## **Final Stormwater Management Plan**

prepared for

# Residences, Reserve and Reunion at Blackwell

Lee's Summit, MO 64081

March 30, 2023

prepared by



14920 W 107<sup>th</sup> ST Lenexa, Kansas (913) 492-5158 Schlagel & Associates Project 20-205

for

Griffin Riley Property Group 21 SE 29<sup>th</sup> Terrace Lee's Summit, Missouri 64082

### **Executive Summary**

March 30, 2023

Gene Williams, P.E. 220 SE Green Street Lee's Summit, MO 64063

RE: Residences at Blackwell

Blue Parkway & Blackwell Road Lee's Summit, MO 64081

200 0 00000000

Dear Gene Williams,

We are submitting the enclosed final stormwater management study in support of the site development plans for the multi-phase development Blackwell. Included are The Residences at Blackwell, a proposed Multi-family development, Reunion at Blackwell proposed townhomes, and Blackwell Reserve proposed single family homes. This report has been prepared to address permitting requirements and provides final design calculations for the required storm water detention and BMP facilities. We have modeled the existing site conditions as they existed at the time this report was prepared.

The proposed site is a 62.40-acre mixed use parcel located in Lee's Summit, MO at the intersection of Blue Parkway and Blackwell Road. The proposed development has been analyzed and designed to meet the APWA Comprehensive Control Strategy, which entails limiting post-development peak discharge rates from the site for the 2-Year, 10-Year, and 100-Year design storm events. One Extended Dry Detention Basin (EDDB) and three Extended Wet Detention Basins (EWDB) have been designed to detain the mentioned events as well as provided 40-hour detention of runoff from the local 90% mean annual event. All elements of the enclosed drainage system will be designed and constructed in accordance with all City of Lee's Summit, Missouri, requirements.

Sincerely,

Schlagel & Associates, P.A.

Michael Moore, E.I.T. Design Engineer



Mark Breuer, P.E. Project Engineer

## **TABLE OF CONTENTS**

			<u>Page No.</u>
TABL	E OF	CONTENTS	III
LIST	OF TA	\BLES	IV
LIST	OF FIG	GURES	V
1.0	GEN	ERAL INFORMATION	1-1
	1.1	Objective	
	1.2	Methodology	1-1
2.0	EXIS	TING CONDITIONS ANALYSIS	2-1
	2.1	Tributary Areas	
	2.2	Curve Number and Time of Concentration	
	2.3	Existing Flow Rates	
	2.4 2.5	Downstream Drainage Issues	
	2.0	2.5.1 Corps of Engineers Review	
		2.5.2 FEMA Requirements	
		2.5.3 Missouri Department of Natural Resources	
3.0	PRO	POSED CONDITIONS ANALYSIS	3-1
	3.1	Tributary Areas	
	3.2	Curve Number and Time of Concentration	
	3.3	Proposed Flow Rates	
	3.4	Detention Analysis	
4.0		MARY AND RECOMMENDATIONS	
APPE	ENDIX	A	A
-EXIS	STING	SITE AERIAL PHOTOGRAPH	A.1
-EXIS	STING	DRAINAGE MAP	A.2
-PRO	POSE	D DRAINAGE MAP	A.3
-EDD	B WA	TER QUALITY DESIGN	A.4
		METTE	
		WETLANDS INVENTORY	
		L OF SERVICE	
		B	
		L RESOURCE REPORT	
		D MODEL OUTPUT REPORT	
		DELINEATION AND JURISDICTIONAL ASSESSMENT	

## **LIST OF TABLES**

<u>Table No.</u>	<u>Page No.</u>
Table 2-1 - Existing Flow Rates	2-3
Table 3-1 – HydroCAD Runoff Conditions	3-3
Table 3-2.B – Allowable Release Rate Calculations	3-5
Table 3-3.B - Required & Proposed Runoff Comparison	3-6

## **LIST OF FIGURES**

<u>Figure No.</u>	<u>Page No.</u>
Figure A.1 – Existing Site Aerial Photograph	
Figure A.3 – Proposed Drainage Map Figure A.4 – FEMA FIRMette	Appendix A
Figure A.5 – National Wetlands Inventory	• •
NRCS Soil Survey Report	

### 1.0 GENERAL INFORMATION

Griffin Riley Property Group is proposing to develop the 62.40 acres of land located in Section 11, Township 47 North, Range 31 West, Jackson County, Missouri. The property is located at the intersection of Blue Parkway and Blackwell Road. The proposed development consists of single-family lots, townhomes, apartments, and commercial use along with associated infrastructure.

### 1.1 OBJECTIVE

The intent of this report is to provide information pertaining to the existing and proposed watersheds, identifying and addressing any downstream drainage issues, determine and address any detention requirements, provide 40-hour extended detention of runoff from the local 90% mean annual event, and address permitting requirements. This study provides the final design calculations for the development of the facilities and associated infrastructure.

### 1.2 METHODOLOGY

The following were utilized in the assessment, preparation and analysis of watersheds in this design concept plan: Section 5600, 2011, Storm Drainage Systems & Facilities of the Standard Specifications & Design Criteria of the Kansas City Metropolitan Chapter of the American Public Works Association; City of Lee's Summit, Missouri Design Criteria (2011 Revision), Storm Drainage Systems & Facilities, prepared by the City of Lee's Summit, Missouri, Public Works Department.

Watersheds for the site were defined according to soil cover and type, tributary area, and runoff times of concentration. Soil cover was determined from inspection of the site and aerial photography. A soil survey for the project area was obtained from the United States Department of Agriculture, Natural Resources Conservation Service (NRCS), website and was utilized in determining soil type. The entire NRCS Soil Resource Report can be found in Appendix B. Watershed size was determined from both aerial topography and topographical survey, and by the proposed grading plan.

Times of concentration were compiled according to *NRCS TR-55 Urban Hydrology for Small Watersheds (1986)* methodology for sheet flow, shallow concentrated flow, and channel flow. For this report, sheet flow travel lengths were modeled at a total distance of 100'. Travel times for channel flows were determined using the length and velocity of the open channel. *HydroCAD-10* was utilized to model the runoff. All storm events were modeled using *SCS 24-hour Type II* distributions and were modeled for 2-Year, 10-Year, and 100-Year storm events.

### 2.0 EXISTING CONDITIONS ANALYSIS

The site lies within the East Fork Little Blue River Watershed. The existing site contains 4 watersheds which have release points located in the southwest, northwest, northern boundary, and eastern boundary of the site. Offsite stormwater comes into the site from south and drains to the release point located along the eastern boundary.

### 2.1 TRIBUTARY AREAS

The existing drainage tributary map is provided in Appendix A, Figure A.1. The site release points have been identified as Release Point 1(RP-1), Release Point 2 (RP-2), Release Point 3 (RP-3), and Release Point 4 (RP-4). The area has been delineated according to the existing topography and an annotation callout of EX DA-1, EX DA-2, EX DA-3, EX DA-4, and EX OFF DA-4, on Figure A.2, have been provided for the watersheds that drain to the release points RP-1 – RP-4 respectively.

### 2.2 CURVE NUMBER AND TIME OF CONCENTRATION

The existing curve numbers and time of concentrations for each area have been established based on the procedures outlined in *NRCS TR-55 Urban Hydrology for Small Watersheds (1986)*. Existing curve numbers were based upon aerial photography, site inspection, and the soil types present on site.

The NRCS Soil Resource Report indicated that a Hydrologic Soil Group (HSG) of C and D were present on site. A current aerial photograph can be found in Appendix A; it depicts the existing cover conditions. Table 2-1 found in section 2.3 Existing Flow Rates summarizes the curve numbers for each of the watershed areas.

Cover types for existing conditions were considered to be "pasture/grassland" in fair condition for the on-site area, and "Woods/grass combo" in fair condition for the off-site area. Procedures outlined in *NRCS TR-55 Urban Hydrology for Small Watersheds* recommends utilizing curve numbers 79 and 84 for HSG C and D for pasture/grassland, and 76 and 82 for the Woods/Grass combination.

Time of concentration flow paths were based upon sheet flow and shallow concentrated flow for the existing conditions. Sheet flow lengths were limited to where a grade break occurred. Flow was then considered shallow concentrated flow until a channel was visible either from the USGS topographic map or the aerial photograph, and then from that point was considered channel flow determined by the length of the channel and the velocity of flow.

### 2.3 EXISTING FLOW RATES

Existing flow rates were determined for the 2-Year, 10-Year, and 100-Year design storms. Offsite runoff is included in the calculations for Table 2-1 below for existing site conditions. Appropriate runoff coefficient curve numbers were based upon aerial photography, site inspection, and the soil types present on site. Detailed calculations with composite curve numbers and time of concentration can be found in the HydroCAD Model Output in Appendix B.

**Table 2-1 - Existing Flow Rates** 

Drainage Sub-	Area	CN	Storm	Runoff
Basin	(Acres)		Event	(CFS)
			2-YR	14.34
EX DA-1	9.52	79	10-YR	28.81
			100-YR	48.20
			2-YR	7.26
EX DA-2	4.28	80	10-YR	14.09
			100-YR	23.62
			2-YR	36.97
EX DA-3	29.35	80	10-YR	72.33
			100-YR	121.81
			2-YR	31.44
EX DA-4	19.25	82	10-YR	64.09
			100-YR	110.52
			2-YR	11.43
EX OFF DA-4	4.58	92	10-YR	18.56
			100-YR	27.98

### 2.4 DOWNSTREAM DRAINAGE ISSUES

The existing downstream drainage system has been reviewed with this development plan. FEMA flood maps have been checked and currently no immediate downstream issues appear to be present. A FEMA FIRMette is included in Appendix A. The project lies outside of the identified FEMA floodplain per map numbers 29095C0437G, 29095C0439G, 29095C0441G, and 29095C0445G.

### 2.5 AGENCY REVIEW

Permitting requirements of the following agencies were reviewed as part of the existing conditions analysis.

### 2.5.1 Corps of Engineers Review

The National Wetlands Inventory (NWI) map was reviewed for the site and there are no identified wetlands located within the project site. The NWI map can be found in Appendix A. A jurisdictional determination is being prepared by others, and any required wetland permitting or mitigation will be completed prior to land disturbance of the wetlands.

### 2.5.2 FEMA Requirements

No FEMA identified floodplain is located on the proposed property per Flood Insurance Rate Map Panel Nos. 29095C0437G, 29095C0439G, 29095C0441G, and 29095C0445G. There is currently no work proposed in the regulated floodplain. Please see the attached FEMA FIRMette in Appendix A.

### 2.5.3 Missouri Department of Natural Resources

All land disturbance activities will be permitted in accordance with the City of Lee's Summit, MO specifications as well as the Missouri Department of Water Pollution Control general permit under the National Pollution Discharge Elimination System (NPDES) and an authorized Notice of Intent (NOI) application form. The disturbance of the site is greater than one acre; therefore, NPDES and NOI applications are required with the future permitting of the site in compliance with local, state and federal guidelines.

### 3.0 PROPOSED CONDITIONS ANALYSIS

With the proposed development, the site watershed will be divided into four sub-basins for analysis. These sub-basins correspond to: Release Points 1-4. Stormwater runoff will be conveyed through the site via open sheet flow, shallow concentrated flow, enclosed storm sewer, one extended dry detention basin, and three extended wet detention basins. All detention facilities have been designed to detain the 2-Year, 10-Year, and 100-Year storm events.

All components of the overland and enclosed storm sewer systems will meet or exceed the specifications provided in *Section 5600 – Storm Drainage Systems & Facilities* of the *Standard Specifications and Design Criteria* compiled by the Kansas City Metropolitan Chapter of the American Public Works Association.

### 3.1 TRIBUTARY AREAS

RP-1 will be divided into two sub-catchments, Onsite 1 and Onsite 2. Onsite 1 will bypass the proposed extended dry detention basin, while Onsite 2 will be collected by the extended dry detention basin and then released to two existing 24" pipes located under Blue Parkway. RP-2 sub-catchment existing flows are proposed to be routed to the detention facility located in the northeast corner of the site. RP-3 will also be divided into two sub-catchments, Onsite 3 and Onsite 4. Onsite 3 will be collected by a proposed extended wet detention basin. It will then be routed downstream to a second proposed extended wet detention basin that will collect Onsite 4 and then be released via storm sewer to an existing area inlet located directly north of our proposed site. Final design of this basin has been designed to ensure the downstream storm sewer system does not exceed the 100-year storm event. RP-4 sub-catchment, Onsite 5, will be collected by an extended wet detention basin. The proposed extended wet detention basin will also collect the off-site area, EX OFF, from the south. Stormwater runoff will be released into the existing swale and continue to flow to the northeast.

### 3.2 CURVE NUMBER AND TIME OF CONCENTRATION

Curve numbers for the proposed development were developed in a similar manner as the existing conditions. Hydrologic Soil Group (HSG) of D was utilized for post-development conditions. Cover types for the proposed conditions were considered to be 1/8 acre lots, Multi-Family, Single Family lots, and urban commercial in good condition.

Time of concentration was established in a similar manner as the existing conditions. Shallow concentrated flow lengths were shortened and considered paved. Detailed calculations with composite curve numbers and time of concentration can be found in the HydroCAD Model Output in Appendix B. Appendix A, Figure A.2 depicts the proposed drainage conditions.

### 3.3 PROPOSED FLOW RATES

Proposed flow rates were determined for the 2-Year, 10-Year, and 100-Year design storms for un-detained condition. Detailed calculations can be found in the HydroCAD Model Output Report in Appendix B.

**Table 3-1 – HydroCAD Runoff Conditions** 

Drainage	Drainage Area	Storm	Peak
Sub-Basin	(Acres)	Event	Discharge
			(CFS)
		2-YR	3.15
*OnSite 1	0.7	10-YR	4.91
		100-YR	7.23
		2-YR	21.75
*OnSite 2	4.93	10-YR	34.23
		100-YR	50.65
		2-YR	43.73
*OnSite 3	12.00	10-YR	74.03
		100-YR	114.13
		2-YR	76.79
*OnSite 4	23.79	10-YR	135.68
		100-YR	214.56
		2-YR	75.92
OnSite 5	19.08	10-YR	128.33
		100-YR	197.63
		2-YR	27.62
EX OFF	6.94	10-YR	46.68
		100-YR	71.89

### 3.4 DETENTION ANALYSIS

The runoff hydrographs utilized to determine the peak flow volumes for each tributary area were determined using *TR-55* methodology and *HydroCAD-10*. For the 2-Year, 10-Year, and 100-Year storm events, the complete hydrograph routing and model output can be found in the HydroCAD Model Output Report in Appendix B.

The site will need to provide detention that meets the requirement under the Comprehensive Control release rates under Section 5608.4C1a and 5608.4C1b of the APWA. This entails limiting post-development peak discharge rates from the site for the 2-Year, 10-Year, and 100-Year design storm events, as well as providing 40-Hour extended detention of runoff from the local 90% mean annual event. The post-development peak discharge rates from the site shall not exceed the following:

- 50% storm peak rate less than or equal to 0.5 cfs per site acre
- 10% storm peak rate less than or equal to 2.0 cfs per site acre
- 1% storm peak rate less than or equal to 3.0 cfs per site acre

For Release Points 1, 3, and 4, HydroCAD output represents the design release rate. For Release Point 2, we propose to route all existing flows to the proposed detention facility located in the northeast corner of the site.

Table 3-1 – HydroCAD Runoff Conditions are shown in Table 3-3.B - Required & Proposed Runoff Comparison. The proposed post-development design release rates are shown next to the allowable release rates for comparison.

Table 3-2.B - Allowable Release Rate Calculations

	Allowable Release Rate (CFS) Calculations						
Release	Area	Storm	Storm Allowable		Allowable		
Point	(Acres)	Event	On-Site	Off-Site	Release		
			Release	Release	Rate (CFS)		
			Rate (CFS)	Rate (CFS)	(A+B)		
			(A)	(B)			
		2-YR	2.82	0.00	2.82		
RP-1	5.63	10-YR	11.26	0.00	11.26		
		100-YR	16.89	0.00	16.89		
		2-YR	17.90	0.00	17.90		
RP-3	35.79	10-YR	71.58	0.00	71.58		
		100-YR	107.37	0.00	107.37		
		2-YR	9.54	27.62	37.16		
RP-4	24.30	10-YR	38.16	46.68	84.84		
		100-YR	57.24	71.89	129.13		

Table 3-3.B - Required & Proposed Runoff Comparison

Si	te Release Information	on (cubic feet per s	econd) (w/ EDDE	3)
Area	Drainage Area	Storm Event	Allowable	Design
			Release Rate	Release Rate
			(CFS)	(CFS)
RP-1	5.51	2-YR	2.82	2.67
		10-YR	11.26	4.05
		100-YR	16.89	15.22
RP-3	36.31	2-YR	17.90	17.52
		10-YR	71.58	69.83
		100-YR	107.37	87.33
RP-4	24.30	2-YR	37.16	15.29
		10-YR	84.84	31.31
		100-YR	129.13	42.24

Please note: Site release rates are not a direct addition of sub-basin runoff due to differences in the time peak as well as storage effects within the basins.

Proposed stormwater drainage structures will be located throughout the site to capture and convey proposed stormwater runoff to both dry detention basins. The Water Quality volume for all proposed basins will be released over 40 hours. Water quality outlet structures have been provided for each basin and have been designed to meet the allowable release rates provided in Table 3-2 for the 2, 10, and 100 year storm events. The water quality storm event will be controlled by a 15" riser pipe with 1" diameter orifices evenly spaced across the pipe for the extended dry detention basin, and V-notch weirs will be utilized for all proposed extended wet detention basins.

Emergency spillways will be provided for each basin per Section 5600 of the Design and Construction Manual. Each emergency spillway will be set at least 0.5 feet above the 100-year water surface elevation and designed to carry the 100-year storm event

assuming a 100% clogged condition. An additional 1 foot of freeboard will be provided from the water surface elevation in the spillway and the top of dam. Final emergency spillway details will be provided with the subsequent Final Stormwater Management Report and construction documents for EDDB-1, EWDB-2, EWDB-3. For EWDB-1 the primary discharge device was removed from the HydroCAD model to simulate a clogged condition. The water surface elevation was set equal to the peak 1% storm water surface elevation, then with no method of primary discharge a second 1% (Back to back) storm was simulated lacking the method of primary discharge and the storage available to the first storm the emergency spillway was utilized. Table 3-4 summarizes the results of this analysis.

Table 3-4 – Emergency Spillway Analysis

	Storm Event	Inflow to Basin	Emergency	Emergency	Clogged
		(CFS)	Spillway	Spillway	Surface
			Elevation	Length	Elevation
			(FT)	(FT)	
EWDB-1	100 Year	269.52	999.70	14.00	1001.54
EWDB-2	100 Year	114.13	995.31	150.00	998.08
EWDB-3	100 Year	328.69	992.10	110.00	992.83

Note: Spillways for the remaining basins will be analyzed with those phases.

Installing drain works per APWA 5608.4G has been determined to be not applicable in the case of EWDB #1. The permanent pool elevation is designed to be 994.80'. Due to the topography of the site the outflow from the primary spillway will be set at the lowest practical elevation of the adjacent receiving ground, 994.00'. This would only allow for draining of 0.80' of water from the permanent pool without the use of mechanical pumps. Since only a very small amount of permanent pool water could be drained with drain works it is recommended that mechanical pumps be used to drain the entire permanent pool should it ever be necessary to do so.

Additionally, erosion control procedures will be designed and implemented at the outlets to reduce impact on the site downstream. These measures include rip-rap, silt fence and establishment of grass. Please see erosion control plans for more details.

### 4.0 SUMMARY AND RECOMMENDATIONS

The proposed drainage site is a 62.40-acre mixed use parcel of land located in Lee's Summit, MO at the intersection of Blue Parkway and Blackwell Road. The proposed development has been analyzed and designed to meet the APWA Comprehensive Control Strategy, which entails limiting post-development peak discharge rates from the site for the 2-Year, 10-Year, and 100-Year design storm events. One extended dry detention basin and three extended wet detention basins have been designed to detain the mentioned events as well as provided 40-hour detention of runoff from the local 90% mean annual event. All elements of the enclosed drainage system will be designed and constructed in accordance with all City of Lee's Summit, Missouri, requirements.

\* \* \* \*

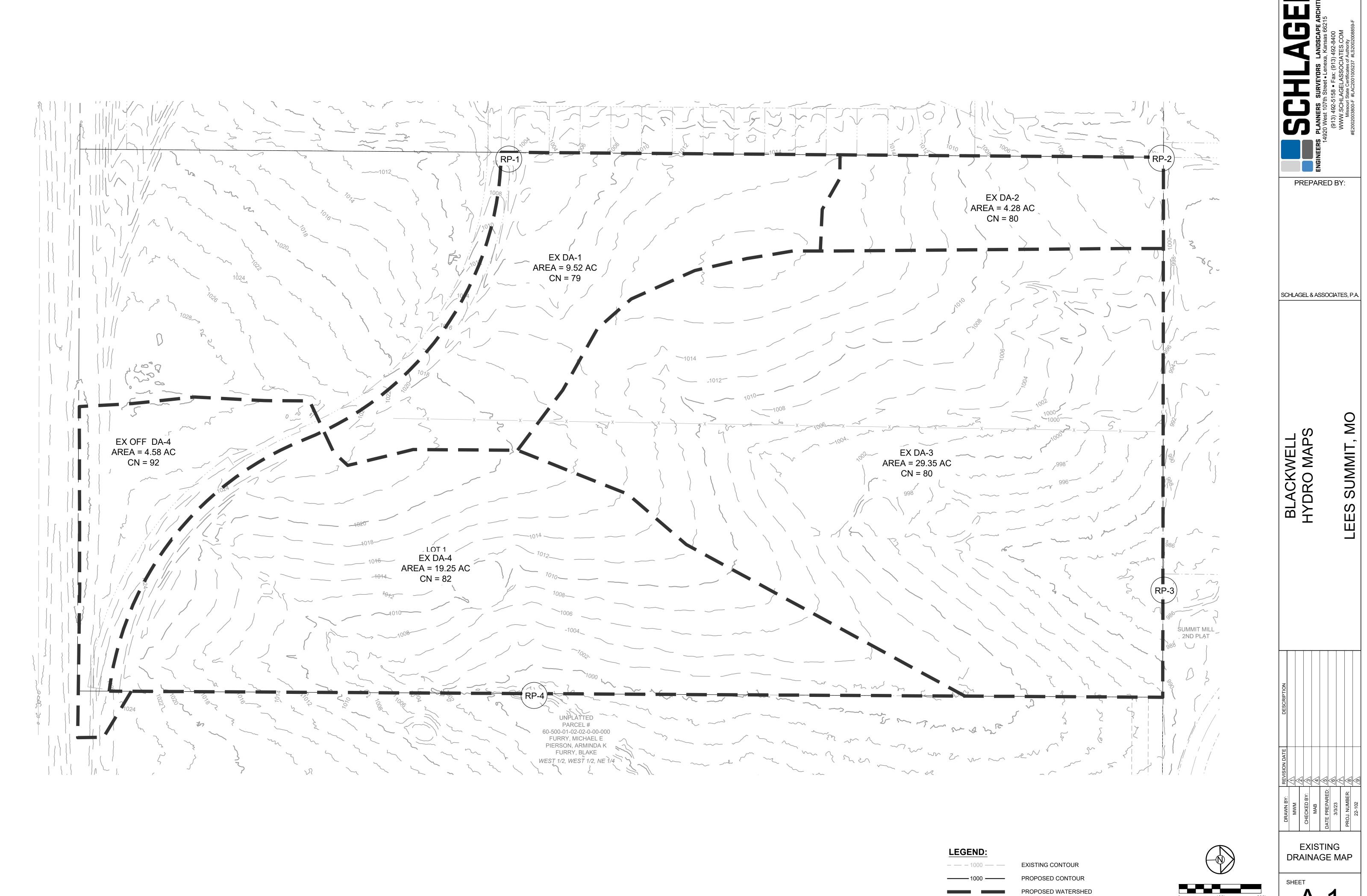
### **APPENDIX A**

-Existing Site Aerial Photograph
-Existing Drainage Map
-Proposed Drainage Map
-EDDB Water Quality Design
-EWDB Water Quality Design
-FEMA FIRMette

-National Wetlands Inventory

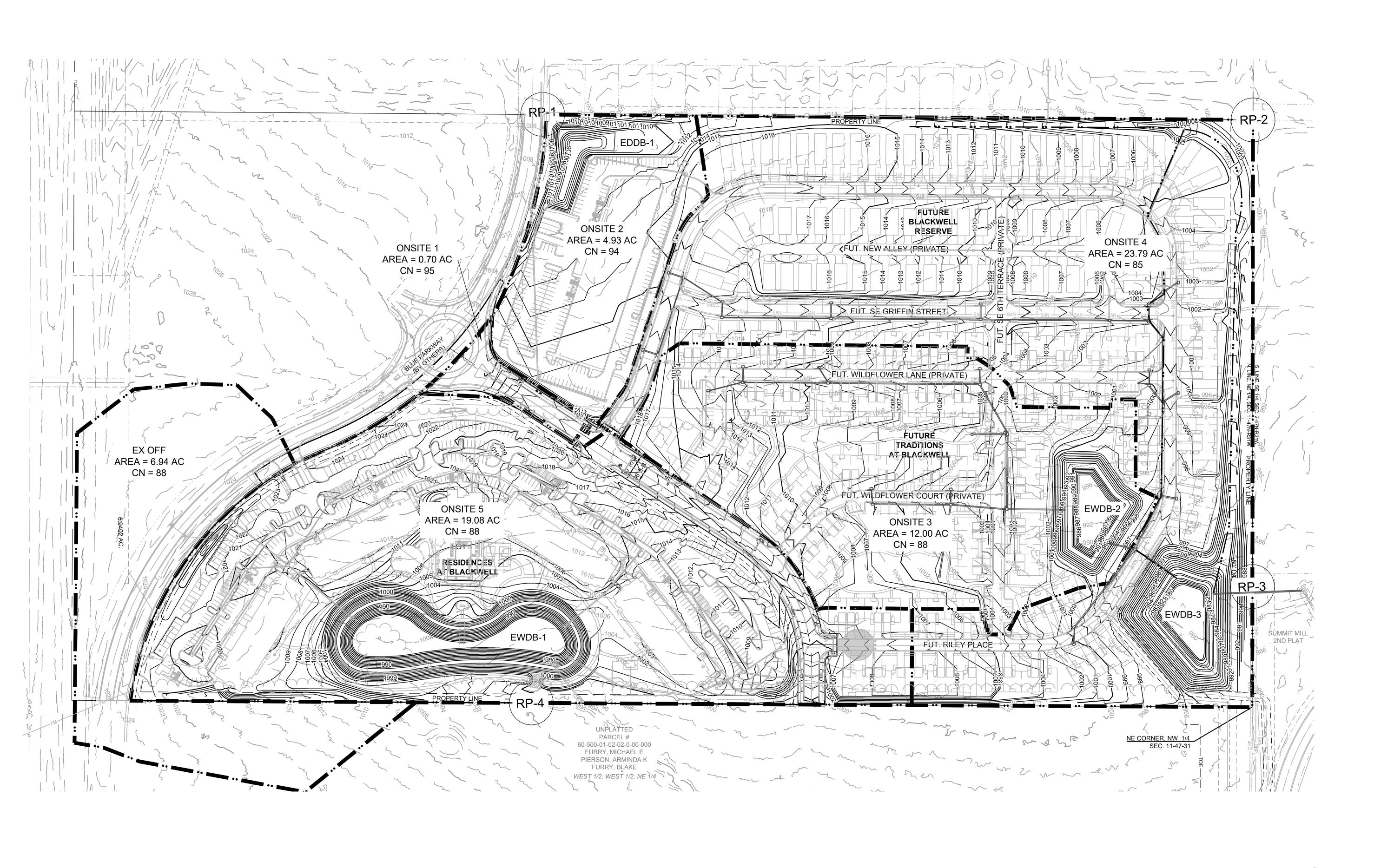
7/30/2021 Google Earth







SCALE: 1" = 100'



PREPARED BY:

SCHLAGEL & ASSOCIATES, P.A.

BLACKWELL HYDRO MAPS

PROPOSED DRAINAGE MAP

**LEGEND**:

**EXISTING CONTOUR** 

PROPOSED CONTOUR

PROPOSED WATERSHED

SHEET **A.2** 

SCALE: 1" = 100'

Project: 22-102 Residences at Blackwell 3/3/2023 15:05

### **Water Quality Volume Calculation**

WQV = P \* Weighted RV

WQV - Water Quality Volume (watershed-inches)
P - Rainfall Event (1.37 inches in Kansas City)
RV - Volumetric Runoff Coefficient

RV = 0.05 + 0.009(I)

I - Percent Site Imperviousness (%)

### I. Determine Weighted RV & Weighted Rational C Coefficient

			Total	Rational			
	%	Area	Impervious	Runoff			
Cover Type	Impervious	(Ac.)	Area (Ac.)	Coefficient	RV	C * Area	RV * Area
Multifamily (Apartments)	60	24.30	14.58	0.66	0.59	16.038	14.337
			0.00		0.05	0	0
Total		24.3	14.58			16.038	14.337

Rv = Sum(Rv\*A)/Total Area = 14.33 / 24.3 = 0.590

C = Sum(C\*A)/Total Area = 16.03 / 24.3 = 0.660

### **II. Determine Water Quality Volume**

WQV = P \* Rv = 1.37 \* 0.59 = 0.808 in

### III. Determine Total Water Quality Volume

Total Watershed Area (AT) = 24.3 acres WQV = 0.808 in

WQV = (24.3 \* 0.808)/12 = **1.64 ac-ft** 

Design Worksheet

# **Project: 22-102 Residences at Blackwell**FINAL STORMWATER MANAGEMENT PLAN 3/3/2023

I. Basin Water Quality Volume		
Tributary Area to EWDB, A <sub>T</sub>	$A_T =$	24.30 acres
Water Qualtity Volume, WQ <sub>V</sub> - See Attached Calculations	$WQ_V =$	1.637 ac-ft
Ila. Permanent Pool Volume - Method 1		
Average 14 Day Wet Season Rainfal, R <sub>14</sub>	R <sub>14</sub> =	2.2 in
Rational Runoff Coefficient, C	C =	0.660
Permanent Pool Volume by Method 1, $V_{P1}$ $V_{P1} = (C^*A_T^*R_{14})/12$	V <sub>P1</sub> =	2.940 ac-ft
Ilb. Permanent Pool Volume - Method 2		
Ratio of Basin Volume to Runoff Volume, $V_{B/R}$ (From Figure 12; $V_{B/R}$ should be >= 4.0)	$V_{B/R} =$	4
Mean Storm Depth, Sd	Sd =	0.6 in
Impervious Tributary Area, Ai	Ai =	14.58 acres
Permanent Pool Volume by Method 2, $V_{P2}$ $V_{P2} = (V_{B/R}*Sd*Ai)/12$	V <sub>P2</sub> =	2.916 ac-ft
Ilc. Permanent Pool Design Volume		
Design Permanent Pool Volume, $V_P$ (Larger of $V_{P1}$ and $V_{P2}$ plus 20%)	V <sub>P</sub> =	3.528 ac-ft
Average Permanent Pool Depth, Z <sub>P</sub>	$Z_P =$	6 ft
Permanent Pool Surface Area, A <sub>P</sub>	A <sub>P</sub> =	0.588 ac
IIId. Water Quality Outlet - V-Notch Weir		
Depth of Water Quality Volume Above Permanent Pool, $Z_{WQ}$	Z <sub>WQ</sub> =	1.65 ft
Average Head of Water Quality Pool Volume Over Invert of V-Notch, $H_{WQ}$ $H_{WQ}$ = 0.50 * $Z_{WQ}$	H <sub>WQ</sub> =	0.8 ft
Average Water Quality Pool Outflow Rate, $Q_{WQ}$ $Q_{WQ} = (WQ_V * 43560)/(40*3600)$	Q <sub>WQ</sub> =	0.50 cfs
V-Notch Weir Coefficient, Cv	Cv	2.62
V-Notch Weir Angle $\Theta = 2*(180/\Pi)*\arctan(Q_{WQ}/(Cv*H_{QW}^5/2)) - Not < 20 \text{ degrees}$	Θ =	0.6 deg
V-Notch Weir Top Width, WV Wv = 2*Z <sub>W0</sub> *tan(Θ/2)	Wv =	0.02 ft

Project: 22-097 Traditions at Blackwell 3/3/2023 15:05

### **Water Quality Volume Calculation**

WQV = P \* Weighted RV

WQV - Water Quality Volume (watershed-inches)
P - Rainfall Event (1.37 inches in Kansas City)
RV - Volumetric Runoff Coefficient

RV = 0.05 + 0.009(I)

I - Percent Site Imperviousness (%)

### I. Determine Weighted RV & Weighted Rational C Coefficient

			Total	Rational			
	%	Area	Impervious	Runoff			
Cover Type	Impervious	(Ac.)	Area (Ac.)	Coefficient	RV	C * Area	RV * Area
Townhomes	60	12.00	7.20	0.66	0.59	7.92	7.08
			0.00		0.05	0	0
Total		12	7.20			7.920	7.08

Rv = Sum(Rv\*A)/Total Area = 7.08 / 12 = 0.590

C = Sum(C\*A)/Total Area = 7.92 / 12 = 0.660

### **II. Determine Water Quality Volume**

WQV = P \* Rv = 1.37 \* 0.59 = 0.808 in

### III. Determine Total Water Quality Volume

Total Watershed Area (AT) = 12 acres WQV = 0.808 in

WQV = (12 \* 0.808)/12 = 0.81 ac-ft

Design Worksheet

# **Traditions at Blackwell**PRELIMINARY STORMWATER MANAGEMENT PLAN 3/3/2023

I. Basin Water Quality Volume		
Tributary Area to EWDB, A <sub>T</sub>	$A_T =$	12.00 acres
Water Qualtity Volume, $WQ_V$ - See Attached Calculations	$WQ_V =$	0.808 ac-ft
Ila. Permanent Pool Volume - Method 1		
Average 14 Day Wet Season Rainfal, R <sub>14</sub>	R <sub>14</sub> =	2.2 in
Rational Runoff Coefficient, C	C =	0.660
Permanent Pool Volume by Method 1, $V_{P1}$ $V_{P1} = (C^*A_T^*R_{14})/12$	V <sub>P1</sub> =	1.452 ac-ft
Ilb. Permanent Pool Volume - Method 2		
Ratio of Basin Volume to Runoff Volume, $V_{B/R}$ (From Figure 12; $V_{B/R}$ should be >= 4.0)	$V_{B/R} =$	4
Mean Storm Depth, Sd	Sd =	0.6 in
Impervious Tributary Area, Ai	Ai =	7.20 acres
Permanent Pool Volume by Method 2, $V_{P2}$ $V_{P2} = (V_{B/R}*Sd*Ai)/12$	V <sub>P2</sub> =	1.440 ac-ft
Ilc. Permanent Pool Design Volume		
Design Permanent Pool Volume, $V_P$ (Larger of $V_{P1}$ and $V_{P2}$ plus 20%)	V <sub>P</sub> =	1.742 ac-ft
Average Permanent Pool Depth, Z <sub>P</sub>	$Z_P =$	6 ft
Permanent Pool Surface Area, A <sub>P</sub>	A <sub>P</sub> =	0.290 ac
IIId. Water Quality Outlet - V-Notch Weir		
Depth of Water Quality Volume Above Permanent Pool, $Z_{WQ}$	Z <sub>WQ</sub> =	1.6 ft
Average Head of Water Quality Pool Volume Over Invert of V-Notch, $H_{WQ}$ $H_{WQ}$ = 0.50 * $Z_{WQ}$	H <sub>WQ</sub> =	0.8 ft
Average Water Quality Pool Outflow Rate, $Q_{WQ}$ $Q_{WQ} = (WQ_V * 43560)/(40*3600)$	Q <sub>WQ</sub> =	0.24 cfs
V-Notch Weir Coefficient, Cv	Cv	2.62
V-Notch Weir Angle $\Theta = 2*(180/\Pi)*arctan(QWQ/(Cv*HQW^5/2)) - Not < 20 degrees$	Θ =	20.0 deg
V-Notch Weir Top Width, WV Wv = 2*Z <sub>W0</sub> *tan(Θ/2)	Wv =	0.56 ft

Project: 22-093 Blackwell Reserve 3/3/2023 15:05

### **Water Quality Volume Calculation**

WQV = P \* Weighted RV

WQV - Water Quality Volume (watershed-inches)
P - Rainfall Event (1.37 inches in Kansas City)
RV - Volumetric Runoff Coefficient

RV = 0.05 + 0.009(I)

I - Percent Site Imperviousness (%)

### I. Determine Weighted RV & Weighted Rational C Coefficient

			Total	Rational			
	%	Area	Impervious	Runoff			
Cover Type	Impervious	(Ac.)	Area (Ac.)	Coefficient	RV	C * Area	RV * Area
Single-Family Lots	35	11.25	3.94	0.51	0.365	5.7375	4.10625
Townhomes	60	12.54	7.52	0.66	0.59	8.2764	7.3986
			0.00		0.05	0	0
Total		23.79	11.46			14.014	11.50485

Rv = Sum(Rv\*A)/Total Area = 11.5 / 23.79 = 0.484

 $C = Sum(C^*A)/Total Area = 14.01 / 23.79 = 0.589$ 

### **II. Determine Water Quality Volume**

WQV = P \* Rv = 1.37 \* 0.48360 **0.663 in** 

### III. Determine Total Water Quality Volume

Total Watershed Area (AT) = 23.79 acres WQV = 0.663 in

WQV = (23.79 \* 0.662)/12 = **1.31 ac-ft** 

Design Worksheet

### Blackwell Reserve

# PRELIMINARY STORMWATER MANAGEMENT PLAN 3/3/2023

I. Basin Water Quality Volume		
Tributary Area to EWDB, A <sub>T</sub>	$A_T =$	23.79 acres
Water Qualtity Volume, $WQ_V$ - See Attached Calculations	$WQ_V =$	1.313 ac-ft
Ila. Permanent Pool Volume - Method 1		
Average 14 Day Wet Season Rainfal, R <sub>14</sub>	R <sub>14</sub> =	2.2 in
Rational Runoff Coefficient, C	C =	0.589
Permanent Pool Volume by Method 1, $V_{P1}$ $V_{P1} = (C^*A_T^*R_{14})/12$	V <sub>P1</sub> =	2.569 ac-ft
Ilb. Permanent Pool Volume - Method 2		
Ratio of Basin Volume to Runoff Volume, $V_{B/R}$ (From Figure 12; $V_{B/R}$ should be >= 4.0)	$V_{B/R} =$	4
Mean Storm Depth, Sd	Sd =	0.6 in
Impervious Tributary Area, Ai	Ai =	11.46 acres
Permanent Pool Volume by Method 2, $V_{P2}$ $V_{P2} = (V_{B/R} * Sd * Ai)/12$	V <sub>P2</sub> =	2.292 ac-ft
Ilc. Permanent Pool Design Volume		
Design Permanent Pool Volume, $V_P$ (Larger of $V_{P1}$ and $V_{P2}$ plus 20%)	V <sub>P</sub> =	3.083 ac-ft
Average Permanent Pool Depth, Z <sub>P</sub>	Z <sub>P</sub> =	6 ft
Permanent Pool Surface Area, A <sub>P</sub>	A <sub>P</sub> =	0.514 ac
IIId. Water Quality Outlet - V-Notch Weir		
Depth of Water Quality Volume Above Permanent Pool, $Z_{WQ}$	$Z_{WQ} =$	2.0 ft
Average Head of Water Quality Pool Volume Over Invert of V-Notch, $H_{WQ}$ H <sub>WQ</sub> = 0.50 * $Z_{WQ}$	H <sub>WQ</sub> =	1.0 ft
Average Water Quality Pool Outflow Rate, $Q_{WQ}$ $Q_{WQ} = (WQ_V * 43560)/(40*3600)$	Q <sub>WQ</sub> =	0.40 cfs
V-Notch Weir Coefficient, Cv	Cv	2.62
V-Notch Weir Angle $\Theta = 2*(180/\Pi)*arctan(QWQ/(Cv*HQW^5/2)) - Not < 20 degrees$	⊖ =	20.0 deg
V-Notch Weir Top Width, WV Wv = 2*Z <sub>WQ</sub> *tan(Θ/2)	Wv =	0.71 ft

## Basin Volume - EWDB #1

Project #: Residences at Blackwell 22-102

Time: 3/30/2023 11:33

Work By: MWM

Volume computed using Conic Method For Reservoir Volumes

Volume = (1/3) \* (EL2-EL1)\*(Area1 + Area2 + (Area1\*Area2)<sup>0.5</sup>)

				Total	Total
Elevation	Area	Area	Δ Volume	Volume	Volume
(ft)	(ft <sup>2</sup> )	(AC)	(ft <sup>3</sup> )	(ft <sup>3</sup> )	(ac-ft)
986	20535	0.471	0	0	0.000
987	24756	0.568	22610	22610	0.519
988	29078	0.668	26885	49496	1.136
989	33500	0.769	31260	80756	1.854
990	38024	0.873	35735	116490	2.674
991	42647	0.979	40309	156799	3.600
992	47371	1.087	44984	201783	4.632
993	52195	1.198	49759	251542	5.775
993.3	53662	1.232	15876	267418	6.139
994	62399	1.432	40579	307997	7.071
994.3	66238	1.521	19291	327288	7.513
996.8	98192	2.254	204211	531499	12.202
997	69233	1.589	16657	548156	12.584
998	74497	1.710	71842	619997	14.233
999	79862	1.833	77156	697154	16.004
1000	85328	1.959	82572	779725	17.900
1001	90894	2.087	88088	867813	19.922
1002	96560	2.217	93703	961516	22.073
1002.7	1006	0.023	25062	986579	22.649

## Basin Volume - EWDB #2

Project #: Reunion at Blackwell 22-102

Time: 3/30/2023 11:33

Work By: MWM

Volume computed using Conic Method For Reservoir Volumes

Volume = (1/3) \* (EL2-EL1)\*(Area1 + Area2 + (Area1\*Area2)<sup>0.5</sup>)

Elevation (ft)	Area (ft²)	Area (AC)	$\Delta$ Volume (ft <sup>3</sup> )	Total Volume (ft <sup>3</sup> )	Total Volume (ac-ft)
985	5081	0.117	0	0	0.000
986	6492	0.149	5772	5772	0.132
987	8025	0.184	7244	13016	0.299
988	9671	0.222	8834	21850	0.502
989	11418	0.262	10531	32381	0.743
990	13264	0.304	12328	44710	1.026
991	15211	0.349	14225	58935	1.353
992	20519	0.471	17797	76732	1.762
993	22818	0.524	21656	98388	2.259
994	25218	0.579	24006	122394	2.810
995	27718	0.636	26456	148849	3.417
996	30318	0.696	29005	177854	4.083
997	33019	0.758	31656	209510	4.810
998	35821	0.822	34407	243917	5.600

## Basin Volume - EWDB #3

Project #: Reunion at Blackwell 22-102

Time: 3/30/2023 11:33

Work By: MWM

Volume computed using Conic Method For Reservoir Volumes

Volume = (1/3) \* (EL2-EL1)\*(Area1 + Area2 + (Area1\*Area2)<sup>0.5</sup>)

Elevation (ft)	Area (ft²)	Area (AC)	$\Delta$ Volume (ft <sup>3</sup> )	Total Volume (ft <sup>3</sup> )	Total Volume (ac-ft)
979	11834	0.272	0	0	0.000
980	13795	0.317	12801	12801	0.294
981	15881	0.365	14824	27625	0.634
982	18093	0.415	16973	44598	1.024
983	20433	0.469	19249	63847	1.466
984	22904	0.526	21655	85502	1.963
985	29590	0.679	26173	111675	2.564
986	32444	0.745	31003	142678	3.275
987	35398	0.813	33907	176585	4.054
988	38453	0.883	36911	213496	4.901
989	42954	0.986	40679	254175	5.835
990	47178	1.083	45045	299220	6.869
991	52032	1.194	49580	348800	8.007

# National Flood Hazard Layer FIRMette

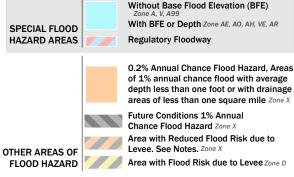


Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020



### Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT



NO SCREEN Area of Minimal Flood Hazard Zone X Effective LOMRs OTHER AREAS Area of Undetermined Flood Hazard Zone D

- - - Channel, Culvert, or Storm Sewer **GENERAL** STRUCTURES | LILLI Levee, Dike, or Floodwall

20.2 Cross Sections with 1% Annual Chance 17.5 Water Surface Elevation **Coastal Transect** ₩₩ 513 WW Base Flood Elevation Line (BFE) Limit of Study Jurisdiction Boundary **Coastal Transect Baseline** OTHER **Profile Baseline FEATURES** Hydrographic Feature

Digital Data Available No Digital Data Available MAP PANELS Unmapped

The pin displayed on the map is an approximate point selected by the user and does not represent

an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap

accuracy standards

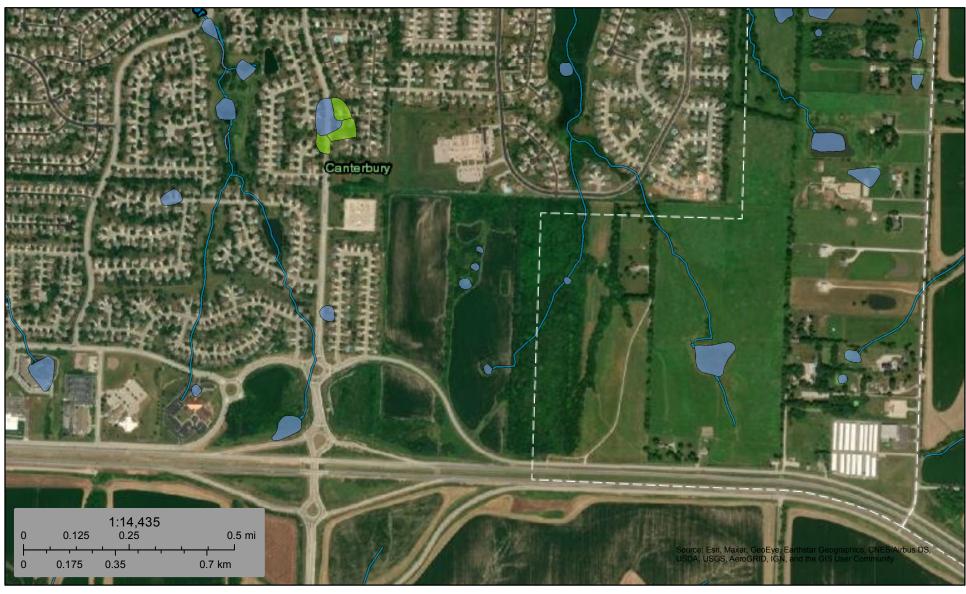
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 7/30/2021 at 10:56 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

### U.S. Fish and Wildlife Service

# **National Wetlands Inventory**

## Wetland Inventory Map



July 30, 2021

#### Wetlands

Estuarine and Marine Deepwater

Estuarine and Marine Wetland

Freshwater Emergent Wetland

Freshwater Forested/Shrub Wetland

Freshwater Pond

Lake

Riverine

Other

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

## **APPENDIX B**

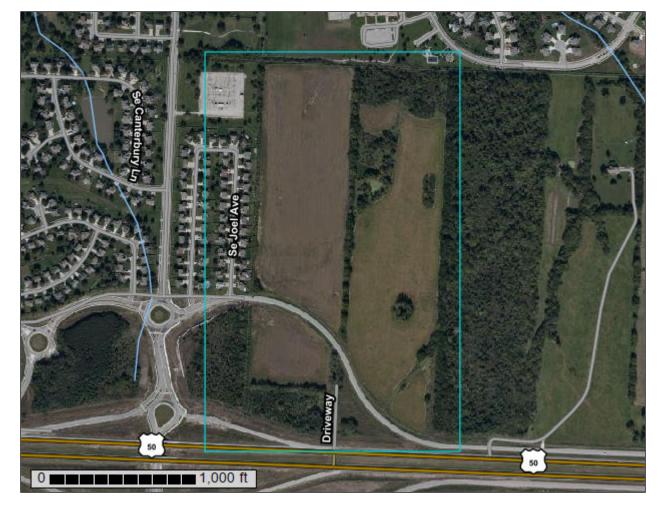
-NRCS Soil Resource Report
-HydroCAD Model Output Report
- Wetland Delineation and Jurisdictional Assessment



**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 Jackson County, Missouri



# **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**

Preface	2
How Soil Surveys Are Made	
Soil Map	
Soil Map	
Legend	
Map Unit Legend	
Map Unit Descriptions	
Jackson County, Missouri	
10000—Arisburg silt loam, 1 to 5 percent slopes	13
10082—Arisburg-Urban land complex, 1 to 5 percent slopes	14
10117—Sampsel silty clay loam, 5 to 9 percent slopes	16
10128—Sharpsburg-Urban land complex, 2 to 5 percent slopes	17
10180—Udarents-Urban land-Sampsel complex, 2 to 5 percent slopes	. 18
10181—Udarents-Urban land-Sampsel complex, 5 to 9 percent slopes	. 20
10183—Udarents-Urban land-Polo complex, 5 to 9 percent slopes	22
Soil Information for All Uses	
Soil Properties and Qualities	25
Soil Qualities and Features	25
Hydrologic Soil Group	. 25
References	30

# **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.



#### 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

(0)

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



Sodic Spot

Slide or Slip

# 8

Spoil Area



Stony Spot



Very Stony Spot



Wet Spot Other



Special Line Features

#### Water Features

\_

Streams and Canals

#### Transportation

Fransp

Rails



Interstate Highways



US Routes



Major Roads



Local Roads

#### Background

Marie Contract

Aerial Photography

#### MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24.000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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: Jackson County, Missouri Survey Area Data: Version 22, May 29, 2020

Soil map units are labeled (as space allows) for map scales 1:50.000 or larger.

Date(s) aerial images were photographed: Sep 6, 2019—Nov 16, 2019

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
10000	Arisburg silt loam, 1 to 5 percent slopes	50.5	46.1%
10082	Arisburg-Urban land complex, 1 to 5 percent slopes	9.1	8.3%
10117	Sampsel silty clay loam, 5 to 9 percent slopes	27.1	24.8%
10128	Sharpsburg-Urban land complex, 2 to 5 percent slopes	5.9	5.4%
10180	Udarents-Urban land-Sampsel complex, 2 to 5 percent slopes	5.8	5.3%
10181	Udarents-Urban land-Sampsel complex, 5 to 9 percent slopes	9.2	8.4%
10183	Udarents-Urban land-Polo complex, 5 to 9 percent slopes	1.9	1.8%
Totals for Area of Interest		109.5	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.

# **Jackson County, Missouri**

#### 10000—Arisburg silt loam, 1 to 5 percent slopes

#### **Map Unit Setting**

National map unit symbol: 2w22b Elevation: 610 to 1,130 feet

Mean annual precipitation: 39 to 43 inches Mean annual air temperature: 50 to 55 degrees F

Frost-free period: 177 to 220 days

Farmland classification: All areas are prime farmland

#### **Map Unit Composition**

Arisburg and similar soils: 87 percent Minor components: 13 percent

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

#### **Description of Arisburg**

#### Setting

Landform: Interfluves

Landform position (two-dimensional): Summit Landform position (three-dimensional): Interfluve

Down-slope shape: Convex Across-slope shape: Convex Parent material: Loess

#### Typical profile

Ap - 0 to 6 inches: silt loam A - 6 to 13 inches: silt loam

Bt - 13 to 19 inches: silty clay loam Btg - 19 to 56 inches: silty clay loam BCg - 56 to 79 inches: silty clay 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 (0.20

to 0.60 in/hr)

Depth to water table: About 18 to 30 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 capacity: High (about 11.5 inches)

#### Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: C

Ecological site: R107BY007MO - Loess Upland Prairie Amorpha canescens/ Andropogon gerardii-Zizia aurea Leadplant/Big Bluestem-Golden Zizia

Hydric soil rating: No

#### **Minor Components**

#### Greenton

Percent of map unit: 5 percent

Landform: Hillslopes

Landform position (two-dimensional): Shoulder Landform position (three-dimensional): Side slope

Down-slope shape: Convex Across-slope shape: Convex

Ecological site: R109XY002MO - Loess Upland Prairie

Hydric soil rating: No

#### **Sharpsburg**

Percent of map unit: 5 percent

Landform: Ridges

Landform position (two-dimensional): Summit Landform position (three-dimensional): Interfluve

Down-slope shape: Linear Across-slope shape: Linear

Ecological site: R109XY002MO - Loess Upland Prairie

Hydric soil rating: No

#### Haig

Percent of map unit: 3 percent

Landform: Flats

Landform position (two-dimensional): Summit Landform position (three-dimensional): Talf

Down-slope shape: Linear Across-slope shape: Convex

Ecological site: R109XY001MO - Claypan Summit Prairie

Hydric soil rating: Yes

# 10082—Arisburg-Urban land complex, 1 to 5 percent slopes

#### Map Unit Setting

National map unit symbol: 2w7ld Elevation: 750 to 1,130 feet

Mean annual precipitation: 39 to 45 inches
Mean annual air temperature: 50 to 55 degrees F

Frost-free period: 177 to 220 days

Farmland classification: All areas are prime farmland

#### **Map Unit Composition**

Arisburg and similar soils: 61 percent

Urban land: 30 percent Minor components: 9 percent

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

#### **Description of Arisburg**

#### Setting

Landform: Interfluves

Landform position (two-dimensional): Summit Landform position (three-dimensional): Interfluve

Down-slope shape: Convex Across-slope shape: Convex Parent material: Loess

#### **Typical profile**

Ap - 0 to 6 inches: silt loam A - 6 to 13 inches: silt loam

Bt - 13 to 19 inches: silty clay loam
Btg - 19 to 56 inches: silty clay loam
BCg - 56 to 79 inches: silty clay 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 (0.20

to 0.60 in/hr)

Depth to water table: About 18 to 30 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 capacity: High (about 11.5 inches)

#### Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: C

Ecological site: R107BY007MO - Loess Upland Prairie Amorpha canescens/ Andropogon gerardii-Zizia aurea Leadplant/Big Bluestem-Golden Zizia

Hydric soil rating: No

#### **Description of Urban Land**

#### Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydric soil rating: No

#### **Minor Components**

#### Sampsel

Percent of map unit: 3 percent

Landform: Hills

Landform position (two-dimensional): Backslope Landform position (three-dimensional): Side slope

Down-slope shape: Convex Across-slope shape: Concave

Ecological site: R109XY010MO - Interbedded Sedimentary Upland Savanna

Hydric soil rating: Yes

#### Greenton

Percent of map unit: 3 percent

Landform: Hillslopes

Landform position (two-dimensional): Shoulder Landform position (three-dimensional): Side slope

Down-slope shape: Convex Across-slope shape: Convex

Ecological site: R109XY002MO - Loess Upland Prairie

Hydric soil rating: No

#### **Sharpsburg**

Percent of map unit: 3 percent

Landform: Ridges

Landform position (two-dimensional): Summit Landform position (three-dimensional): Interfluve

Down-slope shape: Linear Across-slope shape: Linear

Ecological site: R109XY002MO - Loess Upland Prairie

Hydric soil rating: No

## 10117—Sampsel silty clay loam, 5 to 9 percent slopes

#### **Map Unit Setting**

National map unit symbol: 2qkzz

Elevation: 600 to 900 feet

Mean annual precipitation: 33 to 41 inches
Mean annual air temperature: 50 to 55 degrees F

Frost-free period: 177 to 220 days

Farmland classification: Prime farmland if drained

#### **Map Unit Composition**

Sampsel and similar soils: 85 percent

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

#### **Description of Sampsel**

#### Setting

Landform: Hillslopes

Landform position (two-dimensional): Shoulder Landform position (three-dimensional): Side slope

Down-slope shape: Concave

Across-slope shape: Convex, concave

Parent material: Residuum weathered from shale

#### **Typical profile**

Ap - 0 to 13 inches: silty clay loam Bt - 13 to 80 inches: silty clay

#### **Properties and qualities**

Slope: 5 to 9 percent

Depth to restrictive feature: More than 80 inches Drainage class: Somewhat poorly drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to

moderately high (0.06 to 0.20 in/hr)

Depth to water table: About 0 to 18 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 capacity: Moderate (about 8.6 inches)

#### Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: C/D

Ecological site: R109XY010MO - Interbedded Sedimentary Upland Savanna

Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)

Hydric soil rating: No

## 10128—Sharpsburg-Urban land complex, 2 to 5 percent slopes

#### **Map Unit Setting**

National map unit symbol: 2ql09 Elevation: 1,000 to 1,300 feet

Mean annual precipitation: 33 to 41 inches
Mean annual air temperature: 50 to 55 degrees F

Frost-free period: 177 to 220 days

Farmland classification: All areas are prime farmland

#### **Map Unit Composition**

Sharpsburg and similar soils: 60 percent

Urban land: 35 percent

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

#### **Description of Sharpsburg**

#### Setting

Landform: Interfluves

Landform position (two-dimensional): Summit Landform position (three-dimensional): Interfluve

Down-slope shape: Convex Across-slope shape: Convex Parent material: Loess

#### Typical profile

A - 0 to 17 inches: silt loam

Bt - 17 to 55 inches: silty clay loam

C - 55 to 60 inches: silty clay loam

#### **Properties and qualities**

Slope: 2 to 5 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to

moderately high (0.06 to 0.20 in/hr)

Depth to water table: About 24 to 35 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 capacity: Very high (about 12.0 inches)

#### Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: D

Ecological site: R109XY002MO - Loess Upland Prairie

Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)

Hydric soil rating: No

#### **Description of Urban Land**

#### Setting

Landform: Interfluves

Landform position (two-dimensional): Summit Landform position (three-dimensional): Interfluve

#### Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydric soil rating: No

## 10180—Udarents-Urban land-Sampsel complex, 2 to 5 percent slopes

#### Map Unit Setting

National map unit symbol: 1n85h

Elevation: 600 to 900 feet

Mean annual precipitation: 33 to 43 inches
Mean annual air temperature: 50 to 57 degrees F

Frost-free period: 175 to 220 days

Farmland classification: All areas are prime farmland

#### Map Unit Composition

Udarents and similar soils: 41 percent

Urban land: 39 percent

Sampsel and similar soils: 15 percent

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

#### **Description of Udarents**

#### Setting

Landform position (two-dimensional): Summit Landform position (three-dimensional): Crest

Down-slope shape: Convex Across-slope shape: Convex

Parent material: Mine spoil or earthy fill

#### Typical profile

C1 - 0 to 5 inches: silt loam C2 - 5 to 80 inches: silty clay loam

#### **Properties and qualities**

Slope: 2 to 5 percent

Depth to restrictive feature: More than 80 inches Drainage class: Somewhat poorly drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to

moderately high (0.14 to 0.57 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 capacity: Moderate (about 9.0 inches)

#### Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: C

Ecological site: R107BY002MO - Deep Loess Upland Prairie Amorpha

canescens/Schizachyrium scoparium-Sporobolus heterolepis Leadplant/Little

Bluestem-Prairie Dropseed

Other vegetative classification: Mixed/Transitional (Mixed Native Vegetation)

Hydric soil rating: No

#### **Description of Urban Land**

#### Setting

Landform: Interfluves

Landform position (two-dimensional): Summit Landform position (three-dimensional): Interfluve

Across-slope shape: Convex

#### Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydric soil rating: No

#### **Description of Sampsel**

#### Setting

Landform: Hillslopes

Landform position (two-dimensional): Footslope Landform position (three-dimensional): Base slope

Down-slope shape: Concave Across-slope shape: Convex

Parent material: Residuum weathered from shale

**Typical profile** 

Ap - 0 to 13 inches: silty clay loam Bt - 13 to 80 inches: silty clay

Properties and qualities

Slope: 2 to 5 percent

Depth to restrictive feature: More than 80 inches Drainage class: Somewhat poorly drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to

moderately high (0.06 to 0.20 in/hr)

Depth to water table: About 0 to 18 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 capacity: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: C/D

*Ecological site:* R109XY010MO - Interbedded Sedimentary Upland Savanna *Other vegetative classification:* Grass/Prairie (Herbaceous Vegetation)

Hydric soil rating: No

#### 10181—Udarents-Urban land-Sampsel complex, 5 to 9 percent slopes

#### **Map Unit Setting**

National map unit symbol: 1n85g

Elevation: 600 to 900 feet

Mean annual precipitation: 33 to 43 inches Mean annual air temperature: 50 to 57 degrees F

Frost-free period: 175 to 220 days

Farmland classification: Farmland of statewide importance

#### Map Unit Composition

Udarents and similar soils: 41 percent

Urban land: 39 percent

Sampsel and similar soils: 15 percent

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

#### **Description of Udarents**

#### Setting

Landform position (two-dimensional): Shoulder Landform position (three-dimensional): Side slope

Down-slope shape: Convex Across-slope shape: Convex

Parent material: Mine spoil or earthy fill

**Typical profile** 

C1 - 0 to 5 inches: silt loam
C2 - 5 to 80 inches: silty clay loam

Properties and qualities

Slope: 5 to 9 percent

Depth to restrictive feature: More than 80 inches Drainage class: Somewhat poorly drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to

moderately high (0.14 to 0.57 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 capacity: Moderate (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: C

Ecological site: R107BY002MO - Deep Loess Upland Prairie Amorpha

canescens/Schizachyrium scoparium-Sporobolus heterolepis Leadplant/Little

Bluestem-Prairie Dropseed

Other vegetative classification: Mixed/Transitional (Mixed Native Vegetation)

Hydric soil rating: No

#### **Description of Urban Land**

Setting

Landform: Hillslopes

Landform position (two-dimensional): Shoulder Landform position (three-dimensional): Side slope

Across-slope shape: Convex

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydric soil rating: No

#### **Description of Sampsel**

Setting

Landform: Hillslopes

Landform position (two-dimensional): Footslope Landform position (three-dimensional): Base slope

Down-slope shape: Concave Across-slope shape: Convex

Parent material: Residuum weathered from shale

Typical profile

Ap - 0 to 13 inches: silty clay loam Bt - 13 to 80 inches: silty clay

Properties and qualities

Slope: 5 to 9 percent

Depth to restrictive feature: More than 80 inches Drainage class: Somewhat poorly drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to

moderately high (0.06 to 0.20 in/hr)

Depth to water table: About 0 to 18 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 capacity: Moderate (about 8.6 inches)

#### Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: C/D

*Ecological site:* R109XY010MO - Interbedded Sedimentary Upland Savanna *Other vegetative classification:* Grass/Prairie (Herbaceous Vegetation)

Hydric soil rating: No

# 10183—Udarents-Urban land-Polo complex, 5 to 9 percent slopes

#### **Map Unit Setting**

National map unit symbol: 1n85d Elevation: 600 to 1,000 feet

Mean annual precipitation: 33 to 41 inches Mean annual air temperature: 50 to 57 degrees F

Frost-free period: 175 to 220 days

Farmland classification: Farmland of statewide importance

#### Map Unit Composition

Udarents and similar soils: 41 percent

Urban land: 39 percent

Polo and similar soils: 15 percent

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

#### **Description of Udarents**

#### Settina

Landform position (two-dimensional): Shoulder Landform position (three-dimensional): Side slope

Down-slope shape: Convex Across-slope shape: Convex

Parent material: Mine spoil or earthy fill

#### Typical profile

C1 - 0 to 5 inches: silt loam C2 - 5 to 80 inches: silty clay loam

#### **Properties and qualities**

Slope: 5 to 9 percent

Depth to restrictive feature: More than 80 inches Drainage class: Somewhat poorly drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to

moderately high (0.14 to 0.57 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 capacity: Moderate (about 9.0 inches)

#### Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: C

Ecological site: R107BY002MO - Deep Loess Upland Prairie Amorpha

canescens/Schizachyrium scoparium-Sporobolus heterolepis Leadplant/Little

Bluestem-Prairie Dropseed

Other vegetative classification: Mixed/Transitional (Mixed Native Vegetation)

Hydric soil rating: No

#### **Description of Urban Land**

#### Setting

Landform: Hillslopes

Landform position (two-dimensional): Shoulder Landform position (three-dimensional): Side slope

Across-slope shape: Convex

#### Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydric soil rating: No

#### **Description of Polo**

#### Setting

Landform: Hillslopes

Landform position (two-dimensional): Shoulder Landform position (three-dimensional): Side slope

Down-slope shape: Concave

Across-slope shape: Concave, convex Parent material: Loess over residuum

#### Typical profile

A - 0 to 12 inches: silt loam

BA - 12 to 29 inches: silty clay loam Bt1 - 29 to 35 inches: silty clay loam 2Bt2 - 35 to 80 inches: silty clay

#### Properties and qualities

Slope: 5 to 9 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to

moderately high (0.06 to 0.20 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 capacity: High (about 9.9 inches)

#### Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: C

Ecological site: R107BY007MO - Loess Upland Prairie Amorpha canescens/ Andropogon gerardii-Zizia aurea Leadplant/Big Bluestem-Golden Zizia Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)

Hydric soil rating: No

# 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 LEGEND MAP INFORMATION Area of Interest (AOI) The soil surveys that comprise your AOI were mapped at С 1:24.000. Area of Interest (AOI) C/D Soils D Warning: Soil Map may not be valid at this scale. Soil Rating Polygons Not rated or not available Α Enlargement of maps beyond the scale of mapping can cause **Water Features** A/D misunderstanding of the detail of mapping and accuracy of soil Streams and Canals line placement. The maps do not show the small areas of В contrasting soils that could have been shown at a more detailed Transportation scale. B/D Rails ---Interstate Highways Please rely on the bar scale on each map sheet for map C/D **US Routes** measurements. Major Roads Source of Map: Natural Resources Conservation Service Not rated or not available Local Roads Web Soil Survey URL: -Coordinate System: Web Mercator (EPSG:3857) Soil Rating Lines Background Aerial Photography 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: Jackson County, Missouri Not rated or not available Survey Area Data: Version 22, May 29, 2020 **Soil Rating Points** Soil map units are labeled (as space allows) for map scales Α 1:50.000 or larger. A/D Date(s) aerial images were photographed: Sep 6, 2019—Nov 16. 2019 B/D 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
10000	Arisburg silt loam, 1 to 5 percent slopes	С	50.5	46.1%
10082	Arisburg-Urban land complex, 1 to 5 percent slopes	С	9.1	8.3%
10117	Sampsel silty clay loam, 5 to 9 percent slopes	C/D	27.1	24.8%
10128	Sharpsburg-Urban land complex, 2 to 5 percent slopes	D	5.9	5.4%
10180	Udarents-Urban land- Sampsel complex, 2 to 5 percent slopes	С	5.8	5.3%
10181	Udarents-Urban land- Sampsel complex, 5 to 9 percent slopes	С	9.2	8.4%
10183	Udarents-Urban land- Polo complex, 5 to 9 percent slopes	С	1.9	1.8%
Totals for Area of Intere	est	1	109.5	100.0%

# Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition
Component Percent Cutoff: None Specified

Tie-break Rule: Higher

# References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2 053577

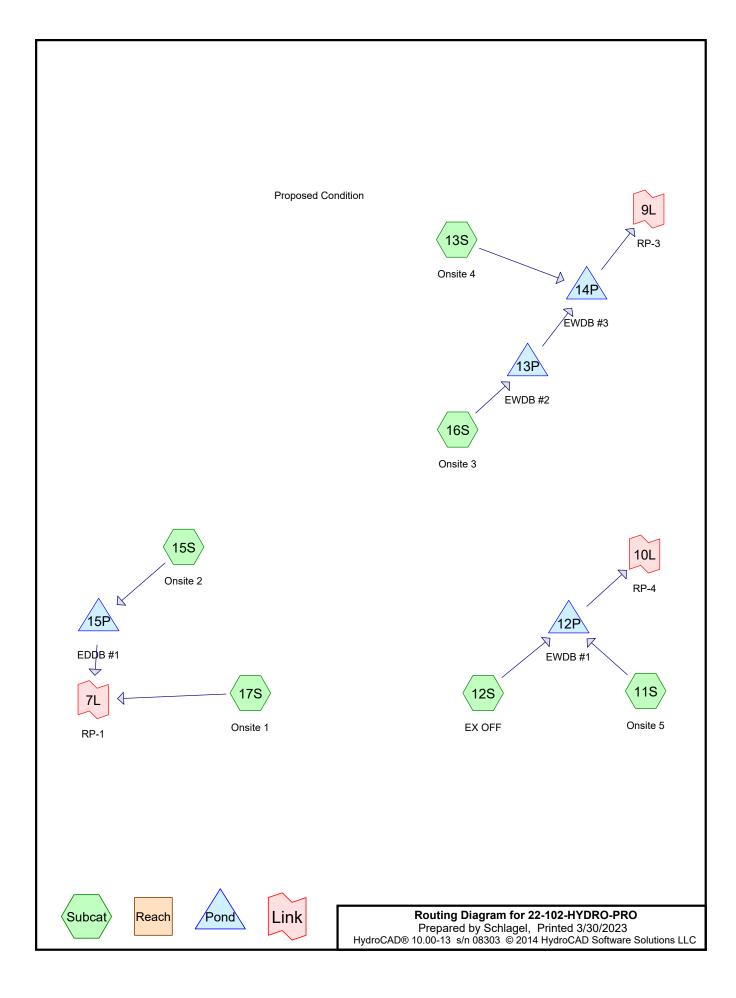
Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2 053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2 053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084



HydroCAD® 10.00-13 s/n 08303 © 2014 HydroCAD Software Solutions LLC

Page 2

### **Summary for Subcatchment 11S: Onsite 5**

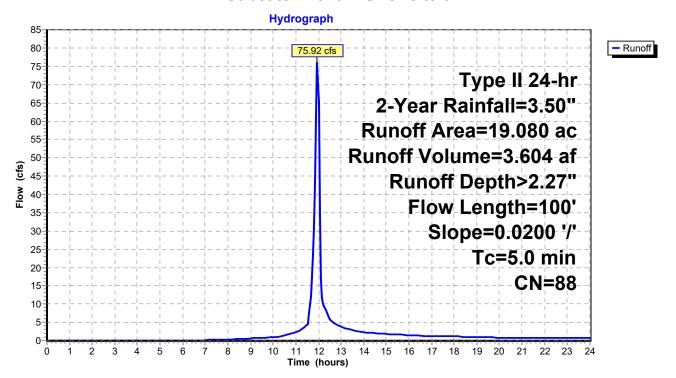
[49] Hint: Tc<2dt may require smaller dt

Runoff = 75.92 cfs @ 11.95 hrs, Volume= 3.604 af, Depth> 2.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 2-Year Rainfall=3.50"

_	Area	(ac) C	N Des	cription		
*	19.	080	38 Apa	rtments, 6	5% imp, HS	SG C
	6.	678	35.0	0% Pervio	us Area	
	12.402 65.00% Impervious Area					
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
_	1.1	100	0.0200	1.46	(013)	Sheet Flow, Smooth surfaces n= 0.011 P2= 3.60"
_	3.9					Direct Entry, Pipe flow
	5.0	100	Total			

#### Subcatchment 11S: Onsite 5



HydroCAD® 10.00-13 s/n 08303 © 2014 HydroCAD Software Solutions LLC

Page 3

# **Summary for Subcatchment 12S: EX OFF**

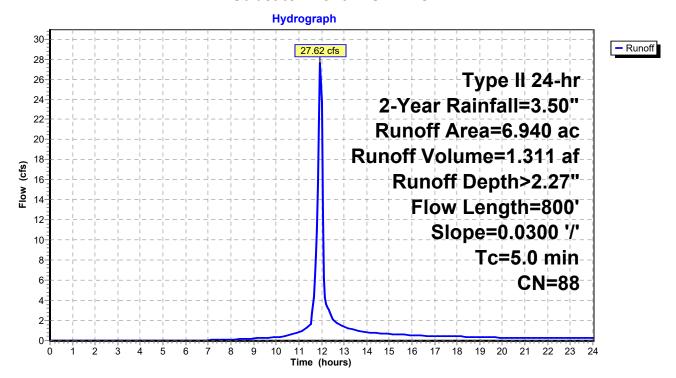
[49] Hint: Tc<2dt may require smaller dt

Runoff = 27.62 cfs @ 11.95 hrs, Volume= 1.311 af, Depth> 2.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 2-Year Rainfall=3.50"

	Area (ac) CN Description					
* 6.940 88 Future Multi-Family, 65% imp, HSG C						imp, HSG C
	2.	429	35.0	0% Pervio	us Area	
	4.511 65.00% Impervious Area					
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
_	1.0	100	0.0300	1.72		Sheet Flow, Sheet flow Smooth surfaces n= 0.011 P2= 3.60"
	4.0	700		2.92		Direct Entry, Pipe flow
	5.0	800	Total			

#### Subcatchment 12S: EX OFF



Page 4

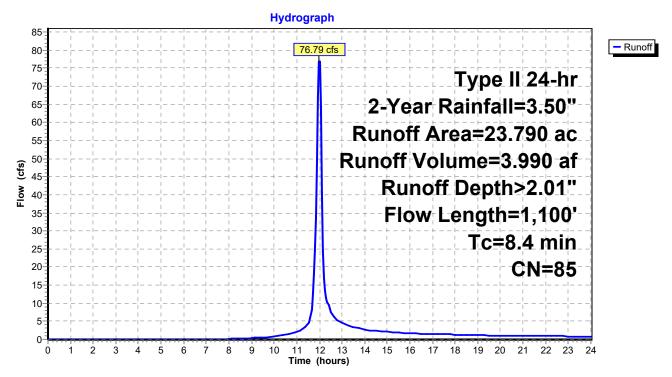
# **Summary for Subcatchment 13S: Onsite 4**

Runoff = 76.79 cfs @ 12.00 hrs, Volume= 3.990 af, Depth> 2.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 2-Year Rainfall=3.50"

_	Area	(ac) (	CN Des	cription		
*	11.	250	82 SIN	GLE FAMI	LY LOTS	
*	12.	540	88 1/8 a	acre lots, 6	5% imp, H	SG D
	23.790 85 Weighted Average					
	15.639 65.74% Pervious Area					
	8.	151	34.2	6% Imperv	∕ious Area	
	Tc	Length	•	Velocity	Capacity	Description
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	1.1	100	0.0205	1.47		Sheet Flow,
						Smooth surfaces n= 0.011 P2= 3.60"
	7.3	1,000	0.0200	2.28		Shallow Concentrated Flow,
_						Unpaved Kv= 16.1 fps
	8.4	1 100	Total			

# Subcatchment 13S: Onsite 4



HydroCAD® 10.00-13 s/n 08303 © 2014 HydroCAD Software Solutions LLC

Page 5

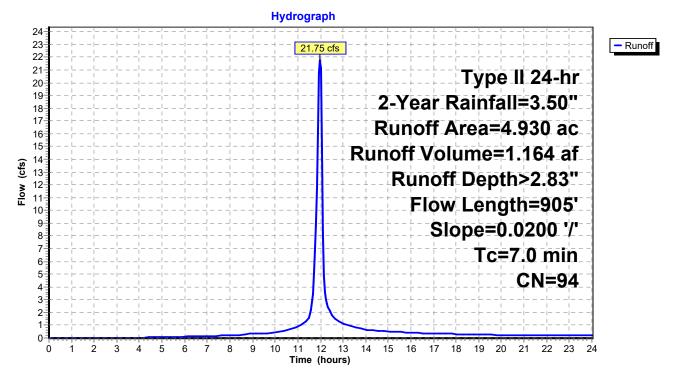
# **Summary for Subcatchment 15S: Onsite 2**

Runoff = 21.75 cfs @ 11.98 hrs, Volume= 1.164 af, Depth> 2.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 2-Year Rainfall=3.50"

_	Area	(ac) C	N Des	cription			
4	4.	930 9	94 Urba	an commei	cial, 85% i	mp, HSG D	
	0.739 15.00% Pervious Area						
	4.190 85.00% Impervious Area						
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description	
	1.1	100	0.0200	1.46		Sheet Flow,	
	5.9	805	0.0200	2.28		Smooth surfaces n= 0.011 P2= 3.60"  Shallow Concentrated Flow, Unpaved Kv= 16.1 fps	
	7.0	905	Total		·		

# Subcatchment 15S: Onsite 2



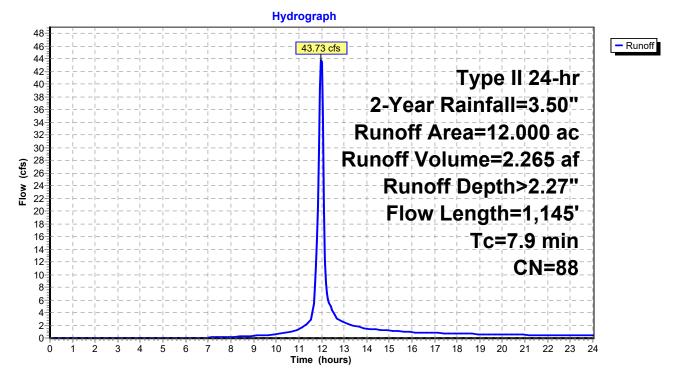
# **Summary for Subcatchment 16S: Onsite 3**

Runoff = 43.73 cfs @ 11.99 hrs, Volume= 2.265 af, Depth> 2.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 2-Year Rainfall=3.50"

Area (ac) CN Description							
•	* 12.	000	38 1/8 a	acre lots, 6	55% imp, H	SG D	
-	4.	200	35.0	0% Pervio	us Area		
	7.800 65.00% Impervious Area						
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description	
-	1.1	100	0.0200	1.46		Sheet Flow,	
	6.8	1,045	0.0250	2.55		Smooth surfaces n= 0.011 P2= 3.60"  Shallow Concentrated Flow, Unpaved Kv= 16.1 fps	
	7.9	1.145	Total		•		

# **Subcatchment 16S: Onsite 3**



Page 7

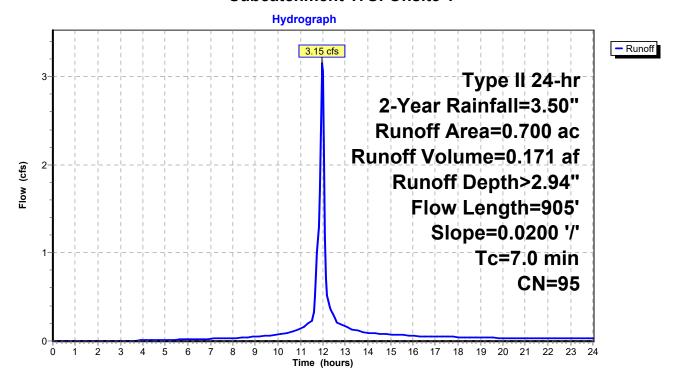
# **Summary for Subcatchment 17S: Onsite 1**

Runoff = 3.15 cfs @ 11.98 hrs, Volume= 0.171 af, Depth> 2.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 2-Year Rainfall=3.50"

	Area	(ac) C	N Desc	cription			
-	0.	700 9	5 Urba	ın commer	cial, 85% ii	mp, HSG D	
•	0.	105	15.0	0% Pervio	us Area		
	0.	595	85.0	0% Imperv	∕ious Area		
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description	
	1.1	100	0.0200	1.46		Sheet Flow,	
	5.9	805	0.0200	2.28		Smooth surfaces n= 0.011 P2= 3.60"  Shallow Concentrated Flow, Unpaved Kv= 16.1 fps	
	7.0	905	Total				

#### **Subcatchment 17S: Onsite 1**



Page 8

# **Summary for Pond 12P: EWDB #1**

Inflow Area = 26.020 ac, 65.00% Impervious, Inflow Depth > 2.27" for 2-Year event

Inflow = 103.54 cfs @ 11.95 hrs, Volume= 4.915 af

Outflow = 15.29 cfs @ 12.17 hrs, Volume= 3.645 af, Atten= 85%, Lag= 13.0 min

Primary = 15.29 cfs @ 12.17 hrs, Volume= 3.645 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Peak Elev= 996.44' @ 12.17 hrs Surf.Area= 67,839 sf Storage= 109,731 cf

Plug-Flow detention time= 195.3 min calculated for 3.637 af (74% of inflow)

Center-of-Mass det. time= 103.8 min ( 910.7 - 806.9 )

Volume	Invert	Avail.Storage	Storage Description
#1	994.80'	561,663 cf	Custom Stage Data (Prismatic)Listed below (Recalc)

Elevation	Surf.Area	Inc.Store	Cum.Store
(feet)	(sq-ft)	(cubic-feet)	(cubic-feet)
994.80	66,251	0	0
996.80	68,192	134,443	134,443
997.00	69,233	13,743	148,186
998.00	74,497	71,865	220,051
999.00	79,862	77,180	297,230
1,000.00	85,328	82,595	379,825
1,001.00	90,894	88,111	467,936
1,002.00	96,560	93,727	561,663

Device	Routing	Invert	Outlet Devices
#1	Primary	994.50'	30.0" Round Culvert
			L= 80.0' RCP, sq.cut end projecting, Ke= 0.500
			Inlet / Outlet Invert= 994.50' / 993.90' S= 0.0075 '/' Cc= 0.900
			n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf
#2	Device 1	994.80'	20.0 deg x 0.70' rise Sharp-Crested Vee/Trap Weir
			Cv= 2.69 (C= 3.36)
#3	Device 1	995.50'	5.0' long x 3.00' rise Sharp-Crested Rectangular Weir
			2 End Contraction(s) 3.0' Crest Height
#4	Device 1	998.50'	<b>60.0" x 60.0" Horiz. Orifice/Grate</b> C= 0.600
			Limited to weir flow at low heads

Primary OutFlow Max=15.24 cfs @ 12.17 hrs HW=996.44' (Free Discharge)

**—1=Culvert** (Passes 15.24 cfs of 17.20 cfs potential flow)

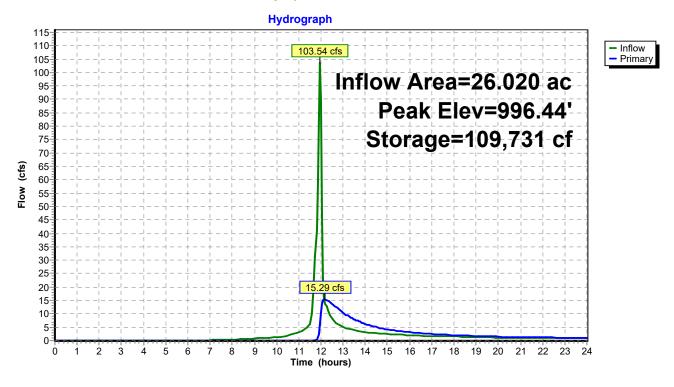
**—2=Sharp-Crested Vee/Trap Weir** (Orifice Controls 0.47 cfs @ 5.44 fps)

-3=Sharp-Crested Rectangular Weir (Weir Controls 14.77 cfs @ 3.28 fps)

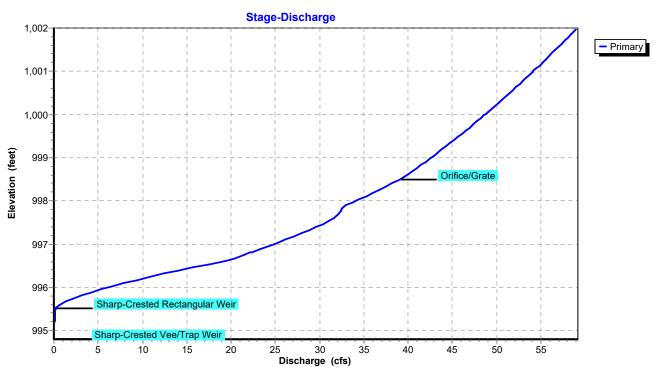
4=Orifice/Grate ( Controls 0.00 cfs)

Page 9

Pond 12P: EWDB #1

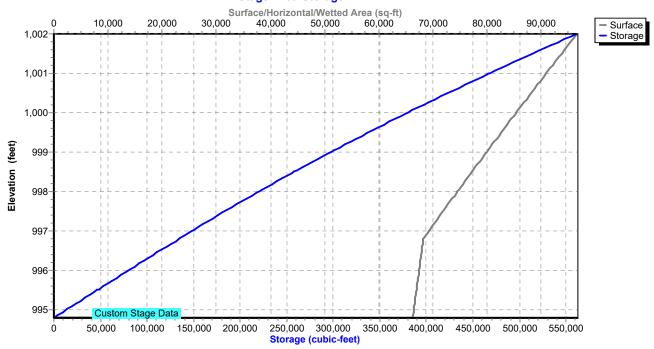


# **Pond 12P: EWDB #1**



Page 10

## **Pond 12P: EWDB #1**



HydroCAD® 10.00-13 s/n 08303 © 2014 HydroCAD Software Solutions LLC

Page 11

# **Summary for Pond 13P: EWDB #2**

Inflow Area = 12.000 ac, 65.00% Impervious, Inflow Depth > 2.27" for 2-Year event

Inflow 43.73 cfs @ 11.99 hrs, Volume= 2.265 af

3.94 cfs @ 12.53 hrs, Volume= Outflow 1.696 af, Atten= 91%, Lag= 32.3 min

Primary 3.94 cfs @ 12.53 hrs, Volume= 1.696 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Peak Elev= 994.33' @ 12.53 hrs Surf.Area= 26,049 sf Storage= 54,208 cf

Plug-Flow detention time= 245.8 min calculated for 1.696 af (75% of inflow)

Center-of-Mass det. time= 154.8 min (964.0 - 809.2)

Volume	Inve	t Avail.Sto	rage	Storage	Description	
#1	992.00	)' 167,26	31 cf	Custom	Stage Data (P	rismatic)Listed below (Recalc)
	_			0.	0 01	
Elevatio		Surf.Area		.Store	Cum.Store	
(feet	t)	(sq-ft)	(cubic	c-feet)	(cubic-feet)	
992.0	0	20,519		0	0	
993.0	0	22,818	2	1,669	21,669	
994.0	0	25,218	2	4,018	45,687	
995.0	0	27,718	2	6,468	72,155	
996.0	0	30,318	2	9,018	101,173	
997.0	0	33,019	3	1,669	132,841	
998.0	0	35,821	3	4,420	167,261	
Device	Routing	Invert	Outle	et Devices	_	
-						
#1	Primary	990.00'	18.0	" Round	Culvert	
			L= 5	5.6' CPF	P, square edge l	neadwall, Ke= 0.500
			Inlet	/ Outlet Ir	nvert= 990.00' /	985.00' S= 0.0899 '/' Cc= 0.900
			n=0	.012 Con	crete pipe, finis	hed, Flow Area= 1.77 sf
#2	Device 1	992.00'				Crested Vee/Trap Weir
		332.30		2.69 (C=		
#3	Device 1	996.00'		`	,	Grate C= 0.600

Limited to weir flow at low heads

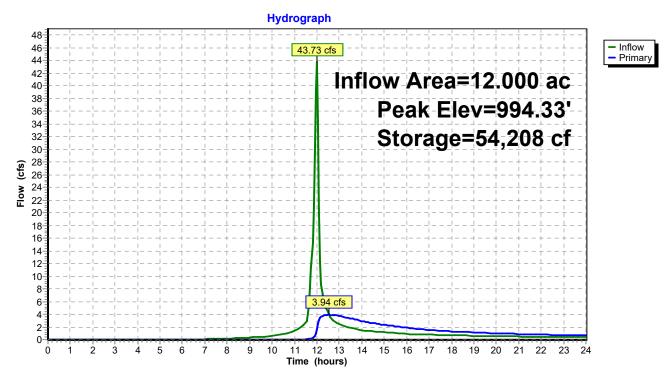
Primary OutFlow Max=3.94 cfs @ 12.53 hrs HW=994.33' (Free Discharge)

-1=Culvert (Passes 3.94 cfs of 16.10 cfs potential flow)

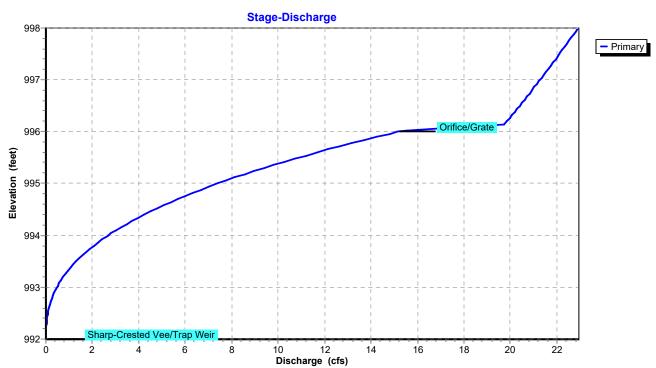
2=Sharp-Crested Vee/Trap Weir (Weir Controls 3.94 cfs @ 4.11 fps)
3=Orifice/Grate (Controls 0.00 cfs)

Page 12

**Pond 13P: EWDB #2** 

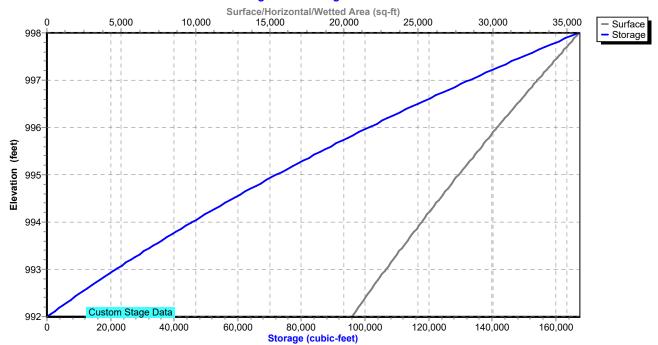


## **Pond 13P: EWDB #2**



Page 13

## **Pond 13P: EWDB #2**



Page 14

# **Summary for Pond 14P: EWDB #3**

[79] Warning: Submerged Pond 13P Primary device # 1 OUTLET by 3.33'

Inflow Area = 35.790 ac, 44.57% Impervious, Inflow Depth > 1.91" for 2-Year event

Inflow = 78.46 cfs @ 12.00 hrs, Volume= 5.686 af

Outflow = 17.52 cfs @ 12.25 hrs, Volume= 4.561 af, Atten= 78%, Lag= 15.2 min

Primary = 17.52 cfs @ 12.25 hrs, Volume= 4.561 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Peak Elev= 988.33' @ 12.25 hrs Surf.Area= 39,956 sf Storage= 83,938 cf

Plug-Flow detention time= 159.1 min calculated for 4.552 af (80% of inflow)

Center-of-Mass det. time= 74.0 min ( 937.0 - 863.1 )

Volume	Inve	ert Avail.Sto	rage Sto	rage Description
#1	986.0	00' 260,92	29 cf <b>Cu</b>	stom Stage Data (Prismatic)Listed below (Recalc)
Elevation	<b>an</b>	Surf.Area	Inc.Sto	re Cum.Store
(fee		(sq-ft)	(cubic-fee	<del></del>
986.0		32,444		0 0
987.0		35,398	33,92	·
988.0		38,453	36,92	
989.0	00	42,954	40,70	•
990.0	00	47,178	45,06	66 156,616
991.0	00	52,032	49,60	05 206,221
992.0	00	57,384	54,70	08 260,929
Device	Routing	Invert	Outlet D	evices
#1	Primary	979.00'	36.0" R	ound Culvert
	•		L= 200.1	' CPP, projecting, no headwall, Ke= 0.900
			Inlet / O	utlet Invert= 979.00' / 977.28' S= 0.0086 '/' Cc= 0.900
			n= 0.012	Concrete pipe, finished, Flow Area= 7.07 sf
#2	Device 1	985.80'	20.0 deg	x 1.60' rise Sharp-Crested Vee/Trap Weir
			•	O (C= 3.36)
#3	Device 1	987.40'		Weir/Orifice, Cv= 2.62 (C= 3.28)
				eet) 987.40 989.10
				eet) 5.00 5.00
#4	Device 1	989.10'		60.0" Horiz. Orifice/Grate C= 0.600
				o weir flow at low heads

Primary OutFlow Max=17.51 cfs @ 12.25 hrs HW=988.33' (Free Discharge)

**-1=Culvert** (Passes 17.51 cfs of 75.20 cfs potential flow)

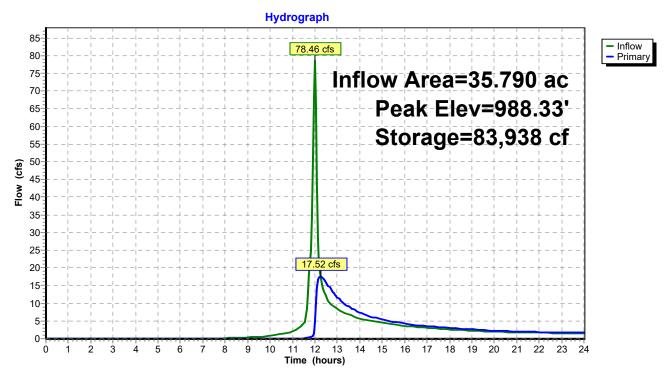
**2=Sharp-Crested Vee/Trap Weir** (Orifice Controls 2.74 cfs @ 6.06 fps)

-3=Custom Weir/Orifice (Weir Controls 14.77 cfs @ 3.16 fps)

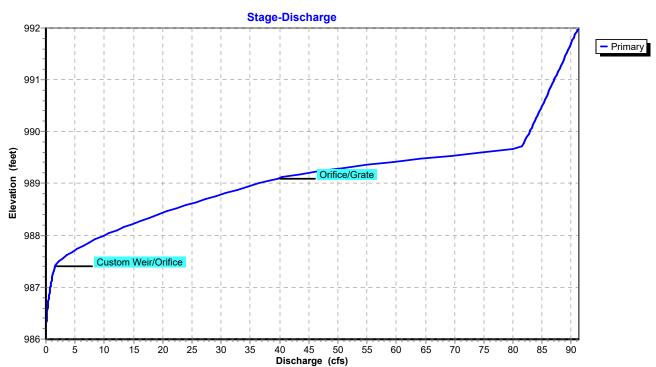
-4=Orifice/Grate (Controls 0.00 cfs)

Page 15

**Pond 14P: EWDB #3** 

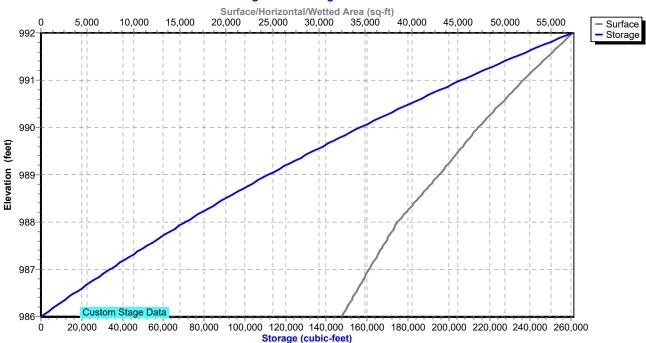


## **Pond 14P: EWDB #3**



Page 16

## **Pond 14P: EWDB #3**



Printed 3/30/2023 Page 17

# Summary for Pond 15P: EDDB #1

Inflow Area = 4.930 ac, 85.00% Impervious, Inflow Depth > 2.83" for 2-Year event

Inflow 21.75 cfs @ 11.98 hrs, Volume= 1.164 af

3.67 cfs @ 12.21 hrs, Volume= Outflow 0.679 af, Atten= 83%, Lag= 13.7 min

Primary 3.67 cfs @ 12.21 hrs, Volume= 0.679 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 1,007.81' @ 12.21 hrs Surf.Area= 13,874 sf Storage= 25,710 cf

Plug-Flow detention time= 193.1 min calculated for 0.677 af (58% of inflow)

Center-of-Mass det. time= 88.3 min ( 869.4 - 781.1 )

Volume	Inver	t Avail.Sto	rage Storage	Description		
#1	1,004.00	)' 68,10	00 cf Custom	Stage Data (Pi	rismatic)Listed below (Rec	alc)
<b>-</b> 14:.		N	la o Otama	0		
Elevation		Surf.Area	Inc.Store	Cum.Store		
(fee		(sq-ft)	(cubic-feet)	(cubic-feet)		
1,004.0		50	0	0		
1,006.0		6,872	6,922	6,922		
1,008.0		14,603	21,475	28,397		
1,010.0	00	25,100	39,703	68,100		
Davidaa	D =		Outlet Davisse	_		
Device	Routing	Invert				
#1	Primary	1,002.00'	24.0" Round			
					ojecting, Ke= 0.500	
				•	'/ 1,001.50' S= 0.0100 '/'	Cc = 0.900
					hed, Flow Area= 3.14 sf	
#2	Device 1	1,002.25'		ORIFICE C=		
#3	Device 1	1,007.50'		Orifice, Cv= 2.		
				,007.50 1,009.	50	
			Width (feet) 6			
#4	Device 2	1,002.50'	6.0" Round 6			
					neadwall, Ke= 0.500	
					' / 1,002.25' S= 0.0083 '/'	Cc= 0.900
					or, Flow Area= 0.20 sf	
#5	Device 2	1,005.00'		<b>RISER X 7.00</b>		
				4.0" cc spacing		
#6	Device 1	1,010.00'	72.0" x 72.0"	Horiz. Orifice/0	<b>Grate</b> C= 0.600	
			Limited to weir	r flow at low hea	ads	

Primary OutFlow Max=3.65 cfs @ 12.21 hrs HW=1,007.81' (Free Discharge)

**-1=Culvert** (Passes 3.65 cfs of 33.18 cfs potential flow)

**-2=2.0" ORIFICE** (Orifice Controls 0.25 cfs @ 11.27 fps)

**-4=6" PVC** (Passes < 2.08 cfs potential flow)

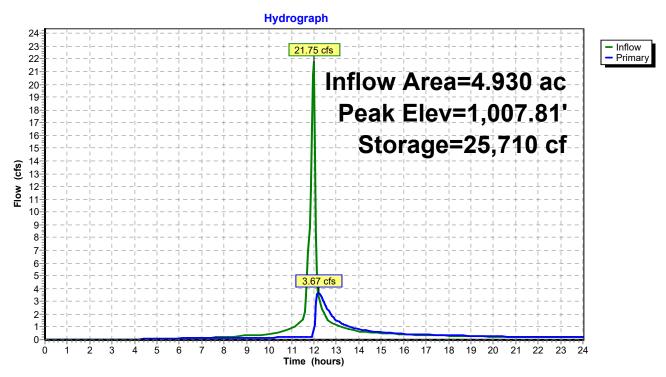
5=15" RISER (Passes < 1.86 cfs potential flow)

-3=Custom Weir/Orifice (Weir Controls 3.40 cfs @ 1.83 fps)

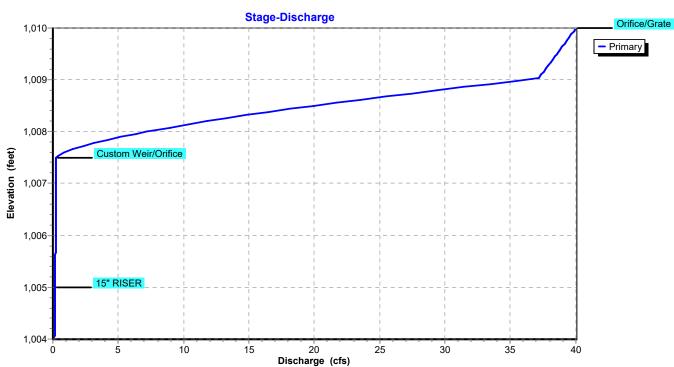
-6=Orifice/Grate (Controls 0.00 cfs)

Page 18

**Pond 15P: EDDB #1** 

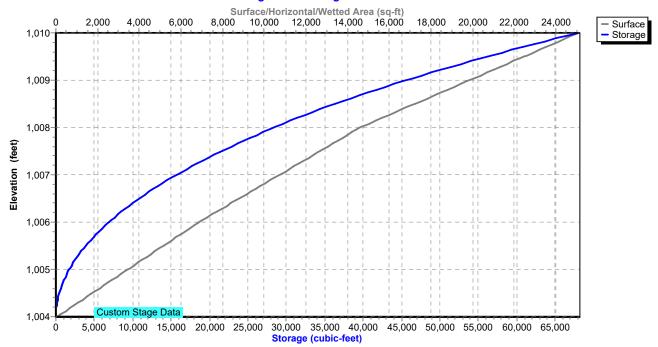


**Pond 15P: EDDB #1** 



Page 19

## Pond 15P: EDDB #1



Page 20

# Summary for Link 7L: RP-1

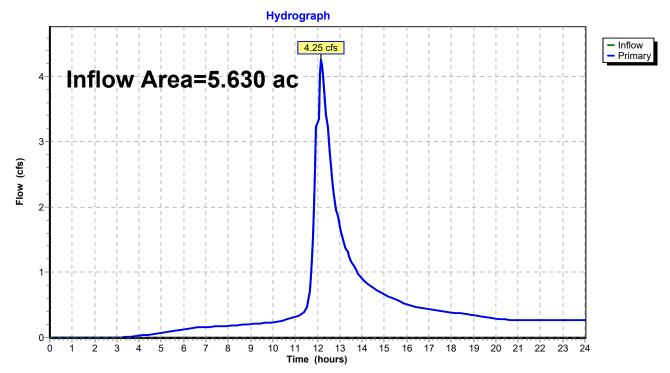
Inflow Area = 5.630 ac, 85.00% Impervious, Inflow Depth > 1.81" for 2-Year event

Inflow = 4.25 cfs @ 12.16 hrs, Volume= 0.850 af

Primary = 4.25 cfs @ 12.16 hrs, Volume= 0.850 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

# Link 7L: RP-1



Page 21

# **Summary for Link 9L: RP-3**

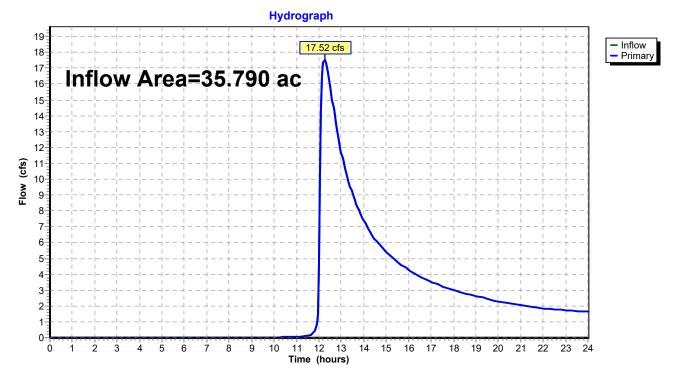
Inflow Area = 35.790 ac, 44.57% Impervious, Inflow Depth > 1.53" for 2-Year event

Inflow = 17.52 cfs @ 12.25 hrs, Volume= 4.561 af

Primary = 17.52 cfs @ 12.25 hrs, Volume= 4.561 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

# Link 9L: RP-3



Page 22

# Summary for Link 10L: RP-4

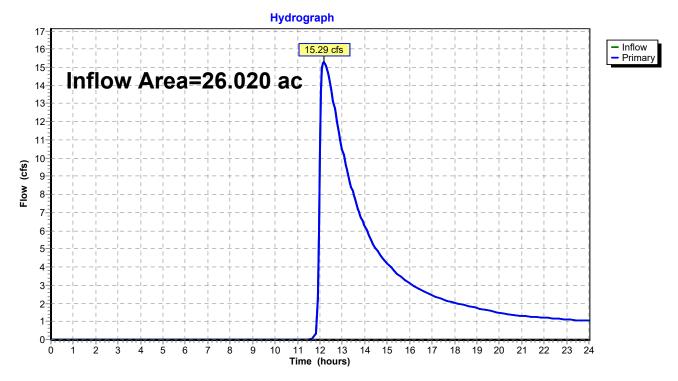
Inflow Area = 26.020 ac, 65.00% Impervious, Inflow Depth > 1.68" for 2-Year event

Inflow = 15.29 cfs @ 12.17 hrs, Volume= 3.645 af

Primary = 15.29 cfs @ 12.17 hrs, Volume= 3.645 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

#### **Link 10L: RP-4**



Page 23

# **Summary for Subcatchment 11S: Onsite 5**

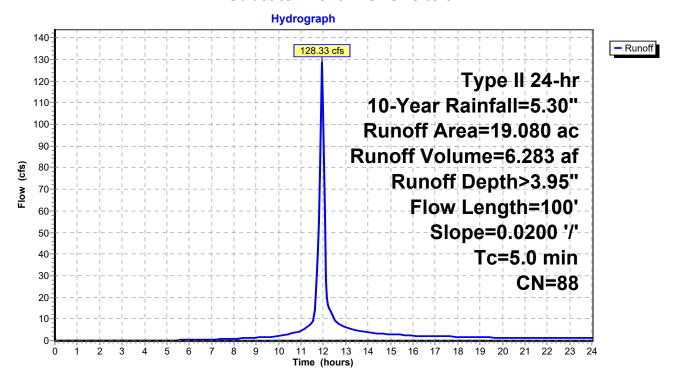
[49] Hint: Tc<2dt may require smaller dt

Runoff = 128.33 cfs @ 11.95 hrs, Volume= 6.283 af, Depth> 3.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 10-Year Rainfall=5.30"

	Area	(ac) C	N Des	cription		
*	19.	080	38 Apai	rtments, 6	5% imp, HS	SG C
	6.	678	35.0	0% Pervio	us Area	
	12.	402	65.0	0% Imperv	ious Area	
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	1.1	100	0.0200	1.46		Sheet Flow,
						Smooth surfaces n= 0.011 P2= 3.60"
_	3.9					Direct Entry, Pipe flow
	5.0	100	Total			

#### Subcatchment 11S: Onsite 5



# **Summary for Subcatchment 12S: EX OFF**

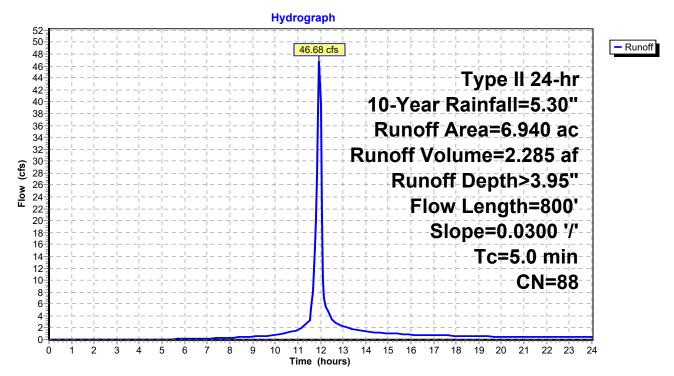
[49] Hint: Tc<2dt may require smaller dt

Runoff = 46.68 cfs @ 11.95 hrs, Volume= 2.285 af, Depth> 3.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 10-Year Rainfall=5.30"

_	Area	(ac) C	N Des	cription		
*	6.	940 8	38 Futu	re Multi-Fa	amily, 65%	imp, HSG C
_	2.	429	35.0	0% Pervio	us Area	
	4.	511	65.0	0% Imperv	∕ious Area	
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
_	1.0	100	0.0300	1.72		Sheet Flow, Sheet flow Smooth surfaces n= 0.011 P2= 3.60"
	4.0	700		2.92		Direct Entry, Pipe flow
	5.0	800	Total			

## Subcatchment 12S: EX OFF



Page 25

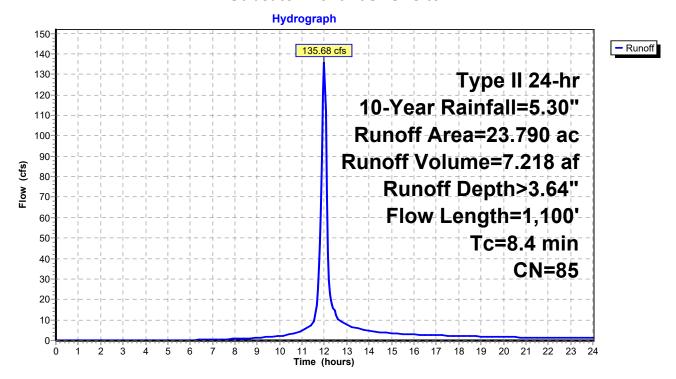
# **Summary for Subcatchment 13S: Onsite 4**

Runoff = 135.68 cfs @ 11.99 hrs, Volume= 7.218 af, Depth> 3.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 10-Year Rainfall=5.30"

	Area	(ac) (	CN Des	cription		
*	11.	250	82 SIN	GLE FAMI	LY LOTS	
*	12.	540	88 1/8	acre lots, 6	55% imp, H	SG D
_	23.	790	85 Wei	ghted Avei	age	
	15.	639	65.7	74% Pervio	us Area	
	8.	151	34.2	26% Imper	vious Area	
	_				_	
	Tc	Length	•	Velocity	Capacity	Description
	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	1.1	100	0.0205	1.47		Sheet Flow,
						Smooth surfaces n= 0.011 P2= 3.60"
	7.3	1,000	0.0200	2.28		Shallow Concentrated Flow,
						Unpaved Kv= 16.1 fps
	84	1 100	Total			

#### Subcatchment 13S: Onsite 4



Page 26

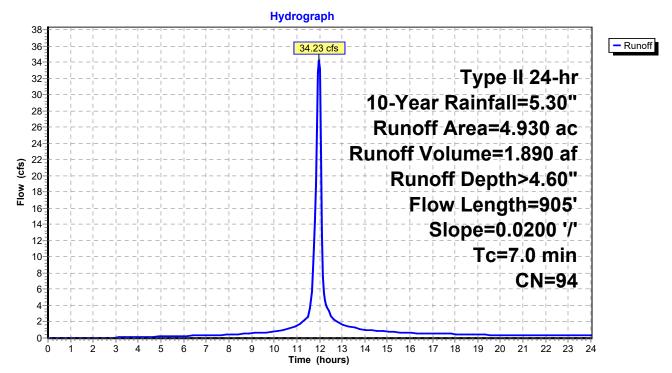
# **Summary for Subcatchment 15S: Onsite 2**

Runoff = 34.23 cfs @ 11.98 hrs, Volume= 1.890 af, Depth> 4.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 10-Year Rainfall=5.30"

	Area	(ac) C	N Des	cription			
*	4.	930 9	94 Urba	an commei	cial, 85% i	mp, HSG D	
	0.	739	15.0	0% Pervio	us Area		
	4.	190	85.0	0% Imper	∕ious Area		
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description	
	1.1	100	0.0200	1.46		Sheet Flow,	
	5.9	805	0.0200	2.28		Smooth surfaces n= 0.011 P2= 3.60"  Shallow Concentrated Flow, Unpaved Kv= 16.1 fps	
	7.0	905	Total	·			

# Subcatchment 15S: Onsite 2



Page 27

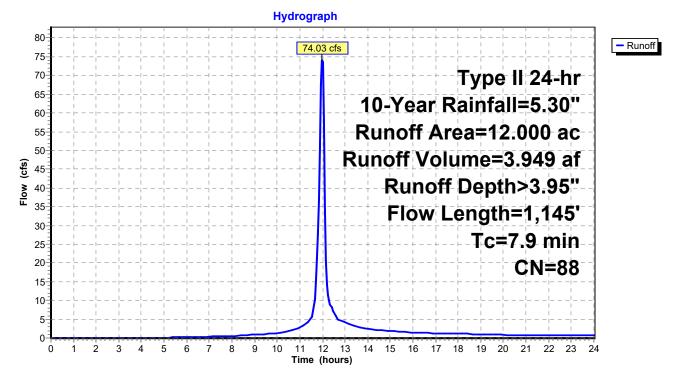
# **Summary for Subcatchment 16S: Onsite 3**

Runoff = 74.03 cfs @ 11.99 hrs, Volume= 3.949 af, Depth> 3.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 10-Year Rainfall=5.30"

_	Area	(ac) C	N Desc	cription			
7	12.	000	38 1/8 a	acre lots, 6	5% imp, H	SG D	
_	4.	200	35.0	0% Pervio	us Area		
	7.	800	65.0	0% Imperv	ious Area		
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description	
_	1.1	100	0.0200	1.46		Sheet Flow,	
	6.8	1,045	0.0250	2.55		Smooth surfaces n= 0.011 P2= 3.60"  Shallow Concentrated Flow, Unpaved Kv= 16.1 fps	
	7.9	1 145	Total				

# **Subcatchment 16S: Onsite 3**



Page 28

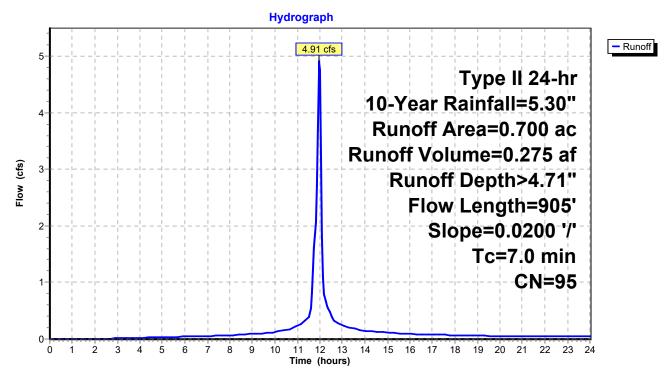
# **Summary for Subcatchment 17S: Onsite 1**

Runoff = 4.91 cfs @ 11.98 hrs, Volume= 0.275 af, Depth> 4.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 10-Year Rainfall=5.30"

	Area (ac) CN Description								
-	0.700 95 Urban commercial, 85% imp, HSG D								
•	0.								
	0.	595	85.0	0% Imperv	∕ious Area				
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description			
	1.1	100	0.0200	1.46		Sheet Flow,			
	5.9	805	0.0200	2.28		Smooth surfaces n= 0.011 P2= 3.60"  Shallow Concentrated Flow, Unpaved Kv= 16.1 fps			
	7.0	905	Total						

# **Subcatchment 17S: Onsite 1**



Page 29

# **Summary for Pond 12P: EWDB #1**

Inflow Area = 26.020 ac, 65.00% Impervious, Inflow Depth > 3.95" for 10-Year event

Inflow = 175.01 cfs @ 11.95 hrs, Volume= 8.569 af

Outflow = 31.31 cfs @ 12.13 hrs, Volume= 7.212 af, Atten= 82%, Lag= 10.8 min

Primary = 31.31 cfs @ 12.13 hrs, Volume= 7.212 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Peak Elev= 997.57' @ 12.13 hrs Surf.Area= 72,237 sf Storage= 188,545 cf

Plug-Flow detention time= 157.2 min calculated for 7.197 af (84% of inflow)

Center-of-Mass det. time= 88.2 min ( 879.5 - 791.2 )

Volume	Inve	rt Avail.Sto	rage	Storage	Description			
#1	994.8	0' 561,66	33 cf	Custom	Stage Data (P	rismatic)Listed below (Recalc)		
Elevation	n (	Surf.Area		Store	Cum.Store			
(fee		(sq-ft)	(cubic-feet)		(cubic-feet)			
994.8		66,251	Ó		0			
996.8	30	•		4,443	134,443			
997.0		69,233		3,743	148,186			
998.0		•		1,865	220,051			
999.0		79,862		7,180	297,230			
1,000.0		85,328		2,595	379,825			
1,001.0		90,894		8,111	467,936			
1,002.0	00	96,560	93	3,727	561,663			
Device	Routing	outing Invert		t Devices	S			
#1	Primary	994.50'	30.0"	Round	Culvert			
L= 80.0' RCP, sq.cut end projecting, Ke= 0.500					ojecting, Ke= 0.500			
			Inlet / Outlet Invert= 994.50' / 993.90' S= 0.0075 '/' Cc= 0.900					
n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf					hed, Flow Area= 4.91 sf			
#2 Device 1 994.80' 20.0 deg x 0.70' rise Sharp-Crested Vee/Trap Weir				Crested Vee/Trap Weir				
			Cv= 2.69 (C= 3.36)					
#3 Device 1 995.50' <b>5.0' long x 3.00' rise Sharp-Creste</b>								
			2 End Contraction(s) 3.0' Crest Height					
#4	Device 1	998.50'	60.0" x 60.0" Horiz. Orifice/Grate C= 0.600					

Limited to weir flow at low heads

Primary OutFlow Max=31.30 cfs @ 12.13 hrs HW=997.57' (Free Discharge)

-1=Culvert (Barrel Controls 31.30 cfs @ 6.62 fps)

—2=Sharp-Crested Vee/Trap Weir (Passes < 0.66 cfs potential flow)

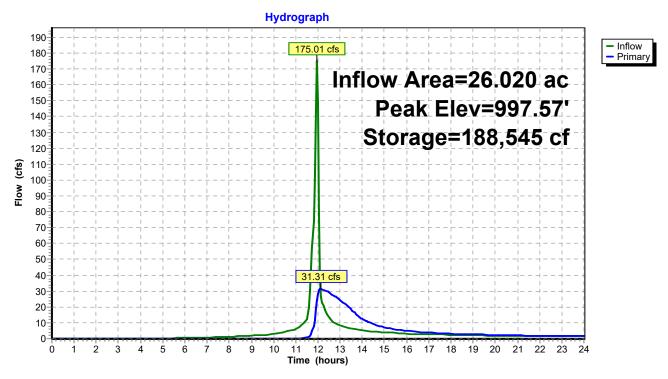
**-3=Sharp-Crested Rectangular Weir**(Passes < 48.37 cfs potential flow)

**4=Orifice/Grate** (Controls 0.00 cfs)

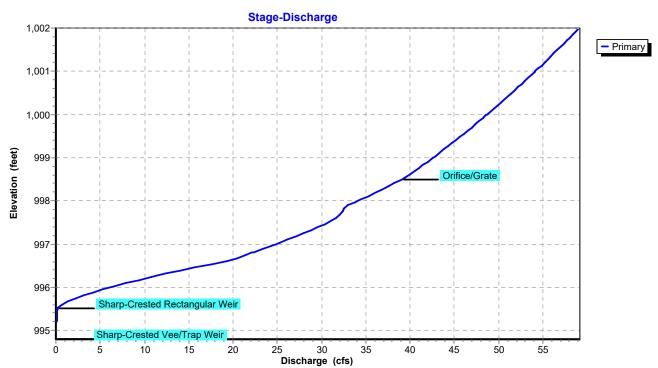
Printed 3/30/2023

Page 30

Pond 12P: EWDB #1

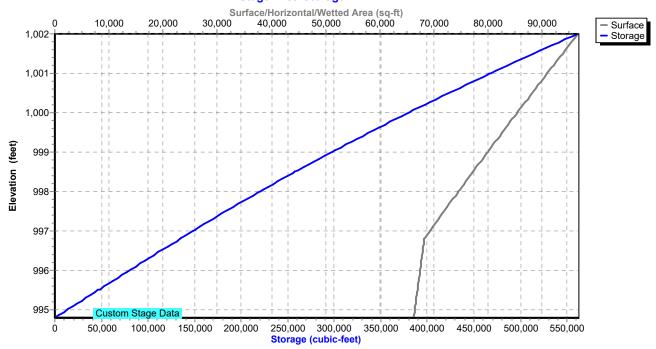


**Pond 12P: EWDB #1** 



Page 31

## **Pond 12P: EWDB #1**



HydroCAD® 10.00-13 s/n 08303 © 2014 HydroCAD Software Solutions LLC

Page 32

# **Summary for Pond 13P: EWDB #2**

Inflow Area = 12.000 ac, 65.00% Impervious, Inflow Depth > 3.95" for 10-Year event

Inflow 74.03 cfs @ 11.99 hrs, Volume= 3.949 af

11.91 cfs @ 12.25 hrs, Volume= Outflow 3.286 af, Atten= 84%, Lag= 15.6 min

Primary 11.91 cfs @ 12.25 hrs, Volume= 3.286 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Peak Elev= 995.63' @ 12.25 hrs Surf.Area= 29,356 sf Storage= 90,135 cf

Plug-Flow detention time= 194.9 min calculated for 3.279 af (83% of inflow)

Center-of-Mass det. time= 123.5 min ( 917.0 - 793.5 )

Volume	Inve	rt Avail.Sto	rage Storage	Description			
#1	992.00	0' 167,26	31 cf Custom	Stage Data (Pr	rismatic)Listed below (Recalc)		
_,	_			0 01			
Elevatio	n S	Surf.Area	Inc.Store	Cum.Store			
(feet	t)	(sq-ft)	(cubic-feet)	(cubic-feet)			
992.0	0	20,519	0	0			
993.0	0	22,818	21,669	21,669			
994.0	0	25,218	24,018	45,687			
995.0	0	27,718	26,468	72,155			
996.0	0	30,318	29,018	101,173			
997.0	0	33,019	31,669	132,841			
998.0	0	35,821	34,420	167,261			
Device	Routing	Invert	Outlet Device	s			
#1	Primary	990.00'	18.0" Round	l Culvert			
L= 55.6' CPP, square edge headwall, Ke= 0.500							
			Inlet / Outlet Invert= 990.00' / 985.00' S= 0.0899 '/' Cc= 0.900				
	ned, Flow Area= 1.77 sf						
#2 Device 1 992.00' 20.0 deg x 4.00' rise Sharp-Crested Vee/Trap Weir							
Cv= 2.69 (C= 3.36)							
#3 Device 1 996.00' <b>60.0" x 60.0" Horiz. Orifice/Grate</b>				Grate C= 0.600			

Limited to weir flow at low heads

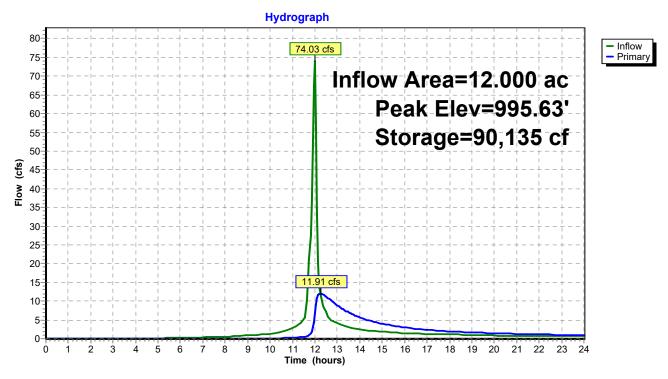
Primary OutFlow Max=11.91 cfs @ 12.25 hrs HW=995.63' (Free Discharge)

**-1=Culvert** (Passes 11.91 cfs of 18.80 cfs potential flow)

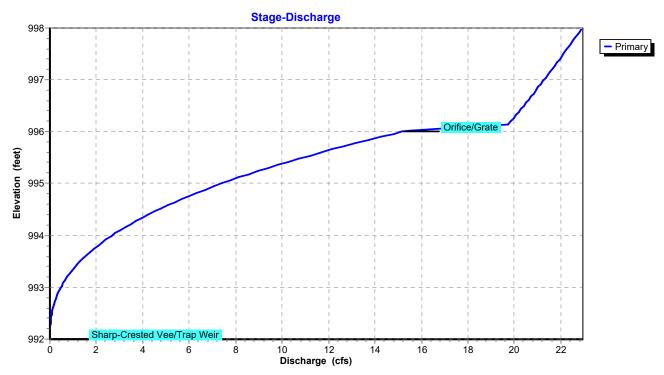
2=Sharp-Crested Vee/Trap Weir (Weir Controls 11.91 cfs @ 5.13 fps)
3=Orifice/Grate (Controls 0.00 cfs)

Page 33

**Pond 13P: EWDB #2** 

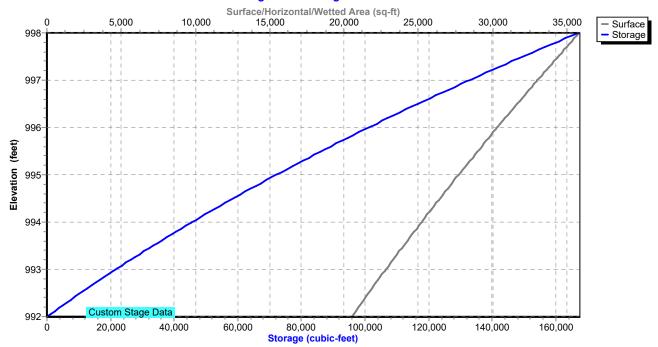


## **Pond 13P: EWDB #2**



Page 34

## **Pond 13P: EWDB #2**



Printed 3/30/2023 Page 35

# **Summary for Pond 14P: EWDB #3**

[79] Warning: Submerged Pond 13P Primary device # 1 OUTLET by 4.53'

Inflow Area = 35.790 ac, 44.57% Impervious, Inflow Depth > 3.52" for 10-Year event

Inflow = 142.24 cfs @ 12.00 hrs, Volume= 10.504 af

Outflow = 69.83 cfs @ 12.12 hrs, Volume= 9.298 af, Atten= 51%, Lag= 7.6 min

Primary = 69.83 cfs @ 12.12 hrs, Volume= 9.298 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 989.55' @ 12.12 hrs Surf.Area= 45,267 sf Storage= 135,700 cf

Plug-Flow detention time= 105.6 min calculated for 9.279 af (88% of inflow)

Center-of-Mass det. time= 50.4 min (889.4 - 839.0)

Volume	Inve	rt Avail.Sto	rage Stor	rage Description			
#1	986.0	0' 260,92	29 cf Cus	stom Stage Data (Prismatic)Listed below (Recalc)			
Classatis		Court Amara		Cum Stara			
Elevation		Surf.Area	Inc.Stor				
(fee		(sq-ft)	(cubic-feet				
986.0		32,444		0 0			
987.0		35,398	33,92				
988.0	00	38,453	36,92				
989.0	00	42,954	40,70	4 111,550			
990.0	00	47,178	45,06	6 156,616			
991.0	00	52,032	49,60	5 206,221			
992.0	00	57,384	54,70	8 260,929			
Device	Routing	Invert	Outlet De	evices			
#1	Primary	979.00'	36.0" Ro	ound Culvert			
	,		L= 200.1' CPP, projecting, no headwall, Ke= 0.900				
				tlet Invert= 979.00' / 977.28' S= 0.0086 '/' Cc= 0.900			
	Concrete pipe, finished, Flow Area= 7.07 sf						
#2	Device 1	985.80'	· · · · · · · · · · · · · · · · · · ·				
			Cv= 2.69 (C= 3.36)				
#3	Device 1	987.40'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28)				
•	et) 987.40 989.10						
	et) 5.00 5.00						
#4	Device 1	<b>0.0" Horiz. Orifice/Grate</b> C= 0.600					
		989.10'	Limited to weir flow at low heads				

Primary OutFlow Max=68.22 cfs @ 12.12 hrs HW=989.53' (Free Discharge)

**1=Culvert** (Passes 68.22 cfs of 80.73 cfs potential flow)

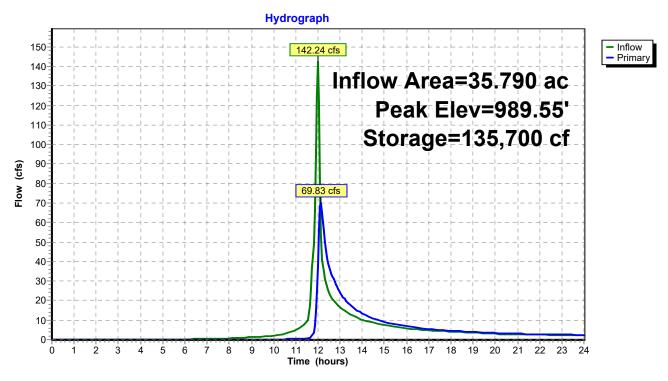
**2=Sharp-Crested Vee/Trap Weir** (Orifice Controls 3.70 cfs @ 8.21 fps)

**-3=Custom Weir/Orifice** (Orifice Controls 46.24 cfs @ 5.44 fps)

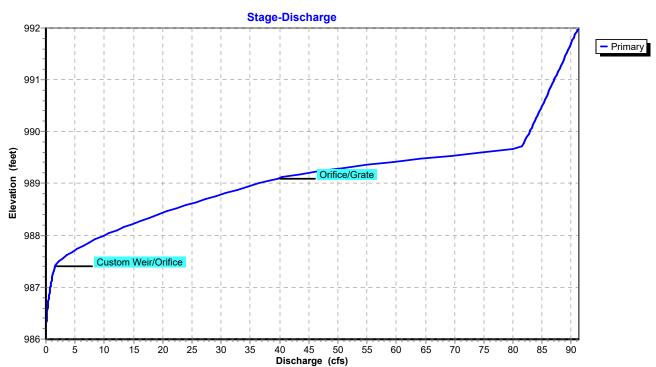
-4=Orifice/Grate (Weir Controls 18.28 cfs @ 2.14 fps)

Page 36

**Pond 14P: EWDB #3** 

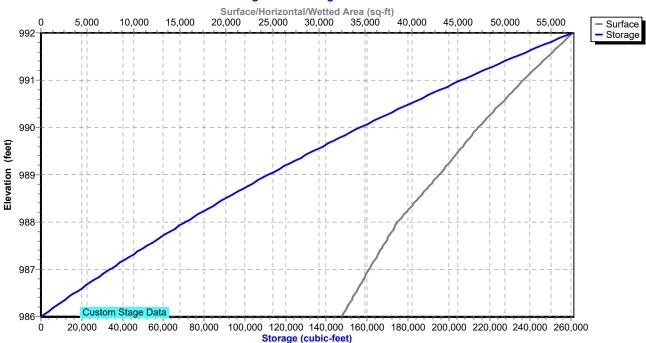


**Pond 14P: EWDB #3** 



Page 37

## **Pond 14P: EWDB #3**



Volume

HydroCAD® 10.00-13 s/n 08303 © 2014 HydroCAD Software Solutions LLC

Page 38

# **Summary for Pond 15P: EDDB #1**

Inflow Area = 4.930 ac, 85.00% Impervious, Inflow Depth > 4.60" for 10-Year event

Inflow 34.23 cfs @ 11.98 hrs, Volume= 1.890 af

18.02 cfs @ 12.08 hrs, Volume= Outflow 1.390 af, Atten= 47%, Lag= 6.0 min

Primary 18.02 cfs @ 12.08 hrs, Volume= 1.390 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 1,008.44' @ 12.08 hrs Surf.Area= 16,886 sf Storage= 35,246 cf

Avail.Storage Storage Description

Plug-Flow detention time= 147.1 min calculated for 1.390 af (74% of inflow)

Center-of-Mass det. time= 56.9 min (825.4 - 768.5)

Invert

Volume	IIIVEI	t Avail.010	rage Storag	e Description			
#1	1,004.00	)' 68,10	00 cf Custo	m Stage Data (Pı	rismatic)Listed below (Rec	alc)	
Elevation		Surf.Area	Inc.Store	Cum.Store			
(fee		(sq-ft)	(cubic-feet)	(cubic-feet)			
1,004.0		50	0	0			
1,006.0		6,872	6,922	6,922			
1,008.0		14,603	21,475	28,397			
1,010.0	00	25,100	39,703	68,100			
Device	Routing	Invert	Outlet Device	ces			
#1	Primary	1,002.00'	24.0" Rour	nd Culvert			
	·		Inlet / Outlet	t Invert= 1,002.00'	ojecting, Ke= 0.500 ' / 1,001.50' S= 0.0100 '/' hed, Flow Area= 3.14 sf	Cc= 0.900	
#2	Device 1	1,002.25'	2.0" Vert. 2.	0.600			
#3	Device 1	1,007.50'	Custom Weir/Orifice, Cv= 2.62 (C= 3.28) Elev. (feet) 1,007.50 1,009.50 Width (feet) 6.00 6.00				
#4	Device 2	1,002.50'	<ul> <li>6.0" Round 6" PVC</li> <li>L= 30.0' CPP, square edge headwall, Ke= 0.500</li> <li>Inlet / Outlet Invert= 1,002.50' / 1,002.25' S= 0.0083 '/' Cc= 0.9</li> <li>n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf</li> </ul>				
#5	Device 2	1,005.00'					
#6 Device 1 1,010.00' <b>72.0" x 72.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads							

Primary OutFlow Max=17.76 cfs @ 12.08 hrs HW=1,008.43' (Free Discharge)

**-1=Culvert** (Passes 17.76 cfs of 35.23 cfs potential flow)

**-2=2.0" ORIFICE** (Orifice Controls 0.26 cfs @ 11.88 fps)

**-4=6" PVC** (Passes < 2.20 cfs potential flow)

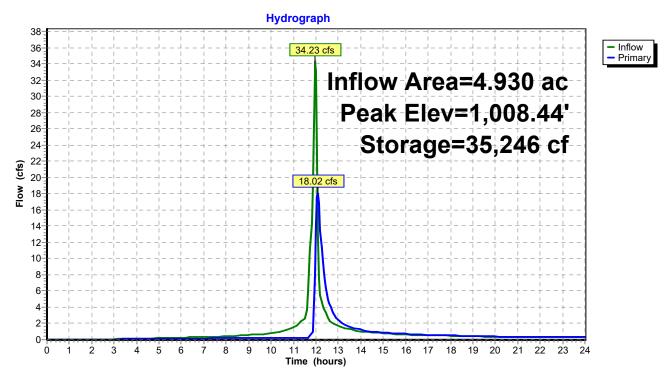
5=15" RISER (Passes < 2.31 cfs potential flow)

-3=Custom Weir/Orifice (Weir Controls 17.50 cfs @ 3.15 fps)

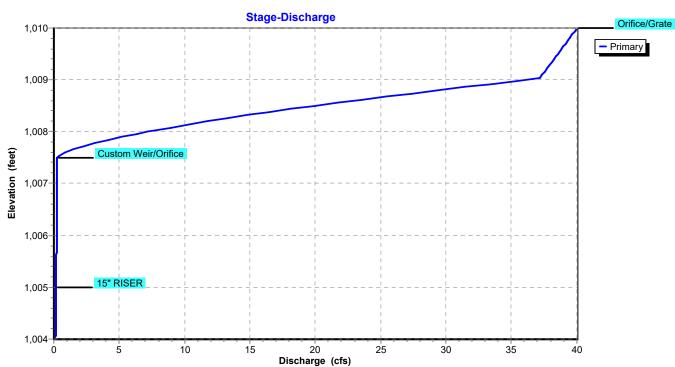
-6=Orifice/Grate (Controls 0.00 cfs)

Page 39

**Pond 15P: EDDB #1** 

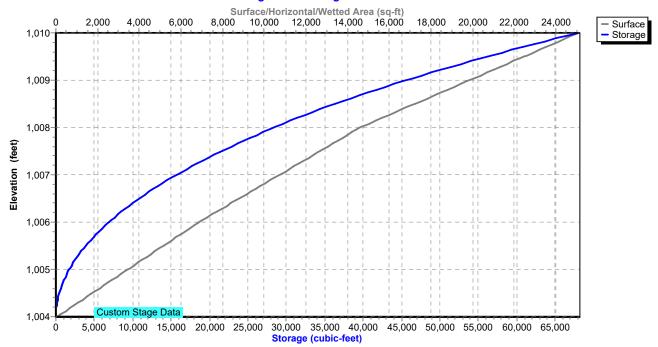


**Pond 15P: EDDB #1** 



Page 40

## Pond 15P: EDDB #1



Page 41

# Summary for Link 7L: RP-1

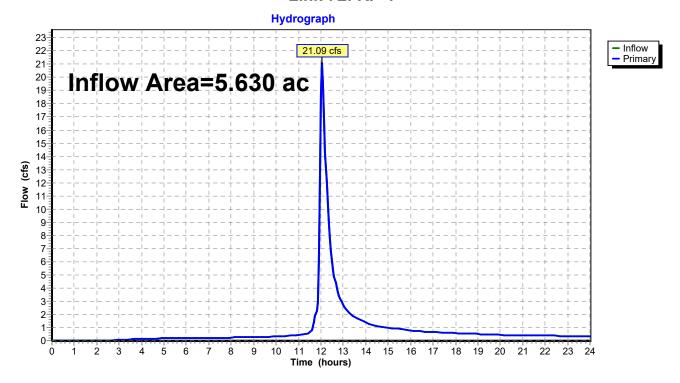
Inflow Area = 5.630 ac, 85.00% Impervious, Inflow Depth > 3.55" for 10-Year event

Inflow = 21.09 cfs @ 12.06 hrs, Volume= 1.665 af

Primary = 21.09 cfs @ 12.06 hrs, Volume= 1.665 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

#### Link 7L: RP-1



Page 42

# **Summary for Link 9L: RP-3**

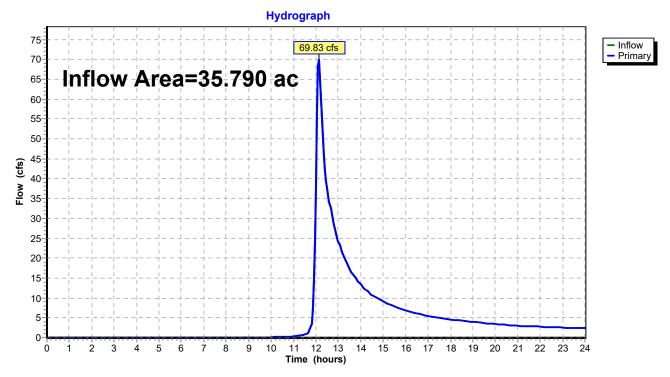
Inflow Area = 35.790 ac, 44.57% Impervious, Inflow Depth > 3.12" for 10-Year event

Inflow = 69.83 cfs @ 12.12 hrs, Volume= 9.298 af

Primary = 69.83 cfs @ 12.12 hrs, Volume= 9.298 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

# Link 9L: RP-3



Page 43

# Summary for Link 10L: RP-4

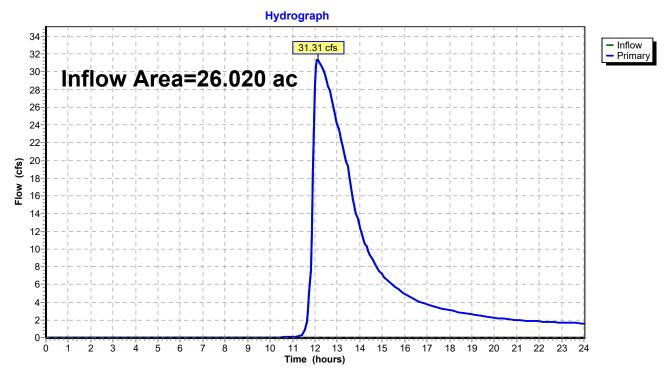
Inflow Area = 26.020 ac, 65.00% Impervious, Inflow Depth > 3.33" for 10-Year event

Inflow = 31.31 cfs @ 12.13 hrs, Volume= 7.212 af

Primary = 31.31 cfs @ 12.13 hrs, Volume= 7.212 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## **Link 10L: RP-4**



# **Summary for Subcatchment 11S: Onsite 5**

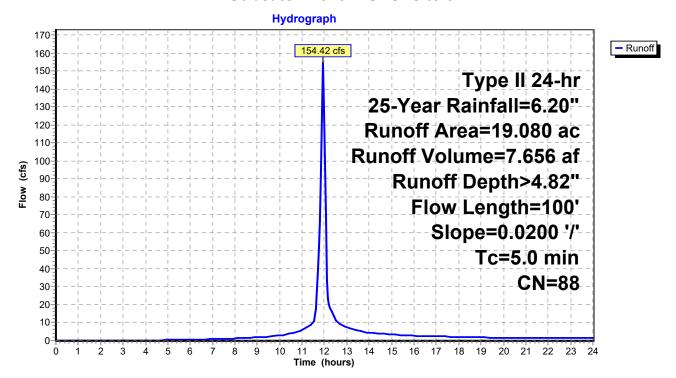
[49] Hint: Tc<2dt may require smaller dt

Runoff = 154.42 cfs @ 11.95 hrs, Volume= 7.656 af, Depth> 4.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 25-Year Rainfall=6.20"

_	Area	(ac) C	N Des	cription						
*	19.	080	38 Apa	partments, 65% imp, HSG C						
	6.678 35.00% Pervious Area									
	12.	402	65.0	0% Imperv	∕ious Area					
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description				
_	1.1	100	0.0200	1.46	(013)	Sheet Flow, Smooth surfaces n= 0.011 P2= 3.60"				
_	3.9					Direct Entry, Pipe flow				
	5.0	100	Total							

#### Subcatchment 11S: Onsite 5



Page 45

# **Summary for Subcatchment 12S: EX OFF**

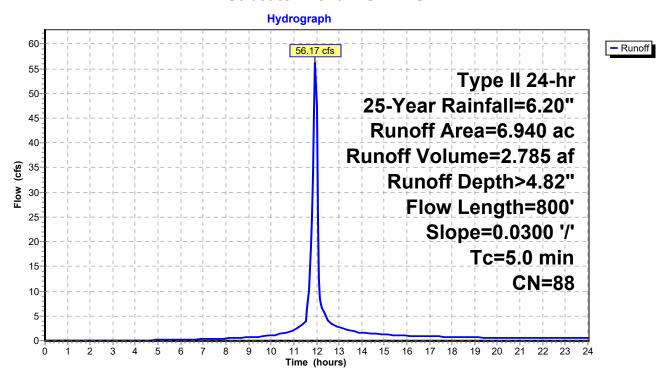
[49] Hint: Tc<2dt may require smaller dt

Runoff = 56.17 cfs @ 11.95 hrs, Volume= 2.785 af, Depth> 4.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 25-Year Rainfall=6.20"

_	Area	(ac) C	N Des	cription				
*	6.	6.940 88 Future Multi-Family, 65% imp, HSG C						
_	2.							
4.511 65.00% Impervious Area								
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description		
_	1.0	100	0.0300	1.72		Sheet Flow, Sheet flow Smooth surfaces n= 0.011 P2= 3.60"		
	4.0	700		2.92		Direct Entry, Pipe flow		
	5.0	800	Total					

#### Subcatchment 12S: EX OFF



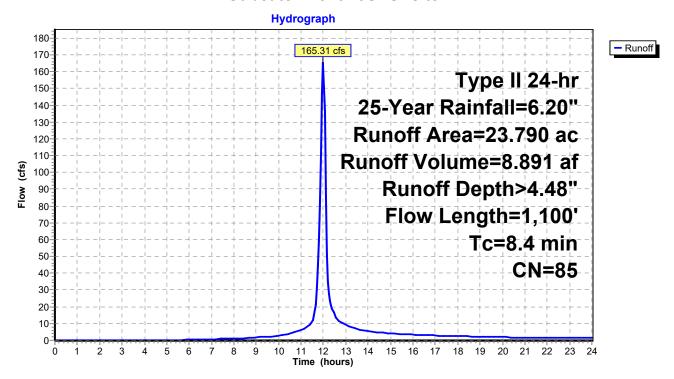
## **Summary for Subcatchment 13S: Onsite 4**

Runoff = 165.31 cfs @ 11.99 hrs, Volume= 8.891 af, Depth> 4.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 25-Year Rainfall=6.20"

	Area	(ac) (	CN Des	cription					
*	11.	250	82 SINGLE FAMILY LOTS						
*	12.	540	88 1/8 8	acre lots, 6	5% imp, H	SG D			
	23.790 85 Weighted Average								
	15.	639	65.7	4% Pervio	us Area				
	8.151 34.26% Impervious Area								
	Tc	Length		Velocity	Capacity	Description			
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)				
	1.1	100	0.0205	1.47		Sheet Flow,			
						Smooth surfaces n= 0.011 P2= 3.60"			
	7.3	1,000	0.0200	2.28		Shallow Concentrated Flow,			
_						Unpaved Kv= 16.1 fps			
	84	1 100	Total						

## Subcatchment 13S: Onsite 4



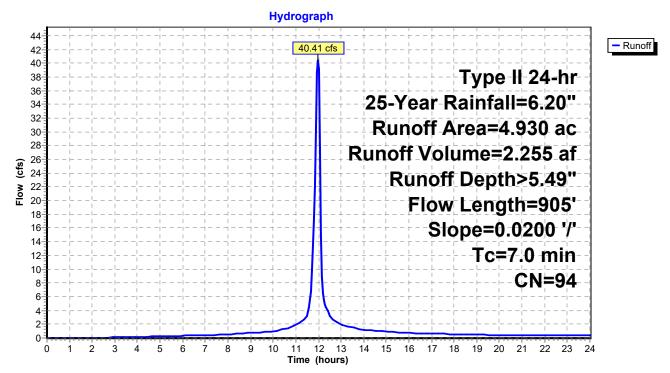
# **Summary for Subcatchment 15S: Onsite 2**

Runoff = 40.41 cfs @ 11.98 hrs, Volume= 2.255 af, Depth> 5.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 25-Year Rainfall=6.20"

_	Area	(ac) C	N Desc	cription			
4	* 4.930 94 Urban commercial, 85% imp, HSG D						
0.739 15.00% Pervious Area							
	4.	190	85.0	0% Imperv	ious Area		
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description	
	1.1	100	0.0200	1.46		Sheet Flow,	
	5.9	805	0.0200	2.28		Smooth surfaces n= 0.011 P2= 3.60"  Shallow Concentrated Flow, Unpaved Kv= 16.1 fps	
	7.0	905	Total				

# Subcatchment 15S: Onsite 2



Page 48

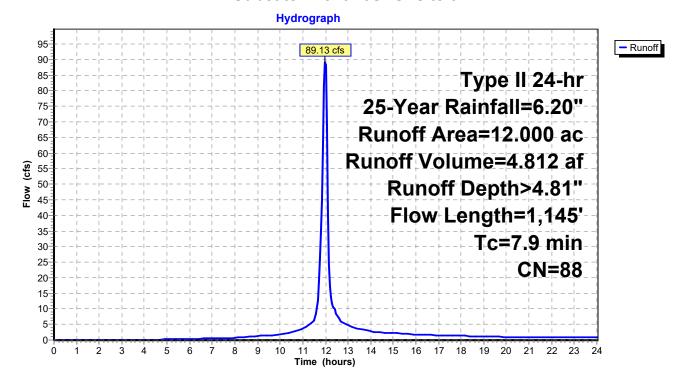
# **Summary for Subcatchment 16S: Onsite 3**

Runoff = 89.13 cfs @ 11.99 hrs, Volume= 4.812 af, Depth> 4.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 25-Year Rainfall=6.20"

_	Area	(ac) C	N Des	cription			
,	* 12.000 88 1/8 acre lots, 65% imp, HSG D						
4.200 35.00% Pervious Area							
	7.	800	65.0	0% Imper	∕ious Area		
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description	
	1.1	100	0.0200	1.46		Sheet Flow,	
	6.8	1,045	0.0250	2.55		Smooth surfaces n= 0.011 P2= 3.60"  Shallow Concentrated Flow, Unpaved Kv= 16.1 fps	
	7.9	1.145	Total				

#### Subcatchment 16S: Onsite 3



Page 49

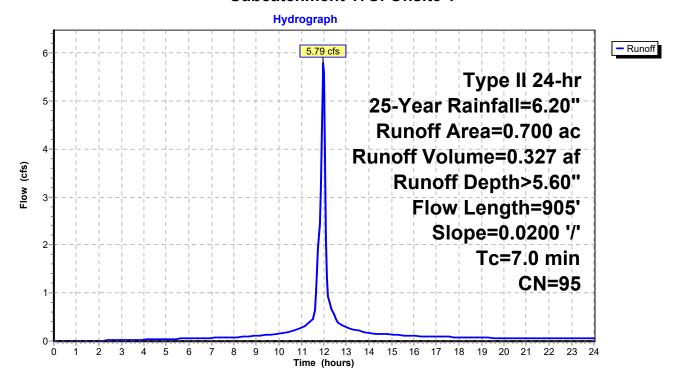
# **Summary for Subcatchment 17S: Onsite 1**

Runoff = 5.79 cfs @ 11.98 hrs, Volume= 0.327 af, Depth> 5.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 25-Year Rainfall=6.20"

	Area	(ac) C	N Desc	cription				
-	0.700 95 Urban commercial, 85% imp, HSG D							
•	0.105 15.00% Pervious Area							
	0.	595	85.0	0% Imperv	∕ious Area			
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description		
	1.1	100	0.0200	1.46		Sheet Flow,		
	5.9	805	0.0200	2.28		Smooth surfaces n= 0.011 P2= 3.60"  Shallow Concentrated Flow, Unpaved Kv= 16.1 fps		
	7.0	905	Total					

## **Subcatchment 17S: Onsite 1**



Page 50

## **Summary for Pond 12P: EWDB #1**

Inflow Area = 26.020 ac, 65.00% Impervious, Inflow Depth > 4.82" for 25-Year event

Inflow = 210.59 cfs @ 11.95 hrs, Volume= 10.441 af

Outflow = 35.37 cfs @ 12.14 hrs, Volume= 9.045 af, Atten= 83%, Lag= 11.4 min

Primary = 35.37 cfs @ 12.14 hrs, Volume= 9.045 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Peak Elev= 998.12' @ 12.14 hrs Surf.Area= 75,132 sf Storage= 228,908 cf

Plug-Flow detention time= 150.7 min calculated for 9.027 af (86% of inflow)

Center-of-Mass det. time= 89.0 min ( 874.7 - 785.7 )

Volume	Inve	rt Avail.Sto	rage Storage l	Description				
#1	994.80	0' 561,66	63 cf Custom	Stage Data (Pr	ismatic)Listed below (Recalc)			
Elevation	on S	Surf.Area	Inc.Store	Cum.Store				
(fee	et)	(sq-ft)	(cubic-feet)	(cubic-feet)				
994.8	30	66,251	0	0				
996.8	30	68,192	134,443	134,443				
997.0	00	69,233	13,743	148,186				
998.0	00	74,497	71,865	220,051				
999.0	00	79,862	77,180	297,230				
1,000.0		85,328	82,595	379,825				
1,001.0		90,894	88,111	467,936				
1,002.0	00	96,560	93,727	561,663				
Davisa	Davitina	المدادما	Outlet Devises					
Device	Routing	Invert	Outlet Devices					
#1	Primary	994.50'	30.0" Round					
					ojecting, Ke= 0.500			
					993.90' S= 0.0075 '/' Cc= 0.900			
110	D	004.00			ned, Flow Area= 4.91 sf			
#2	Device 1	994.80'			Crested Vee/Trap Weir			
що.	Davisa 1	005 501	Cv= 2.69 (C= 3	,	Superioral Department law Main			
#3	Device 1	995.50'			Crested Rectangular Weir			
#1	Dovino 1	000 50'		2 End Contraction(s) 3.0' Crest Height  60.0" x 60.0" Horiz. Orifice/Grate C= 0.600				
#4	Device 1	998.50'						
			Littliced to well	flow at low hea	lu5			

Primary OutFlow Max=35.36 cfs @ 12.14 hrs HW=998.12' (Free Discharge)

-1=Culvert (Barrel Controls 35.36 cfs @ 7.20 fps)

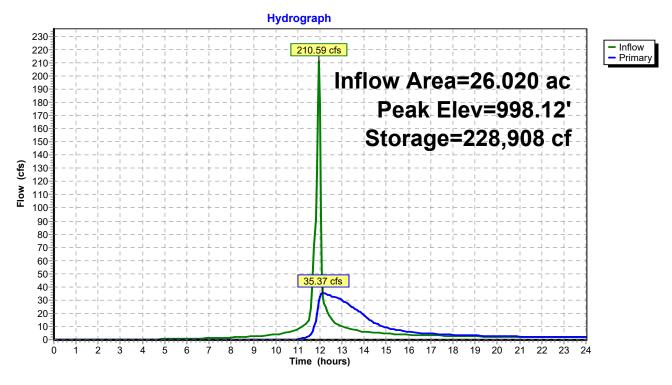
**72=Sharp-Crested Vee/Trap Weir** (Passes < 0.74 cfs potential flow)

**-3=Sharp-Crested Rectangular Weir**(Passes < 68.59 cfs potential flow)

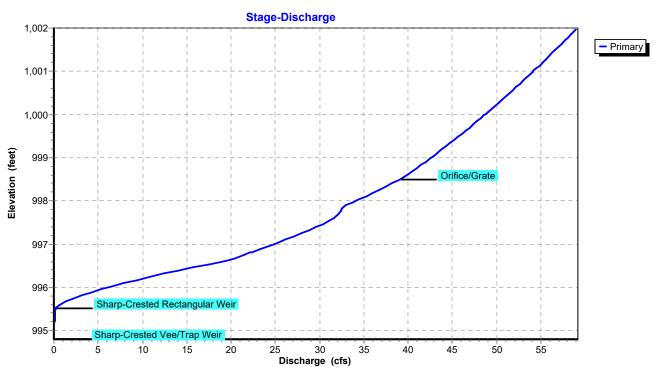
4=Orifice/Grate (Controls 0.00 cfs)

Page 51

### **Pond 12P: EWDB #1**



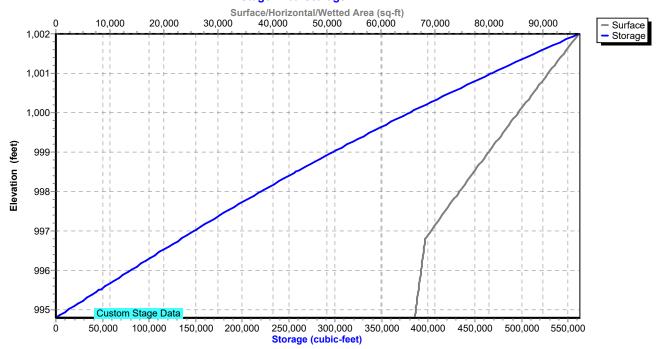
#### **Pond 12P: EWDB #1**



Page 52

### **Pond 12P: EWDB #1**

#### Stage-Area-Storage



Page 53

## **Summary for Pond 13P: EWDB #2**

Inflow Area = 12.000 ac, 65.00% Impervious, Inflow Depth > 4.81" for 25-Year event

Inflow 89.13 cfs @ 11.99 hrs, Volume= 4.812 af

19.80 cfs @ 12.18 hrs, Volume= Outflow 4.111 af, Atten= 78%, Lag= 11.8 min

Primary 19.80 cfs @ 12.18 hrs, Volume= 4.111 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Peak Elev= 996.17' @ 12.18 hrs Surf.Area= 30,789 sf Storage= 106,495 cf

Plug-Flow detention time= 179.1 min calculated for 4.111 af (85% of inflow)

Center-of-Mass det. time= 113.2 min ( 901.3 - 788.0 )

Volume	Invert	Avail.Sto	rage Stora	ge Description	
#1	992.00'	167,26	31 cf Custo	om Stage Data (P	rismatic)Listed below (Recalc)
Elevation (feet)	Surf. <i>i</i> (s	Area sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	
992.00	20	,519	0	0	
993.00	22	,818	21,669	21,669	
994.00	25	,218	24,018	45,687	
995.00	27	,718	26,468	72,155	
996.00	30	,318	29,018	101,173	
997.00	33	,019	31,669	132,841	
998.00	35	,821	34,420	167,261	
Device Ro	outing	Invert	Outlet Devi	ces	

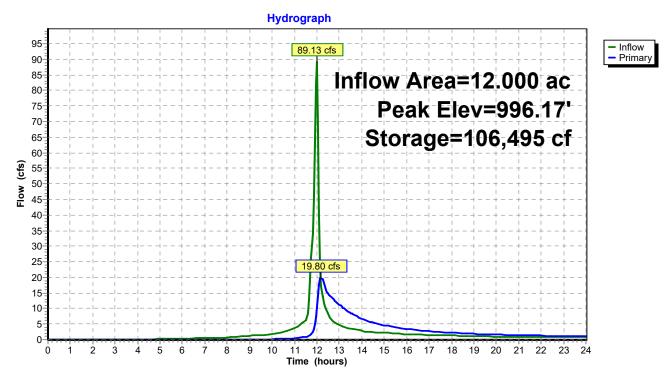
Device	Routing	Invert	Outlet Devices
#1	Primary	990.00'	18.0" Round Culvert
	•		L= 55.6' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 990.00' / 985.00' S= 0.0899 '/' Cc= 0.900
			n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf
#2	Device 1	992.00'	20.0 deg x 4.00' rise Sharp-Crested Vee/Trap Weir
			Cv= 2.69 (C= 3.36)
#3	Device 1	996.00'	<b>60.0" x 60.0" Horiz. Orifice/Grate</b> C= 0.600
			Limited to weir flow at low heads

Primary OutFlow Max=19.81 cfs @ 12.18 hrs HW=996.17' (Free Discharge)

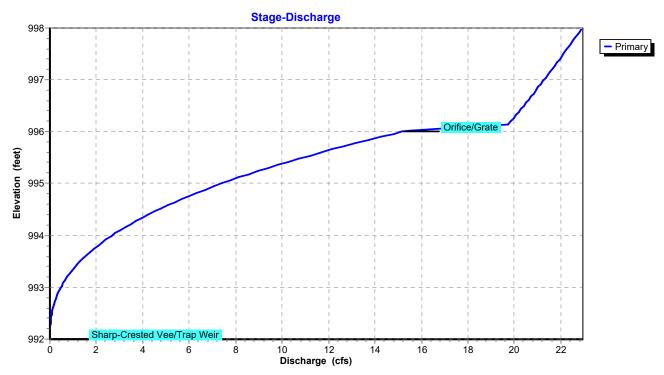
-1=Culvert (Inlet Controls 19.81 cfs @ 11.21 fps)

2=Sharp-Crested Vee/Trap Weir (Passes < 16.51 cfs potential flow)
3=Orifice/Grate (Passes < 4.62 cfs potential flow)

**Pond 13P: EWDB #2** 



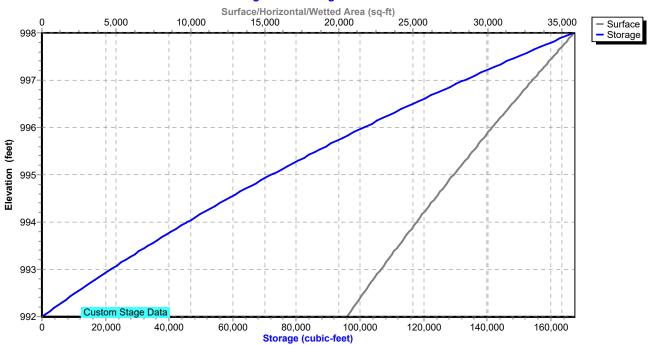
#### **Pond 13P: EWDB #2**



Page 55

### **Pond 13P: EWDB #2**

#### Stage-Area-Storage



HydroCAD® 10.00-13 s/n 08303 © 2014 HydroCAD Software Solutions LLC

Page 56

## **Summary for Pond 14P: EWDB #3**

[79] Warning: Submerged Pond 13P Primary device # 1 INLET by 0.06'

35.790 ac, 44.57% Impervious, Inflow Depth > 4.36" for 25-Year event Inflow Area =

Inflow 175.43 cfs @ 12.00 hrs, Volume= 13.002 af

Outflow 83.10 cfs @ 12.13 hrs, Volume= 11.765 af, Atten= 53%, Lag= 8.1 min

Primary 83.10 cfs @ 12.13 hrs, Volume= 11.765 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 990.07' @ 12.13 hrs Surf.Area= 47,495 sf Storage= 159,707 cf

Plug-Flow detention time= 93.2 min calculated for 11.740 af (90% of inflow)

Center-of-Mass det. time= 45.7 min (876.0 - 830.3)

Volume	Inve	rt Avail.Sto	rage Storag	ge Description			
#1	986.0	0' 260,92	29 cf Custo	m Stage Data (P	rismatic)Listed below (Recalc)		
Elevation		Surf.Area	Inc.Store	Cum.Store			
(fee	et)	(sq-ft)	(cubic-feet)	(cubic-feet)			
986.0	00	32,444	0	0			
987.0	00	35,398	33,921	33,921			
988.0	00	38,453	36,926	70,847			
989.0	00	42,954	40,704	111,550			
990.0		47,178	45,066	156,616			
991.0		52,032	49,605	206,221			
992.0	00	57,384	54,708	260,929			
Device	Routing	Invert	Outlet Devi	ces			
#1	Primary	979.00'	36.0" Roui	nd Culvert			
					o headwall, Ke= 0.900		
			Inlet / Outle	t Invert= 979.00' /	977.28' S= 0.0086 '/' Cc= 0.900		
			n= 0.012 C	oncrete pipe, finis	shed, Flow Area= 7.07 sf		
#2	Device 1	985.80'	20.0 deg x	1.60' rise Sharp-	Crested Vee/Trap Weir		
			Cv = 2.69 (C)	,			
#3	Device 1	987.40'		eir/Orifice, Cv= 2	.62 (C= 3.28)		
			Elev. (feet) 987.40 989.10				
				Width (feet) 5.00 5.00			
#4	Device 1	989.10'		0" Horiz. Orifice/			
			Limited to weir flow at low heads				

**Primary OutFlow** Max=83.06 cfs @ 12.13 hrs HW=990.06' (Free Discharge)

-1=Culvert (Inlet Controls 83.06 cfs @ 11.75 fps)

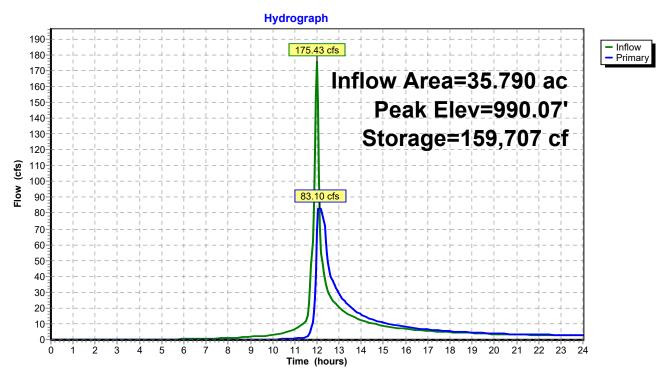
2=Sharp-Crested Vee/Trap Weir (Passes < 4.06 cfs potential flow)

-3=Custom Weir/Orifice (Passes < 55.56 cfs potential flow)

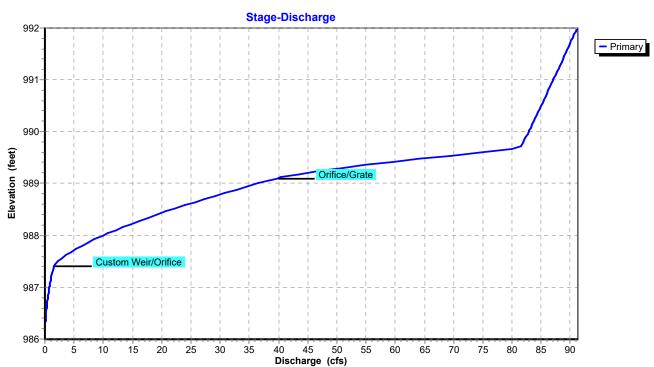
**-4=Orifice/Grate** (Passes < 61.05 cfs potential flow)

Page 57

**Pond 14P: EWDB #3** 



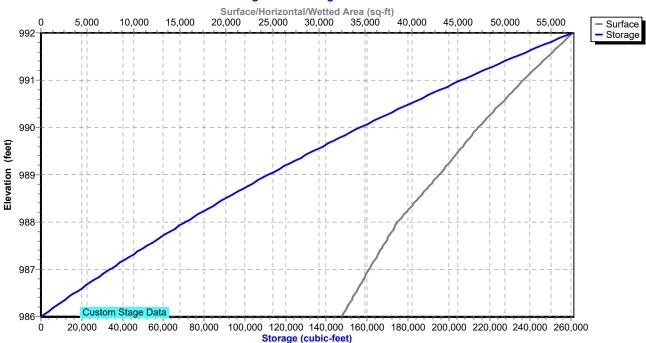
**Pond 14P: EWDB #3** 



Page 58

### **Pond 14P: EWDB #3**

#### Stage-Area-Storage



Printed 3/30/2023 Page 59

## Summary for Pond 15P: EDDB #1

Inflow Area = 4.930 ac, 85.00% Impervious, Inflow Depth > 5.49" for 25-Year event

Inflow 40.41 cfs @ 11.98 hrs, Volume= 2.255 af

24.77 cfs @ 12.06 hrs, Volume= Outflow 1.751 af, Atten= 39%, Lag= 5.2 min

Primary 24.77 cfs @ 12.06 hrs, Volume= 1.751 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 1,008.66' @ 12.06 hrs Surf.Area= 18,060 sf Storage= 39,154 cf

Plug-Flow detention time= 136.0 min calculated for 1.748 af (78% of inflow)

Center-of-Mass det. time= 53.2 min (817.4 - 764.2)

Volume	Inver	t Avail.Sto	rage Storage	Description			
#1	1,004.00	)' 68,10	00 cf Custom	Stage Data (Pi	rismatic)Listed below (Rec	alc)	
<b>-</b> 14:.		N	la o Otama	0			
Elevation		Surf.Area	Inc.Store	Cum.Store			
(fee		(sq-ft)	(cubic-feet)	(cubic-feet)			
1,004.0		50	0	0			
1,006.0		6,872	6,922	6,922			
1,008.0		14,603	21,475	28,397			
1,010.0	00	25,100	39,703	68,100			
Davidaa	D =		Outlet Davisse	_			
Device	Routing	Invert					
#1	Primary	1,002.00'	24.0" Round				
					ojecting, Ke= 0.500		
				•	'/ 1,001.50' S= 0.0100 '/'	Cc = 0.900	
					hed, Flow Area= 3.14 sf		
#2	Device 1	1,002.25'					
#3	Device 1	1,007.50'					
				,007.50 1,009.	50		
			Width (feet) 6				
#4	Device 2	1,002.50'	6.0" Round 6				
					neadwall, Ke= 0.500		
					' / 1,002.25' S= 0.0083 '/'	Cc= 0.900	
					or, Flow Area= 0.20 sf		
#5	Device 2	1,005.00'		<b>RISER X 7.00</b>			
				4.0" cc spacing			
#6	Device 1	1,010.00'	72.0" x 72.0"	Horiz. Orifice/0	<b>Grate</b> C= 0.600		
			Limited to weir	r flow at low hea	ads		

Primary OutFlow Max=24.34 cfs @ 12.06 hrs HW=1,008.65' (Free Discharge)

-1=Culvert (Passes 24.34 cfs of 35.94 cfs potential flow)

**-2=2.0" ORIFICE** (Orifice Controls 0.26 cfs @ 12.10 fps)

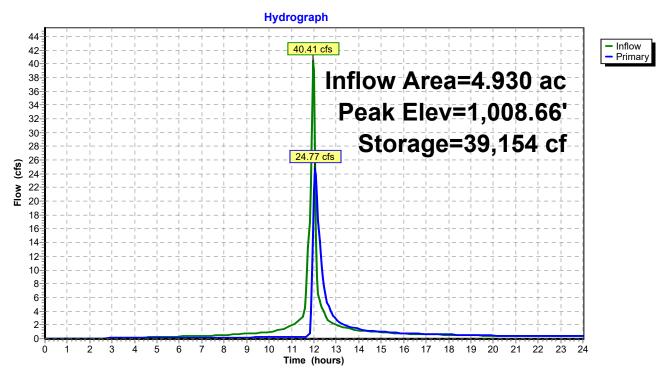
**-4=6" PVC** (Passes < 2.24 cfs potential flow)

5=15" RISER (Passes < 2.44 cfs potential flow)

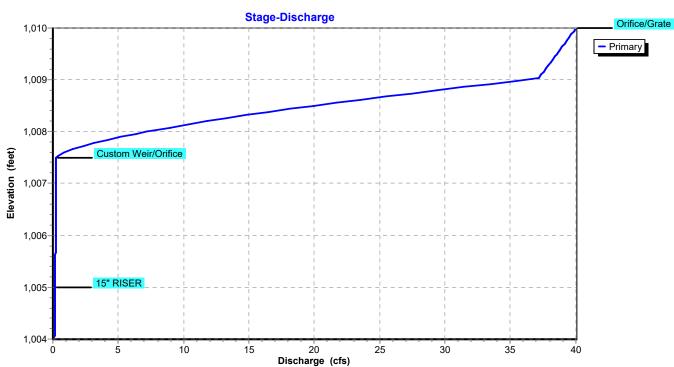
-3=Custom Weir/Orifice (Weir Controls 24.08 cfs @ 3.50 fps)

-6=Orifice/Grate (Controls 0.00 cfs)

## **Pond 15P: EDDB #1**



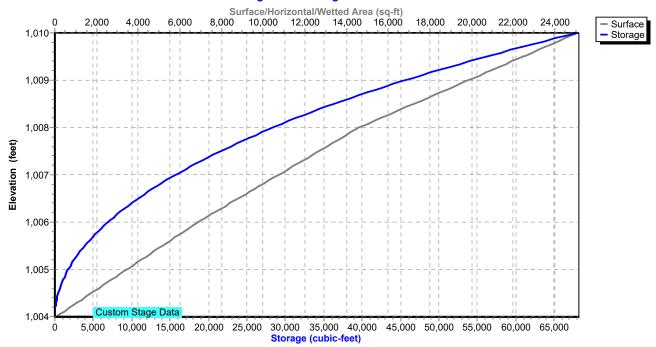
#### **Pond 15P: EDDB #1**



Page 61

### Pond 15P: EDDB #1

#### Stage-Area-Storage



Page 62

# **Summary for Link 7L: RP-1**

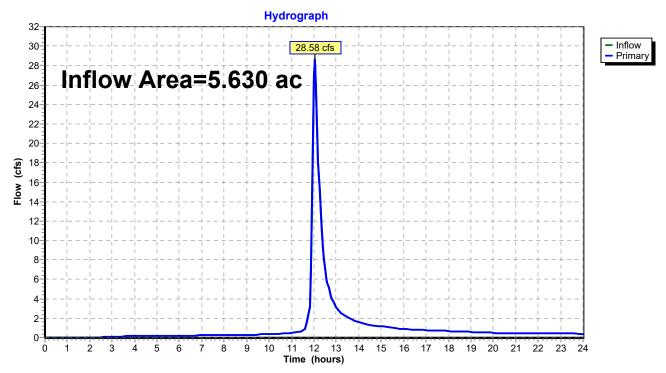
Inflow Area = 5.630 ac, 85.00% Impervious, Inflow Depth > 4.43" for 25-Year event

Inflow = 28.58 cfs @ 12.04 hrs, Volume= 2.078 af

Primary = 28.58 cfs @ 12.04 hrs, Volume= 2.078 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Link 7L: RP-1



Page 63

# **Summary for Link 9L: RP-3**

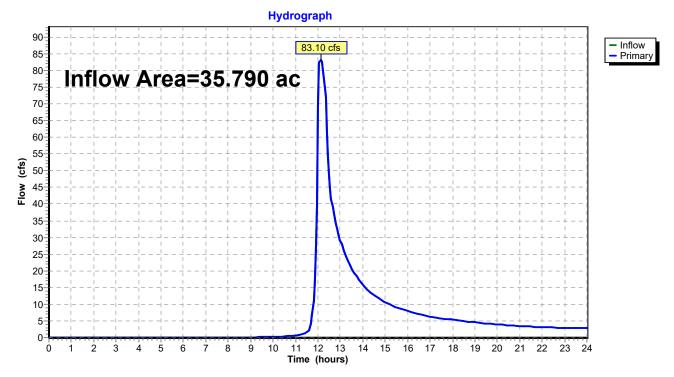
Inflow Area = 35.790 ac, 44.57% Impervious, Inflow Depth > 3.94" for 25-Year event

Inflow = 83.10 cfs @ 12.13 hrs, Volume= 11.765 af

Primary = 83.10 cfs @ 12.13 hrs, Volume= 11.765 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## Link 9L: RP-3



Page 64

# Summary for Link 10L: RP-4

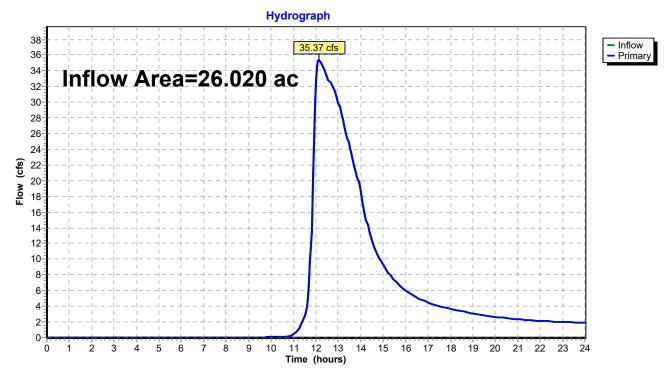
Inflow Area = 26.020 ac, 65.00% Impervious, Inflow Depth > 4.17" for 25-Year event

Inflow = 35.37 cfs @ 12.14 hrs, Volume= 9.045 af

Primary = 35.37 cfs @ 12.14 hrs, Volume= 9.045 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

## **Link 10L: RP-4**



## **Summary for Subcatchment 11S: Onsite 5**

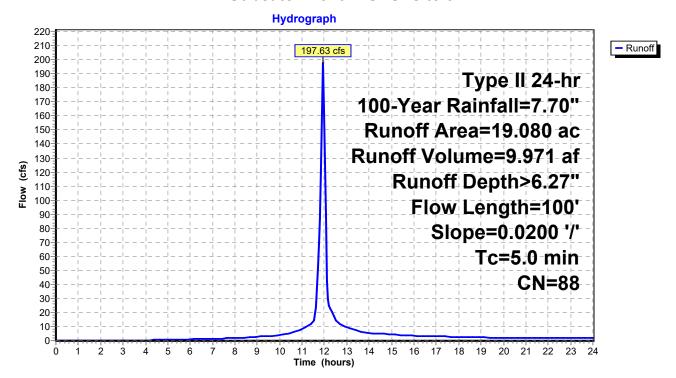
[49] Hint: Tc<2dt may require smaller dt

Runoff = 197.63 cfs @ 11.95 hrs, Volume= 9.971 af, Depth> 6.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 100-Year Rainfall=7.70"

	Area	(ac) C	N Des	cription				
*	19.	19.080 88 Apartments, 65% imp, HSG C						
	6.678 35.00% Pervious Area							
	12.	402	65.0	0% Imperv	ious Area			
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description		
	1.1	100	0.0200	1.46		Sheet Flow,		
						Smooth surfaces n= 0.011 P2= 3.60"		
_	3.9					Direct Entry, Pipe flow		
	5.0	100	Total					

#### Subcatchment 11S: Onsite 5



Page 66

# Summary for Subcatchment 12S: EX OFF

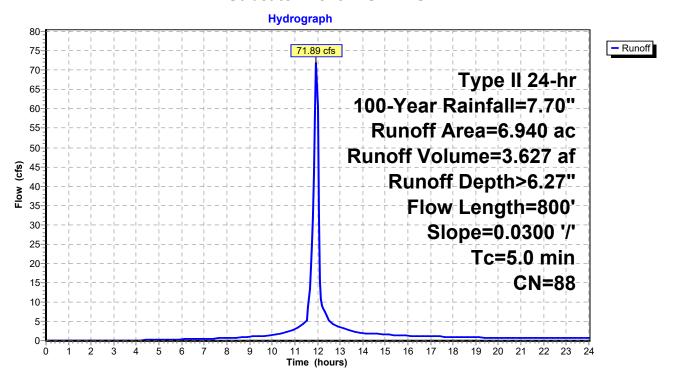
[49] Hint: Tc<2dt may require smaller dt

Runoff = 71.89 cfs @ 11.95 hrs, Volume= 3.627 af, Depth> 6.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 100-Year Rainfall=7.70"

	Area	(ac) C	N Desc	cription					
*	6.	6.940 88 Future Multi-Family, 65% imp, HSG C							
		429		0% Pervio					
	4.	511	65.0	0% Imper	ious Area				
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description			
	1.0	100	0.0300	1.72		Sheet Flow, Sheet flow Smooth surfaces n= 0.011 P2= 3.60"			
	4.0	700		2.92		Direct Entry, Pipe flow			
	5.0	800	Total						

#### Subcatchment 12S: EX OFF



Page 67

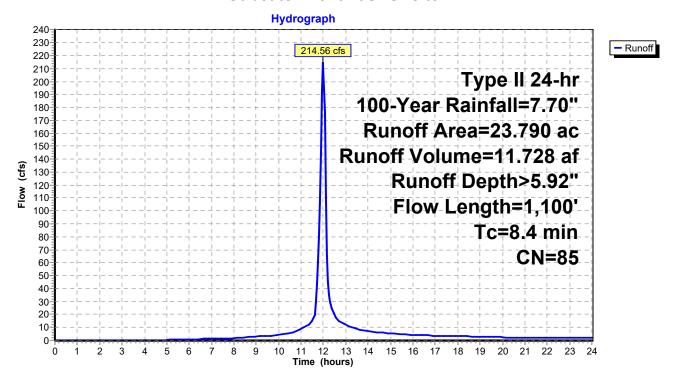
# Summary for Subcatchment 13S: Onsite 4

Runoff = 214.56 cfs @ 11.99 hrs, Volume= 11.728 af, Depth> 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 100-Year Rainfall=7.70"

	Area	(ac) (	CN Des	cription		
*	11.	250	82 SIN	GLE FAMI	LY LOTS	
*	12.	540	88 1/8	acre lots, 6	55% imp, H	SG D
_	23.	790	85 Wei	ghted Avei	age	
	15.	639	65.7	74% Pervio	us Area	
	8.	151	34.2	26% Imper	vious Area	
	_				_	
	Tc	Length	•	Velocity	Capacity	Description
	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	1.1	100	0.0205	1.47		Sheet Flow,
						Smooth surfaces n= 0.011 P2= 3.60"
	7.3	1,000	0.0200	2.28		Shallow Concentrated Flow,
						Unpaved Kv= 16.1 fps
	84	1 100	Total			

#### Subcatchment 13S: Onsite 4



Page 68

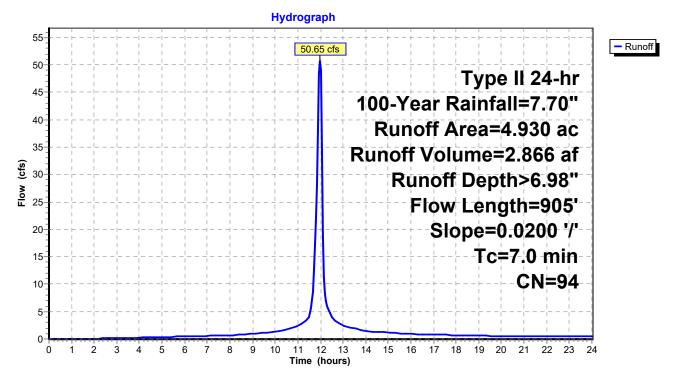
# **Summary for Subcatchment 15S: Onsite 2**

Runoff = 50.65 cfs @ 11.98 hrs, Volume= 2.866 af, Depth> 6.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 100-Year Rainfall=7.70"

_	Area	(ac) C	N Desc	cription				
*	4.930 94 Urban commercial, 85% imp, HSG D							
	0.	739	15.0	0% Pervio	us Area			
	4.	190	85.0	0% Imper	∕ious Area			
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description		
_	1.1	100	0.0200	1.46		Sheet Flow,		
	5.9	805	0.0200	2.28		Smooth surfaces n= 0.011 P2= 3.60"  Shallow Concentrated Flow, Unpaved Kv= 16.1 fps		
_	7.0	905	Total					

# **Subcatchment 15S: Onsite 2**



Page 69

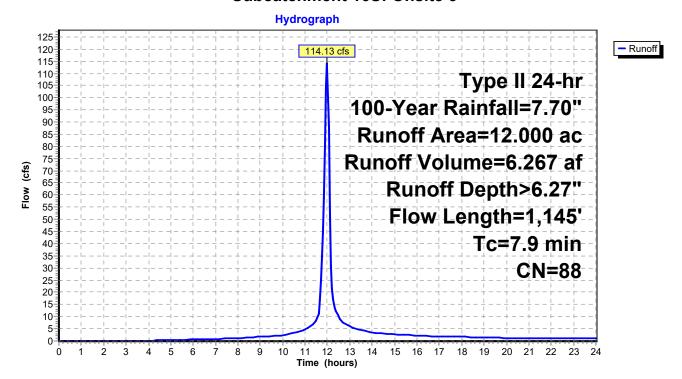
### **Summary for Subcatchment 16S: Onsite 3**

Runoff = 114.13 cfs @ 11.99 hrs, Volume= 6.267 af, Depth> 6.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 100-Year Rainfall=7.70"

_	Area	(ac) C	N Desc	cription			
,	* 12.	3 000	38 1/8 a	acre lots, 6	5% imp, H	SG D	
4.200 35.00% Pervious Area							
	7.	800	65.0	0% Imper	∕ious Area		
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description	
	1.1	100	0.0200	1.46		Sheet Flow,	
	6.8	1,045	0.0250	2.55		Smooth surfaces n= 0.011 P2= 3.60"  Shallow Concentrated Flow, Unpaved Kv= 16.1 fps	
	7.9	1.145	Total				

#### **Subcatchment 16S: Onsite 3**



Page 70

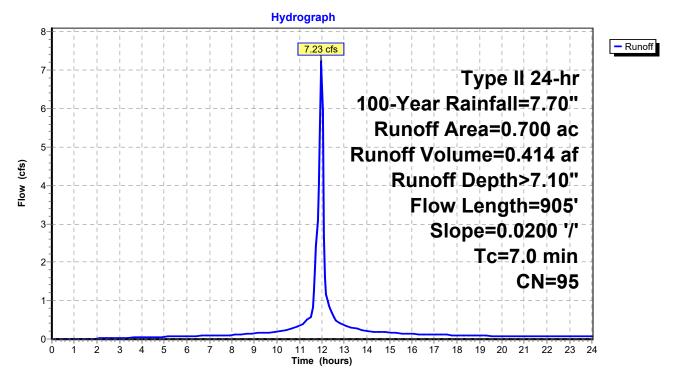
# **Summary for Subcatchment 17S: Onsite 1**

Runoff = 7.23 cfs @ 11.98 hrs, Volume= 0.414 af, Depth> 7.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 100-Year Rainfall=7.70"

_	Area	(ac) C	N Desc	cription			
	0.	700 9	5 Urba	ın commer	cial, 85% ii	mp, HSG D	
-	0.	105	15.0	0% Pervio	us Area		
	0.	595	85.0	0% Imperv	ious Area		
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description	
-	1.1	100	0.0200	1.46		Sheet Flow,	
_	5.9	805	0.0200	2.28		Smooth surfaces n= 0.011 P2= 3.60"  Shallow Concentrated Flow, Unpaved Kv= 16.1 fps	
	7.0	905	Total				

### **Subcatchment 17S: Onsite 1**



Page 71

## **Summary for Pond 12P: EWDB #1**

Inflow Area = 26.020 ac, 65.00% Impervious, Inflow Depth > 6.27" for 100-Year event

Inflow 269.52 cfs @ 11.95 hrs, Volume= 13.597 af

42.24 cfs @ 12.15 hrs, Volume= Outflow 12.143 af, Atten= 84%, Lag= 12.1 min

Primary 42.24 cfs @ 12.15 hrs, Volume= 12.143 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 998.94' @ 12.15 hrs Surf.Area= 79,565 sf Storage= 292,814 cf

Plug-Flow detention time= 144.6 min calculated for 12.143 af (89% of inflow)

Center-of-Mass det. time= 91.2 min ( 869.8 - 778.6 )

Volume	Inve	rt Avail.Sto	rage	Storage	Description	
#1	994.80	D' 561,66	63 cf	Custom	Stage Data (Pr	rismatic)Listed below (Recalc)
Elevation	an G	Surf.Area		Store	Cum.Store	
(fee		(sq-ft)	(cubic		(cubic-feet)	
994.8		66,251	(00010	0	0	
996.8		68,192	134	4,443	134,443	
997.0	00	69,233		3,743	148,186	
998.0		74,497		1,865	220,051	
999.0		79,862		7,180	297,230	
1,000.0		85,328		2,595	379,825	
1,001.0		90,894		8,111	467,936	
1,002.0	00	96,560	9:	3,727	561,663	
Device	Routing	Invert	Outle	t Device	S	
#1	Primary	994.50'	30.0"	' Round	l Culvert	
	-		L= 80	0.0' RCI	P, sq.cut end pro	ejecting, Ke= 0.500
			Inlet /	Outlet I	nvert= 994.50' /	993.90' S= 0.0075 '/' Cc= 0.900
			n= 0.	012 Cor	ncrete pipe, finisl	ned, Flow Area= 4.91 sf
#2	Device 1	994.80'				Crested Vee/Trap Weir
			Cv= 2	2.69 (C=	3.36)	
#3	Device 1	995.50'				Crested Rectangular Weir
					ction(s) 3.0' Cre	
#4	Device 1	998.50'			Horiz. Orifice/C	
			Limite	ed to wei	ir flow at low hea	ids

**Primary OutFlow** Max=42.24 cfs @ 12.15 hrs HW=998.94' (Free Discharge)

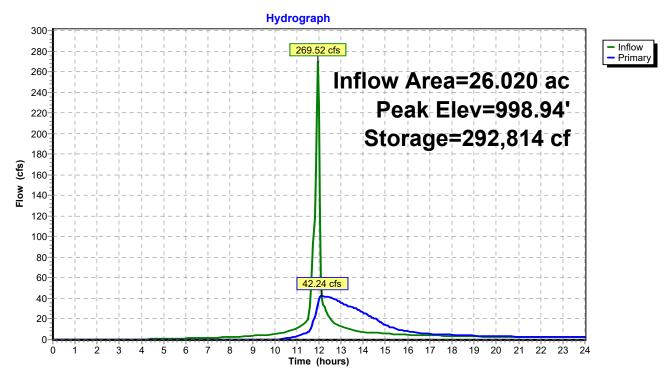
-1=Culvert (Inlet Controls 42.24 cfs @ 8.60 fps)

**72=Sharp-Crested Vee/Trap Weir** (Passes < 0.84 cfs potential flow)

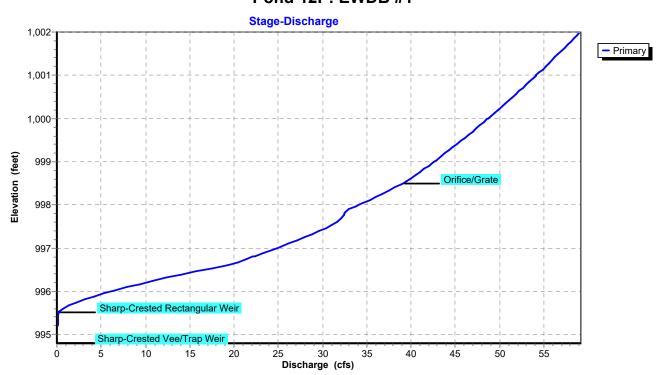
**-3=Sharp-Crested Rectangular Weir**(Passes < 100.01 cfs potential flow)

**4=Orifice/Grate** (Passes < 19.33 cfs potential flow)

### **Pond 12P: EWDB #1**



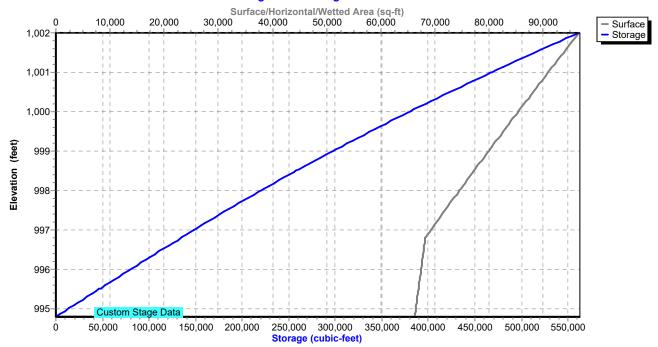
### **Pond 12P: EWDB #1**



Page 73

### **Pond 12P: EWDB #1**

#### Stage-Area-Storage



Page 74

## **Summary for Pond 13P: EWDB #2**

Inflow Area = 12.000 ac, 65.00% Impervious, Inflow Depth > 6.27" for 100-Year event

Inflow 114.13 cfs @ 11.99 hrs, Volume= 6.267 af

21.47 cfs @ 12.21 hrs, Volume= Outflow 5.508 af, Atten= 81%, Lag= 13.4 min

Primary 21.47 cfs @ 12.21 hrs, Volume= 5.508 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Peak Elev= 997.12' @ 12.21 hrs Surf.Area= 33,342 sf Storage= 136,661 cf

Plug-Flow detention time= 163.1 min calculated for 5.508 af (88% of inflow)

Center-of-Mass det. time= 104.9 min (885.8 - 780.9)

Volume	Inve	rt Avail.Sto	rage Stoı	rage Description
#1	992.0	0' 167,26	31 cf Cus	stom Stage Data (Prismatic)Listed below (Recalc)
Elevatio	n (	Surf.Area	Inc.Stor	re Cum.Store
(fee	τ)	(sq-ft)	(cubic-fee	t) (cubic-feet)
992.0	00	20,519		0 0
993.0	00	22,818	21,66	9 21,669
994.0	00	25,218	24,01	8 45,687
995.0	00	27,718	26,46	•
996.0	00	30,318	29,01	· · · · · · · · · · · · · · · · · · ·
997.0		33,019	31,66	·
998.0		35,821	34,42	·
000.0	.0	00,021	01,12	101,201
Device	Routing	Invert	Outlet De	evices
#1	Primary	990.00'	18.0" Ro	ound Culvert
	,		L= 55.6'	CPP, square edge headwall, Ke= 0.500
				tlet Invert= 990.00' / 985.00' S= 0.0899 '/' Cc= 0.900
				Concrete pipe, finished, Flow Area= 1.77 sf
#2	Device 1	992.00'		x 4.00' rise Sharp-Crested Vee/Trap Weir
π∠	Device I	332.00	•	(C= 3.36)
#2	Davisa 1	006 001		,
#3	Device 1	996.00'		60.0" Horiz. Orifice/Grate C= 0.600
			Limited to	o weir flow at low heads

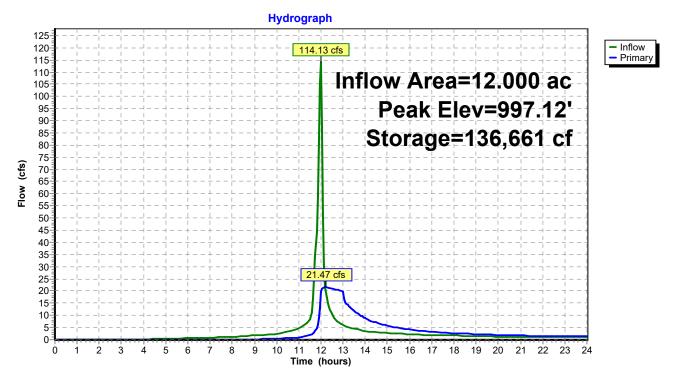
Primary OutFlow Max=21.46 cfs @ 12.21 hrs HW=997.11' (Free Discharge)

-1=Culvert (Inlet Controls 21.46 cfs @ 12.14 fps)

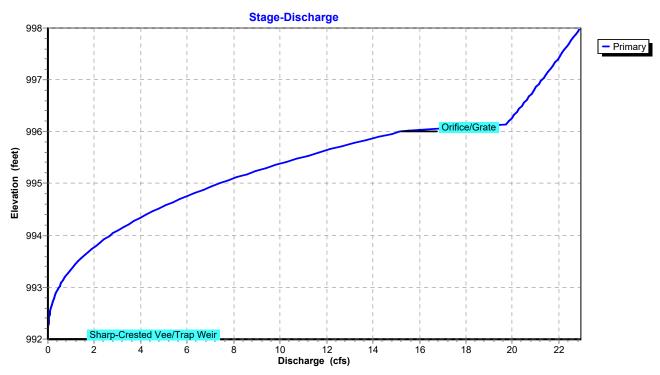
2=Sharp-Crested Vee/Trap Weir (Passes < 21.84 cfs potential flow)

-3=Orifice/Grate (Passes < 76.68 cfs potential flow)

**Pond 13P: EWDB #2** 



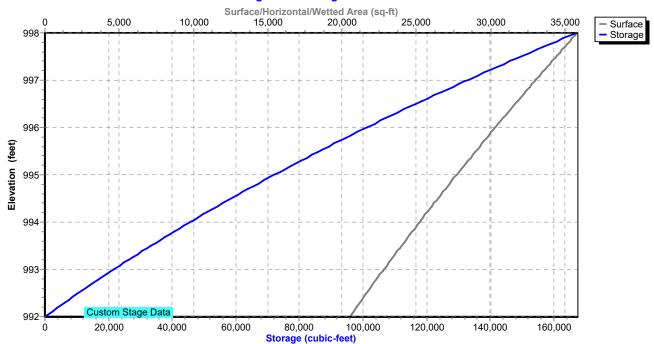
#### **Pond 13P: EWDB #2**



Page 76

### **Pond 13P: EWDB #2**

#### Stage-Area-Storage



Printed 3/30/2023 Page 77

## **Summary for Pond 14P: EWDB #3**

[79] Warning: Submerged Pond 13P Primary device # 1 INLET by 1.06'

Inflow Area = 35.790 ac, 44.57% Impervious, Inflow Depth > 5.78" for 100-Year event

Inflow = 234.06 cfs @ 12.00 hrs, Volume= 17.235 af

Outflow = 87.33 cfs @ 12.16 hrs, Volume= 15.953 af, Atten= 63%, Lag= 9.7 min

Primary = 87.33 cfs @ 12.16 hrs, Volume= 15.953 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 991.06' @ 12.16 hrs Surf.Area= 52,368 sf Storage= 209,495 cf

Plug-Flow detention time= 82.3 min calculated for 15.953 af (93% of inflow)

Center-of-Mass det. time= 43.1 min (863.6 - 820.5)

Volume	Inve	ert Avail.Sto	rage Sto	rage Description
#1	986.0	00' 260,92	29 cf <b>Cu</b>	stom Stage Data (Prismatic)Listed below (Recalc)
Elevation	<b>.</b>	Court Amara		re Cum.Store
		Surf.Area	Inc.Sto	
(fee		(sq-ft)	(cubic-fee	<del></del>
986.0		32,444		0 0
987.0		35,398	33,92	·
988.0		38,453	36,92	
989.0	00	42,954	40,70	•
990.0	00	47,178	45,06	66 156,616
991.0	00	52,032	49,60	05 206,221
992.0	00	57,384	54,70	08 260,929
Device	Routing	Invert	Outlet D	evices
#1	Primary	979.00'	36.0" R	ound Culvert
	-		L= 200.1	' CPP, projecting, no headwall, Ke= 0.900
			Inlet / O	utlet Invert= 979.00' / 977.28' S= 0.0086 '/' Cc= 0.900
			n= 0.012	Concrete pipe, finished, Flow Area= 7.07 sf
#2	Device 1	985.80'	20.0 deg	x 1.60' rise Sharp-Crested Vee/Trap Weir
			•	O (C= 3.36)
#3	Device 1	987.40'		Weir/Orifice, Cv= 2.62 (C= 3.28)
				eet) 987.40 989.10
				eet) 5.00 5.00
#4	Device 1	989.10'		60.0" Horiz. Orifice/Grate C= 0.600
				o weir flow at low heads

Primary OutFlow Max=87.29 cfs @ 12.16 hrs HW=991.05' (Free Discharge)

-1=Culvert (Inlet Controls 87.29 cfs @ 12.35 fps)

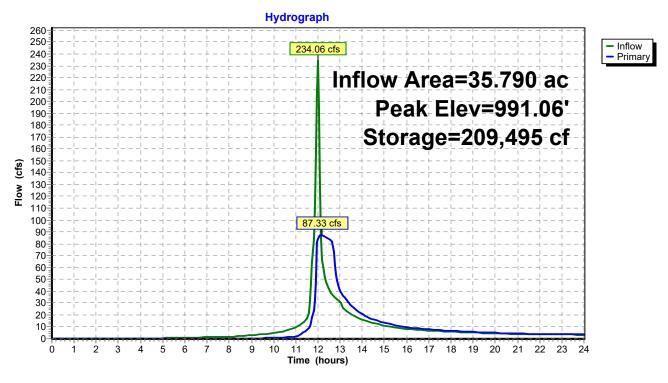
2=Sharp-Crested Vee/Trap Weir (Passes < 4.65 cfs potential flow)

-3=Custom Weir/Orifice (Passes < 69.65 cfs potential flow)

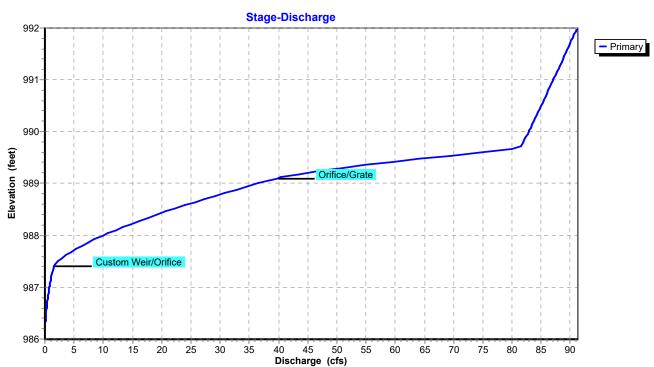
**-4=Orifice/Grate** (Passes < 168.29 cfs potential flow)

Page 78

**Pond 14P: EWDB #3** 



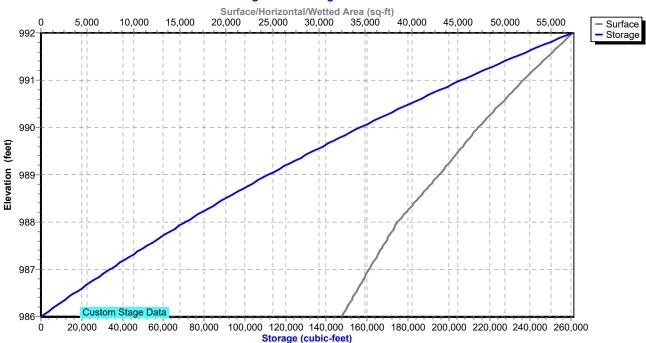
**Pond 14P: EWDB #3** 



Page 79

### **Pond 14P: EWDB #3**

#### Stage-Area-Storage



HydroCAD® 10.00-13 s/n 08303 © 2014 HydroCAD Software Solutions LLC

Printed 3/30/2023 Page 80

### Summary for Pond 15P: EDDB #1

Inflow Area = 4.930 ac, 85.00% Impervious, Inflow Depth > 6.98" for 100-Year event

Inflow 50.65 cfs @ 11.98 hrs, Volume= 2.866 af

34.12 cfs @ 12.05 hrs, Volume= Outflow 2.358 af, Atten= 33%, Lag= 4.7 min

Primary 34.12 cfs @ 12.05 hrs, Volume= 2.358 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 1,008.94' @ 12.05 hrs Surf.Area= 19,520 sf Storage= 44,380 cf

Plug-Flow detention time= 125.6 min calculated for 2.358 af (82% of inflow)

Center-of-Mass det. time= 50.9 min ( 809.6 - 758.7 )

Volume	Inver	t Avail.Sto	rage Storage	e Description		
#1	1,004.00	' 68,10	00 cf Custor	n Stage Data (Pı	rismatic)Listed below (Red	alc)
Elevation	on S	Surf.Area	Inc.Store	Cum.Store		
(fee	et)	(sq-ft)	(cubic-feet)	(cubic-feet)		
1,004.0	00	50	0	0		
1,006.0		6,872	6,922	6,922		
1,008.0		14,603	21,475	28,397		
1,010.0	00	25,100	39,703	68,100		
Device	Routing	Invert	Outlet Devic	es		
#1	Primary	1,002.00'	24.0" Roun	d Culvert		
			L= 50.0' RC	P, sq.cut end pro	ojecting, Ke= 0.500	
					'/ 1,001.50' S= 0.0100 '/'	Cc= 0.900
					hed, Flow Area= 3.14 sf	
#2	Device 1	1,002.25'		O" ORIFICE C=		
#3	Device 1	1,007.50'		ir/Orifice, Cv= 2.		
				1,007.50 1,009.	50	
			Width (feet)			
#4	Device 2	1,002.50'	6.0" Round			
					neadwall, Ke= 0.500	0 0000
					'/1,002.25' S= 0.0083 '/'	Cc = 0.900
	D : 0	4 005 001			or, Flow Area= 0.20 sf	
#5	Device 2	1,005.00'		5" RISER X 7.00		
<b>!</b> /O	D 4	4 040 001		n 4.0" cc spacing		
#6	Device 1	1,010.00'		" Horiz. Orifice/0		
			Limited to we	eir flow at low hea	ads	

Primary OutFlow Max=33.90 cfs @ 12.05 hrs HW=1,008.93' (Free Discharge)

-1=Culvert (Passes 33.90 cfs of 36.84 cfs potential flow)

**-2=2.0" ORIFICE** (Orifice Controls 0.27 cfs @ 12.37 fps)

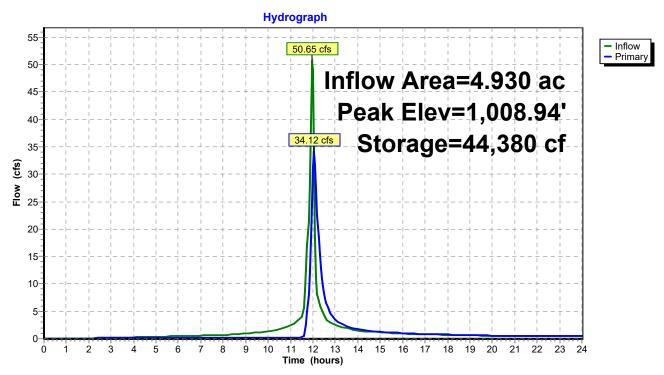
**4=6" PVC** (Passes < 2.30 cfs potential flow)

5=15" RISER (Passes < 2.60 cfs potential flow)

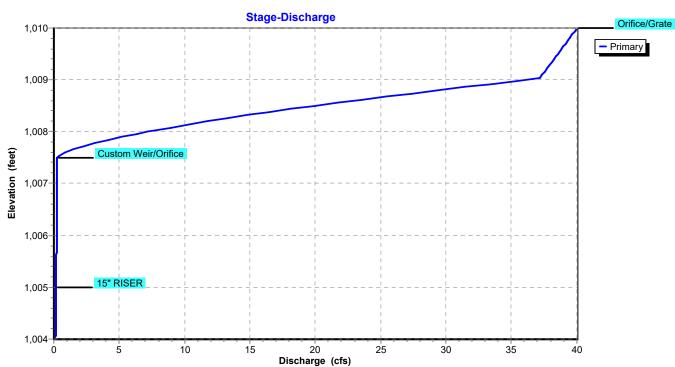
-3=Custom Weir/Orifice (Weir Controls 33.63 cfs @ 3.92 fps)

-6=Orifice/Grate (Controls 0.00 cfs)

**Pond 15P: EDDB #1** 



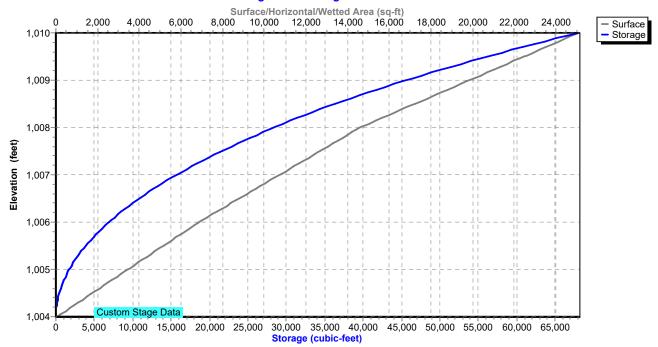
**Pond 15P: EDDB #1** 



Page 82

### Pond 15P: EDDB #1

#### Stage-Area-Storage



Page 83

# Summary for Link 7L: RP-1

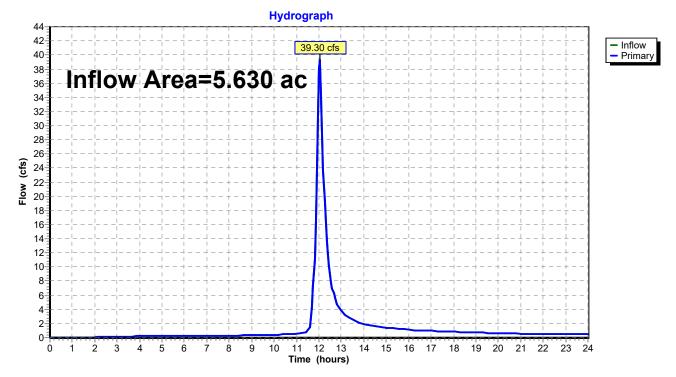
Inflow Area = 5.630 ac, 85.00% Impervious, Inflow Depth > 5.91" for 100-Year event

Inflow = 39.30 cfs @ 12.03 hrs, Volume= 2.772 af

Primary = 39.30 cfs @ 12.03 hrs, Volume= 2.772 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

# Link 7L: RP-1



Page 84

# **Summary for Link 9L: RP-3**

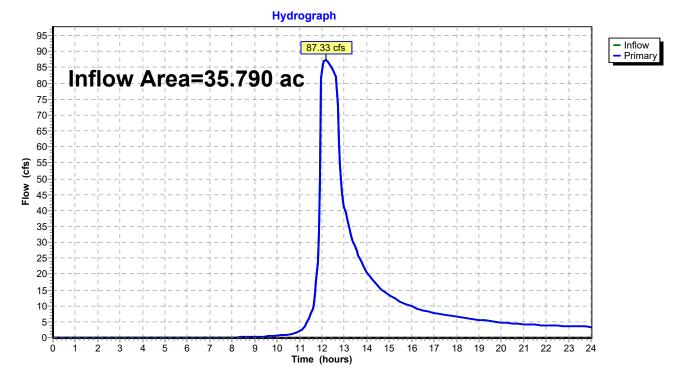
Inflow Area = 35.790 ac, 44.57% Impervious, Inflow Depth > 5.35" for 100-Year event

Inflow = 87.33 cfs @ 12.16 hrs, Volume= 15.953 af

Primary = 87.33 cfs @ 12.16 hrs, Volume= 15.953 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

# Link 9L: RP-3



Page 85

# Summary for Link 10L: RP-4

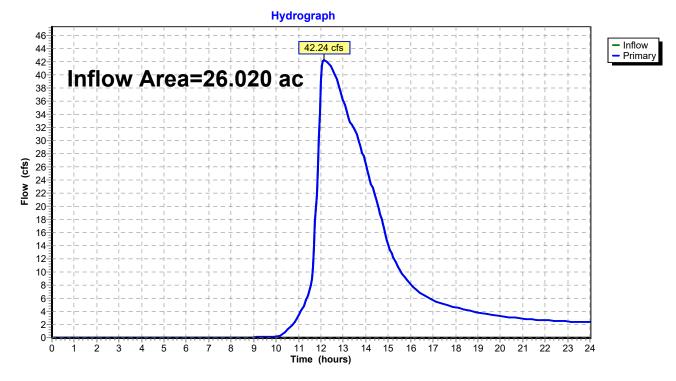
Inflow Area = 26.020 ac, 65.00% Impervious, Inflow Depth > 5.60" for 100-Year event

Inflow = 42.24 cfs @ 12.15 hrs, Volume= 12.143 af

Primary = 42.24 cfs @ 12.15 hrs, Volume= 12.143 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

# **Link 10L: RP-4**



Page 86

# **Summary for Subcatchment 11S: Onsite 5**

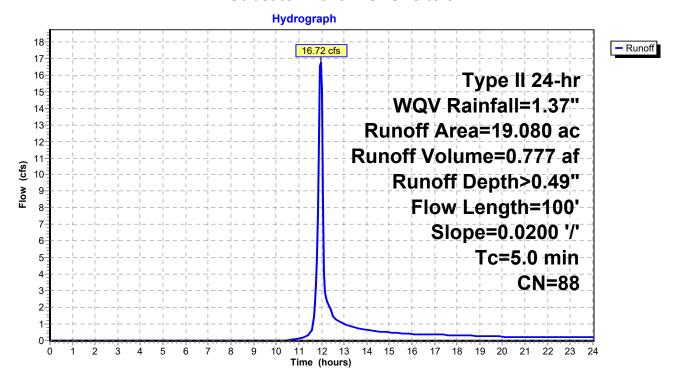
[49] Hint: Tc<2dt may require smaller dt

Runoff = 16.72 cfs @ 11.96 hrs, Volume= 0.777 af, Depth> 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr WQV Rainfall=1.37"

_	Area	(ac) C	N Des	cription					
*	19.	080 88 Apartments, 65% imp, HSG C							
6.678 35.00% Pervious Area									
12.402 65.00% Impervious Area									
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description			
	1.1	100	0.0200	1.46	, ,	Sheet Flow, Smooth surfaces n= 0.011 P2= 3.60"			
	3.9					Direct Entry, Pipe flow			
	5.0	100	Total						

#### Subcatchment 11S: Onsite 5



Page 87

# **Summary for Subcatchment 12S: EX OFF**

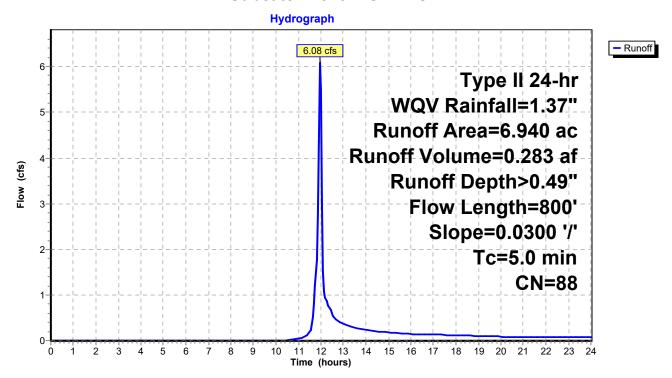
[49] Hint: Tc<2dt may require smaller dt

Runoff = 6.08 cfs @ 11.96 hrs, Volume= 0.283 af, Depth> 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr WQV Rainfall=1.37"

	Area	(ac) C	N Des	cription					
*	6.	6.940 88 Future Multi-Family, 65% imp, HSG C							
	2.	429							
	4.	511	65.0	0% Imper	∕ious Area				
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description			
	1.0	100	0.0300	1.72		Sheet Flow, Sheet flow	_		
	4.0	700		2.92		Smooth surfaces n= 0.011 P2= 3.60"  Direct Entry, Pipe flow			
	5.0	800	Total	-		• •	-		

#### Subcatchment 12S: EX OFF



Page 88

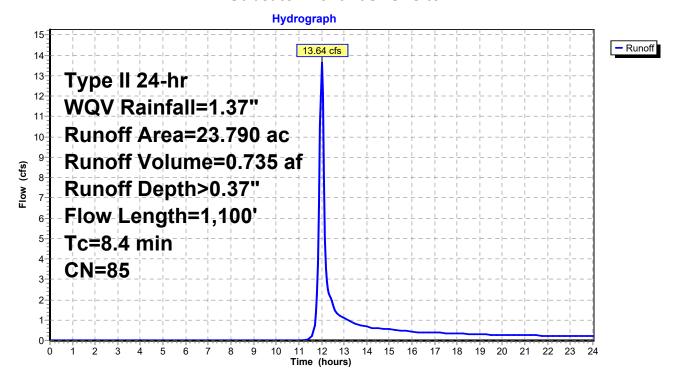
# **Summary for Subcatchment 13S: Onsite 4**

Runoff = 13.64 cfs @ 12.01 hrs, Volume= 0.735 af, Depth> 0.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr WQV Rainfall=1.37"

	Area	(ac) (	N Des	cription								
*	11.	250	82 SIN	GLE FAMI	LE FAMILY LOTS							
*	12.	540	88 1/8	acre lots, 65% imp, HSG D								
23.790 85 Weighted Average												
15.639 65.74% Pervious Area												
	8.	151	34.2	:6% Imperv	∕ious Area							
	Тс	Length	Slope	Velocity	Capacity	Description						
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)							
	1.1	100	0.0205	1.47		Sheet Flow,						
						Smooth surfaces n= 0.011 P2= 3.60"						
	7.3	1,000	0.0200	2.28		Shallow Concentrated Flow,						
_						Unpaved Kv= 16.1 fps						
	8.4	1,100	Total									

#### Subcatchment 13S: Onsite 4



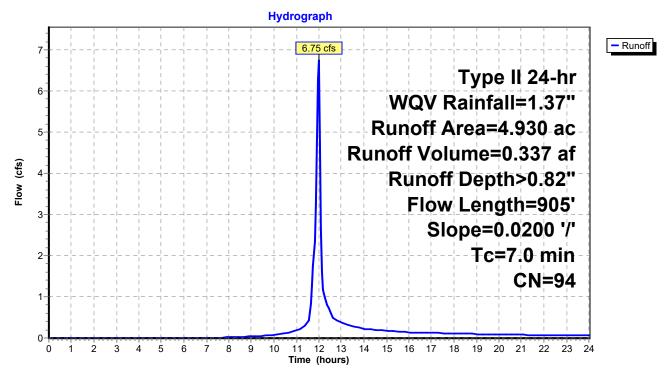
# **Summary for Subcatchment 15S: Onsite 2**

Runoff = 6.75 cfs @ 11.98 hrs, Volume= 0.337 af, Depth> 0.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr WQV Rainfall=1.37"

	Area	(ac) C	N Des	cription			
,	<b>*</b> 4.	930 9	94 Urba	an commei	cial, 85% i	mp, HSG D	
	0.	739	15.0	0% Pervio	us Area		
4.190 85.00% Impervious Area							
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description	
	1.1	100	0.0200	1.46		Sheet Flow,	
	5.9	805	0.0200	2.28		Smooth surfaces n= 0.011 P2= 3.60" <b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps	
	7.0	905	Total				

# Subcatchment 15S: Onsite 2



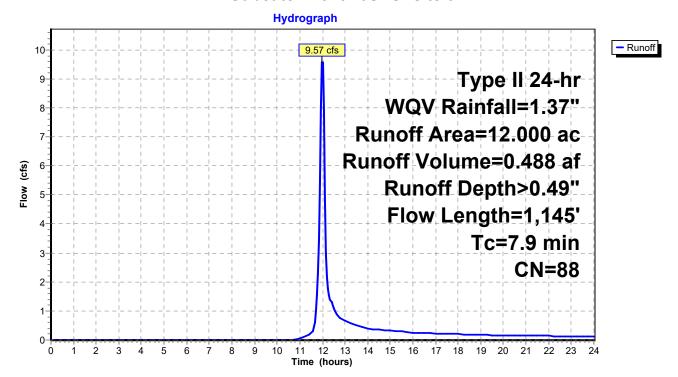
# **Summary for Subcatchment 16S: Onsite 3**

Runoff = 9.57 cfs @ 12.00 hrs, Volume= 0.488 af, Depth> 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr WQV Rainfall=1.37"

_	Area	(ac) C	N Des	cription			
,	* 12.	3 000	38 1/8 a	acre lots, 6	5% imp, H	SG D	
4.200 35.00% Pervious Area							
	7.	800	65.0	0% Imper	∕ious Area		
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description	
	1.1	100	0.0200	1.46		Sheet Flow,	
	6.8	1,045	0.0250	2.55		Smooth surfaces n= 0.011 P2= 3.60"  Shallow Concentrated Flow, Unpaved Kv= 16.1 fps	
	7.9	1.145	Total				

# **Subcatchment 16S: Onsite 3**



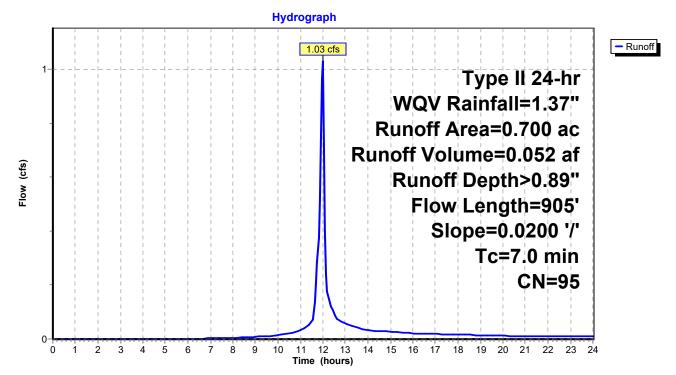
# **Summary for Subcatchment 17S: Onsite 1**

Runoff = 1.03 cfs @ 11.98 hrs, Volume= 0.052 af, Depth> 0.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr WQV Rainfall=1.37"

_	Area	(ac) C	N Desc	cription				
0.700 95 Urban commercial, 85% imp, HSG D								
-	0.	105	15.0	0% Pervio				
0.595 85.00% Impervious Area								
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description		
-	1.1	100	0.0200	1.46		Sheet Flow,		
_	5.9	805	0.0200	2.28		Smooth surfaces n= 0.011 P2= 3.60"  Shallow Concentrated Flow, Unpaved Kv= 16.1 fps		
	7.0	905	Total					

# **Subcatchment 17S: Onsite 1**



Page 92

# **Summary for Pond 12P: EWDB #1**

Inflow Area = 26.020 ac, 65.00% Impervious, Inflow Depth > 0.49" for WQV event

Inflow = 22.80 cfs @ 11.96 hrs, Volume= 1.060 af

Outflow = 0.15 cfs @ 24.00 hrs, Volume= 0.104 af, Atten= 99%, Lag= 722.2 min

Primary = 0.15 cfs @ 24.00 hrs, Volume= 0.104 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Peak Elev= 995.43' @ 24.00 hrs Surf.Area= 66,858 sf Storage= 41,599 cf

Plug-Flow detention time= 444.5 min calculated for 0.104 af (10% of inflow)

Center-of-Mass det. time= 294.1 min (1,145.2 - 851.1)

Volume	Inv	ert Avail.Sto	orage Storage	e Description
#1	994.	80' 561,6	663 cf Custor	m Stage Data (Prismatic)Listed below (Recalc)
Elevatio		Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
994.8	30	66,251	0	0
996.8	30	68,192	134,443	134,443
997.0	00	69,233	13,743	148,186
998.0	00	74,497	71,865	220,051
999.0	00	79,862	77,180	297,230
1,000.0	00	85,328	82,595	379,825
1,001.0	00	90,894	88,111	467,936
1,002.0	00	96,560	93,727	561,663
Device	Routing	Invert	Outlet Devic	ces
#1	Primary	994.50'	30.0" Roun	nd Culvert
			I = 80.0' RC	CP sa cut end projecting. Ke= 0.500

DOVICE	rtouting	IIIVOIT	Outlot Bovioco
#1	Primary	994.50'	30.0" Round Culvert
			L= 80.0' RCP, sq.cut end projecting, Ke= 0.500
			Inlet / Outlet Invert= 994.50' / 993.90' S= 0.0075 '/' Cc= 0.900
			n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf
#2	Device 1	994.80'	20.0 deg x 0.70' rise Sharp-Crested Vee/Trap Weir
			Cv= 2.69 (C= 3.36)
#3	Device 1	995.50'	5.0' long x 3.00' rise Sharp-Crested Rectangular Weir
			2 End Contraction(s) 3.0' Crest Height
#4	Device 1	998.50'	<b>60.0" x 60.0" Horiz. Orifice/Grate</b> C= 0.600
			Limited to weir flow at low heads

Primary OutFlow Max=0.15 cfs @ 24.00 hrs HW=995.43' (Free Discharge)

**1=Culvert** (Passes 0.15 cfs of 5.00 cfs potential flow)

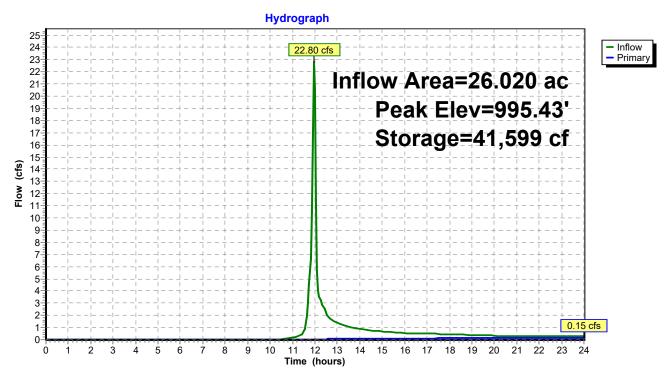
**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 0.15 cfs @ 2.13 fps)

-3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

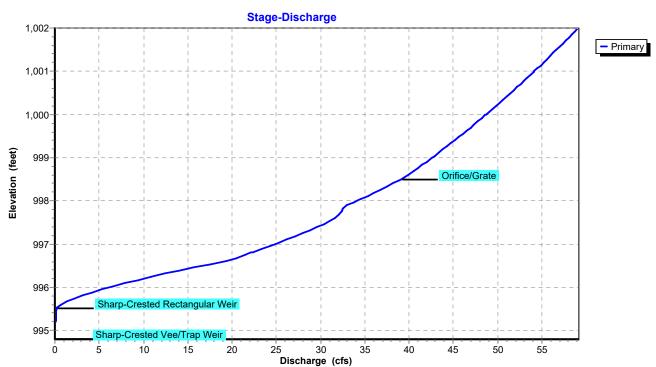
**-4=Orifice/Grate** (Controls 0.00 cfs)

Page 93

**Pond 12P: EWDB #1** 



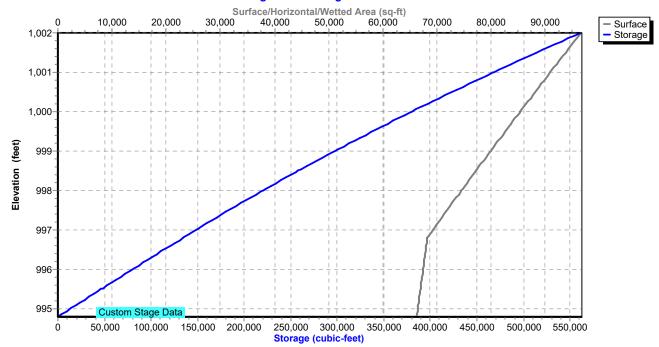
**Pond 12P: EWDB #1** 



Page 94

### **Pond 12P: EWDB #1**

#### Stage-Area-Storage



Volume

HydroCAD® 10.00-13 s/n 08303 © 2014 HydroCAD Software Solutions LLC

Page 95

# **Summary for Pond 13P: EWDB #2**

Inflow Area = 12.000 ac, 65.00% Impervious, Inflow Depth > 0.49" for WQV event

Inflow 9.57 cfs @ 12.00 hrs, Volume= 0.488 af

0.19 cfs @ 18.47 hrs, Volume= Outflow 0.166 af, Atten= 98%, Lag= 388.5 min

Primary 0.19 cfs @ 18.47 hrs, Volume= 0.166 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Peak Elev= 992.69' @ 18.47 hrs Surf.Area= 22,108 sf Storage= 14,734 cf

Plug-Flow detention time= 389.9 min calculated for 0.165 af (34% of inflow)

Avail.Storage Storage Description

Center-of-Mass det. time= 251.4 min (1,104.7 - 853.3)

Invert

#1	992.0	0' 167,2	61 cf Custom	Stage Data (P	rismatic)Listed below (Recalc)
Elevation		Surf.Area	Inc.Store	Cum.Store	
(feet)		(sq-ft)	(cubic-feet)	(cubic-feet)	
992.00		20,519	0	0	
993.00		22,818	21,669	21,669	
994.00		25,218	24,018	45,687	
995.00		27,718	26,468	72,155	
996.00		30,318	29,018	101,173	
997.00		33,019	31,669	132,841	
998.00		35,821	34,420	167,261	
Device F	Routing	Invert	Outlet Devices	S	
#1 F	Primary	990.00'	18.0" Round	Culvert	
	-		L= 55.6' CPP	, square edge l	neadwall, Ke= 0.500
			Inlet / Outlet In	vert= 990.00' /	985.00' S= 0.0899 '/' Cc= 0.900
			n= 0.012 Con	crete pipe, finis	hed, Flow Area= 1.77 sf
#2 [	Device 1	992.00'	<b>20.0 deg x 4.0</b> Cv= 2.69 (C= 3		Crested Vee/Trap Weir
#3 [	Device 1	996.00'	`	,	Grate C= 0.600

Limited to weir flow at low heads

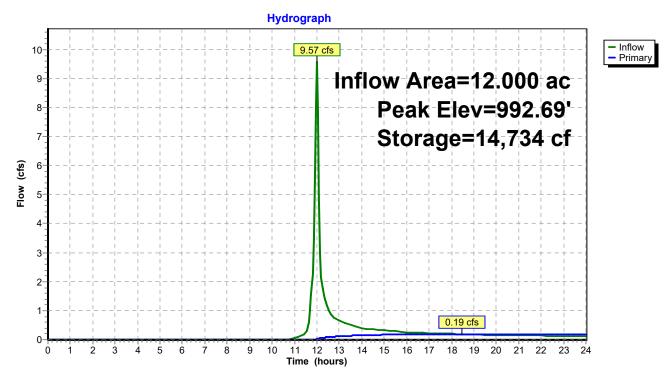
Primary OutFlow Max=0.19 cfs @ 18.47 hrs HW=992.69' (Free Discharge)

-1=Culvert (Passes 0.19 cfs of 11.86 cfs potential flow)

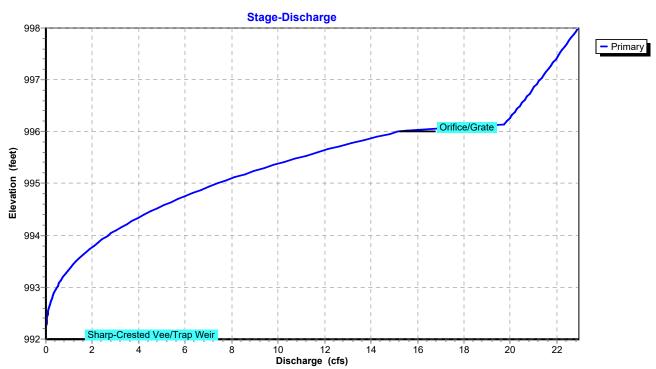
2=Sharp-Crested Vee/Trap Weir (Weir Controls 0.19 cfs @ 2.24 fps) 3=Orifice/Grate (Controls 0.00 cfs)

Page 96

**Pond 13P: EWDB #2** 



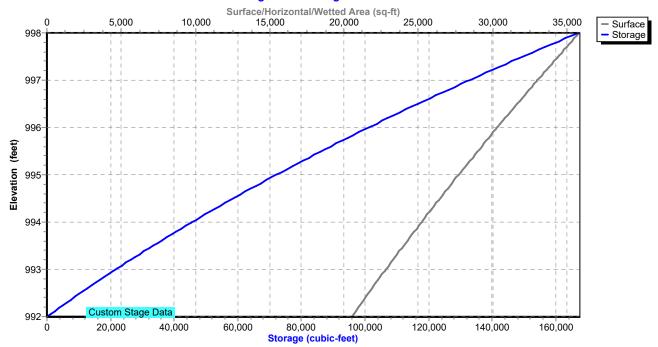
### **Pond 13P: EWDB #2**



Page 97

# **Pond 13P: EWDB #2**

#### Stage-Area-Storage



Page 98

# **Summary for Pond 14P: EWDB #3**

[79] Warning: Submerged Pond 13P Primary device # 1 OUTLET by 1.74'

Inflow Area = 35.790 ac, 44.57% Impervious, Inflow Depth > 0.30" for WQV event

Inflow = 13.65 cfs @ 12.01 hrs, Volume= 0.901 af

Outflow = 0.40 cfs @ 22.69 hrs, Volume= 0.336 af, Atten= 97%, Lag= 640.6 min

Primary = 0.40 cfs @ 22.69 hrs, Volume= 0.336 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Peak Elev= 986.74' @ 22.69 hrs Surf.Area= 34,616 sf Storage= 24,649 cf

Plug-Flow detention time= 400.6 min calculated for 0.336 af (37% of inflow)

Center-of-Mass det. time= 210.3 min (1,123.9 - 913.5)

Volume	Inve	ert Avail.Sto	rage Sto	rage Description
#1	986.0	00' 260,92	29 cf <b>Cu</b>	stom Stage Data (Prismatic)Listed below (Recalc)
Elevation	an.	Surf.Area	Inc.Sto	re Cum.Store
(fee		(sq-ft)	(cubic-fee	<del></del>
986.0		32,444		0 0
987.0		35,398	33,92	•
988.0		38,453	36,92	
989.0	00	42,954	40,70	•
990.0	00	47,178	45,06	66 156,616
991.0	00	52,032	49,60	05 206,221
992.0	00	57,384	54,70	08 260,929
Device	Routing	Invert	Outlet D	evices
#1	Primary	979.00'	36.0" R	ound Culvert
	•		L= 200.1	' CPP, projecting, no headwall, Ke= 0.900
			Inlet / O	utlet Invert= 979.00' / 977.28' S= 0.0086 '/' Cc= 0.900
			n= 0.012	Concrete pipe, finished, Flow Area= 7.07 sf
#2	Device 1	985.80'	20.0 deg	x 1.60' rise Sharp-Crested Vee/Trap Weir
			•	O (C= 3.36)
#3	Device 1	987.40'		Weir/Orifice, Cv= 2.62 (C= 3.28)
				eet) 987.40 989.10
				eet) 5.00 5.00
#4	Device 1	989.10'		60.0" Horiz. Orifice/Grate C= 0.600
				o weir flow at low heads

Primary OutFlow Max=0.40 cfs @ 22.69 hrs HW=986.74' (Free Discharge)

**-1=Culvert** (Passes 0.40 cfs of 67.09 cfs potential flow)

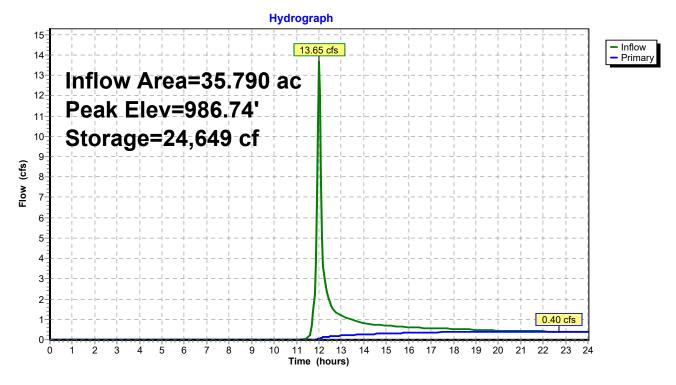
**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 0.40 cfs @ 2.60 fps)

-3=Custom Weir/Orifice (Controls 0.00 cfs)

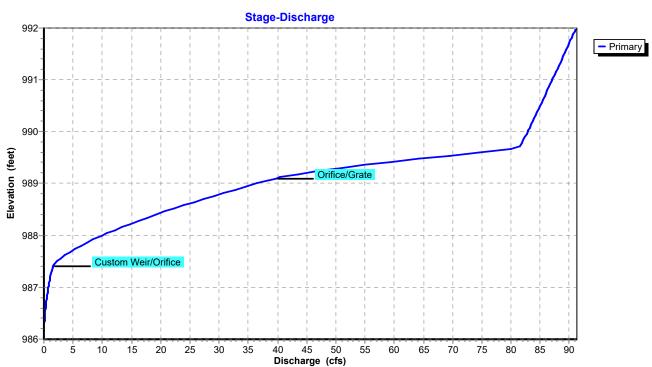
-4=Orifice/Grate (Controls 0.00 cfs)

Page 99

**Pond 14P: EWDB #3** 



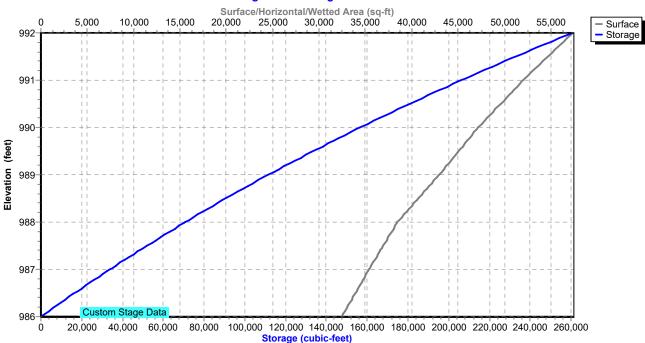
### **Pond 14P: EWDB #3**



Page 100

### **Pond 14P: EWDB #3**

#### Stage-Area-Storage



Printed 3/30/2023 Page 101

# Summary for Pond 15P: EDDB #1

Inflow Area = 4.930 ac, 85.00% Impervious, Inflow Depth > 0.82" for WQV event

Inflow 6.75 cfs @ 11.98 hrs, Volume= 0.337 af

0.21 cfs @ 14.32 hrs, Volume= Outflow 0.228 af, Atten= 97%, Lag= 140.3 min

Primary 0.21 cfs @ 14.32 hrs, Volume= 0.228 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Peak Elev= 1,006.16' @ 14.32 hrs Surf.Area= 7,483 sf Storage= 8,057 cf

Plug-Flow detention time= 308.1 min calculated for 0.228 af (68% of inflow)

Center-of-Mass det. time= 205.5 min (1,021.2 - 815.8)

Volume	Inve	rt Avail.Sto	rage Storage	Description		
#1	1,004.0	0' 68,10	00 cf Custom	Stage Data (Pi	rismatic)Listed below (Rec	alc)
Florestion	<b>-</b>	Curf Araa	Ina Ctora	Cum Store		
Elevation		Surf.Area	Inc.Store	Cum.Store		
(feet	,	(sq-ft)	(cubic-feet)	(cubic-feet)		
1,004.0		50	0	0		
1,006.0	0	6,872	6,922	6,922		
1,008.0	0	14,603	21,475	28,397		
1,010.0	0	25,100	39,703	68,100		
Device	Routing	Invert	Outlet Device	c		
#1	Primary	1,002.00'	24.0" Round			
					ojecting, Ke= 0.500	
				,	'/ 1,001.50' S= 0.0100 '/'	Cc = 0.900
				1 1 /	hed, Flow Area= 3.14 sf	
#2	Device 1	1,002.25'		" ORIFICE C=		
#3	Device 1	1,007.50'		/Orifice, Cv= 2.		
				,007.50 1,009.	50	
			Width (feet) 6	6.00 6.00		
#4	Device 2	1,002.50'	6.0" Round (	6" PVC		
			L= 30.0' CPF	P, square edge h	neadwall, Ke= 0.500	
			Inlet / Outlet In	nvert= 1,002.50	' / 1,002.25' S= 0.0083 '/'	Cc = 0.900
					or, Flow Area= 0.20 sf	
#5	Device 2	1,005.00'		RISER X 7.00	The state of the s	
		,		4.0" cc spacing		

1,010.00' **72.0" x 72.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.21 cfs @ 14.32 hrs HW=1,006.16' (Free Discharge)

-1=Culvert (Passes 0.21 cfs of 26.88 cfs potential flow)

**-2=2.0" ORIFICE** (Orifice Controls 0.21 cfs @ 9.42 fps)

-4=6" PVC (Passes < 1.71 cfs potential flow)

5=15" RISER (Passes < 0.54 cfs potential flow)

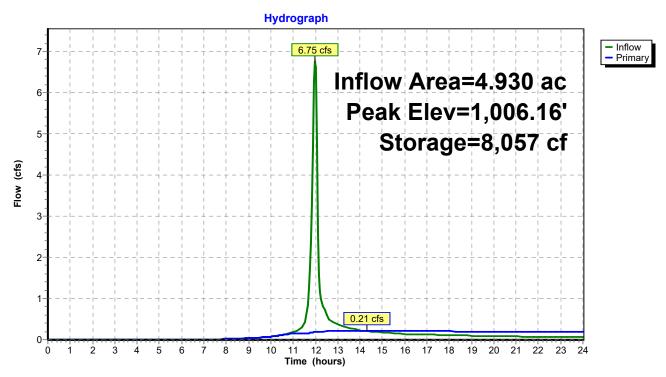
-3=Custom Weir/Orifice (Controls 0.00 cfs)

-6=Orifice/Grate (Controls 0.00 cfs)

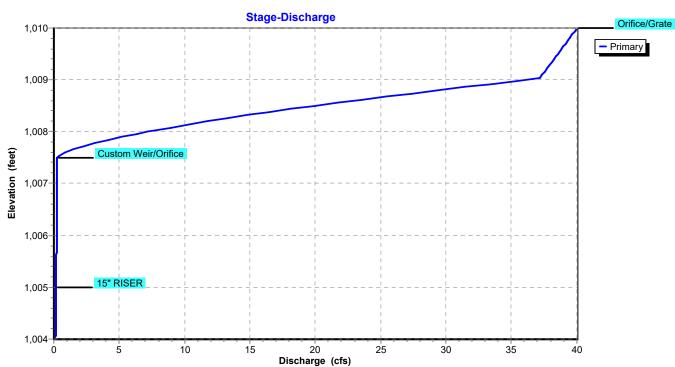
#6

Device 1

Pond 15P: EDDB #1



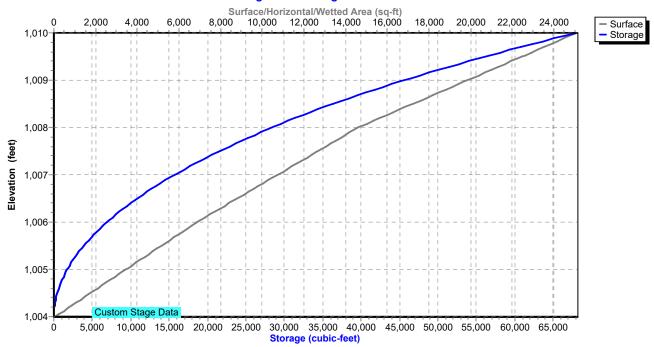
Pond 15P: EDDB #1



Page 103

# **Pond 15P: EDDB #1**

#### Stage-Area-Storage



Page 104

# Summary for Link 7L: RP-1

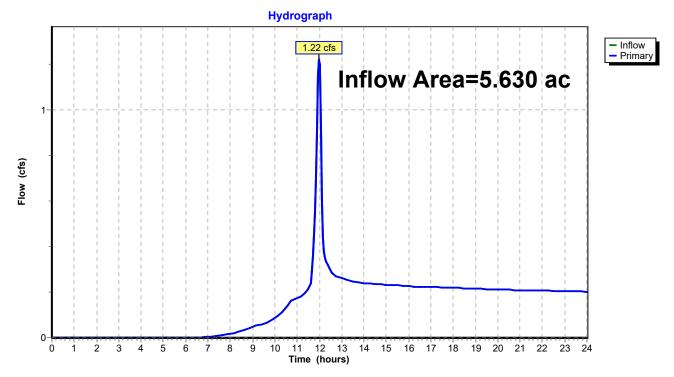
Inflow Area = 5.630 ac, 85.00% Impervious, Inflow Depth > 0.60" for WQV event

Inflow = 1.22 cfs @ 11.98 hrs, Volume= 0.280 af

Primary = 1.22 cfs @ 11.98 hrs, Volume= 0.280 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

# Link 7L: RP-1



Page 105

# **Summary for Link 9L: RP-3**

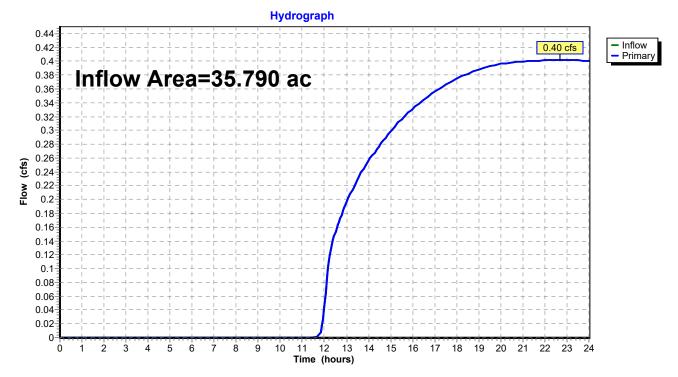
Inflow Area = 35.790 ac, 44.57% Impervious, Inflow Depth > 0.11" for WQV event

Inflow = 0.40 cfs @ 22.69 hrs, Volume= 0.336 af

Primary = 0.40 cfs @ 22.69 hrs, Volume= 0.336 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

# Link 9L: RP-3



Page 106

# Summary for Link 10L: RP-4

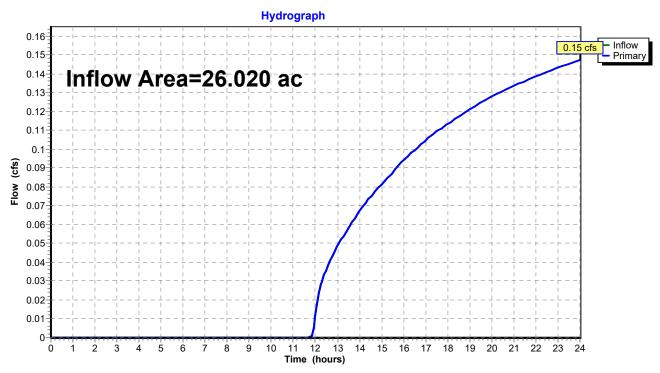
Inflow Area = 26.020 ac, 65.00% Impervious, Inflow Depth > 0.05" for WQV event

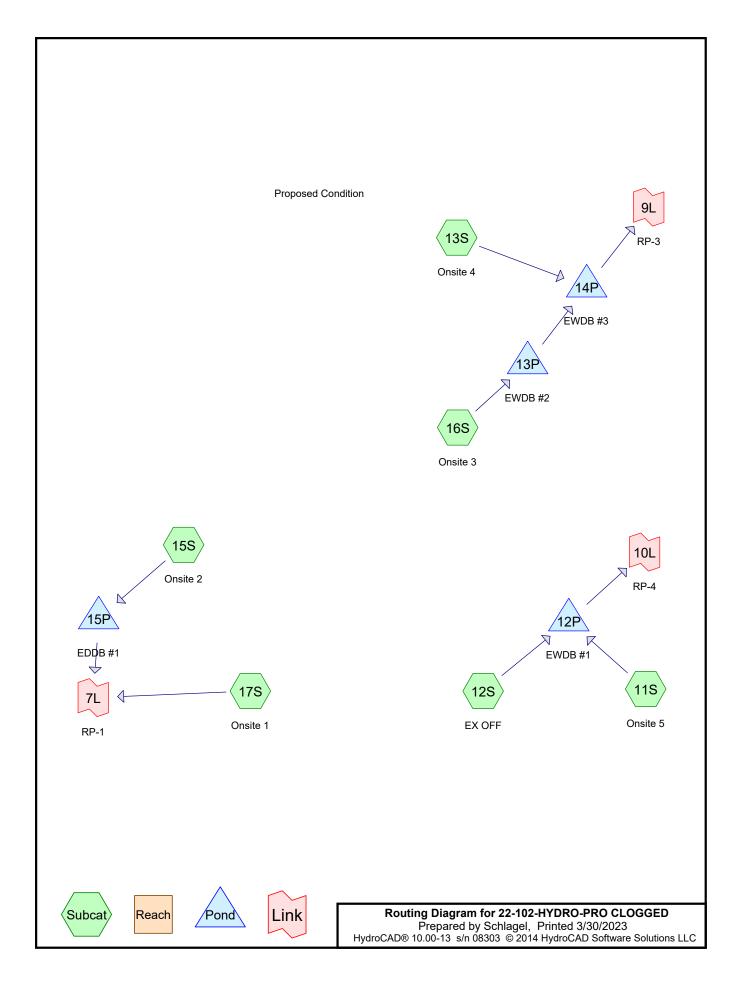
Inflow = 0.15 cfs @ 24.00 hrs, Volume= 0.104 af

Primary = 0.15 cfs @ 24.00 hrs, Volume= 0.104 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

# **Link 10L: RP-4**





Page 2

# **Summary for Subcatchment 11S: Onsite 5**

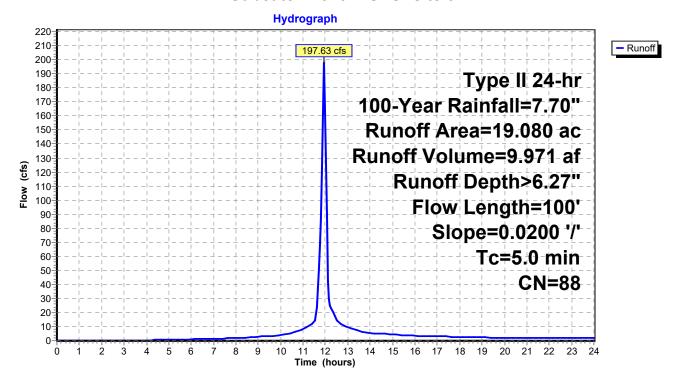
[49] Hint: Tc<2dt may require smaller dt

Runoff = 197.63 cfs @ 11.95 hrs, Volume= 9.971 af, Depth> 6.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 100-Year Rainfall=7.70"

_	Area	(ac) C	N Des	cription							
*	19.	080	38 Apa	Apartments, 65% imp, HSG C							
6.678 35.00% Pervious Area											
	12.	402									
	Tc (min)	Length (feet)	Slope (ft/ft)	Description							
_	1.1	100	0.0200	(ft/sec) 1.46	(cfs)	Sheet Flow, Smooth surfaces n= 0.011 P2= 3.60"					
_	3.9					Direct Entry, Pipe flow					
	5.0	100	Total								

#### Subcatchment 11S: Onsite 5



Printed 3/30/2023 Page 3

# **Summary for Subcatchment 12S: EX OFF**

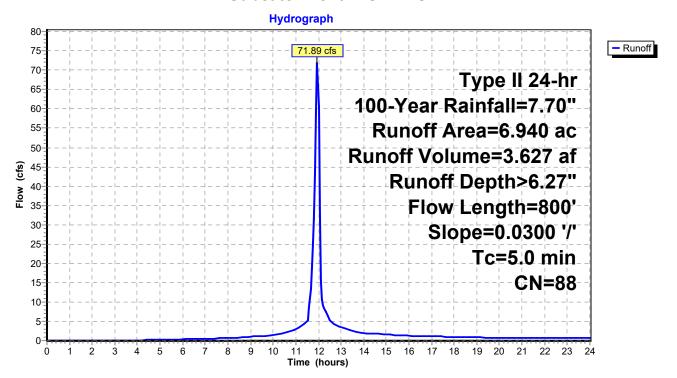
[49] Hint: Tc<2dt may require smaller dt

Runoff = 71.89 cfs @ 11.95 hrs, Volume= 3.627 af, Depth> 6.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 100-Year Rainfall=7.70"

	Area	(ac) C	CN Description								
*	6.	940 8	88 Future Multi-Family, 65% imp, HSG C								
2.429 35.00% Pervious Area											
	4.	511	65.0	0% Imper	∕ious Area						
Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs)						Description					
	1.0	100	0.0300	1.72		Sheet Flow, Sheet flow	_				
	4.0	700		2.92		Smooth surfaces n= 0.011 P2= 3.60"  Direct Entry, Pipe flow					
	5.0	800	Total	-		• •	-				

#### Subcatchment 12S: EX OFF



Page 4

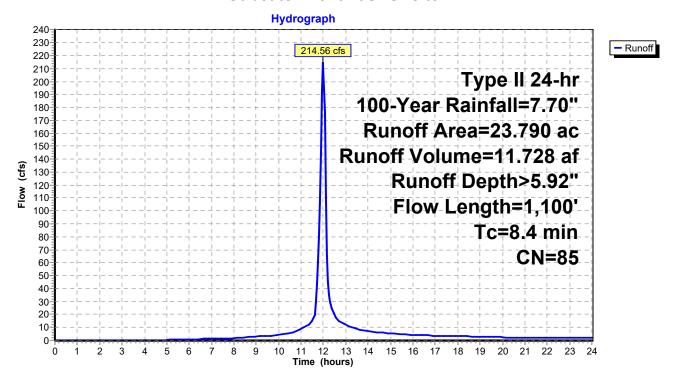
# **Summary for Subcatchment 13S: Onsite 4**

Runoff = 214.56 cfs @ 11.99 hrs, Volume= 11.728 af, Depth> 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 100-Year Rainfall=7.70"

	Area	(ac) (	CN Des	cription		
*	11.	250	82 SIN	GLE FAMI	LY LOTS	
*	12.	540	88 1/8 8	acre lots, 6	SG D	
	23.	790	85 Wei	ghted Aver	age	
	15.	639	65.7	4% Pervio	us Area	
	8.	151	34.2	6% Imper	∕ious Area	
	Tc	Length		Velocity	Capacity	Description
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	1.1	100	0.0205	1.47		Sheet Flow,
						Smooth surfaces n= 0.011 P2= 3.60"
	7.3	1,000	0.0200	2.28		Shallow Concentrated Flow,
_						Unpaved Kv= 16.1 fps
	84	1 100	Total			

#### Subcatchment 13S: Onsite 4



Printed 3/30/2023 Page 5

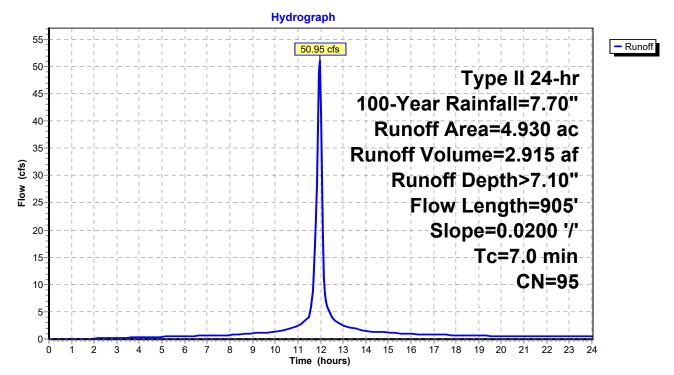
# **Summary for Subcatchment 15S: Onsite 2**

Runoff = 50.95 cfs @ 11.98 hrs, Volume= 2.915 af, Depth> 7.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 100-Year Rainfall=7.70"

_	Area	(ac) C	N Desc	cription				
4.930 95 Urban commercial, 85% imp, HSG D								
0.739 15.00% Pervious Area								
4.190 85.00% Impervious Area								
					Capacity (cfs)	Description		
-	1.1	100	0.0200	1.46		Sheet Flow,		
_	5.9	805	0.0200	2.28		Smooth surfaces n= 0.011 P2= 3.60"  Shallow Concentrated Flow, Unpaved Kv= 16.1 fps		
	7.0	905	Total					

# Subcatchment 15S: Onsite 2



Printed 3/30/2023 Page 6

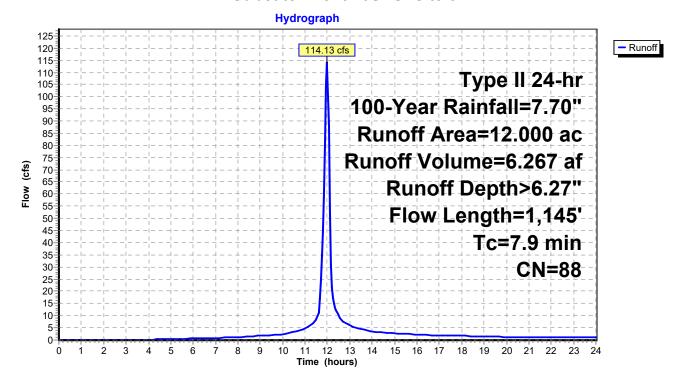
# **Summary for Subcatchment 16S: Onsite 3**

Runoff = 114.13 cfs @ 11.99 hrs, Volume= 6.267 af, Depth> 6.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 100-Year Rainfall=7.70"

_	Area	(ac) C	N Desc	cription					
,	* 12.000 88 1/8 acre lots, 65% imp, HSG D								
4.200 35.00% Pervious Area									
7.800 65.00% Impervious Area									
				Velocity (ft/sec)	Capacity (cfs)	Description			
	1.1	100	0.0200	1.46		Sheet Flow,			
	6.8	1,045	0.0250	2.55		Smooth surfaces n= 0.011 P2= 3.60"  Shallow Concentrated Flow, Unpaved Kv= 16.1 fps			
	7.9	1.145	Total						

# **Subcatchment 16S: Onsite 3**



Page 7

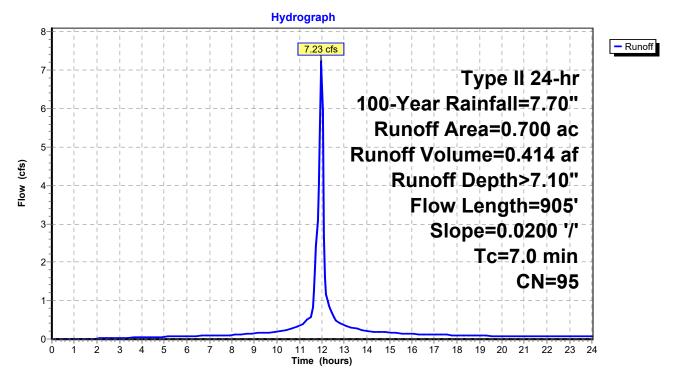
# **Summary for Subcatchment 17S: Onsite 1**

Runoff = 7.23 cfs @ 11.98 hrs, Volume= 0.414 af, Depth> 7.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Type II 24-hr 100-Year Rainfall=7.70"

_	Area	(ac) C	N Desc	cription					
0.700 95 Urban commercial, 85% imp, HSG D									
0.105 15.00% Pervious Area									
0.595 85.00% Impervious Area									
					Capacity (cfs)	Description			
-	1.1	100	0.0200	1.46		Sheet Flow,			
_	5.9	805	0.0200	2.28		Smooth surfaces n= 0.011 P2= 3.60"  Shallow Concentrated Flow, Unpaved Kv= 16.1 fps			
	7.0	905	Total						

### **Subcatchment 17S: Onsite 1**



#### 22-102-HYDRO-PRO CLOGGED

Prepared by Schlagel

HydroCAD® 10.00-13 s/n 08303 © 2014 HydroCAD Software Solutions LLC

Page 8

# **Summary for Pond 12P: EWDB #1**

Inflow Area = 26.020 ac, 65.00% Impervious, Inflow Depth > 6.27" for 100-Year event

Inflow = 269.52 cfs @ 11.95 hrs, Volume= 13.597 af

Outflow = 149.87 cfs @ 12.04 hrs, Volume= 11.918 af, Atten= 44%, Lag= 5.5 min

Primary = 149.87 cfs @ 12.04 hrs, Volume= 11.918 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 1,001.54' @ 12.04 hrs Surf.Area= 93,928 sf Storage= 224,967 cf

Plug-Flow detention time= 114.4 min calculated for 11.894 af (87% of inflow)

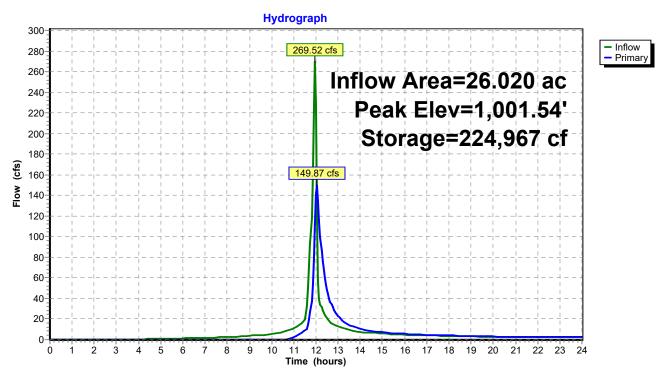
Center-of-Mass det. time= 56.1 min (834.6 - 778.6)

Volume	Inv	vert Avai	il.Storage	Storage	Description	
#1	998.	94' 3	38,216 cf	Custon	n Stage Data (Pr	rismatic)Listed below (Recalc)
Elevatio		Surf.Area (sq-ft)		c.Store c-feet)	Cum.Store (cubic-feet)	
998.9	)4	79,537		0	0	
999.0	0	79,862		4,782	4,782	
1,000.0	0	85,328	;	82,595	87,377	
1,001.0	0	90,894		88,111	175,488	
1,002.0	0	96,560		93,727	269,215	
1,002.7	0	100,587		69,001	338,216	
Device	Routing	ı İn	vert Out	let Device	es	
#1	Primary	999	Elev	/. (feet)	<b>r/Orifice, Cv= 2.</b> 999.70 1,002.70 14.00 32.00	`

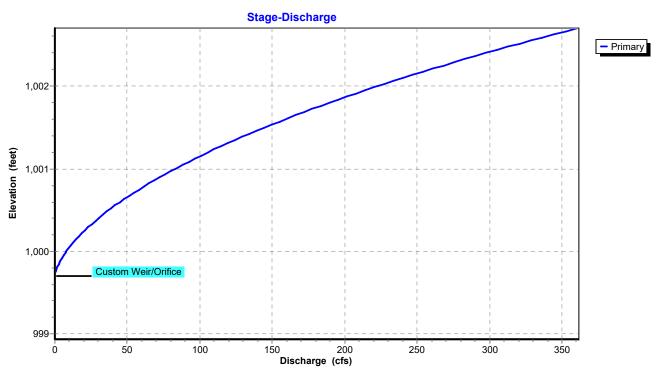
Primary OutFlow Max=148.47 cfs @ 12.04 hrs HW=1,001.53' (Free Discharge) 1=Custom Weir/Orifice (Weir Controls 148.47 cfs @ 4.18 fps)

Page 9

**Pond 12P: EWDB #1** 



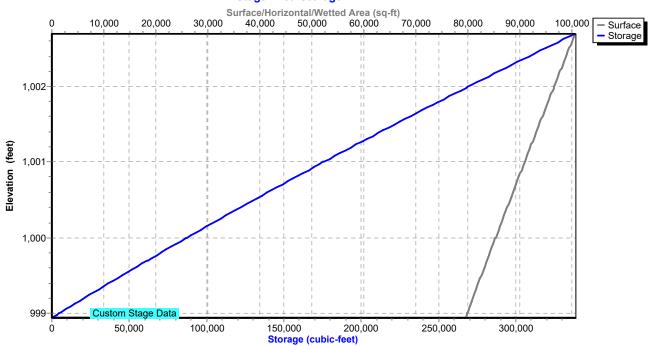
**Pond 12P: EWDB #1** 



Page 10

# **Pond 12P: EWDB #1**

# Stage-Area-Storage



Prepared by Schlagel

HydroCAD® 10.00-13 s/n 08303 © 2014 HydroCAD Software Solutions LLC

Page 11

# **Summary for Pond 13P: EWDB #2**

Inflow Area = 12.000 ac, 65.00% Impervious, Inflow Depth > 6.27" for 100-Year event

Inflow = 114.13 cfs @ 11.99 hrs, Volume= 6.267 af

Outflow = 108.79 cfs @ 12.01 hrs, Volume= 5.421 af, Atten= 5%, Lag= 1.4 min

Primary = 108.79 cfs @ 12.01 hrs, Volume= 5.421 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs Peak Elev= 998.40' @ 12.01 hrs Surf.Area= 39,083 sf Storage= 51,516 cf

Plug-Flow detention time= 101.5 min calculated for 5.421 af (87% of inflow)

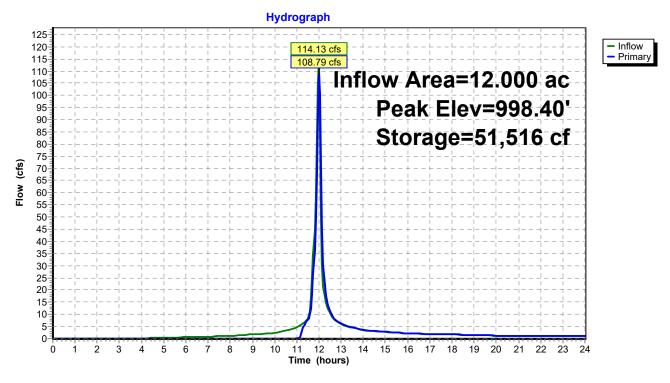
Center-of-Mass det. time= 39.1 min (820.0 - 780.9)

Volume	In	vert Av	ail.Stora	ige Stora	ge Descri	ption	
#1	997	.00'	75,715	of Cust	om Stage	Data (Pr	rismatic)Listed below (Recalc)
Elevatio		Surf.Area (sq-ft)		Inc.Store cubic-feet)	_	m.Store bic-feet)	
997.0	00	34,820		0		0	
998.0	00	37,748		36,284		36,284	
999.0	00	41,114		39,431		75,715	
Device	Routing	j l	nvert	Outlet Dev	ices		
#1	Primary	, 99	8.00'	Custom W	/eir/Orific	e, Cv= 2.	62 (C= 3.28)
				Elev. (feet	998.00	999.50	
			,	Width (feet	t) 132.00	142.00	

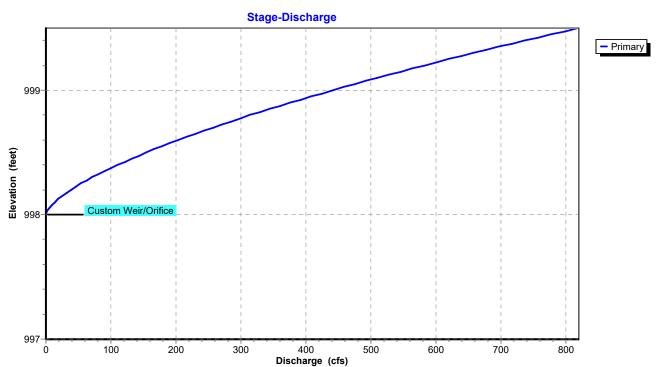
Primary OutFlow Max=106.69 cfs @ 12.01 hrs HW=998.39' (Free Discharge)
1=Custom Weir/Orifice (Weir Controls 106.69 cfs @ 2.04 fps)

Page 12

# **Pond 13P: EWDB #2**



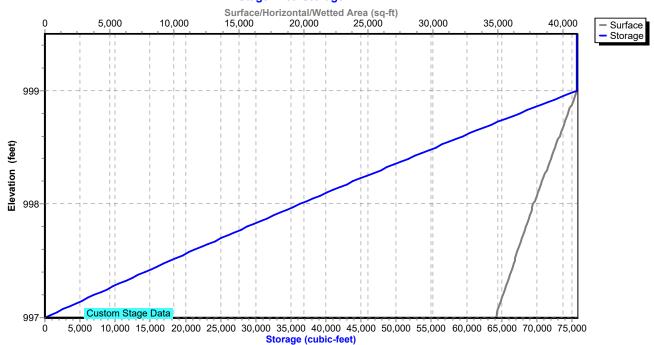
**Pond 13P: EWDB #2** 



Page 13

# **Pond 13P: EWDB #2**

# Stage-Area-Storage



Prepared by Schlagel

HydroCAD® 10.00-13 s/n 08303 © 2014 HydroCAD Software Solutions LLC

Printed 3/30/2023 Page 14

# **Summary for Pond 14P: EWDB #3**

[93] Warning: Storage range exceeded by 0.04'

Inflow Area = 35.790 ac, 44.57% Impervious, Inflow Depth > 5.75" for 100-Year event

Inflow = 322.30 cfs @ 12.00 hrs, Volume= 17.149 af

Outflow = 308.52 cfs @ 12.03 hrs, Volume= 15.534 af, Atten= 4%, Lag= 1.7 min

Primary = 308.52 cfs @ 12.03 hrs, Volume= 15.534 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 993.04' @ 12.03 hrs Surf.Area= 64,579 sf Storage= 118,262 cf

Plug-Flow detention time= 73.8 min calculated for 15.534 af (91% of inflow)

Center-of-Mass det. time= 26.1 min (825.5 - 799.4)

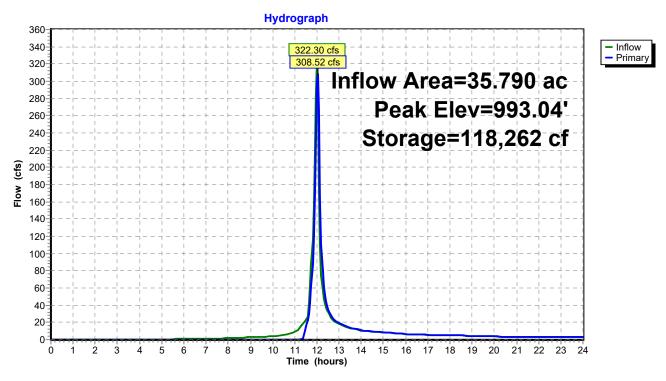
Volume	Inve	ert Avail.St	orage S	torage De	escription	
#1	991.00' 118,26		262 cf <b>C</b>	22 cf Custom Stage Data (Prismatic)Listed below (Recalc)		
Elevatio	_	Surf.Area (sq-ft)	Inc.St (cubic-fe		Cum.Store (cubic-feet)	
991.0	0	52,031		0	0	
992.0	0	59,957	55,9	994	55,994	
993.00 64,5		64,579	62,2	268	118,262	
Device	Routing	Invert	Outlet I	Devices		
#1	Primary	992.20	Custor	n Weir/C	rifice, Cv= 2	.62 (C= 3.28)
			Elev. (	feet) 992	2.20 994.20	

Width (feet) 120.00 136.00

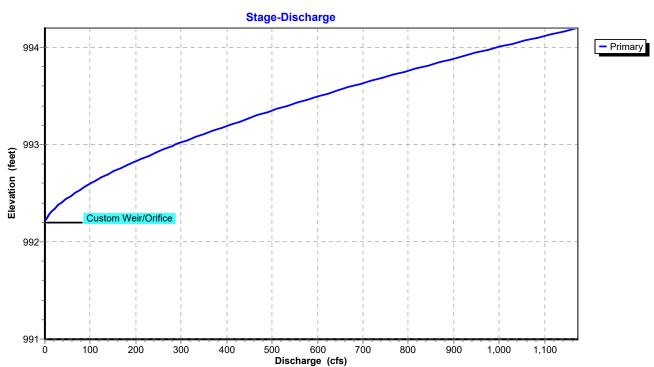
Primary OutFlow Max=299.60 cfs @ 12.03 hrs HW=993.02' (Free Discharge)
—1=Custom Weir/Orifice (Weir Controls 299.60 cfs @ 2.95 fps)

Page 15

**Pond 14P: EWDB #3** 



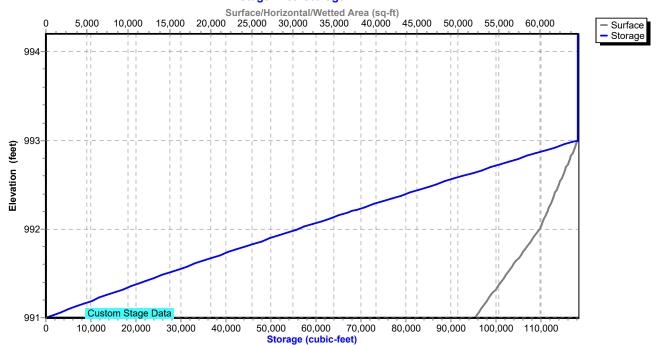
**Pond 14P: EWDB #3** 



Page 16

# **Pond 14P: EWDB #3**

# Stage-Area-Storage



Prepared by Schlagel

HydroCAD® 10.00-13 s/n 08303 © 2014 HydroCAD Software Solutions LLC

Printed 3/30/2023

Page 17

# Summary for Pond 15P: EDDB #1

Inflow Area = 4.930 ac, 85.00% Impervious, Inflow Depth > 7.10" for 100-Year event

Inflow 50.95 cfs @ 11.98 hrs, Volume= 2.915 af

34.57 cfs @ 12.05 hrs, Volume= Outflow 2.407 af, Atten= 32%, Lag= 4.6 min

Primary 34.57 cfs @ 12.05 hrs, Volume= 2.407 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 1,008.95' @ 12.05 hrs Surf.Area= 19,587 sf Storage= 44,630 cf

Plug-Flow detention time= 126.6 min calculated for 2.407 af (83% of inflow)

Center-of-Mass det. time= 52.3 min (806.6 - 754.3)

Volume	Inver	t Avail.Sto	rage Storage I	Description		
#1	1,004.00	)' 68,10	00 cf Custom	Stage Data (Pi	rismatic)Listed below (Rec	alc)
<b>-</b> 1	6	N	la a Otama	0		
Elevation		Surf.Area	Inc.Store	Cum.Store		
(fee		(sq-ft)	(cubic-feet)	(cubic-feet)		
1,004.0		50	0	0		
1,006.0		6,872	6,922	6,922		
1,008.0		14,603	21,475	28,397		
1,010.0	00	25,100	39,703	68,100		
Device	Routing	Invert	Outlet Devices	5		
#1	Primary	1,002.00'	24.0" Round			
			L= 50.0' RCP	, sq.cut end pro	ojecting, Ke= 0.500	
			Inlet / Outlet In	vert= 1,002.00	' / 1,001.50' S= 0.0100 '/'	Cc = 0.900
					hed, Flow Area= 3.14 sf	
#2	Device 1	1,002.25'		'ORIFICE C=		
#3	Device 1	1,007.50'		Orifice, Cv= 2.		
			Elev. (feet) 1,	,007.50 1,009.	50	
			Width (feet) 6	.00 6.00		
#4	Device 2	1,002.50'	6.0" Round 6			
			L= 30.0' CPP	, square edge h	neadwall, Ke= 0.500	
			Inlet / Outlet In	vert= 1,002.50	' / 1,002.25' S= 0.0083 '/'	Cc = 0.900
			n= 0.010 PVC	, smooth interio	or, Flow Area= 0.20 sf	
#5	Device 2	1,005.00'	1.0" Vert. 15"	<b>RISER X 7.00</b>	columns	
			X 9 rows with	4.0" cc spacing	C= 0.600	
#6	Device 1	1,010.00'	72.0" x 72.0"	Horiz. Orifice/0	Grate C= 0.600	
			Limited to weir	flow at low hea	ads	

Primary OutFlow Max=34.39 cfs @ 12.05 hrs HW=1,008.94' (Free Discharge)

-1=Culvert (Passes 34.39 cfs of 36.88 cfs potential flow)

**-2=2.0" ORIFICE** (Orifice Controls 0.27 cfs @ 12.38 fps)

**-4=6" PVC** (Passes < 2.30 cfs potential flow)

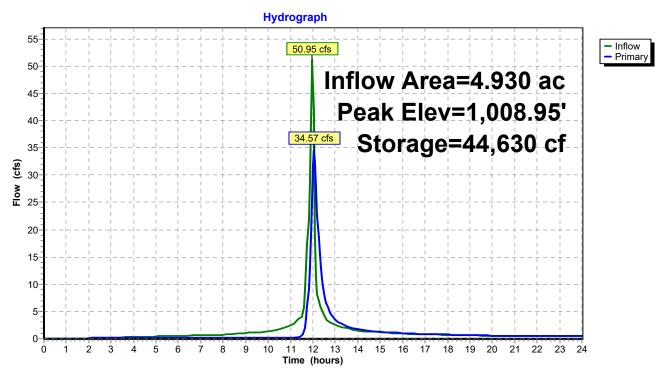
5=15" RISER (Passes < 2.61 cfs potential flow)

-3=Custom Weir/Orifice (Weir Controls 34.12 cfs @ 3.94 fps)

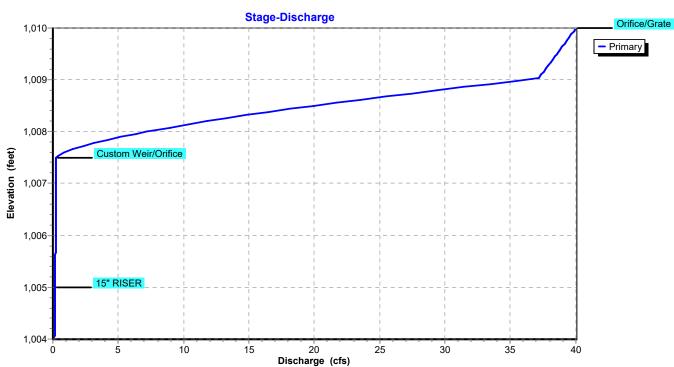
-6=Orifice/Grate (Controls 0.00 cfs)

Page 18

# **Pond 15P: EDDB #1**



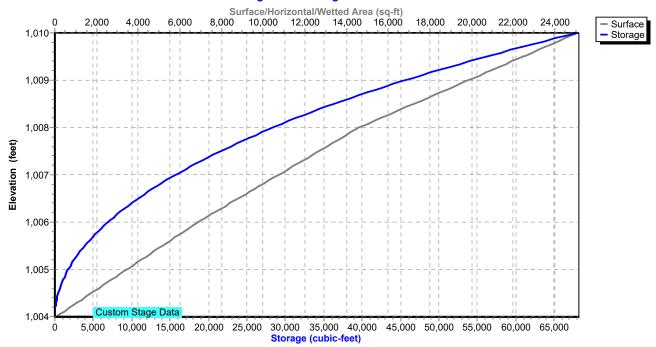
# **Pond 15P: EDDB #1**



Page 19

# Pond 15P: EDDB #1

## Stage-Area-Storage



Prepared by Schlagel

HydroCAD® 10.00-13 s/n 08303 © 2014 HydroCAD Software Solutions LLC

Page 20

# Summary for Link 7L: RP-1

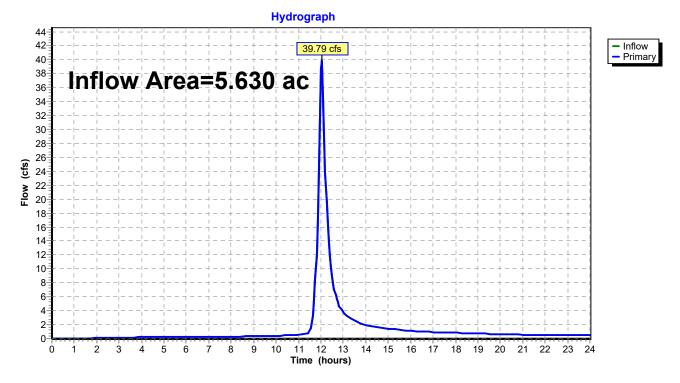
Inflow Area = 5.630 ac, 85.00% Impervious, Inflow Depth > 6.01" for 100-Year event

Inflow = 39.79 cfs @ 12.03 hrs, Volume= 2.821 af

Primary = 39.79 cfs @ 12.03 hrs, Volume= 2.821 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

# Link 7L: RP-1



Prepared by Schlagel

HydroCAD® 10.00-13 s/n 08303 © 2014 HydroCAD Software Solutions LLC

<u>Page 21</u>

# **Summary for Link 9L: RP-3**

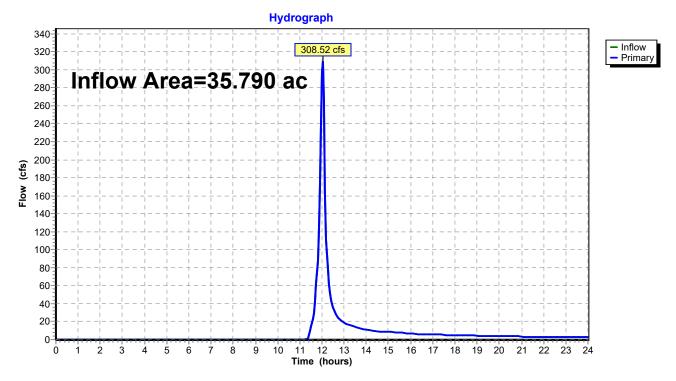
Inflow Area = 35.790 ac, 44.57% Impervious, Inflow Depth > 5.21" for 100-Year event

Inflow = 308.52 cfs @ 12.03 hrs, Volume= 15.534 af

Primary = 308.52 cfs @ 12.03 hrs, Volume= 15.534 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

# Link 9L: RP-3



Prepared by Schlagel

HydroCAD® 10.00-13 s/n 08303 © 2014 HydroCAD Software Solutions LLC

Page 22

# Summary for Link 10L: RP-4

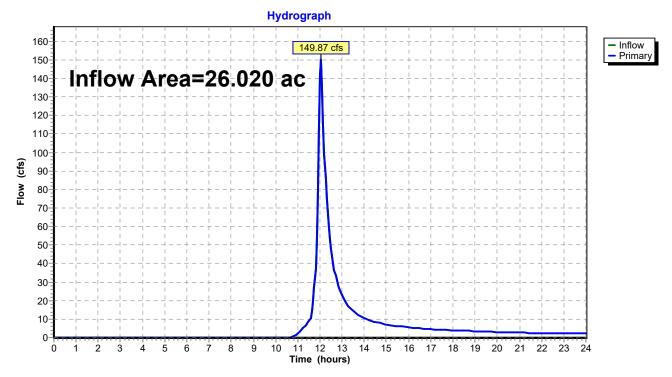
Inflow Area = 26.020 ac, 65.00% Impervious, Inflow Depth > 5.50" for 100-Year event

Inflow = 149.87 cfs @ 12.04 hrs, Volume= 11.918 af

Primary = 149.87 cfs @ 12.04 hrs, Volume= 11.918 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

# **Link 10L: RP-4**



### Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2\_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE\_DOCUMENTS/nrcs142p2\_052290.pdf



# TERRA TECHNOLOGIES

Engineers • Scientists • Permit Specialists

# **Blackwell Parcel**

# Wetland Delineation And Jurisdictional Assessment





Prepared for

Griffin Riley Property Group 21 SE 29<sup>th</sup> Terrace Lee's Summit, MO 64082

March 2022

# **TABLE OF CONTENTS**

1.0	INTRODUCTION	1
2.0	PROJECT LOCATION AND DESCRIPTION	1
3.0	FIELD EFFORTS	2
3.1	Stream Delineation	2
3.2	Wetland Delineation	2
3.3	Jurisdictional Assessment	4
4.0	DELINEATED WATERS OF THE U.S. & JURISDICTIONAL	
	ASSESSMENT	4
4.1	Stream Channels	5
4.2	Wetlands	5
4.3	Ponds	8
5.0	CONCLUSIONS	9
6.0	REFERENCES	10
<u>FIGU</u>	JRES TO STATE OF THE STATE OF T	
Figure	e 1a – Site Location Map	
Figure	e 1b – Section Township Range	
Figure	e 1c – USGS Topography Map	
Figure	e 1d – Aerial Photograph	
Figure	e 1e – Floodplain Map	
Figure	e 2 – National Wetlands Inventory Map	
Figure	e 3 – Soil Survey Map With Mapped Hydric Soil Ratings	
Figure	e 4a – Jurisdictional Assessment Figure	
Figure	e 4b – Jurisdictional Assessment Figure (Without Photo)	

- APPENDICES

  A Photographic Documentation
- В Wetland Determination Data Forms

# 1.0 INTRODUCTION

Terra Technologies is retained by the applicant, Griffin Riley Property Group, to conduct a wetlands delineation and jurisdictional assessment of wetlands and other waters of the U.S. within the project site located in Lee's Summit, Jackson County, Missouri. The property is owned by Fort Hays State University Foundation at One Tiger Place PO Box 1060 Hays, KS 67601. In accordance with Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers (USACE) administers the permitting of dredge and fill activities in waters of the U.S., including wetlands. Most activities that would result in the placement of dredge or fill material in waters of the U.S. require a Section 404 Permit from the USACE. The information contained in this report will serve to delineate the presence and extents of jurisdictional waters of the U.S. within the project site.

# 2.0 PROJECT LOCATION, LAND USE, AND DESCRIPTION

The subject area is approximately 60.41 acres in size and is located in Section 11 of Township 47N Range 31W in the southern portion of Jackson County, Missouri (see Figures 1a & 1b [Google, 2019]).

The USGS topographic map published by the U.S. Geological Survey (USGS) indicates two ponds and one stream feature on the site (see Figure 1c [Google, 2019]).

The project site consists mainly of agricultural land and forested land. It is bordered by a school to the north, by forested land to the east, by Blue Parkway to the south, and by residential land and commercial land to the west (see Figure 1d [Google, 2019]). The subject site resides in the Central Irregular Plains Level III Ecoregion and the Wooded Osage Plains Level IV Ecoregion as mapped by the United States Environmental Protection Agency (Giffith *et al.*, 2008).

According to the Federal Emergency Management Agency, the parcel is not within the mapped 100-year floodplain (see Figure 1e [Google, 2019]). The site is shown by the U.S. Fish and Wildlife Service National Wetlands Inventory (NWI) as having four ponds and one riverine wetland (see Figure 2 [Google, 2019]).

The U.S. Department of Agriculture (USDA) National Resources Conservation Service (NRCS) mapped the soils on the site as Arisburg silt loam, 1-5% slopes (map unit 10000); Arisburg-Urban land complex, 1-5% slopes (map unit 10082); Sampsel silty clay loam, 5-9% slopes (map unit 10117); Sharpsburg-Urban land complex, 2-5% slopes (map unit 10128); Udarents-Urban land-Sampsel complex, 5-9% slopes (map unit 10181), and; Udarents-Urban land-Polo complex, 5-9% slopes (map unit 10183) (see Figure 3 [Soil Survey Staff, 2022]). The Arisburg and the Arisburg-Urban land soils are listed as hydric and the remaining soils are listed as nonhydric according to the NRCS Web Soil Survey.

# 3.0 FIELD EFFORTS

On February 11<sup>th</sup>, 2022 scientists with Terra Technologies completed site inspections to identify, delineate and map the locations of wetlands and other water bodies, and to document existing site conditions.

# 3.1 Stream Delineation

The delineation of streams was conducted through the inspection and characterization of channel characteristics, including a defined bed and bank and the presence of an ordinary high water mark (OHWM). Upon verification of an OHWM, physical attributes are measured and observed to determine channel width and depth and the extent of stream flow. Ephemeral channels carry flow for short durations after rain and snowmelt events and are typically void of pools. Ephemeral channels can exist with pools but do not receive adequate ground water following rain events to maintain pool presence. Intermittent channels carry flow for intermediate durations and often contain pools. Pool formation is supported from the transport of ground water to the pools between periods of precipitation. Intermittent pools are often determined to have a pool to pool base flow originating from the ground water source. Perennial channels represent higher order streams that carry flow for extended durations and are observed to maintain constant pooling. Perennial channels are often associated with the inflow of one or more consistent ground water sources and are typically fed by ephemeral and intermittent channels.

## 3.2 Wetland Delineation

Wetland delineation was performed according to the methods and procedures described in the USACE Wetlands Delineation Manual (Environmental Laboratory, 1987) and the Regional

Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0) (USACE, 2010). The presence of wetlands was ascertained by the observation of all three delineative criteria: 1) a predominance of hydrophytic (water-loving) plant species, 2) hydric soil indicators, and 3) wetland hydrology indicators. Wetland delineation sample points were established at multiple observation points in representative areas of the project. Wetland boundaries were determined in the field and surveyed using a Garmin eTrex Legend C Global Positioning System (GPS) to an approximate accuracy of 10 feet.

The methods used to evaluate the three mandatory wetland criteria (hydrophytic vegetation, hydric soil, and wetland hydrology) are described as follows:

# **Hydrophytic Vegetation Indicators**

The hydrophytic vegetation criterion for wetland determination is met when more than 50 percent of the dominant plant species at a given site are obligate, facultative wetland, or facultative species according to the plant list published by the USACE (Lichvar et al, 2016), the vegetation has a prevalence index score of  $\leq 3.0$ , the vegetation displays certain morphological adaptations, or is problematic hydrophytic vegetation that is determined to be hydrophytic using our best professional judgment. semi-quantitative (routine determination) or quantitative (comprehensive determination) estimate is made of the dominant plant species for each vegetation stratum (herb, shrub, vine, and tree). Vegetative sampling is conducted using a graduated series of plots for each stratum (5-foot radius for herbaceous species, 15foot radius for saplings and shrubs and 30-foot radius for trees and woody vines). A wetland boundary is determined based on the percentage of wetland species versus upland vegetation per vegetation strata identified during the on-site investigation. The indicator status of the vegetation, as listed in Lichvar et al (2016), is used to determine if an area is dominated by hydrophytic or upland species. Taxonomic nomenclature follows that used in Lichvar et al (2016).

# **Hydric Soil Indicators**

Hydric soil is defined by the USACE as soil that is formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. An area is considered to have hydric soil when the National Technical Committee for Hydric Soils criteria are met. These conditions

relate to soil types, soil drainage characteristics, water table levels, and frequency of flooding. The presence or absence of hydric soils throughout the specified reach was determined by collecting soil cores using a 1 ½-inch diameter stainless steel sampling tube. Soil samples were analyzed per the Munsell soil color charts (Gretag/Macbeth, 2010), USDA soil texture, consistency, moisture content, special features, and horizon designation.

# **Wetland Hydrology Indicators**

Wetland hydrology is defined by the USACE as permanent or periodic inundation or prolonged soil saturation sufficient to create anaerobic conditions in the soil. Weather data, season of the year, and field observations of hydrologic indicators (water-stained leaves, high-water marks, saturated or inundated soils, *etc.*) are used to determine whether or not the wetland hydrology criterion is satisfied for the area of investigation.

# 3.3 Jurisdictional Assessment

Opinions about the jurisdictional nature of a wetland or other water of the U.S. are based upon the Clean Water Act and appropriate case law, most importantly to this project being the 1985 United States v. Riverside Bayview Homes, Inc., the 2001 Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers, and the 2006 Rapanos v. United States & Carabell v. United States rulings. Additionally, the December 2, 2008 U.S. Environmental Protection Agency / USACE guidance document titled Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in Rapanos v. United States & Carabell v. United States and prior history of USACE Kansas City District jurisdictional rulings and guidance were utilized. Despite our best professional judgment, the USACE retains the sole authority to determine the jurisdiction of waters of the U.S.

# 4.0 DELINEATED WATERS OF THE U.S. & JURISDICTIONAL ASSESSMENT

A total of 0.48 acre of wetlands, 230 lineal feet of ephemeral stream channel, and 0.49 acre of pond, were delineated within the subject area as shown in Figures 4a and 4b. Photographs of the project site are included in Appendix A and wetland determination data sheets are included in Appendix B. Figures 4a and 4b show the locations of photo points and wetland delineation sample points provided in Appendix A and Appendix B.

# 4.1 Stream Channels

One ephemeral stream channel exists within the subject area.

Ephemeral #1 is a stream originating in the southeastern portion of the subject area and generally flows to the northeast. It has an OHWM which averages two feet in width and banks averaging two feet tall and four feet wide. The substrate predominantly consists of sediment, gravel, and cobble. It extends at the stream centerline approximately 230 lineal feet within the subject area and has a drainage area of approximately 14 acres. Within the assessed site, the stream is surrounded by a vegetated riparian corridor dominated by honey suckle (Lonicera maackii), Virginia wild rye (Elymus virginicus), and Osage orange (Maclura pomifera). Surface water from Ephemeral #1 flows to the northeast into an unnamed tributary. The unnamed tributary flows to the northwest into the East Fork Little Blue River. The East Fork Little Blue River flows to the northwest into the Little Blue River which then flows to the northeast into the Missouri River. This provides a direct surface water connection to downstream traditional navigable waters which makes it likely Ephemeral #1 will be considered a jurisdictional water of the United States.

Stream IDLineal Feet Within Subject AreaLikely Jurisdictional?Ephemeral #1230YesTOTAL230-

**Table 1. Stream Summary** 

# 4.2 Wetlands

A discussion of each delineated wetland follows:

<u>Wetland #1</u> is an approximately 0.10-acre emergent wetland located in the northeastern portion of the subject area. It is dominated by hummocked fescue (*Schedonorus arundinaceus*). Wetland hydrology was found in this location because of the observation of the geomorphic position, drainage patterns, surface water, and saturation. Observations of the soil at this location determined it to have the hydric soil indicator redox dark surface. This wetland receives water as sheet flow from the surrounding lands as well as more concentrated flows from an erosional feature to the southwest. Surface water from this wetland flows to

the northeast through an upland swale and into a stormwater sewer system. The surface flow from the stormwater sewer system generally flows to the northeast and into an unnamed tributary. The unnamed tributary flows to the northwest into the East Fork Little Blue River. The East Fork Little Blue River flows to the northwest into the Little Blue River which then flows to the northeast into the Missouri River. This provides a direct surface water connection to downstream traditional navigable waters which makes it likely Wetland #1 will be considered a jurisdictional water of the United States.

Wetland #2 is an approximately 0.06-acre forested wetland located in the northeastern portion of the subject area. It is dominated by black willow (Salix nigra) and Frank's sedge (Carex frankii). Wetland hydrology was found in this location because of the observation of the geomorphic position, inundation visible on aerial imagery, and the FAC-neutral test. Observations of the soil at this location determined it to have the hydric soil indicator depleted matrix. This wetland receives water as sheet flow from the surrounding lands as well as more concentrated flows from an erosional feature to the southeast. Surface water from this wetland flows to the northeast through an erosional feature and into Wetland #1. The surface water then follows the same path as Wetland #1 to the Missouri River. This provides a direct surface water connection to downstream traditional navigable waters which makes it likely Wetland #2 will be considered a jurisdictional water of the United States.

Wetland #3 is an approximately 0.05-acre emergent wetland located in the northcentral portion of the subject area. It is dominated by hummocked fescue. Wetland hydrology was found in this location because of the observation of the geomorphic position and saturation. Observations of the soil at this location determined it to have the hydric soil indicator redox dark surface. This wetland receives water as sheet flow from the surrounding lands. Surface water from this wetland flows to the northeast into Pond #1. Pond #1 flows to the northeast into an erosional feature which then flows to the northwest into Wetland #2. Wetland #2 flows to the northeast through an erosional feature and into Wetland #1. The surface water then follows the same path as Wetland #1 to the Missouri River. This provides a direct surface water connection to downstream traditional navigable waters which makes it likely Wetland #3 will be considered a jurisdictional water of the United States.

Wetland #4 is an approximately 0.12-acre emergent wetland located in the southeastern portion of the subject area. It is dominated by hummocked fescue. Wetland hydrology was found in this location because of the observation of the geomorphic position, drainage patterns, surface water, and saturation. Observations of the soil at this location determined it

to have the hydric soil indicator depleted matrix. This wetland receives water as sheet flow from the surrounding lands as well as more concentrated flows from a pipe outlet to the southwest. Surface water from this wetland flows to the northeast into Ephemeral #1. Surface water from Ephemeral #1 flows to the northeast into an unnamed tributary. The unnamed tributary flows to the northwest into the East Fork Little Blue River. The East Fork Little Blue River flows to the northwest into the Little Blue River which then flows to the northeast into the Missouri River. This provides a direct surface water connection to downstream traditional navigable waters which makes it likely Wetland #4 will be considered a jurisdictional water of the United States.

Wetland #5 is an approximately 0.09-acre forested wetland located in the southeastern portion It is dominated by black willow, reed canary grass (Phalaris of the subject area. arundinacea), and Pennsylvania smartweed (Persicaria pensylvanica). Wetland hydrology was found in this location because of the observation of the geomorphic position and the FAC neutral test. Observations of the soil at this location determined it to have the hydric soil indicator depleted matrix. This wetland receives water as sheet flow from the surrounding lands. Surface water from this wetland flows to the southeast through the old pond dam overflow into the spillway which curves to the northeast around the pond dam and then into an erosional feature. The erosional feature flows to the northeast into Ephemeral #1. Ephemeral #1 flows to the northeast into an unnamed tributary. The unnamed tributary flows to the northwest into the East Fork Little Blue River. The East Fork Little Blue River flows to the northwest into the Little Blue River which then flows to the northeast into the Missouri River. This provides a direct surface water connection to downstream traditional navigable waters which makes it likely Wetland #5 will be considered a jurisdictional water of the United States.

Wetland #6 is an approximately 0.06-acre forested wetland located in the eastern portion of the subject area. It is dominated by black willow. Wetland hydrology was found in this location because of the observation of the geomorphic position, the FAC neutral test, and saturation. Observations of the soil at this location determined it to have the hydric soil indicator depleted matrix. This wetland receives water as sheet flow from the surrounding lands. This wetland is an isolated wetland which was constructed in an upland location and has no clear surface water path to traditional navigable waters. Because this wetland is an isolated wetland, it is likely this wetland will not be determined to be a jurisdictional water of the United States.

**Wetland Type** Wetland ID Likely Jurisdictional? Size (Acres) 0.10 **Emergent** Yes 2 0.06 Forested Yes 3 0.05 **Emergent** Yes 4 0.12 Emergent Yes 5 0.09 Forested Yes 6 0.06 Forested No **Total Amount of** 0.48 Wetlands Total Amount of Likely 0.42 **Iurisdictional Wetlands** 

**Table 2. Wetland Summary** 

### 4.3 Ponds

Three ponds were present within the subject site.

<u>Pond #1</u> is 0.08-acre and is located in the northcentral portion of the subject area. This pond was likely built for agricultural purposes. Pond #1 receives water as sheet flow from the surrounding lands. This pond was built in an upland area that was not in the location of a historic stream or other water feature and is not adjacent to a stream. For these reasons, it is likely that this pond will be considered a preamble water. Therefore, it is likely that this pond will not be considered to be jurisdictional water of the United States.

<u>Pond #2</u> is 0.39-acre and is located in the central portion of the subject area. This pond was likely built for agricultural purposes. Pond #2 receives water as sheet flow from the surrounding lands. This pond was built in an upland area that was not in the location of a historic stream or other water feature and is not adjacent to a stream. For these reasons, it is likely that this pond will be considered a preamble water. Therefore, it is likely that this pond will not be considered to be jurisdictional water of the United States.

<u>Pond #3</u> is 0.02-acre and is located in the southern portion of the subject area. While not confirmed, it is assumed that this feature was created as the effluent pond for the historic farmstead to the south of the subject area. Pond #3 does not have a drainage area that flows into it nor does it have an outlet or connection to a traditional navigable water, making it an isolated water. Additionally, this pond was built in an upland area that was not in the location of a historic stream or other water feature and is not adjacent to a stream, making it a

preamble water. For these reasons, it is likely that this pond will not be considered to be a jurisdictional water of the United States.

**Table 3. Pond Summary** 

Pond ID	Size (Acres)	Likely Jurisdictional?
1	0.08	No
2	0.39	No
3	0.02	No
Total Pond Acreage	0.49	-
Total Amount of Likely	0.00	-
Jurisdictional Ponds		

# 5.0 CONCLUSIONS

This jurisdictional assessment represents an evaluation of potential jurisdictional environs within the subject area at the time of observation, subject to review and approval by USACE regulatory authorities. As presented above, there are six wetlands totaling 0.48-acre, one ephemeral stream channel totaling 230 lineal feet, and three ponds totaling 0.49 acre delineated on the parcel. It is likely that the stream and all the wetlands except for Wetland #6 will be considered to be jurisdictional waters of the United States. Wetland #6 is an isolated wetland and likely will not be considered a jurisdictional water of the United States. Pond #1, Pond #2, and Pond #3 will likely be determined to be preamble waters that are not considered jurisdictional waters of the United States.

# 6.0 REFERENCES

Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. NTIS No. AD A176 912

Google Inc. 2019. Google Earth Pro (Version 7.3.2.5776) [Software]. http://www.google.com/earth/download/gep/agree.html

Gretag/Macbeth. 2010. Munsell® color. New Windsor, New York.

Griffith, G.E., J.M. Omernik (Lead Author) and M. McGinley (Topic Editor). 2008. December 2011. Ecoregions of Kansas and Nebraska (EPA). In: Encyclopedia of Earth. Eds. Cutler J. Cleveland (Washington, D.C.: Environmental Information Coalition, National Council for Science and the Environment). [First published in the Encyclopedia of Earth December 11, 2008; Last revised Date December 11, 2008; <a href="http://www.eoearth.org/article/Ecoregions\_of\_Kansas\_and\_Nebraska\_(EPA)">http://www.eoearth.org/article/Ecoregions\_of\_Kansas\_and\_Nebraska\_(EPA)</a>

Lichvar, R.W., D. L. Banks, W.N. Kirchner, and N.C. Melvin, (Lichvar et al). 2016. *The National Wetland Plant List*: 2016 Wetland Ratings. Phytoneuron 2016-30: 1-17. Published 28 April 2016. ISSN 2153 733X. <a href="http://www.phytoneuron.net/">http://www.phytoneuron.net/</a>

Soil Survey Staff. March 17, 2022. Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. <a href="http://websoilsurvey.nrcs.usda.gov/">http://websoilsurvey.nrcs.usda.gov/</a>

U.S. Army Corps of Engineers (USACE). 2010. Regional supplement to the corps of engineers wetland delineation manual: Midwest region (version 2.0). ed. J.S. Wakeley, R.W. Lichvar, and C.V. Noble. ERDC/EL TR-10-16. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

# **QUALIFICATIONS OF STAFF**

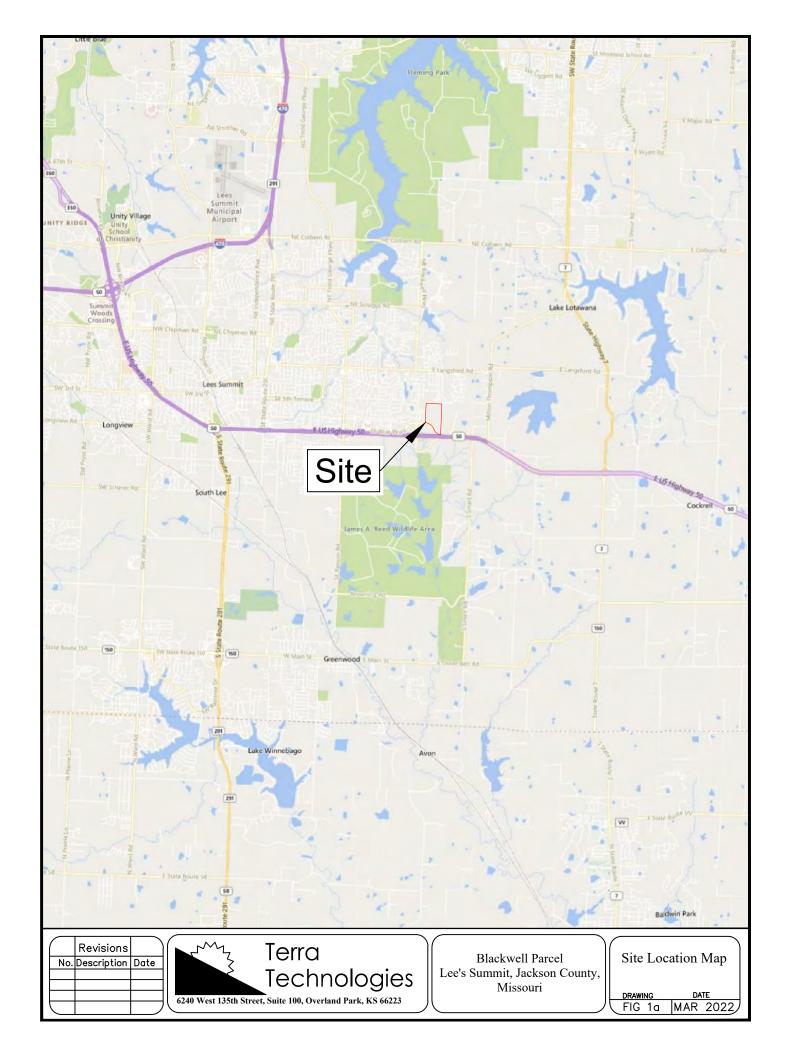
Curricula vitae and project experience is on file with the US Army Corps of Engineers.

Sincerely,

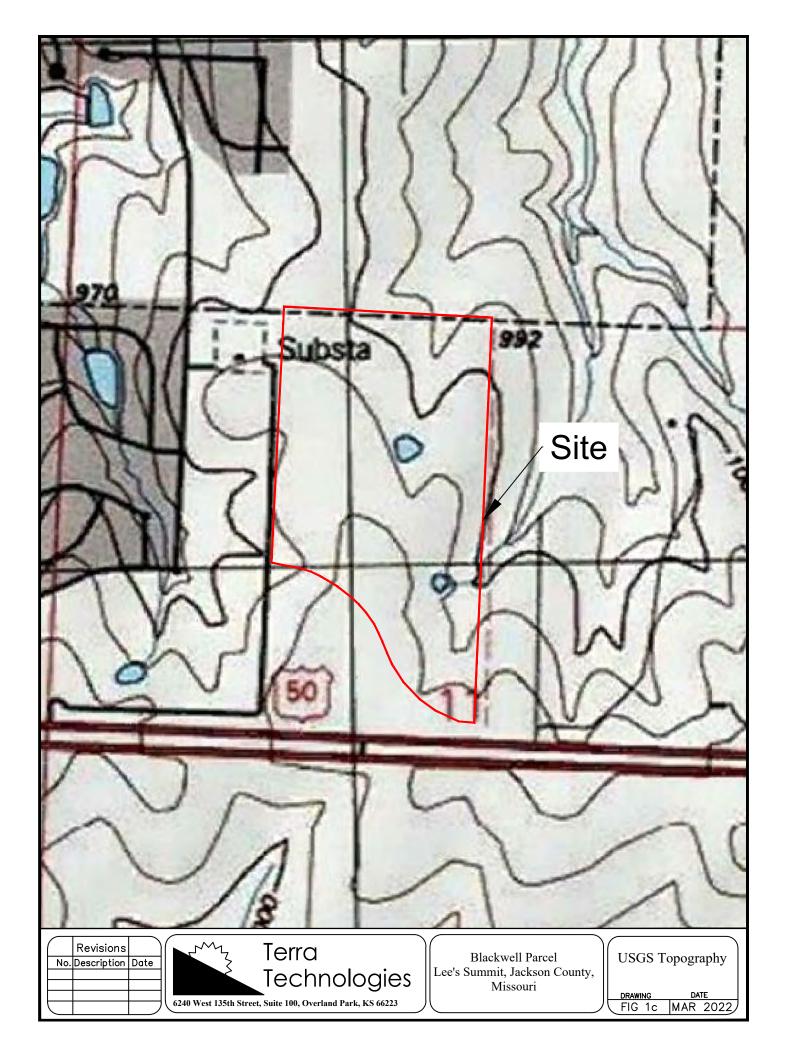
TERRA TECHNOLOGIES INC.

Melanie Stonecypher Environmental Scientist

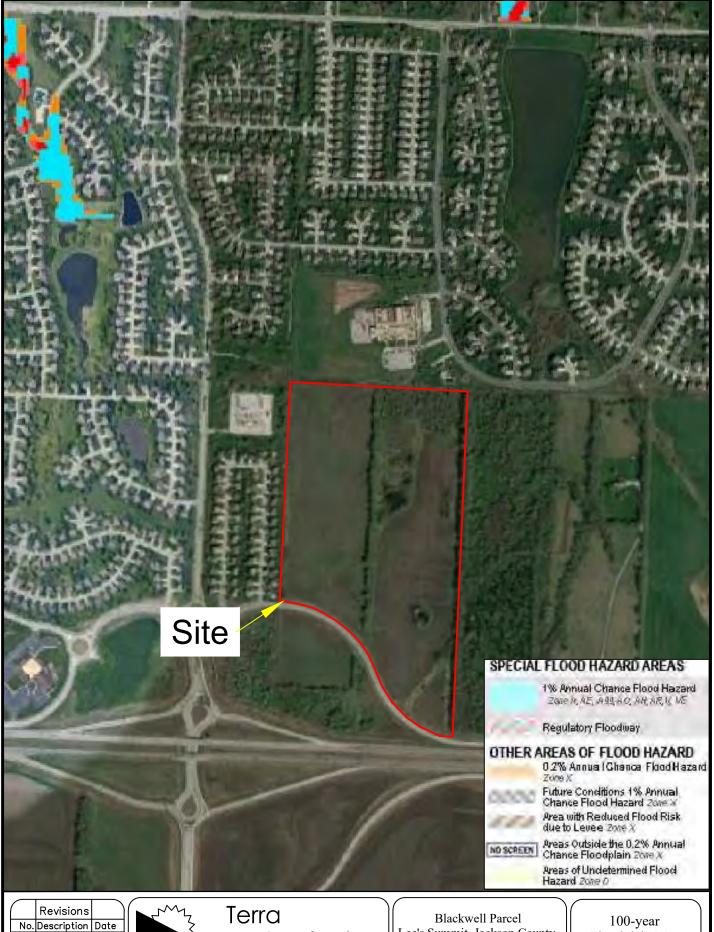
Danny DeAngelo Senior Environmental Scientist











No. Description Date



Blackwell Parcel Lee's Summit, Jackson County, Missouri

100-year Floodplain Map

DRAWING	DATE
FIG 1e	FEB 2022





#### MAP LEGEND

#### Area of Interest (AOI) Transportation Area of Interest (AOI) Rails Soils Interstate Highways **Soil Rating Polygons** US Routes Hydric (100%) Major Roads Hydric (66 to 99%) Local Roads Hydric (33 to 65%) **Background** Hydric (1 to 32%) Aerial Photography Not Hydric (0%) Not rated or not available Soil Rating Lines Hydric (100%) Hydric (66 to 99%) Hydric (33 to 65%) Hydric (1 to 32%) Not Hydric (0%) Not rated or not available **Soil Rating Points** Hydric (100%) Hydric (66 to 99%) Hydric (33 to 65%) Hydric (1 to 32%) Not Hydric (0%) Not rated or not available **Water Features** Streams and Canals

#### MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24.000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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: Jackson County, Missouri Survey Area Data: Version 23, Sep 1, 2021

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

Date(s) aerial images were photographed: Sep 6, 2019—Nov 16, 2019

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.

# **Hydric Rating by Map Unit**

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
10000	Arisburg silt loam, 1 to 5 percent slopes	3	34.7	57.5%
10082	Arisburg-Urban land complex, 1 to 5 percent slopes	3	0.6	1.0%
10117	Sampsel silty clay loam, 5 to 9 percent slopes	0	20.8	34.4%
10128	Sharpsburg-Urban land complex, 2 to 5 percent slopes	0	1.0	1.7%
10181	Udarents-Urban land- Sampsel complex, 5 to 9 percent slopes	0	2.5	4.1%
10183	Udarents-Urban land- Polo complex, 5 to 9 percent slopes	0	0.8	1.3%
Totals for Area of Inter	rest		60.4	100.0%

## **Rating Options**

Aggregation Method: Percent Present

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

JΑ

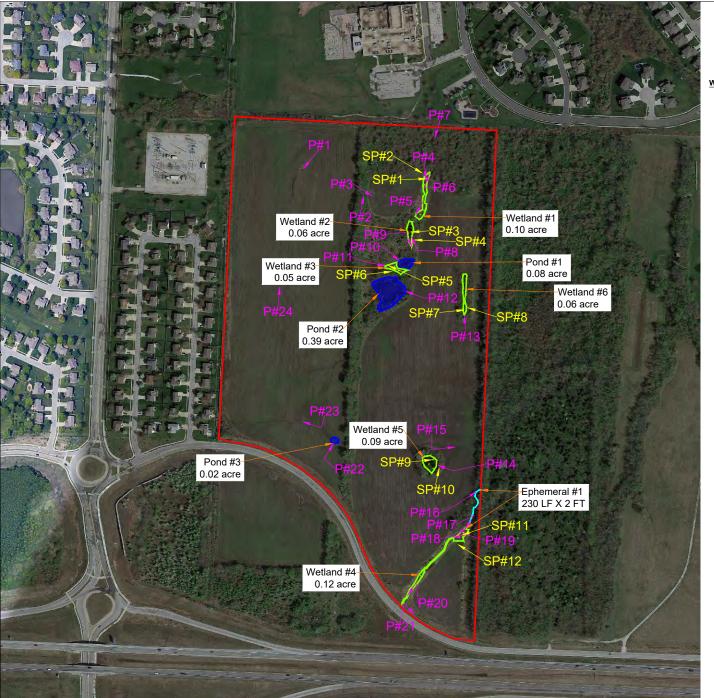


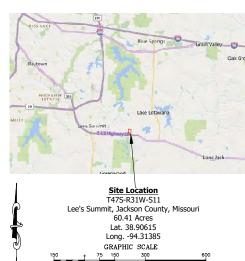
Wetland 1: 0.10 acre, Lat. 38.90781, Long. -94.31287 Wetland 2: 0.06 acre, Lat. 38.90733, Long. -94.31313 Wetland 3: 0.05 acre, Lat. 38.90681, Long. -94.31337 Wetland 4: 0.12 acre, Lat. 38.90321, Long. -94.31224 Wetland 5: 0.09 acre, Lat. 38.90416, Long. -94.31279

Wetland 6: 0.06 acre, Lat. 38.90649, Long. -94.31219 (Non-Jurisdictional)
TOTAL WETLAND AREA: 0.48 Acres

#### Ephemeral 1: 230 LF X 2 FT, Lat. 38.90351, Long. -94.31205 TOTAL EPHEMERAL LENGTH: 230 LF

Pond 1: 0.08 acre, Lat. 38.90687, Long. -94.31321 (Non-Jurisdictional) Pond 2: 0.39 acre, Lat. 38.90651, Long. -94.31352 (Non-Jurisdictional) Pond 3: 0.02 acre, Lat. 38.90449, Long. -94.31445 (Non-Jurisdictional) TOTAL POND AREA: 0.49 Acres





Lone Jack

Site Location
T475-R31W-S11
Lee's Summit, Jackson County, Missouri
60.41 Acres
Lat. 38.90615
Long. -94.31385
GRAPHIC SCALE

DATE 03/3\*
CHECKED BY DRAWN
DTD MA

JA JOB NO. XXX

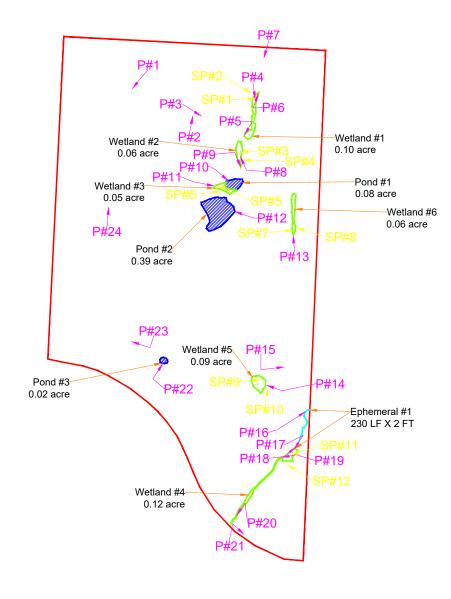
#### JURISDICTIONAL ASSESSMENT

Wetland 1: 0.10 acre, Lat. 38.90781, Long. -94.31287 Wetland 2: 0.06 acre, Lat. 38.90733, Long. -94.31313 Wetland 3: 0.05 acre, Lat. 38.90681, Long. -94.31337 Wetland 4: 0.12 acre, Lat. 38.90321, Long. -94.31224 Wetland 5: 0.09 acre, Lat. 38.90416, Long. -94.31279

Wetland 6: 0.06 acre, Lat. 38.90649, Long. -94.31219 (Non-Jurisdictional)
TOTAL WETLAND AREA: 0.48 Acres

#### Ephemeral 1: 230 LF X 2 FT, Lat. 38.90351, Long. -94.31205 TOTAL EPHEMERAL LENGTH: 230 LF

Pond 1: 0.08 acre, Lat. 38.90687, Long. -94.31321 (Non-Jurisdictional) Pond 2: 0.39 acre, Lat. 38.90651, Long. -94.31352 (Non-Jurisdictional) Pond 3: 0.02 acre, Lat. 38.90449, Long. -94.31445 (Non-Jurisdictional) TOTAL POND AREA: 0.49 Acres



DATE: 02/11/22

TAKEN BY: MS

SITE NAME: BLACKWELL PARCEL

## COMMENTS:

Photograph facing southwest showing the erosional feature within the agricultural field.



PHOTO #: 1

DATE: 02/11/22
TAKEN BY: MS
SITE NAME: BLACKWELL PARCEL

#### COMMENTS:

Photograph facing northeast showing the upland fence line dominated by Osage orange (Maclura pomifera) and honeysuckle (Lonicera maackii) at this location.



DATE: 02/11/22
TAKEN BY: MS
SITE NAME: BLACKWELL PARCEL

### COMMENTS:

Photograph facing southeast showing the upland fallow field dominated by Japanese bristle grass (*Setaria faberi*).



PHOTO #: 3

DATE: 02/11/22
TAKEN BY: MS
SITE NAME: BLACKWELL PARCEL

#### COMMENTS:

Photograph facing southeast showing Wetland #1.



DATE: 02/11/22

TAKEN BY: MS

SITE NAME: BLACKWELL PARCEL

#### COMMENTS:

Photograph facing southwest showing an erosional feature flowing into Wetland #1.



PHOTO #: 5

DATE: 02/11/22
TAKEN BY: MS
SITE NAME: BLACKWELL PARCEL

#### COMMENTS:

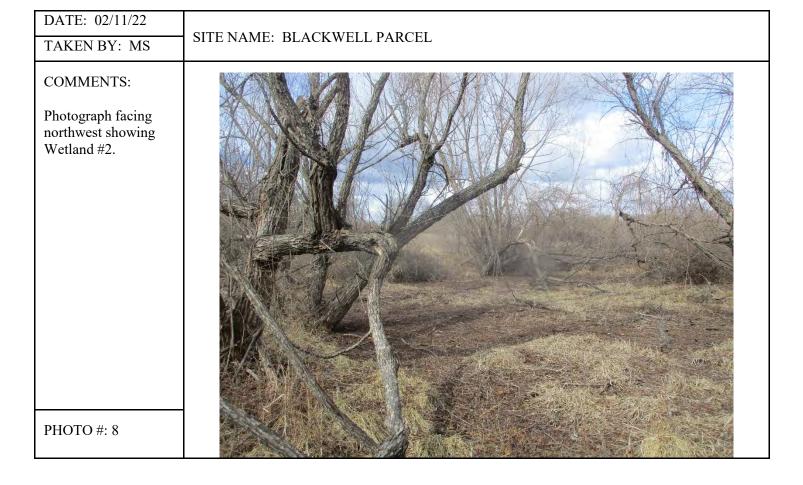
Photograph facing northeast showing Wetland #1 flowing into an upland swale dominated by honeysuckle, honey locust (*Gleditsia* triacanthos), and Osage orange.



DATE: 02/11/22
TAKEN BY: MS

COMMENTS:
Photograph facing southwest showing the upland swale surface water from Wetland #1 flows through before flowing offsite.

PHOTO #: 7



DATE: 02/11/22
TAKEN BY: MS

SITE NAME: BLACKWELL PARCEL

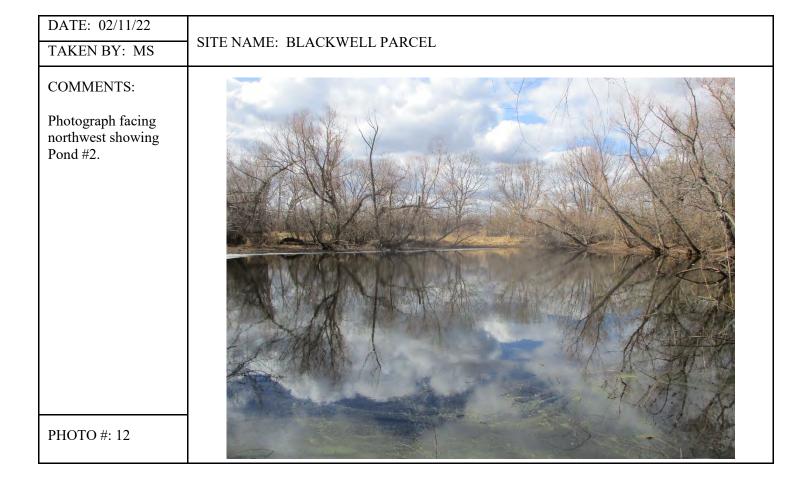
COMMENTS:
Photograph facing southeast showing an southeast showing an

Photograph facing southeast showing an erosional feature flowing into Wetland #2 at this location.



DATE: 02/11/22 TAKEN BY: MS	SITE NAME: BLACKWELL PARCEL
COMMENTS:  Photograph facing southeast showing Pond #1.	
PHOTO #: 10	

DATE: 02/11/22	
TAKEN BY: MS	SITE NAME: BLACKWELL PARCEL
COMMENTS:  Photograph facing southeast showing Wetland #3.	
PHOTO #: 11	



DATE: 02/11/22	
TAKEN BY: MS	SITE NAME: BLACKWELL PARCEL
COMMENTS:  Photograph facing northwest showing Wetland #6.	
РНОТО #: 13	



DATE: 02/11/22
TAKEN BY: MS
SITE NAME: BLACKWELL PARCEL

### COMMENTS:

Photograph facing northeast showing an erosional feature within the agricultural field.



PHOTO #: 15

DATE: 02/11/22
TAKEN BY: MS
SITE NAME: BLACKWELL PARCEL

### COMMENTS:

Photograph facing northeast looking downstream on Ephemeral #1 as it flows offsite.



DATE: 02/11/22
TAKEN BY: MS
SITE NAME: BLACKWELL PARCEL

COMMENTS:

Photograph facing southwest showing Wetland #4.



PHOTO #: 17

DATE: 02/11/22
TAKEN BY: MS
SITE NAME: BLACKWELL PARCEL

#### COMMENTS:

Photograph facing northeast looking downstream on Ephemeral #1 as it flows out of Wetland #4.



DATE: 02/11/22
TAKEN BY: MS
SITE NAME: BLACKWELL PARCEL

### COMMENTS:

Photograph facing southwest showing an erosional feature flowing through Wetland #4 at this location.



PHOTO #: 19

DATE: 02/11/22
TAKEN BY: MS
SITE NAME: BLACKWELL PARCEL

#### COMMENTS:

Photograph facing southwest showing water flowing into Wetland #4 from a pipe outlet.



DATE: 02/11/22

TAKEN BY: MS

SITE NAME: BLACKWELL PARCEL

### COMMENTS:

Photograph facing southeast showing an erosional feature within a roadside ditch at this location.



PHOTO #: 21

DATE: 02/11/22
TAKEN BY: MS
SITE NAME: BLACKWELL PARCEL

#### COMMENTS:

Photograph facing northeast showing Pond #3.



DATE: 02/11/22

TAKEN BY: MS

SITE NAME: BLACKWELL PARCEL

### COMMENTS:

Photograph facing northwest showing an erosional feature within the agricultural field.



PHOTO #: 23

DATE: 02/11/22
TAKEN BY: MS
SITE NAME: BLACKWELL PARCEL

#### COMMENTS:

Photograph facing north showing a welldrained agricultural field at this location.



Project/Site:	Blackwell Parcel					City/C	ounty:		Lee's Su	mmit / Jac	kson	Sampling	Date:		2/11/2022
Applicant/Owner:				Griffin Riley Proper		Stat				MO		Point:		1	
Investigator(s):			M. St	onecypher	Sectio	n, Townsl	hip, Range	e:	S11, T	47N, R31W	Site ID				
Landform (hillslope,	terrace, e	tc.):		Hillslope		Local	relief (con	cave, con	vex, none	):	Non	е	Slope (%)		0-3
GPS: UTM	XXS	xxxxxxxe	XXXX	xxxn		Lat	:	38.9080	04	Long:	-94.312	286	Datum:		NAD 83
Soil Map Unit Name	:			Sampsel silty cla	ay loam, 5	-9% slopes				NWI class	sification:			N/A	
Are climatic / hydrolo	ogic condi	tions on the	site typica	al for this time of year	?	Yes	Yes X No (If no, explain in F				olain in Remark	s.)			_
Are Vegetation	N	, Soil	N	, or Hydrology	N	significantly	ficantly disturbed? Are "Normal Circu				cumstances" pr	esent?	Yes )	No No	
Are Vegetation	N	, Soil	N	, or Hydrology	N	naturally pro	turally problematic? (If needed, explai				lain answers in	Remarks.	)	•	

### $SUMMARY\ OF\ FINDINGS\ -\ Attach\ site\ map\ showing\ sampling\ point\ locations,\ transects,\ important\ features,\ etc.$

Hydrophytic Vegetation Present?	Yes	Χ	No		Is the Sampled Area	
Hydric Soil Present?	Yes	Х	No		within a Wetland? Yes X No	
Wetland Hydrology Present?	Yes	Х	No			
Remarks:						
<u>.</u>						

## VEGETATION - Use scientific names of plants.

VEGETATION - Use scientific names of plants				
	Absolute	Dominant	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: 30ft radius )	% Cover	Species?	Status	
1				
2				Number of Dominant
3				Species That Are OBL, (A)
4				FACW, or FAC:
5				
6				
7				Total Number of Dominant 1 (B)
8				Species Across All Strata:
0	0	T. 10		Species Across All Strata.
	0	= Total Cover		
Sapling/Shrub Stratum (Plot Size: 15ft radius )				Percent of Dominant
1				Species That Are OBL, 100.00 (A/B)
2				FACW, or FAC
3				Prevalence Index worksheet:
4				Total % Cover of:
5				
6				OBL Species 0 x 1 = 0
	0	= Total Cover		- N - U
Had Chat as (Blat City	U	= Total Cover		FACIAL Species 0 v 2
Herb Stratum (Plot Size: 5ft radius )	00	V	FAC	FACW Species 0 x 2 = 0
Schedonorus arundinaceus (hummocked)	98	Υ	FAC	
2				FAC Species 98 x 3 = 294
3				
4				FACU Species 0 x 4 = 0
5				
6				UPL Species 0 x 5 = 0
7				
8				Column Totals: 98 (A) 294 (B)
9				
10				Prevalence Index = B/A 3.00
11				Hydrophytic Vegetation Indicators:
12				
				1 - Rapid Test for Hydrophytic Vegetation
13				X 2 - Dominance Test is > 50%
14				X 3 - Prevalence Index is <= 3.0 <sup>1</sup>
15				4 -Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)
16				
	98	= Total Cover		Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
Woody Vine Stratum (Plot Size: 30ft radius )				Indicators of hydric cail and watland hydrology must be present upless districted
1				<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
2				Hydrophytic
3				Vegetation
	0	= Total Cover	1	Present? Yes X No
Remarks:				
- Constitution of the Cons				

SOIL										Sampling Point	1
	cription: (Describ		document	the indicator of	or confi	irm the absence of indicato	ors.)				
Depth (inches)	Horizon	Matrix	0/	Color (mois	+) 0/	Redox Features	T = -	.1 T .	2	Touturo	Domerko
(inches)	Λ	Color (moist)	% 100	Color (moist	t) %	Abundance/Contrast	Туре	s. Fo	oc <sup>2</sup>	Texture	Remarks
3-15	A A	10YR 2/1 10YR 3/1	95	10YR 3/6	5	Common / Prominent	С	+	PL PL	Silty Clay Loam	
3-13	A	101K 3/1	95	101K 3/0	5	Common / Prominent	<u> </u>		1	Silty Clay Loam	
			<b>-</b>		#		₩	+	$\dashv$		
				_	4		₩	+	$\dashv$		
			$\vdash$		#		$\vdash$	+			
			<del></del>				+				
<sup>1</sup> Tvr	ne: C=Concentra	ation, D=Depletion, RM=R	Peduced M	atrix CS=Co\	ered or	coated Sand Grains	Щ.			<sup>2</sup> l o	cation: PL= Pore Lining, M=Matrix.
		pplicable to all LRRs, un				Codica Sana Grans.	Indica	tors fo	or Problematic Hydric So		
	Histosol (A1)	philadaia to all alliana,	1000			Gleyed Matrix (S4)	-	IIIuiu		past Prairie Redox (A16)	лз .
	Histic Epipedon (	(A2)				Redox (S5)				n-Manganese Masses (F	12)
	Black Histic (A3)					ed Matrix (S6)				her (Explain in Remarks)	
	Hydrogen Sulfide					/ Mucky Mineral (F1)					
	Stratified Layers					Gleyed Matrix (F2)					
2	cm Muck (A10)				Deplet	ed Matrix (F3)					
[	Depleted Below Dark Surface (A11)  X Redox Dark Surface (F6)										
	Thick Dark Surface (A12) Depleted Dark Surface (F7)										
	Sandy Mucky Mineral (S1) Redox Depressions (F8)										
5	cm Mucky Peat	or Peat (S3)		]			(	(3) Indic	ators o	of hydrophytic vegetation a	and wetland hydrology must be present, unless disturbed or problematic.
	Layer (if observe	d):									
Type:											
	n (inches):							Hyar	ic Son	Present? Yes	X No
Remarks:	]										
HYDROLO	7CV										
	ydrology Indicat								- C		
		n of one required; check a	Il that appr		1.4.	(20)			Sei	econdary Indicators (minim	•
	Surface water (A	•				ed leaves (B9)				Surface soil crack	
	ligh water table	(A2)				ına (B13)			Х		
	Saturation (A3)					ic Plants (B14)				Dry-Season Wate	
	Water marks (B1	•			-	ulfide odor (C1)				Crayfish burrows	
	Sediment deposits	· ·				izospheres on living roots (	(C3)				on aerial imagery (C9)
	Orift deposits (B3					f reduced iron (C4)				Stunted or Stress	
А	Algal mat or crust	(B4)		Rece	nt Iron	Reduction in Tilled Soils (	(C6)		Х		
	ron deposits (B5)									FAC-neutral test	
	Inundation visible on aerial imagery (B7)  Gauge or Well Data (D9)									Other (explain in	Remarks)
S	parsely Vegetate	ed Concave Surface (B8)		Othe	r (expl	lain in Remarks)					
Field Obse	rvations:	_									
Surface Wa	ater Present?	Yes X N	No	Dept	h (inche	es) <b>0-2</b>					
Water Table	e Present?	Yes N	No )	X Depth	h (inche	÷s)	Wetlar	nd Hydro	ology	<b></b>	<u> </u>
Saturation F	Present?	Yes X N	No	Dept	th (inche	es) <b>0-3</b>	P	Present?		Yes X	No
(includes ca	apillary fringe)										

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Project/Site:	Blackwell Parcel City					City/C	County:		Lee's Su	mmit / Jac	kson	Sampling	Date:			2/11/20	22
Applicant/Owner:	Griffin Riley Property Group						State:				MO	Sampling Point:				2	
Investigator(s):	M. Stonecypher S					Section	n, Towns	hip, Range	e:	S11, T47N, R31W		Site ID					
Landform (hillslope,	terrace, e	tc.):		Hillslope		Local	relief (cor	lief (concave, convex, none): None			e Slope (%				0-	3	
GPS: UTM	XXS	xxxxxxxe	XXXX	xxxn		Lat	t:	38.908	12	Long:	-94.31	293	Datum:			NAD 8	3
Soil Map Unit Name	:			Sampsel silty cla	y loam, 5	5-9% slopes				NWI class	sification:				N	I/A	
Are climatic / hydrol	ogic condi	tions on the	site typica	al for this time of year	?	Yes	Х	No	o (If no, explain in Remarks								
Are Vegetation	N	, Soil	N	, or Hydrology	N	significantly	y disturbe	d?	Are "	Normal Cir	cumstances" pi	resent?	Yes	<b>(</b> No			
Are Vegetation	N	, Soil	N	, or Hydrology	N	naturally pr	oblematic	?	(If n	eeded, exp	olain answers in	Remarks.	)	•			

#### SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No	Х	Is the Sampled Area	
Hydric Soil Present?	Yes	No	Х	within a Wetland?	Yes No X
Wetland Hydrology Present?	Yes	No	Х		
Remarks:					

## VEGETATION - Use scientific names of plants.

VEGETATION - Use scientific names of plants	•								
	Absolute	Dominant		Indicator			Domir	nance Test wo	orksheet:
Tree Stratum (Plot size: 30ft radius )	% Cover	Species?		Status					
1									
2					Number of Doi	minant			
3					Species That A	re OBL,		0	(A)
4					FACW, or F				
5									
6									
7					Total Number of I	Dominant		1	(B)
8					Species Across A			•	(5)
	0	T.1.10			Species Across A	All Strata.			
	U	= Total Cover							
Sapling/Shrub Stratum (Plot Size: 15ft radius )					Percent of Dor				
1					Species That A		0.	.00	(A/B)
2					FACW, or F	FAC			
3							Preval	ence Index wo	orksheet:
4					Total % Cove	er of:			
5									
6					OBL Species	0	x 1 =	0	
	0	= Total Cover			'				<del>-</del> -
Herb Stratum (Plot Size: 5ft radius )	Ü	70101 00701			FACW Species	0	x 2 =	0	
1 Setaria faberi	90	Υ		FACU	Trow openes				<del>-</del> -
2 Ambrosia artemisiifolia	10	N		FACU	FAC Species	0	v 2 –	0	
	10	IV		TACO	rac species	U	X 3 =	0	<mark>-</mark> -
3					540110	400			
4					FACU Species	100	x 4 =	400	_
5							_		
6					UPL Species	0	x 5 =	0	_
7									
8					Column Totals:	100	(A)	400	(B)
9									
10					Prevalence Inde	ex = B/A		4.00	
11							Hydrophy	tic Vegetation	n Indicators:
12					1 - Rapid Te	est for Hydrop	hytic Vege	etation	
13						nce Test is > 5			
14						ice Index is <			
15									
16					4 -Morpholo	gical Adaptat	ions1 (Pro	vide supporting	g data in Remarks or on a separate sheet)
	100	= Total Cover			Problematic	Hydrophytic '	Vegetation	n <sup>1</sup> (Explain)	
Woody Vine Stratum (Plot Size: 30ft radius )	100	10101 00101			. robicinatio	,	. agaidata	. (=Npi0iii)	
woody vine Stratum (Piot Size: Solitadius )					<sup>1</sup> Indicators of hyd	dric soil and w	vetland hy	drology must b	e present, unless disturbed or problematic.
					Lludron butte				
2					Hydrophytic				
3	0	T.1.10			· ·	V		N	╗
	U	= Total Cover			Present ?	Yes		INO X	
Remarks:	0	= Total Cover			Vegetation Present ?	Yes		No X	1

SOIL										Sampling Point	2
Profile Desc	ription: (Describ	oe to the depth needed to	document	the indicator or	confi	irm the absence of indicato	rs.)				
Depth	Horizon	Matrix				Redox Features					
(inches)		Color (moist)	%	Color (moist)	%	Abundance/Contrast	Type <sup>1</sup>	1 Lo	c <sup>2</sup>	Texture	Remarks
0-15	А	10YR 3/1	100							Silt Loam	
									_		
1-		"								2,	
		ation, D=Depletion, RM=R			ed or	coated Sand Grains.					cation: PL= Pore Lining, M=Matrix.
		pplicable to all LRRs, ur	niess otne		ond:	Claved Matrix (CA)		Indicat		or Problematic Hydric S	bils":
	istosol (A1)	(A2)			_	Gleyed Matrix (S4)				past Prairie Redox (A16)	12)
	istic Epipedon ( lack Histic (A3)	A2)			_	Redox (S5)				on-Manganese Masses (F	12)
		(AA)				ed Matrix (S6) Mucky Mineral (F1)			Ul	ther (Explain in Remarks)	
	ydrogen Sulfide tratified Layers				_	Gleyed Matrix (F2)					
	cm Muck (A10)				_	ed Matrix (F3)					
		Park Surface (A11)			_	Dark Surface (F6)					
	hick Dark Surfac				_	ed Dark Surface (F7)					
	andy Mucky Min					Depressions (F8)					
	cm Mucky Peat						(3	3) Indica	ators o	of hydrophytic vegetation a	and wetland hydrology must be present, unless disturbed or problematic.
		(4.4)		]			(-	-,			
Restrictive I	ayer (if observe	d):									
Type:	.,. (	,									
	(inches):							Hvdri	c Soil	I Present? Yes	No X
Remarks:											
	I										
HYDROLO	)GY										
Wetland Hy	drology Indica	tors:									
Primary Ind	cators (minimun	n of one required; check a	all that appl	у)					Se	econdary Indicators (minin	num of two required)
	urface water (A				stain	ed leaves (B9)				Surface soil crack	ss (B6)
	igh water table					ına (B13)				Drainage patterns	
	aturation (A3)	. ,				c Plants (B14)				Dry-Season Wate	
	/ater marks (B1	1)			•	ulfide odor (C1)				Crayfish burrows	
	ediment deposit					izospheres on living roots (	(C3)				on aerial imagery (C9)
	rift deposits (B:					f reduced iron (C4)	/			Stunted or Stress	• • • •
	lgal mat or crust					Reduction in Tilled Soils (	(C6)			Geomorphic posi	
	on deposits (B5					surface (C7)	(00)			FAC-neutral test	
		on aerial imagery (B7)				/ell Data (D9)				Other (explain in	
										Other (explaintin	Remarks
		ed Concave Surface (B8)		Other	(expi	ain in Remarks)					
Field Obse		, <u> </u>				,					
	ter Present?			X Depth (							
Water Table				X Depth (		•		d Hydro	logy		
Saturation F		Yes	No :	X Depth (	inche	÷S)	Pr	resent?		Yes	No X
	pillary fringe)										
Describe Re	ecorded Data (st	ream gauge, monitoring v	vell, aerial	photos, previous	insp	ections), if available:					
	1										
Remarks:											

				***	~110		Z141114	~	OII DAI	7101	LIVI - IVII G	WCSt I	vcg.o.					
Project/Site:			Blackwe	ell Parcel		City/C	ounty:	unty: Lee's Summit / Jackson					Sampling Date:			2/11/2022		
Applicant/Owner:				Griffin Riley Property	Group		State:			MO		Point:				3		
Investigator(s):			M. St	onecypher		Sectio	Section, Township, Range:				47N, R31W	Site ID						
Landform (hillslope,	terrace, e	tc.):		Hillslope		Local	Local relief (concave, con			e):	Conca	ave	Slope (%	):			0-3	
GPS: UTM	XXS	хххххххе	XXXX	xxxn		Lat	:	38.	.90732	Long:	-94.31	31	Datum:				NAD 83	
Soil Map Unit Name	9:			Sampsel silty clay	loam, 5	5-9% slopes				NWI class	ification:					Pon	nd	
Are climatic / hydrol	logic condi	tions on the	site typica	al for this time of year?		Yes	Χ	No		(If no, exp	lain in Remark	s.)						
Are Vegetation	N	, Soil	N	, or Hydrology	N	significantly	/ disturb	ed?	Are '	"Normal Cir	cumstances" pr	resent?	Yes	Х	No			
Are Vegetation	N	N , Soil N , or Hydrology N naturally problematic? (If needed, explain answers in Remarks.)																
CHAMAADY	NIMMADY OF FINISHOOD Attack the control of the cont																	

#### SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

No	Is the Sampled Area	
No	within a Wetland? Yes X No	
No		

GETATION - Use scientific names of plants		T T						
	Absolute	Dominant	Indicator			Domir	nance Test workshe	eet:
Tree Stratum (Plot size: 30ft radius )	% Cover	Species?	Status					
Salix nigra	40	Y	OBL					
				Number of D				
				Species That			2	(A)
				FACW, or	FAC:			
							_	
				Total Number o			2	(B)
				Species Across	All Strata:			
	40	= Total Cover						
Sapling/Shrub Stratum (Plot Size: 15ft radius )				Percent of D	ominant			
				Species That	Are OBL,	100	0.00	(A/B)
				FACW, or			<u></u>	
						Preval	ence Index worksh	neet:
				Total % Co	ver of:			
				OBL Species	70	x 1 =	70	
	0	= Total Cover						
Herb Stratum (Plot Size: 5ft radius )	_			FACW Species	0	x 2 =	0	
Carex frankii	30	Υ	OBL					
24.31.112.1111				FAC Species	0	x 3 =	0	
				1710 Species				
				FACU Species	0	x 4 =	0	
				I ACO Species	0	X 4 =		
				UPL Species	0	x 5 =	0	
				OT L Species	0	X 3 -		
				Column Totals:	70	(A)	70	(B)
				Oolumin Totals.	70	(71)	70	(6)
				Prevalence Inc	lov - R/A		1.00	
				i revalence inc			rtic Vegetation Indi	cators
				1 Donid	Test for Hydrop		-	Cators.
					ance Test is > 5	-	RIAUOH	
					ence Index is <			
				X 3 - Plevale	ence muex is <	= 3.0		
				4 -Morpho	logical Adaptat	ions <sup>1</sup> (Prov	vide supporting data	in Remarks or on a separate sheet)
	30	Table 0		Deablasse	ic Hydrophytic	\/t-t:	1 (5)	
Wanda Vina Chatana (Diet Cina	30	= Total Cover		Problemat	ic riyurupiiyilC	vegetation	і (схріані)	
Woody Vine Stratum (Plot Size: 30ft radius )				<sup>1</sup> Indicators of h	ydric soil and v	vetland hyd	drology must be pres	sent, unless disturbed or problematic.
				11 1				
				Hydrophytic				
	0	Table		Vegetation	,,	, I		
. 1	0	= Total Cover		Present ?	Yes	Х	No	
demarks:								

SOIL												Sampling Point		3
	rintion: (Describe	to the de	onth neede	d to docum	ent the ir	ndicator or	confi	rm the absence of indica	itors )					-
Depth		, to the de	Matrix			idiodioi oi	001111	Redox Features						
(inches)	Horizon	Colo	r (moist)	%	Col	or (moist)	%	Abundance/Contrast	Type	1 1	Loc <sup>2</sup>	Texture		Remarks
0-15	Α		YR 4/1	90		OYR 3/6	10	Common / Prominent	C	_	PL	Silty Clay Loam		
												, ,		
<sup>1</sup> Typ	e: C=Concentrati	ion, D=De	epletion, RI	M=Reduce	d Matrix,	CS=Cover	ed or	coated Sand Grains.				<sup>2</sup> Lo	cation: PL= Pore Lining, M=M	atrix.
Hydric Soil	Indicators: (App	plicable t	o all LRRs	s, unless o	therwise	noted.)				Indic	ators f	or Problematic Hydric S	oils³:	
Н	istosol (A1)					S	andy	Gleyed Matrix (S4)			C	oast Prairie Redox (A16)		
Н	istic Epipedon (A	2)				S	andy	Redox (S5)			Iro	on-Manganese Masses (F	12)	
В	lack Histic (A3)					S	trippe	d Matrix (S6)			0	ther (Explain in Remarks)		
	ydrogen Sulfide (							Mucky Mineral (F1)						
	tratified Layers (A	<b>A</b> 5)					_	Gleyed Matrix (F2)						
	cm Muck (A10)							ed Matrix (F3)						
	epleted Below Da		e (A11)					Dark Surface (F6)						
	hick Dark Surface							ed Dark Surface (F7)						
	andy Mucky Mine		.0)			R	edox	Depressions (F8)						
5	cm Mucky Peat o	r Peat (S	53)						(3	3) Indi	cators	of hydrophytic vegetation	and wetland hydrology must b	e present, unless disturbed or problematic.
Dantelation I	/:f -	١.												
Type:	ayer (if observed)	):												
	(inches):									Llval	lria Cai	il Present? Yes	X No	
Remarks:	(inches).									пуи	1110 301	i Fieseit!	X 140	-
ixemaiks.	l .													
HYDROLO	)GY													
	drology Indicate	ors:												
Primary Indi	cators (minimum	of one red	quired; che	ck all that a	apply)						Se	econdary Indicators (minin	num of two required)	
Si	urface water (A1	)				Water-	staine	ed leaves (B9)				Surface soil crack	s (B6)	
Н	igh water table (	A2)				Aquatio	Fau	na (B13)				Drainage patterns	s (B10)	
S	aturation (A3)					True A	quatio	Plants (B14)				Dry-Season Wate	r Table (C2)	
W	/ater marks (B1)					Hydrog	jen sı	ulfide odor (C1)				Crayfish burrows	(C8)	
S	ediment deposits	(B2)				Oxidize	ed rhi	zospheres on living roots	s (C3)			Saturation visible	on aerial imagery (C9)	
D	rift deposits (B3)					Preser	ce of	reduced iron (C4)				Stunted or Stress	ed Plants (D2)	
A	lgal mat or crust	(B4)				Recen	Iron	Reduction in Tilled Soils	(C6)		)	Geomorphic posi	ion (D2)	
	on deposits (B5)					Thin m	uck s	urface (C7)			>			
	undation visible o	n aerial ir	magery (E	37)				ell Data (D9)				Other (explain in		
	parsely Vegetated					-		ain in Remarks)				` '	•	
Field Obser	. , ,			,			V- I-							
	ter Present?	Yes		No	Х	Depth	inche	25)						
Water Table		Yes		No	X	Depth			Motto-	ال ال	roloa:			
Saturation P		Yes		No	X	Depth			Wetlan Pr	d Hydi esent		Yes X	No	
	pillary fringe)	103		110	Α .	Берин		٥,		200.11		103 X		
		am dana	o monitori	na well so	rial nhoto	s nrovious	inen	ections), if available:						
Describe Re	coraca Data (SIIE	am gaug	o, monitum	ng well, del	ιαι μποιυ	o, previous	, ii isp	socions), ii avaliabic.						

Remarks:

Project/Site:		Blackwell Parcel						Lee's S	ummit / Jac	/ Jackson Sampling Date:			2/11/2022			
Applicant/Owner:				Griffin Riley Propert	y Group			State:		MO	Sampling	Point:			4	
Investigator(s):			M. St	tonecypher		Section	, Township, I	Range:	S11, 7	Γ47N, R31W	Site ID					
Landform (hillslope,	terrace, e	tc.):		Hillslope		Local re	elief (concave	e, convex, non	e):	Non	ie	Slope (%)			0-3	
GPS: UTM	XXS	хххххххе	XXXX	xxxn		Lat:	38	8.90721	Long:	-94.31	305	Datum:			NAD 83	
Soil Map Unit Name	:			Sampsel silty cla	y loam, 5	-9% slopes			NWI clas	sification:				N	/A	
Are climatic / hydrol	ogic condi	tions on the	site typica	al for this time of year	Yes	X No		(If no, ex	olain in Remark	s.)						
Are Vegetation	N	, Soil	N	, or Hydrology	N	significantly o	disturbed?	Are	"Normal Cir	cumstances" p	resent?	Yes	<b>(</b> No			
Are Vegetation	N	, Soil	oil N , or Hydrology N naturally prol					(If	needed, exp	d, explain answers in Remarks.)						

#### SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No	Х	Is the Sampled Area	
Hydric Soil Present?	Yes	No	Х	within a Wetland?	Yes No X
Wetland Hydrology Present?	Yes	No	Х		
Remarks:					

EGETATION - Use scientific names of plants								
	Absolute	Dominant	Indicator			Domin	ance Test worksh	neet:
Tree Stratum (Plot size: 30ft radius )	% Cover	Species?	Status					
Maclura pomifera	40	Υ	FACU					
2				Number of D	Oominant			
3				Species That	Are OBL,	(	0	(A)
1				FACW, or	FAC:			
5								
1				Total Number of	of Dominant	3	3	(B)
				Species Across				
	40	= Total Cover		'				
Sapling/Shrub Stratum (Plot Size: 15ft radius )		10141 00101		Percent of D	Ominant			
Symphoricarpos orbiculatus	30	Υ	FACU			0.0	00	(A/B)
Lonicera maackii	20	Y	UPL	Species That FACW, or		0.0	00	(A/B)
	20	•	OI L	FACW, U	FAC	D		11
				T-1-10/ 0	war of	Prevale	ence Index worksh	neet:
				Total % Co	iver or:			
<u> </u>				ODL Coast	0	1	0	
				OBL Species	0	x 1 =	0	
	50	= Total Cover						
Herb Stratum (Plot Size: 5ft radius )	1		_	FACW Species	0	x 2 =	0	
				FAC Species	0	x 3 =	0	
				FACU Species	70	x 4 =	280	
				UPL Species	20	x 5 =	100	
1								
3				Column Totals:	90	(A)	380	(B)
0				Prevalence In	dex = B/A		4.22	
1						Hydrophy	tic Vegetation Ind	licators:
2				1 - Rapid	Test for Hydron			
3					ance Test is >			
4					ence Index is <			
5								
6				4 -Morpho	ological Adapta	tions1 (Prov	ride supporting data	a in Remarks or on a separate sheet)
	0	= Total Cover		Problema	tic Hydrophytic	Vegetation	1 (Explain)	
Woody Vine Stratum (Plot Size: 30ft radius )	J					-	•	
woody vine Stratum (1 lot Size. Solt radius )				<sup>1</sup> Indicators of h	nydric soil and v	wetland hyd	frology must be pre	esent, unless disturbed or problematic.
				Hydrophytic				
				Vegetation				
	0	= Total Cover		Present ?	Yes		No X	
Demonto	U	- Total Covel		FIGSEIR!	162		140 V	
Remarks:								

SOIL									Sampling Point	4
	rintion: (Describ	e to the denth needed	to document	the indicator or	confi	rm the absence of indicato	rs )		ounping roun	•
Depth	прион. (Безень	Matrix	to document	the indicator of	COTIII	Redox Features	13.)		7	
(inches)	Horizon	Color (moist)	%	Color (moist)	%	Abundance/Contrast	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks
0-15	А	10YR 3/1	100		,,,		1300	Loc	Silt Loam	
<sup>1</sup> Type	e: C=Concentra	tion, D=Depletion, RM:	=Reduced Ma	atrix, CS=Cover	ed or	coated Sand Grains.			<sup>2</sup> Lo	ocation: PL= Pore Lining, M=Matrix.
		plicable to all LRRs,					lr	ndicators	for Problematic Hydric S	oils <sup>3</sup> :
Hi	stosol (A1)			S	andy	Gleyed Matrix (S4)		C	Coast Prairie Redox (A16)	
Hi	stic Epipedon (/	A2)		S	andy	Redox (S5)		lr	on-Manganese Masses (F	12)
Bl	ack Histic (A3)			S	rippe	ed Matrix (S6)		C	Other (Explain in Remarks)	
Hy	ydrogen Sulfide	(A4)		Lo	oamy	Mucky Mineral (F1)				
St	ratified Layers(	(A5)		Lo	oamy	Gleyed Matrix (F2)				
2 (	cm Muck (A10)			D	eplet	ed Matrix (F3)				
De	epleted Below D	ark Surface (A11)				Dark Surface (F6)				
	nick Dark Surface				_	ed Dark Surface (F7)				
	andy Mucky Mine			R	edox	Depressions (F8)				
5 (	cm Mucky Peat	or Peat (S3)					(3)	Indicators	of hydrophytic vegetation	and wetland hydrology must be present, unless disturbed or problematic.
		_								
	ayer (if observed	d):								
Type:									.,	
	(inches):							Hydric So	il Present? Yes	No X
Remarks:										
HYDROLO	GY									
Wetland Hy	drology Indicat	ors:								
Primary India	cators (minimum	of one required; check	k all that appl	y)				S	Secondary Indicators (minin	num of two required)
Su	urface water (A	1)		Water-	staine	ed leaves (B9)			Surface soil crack	ks (B6)
Hi	gh water table	(A2)		Aquatio	: Fau	ına (B13)			Drainage patterns	s (B10)
Sa	aturation (A3)			True A	quati	c Plants (B14)			Dry-Season Wate	er Table (C2)
W	ater marks (B1)	)		Hydrog	en si	ulfide odor (C1)			Crayfish burrows	(C8)
Se	ediment deposits	s (B2)		Oxidize	ed rhi	izospheres on living roots (	(C3)		Saturation visible	on aerial imagery (C9)
Dr	ift deposits (B3	3)		Presen	ce of	reduced iron (C4)			Stunted or Stress	sed Plants (D2)
Al	gal mat or crust	(B4)		Recent	Iron	Reduction in Tilled Soils (	(C6)		Geomorphic posi	tion (D2)
Iro	on deposits (B5)			Thin m	uck s	surface (C7)			FAC-neutral test	(D5)
		on aerial imagery (B7	')	Gauge	or W	/ell Data (D9)			Other (explain in	
Sp	parsely Vegetate	d Concave Surface (B	8)	Other	(expl	ain in Remarks)				
Field Obser	vations:	-								
Surface Wat		Yes	No 2	X Depth (	inche	35)				
Water Table		Yes		X Depth (			Motland	Judroloc:	,	
Saturation P		Yes		X Depth (				Hydrology sent?	Yes	No X
(includes cap				Sopur		/	. 700			1 ·
		eam gauge, monitoring	n well aerial i	nhotos previous	insn	ections) if available				
	1011		, , aonai	,, p. 01.00c						

Remarks:

Project/Site:			Blackwe	ell Parcel	City/0	County:		Lee's Summit / Jackson				Date:		2/11/2022		
Applicant/Owner:				Griffin Riley Proper	ty Group			State:			MO	Sampling	Point:		5	
Investigator(s):			M. St	onecypher		Section	on, Towns	ship, Ran	ge:	S11, T	S11, T47N, R31W					
Landform (hillslope,	terrace, e	tc.):		Hillslope	Local	relief (co	ncave, co	nvex, none	):	Non	e Slope (%			0-3		
GPS: UTM	XXS	xxxxxxxe	XXXX	xxxn		La	t:	38.90	686	Long:	-94.31	35	Datum:		NAD 83	
Soil Map Unit Name	:			Sampsel silty cla	y loam, 5	-9% slopes				NWI class	sification:				N/A	
Are climatic / hydrolo	ogic condi	tions on the	site typica	al for this time of year	?	Yes	Χ	No		(If no, exp	olain in Remark	s.)				
Are Vegetation	N	, Soil	N	, or Hydrology	N	significantl	y disturbe	:d?	Are "I	Normal Cir	cumstances" pr	esent?	Yes >	No		
Are Vegetation	N	, Soil	ioil N , or Hydrology N naturally probl				y problematic? (If needed, explain answers in Rema				Remarks.	)				

#### SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

No	Is the Sampled Area	
No	within a Wetland? Yes X No	
No		

## VEGETATION - Use scientific names of plants.

VEGETATION - Use scientific names of plants				
	Absolute	Dominant	Indicator	Dominance Test worksheet:
Tree Stratum (Plot size: 30ft radius )	% Cover	Species?	Status	
1				
2				Number of Dominant
3				Species That Are OBL, 1 (A)
4				FACW, or FAC:
5				
6				
7				Total Number of Dominant 1 (B)
8				Species Across All Strata:
0	0	T. 10		Species Across All Strata.
	0	= Total Cover		
Sapling/Shrub Stratum (Plot Size: 15ft radius )				Percent of Dominant
1				Species That Are OBL, 100.00 (A/B)
2				FACW, or FAC
3				Prevalence Index worksheet:
4				Total % Cover of:
5				
6				OBL Species 0 x 1 = 0
·	0	= Total Cover		A 1
Herb Stratum (Plot Size: 5ft radius )	U	= Total Cover		FACW Species 0 v 2
	99	Υ	FAC	FACW Species 0 x 2 = 0
Schedonorus arundinaceus (hummocked)	99	Y	FAC	
2				FAC Species 99 x 3 = 297
3				
4				FACU Species 0 x 4 = 0
5				
6				UPL Species 0 x 5 = 0
7				
8				Column Totals: 99 (A) 297 (B)
9				
10				Prevalence Index = B/A 3.00
11				Hydrophytic Vegetation Indicators:
12				
				1 3 1 3 3
13				X 2 - Dominance Test is > 50%
14				X 3 - Prevalence Index is <= 3.0 <sup>1</sup>
15				4 -Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)
16				
	99	= Total Cover		Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
Woody Vine Stratum (Plot Size: 30ft radius )				<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1				indicators of fryunc soil and wetland fryundlogy must be present, unless disturbed of problematic.
2				Hydrophytic
3				Vegetation
	0	= Total Cover		Present ? Yes X No
Remarks:				
remarks.				

SOIL										Sampling Point	5
	scription: (Describ	e to the depth needed to	document	the indicator or	confi	rm the absence of indicato	ors.)				
Depth		Matrix				Redox Features					
(inches)	- Horizon -	Color (moist)	%	Color (moist)	%	Abundance/Contrast	Туре	1 Lo	c <sup>2</sup>	Texture	Remarks
0-15	А	10YR 3/1	95	10YR 3/6	5	Common / Prominent	С	Р	L	Silty Clay Loam	
		tion, D=Depletion, RM=I			ed or	coated Sand Grains.					cation: PL= Pore Lining, M=Matrix.
		plicable to all LRRs, u	nless othe			01 11111 (01)	_	Indicat		or Problematic Hydric So	ils <sup>3</sup> :
	Histosol (A1)	12)				Gleyed Matrix (S4)	_			past Prairie Redox (A16)	10)
	Histic Epipedon (AB)	42)			_	Redox (S5)	_			n-Manganese Masses (F	12)
	Hydrogen Sulfide	(14)				ed Matrix (S6) Mucky Mineral (F1)	-		Ull	her (Explain in Remarks)	
	Stratified Layers (					Gleyed Matrix (F2)	-				
	2 cm Muck (A10)	noj			_	ed Matrix (F3)	-				
	Depleted Below Da	ark Surface (A11)				Dark Surface (F6)					
	Thick Dark Surface					ed Dark Surface (F7)					
	Sandy Mucky Mine	eral (S1)		R	edox	Depressions (F8)					
	5 cm Mucky Peat o	or Peat (S3)		,			(3	3) Indica	itors o	of hydrophytic vegetation a	and wetland hydrology must be present, unless disturbed or problematic.
				_							
Restrictive	Layer (if observed	i):									
Туре	<u> </u>										
Dept	h (inches):							Hydri	c Soil	Present? Yes	X No
Remarks:											
HYDROL	OGY										
Wetland H	lydrology Indicat	ors:									
Primary Inc	dicators (minimum	of one required; check	all that appl	ly)					Se	econdary Indicators (minim	num of two required)
	Surface water (A'	1)		Water-	staine	ed leaves (B9)				Surface soil crack	s (B6)
	High water table	(A2)		Aquatio	c Fau	ına (B13)				Drainage patterns	(B10)
X	Saturation (A3)			True A	quati	c Plants (B14)				Dry-Season Wate	r Table (C2)
1	Water marks (B1)	)		Hydrog	gen si	ulfide odor (C1)				Crayfish burrows	(C8)
	Sediment deposits	(B2)		Oxidiz	ed rhi	izospheres on living roots (	(C3)			Saturation visible	on aerial imagery (C9)
	Drift deposits (B3	)		Preser	nce of	reduced iron (C4)				Stunted or Stress	ed Plants (D2)
	Algal mat or crust	(B4)		Recent	t Iron	Reduction in Tilled Soils (	(C6)		Х	Geomorphic posit	ion (D2)
	Iron deposits (B5)			Thin m	iuck s	surface (C7)				FAC-neutral test	(D5)
	Inundation visible	on aerial imagery (B7)		Gauge	or W	/ell Data (D9)				Other (explain in	Remarks)
!	Sparsely Vegetate	d Concave Surface (B8)	)	Other	(expl	ain in Remarks)					
Field Obs	ervations:										
Surface W	ater Present?	Yes	No :	X Depth	(inche	÷s)					
Water Tab	le Present?	Yes	No :	X Depth	(inche	÷s)	Wetlan	ıd Hydro	logy	_	
Saturation	Present?	Yes X	No	Depth	(inche			resent?	3,	Yes X	No
(includes c	apillary fringe)	<u></u>									
Describe F	Recorded Data (str	eam gauge, monitoring	well, aerial	photos, previous	s insp	ections), if available:					

Remarks:

Project/Site:			Blackwe	II Parcel		City/C	City/County: Lee's Summit / Jackson					Sampling	Date:			2/11/20	022
Applicant/Owner:				Griffin Riley Propert	y Group				State:		MO	Sampling	Point:			6	
Investigator(s):			M. St	onecypher		Section	n, Towns	hip, Range:		S11, T	S11, T47N, R31W						
Landform (hillslope,	terrace, e	tc.):		Hillslope	Local	relief (cor	ncave, con	ivex, none	):	Non	е	Slope (%)			2	2-5	
GPS: UTM	XXS	хххххххе	XXXX	xxxn		Lat	t:	38.906	78	Long:	-94.31	347	Datum:			NAD	83
Soil Map Unit Name	:			Sampsel silty cla	y loam, 5	5-9% slopes				NWI class	sification:				N	I/A	
Are climatic / hydrole	ogic condi	tions on the	site typica	al for this time of year	?	Yes	Х	No		(If no, exp	olain in Remark	s.)					
Are Vegetation	N	N , Soil N , or Hydrology N sign					ly disturbed? Are "			Are "Normal Circumstances" pr			Yes	<b>(</b> No			
Are Vegetation	N	N , Soil N , or Hydrology N naturally proble					turally problematic? (If				If needed, explain answers in Remarks.)			•	•		

#### SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Yes		No	Х		Is the Sampled Area	
Yes		No	Х		within a Wetland?	Yes No X
Yes		No	Х			
	Yes	Yes	Yes No	Yes No X	Yes No X Yes No X	Yes No X within a Wetland?

Dominance Test work  at  BL,   O  anant   Cata:  at  BL,   O.00	ksheet: (A) (B)
nant 2 rata:	
nant 2 rata:	
nant 2 rata:	
nant <u>2</u> rata:	
rata:	(B)
nt	
	(A/B)
DL, 0.00	(AD)
D. J. L. L.	1.11
Prevalence Index wor	ksneet:
x 1 = 0	
x 2 = 0	
x 3 = 0	
x 4 = 40	
x 5 = 250	
,	
(A) 290	(B)
(1) 270	(5)
B/A 4.83	
Hydrophytic Vegetation	Indicators
	indicators:
Hydrophytic Vegetation	
st is > 50%	
$ex is <= 3.0^{1}$	
daptations1 (Provide supporting of	data in Remarks or on a separate sheet)
	•
phytic Vegetation' (Explain)	
	nresent unless disturbed or problematic
l and wetland hydrology must be	prosont, unless distalbed of problematic.
l and wetland hydrology must be	
l and wetland hydrology must be	_
l and wetland hydrology must be	
ſO	rophytic Vegetation <sup>1</sup> (Explain) coil and wetland hydrology must be

SOIL										Sampling Point	6
Profile Desc	ription: (Describ	be to the depth needed to	o document	the indicator or	confi	m the absence of indicato	ors.)				
Depth		Matrix				Redox Features				1	
(inches)	Horizon	Color (moist)	%	Color (moist)	%	Abundance/Contrast	Тур	oe <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks
0-15	А	10YR 3/1	100							Silt Loam	
								_			
<sup>1</sup> Tvn	e: C=Concentra	ation, D=Depletion, RM=	Reduced Ma	atrix CS=Cover	ed or	coated Sand Grains				<sup>2</sup> l o	cation: PL= Pore Lining, M=Matrix.
		pplicable to all LRRs, u			ou 0.	Soutou Guila Grainsi		In	dicators t	for Problematic Hydric So	
	istosol (A1)	11			andv	Gleyed Matrix (S4)				Coast Prairie Redox (A16)	
	istic Epipedon (	(A2)			_	Redox (S5)				ron-Manganese Masses (F	12)
	lack Histic (A3)				_	d Matrix (S6)				Other (Explain in Remarks)	,
	ydrogen Sulfide					Mucky Mineral (F1)				(	
	tratified Layers				_	Gleyed Matrix (F2)					
	cm Muck (A10)				_	ed Matrix (F3)					
		Dark Surface (A11)				Dark Surface (F6)					
	hick Dark Surfac					ed Dark Surface (F7)					
	andy Mucky Mir					Depressions (F8)					
	cm Mucky Peat					.,		(3) 1	ndicators	of hydrophytic vegetation a	and wetland hydrology must be present, unless disturbed or problematic.
								(-)		,	
Restrictive L	ayer (if observe	ed):									
Type:											
	(inches):							F	lvdric So	oil Present? Yes	No X
Remarks:	,						-		,		
	l										
HYDROLC	)GY										
Wetland Hy	drology Indica	tors:									
Primary Indi	cators (minimun	n of one required; check	all that appl	y)					S	Secondary Indicators (minim	num of two required)
S	urface water (A	<b>\1)</b>		Water-	staine	ed leaves (B9)				Surface soil crack	s (B6)
Н	igh water table	(A2)		Aquatio	Fau	na (B13)				Drainage patterns	(B10)
S	aturation (A3)			True A	quati	Plants (B14)				Dry-Season Wate	r Table (C2)
W	/ater marks (B1	1)		Hydrod	jen si	ılfide odor (C1)				Crayfish burrows	(C8)
S	ediment deposit	s (B2)				zospheres on living roots	(C3)				on aerial imagery (C9)
	rift deposits (B					reduced iron (C4)	•			Stunted or Stress	9 3 1 1
	lgal mat or crust					Reduction in Tilled Soils	(C6)			Geomorphic posit	
	on deposits (B5					urface (C7)	/			FAC-neutral test	
		on aerial imagery (B7)				ell Data (D9)				Other (explain in	
		ed Concave Surface (B8)	\			ain in Remarks)				Other (explain in	Kemanaj
		eu Concave Surface (Bo	)	Other	(expi	alli ili Remarks)					
Field Obser		Voc	No.	/ D//-	inch	(0)					
Surface Wa				C Depth		,					
Water Table				C Depth					ydrology		
Saturation F		Yes	No 2	<b>C</b> Depth	inche	es)		Prese	ent?	Yes	No X
	pillary fringe)										
Describe Re	ecorded Data (st	ream gauge, monitoring	well, aerial p	ohotos, previous	s insp	ections), if available:					
Remarks:											

Project/Site:			Blackw	ell Parcel		City/Cou	unty:	Lee's	s Summit / Ja	ckson	Samplin	g Date:	2/11/2022			
Applicant/Owner:				Griffin Riley Proper	ty Group		State:		:	MO	Samplin	g Point:			7	
Investigator(s):			M. S	tonecypher		Section,	, Townsh	ip, Range:	S11,	S11, T47N, R31W						
Landform (hillslope,	terrace, et	tc.):		Hillslope		Local re	lief (cond	cave, convex, r	none):	Conc	ave	Slope (%)			0-3	
GPS: UTM	XXS	xxxxxxxe	XXXX	xxxn		Lat:		38.90626	Long:	-94.31	221	Datum:			NAD 83	
Soil Map Unit Name	:			Arisburg silt l	oam, 1-5°	% slopes			NWI clas	ssification:				١	I/A	
Are climatic / hydrole	ogic condi	tions on the	site typic	al for this time of year	?	Yes	X N	No O	(If no, ex	ıplain in Remark	(s.)					
Are Vegetation	N	N , Soil N , or Hydrology N signif					disturbed	? A	re "Normal C	ircumstances" p	resent?	Yes )	No			
Are Vegetation	N	, Soil	, Soil N , or Hydrology N naturally problematic?					)	(If needed, ex	plain answers ir	n Remarks	i.)			•	•

#### SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

No	Is the Sampled Area	
No	within a Wetland? Yes X No	
No		

Tree Stratum (Plot size: 30ft radius ) Salix nigra	Absolute % Cover 30	Dominant Species? Y	Indicator Status OBL	Number of D	ominant	Domin	ance Test works	ileet.
,					ominant			
Jana Ingra	30	'	OBL		ominant			
					ominant			
				Species That		1	1	(A)
				FACW, or	FAC:			
				Total Number o	f Dominant	-	1	(B)
				Species Across				.,
	20	Tatal Causa		Species / teross	7 iii Otrata.			
	30	= Total Cover		4				
Sapling/Shrub Stratum (Plot Size: 15ft radius )				Percent of D	ominant			
				Species That	Are OBL,	100	0.00	(A/B)
				FACW, or	FAC		•	
						Prevale	ence Index works	heet:
				Total % Co	ver of			
				10.01 /0 00				
				ODI Cassis	20	., 1	20	
				OBL Species	30	x 1 =	30	
	0	= Total Cover						
Herb Stratum (Plot Size: 5ft radius )				FACW Species	0	x 2 =	0	
				FAC Species	0	x 3 =	0	
				FACU Species	0	v 1	0	
				FACU Species	0	X 4 =	0	
				LIDI Consiler	0		0	
				UPL Species	0	x 5 =	0	
				Column Totals:	30	(A)	30	(B)
				Prevalence Inc	dex = B/A		1.00	
						Hydrophy	tic Vegetation Inc	dicators:
				1 - Ranid	Test for Hydrop			
					ance Test is > 5		tation	
				X 3 - Prevale	ence Index is <	= 3.0		
				4 -Morpho	logical Adaptat	ions <sup>1</sup> (Prov	ide supporting dat	a in Remarks or on a separate sheet)
					-			,
	0	= Total Cover		Problemat	ic Hydrophytic	Vegetation	1 (Explain)	
Woody Vine Stratum (Plot Size: 30ft radius )				1				
				Indicators of r	iydric soil and v	vetland hyd	irology must be pr	esent, unless disturbed or problematic.
				Hydrophytic				
				Vegetation				
	0	= Total Cover		Present ?	Yes	Х	No	
emarks:	U	- Total COVEI		FIGSEIIL!	162	^	140	

COII													
SOIL						_					Sampling Poin		7
Profile Desc Depth	ription: (Describe	e to the de	epth needed Matrix	d to docum	ent the indica	ator or co	onfirm t	he absence of indicat Redox Features	tors.)		7		
(inches)	Horizon	Colo	or (moist)	%	Color (r	noist)	% A	Abundance/Contrast	Type <sup>1</sup>	Loc <sup>2</sup>	Texture		Remarks
0-15	А		YR 5/1	85	10YR			Common / Prominent	С	PL	Silty Clay Loam		romano
							10 -						
<sup>1</sup> Typ	e: C=Concentrat	ion, D=De	epletion, RN	/I=Reduced	Matrix, CS=	Covered	d or coa	nted Sand Grains.			<sup>2</sup> Lc	ocation: PL= Pore Lining, M=N	Matrix.
Hydric Soil	Indicators: (Ap	plicable t	to all LRRs	, unless ot	herwise no	ed.)				ndicators	for Problematic Hydric S	oils <sup>3</sup> :	
	istosol (A1)							yed Matrix (S4)			Coast Prairie Redox (A16)		
	istic Epipedon (A	12)						dox (S5)			ron-Manganese Masses (F	12)	
	lack Histic (A3)							latrix (S6)		(	Other (Explain in Remarks)		
	ydrogen Sulfide							cky Mineral (F1)					
	tratified Layers (A cm Muck (A10)	A5)			Х			eyed Matrix (F2) Matrix (F3)					
	epleted Below Da	ark Surfac	- (Δ11)		۸			k Surface (F6)	_				
	hick Dark Surface		e (ATT)					Dark Surface (F7)					
	andy Mucky Mine							pressions (F8)	-				
	cm Mucky Peat o		S3)						(3)	Indicators	of hydrophytic vegetation	and wetland hydrology must b	be present, unless disturbed or problematic.
									(-)		,		
Restrictive L	ayer (if observed	):											
Type:													
Depth	(inches):									Hydric Sc	oil Present? Yes	X No	
Remarks:													
HYDROLC													
	drology Indicate												
	cators (minimum		quired; ched	ck all that a						5	Secondary Indicators (minir	•	
	urface water (A1							eaves (B9)			Surface soil crack		
	igh water table (	(A2)				Aquatic F					Drainage pattern		
	aturation (A3)							ants (B14)			Dry-Season Water		
	/ater marks (B1)							e odor (C1)			Crayfish burrows		
	ediment deposits							pheres on living roots	(C3)			on aerial imagery (C9)	
	rift deposits (B3)							luced iron (C4)			Stunted or Stress		
	lgal mat or crust							duction in Tilled Soils	(C6)		X Geomorphic posi		
	on deposits (B5)							ice (C7)			X FAC-neutral test		
	undation visible o					-		Data (D9)			Other (explain in	Remarks)	
	parsely Vegetate	d Concav	e Surface (I	B8)		Other (e	xplain i	in Remarks)					
Field Obser	rvations:	ſ											
Surface Wat		Yes		No		Depth (in							
Water Table		Yes		No		Depth (in				Hydrology			
Saturation P		Yes	Х	No		Depth (in	iches)	0-8	Pre	sent?	Yes X	No	
	pillary fringe)												
Describe Re	ecorded Data (stre	eam gaug	je, monitorir	ng well, aer	ial photos, p	evious i	nspecti	ons), if available:					

Remarks:

Project/Site:			Blackwe	II Parcel		City/Cou	inty:	Lee's Summit / Jackson				Date:	2/11/2022
Applicant/Owner:				Griffin Riley Proper	y Group			State:		MO		Point:	8
Investigator(s):			M. St	onecypher		Section,	Township,	Range:	S11, <sup>-</sup>	S11, T47N, R31W			
Landform (hillslope,	terrace, e	tc.):		Hillslope		Local rel	ief (concav	/e, convex, non	e):	Non	е	Slope (%)	): 0-3
GPS: UTM	XXS	хххххххе	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx				3	38.90629	Long:	-94.31	213	Datum:	NAD 83
Soil Map Unit Name	:			Arisburg silt l	oam, 1-5°	% slopes			NWI clas	sification:			N/A
Are climatic / hydrolo	ogic condi	tions on the	site typica	al for this time of year	?	Yes	Yes X No (If no, explain in Remarks.)						
Are Vegetation	N	I , Soil N , or Hydrology N sig				significantly d	isturbed?	Are	"Normal Cir	cumstances" p	resent?	Yes )	X No
Are Vegetation	N	, Soil N , or Hydrology N natura					sturally problematic? (If needed, explain answers i					)	

#### SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No	Х	Is the Sampled Area	
Hydric Soil Present?	Yes	No	Х	within a Wetland?	Yes No X
Wetland Hydrology Present?	Yes	No	Х		
Remarks:					

EGETATION - Use scientific names of plants	i.									
	Absolute	Dominant	Indicator	Dominance Test worksheet:						
Tree Stratum (Plot size: 30ft radius )	% Cover	Species?	Status							
Gleditsia triacanthos	10	Υ	FACU							
2				Number of D	ominant					
3				Species That	Are OBL,	(	)	(A)		
4				FACW, or	FAC:					
5										
6										
7				Total Number of	f Dominant	3	3	(B)		
В				Species Across				. ,		
	10	= Total Cover		Species 7 10, 000	7 III Ottata					
Sapling/Shrub Stratum (Plot Size: 15ft radius )	10	= Total Gover		Donount of D						
	40	Υ	UPL	Percent of D		0.4	00	(4 (5)		
Lonicera maackii	20	Y	FACU	Species That		0.0	00	(A/B)		
Symphoricarpos orbiculatus	20	Y	FACU	FACW, or	FAC					
3						Prevale	ence Index worksh	neet:		
4				Total % Cov	ver of:					
5										
6				OBL Species	0	x 1 =	0			
	60	= Total Cover								
Herb Stratum (Plot Size: 5ft radius )				FACW Species	0	x 2 =	0			
1							_			
2				FAC Species	0	x 3 =	0			
3				· ·						
4				FACU Species	30	x 4 =	120			
5				Trice openies			120			
6				UPL Species	40	x 5 =	200			
7				0. 2 opos.co						
8				Column Totals:	70	(A)	320	(B)		
9				o o i di i i i i o i di o i		( ' ')	020	(2)		
0				Prevalence Inc	hov - R/A		4.57			
1				i revalence inc			tic Vegetation Indi	instance.		
				4 . D				icators:		
2					Test for Hydrop		เลแปท			
3					ance Test is > !					
4				3 - Prevale	ence Index is <	= 3.0				
5				4 -Morpho	logical Adaptat	ions <sup>1</sup> (Prov	ide supporting data	in Remarks or on a separate sheet)		
6					-			, , ,		
	0	= Total Cover		Problemat	ic Hydrophytic	Vegetation	(Explain)			
Woody Vine Stratum (Plot Size: 30ft radius )				<sup>1</sup> Indicators of h	wdric soil and w	votland hvd	Irology must he pre	sent, unless disturbed or problematic.		
1				indicators of fi	yunc son and v	veliana riya	irology mast be pre	sent, unless distarbed of problematic.		
2				Hydrophytic		-	<u>-</u>			
3				Vegetation	_					
	0	= Total Cover		Present ?	Yes		No X			
Remarks:										

SOIL										Sampling Point	8
Profile Desc	ription: (Descrit	e to the depth needed to	o document	the indicator or	confi	rm the absence of indicato	rs.)				
Depth		Matrix				Redox Features					
(inches)	Horizon	Color (moist)	%	Color (moist)	%	Abundance/Contrast	Туре	1	Loc <sup>2</sup>	Texture	Remarks
0-15	А	10YR 3/2	100							Silt Loam	
<sup>1</sup> Typ	e: C=Concentra	ation, D=Depletion, RM=	Reduced Ma	atrix, CS=Cover	ed or	coated Sand Grains.				<sup>2</sup> Lo	cation: PL= Pore Lining, M=Matrix.
Hydric Soil	Indicators: (A	oplicable to all LRRs, u	ınless otheı	rwise noted.)				Indi	cators f	or Problematic Hydric So	pils <sup>3</sup> :
Н	istosol (A1)			S	andy	Gleyed Matrix (S4)			C	oast Prairie Redox (A16)	
Н	istic Epipedon (	A2)		S	andy	Redox (S5)			lro	on-Manganese Masses (F	12)
В	lack Histic (A3)			S	rippe	d Matrix (S6)			0	ther (Explain in Remarks)	
Н	ydrogen Sulfide	(A4)		L	oamy	Mucky Mineral (F1)					
	tratified Layers	(A5)			_	Gleyed Matrix (F2)					
	cm Muck (A10)				_	ed Matrix (F3)					
	•	Park Surface (A11)				Dark Surface (F6)					
	nick Dark Surfac				•	ed Dark Surface (F7)					
	andy Mucky Mir			R	edox	Depressions (F8)	Ш.				
5	cm Mucky Peat	or Peat (S3)					(	3) Inc	dicators	of hydrophytic vegetation a	and wetland hydrology must be present, unless disturbed or problematic.
D. delen	(15 . )	n									
	ayer (if observe	a):									
Type:	(:b)									us is vas l	No X
	(inches):							НУ	aric Soi	il Present? Yes	No X
Remarks:											
HYDROLO											
	drology Indica			,							
		n of one required; check	all that appl			(==)			S	econdary Indicators (minim	
	urface water (A					ed leaves (B9)				Surface soil crack	
	igh water table	(A2)				na (B13)				Drainage patterns	
	aturation (A3)					Plants (B14)				Dry-Season Wate	
	ater marks (B1					ulfide odor (C1)				Crayfish burrows	
	ediment deposit					zospheres on living roots (	(C3)				on aerial imagery (C9)
D	rift deposits (B	3)		Presen	ce of	reduced iron (C4)				Stunted or Stress	ed Plants (D2)
	lgal mat or crust					Reduction in Tilled Soils (	(C6)			Geomorphic posit	
Ire	on deposits (B5	)		Thin m	uck s	urface (C7)				FAC-neutral test	(D5)
In	undation visible	on aerial imagery (B7)		Gauge	or W	ell Data (D9)				Other (explain in	Remarks)
S	parsely Vegetat	ed Concave Surface (B8	)	Other	(expl	ain in Remarks)					
Field Obser	vations:										
Surface Wat	ter Present?	Yes	No )	X Depth (	inche	es)					
Water Table	Present?	Yes	No 2	X Depth (	inche	es)	Wetlan	nd Hy	drology	. <u>.</u>	
Saturation P	resent?	Yes	No 2	X Depth (	inche			resen		Yes	No X
(includes ca	pillary fringe)										
Describe Re	corded Data (st	ream gauge, monitoring	well, aerial	photos, previous	insp	ections), if available:					
Remarks:											

Project/Site:			Blackwe	II Parcel		City/Cou	nty:	Lee's S	Summit / Jac	kson	Sampling	g Date:	2/11/2022
Applicant/Owne	r:			Griffin Riley Proper	y Group			State:		MO	Samplino	g Point:	9
Investigator(s):			M. St	onecypher		Section,	Township	, Range:	S11, 1	47N, R31W	Site ID		
Landform (hillsle	ope, terrace,	etc.):		Hillslope		Local reli	ief (conca	ive, convex, nor	ne):	Conca	ave	Slope (%)	): 0-3
GPS: UTM	XXS	xxxxxxxe	XXXX	xxxn		Lat:		38.90423	Long:	-94.31	277	Datum:	NAD 83
Soil Map Unit N	ame:			Sampselt silty cla	ay loam,	5-9% slopes			NWI class	sification:			Pond
Are climatic / hy	drologic cond	litions on the	site typica	al for this time of year	?	Yes	X No	)	(If no, exp	olain in Remark	s.)		
Are Vegetation	N	, Soil	N	, or Hydrology	N	significantly di	sturbed?	Are	"Normal Cir	cumstances" p	resent?	Yes )	X No
Are Vegetation	N	N , Soil N , or Hydrology N					lematic?	(If	needed, exp	olain answers ir	n Remarks	.)	

#### SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	Х	No		Is the Sampled Area
Hydric Soil Present?	Yes	Х	No		within a Wetland? Yes X No
Wetland Hydrology Present?	Yes	Х	No		
Remarks:					

				1	1				
To Clark of (District Control of	Absolute	Domina		Indicator	ĺ		Domir	nance Test wo	orksheet:
Tree Stratum (Plot size: 30ft radius )	% Cover	Specie	s?	Status					
Salix nigra	30	Υ		OBL					
					Number of D				
					Species That			3	(A)
					FACW, or	FAC:			
					Total Number o	of Dominant		3	(B)
					Species Across	s All Strata:			
	30	= Total Cove	er						
Sapling/Shrub Stratum (Plot Size: 15ft radius )					Percent of D	)ominant			
					Species That		100	0.00	(A/B)
					FACW, or				, ,
						-	Preval	ence Index w	orksheet:
					Total % Co	ver of:			
					. 5.2. 75 00				
					OBL Species	30	x 1 =	30	
	0	= Total Cove	or		522 Species	30	~ ' '	- 00	-
Herb Stratum (Plot Size: 5ft radius )	U	- TOTAL COVE	al		FACW Species	30	x 2 =	60	
Phalaris arundinacea	20	Υ		FACW	1 ACW Species	30	X Z -	00	<del>-</del> -
Persicaria pensylvanica	10	Y		FACW	FAC Species	0	x 3 =	0	
reisicalia perisyivaliica	10			TACVV	FAC Species	U	x 3 =	U	<u> </u>
					E40110 :	0		0	
					FACU Species	0	x 4 =	0	_
					LIDI Consider	0		0	
					UPL Species	0	x 5 =	0	_
					O - l T - 4 - l -	40	(4)	00	(D)
					Column Totals:	60	(A)	90	(B)
						I D/A		4.50	
					Prevalence In			1.50	
								tic Vegetation	n Indicators:
						Test for Hydrop		etation	
						ance Test is >			
					X 3 - Preval	ence Index is <	$= 3.0^{1}$		
					4 -Morpho	nlonical Adaptat	tions <sup>1</sup> (Prov	vide sunnorting	data in Remarks or on a separate sheet)
						-			g data in recinaries or on a separate street)
	30	= Total Cove	er		Problema	tic Hydrophytic	Vegetation	n <sup>1</sup> (Explain)	
Woody Vine Stratum (Plot Size: 30ft radius )					<sup>1</sup> Indicators of h	nudria cail and i	uotland hu	dralagu must b	e present, unless disturbed or problematic.
					indicators of t	iyunc son anu v	wellanu ny	urology must b	e present, unless disturbed of problematic.
					Hydrophytic				<u>.                                      </u>
					Vegetation			_	<u>_</u>
	0	= Total Cove	er		Present ?	Yes	Х	No	
marks:	J	- Total Cove			i roseiii :	163	^	NO	

SOIL										Sampling Point	9
	cription: (Describ	e to the depth needed to	document	the indicator or	confi	rm the absence of indicato	ors.)				
Depth		Matrix				Redox Features					
(inches)	- Horizon -	Color (moist)	%	Color (moist)	%	Abundance/Contrast	Type	1 Loc	2	Texture	Remarks
0-15	А	10YR 4/1	90	10YR 3/6	10	Common / Prominent	С	PL		Silty Clay Loam	
							<u> </u>				
							ـــــ				
							<del></del>				
1=	0.0	r D. D lett DM f	D. I IM	11. 00. 0			Щ.			21	ortho Di Donaldia Maria
		tion, D=Depletion, RM=F			ea or	coated Sand Grains.	$-\!\!\!+$	la di sata	6		cation: PL= Pore Lining, M=Matrix.
<del></del>	Histosol (A1)	iplicable to all ERRS, u	niess oute		andy	Gleyed Matrix (S4)	_	indicato		Problematic Hydric So st Prairie Redox (A16)	ous:
	Histic Epipedon (A	42)				Redox (S5)	_			-Manganese Masses (F1	12)
	Black Histic (A3)	<u></u>			_	ed Matrix (S6)	_			er (Explain in Remarks)	)
	Hydrogen Sulfide	(A4)				Mucky Mineral (F1)				, ,	
	Stratified Layers (					Gleyed Matrix (F2)					
2	cm Muck (A10)			X D	eplete	ed Matrix (F3)					
[	Depleted Below Da	ark Surface (A11)		R	edox	Dark Surface (F6)					
	Thick Dark Surface	` '		D	eplete	ed Dark Surface (F7)					
	Sandy Mucky Mine			R	edox	Depressions (F8)					
5	cm Mucky Peat of	or Peat (S3)		]			(3	3) Indicate	ors of h	hydrophytic vegetation a	and wetland hydrology must be present, unless disturbed or problematic.
							_				
	Layer (if observed	1):									
Type:	-							I le calada	C-:I D	Present? Yes	X No
Remarks:	n (inches):							нуагіс	2011 P	Present? Yes	Λ ΝΟ
Kemarks.											
HYDROLO	OGY										
	ydrology Indicate	ors:									
		of one required; check a	all that appl	lv)					Seco	ondary Indicators (minim	num of two required)
	Surface water (A'				staine	ed leaves (B9)				Surface soil crack	•
	ligh water table (					ına (B13)				Drainage patterns	
	Saturation (A3)	( -)				c Plants (B14)		-		Dry-Season Water	
	Vater marks (B1)	)				ulfide odor (C1)				Crayfish burrows	
	Sediment deposits					izospheres on living roots (	(C3)	-			on aerial imagery (C9)
	Orift deposits (B3					reduced iron (C4)	( /	-		Stunted or Stresse	0 3
	Algal mat or crust					Reduction in Tilled Soils (	(C6)	-	Х	Geomorphic positi	
	ron deposits (B5)					surface (C7)	( /		Х	FAC-neutral test	
		on aerial imagery (B7)				/ell Data (D9)		-		Other (explain in	
		d Concave Surface (B8)	)			ain in Remarks)		-			
Field Obse					V- I-						
	ater Present?	Yes	No 2	X Depth	(inche	es)					
Water Table				X Depth		,	Wetlan	d Hydrolo	nav		
Saturation I				X Depth				resent?	Jy	Yes X	No
	apillary fringe)					•					
		eam gauge, monitoring	well, aerial	photos, previous	s insp	ections), if available:					

Remarks:

Project/Site:			Blackwe	ell Parcel		City/C	County:		Lee's Su	ımmit / Jac	kson	Sampling	Date:			2/11/202	22
Applicant/Owner:				Griffin Riley Propert	y Group				State:		MO	Sampling	Point:			10	
Investigator(s):			M. St	onecypher		Section	n, Towns	ship, Rang	je:	S11, 1	Γ47N, R31W	Site ID					
Landform (hillslope,	terrace, e	tc.):		Hillslope		Local	relief (cor	ncave, cor	nvex, none	e):	Non	е	Slope (%)			0-:	3
GPS: UTM	XXS	хххххххе	XXXX	xxxn		Lat	t:	38.904	111	Long:	-94.31	264	Datum:			NAD 83	3
Soil Map Unit Name	:			Sampselt silty cla	y loam, !	5-9% slopes				NWI class	sification:				N	I/A	
Are climatic / hydrol	ogic condi	onditions on the site typical for this time of year?					Χ	No		(If no, exp	olain in Remark	s.)					
Are Vegetation	N	, Soil	N	, or Hydrology	N	significantly	y disturbe	d?	Are "	Normal Cir	cumstances" pi	resent?	Yes	( No			
Are Vegetation	N	, Soil	N	, or Hydrology	N	naturally pr	oblematio	:?	(If needed, explain answ			n Remarks.	)				

#### SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No	Х	Is the Sampled Area	
Hydric Soil Present?	Yes	No	Х	within a Wetland?	Yes No X
Wetland Hydrology Present?	Yes	No	Х		
Remarks:					

	•								
	Absolute	Dominant	L	Indicator			Domir	nance Test work	sheet:
Tree Stratum (Plot size: 30ft radius )	% Cover	Species?		Status					
Gleditsia triacanthos	5	Υ		FACU					
					Number of D	ominant			
					Species That	Are OBL,		0	(A)
					FACW, or	FAC:		<u></u>	
					1				
					1				
					Total Number o	of Dominant		4	(B)
					Species Across				
	5	= Total Cover							
Sapling/Shrub Stratum (Plot Size: 15ft radius )		- Total Gover			Doroont of D	lominant			
Lonicera maackii	30	Υ	1	UPL	Percent of D		0	.00	(A/B)
LOHICEI A MAACKII	30	T	-	UPL	Species That		0.	.00	(A/B)
					FACW, or	FAC	ь	1 . 1	Librat
			-		Ŧ	6	Preval	ence Index wor	ksneet:
			-		Total % Co	ver ot:			
					001.0		_		
					OBL Species	0	x 1 =	0	
	30	= Total Cover							
Herb Stratum (Plot Size: 5ft radius )					FACW Species	0	x 2 =	0	
Schedonorus arundinaceus	10	Υ		FACU					
Setaria faberi	5	Υ		FACU	FAC Species	0	x 3 =	0	
					FACU Species	20	x 4 =	80	
			1		' '				
			1		UPL Species	30	x 5 =	150	
					, i				
					Column Totals:	50	(A)	230	(B)
					Prevalence Inc	dex = B/A		4.60	
			1				Hydrophy	rtic Vegetation I	ndicators:
					1 - Panid	Test for Hydrop			
			1			ance Test is > !		addion.	
			<del> </del>			ence Index is <			
			-		3-11cvalv	CITCC IIIUCX IS <	- 3.0		
			-		4 -Morpho	ological Adaptat	tions <sup>1</sup> (Pro	vide supporting d	lata in Remarks or on a separate sheet)
	15	= Total Cover			Droblomat	tic Hydrophytic	Vonetation	n <sup>1</sup> (Evolain)	
Woody Vine Stratum (Plot Size: 30ft radius )	13	= TULAI CUVEI			Froblettla	uc riyurupriylic	vegetatiOl	ı (Expialii)	
woody vine Stratum (Piot Size: 3011 radius )		1	1 6		1Indicators of h	nydric soil and v	vetland hy	drology must be	present, unless disturbed or problematic.
			-		11 10 10				
			-		Hydrophytic				
	0				Vegetation Present ?			No X	
		<ul> <li>Total Cover</li> </ul>				Yes			

SOIL										Sampling	Point 10	
Profile Descr	iption: (Describ	e to the dep	th needed to	document	the indicator or	confi	rm the absence of indicato	rs.)				
Depth	Horizon		Matrix				Redox Features					
(inches)	HUHZUH	Color	(moist)	%	Color (moist)	%	Abundance/Contrast	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks	
0-15	Α	10Y	R 3/1	100						Silt Loam		
<sup>1</sup> Type	e: C=Concentra	ition, D=Dep	letion, RM=Re	educed M	atrix, CS=Cover	ed or	coated Sand Grains.				<sup>2</sup> Location: PL= Pore Lining, M=Matrix.	
Hydric Soil	Indicators: (Ap	oplicable to	all LRRs, un	less othe	rwise noted.)				Indicator	s for Problematic Hyd	lric Soils <sup>3</sup> :	
Hi	stosol (A1)				S	andy	Gleyed Matrix (S4)			Coast Prairie Redox (A	A16)	
Hi	stic Epipedon (	A2)			S	andy	Redox (S5)			Iron-Manganese Mass	ses (F12)	
BI	ack Histic (A3)				S	rippe	ed Matrix (S6)			Other (Explain in Rema	arks)	
Hy	/drogen Sulfide	(A4)			Lo	oamy	Mucky Mineral (F1)					
St	ratified Layers(	(A5)			Lo	oamy	Gleyed Matrix (F2)					
2	cm Muck (A10)				D	eplet	ed Matrix (F3)					
De	epleted Below D	ark Surface	(A11)		R	edox	Dark Surface (F6)					
Th	nick Dark Surfac	e (A12)			D	eplet	ed Dark Surface (F7)					
Sa	andy Mucky Min	eral (S1)			R	edox	Depressions (F8)					
5	cm Mucky Peat	or Peat (S3	)					(3)	) Indicato	ors of hydrophytic vegeta	ation and wetland hydrology must be present, unless disturbed or p	roblematic.
Restrictive L	ayer (if observe	d):										
Туре:												
Depth	(inches):								Hydric S	Soil Present? Ye	es No X	
Remarks:												
HYDROLO	GY											
Wetland Hv	drology Indicat	ors:										
	cators (minimum		ired: check al	I that appl	v)					Secondary Indicators (	(minimum of two required)	
	ırface water (A					staine	ed leaves (B9)				cracks (B6)	
	gh water table						ina (B13)				atterns (B10)	
	aturation (A3)	(AZ)					c Plants (B14)				Water Table (C2)	
		`										
	ater marks (B1						ulfide odor (C1)	(00)	_	Crayfish bur		
	ediment deposits						izospheres on living roots (	(63)	_		risible on aerial imagery (C9)	
	ift deposits (B3						reduced iron (C4)				Stressed Plants (D2)	
Al	gal mat or crust	(B4)					Reduction in Tilled Soils (	(C6)		Geomorphic	c position (D2)	
Iro	on deposits (B5)	)			Thin m	uck s	surface (C7)			FAC-neutral	I test (D5)	
In	undation visible	on aerial im	agery (B7)		Gauge	or W	/ell Data (D9)			Other (expla	ain in Remarks)	
Sį	arsely Vegetate	ed Concave	Surface (B8)		Other	(expl	ain in Remarks)					
Field Obser	vations:											
Surface Wat	er Present?	Yes	N	0	X Depth (	inche	25)					
Water Table	Present?	Yes	N	0	X Depth (	inche	<b>2S)</b>	Wetland	l Hydrolo	αv		
Saturation P	resent?	Yes	N	0	X Depth (	inche			esent?	Yes	No X	
(includes car	oillary fringe)											
		ream gauge	monitorina w	ell, aerial	photos, previous	insn	ections), if available:					
D 000mD0 110	oordod Data (ot.	oam gaago,	, mormorning ii	on, dona	priotos, provious	,ор	ostonoj, ii avanabio.					
Remarks:												

Project/Site:			Blackwe	ell Parcel		City/C	ounty:		Lee's Su	ımmit / Jac	kson	Sampling	Date:			2/11/20	22
Applicant/Owner:				Griffin Riley Propert	y Group				State:		MO	Sampling	Point:			11	
Investigator(s):			M. St	tonecypher		Section	n, Towns	ship, Rang	je:	S11, 1	Γ47N, R31W	Site ID					
Landform (hillslope,	terrace, et	tc.):		Hillslope		Local	relief (cor	ncave, cor	nvex, none	e):	Non	е	Slope (%)			0-	3
GPS: UTM	XXS	xxxxxxxe	XXXX	xxxn		Lat	t:	38.903	21	Long:	-94.31	224	Datum:			NAD 8	3
Soil Map Unit Name	:			Sampselt silty cla	y loam, !	5-9% slopes				NWI class	sification:				N	I/A	
Are climatic / hydrol	ogic condi	onditions on the site typical for this time of year? Yes					Χ	No		(If no, exp	olain in Remark	s.)					
Are Vegetation	N	, Soil	N	, or Hydrology	N	significantly	y disturbe	d?	Are "	Normal Cir	cumstances" pi	resent?	Yes	<b>(</b> No			
Are Vegetation	N	, Soil	N	, or Hydrology	N	naturally pr	oblematio	:?	(If n	eeded, exp	olain answers in	Remarks.	)	•	•		

#### SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	Х	No		Is the Sampled Area	
Hydric Soil Present?	Yes	Х	No		within a Wetland? Yes X No	
Wetland Hydrology Present?	Yes	Х	No			
Remarks:						
<u> </u>						

## VEGETATION - Use scientific names of plants.

- Use scientific names of plants.					
Absolu	Dominant	Indicator		Dominance Test	worksheet:
(Plot size: 30ft radius ) % Cove	Species?	Status			
			Number of Dominant		
			Species That Are OBL,	1	(A)
			FACW, or FAC:		
			Total Number of Domina	nt 1	(B)
			Species Across All Strata		(5)
0	T. I. I. O.		Species Across Air Strate	u.	
	= Total Cover		4		
o Stratum (Plot Size: 15ft radius )			Percent of Dominant		
			Species That Are OBL,	100.00	(A/B)
			FACW, or FAC		
				Prevalence Index	worksheet:
			Total % Cover of:		
			OBL Species 0	x 1 = 0	
0	= Total Cover		322 oposios 0	_ ^ .	_
	= Total Cover		FACW Species 0	v 2 0	
(Plot Size: 5ft radius )		FAC	FACW Species 0	X 2 = 0	<u></u>
s arundinaceus (hummocked) 99	Y	FAC			
			FAC Species 99	x 3 = 297	<u></u>
			FACU Species 0	x 4 = 0	
			UPL Species 0	x 5 = 0	
			Column Totals: 99	(A) 297	(B)
					· ·
			Prevalence Index = B/A	3.00	
			Trevalence index - Bit	Hydrophytic Vegeta	tion Indicators:
			1 Danid Tool for Unit		tion malcators.
			1 - Rapid Test for Hyd		
			X 2 - Dominance Test is		
			X 3 - Prevalence Index i	S <= 3.0°	
			4 -Morphological Ada	otations <sup>1</sup> (Provide suppor	ting data in Remarks or on a separate sheet)
					-
99	= Total Cover		Problematic Hydrophy	rtic Vegetation <sup>1</sup> (Explain)	
Stratum (Plot Size: 30ft radius )			Indicators of building the	ud wotland by deele er	ot be present upless districted as a selection.
			indicators of nyuffc soll ar	ia wetiana nyarology mus	st be present, unless disturbed or problematic.
			Hydrophytic		
0	= Total Cover		4 * -	X No	
	10101 00101				
0	= Total Cover		Vegetation Present ? Yes	X No	

SOIL									Sampling Poi	nt 11
Profile Desc	ription: (Describ	e to the depth needed to	document	the indicator o	r confi	rm the absence of indicato	ors.)			
Depth	Horizon	Matrix				Redox Features				
(inches)	HOHZOH	Color (moist)	%	Color (moist)	%	Abundance/Contrast	Туре	Loc <sup>2</sup>	Texture	Remarks
0-15	А	10YR 4/1	95	10YR 3/6	5	Common / Prominent	С	PL	Silty Clay Loam	
31		ation, D=Depletion, RM=F			ered or	coated Sand Grains.				Location: PL= Pore Lining, M=Matrix.
	•	oplicable to all LRRs, u	nless othe					Indicator	rs for Problematic Hydric	
	istosol (A1)					Gleyed Matrix (S4)			Coast Prairie Redox (A16	
	istic Epipedon (	A2)				Redox (S5)			Iron-Manganese Masses (	
	lack Histic (A3)					ed Matrix (S6)			Other (Explain in Remarks	s)
	ydrogen Sulfide					Mucky Mineral (F1)				
	tratified Layers					Gleyed Matrix (F2)				
	cm Muck (A10)					ed Matrix (F3)				
	•	Park Surface (A11)				Dark Surface (F6)	-			
	hick Dark Surfac					ed Dark Surface (F7) Depressions (F8)				
	andy Mucky Min				Redux	Debiessions (Lo)		2) laaliaata	f bdbtit-ti-	
5	cm Mucky Peat	or rear (53)					(	3) indicate	ors or nydropnytic vegetation	n and wetland hydrology must be present, unless disturbed or problematic
Doctrictive I	ayer (if observe	d).								
Type:	ayer (ii observe	u).								
	(inches):							Undric	Soil Present? Yes	X No
Remarks:	(mones).							Tiyunc	Son Freschi: 100	A 110
remarks.	Į.									
HYDROLC	)CV									
	drology Indicat									
		n of one required; check a	all that appl						Secondary Indicators (min	
	urface water (A					ed leaves (B9)			Surface soil cra	
	igh water table	(A2)				na (B13)			X Drainage patter	
	aturation (A3)					c Plants (B14)			Dry-Season Wa	
W	/ater marks (B1	)			-	ulfide odor (C1)			Crayfish burrow	
S	ediment deposits	s (B2)		Oxidiz	zed rh	zospheres on living roots	(C3)		Saturation visib	e on aerial imagery (C9)
D	rift deposits (B3	3)		Prese	ence of	reduced iron (C4)			Stunted or Street	ssed Plants (D2)
A	lgal mat or crust	(B4)		Recer	nt Iron	Reduction in Tilled Soils	(C6)		X Geomorphic po	sition (D2)
Ire	on deposits (B5)	)		Thin r	nuck s	urface (C7)			FAC-neutral tes	t (D5)
In	undation visible	on aerial imagery (B7)		Gaug	e or W	'ell Data (D9)			Other (explain	in Remarks)
S	parsely Vegetate	ed Concave Surface (B8)	)	Other	(expl	ain in Remarks)				
Field Obser	vations:		•							
Surface Wat	ter Present?	Yes X	No	Depth	(inche	es) <b>0-1</b>				
Water Table	Present?			X Depth		,	Wetlan	nd Hydrolo	vav	
Saturation P			No		(inche			resent?	Yes X	No No
	pillary fringe)									
		ream gauge, monitoring	well, aerial	photos, previou	us insp	ections), if available:				

Remarks:

Project/Site:		Blackwell Parcel							Lee's S	iummit / Ja	ickson	Sampling Date:				2/11/2	2022	
Applicant/Owner:		Griffin Riley Property Group						S			MO	Samplino	Sampling Point:			12	2	
Investigator(s):		M. Stonecypher						Section, Township, Range			I, T47N, R31W Site ID							
Landform (hillslop	pe, terrace, e	etc.):		Hillslope	Local	Local relief (concave, convex, non-				None		Slope (%):				0-3		
GPS: UTM	XXS	хххххххе	XXXX	xxxn	La	t:	38.9	90308	Long:	-94.31	231	Datum:			NAD	83		
Soil Map Unit Name: Sampselt silty clay loam, 5-9							% slopes				ssification:		1	V/A				
Are climatic / hydrologic conditions on the site typical for this time of year?						Yes	Х	No		(If no, explain in Remarks.)								
Are Vegetation	Υ	, Soil	N	, or Hydrology	N	significantl	y disturbe	disturbed? Are "Normal Circumstances" present? Yes No X										
Are Vegetation	N	, Soil	N	, or Hydrology	N	naturally p	roblemati	c?	(If needed, explain answers in Remarks.)									

### $SUMMARY\ OF\ FINDINGS\ -\ Attach\ site\ map\ showing\ sampling\ point\ locations,\ transects,\ important\ features,\ etc.$

Hydrophytic Vegetation Present? Yes			No	Х		Is the Sampled Area				
Hydric Soil Present?	Yes		No	Х		within a Wetland? Yes No X				
Wetland Hydrology Present?	Yes		No	Х						
Remarks:										
The vegetation at this location was disregarded because the current agricultural production significantly disturbs the plant community through the removal of any natural vegetation and the cultivation of crops. Since the natural plant community is unnaturally altered.										

The vegetation at this location was disregarded because the current agricultural production significantly disturbs the plant community through the removal of any natural vegetation and the cultivation of crops. Since the natural plant community is unnaturally altered the vegetation was not taken into account at this sampling location and the determination of wetland conditions was made solely based on the hydrology and soils present.

/EGETATION - Use scientific names of plants								
	Absolute	Dominant	Indicator			Domin	ance Test workshe	eet:
Tree Stratum (Plot size: 30ft radius )	% Cover	Species?	Status					
1								
2				Number of D		,		(4)
3				Species That		(	)	(A)
5				FACW, or	FAC:			
				ł				
6				Tatal Namelana	6 D t t	,	<b>)</b>	(D)
7				Total Number o			)	(B)
8				Species Across	All Strata:			
	0	= Total Cover						
Sapling/Shrub Stratum (Plot Size: 15ft radius )				Percent of D				
1				Species That				(A/B)
2				FACW, or	FAC			
3						Prevale	ence Index worksh	eet:
4				Total % Co	ver of:			
5								
6				OBL Species	0	x 1 =	0	
	0	= Total Cover		1				
Herb Stratum (Plot Size: 5ft radius )				FACW Species	0	x 2 =	0	
1								
2				FAC Species	0	x 3 =	0	
3				1				
4				FACU Species	0	x 4 =	0	
5				'				
6				UPL Species	0	x 5 =	0	
7								
8				Column Totals:	0	(A)	0	(B)
9								
10				Prevalence Inc	dex = B/A			
11						Hydrophy	tic Vegetation Indic	cators:
12				1 - Rapid	Test for Hydro	ohytic Vege	tation	
13				2 - Domina	ance Test is >	50%		
14				3 - Prevale	ence Index is <	$= 3.0^1$		
15				4 44	logical Adeat	tional /D-	ido cumportis e de la	in Domarko er en eth!\
16					-			in Remarks or on a separate sheet)
	0	= Total Cover		Problemat	ic Hydrophytic	Vegetation	1 (Explain)	
Woody Vine Stratum (Plot Size: 30ft radius )				1,			landa ann ann an 1865 a	and contain the desired at the contract of the
1				indicators of h	yuric soil and t	wettana nyo	irology must be pres	sent, unless disturbed or problematic.
2				Hydrophytic				
3				Vegetation				
	0	= Total Cover		Present ?	Yes		No X	
Remarks:				-				

SOIL									Sampling Poin	t 12				
Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)														
Depth		Matri:			Redox Features									
(inches)	Horizon	Color (moist)		Color (moist)	%	Abundance/Contrast	Type <sup>1</sup>	Loc <sup>2</sup>	Texture	Remarks				
0-15	Α	10YR 3/1	100						Silty Clay Loam					
<sup>1</sup> Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or coated Sand Grains. <sup>2</sup> Location: PL= Pore Lining, M=Matrix.														
Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)								Indicator	rs for Problematic Hydric S	Soils <sup>3</sup> :				
	stosol (A1)	42)				Gleyed Matrix (S4)			Coast Prairie Redox (A16) Iron-Manganese Masses (F12)					
	stic Epipedon (	A2)			_	Redox (S5)				Other (Explain in Remarks)				
	ack Histic (A3) drogen Sulfide	(1.4)				ed Matrix (S6)  / Mucky Mineral (F1)			Other (Explain in Remarks)					
	ratified Layers					Gleyed Matrix (F2)								
	cm Muck (A10)				_	ted Matrix (F3)								
		ark Surface (A11)				Dark Surface (F6)								
	nick Dark Surfac					ted Dark Surface (F7)								
	Sandy Mucky Mineral (S1)					Depressions (F8)								
5 (	or Peat (S3)				(3)	(3) Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic								
Restrictive L	ayer (if observe	d):												
Type:	Туре:													
Depth (inches): Hydric Soil Present? Yes No X									No X					
Remarks:														
HYDROLO	GY													
Wetland Hy	drology Indicat	ors:												
Primary India	cators (minimum	of one required; ch	eck all that app	ly)					Secondary Indicators (mini	mum of two required)				
St	ırface water (A	1)		Water	-stain	ed leaves (B9)			Surface soil crac	ks (B6)				
Hi	gh water table	(A2)		Aquati	c Fau	ına (B13)			Drainage pattern	is (B10)				
Sa	aturation (A3)			True A	lquati	ic Plants (B14)			Dry-Season Wat	er Table (C2)				
W	ater marks (B1	)		Hydro	gen s	ulfide odor (C1)			Crayfish burrows	s (C8)				
Se	ediment deposits	s (B2)		Oxidiz	ed rh	izospheres on living roots (	C3)		Saturation visible	e on aerial imagery (C9)				
Dr	ift deposits (B3	3)		Prese	nce o	f reduced iron (C4)			Stunted or Stress	sed Plants (D2)				
Al	gal mat or crust	(B4)		Recer	t Iron	Reduction in Tilled Soils (	C6)		Geomorphic pos	ition (D2)				
Iro	n deposits (B5)	)		Thin n	Thin muck surface (C7)				FAC-neutral test	FAC-neutral test (D5)				
Inundation visible on aerial imagery (B7) Gauge or Well Data (D9)				/ell Data (D9)			Other (explain in	n Remarks)						
Sparsely Vegetated Concave Surface (B8)  Other (explain in Remarks)														
Field Obser														
Surface Wat	er Present?	Yes	No	X Depth	(inch	es)								
Water Table	Present?	Yes	No	X Depth	(inch	es)	Wetland	d Hydrolo	oav					
Saturation P	resent?	Yes	No	X Depth	(inch			esent?	Yes	No X				
(includes cap	oillary fringe)	•							•	- <del></del>				
Describe Re	Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:													
		•		•										
Remarks:														