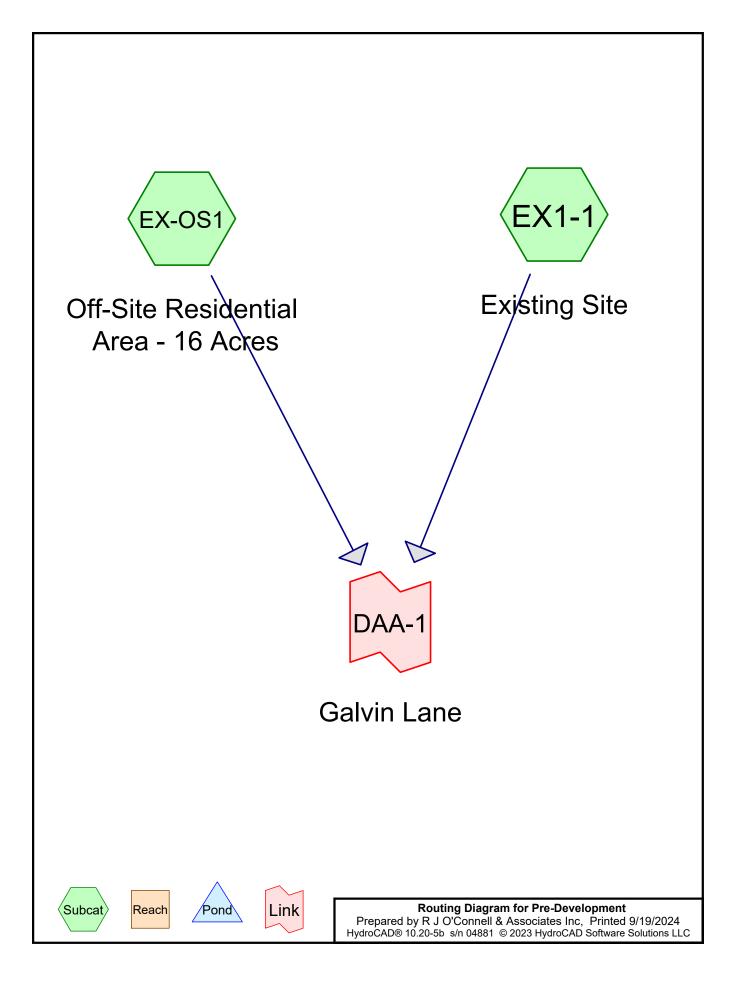


# **III. APPENDICIES**

APPENDIX A Computations **Pre-Development Hydrological Computations** 



# Area Listing (all nodes)

CN	Description
	(subcatchment-numbers)
61	>75% Grass cover, Good, HSG B (EX1-1)
53	OFF SITE RESIDENTIAL AREAS (EX-OS1)
	61

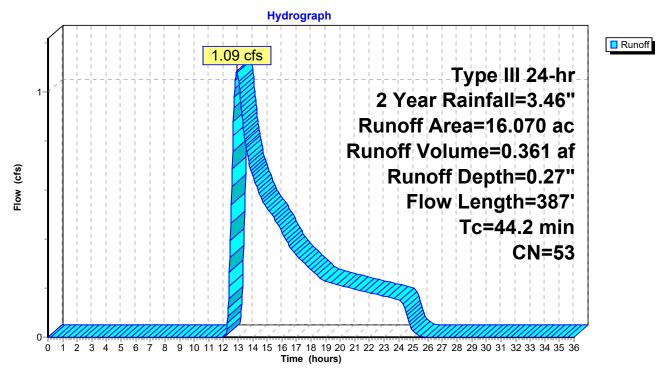
#### Summary for Subcatchment EX-OS1: Off-Site Residential Area - 16 Acres

Runoff = 1.09 cfs @ 12.92 hrs, Volume= Routed to Link DAA-1 : Galvin Lane 0.361 af, Depth= 0.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Type III 24-hr 2 Year Rainfall=3.46"

_	Area	(ac) C	N Dese	cription		
*	16.	.070 5	53 OFF	SITE RES	SIDENTIAL	AREAS
	16.	.070	100.	00% Pervi	ous Area	
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	30.0 10.3	100	0.0400	0.16		Direct Entry, Sheet Flow,
	3.9	287	0.0300	1.21		Grass: Dense n= 0.240 P2= 3.50" Shallow Concentrated Flow, ON SITE SHALLOW CONC. FLOW Short Grass Pasture Kv= 7.0 fps
	44.2	387	Total			

#### Subcatchment EX-OS1: Off-Site Residential Area - 16 Acres



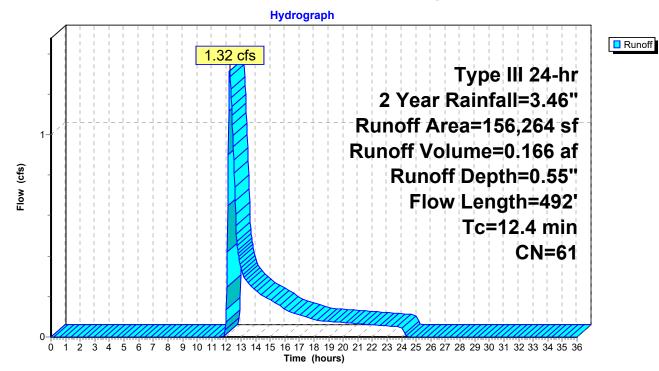
## Summary for Subcatchment EX1-1: Existing Site

Runoff = 1.32 cfs @ 12.22 hrs, Volume= 0.166 af, Depth= 0.55" Routed to Link DAA-1 : Galvin Lane

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Type III 24-hr 2 Year Rainfall=3.46"

	A	rea (sf)	CN I	Description		
_	1	56,264	61 :	>75% Gras	s cover, Go	bod, HSG B
156,264			100.00% Pervious Area		a	
	Tc (min)	Length (feet)	Slope (ft/ft)		Capacity (cfs)	Description
_	10.3	100	0.0400	0.16		Sheet Flow, Sheet Flow
	0.2	76	0.1300	5.80		Grass: Dense n= 0.240 P2= 3.50" Shallow Concentrated Flow, Shallow Flow through site to Galv Unpaved Kv= 16.1 fps
	1.9	316	0.0300	2.79		Shallow Concentrated Flow, Shallow Concentrated Flow on sit Unpaved Kv= 16.1 fps
	12.4	492	Total			

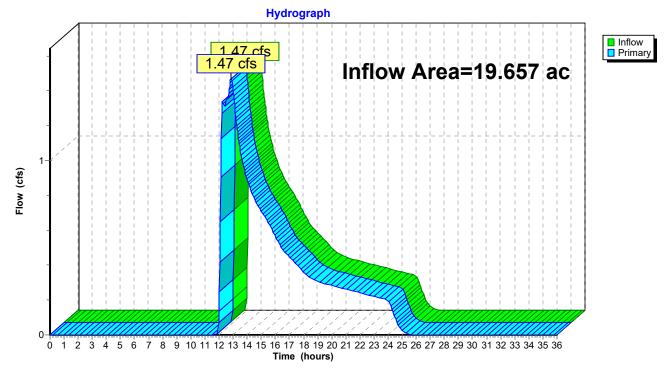
# Subcatchment EX1-1: Existing Site



## Summary for Link DAA-1: Galvin Lane

Inflow Area =	19.657 ac,	0.00% Impervious, Inflo	w Depth = 0.32"	for 2 Year event
Inflow =	1.47 cfs @	12.86 hrs, Volume=	0.527 af	
Primary =	1.47 cfs @	12.86 hrs, Volume=	0.527 af, Atte	en= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs



# Link DAA-1: Galvin Lane

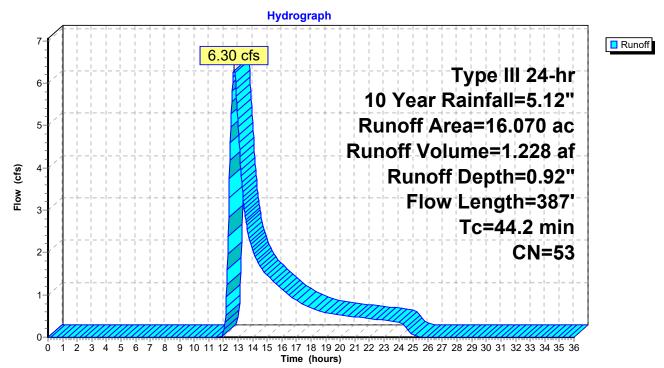
#### Summary for Subcatchment EX-OS1: Off-Site Residential Area - 16 Acres

Runoff = 6.30 cfs @ 12.73 hrs, Volume= Routed to Link DAA-1 : Galvin Lane 1.228 af, Depth= 0.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Type III 24-hr 10 Year Rainfall=5.12"

	Area	(ac) <u>C</u>	N Desc	cription			
*	16.	.070 5	53 OFF	SITE RES	SIDENTIAL	AREAS	
	16.	.070	100.	00% Pervi	ous Area		
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description	
	30.0					Direct Entry,	
	10.3	100	0.0400	0.16		Sheet Flow,	
	3.9	287	0.0300	1.21		Grass: Dense n= 0.240 P2= 3.50" Shallow Concentrated Flow, ON SITE SHALLOW CONC Short Grass Pasture Kv= 7.0 fps	). FLOW
	44.2	387	Total				

#### Subcatchment EX-OS1: Off-Site Residential Area - 16 Acres



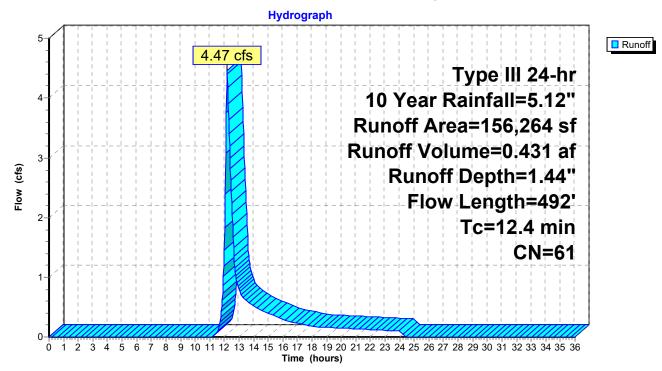
## Summary for Subcatchment EX1-1: Existing Site

Runoff = 4.47 cfs @ 12.19 hrs, Volume= 0.431 af, Depth= 1.44" Routed to Link DAA-1 : Galvin Lane

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Type III 24-hr 10 Year Rainfall=5.12"

	A	rea (sf)	CN I	Description		
	1	56,264	61 >	>75% Gras	s cover, Go	ood, HSG B
	1	56,264		100.00% Pe	ervious Are	a
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
_	10.3	100	0.0400	0.16		Sheet Flow, Sheet Flow
	0.2	76	0.1300	5.80		Grass: Dense n= 0.240 P2= 3.50" Shallow Concentrated Flow, Shallow Flow through site to Galvi Unpaved Kv= 16.1 fps
	1.9	316	0.0300	2.79		Shallow Concentrated Flow, Shallow Concentrated Flow on site Unpaved Kv= 16.1 fps
_	12.4	492	Total			

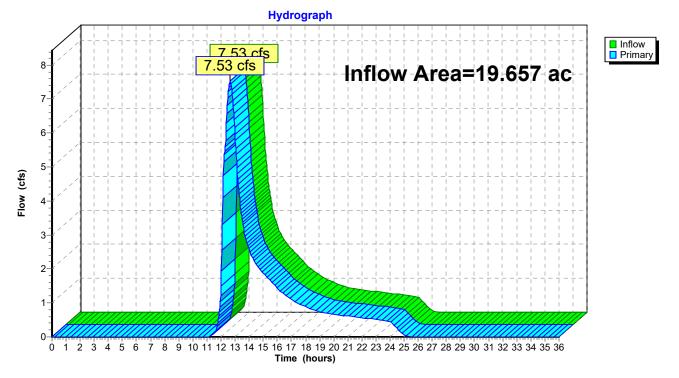
# Subcatchment EX1-1: Existing Site



## Summary for Link DAA-1: Galvin Lane

Inflow Area =	19.657 ac,	0.00% Impervious, Inf	flow Depth = 1.01"	for 10 Year event
Inflow =	7.53 cfs @	12.64 hrs, Volume=	1.659 af	
Primary =	7.53 cfs @	12.64 hrs, Volume=	1.659 af, Atte	en= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs



#### Link DAA-1: Galvin Lane

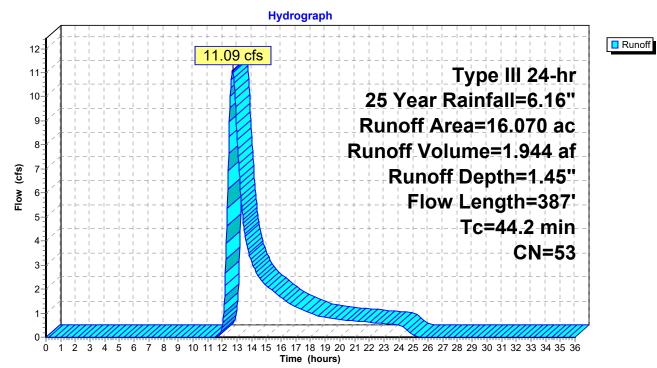
#### Summary for Subcatchment EX-OS1: Off-Site Residential Area - 16 Acres

Runoff = 11.09 cfs @ 12.70 hrs, Volume= Routed to Link DAA-1 : Galvin Lane 1.944 af, Depth= 1.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Type III 24-hr 25 Year Rainfall=6.16"

	Area	(ac) C	N Des	cription		
*	16.	070 5	53 OFF	SITE RES	SIDENTIAL	AREAS
	16.	070	100.	00% Pervi	ous Area	
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
_	30.0					Direct Entry,
	10.3	100	0.0400	0.16		Sheet Flow,
						Grass: Dense n= 0.240 P2= 3.50"
	3.9	287	0.0300	1.21		Shallow Concentrated Flow, ON SITE SHALLOW CONC. FLOW
_						Short Grass Pasture Kv= 7.0 fps
	44.2	387	Total			

#### Subcatchment EX-OS1: Off-Site Residential Area - 16 Acres



#### Summary for Subcatchment EX1-1: Existing Site

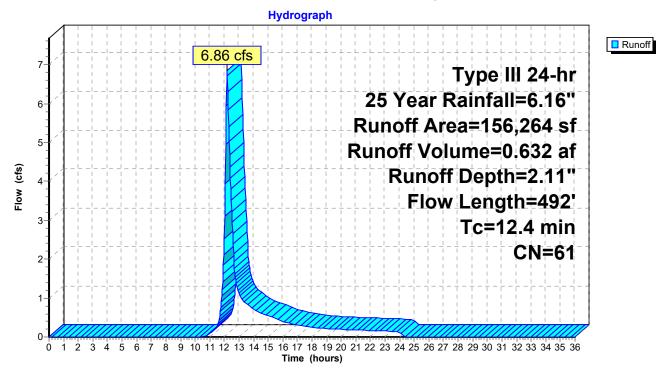
Runoff = 6.86 cfs @ 12.18 hrs, Volume= Routed to Link DAA-1 : Galvin Lane

0.632 af, Depth= 2.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Type III 24-hr 25 Year Rainfall=6.16"

	Area (sf) 156,264 156,264		CN	Description		
_			61	>75% Gras	s cover, Go	ood, HSG B
			156,264 100.00% Perv		ervious Are	a
	Tc (min)	Length (feet)	Slope (ft/ft)		Capacity (cfs)	Description
_	10.3	100	0.0400	0.16		Sheet Flow, Sheet Flow Grass: Dense n= 0.240 P2= 3.50"
	0.2	76	0.1300	5.80		Shallow Concentrated Flow, Shallow Flow through site to Galvi Unpaved Kv= 16.1 fps
	1.9	316	0.0300	2.79		Shallow Concentrated Flow, Shallow Concentrated Flow on site Unpaved Kv= 16.1 fps
_	12.4	492	Total			

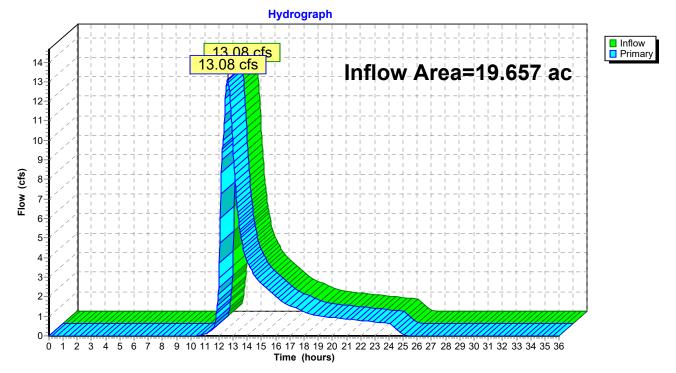
# Subcatchment EX1-1: Existing Site



## Summary for Link DAA-1: Galvin Lane

Inflow Area	a =	19.657 ac,	0.00% Impervious, Inflo	ow Depth = 1.57"	for 25 Year event
Inflow	=	13.08 cfs @	12.61 hrs, Volume=	2.576 af	
Primary	=	13.08 cfs @	12.61 hrs, Volume=	2.576 af, Atte	en= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs



# Link DAA-1: Galvin Lane

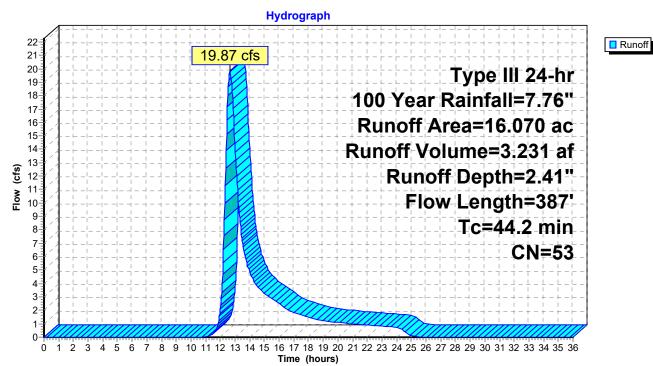
#### Summary for Subcatchment EX-OS1: Off-Site Residential Area - 16 Acres

Runoff = 19.87 cfs @ 12.65 hrs, Volume= Routed to Link DAA-1 : Galvin Lane 3.231 af, Depth= 2.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Type III 24-hr 100 Year Rainfall=7.76"

	Area	(ac) C	N Des	cription		
*	16.	070 5	53 OFF	SITE RES	SIDENTIAL	AREAS
	16.	070	100.	00% Pervi	ous Area	
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
_	30.0 10.3	100	0.0400	0.16		Direct Entry, Sheet Flow,
	3.9	287	0.0300	1.21		Grass: Dense n= 0.240 P2= 3.50" Shallow Concentrated Flow, ON SITE SHALLOW CONC. FLOW Short Grass Pasture Kv= 7.0 fps
	44.2	387	Total			· · · · · · · · · · · · · · · · · · ·

#### Subcatchment EX-OS1: Off-Site Residential Area - 16 Acres



## Summary for Subcatchment EX1-1: Existing Site

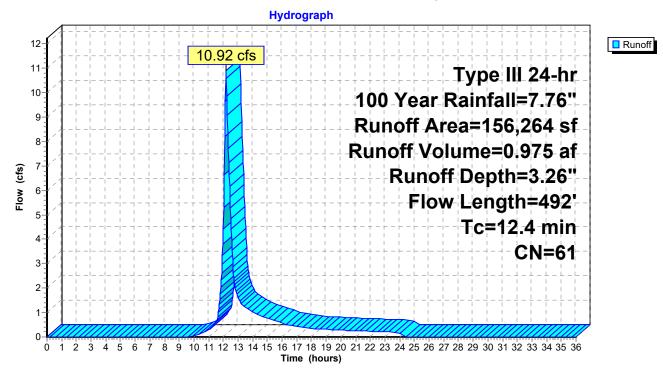
Runoff = 10.92 cfs @ 12.18 hrs, Volume= 0 Routed to Link DAA-1 : Galvin Lane

0.975 af, Depth= 3.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Type III 24-hr 100 Year Rainfall=7.76"

	А	rea (sf)	CN	Description		
_	1	56,264	61	>75% Gras	s cover, Go	ood, HSG B
156,264				100.00% Pervious Area		a
	Tc (min)	Length (feet)	Slope (ft/ft)		Capacity (cfs)	Description
-	10.3	100	0.0400	0.16		Sheet Flow, Sheet Flow Grass: Dense n= 0.240 P2= 3.50"
	0.2	76	0.1300	5.80		Shallow Concentrated Flow, Shallow Flow through site to Galvi Unpaved Kv= 16.1 fps
	1.9	316	0.0300	) 2.79		Shallow Concentrated Flow, Shallow Concentrated Flow on site Unpaved Kv= 16.1 fps
_	12.4	492	Total			

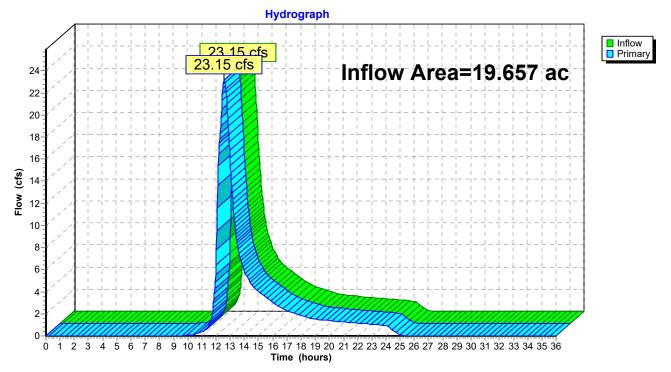
# Subcatchment EX1-1: Existing Site



## Summary for Link DAA-1: Galvin Lane

Inflow Area	a =	19.657 ac,	0.00% Impervious,	Inflow Depth = 2.57	" for 100 Year event
Inflow	=	23.15 cfs @	12.58 hrs, Volume=	= 4.206 af	
Primary	=	23.15 cfs @	12.58 hrs, Volume=	= 4.206 af, A	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs



# Link DAA-1: Galvin Lane

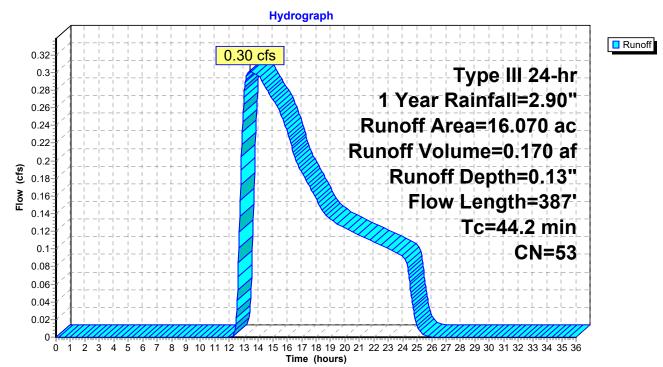
#### Summary for Subcatchment EX-OS1: Off-Site Residential Area - 16 Acres

Runoff = 0.30 cfs @ 13.41 hrs, Volume= Routed to Link DAA-1 : Galvin Lane 0.170 af, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Type III 24-hr 1 Year Rainfall=2.90"

	Area	(ac)	N Des	cription		
_	Alea	(ac) C				
*	16.	.070 5	53 OFF	SITE RES	SIDENTIAL	AREAS
16.070 100.00% Pervious Area					ous Area	
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
_	30.0					Direct Entry,
	10.3	100	0.0400	0.16		Sheet Flow,
						Grass: Dense n= 0.240 P2= 3.50"
	3.9	287	0.0300	1.21		Shallow Concentrated Flow, ON SITE SHALLOW CONC. FLOW Short Grass Pasture Kv= 7.0 fps
_	44.2	387	Total			

#### Subcatchment EX-OS1: Off-Site Residential Area - 16 Acres



## Summary for Subcatchment EX1-1: Existing Site

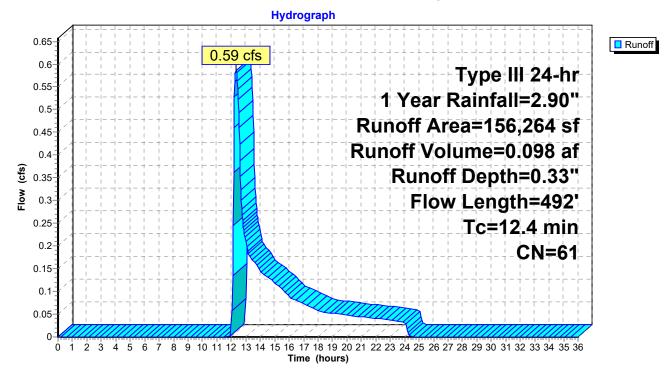
Runoff = 0.59 cfs @ 12.33 hrs, Volume= 0. Routed to Link DAA-1 : Galvin Lane

0.098 af, Depth= 0.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Type III 24-hr 1 Year Rainfall=2.90"

	A	rea (sf)	CN I	Description		
_	1	56,264	61 :	>75% Gras	s cover, Go	bod, HSG B
	1	56,264		100.00% P	ervious Are	a
	Tc (min)	Length (feet)	Slope (ft/ft)		Capacity (cfs)	Description
_	10.3	100	0.0400	0.16		Sheet Flow, Sheet Flow
	0.2	76	0.1300	5.80		Grass: Dense n= 0.240 P2= 3.50" Shallow Concentrated Flow, Shallow Flow through site to Galve Unpaved Kv= 16.1 fps
	1.9	316	0.0300	2.79		Shallow Concentrated Flow, Shallow Concentrated Flow on site Unpaved Kv= 16.1 fps
_	12.4	492	Total			

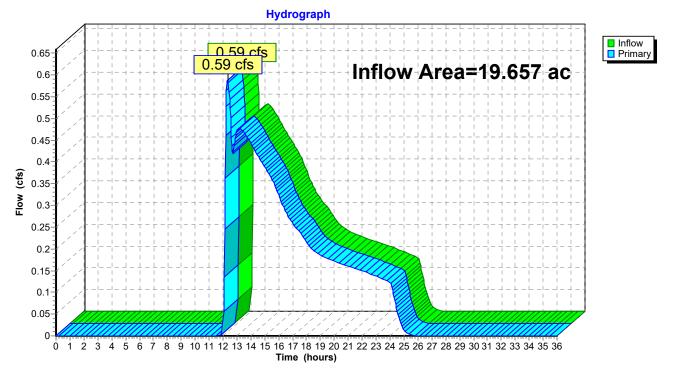
# Subcatchment EX1-1: Existing Site



## Summary for Link DAA-1: Galvin Lane

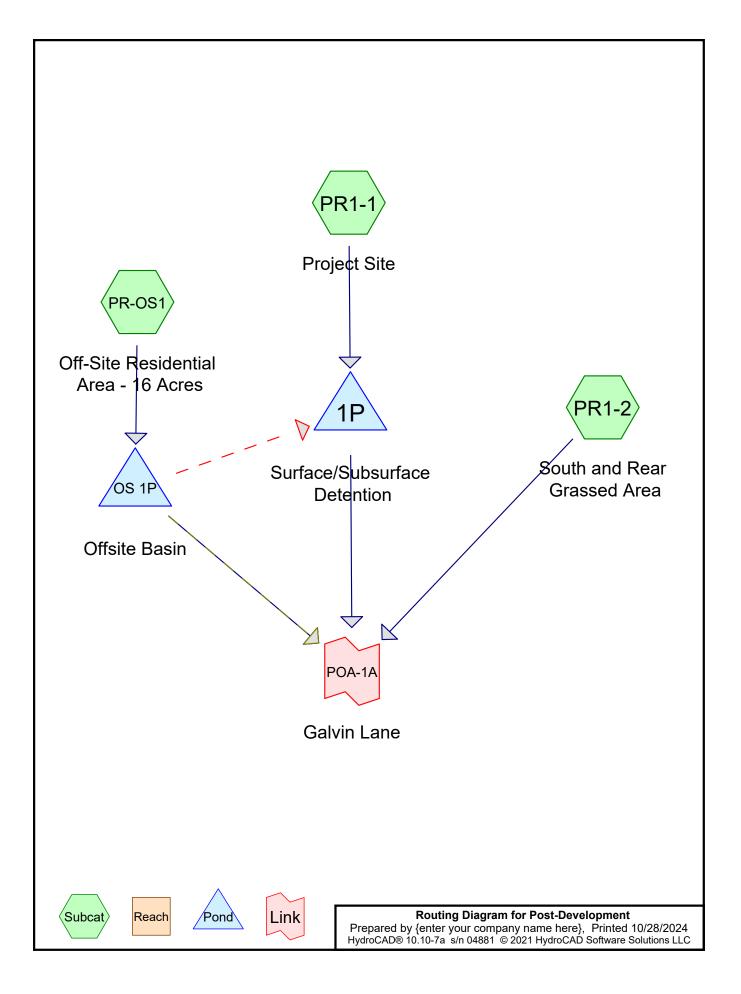
Inflow Area =	19.657 ac,	0.00% Impervious, Infl	ow Depth = 0.16"	for 1 Year event
Inflow =	0.59 cfs @	12.34 hrs, Volume=	0.268 af	
Primary =	0.59 cfs @	12.34 hrs, Volume=	0.268 af, Atte	en= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs



# Link DAA-1: Galvin Lane

Post-Development Hydrologic Computations



# Post-Development

Prepared by {enter your company name here} HydroCAD® 10.10-7a s/n 04881 © 2021 HydroCAD Software Solutions LLC Printed 10/28/2024 Page 2

# Area Listing (all nodes)

Area	CN	Description
(acres)		(subcatchment-numbers)
1.300	69	50-75% Grass cover, Fair, HSG B (PR-OS1, PR1-1)
0.204	61	>75% Grass cover, Good, HSG B (PR-OS1, PR1-2)
16.070	53	OFF SITE RESIDENTIAL AREAS (PR-OS1)
1.735	98	Paved parking, HSG B (PR1-1)
0.348	98	Roofs, HSG B (PR1-1)
19.657	59	TOTAL AREA

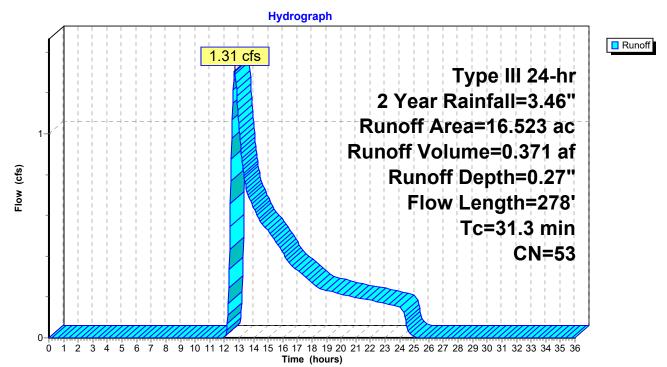
#### Summary for Subcatchment PR-OS1: Off-Site Residential Area - 16 Acres

Runoff = 1.31 cfs @ 12.70 hrs, Volume= 0.371 af, Depth= 0.27" Routed to Pond OS 1P : Offsite Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Type III 24-hr 2 Year Rainfall=3.46"

	Area	(ac) (	N Dese	cription		
*	16.	070	53 OFF	SITE RES	SIDENTIAL	AREAS
	0.	024	61 >75	% Grass co	over, Good,	HSG B
	0.	429	69 50-7	5% Grass	cover, Fair	, HSG B
	16.	523	53 Weig	ghted Aver	age	
	16.	523	100.	00% Pervi	ous Area	
	Тс	Length	Slope	Velocity	Capacity	Description
	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	30.0					Direct Entry,
	0.3	180	0.0070	9.24	16.32	Pipe Channel,
						18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38'
						n= 0.007
	1.0	98	0.0100	1.61		Shallow Concentrated Flow,
						Unpaved Kv= 16.1 fps
	31.3	278	Total			

#### Subcatchment PR-OS1: Off-Site Residential Area - 16 Acres



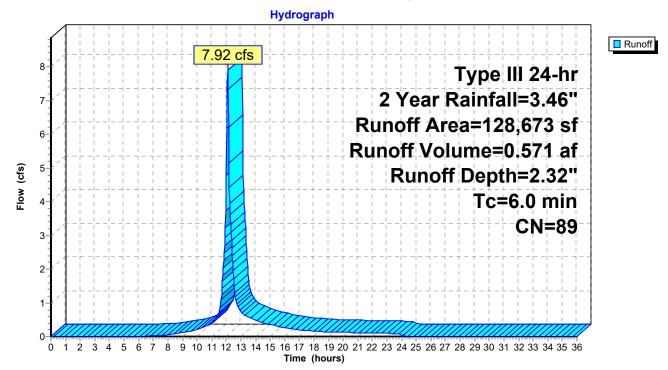
# Summary for Subcatchment PR1-1: Project Site

Runoff	=	7.92 cfs @	12.09 hrs,	Volume=	0.571 af,	Depth= 2.32"
Routed	to Pond	1P : Surface	/Subsurface	e Detention		

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Type III 24-hr 2 Year Rainfall=3.46"

Area (s	sf) CN	Description				
37,93	8 69	50-75% Gra	ass cover, F	Fair, HSG B		
75,56	64 98	Paved park	ing, HSG B	В		
15,17	<b>'</b> 1 98	Roofs, HSC	Β́Β			
128,67	73 89 Weighted Average					
37,93	38	29.48% Pe	rvious Area	а		
90,73	35	70.52% lmp	pervious Are	rea		
Tc Leng	gth Slo	pe Velocity	Capacity	Description		
(min) (fe	et) (ft/	/ft) (ft/sec)	(cfs)			
6.0				Direct Entry,		

## Subcatchment PR1-1: Project Site



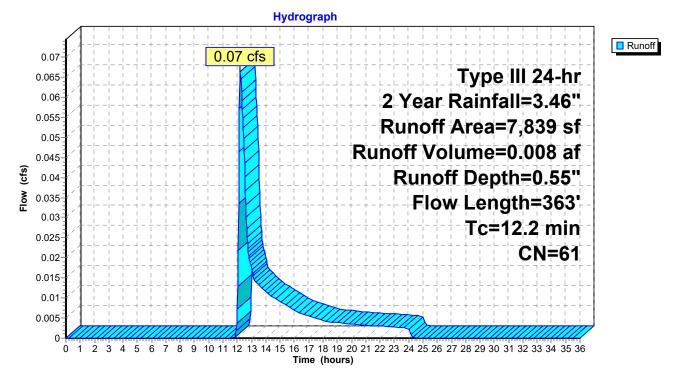
#### Summary for Subcatchment PR1-2: South and Rear Grassed Area

Runoff = 0.07 cfs @ 12.22 hrs, Volume= 0.008 af, Depth= 0.55" Routed to Link POA-1A : Galvin Lane

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Type III 24-hr 2 Year Rainfall=3.46"

_	A	rea (sf)	CN E	Description									
		7,839	61 >	61 >75% Grass cover, Good, HSG B									
		7,839	1	00.00% Pe	ervious Are	a							
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description							
-	10.8	100	0.1000	0.15		Sheet Flow,							
_	1.4	263	0.0400	3.22		Woods: Light underbrush n= 0.400 P2= 3.50" <b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps							
	12.2	363	Total										

#### Subcatchment PR1-2: South and Rear Grassed Area



**Post-Development** Prepared by {enter your company name here} HydroCAD® 10.10-7a s/n 04881 © 2021 HydroCAD Software Solutions LLC

#### Summary for Pond 1P: Surface/Subsurface Detention

2.954 ac, 70.52% Impervious, Inflow Depth = 2.32" for 2 Year event Inflow Area = 7.92 cfs @ 12.09 hrs, Volume= 0.17 cfs @ 17.61 hrs, Volume= Inflow 0.571 af = Outflow 0.367 af, Atten= 98%, Lag= 331.1 min = Discarded = 0.17 cfs @ 17.61 hrs, Volume= 0.367 af 0.000 af Primary = 0.00 cfs @ 0.00 hrs, Volume= Routed to Link POA-1A : Galvin Lane

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Peak Elev= 145.50' @ 17.61 hrs Surf.Area= 10,812 sf Storage= 17,170 cf

Plug-Flow detention time= 643.4 min calculated for 0.367 af (64% of inflow) Center-of-Mass det. time= 542.8 min (1,350.8 - 808.0)

Volume	Invert	Avail.Storage	Storage Description
#1	146.00'	17,407 cf	Detention Basin 1 (Irregular)Listed below (Recalc)
#2A	143.00'		68.00'W x 159.00'L x 7.00'H Field A
			75,684 cf Overall - 21,149 cf Embedded = 54,535 cf x 40.0% Voids
#3A	143.50'	21,149 cf	CMP Round 48 x 77 Inside #2
			Effective Size= 48.0"W x 48.0"H => 12.57 sf x 20.00'L = 251.3 cf
			Overall Size= 48.0"W x 48.0"H x 20.00'L
			Row Length Adjustment= +13.00' x 12.57 sf x 11 rows
		60 370 cf	Total Available Storage

60,370 cf Total Available Storage

Storage Group A created with Chamber Wizard

Elevatio (fee		Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
146.0	)()	991	163.0	0	0	991
147.0		1,528	186.0	1,250	1,250	1,653
148.0		2,135	209.0	1,823	3,073	2,403
150.0	00	3,553	254.0	5,628	8,701	4,124
151.0	00	4,345	273.0	3,942	12,643	4,963
152.0	00	5,194	292.0	4,763	17,407	5,863
Device	Routing	Inve	rt Outle	t Devices		
#1	Primary	146.00	-	Round Culvert L= Outlet Invert= 146.00		
				000101 PVC, smooth int		
#2	Device 1	146.00	)' <b>6.0" \</b>	/ert. Orifice/Grate	C= 0.600 Limited	to weir flow at low heads
#3	Device 1	151.20	)' <b>20.0'</b>	long x 10.0' breadth	n Broad-Crested	Rectangular Weir
			Head	(feet) 0.20 0.40 0.6	60 0.80 1.00 1.20	0 1.40 1.60
				(English) 2.49 2.56		
#4	Discarde	d 143.00				rom 141.00' - 146.00'
				uctivity to Groundwat		3.00'
			Exclu	ded Surface area = 0	) sf	

Page 6

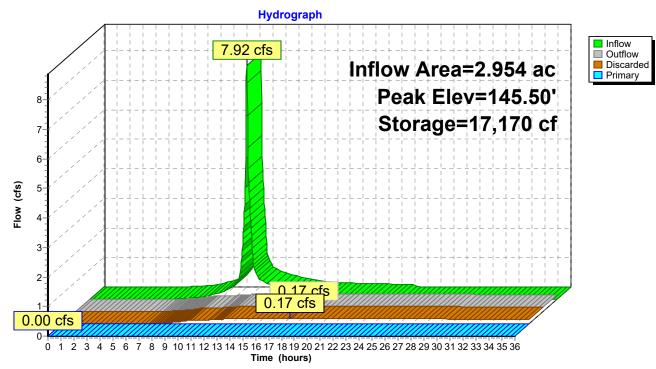
# Post-Development

Prepared by {enter your company name here} HydroCAD® 10.10-7a s/n 04881 © 2021 HydroCAD Software Solutions LLC

**Discarded OutFlow** Max=0.17 cfs @ 17.61 hrs HW=145.50' (Free Discharge) **4=Exfiltration** (Controls 0.17 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=143.00' (Free Discharge) 1=Culvert (Controls 0.00 cfs) 2=Orifice/Grate (Controls 0.00 cfs) 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

# Pond 1P: Surface/Subsurface Detention



Post-DevelopmentTypePrepared by {enter your company name here}HydroCAD® 10.10-7a s/n 04881 © 2021 HydroCAD Software Solutions LLC

#### Summary for Pond OS 1P: Offsite Basin

Inflow Area = 16.523 ac, 0.00% Impervious, Inflow Depth = 0.27" for 2 Year event Inflow 1.31 cfs @ 12.70 hrs, Volume= = 0.371 af 1.15 cfs @ 12.90 hrs, Volume= 0.371 af, Atten= 12%, Lag= 12.0 min Outflow = Primary = 1.15 cfs @ 12.90 hrs, Volume= 0.371 af Routed to Link POA-1A : Galvin Lane Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af Routed to Pond 1P : Surface/Subsurface Detention

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Peak Elev= 148.48' @ 12.90 hrs Surf.Area= 2,246 sf Storage= 981 cf

Plug-Flow detention time= 23.8 min calculated for 0.371 af (100% of inflow) Center-of-Mass det. time= 23.7 min (1,003.0 - 979.3)

Volume	Invert	Avail.S	torage	Storage Descriptio	n		
#1	148.00'	21,	446 cf	Custom Stage Da	<b>ita (Irregular)</b> Liste	d below (Recalc)	
Elevatio (fee		rf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
148.0	00	1,856	257.0	0	0	1,856	
150.0	00	3,729	332.0	5,477	5,477	5,420	
151.0	00	4,768	354.0	4,238	9,715	6,669	
152.0		5,860	373.0	5,305	15,020	7,827	
153.0	00	7,009	392.0	6,426	21,446	9,045	
Device	Routing	Inver	t Outle	et Devices			
#1	Primary	148.00	' 18.0	" Round Culvert	L= 190.0' Ke= 0.5	00	
						0.0316 '/' Cc= 0.900	)
				.010 PVC, smooth			
#2	Device 1	148.00		" W x 12.0" H Vert.		0.600	
що	Device 1	150.00		ted to weir flow at lo			
#3	Device 1	150.00		' long x 1.0' bread			2.00
					0.00 0.80 1.00 1.	20 1.40 1.60 1.80	2.00
					72 2 75 2 85 2 09	3 3.08 3.20 3.28 3	31
				3.31 3.32	12 2.10 2.00 2.00	5 5.00 5.20 5.20 5	.01
#4	Secondary	151.50		long x 5.0' bread	th Broad-Crested	Rectangular Weir	
	<b>,</b>					20 1.40 1.60 1.80	2.00
				3.00 3.50 4.00 4			
						3 2.66 2.65 2.65 2	.65
			2.65	2.67 2.66 2.68 2	.70 2.74 2.79 2.8	8	

**Primary OutFlow** Max=1.15 cfs @ 12.90 hrs HW=148.48' (Free Discharge)

-1=Culvert (Inlet Controls 1.15 cfs @ 2.36 fps)

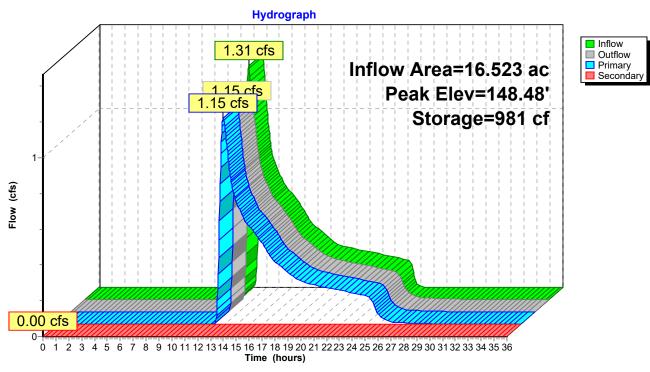
**2=Orifice/Grate** (Passes 1.15 cfs of 1.77 cfs potential flow)

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

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=148.00' (Free Discharge) 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

# **Post-Development**

Prepared by {enter your company name here} HydroCAD® 10.10-7a s/n 04881 © 2021 HydroCAD Software Solutions LLC



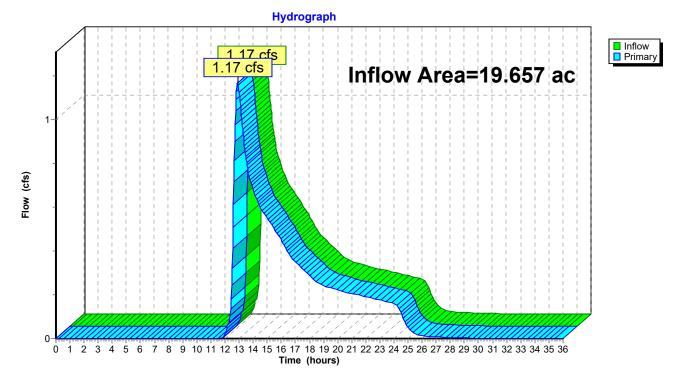
# Pond OS 1P: Offsite Basin

Post Development Conditions **Post-Development** Type III 24-hr 2 Year Rainfall=3.46" Prepared by {enter your company name here} HydroCAD® 10.10-7a s/n 04881 © 2021 HydroCAD Software Solutions LLC

# Summary for Link POA-1A: Galvin Lane

Inflow Area	=	19.657 ac, 10.60% Impervious, Inflow Depth = 0.23" for 2	Year event
Inflow	=	1.17 cfs @ 12.90 hrs, Volume= 0.379 af	
Primary	=	1.17 cfs @ 12.90 hrs, Volume= 0.379 af, Atten= 0%	,Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs



Link POA-1A: Galvin Lane

Printed 10/28/2024

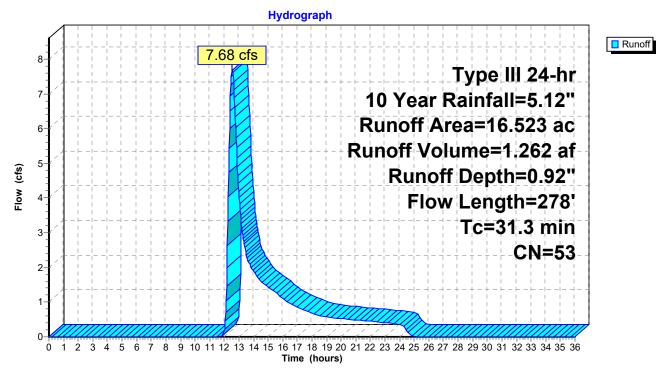
#### Summary for Subcatchment PR-OS1: Off-Site Residential Area - 16 Acres

Runoff = 7.68 cfs @ 12.54 hrs, Volume= 1.262 af, Depth= 0.92" Routed to Pond OS 1P : Offsite Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Type III 24-hr 10 Year Rainfall=5.12"

	Area	(ac) (	CN E	Desc	cription		
*	16.	070	53 (	DFF	SITE RES	SIDENTIAL	AREAS
	0.	024	61 >	-75%	% Grass co	over, Good,	HSG B
	0.4	429	69 5	50-7	5% Grass	cover, Fair,	, HSG B
	16.	523	53 V	Veiç	ghted Aver	age	
	16.	523	1	00.	00% Pervi	ous Area	
	Тс	Length	Slo	ре	Velocity	Capacity	Description
	(min)	(feet)	(ft	/ft)	(ft/sec)	(cfs)	
	30.0						Direct Entry,
	0.3	180	0.00	70	9.24	16.32	Pipe Channel,
							18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38'
							n= 0.007
	1.0	98	0.01	00	1.61		Shallow Concentrated Flow,
							Unpaved Kv= 16.1 fps
	31.3	278	Tota	l I			

#### Subcatchment PR-OS1: Off-Site Residential Area - 16 Acres



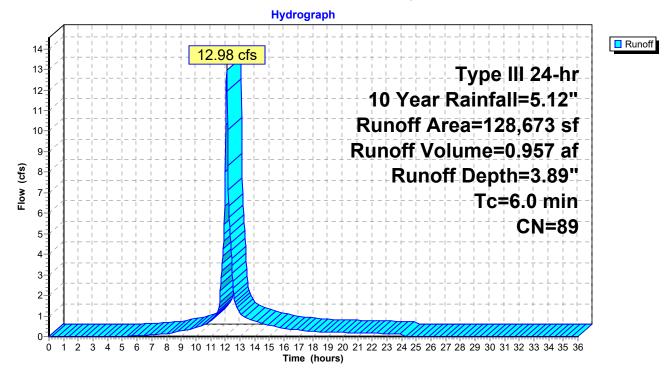
# Summary for Subcatchment PR1-1: Project Site

Runoff	=	12.98 cfs @	12.09 hrs,	Volume=	0.957 af,	Depth= 3.89"
Routed	to Pon	d 1P : Surface	/Subsurface	e Detention		-

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Type III 24-hr 10 Year Rainfall=5.12"

Area (sf)	CN	Description			
37,938	69	50-75% Gra	ass cover, l	Fair, HSG B	
75,564	98	Paved park	ing, HSG B	3	
15,171	98	Roofs, HSC	βB		
128,673	89	Weighted A	verage		
37,938		29.48% Pervious Area			
90,735		70.52% Imp	pervious Ar	ea	
Tc Length	Slop	,	Capacity	Description	
(min) (feet)	(ft/	ft) (ft/sec)	(cfs)		
6.0				Direct Entry,	

## Subcatchment PR1-1: Project Site



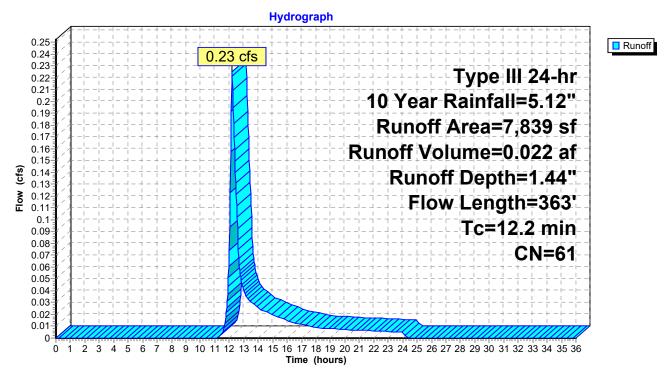
#### Summary for Subcatchment PR1-2: South and Rear Grassed Area

Runoff = 0.23 cfs @ 12.19 hrs, Volume= 0.022 af, Depth= 1.44" Routed to Link POA-1A : Galvin Lane

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Type III 24-hr 10 Year Rainfall=5.12"

_	A	rea (sf)	CN E	Description		
		7,839	61 >	75% Gras	s cover, Go	bod, HSG B
	7,839 100.00% Pervious Area					
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
-	10.8	100	0.1000	0.15		Sheet Flow,
	1.4	263	0.0400	3.22		Woods: Light underbrush n= 0.400 P2= 3.50" <b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
	12.2	363	Total			

#### Subcatchment PR1-2: South and Rear Grassed Area



Post Development Conditions **Post-Development** Type III 24-hr 10 Year Rainfall=5.12" Prepared by {enter your company name here} Printed 10/28/2024 HydroCAD® 10.10-7a s/n 04881 © 2021 HydroCAD Software Solutions LLC Page 14

# Summary for Pond 1P: Surface/Subsurface Detention

Inflow Area =	2.954 ac, 70.52% Impervious, Inflow	Depth = 3.89" for 10 Year event
Inflow =	12.98 cfs @ 12.09 hrs, Volume=	0.957 af
Outflow =	0.67 cfs @ 14.28 hrs, Volume=	0.630 af, Atten= 95%, Lag= 131.6 min
Discarded =	0.20 cfs @ 14.28 hrs, Volume=	0.425 af
Primary =	0.47 cfs @14.28 hrs, Volume=	0.204 af
Routed to Link	POA-1A : Galvin Lane	

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Peak Elev= 146.50' @ 14.28 hrs Surf.Area= 12,056 sf Storage= 25,879 cf

Plug-Flow detention time= 498.1 min calculated for 0.630 af (66% of inflow) Center-of-Mass det. time= 400.8 min (1,194.4 - 793.6)

Volume	Invert	Avail.Storage	Storage Description
#1	146.00'	17,407 cf	Detention Basin 1 (Irregular)Listed below (Recalc)
#2A	143.00'	21,814 cf	68.00'W x 159.00'L x 7.00'H Field A
			75,684 cf Overall - 21,149 cf Embedded = 54,535 cf x 40.0% Voids
#3A	143.50'	21,149 cf	CMP Round 48 x 77 Inside #2
			Effective Size= 48.0"W x 48.0"H => 12.57 sf x 20.00'L = 251.3 cf
			Overall Size= 48.0"W x 48.0"H x 20.00'L
			Row Length Adjustment= +13.00' x 12.57 sf x 11 rows
		60.370 cf	Total Available Storage

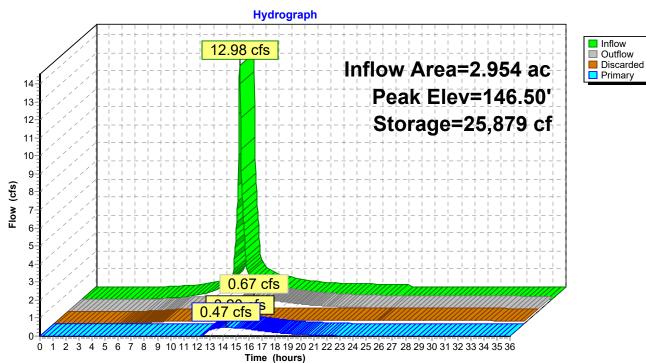
60,370 cf Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)		Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
146.0	)0	991	163.0	0	0	991
147.0		1,528	186.0	1,250	1,250	1,653
148.0	00	2,135	209.0	1,823	3,073	2,403
150.0	00	3,553	254.0	5,628	8,701	4,124
151.0	00	4,345	273.0	3,942	12,643	4,963
152.0	00	5,194	292.0	4,763	17,407	5,863
Device	Routing	Inve	rt Outlet	Devices		
#1	Primary	146.00	-	Round Culvert L=		
				Outlet Invert= 146.0		
що	Davias 1	140.00		10 PVC, smooth int	,	
#2	Device 1	146.00				to weir flow at low heads
#3	Device 1	151.20		ong x 10.0' breadt		<b>U</b>
			Head	(feet) 0.20 0.40 0.0	60 0.80 1.00 1.2	0 1.40 1.60
			Coef.	(English) 2.49 2.56	2.70 2.69 2.68	2.69 2.67 2.64
#4	Discardeo	d 143.00	O' <b>0.510</b>	in/hr Exfiltration ov	ver Surface area f	from 141.00' - 146.00'
			Condu	uctivity to Groundwat	ter Elevation = 136	6.00'
				ded Surface area = (		

**Discarded OutFlow** Max=0.20 cfs @ 14.28 hrs HW=146.50' (Free Discharge) **4=Exfiltration** (Controls 0.20 cfs)

Primary OutFlow Max=0.47 cfs @ 14.28 hrs HW=146.50' (Free Discharge) 1=Culvert (Passes 0.47 cfs of 0.94 cfs potential flow) 2=Orifice/Grate (Orifice Controls 0.47 cfs @ 2.40 fps) -3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)



## Pond 1P: Surface/Subsurface Detention

Post-DevelopmentPost Development ConditionsPost-DevelopmentType III 24-hr10 Year Rainfall=5.12"Prepared by {enter your company name here}Printed 10/28/2024HydroCAD® 10.10-7a s/n 04881 © 2021 HydroCAD Software Solutions LLCPage 16

#### Summary for Pond OS 1P: Offsite Basin

Inflow Area = 16.523 ac. 0.00% Impervious, Inflow Depth = 0.92" for 10 Year event Inflow 7.68 cfs @ 12.54 hrs, Volume= = 1.262 af 7.02 cfs @ 12.67 hrs, Volume= Outflow 1.262 af, Atten= 9%, Lag= 8.0 min = Primary = 7.02 cfs @ 12.67 hrs, Volume= 1.262 af Routed to Link POA-1A : Galvin Lane Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af Routed to Pond 1P : Surface/Subsurface Detention

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Peak Elev= 149.42' @ 12.67 hrs Surf.Area= 3,120 sf Storage= 3,495 cf

Plug-Flow detention time= 13.3 min calculated for 1.261 af (100% of inflow) Center-of-Mass det. time= 13.5 min ( 935.2 - 921.8 )

Volume	Invert	Avail.St	orage	Storage Description	n				
#1	148.00'	21,4	446 cf	Custom Stage Da	Custom Stage Data (Irregular)Listed below (Recalc)				
Elevatio (fee		rf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)			
148.0	1	1,856	257.0	0	0	1,856			
150.0		3,729	332.0	5,477	5,477	5,420			
151.0	-	4,768	354.0	4,238	9,715	6,669			
152.0		5,860	373.0	5,305	15,020	7,827			
153.0	00	7,009	392.0	6,426	21,446	9,045			
Device	Routing	Inver	t Outle	et Devices					
#1	Primary	148.00	0' 18.0" Round Culvert L= 190.0' Ke= 0.500						
				nlet / Outlet Invert= 148.00' / 142.00' S= 0.0316 '/' Cc= 0.900					
				.010 PVC, smooth					
#2	Device 1	148.00		" W x 12.0" H Vert		= 0.600			
	<b>.</b>	4 = 0 0 0		Limited to weir flow at low heads					
#3	Device 1	150.00							
				Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00					
				3.00					
				Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31					
#4	Secondary	151.50			th Broad Created	Rectangular Weir			
#4	Secondary	151.50				.20 1.40 1.60 1.80 2.00			
				3.00 3.50 4.00 4		.20 1.40 1.00 1.00 2.00			
						8 2.66 2.65 2.65 2.65			
				2.67 2.66 2.68 2					

**Primary OutFlow** Max=7.02 cfs @ 12.67 hrs HW=149.42' (Free Discharge)

-1=Culvert (Inlet Controls 7.02 cfs @ 4.06 fps)

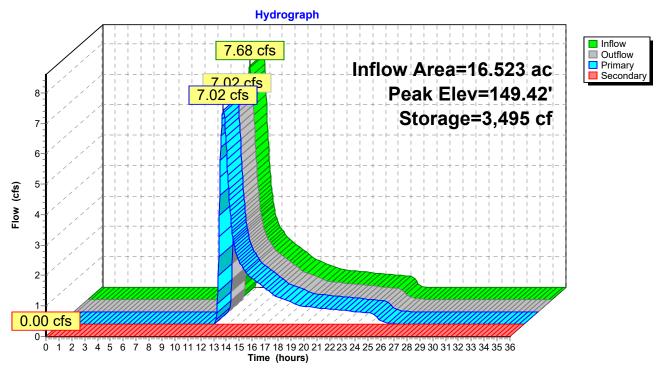
**2=Orifice/Grate** (Passes 7.02 cfs of 7.59 cfs potential flow)

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

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=148.00' (Free Discharge) 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

## **Post-Development**

**Post Development Conditions** Type III 24-hr 10 Year Rainfall=5.12" Prepared by {enter your company name here} HydroCAD® 10.10-7a s/n 04881 © 2021 HydroCAD Software Solutions LLC Printed 10/28/2024 Page 17



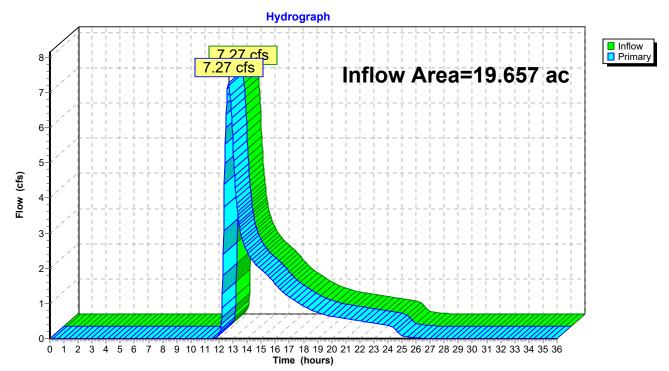
## Pond OS 1P: Offsite Basin

Post-DevelopmentPost Development ConditionsPrepared by {enter your company name here}Type III 24-hr10 Year Rainfall=5.12"HydroCAD® 10.10-7a s/n 04881 © 2021 HydroCAD Software Solutions LLCPage 18

## Summary for Link POA-1A: Galvin Lane

Inflow Area	a =	19.657 ac, 10.60% Impervious, Inflow Depth = 0.91" for 10 Year event
Inflow	=	7.27 cfs @ 12.68 hrs, Volume= 1.488 af
Primary	=	7.27 cfs @ 12.68 hrs, Volume= 1.488 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs



## Link POA-1A: Galvin Lane

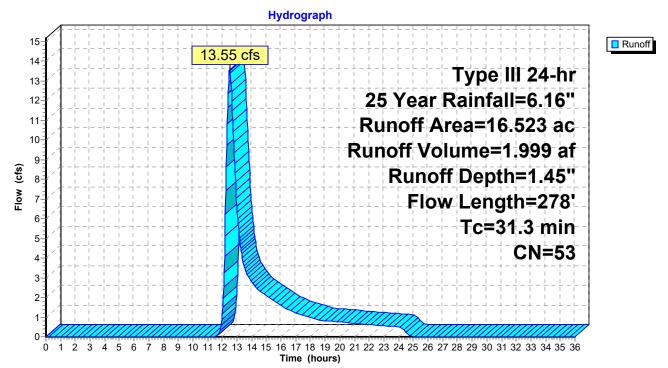
#### Summary for Subcatchment PR-OS1: Off-Site Residential Area - 16 Acres

Runoff = 13.55 cfs @ 12.50 hrs, Volume= 1.999 af, Depth= 1.45" Routed to Pond OS 1P : Offsite Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Type III 24-hr 25 Year Rainfall=6.16"

	Area	(ac) (	N Dese	cription		
*	16.	070	53 OFF	SITE RES	SIDENTIAL	AREAS
	0.	024	61 >75	% Grass co	over, Good,	HSG B
	0.	429	69 50-7	5% Grass	cover, Fair	, HSG B
	16.	523	53 Weig	ghted Aver	age	
	16.	523	100.	00% Pervi	ous Area	
	Тс	Length	Slope	Velocity	Capacity	Description
	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	30.0					Direct Entry,
	0.3	180	0.0070	9.24	16.32	Pipe Channel,
						18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38'
						n= 0.007
	1.0	98	0.0100	1.61		Shallow Concentrated Flow,
						Unpaved Kv= 16.1 fps
	31.3	278	Total			

#### Subcatchment PR-OS1: Off-Site Residential Area - 16 Acres



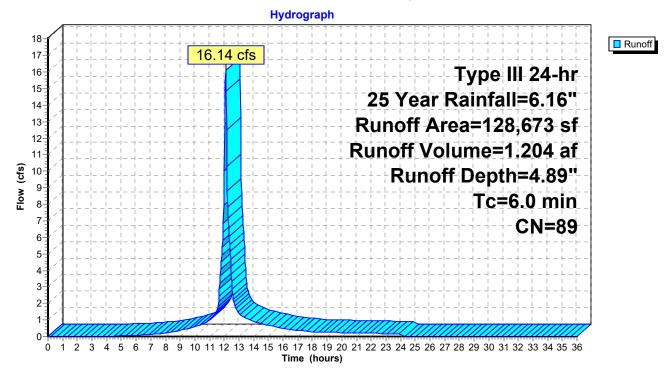
## Summary for Subcatchment PR1-1: Project Site

Runoff	=	16.14 cfs @	12.09 hrs,	Volume=	1.204 af,	Depth= 4.89"
Routed	to Pon	d 1P : Surface	/Subsurface	e Detention		

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Type III 24-hr 25 Year Rainfall=6.16"

Area (sf)	CN	Description	Description					
37,938	69	50-75% Gra	ass cover, l	Fair, HSG B				
75,564	98	Paved park	ing, HSG E	3				
15,171	98	Roofs, HSC	βB					
128,673	89	Weighted A	verage					
37,938		29.48% Per	vious Area	1				
90,735		70.52% Imp	pervious Ar	ea				
Tc Length	Slop	,	Capacity	Description				
(min) (feet)	(ft/	ft) (ft/sec)	(cfs)					
6.0				Direct Entry,				

## Subcatchment PR1-1: Project Site



#### Summary for Subcatchment PR1-2: South and Rear Grassed Area

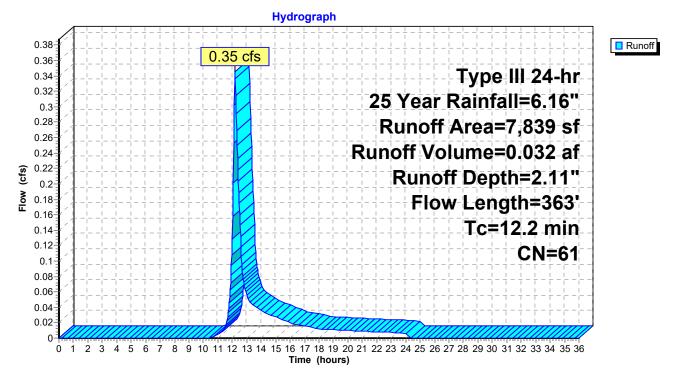
Runoff = 0.35 cfs @ 12.18 hrs, Volume= 0.032 Routed to Link POA-1A : Galvin Lane

0.032 af, Depth= 2.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Type III 24-hr 25 Year Rainfall=6.16"

_	A	rea (sf)	CN [	Description		
		7,839	61 >	>75% Gras	s cover, Go	bod, HSG B
		7,839		100.00% Pe	ervious Are	a
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
-	10.8	100	0.1000			Sheet Flow,
	1.4	263	0.0400	3.22		Woods: Light underbrush n= 0.400 P2= 3.50" <b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
	12.2	363	Total			

### Subcatchment PR1-2: South and Rear Grassed Area



**Post Development Conditions Post-Development** Type III 24-hr 25 Year Rainfall=6.16" Prepared by {enter your company name here} Printed 10/28/2024 HydroCAD® 10.10-7a s/n 04881 © 2021 HydroCAD Software Solutions LLC Page 22

## Summary for Pond 1P: Surface/Subsurface Detention

Inflow Area =	2.954 ac, 70.52% Impervious, Inflow	w Depth = 4.89" for 25 Year event						
Inflow =	16.14 cfs @ 12.09 hrs, Volume=	1.204 af						
Outflow =	1.07 cfs @ 13.59 hrs, Volume=	0.868 af, Atten= 93%, Lag= 90.4 min						
Discarded =	0.21 cfs @ 13.59 hrs, Volume=	0.442 af						
Primary =	0.85 cfs @ 13.59 hrs, Volume=	0.425 af						
Routed to Link POA-1A : Galvin Lane								

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Peak Elev= 147.07' @ 13.59 hrs Surf.Area= 12,377 sf Storage= 30,887 cf

Plug-Flow detention time= 424.3 min calculated for 0.867 af (72% of inflow) Center-of-Mass det. time= 335.9 min (1,123.2 - 787.3)

Volume	Invert	Avail.Storage	Storage Description
#1	146.00'	17,407 cf	Detention Basin 1 (Irregular)Listed below (Recalc)
#2A	143.00'	21,814 cf	68.00'W x 159.00'L x 7.00'H Field A
			75,684 cf Overall - 21,149 cf Embedded = 54,535 cf x 40.0% Voids
#3A	143.50'	21,149 cf	CMP Round 48 x 77 Inside #2
			Effective Size= 48.0"W x 48.0"H => 12.57 sf x 20.00'L = 251.3 cf
			Overall Size= 48.0"W x 48.0"H x 20.00'L
			Row Length Adjustment= +13.00' x 12.57 sf x 11 rows
		60.370 cf	Total Available Storage

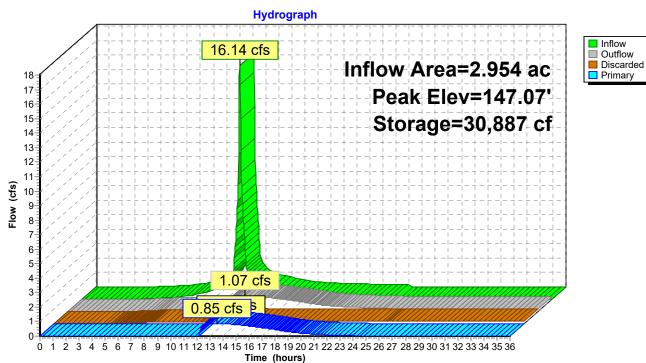
60,370 cf Total Available Storage

Storage Group A created with Chamber Wizard

Elevation S (feet)		Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)		
146.0		991	163.0	0	0	991		
147.0		1,528	186.0	1,250	1,250	1,653		
148.0		2,135	209.0	1,823	3,073	2,403		
150.0		3,553	254.0	5,628	8,701	4,124		
151.0	00	4,345	273.0	3,942	12,643	4,963		
152.0	00	5,194	292.0	4,763	17,407	5,863		
Device	Routing	Inver	t Outle	t Devices				
#1	Primary	146.00	Inlet /	<b>Round Culvert</b> L= Outlet Invert= 146.00	0' / 145.70' S= 0.			
#2	Device 1	146.00		n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf 6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads				
#3	Device 1	151.20		20.0' long x 10.0' breadth Broad-Crested Rectangular Weir				
#4	Discardeo	143.00	Coef. ' <b>0.510</b> Cond	Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 <b>0.510 in/hr Exfiltration over Surface area from 141.00' - 146.00'</b> Conductivity to Groundwater Elevation = 136.00' Excluded Surface area = 0 sf				

**Discarded OutFlow** Max=0.21 cfs @ 13.59 hrs HW=147.07' (Free Discharge) **4=Exfiltration** (Controls 0.21 cfs)

Primary OutFlow Max=0.85 cfs @ 13.59 hrs HW=147.07' (Free Discharge) 1=Culvert (Passes 0.85 cfs of 2.85 cfs potential flow) 2=Orifice/Grate (Orifice Controls 0.85 cfs @ 4.35 fps) -3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)



## Pond 1P: Surface/Subsurface Detention

Post-DevelopmentPost Development ConditionsProst-DevelopmentType III 24-hr25 Year Rainfall=6.16"Prepared by {enter your company name here}Printed 10/28/2024HydroCAD® 10.10-7a s/n 04881 © 2021 HydroCAD Software Solutions LLCPage 24

### Summary for Pond OS 1P: Offsite Basin

Inflow Area = 16.523 ac, 0.00% Impervious, Inflow Depth = 1.45" for 25 Year event Inflow 13.55 cfs @ 12.50 hrs, Volume= = 1.999 af 11.15 cfs @ 12.71 hrs, Volume= Outflow 1.999 af, Atten= 18%, Lag= 12.3 min = 11.15 cfs @ 12.71 hrs, Volume= Primary = 1.999 af Routed to Link POA-1A : Galvin Lane Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af Routed to Pond 1P : Surface/Subsurface Detention

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Peak Elev= 150.47' @ 12.71 hrs Surf.Area= 4,197 sf Storage= 7,324 cf

Plug-Flow detention time= 12.3 min calculated for 1.999 af (100% of inflow) Center-of-Mass det. time= 12.1 min ( 917.0 - 904.8 )

Volume	Invert	Avail.S	torage	Storage Descriptio	n				
#1	148.00'	21,	446 cf	Custom Stage Da	Custom Stage Data (Irregular)Listed below (Recalc)				
Elevatio (fee		rf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)			
148.0	00	1,856	257.0	0	0	1,856			
150.0	00	3,729	332.0	5,477	5,477	5,420			
151.0	00	4,768	354.0	4,238	9,715	6,669			
152.0		5,860	373.0	5,305	15,020	7,827			
153.0	00	7,009	392.0	6,426	21,446	9,045			
Device	Routing	Inver	t Outle	et Devices					
#1	Primary	148.00	148.00' 18.0" Round Culvert L= 190.0' Ke= 0.500						
		Inlet / Outlet Invert= 148.00' / 142.00' S= 0.0316 '/' Cc= 0.900							
				.010 PVC, smooth					
#2	Device 1	148.00							
що	Device 1	150.00		Limited to weir flow at low heads					
#3	Device 1	150.00		<b>12.0' long x 1.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00					
					0.00 0.80 1.00 1.	20 1.40 1.60 1.80	2.00		
				0.00	72 2 75 2 85 2 09	<u>, , , , , , , , , , , , , , , , , , , </u>	31		
				Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32					
#4	Secondary	151.50		long x 5.0' bread	th Broad-Crested	Rectangular Weir			
	<b>,</b>					20 1.40 1.60 1.80	2.00		
				3.00 3.50 4.00 4					
						3 2.66 2.65 2.65 2	.65		
			2.65	2.67 2.66 2.68 2	.70 2.74 2.79 2.8	8			

**Primary OutFlow** Max=11.14 cfs @ 12.71 hrs HW=150.46' (Free Discharge)

-1=Culvert (Inlet Controls 11.14 cfs @ 6.30 fps)

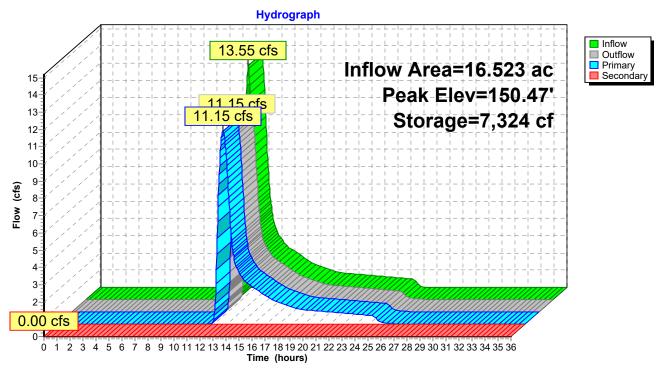
**2=Orifice/Grate** (Passes < 11.22 cfs potential flow)

**—3=Broad-Crested Rectangular Weir** (Passes < 10.38 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=148.00' (Free Discharge) 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

## **Post-Development**

**Post Development Conditions** Type III 24-hr 25 Year Rainfall=6.16" Prepared by {enter your company name here} HydroCAD® 10.10-7a s/n 04881 © 2021 HydroCAD Software Solutions LLC Printed 10/28/2024 Page 25



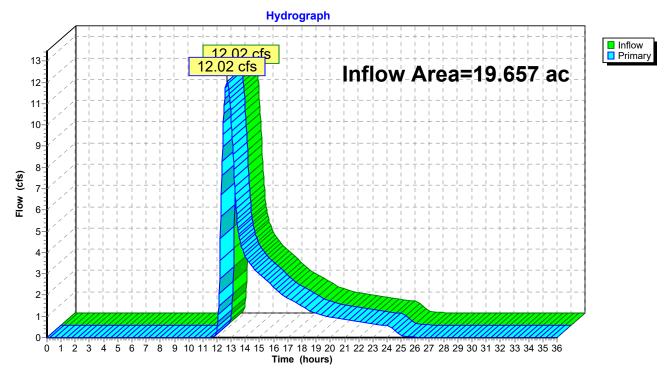
## Pond OS 1P: Offsite Basin

Post-DevelopmentPost Development ConditionsPost-DevelopmentType III 24-hr25 Year Rainfall=6.16"Prepared by {enter your company name here}Printed 10/28/2024HydroCAD® 10.10-7a s/n 04881 © 2021 HydroCAD Software Solutions LLCPage 26

## Summary for Link POA-1A: Galvin Lane

Inflow Area	a =	19.657 ac, 10.60% Impervious, Inflow Depth = 1.50" for 25 Year event
Inflow	=	12.02 cfs @ 12.71 hrs, Volume= 2.456 af
Primary	=	12.02 cfs @ 12.71 hrs, Volume= 2.456 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs



## Link POA-1A: Galvin Lane

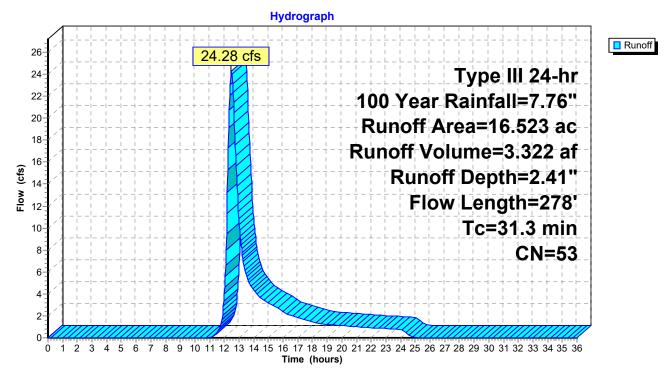
#### Summary for Subcatchment PR-OS1: Off-Site Residential Area - 16 Acres

Runoff = 24.28 cfs @ 12.48 hrs, Volume= 3.322 af, Depth= 2.41" Routed to Pond OS 1P : Offsite Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Type III 24-hr 100 Year Rainfall=7.76"

	Area	(ac) (	CN Des	scription		
*	16.	16.070 53 OFF SITE RESIDENTIA			SIDENTIAL	AREAS
	0.	024	61 >75	% Grass c	over, Good	, HSG B
	0.	429	69 50-	75% Grass	cover, Fair	, HSG B
	16.	523	53 We	ighted Aver	age	
	16.	523	100	.00% Pervi	ous Area	
	_					
	Тс	Length			Capacity	Description
	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	30.0					Direct Entry,
	0.3	180	0.0070	9.24	16.32	Pipe Channel,
						18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38'
						n= 0.007
	1.0	98	0.0100	1.61		Shallow Concentrated Flow,
						Unpaved Kv= 16.1 fps
	31.3	278	Total			

#### Subcatchment PR-OS1: Off-Site Residential Area - 16 Acres



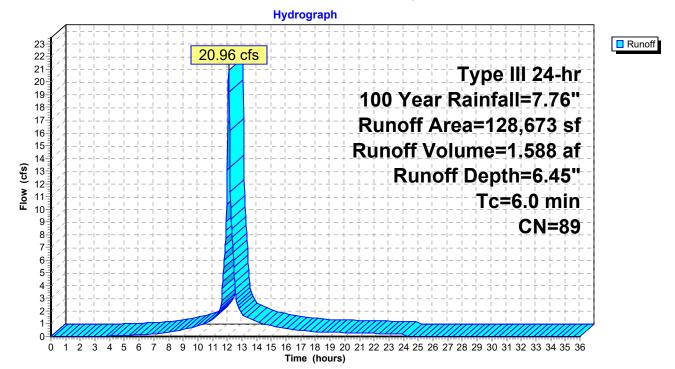
#### Summary for Subcatchment PR1-1: Project Site

Runoff = 20.96 cfs @ 12.09 hrs, Volume= 1.588 af, Depth= 6.45" Routed to Pond 1P : Surface/Subsurface Detention

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Type III 24-hr 100 Year Rainfall=7.76"

Area (sf	) CN	Description							
37,938	3 69	9 50-75% Grass cover, Fair, HSG B							
75,564	4 98	Paved park	Paved parking, HSG B						
15,171	1 98	Roofs, HSC	βB						
128,673	3 89	Weighted A	verage						
37,938	3	29.48% Pervious Area							
90,735	5	70.52% Imp	pervious Ar	rea					
Tc Leng		,	Capacity						
(min) (fee	et) (ft/	ft) (ft/sec)	(cfs)						
6.0				Direct Entry,					

#### Subcatchment PR1-1: Project Site



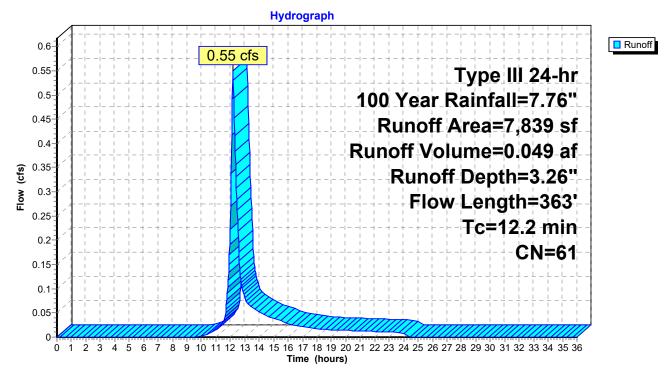
#### Summary for Subcatchment PR1-2: South and Rear Grassed Area

Runoff = 0.55 cfs @ 12.18 hrs, Volume= 0.049 af, Depth= 3.26" Routed to Link POA-1A : Galvin Lane

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Type III 24-hr 100 Year Rainfall=7.76"

_	A	rea (sf)	CN E	Description		
		7,839	61 >	>75% Gras	s cover, Go	bod, HSG B
		7,839	1	00.00% Pe	ervious Are	a
	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	10.8	100	0.1000	0.15		Sheet Flow,
_	1.4	263	0.0400	3.22		Woods: Light underbrush n= 0.400 P2= 3.50" <b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
	12.2	363	Total			

## Subcatchment PR1-2: South and Rear Grassed Area



**Post Development Conditions** Type III 24-hr 100 Year Rainfall=7.76" **Post-Development** Printed 10/28/2024 Prepared by {enter your company name here} HydroCAD® 10.10-7a s/n 04881 © 2021 HydroCAD Software Solutions LLC Page 30

#### Summary for Pond 1P: Surface/Subsurface Detention

2.954 ac, 70.52% Impervious, Inflow Depth = 7.14" for 100 Year event Inflow Area = 20.96 cfs @ 12.09 hrs, Volume= Inflow 1.757 af = 1.94 cfs @ 12.96 hrs, Volume= Outflow 1.407 af, Atten= 91%, Lag= 52.3 min = 0.476 af Discarded = 0.26 cfs @ 12.96 hrs, Volume= Primary = 1.68 cfs @ 12.96 hrs, Volume= 0.931 af Routed to Link POA-1A : Galvin Lane

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Peak Elev= 149.41' @ 12.96 hrs Surf.Area= 13,906 sf Storage= 47,121 cf

Plug-Flow detention time= 364.0 min calculated for 1.406 af (80% of inflow) Center-of-Mass det. time= 294.5 min (1,072.4 - 777.9)

Volume	Invert	Avail.Storage	Storage Description
#1	146.00'	17,407 cf	Detention Basin 1 (Irregular)Listed below (Recalc)
#2A	143.00'	21,814 cf	68.00'W x 159.00'L x 7.00'H Field A
			75,684 cf Overall - 21,149 cf Embedded = 54,535 cf x 40.0% Voids
#3A	143.50'	21,149 cf	CMP Round 48 x 77 Inside #2
			Effective Size= 48.0"W x 48.0"H => 12.57 sf x 20.00'L = 251.3 cf
			Overall Size= 48.0"W x 48.0"H x 20.00'L
			Row Length Adjustment= +13.00' x 12.57 sf x 11 rows
		60.370 cf	Total Available Storage

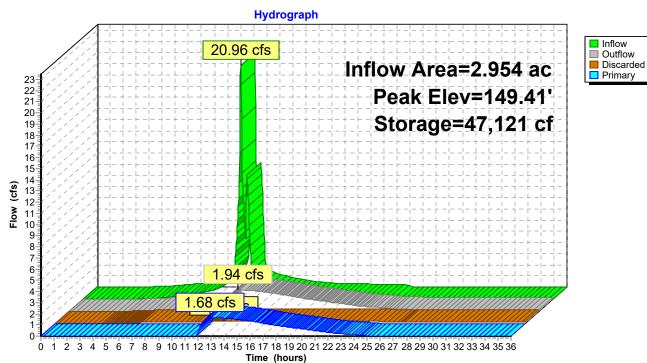
60,370 cf Total Available Storage

Storage Group A created with Chamber Wizard

				rim. Inc.Store Cum.Store Wet.Area eet) (cubic-feet) (cubic-feet) (sq-ft)						
146.0		991	163.0							
147.0		1,528	186.0	1,250	1,250	1,653				
148.0		2,135	209.0	1,823	3,073	2,403				
150.0		3,553	254.0	5,628	8,701	4,124				
151.0	151.00		273.0	3,942	12,643	4,963				
152.0	00	5,194	292.0	4,763	17,407	5,863				
Device	Routing	Inve	rt Outle	t Devices						
#1	Primary	146.00	146.00' 12.0" Round Culvert L= 15.0' Ke= 0.500							
				Outlet Invert= 146.0						
				010 PVC, smooth int	-					
#2	Device 1	146.00		6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low head						
#3	Device 1	151.20		long x 10.0' breadtl						
				(feet) 0.20 0.40 0.6						
				(English) 2.49 2.56						
#4	Discardeo	143.00	)' <b>0.510</b>	in/hr Exfiltration ov	ver Surface area f	from 141.00' - 146.00'				
			Cond	uctivity to Groundwat	ter Elevation = 136	5.00'				
			Exclu	ded Surface area = 0	) sf					

**Discarded OutFlow** Max=0.26 cfs @ 12.96 hrs HW=149.41' (Free Discharge) **4=Exfiltration** (Controls 0.26 cfs)

Primary OutFlow Max=1.68 cfs @ 12.96 hrs HW=149.41' (Free Discharge) 1=Culvert (Passes 1.68 cfs of 6.45 cfs potential flow) 2=Orifice/Grate (Orifice Controls 1.68 cfs @ 8.55 fps) 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)



## Pond 1P: Surface/Subsurface Detention

Post Development ConditionsPost-DevelopmentType III 24-hr 100 Year Rainfall=7.76"Prepared by {enter your company name here}Printed 10/28/2024HydroCAD® 10.10-7a s/n 04881 © 2021 HydroCAD Software Solutions LLCPage 32

#### Summary for Pond OS 1P: Offsite Basin

Inflow Area = 16.523 ac. 0.00% Impervious, Inflow Depth = 2.41" for 100 Year event Inflow 24.28 cfs @ 12.48 hrs, Volume= = 3.322 af 22.91 cfs @ 12.58 hrs, Volume= 3.322 af, Atten= 6%, Lag= 6.2 min Outflow = Primary = 14.87 cfs @ 12.58 hrs, Volume= 3.153 af Routed to Link POA-1A : Galvin Lane Secondary = 8.04 cfs @ 12.58 hrs, Volume= 0.169 af Routed to Pond 1P : Surface/Subsurface Detention

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs Peak Elev= 151.80' @ 12.58 hrs Surf.Area= 5,635 sf Storage= 13,883 cf

Plug-Flow detention time= 12.0 min calculated for 3.322 af (100% of inflow) Center-of-Mass det. time= 11.8 min ( 899.9 - 888.1 )

Volume	Invert	Avail.St	orage	Storage Descriptio	n		
#1	148.00'	21,4	146 cf	Custom Stage Da	<b>ta (Irregular)</b> Listed	below (Recalc)	
Elevatio (fee		rf.Area l (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
148.0	00	1,856	257.0	0	0	1,856	
150.0	00	3,729	332.0	5,477	5,477	5,420	
151.0	00	4,768	354.0	4,238	9,715	6,669	
152.0	00	5,860	373.0	5,305	15,020	7,827	
153.0	00	7,009	392.0	6,426	21,446	9,045	
Device Routing Invert Outlet Devices							
#1 Primary 148.00' <b>18.0" Round Culvert</b> L= 190.0' Ke= 0.500							
Inlet / Outlet Invert= 148.00' / 142.00' S= 0.0316 '/' Cc= 0.900							
	n= 0.010 PVC, smooth interior, Flov						
#2	Device 1	148.00'		" W x 12.0" H Vert.		0.600	
#3	Device 1	150.00'		ted to weir flow at lo		Pootongular Mair	
#3	Device I	150.00		' long x 1.0' bread		20 1.40 1.60 1.80 2.0	0
				3.00	0.00 0.00 1.00 1.2	20 1.40 1.00 1.00 2.0	U
					72 2 75 2 85 2 98	3.08 3.20 3.28 3.31	
				3.31 3.32	2 200 2000 2000		
#4	Secondary	151.50'	<b>20.0</b> Head 2.50 Coef	<b>' long x 5.0' bread</b> d (feet) 0.20 0.40 3.00 3.50 4.00 4	0.60 0.80 1.00 1.2 .50 5.00 5.50 50 2.70 2.68 2.68	20 1.40 1.60 1.80 2.0 2.66 2.65 2.65 2.65	0

**Primary OutFlow** Max=14.86 cfs @ 12.58 hrs HW=151.80' (Free Discharge)

-1=Culvert (Inlet Controls 14.86 cfs @ 8.41 fps)

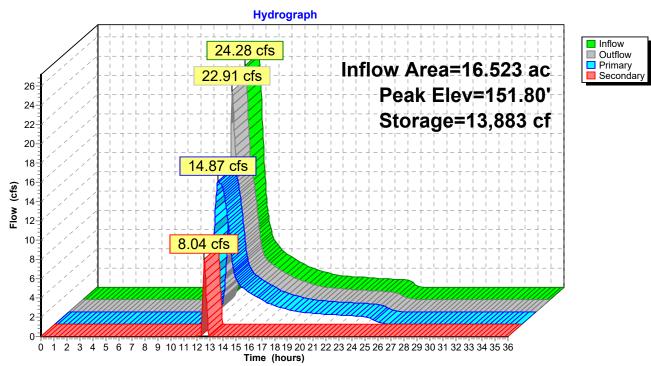
**2=Orifice/Grate** (Passes < 14.56 cfs potential flow)

-3=Broad-Crested Rectangular Weir (Passes < 95.89 cfs potential flow)

Secondary OutFlow Max=7.94 cfs @ 12.58 hrs HW=151.80' (Free Discharge) 4=Broad-Crested Rectangular Weir (Weir Controls 7.94 cfs @ 1.32 fps)

## **Post-Development**

**Post Development Conditions** Type III 24-hr 100 Year Rainfall=7.76" Prepared by {enter your company name here} HydroCAD® 10.10-7a s/n 04881 © 2021 HydroCAD Software Solutions LLC Printed 10/28/2024 Page 33



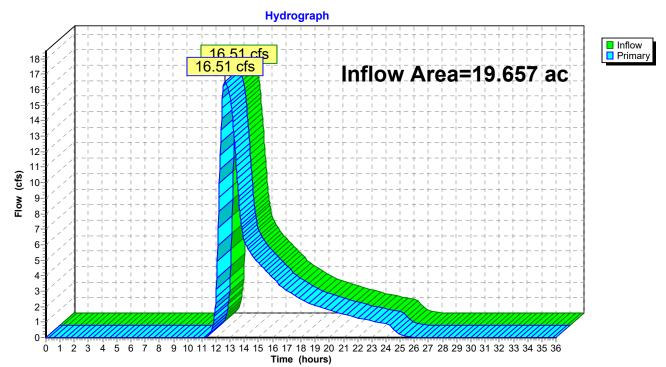
## Pond OS 1P: Offsite Basin

Post-DevelopmentPost Development ConditionsPrepared by {enter your company name here}Type III 24-hr 100 Year Rainfall=7.76"HydroCAD® 10.10-7a s/n 04881 © 2021 HydroCAD Software Solutions LLCPage 34

## Summary for Link POA-1A: Galvin Lane

Inflow Are	a =	19.657 ac, 10.60% Impervious, Inflow Depth = 2.52" for 100 Year event
Inflow	=	16.51 cfs @ 12.61 hrs, Volume=
Primary	=	16.51 cfs $\overline{@}$ 12.61 hrs, Volume= 4.132 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs



### Link POA-1A: Galvin Lane

Pipe Capacity Analysis



### Storm Drainage Computations

Name: Horizon View	Proj. No.:	24029	Design Parameters:
	Date:	9/25/2024	10 Year Storn
Client: Honeycomb Partners	Computed by:	МАР	
	Checked by:	RWS	k <sub>≏</sub> = 0.5

80 Montvale Ave Stoneham MA 02180 P 781.279.0173

	LOC	ATION	AREA	Cn	Cn x A	SUM	TIME OF	INTENSITY			DESIGN			CA	PACITY
DESCRIPTION	FROM	то	(AC.)			Cn x A	CONCENTRATION	IDF CURVE	Q	V	n	PIPE	SLOPE	Q full	V full
									cfs	fps		SIZE		ft^3/s	ft/s
To SSIB	CB-1	DMH-1	0.32	0.90	0.29	0.29	6.0	5.1	1.47	3.35	0.011	12	0.006	3.21	4.08
	CB-2	DMH-1	0.15	0.90 0.14 0.14 6.0 5.1				0.69	3.41	0.011	12	0.012	4.61	5.87	
	DMH-1	CDS-1	-	-	-	0.42	-	5.1	2.16	4.51	0.011	12	0.010	4.17	5.31
	CDS-1	SSIB	-	-	-	0.42	-	5.1	2.16	3.66	0.011	12	0.005	3.09	3.94
	CB-3	DMH-2	0.44	0.90	0.40	0.40	6.0	5.1	2.02	3.59	0.011	12	0.005	3.09	3.94
	CB4	DMH-2	0.20	0.90	0.18	0.18	6.0	5.1	0.92	3.32	0.011	12	0.008	3.84	4.88
	DMH-2	DMH-3	0.58 - 5.1		2.94	3.75	0.011	15	0.005	5.34	4.35				
	CB-5	DMH-3	0.62	0.90	0.56	1.13	6.0	6.0 5.1		4.60	0.011	18	0.005	9.04	5.11
	DMH-3	CDS-2	-	-	-	1.13	-	5.1	5.78	4.73	0.011	18	0.006	9.29	5.26
	CB-6	CDS-2	0.18	0.90	0.16	0.16	6.0	5.1	0.83	3.07	0.011	12	0.007	3.60	4.58
	CDS-2	SSIB	-	-	-	1.13	-	5.1	5.78	5.27	0.011	18	0.008	10.96	6.20
	CB-7	SSIB	0.37	0.90	0.33	0.33	6.0	5.1	1.70	4.54	0.011	12	0.012	4.57	5.82
To ON-SITE DB	SSIB	SSI-OCS-1	1.69	0.90	1.52	1.52	6.0	5.1	7.76	1.94	0.011	30	0.000	9.69	1.98
	SSI-OCS-1	OSDB	-	-	-	1.52	-	5.1	7.76	1.94	0.011	30	0.000	9.69	1.98
	SSIB	SSI-OCS-2	1.69	0.90	1.52	1.52	6.0	5.1	7.76	1.94	0.011	30	0.000	9.69	1.98
	SSI-OCS-2 OSDB 1.52 - 5.1						5.1	7.76	1.94	0.011	30	0.000	9.69	1.98	
To LS	OCS-OFF	OS-DMH-1	F	LOW RATE I	BASED ON ST	ORMWATE	R MODEL POND DISCHARG	E RATE	14.86	9.89	0.011	18	0.020	17.47	9.89
	OS-DMH-1	OS-DMH-2	F	FLOW RATE BASED ON STORMWATER MODEL POND DISCHARGE RATE							0.011	18	0.020	17.38	9.84
	OCS-1	OS-DMH-2	F	LOW RATE I	BASED ON ST	ORMWATER	R MODEL POND DISCHARGI	E RATE	1.62	7.42	0.011	18	0.086	36.41	20.60
	OS-DMH-2	OS-DMH-3	F	LOW RATE I	BASED ON ST	ORMWATER	R MODEL POND DISCHARGI	E RATE	16.48	11.21	0.011	18	0.026	20.02	11.33
	OS-DMH-3	OS-FES1	F	LOW RATE I	BASED ON ST	ORMWATER	R MODEL POND DISCHARG	E RATE	16.48	10.95	0.011	18	0.024	19.35	10.95

Level Spreader Swale Calculations

Level Spreader Calculation

Continuity Equation Q=VA

Q = Weir Discharge Rate (cfs)

C = Runoff Coefficient (3.2)

H = Height of Water over Weir (ft)

L = Length of Level Spreader Required (ft)

V = Velocity over Level Spreader (fps)

Q =	11.1	cfs	(From HydroCAD routing data - 100yr 24hr)
C =	3.2		(Runoff Coefficient)
V =	2	fps	(Max Velocity Allowed over Spreader Swale)
H =	0.1	ft	(Max Height of Water)
Q =	VA	cfs	
A =	Q/V	sf	
A =	5.55	sf	
A =	LH	sf	(Area = Length x Height)
L =	A/H	ft	
L =	55.5	ft @ 2 fps	Minimum Required Length

APPENDIX B Soil Report by NRCS



16 OLD FORGE ROAD SUITE A ROCKY HILL, CT 06067 860.726.7889 whitestoneassoc.com

August 15, 2024

via email

**R.J. O'CONNELL & ASSOCIATES, INC.** 80 Montvale Avenue Suite 201 Stoneham, Massachusetts 02180

Attention: Mr. Roy W. Smith Vice President

#### Regarding: STORMWATER MANAGEMENT AREA EVALUATION PROPOSED APARTMENT BUILDING 2268 - 2284 CONNECTICUT ROUTE 32 MAP 106, LOTS 34, 35, & 36 MONTVILLE, NEW LONDON COUNTY, CONNECTICUT WHITESTONE PROJECT NO.: GM2422090.000

Dear Mr. Smith:

Whitestone Associates, Inc. (Whitestone) is pleased to submit the results of a stormwater management (SWM) area evaluation in support of the proposed development referenced above. Services were provided in general accordance with Whitestone's May 10, 2024 proposal. Whitestone also issued an August 14, 2024 *Report of Geotechnical Investigation* for the above-referenced project.

## 1.0 **PROJECT DESCRIPTION**

#### 1.1 Site Location & Existing Conditions

The 3.36-acre site is located at 2268 - 2284 Connecticut Route 32 (Norwich New London Turnpike) in the Town of Montville, New London County, Connecticut. At the time of Whitestone's investigation, the subject site was vacant, with brush and mature trees. The site was previously developed with residences and outbuildings, since demolished. Existing fill from this previous development was encountered in several explorations. A buried asphaltic concrete driveway was encountered in one boring. Limited asphalt-paved driveways were noted around the site. Low stone walls and concrete rubble were noted within the western portion of the site. There appears to be a former well within the eastern/central portion of the site.

#### 1.2 Site Geology

On the *Surficial Materials Map of Connecticut (1992)*, the site is shown underlain by glacial till. The *Bedrock Geologic Map of Connecticut (1985)* indicates that the site is primarily underlain by the Proterozoic Z-age Waterford Group, consisting of gneiss with minor amphibolite, and in the northeastern corner by Proterozoic Z-age Hope Valley Alaskite Gneiss, consisting of gneiss, both part of the Eastern Uplands; Avalonian (Continental) Terrane; Avalonian Anticlinorium.

Office Locations:



#### 1.3 Proposed Construction

Based on a March 15, 2010 *Conceptual Site Plan* prepared by R.J. O'Connell & Associates, Inc. (RJO), the proposed development will include the construction of a three-story apartment building with a footprint of approximately 20,500-square feet and associated pavements, landscaping, and utilities. Stormwater detention basins planned on the western side of the site.

#### 2.0 FIELD & LABORATORY WORK

#### 2.1 Field Exploration

Field exploration consisted of excavating eight test pits (identified as TP-1 through TP-8). The test pits subsequently were backfilled to the surface with excavated soils from the investigation after observing soil conditions. The locations of the test pits are shown on the accompanying *Test Location Plan* included as Figure 1. *Records of Subsurface Exploration* for the test pits are provided in Appendix A.

The subsurface tests were conducted in the presence of a Whitestone engineer who conducted field tests, recorded visual classifications, and collected samples of the various strata encountered. Test locations were surveyed by others.

Groundwater was not encountered in the test pits during field operations and prior to backfilling. Seasonal variations, temperature effects, man-made effects, and recent rainfall conditions may influence the levels of the groundwater. The levels will also depend on the permeability of the soils. Groundwater elevations derived from sources other than seasonally observed groundwater monitor wells may not be representative of true groundwater levels.

#### 2.2 Laboratory Testing

Laboratory testing was conducted to provide data for a US Department of Agriculture (USDA) textural analysis. The laboratory testing was conducted in general accordance with applicable ASTM standard test methods and included physical/textural testing of representative samples of the natural soils. Quantitative test results are provided in Appendix B.

**Physical and Textural Analysis:** Representative samples were subjected to laboratory testing that included moisture content determinations (ASTM D2216) and washed gradation analyses (ASTM D422). The soil stratum tested was classified by the Unified Soil Classification System (USCS). The results of the laboratory testing are summarized in the following table.

	PHYSICAL/TEXTURAL ANALYSES SUMMARY												
Exploration	Sample	Depth (fbgs)	Moisture Content (%)	% Passing No. 200 Sieve	USCS Classification								
B-5	S-2	2.0 - 4.0	11.6	20.8	SM								
B-8	S-3	5.0 - 7.0	3.2	12.1	SM								
TP-6	S-1	3.5	18.2	44.9	SM								
TP-7	S-1	3.5	4.6	12.7	SM								
TP-8	S-1	4.5	9.2	26.2	SM								

## Environmental & Geotechnical Engineers & Consultants



Based on the results of the gradation testing, the United States Department of Agriculture (USDA) textural analysis classifies the glacial till as "sand" and "sandy loam", which implies USDA Natural Resources Conservation Service (NRCS) Hydrological Soil Group (HSG) "A" or "B".

#### 2.3 Infiltration Testing

Because of the above soil classification (HSG "A" and "B"), infiltration testing was omitted from the scope. A Rawls infiltration rate of 1.02 inches per hour is appropriate for each test pit location.

#### 3.0 SUBSURFACE CONDITIONS

The soil conditions encountered within the subsurface tests conducted by Whitestone consisted of the following generalized strata in order of increasing depth. *Records of Subsurface Exploration* are provided in Appendix A.

**Surface Cover Materials:** The test pits encountered four inches to 30 inches of topsoil at the ground surface, underlain by six inches to 36 inches of subsoil with roots.

**Glacial Till:** Beneath the surface cover materials, the test pits encountered glacial till, consisting of gray to brown, silty sand with gravel (USCS: SM), frequent cobbles and boulders. Where penetrated, the glacial till extended to depths of eight fbgs to 9.5 fbgs. Test pits TP-5 and TP-8 terminated in the glacial till at depths of 10 fbgs and nine fbgs, respectively.

**Bedrock:** Test pits TP-1 through TP-4, TP-6, and TP-7 encountered excavator refusal on bedrock at depths of eight fbgs to 9.5 fbgs. The bedrock was not sampled through rock coring efforts but was inferred by excavator bucket refusal. Rock coring techniques would be required to further characterize the nature and extent of the bedrock.

**Groundwater:** Groundwater was not encountered within the test pits during the exploration. Minor mottling was noted on the sidewalls of test pit TP-6 at a depth of three fbgs. Whitestone does not consider this mottling to be a true indication of an estimated seasonal groundwater high (ESGWH) but is perhaps indicative of a brief high-water event associated with localized perched conditions. Groundwater levels should be expected to fluctuate seasonally and following periods of precipitation.

Whitestone appreciates being of continued service to R.J. O'Connell & Associates, Inc. Please do not hesitate to contact us with any questions regarding this letter.

Sincerely,

WHITESTONE ASSOCIATES, INC.

Puer P. Pay PE

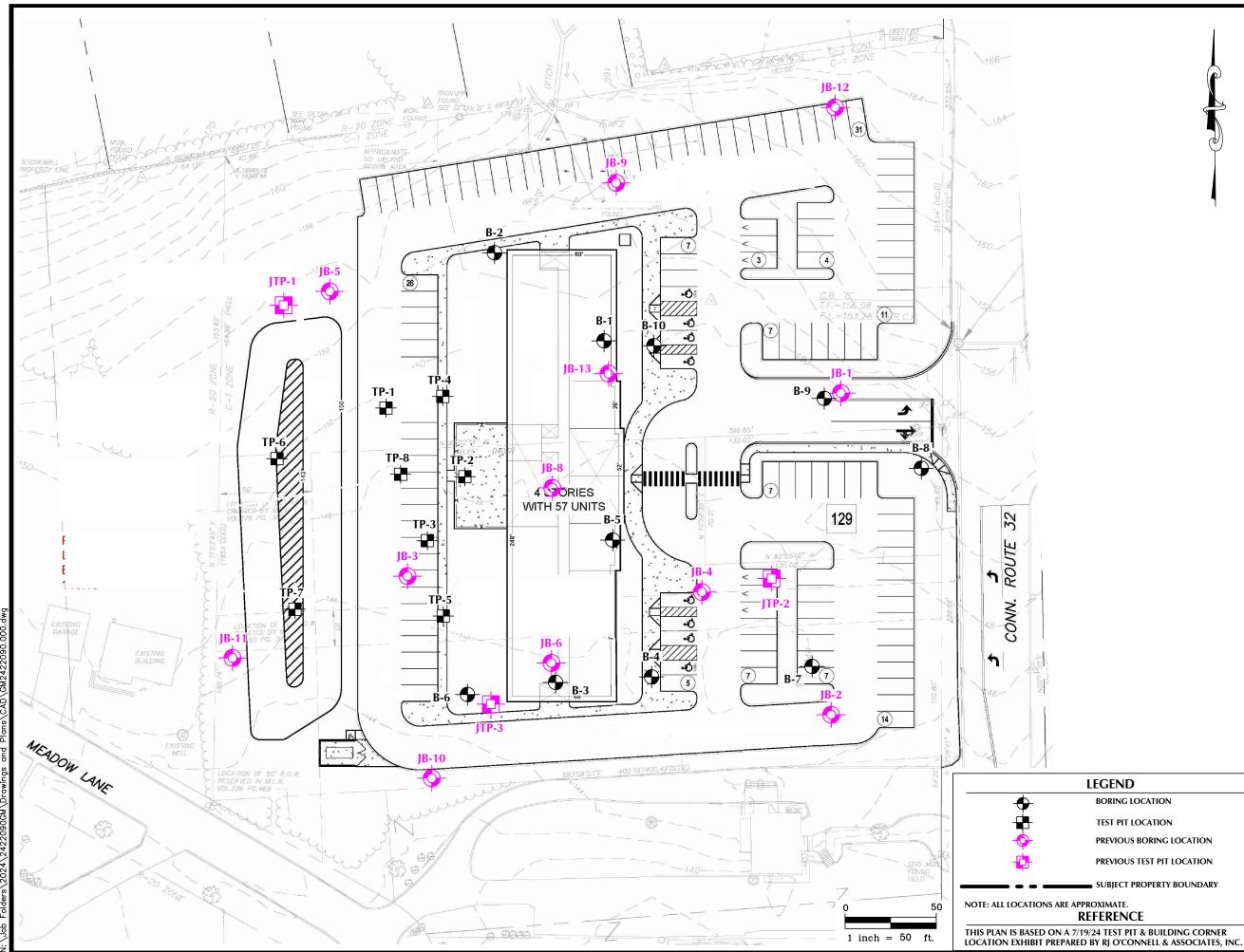
 Richard W.M. McLaren, PE
 Ryan R. Roy, PE

 Senior Consultant
 Vice President

 RWM/th
 N:Job Folders\2024\2422090GM\Reports and Submittals\RJO Montville CT GM2422090 SWM 8-15-24 (Rev. 1).docx



# **FIGURE 1 Test Location Plan**



DRAWING TITLE     DRAWING TITLE       TEST LOCATION PLAN     ISAMING TITLE       TEST LOCATION PLAN     ISAMING TITLE       TEST LOCATION PLAN     ISAMING TITLE       TIL     ISAMING TITLE       R.J. O'CONNELL & ASSOCIATES, INC.     An Emplane       I     ISAMING TITLE       I     ISAMING TITLE			
CLIENT:       CLIENT:         CLIENT:       R.J. O'CONNELL & ASSOCIATES, INC.         R.J. O'CONNELL & ASSOCIATES, INC.       An Em         PROJECT:       PROJECT:         PROPOSED APARTMENT BUILDING       16 OLD FORGE ROAD, SU         2268 - 2284 ROUTE 32       860.726.7889 WHI	PROJECT #: GM DESIGNED BY: M	drawing title: FEST LOCATION PLAN	
PROJECT: PROPOSED APARTMENT BUILDING 2268 - 2284 ROUTE 32 MONTVILLE, NEW LONDON COUNTY, CONNECTICUT	242209	LLENT: 2.1. O'CONNELL & ASSOCIATES, INC.	WHILESIONE
	0.000 PROJ. MGR.: RR	ROJECT: ROPOSED APARTMENT BUILDING 2268 - 2284 ROUTE 32 AONTVILLE, NEW LONDON COUNTY, CONNECTICUT	An Employee-Owned Company 16 OLD FORGE ROAD, SUITE A, ROCKY HILL, CT 06067 860.726.7889 WHITESTONEASSOC.COM



#### LEGEND

BORING LOCATION

TEST PIT LOCATION

PREVIOUS BORING LOCATION

PREVIOUS TEST PIT LOCATION

SUBJECT PROPERTY BOUNDARY

REFERENCE



# **APPENDIX A Records of Subsurface Exploration**



Test Pit No.: TP-1

Page 1 of 1

Project:		Apartment E						WAI	Project No.:	GM2422090.000	
Location:				lontville, New Lon					Client:	R.J. O'Connell & /	
Surface Eleva			feet NAVD88	Date Started:	-	7/22/2024		-	Elevation		In Depth   Elevation
Termination I			feet bgs	Date Comple	-	7/22/2024		eet bgs)	(ft NAVD88)	(	feet bgs)   (ft NAVD88)
Proposed Lo		SWM Area		Logged By:			During:		·		
Excavating M		Midi Excava		Contractor:			At Completion:			At Completion:	<u></u> 丨 <u></u>
Test Method:		Visual Obse	ervation	Rig Type:	Caterp	oillar 314	24 Hours:		<u> </u>		
SAMPLE		IATION	DEPTH	STRATA					MATERIALS		REMARKS
Depth (ft.)	Number	Туре	(feet)				(C	lassifica	ition)		
			0.0								No indication of ESGWH
				TOPSOIL	<u>NI/</u>	4" Topsoil					
						-					•
				SUBSOIL		20" Subsoil, Ro	oots				
						-					
						I					
<b> </b>						I					
3.5	1	Grab	_								
			_								
			5.0								
				GLACIAL							
				TILL		Gray-Brown, Si	Ity Sand with Gravel,	Cobbles, Bo	oulders (SM)		
							<b>,</b> ,		,		
			_								
			·								
7.5	2	Grab	_								
					141141	<u> </u>					
						Test Pit TP-1 T	erminated upon Refus	al at Depth	of 9.0 Feet Below C	Fround Surface.	
			10.0			I					
						I					
						I					
			-			I					
						I					
			7			I					
						I					
						I					
			-								
			15.0			I					

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched



Test Pit No.: TP-2

Page 1 of 1

Project: Proposed Apartment Building WAI Project No.: GM2422090.000											
Location: 2268 - 2284 Connecticut Route 32, Montville, New London County, Connecticut Client: R.J. O'Connell & As											Associates, Inc.
Surface Eleva	ation: ±	148.2	feet NAVD88	Date Started:	_	7/22/2024	Wate	r Depth	Elevation	Cave	In Depth   Elevation
Termination [	Depth:	9.0	feet bgs	Date Comple	ted:	7/22/2024	(fe	et bgs)	(ft NAVD88)	(	feet bgs)   (ft NAVD88)
Proposed Loo	cation:	SWM Area		Logged By:	JB		During:		<u> </u>		
Excavating M	ethod:	Midi Excava	ator	Contractor:	CL		At Completion:		▽	At Completion:	<u></u>   <u></u>
Test Method:		Visual Obse	ervation	Rig Type:	Caterp	oillar 314	24 Hours:		<u></u> ▼		
SAMPLE INFORMATION DEPTH			STRATA			DESCRIPT	REMARKS				
Depth (ft.)	Number	Туре	(feet)				(Cl	assifica	tion)		
			0.0								No indication of ESGWH
					<u>NU</u> 2						
					<u>\\\/</u>						
				TOPSOIL		30" Topsoil					
					<u>\\\/</u>						
					<u>&gt;</u>						
			+								1
				SUBSOIL		30" Subsoil, Ro	ots				
			5.0								
					B13						
			_								
				GLACIAL		Gray, Silty San	d with Gravel, Cobbles,	Boulders	(SM)		
				TILL							
			_								
					111413						
						Test Pit TP-2 T	erminated upon Refusa	al at Depth	of 9.0 Feet Below G	round Surface.	
			10.0								
			15.0								

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched



Test Pit No.: TP-3

Page 1 of 1

Project:	Proposed	Apartment E	Building					WAI	Project No.:	GM2422090.000	
Location:	2268 - 228	34 Connectio	cut Route 32, Mo	ntville, New Lor	ndon Co	ounty, Connec	ticut		Client:	R.J. O'Connell &	Associates, Inc.
Surface Eleva	ation: ±	147.1	feet NAVD88	Date Started		7/22/2024	Wat	er Depth	Elevation	Cave	In Depth   Elevation
Termination	Depth:		feet bgs	Date Comple	ted:	7/22/2024	(1	eet bgs)	(ft NAVD88)	(	feet bgs)   (ft NAVD88)
Proposed Loc	cation:	SWM Area		Logged By:	JB -		During:		I I		
Excavating M		Midi Excava	ator	Contractor:			At Completion:			At Completion:	<u> </u>
Test Method:		Visual Obse			-	oillar 314	24 Hours:		<b>-</b>		
							· · · · · · · · · · · · · · · · · · ·				
SAMPLE			DEPTH	STRATA					MATERIALS		REMARKS
Depth (ft.)	Number	Туре	(feet)				(C	lassifica	tion)		
			0.0								No indication of ESGWH
					<u>NU</u> 2						
					<u> </u>						
				TOPSOIL	NU2	24" Topsoil					
					<u>NU</u> 2						
					_						
3	1	Grab		SUBSOIL		30" Subsoil, Ro	ooto				
				SUBSUIL		SU SUDSOII, RU	0015				
			5.0								
5.5	2	Grab	_								
				GLACIAL							
			_	TILL		Danuar Oilte Oa	a durith Oracush Oakhi	. Deviden			
				TILL		Brown, Silly Sa	nd with Gravel, Cobbl	es, bouiders	(SIVI)		
					ET ET						
						Test Pit TP-3 T	erminated upon Refus	al at Depth	of 8.0 Feet Below G	round Surface.	
			10.0								
			15.0								

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched



Test Pit No.: TP-4

Page 1 of 1

Project:	Proposed	Apartment E	Building					WAI	Project No.:	GM2422090.000	
Location:	2268 - 228	34 Connectio	cut Route 32, Mo	ontville, New Lor	ndon Co	ounty, Connec	ticut		Client:	R.J. O'Connell & A	
Surface Eleva	tion: ±	150.6	feet NAVD88	Date Started		7/22/2024	Wat	er Depth	Elevation	Cave-	In Depth   Elevation
Termination D	feet bgs	Date Comple	ted:	7/22/2024	(1	ieet bgs)	(ft NAVD88)	(	feet bgs)   (ft NAVD88)		
Proposed Loc	cation:	SWM Area		Logged By:	JB		During:		¥		
Excavating M	ethod:	Midi Excava	ator	Contractor:	CL		At Completion:		I <u></u> ▽	At Completion:	<u> </u>
Test Method:	ervation	Rig Type:	Caterp	oillar 314	24 Hours:		<u></u> _				
SAMPLE INFORMATION DEPTH							DESCRIPT				
Depth (ft.)				STRATA			DESCRIPT (C	REMARKS			
Deptil (it.)	Number	Туре						-	•		No indication of ESGWH
			0.0								
				TOPSOIL	<u>N11</u>	10" Tenesil					
				TOPSOIL	<u>NU/</u>	12" Topsoil					
				SUBSOIL		36" Subsoil, Ro	oots				
			5.0								
				GLACIAL		Gray-Brown, Si	Ity Sand with Gravel, 0	Cobbles, Bo	ulders (SM)		
				TILL							
				TILL							
7.5	1	Grab									
						Test Pit TP-4 T	erminated upon Refus	al at Denth	of 8.0 Feet Below G	round Surface	
			10.0								
			15.0								

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched



Test Pit No.: TP-5

Page 1 of 1

Р	Project: Proposed Apartment Building WAI Project No.: GM2422090.000											
Location: 2268 - 2284 Connecticut Route 32, Montville, New London County, Connecticut Client: R.J. O'Connell & Associates, Inc										Associates, Inc.		
s	urface Eleva			feet NAVD88	Date Started		7/22/2024		er Depth			In Depth   Elevation
	ermination D			feet bgs	Date Comple	-	7/22/2024	(1	feet bgs)	(ft NAVD88)	(	feet bgs)   (ft NAVD88)
	roposed Loc		SWM Area		Logged By:	-		During:		Ā		
Excavating Method: Midi Excavator					Contractor:			At Completion:			At Completion:	I <u>bd</u>
	est Method:		Visual Obse		Rig Type:					·▼	•	' <u></u> Ŧ
L					0 ,1			24 Hours:	•	· *		
SAMPLE INFORMATION DEPTH				STRATA			DESCRIPTION OF MATERIALS				REMARKS	
	Depth (ft.)	Number	Туре	(feet)	•••••			(C	lassifica	tion)		
Г												No indication of ESGWH
				0.0								
						<u>&gt;\//</u>						
					TOPSOIL		24" Topsoil					
					101 0012	<u>&gt;\//</u>	21 10000					
						<u>&gt;</u>						
					SUBSOIL		30" Subsoil, Roo	ots				
						1111						
				5.0								
			<u> </u>									
	5.5	1	Grab									
					GLACIAL							
					TILL		Brown to Gray-E	Brown, Silty Sand with	n Gravel, Co	bbles, Boulders (SM	1)	
				10.0								
$\vdash$				10.0		60.60						
							Test Pit TP-5 Te	erminated at Depth of	10.0 Feet B	elow Ground Surfac	æ.	
1												
1												
1												
1												
1				15.0								
				15.0								

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched



# RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-6

Page 1 of 1

Project:	Project: Proposed Apartment Building WAI Project No.: GM2422090.000										
Location:	2268 - 228	34 Connectio	ut Route 32, I	Nontville, New Lor	ndon Co	ounty, Connect	ticut		Client:	R.J. O'Connell & /	Associates, Inc.
Surface Eleva	tion: ±	150.0	feet NAVD88	Date Started:	_	8/10/2024	Wate	r Depth	Elevation	Cave	In Depth   Elevation
Termination I	Depth:	9.5	feet bgs	Date Comple	ted:	8/10/2024	(fe	et bgs)	(ft NAVD88)	(	feet bgs)   (ft NAVD88)
Proposed Lo	cation:	SWM Area		Logged By:	JB		During:		Ţ		
Excavating M	ethod:	Backhoe		Contractor:	CL		At Completion:		▽	At Completion:	<u></u>
Test Method:		Visual Obse	ervation	Rig Type:	Caterp	oillar 430	24 Hours:		<u></u> _		
SAMPLE	INFORM	ATION	DEPTH	STRATA	STRATA DESCRIPTION OF MATERIALS				REMARKS		
Depth (ft.)	Number	Туре	(feet)				(Cla	assifica	tion)		
			0.0								No indication of ESGWH
			_	TOPSOIL	<u>NU/</u>	12" Topsoil					
				SUBSOIL		6" Subsoil, Roo	ts				
			_								Minor mottling @ 3 fbgs
3.5	1	Grab	-								
			5.0	GLACIAL TILL	ان و من	Brown, Silty Sa	nd with Gravel, Cobble	s, Boulders	: (SM)		
						Test Pit TP-6 T	erminated upon Refusa	I at Depth	of 9.5 Feet Below G	round Surface.	

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

RECORD OF SUBSURFACE EXPLORATION RJO Apartment Montville CT GM2422090 Test Pit Logs 7-22 and 8-10-24 FOR SWM REPORT 8/15/2024



# RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-7

Page 1 of 1

Project:	Proposed	Apartment E	Building					WAI	Project No.:	GM2422090.000	
Location: 2268 - 2284 Connecticut Route 32, Montville, New London County, Connecticut Client: R.J. O'Connell & A								Associates, Inc.			
Surface Elevation: ± 146.0 feet NAVD88 Date Started: 8/10/2024								er Depth	Elevation		-In Depth   Elevation
Termination	Depth:	9.5	feet bgs	Date Comple	ted:	8/10/2024	(	feet bgs)	(ft NAVD88)	(	feet bgs)   (ft NAVD88)
Proposed Loo	cation:	SWM Area		Logged By:	JB .		During:		¥		
Excavating M		Backhoe		Contractor:			At Completion:		∇	At Completion:	<u> </u>
Test Method:		Visual Obs	ervation	Rig Type:		oillar 430	24 Hours:		<u></u>		
SAMPLE	INFORM	IATION	DEPTH	STRATA					MATERIALS		REMARKS
Depth (ft.)	Number	Туре	(feet)				(C	lassifica	ition)		
			0.0								No indication of ESGWH
					<u>NU</u> 2						
			_								
				TOPSOIL	<u>\\\/</u>	24" Topsoil					
					<u>NU/</u>						
			_		NU2						
					<u></u>						
			-+	SUBSOIL	Ш	6" Subsoil, Roc	ots				1
			+								
3.5	1	Grab	-								
			-								
			5.0								
				GLACIAL		Brown Silty So	nd with Gravel, Cobbl	oo Pouldor			
				GLACIAL		DIOWII, SIILY Sa	nd with Glavel, Cobbi	es, bouider	S (SIVI)		
				TILL							
			_								
			10.0			Test Pit TP-7 T	erminated upon Refus	al at Depth	of 9.5 Feet Below (	Ground Surface.	
			10.0								
			15.0								

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

RECORD OF SUBSURFACE EXPLORATION RJO Apartment Montville CT GM2422090 Test Pit Logs 7-22 and 8-10-24 FOR SWM REPORT 8/15/2024



# RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-8

Page 1 of 1

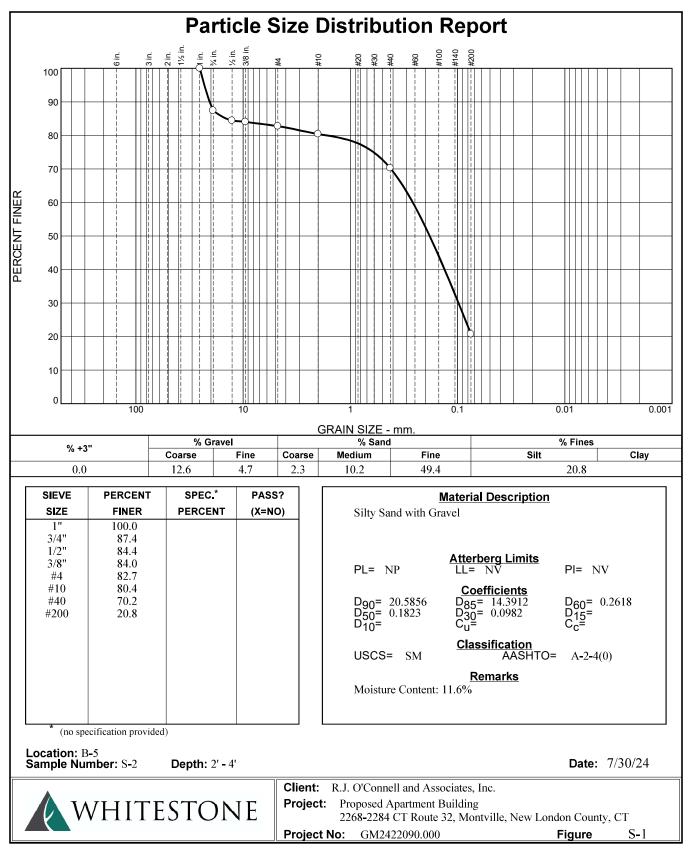
Project:	Proposed	Apartment E	Building					WAI	Project No.:	GM2422090.000	
	2268 - 228	34 Connectio	cut Route 32, Mo	ontville, New Lor	ndon C	ounty, Connec	ticut		Client:	R.J. O'Connell & /	Associates, Inc.
Surface Eleva	ation: ±	148.0	feet NAVD88	Date Started		8/10/2024	Wate	er Depth	Elevation	Cave	In Depth   Elevation
Termination D	Depth:	9.0	feet bgs	Date Comple	ted:	8/10/2024	(f	eet bgs)	(ft NAVD88)	(	feet bgs)   (ft NAVD88)
Proposed Loo	cation:	SWM Area	-	Logged By:	JB .		During:		Y I		
Excavating M	ethod:	Backhoe		Contractor:	-		At Completion:		<del></del> \[\]	At Completion:	<u> </u>
Test Method:		Visual Obse	ervation	Rig Type:		oillar 430	24 Hours:		<b>T</b>		
							-			ļ	
SAMPLE	-		DEPTH	STRATA					MATERIALS		REMARKS
Depth (ft.)	Number	Туре	(feet)				(CI	assifica	tion)		
			0.0								No indication of ESGWH
					\$112						
			_	TOPSOIL		12" Topsoil					
					<u>\\\/</u>						
				SUBSOIL		6" Subsoil, Roc	ts				
						,					
			_								
4.5	1	Grab	_								
			5.0	GLACIAL							
				TILL		Brown, Silty Sa	nd with Gravel, Cobble	s. Boulders	; (SM)		
			_						()		
			_								
			_								
			_								
						Test Pit TP-8 T	erminated upon Refus	al at Depth	of 9.0 Feet Below G	Fround Surface.	
							-				
			10.0								
			15.0								

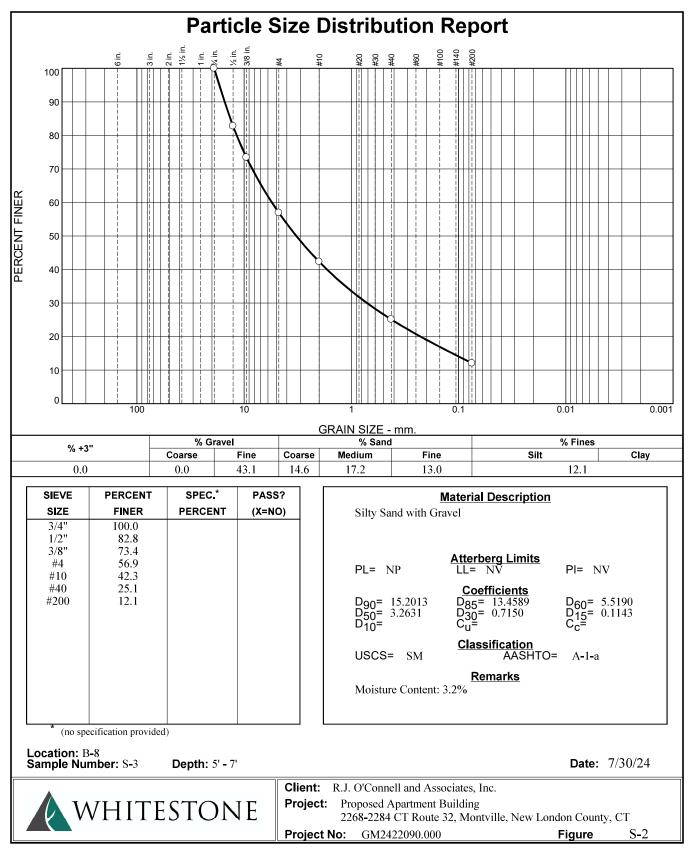
NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

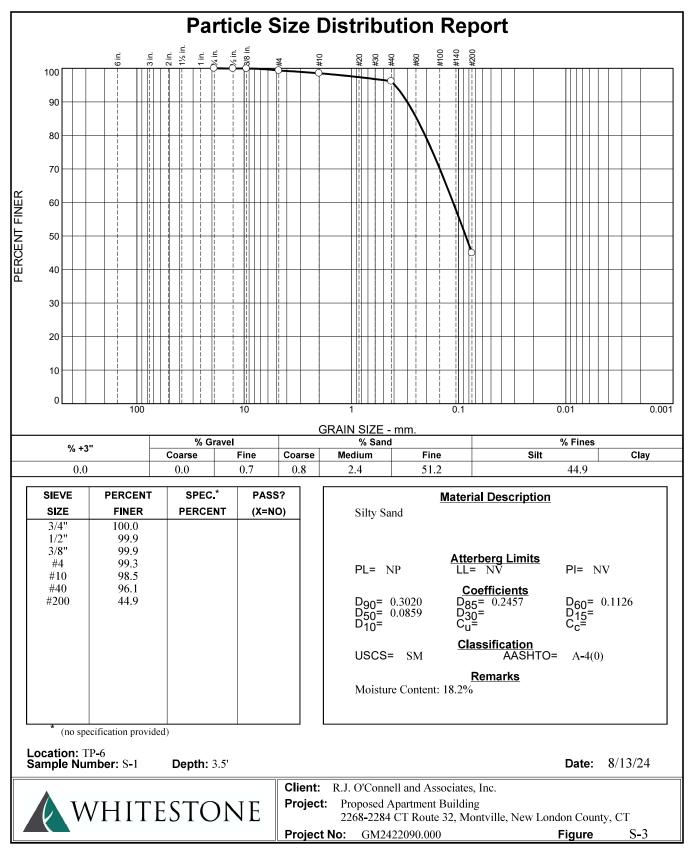
RECORD OF SUBSURFACE EXPLORATION RJO Apartment Montville CT GM2422090 Test Pit Logs 7-22 and 8-10-24 FOR SWM REPORT 8/15/2024

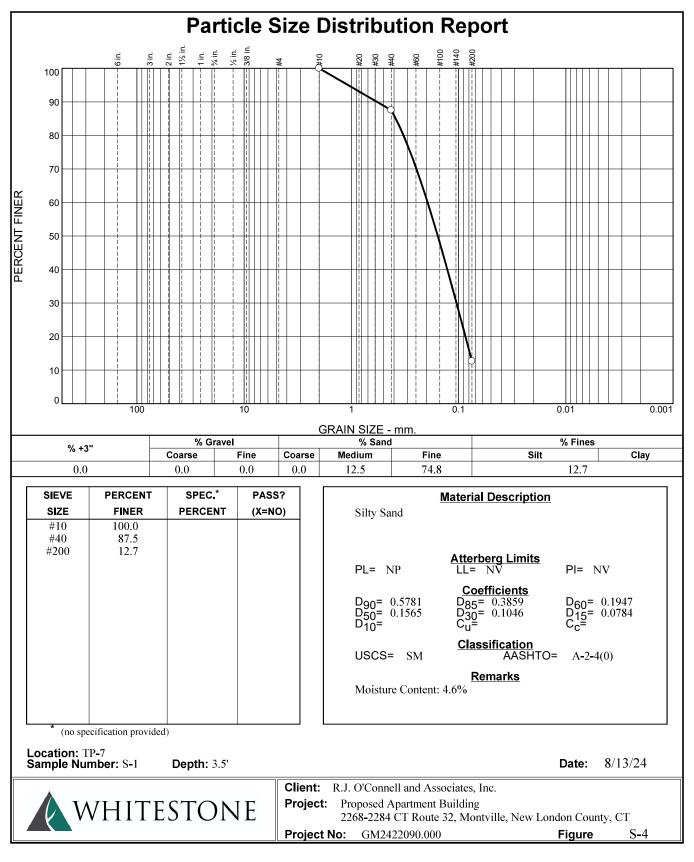


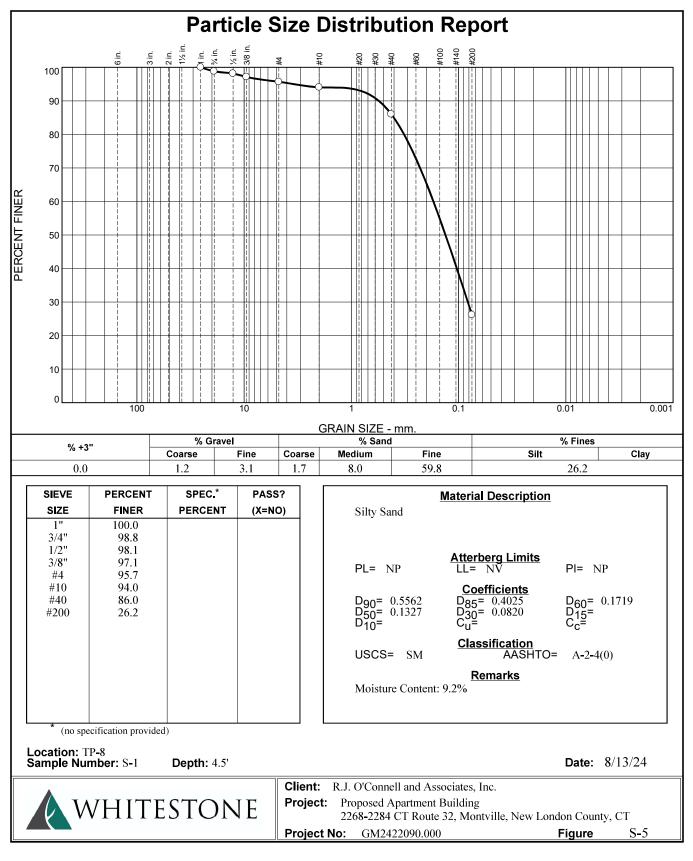
# **APPENDIX B Laboratory Test Results**













# APPENDIX C Supplemental Information (USCS, Terms & Symbols)



# **UNIFIED SOIL CLASSIFICATION SYSTEM**

	MAJOR DIVISIONS		LETTER SYMBOL	TYPICAL DESCRIPTIONS
	GRAVEL AND	CLEAN GRAVELS	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	GRAVELLY SOILS	(LITTLE OR NO FINES)	GP	POORLY-GRADED GRAVELS, GRAVEL- SAND MIXTURES, LITTLE OR NO FINES
COARSE GRAINED SOILS	MORE THAN 50% OF COARSE FRACTION	GRAVELS WITH FINES	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
SOILS	RETAINED ON NO. 4 SIEVE	(APPRECIABLE AMOUNT OF FINES)	GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY	CLEAN SAND (LITTLE OR NO	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	SOILS	FINES)	SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
MORE THAN	MORE THAN 50% OF	SANDS WITH	SM	SILTY SANDS, SAND-SILT MIXTURES
50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	COARSE FRACTION <u>PASSING</u> NO. 4 SIEVE	FINES (APPRECIABLE AMOUNT OF FINES)	SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE	SILTS		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
GRAINED SOILS	AND CLAYS	<u>LESS</u> THAN 50	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
MATERIAL IS SMALLER THAN NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMITS <u>GREATER</u> THAN 50	СН	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
SIZE			ОН	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
ŀ	HIGHLY ORGANIC SOILS		PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

SOIL CLASSIFICATION CHART

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS FOR SAMPLES WITH 5% TO 12% FINES

#### **GRADATION\***

#### % FINER BY WEIGHT

TRACE	1%	то	10%
LITTLE	10%	то	20%
SOME	20%	то	35%
AND	35%	то	50%

COMPACTNESS\* Sand and/or Gravel

RELATIVE
DENSITY

----

1% TO 10%	LOOSE	0% TO	40%
10% TO 20%	MEDIUM DENSE	40% TO	70%
20% TO 35%	DENSE	70% TO	90%
35% TO 50%	VERY DENSE	. 90% TO ′	100%

. . . . . .

CONSISTENCY\* Clay and/or Silt

RANGE OF SHEARING STRENGTH IN POUNDS PER SQUARE FOOT

\* VALUES ARE FROM LABORATORY OR FIELD TEST DATA, WHERE APPLICABLE. WHEN NO TESTING WAS PERFORMED, VALUES ARE ESTIMATED.

L:\Geotechnical Forms and References\Reports\USCSTRMSSYM CT.docx

PENNSYLVANIA

Office Locations:

Florida



# **GEOTECHNICAL TERMS AND SYMBOLS**

#### SAMPLE IDENTIFICATION

The Unified Soil Classification System is used to identify the soil unless otherwise noted.

#### SOIL PROPERTY SYMBOLS

- N: Standard Penetration Value: Blows per ft. of a 140 lb. hammer falling 30" on a 2" O.D. split-spoon.
- Qu: Unconfined compressive strength, TSF.
- Qp: Penetrometer value, unconfined compressive strength, TSF.
- Mc: Moisture content, %.
- LL: Liquid limit, %.
- PI: Plasticity index, %.
- δd: Natural dry density, PCF.
- ▼: Apparent groundwater level at time noted after completion of boring.

#### DRILLING AND SAMPLING SYMBOLS

- NE: Not Encountered (Groundwater was not encountered).
- SS: Split-Spoon 1 <sup>3</sup>/<sub>8</sub>" I.D., 2" O.D., except where noted.
- ST: Shelby Tube 3" O.D., except where noted.
- AU: Auger Sample.
- OB: Diamond Bit.
- CB: Carbide Bit
- WS: Washed Sample.

#### RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

#### Term (Non-Cohesive Soils)

Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

Term (Cohesive Soils)	<u>Ou (TSF)</u>
Very Soft	0 - 0.25
Soft	0.25 - 0.50
Firm (Medium)	0.50 - 1.00
Stiff	1.00 - 2.00
Very Stiff	2.00 - 4.00
Hard	4.00 +

#### PARTICLE SIZE

Boulders	8 in.+	Coarse Sand	5mm-0.6mm	Silt	0.074mm-0.005mm
Cobbles	8 in3 in.	Medium Sand	0.6mm-0.2mm	Clay	-0.005mm
Gravel	3 in5mm	Fine Sand	0.2mm-0.074mm	-	

L:\Geotechnical Forms and References\Reports\USCSTRMSSYM CT.docx

MASSACHUSETTS

CONNECTICUT

Florida

**Standard Penetration Resistance** 

APPENDIX C Stormwater Pollution Control Plan (SWPCP) To be submitted prior to construction

# **Stormwater Pollution Control Plan (SWPCP)**

# Horizon View 2268-2284 Connecticut Route 32 Montville, CT 06353

**Prepared for:** 

Honeycomb Real Estate Partners 20 Avon Meadow Lane Montville, CT 06001

**Prepared by:** 

RJOC

R.J. O'Connell & Associates, Inc. 80 Montvale Ave, Suite 201 Stoneham, MA 02180

Date:

October 2024

# STORMWATER POLLUTION CONTROL PLAN SWPCP

Horizon View Montville, CT

State Project No. TBD EzFile No. TBD

# **Connecticut Department of Transportation**

October 2024

This Stormwater Pollution Control Plan (SWPCP) is prepared to comply with the requirements for the General Permit for Stormwater Discharges from Construction Activities and the 2024 Connecticut Guidelines for Soil Erosion and Sediment Control (2024 E&S Guidelines).

# **Table of Contents**

Development & Contents of Plan	4
Site Description	4
Site Description	
Estimated Disturbed Area	
Estimated Runoff Coefficient	
Receiving Waters	
Extent of Wetlands on Site	
Construction Sequencing	6
Control Measures	8
Erosion and Sedimentation Controls	
Soil Stabilization and Protection	
Temporary Stabilization Practices	
Permanent Stabilization Practices	
Structural Measures	
Maintenance	
Dewatering Wastewaters	13
Dewatering Guidelines	
Post-Construction Stormwater Management	14
Post-Construction Guidelines	
Post Construction Performance Standards and Control Measure	
Redevelopment:	
Other Development:	
Runoff Reduction and LID Practices	
Suspended Solids and Floatable Removal	
Velocity Dissipation:	
Other Controls (Non-Structural)	18
Waste Disposal	
Washout Areas	
Anti-tracking Pads and Dust Control	
Maintaining and Storing Vehicles and Equipment- Storage of Chemicals & Petroleum	1.1.20
Products	19
Cold Water Stream Habitat	

Inspections	20
Plan Implementation Inspections	
Post-Construction Inspection	
Final Stabilization Inspection	
Keeping Plans Current	22
Revisions to Stormwater Pollution Control Plans	
Contractors	
Certification Statement	23
List of applicable Figures / Plans:	25
Appendix A – Figures	
Appendix B – Plan Sheets	25
Appendix C- Connecticut DEEP General Permit for the Discharge of Stormwater and	
Dewatering Wastewaters from Construction Activities	25
Appendix D- CTDOT MS4 Project Design Maximum Extent Practicable Worksheet	
Appendix E- Construction Site Environmental Inspection Report (CSEIR)	
Appendix F – Notice of Termination Form	

# **Development & Contents of Plan**

The Plan shall consist of site plan drawings and a narrative. The Plan shall be prepared in accordance with sound engineering practices, and shall be consistent with the <u>2024 Connecticut</u> <u>Guidelines for Soil Erosion and Sediment Control</u> (2024 E&S Guidelines), the <u>2024 Connecticut</u> <u>Stormwater Quality Manual (2024 SWQ Manual)</u>, and any applicable requirements of this general permit.

# **Site Description**

# **Site Description**

The proposed project site, referred herein as the "Site", is located at 2268-2248 Norwich-New London Turnpike (Route 32) in Montville, CT. The Site totals approximately 3.4 acres in area, located in the Commercial 1 (C-1) district and the Route 32 Overlay District (OZ) and is bound by residential properties to the north and west, Route 32 to the east, and Shantok Motors commercial property to the south. The existing Site is currently an undeveloped open space area.

The purpose of this project is to construct a new four-story, 60,000 sf, 57-unit residential building with an approximate 15,000 sf footprint. Substantial new landscaping along the perimeter and within the development is proposed, along with a stormwater management system providing water quality treatment and peak flow mitigation.

- Stormwater from the Site flows off the property in one location and onto Meadow Lane. Runoff from the Site flows into Shantok Brook. Shantok Brook is not identified as an impaired water body per the 2022 State of Connecticut Integrated Water Quality Report.
  - o <u>2022 Integrated Water Quality Report List of Impaired Waters for CT</u>
- The project is not within an Aquifer Protection Area (APA) per the online Connecticut Aquifer Protection Areas map. The project is not located within a public water supply watershed per the online DPH Connecticut Public Water Supply Map.
  - <u>Aquifer Protection Area Interactive Map</u>
  - <u>Public Water Supply Map (ct.gov)</u>
- The outfall from the project does not discharge to a river within the National Wild and Scenic Rivers System Connecticut per the online National Wild and Scenic Rivers System mapping tool.
  - o <u>National Wild & Scenic River System</u>
- There are no endangered or threatened species and critical habitats on or near the project area per the Natural Diversity Data Base Areas Montville, CT Map.

# **Estimated Disturbed Area**

The total area for this project site is 3.4 acres. Of this area, 3.4 acres will be disturbed by construction activities.

Total project area: 3.4 acres Construction site area to be disturbed: 3.4 acres Percentage impervious (pre-development): 0% Percentage impervious (post-development): 61% Effective impervious cover (pre-development) = 0% Effective impervious cover (post-development) = 62%

# Pre- and Post-Development Peak Rates of Runoff in Cubic Feet per Second (cfs)

Point of Analysis 1				
Storm Frequency	Existing Flow Rate (cfs)	Proposed Flow Rate (cfs)	Change (cfs)	% Reduction
2-Year	1.47	1.17	-0.30	20%
10-Year	7.53	7.27	-0.26	3%
25-Year	13.08	12.02	-1.06	8%
100-Year	23.15	16.51	-6.64	29%

# Pre- and Post-Development Volume of Runoff in Acre-Feet (af)

Point of Analysis 1				
Storm Frequency	Existing Volume (ac-ft)	Proposed Volume (ac-ft)	Change (ac-ft)	% Reduction
2-Year	0.527	0.379	-0.148	28%
10-Year	1.659	1.488	-0.171	10%
25-Year	2.576	2.456	-0.120	5%
100-Year	4.206	4.132	-0.074	2%

### **Estimated Runoff Coefficient**

As depicted in the calculations below, the runoff coefficient for pre- and post-construction is 0.77 and 0.75 (respectively).

The runoff coefficient assumed for pavement is 0.9 and for gravel roads is 0.7. For the pervious areas, a coefficient of 0.3 was assumed.

Pre-Construction  $\frac{(0 \text{ ac. } x \ 0.9) + (3.4 \text{ ac. } x \ 0.3)}{0 \text{ ac. } + 3.4 \text{ ac.}} = 0.30$ 

Pre-Construction  $\frac{(2.1 \text{ ac. } x \text{ } 0.9) + (1.3 \text{ ac. } x \text{ } 0.3)}{2.1 \text{ ac. } + 1.3 \text{ ac.}} = 0.67$ 

#### **Receiving Waters**

Stormwater from the Site flows off the property at one location. Runoff from the Site flows onto Meadow Lane and eventually discharges to Shantok Brook and the Thames River. The Shantok Brook is not identified as an impaired water body per the 2022 State of Connecticut Integrated Water Quality Report.

### **Extent of Wetlands on Site**

There is one small wetland located at the north property line of the Site.

The Site is located outside the 100-year flood zone according to the Federal Emergency management Agency (FEMA) FIRM panel 357 of 554 on map number 09011C0351G last revised July 18, 2011.

# **Construction Sequencing**

The proposed project will be constructed in one phase. Construction is anticipated to take one year from the completion of permitting.

The contractor will be responsible for implementing the following erosion and sediment controls and storm water management control measures. The contractor shall comply with the Connecticut Department of Energy & Environmental Protection (DEEP) 2024 Stormwater Quality Manual and the most recent edition of the Connecticut Erosion and Sediment Guidelines. The contractor may designate these tasks to certain subcontractors as he sees fit, but the ultimate responsibility for implementing these controls and ensuring their proper functioning remains with the contractor. The order of activities will be as follows:

- 1. Install perimeter straw wattles in the locations shown on DWG. C-1 titled "Demolition and Erosion Control Plan". Straw wattles to be installed per detail shown on detail sheets.
- 2. Install inlet/outlet protection at the locations of all existing grate inlets, curb inlets and at the ends of all exposed storm water drainage pipes.
- 3. Begin termination of existing utility services in accordance with the requirements of the utility company having authority.
- 4. Commence clearing and grubbing activities.
- 5. Excavate temporary sediment basin and temporary drainage swale per the C-1 plan and as needed to collect any silt laden runoff.
- 6. The temporary sediment basin and temporary drainage swale shown on the plan depict one point in time during earthwork construction. The temporary basins as shown are sized to hold a volume of 134 cy/ac based on contributing area. Catchment areas to sediment traps shall be kept as small as possible. Installation of the infiltration system will be kept as small as possible.
- 7. Installation of the infiltration system will commence once temporary drainage swales and sediment basins are in place.
- 8. Commence site grading activities (rough grade site). During grading activities perform erosion and sediment control inspections as required this Stormwater Pollution Control Plan.
- 9. Fill slopes shall be compacted and stabilized with vegetation and erosion control blankets as quickly as possible during the initial site earthwork.
- 10. At all times during grading activities, verify stability of perimeter controls and repair where necessary. Clean and re-install all inlet and outlet protection. Cover stockpiles to minimize erosion by wind or rainfall. Complete final sweeping of all existing paved surfaces to remove any remaining sediment.
- 11. Inspect the entire site to verify that no areas remain that are susceptible to allowing sediment and/or hazardous materials to be discharged from the project Site.
- 12. Disturbed areas of the Site where construction activity has, or will, cease for more than 7 days shall be temporarily stabilized.
- 13. Install site utilities. Inlet protection must be installed at all existing and new drain inlets. Place rip-rap and outlet protection at all drain outlets at locations shown on the plans.
- 14. Finalize pavement and building subgrade preparation.
- 15. Remove inlet protection around inlets and manholes no more than 48 hours prior to placing stabilized base course.
- 16. Install and compact pavement gravel.
- 17. Install binder and finish course pavement.
- 18. Install silt bags in catch basins until the site is vegetated and stabilized.
- 19. Fine grade landscape areas and install landscape plantings.
- 20. Install traffic control signage and parking lot striping.
- 21. Complete outstanding punch list items and perform final clean-up activities.
- 22. Remove and dispose of all accumulated sands and sediment to design grades, stabilize and revegetate disturbed areas.
- 23. Remove perimeter controls after paving operations are complete and all disturbed areas are stabilized, only upon approval of the Town of Waterford.
- 24. Clean all stormwater structures and devices that collected and conveyed stormwater from the construction area.

# **Control Measures**

This section describes the minimum measures required to control soil erosion during and after construction of the proposed sitework. The soil erosion and sediment control measures depicted herein are designed in accordance with a document entitled "Connecticut Guidelines for Soil Erosion and Sediment Control" published by the Connecticut Council on Soil and Water Conservation in 2024. The contractor may be required to implement additional measures to prevent site erosion and sedimentation of downstream waterways.

For those areas for which construction activity will be temporarily suspended for a period of greater than 14 days, temporary stabilization measures shall be implemented within 3 days of such suspension of activity. For all areas, permanent stabilization shall be implemented within 30 days of disturbance:

### **Erosion and Sedimentation Controls**

The Department of Transportation (STET) will have a Qualified Inspector assigned to the project to oversee the Contractor's operations and to ensure compliance with the provisions of the Contract. Further Department oversight is provided by the Eastern District Environmental Coordinator and the Office of Environmental Planning.

The following timelines will be followed for the proposed construction activities:

- The Contractor shall stabilize disturbed areas with temporary or permanent measures as quickly as possible after the land is disturbed. *Requirements for soil stabilization are detailed in Form 818 Section 1.10, Environmental Compliance.*
- Areas that remain disturbed but inactive for at least 30 days shall receive temporary seeding or soil protection within seven (7) days.
- Areas that will be disturbed past the planting season will be covered with a long-term, non-vegetative stabilization method that will provide protection through the winter.
- If construction activities are completed to final grade, permanent seeding shall take place within seven (7) days. (*Review Chapter 5 of the 2022 E&S Guidelines*)

The following note (below) appears on the project Construction Plans; Department projects are required to have Preconstruction Meetings with the Contractor. The Contractor is required to review and understand the Contract Plans and Specifications and to develop an E&S Plan for review and approval by the Engineer. In the review of the Contractor's E&S plan at all disturbed locations for compliance with the Stormwater Permit requirements for a double row of sediment control barriers.

#### **Double Row of Erosion and Sediment Control Barriers (SCS)**

• Additional erosion control barriers (double row of SCS) may be required within the project area. Factors to be reviewed by the Engineer include but are not limited to: the contributing disturbed area, drainage area, slope, length of slope, and flow conditions to maintain sheet

flow. If determined necessary, the Engineer will direct the Contractor to install and maintain additional rows of erosion control barrier (or equivalent).

# Soil Stabilization and Protection

The project erosion and sediment control monitor shall supervise the layout of sediment and erosion control measures to ensure maximum protection of existing native trees and shrubs. Erosion and sediment control measures shall be installed prior to any fill being placed and shall be modified as required during earthwork operations to control and divert surface runoff from fill slopes and exposed soil surfaces. The erosion and sediment control measures shall include silt fences and staked straw wattles at bottom of fill slopes. erosion control blankets shall be placed on completed slopes steeper than 3:1 as soon as possible. When necessary, seeding with temporary grasses may be required. use berms and temporary drainage swales to divert runoff from slopes prior to final stabilization.

Bring all excavated, filled, or disturbed areas to final grade as soon as possible and stabilize areas with loam, seed and mulch immediately. Keep erosion control measures in place until the site is stabilized with pavement and/or vegetation.

### **Reverse Slope Benches**

A reverse slope bench is required for any slope steeper than 3:1 (horizontal: vertical) that exceeds 15 feet vertically, except when engineered slope stabilization structures or measures are included or a detailed soil mechanics analysis has been conducted to verify stability. Engineered analyses and measures must be designed by a Connecticut licensed Professional Engineer with experience in geotechnical engineering or soil mechanics.

Reverse Slope Benches have not been incorporated into the project since there are no slopes steeper than 3H:1V that exceed 15' tall. Therefore, there is no need to lessen the erosive potential of surface water and subsequent rilling and rutting.

# **Temporary Stabilization Practices**

#### Temporary grass cover:

Provide temporary grass cover where indicated on the plans or where temporary land grading will be unaltered for more than one month but less than 12 months. The contractor shall loosen the soil to a depth of two inches before seeding. If existing soil is not capable of growing grass, the contractor shall spread at least two inches of topsoil over the loosened surface. If seeding commences during the summer or early autumn, annual or perennial rye grass seed shall be used. If seeding commences in spring or late autumn, winter rye grass seed shall be used. Seeding rates shall be 5 lbs./1000 s.f. Hay mulch shall be spread at the rate of 100 lbs/1000 s.f. The contractor shall irrigate the grass until an acceptable stand of grass is established.

#### Stockpiling or storage of excavated materials:

Completely surround all temporary (2-4 weeks) material stockpiles with silt fence to prevent transportation of sediment. Seed stockpiles what will remain for a longer duration with a quick growing rye grass.

#### Fabric slope protection:

Install fabric slope protection on slopes steeper than 3:1. The contractor shall select a fabric from the Connecticut department of transportation's approved product list. Curlex erosion control matting by American Excelsior company or approved equal. The contractor will submit a filter fabric shop drawing for engineer and municipality review and approval. The fabric shall meet the requirements of class 1 type c slope protection. The fabric shall be installed in accordance with the manufacturer's instructions and guidelines. The contractor shall maintain the fabric until a stand of grass, acceptable to the engineer, is established.

#### Temporary mulch:

Mulch all disturbed areas with hay or straw at the rate of 2 tons per acre. Spread mulch by hand or mulch blower to provide a uniform distribution. Anchor the mulch by tracking with tracked construction equipment so cleat marks are parallel to the contour. Mulch nettings, applied in accordance with the manufacturer's recommendations, may be used as an alternate to tracking. Restore any areas where mulch is washed away or blown away by the wind.

This activity shall be used to stabilize areas where construction is suspended during the winter months. Once the appropriate dates for seeding are reached, the contractor shall complete the seeding operations.

#### Dust control:

Take precautions to prevent dust from becoming a nuisance to abutting property owners and streets. Broom off pavements adjoining the excavation on a daily basis. Cover and/or keep all earth stockpiles moist at all times. Use calcium chloride to control dust over certain areas of the site, as directed by the engineer or shown on the plans, calcium chloride shall conform to ASTM d-98, type I. The contractor shall maintain and inspect, on a daily basis, the adequacy of dust control measures and correct any deficiencies immediately.

#### Tree protection:

The contractor shall provide snow fencing, board fencing, or rope fencing around trees or groups of trees that are to remain, to protect them against damage. The contractor shall be responsible for selecting and installing the protection measures most appropriate for the conditions present. The contractor shall repair and/or replace tree protection measures immediately if damaged during construction.

Stabilization practices shall be implemented after completion, as final grades are reached, within seven (7) days.

Temporary seeding shall be spread over any disturbed areas which will remain inactive for at least 30 days. Areas to remain disturbed through winter shall be protected with non-vegetative stabilization measures. The Contractor must provide an Erosion and Sedimentation Control plan for each winter season during construction operations.

The Contractor may elect to utilize other controls in conformance with the 2024 E&S Guidelines, as approved by the Qualified Inspector. The Contractor will be required to provide the necessary details for any erosion controls not specifically called for on the project plans.

During construction, all areas disturbed by the construction activity that have not been stabilized,

structural control measures, and locations where vehicles enter or exit the site shall be inspected at least once a week and within 24 hours of the end of a storm that generates a discharge. For storms that end on a weekend, holiday, or other time in which normal working hours will not commence within 24 hours, an inspection is required within 24 hours following any storm in which 0.1 inches or greater of rain occurs. For lesser storms, inspection shall occur immediately upon the start of subsequent normal working hours.

# **Permanent Stabilization Practices**

During construction, the following methods of permanent stabilization shall be installed:

- <u>Topsoiling</u>: In conjunction with permanent seeding, once final grades have been established, topsoil shall be applied to provide a suitable growth medium for vegetation.
- <u>Permanent Seeding</u>: Once soils have been brought to final grade; permanent seeding shall be used to stabilize the soil with a vegetative cover. Disturbed areas below the wetland limit shall be seeded with the appropriate seed mix. Once the site has achieved final stabilization for at least one full growing season (April October) in <u>the year</u> following the end of construction, the Contractor shall have the site inspected by a Qualified Inspector to confirm such stabilization is maintained. The Qualified Inspector shall indicate compliance with this requirement on the Notice of Termination form.
- <u>Landscaping</u>: Wood chip mulch shall be placed around the plants. Plantings (trees, shrubs, etc.) and permanent seeding may be established together. Wood chip mulch shall NOT be utilized in wetland areas.

All new embankments and unpaved areas that are graded or disturbed by construction will receive erosion control matting, topsoil and/or turf establishment. The Contractor may use other permanent stabilization practices approved by the Qualified Inspector and in conformance with the 2024 E&S Guidelines.

# **Structural Measures**

#### **Temporary structural measures:**

Catch basin protection, filter fabric and stone filter:

Use filter fabric and stone filter for protection of catch basins in a low point as shown and detailed on DWG. C-1 and C-5. Firmly stake filter fabric into the pavement base material. Wrap the entire grate with Mirafi 140n filter fabric or approved equal. Remove sediment from around the inlet protection once levels reach 1/4 the effective height. Replace the inlet protection immediately if they are damaged or deteriorated. The fabric shall be replaced immediately if its permeability is impeded by sediment.

#### Catch basin protection, straw wattle check dams, type 5:

Use straw wattle check dams for protection of catch basins in a swale. Place staked barriers in the swale in at least two locations upstream of the basin as shown on the plans and details. Monitor the barriers to ensure that runoff either filters through the barrier or goes over the top.

Do not allow runoff to bypass the side of the barrier. Remove the sediment when it reaches 1/4 of the height of the barrier.

#### Temporary sediment trap:

Install temporary sediment trap in the locations shown on the plans. Construct the trap to the length, width, and depth shown on the plans. Inspect the sediment trap at least once per week and within 24 hours of the end of a storm with a rainfall amount of 0.5 inches or greater. Remove sediment once levels reach 50 percent of the trap's wet storage volume. Backfill the temporary sediment trap only after the site has been stabilized in a fashion that provides adequate sediment control through permanent devices prior to stormwater reaching the infiltration basin.

#### Temporary swales:

If runoff becomes channelized, install temporary swales and direct runoff to a temporary sediment trap. Modify and install additional swales as required during construction to direct runoff from fill slopes and exposed soil surfaces toward temporary sediment traps.

### Permanent structural measures:

Land grading: Proposed grades are shown in detail on civil drawing C-2.

Bring all excavated, filled, or disturbed areas to final grade as soon as possible and stabilize areas with loam, seed and mulch immediately. Keep erosion control measures in place until the site is stabilized with pavement and/or vegetation.

#### Infiltration system:

An infiltration system is required, as shown on the plans and details, to reduce the peak rate of runoff leaving the site. Construct the infiltration system according to the plans and details. Minimize the amount of sediment flowing into the underground system by temporarily capping the inlet pipe to the system until final catch basins and pavement courses have been installed. Additionally, install silt sacks or approved equivalent until construction is completed, in order to minimize sediment entering the infiltration chamber system. Following construction and site stabilization, the contractor shall remove sediment as required.

# **Maintenance**

The narrative shall include the procedures to maintain, in good and effective operating conditions, all erosion and sediment control measures, including vegetation, and all other protective measures identified in the Plan.

All construction activities and related activities shall conform to the requirements of Section 1.10 "Environmental Compliance" of Form 818, the Department's Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction. In general, all construction activities shall proceed in such a manner so as not to pollute any wetlands, watercourses, water body, and conduit carrying stormwater. The Contractor shall limit, in so far as possible, the surface area of earthen materials exposed by construction activity and immediately provide temporary and permanent pollution control to prevent soil erosion and contamination on the site. Water pollution control provisions and Required Best Management Practices per Section 1.10, Environmental Compliance of the Standard Specifications shall be administered during construction. Control measures shall be inspected and maintained in accordance with the 2024 E&S Guidelines and as directed by the Qualified Inspector .

# **Dewatering Wastewaters**

# **Dewatering Guidelines**

When dewatering is necessary, pumps used shall not be allowed to discharge directly into a wetland, watercourse, or stormwater drainage system. Prior to any dewatering, the Contractor must prepare a written proposal for specific methods and devices to be used, including, but not limited to, the pumping of water into a temporary sedimentation basin, providing surge protection at the inlet or outlet of pumps, floating the intake of a pump, or any other method for minimizing and retaining the suspended solids. If the Qualified Inspector determines that a pumping operation is causing turbidity problems, the Contractor shall halt said operation until a means of controlling the turbidity is submitted by the Contractor.

No discharge of dewatering wastewater shall contain or cause a visible oil sheen, floating solids or foaming in the receiving water. If required, all activities are to be performed in compliance with the Department's Standard Specifications.

# **Post-Construction Stormwater Management**

(All controls in this section must be in conformance with the 2024 SWQ Manual and the Department's qualified product list. Be sure to use the same call outs for structures as in the manual)

The Qualified Inspector may consider BMP's to be installed during the construction process to minimize the discharge of pollutants, and stormwater discharges that will occur after construction operations have been completed.

- <u>Minimal Curbing</u>: Curbing shall be avoided wherever possible to maximize overland sheet flow and encourage infiltration. See if this can be moved elsewhere
- <u>Outlet Protection</u>: Riprap outlet protection shall be used at the proposed outlet to decrease velocity and the potential for erosion. (i.e. apron, splash pad...)
- Catch Basins w/4 ft. Sumps and Hoods: Catch basins shall be used, especially adjacent to outlets, to intercept pollutants and debris.
- <u>Street Sweeping</u>: Street sweeping shall be performed as required to clean debris/sediment prior to leaving the site.
- <u>Hydrodynamic Particle Separator</u>: Hydrodynamic Particle Separators shall be installed and cleaned as required to reduce the levels of TSS and provide treatment to stormwater prior to continuing to downstream drainage systems.

# **Post-Construction Guidelines**

After the project is complete, the Department will perform the following maintenance and restorative measures:

- Litter/debris and sweepings will be removed from the site regularly.
- Mowing and maintenance of the turf areas and vegetated areas will occur, as needed.
- Riprap outlet protection will be inspected and repaired, as needed.
- Stormwater drainage system will be cleaned of sediment/debris, as directed by the Qualified Inspector .
- Identify, inspect, and maintain all stormwater quality BMP's included within the project, as per the MS4 or manufacturer recommendations.

# **Post Construction Performance Standards and Control Measure**

### **Redevelopment:**

For sites that are already developed where there is more than 40% effective impervious cover, the site must be designed to retain on-site half the water quality volume for the site and provide

additional stormwater treatment without retention for discharges up to the full water quality volume for sediment, floatables and nutrients to the maximum extent achievable using control measures that are technologically available and economically practicable and achievable in light of best industry practice.

*If this retention and treatment cannot be achieved, describe:* 

- The measures taken to maximize runoff reduction on site.
- The reasons those are the maximum extent achievable.
- The alternative retention volume you are providing; and
- A description of the measures used to provide additional treatment above the alternative volume.

For Roadway and other linear redevelopment projects:

- For the developed portion of the ROW:
  - If the full retention standard cannot be met; describe the alternative retention provided and the treatment measures provided.

If the effective impervious cover will not be increased within a given watershed, stormwater treatment measures must be provided, but retention of half the water quality volume is NOT required. Permit says implement additional stormwater treatment.

In order to comply with the Department's MS4 Permit requirements. projects shall seek to reduce the effective impervious cover (as defined in 12/31/20 Construction SW Permit) to the maximum extent practicable.

"Effective Impervious Cover" is the area of impervious cover that is hydraulically connected to a water or wetland by means of continuous paved surfaces, gutters, swales, ditches, drain pipes or other conventional conveyance and detention structures that do not reduce runoff volume. Impervious cover is a surface composed of any material that impedes or prevents infiltration of water into the soil. Impervious surfaces shall include, but are not limited to, roofs, solid decks, driveways, patios, sidewalks, parking areas, tennis courts, concrete or asphalt streets, or compacted soils or compacted gravel surfaces.

Pre-Development:

Effective impervious cover = <u>Impervious cover hydraulically connected to water/wetlands</u> All area hydraulically connected to water/wetlands

Effective impervious cover = <u>0 acres (pavement)</u> 0 acres

Effective impervious cover (pre-development) = 0%

Post-Development:

Effective impervious cover = <u>Impervious cover hydraulically connected to water/wetlands</u> All area hydraulically connected to water/wetlands Effective impervious cover = <u>2.1 acres</u>. 3.4 acres

Effective impervious cover (post-development) = 62%

Required Water Quality Volume (WQV)

#### Subsurface Infiltration Field #1 (PSIS-1)

This subsurface infiltration field is located in the proposed landscape area and pavement, west of the proposed residential building. It collects and provides treatment for all the stormwater runoff from the roof, as well as the parking area. The system utilizes 84" perforated CMP pipes configured in five rows. The proposed bottoms of the field and pipe inverts are 142'. The dimensions of the field is 155-feet x 49-feet for a total bottom area of 7,595 Square Feet. The volume provided is 29,441 Cubic Feet in the chambers and 12,518 Cubic Feet in the stone voids for a total volume of 41,968 Cubic Feet. The system is designed to store and infiltrate up to the required treatment amount.

The on-site stormwater management system has been designed to capture, detain, and treat stormwater runoff from the on-stormwater runoff while capturing and detaining stormwater runoff from the offsite tributary area, which will improve runoff conditions. A hydrodynamic particle separator (CDS Unit) has been provided to minimize the number of contaminants that may flow into the system. The subsurface infiltration system has three inlets from CDS Units, which directs flow into the system..

WQV = (P) \* (R) \* (A)(1ft/12in)

Where:

WQV = Water Quality Volume R = Volumetric Runoff Coefficient (dimensionless) = 0.05 + 0.009(I) I = Percent Impervious Cover = 90,735 SF / 148,322 SF = 62 % A = Drainage Area in Acres = 148,322 SF = 3.4 AC

R = 0.05 + 0.009(I)

R = 0.05 + 0.009(62)

R = 0.608

WQV = 1.30 \* 0.608 \* 148,322 (1ft/12in)

WQV = 9,770 CF = 0.224 acre feetProposed Volume provided 41,968 CF

# **Other Development:**

A stormwater management system has been designed consistent with the Connecticut Stormwater Quality Manual that will improve upon the current stormwater runoff conditions in terms of peak flow control, recharge, and water quality from pre-development conditions. Runoff control, water quality improvement, and groundwater recharge will be accomplished by implementing the following drainage improvements:

- Collect storm runoff in catch basins with deep sumps and hooded outlets,
- Route runoff through hydrodynamic particle separators for additional removal of Total Suspended Solids (TSS),
- Construction of a subsurface infiltration systems designed to retain and recharge runoff, thereby reducing the hydraulic burden on the existing drainage system.

# **Runoff Reduction and LID Practices**

The proposed stormwater management measures described above will not have any adverse impacts to the adjacent properties. Runoff generated from storms up to the 100-year storm will be mitigated through the various on-site closed drainage systems prior to discharging offsite. Water quality will be enhanced over existing conditions, resulting in an overall improvement in storm runoff from the Site compared to pre-development conditions.

# **Suspended Solids and Floatable Removal**

The onsite stormwater management system has been designed to collect, treat and infiltrate the first inch of rain on-site via deep sump catch basins, hydrodynamic particle separators, and subsurface infiltration system, achieving greater than 80% Total Suspended Solids (TSS) pollutant removal rates. Therefore, the stormwater management system will minimize the discharge of suspended solids and floatable (e.g., oil and grease, other floatable liquids, floatable solids, trash, etc.)

# **Velocity Dissipation:**

Velocity dissipation devices shall be placed at discharge locations and along the length of any outfall channel as necessary to provide a non-erosive velocity flow offsite so that the existing, downstream characteristics and functions are maintained and protected.

# Waste Disposal

Construction site waste shall be properly managed and disposed of during the entire construction period.

The following is applicable:

- A waste collection area will be designated. The selected area will minimize truck travel through the site and will not drain directly to the adjacent wetlands.
- Waste collection shall be scheduled regularly to prevent the containers from overfilling.
- Spills shall be cleaned up immediately.
- Defective containers that may cause leaks or spills will be identified through regular inspection. Any found to be defective will be repaired or replaced immediately.
- Any stockpiling of materials should be confined to the designated area as approved by the Qualified Inspector .

### Washout Areas

Washout of applicators, containers, vehicles, and equipment for concrete shall be conducted in a designated washout area. No surface discharge of washout wastewaters from the area will be allowed. All concrete wash water will be directed into a container or pit such that no overflows can occur. Washout shall be conducted in an entirely self-contained system and will be clearly designed and flagged or signed where necessary. The washout area shall be located outside of any buffers and at least 50 feet from any stream, wetland or other sensitive water or natural resources as determined or designated by the Department's Office of Environmental Planning or the project Qualified Inspector .

Washout Area(s) will be site located by the Contractor, approved by the Qualified Inspector and the SWPCP revised, as appropriate. The "Concrete Washout Area" detail <u>Concrete Washout Detail</u> shows the recommended method of construction for the washout area. The designated area shall be designed and maintained such that no overflows can occur during rainfall or after snowmelt.

# **Anti-tracking Pads and Dust Control**

(Form 818- Sections 2.11, 9.39, 9.42, and 9.43)

Off –site vehicle tracking of sediments and the generation of dust shall be minimized. Temporary anti-tracking pads from the active work site to the existing pavement will be installed and maintained at the locations shown on the plans.

The Contractor shall:

• Maintain the entrance in a condition which will prevent tracking and washing of sediment onto paved surfaces.

- Provide periodic top dressing with additional stone or additional length as conditions demand.
- Repair any measures used to trap sediment as needed.
- Immediately remove all sediment spilled, dropped, washed or tracked onto paved surfaces.
- Ensure roads adjacent to a construction site are left clean at the end of each day.

If the construction entrance is being properly maintained and the action of a vehicle traveling over the stone pad is not sufficient to remove the majority of the sediment, then the contractor shall either:

- Increase the length of the construction entrance,
- Modify the construction access road surface, or
- Install washing racks and associated settling area or similar devices before the vehicle enters a paved surface.

For construction activities which cause airborne particulates, wet dust suppression shall be utilized. Construction site dust will be controlled by sprinkling the ground surface with water until it is moist on an as-needed basis. The volume of water sprayed shall be such that it suppresses dust yet also prevents the runoff of water.

# <u>Maintaining and Storing Vehicles and Equipment- Storage of Chemicals &</u> <u>Petroleum Products</u>

The Contractor shall take measures to prevent any contamination to wetlands and watercourses while maintaining and storing construction equipment on the site. All chemical and petroleum containers stored on site shall be provided with impermeable containment which will hold at least 110% of the volume of the largest container, or 10% of the total volume of all containers in the area, whichever is larger, without overflow from the containment area. All chemicals and their containers shall be stored under a roofed area except for those stored in containers of 100-gallon capacity or more, in which case double-walled tanks will suffice. Accumulation of rainwater within secondary containment must be visually inspected for sheen prior to being discharged. If any sheen is identified; the accumulated water must be removed by the Contractor to an appropriate off-site location.

# **<u>Cold Water Stream Habitat</u>**

For construction activities within a Cold-Water Stream Habitat watershed, the one hundred (100) foot undisturbed buffer specified is that section must be verified post-construction and, where such buffer is located within the boundaries of the construction site, supplemented with additional plantings as necessary to maintain canopy/stream cover.

- The construction activities associated with the project are not within a Cold-Water Stream Habitat watershed per the online CT Dept. of Energy and Environmental Protection Cold Water Habitat mapping tool.
  - o Cold Water Stream Habitat Map Application

# Inspections

The Qualified Inspector will conduct site inspections once a week or after any rain event of 0.1" or greater. The Qualified Inspector conducting inspections shall fill out a <u>Construction Site</u> <u>Environmental Inspection Report (CSEIR)</u> for each inspection described below. Each report shall be retained as a part of the SWPCP. The report shall include a statement that, in the judgment of the Qualified Inspector(s) conducting the site inspection, the site is either in compliance or out of compliance with the terms and conditions of the Plan and permit. If the site inspection indicates that the site is out of compliance, the inspection report shall include a summary of the remedial actions required to bring the site back into compliance, review Keeping Plans Current.

### **Plan Implementation Inspections**

For each phase of construction, the site shall be inspected at least once within the first 30 days of construction activity and at least three times, with 7 or more days between inspections, within the first 90 days of construction activity to confirm compliance and proper initial implementation of all control measures.

### **Routine Inspections**

The Permittee will maintain a rain gauge on-site to document rainfall amounts. During construction, all areas disturbed by the construction activity that have not been stabilized, all erosion and sediment control measures, structural control measures, soil stockpile areas, washout areas, and locations where vehicles enter or exit the site shall be inspected for evidence of or the potential for pollutant entering the drainage systems and impacts to the receiving waters at least every seven (7) calendar days and within 24 hours of the end of a storm that generates a discharge.

For storms that end on a weekend, holiday, or other time in which normal working hours will not commence within 24 hours, an inspection is required within 24 hours following any storm in which 0.1 inches or greater of rain occurs. For lesser storms, inspection shall occur immediately upon the start of subsequent normal working hours.

Where sites have been temporarily or finally stabilized, such inspection shall be conducted at least weekly until final stabilization has been achieved.

Qualified Inspectors provided by the Department's Eastern District Office shall conduct inspections.

The following items shall be inspected as described below:

Item	Procedure
Parking Lot & Roadways	The parking lot and roadways in and around the project site should be inspected weekly to find if any trash or debris is present.

Landscaped areas	Landscaped areas within the project site should be inspected weekly for any trash or debris.
Compactor/Dumpster	The compactor/dumpster area should be inspected weekly for any trash or debris in and around the area.
Property Perimeter	The property perimeter should be inspected weekly for any trash or debris.
Catch Basins	Catch basins should be inspected semi-annually for any trash, oil sheen, hood (securely fastened), and excessive sediment. Catch basins should be cleaned annually.
Curbing	Curbing should be inspected semi-annually for structural conditions.
Hydrodynamic Particle Separators (CDS Units)	Hydrodynamic Particle Separators (CDS Units) should be inspected semi-annually for trash, excessive sediment, structural condition.

### **Post-Construction Inspection**

Upon completion of construction activities and stabilization of the site, all post-construction stormwater structures, including catch basins, hydrodynamic particle separators, StormTech Isolator Rows, shall be cleaned of construction sediment or debris and the site inspected to confirm compliance with all post-construction stormwater management requirements. Sediment shall be properly disposed of in accordance with all applicable laws, regulations and guidelines. Any remaining sediment control system(s) SCS shall be removed prior to acceptance of the project by the Department.

# **Final Stabilization Inspection**

Once the site has achieved final stabilization, the site shall be inspected to confirm stabilization is maintained, and a Notice of Termination Form shall be submitted.

# **Revisions to Stormwater Pollution Control Plans**

The Department shall amend the Plan if the actions required by the Plan fail to prevent pollution or otherwise comply with provisions of the General Permit. The Plan shall also be amended whenever there is a change in contractors or sub-contractors at the site, or a change in design, construction, operation, or maintenance at the site which has not otherwise been addressed in the plan.

Resubmission is for extenuating circumstance in which new calculations are required such as the addition a new outfall or a modification to a stormwater quality structure within the project limits and not for modifications such as staging/access road relocations. Additionally, resubmission is applicable if there is a change in run off or discharge of pollutants.

If the results of the inspections require modifications to the Stormwater Pollution Control Plan, the plans shall be revised as soon as practicable after the inspection. Such modifications shall provide for a timely implementation of any changes to non-engineered controls on the site within 24 hours and implementation of any changes to the plan within 3 (three) calendar days following the inspection. For Engineered measures, corrective actions shall be implemented on site within 7 (seven) days and incorporated into a revised Plan within 10 (ten) days of the date of inspection.

In no event shall the requirements to keep the Plan current or update a Plan, relieve the permittee and their contactor(s) of the responsibility to properly implement any actions required to protect the waters of the State and to comply with all conditions of the permit.

# **General**

This section identifies all Contractors and Subcontractors who will perform on site actions which may reasonably be expected to cause or have the potential to cause pollution of the waters of the State.

### **Certification Statement**

All contractors and subcontractors must sign the attached statement. All certifications will be included in the Stormwater Pollution Control Plan.

### State Project No. TBD

Residential Development Montville, CT

"I certify under penalty of law that I have read and understand the terms and conditions of the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities. I understand that as Contractor on the project, I am covered by this General Permit, and must comply with the terms and conditions of this permit, including, but not limited to, the requirements of the Stormwater Pollution Control Plan prepared for this project."

# **GENERAL CONTRACTOR**

Signed:	Date:
Title: <u>TBD</u>	
Firm: <u>TBD</u>	Telephone:
Address: <u>TBD</u>	
TBD	
SUBCONTRACTOR	
Signed: <u>TBD</u>	Date:
Title: <u>TBD</u>	
Firm: <u>TBD</u>	Telephone:
Address: TBD	

# **General:**

This Stormwater Pollution Control Plan (SWPCP) is prepared to comply with the requirements for the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities. Also, to be considered part of the SWPCP are the proposed construction plans, special provisions, and the Connecticut Department of Transportation's "Standard Specifications for Roads, Bridges and Incidental Construction" (Form 818) including supplements thereto and the 2024 Connecticut Guidelines for Erosion and Sediment Control (2002 E&S Guidelines) and 2024 Stormwater Quality Manual (2024 SWQ Manual).

# List of applicable Figures / Plans:

### Appendix A – Figures

- USGS Map
- Soils Map
- FEMA Flood Insurance Map
- Existing Watershed Plan
- Proposed Watershed Plan
- Natural Diversity Data Base Areas Map Montville, CT

#### Appendix B – Plan Sheets

- Demolition and Erosion Control Plan
- Demolition and Erosion Control Notes
- Grading and Drainage Plan
- Erosion Control Details
- Applicable Stormwater details
- Overall Landscape Plan

#### Appendix C- Connecticut DEEP General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities

Appendix D- CTDOT MS4 Project Design Maximum Extent Practicable Worksheet

• CTDOT MS4 Maximum Extent Possible (MEP) sheet

#### Appendix E- Construction Site Environmental Inspection Report (CSEIR)

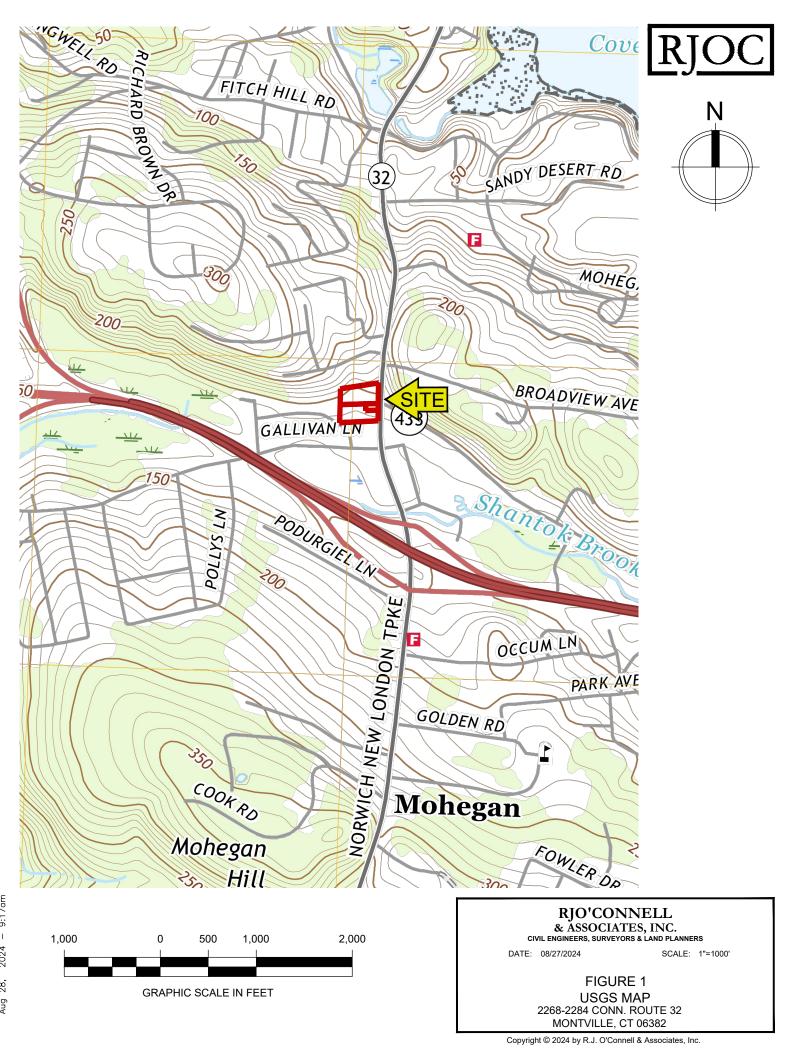
• CSEIR Form

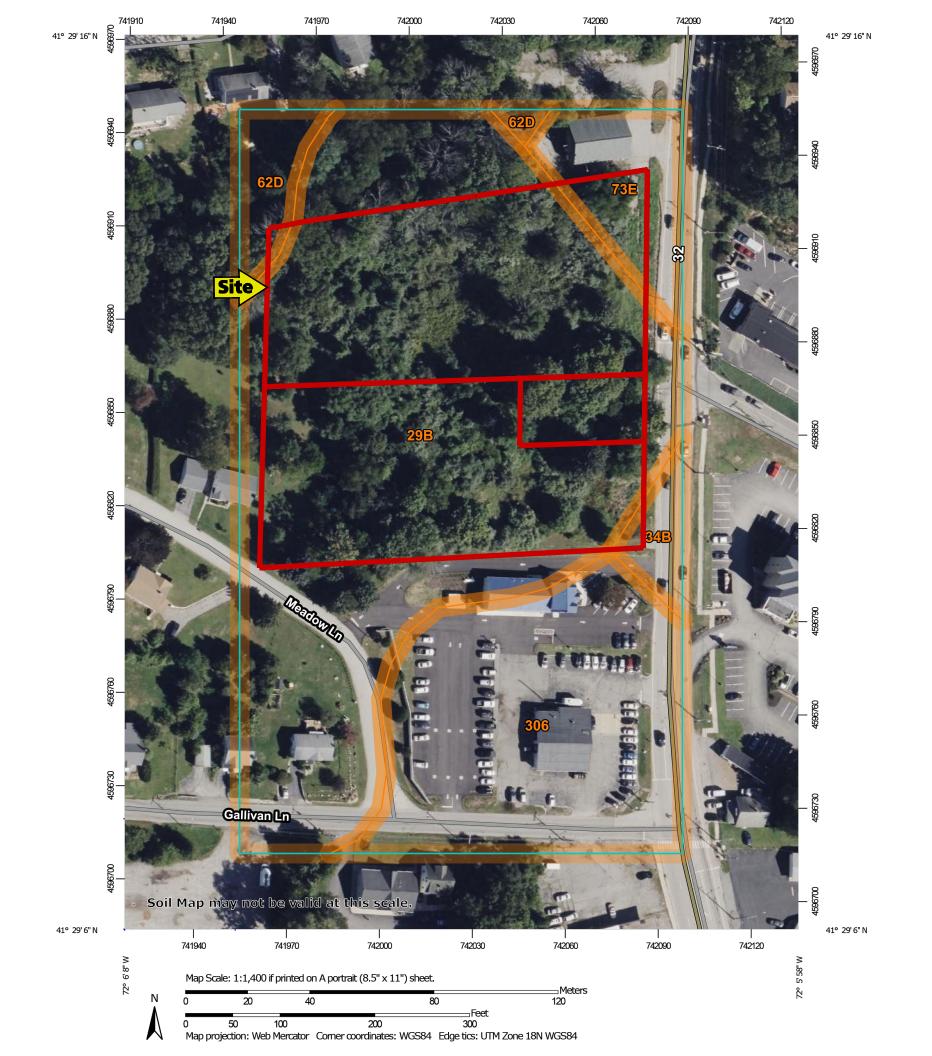
#### Appendix F – Notice of Termination Form

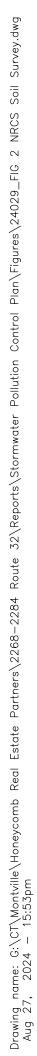
• <u>General Permit for the Discharge of Stormwater & Dewatering Wastewaters from</u> <u>Construction Activities – Notice of Termination Form</u>

### **APPENDIX A - FIGURES**

- USGS Map
- Soils Map
- FEMA Flood Insurance Map
- Existing Watershed Plan
- Proposed Watershed Plan
- Natural Diversity Data Base Areas Map Montville, CT

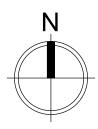




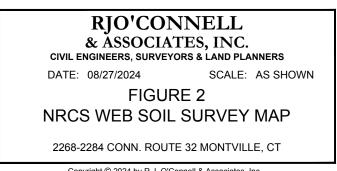


MAP UNI





HYDROLOGIC SOIL GROUP			
IIT SYMBOL	MAP UNIT NAME	RATING	
29B	AGAWAM FINE SANDY LOAM, 3 TO 8 PERCENT SLOPES	В	
34B	MERRIMAC FINE SANDY LOAM, 3 TO 8 PERCENT SLOPES	A	
62D	CANTON AND CHARLTON FINE SANDY LOAMS, 15 TO 35 PERCENT SLOPES, EXTREMELY STONY	В	
73E	CHARLTON-CHATFIELD COMPLEX, 15 TO 45 PERCENT SLOPES, VERY ROCKY	В	
306	UDORTHENTS-URBAN LAND COMPLEX	B (UDORTHENTS) D (URBAN)	



Copyright © 2024 by R.J. O'Connell & Associates, Inc.