ 12.50 hrs, Volume= 6.157 af, Depth= 1.57"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	0.456	72	Gr-Road, HSG A
*	0.006	82	Gr-Road, HSG B
*	24.877	67	Row Crop, HSG A
*	19.903	78	Row Crop, HSG B
*	1.720	85	Row Crop, HSG C
	46.961	72	Weighted Average
	46.961		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	100	0.0350	0.41		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
29.3	2,250	0.0202	1.28		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
33.3	2,350	Total			

Subcatchment S09: S09



Summary for Subcatchment S10: S10

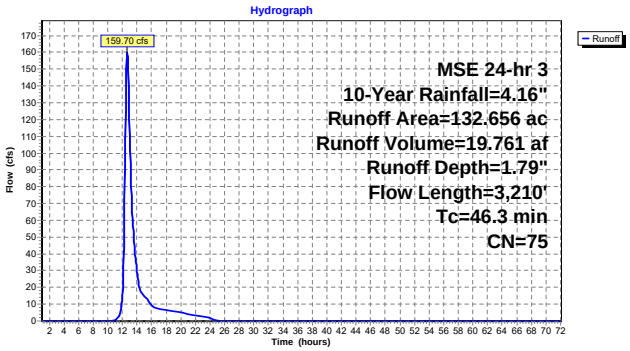
Runoff = 159.70 cfs @ 12.67 hrs, Volume= 19.761 af, Depth= 1.79"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	1.687	72	Gr-Road, HSG A
*	2.314	82	Gr-Road, HSG B
*	0.233	89	Gr-Road, HSG D
*	0.154	78	Meadow, HSG D
*	0.131	83	Pav-Road, HSG A
*	0.643	89	Pav-Road, HSG B
*	0.133	57	Residential, HSG A
*	1.397	77	Residential-Med, HSG A
*	0.160	85	Residential-Med, HSG B
*	57.816	67	Row Crop, HSG A
*	41.673	78	Row Crop, HSG B
*	26.317	89	Row Crop, HSG D
	132.656	75	Weighted Average
	132.656		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	100	0.0690	0.54		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
34.9	2,180	0.0134	1.04		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
8.3	930	0.0012	1.86	66.90	**Channel Flow,** Area= 36.0 sf Perim= 30.9' r= 1.16' n= 0.030
46.3	3,210	Total			

Subcatchment S10: S10



Summary for Subcatchment S11: S11

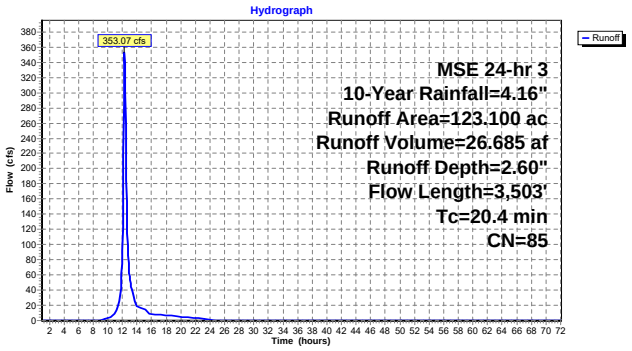
Runoff = 353.07 cfs @ 12.30 hrs, Volume= 26.685 af, Depth= 2.60"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	3.023	83	Forest Poor, HSG D
*	1.907	82	Gr-Road, HSG B
*	2.976	89	Gr-Road, HSG D
*	4.775	78	Meadow, HSG D
*	0.119	72	Residential, HSG B
*	0.027	86	Residential, HSG D
*	0.667	85	Residential-Med, HSG B
*	3.317	67	Row Crop, HSG A
*	25.681	78	Row Crop, HSG B
*	80.608	89	Row Crop, HSG D
	123.100	85	Weighted Average
	123.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	100	0.0280	1.47		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.80"
12.7	1,150	0.0281	1.51		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
6.6	2,253	0.0040	5.67	589.90	**Channel Flow,** Area= 104.0 sf Perim= 43.0' r= 2.42' n= 0.030
20.4	3,503	Total			

Subcatchment S11: S11



Summary for Subcatchment S12: S12

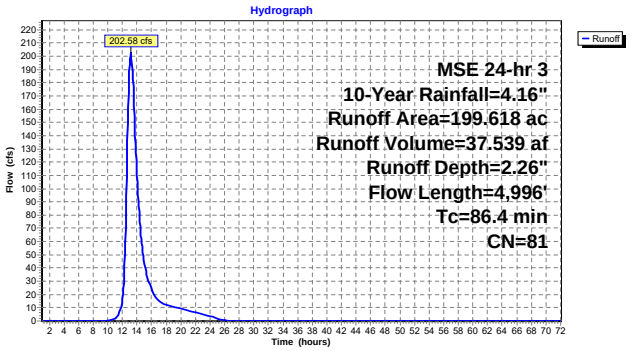
Runoff = 202.58 cfs @ 13.16 hrs, Volume= 37.539 af, Depth= 2.26"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	1.634	82	Gr-Road, HSG B
*	2.224	89	Gr-Road, HSG D
*	3.465	30	Meadow, HSG A
*	0.640	58	Meadow, HSG B
*	39.407	78	Meadow, HSG D
*	1.215	72	Residential, HSG B
*	0.222	86	Residential, HSG D
*	27.039	67	Row Crop, HSG A
*	24.619	78	Row Crop, HSG B
*	99.153	89	Row Crop, HSG D
	199.618	81	Weighted Average
	199.618		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	100	0.0460	1.80		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.80"
80.5	4,519	0.0108	0.94		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
5.0	377	0.0005	1.26	45.43	**Channel Flow,** Area= 36.0 sf Perim= 30.9' r= 1.16' n= 0.030
86.4	4,996	Total			

Subcatchment S12: S12



Summary for Subcatchment S13: S13

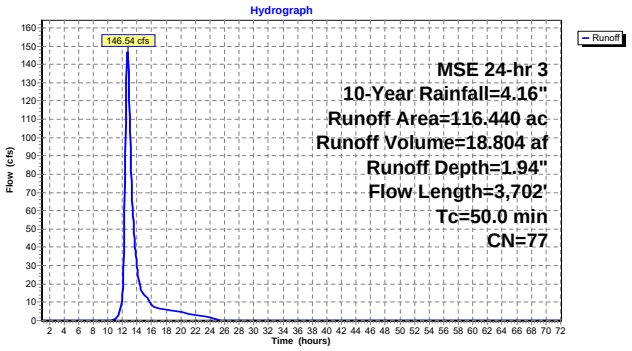
Runoff = 146.54 cfs @ 12.71 hrs, Volume= 18.804 af, Depth= 1.94"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	0.128	45	Forest Poor, HSG A
*	0.030	83	Forest Poor, HSG D
*	0.446	72	Gr-Road, HSG A
*	0.132	82	Gr-Road, HSG B
*	0.366	89	Gr-Road, HSG D
*	4.858	30	Meadow, HSG A
*	0.178	58	Meadow, HSG B
*	0.389	71	Meadow, HSG C
*	34.659	78	Meadow, HSG D
*	20.485	67	Row Crop, HSG A
*	18.556	78	Row Crop, HSG B
*	5.044	85	Row Crop, HSG C
*	31.169	89	Row Crop, HSG D
	116.440	77	Weighted Average
	116.440		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	100	0.0390	0.43		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
39.7	2,697	0.0158	1.13		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
6.4	905	0.0018	2.34	84.24	**Channel Flow,** Area= 36.0 sf Perim= 30.9' r= 1.16' n= 0.030
50.0	3,702	Total			

Subcatchment S13: S13



Summary for Subcatchment S14: S14

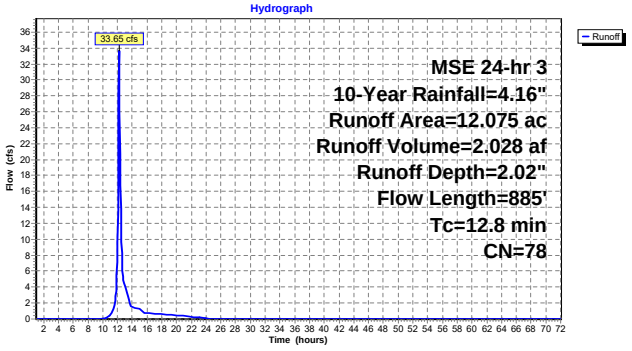
Runoff = 33.65 cfs @ 12.21 hrs, Volume= 2.028 af, Depth= 2.02"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	0.105	55	Forest Good, HSG B
*	0.033	45	Forest Poor, HSG A
*	0.928	66	Forest Poor, HSG B
*	0.454	82	Gr-Road, HSG B
*	0.101	72	Residential, HSG B
*	1.700	67	Row Crop, HSG A
*	6.203	78	Row Crop, HSG B
*	0.093	85	Row Crop, HSG C
*	2.458	89	Row Crop, HSG D
	12.075	78	Weighted Average
	12.075		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	100	0.0440	0.45		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
9.1	785	0.0257	1.44		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
12.8	885	Total			

Subcatchment S14: S14

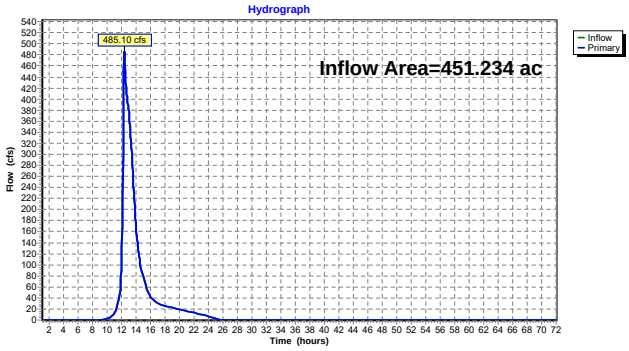


Summary for Link N: North to SBVR

Inflow Area = 451.234 ac, 0.00% Impervious, Inflow Depth = 2.26" for 10-Year event
Inflow = 485.10 cfs @ 12.33 hrs, Volume= 85.056 af
Primary = 485.10 cfs @ 12.33 hrs, Volume= 85.056 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link N: North to SBVR

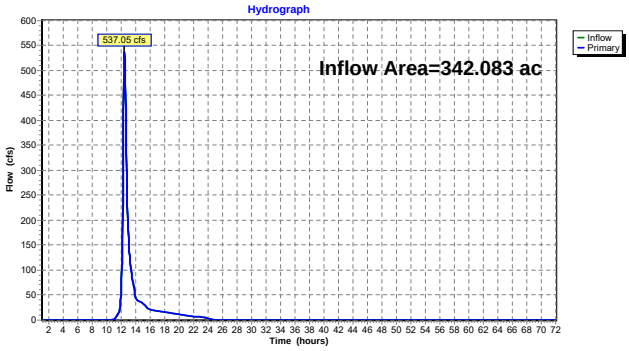


Summary for Link NE: NorthEast to SBVR

Inflow Area = 342.083 ac, 0.52% Impervious, Inflow Depth = 1.68" for 10-Year event
Inflow = 537.05 cfs @ 12.38 hrs, Volume= 47.941 af
Primary = 537.05 cfs @ 12.38 hrs, Volume= 47.941 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link NE: NorthEast to SBVR

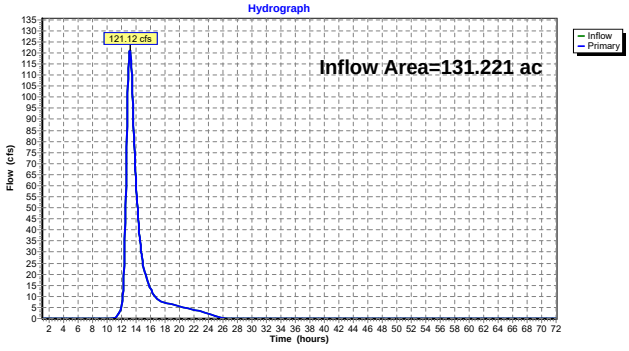


Summary for Link NW: NorthWest to Vermillion R.

Inflow Area = 131.221 ac, 0.00% Impervious, Inflow Depth = 1.94" for 10-Year event
Inflow = 121.12 cfs @ 13.10 hrs, Volume= 21.190 af
Primary = 121.12 cfs @ 13.10 hrs, Volume= 21.190 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link NW: NorthWest to Vermillion R.

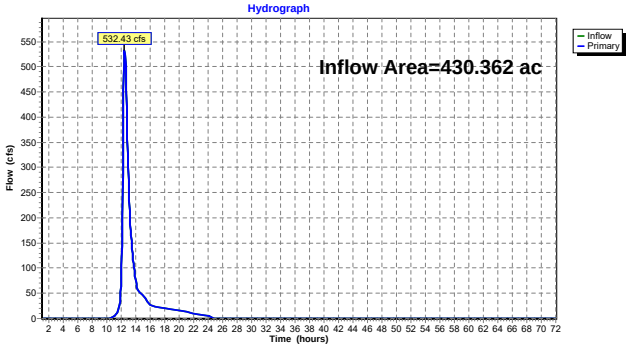


Summary for Link S: South to SBVR

Inflow Area = 430.362 ac, 0.00% Impervious, Inflow Depth = 1.76" for 10-Year event
Inflow = 532.43 cfs @ 12.41 hrs, Volume= 63.260 af
Primary = 532.43 cfs @ 12.41 hrs, Volume= 63.260 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link S: South to SBVR



Time span=1.00-72.00 hrs, dt=0.05 hrs, 1421 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment S01: S01 Runoff Area=184.155 ac 0.00% Impervious Runoff Depth=4.39"
Flow Length=1,941' Tc=29.1 min CN=74 Runoff=736.71 cfs 67.412 af

Subcatchment S02: S02 Runoff Area=157.929 ac 1.13% Impervious Runoff Depth=4.28"
Flow Length=2,628' Tc=22.5 min CN=73 Runoff=712.64 cfs 56.357 af

Subcatchment S03: S03 Runoff Area=83.513 ac 0.00% Impervious Runoff Depth=4.62"
Flow Length=2,187' Tc=36.5 min CN=76 Runoff=306.41 cfs 32.119 af

Subcatchment S04: S04 Runoff Area=131.221 ac 0.00% Impervious Runoff Depth=4.73"
Flow Length=4,429' Tc=78.3 min CN=77 Runoff=299.53 cfs 51.690 af

Subcatchment S05: S05 Runoff Area=74.439 ac 0.00% Impervious Runoff Depth=4.95"
Flow Length=2,690' Tc=17.8 min CN=79 Runoff=433.39 cfs 30.718 af

Subcatchment S06: S06 Runoff Area=13.695 ac 0.00% Impervious Runoff Depth=4.62"
Flow Length=1,071' Tc=12.8 min CN=76 Runoff=86.78 cfs 5.267 af

Subcatchment S07: S07 Runoff Area=20.432 ac 0.00% Impervious Runoff Depth=4.06"
Flow Length=1,073' Tc=18.0 min CN=71 Runoff=97.85 cfs 6.917 af

Subcatchment S08: S08 Runoff Area=58.666 ac 0.00% Impervious Runoff Depth=3.84"
Flow Length=1,871' Tc=25.6 min CN=69 Runoff=220.63 cfs 18.796 af

Subcatchment S09: S09 Runoff Area=46.961 ac 0.00% Impervious Runoff Depth=4.17"
Flow Length=2,350' Tc=33.3 min CN=72 Runoff=165.02 cfs 16.327 af

Subcatchment S10: S10 Runoff Area=132.656 ac 0.00% Impervious Runoff Depth=4.50"
Flow Length=3,210' Tc=46.3 min CN=75 Runoff=409.58 cfs 49.788 af

Subcatchment S11: S11 Runoff Area=123.100 ac 0.00% Impervious Runoff Depth=5.64"
Flow Length=3,503' Tc=20.4 min CN=85 Runoff=744.94 cfs 57.814 af

Subcatchment S12: S12 Runoff Area=199.618 ac 0.00% Impervious Runoff Depth=5.18"
Flow Length=4,996' Tc=86.4 min CN=81 Runoff=465.84 cfs 86.140 af

Subcatchment S13: S13 Runoff Area=116.440 ac 0.00% Impervious Runoff Depth=4.73"
Flow Length=3,702' Tc=50.0 min CN=77 Runoff=360.99 cfs 45.868 af

Subcatchment S14: S14 Runoff Area=12.075 ac 0.00% Impervious Runoff Depth=4.84"
Flow Length=885' Tc=12.8 min CN=78 Runoff=79.84 cfs 4.869 af

Link N: North to SBVR Inflow=1,105.39 cfs 194.691 af
Primary=1,105.39 cfs 194.691 af

Link NE: NorthEast to SBVR Inflow=1,419.00 cfs 123.770 af
Primary=1,419.00 cfs 123.770 af

Link NW: NorthWest to Vermillion R. Inflow=299.53 cfs 51.690 af
Primary=299.53 cfs 51.690 af

Link S: South to SBVR Inflow=1,391.38 cfs 159.931 af
Primary=1,391.38 cfs 159.931 af

Total Runoff Area = 1,354.900 ac Runoff Volume = 530.082 af Average Runoff Depth = 4.69"
99.87% Pervious = 1,353.121 ac 0.13% Impervious = 1.779 ac

Summary for Subcatchment S01: S01

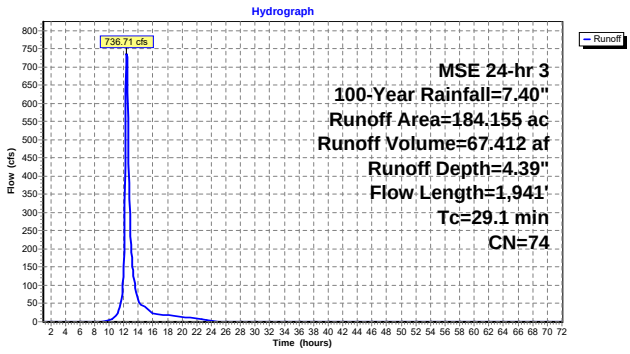
Runoff = 736.71 cfs @ 12.41 hrs, Volume= 67.412 af, Depth= 4.39"
Routed to Link NE : NorthEast to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	0.685	72	Gr-Road, HSG A
*	0.238	82	Gr-Road, HSG B
*	0.368	57	Residential, HSG A
*	86.249	67	Row Crop, HSG A
*	80.405	78	Row Crop, HSG B
*	4.641	85	Row Crop, HSG C
*	11.567	89	Row Crop, HSG D
	184.155	74	Weighted Average
	184.155		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	109	0.1237	0.70		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
26.5	1,832	0.0164	1.15		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
29.1	1,941	Total			

Subcatchment S01: S01



Summary for Subcatchment S02: S02

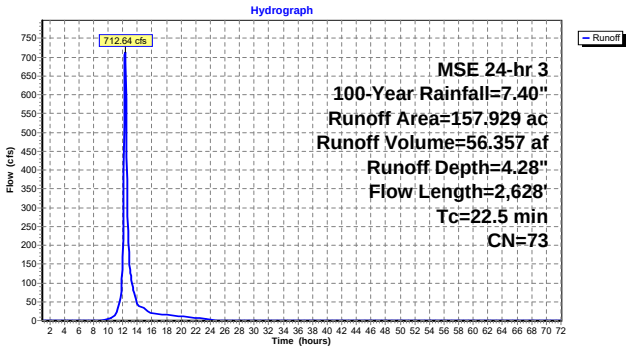
Runoff = 712.64 cfs @ 12.33 hrs, Volume= 56.357 af, Depth= 4.28"
Routed to Link NE : NorthEast to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	0.007	83	Forest Poor, HSG D
*	0.964	72	Gr-Road, HSG A
*	0.356	82	Gr-Road, HSG B
*	0.310	89	Gr-Road, HSG D
*	0.308	30	Meadow, HSG A
*	0.113	58	Meadow, HSG B
*	2.914	78	Meadow, HSG D
*	0.484	72	Residential, HSG B
*	88.631	67	Row Crop, HSG A
*	44.435	78	Row Crop, HSG B
*	1.300	85	Row Crop, HSG C
*	16.328	89	Row Crop, HSG D
*	1.779	99	Water, HSG D
	157.929	73	Weighted Average
	156.150		98.87% Pervious Area
	1.779		1.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	107	0.0756	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.80"
5.9	691	0.0473	1.96		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
2.4	1,830	0.0059	12.95	4,040.29	**Channel Flow,** Area= 312.0 sf Perim= 50.0' r= 6.24' n= 0.030
22.5	2,628	Total			

Subcatchment S02: S02



Summary for Subcatchment S03: S03

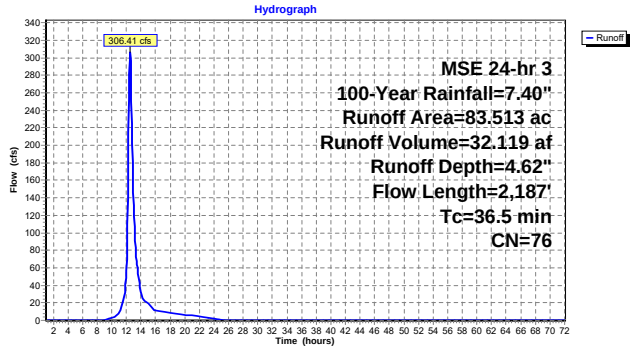
Runoff = 306.41 cfs @ 12.51 hrs, Volume= 32.119 af, Depth= 4.62"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	0.189	72	Gr-Road, HSG A
*	1.911	82	Gr-Road, HSG B
*	3.261	89	Gr-Road, HSG D
*	0.001	72	Residential, HSG B
*	29.050	67	Row Crop, HSG A
*	40.714	78	Row Crop, HSG B
*	8.387	89	Row Crop, HSG D
	83.513	76	Weighted Average
	83.513		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	108	0.0425	0.45		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
32.5	2,079	0.0140	1.07		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
36.5	2,187	Total			

Subcatchment S03: S03



Summary for Subcatchment S04: S04

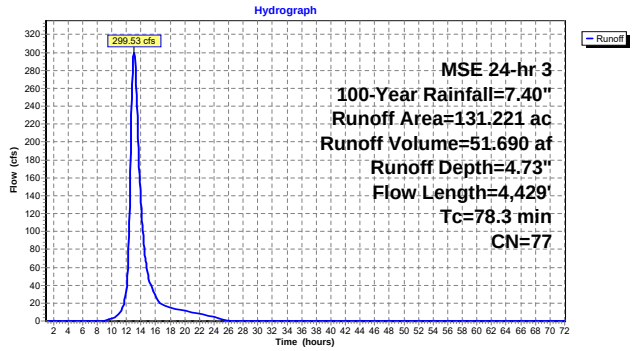
Runoff = 299.53 cfs @ 13.05 hrs, Volume= 51.690 af, Depth= 4.73"
Routed to Link NW : NorthWest to Vermillion R.

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	0.737	72	Gr-Road, HSG A
*	0.606	82	Gr-Road, HSG B
*	0.915	89	Gr-Road, HSG D
*	0.076	57	Residential, HSG A
*	22.979	67	Row Crop, HSG A
*	92.532	78	Row Crop, HSG B
*	13.376	89	Row Crop, HSG D
	131.221	77	Weighted Average
	131.221		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	100	0.0260	0.37		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
73.6	4,220	0.0113	0.96		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
0.2	110	0.0073	8.38	326.77	**Channel Flow,** Area= 39.0 sf Perim= 14.0' r= 2.79' n= 0.030
78.3	4,429	Total			

Subcatchment S04: S04



Summary for Subcatchment S05: S05

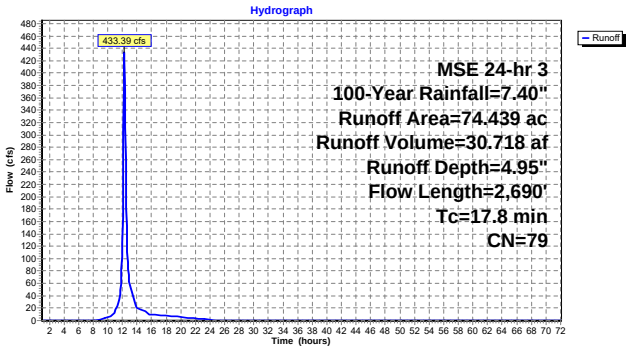
Runoff = 433.39 cfs @ 12.27 hrs, Volume= 30.718 af, Depth= 4.95"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	0.624	72	Gr-Road, HSG A
*	1.843	82	Gr-Road, HSG B
*	0.773	89	Gr-Road, HSG D
*	0.029	57	Residential, HSG A
*	0.057	86	Residential, HSG D
*	12.466	67	Row Crop, HSG A
*	41.510	78	Row Crop, HSG B
*	17.138	89	Row Crop, HSG D
	74.439	79	Weighted Average
	74.439		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	100	0.0560	1.94		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.80"
11.9	1,141	0.0315	1.60		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
5.0	1,449	0.0077	4.81	67.27	**Channel Flow,** Area= 14.0 sf Perim= 12.0' r= 1.17' n= 0.030
17.8	2,690	Total			

Subcatchment S05: S05



Summary for Subcatchment S06: S06

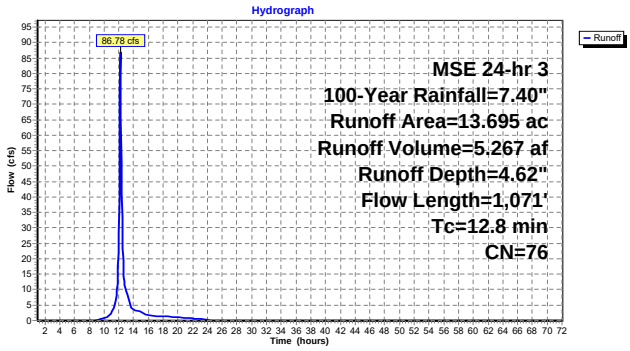
Runoff = 86.78 cfs @ 12.21 hrs, Volume= 5.267 af, Depth= 4.62"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	0.146	72	Gr-Road, HSG A
*	0.586	82	Gr-Road, HSG B
*	0.164	89	Gr-Road, HSG D
*	4.514	67	Row Crop, HSG A
*	7.168	78	Row Crop, HSG B
*	1.116	89	Row Crop, HSG D
	13.695	76	Weighted Average
	13.695		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	100	0.0830	0.59		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
10.0	971	0.0320	1.61		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
12.8	1,071	Total			

Subcatchment S06: S06



Summary for Subcatchment S07: S07

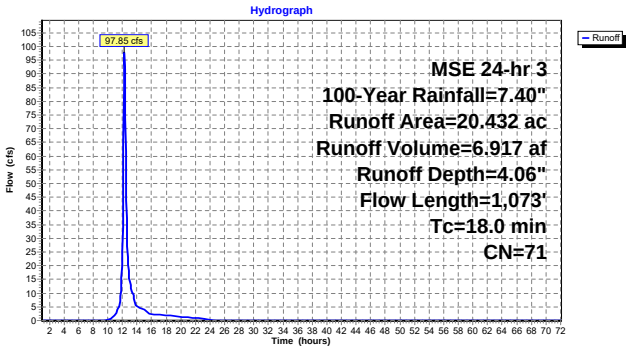
Runoff = 97.85 cfs @ 12.27 hrs, Volume= 6.917 af, Depth= 4.06"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	0.256	72	Gr-Road, HSG A
*	0.093	82	Gr-Road, HSG B
*	0.067	89	Gr-Road, HSG D
*	15.387	67	Row Crop, HSG A
*	1.790	78	Row Crop, HSG B
*	2.839	89	Row Crop, HSG D
	20.432	71	Weighted Average
	20.432		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	100	0.0180	0.32		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
12.8	973	0.0197	1.26		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
18.0	1,073	Total			

Subcatchment S07: S07



Summary for Subcatchment S08: S08

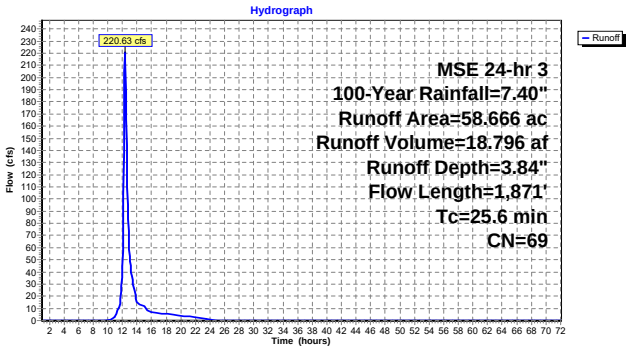
Runoff = 220.63 cfs @ 12.37 hrs, Volume= 18.796 af, Depth= 3.84"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	0.503	30	Forest Good, HSG A
*	0.287	55	Forest Good, HSG B
*	0.135	45	Forest Poor, HSG A
*	0.880	72	Gr-Road, HSG A
*	0.458	82	Gr-Road, HSG B
*	0.044	57	Residential, HSG A
*	0.076	72	Residential, HSG B
*	44.270	67	Row Crop, HSG A
*	12.013	78	Row Crop, HSG B
	58.666	69	Weighted Average
	58.666		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	100	0.0530	0.49		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
22.2	1,771	0.0217	1.33		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
25.6	1,871	Total			

Subcatchment S08: S08



Summary for Subcatchment S09: S09

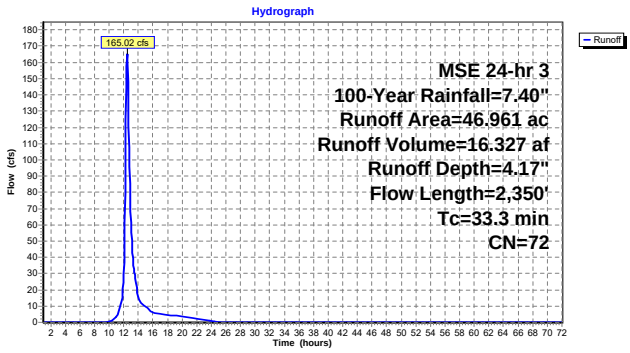
Runoff = 165.02 cfs @ 12.47 hrs, Volume= 16.327 af, Depth= 4.17"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	0.456	72	Gr-Road, HSG A
*	0.006	82	Gr-Road, HSG B
*	24.877	67	Row Crop, HSG A
*	19.903	78	Row Crop, HSG B
*	1.720	85	Row Crop, HSG C
	46.961	72	Weighted Average
	46.961		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	100	0.0350	0.41		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
29.3	2,250	0.0202	1.28		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
33.3	2,350	Total			

Subcatchment S09: S09



Summary for Subcatchment S10: S10

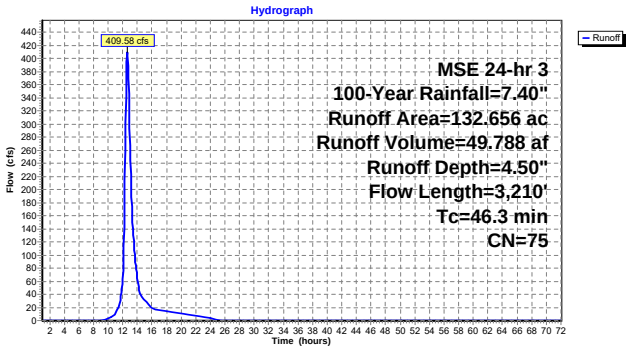
Runoff = 409.58 cfs @ 12.63 hrs, Volume= 49.788 af, Depth= 4.50"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	1.687	72	Gr-Road, HSG A
*	2.314	82	Gr-Road, HSG B
*	0.233	89	Gr-Road, HSG D
*	0.154	78	Meadow, HSG D
*	0.131	83	Pav-Road, HSG A
*	0.643	89	Pav-Road, HSG B
*	0.133	57	Residential, HSG A
*	1.397	77	Residential-Med, HSG A
*	0.160	85	Residential-Med, HSG B
*	57.816	67	Row Crop, HSG A
*	41.673	78	Row Crop, HSG B
*	26.317	89	Row Crop, HSG D
	132.656	75	Weighted Average
	132.656		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	100	0.0690	0.54		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
34.9	2,180	0.0134	1.04		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
8.3	930	0.0012	1.86	66.90	**Channel Flow,** Area= 36.0 sf Perim= 30.9' r= 1.16' n= 0.030
46.3	3,210	Total			

Subcatchment S10: S10



Summary for Subcatchment S11: S11

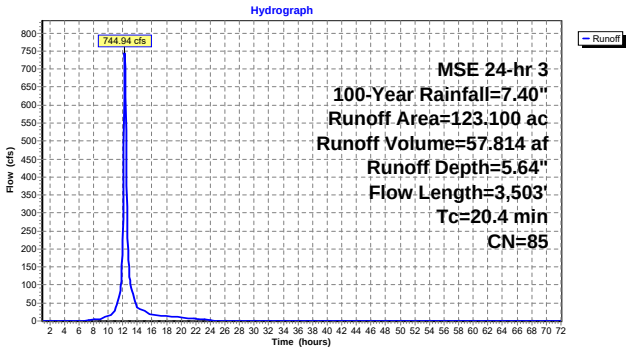
Runoff = 744.94 cfs @ 12.29 hrs, Volume= 57.814 af, Depth= 5.64"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	3.023	83	Forest Poor, HSG D
*	1.907	82	Gr-Road, HSG B
*	2.976	89	Gr-Road, HSG D
*	4.775	78	Meadow, HSG D
*	0.119	72	Residential, HSG B
*	0.027	86	Residential, HSG D
*	0.667	85	Residential-Med, HSG B
*	3.317	67	Row Crop, HSG A
*	25.681	78	Row Crop, HSG B
*	80.608	89	Row Crop, HSG D
	123.100	85	Weighted Average
	123.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	100	0.0280	1.47		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.80"
12.7	1,150	0.0281	1.51		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
6.6	2,253	0.0040	5.67	589.90	**Channel Flow,** Area= 104.0 sf Perim= 43.0' r= 2.42' n= 0.030
20.4	3,503	Total			

Subcatchment S11: S11



Summary for Subcatchment S12: S12

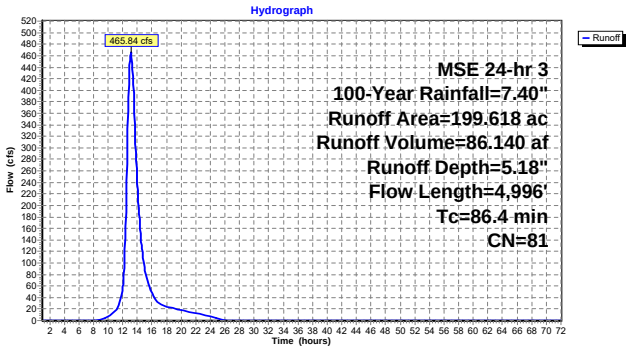
Runoff = 465.84 cfs @ 13.14 hrs, Volume= 86.140 af, Depth= 5.18"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	1.634	82	Gr-Road, HSG B
*	2.224	89	Gr-Road, HSG D
*	3.465	30	Meadow, HSG A
*	0.640	58	Meadow, HSG B
*	39.407	78	Meadow, HSG D
*	1.215	72	Residential, HSG B
*	0.222	86	Residential, HSG D
*	27.039	67	Row Crop, HSG A
*	24.619	78	Row Crop, HSG B
*	99.153	89	Row Crop, HSG D
	199.618	81	Weighted Average
	199.618		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	100	0.0460	1.80		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.80"
80.5	4,519	0.0108	0.94		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
5.0	377	0.0005	1.26	45.43	**Channel Flow,** Area= 36.0 sf Perim= 30.9' r= 1.16' n= 0.030
86.4	4,996	Total			

Subcatchment S12: S12



Summary for Subcatchment S13: S13

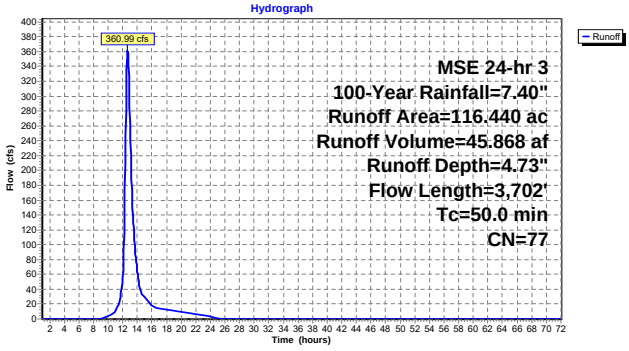
Runoff = 360.99 cfs @ 12.68 hrs, Volume= 45.868 af, Depth= 4.73"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	0.128	45	Forest Poor, HSG A
*	0.030	83	Forest Poor, HSG D
*	0.446	72	Gr-Road, HSG A
*	0.132	82	Gr-Road, HSG B
*	0.366	89	Gr-Road, HSG D
*	4.858	30	Meadow, HSG A
*	0.178	58	Meadow, HSG B
*	0.389	71	Meadow, HSG C
*	34.659	78	Meadow, HSG D
*	20.485	67	Row Crop, HSG A
*	18.556	78	Row Crop, HSG B
*	5.044	85	Row Crop, HSG C
*	31.169	89	Row Crop, HSG D
	116.440	77	Weighted Average
	116.440		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	100	0.0390	0.43		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
39.7	2,697	0.0158	1.13		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
6.4	905	0.0018	2.34	84.24	**Channel Flow,** Area= 36.0 sf Perim= 30.9' r= 1.16' n= 0.030
50.0	3,702	Total			

Subcatchment S13: S13



Summary for Subcatchment S14: S14

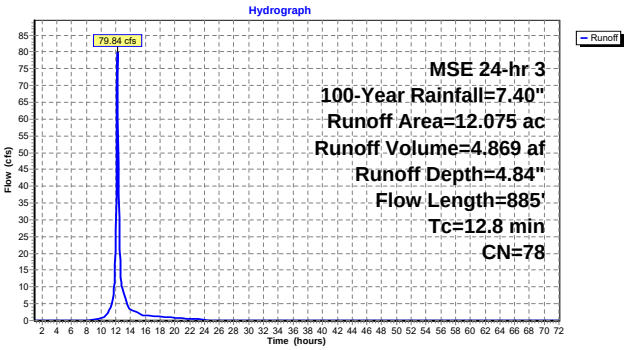
Runoff = 79.84 cfs @ 12.21 hrs, Volume= 4.869 af, Depth= 4.84"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	0.105	55	Forest Good, HSG B
*	0.033	45	Forest Poor, HSG A
*	0.928	66	Forest Poor, HSG B
*	0.454	82	Gr-Road, HSG B
*	0.101	72	Residential, HSG B
*	1.700	67	Row Crop, HSG A
*	6.203	78	Row Crop, HSG B
*	0.093	85	Row Crop, HSG C
*	2.458	89	Row Crop, HSG D
	12.075	78	Weighted Average
	12.075		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	100	0.0440	0.45		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
9.1	785	0.0257	1.44		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
12.8	885	Total			

Subcatchment S14: S14

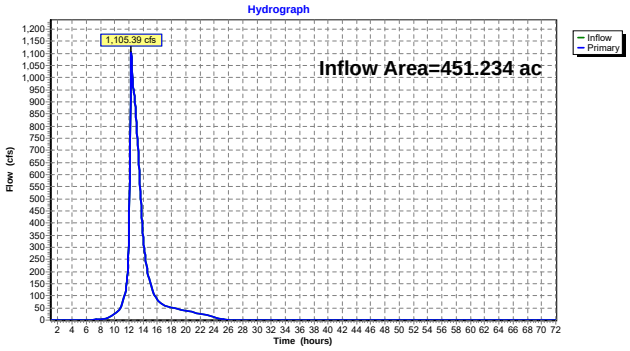


Summary for Link N: North to SBVR

Inflow Area = 451.234 ac, 0.00% Impervious, Inflow Depth = 5.18" for 100-Year event
Inflow = 1,105.39 cfs @ 12.33 hrs, Volume= 194.691 af
Primary = 1,105.39 cfs @ 12.33 hrs, Volume= 194.691 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link N: North to SBVR

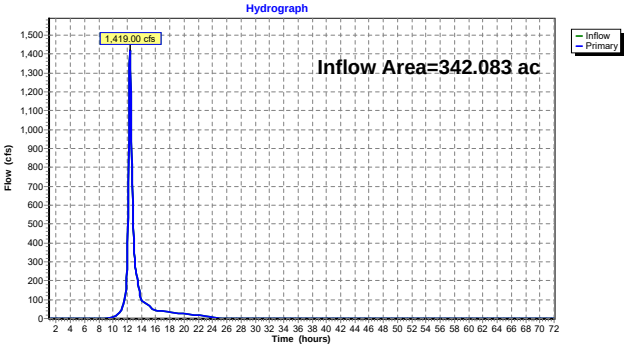


Summary for Link NE: NorthEast to SBVR

Inflow Area = 342.083 ac, 0.52% Impervious, Inflow Depth = 4.34" for 100-Year event
Inflow = 1,419.00 cfs @ 12.37 hrs, Volume= 123.770 af
Primary = 1,419.00 cfs @ 12.37 hrs, Volume= 123.770 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link NE: NorthEast to SBVR

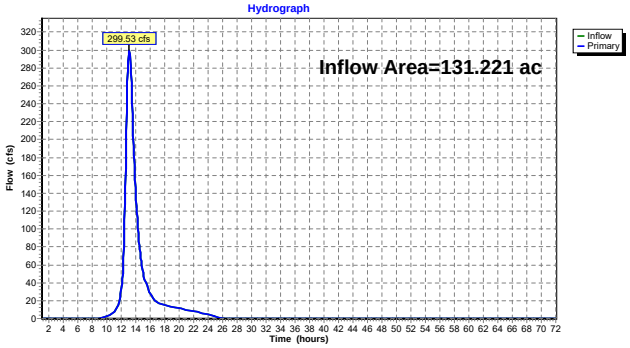


Summary for Link NW: NorthWest to Vermillion R.

Inflow Area = 131.221 ac, 0.00% Impervious, Inflow Depth = 4.73" for 100-Year event
Inflow = 299.53 cfs @ 13.05 hrs, Volume= 51.690 af
Primary = 299.53 cfs @ 13.05 hrs, Volume= 51.690 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link NW: NorthWest to Vermillion R.

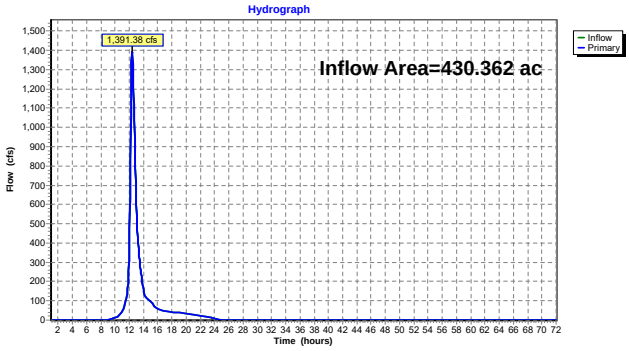


Summary for Link S: South to SBVR

Inflow Area = 430.362 ac, 0.00% Impervious, Inflow Depth = 4.46" for 100-Year event
Inflow = 1,391.38 cfs @ 12.38 hrs, Volume= 159.931 af
Primary = 1,391.38 cfs @ 12.38 hrs, Volume= 159.931 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link S: South to SBVR



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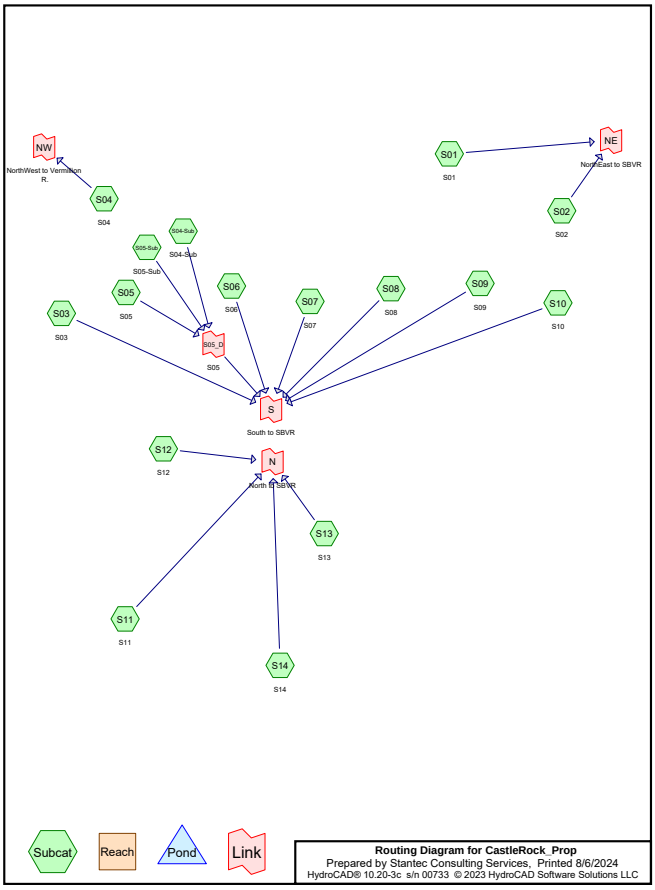
B.3 PROPOSED HYDROCAD RESULTS



Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-Year	MSE 24-hr	3	Default	24.00	1	2.46	2
2	2-Year	MSE 24-hr	3	Default	24.00	1	2.80	2
3	10-Year	MSE 24-hr	3	Default	24.00	1	4.16	2
4	100-Year	MSE 24-hr	3	Default	24.00	1	7.40	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
12.766	98	Access Road, HSG D (S01, S02, S03, S04, S05, S05-Sub, S06, S08, S09, S10, S11, S12, S13, S14)
109.097	30	Array, HSG A (S01, S02, S03, S04, S05, S05-Sub, S06, S07, S08, S09, S10, S11, S12, S13, S14)
113.518	58	Array, HSG B (S01, S02, S03, S04, S05, S05-Sub, S06, S07, S08, S09, S10, S11, S12, S13, S14)
4.073	71	Array, HSG C (S01, S02, S09, S13, S14)
46.155	78	Array, HSG D (S01, S02, S03, S04, S05, S06, S07, S10, S11, S12, S13, S14)
0.359	30	Forest Good, HSG A (S08)
0.391	55	Forest Good, HSG B (S08, S14)
0.201	45	Forest Poor, HSG A (S08, S13, S14)
0.808	66	Forest Poor, HSG B (S14)
2.990	83	Forest Poor, HSG D (S02, S11, S13)
7.047	72	Gr-Road, HSG A (S01, S02, S03, S04, S05, S06, S07, S08, S09, S10, S13)
12.363	82	Gr-Road, HSG B (S01, S02, S03, S04, S05, S06, S07, S08, S09, S10, S11, S12, S13, S14)
11.209	89	Gr-Road, HSG D (S02, S03, S04, S05, S06, S07, S10, S11, S12, S13)
0.159	98	Inverter, HSG D (S01, S02, S03, S04, S05, S08, S09, S10, S11, S12, S13)
257.399	30	Meadow, HSG A (S01, S02, S03, S04, S05, S05-Sub, S06, S07, S08, S09, S10, S11, S12, S13, S14)
253.747	58	Meadow, HSG B (S01, S02, S03, S04, S04-Sub, S05, S05-Sub, S06, S07, S08, S09, S10, S11, S12, S13, S14)
8.735	71	Meadow, HSG C (S01, S02, S09, S13, S14)
204.445	78	Meadow, HSG D (S01, S02, S03, S04, S05, S06, S07, S10, S11, S12, S13, S14)
0.129	98	O&M, HSG D (S05-Sub)
0.131	83	Pav-Road, HSG A (S10)
0.603	89	Pav-Road, HSG B (S10)
0.649	57	Residential, HSG A (S01, S04, S05, S08, S10)
1.995	72	Residential, HSG B (S02, S03, S08, S11, S12, S14)
0.306	86	Residential, HSG D (S05, S11, S12)
1.221	77	Residential-Med, HSG A (S10)
0.827	85	Residential-Med, HSG B (S10, S11)
73.610	67	Row Crop, HSG A (S01, S02, S03, S04, S05, S05-Sub, S06, S07, S08, S09, S10, S11, S12, S13, S14)
77.191	78	Row Crop, HSG B (S01, S02, S03, S04, S05, S05-Sub, S06, S07, S08, S09, S10, S11, S12, S13, S14)
0.379	85	Row Crop, HSG C (S02, S09)
138.602	89	Row Crop, HSG D (S01, S02, S03, S04, S05, S05-Sub, S06, S07, S10, S11, S12, S13, S14)
6.021	98	Substation, HSG D (S04-Sub, S05-Sub)
5.994	98	Switchyard, HSG D (S05-Sub)
1.779	99	Water, HSG D (S02)

Area Listing (selected nodes) (continued)

Area (acres)	CN	Description (subcatchment-numbers)
1,354.899	**61**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
449.715	HSG A	S01, S02, S03, S04, S05, S05-Sub, S06, S07, S08, S09, S10, S11, S12, S13, S14
461.442	HSG B	S01, S02, S03, S04, S04-Sub, S05, S05-Sub, S06, S07, S08, S09, S10, S11, S12, S13, S14
13.187	HSG C	S01, S02, S09, S13, S14
430.555	HSG D	S01, S02, S03, S04, S04-Sub, S05, S05-Sub, S06, S07, S08, S09, S10, S11, S12, S13, S14
0.000	Other	
1,354.899		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	12.766	0.000	12.766	Access Road	S01, S02, S03, S04, S05, S05-Sub, S06, S08, S09, S10, S11, S12, S13, S14
109.097	113.518	4.073	46.155	0.000	272.843	Array	S01, S02, S03, S04, S05, S05-Sub, S06, S07, S08, S09, S10, S11, S12, S13, S14
0.359	0.391	0.000	0.000	0.000	0.750	Forest Good	S08, S14
0.201	0.808	0.000	2.990	0.000	4.000	Forest Poor	S02, S08, S11, S13, S14
7.047	12.363	0.000	11.209	0.000	30.619	Gr-Road	S01, S02, S03, S04, S05, S06, S07, S08, S09, S10, S11, S12, S13, S14
0.000	0.000	0.000	0.159	0.000	0.159	Inverter	S01, S02, S03, S04, S05, S08, S09, S10, S11, S12, S13
257.399	253.747	8.735	204.445	0.000	724.325	Meadow	S01, S02, S03, S04, S04-Sub, S05, S05-Sub, S06, S07, S08, S09, S10, S11, S12, S13, S14
0.000	0.000	0.000	0.129	0.000	0.129	O&M	S05-Sub
0.131	0.603	0.000	0.000	0.000	0.734	Pav-Road	S10
0.649	1.995	0.000	0.306	0.000	2.950	Residential	S01, S02, S03, S04, S05, S08, S10, S11, S12, S14
1.221	0.827	0.000	0.000	0.000	2.048	Residential-Med	S10, S11
73.610	77.191	0.379	138.602	0.000	289.783	Row Crop	S01, S02, S03, S04, S05, S05-Sub, S06, S07, S08, S09, S10, S11, S12, S13, S14

Ground Covers (selected nodes) (continued)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	6.021	0.000	6.021	Substation	S04-Sub, S05-Sub
0.000	0.000	0.000	5.994	0.000	5.994	Switchyard	S05-Sub
0.000	0.000	0.000	1.779	0.000	1.779	Water	S02
449.715	**461.442**	**13.187**	**430.555**	**0.000**	**1,354.899**	**TOTAL AREA**	

Time span=1.00-72.00 hrs, dt=0.05 hrs, 1421 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment S01: S01 Runoff Area=184.155 ac 0.74% Impervious Runoff Depth=0.01"
Flow Length=1,941' Tc=39.5 min CN=49 Runoff=0.31 cfs 0.204 af

Subcatchment S02: S02 Runoff Area=157.929 ac 1.79% Impervious Runoff Depth=0.02"
Flow Length=2,628' Tc=24.1 min CN=50 Runoff=0.47 cfs 0.266 af

Subcatchment S03: S03 Runoff Area=83.513 ac 0.39% Impervious Runoff Depth=0.09"
Flow Length=2,187' Tc=89.4 min CN=56 Runoff=1.50 cfs 0.628 af

Subcatchment S04: S04 Runoff Area=130.514 ac 0.88% Impervious Runoff Depth=0.11"
Flow Length=4,429' Tc=428.4 min CN=57 Runoff=1.34 cfs 1.158 af

Subcatchment S04-Sub: S04-Sub Runoff Area=0.707 ac 81.61% Impervious Runoff Depth=1.57"
Flow Length=219' Tc=7.0 min CN=91 Runoff=1.90 cfs 0.093 af

Subcatchment S05: S05 Runoff Area=56.105 ac 0.95% Impervious Runoff Depth=0.37"
Flow Length=2,690' Tc=25.4 min CN=68 Runoff=14.97 cfs 1.733 af

Subcatchment S05-Sub: S05-Sub Runoff Area=18.335 ac 69.50% Impervious Runoff Depth=1.21"
Flow Length=779' Tc=17.4 min CN=86 Runoff=26.66 cfs 1.850 af

Subcatchment S06: S06 Runoff Area=13.695 ac 0.42% Impervious Runoff Depth=0.14"
Flow Length=1,071' Tc=18.1 min CN=59 Runoff=0.83 cfs 0.163 af

Subcatchment S07: S07 Runoff Area=20.432 ac 0.00% Impervious Runoff Depth=0.01"
Flow Length=1,073' Tc=26.6 min CN=48 Runoff=0.02 cfs 0.013 af

Subcatchment S08: S08 Runoff Area=58.666 ac 0.63% Impervious Runoff Depth=0.00"
Flow Length=1,871' Tc=32.2 min CN=43 Runoff=0.00 cfs 0.000 af

Subcatchment S09: S09 Runoff Area=46.961 ac 1.34% Impervious Runoff Depth=0.00"
Flow Length=2,350' Tc=46.0 min CN=47 Runoff=0.03 cfs 0.014 af

Subcatchment S10: S10 Runoff Area=132.656 ac 1.20% Impervious Runoff Depth=0.21"
Flow Length=3,210' Tc=57.4 min CN=62 Runoff=9.39 cfs 2.287 af

Subcatchment S11: S11 Runoff Area=123.100 ac 1.00% Impervious Runoff Depth=0.81"
Flow Length=3,503' Tc=20.4 min CN=79 Runoff=105.72 cfs 8.317 af

Subcatchment S12: S12 Runoff Area=199.616 ac 1.15% Impervious Runoff Depth=0.51"
Flow Length=4,996' Tc=108.8 min CN=72 Runoff=32.49 cfs 8.450 af

Subcatchment S13: S13 Runoff Area=116.440 ac 0.75% Impervious Runoff Depth=0.37"
Flow Length=3,702' Tc=65.5 min CN=68 Runoff=17.66 cfs 3.596 af

Subcatchment S14: S14 Runoff Area=12.075 ac 2.54% Impervious Runoff Depth=0.26"
Flow Length=885' Tc=19.3 min CN=64 Runoff=2.03 cfs 0.258 af

Link N: North to SBVR Inflow=110.40 cfs 20.620 af
Primary=110.40 cfs 20.620 af

Link NE: NorthEast to SBVR Inflow=0.72 cfs 0.470 af
Primary=0.72 cfs 0.470 af

Link NW: NorthWest to Vermillion R. Inflow=1.34 cfs 1.158 af
Primary=1.34 cfs 1.158 af

Link S: South to SBVR Inflow=38.39 cfs 6.781 af
Primary=38.39 cfs 6.781 af

Link S05_D: S05 Inflow=37.30 cfs 3.676 af
Primary=37.30 cfs 3.676 af

Total Runoff Area = 1,354.899 ac Runoff Volume = 29.030 af Average Runoff Depth = 0.26"
98.02% Pervious = 1,328.051 ac 1.98% Impervious = 26.848 ac

Summary for Subcatchment S01: S01

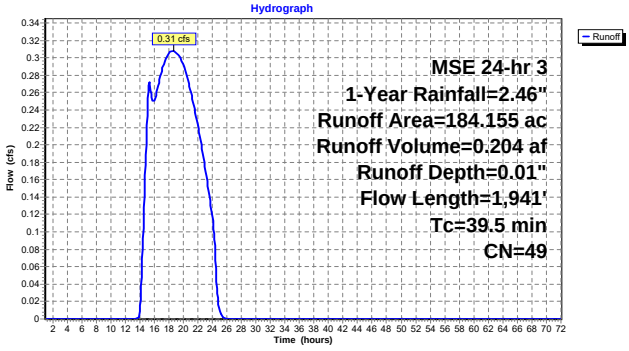
Runoff = 0.31 cfs @ 18.65 hrs, Volume= 0.204 af, Depth= 0.01"
Routed to Link NE : NorthEast to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	1.326	98	Access Road, HSG D
*	24.531	30	Array, HSG A
*	22.902	58	Array, HSG B
*	1.571	71	Array, HSG C
*	3.538	78	Array, HSG D
*	0.685	72	Gr-Road, HSG A
*	0.238	82	Gr-Road, HSG B
*	0.032	98	Inverter, HSG D
*	53.891	30	Meadow, HSG A
*	50.431	58	Meadow, HSG B
*	3.071	71	Meadow, HSG C
*	7.521	78	Meadow, HSG D
*	0.368	57	Residential, HSG A
*	6.997	67	Row Crop, HSG A
*	6.546	78	Row Crop, HSG B
*	0.509	89	Row Crop, HSG D
	184.155	49	Weighted Average
	182.797		99.26% Pervious Area
	1.357		0.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	109	0.1237	0.34		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
34.1	1,832	0.0164	0.90		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
39.5	1,941	Total			

Subcatchment S01: S01



Summary for Subcatchment S02: S02

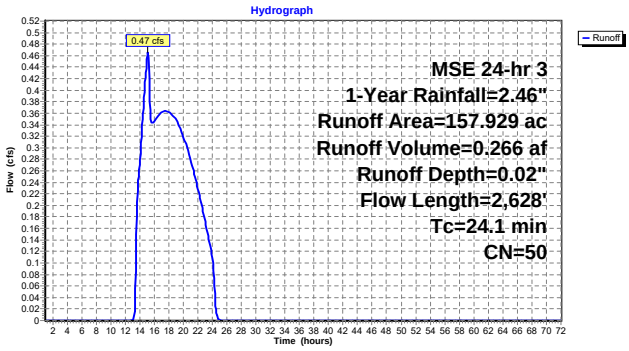
Runoff = 0.47 cfs @ 15.12 hrs, Volume= 0.266 af, Depth= 0.02"
Routed to Link NE : NorthEast to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	1.025	98	Access Road, HSG D
*	23.605	30	Array, HSG A
*	11.918	58	Array, HSG B
*	0.327	71	Array, HSG C
*	3.370	78	Array, HSG D
*	0.007	83	Forest Poor, HSG D
*	0.964	72	Gr-Road, HSG A
*	0.356	82	Gr-Road, HSG B
*	0.310	89	Gr-Road, HSG D
*	0.024	98	Inverter, HSG D
*	53.540	30	Meadow, HSG A
*	26.916	58	Meadow, HSG B
*	0.833	71	Meadow, HSG C
*	10.547	78	Meadow, HSG D
*	0.484	72	Residential, HSG B
*	11.115	67	Row Crop, HSG A
*	5.344	78	Row Crop, HSG B
*	0.140	85	Row Crop, HSG C
*	5.326	89	Row Crop, HSG D
*	1.779	99	Water, HSG D
	157.929	50	Weighted Average
	155.101		98.21% Pervious Area
	2.828		1.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	107	0.0756	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.80"
0.6	100	0.0835	2.60		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
6.9	591	0.0413	1.42		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.4	1,830	0.0059	12.95	4,040.29	**Channel Flow,** Area= 312.0 sf Perim= 50.0' r= 6.24' n= 0.030
24.1	2,628	Total			

Subcatchment S02: S02



Summary for Subcatchment S03: S03

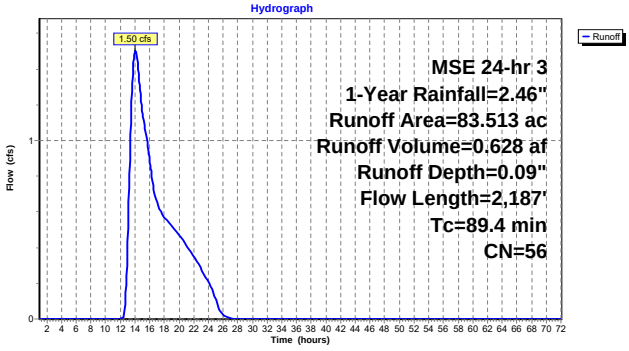
Runoff = 1.50 cfs @ 14.04 hrs, Volume= 0.628 af, Depth= 0.09"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	0.318	98	Access Road, HSG D
*	7.882	30	Array, HSG A
*	11.353	58	Array, HSG B
*	1.024	78	Array, HSG D
*	0.189	72	Gr-Road, HSG A
*	1.911	82	Gr-Road, HSG B
*	3.261	89	Gr-Road, HSG D
*	0.008	98	Inverter, HSG D
*	16.773	30	Meadow, HSG A
*	23.515	58	Meadow, HSG B
*	2.221	78	Meadow, HSG D
*	0.001	72	Residential, HSG B
*	4.329	67	Row Crop, HSG A
*	5.586	78	Row Crop, HSG B
*	5.142	89	Row Crop, HSG D
	83.513	56	Weighted Average
	83.187		99.61% Pervious Area
	0.326		0.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	108	0.0425	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
6.6	596	0.0456	1.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
74.6	1,483	0.0014	0.33		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
89.4	2,187	Total			

Subcatchment S03: S03



Summary for Subcatchment S04: S04

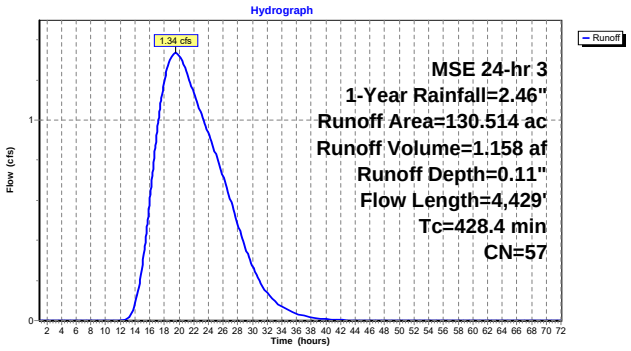
Runoff = 1.34 cfs @ 19.52 hrs, Volume= 1.158 af, Depth= 0.11"
Routed to Link NW : NorthWest to Vermillion R.

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	1.117	98	Access Road, HSG D
*	7.113	30	Array, HSG A
*	29.473	58	Array, HSG B
*	2.855	78	Array, HSG D
*	0.737	72	Gr-Road, HSG A
*	0.606	82	Gr-Road, HSG B
*	0.915	89	Gr-Road, HSG D
*	0.028	98	Inverter, HSG D
*	14.042	30	Meadow, HSG A
*	58.392	58	Meadow, HSG B
*	7.452	78	Meadow, HSG D
*	0.076	57	Residential, HSG A
*	1.578	67	Row Crop, HSG A
*	3.112	78	Row Crop, HSG B
*	3.018	89	Row Crop, HSG D
	130.514	57	Weighted Average
	129.369		99.12% Pervious Area
	1.145		0.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0260	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
2.1	336	0.1384	2.60		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
416.7	3,884	0.0003	0.16		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
0.2	110	0.0073	8.38	326.77	**Channel Flow,** Area= 39.0 sf Perim= 14.0' r= 2.79' n= 0.030
428.4	4,429	Total			

Subcatchment S04: S04



Summary for Subcatchment S04-Sub: S04-Sub

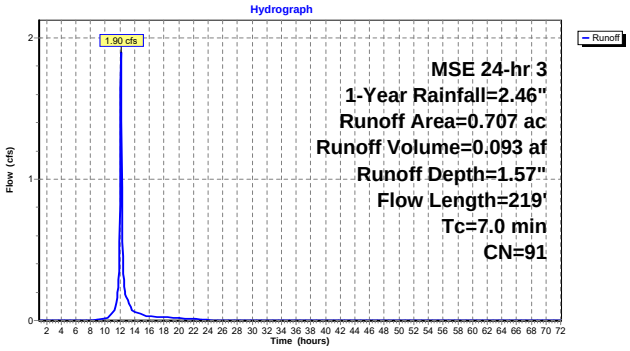
Runoff = 1.90 cfs @ 12.14 hrs, Volume= 0.093 af, Depth= 1.57"
Routed to Link S05_D : S05

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	0.130	58	Meadow, HSG B
*	0.577	98	Substation, HSG D
	0.707	91	Weighted Average
	0.130		18.39% Pervious Area
	0.577		81.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	102	0.0009	0.37		**Sheet Flow,** Smooth Surfaces n= 0.011 P2= 2.80"
2.4	116	0.0026	0.82		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
7.0	219	Total			

Subcatchment S04-Sub: S04-Sub



Summary for Subcatchment S05: S05

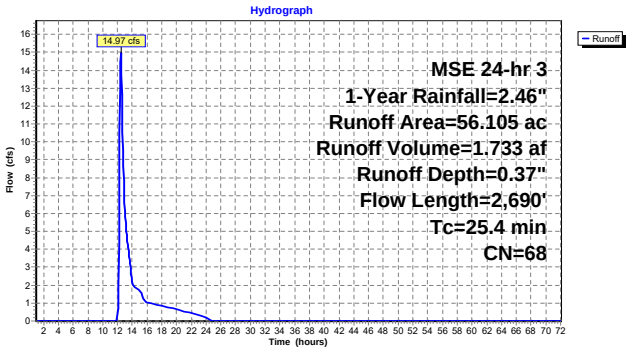
Runoff = 14.97 cfs @ 12.46 hrs, Volume= 1.733 af, Depth= 0.37"
Routed to Link S05_D : S05

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	0.531	98	Access Road, HSG D
*	1.573	30	Array, HSG A
*	6.545	58	Array, HSG B
*	1.929	78	Array, HSG D
*	0.624	72	Gr-Road, HSG A
*	1.793	82	Gr-Road, HSG B
*	0.773	89	Gr-Road, HSG D
*	0.004	98	Inverter, HSG D
*	3.434	30	Meadow, HSG A
*	14.529	58	Meadow, HSG B
*	5.640	78	Meadow, HSG D
*	0.029	57	Residential, HSG A
*	0.057	86	Residential, HSG D
*	1.908	67	Row Crop, HSG A
*	7.306	78	Row Crop, HSG B
*	9.430	89	Row Crop, HSG D
	56.105	68	Weighted Average
	55.570		99.05% Pervious Area
	0.535		0.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.0560	0.24		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
5.5	477	0.0425	1.44		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.0	664	0.0236	1.38		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
5.0	1,449	0.0077	4.81	67.27	**Channel Flow,** Area= 14.0 sf Perim= 12.0' r= 1.17' n= 0.030
25.4	2,690	Total			

Subcatchment S05: S05



Summary for Subcatchment S05-Sub: S05-Sub

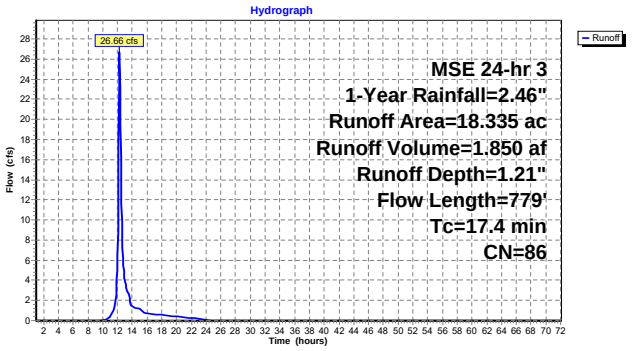
Runoff = 26.66 cfs @ 12.27 hrs, Volume= 1.850 af, Depth= 1.21"
Routed to Link S05_D : S05

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	1.175	98	Access Road, HSG D
*	0.413	30	Array, HSG A
*	0.221	58	Array, HSG B
*	0.939	30	Meadow, HSG A
*	2.044	58	Meadow, HSG B
*	0.129	98	O&M, HSG D
*	0.227	67	Row Crop, HSG A
*	1.695	78	Row Crop, HSG B
*	0.054	89	Row Crop, HSG D
*	5.444	98	Substation, HSG D
*	5.994	98	Switchyard, HSG D
	18.335	86	Weighted Average
	5.593		30.50% Pervious Area
	12.742		69.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	79	0.0260	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
9.6	700	0.0300	1.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.4	779	Total			

Subcatchment S05-Sub: S05-Sub



Summary for Subcatchment S06: S06

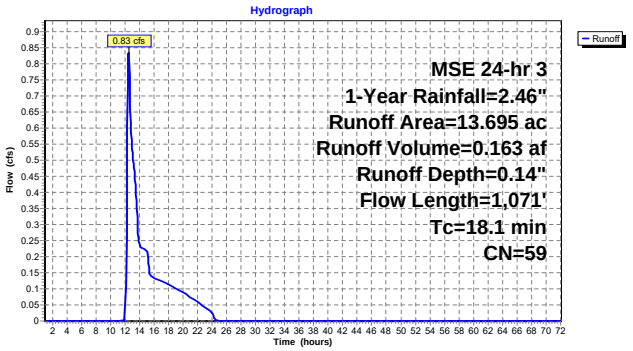
Runoff = 0.83 cfs @ 12.52 hrs, Volume= 0.163 af, Depth= 0.14"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	0.058	98	Access Road, HSG D
*	0.966	30	Array, HSG A
*	1.776	58	Array, HSG B
*	0.000	78	Array, HSG D
*	0.146	72	Gr-Road, HSG A
*	0.547	82	Gr-Road, HSG B
*	0.164	89	Gr-Road, HSG D
*	2.133	30	Meadow, HSG A
*	3.943	58	Meadow, HSG B
*	0.046	78	Meadow, HSG D
*	1.415	67	Row Crop, HSG A
*	1.430	78	Row Crop, HSG B
*	1.070	89	Row Crop, HSG D
	13.695	59	Weighted Average
	13.637		99.58% Pervious Area
	0.058		0.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	100	0.0830	0.28		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
6.8	579	0.0417	1.43		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
5.4	392	0.0179	1.20		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
18.1	1,071	Total			

Subcatchment S06: S06



Summary for Subcatchment S07: S07

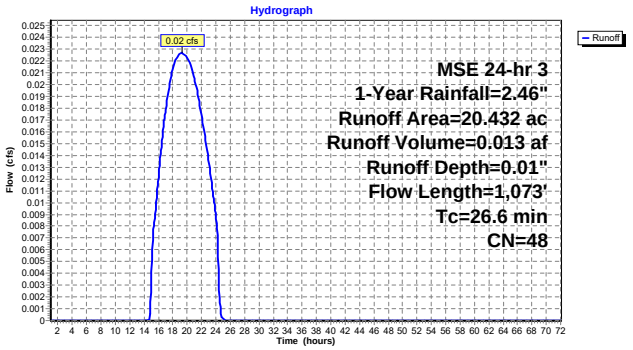
Runoff = 0.02 cfs @ 19.28 hrs, Volume= 0.013 af, Depth= 0.01"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	3.956	30	Array, HSG A
*	0.278	58	Array, HSG B
*	0.272	78	Array, HSG D
*	0.256	72	Gr-Road, HSG A
*	0.093	82	Gr-Road, HSG B
*	0.067	89	Gr-Road, HSG D
*	8.102	30	Meadow, HSG A
*	0.555	58	Meadow, HSG B
*	1.369	78	Meadow, HSG D
*	3.330	67	Row Crop, HSG A
*	0.957	78	Row Crop, HSG B
*	1.199	89	Row Crop, HSG D
	20.432	48	Weighted Average
	20.432		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.9	100	0.0180	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
12.9	773	0.0204	1.00		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.8	200	0.0170	1.17		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
26.6	1,073	Total			

Subcatchment S07: S07



Summary for Subcatchment S08: S08

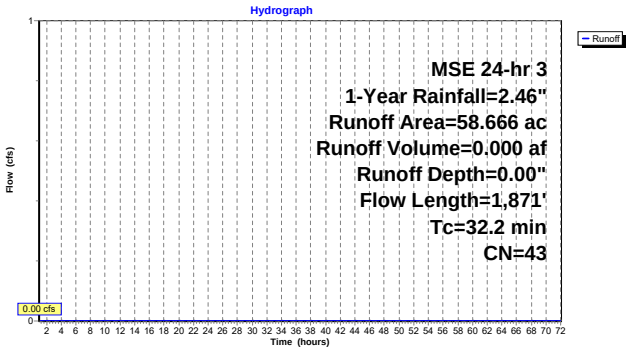
Runoff = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	0.357	98	Access Road, HSG D
*	10.463	30	Array, HSG A
*	1.768	58	Array, HSG B
*	0.359	30	Forest Good, HSG A
*	0.287	55	Forest Good, HSG B
*	0.131	45	Forest Poor, HSG A
*	0.880	72	Gr-Road, HSG A
*	0.458	82	Gr-Road, HSG B
*	0.012	98	Inverter, HSG D
*	27.399	30	Meadow, HSG A
*	4.979	58	Meadow, HSG B
*	0.044	57	Residential, HSG A
*	0.076	72	Residential, HSG B
*	6.187	67	Row Crop, HSG A
*	5.265	78	Row Crop, HSG B
	58.666	43	Weighted Average
	58.296		99.37% Pervious Area
	0.369		0.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	100	0.0530	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
8.6	641	0.0315	1.24		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.5	1,130	0.0162	1.15		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
32.2	1,871	Total			

Subcatchment S08: S08



Summary for Subcatchment S09: S09

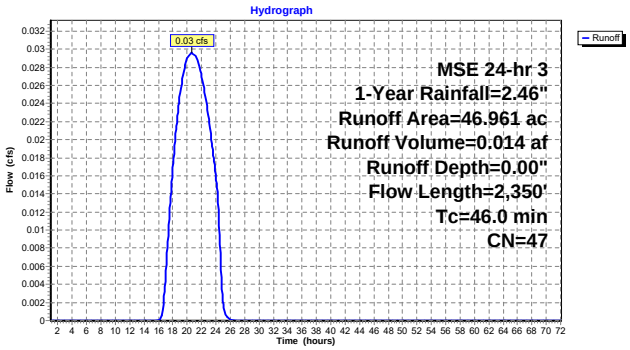
Runoff = 0.03 cfs @ 20.60 hrs, Volume= 0.014 af, Depth= 0.00"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	0.625	98	Access Road, HSG D
*	6.847	30	Array, HSG A
*	6.018	58	Array, HSG B
*	0.395	71	Array, HSG C
*	0.434	72	Gr-Road, HSG A
*	0.006	82	Gr-Road, HSG B
*	0.004	98	Inverter, HSG D
*	14.877	30	Meadow, HSG A
*	12.046	58	Meadow, HSG B
*	1.086	71	Meadow, HSG C
*	2.823	67	Row Crop, HSG A
*	1.563	78	Row Crop, HSG B
*	0.239	85	Row Crop, HSG C
	46.961	47	Weighted Average
	46.333		98.66% Pervious Area
	0.628		1.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0350	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
37.6	2,250	0.0202	1.00		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
46.0	2,350	Total			

Subcatchment S09: S09



Summary for Subcatchment S10: S10

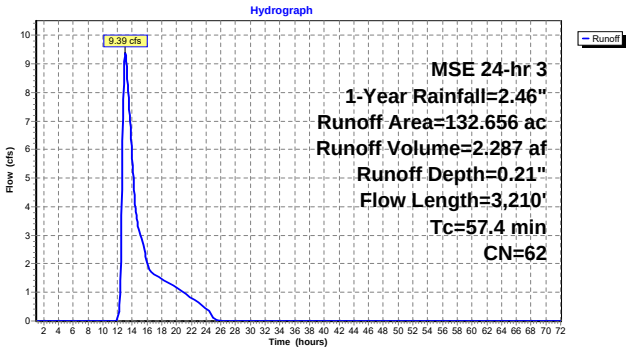
Runoff = 9.39 cfs @ 13.07 hrs, Volume= 2.287 af, Depth= 0.21"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	1.583	98	Access Road, HSG D
*	10.237	30	Array, HSG A
*	7.255	58	Array, HSG B
*	0.009	78	Array, HSG D
*	1.687	72	Gr-Road, HSG A
*	2.288	82	Gr-Road, HSG B
*	0.233	89	Gr-Road, HSG D
*	0.008	98	Inverter, HSG D
*	25.120	30	Meadow, HSG A
*	20.359	58	Meadow, HSG B
*	0.319	78	Meadow, HSG D
*	0.131	83	Pav-Road, HSG A
*	0.603	89	Pav-Road, HSG B
*	0.133	57	Residential, HSG A
*	1.221	77	Residential-Med, HSG A
*	0.160	85	Residential-Med, HSG B
*	21.812	67	Row Crop, HSG A
*	13.357	78	Row Crop, HSG B
*	26.142	89	Row Crop, HSG D
	132.656	62	Weighted Average
	131.066		98.80% Pervious Area
	1.590		1.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	100	0.0690	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
34.8	1,724	0.0139	0.82		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.9	456	0.0116	0.97		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
8.3	930	0.0012	1.86	66.90	**Channel Flow,** Area= 36.0 sf Perim= 30.9' r= 1.16' n= 0.030
57.4	3,210	Total			

Subcatchment S10: S10



Summary for Subcatchment S11: S11

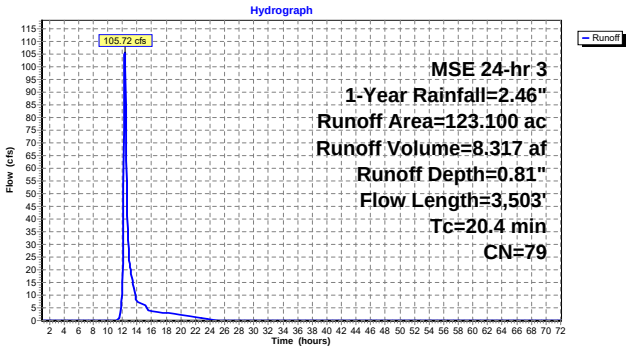
Runoff = 105.72 cfs @ 12.32 hrs, Volume= 8.317 af, Depth= 0.81"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	1.219	98	Access Road, HSG D
*	0.657	30	Array, HSG A
*	3.013	58	Array, HSG B
*	9.016	78	Array, HSG D
*	2.953	83	Forest Poor, HSG D
*	1.907	82	Gr-Road, HSG B
*	2.954	89	Gr-Road, HSG D
*	0.008	98	Inverter, HSG D
*	1.747	30	Meadow, HSG A
*	8.918	58	Meadow, HSG B
*	34.440	78	Meadow, HSG D
*	0.119	72	Residential, HSG B
*	0.027	86	Residential, HSG D
*	0.667	85	Residential-Med, HSG B
*	0.857	67	Row Crop, HSG A
*	13.635	78	Row Crop, HSG B
*	40.965	89	Row Crop, HSG D
	123.100	79	Weighted Average
	121.873		99.00% Pervious Area
	1.227		1.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	100	0.0280	1.47		**Sheet Flow,** Smooth Surfaces n= 0.011 P2= 2.80"
12.7	1,150	0.0281	1.51		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
6.6	2,253	0.0040	5.67	589.90	**Channel Flow,** Area= 104.0 sf Perim= 43.0' r= 2.42' n= 0.030
20.4	3,503	Total			

Subcatchment S11: S11



Summary for Subcatchment S12: S12

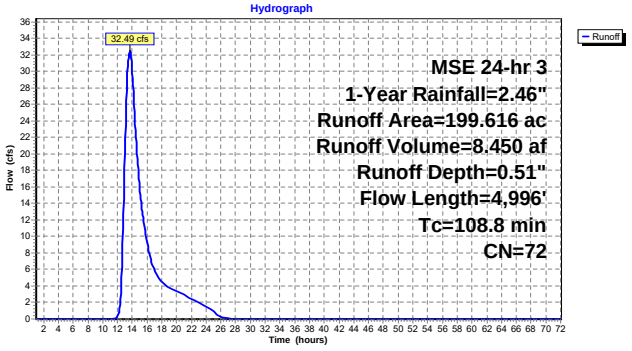
Runoff = 32.49 cfs @ 13.66 hrs, Volume= 8.450 af, Depth= 0.51"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	2.266	98	Access Road, HSG D
*	6.478	30	Array, HSG A
*	5.369	58	Array, HSG B
*	18.012	78	Array, HSG D
*	1.596	82	Gr-Road, HSG B
*	2.208	89	Gr-Road, HSG D
*	0.020	98	Inverter, HSG D
*	18.777	30	Meadow, HSG A
*	12.457	58	Meadow, HSG B
*	84.696	78	Meadow, HSG D
*	1.215	72	Residential, HSG B
*	0.222	86	Residential, HSG D
*	5.074	67	Row Crop, HSG A
*	7.117	78	Row Crop, HSG B
*	34.109	89	Row Crop, HSG D
	199.616	72	Weighted Average
	197.330		98.85% Pervious Area
	2.286		1.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	100	0.0460	1.80		**Sheet Flow,** Smooth Surfaces n= 0.011 P2= 2.80"
11.0	794	0.0177	1.20		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
91.9	3,725	0.0093	0.68		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
5.0	377	0.0005	1.26	45.43	**Channel Flow,** Area= 36.0 sf Perim= 30.9' r= 1.16' n= 0.030
108.8	4,996	Total			

Subcatchment S12: S12



Summary for Subcatchment S13: S13

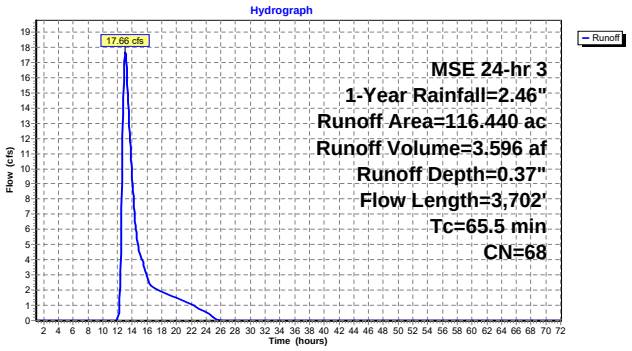
Runoff = 17.66 cfs @ 13.07 hrs, Volume= 3.596 af, Depth= 0.37"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	0.859	98	Access Road, HSG D
*	3.879	30	Array, HSG A
*	4.758	58	Array, HSG B
*	1.748	71	Array, HSG C
*	5.439	78	Array, HSG D
*	0.049	45	Forest Poor, HSG A
*	0.030	83	Forest Poor, HSG D
*	0.446	72	Gr-Road, HSG A
*	0.132	82	Gr-Road, HSG B
*	0.324	89	Gr-Road, HSG D
*	0.012	98	Inverter, HSG D
*	15.535	30	Meadow, HSG A
*	11.173	58	Meadow, HSG B
*	3.685	71	Meadow, HSG C
*	48.688	78	Meadow, HSG D
*	5.858	67	Row Crop, HSG A
*	2.371	78	Row Crop, HSG B
*	11.453	89	Row Crop, HSG D
	116.440	68	Weighted Average
	115.569		99.25% Pervious Area
	0.871		0.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	100	0.0390	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
51.1	2,697	0.0158	0.88		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.4	905	0.0018	2.34	84.24	**Channel Flow,** Area= 36.0 sf Perim= 30.9' r= 1.16' n= 0.030
65.5	3,702	Total			

Subcatchment S13: S13



Summary for Subcatchment S14: S14

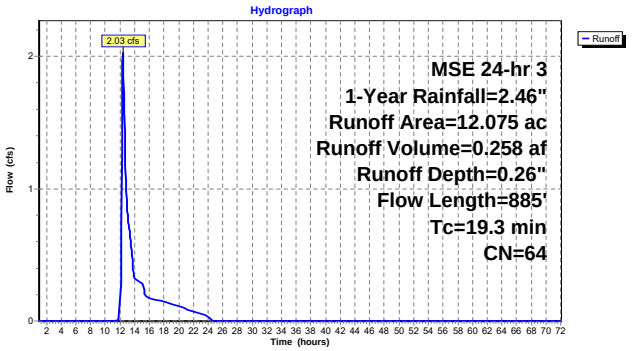
Runoff = 2.03 cfs @ 12.40 hrs, Volume= 0.258 af, Depth= 0.26"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.46"

	Area (ac)	CN	Description
*	0.307	98	Access Road, HSG D
*	0.497	30	Array, HSG A
*	0.869	58	Array, HSG B
*	0.033	71	Array, HSG C
*	0.690	78	Array, HSG D
*	0.105	55	Forest Good, HSG B
*	0.021	45	Forest Poor, HSG A
*	0.808	66	Forest Poor, HSG B
*	0.432	82	Gr-Road, HSG B
*	1.090	30	Meadow, HSG A
*	3.360	58	Meadow, HSG B
*	0.060	71	Meadow, HSG C
*	1.508	78	Meadow, HSG D
*	0.101	72	Residential, HSG B
*	0.103	67	Row Crop, HSG A
*	1.908	78	Row Crop, HSG B
*	0.184	89	Row Crop, HSG D
	12.075	64	Weighted Average
	11.768		97.46% Pervious Area
	0.307		2.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0440	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
11.7	785	0.0257	1.12		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
19.3	885	Total			

Subcatchment S14: S14

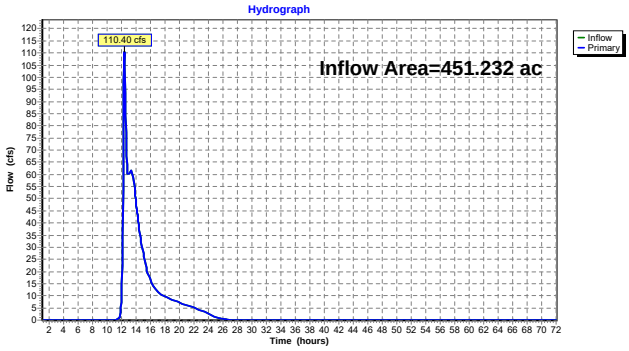


Summary for Link N: North to SBVR

Inflow Area = 451.232 ac, 1.04% Impervious, Inflow Depth = 0.55" for 1-Year event
Inflow = 110.40 cfs @ 12.33 hrs, Volume= 20.620 af
Primary = 110.40 cfs @ 12.33 hrs, Volume= 20.620 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link N: North to SBVR

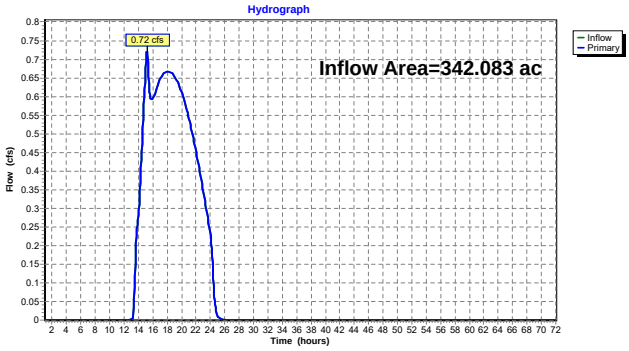


Summary for Link NE: NorthEast to SBVR

Inflow Area = 342.083 ac, 1.22% Impervious, Inflow Depth = 0.02" for 1-Year event
Inflow = 0.72 cfs @ 15.17 hrs, Volume= 0.470 af
Primary = 0.72 cfs @ 15.17 hrs, Volume= 0.470 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link NE: NorthEast to SBVR

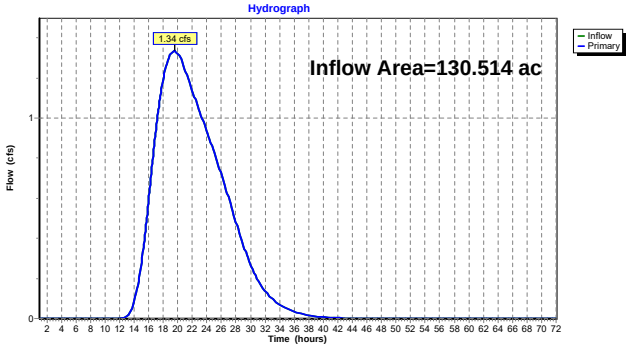


Summary for Link NW: NorthWest to Vermillion R.

Inflow Area = 130.514 ac, 0.88% Impervious, Inflow Depth = 0.11" for 1-Year event
Inflow = 1.34 cfs @ 19.52 hrs, Volume= 1.158 af
Primary = 1.34 cfs @ 19.52 hrs, Volume= 1.158 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link NW: NorthWest to Vermillion R.

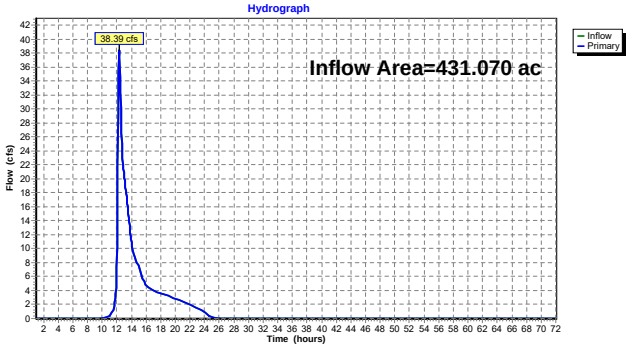


Summary for Link S: South to SBVR

Inflow Area = 431.070 ac, 3.90% Impervious, Inflow Depth = 0.19" for 1-Year event
Inflow = 38.39 cfs @ 12.33 hrs, Volume= 6.781 af
Primary = 38.39 cfs @ 12.33 hrs, Volume= 6.781 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link S: South to SBVR

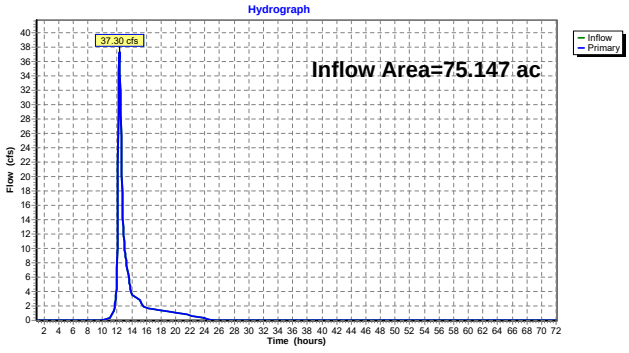


Summary for Link S05_D: S05

Inflow Area = 75.147 ac, 18.44% Impervious, Inflow Depth = 0.59" for 1-Year event
Inflow = 37.30 cfs @ 12.32 hrs, Volume= 3.676 af
Primary = 37.30 cfs @ 12.32 hrs, Volume= 3.676 af, Atten= 0%, Lag= 0.0 min
Routed to Link S : South to SBVR

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link S05_D: S05



Time span=1.00-72.00 hrs, dt=0.05 hrs, 1421 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment S01: S01 Runoff Area=184.155 ac 0.74% Impervious Runoff Depth=0.05"
Flow Length=1,941' Tc=39.5 min CN=49 Runoff=1.46 cfs 0.712 af

Subcatchment S02: S02 Runoff Area=157.929 ac 1.79% Impervious Runoff Depth=0.06"
Flow Length=2,628' Tc=24.1 min CN=50 Runoff=1.97 cfs 0.780 af

Subcatchment S03: S03 Runoff Area=83.513 ac 0.39% Impervious Runoff Depth=0.17"
Flow Length=2,187' Tc=89.4 min CN=56 Runoff=3.34 cfs 1.156 af

Subcatchment S04: S04 Runoff Area=130.514 ac 0.88% Impervious Runoff Depth=0.19"
Flow Length=4,429' Tc=428.4 min CN=57 Runoff=2.49 cfs 2.052 af

Subcatchment S04-Sub: S04-Sub Runoff Area=0.707 ac 81.61% Impervious Runoff Depth=1.89"
Flow Length=219' Tc=7.0 min CN=91 Runoff=2.25 cfs 0.111 af

Subcatchment S05: S05 Runoff Area=56.105 ac 0.95% Impervious Runoff Depth=0.53"
Flow Length=2,690' Tc=25.4 min CN=68 Runoff=23.46 cfs 2.461 af

Subcatchment S05-Sub: S05-Sub Runoff Area=18.335 ac 69.50% Impervious Runoff Depth=1.49"
Flow Length=779' Tc=17.4 min CN=86 Runoff=32.91 cfs 2.280 af

Subcatchment S06: S06 Runoff Area=13.695 ac 0.42% Impervious Runoff Depth=0.24"
Flow Length=1,071' Tc=18.1 min CN=59 Runoff=1.88 cfs 0.271 af

Subcatchment S07: S07 Runoff Area=20.432 ac 0.00% Impervious Runoff Depth=0.03"
Flow Length=1,073' Tc=26.6 min CN=48 Runoff=0.11 cfs 0.060 af

Subcatchment S08: S08 Runoff Area=58.666 ac 0.63% Impervious Runoff Depth=0.00"
Flow Length=1,871' Tc=32.2 min CN=43 Runoff=0.02 cfs 0.008 af

Subcatchment S09: S09 Runoff Area=46.961 ac 1.34% Impervious Runoff Depth=0.03"
Flow Length=2,350' Tc=46.0 min CN=47 Runoff=0.16 cfs 0.098 af

Subcatchment S10: S10 Runoff Area=132.656 ac 1.20% Impervious Runoff Depth=0.32"
Flow Length=3,210' Tc=57.4 min CN=62 Runoff=17.01 cfs 3.556 af

Subcatchment S11: S11 Runoff Area=123.100 ac 1.00% Impervious Runoff Depth=1.04"
Flow Length=3,503' Tc=20.4 min CN=79 Runoff=138.76 cfs 10.714 af

Subcatchment S12: S12 Runoff Area=199.616 ac 1.15% Impervious Runoff Depth=0.69"
Flow Length=4,996' Tc=108.8 min CN=72 Runoff=46.12 cfs 11.508 af

Subcatchment S13: S13 Runoff Area=116.440 ac 0.75% Impervious Runoff Depth=0.53"
Flow Length=3,702' Tc=65.5 min CN=68 Runoff=27.05 cfs 5.107 af

Subcatchment S14: S14 Runoff Area=12.075 ac 2.54% Impervious Runoff Depth=0.38"
Flow Length=885' Tc=19.3 min CN=64 Runoff=3.66 cfs 0.387 af

Link N: North to SBVR Inflow=147.47 cfs 27.716 af
Primary=147.47 cfs 27.716 af

Link NE: NorthEast to SBVR Inflow=3.31 cfs 1.492 af
Primary=3.31 cfs 1.492 af

Link NW: NorthWest to Vermillion R. Inflow=2.49 cfs 2.052 af
Primary=2.49 cfs 2.052 af

Link S: South to SBVR Inflow=54.67 cfs 10.002 af
Primary=54.67 cfs 10.002 af

Link S05_D: S05 Inflow=51.21 cfs 4.852 af
Primary=51.21 cfs 4.852 af

Total Runoff Area = 1,354.899 ac Runoff Volume = 41.262 af Average Runoff Depth = 0.37"
98.02% Pervious = 1,328.051 ac 1.98% Impervious = 26.848 ac

Summary for Subcatchment S01: S01

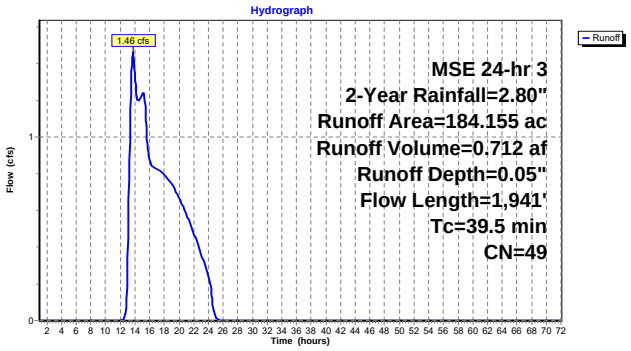
Runoff = 1.46 cfs @ 13.75 hrs, Volume= 0.712 af, Depth= 0.05"
Routed to Link NE : NorthEast to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	1.326	98	Access Road, HSG D
*	24.531	30	Array, HSG A
*	22.902	58	Array, HSG B
*	1.571	71	Array, HSG C
*	3.538	78	Array, HSG D
*	0.685	72	Gr-Road, HSG A
*	0.238	82	Gr-Road, HSG B
*	0.032	98	Inverter, HSG D
*	53.891	30	Meadow, HSG A
*	50.431	58	Meadow, HSG B
*	3.071	71	Meadow, HSG C
*	7.521	78	Meadow, HSG D
*	0.368	57	Residential, HSG A
*	6.997	67	Row Crop, HSG A
*	6.546	78	Row Crop, HSG B
*	0.509	89	Row Crop, HSG D
	184.155	49	Weighted Average
	182.797		99.26% Pervious Area
	1.357		0.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	109	0.1237	0.34		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
34.1	1,832	0.0164	0.90		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
39.5	1,941	Total			

Subcatchment S01: S01



Summary for Subcatchment S02: S02

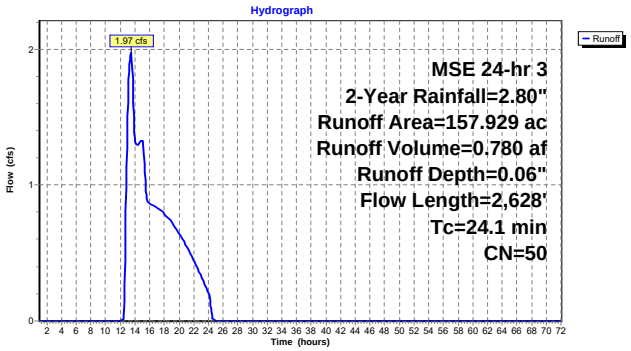
Runoff = 1.97 cfs @ 13.44 hrs, Volume= 0.780 af, Depth= 0.06"
Routed to Link NE : NorthEast to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	1.025	98	Access Road, HSG D
*	23.605	30	Array, HSG A
*	11.918	58	Array, HSG B
*	0.327	71	Array, HSG C
*	3.370	78	Array, HSG D
*	0.007	83	Forest Poor, HSG D
*	0.964	72	Gr-Road, HSG A
*	0.356	82	Gr-Road, HSG B
*	0.310	89	Gr-Road, HSG D
*	0.024	98	Inverter, HSG D
*	53.540	30	Meadow, HSG A
*	26.916	58	Meadow, HSG B
*	0.833	71	Meadow, HSG C
*	10.547	78	Meadow, HSG D
*	0.484	72	Residential, HSG B
*	11.115	67	Row Crop, HSG A
*	5.344	78	Row Crop, HSG B
*	0.140	85	Row Crop, HSG C
*	5.326	89	Row Crop, HSG D
*	1.779	99	Water, HSG D
	157.929	50	Weighted Average
	155.101		98.21% Pervious Area
	2.828		1.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	107	0.0756	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.80"
0.6	100	0.0835	2.60		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
6.9	591	0.0413	1.42		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.4	1,830	0.0059	12.95	4,040.29	**Channel Flow,** Area= 312.0 sf Perim= 50.0' r= 6.24' n= 0.030
24.1	2,628	Total			

Subcatchment S02: S02



Summary for Subcatchment S03: S03

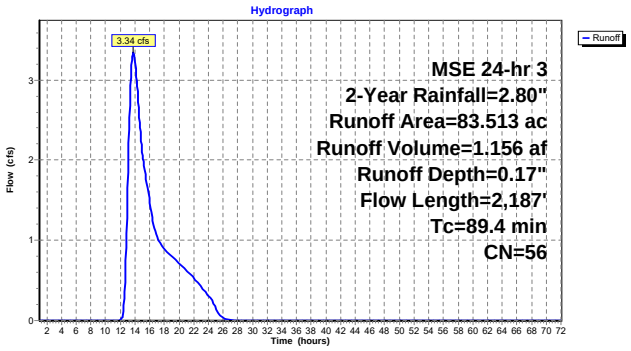
Runoff = 3.34 cfs @ 13.79 hrs, Volume= 1.156 af, Depth= 0.17"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	0.318	98	Access Road, HSG D
*	7.882	30	Array, HSG A
*	11.353	58	Array, HSG B
*	1.024	78	Array, HSG D
*	0.189	72	Gr-Road, HSG A
*	1.911	82	Gr-Road, HSG B
*	3.261	89	Gr-Road, HSG D
*	0.008	98	Inverter, HSG D
*	16.773	30	Meadow, HSG A
*	23.515	58	Meadow, HSG B
*	2.221	78	Meadow, HSG D
*	0.001	72	Residential, HSG B
*	4.329	67	Row Crop, HSG A
*	5.586	78	Row Crop, HSG B
*	5.142	89	Row Crop, HSG D
	83.513	56	Weighted Average
	83.187		99.61% Pervious Area
	0.326		0.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	108	0.0425	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
6.6	596	0.0456	1.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
74.6	1,483	0.0014	0.33		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
89.4	2,187	Total			

Subcatchment S03: S03



Summary for Subcatchment S04: S04

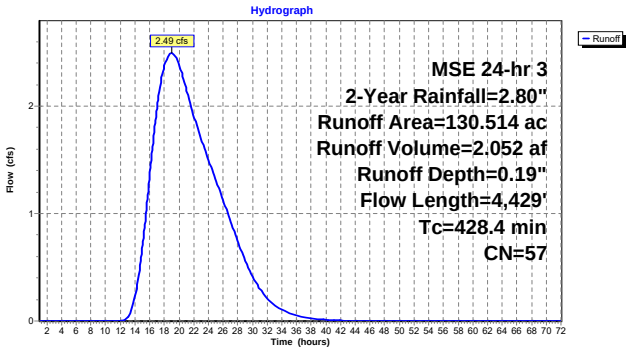
Runoff = 2.49 cfs @ 19.03 hrs, Volume= 2.052 af, Depth= 0.19"
Routed to Link NW : NorthWest to Vermillion R.

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	1.117	98	Access Road, HSG D
*	7.113	30	Array, HSG A
*	29.473	58	Array, HSG B
*	2.855	78	Array, HSG D
*	0.737	72	Gr-Road, HSG A
*	0.606	82	Gr-Road, HSG B
*	0.915	89	Gr-Road, HSG D
*	0.028	98	Inverter, HSG D
*	14.042	30	Meadow, HSG A
*	58.392	58	Meadow, HSG B
*	7.452	78	Meadow, HSG D
*	0.076	57	Residential, HSG A
*	1.578	67	Row Crop, HSG A
*	3.112	78	Row Crop, HSG B
*	3.018	89	Row Crop, HSG D
	130.514	57	Weighted Average
	129.369		99.12% Pervious Area
	1.145		0.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0260	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
2.1	336	0.1384	2.60		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
416.7	3,884	0.0003	0.16		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
0.2	110	0.0073	8.38	326.77	**Channel Flow,** Area= 39.0 sf Perim= 14.0' r= 2.79' n= 0.030
428.4	4,429	Total			

Subcatchment S04: S04



Summary for Subcatchment S04-Sub: S04-Sub

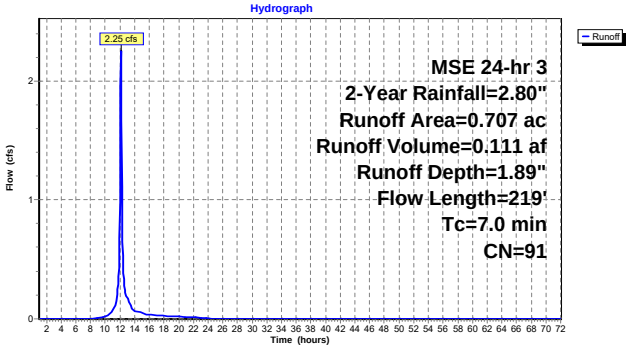
Runoff = 2.25 cfs @ 12.14 hrs, Volume= 0.111 af, Depth= 1.89"
Routed to Link S05_D : S05

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	0.130	58	Meadow, HSG B
*	0.577	98	Substation, HSG D
	0.707	91	Weighted Average
	0.130		18.39% Pervious Area
	0.577		81.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	102	0.0009	0.37		**Sheet Flow,** Smooth Surfaces n= 0.011 P2= 2.80"
2.4	116	0.0026	0.82		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
7.0	219	Total			

Subcatchment S04-Sub: S04-Sub



Summary for Subcatchment S05: S05

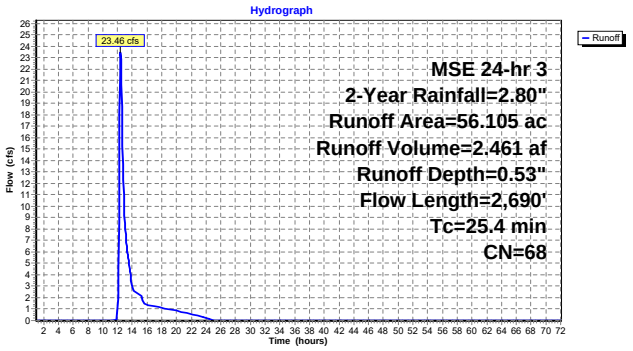
Runoff = 23.46 cfs @ 12.43 hrs, Volume= 2.461 af, Depth= 0.53"
Routed to Link S05_D : S05

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	0.531	98	Access Road, HSG D
*	1.573	30	Array, HSG A
*	6.545	58	Array, HSG B
*	1.929	78	Array, HSG D
*	0.624	72	Gr-Road, HSG A
*	1.793	82	Gr-Road, HSG B
*	0.773	89	Gr-Road, HSG D
*	0.004	98	Inverter, HSG D
*	3.434	30	Meadow, HSG A
*	14.529	58	Meadow, HSG B
*	5.640	78	Meadow, HSG D
*	0.029	57	Residential, HSG A
*	0.057	86	Residential, HSG D
*	1.908	67	Row Crop, HSG A
*	7.306	78	Row Crop, HSG B
*	9.430	89	Row Crop, HSG D
	56.105	68	Weighted Average
	55.570		99.05% Pervious Area
	0.535		0.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.0560	0.24		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
5.5	477	0.0425	1.44		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.0	664	0.0236	1.38		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
5.0	1,449	0.0077	4.81	67.27	**Channel Flow,** Area= 14.0 sf Perim= 12.0' r= 1.17' n= 0.030
25.4	2,690	Total			

Subcatchment S05: S05



Summary for Subcatchment S05-Sub: S05-Sub

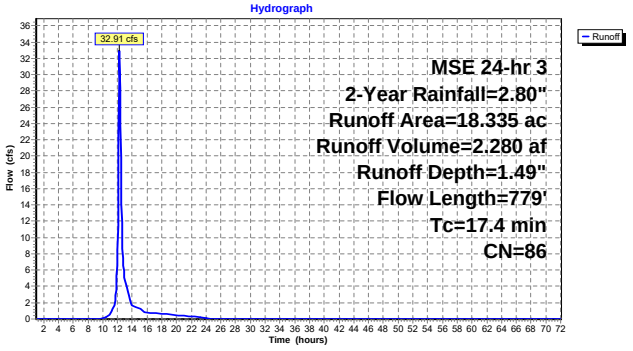
Runoff = 32.91 cfs @ 12.27 hrs, Volume= 2.280 af, Depth= 1.49"
Routed to Link S05_D : S05

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	1.175	98	Access Road, HSG D
*	0.413	30	Array, HSG A
*	0.221	58	Array, HSG B
*	0.939	30	Meadow, HSG A
*	2.044	58	Meadow, HSG B
*	0.129	98	O&M, HSG D
*	0.227	67	Row Crop, HSG A
*	1.695	78	Row Crop, HSG B
*	0.054	89	Row Crop, HSG D
*	5.444	98	Substation, HSG D
*	5.994	98	Switchyard, HSG D
	18.335	86	Weighted Average
	5.593		30.50% Pervious Area
	12.742		69.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	79	0.0260	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
9.6	700	0.0300	1.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.4	779	Total			

Subcatchment S05-Sub: S05-Sub



Summary for Subcatchment S06: S06

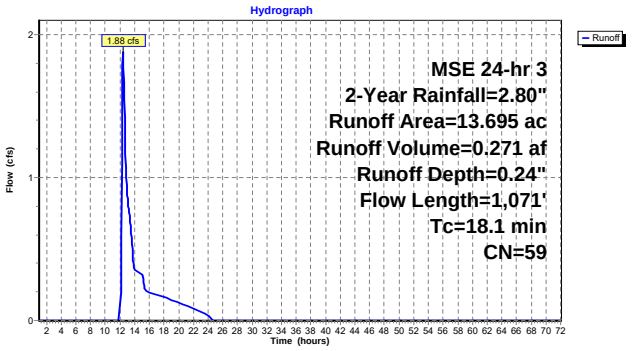
Runoff = 1.88 cfs @ 12.41 hrs, Volume= 0.271 af, Depth= 0.24"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	0.058	98	Access Road, HSG D
*	0.966	30	Array, HSG A
*	1.776	58	Array, HSG B
*	0.000	78	Array, HSG D
*	0.146	72	Gr-Road, HSG A
*	0.547	82	Gr-Road, HSG B
*	0.164	89	Gr-Road, HSG D
*	2.133	30	Meadow, HSG A
*	3.943	58	Meadow, HSG B
*	0.046	78	Meadow, HSG D
*	1.415	67	Row Crop, HSG A
*	1.430	78	Row Crop, HSG B
*	1.070	89	Row Crop, HSG D
	13.695	59	Weighted Average
	13.637		99.58% Pervious Area
	0.058		0.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	100	0.0830	0.28		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
6.8	579	0.0417	1.43		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
5.4	392	0.0179	1.20		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
18.1	1,071	Total			

Subcatchment S06: S06



Summary for Subcatchment S07: S07

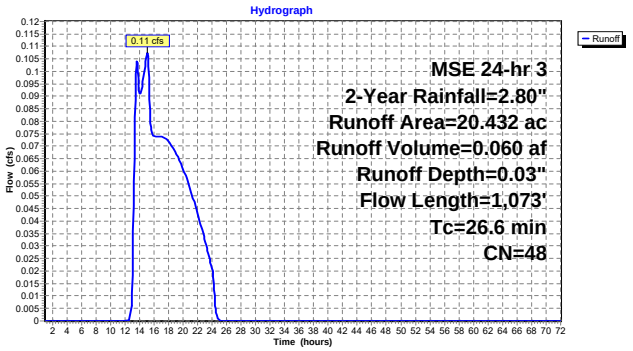
Runoff = 0.11 cfs @ 15.10 hrs, Volume= 0.060 af, Depth= 0.03"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	3.956	30	Array, HSG A
*	0.278	58	Array, HSG B
*	0.272	78	Array, HSG D
*	0.256	72	Gr-Road, HSG A
*	0.093	82	Gr-Road, HSG B
*	0.067	89	Gr-Road, HSG D
*	8.102	30	Meadow, HSG A
*	0.555	58	Meadow, HSG B
*	1.369	78	Meadow, HSG D
*	3.330	67	Row Crop, HSG A
*	0.957	78	Row Crop, HSG B
*	1.199	89	Row Crop, HSG D
	20.432	48	Weighted Average
	20.432		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.9	100	0.0180	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
12.9	773	0.0204	1.00		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.8	200	0.0170	1.17		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
26.6	1,073	Total			

Subcatchment S07: S07



Summary for Subcatchment S08: S08

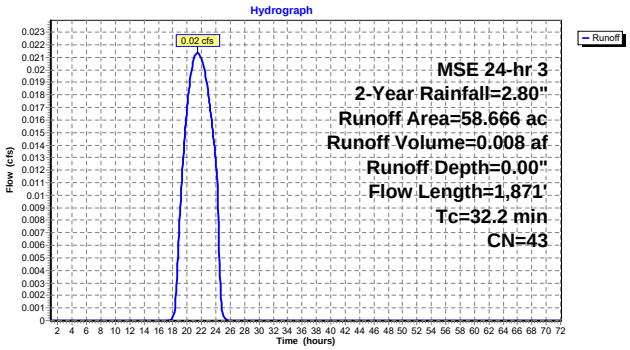
Runoff = 0.02 cfs @ 21.49 hrs, Volume= 0.008 af, Depth= 0.00"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	0.357	98	Access Road, HSG D
*	10.463	30	Array, HSG A
*	1.768	58	Array, HSG B
*	0.359	30	Forest Good, HSG A
*	0.287	55	Forest Good, HSG B
*	0.131	45	Forest Poor, HSG A
*	0.880	72	Gr-Road, HSG A
*	0.458	82	Gr-Road, HSG B
*	0.012	98	Inverter, HSG D
*	27.399	30	Meadow, HSG A
*	4.979	58	Meadow, HSG B
*	0.044	57	Residential, HSG A
*	0.076	72	Residential, HSG B
*	6.187	67	Row Crop, HSG A
*	5.265	78	Row Crop, HSG B
	58.666	43	Weighted Average
	58.296		99.37% Pervious Area
	0.369		0.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	100	0.0530	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
8.6	641	0.0315	1.24		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.5	1,130	0.0162	1.15		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
32.2	1,871	Total			

Subcatchment S08: S08



Summary for Subcatchment S09: S09

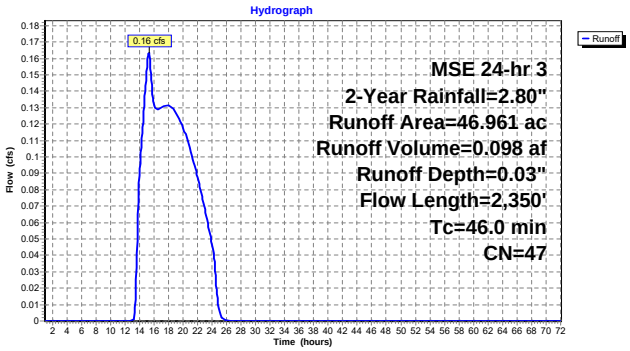
Runoff = 0.16 cfs @ 15.30 hrs, Volume= 0.098 af, Depth= 0.03"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	0.625	98	Access Road, HSG D
*	6.847	30	Array, HSG A
*	6.018	58	Array, HSG B
*	0.395	71	Array, HSG C
*	0.434	72	Gr-Road, HSG A
*	0.006	82	Gr-Road, HSG B
*	0.004	98	Inverter, HSG D
*	14.877	30	Meadow, HSG A
*	12.046	58	Meadow, HSG B
*	1.086	71	Meadow, HSG C
*	2.823	67	Row Crop, HSG A
*	1.563	78	Row Crop, HSG B
*	0.239	85	Row Crop, HSG C
	46.961	47	Weighted Average
	46.333		98.66% Pervious Area
	0.628		1.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0350	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
37.6	2,250	0.0202	1.00		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
46.0	2,350	Total			

Subcatchment S09: S09



Summary for Subcatchment S10: S10

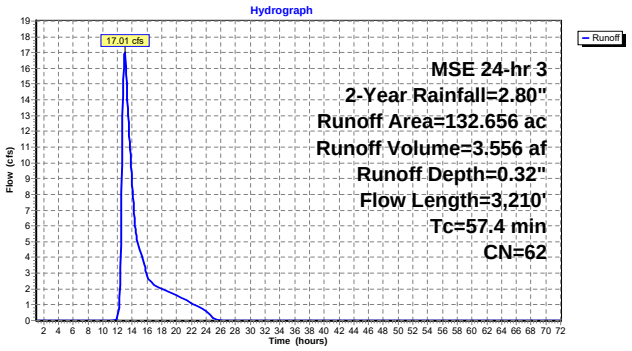
Runoff = 17.01 cfs @ 13.00 hrs, Volume= 3.556 af, Depth= 0.32"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	1.583	98	Access Road, HSG D
*	10.237	30	Array, HSG A
*	7.255	58	Array, HSG B
*	0.009	78	Array, HSG D
*	1.687	72	Gr-Road, HSG A
*	2.288	82	Gr-Road, HSG B
*	0.233	89	Gr-Road, HSG D
*	0.008	98	Inverter, HSG D
*	25.120	30	Meadow, HSG A
*	20.359	58	Meadow, HSG B
*	0.319	78	Meadow, HSG D
*	0.131	83	Pav-Road, HSG A
*	0.603	89	Pav-Road, HSG B
*	0.133	57	Residential, HSG A
*	1.221	77	Residential-Med, HSG A
*	0.160	85	Residential-Med, HSG B
*	21.812	67	Row Crop, HSG A
*	13.357	78	Row Crop, HSG B
*	26.142	89	Row Crop, HSG D
	132.656	62	Weighted Average
	131.066		98.80% Pervious Area
	1.590		1.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	100	0.0690	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
34.8	1,724	0.0139	0.82		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.9	456	0.0116	0.97		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
8.3	930	0.0012	1.86	66.90	**Channel Flow,** Area= 36.0 sf Perim= 30.9' r= 1.16' n= 0.030
57.4	3,210	Total			

Subcatchment S10: S10



Summary for Subcatchment S11: S11

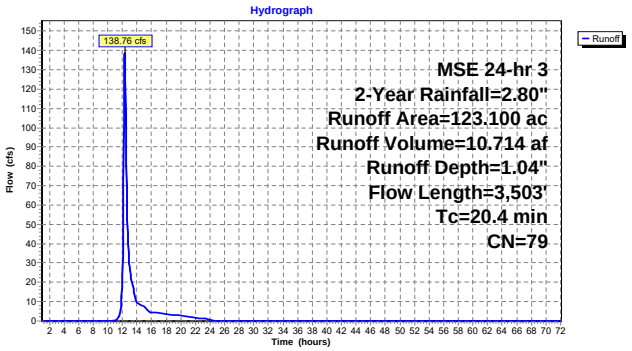
Runoff = 138.76 cfs @ 12.32 hrs, Volume= 10.714 af, Depth= 1.04"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	1.219	98	Access Road, HSG D
*	0.657	30	Array, HSG A
*	3.013	58	Array, HSG B
*	9.016	78	Array, HSG D
*	2.953	83	Forest Poor, HSG D
*	1.907	82	Gr-Road, HSG B
*	2.954	89	Gr-Road, HSG D
*	0.008	98	Inverter, HSG D
*	1.747	30	Meadow, HSG A
*	8.918	58	Meadow, HSG B
*	34.440	78	Meadow, HSG D
*	0.119	72	Residential, HSG B
*	0.027	86	Residential, HSG D
*	0.667	85	Residential-Med, HSG B
*	0.857	67	Row Crop, HSG A
*	13.635	78	Row Crop, HSG B
*	40.965	89	Row Crop, HSG D
	123.100	79	Weighted Average
	121.873		99.00% Pervious Area
	1.227		1.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	100	0.0280	1.47		**Sheet Flow,** Smooth Surfaces n= 0.011 P2= 2.80"
12.7	1,150	0.0281	1.51		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
6.6	2,253	0.0040	5.67	589.90	**Channel Flow,** Area= 104.0 sf Perim= 43.0' r= 2.42' n= 0.030
20.4	3,503	Total			

Subcatchment S11: S11



Summary for Subcatchment S12: S12

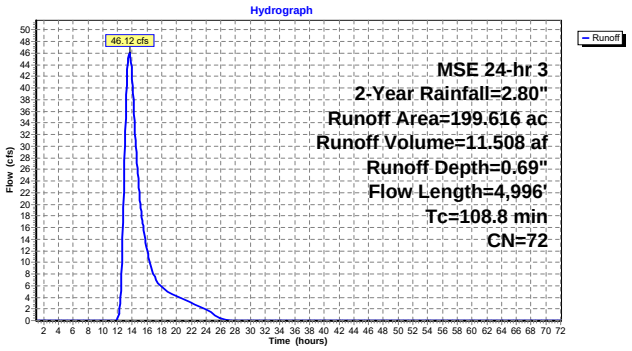
Runoff = 46.12 cfs @ 13.64 hrs, Volume= 11.508 af, Depth= 0.69"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	2.266	98	Access Road, HSG D
*	6.478	30	Array, HSG A
*	5.369	58	Array, HSG B
*	18.012	78	Array, HSG D
*	1.596	82	Gr-Road, HSG B
*	2.208	89	Gr-Road, HSG D
*	0.020	98	Inverter, HSG D
*	18.777	30	Meadow, HSG A
*	12.457	58	Meadow, HSG B
*	84.696	78	Meadow, HSG D
*	1.215	72	Residential, HSG B
*	0.222	86	Residential, HSG D
*	5.074	67	Row Crop, HSG A
*	7.117	78	Row Crop, HSG B
*	34.109	89	Row Crop, HSG D
	199.616	72	Weighted Average
	197.330		98.85% Pervious Area
	2.286		1.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	100	0.0460	1.80		**Sheet Flow,** Smooth Surfaces n= 0.011 P2= 2.80"
11.0	794	0.0177	1.20		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
91.9	3,725	0.0093	0.68		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
5.0	377	0.0005	1.26	45.43	**Channel Flow,** Area= 36.0 sf Perim= 30.9' r= 1.16' n= 0.030
108.8	4,996	Total			

Subcatchment S12: S12



Summary for Subcatchment S13: S13

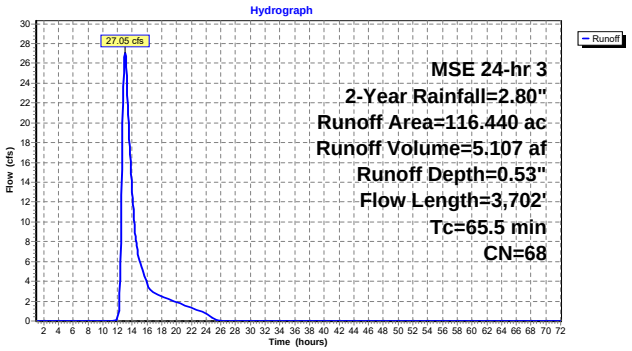
Runoff = 27.05 cfs @ 13.04 hrs, Volume= 5.107 af, Depth= 0.53"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	0.859	98	Access Road, HSG D
*	3.879	30	Array, HSG A
*	4.758	58	Array, HSG B
*	1.748	71	Array, HSG C
*	5.439	78	Array, HSG D
*	0.049	45	Forest Poor, HSG A
*	0.030	83	Forest Poor, HSG D
*	0.446	72	Gr-Road, HSG A
*	0.132	82	Gr-Road, HSG B
*	0.324	89	Gr-Road, HSG D
*	0.012	98	Inverter, HSG D
*	15.535	30	Meadow, HSG A
*	11.173	58	Meadow, HSG B
*	3.685	71	Meadow, HSG C
*	48.688	78	Meadow, HSG D
*	5.858	67	Row Crop, HSG A
*	2.371	78	Row Crop, HSG B
*	11.453	89	Row Crop, HSG D
	116.440	68	Weighted Average
	115.569		99.25% Pervious Area
	0.871		0.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	100	0.0390	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
51.1	2,697	0.0158	0.88		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.4	905	0.0018	2.34	84.24	**Channel Flow,** Area= 36.0 sf Perim= 30.9' r= 1.16' n= 0.030
65.5	3,702	Total			

Subcatchment S13: S13



Summary for Subcatchment S14: S14

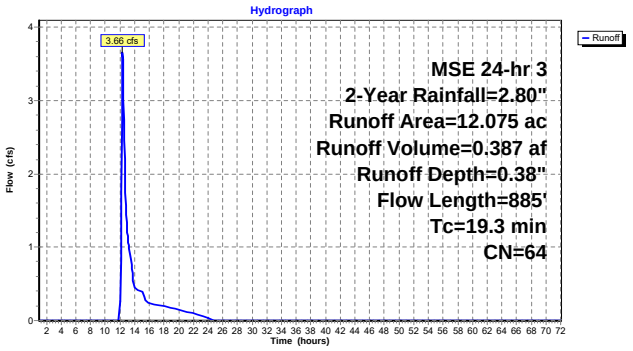
Runoff = 3.66 cfs @ 12.36 hrs, Volume= 0.387 af, Depth= 0.38"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.80"

	Area (ac)	CN	Description
*	0.307	98	Access Road, HSG D
*	0.497	30	Array, HSG A
*	0.869	58	Array, HSG B
*	0.033	71	Array, HSG C
*	0.690	78	Array, HSG D
*	0.105	55	Forest Good, HSG B
*	0.021	45	Forest Poor, HSG A
*	0.808	66	Forest Poor, HSG B
*	0.432	82	Gr-Road, HSG B
*	1.090	30	Meadow, HSG A
*	3.360	58	Meadow, HSG B
*	0.060	71	Meadow, HSG C
*	1.508	78	Meadow, HSG D
*	0.101	72	Residential, HSG B
*	0.103	67	Row Crop, HSG A
*	1.908	78	Row Crop, HSG B
*	0.184	89	Row Crop, HSG D
	12.075	64	Weighted Average
	11.768		97.46% Pervious Area
	0.307		2.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0440	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
11.7	785	0.0257	1.12		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
19.3	885	Total			

Subcatchment S14: S14

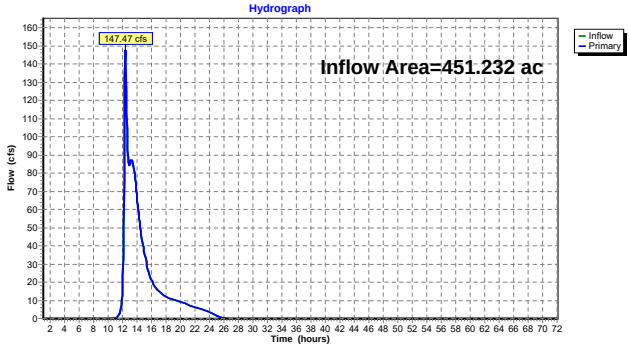


Summary for Link N: North to SBVR

Inflow Area = 451.232 ac, 1.04% Impervious, Inflow Depth = 0.74" for 2-Year event
Inflow = 147.47 cfs @ 12.33 hrs, Volume= 27.716 af
Primary = 147.47 cfs @ 12.33 hrs, Volume= 27.716 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link N: North to SBVR

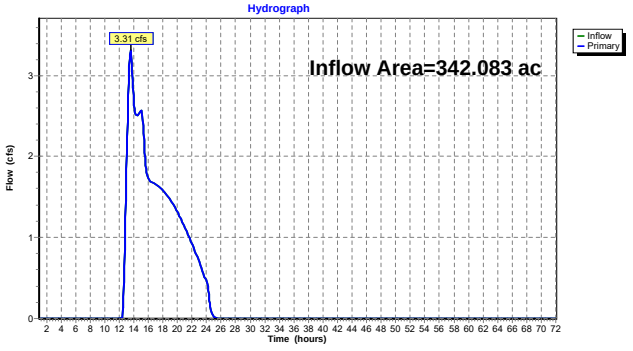


Summary for Link NE: NorthEast to SBVR

Inflow Area = 342.083 ac, 1.22% Impervious, Inflow Depth = 0.05" for 2-Year event
Inflow = 3.31 cfs @ 13.59 hrs, Volume= 1.492 af
Primary = 3.31 cfs @ 13.59 hrs, Volume= 1.492 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link NE: NorthEast to SBVR

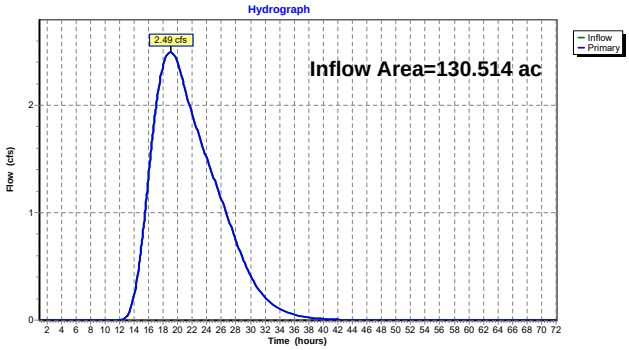


Summary for Link NW: NorthWest to Vermillion R.

Inflow Area = 130.514 ac, 0.88% Impervious, Inflow Depth = 0.19" for 2-Year event
Inflow = 2.49 cfs @ 19.03 hrs, Volume= 2.052 af
Primary = 2.49 cfs @ 19.03 hrs, Volume= 2.052 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link NW: NorthWest to Vermillion R.

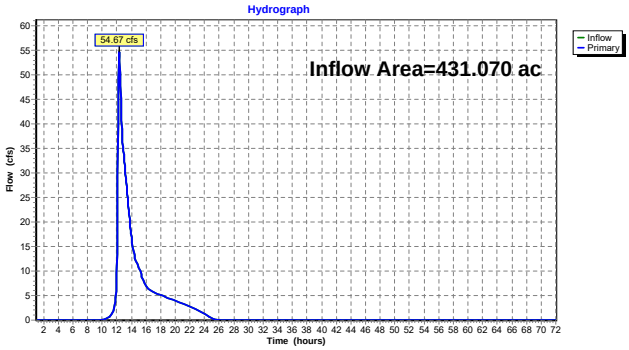


Summary for Link S: South to SBVR

Inflow Area = 431.070 ac, 3.90% Impervious, Inflow Depth = 0.28" for 2-Year event
Inflow = 54.67 cfs @ 12.34 hrs, Volume= 10.002 af
Primary = 54.67 cfs @ 12.34 hrs, Volume= 10.002 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link S: South to SBVR

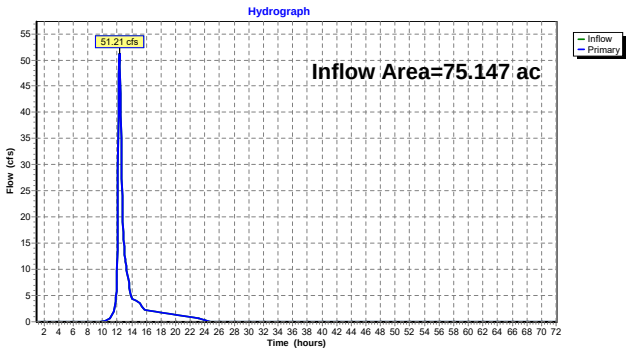


Summary for Link S05_D: S05

Inflow Area = 75.147 ac, 18.44% Impervious, Inflow Depth = 0.77" for 2-Year event
Inflow = 51.21 cfs @ 12.32 hrs, Volume= 4.852 af
Primary = 51.21 cfs @ 12.32 hrs, Volume= 4.852 af, Atten= 0%, Lag= 0.0 min
Routed to Link S : South to SBVR

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link S05_D: S05



Time span=1.00-72.00 hrs, dt=0.05 hrs, 1421 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment S01: S01 Runoff Area=184.155 ac 0.74% Impervious Runoff Depth=0.35"
Flow Length=1,941' Tc=39.5 min CN=49 Runoff=26.20 cfs 5.309 af

Subcatchment S02: S02 Runoff Area=157.929 ac 1.79% Impervious Runoff Depth=0.38"
Flow Length=2,628' Tc=24.1 min CN=50 Runoff=33.17 cfs 5.050 af

Subcatchment S03: S03 Runoff Area=83.513 ac 0.39% Impervious Runoff Depth=0.64"
Flow Length=2,187' Tc=89.4 min CN=56 Runoff=18.06 cfs 4.464 af

Subcatchment S04: S04 Runoff Area=130.514 ac 0.88% Impervious Runoff Depth=0.69"
Flow Length=4,429' Tc=428.4 min CN=57 Runoff=10.10 cfs 7.499 af

Subcatchment S04-Sub: S04-Sub Runoff Area=0.707 ac 81.61% Impervious Runoff Depth=3.17"
Flow Length=219' Tc=7.0 min CN=91 Runoff=3.68 cfs 0.187 af

Subcatchment S05: S05 Runoff Area=56.105 ac 0.95% Impervious Runoff Depth=1.31"
Flow Length=2,690' Tc=25.4 min CN=68 Runoff=67.95 cfs 6.113 af

Subcatchment S05-Sub: S05-Sub Runoff Area=18.335 ac 69.50% Impervious Runoff Depth=2.69"
Flow Length=779' Tc=17.4 min CN=86 Runoff=58.89 cfs 4.113 af

Subcatchment S06: S06 Runoff Area=13.695 ac 0.42% Impervious Runoff Depth=0.79"
Flow Length=1,071' Tc=18.1 min CN=59 Runoff=10.41 cfs 0.901 af

Subcatchment S07: S07 Runoff Area=20.432 ac 0.00% Impervious Runoff Depth=0.31"
Flow Length=1,073' Tc=26.6 min CN=48 Runoff=2.88 cfs 0.527 af

Subcatchment S08: S08 Runoff Area=58.666 ac 0.63% Impervious Runoff Depth=0.15"
Flow Length=1,871' Tc=32.2 min CN=43 Runoff=2.29 cfs 0.754 af

Subcatchment S09: S09 Runoff Area=46.961 ac 1.34% Impervious Runoff Depth=0.28"
Flow Length=2,350' Tc=46.0 min CN=47 Runoff=4.35 cfs 1.077 af

Subcatchment S10: S10 Runoff Area=132.656 ac 1.20% Impervious Runoff Depth=0.95"
Flow Length=3,210' Tc=57.4 min CN=62 Runoff=64.76 cfs 10.501 af

Subcatchment S11: S11 Runoff Area=123.100 ac 1.00% Impervious Runoff Depth=2.09"
Flow Length=3,503' Tc=20.4 min CN=79 Runoff=285.03 cfs 21.482 af

Subcatchment S12: S12 Runoff Area=199.616 ac 1.15% Impervious Runoff Depth=1.57"
Flow Length=4,996' Tc=108.8 min CN=72 Runoff=113.72 cfs 26.171 af

Subcatchment S13: S13 Runoff Area=116.440 ac 0.75% Impervious Runoff Depth=1.31"
Flow Length=3,702' Tc=65.5 min CN=68 Runoff=77.03 cfs 12.686 af

Subcatchment S14: S14 Runoff Area=12.075 ac 2.54% Impervious Runoff Depth=1.06"
Flow Length=885' Tc=19.3 min CN=64 Runoff=13.23 cfs 1.070 af

Link N: North to SBVR Inflow=324.07 cfs 61.410 af
Primary=324.07 cfs 61.410 af

Link NE: NorthEast to SBVR Inflow=53.67 cfs 10.358 af
Primary=53.67 cfs 10.358 af

Link NW: NorthWest to Vermillion R. Inflow=10.10 cfs 7.499 af
Primary=10.10 cfs 7.499 af

Link S: South to SBVR Inflow=146.92 cfs 28.637 af
Primary=146.92 cfs 28.637 af

Link S05_D: S05 Inflow=118.60 cfs 10.412 af
Primary=118.60 cfs 10.412 af

Total Runoff Area = 1,354.899 ac Runoff Volume = 107.904 af Average Runoff Depth = 0.96"
98.02% Pervious = 1,328.051 ac 1.98% Impervious = 26.848 ac

Summary for Subcatchment S01: S01

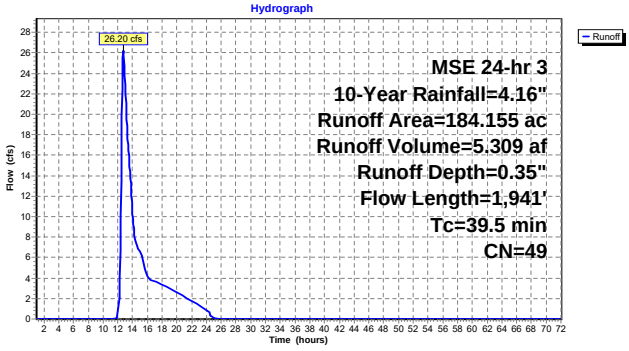
Runoff = 26.20 cfs @ 12.77 hrs, Volume= 5.309 af, Depth= 0.35"
Routed to Link NE : NorthEast to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	1.326	98	Access Road, HSG D
*	24.531	30	Array, HSG A
*	22.902	58	Array, HSG B
*	1.571	71	Array, HSG C
*	3.538	78	Array, HSG D
*	0.685	72	Gr-Road, HSG A
*	0.238	82	Gr-Road, HSG B
*	0.032	98	Inverter, HSG D
*	53.891	30	Meadow, HSG A
*	50.431	58	Meadow, HSG B
*	3.071	71	Meadow, HSG C
*	7.521	78	Meadow, HSG D
*	0.368	57	Residential, HSG A
*	6.997	67	Row Crop, HSG A
*	6.546	78	Row Crop, HSG B
*	0.509	89	Row Crop, HSG D
	184.155	49	Weighted Average
	182.797		99.26% Pervious Area
	1.357		0.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	109	0.1237	0.34		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
34.1	1,832	0.0164	0.90		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
39.5	1,941	Total			

Subcatchment S01: S01



Summary for Subcatchment S02: S02

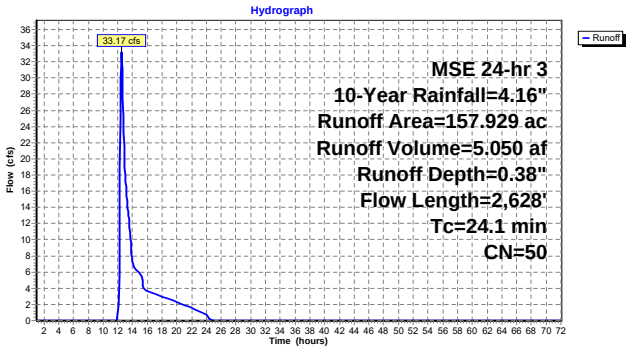
Runoff = 33.17 cfs @ 12.50 hrs, Volume= 5.050 af, Depth= 0.38"
Routed to Link NE : NorthEast to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	1.025	98	Access Road, HSG D
*	23.605	30	Array, HSG A
*	11.918	58	Array, HSG B
*	0.327	71	Array, HSG C
*	3.370	78	Array, HSG D
*	0.007	83	Forest Poor, HSG D
*	0.964	72	Gr-Road, HSG A
*	0.356	82	Gr-Road, HSG B
*	0.310	89	Gr-Road, HSG D
*	0.024	98	Inverter, HSG D
*	53.540	30	Meadow, HSG A
*	26.916	58	Meadow, HSG B
*	0.833	71	Meadow, HSG C
*	10.547	78	Meadow, HSG D
*	0.484	72	Residential, HSG B
*	11.115	67	Row Crop, HSG A
*	5.344	78	Row Crop, HSG B
*	0.140	85	Row Crop, HSG C
*	5.326	89	Row Crop, HSG D
*	1.779	99	Water, HSG D
	157.929	50	Weighted Average
	155.101		98.21% Pervious Area
	2.828		1.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	107	0.0756	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.80"
0.6	100	0.0835	2.60		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
6.9	591	0.0413	1.42		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.4	1,830	0.0059	12.95	4,040.29	**Channel Flow,** Area= 312.0 sf Perim= 50.0' r= 6.24' n= 0.030
24.1	2,628	Total			

Subcatchment S02: S02



Summary for Subcatchment S03: S03

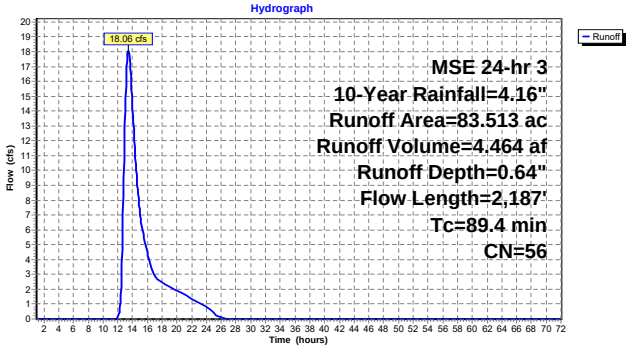
Runoff = 18.06 cfs @ 13.43 hrs, Volume= 4.464 af, Depth= 0.64"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	0.318	98	Access Road, HSG D
*	7.882	30	Array, HSG A
*	11.353	58	Array, HSG B
*	1.024	78	Array, HSG D
*	0.189	72	Gr-Road, HSG A
*	1.911	82	Gr-Road, HSG B
*	3.261	89	Gr-Road, HSG D
*	0.008	98	Inverter, HSG D
*	16.773	30	Meadow, HSG A
*	23.515	58	Meadow, HSG B
*	2.221	78	Meadow, HSG D
*	0.001	72	Residential, HSG B
*	4.329	67	Row Crop, HSG A
*	5.586	78	Row Crop, HSG B
*	5.142	89	Row Crop, HSG D
	83.513	56	Weighted Average
	83.187		99.61% Pervious Area
	0.326		0.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	108	0.0425	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
6.6	596	0.0456	1.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
74.6	1,483	0.0014	0.33		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
89.4	2,187	Total			

Subcatchment S03: S03



Summary for Subcatchment S04: S04

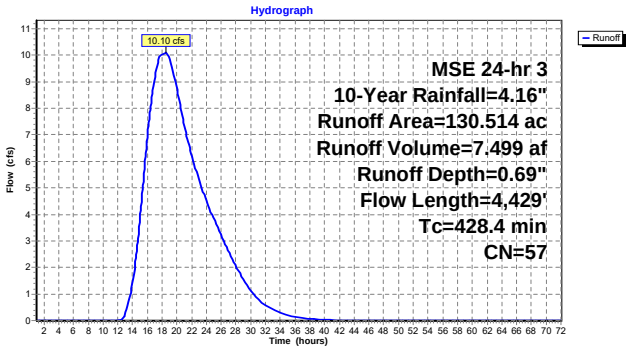
Runoff = 10.10 cfs @ 18.55 hrs, Volume= 7.499 af, Depth= 0.69"
Routed to Link NW : NorthWest to Vermillion R.

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	1.117	98	Access Road, HSG D
*	7.113	30	Array, HSG A
*	29.473	58	Array, HSG B
*	2.855	78	Array, HSG D
*	0.737	72	Gr-Road, HSG A
*	0.606	82	Gr-Road, HSG B
*	0.915	89	Gr-Road, HSG D
*	0.028	98	Inverter, HSG D
*	14.042	30	Meadow, HSG A
*	58.392	58	Meadow, HSG B
*	7.452	78	Meadow, HSG D
*	0.076	57	Residential, HSG A
*	1.578	67	Row Crop, HSG A
*	3.112	78	Row Crop, HSG B
*	3.018	89	Row Crop, HSG D
	130.514	57	Weighted Average
	129.369		99.12% Pervious Area
	1.145		0.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0260	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
2.1	336	0.1384	2.60		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
416.7	3,884	0.0003	0.16		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
0.2	110	0.0073	8.38	326.77	**Channel Flow,** Area= 39.0 sf Perim= 14.0' r= 2.79' n= 0.030
428.4	4,429	Total			

Subcatchment S04: S04



Summary for Subcatchment S04-Sub: S04-Sub

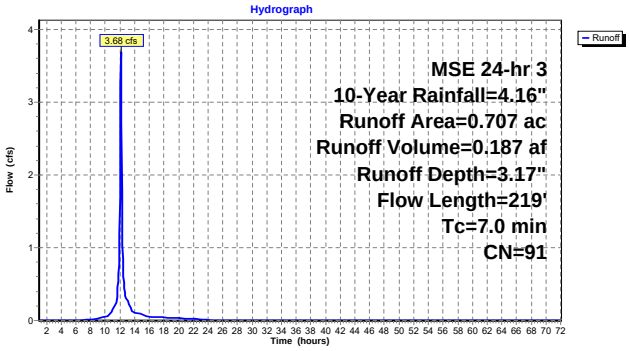
Runoff = 3.68 cfs @ 12.14 hrs, Volume= 0.187 af, Depth= 3.17"
Routed to Link S05_D : S05

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	0.130	58	Meadow, HSG B
*	0.577	98	Substation, HSG D
	0.707	91	Weighted Average
	0.130		18.39% Pervious Area
	0.577		81.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	102	0.0009	0.37		**Sheet Flow,** Smooth Surfaces n= 0.011 P2= 2.80"
2.4	116	0.0026	0.82		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
7.0	219	Total			

Subcatchment S04-Sub: S04-Sub



Summary for Subcatchment S05: S05

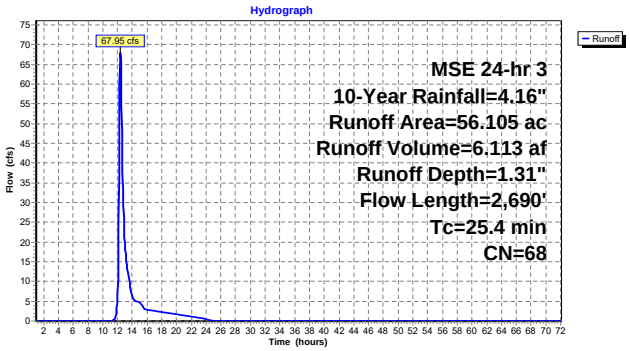
Runoff = 67.95 cfs @ 12.40 hrs, Volume= 6.113 af, Depth= 1.31"
Routed to Link S05_D : S05

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	0.531	98	Access Road, HSG D
*	1.573	30	Array, HSG A
*	6.545	58	Array, HSG B
*	1.929	78	Array, HSG D
*	0.624	72	Gr-Road, HSG A
*	1.793	82	Gr-Road, HSG B
*	0.773	89	Gr-Road, HSG D
*	0.004	98	Inverter, HSG D
*	3.434	30	Meadow, HSG A
*	14.529	58	Meadow, HSG B
*	5.640	78	Meadow, HSG D
*	0.029	57	Residential, HSG A
*	0.057	86	Residential, HSG D
*	1.908	67	Row Crop, HSG A
*	7.306	78	Row Crop, HSG B
*	9.430	89	Row Crop, HSG D
	56.105	68	Weighted Average
	55.570		99.05% Pervious Area
	0.535		0.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.0560	0.24		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
5.5	477	0.0425	1.44		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.0	664	0.0236	1.38		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
5.0	1,449	0.0077	4.81	67.27	**Channel Flow,** Area= 14.0 sf Perim= 12.0' r= 1.17' n= 0.030
25.4	2,690	Total			

Subcatchment S05: S05



Summary for Subcatchment S05-Sub: S05-Sub

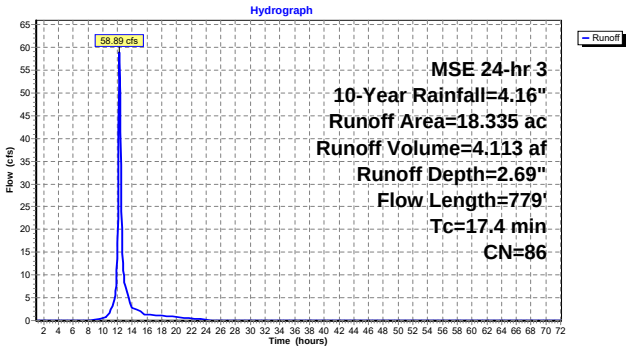
Runoff = 58.89 cfs @ 12.26 hrs, Volume= 4.113 af, Depth= 2.69"
Routed to Link S05_D : S05

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	1.175	98	Access Road, HSG D
*	0.413	30	Array, HSG A
*	0.221	58	Array, HSG B
*	0.939	30	Meadow, HSG A
*	2.044	58	Meadow, HSG B
*	0.129	98	O&M, HSG D
*	0.227	67	Row Crop, HSG A
*	1.695	78	Row Crop, HSG B
*	0.054	89	Row Crop, HSG D
*	5.444	98	Substation, HSG D
*	5.994	98	Switchyard, HSG D
	18.335	86	Weighted Average
	5.593		30.50% Pervious Area
	12.742		69.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	79	0.0260	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
9.6	700	0.0300	1.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.4	779	Total			

Subcatchment S05-Sub: S05-Sub



Summary for Subcatchment S06: S06

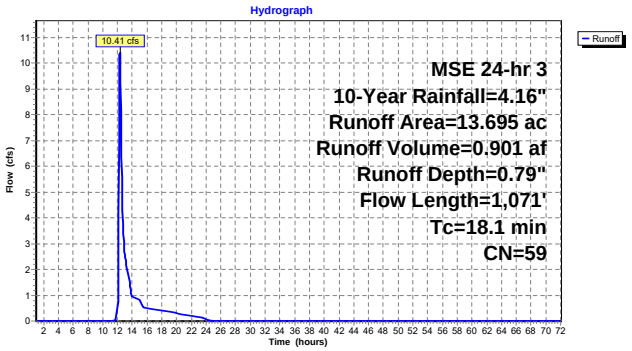
Runoff = 10.41 cfs @ 12.32 hrs, Volume= 0.901 af, Depth= 0.79"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	0.058	98	Access Road, HSG D
*	0.966	30	Array, HSG A
*	1.776	58	Array, HSG B
*	0.000	78	Array, HSG D
*	0.146	72	Gr-Road, HSG A
*	0.547	82	Gr-Road, HSG B
*	0.164	89	Gr-Road, HSG D
*	2.133	30	Meadow, HSG A
*	3.943	58	Meadow, HSG B
*	0.046	78	Meadow, HSG D
*	1.415	67	Row Crop, HSG A
*	1.430	78	Row Crop, HSG B
*	1.070	89	Row Crop, HSG D
	13.695	59	Weighted Average
	13.637		99.58% Pervious Area
	0.058		0.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	100	0.0830	0.28		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
6.8	579	0.0417	1.43		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
5.4	392	0.0179	1.20		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
18.1	1,071	Total			

Subcatchment S06: S06



Summary for Subcatchment S07: S07

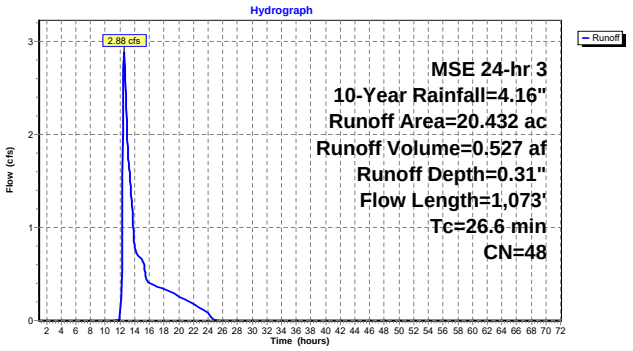
Runoff = 2.88 cfs @ 12.59 hrs, Volume= 0.527 af, Depth= 0.31"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	3.956	30	Array, HSG A
*	0.278	58	Array, HSG B
*	0.272	78	Array, HSG D
*	0.256	72	Gr-Road, HSG A
*	0.093	82	Gr-Road, HSG B
*	0.067	89	Gr-Road, HSG D
*	8.102	30	Meadow, HSG A
*	0.555	58	Meadow, HSG B
*	1.369	78	Meadow, HSG D
*	3.330	67	Row Crop, HSG A
*	0.957	78	Row Crop, HSG B
*	1.199	89	Row Crop, HSG D
	20.432	48	Weighted Average
	20.432		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.9	100	0.0180	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
12.9	773	0.0204	1.00		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.8	200	0.0170	1.17		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
26.6	1,073	Total			

Subcatchment S07: S07



Summary for Subcatchment S08: S08

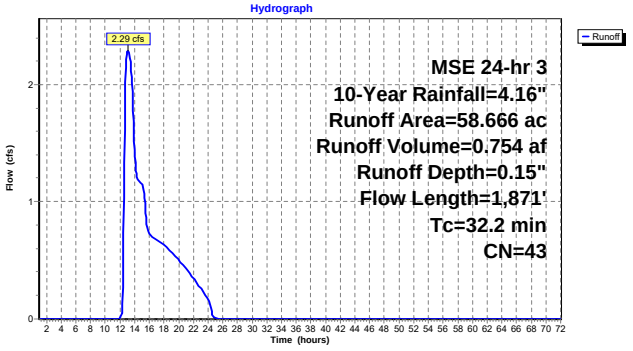
Runoff = 2.29 cfs @ 13.06 hrs, Volume= 0.754 af, Depth= 0.15"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	0.357	98	Access Road, HSG D
*	10.463	30	Array, HSG A
*	1.768	58	Array, HSG B
*	0.359	30	Forest Good, HSG A
*	0.287	55	Forest Good, HSG B
*	0.131	45	Forest Poor, HSG A
*	0.880	72	Gr-Road, HSG A
*	0.458	82	Gr-Road, HSG B
*	0.012	98	Inverter, HSG D
*	27.399	30	Meadow, HSG A
*	4.979	58	Meadow, HSG B
*	0.044	57	Residential, HSG A
*	0.076	72	Residential, HSG B
*	6.187	67	Row Crop, HSG A
*	5.265	78	Row Crop, HSG B
	58.666	43	Weighted Average
	58.296		99.37% Pervious Area
	0.369		0.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	100	0.0530	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
8.6	641	0.0315	1.24		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.5	1,130	0.0162	1.15		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
32.2	1,871	Total			

Subcatchment S08: S08



Summary for Subcatchment S09: S09

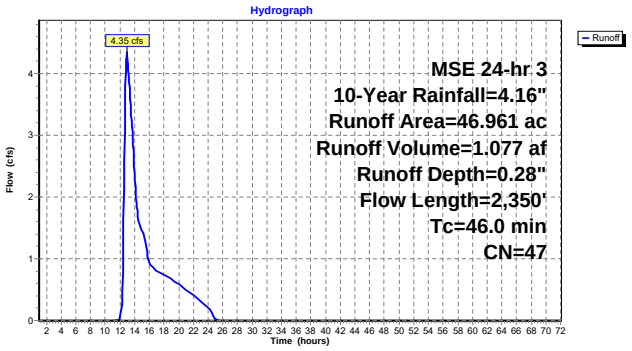
Runoff = 4.35 cfs @ 12.94 hrs, Volume= 1.077 af, Depth= 0.28"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	0.625	98	Access Road, HSG D
*	6.847	30	Array, HSG A
*	6.018	58	Array, HSG B
*	0.395	71	Array, HSG C
*	0.434	72	Gr-Road, HSG A
*	0.006	82	Gr-Road, HSG B
*	0.004	98	Inverter, HSG D
*	14.877	30	Meadow, HSG A
*	12.046	58	Meadow, HSG B
*	1.086	71	Meadow, HSG C
*	2.823	67	Row Crop, HSG A
*	1.563	78	Row Crop, HSG B
*	0.239	85	Row Crop, HSG C
	46.961	47	Weighted Average
	46.333		98.66% Pervious Area
	0.628		1.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0350	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
37.6	2,250	0.0202	1.00		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
46.0	2,350	Total			

Subcatchment S09: S09



Summary for Subcatchment S10: S10

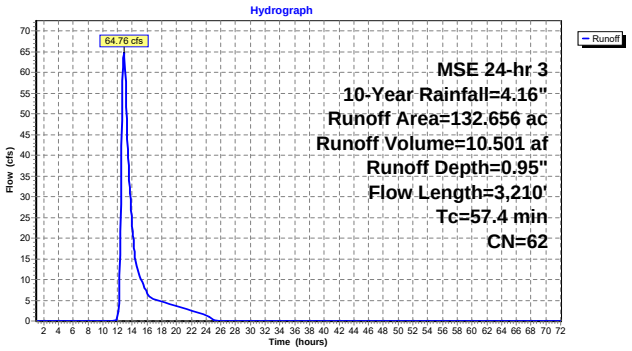
Runoff = 64.76 cfs @ 12.88 hrs, Volume= 10.501 af, Depth= 0.95"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	1.583	98	Access Road, HSG D
*	10.237	30	Array, HSG A
*	7.255	58	Array, HSG B
*	0.009	78	Array, HSG D
*	1.687	72	Gr-Road, HSG A
*	2.288	82	Gr-Road, HSG B
*	0.233	89	Gr-Road, HSG D
*	0.008	98	Inverter, HSG D
*	25.120	30	Meadow, HSG A
*	20.359	58	Meadow, HSG B
*	0.319	78	Meadow, HSG D
*	0.131	83	Pav-Road, HSG A
*	0.603	89	Pav-Road, HSG B
*	0.133	57	Residential, HSG A
*	1.221	77	Residential-Med, HSG A
*	0.160	85	Residential-Med, HSG B
*	21.812	67	Row Crop, HSG A
*	13.357	78	Row Crop, HSG B
*	26.142	89	Row Crop, HSG D
	132.656	62	Weighted Average
	131.066		98.80% Pervious Area
	1.590		1.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	100	0.0690	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
34.8	1,724	0.0139	0.82		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.9	456	0.0116	0.97		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
8.3	930	0.0012	1.86	66.90	**Channel Flow,** Area= 36.0 sf Perim= 30.9' r= 1.16' n= 0.030
57.4	3,210	Total			

Subcatchment S10: S10



Summary for Subcatchment S11: S11

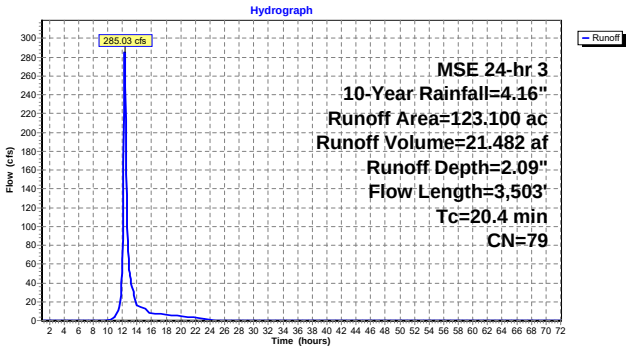
Runoff = 285.03 cfs @ 12.31 hrs, Volume= 21.482 af, Depth= 2.09"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	1.219	98	Access Road, HSG D
*	0.657	30	Array, HSG A
*	3.013	58	Array, HSG B
*	9.016	78	Array, HSG D
*	2.953	83	Forest Poor, HSG D
*	1.907	82	Gr-Road, HSG B
*	2.954	89	Gr-Road, HSG D
*	0.008	98	Inverter, HSG D
*	1.747	30	Meadow, HSG A
*	8.918	58	Meadow, HSG B
*	34.440	78	Meadow, HSG D
*	0.119	72	Residential, HSG B
*	0.027	86	Residential, HSG D
*	0.667	85	Residential-Med, HSG B
*	0.857	67	Row Crop, HSG A
*	13.635	78	Row Crop, HSG B
*	40.965	89	Row Crop, HSG D
	123.100	79	Weighted Average
	121.873		99.00% Pervious Area
	1.227		1.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	100	0.0280	1.47		**Sheet Flow,** Smooth Surfaces n= 0.011 P2= 2.80"
12.7	1,150	0.0281	1.51		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
6.6	2,253	0.0040	5.67	589.90	**Channel Flow,** Area= 104.0 sf Perim= 43.0' r= 2.42' n= 0.030
20.4	3,503	Total			

Subcatchment S11: S11



Summary for Subcatchment S12: S12

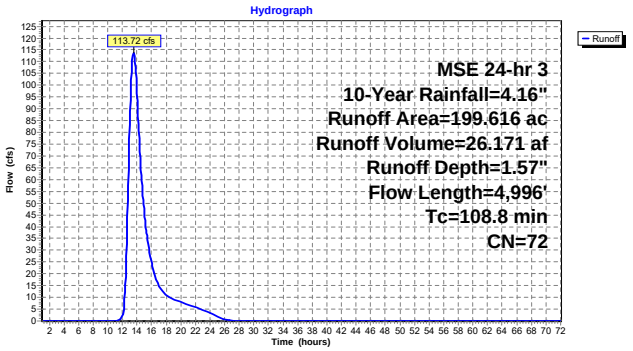
Runoff = 113.72 cfs @ 13.53 hrs, Volume= 26.171 af, Depth= 1.57"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	2.266	98	Access Road, HSG D
*	6.478	30	Array, HSG A
*	5.369	58	Array, HSG B
*	18.012	78	Array, HSG D
*	1.596	82	Gr-Road, HSG B
*	2.208	89	Gr-Road, HSG D
*	0.020	98	Inverter, HSG D
*	18.777	30	Meadow, HSG A
*	12.457	58	Meadow, HSG B
*	84.696	78	Meadow, HSG D
*	1.215	72	Residential, HSG B
*	0.222	86	Residential, HSG D
*	5.074	67	Row Crop, HSG A
*	7.117	78	Row Crop, HSG B
*	34.109	89	Row Crop, HSG D
	199.616	72	Weighted Average
	197.330		98.85% Pervious Area
	2.286		1.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	100	0.0460	1.80		**Sheet Flow,** Smooth Surfaces n= 0.011 P2= 2.80"
11.0	794	0.0177	1.20		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
91.9	3,725	0.0093	0.68		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
5.0	377	0.0005	1.26	45.43	**Channel Flow,** Area= 36.0 sf Perim= 30.9' r= 1.16' n= 0.030
108.8	4,996	Total			

Subcatchment S12: S12



Summary for Subcatchment S13: S13

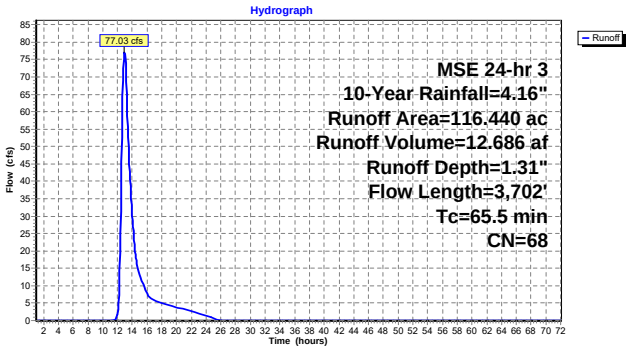
Runoff = 77.03 cfs @ 12.95 hrs, Volume= 12.686 af, Depth= 1.31"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	0.859	98	Access Road, HSG D
*	3.879	30	Array, HSG A
*	4.758	58	Array, HSG B
*	1.748	71	Array, HSG C
*	5.439	78	Array, HSG D
*	0.049	45	Forest Poor, HSG A
*	0.030	83	Forest Poor, HSG D
*	0.446	72	Gr-Road, HSG A
*	0.132	82	Gr-Road, HSG B
*	0.324	89	Gr-Road, HSG D
*	0.012	98	Inverter, HSG D
*	15.535	30	Meadow, HSG A
*	11.173	58	Meadow, HSG B
*	3.685	71	Meadow, HSG C
*	48.688	78	Meadow, HSG D
*	5.858	67	Row Crop, HSG A
*	2.371	78	Row Crop, HSG B
*	11.453	89	Row Crop, HSG D
	116.440	68	Weighted Average
	115.569		99.25% Pervious Area
	0.871		0.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	100	0.0390	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
51.1	2,697	0.0158	0.88		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.4	905	0.0018	2.34	84.24	**Channel Flow,** Area= 36.0 sf Perim= 30.9' r= 1.16' n= 0.030
65.5	3,702	Total			

Subcatchment S13: S13



Summary for Subcatchment S14: S14

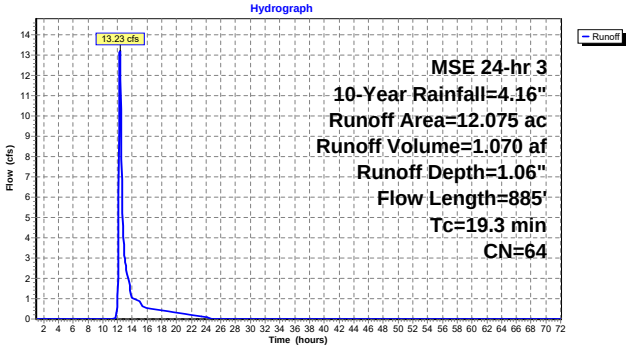
Runoff = 13.23 cfs @ 12.32 hrs, Volume= 1.070 af, Depth= 1.06"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=4.16"

	Area (ac)	CN	Description
*	0.307	98	Access Road, HSG D
*	0.497	30	Array, HSG A
*	0.869	58	Array, HSG B
*	0.033	71	Array, HSG C
*	0.690	78	Array, HSG D
*	0.105	55	Forest Good, HSG B
*	0.021	45	Forest Poor, HSG A
*	0.808	66	Forest Poor, HSG B
*	0.432	82	Gr-Road, HSG B
*	1.090	30	Meadow, HSG A
*	3.360	58	Meadow, HSG B
*	0.060	71	Meadow, HSG C
*	1.508	78	Meadow, HSG D
*	0.101	72	Residential, HSG B
*	0.103	67	Row Crop, HSG A
*	1.908	78	Row Crop, HSG B
*	0.184	89	Row Crop, HSG D
	12.075	64	Weighted Average
	11.768		97.46% Pervious Area
	0.307		2.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0440	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
11.7	785	0.0257	1.12		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
19.3	885	Total			

Subcatchment S14: S14

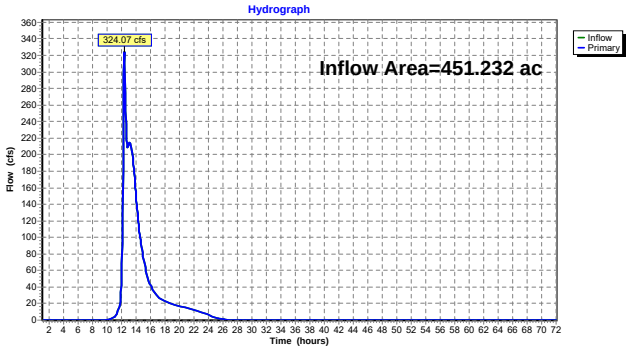


Summary for Link N: North to SBVR

Inflow Area = 451.232 ac, 1.04% Impervious, Inflow Depth = 1.63" for 10-Year event
Inflow = 324.07 cfs @ 12.32 hrs, Volume= 61.410 af
Primary = 324.07 cfs @ 12.32 hrs, Volume= 61.410 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link N: North to SBVR

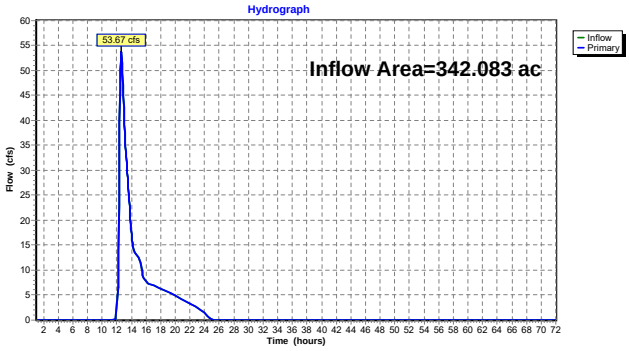


Summary for Link NE: NorthEast to SBVR

Inflow Area = 342.083 ac, 1.22% Impervious, Inflow Depth = 0.36" for 10-Year event
Inflow = 53.67 cfs @ 12.63 hrs, Volume= 10.358 af
Primary = 53.67 cfs @ 12.63 hrs, Volume= 10.358 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link NE: NorthEast to SBVR

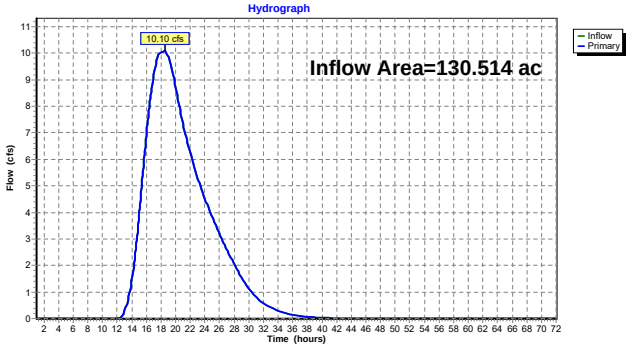


Summary for Link NW: NorthWest to Vermillion R.

Inflow Area = 130.514 ac, 0.88% Impervious, Inflow Depth = 0.69" for 10-Year event
Inflow = 10.10 cfs @ 18.55 hrs, Volume= 7.499 af
Primary = 10.10 cfs @ 18.55 hrs, Volume= 7.499 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link NW: NorthWest to Vermillion R.

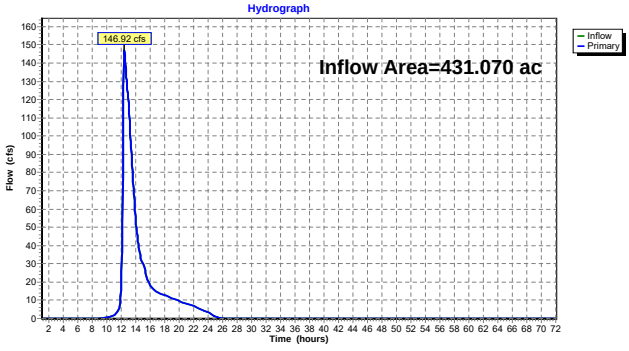


Summary for Link S: South to SBVR

Inflow Area = 431.070 ac, 3.90% Impervious, Inflow Depth = 0.80" for 10-Year event
Inflow = 146.92 cfs @ 12.37 hrs, Volume= 28.637 af
Primary = 146.92 cfs @ 12.37 hrs, Volume= 28.637 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link S: South to SBVR

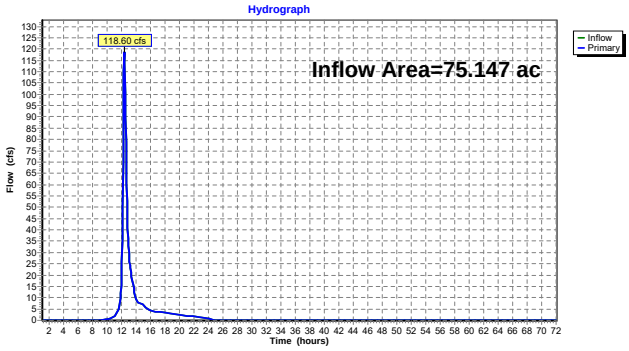


Summary for Link S05_D: S05

Inflow Area = 75.147 ac, 18.44% Impervious, Inflow Depth = 1.66" for 10-Year event
Inflow = 118.60 cfs @ 12.32 hrs, Volume= 10.412 af
Primary = 118.60 cfs @ 12.32 hrs, Volume= 10.412 af, Atten= 0%, Lag= 0.0 min
Routed to Link S : South to SBVR

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link S05_D: S05



Time span=1.00-72.00 hrs, dt=0.05 hrs, 1421 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment S01: S01 Runoff Area=184.155 ac 0.74% Impervious Runoff Depth=1.80"
Flow Length=1,941' Tc=39.5 min CN=49 Runoff=221.65 cfs 27.601 af

Subcatchment S02: S02 Runoff Area=157.929 ac 1.79% Impervious Runoff Depth=1.89"
Flow Length=2,628' Tc=24.1 min CN=50 Runoff=272.38 cfs 24.920 af

Subcatchment S03: S03 Runoff Area=83.513 ac 0.39% Impervious Runoff Depth=2.48"
Flow Length=2,187' Tc=89.4 min CN=56 Runoff=85.30 cfs 17.275 af

Subcatchment S04: S04 Runoff Area=130.514 ac 0.88% Impervious Runoff Depth=2.58"
Flow Length=4,429' Tc=428.4 min CN=57 Runoff=41.24 cfs 28.096 af

Subcatchment S04-Sub: S04-Sub Runoff Area=0.707 ac 81.61% Impervious Runoff Depth=6.33"
Flow Length=219' Tc=7.0 min CN=91 Runoff=7.04 cfs 0.373 af

Subcatchment S05: S05 Runoff Area=56.105 ac 0.95% Impervious Runoff Depth=3.74"
Flow Length=2,690' Tc=25.4 min CN=68 Runoff=205.39 cfs 17.469 af

Subcatchment S05-Sub: S05-Sub Runoff Area=18.335 ac 69.50% Impervious Runoff Depth=5.75"
Flow Length=779' Tc=17.4 min CN=86 Runoff=122.07 cfs 8.787 af

Subcatchment S06: S06 Runoff Area=13.695 ac 0.42% Impervious Runoff Depth=2.79"
Flow Length=1,071' Tc=18.1 min CN=59 Runoff=43.76 cfs 3.181 af

Subcatchment S07: S07 Runoff Area=20.432 ac 0.00% Impervious Runoff Depth=1.70"
Flow Length=1,073' Tc=26.6 min CN=48 Runoff=29.08 cfs 2.902 af

Subcatchment S08: S08 Runoff Area=58.666 ac 0.63% Impervious Runoff Depth=1.25"
Flow Length=1,871' Tc=32.2 min CN=43 Runoff=48.79 cfs 6.123 af

Subcatchment S09: S09 Runoff Area=46.961 ac 1.34% Impervious Runoff Depth=1.61"
Flow Length=2,350' Tc=46.0 min CN=47 Runoff=44.36 cfs 6.308 af

Subcatchment S10: S10 Runoff Area=132.656 ac 1.20% Impervious Runoff Depth=3.10"
Flow Length=3,210' Tc=57.4 min CN=62 Runoff=240.53 cfs 34.252 af

Subcatchment S11: S11 Runoff Area=123.100 ac 1.00% Impervious Runoff Depth=4.95"
Flow Length=3,503' Tc=20.4 min CN=79 Runoff=668.28 cfs 50.798 af

Subcatchment S12: S12 Runoff Area=199.616 ac 1.15% Impervious Runoff Depth=4.17"
Flow Length=4,996' Tc=108.8 min CN=72 Runoff=316.08 cfs 69.402 af

Subcatchment S13: S13 Runoff Area=116.440 ac 0.75% Impervious Runoff Depth=3.74"
Flow Length=3,702' Tc=65.5 min CN=68 Runoff=236.15 cfs 36.256 af

Subcatchment S14: S14 Runoff Area=12.075 ac 2.54% Impervious Runoff Depth=3.31"
Flow Length=885' Tc=19.3 min CN=64 Runoff=45.06 cfs 3.330 af

Link N: North to SBVR Inflow=836.13 cfs 159.786 af
Primary=836.13 cfs 159.786 af

Link NE: NorthEast to SBVR Inflow=444.89 cfs 52.521 af
Primary=444.89 cfs 52.521 af

Link NW: NorthWest to Vermillion R. Inflow=41.24 cfs 28.096 af
Primary=41.24 cfs 28.096 af

Link S: South to SBVR Inflow=554.76 cfs 96.672 af
Primary=554.76 cfs 96.672 af

Link S05_D: S05 Inflow=311.56 cfs 26.630 af
Primary=311.56 cfs 26.630 af

Total Runoff Area = 1,354.899 ac Runoff Volume = 337.075 af Average Runoff Depth = 2.99"
98.02% Pervious = 1,328.051 ac 1.98% Impervious = 26.848 ac

Summary for Subcatchment S01: S01

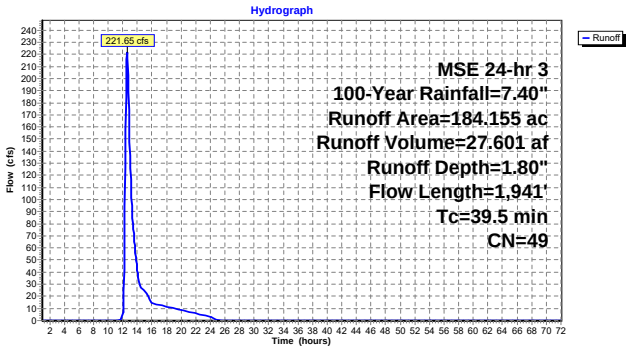
Runoff = 221.65 cfs @ 12.61 hrs, Volume= 27.601 af, Depth= 1.80"
Routed to Link NE : NorthEast to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	1.326	98	Access Road, HSG D
*	24.531	30	Array, HSG A
*	22.902	58	Array, HSG B
*	1.571	71	Array, HSG C
*	3.538	78	Array, HSG D
*	0.685	72	Gr-Road, HSG A
*	0.238	82	Gr-Road, HSG B
*	0.032	98	Inverter, HSG D
*	53.891	30	Meadow, HSG A
*	50.431	58	Meadow, HSG B
*	3.071	71	Meadow, HSG C
*	7.521	78	Meadow, HSG D
*	0.368	57	Residential, HSG A
*	6.997	67	Row Crop, HSG A
*	6.546	78	Row Crop, HSG B
*	0.509	89	Row Crop, HSG D
	184.155	49	Weighted Average
	182.797		99.26% Pervious Area
	1.357		0.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	109	0.1237	0.34		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
34.1	1,832	0.0164	0.90		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
39.5	1,941	Total			

Subcatchment S01: S01



Summary for Subcatchment S02: S02

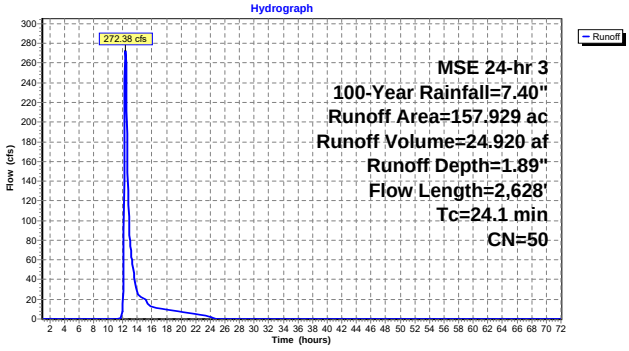
Runoff = 272.38 cfs @ 12.39 hrs, Volume= 24.920 af, Depth= 1.89"
Routed to Link NE : NorthEast to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	1.025	98	Access Road, HSG D
*	23.605	30	Array, HSG A
*	11.918	58	Array, HSG B
*	0.327	71	Array, HSG C
*	3.370	78	Array, HSG D
*	0.007	83	Forest Poor, HSG D
*	0.964	72	Gr-Road, HSG A
*	0.356	82	Gr-Road, HSG B
*	0.310	89	Gr-Road, HSG D
*	0.024	98	Inverter, HSG D
*	53.540	30	Meadow, HSG A
*	26.916	58	Meadow, HSG B
*	0.833	71	Meadow, HSG C
*	10.547	78	Meadow, HSG D
*	0.484	72	Residential, HSG B
*	11.115	67	Row Crop, HSG A
*	5.344	78	Row Crop, HSG B
*	0.140	85	Row Crop, HSG C
*	5.326	89	Row Crop, HSG D
*	1.779	99	Water, HSG D
	157.929	50	Weighted Average
	155.101		98.21% Pervious Area
	2.828		1.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	107	0.0756	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.80"
0.6	100	0.0835	2.60		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
6.9	591	0.0413	1.42		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.4	1,830	0.0059	12.95	4,040.29	**Channel Flow,** Area= 312.0 sf Perim= 50.0' r= 6.24' n= 0.030
24.1	2,628	Total			

Subcatchment S02: S02



Summary for Subcatchment S03: S03

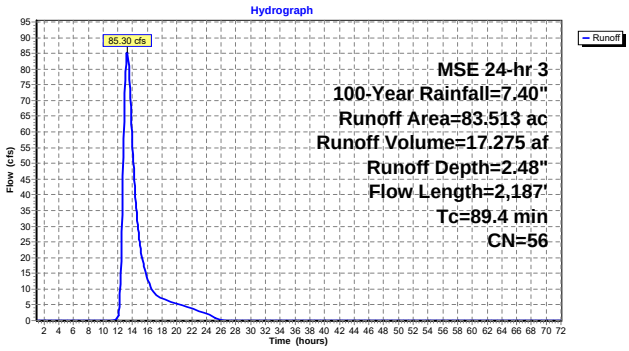
Runoff = 85.30 cfs @ 13.26 hrs, Volume= 17.275 af, Depth= 2.48"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	0.318	98	Access Road, HSG D
*	7.882	30	Array, HSG A
*	11.353	58	Array, HSG B
*	1.024	78	Array, HSG D
*	0.189	72	Gr-Road, HSG A
*	1.911	82	Gr-Road, HSG B
*	3.261	89	Gr-Road, HSG D
*	0.008	98	Inverter, HSG D
*	16.773	30	Meadow, HSG A
*	23.515	58	Meadow, HSG B
*	2.221	78	Meadow, HSG D
*	0.001	72	Residential, HSG B
*	4.329	67	Row Crop, HSG A
*	5.586	78	Row Crop, HSG B
*	5.142	89	Row Crop, HSG D
	83.513	56	Weighted Average
	83.187		99.61% Pervious Area
	0.326		0.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	108	0.0425	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
6.6	596	0.0456	1.49		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
74.6	1,483	0.0014	0.33		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
89.4	2,187	Total			

Subcatchment S03: S03



Summary for Subcatchment S04: S04

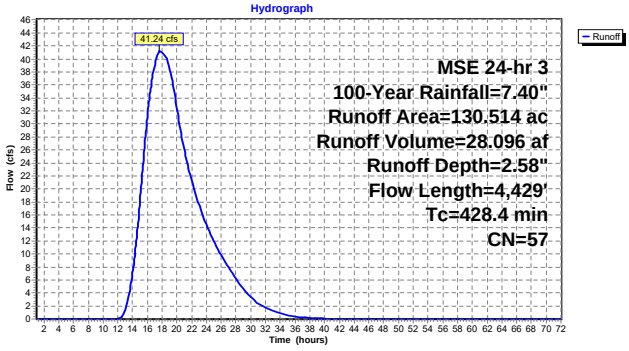
Runoff = 41.24 cfs @ 17.65 hrs, Volume= 28.096 af, Depth= 2.58"
Routed to Link NW : NorthWest to Vermillion R.

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	1.117	98	Access Road, HSG D
*	7.113	30	Array, HSG A
*	29.473	58	Array, HSG B
*	2.855	78	Array, HSG D
*	0.737	72	Gr-Road, HSG A
*	0.606	82	Gr-Road, HSG B
*	0.915	89	Gr-Road, HSG D
*	0.028	98	Inverter, HSG D
*	14.042	30	Meadow, HSG A
*	58.392	58	Meadow, HSG B
*	7.452	78	Meadow, HSG D
*	0.076	57	Residential, HSG A
*	1.578	67	Row Crop, HSG A
*	3.112	78	Row Crop, HSG B
*	3.018	89	Row Crop, HSG D
	130.514	57	Weighted Average
	129.369		99.12% Pervious Area
	1.145		0.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0260	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
2.1	336	0.1384	2.60		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
416.7	3,884	0.0003	0.16		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
0.2	110	0.0073	8.38	326.77	**Channel Flow,** Area= 39.0 sf Perim= 14.0' r= 2.79' n= 0.030
428.4	4,429	Total			

Subcatchment S04: S04



Summary for Subcatchment S04-Sub: S04-Sub

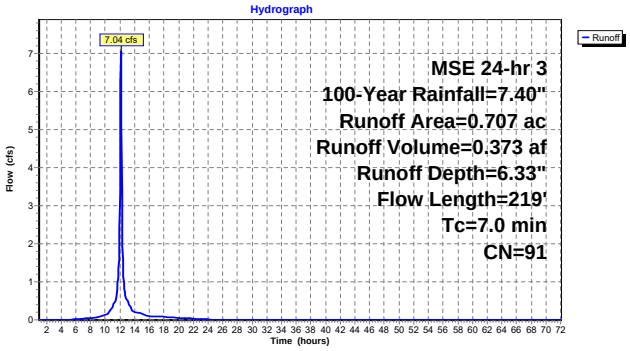
Runoff = 7.04 cfs @ 12.14 hrs, Volume= 0.373 af, Depth= 6.33"
Routed to Link S05_D : S05

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	0.130	58	Meadow, HSG B
*	0.577	98	Substation, HSG D
	0.707	91	Weighted Average
	0.130		18.39% Pervious Area
	0.577		81.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	102	0.0009	0.37		**Sheet Flow,** Smooth Surfaces n= 0.011 P2= 2.80"
2.4	116	0.0026	0.82		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
7.0	219	Total			

Subcatchment S04-Sub: S04-Sub



Summary for Subcatchment S05: S05

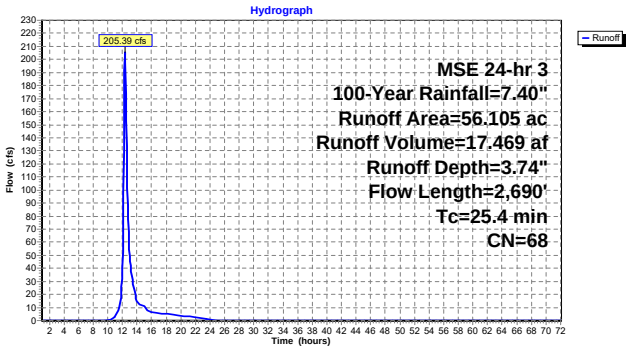
Runoff = 205.39 cfs @ 12.37 hrs, Volume= 17.469 af, Depth= 3.74"
Routed to Link S05_D : S05

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	0.531	98	Access Road, HSG D
*	1.573	30	Array, HSG A
*	6.545	58	Array, HSG B
*	1.929	78	Array, HSG D
*	0.624	72	Gr-Road, HSG A
*	1.793	82	Gr-Road, HSG B
*	0.773	89	Gr-Road, HSG D
*	0.004	98	Inverter, HSG D
*	3.434	30	Meadow, HSG A
*	14.529	58	Meadow, HSG B
*	5.640	78	Meadow, HSG D
*	0.029	57	Residential, HSG A
*	0.057	86	Residential, HSG D
*	1.908	67	Row Crop, HSG A
*	7.306	78	Row Crop, HSG B
*	9.430	89	Row Crop, HSG D
	56.105	68	Weighted Average
	55.570		99.05% Pervious Area
	0.535		0.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.0560	0.24		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
5.5	477	0.0425	1.44		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.0	664	0.0236	1.38		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
5.0	1,449	0.0077	4.81	67.27	**Channel Flow,** Area= 14.0 sf Perim= 12.0' r= 1.17' n= 0.030
25.4	2,690	Total			

Subcatchment S05: S05



Summary for Subcatchment S05-Sub: S05-Sub

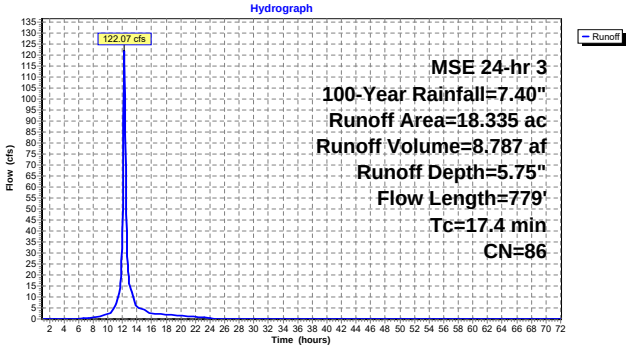
Runoff = 122.07 cfs @ 12.26 hrs, Volume= 8.787 af, Depth= 5.75"
Routed to Link S05_D : S05

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	1.175	98	Access Road, HSG D
*	0.413	30	Array, HSG A
*	0.221	58	Array, HSG B
*	0.939	30	Meadow, HSG A
*	2.044	58	Meadow, HSG B
*	0.129	98	O&M, HSG D
*	0.227	67	Row Crop, HSG A
*	1.695	78	Row Crop, HSG B
*	0.054	89	Row Crop, HSG D
*	5.444	98	Substation, HSG D
*	5.994	98	Switchyard, HSG D
	18.335	86	Weighted Average
	5.593		30.50% Pervious Area
	12.742		69.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	79	0.0260	0.17		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
9.6	700	0.0300	1.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.4	779	Total			

Subcatchment S05-Sub: S05-Sub



Summary for Subcatchment S06: S06

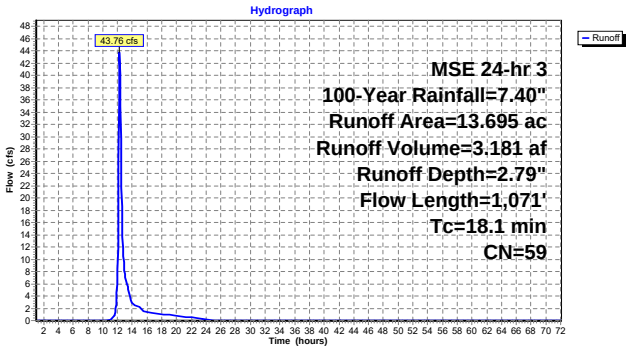
Runoff = 43.76 cfs @ 12.29 hrs, Volume= 3.181 af, Depth= 2.79"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	0.058	98	Access Road, HSG D
*	0.966	30	Array, HSG A
*	1.776	58	Array, HSG B
*	0.000	78	Array, HSG D
*	0.146	72	Gr-Road, HSG A
*	0.547	82	Gr-Road, HSG B
*	0.164	89	Gr-Road, HSG D
*	2.133	30	Meadow, HSG A
*	3.943	58	Meadow, HSG B
*	0.046	78	Meadow, HSG D
*	1.415	67	Row Crop, HSG A
*	1.430	78	Row Crop, HSG B
*	1.070	89	Row Crop, HSG D
	13.695	59	Weighted Average
	13.637		99.58% Pervious Area
	0.058		0.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	100	0.0830	0.28		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
6.8	579	0.0417	1.43		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
5.4	392	0.0179	1.20		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
18.1	1,071	Total			

Subcatchment S06: S06



Summary for Subcatchment S07: S07

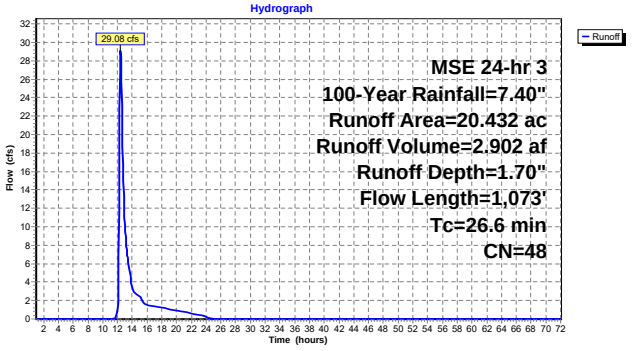
Runoff = 29.08 cfs @ 12.43 hrs, Volume= 2.902 af, Depth= 1.70"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	3.956	30	Array, HSG A
*	0.278	58	Array, HSG B
*	0.272	78	Array, HSG D
*	0.256	72	Gr-Road, HSG A
*	0.093	82	Gr-Road, HSG B
*	0.067	89	Gr-Road, HSG D
*	8.102	30	Meadow, HSG A
*	0.555	58	Meadow, HSG B
*	1.369	78	Meadow, HSG D
*	3.330	67	Row Crop, HSG A
*	0.957	78	Row Crop, HSG B
*	1.199	89	Row Crop, HSG D
	20.432	48	Weighted Average
	20.432		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.9	100	0.0180	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
12.9	773	0.0204	1.00		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.8	200	0.0170	1.17		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
26.6	1,073	Total			

Subcatchment S07: S07



Summary for Subcatchment S08: S08

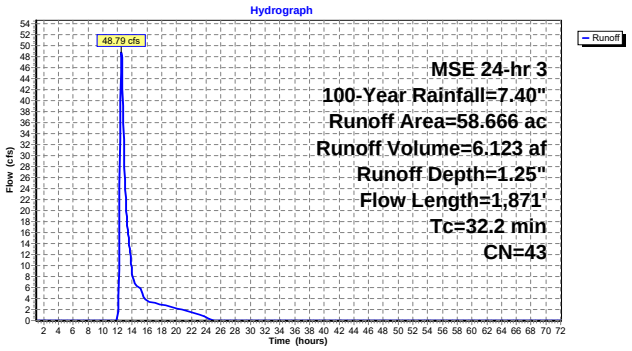
Runoff = 48.79 cfs @ 12.55 hrs, Volume= 6.123 af, Depth= 1.25"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	0.357	98	Access Road, HSG D
*	10.463	30	Array, HSG A
*	1.768	58	Array, HSG B
*	0.359	30	Forest Good, HSG A
*	0.287	55	Forest Good, HSG B
*	0.131	45	Forest Poor, HSG A
*	0.880	72	Gr-Road, HSG A
*	0.458	82	Gr-Road, HSG B
*	0.012	98	Inverter, HSG D
*	27.399	30	Meadow, HSG A
*	4.979	58	Meadow, HSG B
*	0.044	57	Residential, HSG A
*	0.076	72	Residential, HSG B
*	6.187	67	Row Crop, HSG A
*	5.265	78	Row Crop, HSG B
	58.666	43	Weighted Average
	58.296		99.37% Pervious Area
	0.369		0.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	100	0.0530	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
8.6	641	0.0315	1.24		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.5	1,130	0.0162	1.15		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
32.2	1,871	Total			

Subcatchment S08: S08



Summary for Subcatchment S09: S09

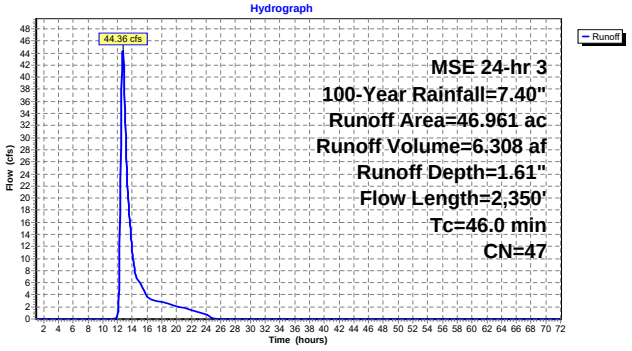
Runoff = 44.36 cfs @ 12.73 hrs, Volume= 6.308 af, Depth= 1.61"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	0.625	98	Access Road, HSG D
*	6.847	30	Array, HSG A
*	6.018	58	Array, HSG B
*	0.395	71	Array, HSG C
*	0.434	72	Gr-Road, HSG A
*	0.006	82	Gr-Road, HSG B
*	0.004	98	Inverter, HSG D
*	14.877	30	Meadow, HSG A
*	12.046	58	Meadow, HSG B
*	1.086	71	Meadow, HSG C
*	2.823	67	Row Crop, HSG A
*	1.563	78	Row Crop, HSG B
*	0.239	85	Row Crop, HSG C
	46.961	47	Weighted Average
	46.333		98.66% Pervious Area
	0.628		1.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0350	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
37.6	2,250	0.0202	1.00		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
46.0	2,350	Total			

Subcatchment S09: S09



Summary for Subcatchment S10: S10

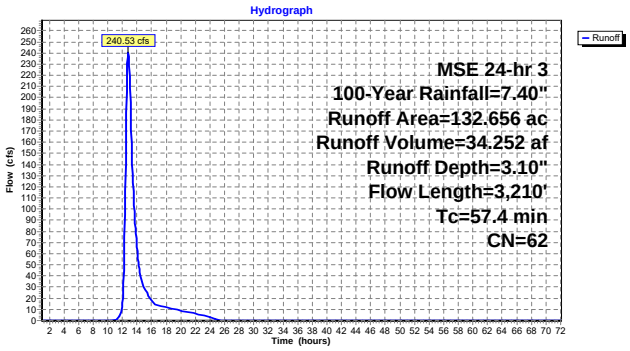
Runoff = 240.53 cfs @ 12.81 hrs, Volume= 34.252 af, Depth= 3.10"
Routed to Link S : South to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	1.583	98	Access Road, HSG D
*	10.237	30	Array, HSG A
*	7.255	58	Array, HSG B
*	0.009	78	Array, HSG D
*	1.687	72	Gr-Road, HSG A
*	2.288	82	Gr-Road, HSG B
*	0.233	89	Gr-Road, HSG D
*	0.008	98	Inverter, HSG D
*	25.120	30	Meadow, HSG A
*	20.359	58	Meadow, HSG B
*	0.319	78	Meadow, HSG D
*	0.131	83	Pav-Road, HSG A
*	0.603	89	Pav-Road, HSG B
*	0.133	57	Residential, HSG A
*	1.221	77	Residential-Med, HSG A
*	0.160	85	Residential-Med, HSG B
*	21.812	67	Row Crop, HSG A
*	13.357	78	Row Crop, HSG B
*	26.142	89	Row Crop, HSG D
	132.656	62	Weighted Average
	131.066		98.80% Pervious Area
	1.590		1.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	100	0.0690	0.26		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
34.8	1,724	0.0139	0.82		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.9	456	0.0116	0.97		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
8.3	930	0.0012	1.86	66.90	**Channel Flow,** Area= 36.0 sf Perim= 30.9' r= 1.16' n= 0.030
57.4	3,210	Total			

Subcatchment S10: S10



Summary for Subcatchment S11: S11

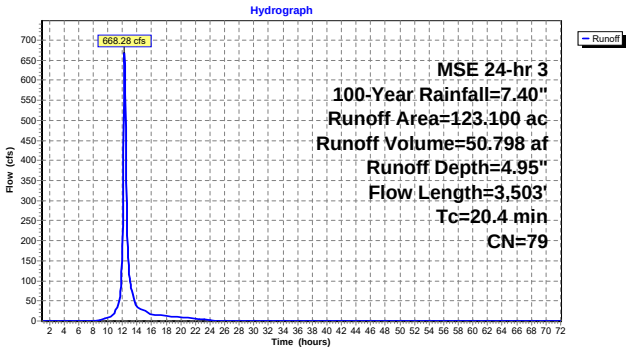
Runoff = 668.28 cfs @ 12.30 hrs, Volume= 50.798 af, Depth= 4.95"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	1.219	98	Access Road, HSG D
*	0.657	30	Array, HSG A
*	3.013	58	Array, HSG B
*	9.016	78	Array, HSG D
*	2.953	83	Forest Poor, HSG D
*	1.907	82	Gr-Road, HSG B
*	2.954	89	Gr-Road, HSG D
*	0.008	98	Inverter, HSG D
*	1.747	30	Meadow, HSG A
*	8.918	58	Meadow, HSG B
*	34.440	78	Meadow, HSG D
*	0.119	72	Residential, HSG B
*	0.027	86	Residential, HSG D
*	0.667	85	Residential-Med, HSG B
*	0.857	67	Row Crop, HSG A
*	13.635	78	Row Crop, HSG B
*	40.965	89	Row Crop, HSG D
	123.100	79	Weighted Average
	121.873		99.00% Pervious Area
	1.227		1.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	100	0.0280	1.47		**Sheet Flow,** Smooth Surfaces n= 0.011 P2= 2.80"
12.7	1,150	0.0281	1.51		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
6.6	2,253	0.0040	5.67	589.90	**Channel Flow,** Area= 104.0 sf Perim= 43.0' r= 2.42' n= 0.030
20.4	3,503	Total			

Subcatchment S11: S11



Summary for Subcatchment S12: S12

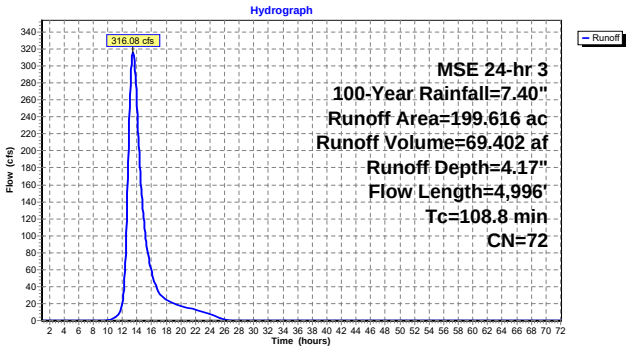
Runoff = 316.08 cfs @ 13.44 hrs, Volume= 69.402 af, Depth= 4.17"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	2.266	98	Access Road, HSG D
*	6.478	30	Array, HSG A
*	5.369	58	Array, HSG B
*	18.012	78	Array, HSG D
*	1.596	82	Gr-Road, HSG B
*	2.208	89	Gr-Road, HSG D
*	0.020	98	Inverter, HSG D
*	18.777	30	Meadow, HSG A
*	12.457	58	Meadow, HSG B
*	84.696	78	Meadow, HSG D
*	1.215	72	Residential, HSG B
*	0.222	86	Residential, HSG D
*	5.074	67	Row Crop, HSG A
*	7.117	78	Row Crop, HSG B
*	34.109	89	Row Crop, HSG D
	199.616	72	Weighted Average
	197.330		98.85% Pervious Area
	2.286		1.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	100	0.0460	1.80		**Sheet Flow,** Smooth Surfaces n= 0.011 P2= 2.80"
11.0	794	0.0177	1.20		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
91.9	3,725	0.0093	0.68		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
5.0	377	0.0005	1.26	45.43	**Channel Flow,** Area= 36.0 sf Perim= 30.9' r= 1.16' n= 0.030
108.8	4,996	Total			

Subcatchment S12: S12



Summary for Subcatchment S13: S13

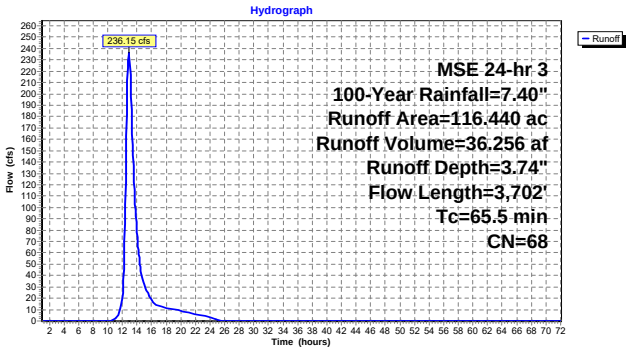
Runoff = 236.15 cfs @ 12.90 hrs, Volume= 36.256 af, Depth= 3.74"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	0.859	98	Access Road, HSG D
*	3.879	30	Array, HSG A
*	4.758	58	Array, HSG B
*	1.748	71	Array, HSG C
*	5.439	78	Array, HSG D
*	0.049	45	Forest Poor, HSG A
*	0.030	83	Forest Poor, HSG D
*	0.446	72	Gr-Road, HSG A
*	0.132	82	Gr-Road, HSG B
*	0.324	89	Gr-Road, HSG D
*	0.012	98	Inverter, HSG D
*	15.535	30	Meadow, HSG A
*	11.173	58	Meadow, HSG B
*	3.685	71	Meadow, HSG C
*	48.688	78	Meadow, HSG D
*	5.858	67	Row Crop, HSG A
*	2.371	78	Row Crop, HSG B
*	11.453	89	Row Crop, HSG D
	116.440	68	Weighted Average
	115.569		99.25% Pervious Area
	0.871		0.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	100	0.0390	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
51.1	2,697	0.0158	0.88		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
6.4	905	0.0018	2.34	84.24	**Channel Flow,** Area= 36.0 sf Perim= 30.9' r= 1.16' n= 0.030
65.5	3,702	Total			

Subcatchment S13: S13



Summary for Subcatchment S14: S14

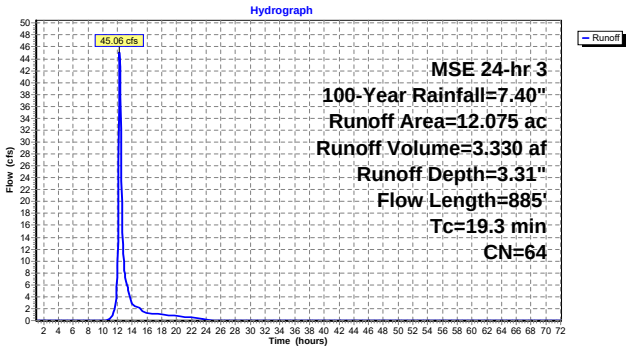
Runoff = 45.06 cfs @ 12.30 hrs, Volume= 3.330 af, Depth= 3.31"
Routed to Link N : North to SBVR

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=7.40"

	Area (ac)	CN	Description
*	0.307	98	Access Road, HSG D
*	0.497	30	Array, HSG A
*	0.869	58	Array, HSG B
*	0.033	71	Array, HSG C
*	0.690	78	Array, HSG D
*	0.105	55	Forest Good, HSG B
*	0.021	45	Forest Poor, HSG A
*	0.808	66	Forest Poor, HSG B
*	0.432	82	Gr-Road, HSG B
*	1.090	30	Meadow, HSG A
*	3.360	58	Meadow, HSG B
*	0.060	71	Meadow, HSG C
*	1.508	78	Meadow, HSG D
*	0.101	72	Residential, HSG B
*	0.103	67	Row Crop, HSG A
*	1.908	78	Row Crop, HSG B
*	0.184	89	Row Crop, HSG D
	12.075	64	Weighted Average
	11.768		97.46% Pervious Area
	0.307		2.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0440	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.80"
11.7	785	0.0257	1.12		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
19.3	885	Total			

Subcatchment S14: S14

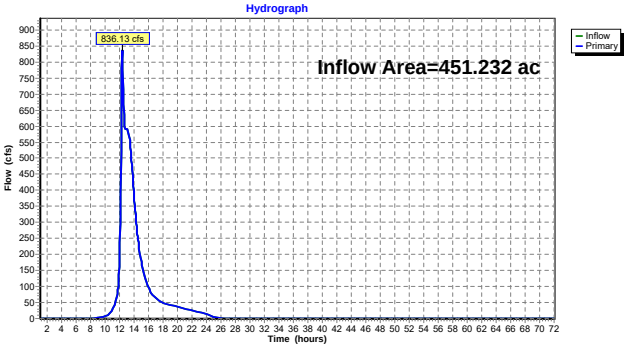


Summary for Link N: North to SBVR

Inflow Area = 451.232 ac, 1.04% Impervious, Inflow Depth = 4.25" for 100-Year event
Inflow = 836.13 cfs @ 12.32 hrs, Volume= 159.786 af
Primary = 836.13 cfs @ 12.32 hrs, Volume= 159.786 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link N: North to SBVR

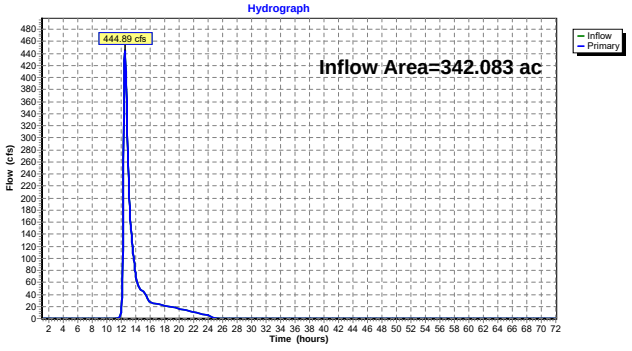


Summary for Link NE: NorthEast to SBVR

Inflow Area = 342.083 ac, 1.22% Impervious, Inflow Depth = 1.84" for 100-Year event
Inflow = 444.89 cfs @ 12.47 hrs, Volume= 52.521 af
Primary = 444.89 cfs @ 12.47 hrs, Volume= 52.521 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link NE: NorthEast to SBVR

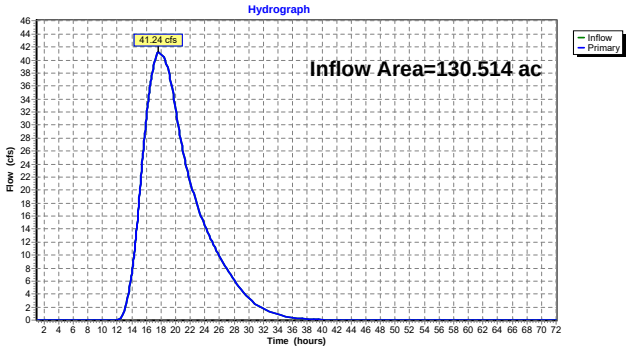


Summary for Link NW: NorthWest to Vermillion R.

Inflow Area = 130.514 ac, 0.88% Impervious, Inflow Depth = 2.58" for 100-Year event
Inflow = 41.24 cfs @ 17.65 hrs, Volume= 28.096 af
Primary = 41.24 cfs @ 17.65 hrs, Volume= 28.096 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link NW: NorthWest to Vermillion R.

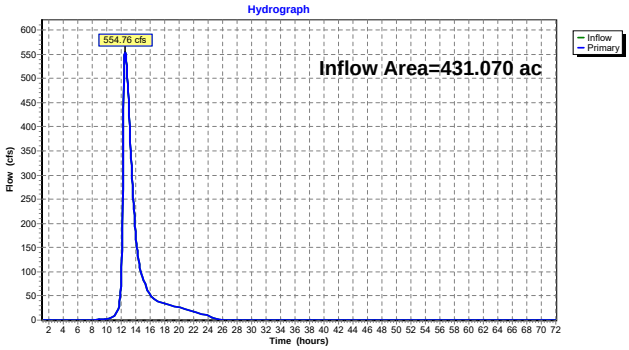


Summary for Link S: South to SBVR

Inflow Area = 431.070 ac, 3.90% Impervious, Inflow Depth = 2.69" for 100-Year event
Inflow = 554.76 cfs @ 12.49 hrs, Volume= 96.672 af
Primary = 554.76 cfs @ 12.49 hrs, Volume= 96.672 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link S: South to SBVR

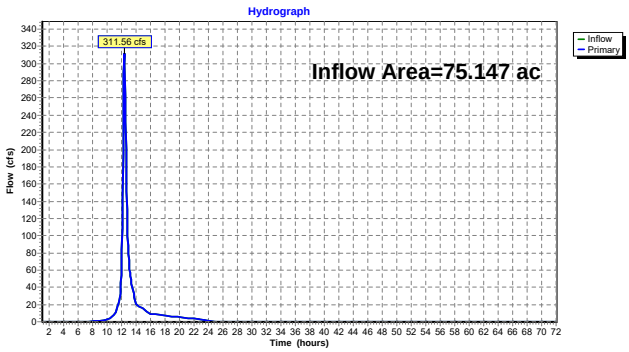


Summary for Link S05_D: S05

Inflow Area = 75.147 ac, 18.44% Impervious, Inflow Depth = 4.25" for 100-Year event
Inflow = 311.56 cfs @ 12.32 hrs, Volume= 26.630 af
Primary = 311.56 cfs @ 12.32 hrs, Volume= 26.630 af, Atten= 0%, Lag= 0.0 min
Routed to Link S : South to SBVR

Primary outflow = Inflow, Time Span= 1.00-72.00 hrs, dt= 0.05 hrs

Link S05_D: S05



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Prepared by Stantec Consulting Services Printed 8/6/2024
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